KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
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Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts
and New York

October 1, 2021

Via Electronic Mail

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

Re: **Notice of Exempt Modification – Facility Modification**
900 Old Town Road (a/k/a Rocky Hill Road), Trumbull, Connecticut

Dear Attorney Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains an existing wireless telecommunications facility on an electric transmission line tower near the above-referenced property address (the "Property"). The facility consists of antennas and remote radio heads attached to the transmission line tower and related equipment on the ground, near the base of the tower. Cellco's shared use of the transmission line tower was approved by sub-petition on July 5, 2016 (PE1133-VER-21060603). A copy of Siting Council's PE1133-VER-20160603 approval is included in Attachment 1.

Cellco now intends to modify its facility by removing three (3) existing antennas and installing three (3) new Samsung MT6407-77A antennas; and three (3) NNH4-65B-R6 antennas. Cellco will also remove six (6) existing remote radio heads ("RRHs") and install six (6) new RRHs all on Cellco's existing antenna mounting devices. A set of project plans showing Cellco's proposed facility modifications and new antennas and RRHs specifications are included in Attachment 2.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Trumbull's Chief Elected Official and Land Use Officer.

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

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

2. The proposed modifications will not involve any change to ground-mounted equipment and, therefore, will not require the extension of the site boundary.

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

4. The installation of Cellco's new antennas and RRHs will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative general power density table for Cellco's modified facility is included in Attachment 3. The modified facility will be capable of providing Cellco's 5G wireless service.

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

6. According to the attached Structural Analysis ("SA") and Antenna Mount Analysis ("MA"), the existing tower, tower foundation and antenna masts can support Cellco's proposed modifications. Copies of the SA and MA are included in Attachment 4.

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

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

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:

Vicki A. Tesoro, Trumbull First Selectman
Roberto Librandi, Trumbull Land Use Planner
Royce At Trumbull LLC and The Royce at Trumbull LLC, Property Owner
Aleksey Tyurin

ATTACHMENT 1

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

July 5, 2016

Kenneth C. Baldwin, Esq.
Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103-3597

RE: **PE1133-VER-20160603** – Cellco Partnership d/b/a Verizon Wireless sub-petition for a declaratory ruling for approval of an eligible facility request for modifications to an existing telecommunications facility located at 900 Old Town Road (a/k/a Rocky Hill Road), Trumbull, Connecticut.

Dear Attorney Baldwin:

The Connecticut Siting Council (Council) hereby approves your Eligible Facilities Request (EFR) to install antennas and associated equipment at the above-referenced facility pursuant to the Federal Communications Commission Wireless Infrastructure Report and Order, with the following conditions:

1. A fence shall not be placed around Verizon's equipment unless ordered by the Town of Trumbull;
2. Within 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;
3. Any nonfunctioning antenna and associated antenna mounting equipment on this facility owned and operated by the Petitioner shall be removed within 60 days of the date the antenna ceased to function;
4. The validity of this action shall expire one year from the date of this letter; and
5. The Petitioner may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration.

This decision is under the exclusive jurisdiction of the Council and is not applicable to any other modification or construction. All work is to be implemented as specified in the EFR dated June 2, 2016.

Thank you for your attention and cooperation.

Very truly yours,

Melanie Bachman
Acting Executive Director

MB/CW

c: Honorable Timothy M. Herbst, First Selectman, Town of Trumbull
Rob Librandi, Land Use Planner, Town of Trumbull
Douglas Wenz, Zoning Enforcement Officer, Town of Trumbull

S:\PETITIONS\1101-1200\1133\3_Subpetitions_ByTown\Trumbull\P1133-ver-20160603-dcltr-oldtownroad-trumbull.docx

ATTACHMENT 2

verizon✓

WIRELESS COMMUNICATIONS FACILITY UPGRADE

TRUMBULL 4 CT
900 OLD TOWN RD.
EVERSOURCE STRUCTURE #845
TRUMBULL, CT 06611

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2015 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2018 CONNECTICUT SUPPLEMENT, INCLUDING THE TIA/EIA-222 REVISION "G" STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES, 2017 CONNECTICUT FIRE SAFETY CODE, NATIONAL ELECTRICAL CODE, AND LOCAL CODES.
2. SHOULD ANY FIELD CONDITIONS PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL NOT PROCEED WITH ANY AFFECTED WORK.
3. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
4. CONTRACTOR SHALL PROVIDE A COMPLETE BUILD-OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.
5. CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
6. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION, AND ALL TRADES AS APPLICABLE. PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
7. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN 'AS-BUILT' SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
8. LOCATION OF EQUIPMENT, AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.
9. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY. MAINTAIN EXISTING BUILDING'S/PROPERTY'S OPERATIONS, COORDINATE WORK WITH BUILDING/PROPERTY OWNER.
10. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
11. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
12. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MFR.'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
13. ANY AND ALL ERRORS, DISCREPANCIES, AND 'MISSED" ITEMS ARE TO BE BROUGHT TO THE ATTENTION OF THE VERIZON WIRELESS CONSTRUCTION MANAGER DURING THE BIDDING PROCESS BY THE CONTRACTOR. ALL THESE ITEMS ARE TO BE INCLUDED IN THE BID. NO 'EXTRA' WILL BE ALLOWED FOR MISSED ITEMS.
14. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
15. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE CONSTRUCTION MANAGER FOR REVIEW.
16. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
17. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUIT AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
18. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUB-CONTRACTORS FOR ANY CONDITION PER THE MANUFACTURER'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
19. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
20. THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG" AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS AT 1-800-922-4455. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED PRIOR TO ANY EXCAVATION WORK. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.

SITE DIRECTIONS

FROM: 20 ALEXANDER DRIVE
WALLINGFORD, CONNECTICUT

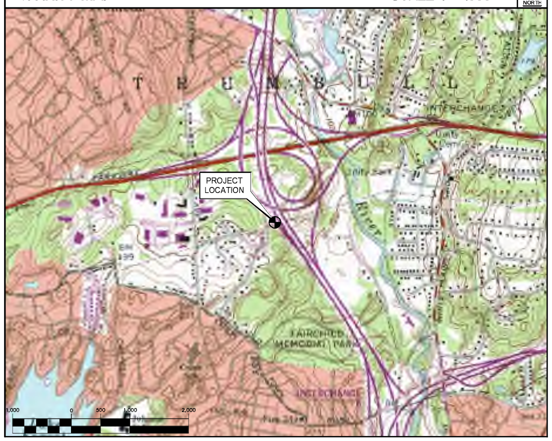
TO: 900 OLD TOWN RD. STRUCTURE #845
TRUMBULL, CT 06611

1.	HEAD NORTH ON ALEXANDER DR. TOWARDS BARNES INDUSTRIAL RD;	0.18 MI
2.	TURN RIGHT ONTO BARNES INDUSTRIAL RD;	0.11 MI
3.	TAKE FIRST LEFT ONTO CT-68;	0.35 MI
4.	TURN RIGHT ONTO RAMP;	0.17 MI
5.	TURN RIGHT ONTO N COLONY RD/ US-5 N;	0.39 MI
6.	MERGE ONTO CT-15 S VIA THE RAMP ON THE LEFT.	26.50 MI
7.	MERGE ONTO CT-8 S VIA EXIT 52 TOWARD BRIDGEPORT.	1.86 MI
8.	TAKE THE CT-127/WHITE PLAINS ROAD EXIT, EXIT 7.	0.26 MI
9.	TURN SLIGHT LEFT ONTO OLD TOWN RD.	0.58 MI
10.	TURN RIGHT ONTO SYLVAN AVE.	0.03 MI
11.	TAKE THE 1ST LEFT ONTO OLD TOWN RD.	0.42 MI
12.	900 OLD TOWN RD, TRUMBULL, CT 06611-4870, 900 OLD TOWN RD IS ON THE RIGHT.	

VICINITY MAP

SCALE: 1" = 1000'

NORTH



PROJECT SUMMARY

1. THE PROPOSED UPGRADE SCOPE OF WORK AT THE EXISTING UNMANNED TELECOMMUNICATIONS FACILITY GENERALLY INCLUDES THE FOLLOWING:
   A. AT THE EXISTING TOWER MOUNTED ANTENNA SECTORS:
      - INSTALL ADDITIONAL STEEL ANTENNA/RRH SUPPORT MEMBERS/ASSEMBLIES TO THE EXISTING ANTENNA MOUNT SYSTEM TO ACCOMMODATE THE ADDITIONAL PROPOSED ANTENNAS/RRHs, AND FOR COMPLIANCE WITH EVERSOURCE REQUIREMENTS.
      - REMOVE (1) ANTENNA PER SECTOR, TOTAL (3)
      - REMOVE (2) RRH'S PER SECTOR, TOTAL (6)
      - INSTALL (1) SAMSUNG ANTENNA PER SECTOR, TOTAL (3)
      - INSTALL (1) COMMSCOPE ANTENNA PER SECTOR, TOTAL (3)
      - INSTALL (2) SAMSUNG RRH'S PER SECTOR, TOTAL (6)

PROJECT INFORMATION

SITE NAME:	TRUMBULL 4 CT
SITE ADDRESS:	900 OLD TOWN RD., EVERSOURCE STRUCTURE #845 TRUMBULL, CT 06611
LESSEE/TENANT:	CELLCO PARTNERSHIP d.b.a. VERIZON WIRELESS 20 ALEXANDER DRIVE WALLINGFORD, CT 06492
CONTACT PERSON:	WALTER CHARCZNSKI (CONSTRUCTION MANAGER) VERIZON WIRELESS (860) 306-1806
ENGINEER:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD RD. BRANFORD, CT. 06405 (203) 488-0580
PROJECT COORDINATES:	LATITUDE: 41°-13'-53.768"N LONGITUDE: 73°-11'-24.001"W GROUND ELEVATION: 163.11'± AMSL (COORDINATES AND GROUND ELEVATION REFERENCED FROM FAA 2-C SURVEY CERTIFICATION AS PREPARED FOR VERIZON WIRELESS BY CENTEK ENGINEERING, INC. DATED FEBRUARY 23, 2016)

SHEET INDEX

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
D	09/07/21	ASC	DMD	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION
C	05/25/21	ASC	DMD	PRELIMINARY CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
B	03/25/21	ASC	DMD	PRELIMINARY CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
A	03/23/21	ASC	DMD	PRELIMINARY CONSTRUCTION DRAWINGS – ISSUED FOR CLIENT REVIEW

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Cellco Partnership d/b/a Verizon Wireless

TRUMBULL 4 CT
ROCKY HILL RD ASSESSORS:
900 OLD TOWN RD. STRUCTURE #845
TRUMBULL, CT 06611

DATE:	03/23/21
SCALE:	AS NOTED
JOB NO.	20150.03

TITLE SHEET

T-1

NOTES AND SPECIFICATIONS

DESIGN BASIS

1. GOVERNING CODE: 2015 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2018 CT STATE SUPPLEMENT.

2. TIA–222–G, ASCE MANUAL NO. 48–11 – "DESIGN OF STEEL TRANSMISSION POLE STRUCTURES SECOND EDITION", NESC C2–2007 AND NORTHEAST UTILITIES DESIGN CRITERIA.

3. DESIGN CRITERIA

   WIND LOAD: (ANTENNA MAST)
   NOMINAL DESIGN WIND SPEED (V) = 97 MPH (2018 CSBC: APPENDIX 'N')

   WIND LOAD: (UTILITY POLE & FOUNDATION)
   BASIC WIND SPEED (V) =110 MPH (3–SECOND GUST) BASED ON NESC C2–2007, SECTION 25 RULE 250C.

GENERAL NOTES:

1. ALL CONSTRUCTION SHALL BE IN COMPLIANCE WITH THE GOVERNING BUILDING CODE.

2. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.

3. BEFORE BEGINNING THE WORK, THE CONTRACTOR IS RESPONSIBLE FOR MAKING SUCH INVESTIGATIONS CONCERNING PHYSICAL CONDITIONS (SURFACE AND SUBSURFACE) AT OR CONTIGUOUS TO THE SITE WHICH MAY AFFECT PERFORMANCE AND COST OF THE WORK.

4. DIMENSIONS AND DETAILS SHALL BE CHECKED AGAINST EXISTING FIELD CONDITIONS.

5. THE CONTRACTOR SHALL VERIFY AND COORDINATE THE SIZE AND LOCATION OF ALL OPENINGS, SLEEVES AND ANCHOR BOLTS AS REQUIRED BY ALL TRADES.

6. ALL DIMENSIONS, ELEVATIONS, AND OTHER REFERENCES TO EXISTING STRUCTURES, SURFACE, AND SUBSURFACE CONDITIONS ARE APPROXIMATE. NO GUARANTEE IS MADE FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN. THE CONTRACTOR SHALL VERIFY AND COORDINATE ALL DIMENSIONS, ELEVATIONS, ANGLES WITH EXISTING CONDITIONS AND WITH ARCHITECTURAL AND SITE DRAWINGS BEFORE PROCEEDING WITH ANY WORK.

7. AS THE WORK PROGRESSES, THE CONTRACTOR SHALL NOTIFY THE OWNER OF ANY CONDITIONS WHICH ARE IN CONFLICT OR OTHERWISE NOT CONSISTENT WITH THE CONSTRUCTION DOCUMENTS AND SHALL NOT PROCEED WITH SUCH WORK UNTIL THE CONFLICT IS SATISFACTORILY RESOLVED.

8. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE SAFETY CODES AND REGULATIONS DURING ALL PHASES OF CONSTRUCTION. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING AND MAINTAINING ADEQUATE SHORING, BRACING, AND BARRICADES AS MAY BE REQUIRED FOR THE PROTECTION OF EXISTING PROPERTY, CONSTRUCTION WORKERS, AND FOR PUBLIC SAFETY.

9. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY. MAINTAIN EXISTING SITE OPERATIONS, COORDINATE WORK WITH NORTHEAST UTILITIES

10. 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.

11. REFER TO DRAWING T1 FOR ADDITIONAL NOTES AND REQUIREMENTS.

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D	09/07/21	ASC	DMD	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION
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Cellco Partnership d/b/a Verizon Wireless

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DATE: 03/23/21
SCALE: AS NOTED
JOB NO. 20150.03

NOTES AND SPECIFICATIONS

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Sheet No. 2 of 7

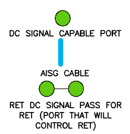
PLUMBING DIAGRAM NOTES:

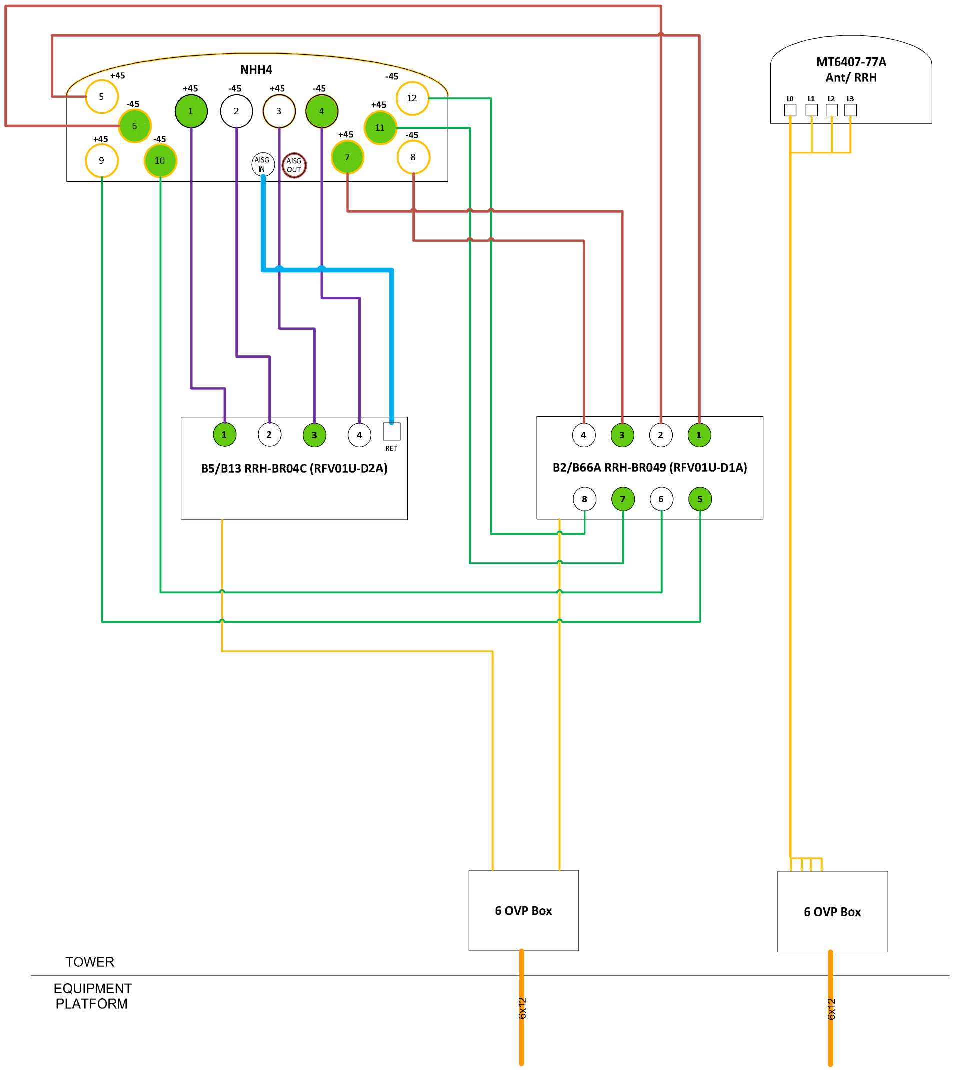
1. PORTS 1 & 2 ARE FOR LOW BAND (698–896 MHz).
2. PORTS 3, 4, 5 & 5 ARE FOR HIGH BAND (1695–2360 MHz).
3. SMART BIAS TEE (SBT) IS THROUGH ANTENNA PORTS 1 & 3 (1 FOR LOW BAND AND 3 FOR HIGH BAND).
4. AISG CABLE IS ONLY NEEDED WHEN DRAWN IN THE DIAGRAMS ABOVE. IF IT IS NOT DRAWN THEN SBT IS ENOUGH TO CONTROL ALL RET MOTORS.
5. NOT ALL SBT PORTS ARE NEEDED TO CONTROL RET. ONLY GREEN PORT CONNECTION TO GREEN PORT WILL CONTROL RET.

RET DC SIGNAL PASS FOR RET
(PORT THAT WILL CONTROL RET)

PLUMBING DIAGRAM COMMENTS:

A. DIAGRAMS SHOW ANTENNA PORT CONFIGURATIONS AS VIEWED FROM BELOW ANTENNAS.
B. ANTENNA POSITIONS ARE INDICATED AS VIEWED FROM IN FRONT OF ANTENNAS.
C. CAP AND WEATHERPROOF UNUSED ANTENNA PORTS.
D. ALL PLUMBING DIAGRAM COLORS ARE IRRELEVANT EXCEPT FOR AISG AND HYBRIFLEX CABLE. (FOR THE COAX COLORS, FOLLOW COAX COLORS GUIDE ABOVE)





NOTES:

1. INFORMATION SHOWN HEREIN IS FOR USE BY VERIZON WIRELESS EQUIPMENT OPERATIONS.
2. THIS B.OM. DRAWING IS BASED ON FACILITY UPGRADE DESIGN DRAWINGS PREPARED BY CENTEK ENGINEERING (REV.0 DATED: 09.07.21), & VERIZON WIRELESS RF ANTENNA EQUIPMENT RECOMMENDATION (DATED 05.25.21).

BILL OF MATERIALS		
TECHNOLOGY	QUANTITY	ANTENNA
LTE 700	3	COMMSCOPE ANTENNA MODEL: NNH4–65B–R6
LTE 850		
LTE PCS 1900		
LTE AWS 2100		
5G	3	SAMSUNG ANTENNA MODEL: MT6407–77A

CABLES	QUANTITY	LENGTH	COMMENTS
–	–	–	–

RADIOS	QUANTITY	COMMENTS
LTE 700	3	SAMSUNG MODEL: B5/B13 RRH–BR04C
LTE 850		
LTE PCS 1900	3	SAMSUNG MODEL: B2/B66A RRH–BR049
LTE AWS 2100		
5G	3	INTEGRATED INTO MT6407–77A ANTENNA

DIPLEXERS	QUANTITY	COMMENTS
FOR LTE 700 ANTENNA	–	–
FOR LTE 850 ANTENNA		

OVP BOXES	QUANTITY	COMMENTS
OVP	–	–

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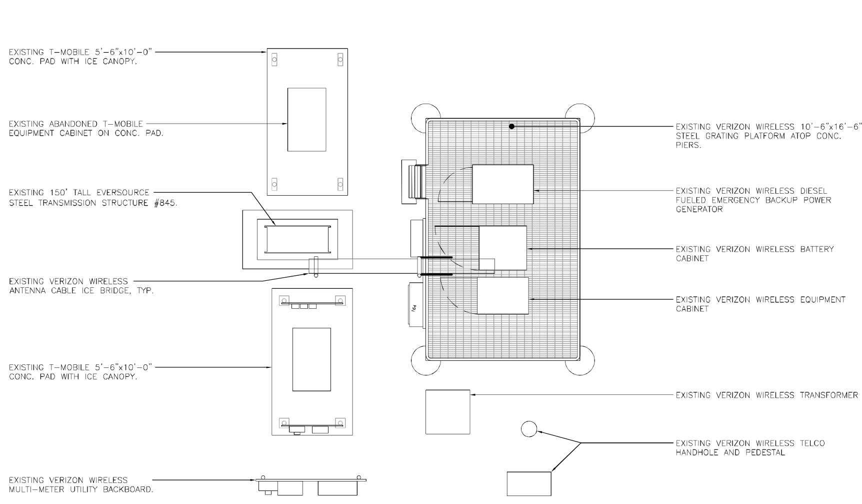
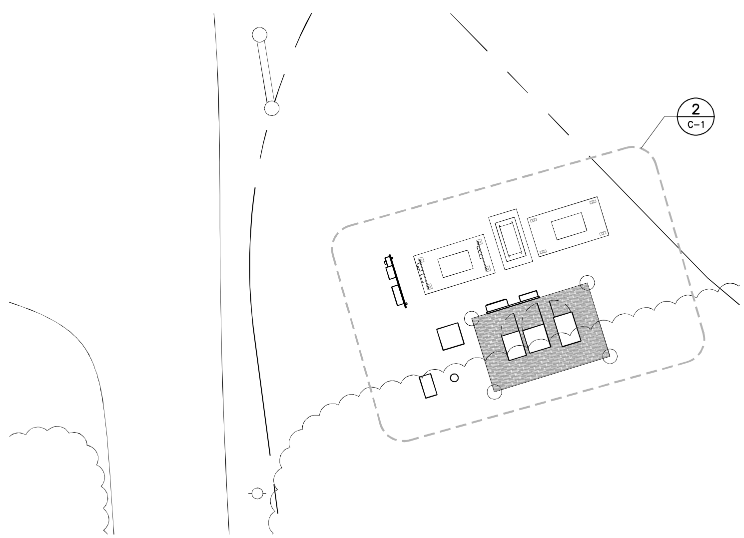
RF BILL OF MATERIALS

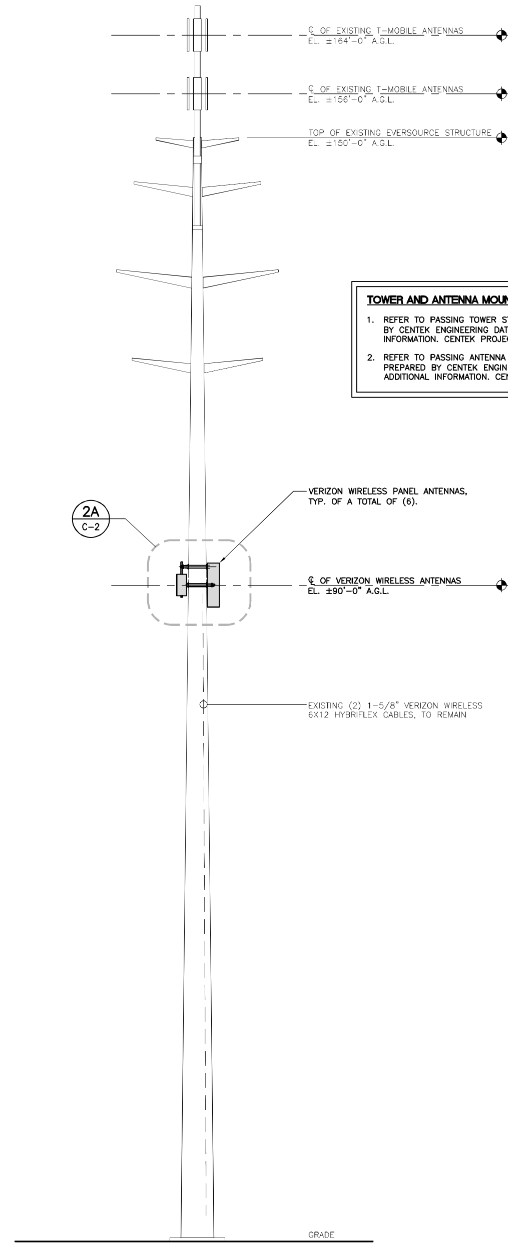
B-1



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



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



TOWER AND ANTENNA MOUNT ANALYSIS REFERENCE NOTES:

1. REFER TO PASSING TOWER STRUCTURAL ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING DATED 08/16/2021. FOR ADDITIONAL INFORMATION. CENTEK PROJECT NO. 20150.03
2. REFER TO PASSING ANTENNA MOUNT STRUCTURAL ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING DATED 03/23/2021 FOR ADDITIONAL INFORMATION. CENTEK PROJECT NO. 20150.03

3 C-1 **TOWER ELEVATION - PROPOSED CONDITIONS**
SCALE: 1/8" = 1'- 0"

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verizon

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ROCKY HILL RD ASSESSORS:
900 OLD TOWN RD. STRUCTURE #845
TRUMBULL, CT 06611

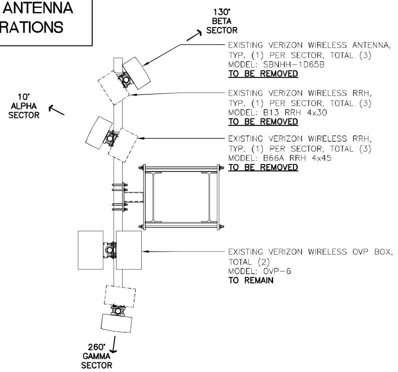
DATE: 03/23/21
SCALE: AS NOTED
JOB NO. 20150.03

PARTIAL SITE PLANS AND TOWER ELEVATION

C-1

Sheet No. 4 of 7

EXISTING ANTENNA CONFIGURATIONS



1 C-2 **EXISTING SECTOR CONFIGURATION PLAN**
SCALE: 1/2" = 1'-0"

APPROXIMATE NORTH

ANTENNA MOUNT ANALYSIS REFERENCE NOTE:

REFER TO PASSING ANTENNA MOUNT STRUCTURAL ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING DATED 03/23/2021 FOR ADDITIONAL INFORMATION. CENTEK PROJECT NO. 20150.03

ANTENNA FRONT

SECTOR ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: SAMSUNG MODEL: MT6407-77A	35.1"H x 16.1"W x 5.5"D (NOT TO EXCEED)	87 LBS. (NOT TO EXCEED)

CLEARANCES AND SERVICE AREA			
TOP:	31.5"	HORIZONTAL DISTANCE: (ANT. TO ANT.)	31.5"
FRONT, SIDES & BOTTOM:	15.7"	VERTICAL DISTANCE: (ANT. TO ANT.)	63.0"

NOTES:
1. THIS ANTENNA HAS ITS OWN BUILT-IN RRH.

3 C-2 **SECTOR ANTENNA DETAIL**
NOT TO SCALE

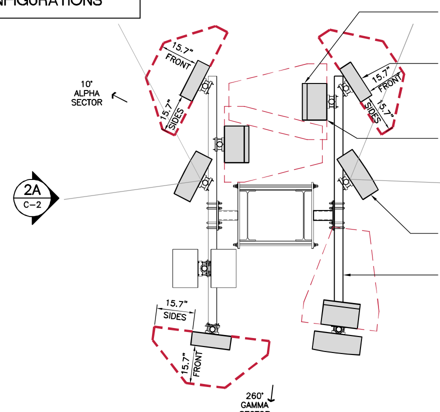
FRONT ELEVATION

BOTTOM

8-PORT SECTOR ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: COMMSCOPE MODEL: NNH4-65B-R6	72.0"L x 11.9"W x 7.8"D	83.1 LBS. (W/OUT MOUNT KIT)

4 C-2 **SECTOR ANTENNA DETAIL**
NOT TO SCALE

PROPOSED ANTENNA CONFIGURATIONS



2 C-2 **PROPOSED SECTOR CONFIGURATION PLAN**
SCALE: 1/2" = 1'-0"

APPROXIMATE NORTH

DUAL BAND RRU (REMOTE RADIO UNIT)			
EQUIPMENT	BANDS	DIMENSIONS	WEIGHT
MAKE: SAMSUNG MODEL: B2/B66A RRH-BR049 (RFV01U-D1A)	B2: PCS (1900 MHz) B66: AWS (2100 MHz)	15.0"H x 15.0"W x 10.0"D	84.4 LBS.

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH VERIZON WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.

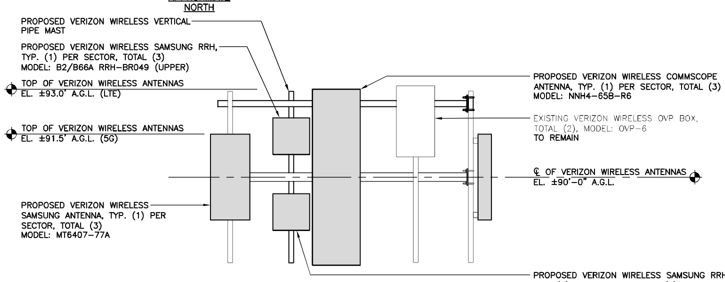
5 C-2 **DUAL-BAND AWS/PCS RADIO UNIT DETAIL**
NOT TO SCALE

DUAL BAND RRU (REMOTE RADIO UNIT)			
EQUIPMENT	BANDS	DIMENSIONS	WEIGHT
MAKE: SAMSUNG MODEL: B5/B13 RRH-BR04C (RFV01U-D2A)	B5: 850 MHz B13: 700 MHz	15.0"H x 15.0"W x 8.1"D	70.3 LBS.

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH VERIZON WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.

6 C-2 **DUAL-BAND 700/850 MHZ RADIO UNIT DETAIL**
NOT TO SCALE

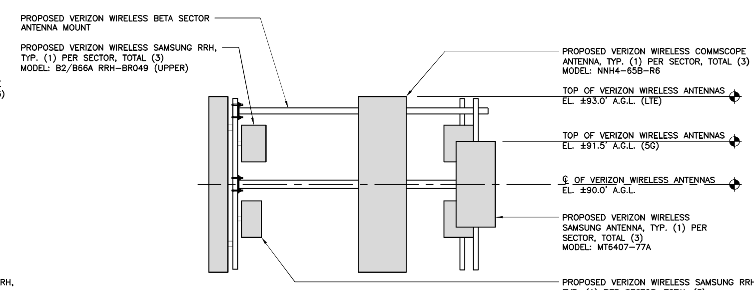
LEGEND		
- - - (red, bold)	VERIZON WIRELESS MT6407-77A REQUIRED ANTENNA CLEARANCE LIMITS (PER DETAILS ON SHEET C-2)	
ANTENNA CLEARANCE STATUS	ALPHA SECTOR:	COMPLIANT
	BETA SECTOR:	COMPLIANT
	GAMMA SECTOR:	COMPLIANT
- - - (red, thin)	VERIZON WIRELESS RRU REQUIRED ANTENNA CLEARANCE LIMITS (PER DETAILS ON SHEET C-2)	
RRU CLEARANCE STATUS	ALPHA SECTOR:	COMPLIANT
	BETA SECTOR:	COMPLIANT
	GAMMA SECTOR:	COMPLIANT



ALPHA SECTOR SHOWN

FRONT OF ANTENNA ELEVATION PERSPECTIVE

2A C-2 **PROPOSED SECTOR CONFIGURATION ELEVATION**
SCALE: 1/2" = 1'-0"



BETA SECTOR SHOWN

FRONT OF ANTENNA ELEVATION PERSPECTIVE

2B C-2 **PROPOSED SECTOR CONFIGURATION ELEVATION**
SCALE: 1/2" = 1'-0"

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	09/07/21	ASC	DMD	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION
C	05/25/21	ASC	DMD	PRELIMINARY CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
B	03/25/21	ASC	DMD	PRELIMINARY CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
A	03/23/21	ASC	DMD	PRELIMINARY CONSTRUCTION DRAWINGS – ISSUED FOR CLIENT REVIEW

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Cellco Partnership d/b/a Verizon Wireless

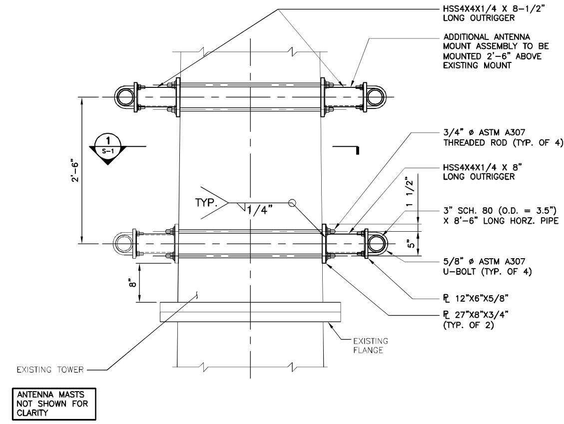
TRUMBULL 4 CT
ROCKY HILL RD ASSESSORS-
900 OLD TOWN RD. STRUCTURE #845
TRUMBULL, CT 06611

DATE: 03/23/21
SCALE: AS NOTED
JOB NO. 20150.03

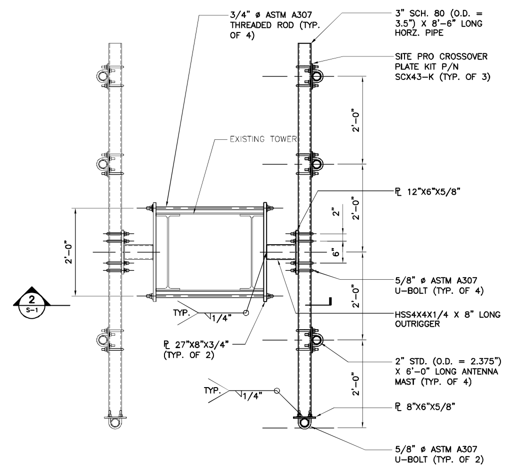
ANTENNA CONFIGURATION AND RF DETAILS

C-2

Sheet No. 5 of 7



2 / S-1 CONNECTION DETAIL (ELEVATION)
SCALE: 1" = 1'-0"



1 / S-1 ANTENNA MAST DETAIL (PLAN)
SCALE: 3/4" = 1'-0"

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
D	09/07/21	ASC	DMD	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION
C	05/25/21	ASC	DMD	PRELIMINARY CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
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A	03/23/21	ASC	DMD	PRELIMINARY CONSTRUCTION DRAWINGS – ISSUED FOR CLIENT REVIEW

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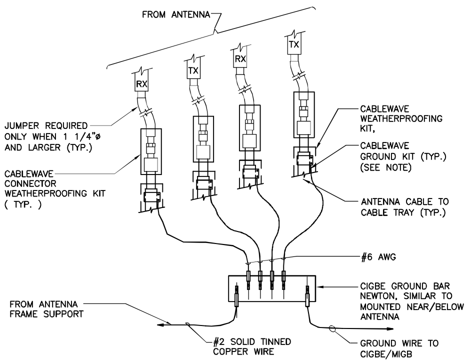
TRUMBULL 4 CT
ROCKY HILL RD ASSESSORS:
900 OLD TOWN RD. STRUCTURE #845
TRUMBULL, CT 06611

DATE: 03/23/21
SCALE: AS NOTED
JOB NO. 20150.03

ANTENNA MOUNT DETAILS

S-1

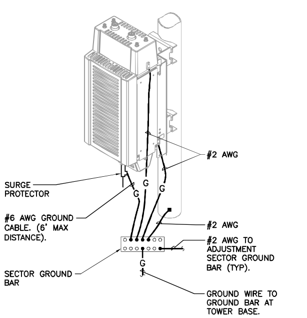


NOTES:

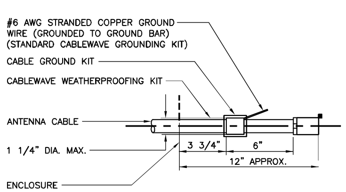
1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE

1 (E-1) CONNECTION OF GROUND WIRES TO GROUND BAR
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.



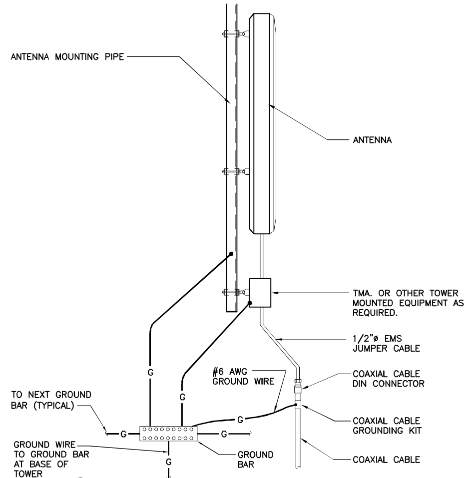
2 (E-1) RRH POLE MOUNT GROUNDING
NOT TO SCALE



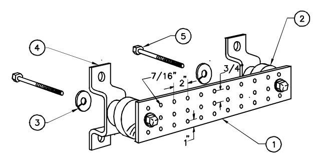
NOTES:

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

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



4 (E-1) TYPICAL ANTENNA GROUNDING DETAIL
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.

5 (E-1) GROUND BAR DETAIL
NOT TO SCALE

ELECTRICAL SPECIFICATIONS

SECTION 16010

1.01. SCOPE OF WORK

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

1. CELLULAR GROUNDING SYSTEMS CONSISTING OF ANTENNA GROUNDING, GROUND BARS, ETC.

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 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. 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 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. 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.

D. CELLULAR GROUNDING SYSTEM:

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

1. GROUND BARS
2. ANTENNA GROUND CONNECTIONS AND PLATES.

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

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ELECTRICAL SPECIFICATIONS AND DETAILS

E-1

Sheet No. 7 of 7

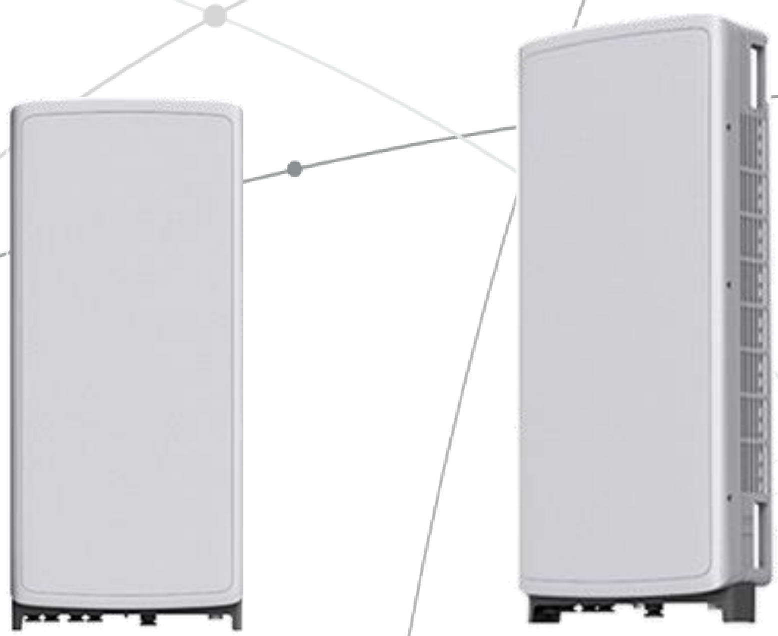
SAMSUNG

SAMSUNG C-Band 64T64R Massive MIMO Radio

for High Capacity and Wide Coverage

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

Model Code : MT6407-77A



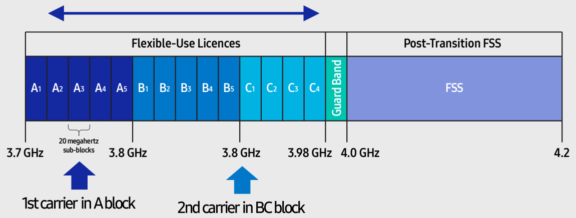
Points of Differentiation

Wide Bandwidth

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

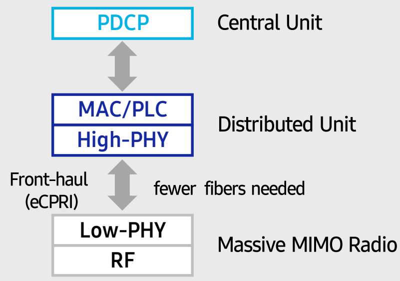
Samsung C-Band massive MIMO Radio covers the entire C-Band 280 MHz spectrum, so it can meet the operator's needs in current A block and future B/C blocks

C-Band spectrum supported by Massive MIMO Radio



Future Proof Product

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



Enhanced Performance

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

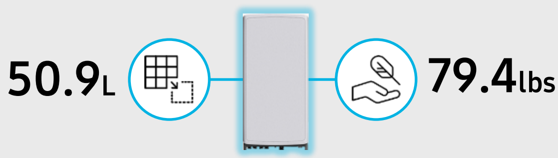
This helps operators reduce their CAPEX as they now need less products to cover the same area than before.

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

Well Matched Design

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

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



Technical Specifications

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

About Samsung Electronics Co., Ltd.

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

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

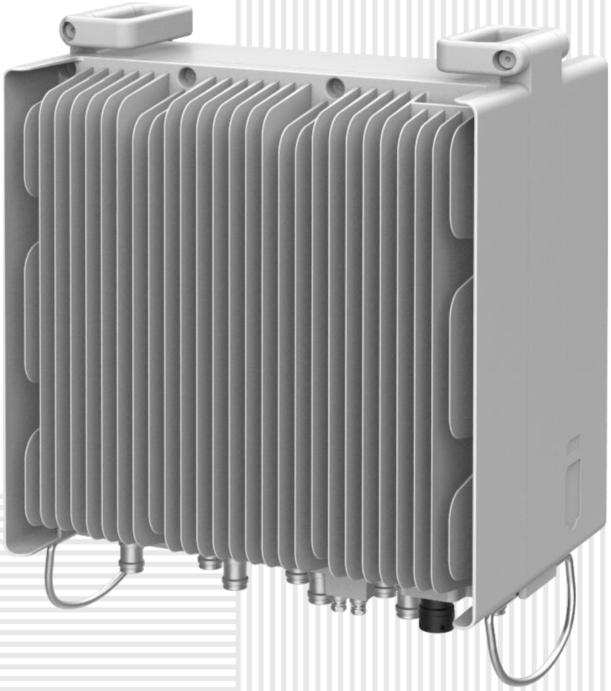
SAMSUNG

AWS/PCS MACRO RADIO

DUAL-BAND AND HIGH POWER FOR MACRO COVERAGE

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

Model Code	RF4439d-25A



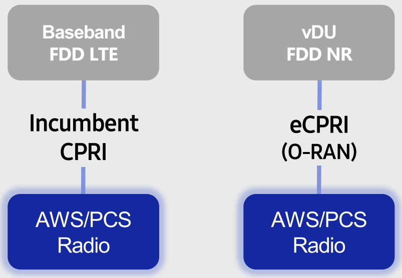
Homepage
samsungnetworks.com

Youtube
www.youtube.com/samsung5g

Points of Differentiation

Continuous Migration

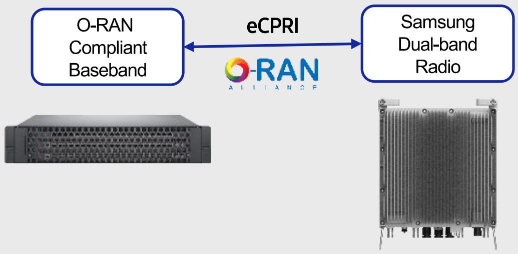
Samsung's AWS/PCS macro radio can support each incumbent CPRI interface as well as advanced eCPRI interfaces. This feature provides installable options for both legacy LTE networks and added NR networks.



O-RAN Compliant

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

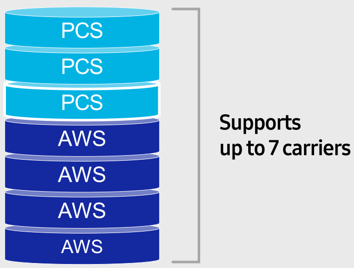
Samsung's state-of-the-art O-RAN technology will help accelerate the effort toward constructing a solid O-RAN ecosystem.



Optimum Spectrum Utilization

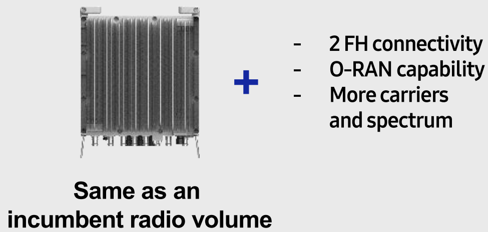
The number of required carriers varies according to site (region). Supporting many carriers is essential for using all frequencies that the operator has available.

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



Brand New Features in a Compact Size

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



Technical Specifications

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

SAMSUNG

700/850MHZ MACRO RADIO

DUAL-BAND AND HIGH POWER FOR MACRO COVERAGE

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

Model Code	RF4440d-13A

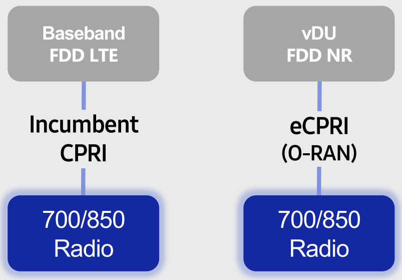
Homepage
samsungnetworks.com

Youtube
www.youtube.com/samsung5g

Points of Differentiation

Continuous Migration

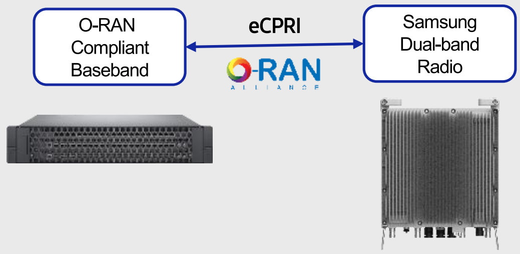
Samsung's 700/850MHz macro radio can support each incumbent CPRI interface as well as an advanced eCPRI interface. This feature provides installable options for both legacy LTE networks and added NR networks.



O-RAN Compliant

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

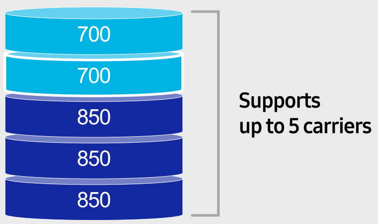
Samsung's state-of-the-art O-RAN technology will help accelerate the effort toward constructing a solid O-RAN ecosystem.



Optimum Spectrum Utilization

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

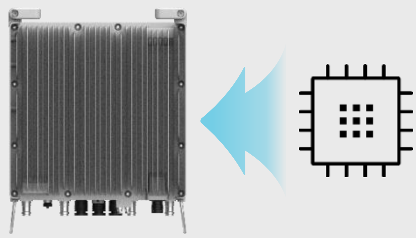
The new 700/850MHz dual-band radio can support up to 2 carriers in the B13 (700MHz) band and 3 carriers in the B5 (850MHz) band, respectively.



Secured Integrity

Access to sensitive data is allowed only to authorized software.

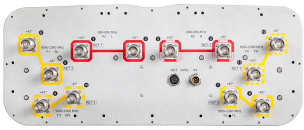
The Samsung radio's CPU can protect root of trust, which is credential information to verify SW integrity, and secure storage provides access control to sensitive data by using dedicated hardware (TPM).



Technical Specifications

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

NNH4-65B-R6



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

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

General Specifications

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

Remote Electrical Tilt (RET) Information

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

COMMSCOPE®

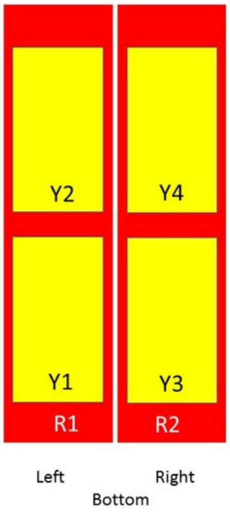
NNH4-65B-R6

Protocol	3GPP/AISG 2.0 (Multi-RET)

Dimensions

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

Array Layout

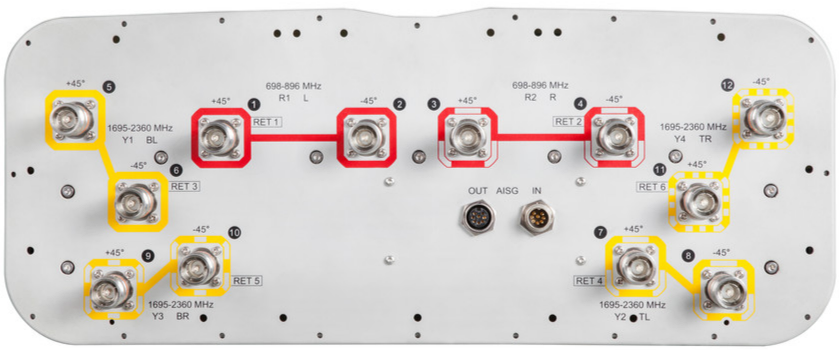


Array	Freq (MHz)	Conns	RET (SRET)	AISG RET UID
R1	698-896	1-2	1	CPxxxxxxxxxxxxxxxxmm.1
R2	698-896	3-4	2	CPxxxxxxxxxxxxxxxxmm.2
Y1	1695-2360	5-6	3	CPxxxxxxxxxxxxxxxxmm.3
Y2	1695-2360	7-8	4	CPxxxxxxxxxxxxxxxxmm.4
Y3	1695-2360	9-10	5	CPxxxxxxxxxxxxxxxxmm.5
Y4	1695-2360	11-12	6	CPxxxxxxxxxxxxxxxxmm.6

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

Port Configuration

NNH4-65B-R6



Electrical Specifications

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

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**	**1695–1880**	**1850–1990**	**1920–2180**	**2300–2360**
Gain, dBi	14.4	15	15.7	16.3	16.5	16.9
Beamwidth, Horizontal, degrees	69	65	58	60	60	58
Beamwidth, Vertical, degrees	12	10.5	11.2	10.4	9.8	8.8
Beam Tilt, degrees	2–14	2–14	2–14	2–14	2–14	2–14
USLS (First Lobe), dB	16	18	18	19	19	17
Front-to-Back Ratio at 180°, dB	28	32	33	38	35	37
Isolation, Cross Polarization, dB	25	25	25	25	25	25
Isolation, Inter-band, dB	25	25	25	25	25	25
VSWR | Return loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0

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

Electrical Specifications, BASTA

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

Mechanical Specifications

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

Packaging and Weights

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

NNH4-65B-R6

Regulatory Compliance/Certifications

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

Included Products

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

* Footnotes

Performance Note Severe environmental conditions may degrade optimum performance

ATTACHMENT 3

	General	Power	Density					
Site Name: Trumbull 4								
Tower Height: Verizon @ 90ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**FREQ.**	**CALC. POWER DENS**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*T-Mobile	1	373	165	1900	0.0053	1.0000	0.05%	
*T-Mobile	2	993	165	1900	0.0283	1.0000	0.28%	
*T-Mobile	2	962	165	2100	0.0274	1.0000	0.27%	
*T-Mobile	2	1443	165	2100	0.0411	1.0000	0.41%	
*T-Mobile	2	593	165	600	0.0169	0.4000	0.42%	
*T-Mobile	2	317	164	700	0.0091	0.4667	0.20%	
VZW 700	**4**	**594**	**90**	**751**	**0.0105**	**0.5007**	**2.11%**	
VZW Cellular	**4**	**684**	**90**	**874**	**0.0121**	**0.5827**	**2.08%**	
VZW PCS	**4**	**958**	**90**	**1980**	**0.0170**	**1.0000**	**1.70%**	
VZW AWS	**4**	**1030**	**90**	**2120**	**0.0183**	**1.0000**	**1.83%**	
VZW CBAND	**4**	**6531**	**90**	**3730.08**	**0.1160**	**1.0000**	**11.60%**	
								20.96%
* Source: Siting Council								

ATTACHMENT 4

CENTEK engineering

Centered on Solutions℠

Structural Analysis

Verizon Site Ref: Trumbull 4

Structure No. 845
150' Electric Transmission Tower

900 Old Town Road
Trumbull, CT

CENTEK Project No. 20150.03

~~Date: March 22, 2021~~
Rev 2: August 16, 2021

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

Prepared for:
Verizon Wireless
20 Alexander Drive
Wallingford, CT 06492

Table of Contents

Introduction

The purpose of this report is to analyze the existing 150' tower located in Trumbull, CT for the proposed antenna and equipment upgrade by Verizon.

The proposed loads consist of the following:

- T-MOBILE (Existing/Reserved):
  Antennas: Three (3) RFS APX16DWV-16DWVS and three (3) RFS APXVAARR24_43 panel antennas mounted on a proposed mast with a RAD center elevation of 160-ft above grade.
  Coax Cables: Twenty-four (24) 1-1/4" ∅ coax cables running on the exterior of the existing tower.
- VERIZON (EXISTING TO REMAIN):
  Appurtenances: Two (2) RFS DB-T1-6Z-8AB-0Z distribution boxes.
  Coax Cables: Two (2) 1-5/8" ∅ fiber cables running on the exterior of the existing tower.
- VERIZON (EXISTING TO REMOVE):
  Antennas: Three (3) Andrew SBNHH-1D65B panel antennas mounted to the tower with a RAD center elevation of ±90-ft above grade level.
  Appurtenances: Three (3) Alcatel-Lucent B13 RRH4x30-LTE remote radio heads and three (3) Alcatel-Lucent RRH4x45/2x90-AWS remote radio heads.
- **VERIZON (PROPOSED):**
  Antennas: Three (3) Commscope NNH4-65B-R6 and three (3) Samsung MT6407-77A panel antennas mounted to the tower with a RAD center elevation of ±90-ft above grade level.
  Appurtenances: Three (3) Samsung B2/B66A and three (3) Samsung B5/B13 remote radio heads.

Primary assumptions used in the analysis

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

A n a l y s i s

Structural analysis of the existing/modified mount was independently completed using the current version of RISA-3D computer program licensed to CENTEK Engineering, Inc.

The modified antenna mount was designed to resist loads prescribed by the TIA-222G standard. Section 5 of this report details these gravity and lateral wind loads. NESC prescribed loads were also applied to the mount in order to obtain reactions needed for analyzing the utility pole structure. These loads are developed in Section 7 of this report. Load cases and combinations used in RISA-3D for TIA-222-G loading and for NESC/Eversource 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. Maximum usage for the pole was calculated considering the additional forces from the mast and associated appurtenances.

D e s i g n   B a s i s

Our analysis was performed in accordance with TIA-222-G, ASCE Manual No. 48-11, "Design of Steel Transmission Pole Structures", NESC C2-2012 and Northeast Utilities Design Criteria.

- UTILITY TOWER ANALYSIS

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

  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…………………………………. 110 mph (1)
  Radial Ice Thickness………………………… 0"

  Note 1: NESC C2-2012, 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 the Eversource Design Criteria Table, TIA-222-G and AISC standards.

  Load cases considered:

  Load Case 1:
  Nominal Wind Speed………………………… 97 mph (2018 CSBC Appendix-N)
  Radial Ice Thickness……………………….. 0"

  Load Case 2:
  Wind Pressure..……………………………. 50 mph wind pressure
  Radial Ice Thickness……………………….. 0.75"

R e s u l t s

- MAST ASSEMBLY

Component	Stress Ratio (percentage of capacity)	Result
2" Std. Pipe	57.6%	**PASS**
8"x3/4" Plate	61.8%	**PASS**
Connection to Tower	30.7%	**PASS**

- UTILITY TOWER

  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 **98.3%** occurs in the utility pole under the **NESC Extreme** loading condition.

  TOWER SECTION:

  The utility structure was found to be within allowable limits.

Tower Section	Stress Ratio (% of capacity)	Result
0' AGL	98.3%	**PASS**

- FOUNDATION AND ANCHORS

The existing foundation consists of a 4-ft x 7.5-ft x 14-ft long reinforced concrete pier and an 18-ft x 22-ft x 2.5-ft thick reinforced concrete pad. The base of the tower is connected to the foundation by means of (26) 2.25”∅, ASTM A615 Grade 60 anchor bolts embedded into the concrete foundation structure.

Subgrade properties were taken from a soil investigation done by DR. Clarence Welti, P.E., P.C. dated July 7, 2009.

BASE REACTIONS:

From analysis of utility tower based on NESC/NU prescribed loads.

Load Case	Shear (kips)	Axial (kips)	Moment (k-ft)
NESC Heavy Wind x-dir	23.0	106.6	3191
NESC Extreme Wind x-dir	41.6	52.0	4845
NESC Heavy Wind z-dir	11.1	106.6	1335
NESC Extreme Wind z-dir	35.5	52.0	3456

Note 1 – 10% increase to be applied to the above tower base reactions for foundation verification per OTRM 051

FLANGE BOLTS / FLANGE PLATE:

The bolts and plate was found to be within allowable limits

Component	Design Limit	Stress Ratio (percent of capacity)	Result
Flange Bolts	Tension	91.9%	**PASS**
Flange Plate	Bending	92.7%	**PASS**

ANCHOR BOLTS / BASE PLATE:

The bolts and plate was found to be within allowable limits.

Component	Design Limit	Stress Ratio (percent of capacity)	Result
Anchor Bolts	Tension	79.6%	**PASS**
Base Plate	Bending	92.3%	**PASS**

FOUNDATION:

The foundation was found to be within allowable limits.

Foundation	Design Limit	Allowable Limit	Proposed Loading (2)	Result
Reinforced Conc. Pad and Pier	Uplift	1.0 FS (1)	2.3 FS (1)	**PASS**

Note 1: FS denotes Factor of Safety
Note 2: 10% increase to PLS base reactions used in foundation analysis per OTRM 051.

Conclusion

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

The analysis is based, in part on the information provided to this office by Eversource and Verizon Wireless. 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

STATE OF CONNECTICUT
TIMOTHY J. LYNN
No. 29336
LICENSED
PROFESSIONAL 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-TOWER

PLS-TOWER is a Microsoft Windows program for the analysis and design of steel latticed towers used in electric power lines or communication facilities. Both self-supporting and guyed towers can be modeled. The program performs design checks of structures under user specified loads. For electric power structures it can also calculate maximum allowable wind and weight spans and interaction diagrams between different ratios of allowable wind and weight spans.

Modeling Features:

- Powerful graphics module (stress usages shown in different colors)
- Graphical selection of joints and members allows graphical editing and checking
- Towers can be shown as lines, wire frames or can be rendered as 3-d polygon surfaces
- Can extract geometry and connectivity information from a DXF CAD drawing
- CAD design drawings, title blocks, drawing borders or photos can be tied to structure model
- XML based post processor interface
- Steel Detailing Neutral File (SDNF) export to link with detailing packages
- Can link directly to line design program PLS-CADD
- Automatic generation of structure files for PLS-CADD
- Databases of steel angles, rounds, bolts, guys, etc.
- Automatic generation of joints and members by symmetries and interpolations
- Automated mast generation (quickly builds model for towers that have regular repeating sections) via graphical copy/paste
- Steel angles and rounds modeled either as truss, beam or tension-only elements
- Guys are easily handled (can be modeled as exact cable elements)

Analysis Features:

- Automatic handling of tension-only members
- Automatic distribution of loads in 2-part suspension insulators (v-strings, horizontal vees, etc.)
- Automatic calculation of tower dead, ice, and wind loads as well as 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
- Minimization of problems caused by unstable joints and mechanisms
- Automatic bandwidth minimization and ability to solve large problems
- Design checks according to (other standards can be added easily):
    - ASCE Standard 10-90

- AS 3995 (Australian Standard 3995)
- BS 8100 (British Standard 8100)
- EN50341-1 (CENELEC, both empirical and analytical methods are available)
- ECCS 1985
- NGT-ECCS
- PN-90/B-03200
- EIA/TIA 222-F
- ANSI/TIA 222-G
- CSA S37-01
- EDF/RTE Resal
- IS 802 (India Standard 802)

Results Features:

- Design summaries printed for each group of members
- 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
- Capability to batch run multiple tower configurations and consolidate the results
- Automated optimum angle member size selection and bolt quantity determination

Tool for interactive angle member sizing and bolt quantity determination.

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

Introduction

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

ANSI Standard TIA-222-G covering the design of telecommunications structures specifies a working strength/allowable stress design approach. This approach applies the loads from extreme weather loading conditions, and designs the structure so that it does not exceed some defined percentage of failure strength (allowable stress).

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

Each standard defines the details of how loads are to be calculated differently. Most of the EVERSOURCE 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 Eversource.

Antenna Mast

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:

ELECTRIC TRANSMISSION TOWER

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 2012 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	Load Case	Attachment A ES Design Criteria	Basic Wind Speed	Pressure	Height Factor	Gust Factor	Load or Stress Factor	Force Coef. - Shape Factor
					Kz	Gh		
Ice Condition		Antenna Mount		(0.75Wi)			TIA, Section 3.1.1.1 disallowed for connection design	
Ice Condition	NESC Heavy	Tower/Pole Analysis with antennas extending above top of Tower/Pole (Yield Stress)						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)						1.6 Flat Surfaces 1.3 Round Surfaces
Ice Condition	NESC Heavy	Conductors:	Conductor Loads Provided by ES					
High Wind Condition		Antenna Mount					TIA, Section 3.1.1.1 disallowed for connection design	
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: *Lines 1714 & 1710, Structure 845*
Date: *10/19/2018*
Engineer: *TG*
Checked by: *JS*
Purpose *Recalculate wire loads.*

1714 Line
Conductor: *1590 Lapwing ACSR, sagged in PLS-CADD*
Shield Wire: *FOCAS 0.738" OPGW, sagged in PLS-CADD*

1710 Line
Conductor: *1590 Lapwing ACSR, sagged in PLS-CADD*
Shield Wire: *7#8 Alumoweld, sagged in PLS-CADD*

NESC 250B

	Vertical	*Transverse*	*Longitudinal*
Conductor	4759	2046	0
Alumoweld	1202	1101	0
OPGW	1973	1475	0

HISTORICAL NESC 250C

	Vertical	*Transverse*	*Longitudinal*
Conductor	2109	2349	0
Alumoweld	329	607	0
OPGW	675	1185	0

ANTENNA UPGRADE

EVERSOURCE STRUCT. NO. 845
VERIZON SITE REF: TRUMBULL 4
900 OLD TOWN ROAD
TRUMBULL, CT 06611

VICINITY MAP

PROJECT SUMMARY

SITE ADDRESS:	900 OLD TOWN ROAD TRUMBULL, CT 06611
PROJECT COORDINATES:	LAT: 41°-13'-53.64"N LON: 73°-11'-24.00"W ELEV:±156' AMSL
EVERSOURCE STRUCT NO:	845
EVERSOURCE CONTACT:	RICH BADON 860.728.4852
VERIZON SITE REF.:	TRUMBULL 4
VERIZON CONTACT:	WALTER CHARCZNSKI 860.306.1806
ANTENNA CL HEIGHT:	90'-0" AGL
ENGINEER OF RECORD:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD ROAD BRANFORD, CT 06405
CENTEK CONTACT:	TIMOTHY LYNN, PE 203-433-7507

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
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TITLE SHEET

SHEET NO.
T-1
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DESIGN BASIS

1. GOVERNING CODE: 2015 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2018 CT STATE SUPPLEMENT.

2. TIA-222-G, ASCE MANUAL NO. 48-11 - "DESIGN OF STEEL TRANSMISSION POLE STRUCTURES SECOND EDITION", NESC C2-2017 AND NORTHEAST UTILITIES DESIGN CRITERIA.

3. DESIGN CRITERIA

   WIND LOAD: (ANTENNA MAST)
   NOMINAL DESIGN WIND SPEED (V) = 97 MPH (2018 CSBC: APPENDIX 'N')

   WIND LOAD: (UTILITY POLE & FOUNDATION)
   BASIC WIND SPEED (V) =110 MPH (3-SECOND GUST) BASED ON NESC C2-2007, SECTION 25 RULE 250C.

GENERAL NOTES

1. REFER TO STRUCTURAL ANALYSIS PREPARED BY CENTEK ENGINEERING, INC., FOR VERIZON DATED 8/16/21.

2. TOWER GEOMETRY AND STRUCTURE MEMBER SIZES WERE OBTAINED FROM THE ORIGINAL TOWER DESIGN DOCUMENTS PREPARED BY THE FINNEY STEEL POLE CO. JOB NO. 1300.8 CIRCA 1971.

3. THE TEMPORARY DETACHMENT AND/OR REPLACEMENT OF TOWER MEMBERS SHALL BE DONE ONE AT A TIME AND SHALL BE CONDUCTED ON DAYS WITH LESS THAN 15 MPH WIND PRESENT. NO MEMBER SHALL BE LEFT DISCONNECTED FOR THE NEXT WORKING DAY.

4. ALL STEEL REINFORCEMENT SHOWN HEREIN APPLIES TO ALL SIDES OF THE TOWER.

5. ALL REPLACEMENT STEEL MEMBERS SHALL BE INSTALLED WITH A325-N BOLTS (SIZE TO MATCH EXISTING). UNLESS OTHERWISE NOTED BELOW.

6. THE TOWER STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER REINFORCEMENTS ARE COMPLETE. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE & SEQUENCE AND TO INSURE THE SAFETY OF THE TOWER STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES PROVIDING AND MAINTAINING ADEQUATE SHORING, BRACING, UNDERPINNING, TEMPORARY ANCHORS, GUYING, BARRICADES, ETC. AS MAY BE REQUIRED FOR THE PROTECTION OF EXISTING PROPERTY, CONSTRUCTION WORKERS, AND FOR PUBLIC SAFETY. MAINTAIN EXISTING SITE OPERATIONS AND COORDINATE WORK WITH TOWER OWNER.

7. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE GOVERNING BUILDING CODE.

8. 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.

9. 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.

10. TOWER REINFORCEMENTS 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.

11. EXISTING COAXIAL CABLES AND ALL ACCESSORIES SHALL BE RELOCATED AS NECESSARY AND REINSTALLED BY THE CONTRACTOR WITHOUT INTERRUPTION IN SERVICE WHERE THEY ARE IN CONFLICT WITH THE TOWER REINFORCEMENT WORK.

12. 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.

13. 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.

14. NO DRILLING WELDING OR TAPING IS PERMITTED ON CL&P OWNED EQUIPMENT.

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DESIGN BASIS AND GENERAL NOTES

SHEET NO.
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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 HSS (RECTANGULAR SHAPES)---ASTM A500 GRADE B, (FY = 46 KSI)
   D. STRUCTURAL HSS (ROUND SHAPES)---ASTM A500 GRADE B, (FY = 42 KSI)
   E. PIPE---ASTM A53 GRADE B (FY = 35 KSI)

3. FASTENER SPECIFICATIONS

   A. CONNECTION BOLTS---ASTM A325-N, UNLESS OTHERWISE SCHEDULED.
   B. U-BOLTS---ASTM A307
   C. ANCHOR RODS---ASTM F1554
   D. WELDING ELECTRODES---ASTM E70XX FOR A36 & A572_GR50 STEELS, ASTM E80XX FOR A572_GR65 STEEL.

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" 9TH EDITION. AT THE COMPLETION OF WELDING, ALL DAMAGE TO GALVANIZED COATING SHALL BE REPAIRED.

13. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.

14. CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.

15. STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE 3/4" DIAMETER MINIMUM AND SHALL HAVE A MINIMUM OF TWO BOLTS, UNLESS OTHERWISE ON THE DRAWINGS.

16. LOCK WASHER ARE NOT PERMITTED FOR A325 BOLTED STEEL ASSEMBLIES.

17. SHOP CONNECTIONS SHALL BE WELDED OR HIGH STRENGTH BOLTED.

18. MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.

19. FABRICATE BEAMS WITH MILL CAMBER UP.

20. 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.

21. 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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SCALE: AS SHOWN
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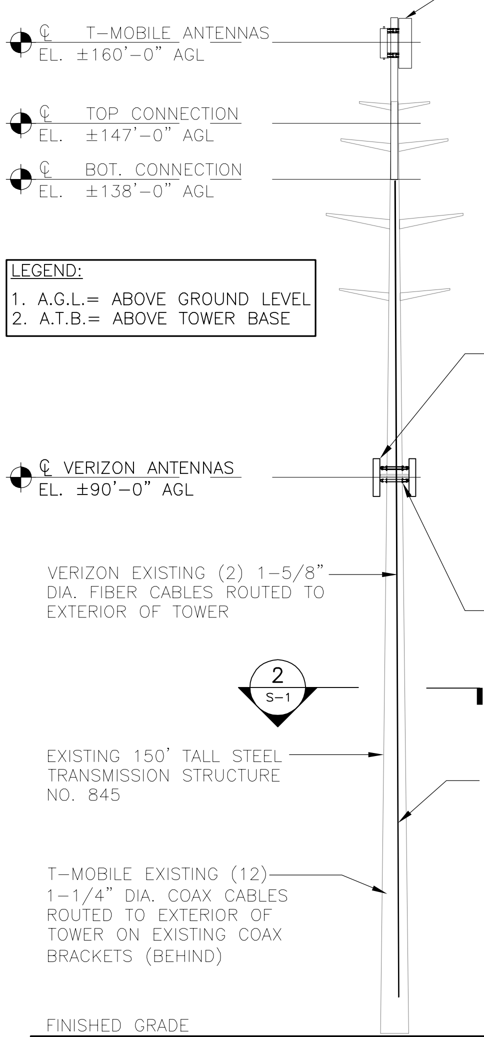
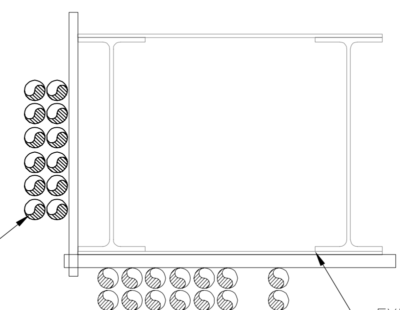
MODIFICATION INSPECTION REQUIREMENTS

SHEET NO. MI-1
Sheet No. 4 of 6



1 S-1 TOWER & ANTENNA MAST ELEVATION

SCALE: NOT TO SCALE



2 S-1 FEEDLINE PLAN

SCALE: 1" = 1'-0"

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	08/16/21	TJL	DMD	REVISED PER COMMENTS
1	07/14/21	TJL	DMD	REVISED PER COMMENTS
0	03/22/21	TJL	DMD	ISSUED FOR EVERSOURCE REVIEW

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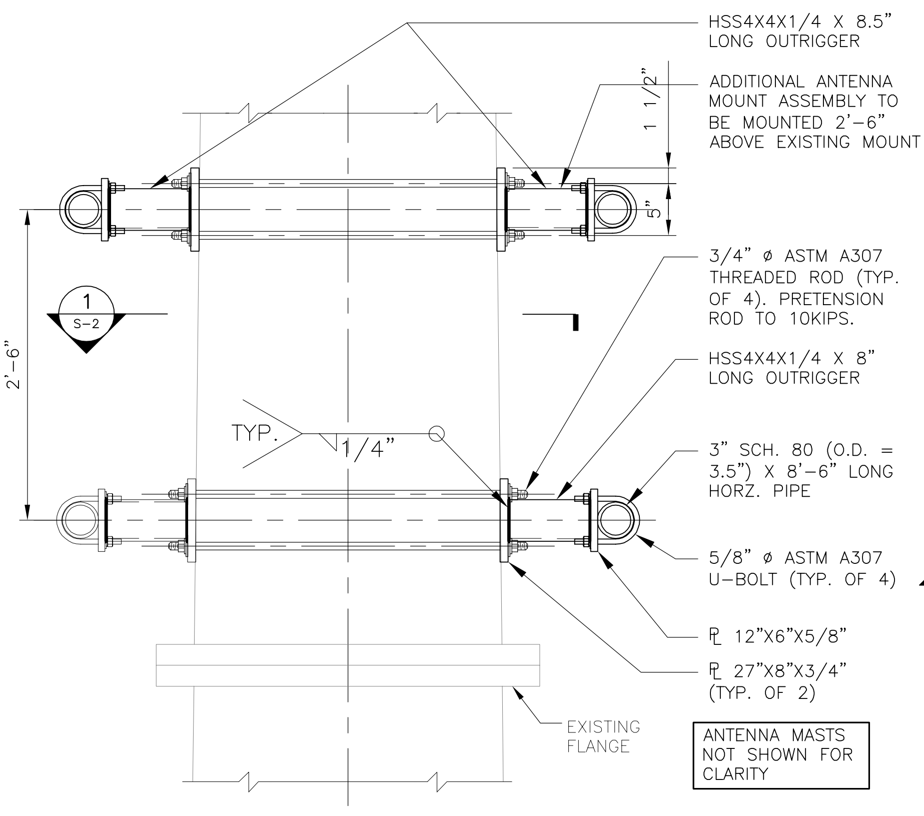
JOB NO. 20150.03

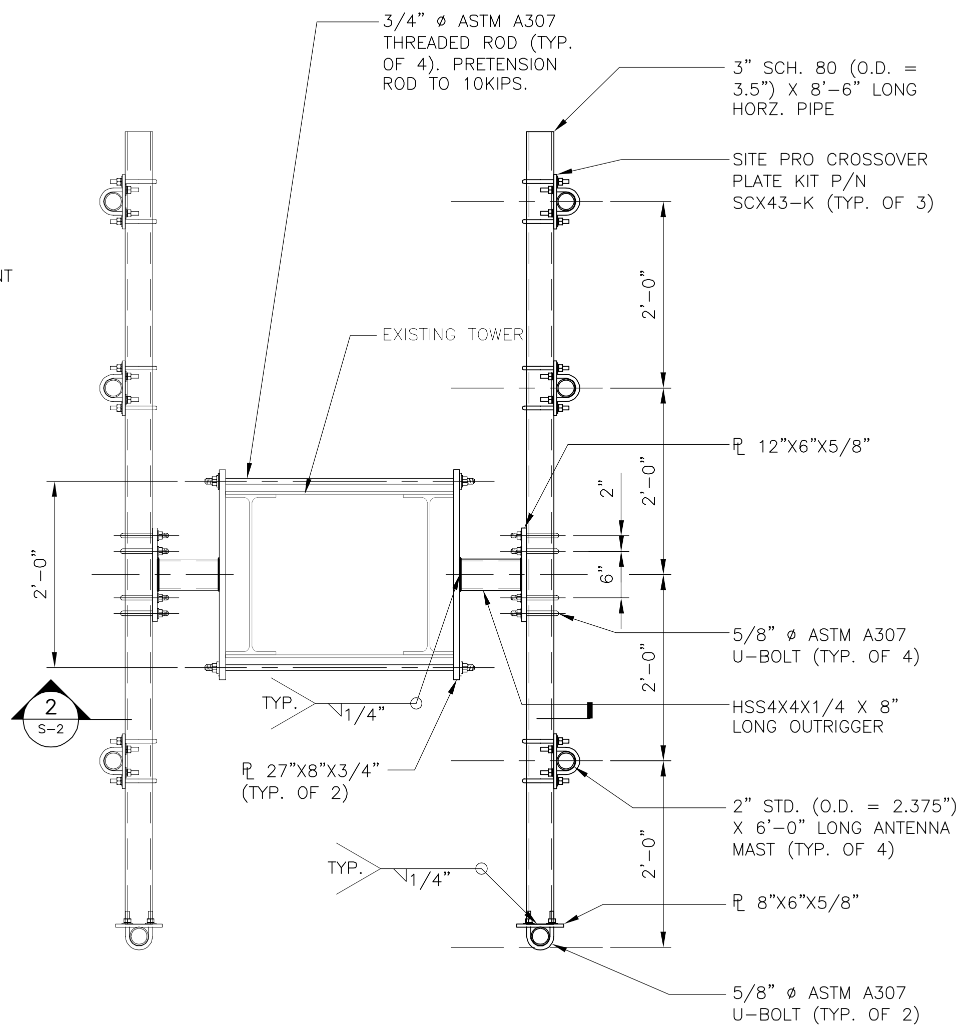
TOWER ELEVATION AND FEEDLINE PLAN

SHEET NO.
S-1
Sheet No. 5 of 8



2 S-2 MOUNT DETAIL (ELEVATION)

SCALE: 1" = 1'-0"



1 S-2 MOUNT DETAIL (PLAN)

SCALE: 3/4" = 1'-0"

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	08/16/21	TJL	DMD	REVISED PER COMMENTS
1	07/14/21	TJL	DMD	REVISED PER COMMENTS
0	03/22/21	TJL	DMD	ISSUED FOR EVERSOURCE REVIEW

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SCALE: AS SHOWN
JOB NO. 20150.03

ANTENNA MOUNT DETAILS

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

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

Wind Speeds

Basic Wind Speed	$V := 97$	mph	(User Input - 2018 CSBC Appendix N)
Basic Wind Speed with Ice	$V_i := 50$	mph	(User Input per Annex B of TIA-222-G)
Basic Wind Speed Service Loads	$V_{Ser} := 60$	mph	(User Input - TIA-222-G Section 2.8.3)

Input

Structure Type =	Structure_Type := Pole		(User Input)
Structure Category =	$SC := III$		(User Input)
Exposure Category =	$Exp := C$		(User Input)
Structure Height =	$h := 150$	ft	(User Input)
Height to Center of Antennas =	$z_{ant} := 90$	ft	(User Input)
Height to Center of Mast =	$z_{mast} := 90$	ft	(User Input)
Radial Ice Thickness =	$t_i := 0.75$	in	(User Input per Annex B of TIA-222-G)
Radial Ice Density =	$Id := 56.00$	pcf	(User Input)
Topograpic Factor =	$K_{zt} := 1.0$		(User Input)
	$K_a := 1.0$		(User Input)
Gust Response Factor =	$G_H := 1.35$		(User Input)

Output

Wind Direction Probability Factor =

$$K_d := \begin{cases} 0.95 \text{ if } Structure\_Type = Pole \\ 0.85 \text{ if } Structure\_Type = Lattice \end{cases} = 0.95$$

(Per Table 2-2 of TIA-222-G)

Importance Factors =

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

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

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

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

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

Importance Factor (Service) = $I_{Ser} := 1$ (Per Section 2.8.3 of TIA-222-G)

$K_{iz} := \left(\frac{z_{ant}}{33}\right)^{0.1} = 1.106$ $t_{iz.ant} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 2.073$

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

Velocity Pressure w/o Ice Antennas = $qz_{ant} := 0.00256 \cdot K_d \cdot Kz_{ant} \cdot V^2 \cdot I_{Wind} = 32.574$

Velocity Pressure with Ice Antennas = $qz_{ice.ant} := 0.00256 \cdot K_d \cdot Kz_{ant} \cdot V_i^2 \cdot I_{Wind\_w\_Ice} = 7.526$

Velocity Pressure Service = $qz_{ant.Ser} := 0.00256 \cdot K_{dSer} \cdot Kz_{ant} \cdot V_{Ser}^2 \cdot I_{Ser} = 9.697$

$K_{izmast} := \left(\frac{z_{mast}}{33}\right)^{0.1} = 1.106$ $t_{izmast} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{izmast} \cdot K_{zt}^{0.35} = 2.073$

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

Velocity Pressure w/o Ice Mast = $qz_{mast} := 0.00256 \cdot K_d \cdot Kz_{mast} \cdot V^2 \cdot I_{Wind} = 32.574$

Velocity Pressure with Ice Mast = $qz_{ice.mast} := 0.00256 \cdot K_d \cdot Kz_{mast} \cdot V_i^2 \cdot I_{Wind\_w\_Ice} = 7.526$

Velocity Pressure Service = $qz_{mast.Ser} := 0.00256 \cdot K_{dSer} \cdot Kz_{mast} \cdot V_{Ser}^2 \cdot I_{Ser} = 9.697$

Development of Wind & Ice Load on Mast

Mast Data:	(3" Sch. 80 Pipe)		(User Input)
Mast Shape =	Round		(User Input)
Mast Diameter =	$D_{mast} := 3.5$	in	(User Input)
Mast Length =	$L_{mast} := 8.5$	ft	(User Input)
Mast Thickness =	$t_{mast} := 0.3$	in	(User Input)
Velocity Coefficient =	$C := \sqrt{I \cdot Kz_{mast}} \cdot V \cdot \frac{D_{mast}}{12} = 31$		
Mast Force Coefficient =	$CF_{mast} = 1.2$		

Wind Load (without ice)

Mast Projected Surface Area =	$A_{mast} := \frac{D_{mast}}{12} = 0.292$	sf/ft	
Total Mast Wind Force =	$qz_{mast} \cdot G_H \cdot CF_{mast} \cdot A_{mast} = 15$	plf	**BLC 5,7**

Wind Load (with ice)

Mast Projected Surface Area w/ Ice =	$AICE_{mast} := \frac{(D_{mast} + 2 \cdot t_{izmast})}{12} = 0.637$	sf/ft	
Total Mast Wind Force w/ Ice =	$qz_{ice.mast} \cdot G_H \cdot CF_{mast} \cdot AICE_{mast} = 8$	plf	**BLC 4,6**

Gravity Loads (without ice)

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

Gravity Loads (ice only)

Ice Area per Linear Foot =	$Ai_{mast} := \frac{\pi}{4}\left[\left(D_{mast} + t_{izmast} \cdot 2\right)^2 - D_{mast}^{\ 2}\right] = 36.3$	sq in	
Weight of Ice on Mast =	$W_{ICEmast} := Id \cdot \frac{Ai_{mast}}{144} = 14$	plf	**BLC 3**

Development of Wind & Ice Load on Mast

Mast Data:	(2" Sch. 40 Pipe)		(User Input)
Mast Shape =	Round		(User Input)
Mast Diameter =	$D_{mast} := 2.375$	in	(User Input)
Mast Length =	$L_{mast} := 6$	ft	(User Input)
Mast Thickness =	$t_{mast} := 0.154$	in	(User Input)
Velocity Coefficient =	$C := \sqrt{I \cdot Kz_{mast}} \cdot V \cdot \frac{D_{mast}}{12} = 21$		
Mast Force Coefficient =	$CF_{mast} = 1.2$		

Wind Load (without ice)

Mast Projected Surface Area =	$A_{mast} := \frac{D_{mast}}{12} = 0.198$	sf/ft	
Total Mast Wind Force =	$qz_{mast} \cdot G_H \cdot CF_{mast} \cdot A_{mast} = 10$	plf	**BLC 5,7**

Wind Load (with ice)

Mast Projected Surface Area w/ Ice =	$AICE_{mast} := \frac{(D_{mast} + 2 \cdot t_{izmast})}{12} = 0.543$	sf/ft	
Total Mast Wind Force w/ Ice =	$qz_{ice.mast} \cdot G_H \cdot CF_{mast} \cdot AICE_{mast} = 7$	plf	**BLC 4,6**

Gravity Loads (without ice)

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

Gravity Loads (ice only)

Ice Area per Linear Foot =	$Ai_{mast} := \frac{\pi}{4}\left[\left(D_{mast} + t_{izmast} \cdot 2\right)^2 - D_{mast}^{\;2}\right] = 29$	sq in	
Weight of Ice on Mast =	$W_{ICEmast} := Id \cdot \frac{Ai_{mast}}{144} = 11$	plf	**BLC 3**

Development of Wind & Ice Load on Brace Member

Member Data:	HSS4x4x1/4				
Antenna Shape =	Flat		(User Input)		
Height =	$H_{mem} := 4$	in	(User Input)		
Width =	$W_{mem} := 4$	in	(User Input)		
Thickness =	$t_{mem} := 0.25$	in	(User Input)		
Length =	$L_{mem} := 12$	in	(User Input)		
Member Aspect Ratio =	$Ar_{mem} := \frac{L_{mem}}{W_{mem}} = 3.0$				
Member Force Coefficient =	$Ca_{mem} = 1.22$				

Wind Load (without ice)

Member Projected Surface Area =	$A_{mem} := \frac{H_{mem}}{12} = 0.3$	sf/ft	
Total Member Wind Force =	$F_{mem} := qz_{mast} \cdot G_H \cdot Ca_{mem} \cdot A_{mem} = 18$	plf	**BLC 5,7**

Wind Load (with ice)

Member Projected Surface Area w/ Ice =	$A_{ICEmem} := \frac{\left(H_{mem} + 2 \cdot t_{izmast}\right)}{12} = 0.7$	sf/ft	
Total Member Wind Force w/ Ice =	$Fi_{mem} := qz_{ice.mast} \cdot G_H \cdot Ca_{mem} \cdot A_{ICEmem} = 8$	plf	**BLC 4,6**

Gravity Load (without ice)

Weight of Member =	Self Weight	plf	**BLC 1**

Gravity Loads (ice only)

Ice Area per Linear foot =	$Ai_{mem} := \left(W_{mem} + 2 \cdot t_{izmast}\right) \cdot \left(H_{mem} + 2 \cdot t_{izmast}\right) - W_{mem} \cdot H_{mem} = 50$	sq in	
Weight of Ice on Member =	$W_{ICE.mem} := Id \cdot \frac{Ai_{mem}}{144} = 20$	plf	**BLC 3**

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model = Commscope NNH4-65B-R6

Antenna Shape = Flat (User Input)

Antenna Height = $L_{ant} := 71.97$ in (User Input)

Antenna Width = $W_{ant} := 19.61$ in (User Input)

Antenna Thickness = $T_{ant} := 7.76$ in (User Input)

Antenna Weight = $WT_{ant} := 117$ lbs (User Input)

Number of Antennas = $N_{ant} := 1$ (User Input) (One per pipe mast / tot. of 3)

Antenna Aspect Ratio = $Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 3.7$

Antenna Force Coefficient = $Ca_{ant} = 1.25$

Wind Load (without ice)

Surface Area for One Antenna = $SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 9.8$ sf

Total Antenna Wind Force = $F_{antF} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 540$ lbs

Surface Area for One Antenna = $SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 3.9$ sf

Total Antenna Wind Force = $F_{antS} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 214$ lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz.ant}) \cdot (W_{ant} + 2 \cdot t_{iz.ant})}{144} = 12.6$ sf

Total Antenna Wind Force w/ Ice = $Fi_{antF} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 160$ lbs

Surface Area for One Antenna w/ Ice = $SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz.ant}) \cdot (T_{ant} + 2 \cdot t_{iz.ant})}{144} = 6.3$ sf

Total Antenna Wind Force w/ Ice = $Fi_{antS} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 80$ lbs

Gravity Load (without ice)

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

Gravity Loads (ice only)

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

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

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 343$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 343$ lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Samsung VZS01			
Antenna Shape =	Flat		(User Input)	
Antenna Height =	$L_{ant} := 35.1$	in	(User Input)	
Antenna Width =	$W_{ant} := 16.1$	in	(User Input)	
Antenna Thickness =	$T_{ant} := 5.5$	in	(User Input)	
Antenna Weight =	$WT_{ant} := 87.1$	lbs	(User Input)	
Number of Antennas =	$N_{ant} := 1$		(User Input)	(One per pipe mast / tot. of 3)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 2.2$			
Antenna Force Coefficient =	$Ca_{ant} = 1.2$			

Wind Load (without ice)

Surface Area for One Antenna = $SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 3.9$ sf

Total Antenna Wind Force = $F_{antF} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 207$ lbs

Surface Area for One Antenna = $SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 1.3$ sf

Total Antenna Wind Force = $F_{antS} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 71$ lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz.ant}) \cdot (W_{ant} + 2 \cdot t_{iz.ant})}{144} = 5.5$ sf

Total Antenna Wind Force w/ Ice = $Fi_{antF} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 67$ lbs

Surface Area for One Antenna w/ Ice = $SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz.ant}) \cdot (T_{ant} + 2 \cdot t_{iz.ant})}{144} = 2.6$ sf

Total Antenna Wind Force w/ Ice = $Fi_{antS} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 32$ lbs

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 87$ lbs

Gravity Loads (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 3108$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot t_{iz.ant})(W_{ant} + 2 \cdot t_{iz.ant}) \cdot (T_{ant} + 2 \cdot t_{iz.ant}) - V_{ant} = 4556$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 148$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 148$ lbs

Development of Wind & Ice Load on RRHs

RRH Data:

RRH Model = Samsung B2/B66A RRH

RRH Shape = Flat (User Input)

RRH Height = $L_{RRH} := 15$ in (User Input)

RRH Width = $W_{RRH} := 15$ in (User Input)

RRH Thickness = $T_{RRH} := 10$ in (User Input)

RRH Weight = $WT_{RRH} := 84.4$ lbs (User Input)

Number of RRHs = $N_{RRH} := 1$ (User Input) (One per pipe mast / tot. of 3)

RRH Aspect Ratio = $Ar_{RRH} := \frac{L_{RRH}}{W_{RRH}} = 1.0$

RRH Force Coefficient = $Ca_{RRH} = 1.2$

Wind Load (without ice)

Surface Area for One RRH = $SA_{RRHF} := \frac{L_{RRH} \cdot W_{RRH}}{144} = 1.6$ sf

Total RRH Wind Force = $F_{RRHF} := qz_{ant} \cdot G_H \cdot Ca_{RRH} \cdot K_a \cdot SA_{RRHF} = 82$ lbs

Surface Area for One RRH = $SA_{RRHS} := \frac{L_{RRH} \cdot T_{RRH}}{144} = 1$ sf

Total RRH Wind Force = $F_{RRHS} := qz_{ant} \cdot G_H \cdot Ca_{RRH} \cdot K_a \cdot SA_{RRHS} = 55$ lbs

Wind Load (with ice)

Surface Area for One RRH w/ Ice = $SA_{ICERRHF} := \frac{(L_{RRH} + 2 \cdot t_{iz.ant}) \cdot (W_{RRH} + 2 \cdot t_{iz.ant})}{144} = 2.5$ sf

Total RRH Wind Force w/ Ice = $Fi_{RRHF} := qz_{ice.ant} \cdot G_H \cdot Ca_{RRH} \cdot K_a \cdot SA_{ICERRHF} = 31$ lbs

Surface Area for One RRH w/ Ice = $SA_{ICERRHS} := \frac{(L_{RRH} + 2 \cdot t_{iz.ant}) \cdot (T_{RRH} + 2 \cdot t_{iz.ant})}{144} = 1.9$ sf

Total RRH Wind Force w/ Ice = $Fi_{RRHS} := qz_{ice.ant} \cdot G_H \cdot Ca_{RRH} \cdot K_a \cdot SA_{ICERRHS} = 23$ lbs

Gravity Load (without ice)

Weight of All RRHs = $WT_{RRH} \cdot N_{RRH} = 84$ lbs

Gravity Loads (ice only)

Volume of Each RRH = $V_{RRH} := L_{RRH} \cdot W_{RRH} \cdot T_{RRH} = 2250$ cu in

Volume of Ice on Each RRH = $V_{ice} := (L_{RRH} + 2 \cdot t_{iz.ant})(W_{RRH} + 2 \cdot t_{iz.ant}) \cdot (T_{RRH} + 2 \cdot t_{iz.ant}) - V_{RRH} = 2935$ cu in

Weight of Ice on Each RRH = $W_{ICERRH} := \frac{V_{ice}}{1728} \cdot Id = 95$ lbs

Weight of Ice on All RRHs = $W_{ICERRH} \cdot N_{RRH} = 95$ lbs

Development of Wind & Ice Load on RRHs

RRH Data:

RRH Model = Samsung B5/B13 RRH

RRH Shape = Flat (User Input)

RRH Height = $L_{RRH} := 15$ in (User Input)

RRH Width = $W_{RRH} := 15$ in (User Input)

RRH Thickness = $T_{RRH} := 8.1$ in (User Input)

RRH Weight = $WT_{RRH} := 70.3$ lbs (User Input)

Number of RRHs = $N_{RRH} := 1$ (User Input) (One per pipe mast / tot. of 3)

RRH Aspect Ratio = $Ar_{RRH} := \frac{L_{RRH}}{W_{RRH}} = 1.0$

RRH Force Coefficient = $Ca_{RRH} = 1.2$

Wind Load (without ice)

Surface Area for One RRH = $SA_{RRHF} := \frac{L_{RRH} \cdot W_{RRH}}{144} = 1.6$ sf

Total RRH Wind Force = $F_{RRHF} := qz_{ant} \cdot G_H \cdot Ca_{RRH} \cdot K_a \cdot SA_{RRHF} = 82$ lbs

Surface Area for One RRH = $SA_{RRHS} := \frac{L_{RRH} \cdot T_{RRH}}{144} = 0.8$ sf

Total RRH Wind Force = $F_{RRHS} := qz_{ant} \cdot G_H \cdot Ca_{RRH} \cdot K_a \cdot SA_{RRHS} = 45$ lbs

Wind Load (with ice)

Surface Area for One RRH w/ Ice = $SA_{ICERRHF} := \frac{(L_{RRH} + 2 \cdot t_{iz.ant}) \cdot (W_{RRH} + 2 \cdot t_{iz.ant})}{144} = 2.5$ sf

Total RRH Wind Force w/ Ice = $Fi_{RRHF} := qz_{ice.ant} \cdot G_H \cdot Ca_{RRH} \cdot K_a \cdot SA_{ICERRHF} = 31$ lbs

Surface Area for One RRH w/ Ice = $SA_{ICERRHS} := \frac{(L_{RRH} + 2 \cdot t_{iz.ant}) \cdot (T_{RRH} + 2 \cdot t_{iz.ant})}{144} = 1.6$ sf

Total RRH Wind Force w/ Ice = $Fi_{RRHS} := qz_{ice.ant} \cdot G_H \cdot Ca_{RRH} \cdot K_a \cdot SA_{ICERRHS} = 20$ lbs

Gravity Load (without ice)

Weight of All RRHs = $WT_{RRH} \cdot N_{RRH} = 70$ lbs

Gravity Loads (ice only)

Volume of Each RRH = $V_{RRH} := L_{RRH} \cdot W_{RRH} \cdot T_{RRH} = 1823$ cu in

Volume of Ice on Each RRH = $V_{ice} := (L_{RRH} + 2 \cdot t_{iz.ant})(W_{RRH} + 2 \cdot t_{iz.ant}) \cdot (T_{RRH} + 2 \cdot t_{iz.ant}) - V_{RRH} = 2666$ cu in

Weight of Ice on Each RRH = $W_{ICERRH} := \frac{V_{ice}}{1728} \cdot Id = 86$ lbs

Weight of Ice on All RRHs = $W_{ICERRH} \cdot N_{RRH} = 86$ lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model = RFS DB-T1-6Z-8AB-0Z

Antenna Shape = Flat (User Input)

Antenna Height = $L_{ant} := 24$ in (User Input)

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

Antenna Thickness = $T_{ant} := 10$ in (User Input)

Antenna Weight = $WT_{ant} := 45$ lbs (User Input)

Number of Antennas = $N_{ant} := 1$ (User Input) (One per pipe mast / tot. of 2)

Antenna Aspect Ratio = $Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 1.0$

Antenna Force Coefficient = $Ca_{ant} = 1.2$

Wind Load (without ice)

Surface Area for One Antenna = $SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 4$ sf

Total Antenna Wind Force = $F_{antF} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 211$ lbs

Surface Area for One Antenna = $SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 1.7$ sf

Total Antenna Wind Force = $F_{antS} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 88$ lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz.ant}) \cdot (W_{ant} + 2 \cdot t_{iz.ant})}{144} = 5.5$ sf

Total Antenna Wind Force w/ Ice = $Fi_{antF} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 67$ lbs

Surface Area for One Antenna w/ Ice = $SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz.ant}) \cdot (T_{ant} + 2 \cdot t_{iz.ant})}{144} = 2.8$ sf

Total Antenna Wind Force w/ Ice = $Fi_{antS} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 34$ lbs

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 45$ lbs

Gravity Loads (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 5760$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot t_{iz.ant})(W_{ant} + 2 \cdot t_{iz.ant}) \cdot (T_{ant} + 2 \cdot t_{iz.ant}) - V_{ant} = 5446$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 176$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 176$ lbs

(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	Accelerated 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 Ru...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Horz Mast	PIPE_3.0X	Beam	Pipe	A53 Gr. B	Typical	2.83	3.7	3.7	7.4
2	Pipe Mast	PIPE_2.0	Column	Pipe	A53 Gr. B	Typical	1.02	.627	.627	1.25
3	Outrigger	HSS4X4X4	Beam	Tube	A500 Gr.46	Typical	3.37	7.8	7.8	12.8
4	Plate	8"x3/4" PL	Beam	Tube	A36 Gr.36	Typical	6	.281	32	1.059

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	1			Lbyy						Lateral
2	M2	Horz Mast	8.5			Lbyy						Lateral
3	M3	Plate	2			Lbyy						Lateral
4	M4	Pipe Mast	6			Lbyy						Lateral
5	M5	Pipe Mast	6			Lbyy						Lateral
6	M6	Pipe Mast	6			Lbyy						Lateral
7	M7	Pipe Mast	6			Lbyy						Lateral
8	M8	Outrigger	1			Lbyy						Lateral
9	M9	Horz Mast	8.5			Lbyy						Lateral
10	M10	Plate	2			Lbyy						Lateral
11	M11	Outrigger	1			Lbyy						Lateral
12	M12	Horz Mast	8.5			Lbyy						Lateral
13	M13	Plate	2			Lbyy						Lateral
14	M14	Pipe Mast	6			Lbyy						Lateral
15	M15	Pipe Mast	6			Lbyy						Lateral
16	M16	Pipe Mast	6			Lbyy						Lateral
17	M17	Pipe Mast	6			Lbyy						Lateral
18	M18	Outrigger	1			Lbyy						Lateral
19	M19	Horz Mast	8.5			Lbyy						Lateral
20	M20	Plate	2			Lbyy						Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design R...
1	M1	N3	N4			Outrigger	Beam	Tube	A500 Gr.46	Typical
2	M2	N5	N9			Horz Mast	Beam	Pipe	A53 Gr. B	Typical
3	M3	N2	N1			Plate	Beam	Tube	A36 Gr.36	Typical
4	M4	N10	N11			Pipe Mast	Column	Pipe	A53 Gr. B	Typical
5	M5	N12	N13			Pipe Mast	Column	Pipe	A53 Gr. B	Typical
6	M6	N14	N15			Pipe Mast	Column	Pipe	A53 Gr. B	Typical
7	M7	N16	N17			Pipe Mast	Column	Pipe	A53 Gr. B	Typical
8	M8	N20	N21			Outrigger	Beam	Tube	A500 Gr.46	Typical
9	M9	N22	N26			Horz Mast	Beam	Pipe	A53 Gr. B	Typical
10	M10	N19	N18			Plate	Beam	Tube	A36 Gr.36	Typical
11	M11	N29	N30			Outrigger	Beam	Tube	A500 Gr.46	Typical
12	M12	N31	N35			Horz Mast	Beam	Pipe	A53 Gr. B	Typical
13	M13	N28	N27			Plate	Beam	Tube	A36 Gr.36	Typical
14	M14	N36	N37			Pipe Mast	Column	Pipe	A53 Gr. B	Typical
15	M15	N38	N39			Pipe Mast	Column	Pipe	A53 Gr. B	Typical
16	M16	N40	N41			Pipe Mast	Column	Pipe	A53 Gr. B	Typical
17	M17	N42	N43			Pipe Mast	Column	Pipe	A53 Gr. B	Typical
18	M18	N46	N47			Outrigger	Beam	Tube	A500 Gr.46	Typical
19	M19	N48	N52			Horz Mast	Beam	Pipe	A53 Gr. B	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design R...
20	M20	N45	N44			Plate	Beam	Tube	A36 Gr.36	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	1	0	1.25	0	
2	N2	-1	0	1.25	0	
3	N3	0	0	1.25	0	
4	N4	0	0	2.25	0	
5	N5	-4.5	0	2.25	0	
6	N6	-4	0	2.25	0	
7	N7	-2	0	2.25	0	
8	N8	2	0	2.25	0	
9	N9	4	0	2.25	0	
10	N10	-4	3	2.25	0	
11	N11	-4	-3	2.25	0	
12	N12	-2	3	2.25	0	
13	N13	-2	-3	2.25	0	
14	N14	2	3	2.25	0	
15	N15	2	-3	2.25	0	
16	N16	4	3	2.25	0	
17	N17	4	-3	2.25	0	
18	N18	1	2.5	1.25	0	
19	N19	-1	2.5	1.25	0	
20	N20	0	2.5	1.25	0	
21	N21	0	2.5	2.25	0	
22	N22	-4.5	2.5	2.25	0	
23	N23	-4	2.5	2.25	0	
24	N24	-2	2.5	2.25	0	
25	N25	2	2.5	2.25	0	
26	N26	4	2.5	2.25	0	
27	N27	1	0	-1.25	0	
28	N28	-1	0	-1.25	0	
29	N29	0	0	-1.25	0	
30	N30	0	0	-2.25	0	
31	N31	-4.5	0	-2.25	0	
32	N32	-4	0	-2.25	0	
33	N33	-2	0	-2.25	0	
34	N34	2	0	-2.25	0	
35	N35	4	0	-2.25	0	
36	N36	-4	3	-2.25	0	
37	N37	-4	-3	-2.25	0	
38	N38	-2	3	-2.25	0	
39	N39	-2	-3	-2.25	0	
40	N40	2	3	-2.25	0	
41	N41	2	-3	-2.25	0	
42	N42	4	3	-2.25	0	
43	N43	4	-3	-2.25	0	
44	N44	1	2.5	-1.25	0	
45	N45	-1	2.5	-1.25	0	
46	N46	0	2.5	-1.25	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
47	N47	0	2.5	-2.25	0	
48	N48	-4.5	2.5	-2.25	0	
49	N49	-4	2.5	-2.25	0	
50	N50	-2	2.5	-2.25	0	
51	N51	2	2.5	-2.25	0	
52	N52	4	2.5	-2.25	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N2	Reaction	Reaction	Reaction			
2	N1	Reaction	Reaction	Reaction			
3	N18	Reaction	Reaction	Reaction			
4	N19	Reaction	Reaction	Reaction			
5	N27	Reaction	Reaction	Reaction			
6	N28	Reaction	Reaction	Reaction			
7	N44	Reaction	Reaction	Reaction			
8	N45	Reaction	Reaction	Reaction			

Member Point Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	Y	-.059	1
2	M15	Y	-.059	1
3	M17	Y	-.059	1
4	M5	Y	-.059	5
5	M15	Y	-.059	5
6	M17	Y	-.059	5
7	M4	Y	-.044	1
8	M7	Y	-.044	1
9	M14	Y	-.044	1
10	M4	Y	-.044	3.5
11	M7	Y	-.044	3.5
12	M14	Y	-.044	3.5
13	M5	Y	-.084	2.5
14	M15	Y	-.084	2.5
15	M17	Y	-.084	2.5
16	M5	Y	-.07	4
17	M15	Y	-.07	4
18	M17	Y	-.07	4
19	M6	Y	-.045	2
20	M16	Y	-.045	2

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	Y	-.172	1
2	M15	Y	-.172	1
3	M17	Y	-.172	1
4	M5	Y	-.172	5
5	M15	Y	-.172	5

Member Point Loads (BLC 3 : Weight of Ice Only) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
6	M17	Y	-.172	5
7	M4	Y	-.074	1
8	M7	Y	-.074	1
9	M14	Y	-.074	1
10	M4	Y	-.074	3.5
11	M7	Y	-.074	3.5
12	M14	Y	-.074	3.5
13	M5	Y	-.095	2.5
14	M15	Y	-.095	2.5
15	M17	Y	-.095	2.5
16	M5	Y	-.086	4
17	M15	Y	-.086	4
18	M17	Y	-.086	4
19	M6	Y	-.176	2
20	M16	Y	-.176	2

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	X	.04	1
2	M15	X	.04	1
3	M5	X	.04	5
4	M15	X	.04	5
5	M17	X	.08	1
6	M17	X	.08	5
7	M4	X	.016	1
8	M14	X	.016	1
9	M4	X	.016	3.5
10	M14	X	.016	3.5
11	M7	X	.034	1
12	M7	X	.034	3.5
13	M5	X	.023	2.5
14	M15	X	.023	2.5
15	M5	X	.02	4
16	M15	X	.02	4
17	M6	X	.034	2
18	M16	X	.034	2
19	M17	X	.031	2.5
20	M17	X	.031	4

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	X	.107	1
2	M15	X	.107	1
3	M5	X	.107	5
4	M15	X	.107	5
5	M17	X	.27	1
6	M17	X	.27	5
7	M4	X	.036	1
8	M14	X	.036	1
9	M4	X	.036	3.5
10	M14	X	.036	3.5

Member Point Loads (BLC 5 : (x) TIA Wind) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
11	M7	X	.104	1
12	M7	X	.104	3.5
13	M5	X	.055	2.5
14	M15	X	.055	2.5
15	M5	X	.045	4
16	M15	X	.045	4
17	M6	X	.088	2
18	M16	X	.088	2
19	M17	X	.082	2.5
20	M17	X	.082	4

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	Z	.08	1
2	M15	Z	.08	1
3	M5	Z	.08	5
4	M15	Z	.08	5
5	M17	Z	.04	1
6	M17	Z	.04	5
7	M4	Z	.034	1
8	M14	Z	.034	1
9	M4	Z	.034	3.5
10	M14	Z	.034	3.5
11	M7	Z	.016	1
12	M7	Z	.016	3.5
13	M17	Z	.023	2.5
14	M17	Z	.02	4
15	M6	Z	.067	2
16	M16	Z	.067	2
17	M5	Z	.031	2.5
18	M15	Z	.031	2.5
19	M15	Z	.031	4
20	M5	Z	.031	4

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	Z	.27	1
2	M15	Z	.27	1
3	M5	Z	.27	5
4	M15	Z	.27	5
5	M17	Z	.107	1
6	M17	Z	.107	5
7	M4	Z	.104	1
8	M14	Z	.104	1
9	M4	Z	.104	3.5
10	M14	Z	.104	3.5
11	M7	Z	.036	1
12	M7	Z	.036	3.5
13	M17	Z	.055	2.5
14	M17	Z	.045	4
15	M6	Z	.211	2

Member Point Loads (BLC 7 : (z) TIA Wind) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
16	M16	Z	.211	2
17	M5	Z	.082	2.5
18	M15	Z	.082	2.5
19	M15	Z	.082	4
20	M5	Z	.082	4

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M3	Y	-.011	-.011	0	0
2	M4	Y	-.011	-.011	0	0
3	M5	Y	-.011	-.011	0	0
4	M6	Y	-.011	-.011	0	0
5	M7	Y	-.011	-.011	0	0
6	M10	Y	-.011	-.011	0	0
7	M13	Y	-.011	-.011	0	0
8	M14	Y	-.011	-.011	0	0
9	M15	Y	-.011	-.011	0	0
10	M16	Y	-.011	-.011	0	0
11	M17	Y	-.011	-.011	0	0
12	M20	Y	-.011	-.011	0	0
13	M2	Y	-.014	-.014	0	0
14	M9	Y	-.014	-.014	0	0
15	M12	Y	-.014	-.014	0	0
16	M19	Y	-.014	-.014	0	0
17	M1	Y	-.02	-.02	0	0
18	M8	Y	-.02	-.02	0	0
19	M11	Y	-.02	-.02	0	0
20	M18	Y	-.02	-.02	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.008	.008	0	0
2	M8	X	.008	.008	0	0
3	M18	X	.008	.008	0	0
4	M11	X	.008	.008	0	0
5	M4	X	.007	.007	0	0
6	M5	X	.007	.007	0	0
7	M6	X	.007	.007	0	0
8	M7	X	.007	.007	0	0
9	M14	X	.007	.007	0	0
10	M15	X	.007	.007	0	0
11	M16	X	.007	.007	0	0
12	M17	X	.007	.007	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.018	.018	0	0
2	M8	X	.018	.018	0	0
3	M18	X	.018	.018	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
4	M11	X	.018	.018	0	0
5	M4	X	.01	.01	0	0
6	M5	X	.01	.01	0	0
7	M6	X	.01	.01	0	0
8	M7	X	.01	.01	0	0
9	M14	X	.01	.01	0	0
10	M15	X	.01	.01	0	0
11	M16	X	.01	.01	0	0
12	M17	X	.01	.01	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M19	Z	.008	.008	0	0
2	M12	Z	.008	.008	0	0
3	M9	Z	.008	.008	0	0
4	M2	Z	.008	.008	0	0
5	M4	Z	.007	.007	0	0
6	M5	Z	.007	.007	0	0
7	M6	Z	.007	.007	0	0
8	M7	Z	.007	.007	0	0
9	M14	Z	.007	.007	0	0
10	M15	Z	.007	.007	0	0
11	M16	Z	.007	.007	0	0
12	M17	Z	.007	.007	0	0

Member Distributed Loads (BLC 7 : (z) TIA Wind)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M19	Z	.015	.015	0	0
2	M12	Z	.015	.015	0	0
3	M9	Z	.015	.015	0	0
4	M2	Z	.015	.015	0	0
5	M4	Z	.01	.01	0	0
6	M5	Z	.01	.01	0	0
7	M6	Z	.01	.01	0	0
8	M7	Z	.01	.01	0	0
9	M14	Z	.01	.01	0	0
10	M15	Z	.01	.01	0	0
11	M16	Z	.01	.01	0	0
12	M17	Z	.01	.01	0	0

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distrib..	Area(...	Surfa...
1	Self Weigh	None		-1						
2	Weight of Appurtenances	None					20			
3	Weight of Ice Only	None					20	20		
4	(x) TIA Wind with Ice	None					20	12		
5	(x) TIA Wind	None					20	12		
6	(z) TIA Wind with Ice	None					20	12		
7	(z) TIA Wind	None					20	12		

Load Combinations

	Description	Solve	P...	S...	B...	Fa...	BLC	Fact...	BLC	Fa...	BLC	Fa...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1.2D + 1.6W (X-dir...	Yes	Y		1	1.2	2	1.2	5	1.6																
2	0.9D + 1.6W (X-dir...	Yes	Y		1	.9	2	.9	5	1.6																
3	1.2D + 1.0Di + 1.0...	Yes	Y		1	1.2	2	1.2	3	1	4	1														
4	1.2D + 1.6W (Z-dire...	Yes	Y		1	1.2	2	1.2	7	1.6																
5	0.9D + 1.6W (Z-dire...	Yes	Y		1	.9	2	.9	7	1.6																
6	1.2D + 1.0Di + 1.0...	Yes	Y		1	1.2	2	1.2	3	1	6	1														

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N2	max	-.007	5	.885	6	.322	3	0	6	0	6	0	6
2		min	-.624	1	.352	2	-1.68	5	0	1	0	1	0	1
3	N1	max	-.007	5	.462	6	.641	3	0	6	0	6	0	6
4		min	-.624	1	.016	2	-.302	5	0	1	0	1	0	1
5	N18	max	.102	6	.416	3	.218	5	0	6	0	6	0	6
6		min	-.154	2	-.014	5	-.461	6	0	1	0	1	0	1
7	N19	max	.102	6	.889	3	-.44	2	0	6	0	6	0	6
8		min	-.154	2	.19	5	-.981	4	0	1	0	1	0	1
9	N27	max	.132	6	.853	6	-.735	3	0	6	0	6	0	6
10		min	-.934	2	.042	2	-1.288	4	0	1	0	1	0	1
11	N28	max	.132	6	.75	3	.51	2	0	6	0	6	0	6
12		min	-.934	2	.061	5	-1.858	4	0	1	0	1	0	1
13	N44	max	-.018	5	.934	6	.533	6	0	6	0	6	0	6
14		min	-.24	1	.061	2	-.294	2	0	1	0	1	0	1
15	N45	max	-.018	5	.762	3	.757	3	0	6	0	6	0	6
16		min	-.24	1	.34	5	-.251	5	0	1	0	1	0	1
17	Totals:	max	0	6	5.791	6	0	3						
18		min	-3.859	1	1.686	2	-5.795	4						

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotation [rad]	LC
1	N1	max	0	6	0	6	0	6	9.28e-03	3	8.41e-03	5	6.11e-05	6
2		min	0	1	0	1	0	1	-3.183e-03	5	-5.899e-03	3	1.476e-05	2
3	N2	max	0	6	0	6	0	6	9.28e-03	3	4.726e-03	3	-1.971e-05	2
4		min	0	1	0	1	0	1	-3.183e-03	5	-1.346e-02	5	-6.733e-05	6
5	N3	max	0	1	0	2	.088	5	9.28e-03	3	5.11e-03	4	1.932e-05	3
6		min	0	5	0	6	-.043	3	-3.183e-03	5	1.182e-03	3	8.46e-06	5
7	N4	max	.068	4	.038	5	.088	5	8.795e-03	3	6.202e-03	4	4.932e-04	3
8		min	.015	3	-.111	3	-.043	3	-3.402e-03	5	1.216e-03	3	2.16e-04	5
9	N5	max	.068	4	-.001	5	.684	5	6.25e-03	3	1.221e-02	5	1.758e-03	3
10		min	.016	3	-.213	3	-.048	3	-6.244e-03	5	-2.239e-04	3	6.662e-04	5
11	N6	max	.068	4	.003	5	.611	5	6.25e-03	3	1.221e-02	5	1.757e-03	3
12		min	.016	3	-.203	3	-.047	3	-6.244e-03	5	-2.239e-04	3	6.659e-04	5
13	N7	max	.068	4	.021	5	.321	5	6.507e-03	3	1.163e-02	5	2.145e-03	3
14		min	.016	3	-.153	3	-.04	3	-5.918e-03	5	-3.167e-04	3	8.418e-04	5
15	N8	max	.068	4	.037	5	-.014	5	6.855e-03	3	3.634e-03	1	1.985e-04	2
16		min	.015	3	-.119	3	-.104	1	-2.799e-03	5	1.502e-03	6	-7.538e-04	6
17	N9	max	.068	4	.037	5	-.081	5	6.745e-03	3	3.489e-03	1	4.505e-04	2
18		min	.015	3	-.136	3	-.189	1	-2.985e-03	5	1.176e-03	6	-6.482e-04	6

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotation [rad]	LC
19	N10	max	.052	5	.003	5	.436	4	6.27e-03	3	1.035e-02	4	1.765e-03	3
20		min	-.005	3	-.203	3	.169	3	-4.142e-03	5	1.981e-03	3	7.291e-04	5
21	N11	max	.111	1	.003	5	.862	5	6.226e-03	3	1.221e-02	5	2.081e-03	3
22		min	.073	6	-.203	3	-.271	3	-7.155e-03	5	-2.239e-04	3	6.652e-04	5
23	N12	max	.053	5	.021	5	.201	4	6.526e-03	3	9.289e-03	4	2.093e-03	3
24		min	-.007	3	-.153	3	.096	2	-3.48e-03	5	2.076e-03	3	6.749e-04	5
25	N13	max	.227	1	.021	5	.815	5	6.441e-03	3	1.163e-02	5	6.039e-03	1
26		min	.086	6	-.154	3	-.272	3	-1.579e-02	5	-3.167e-04	3	8.395e-04	5
27	N14	max	.056	4	.037	5	.089	3	6.866e-03	3	3.921e-03	5	2.698e-04	2
28		min	.01	3	-.119	3	-.091	5	-2.634e-03	5	-6.715e-04	6	-7.158e-04	6
29	N15	max	.069	2	.037	5	.106	5	6.848e-03	3	3.634e-03	1	9.111e-04	2
30		min	-.011	6	-.119	3	-.337	3	-3.511e-03	5	1.502e-03	6	-7.53e-04	6
31	N16	max	.057	4	.037	5	.103	6	6.759e-03	3	3.546e-03	5	3.531e-04	2
32		min	.009	3	-.135	3	-.18	5	-2.684e-03	5	-6.284e-04	6	-6.616e-04	6
33	N17	max	.086	2	.037	5	.048	5	6.72e-03	3	3.489e-03	1	1.368e-03	2
34		min	-.008	6	-.136	3	-.384	3	-3.765e-03	5	1.176e-03	6	-6.457e-04	6
35	N18	max	0	6	0	6	0	6	9.288e-03	3	5.675e-03	6	5.868e-05	3
36		min	0	1	0	1	0	1	-2.768e-03	5	3.741e-04	2	6.442e-06	5
37	N19	max	0	6	0	6	0	6	9.288e-03	3	-2.606e-03	2	-9.453e-06	5
38		min	0	1	0	1	0	1	-2.768e-03	5	-6.587e-03	4	-6.564e-05	3
39	N20	max	0	2	0	5	.048	6	9.288e-03	3	4.269e-03	5	1.943e-05	3
40		min	0	6	0	3	.012	2	-2.768e-03	5	4.132e-04	3	8.399e-06	5
41	N21	max	.057	5	.033	5	.048	6	8.805e-03	3	5.198e-03	5	4.961e-04	3
42		min	.006	3	-.111	3	.012	2	-2.823e-03	5	5.493e-04	3	2.144e-04	5
43	N22	max	.057	5	-.002	5	.52	4	6.27e-03	3	1.035e-02	4	1.767e-03	3
44		min	.005	3	-.213	3	.143	3	-4.145e-03	5	1.981e-03	3	7.294e-04	5
45	N23	max	.057	5	.003	5	.458	4	6.27e-03	3	1.035e-02	4	1.766e-03	3
46		min	.005	3	-.203	3	.131	3	-4.145e-03	5	1.981e-03	3	7.291e-04	5
47	N24	max	.057	5	.021	5	.218	4	6.526e-03	3	9.289e-03	4	2.094e-03	3
48		min	.005	3	-.153	3	.082	3	-3.483e-03	5	2.076e-03	3	6.749e-04	5
49	N25	max	.057	5	.037	5	.054	6	6.866e-03	3	3.921e-03	5	2.731e-04	2
50		min	.006	3	-.119	3	-.075	5	-2.637e-03	5	-6.715e-04	6	-7.158e-04	6
51	N26	max	.057	5	.037	5	.07	6	6.759e-03	3	3.546e-03	5	3.564e-04	2
52		min	.006	3	-.135	3	-.163	5	-2.688e-03	5	-6.284e-04	6	-6.616e-04	6
53	N27	max	0	6	0	6	0	6	-3.113e-03	2	1.631e-02	4	7.634e-05	3
54		min	0	1	0	1	0	1	-1.347e-02	6	4.34e-03	2	8.736e-06	5
55	N28	max	0	6	0	6	0	6	-3.113e-03	2	6.313e-04	2	-7.823e-06	5
56		min	0	1	0	1	0	1	-1.347e-02	6	-1.84e-02	4	-7.51e-05	3
57	N29	max	0	2	0	5	.139	4	-3.113e-03	2	2.105e-03	4	1.475e-05	2
58		min	0	6	0	3	.015	2	-1.347e-02	6	-5.008e-03	2	-7.69e-06	6
59	N30	max	.065	2	-.037	2	.14	4	-2.953e-03	2	2.533e-03	4	3.767e-04	2
60		min	-.028	4	-.161	6	.015	2	-1.289e-02	6	-5.348e-03	2	-1.963e-04	6
61	N31	max	.065	2	-.105	2	.6	4	-1.7e-03	2	9.792e-03	4	1.404e-03	1
62		min	-.028	4	-.223	6	-.227	2	-1.235e-02	4	-4.302e-03	2	2.523e-04	5
63	N32	max	.065	2	-.097	2	.542	4	-1.7e-03	2	9.791e-03	4	1.404e-03	1
64		min	-.028	4	-.217	6	-.201	2	-1.235e-02	4	-4.302e-03	2	2.52e-04	5
65	N33	max	.065	2	-.063	2	.308	4	-1.903e-03	2	9.316e-03	4	1.701e-03	1
66		min	-.028	4	-.185	6	-.098	2	-1.225e-02	4	-4.371e-03	2	2.122e-04	5
67	N34	max	.065	2	-.032	2	.177	4	-2.604e-03	2	-2.765e-03	3	3.159e-04	2
68		min	-.028	4	-.203	6	.109	3	-1.026e-02	4	-5.347e-03	1	-2.446e-03	6
69	N35	max	.066	2	-.012	2	.291	4	-2.706e-03	2	-2.585e-03	3	1.78e-03	2
70		min	-.028	4	-.269	6	.174	3	-1.14e-02	4	-5.146e-03	1	-2.449e-03	6

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotation [rad]	LC
71	N36	max	.037	2	-.097	2	.161	5	-1.811e-03	2	5.939e-03	5	1.452e-03	1
72		min	-.023	4	-.217	6	-.273	1	-1.014e-02	4	-5.157e-03	1	1.74e-04	5
73	N37	max	.137	1	-.098	2	1.012	4	-1.698e-03	2	9.791e-03	4	2.185e-03	1
74		min	-.018	5	-.217	6	-.14	2	-1.325e-02	4	-4.302e-03	2	2.518e-04	5
75	N38	max	.037	2	-.063	2	.032	5	-2.045e-03	2	4.788e-03	5	1.615e-03	3
76		min	-.025	4	-.185	6	-.161	3	-1.006e-02	6	-5.106e-03	1	4.429e-04	5
77	N39	max	.252	1	-.064	2	1.029	4	-1.898e-03	2	9.316e-03	4	6.14e-03	1
78		min	-.02	5	-.185	6	-.03	2	-2.209e-02	4	-4.371e-03	2	2.116e-04	5
79	N40	max	.043	1	-.031	2	.063	2	-2.746e-03	2	1.062e-03	6	5.846e-04	2
80		min	-.017	5	-.203	6	-.129	6	-9.785e-03	6	-4.04e-03	2	-2.507e-03	6
81	N41	max	.096	2	-.032	2	.565	4	-2.604e-03	2	-2.765e-03	3	1.028e-03	2
82		min	-.095	6	-.203	6	.237	2	-1.097e-02	4	-5.347e-03	1	-2.444e-03	6
83	N42	max	.041	1	-.012	2	.162	2	-2.818e-03	2	6.164e-04	6	9.381e-04	2
84		min	-.017	5	-.269	6	-.148	6	-9.736e-03	4	-4.207e-03	2	-2.417e-03	6
85	N43	max	.411	2	-.012	2	.826	4	-2.698e-03	2	-2.585e-03	3	1.167e-02	2
86		min	-.095	6	-.269	6	.362	2	-1.58e-02	4	-5.146e-03	1	-2.424e-03	6
87	N44	max	0	6	0	6	0	6	-3.341e-03	2	-1.65e-04	2	8.151e-05	6
88		min	0	1	0	1	0	1	-1.33e-02	6	-6.035e-03	3	2.02e-05	2
89	N45	max	0	6	0	6	0	6	-3.341e-03	2	7.186e-03	3	-2.554e-05	2
90		min	0	1	0	1	0	1	-1.33e-02	6	-1.128e-03	5	-7.869e-05	6
91	N46	max	0	1	0	2	.003	5	-3.341e-03	2	1.637e-03	5	1.489e-05	2
92		min	0	5	0	6	-.053	3	-1.33e-02	6	-3.426e-03	1	-7.886e-06	6
93	N47	max	.045	1	-.04	2	.003	5	-3.164e-03	2	2.004e-03	5	3.801e-04	2
94		min	-.022	5	-.159	6	-.053	3	-1.267e-02	6	-3.979e-03	1	-2.013e-04	6
95	N48	max	.045	1	-.105	2	.253	5	-1.811e-03	2	5.94e-03	5	1.456e-03	1
96		min	-.022	5	-.223	6	-.288	1	-1.015e-02	4	-5.157e-03	1	1.743e-04	5
97	N49	max	.045	1	-.097	2	.217	5	-1.811e-03	2	5.939e-03	5	1.455e-03	1
98		min	-.022	5	-.217	6	-.257	1	-1.015e-02	4	-5.157e-03	1	1.74e-04	5
99	N50	max	.045	1	-.063	2	.086	5	-2.045e-03	2	4.788e-03	5	1.617e-03	3
100		min	-.022	5	-.185	6	-.133	1	-1.006e-02	6	-5.106e-03	1	4.429e-04	5
101	N51	max	.045	1	-.031	2	.08	2	-2.746e-03	2	1.062e-03	6	5.879e-04	2
102		min	-.022	5	-.203	6	-.07	6	-9.786e-03	6	-4.04e-03	2	-2.507e-03	6
103	N52	max	.045	1	-.012	2	.179	2	-2.818e-03	2	6.164e-04	6	9.414e-04	2
104		min	-.022	5	-.269	6	-.09	6	-9.739e-03	4	-4.207e-03	2	-2.417e-03	6

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

	Member	Shape	Code Check	Lo...	LC	She...	Lo...	Dir	...	phi*...	phi*...	phi*...	phi*...	Cb	Eqn
1	M1	HSS4X4X4	.132	1	4	.066	0	y	3	138....	139....	16.181	16.181	1.6...	H1-...
2	M2	PIPE_3.0X	.378	4....	5	.167	4....		4	59.322	89.145	7.639	7.639	1.8...	H1-...
3	M3	8"x3/4" PL	.565	1	5	.014	0	z	5	101....	194.4	3.038	32.4	1.4...	H1-...
4	M4	PIPE_2.0	.187	3	3	.081	3		3	20.867	32.13	1.872	1.872	1.7...	H1-...
5	M5	PIPE_2.0	.576	3	4	.120	3		5	20.867	32.13	1.872	1.872	1.8...	H1-...
6	M6	PIPE_2.0	.310	.5	3	.111	.5		3	20.867	32.13	1.872	1.872	1.8...	H1-...
7	M7	PIPE_2.0	.120	.5	6	.073	.5		3	20.867	32.13	1.872	1.872	1.7...	H1-...
8	M8	HSS4X4X4	.098	1	6	.067	0	y	3	138....	139....	16.181	16.181	1.66	H1-...
9	M9	PIPE_3.0X	.236	4....	4	.133	4....		3	59.322	89.145	7.639	7.639	1.7...	H1-...
10	M10	8"x3/4" PL	.331	1	4	.011	0	y	3	101....	194.4	3.038	32.4	1.5...	H1-...
11	M11	HSS4X4X4	.104	1	6	.075	0	z	2	138....	139....	16.181	16.181	1.6...	H1-...
12	M12	PIPE_3.0X	.482	4....	4	.165	4....		6	59.322	89.145	7.639	7.639	1.7...	H1-...
13	M13	8"x3/4" PL	.618	1	4	.016	0	z	4	101....	194.4	3.038	32.4	1.3...	H1-...

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

	Member	Shape	Code Check	Lo...	LC	She...	Lo...	Dir	...	phi*...	phi*...	phi*...	phi*...	Cb	Eqn
14	M14	PIPE_2.0	.180	3	3	.115	3		4	20.867	32.13	1.872	1.872	1.7...	H1-...
15	M15	PIPE_2.0	.576	3	4	.193	3		4	20.867	32.13	1.872	1.872	1.8...	H1-...
16	M16	PIPE_2.0	.532	3	6	.180	3		4	20.867	32.13	1.872	1.872	1.7...	H1-...
17	M17	PIPE_2.0	.575	3	2	.126	3		6	20.867	32.13	1.872	1.872	1.7...	H1-...
18	M18	HSS4X4X4	.116	1	6	.056	0	y	6	138....	139....	16.181	16.181	1.6...	H1-...
19	M19	PIPE_3.0X	.229	4....	3	.161	4....		6	59.322	89.145	7.639	7.639	2.1...	H1-...
20	M20	8"x3/4" PL	.275	1	3	.012	2	y	6	101....	194.4	3.038	32.4	1.3...	H1-...

Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	N2	-.624	.438	-.27	0	0	0
2	1	N1	-.624	.056	.629	0	0	0
3	1	N18	-.142	.058	.121	0	0	0
4	1	N19	-.142	.462	-.481	0	0	0
5	1	N27	-.923	.123	-.895	0	0	0
6	1	N28	-.923	.472	.448	0	0	0
7	1	N44	-.24	.144	-.239	0	0	0
8	1	N45	-.24	.496	.686	0	0	0
9	1	Totals:	-3.859	2.248	0			
10	1	COG (ft):	X: -.136	Y: .467	Z: -.221			

Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	N2	-.612	.352	-.311	0	0	0
2	2	N1	-.612	.015	.581	0	0	0
3	2	N18	-.154	.017	.17	0	0	0
4	2	N19	-.154	.376	-.44	0	0	0
5	2	N27	-.933	.041	-.843	0	0	0
6	2	N28	-.933	.4	.507	0	0	0
7	2	N44	-.23	.061	-.292	0	0	0
8	2	N45	-.23	.423	.627	0	0	0
9	2	Totals:	-3.859	1.686	0			
10	2	COG (ft):	X: -.136	Y: .467	Z: -.221			

Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	3	N2	-.278	.879	.321	0	0	0
2	3	N1	-.278	.409	.639	0	0	0
3	3	N18	.057	.418	-.424	0	0	0
4	3	N19	.057	.891	-.535	0	0	0
5	3	N27	-.113	.832	-.732	0	0	0
6	3	N28	-.113	.748	-.461	0	0	0
7	3	N44	-.185	.85	.438	0	0	0
8	3	N45	-.185	.765	.755	0	0	0
9	3	Totals:	-1.036	5.791	0			
10	3	COG (ft):	X: -.054	Y: .419	Z: -.232			

Joint Reactions (By Combination)

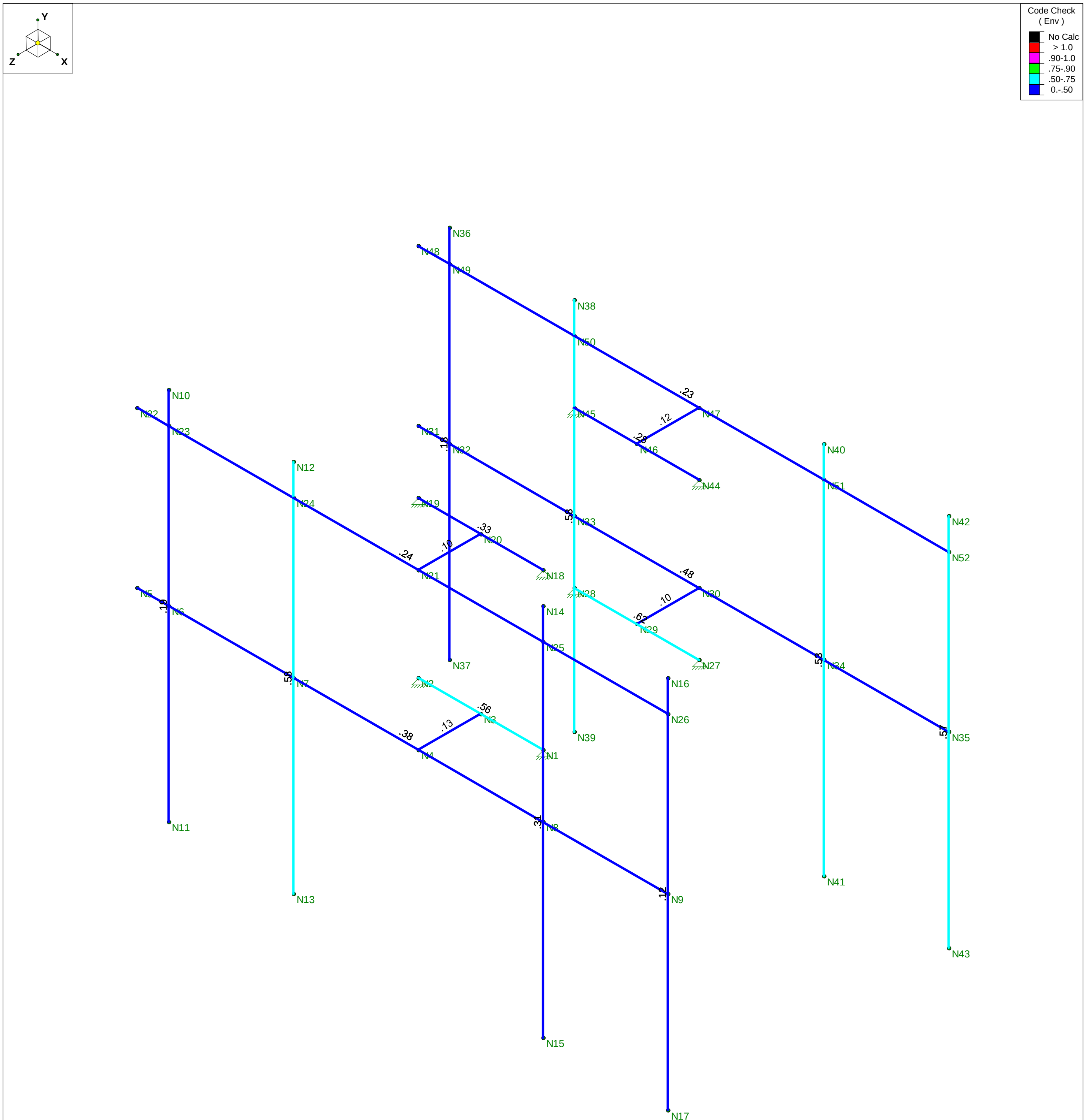
	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	4	N2	-.019	.48	-1.636	0	0	0
2	4	N1	-.019	.23	-.254	0	0	0
3	4	N18	.019	.028	.166	0	0	0
4	4	N19	.019	.276	-.981	0	0	0
5	4	N27	.028	.2	-1.289	0	0	0
6	4	N28	.028	.128	-1.861	0	0	0
7	4	N44	-.028	.491	.249	0	0	0
8	4	N45	-.028	.416	-.19	0	0	0
9	4	Totals:	0	2.248	-5.795			
10	4	COG (ft):	X: -.136	Y: .467	Z: -.221			

Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	5	N2	-.007	.394	-1.676	0	0	0
2	5	N1	-.007	.189	-.303	0	0	0
3	5	N18	.007	-.013	.215	0	0	0
4	5	N19	.007	.191	-.94	0	0	0
5	5	N27	.018	.119	-1.236	0	0	0
6	5	N28	.018	.057	-1.803	0	0	0
7	5	N44	-.018	.407	.196	0	0	0
8	5	N45	-.018	.343	-.249	0	0	0
9	5	Totals:	0	1.686	-5.795			
10	5	COG (ft):	X: -.136	Y: .467	Z: -.221			

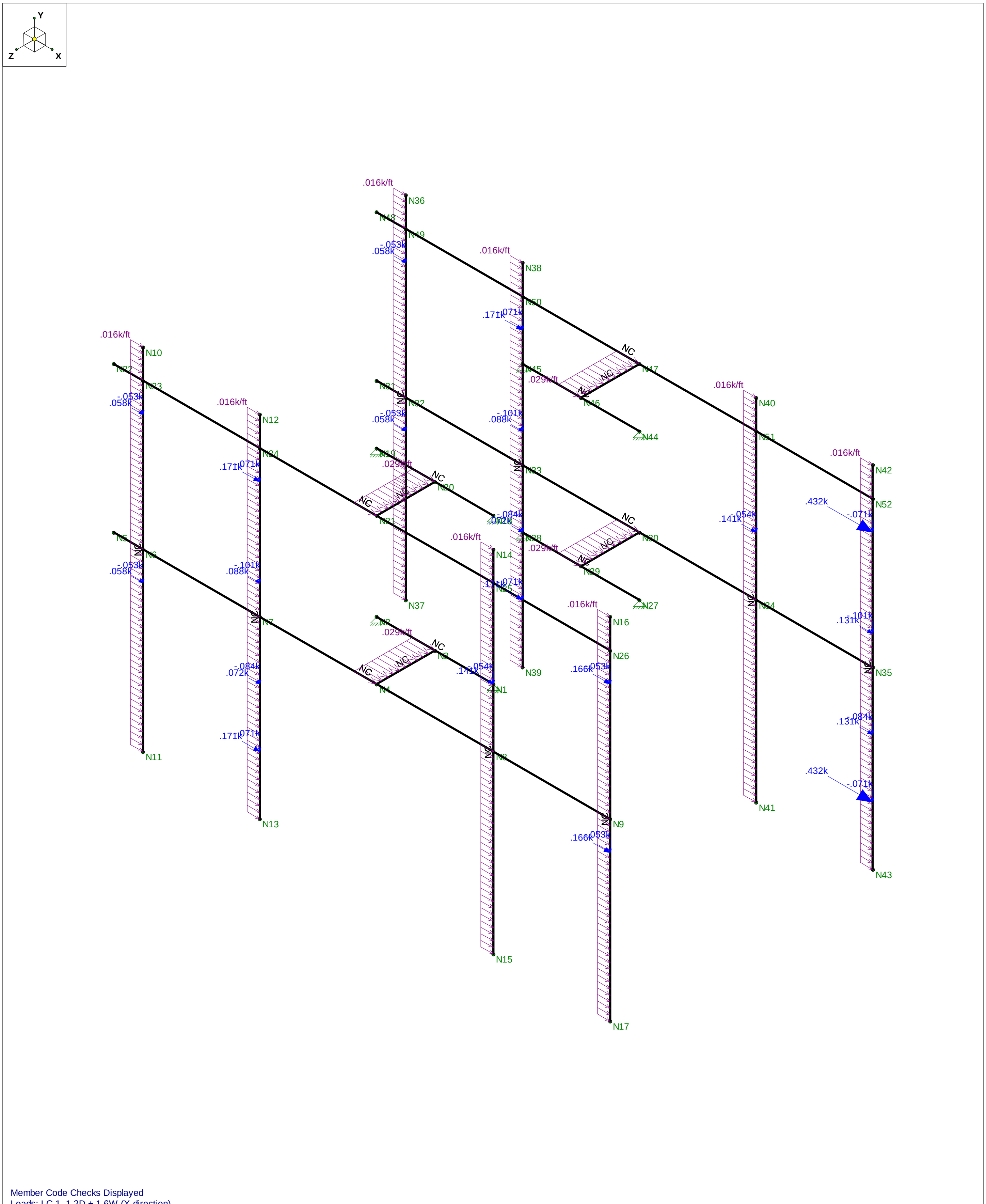
Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	6	N2	-.101	.884	.028	0	0	0
2	6	N1	-.101	.461	.357	0	0	0
3	6	N18	.101	.416	-.46	0	0	0
4	6	N19	.101	.835	-.618	0	0	0
5	6	N27	.132	.849	-.863	0	0	0
6	6	N28	.132	.662	-1.01	0	0	0
7	6	N44	-.132	.937	.53	0	0	0
8	6	N45	-.132	.746	.558	0	0	0
9	6	Totals:	0	5.791	-1.477			
10	6	COG (ft):	X: -.054	Y: .419	Z: -.232			

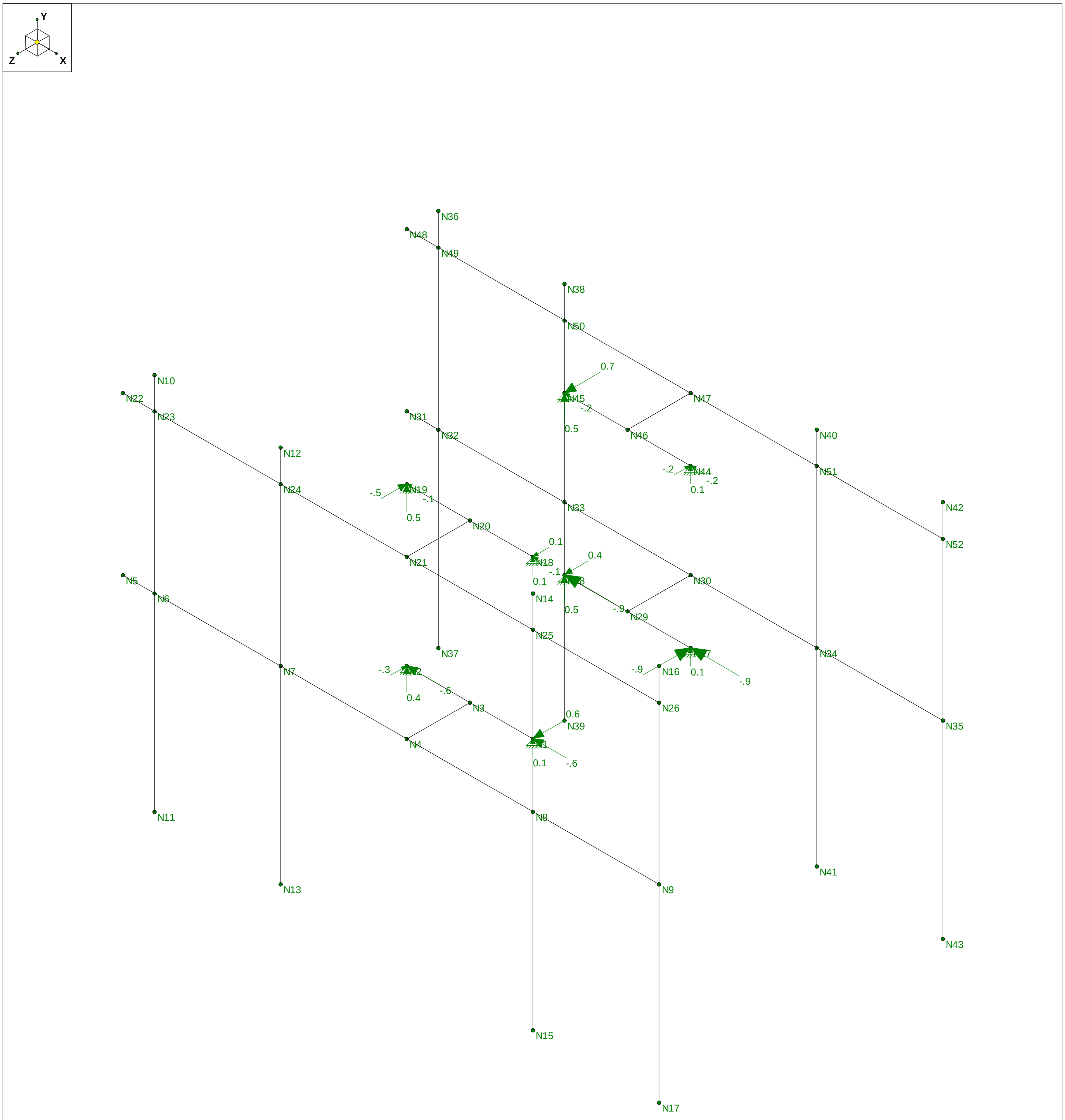


Member Code Checks Displayed (Enveloped)
Envelope Only Solution

CENTEK Engineering, Inc.		
TJL	Tower # 845 - Verizon Mast	Aug 16, 2021 at 8:11 AM
20150.03	Unity Check	Verizon Antenna Mast - TIA.r3d

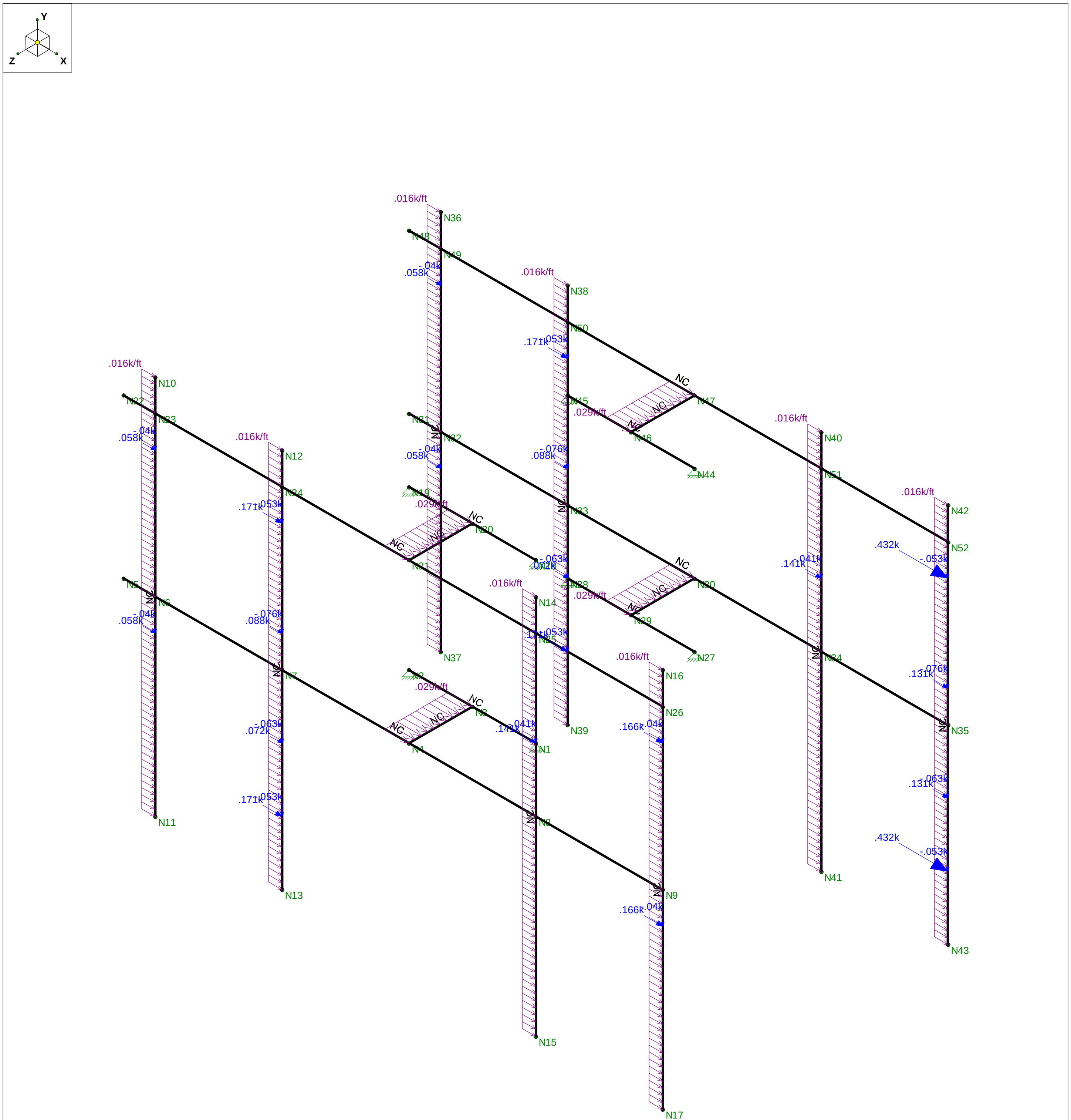


CENTEK Engineering, Inc.	Tower # 845 - Verizon Mast	
TJL		July 14, 2021 at 8:58 AM
20150.03	LC #1 Loads	Verizon Antenna Mast - TIA.r3d



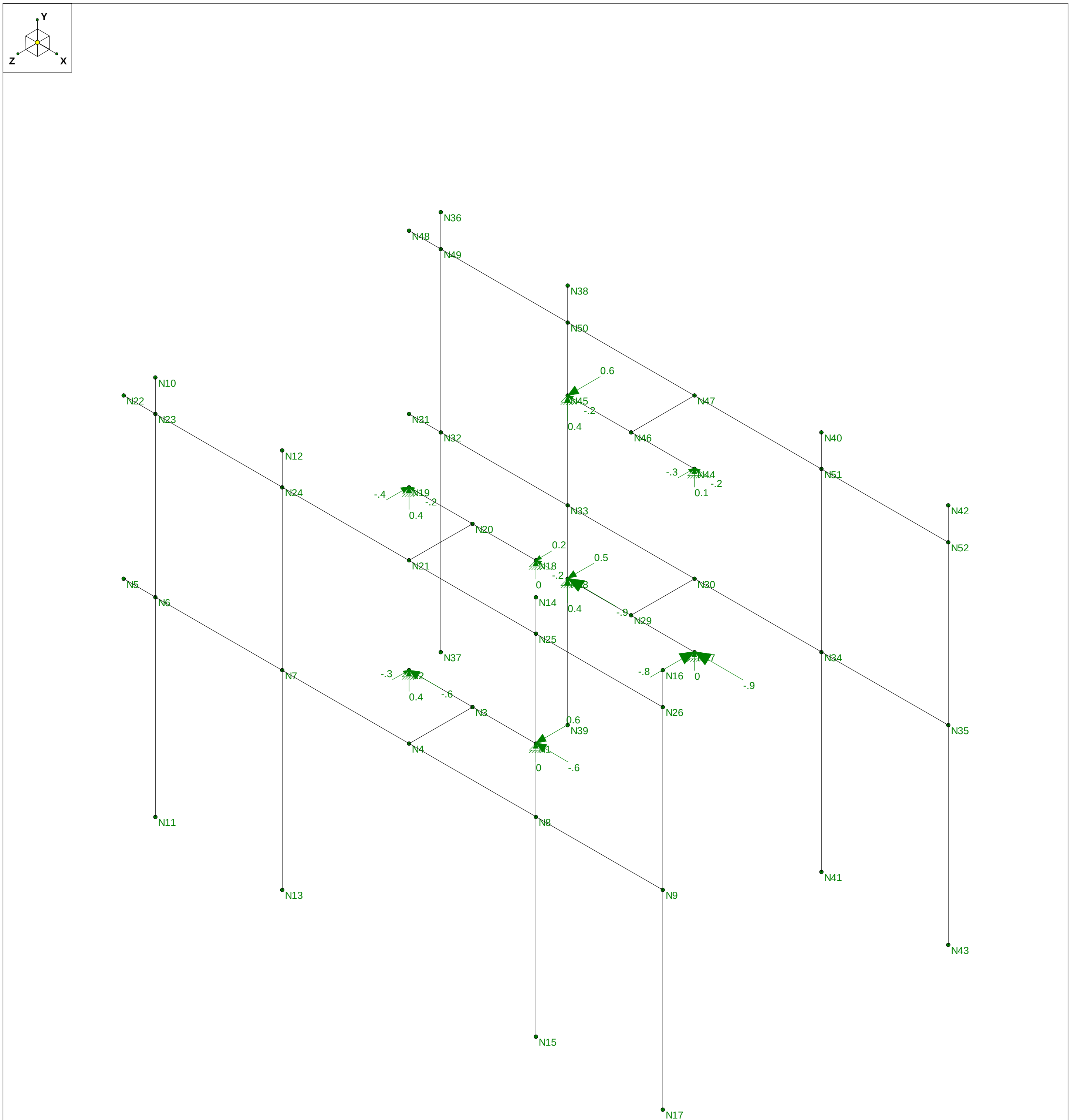
Reaction and Moment Units are k and k-ft

CENTEK Engineering, Inc.		
TJL	Tower # 845 - Verizon Mast	July 14, 2021 at 9:00 AM
20150.03	LC #1 Reactions	Verizon Antenna Mast - TIA.r3d



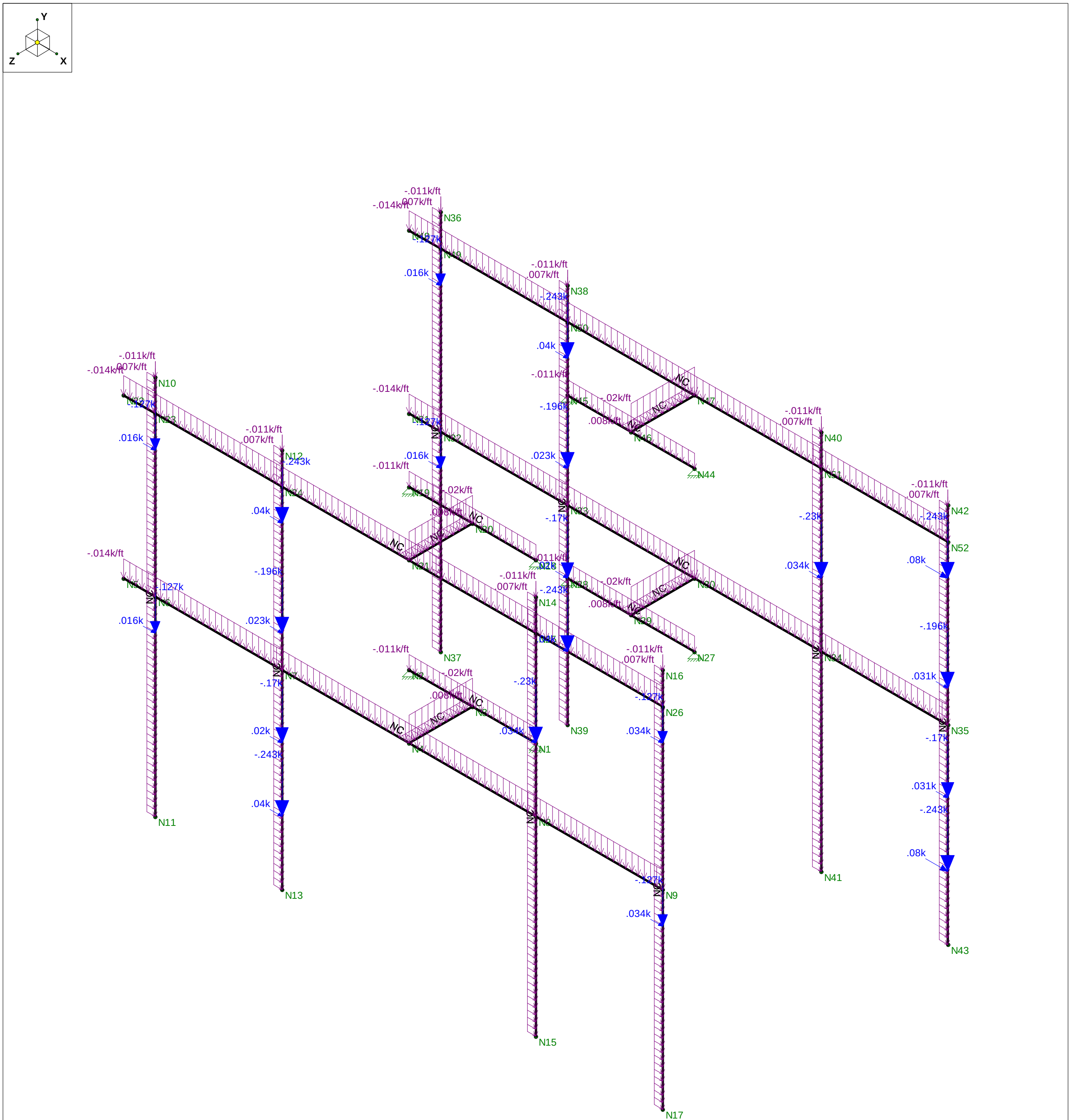
Member Code Checks Displayed
Loads: LC 2, 0.9D + 1.6W (X-direction)

CENTEK Engineering, Inc.	Tower # 845 - Verizon Mast	
TJL		July 14, 2021 at 8:59 AM
20150.03	LC #2 Loads	Verizon Antenna Mast - TIA.r3d



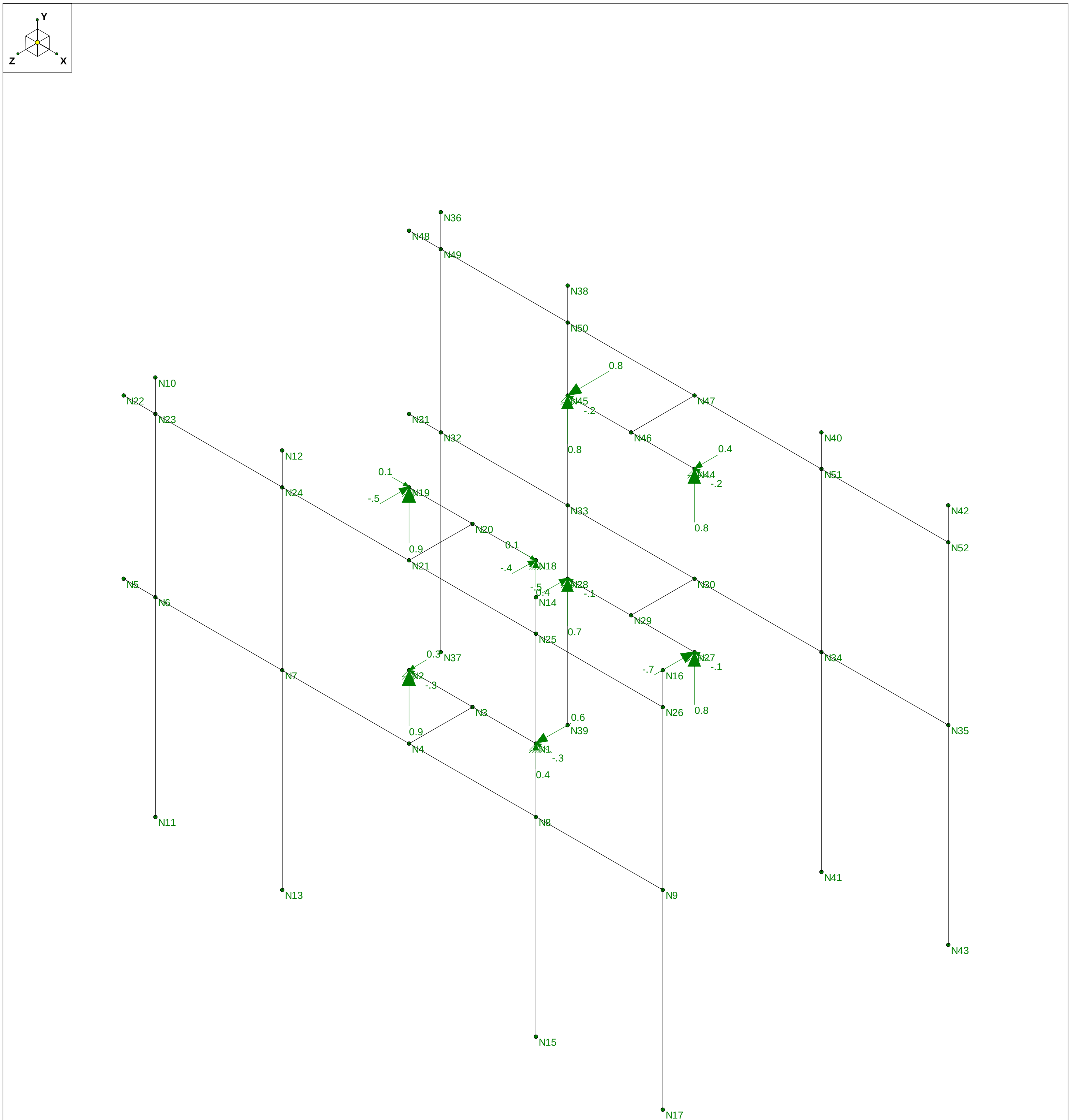
Reaction and Moment Units are k and k-ft

CENTEK Engineering, Inc.		
TJL	Tower # 845 - Verizon Mast	July 14, 2021 at 9:01 AM
20150.03	LC #2 Reactions	Verizon Antenna Mast - TIA.r3d



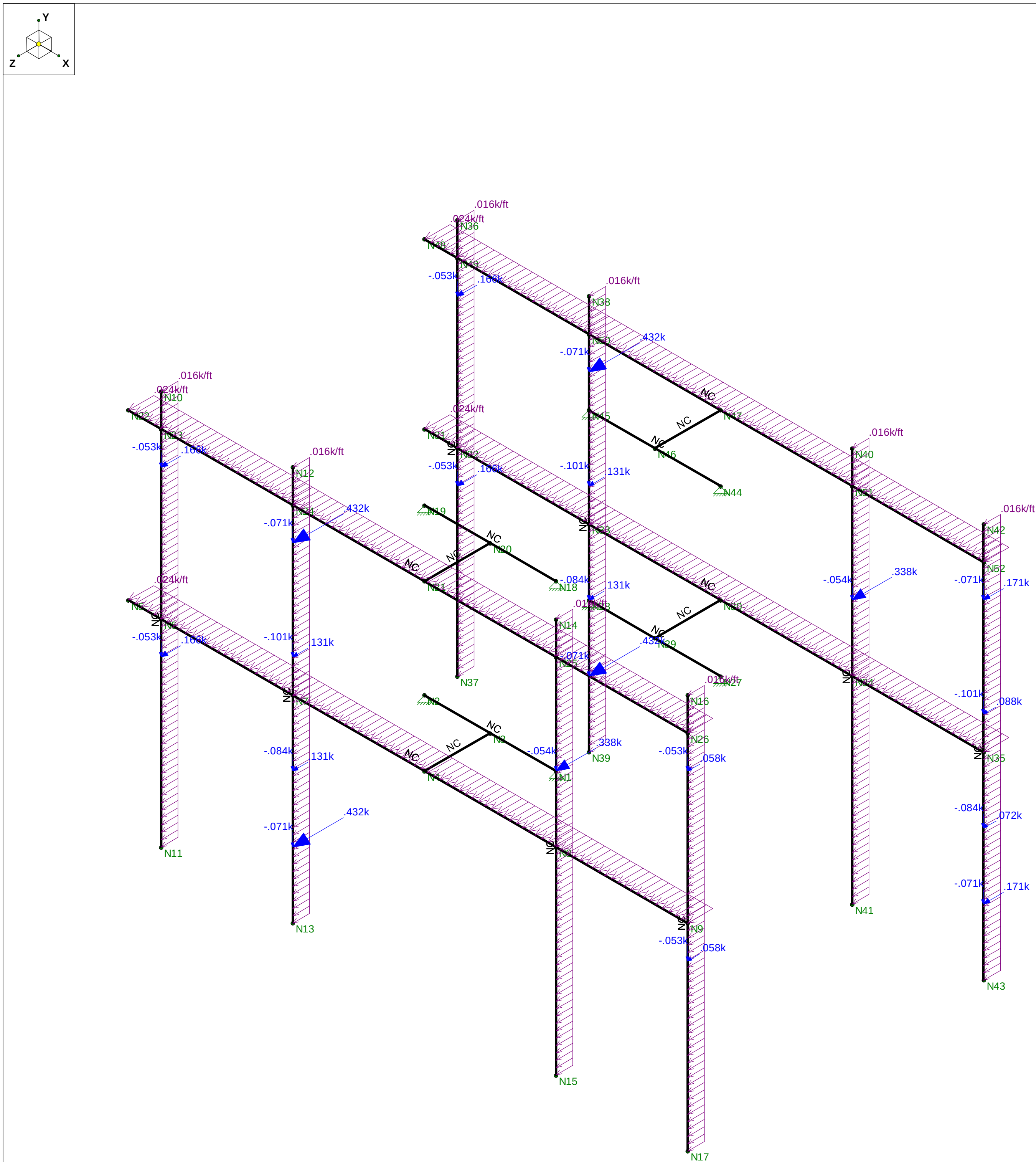
Member Code Checks Displayed
Loads: LC 3, 1.2D + 1.0Di + 1.0Wi (X-direction)

CENTEK Engineering, Inc.		
TJL	Tower # 845 - Verizon Mast	July 14, 2021 at 8:59 AM
20150.03	LC #3 Loads	Verizon Antenna Mast - TIA.r3d



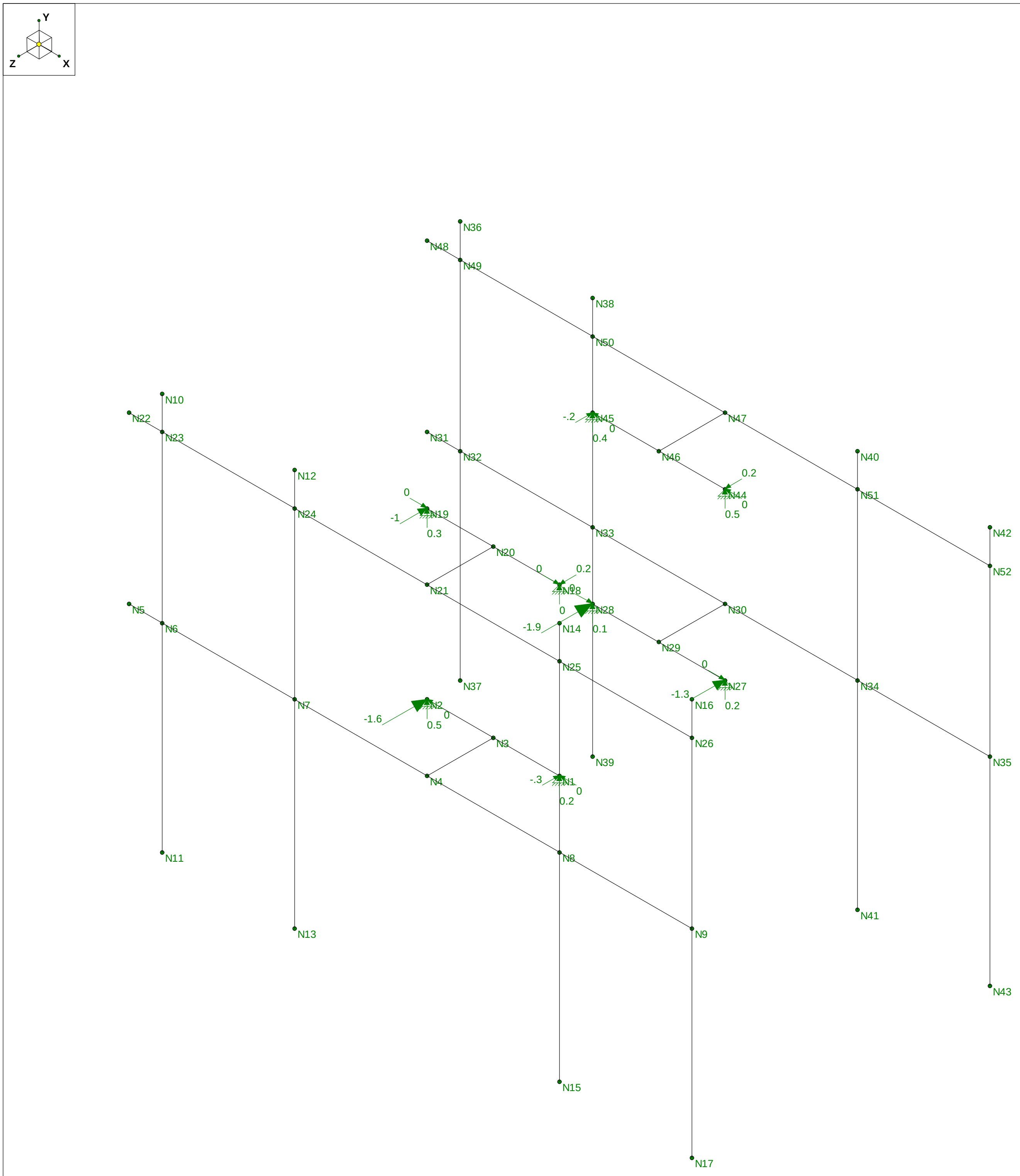
Reaction and Moment Units are k and k-ft

CENTEK Engineering, Inc.		
TJL	Tower # 845 - Verizon Mast	July 14, 2021 at 9:01 AM
20150.03	LC #3 Reactions	Verizon Antenna Mast - TIA.r3d



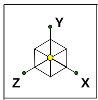
Member Code Checks Displayed
Loads: LC 4, 1.2D + 1.6W (Z-direction)

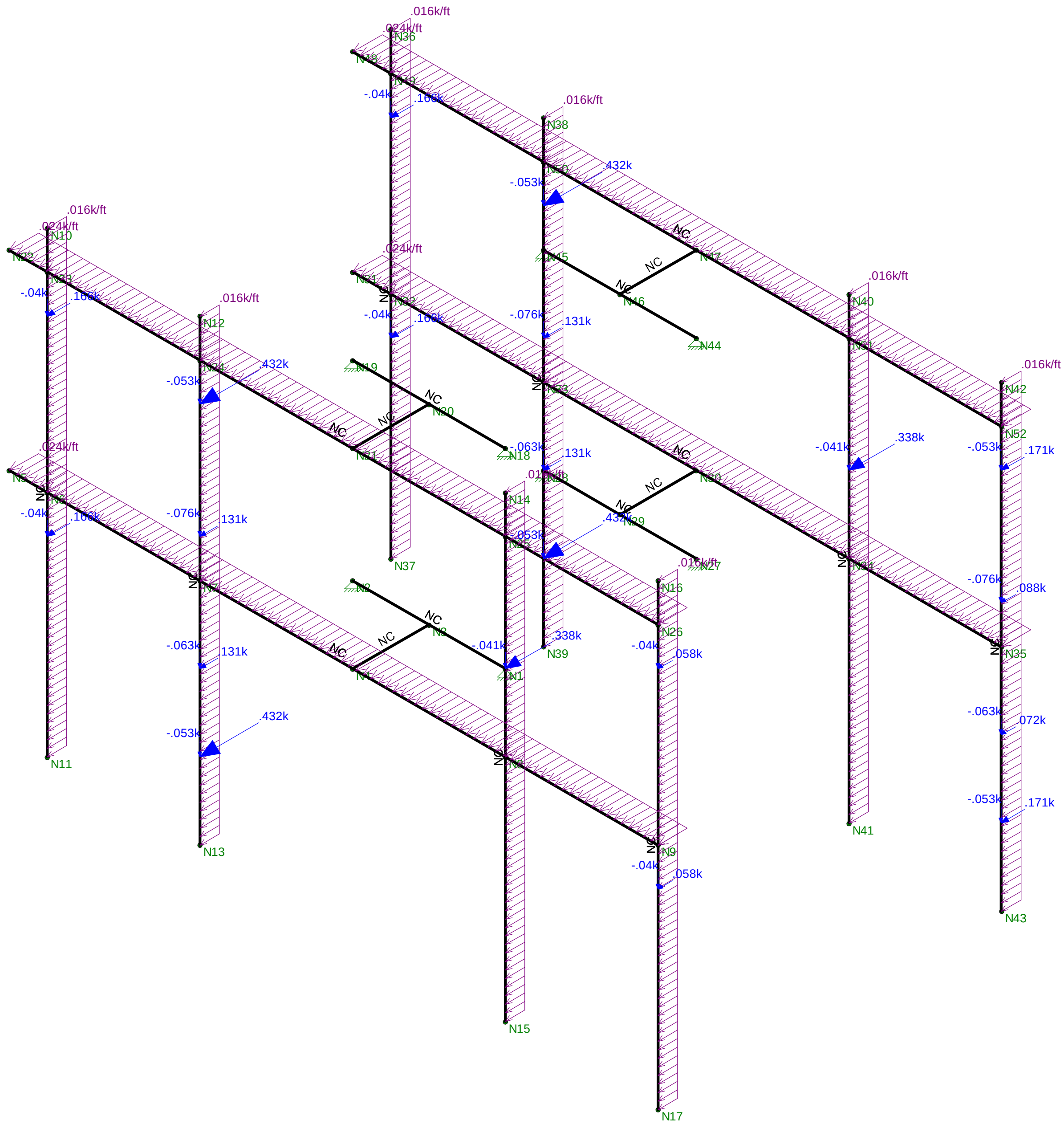
CENTEK Engineering, Inc.		
TJL	Tower # 845 - Verizon Mast	July 14, 2021 at 8:59 AM
20150.03	LC #4 Loads	Verizon Antenna Mast - TIA.r3d



Reaction and Moment Units are k and k-ft

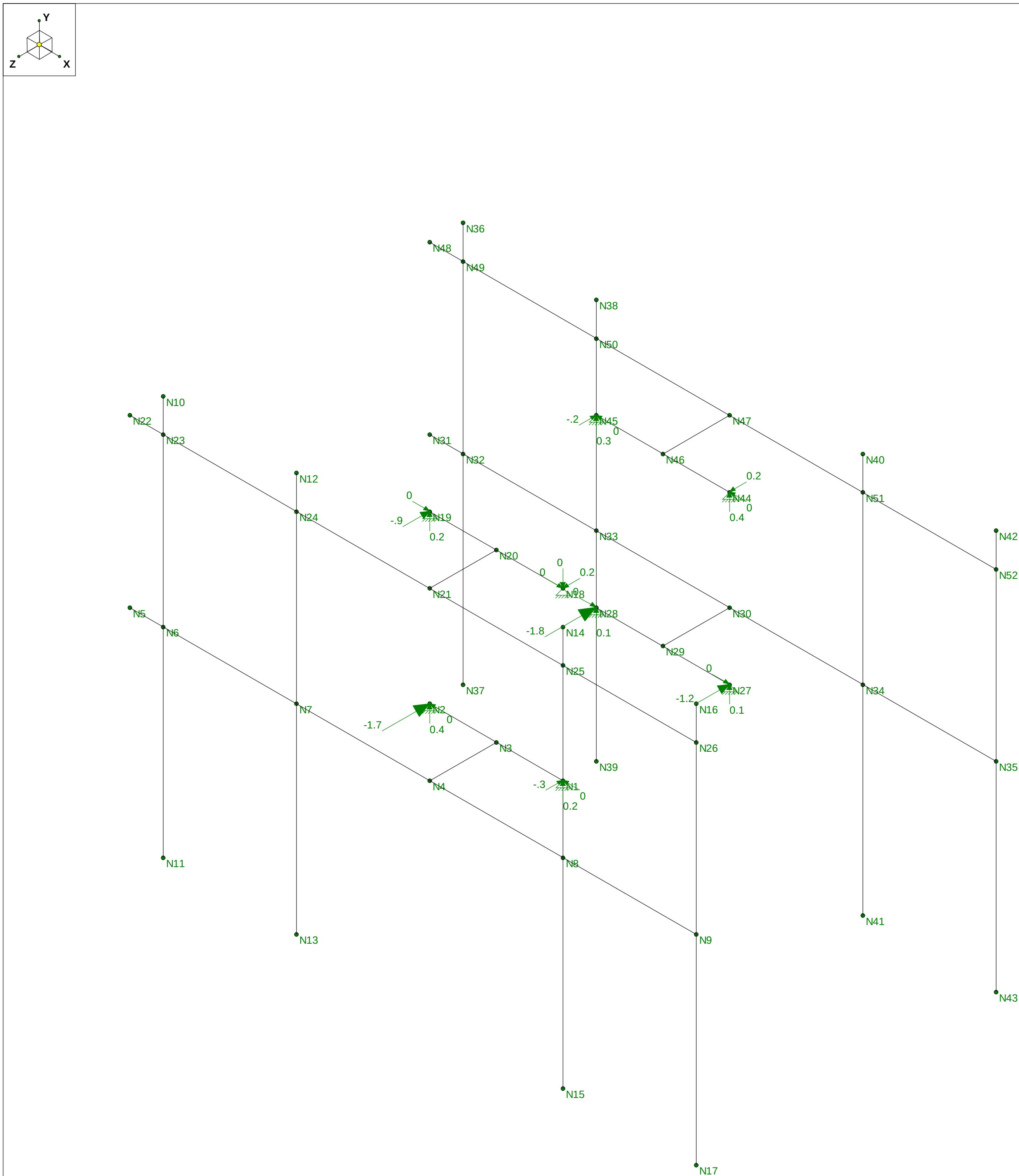
CENTEK Engineering, Inc.		
TJL	Tower # 845 - Verizon Mast	July 14, 2021 at 9:01 AM
20150.03	LC #4 Reactions	Verizon Antenna Mast - TIA.r3d





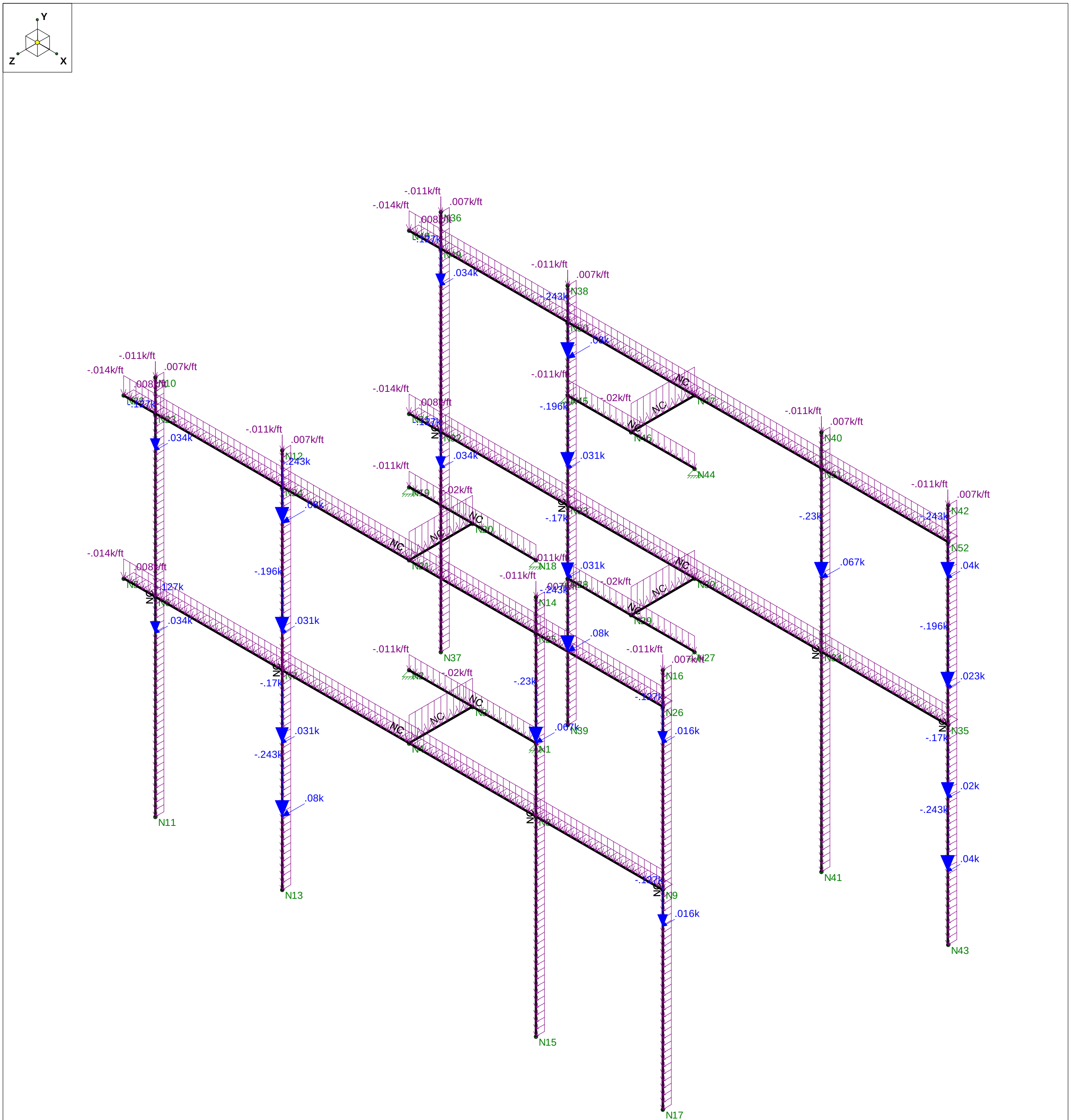
Member Code Checks Displayed
Loads: LC 5, 0.9D + 1.6W (Z-direction)

CENTEK Engineering, Inc.		
TJL	Tower # 845 - Verizon Mast	July 14, 2021 at 8:59 AM
20150.03	LC #5 Loads	Verizon Antenna Mast - TIA.r3d



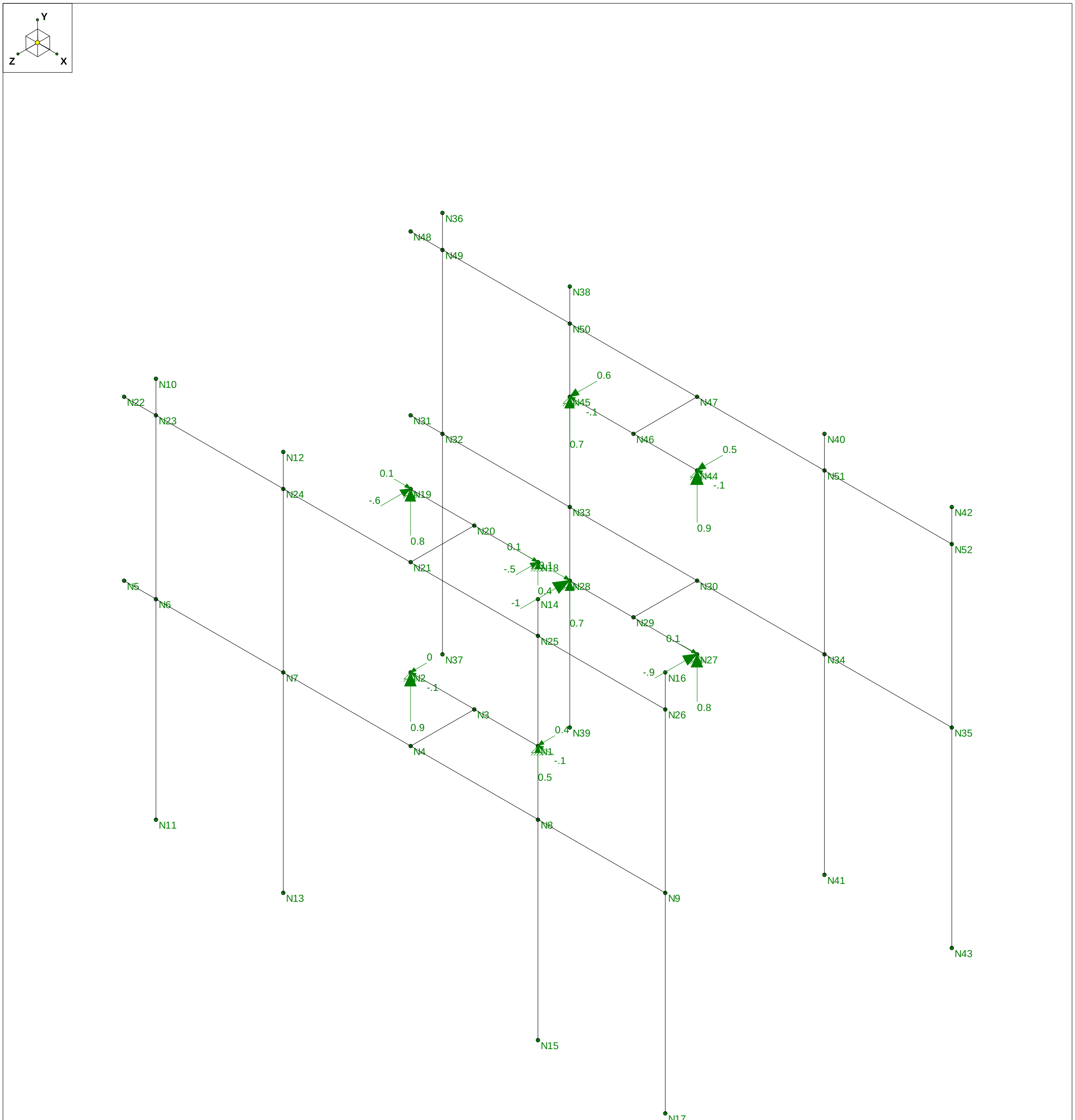
Reaction and Moment Units are k and k-ft

CENTEK Engineering, Inc.		
TJL	Tower # 845 - Verizon Mast	July 14, 2021 at 9:02 AM
20150.03	LC #5 Reactions	Verizon Antenna Mast - TIA.r3d



Member Code Checks Displayed
Loads: LC 6, 1.2D + 1.0Di + 1.0Wi (Z-direction)

CENTEK Engineering, Inc.		
TJL	Tower # 845 - Verizon Mast	July 14, 2021 at 8:59 AM
20150.03	LC #6 Loads	Verizon Antenna Mast - TIA.r3d



Reaction and Moment Units are k and k-ft

CENTEK Engineering, Inc.		
TJL	Tower # 845 - Verizon Mast	July 14, 2021 at 9:02 AM
20150.03	LC #6 Reactions	Verizon Antenna Mast - TIA.r3d

Antenna Mast Connection:

Anchor Data:

3/4" Diameter A307 Threaded Rod

Number of Bolts =	$N := 2$	(User Input)
Design Tension Strength =	$\phi F_{nt} := 14.9 \cdot kips$	(User Input)
Design Shear Strength =	$\phi F_{nv} := 8.97 \cdot kips$	(User Input)
Rod Pretension Force =	$T_b := 10 \cdot kips$	(User Input)
Resistance Factor =	$\phi := 0.7$	(User Input)
Mean Slip Coefficient =	$\mu := 0.3$	(User Input)
Bolt Pretension Installation Multiplier =	$D_u := 1.13$	(User Input)

Design Reactions: Wind X-Direction

Force Y =	$F_y := 0.5 \cdot kips$	(User Input)
Force X =	$F_x := 0.9 \cdot kips$	(User Input)
Force Z =	$F_z := 0.9 \cdot kips$	(User Input)

Anchor Check:

Max Tension Force = $T_{Max} := \frac{F_z}{N} = 0.45 \cdot kips$

Max Shear Force = $V_{Max} := \frac{F_x + F_y}{N} = 0.7 \cdot kips$

Condition 1 = $Condition1 := if\left(\frac{T_{Max}}{\phi F_{nt}} \le 1.00, "OK", "NG"\right) = "OK"$

Condition 2 = $Condition2 := if\left(\frac{V_{Max}}{\phi F_{nv}} \le 1.00, "OK", "NG"\right) = "OK"$

Condition 3 = $Condition3 := if\left(\frac{T_{Max}}{\phi F_{nt}} + \frac{V_{Max}}{\phi F_{nv}} \le 1.0, "OK", "NG"\right) = "OK"$

% of Capacity = $max\left[\frac{T_{Max}}{\phi F_{nt}}, \frac{V_{Max}}{\phi F_{nv}}, \left(\frac{\frac{T_{Max}}{\phi F_{nt}} + \frac{V_{Max}}{\phi F_{nv}}}{1.0}\right)\right] = 10.8 \cdot \%$

Combined Tension Reduction Factor = $k_{sc} := 1 - \frac{T_{Max}}{D_u \cdot T_b} = 0.96$

Friction Connection Slip Resistance = $\phi R_n := \phi \cdot \mu \cdot D_u \cdot T_b \cdot k_{sc} = 2.3 \, kips$

Condition 3 = $Condition4 := if\left(\frac{V_{Max}}{\phi R_n} \le 1.0, "OK", "NG"\right) = "OK"$

% of Capacity = $\frac{V_{Max}}{\phi R_n} = 30.7 \cdot \%$

Design Reactions: Wind Z-Direction

Force Y= $F_y := 0.2 \cdot kips$ (User Input)

Force X= $F_x := 0.1 \cdot kips$ (User Input)

Force Z= $F_z := 1.9 \cdot kips$ (User Input)

Anchor Check:

Max Tension Force = $T_{Max} := \frac{F_z}{N} = 0.95 \cdot kips$

Max Shear Force = $V_{Max} := \frac{F_x + F_y}{N} = 0.15 \cdot kips$

Condition 1 = $Condition1 := if\left(\frac{T_{Max}}{\phi F_{nt}} \le 1.00, \text{"OK"}, \text{"NG"}\right) = \text{"OK"}$

Condition 2 = $Condition2 := if\left(\frac{V_{Max}}{\phi F_{nv}} \le 1.00, \text{"OK"}, \text{"NG"}\right) = \text{"OK"}$

Condition 3 = $Condition3 := if\left(\frac{T_{Max}}{\phi F_{nt}} + \frac{V_{Max}}{\phi F_{nv}} \le 1.0, \text{"OK"}, \text{"NG"}\right) = \text{"OK"}$

% of Capacity = $\max\left[\frac{T_{Max}}{\phi F_{nt}}, \frac{V_{Max}}{\phi F_{nv}}, \left(\frac{\frac{T_{Max}}{\phi F_{nt}} + \frac{V_{Max}}{\phi F_{nv}}}{1.0}\right)\right] = 8 \cdot \%$

Combined Tension Reduction Factor = $k_{sc} := 1 - \frac{T_{Max}}{D_u \cdot T_b} = 0.916$

Friction Connection Slip Resistance = $\phi R_n := \phi \cdot \mu \cdot D_u \cdot T_b \cdot k_{sc} = 2.2 \, kips$

Condition 3 = $Condition4 := if\left(\frac{V_{Max}}{\phi R_n} \le 1.0, \text{"OK"}, \text{"NG"}\right) = \text{"OK"}$

% of Capacity = $\frac{V_{Max}}{\phi R_n} = 6.9 \cdot \%$

Basic Components

Heavy Wind Pressure = $p := 4.00$ psf (User Input NESC 2017 Figure 250-1 & Table 250-1)

Basic Windspeed = $V := 110$ 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 Mast Above Grade = $TME := 163$ 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 = $$Kz := 2.01 \cdot \left(\frac{TME}{900}\right)^{\frac{2}{9.5}} = 1.403$$ (NESC 2017 Table 250-2)

Exposure Factor = $$Es := 0.346 \left[\frac{33}{(0.67 \cdot TME)}\right]^{\frac{1}{7}} = 0.292$$ (NESC 2017 Table 250-3)

Response Term = $$Bs := \frac{1}{\left(1 + 0.375 \cdot \frac{TME}{220}\right)} = 0.783$$ (NESC 2017 Table 250-3)

Gust Response Factor = $$Grf := \frac{\left[1 + \left(2.7 \cdot Es \cdot Bs^{\frac{1}{2}}\right)\right]}{kv^2} = 0.83$$ (NESC 2017 Table 250-3)

Wind Pressure = $qz := 0.00256 \cdot Kz \cdot V^2 \cdot Grf \cdot I = 36$ 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

Overload Factors for Wind Loads:

NESC Heavy Wind Loading = **2.5** (User Input)

NESC Extreme Wind Loading = **1.0** (User Input)

NESC Extreme Ice w/ Wind Loading = **1.0** (User Input)

Overload Factors for Vertical Loads:

NESC Heavy Wind Loading = **1.5** (User Input)

NESC Extreme Wind Loading = **1.0** (User Input)

NESC Extreme Ice w/ Wind Loading = **1.0** (User Input)

Development of Wind & Ice Load on Antenna Mast

Antenna Mast Data: (12" Sch. 80)

Mast Shape =	Round		(User Input)
Mast Diameter =	$D_{mast} := 12.75$	in	(User Input)
Mast Length =	$L_{mast} := 26$	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 = $Ai_{mast} := \frac{\pi}{4}\left[\left(D_{mast} + Ir \cdot 2\right)^2 - D_{mast}^{\ 2}\right] = 20.8$ sq in

Weight of Ice on Mast = $W_{ICEmast} := Id \cdot \frac{Ai_{mast}}{144} = 8$ plf **BLC 3**

Wind Load (NESC Heavy)

Mast Projected Surface Area w/ Ice = $AICE_{mast} := \frac{\left(D_{mast} + 2 \cdot Ir\right)}{12} = 1.146$ sf/ft

Total Mast Wind Force w/ Ice (Above NU Structure) = $Fi_{mast} := p \cdot Cd_{coax} \cdot AICE_{mast} = 7$ plf **BLC 4**

Wind Load (NESC Extreme)

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

Total Mast Wind Force (Above NU Structure) = $F_{mast} := qz \cdot Cd_{coax} \cdot A_{mast} \cdot m = 77$ plf **BLC 5**

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

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFS APX16DWV-16DWVS		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 55.9$	in	(User Input)
Antenna Width =	$W_{ant} := 13$	in	(User Input)
Antenna Thickness =	$T_{ant} := 3.15$	in	(User Input)
Antenna Weight =	$WT_{ant} := 41$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)

Gravity Load (without ice)

Weight of All Antennas = $Wt_{ant1} := WT_{ant} \cdot N_{ant} = 123$ lbs

Gravity Load (ice only)

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

Volume of Ice on Each Antenna = $V_{ice} := \left(L_{ant} + 2 \cdot Ir\right)\left(W_{ant} + 2 \cdot Ir\right)\left(T_{ant} + 2 \cdot Ir\right) - V_{ant} = 1017$ cu in

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

Weight of Ice on All Antennas = $Wt_{ice.ant1} := W_{ICEant} \cdot N_{ant} = 99$ lbs

Wind Load (NESC Heavy)

Effective Projected Area for One Antenna = $EPA_N := \frac{\left(L_{ant} + 2 \cdot Ir\right) \cdot \left(W_{ant} + 2 \cdot Ir\right)}{144} = 5.53$ $EPA_T := \frac{\left(L_{ant} + 2 \cdot Ir\right) \cdot \left(T_{ant} + 2 \cdot Ir\right)}{144} = 1.64$

Antenna Projected Surface Area =

$EPA_{A1} := EPA_N \cdot \cos(\phi)^2 + EPA_T \cdot \sin(\phi)^2 = 5.53$

$EPA_{A2} := EPA_N \cdot \cos(120 \cdot deg - \phi)^2 + EPA_T \cdot \sin(120 \cdot deg - \phi)^2 = 2.61$

$EPA_{A3} := EPA_N \cdot \cos(240 \cdot deg - \phi)^2 + EPA_T \cdot \sin(240 \cdot deg - \phi)^2 = 2.61$

$EPA_{tot} := EPA_{A1} + EPA_{A2} + EPA_{A3} = 10.758$

Total Antenna Wind Force w/ Ice = $Fi_{ant1} := p \cdot Cd_F \cdot EPA_{tot} = 69$ lbs

Wind Load (NESC Extreme)

Effective Projected Area for One Antenna = $EPA_N := \frac{L_{ant} \cdot W_{ant}}{144} = 5.05$ $EPA_T := \frac{L_{ant} \cdot T_{ant}}{144} = 1.22$

Antenna Projected Surface Area =

$EPA_{A1} := EPA_N \cdot \cos(\phi)^2 + EPA_T \cdot \sin(\phi)^2 = 5.05$

$EPA_{A2} := EPA_N \cdot \cos(120 \cdot deg - \phi)^2 + EPA_T \cdot \sin(120 \cdot deg - \phi)^2 = 2.18$

$EPA_{A3} := EPA_N \cdot \cos(240 \cdot deg - \phi)^2 + EPA_T \cdot \sin(240 \cdot deg - \phi)^2 = 2.18$

$EPA_{tot} := EPA_{A1} + EPA_{A2} + EPA_{A3} = 9.404$

Total Antenna Wind Force = $F_{ant1} := qz \cdot Cd_F \cdot EPA_{tot} \cdot m = 678$ lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFSAPXVAARR24_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 =	$T_{ant} := 8.7$	in	(User Input)
Antenna Weight =	$WT_{ant} := 154$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)

Gravity Load (without ice)

Weight of All Antennas = $Wt_{ant2} := WT_{ant} \cdot N_{ant} = 462$ 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 = $V_{ice} := (L_{ant} + 2 \cdot Ir)(W_{ant} + 2 \cdot Ir)(T_{ant} + 2 \cdot Ir) - V_{ant} = 3474$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 113$ lbs

Weight of Ice on All Antennas = $Wt_{ice.ant2} := W_{ICEant} \cdot N_{ant} = 338$ lbs

Wind Load (NESC Heavy)

Effective Projected Area for One Antenna = $EPA_N := \frac{(L_{ant} + 2 \cdot Ir) \cdot (W_{ant} + 2 \cdot Ir)}{144} = 16.82$ $EPA_T := \frac{(L_{ant} + 2 \cdot Ir) \cdot (T_{ant} + 2 \cdot Ir)}{144} = 6.53$

Antenna Projected Surface Area =

$$EPA_{A1} := EPA_N \cdot \cos(\phi)^2 + EPA_T \cdot \sin(\phi)^2 = 16.82$$

$$EPA_{A2} := EPA_N \cdot \cos(120 \cdot deg - \phi)^2 + EPA_T \cdot \sin(120 \cdot deg - \phi)^2 = 9.1$$

$$EPA_{A3} := EPA_N \cdot \cos(240 \cdot deg - \phi)^2 + EPA_T \cdot \sin(240 \cdot deg - \phi)^2 = 9.1$$

$$EPA_{tot} := EPA_{A1} + EPA_{A2} + EPA_{A3} = 35.025$$

Total Antenna Wind Force w/ Ice = $Fi_{ant1} := p \cdot Cd_F \cdot EPA_{tot} = 224$ lbs

Wind Load (NESC Extreme)

Effective Projected Area for One Antenna = $EPA_N := \frac{L_{ant} \cdot W_{ant}}{144} = 15.98$ $EPA_T := \frac{L_{ant} \cdot T_{ant}}{144} = 5.79$

Antenna Projected Surface Area =

$$EPA_{A1} := EPA_N \cdot \cos(\phi)^2 + EPA_T \cdot \sin(\phi)^2 = 15.98$$

$$EPA_{A2} := EPA_N \cdot \cos(120 \cdot deg - \phi)^2 + EPA_T \cdot \sin(120 \cdot deg - \phi)^2 = 8.34$$

$$EPA_{A3} := EPA_N \cdot \cos(240 \cdot deg - \phi)^2 + EPA_T \cdot \sin(240 \cdot deg - \phi)^2 = 8.34$$

$$EPA_{tot} := EPA_{A1} + EPA_{A2} + EPA_{A3} = 32.666$$

Total Antenna Wind Force = $F_{ant1} := qz \cdot Cd_F \cdot EPA_{tot} \cdot m = 2355$ lbs

Development of Wind & Ice Load on Platform

Platform Data:

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

Gravity Loads (without ice)

Weight of All Mounts = $Wt_{mnt1} := WT_{mnt} = 1080$ lbs

Gravity Load (ice only)

Weight of Ice on All Mounts = $Wt_{ice.mnt1} := (WT_{mnt.ice} - WT_{mnt}) = 170$ lbs

Wind Load (NESC Heavy)

Total Mount Wind Force w/ Ice = $Fi_{mnt1} := p \cdot CdAa_{ice} = 44$ lbs

Wind Load (NESC Extreme)

Total Mount Wind Force = $F_{mnt1} := qz \cdot CdAa \cdot m = 315$ lbs

Development of Wind & Ice Load on Coax Cables

Coax Cable Data: (138-ft - 150-ftAGL)

Coax Type = HELIAX 1-1/4"

Shape = Round (User Input)

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

Coax Cable Length = $L_{coax} := 12$ ft (User Input)

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

Total Number of Coax = $N_{coax} := 12$ (User Input)

No. of Coax Projecting Outside Face of Antenna Mast = $NP_{coax} := 2$ (User Input)

Gravity Loads (without ice)

Weight of all cables w/o ice = $WT_{coax} := Wt_{coax} \cdot N_{coax} = 8$ 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 = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 15$ plf **BLC 3**

Wind Load (NESC Heavy)

Coax projected surface area w/ Ice = $AICE_{coax} := \frac{NP_{coax} \cdot D_{coax} + 2 \cdot Ir}{12} = 0.3$ sf/ft

Total Coax Wind Force w/ Ice = $Fi_{coax} := p \cdot Cd_{coax} \cdot AICE_{coax} = 2$ plf **BLC 4**

Wind Load (NESC Extreme)

Coax projected surface area = $A_{coax} := \frac{\left(NP_{coax} D_{coax}\right)}{12} = 0.3$ sf/ft

Total Coax Wind Force (Above NU Structure) = $F_{coax} := qz \cdot Cd_{coax} \cdot A_{coax} \cdot m = 19$ plf **BLC 5**

Total Coax Wind Force (Below NU Structure) = $F_{coax} := qz \cdot Cd_{coax} \cdot A_{coax} = 15$ plf **BLC 5**

Development of Wind & Ice Load on Coax Cables

Coax Cable Data: (150-ft - 160-ftAGL)

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 =	$N_{coax} := 24$		(User Input)
No. of Coax Projecting Outside Face of Antenna Mast =	$NP_{coax} := 4$		(User Input)

Gravity Loads (without ice)

Weight of all cables w/o ice = $WT_{coax} := Wt_{coax} \cdot N_{coax} = 16$ 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 = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 30$ plf **BLC 3**

Wind Load (NESC Heavy)

Coax projected surface area w/ Ice = $AICE_{coax} := \frac{NP_{coax} \cdot D_{coax} + 2 \cdot Ir}{12} = 0.6$ 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 NU Structure) = $F_{coax} := qz \cdot Cd_{coax} \cdot A_{coax} \cdot m = 37$ plf **BLC 5**

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

Basic Components

Heavy Wind Pressure =	$p := 4.00$	psf	(User Input NESC 2007 Figure 250-1 & Table 250-1)
Basic Windspeed =	$V := 110$	mph	(User Input NESC 2007 Figure 250-2(e))
Radial Ice Thickness =	$Ir := 0.50$	in	(User Input)
Radial Ice Density =	$Id := 56.0$	pcf	(User Input)

Factors for Extreme Wind Calculation

Elevation of Top of Mast Above Grade =	$TME := 90$	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 2007 Table 250-3 equation)
Importance Factor =	$I := 1.0$		(User Input from NESC 2007 Section 250.C.2)

Velocity Pressure Coefficient = $Kz := 2.01 \cdot \left(\frac{TME}{900}\right)^{\frac{2}{9.5}} = 1.238$ (NESC 2007 Table 250-2)

Exposure Factor = $Es := 0.346 \left[\frac{33}{(0.67 \cdot TME)}\right]^{\frac{1}{7}} = 0.317$ (NESC 2007 Table 250-3)

Response Term = $Bs := \frac{1}{\left(1 + 0.375 \cdot \frac{TME}{220}\right)} = 0.867$ (NESC 2007 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 2007 Table 250-3)

Wind Pressure = $qz := 0.00256 \cdot Kz \cdot V^2 \cdot Grf \cdot I = 33.7$ psf (NESC 2007 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

Overload Factors for Wind Loads:

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

Overload Factors for Vertical Loads:

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

Development of Wind & Ice Load on Mast

Mast Data:	(3" Sch. 80 Pipe)		
Mast Shape =	Round		(User Input)
Mast Diameter =	$D_{mast} := 3.5$	in	(User Input)
Mast Length =	$L_{mast} := 8.5$	ft	(User Input)
Mast Thickness =	$t_{mast} := 0.3$	in	(User Input)

Wind Load (NESC Extreme)

Mast Projected Surface Area =	$A_{mast} := \frac{D_{mast}}{12} = 0.292$	sf/ft	
Total Mast Wind Force (Below NU Structure) =	$qz \cdot Cd_R \cdot A_{mast} = 13$	plf	**BLC 5,7**

Wind Load (NESE Heavy)

Mast Projected Surface Area w/ Ice =	$AICE_{mast} := \frac{(D_{mast} + 2 \cdot Ir)}{12} = 0.375$	sf/ft	
Total Mast Wind Force w/ Ice =	$p \cdot Cd_R \cdot AICE_{mast} = 2$	plf	**BLC 4,6**

Gravity Loads (without ice)

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

Gravity Loads (ice only)

Ice Area per Linear Foot =	$Ai_{mast} := \frac{\pi}{4}\left[(D_{mast} + Ir \cdot 2)^2 - D_{mast}^2\right] = 6.3$	sq in	
Weight of Ice on Mast =	$W_{ICEmast} := Id \cdot \frac{Ai_{mast}}{144} = 2$	plf	**BLC 3**

Development of Wind & Ice Load on Mast

Mast Data: (2" Sch. 40 Pipe)

Mast Shape =	Round		(User Input)
Mast Diameter =	$D_{mast} := 2.375$	in	(User Input)
Mast Length =	$L_{mast} := 6$	ft	(User Input)
Mast Thickness =	$t_{mast} := 0.154$	in	(User Input)

Wind Load (NESC Extreme)

Mast Projected Surface Area = $A_{mast} := \frac{D_{mast}}{12} = 0.198$ sf/ft

Total Mast Wind Force (Below NU Structure) = $qz \cdot Cd_R \cdot A_{mast} = 9$ plf **BLC 5,7**

Wind Load (NESE Heavy)

Mast Projected Surface Area w/ Ice = $AICE_{mast} := \frac{(D_{mast} + 2 \cdot Ir)}{12} = 0.281$ sf/ft

Total Mast Wind Force w/ Ice = $p \cdot Cd_R \cdot AICE_{mast} = 1$ plf **BLC 4,6**

Gravity Loads (without ice)

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

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{mast} := \frac{\pi}{4}\left[(D_{mast} + Ir \cdot 2)^2 - D_{mast}^{\,2}\right] = 4.5$ sq in

Weight of Ice on Mast = $W_{ICEmast} := Id \cdot \frac{Ai_{mast}}{144} = 2$ plf **BLC 3**

Development of Wind & Ice Load on Brace Member

Member Data:	HSS4x4x1/4		
Shape =	Flat		(User Input)
Width =	$W_{mem} := 4$	in	(User Input)
Length =	$L_{mem} := 1$	ft	(User Input)
Height =	$H_{mem} := 4$	in	(User Input)

Wind Load (NESC Extreme)

Member Projected Surface Area = $A_{mem} := \frac{W_{mem}}{12} = 0.333$

Total Member Wind Force = $qz \cdot Cd_F \cdot A_{mem} = 18$ plf **BLC 5,7**

Wind Load (NESE Heavy)

Member Projected Surface Area w/ Ice = $AICE_{mem} := \frac{(W_{mem} + 2 \cdot Ir)}{12} = 0.417$

Total Member Wind Force w/ Ice = $p \cdot Cd_F \cdot AICE_{mem} = 3$ plf **BLC 4,6**

Gravity Loads (without ice)

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

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{mem} := (W_{mem} + 2 \cdot Ir) \cdot (H_{mem} + 2 \cdot Ir) - W_{mem} \cdot H_{mem} = 9$ sq in

Weight of Ice on Member = $W_{ICEmem} := Id \cdot \frac{Ai_{mem}}{144} = 4$ plf **BLC 3**

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Commscope NNH4-65BH-R6			
Antenna Shape =	Flat		(User Input)	
Antenna Height =	$L_{ant} := 71.97$	in	(User Input)	
Antenna Width =	$W_{ant} := 19.61$	in	(User Input)	
Antenna Thickness =	$T_{ant} := 7.76$	in	(User Input)	
Antenna Weight =	$WT_{ant} := 117$	lbs	(User Input)	
Number of Antennas =	$N_{ant} := 1$		(User Input)	(One per pipe mast / tot. of 3)

Wind Load (NESC Extreme)

Surface Area for One Antenna = $SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 9.8$ sf

Total Antenna Wind Force = $F_{antF} := qz \cdot Cd_F \cdot SA_{antF} = 529$ lbs

Surface Area for One Antenna = $SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 3.9$ sf

Total Antenna Wind Force = $F_{antS} := qz \cdot Cd_F \cdot SA_{antS} = 209$ lbs

Wind Load (NESC Heavy)

Surface Area for One Antenna w/ Ice = $SA_{ICEantF} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 10.4$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := p \cdot Cd_F \cdot SA_{ICEantF} = 67$ lbs

Surface Area for One Antenna w/ Ice = $SA_{ICEantS} := \frac{(L_{ant} + 1) \cdot (T_{ant} + 1)}{144} = 4.4$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := p \cdot Cd_F \cdot SA_{ICEantS} = 28$ lbs

Gravity Load (without ice)

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

Gravity Load (ice only)

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

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 1)(W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 2222$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 72$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 72$ lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Samsung VZS01			
Antenna Shape =	Flat		(User Input)	
Antenna Height =	$L_{ant} := 35.1$	in	(User Input)	
Antenna Width =	$W_{ant} := 16.1$	in	(User Input)	
Antenna Thickness =	$T_{ant} := 5.5$	in	(User Input)	
Antenna Weight =	$WT_{ant} := 87.1$	lbs	(User Input)	
Number of Antennas =	$N_{ant} := 1$		(User Input)	(One per pipe mast / tot. of 3)

Wind Load (NESC Extreme)

Surface Area for One Antenna = $SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 3.9$ sf

Total Antenna Wind Force = $F_{antF} := qz \cdot Cd_F \cdot SA_{antF} = 212$ lbs

Surface Area for One Antenna = $SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 1.3$ sf

Total Antenna Wind Force = $F_{antS} := qz \cdot Cd_F \cdot SA_{antS} = 72$ lbs

Wind Load (NESC Heavy)

Surface Area for One Antenna w/ Ice = $SA_{ICEantF} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 4.3$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := p \cdot Cd_F \cdot SA_{ICEantF} = 27$ lbs

Surface Area for One Antenna w/ Ice = $SA_{ICEantS} := \frac{(L_{ant} + 1) \cdot (T_{ant} + 1)}{144} = 1.6$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := p \cdot Cd_F \cdot SA_{ICEantS} = 10$ lbs

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 87$ lbs

Gravity Load (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 3108$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 1)(W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 904$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 29$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 29$ lbs

Development of Wind & Ice Load on RRHs

RRH Data:

RRH Model =	Samsung B2/B66A RRH			
RRH Shape =	Flat		(User Input)	
RRH Height =	$L_{RRH} := 15$	in	(User Input)	
RRH Width =	$W_{RRH} := 15$	in	(User Input)	
RRH Thickness =	$T_{RRH} := 10$	in	(User Input)	
RRH Weight =	$WT_{RRH} := 84.4$	lbs	(User Input)	
Number of RRHs =	$N_{RRH} := 1$		(User Input)	(One per pipe mast / tot. of 3)

Wind Load (NESC Extreme)

Surface Area for One RRH = $SA_{RRHF} := \frac{L_{RRH} \cdot W_{RRH}}{144} = 1.6$ sf

Total RRH Wind Force = $F_{RRHF} := qz \cdot Cd_F \cdot SA_{RRHF} = 84$ lbs

Surface Area for One RRH = $SA_{RRHS} := \frac{L_{RRH} \cdot T_{RRH}}{144} = 1$ sf

Total RRH Wind Force = $F_{RRHS} := qz \cdot Cd_F \cdot SA_{RRHS} = 56$ lbs

Wind Load (NESC Heavy)

Surface Area for One RRH w/ Ice = $SA_{ICERRHF} := \frac{(L_{RRH} + 1) \cdot (W_{RRH} + 1)}{144} = 1.8$ sf

Total RRH Wind Force w/ Ice = $Fi_{RRHF} := p \cdot Cd_F \cdot SA_{ICERRHF} = 11$ lbs

Surface Area for One RRH w/ Ice = $SA_{ICERRHS} := \frac{(L_{RRH} + 1) \cdot (T_{RRH} + 1)}{144} = 1.2$ sf

Total RRH Wind Force w/ Ice = $Fi_{RRHS} := p \cdot Cd_F \cdot SA_{ICERRHS} = 8$ lbs

Gravity Load (without ice)

Weight of All RRHs = $WT_{RRH} \cdot N_{RRH} = 84$ lbs

Gravity Load (ice only)

Volume of Each RRH = $V_{RRH} := L_{RRH} \cdot W_{RRH} \cdot T_{RRH} = 2250$ cu in

Volume of Ice on Each RRH = $V_{ice} := (L_{RRH} + 1)(W_{RRH} + 1) \cdot (T_{RRH} + 1) - V_{RRH} = 566$ cu in

Weight of Ice on Each RRH = $W_{ICERRH} := \frac{V_{ice}}{1728} \cdot Id = 18$ lbs

Weight of Ice on All RRHs = $W_{ICERRH} \cdot N_{RRH} = 18$ lbs

Development of Wind & Ice Load on RRHs

RRH Data:

RRH Model =	Samsung B5/B13 RRH			
RRH Shape =	Flat		(User Input)	
RRH Height =	$L_{RRH} := 15$	in	(User Input)	
RRH Width =	$W_{RRH} := 15$	in	(User Input)	
RRH Thickness =	$T_{RRH} := 8.1$	in	(User Input)	
RRH Weight =	$WT_{RRH} := 70.3$	lbs	(User Input)	
Number of RRHs =	$N_{RRH} := 1$		(User Input)	(One per pipe mast / tot. of 3)

Wind Load (NESC Extreme)

Surface Area for One RRH = $SA_{RRHF} := \frac{L_{RRH} \cdot W_{RRH}}{144} = 1.6$ sf

Total RRH Wind Force = $F_{RRHF} := qz \cdot Cd_F \cdot SA_{RRHF} = 84$ lbs

Surface Area for One RRH = $SA_{RRHS} := \frac{L_{RRH} \cdot T_{RRH}}{144} = 0.8$ sf

Total RRH Wind Force = $F_{RRHS} := qz \cdot Cd_F \cdot SA_{RRHS} = 46$ lbs

Wind Load (NESC Heavy)

Surface Area for One RRH w/ Ice = $SA_{ICERRHF} := \frac{(L_{RRH} + 1) \cdot (W_{RRH} + 1)}{144} = 1.8$ sf

Total RRH Wind Force w/ Ice = $Fi_{RRHF} := p \cdot Cd_F \cdot SA_{ICERRHF} = 11$ lbs

Surface Area for One RRH w/ Ice = $SA_{ICERRHS} := \frac{(L_{RRH} + 1) \cdot (T_{RRH} + 1)}{144} = 1$ sf

Total RRH Wind Force w/ Ice = $Fi_{RRHS} := p \cdot Cd_F \cdot SA_{ICERRHS} = 6$ lbs

Gravity Load (without ice)

Weight of All RRHs = $WT_{RRH} \cdot N_{RRH} = 70$ lbs

Gravity Load (ice only)

Volume of Each RRH = $V_{RRH} := L_{RRH} \cdot W_{RRH} \cdot T_{RRH} = 1823$ cu in

Volume of Ice on Each RRH = $V_{ice} := (L_{RRH} + 1)(W_{RRH} + 1) \cdot (T_{RRH} + 1) - V_{RRH} = 507$ cu in

Weight of Ice on Each RRH = $W_{ICERRH} := \frac{V_{ice}}{1728} \cdot Id = 16$ lbs

Weight of Ice on All RRHs = $W_{ICERRH} \cdot N_{RRH} = 16$ lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFS DB-T1-6Z-8AB-0Z			
Antenna Shape =	Flat		(User Input)	
Antenna Height =	$L_{ant} := 24$	in	(User Input)	
Antenna Width =	$W_{ant} := 24$	in	(User Input)	
Antenna Thickness =	$T_{ant} := 10$	in	(User Input)	
Antenna Weight =	$WT_{ant} := 45$	lbs	(User Input)	
Number of Antennas =	$N_{ant} := 1$		(User Input)	(One per pipe mast / tot. of 2)

Wind Load (NESC Extreme)

Surface Area for One Antenna = $SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 4$ sf

Total Antenna Wind Force = $F_{ant} := qz \cdot Cd_F \cdot SA_{antF} = 216$ lbs

Surface Area for One Antenna = $SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 1.7$ sf

Total Antenna Wind Force = $F_{ant} := qz \cdot Cd_F \cdot SA_{antS} = 90$ lbs

Wind Load (NESC Heavy)

Surface Area for One Antenna w/ Ice = $SA_{ICEantF} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 4.3$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := p \cdot Cd_F \cdot SA_{ICEantF} = 28$ lbs

Surface Area for One Antenna w/ Ice = $SA_{ICEantS} := \frac{(L_{ant} + 1) \cdot (T_{ant} + 1)}{144} = 1.9$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := p \cdot Cd_F \cdot SA_{ICEantS} = 12$ lbs

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 45$ lbs

Gravity Load (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 5760$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 1)(W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 1115$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 36$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 36$ lbs

(Global) Model Settings

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

Hot Rolled Steel Code	AISC 14th(360-10): LRFD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	AISC 14th(360-10): ASD
Cold Formed Steel Code	AISI 1999: ASD
Wood Code	AF&PA NDS-91/97: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-02
Masonry Code	ACI 530-13: ASD
Aluminum Code	AA ADM1-15: ASD - Building
Stainless Steel Code	AISC 14th(360-10): ASD
Adjust Stiffness?	Yes(Iterative)

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	PCA Load Contour
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	Yes
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

(Global) Model Settings, Continued

Seismic Code	UBC 1997
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	No
Ct X	.035
Ct Z	.035
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	8.5
R Z	8.5
Ca	.36
Cv	.54
Nv	1
Occupancy Category	4
Seismic Zone	3
Om Z	1
Om X	1
Rho Z	1
Rho X	1
Footing Overturning Safety Factor	1.5
Optimize for OTM/Sliding	No
Check Concrete Bearing	No
Footing Concrete Weight (k/ft^3)	0
Footing Concrete f'c (ksi)	3
Footing Concrete Ec (ksi)	4000
Lambda	1
Footing Steel fy (ksi)	60
Minimum Steel	0.0018
Maximum Steel	0.0075
Footing Top Bar	#3
Footing Top Bar Cover (in)	3.5
Footing Bottom Bar	#3
Footing Bottom Bar Cover (in)	3.5
Pedestal Bar	#3
Pedestal Bar Cover (in)	1.5
Pedestal Ties	#3

Hot Rolled Steel Properties

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

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Ru...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Mast-new	PIPE_12.0X	Column	Pipe	A53 Gr. B	Typical	17.5	339	339	678
2	Outrigger	HSS6X6X5	Beam	Wide Flange	A500 Gr.46	Typical	6.43	34.3	34.3	55.4

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	Mast-new	26			Lbyy						Lateral
2	M2	Outrigger	1.5			Lbyy						Lateral
3	M3	Outrigger	1.5			Lbyy						Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design R...
1	M1	BOT-M...	TOP-M...			Mast-new	Column	Pipe	A53 Gr. B	Typical
2	M2	TOP-B...	N4			Outrigger	Beam	Wide Flange	A500 Gr.46	Typical
3	M3	BOT-M...	N5			Outrigger	Beam	Wide Flange	A500 Gr.46	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	TOP-BRACE	0	9	0	0	
2	TOP-MAST	0	26	0	0	
3	BOT-MAST	0	0	0	0	
4	N4	0	9	-1.5	0	
5	N5	0	0	-1.5	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	TOP-BRACE						
2	BOT-MAST						
3	N4	Reaction	Reaction	Reaction		Reaction	
4	N5	Reaction	Reaction	Reaction		Reaction	

Member Point Loads (BLC 2 : Weight of Equipment)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Y	-.123	22
2	M1	Y	-.462	22
3	M1	Y	-1.08	22

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Y	-.099	22
2	M1	Y	-.338	22
3	M1	Y	-.17	22

Member Point Loads (BLC 4 : NESC Heavy Wind X-Dir)

Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]

Member Point Loads (BLC 4 : NESC Heavy Wind X-Dir) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	X	.069	22
2	M1	X	.224	22
3	M1	X	.044	22

Member Point Loads (BLC 5 : NESC Extreme Wind X-Dir)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	X	.678	22
2	M1	X	2.355	22
3	M1	X	.315	22

Member Point Loads (BLC 6 : NESC Heavy Wind Z-Dir)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Z	.069	22
2	M1	Z	.224	22
3	M1	Z	.044	22

Member Point Loads (BLC 7 : NESC Extreme Wind Z-Dir)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Z	.687	22
2	M1	Z	2.355	22
3	M1	Z	.315	22

Member Distributed Loads (BLC 2 : Weight of Equipment)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.008	-.008	0	12
2	M1	Y	-.016	-.016	12	18

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.008	-.008	0	0
2	M1	Y	-.015	-.015	0	12
3	M1	Y	-.03	-.03	12	18

Member Distributed Loads (BLC 4 : NESC Heavy Wind X-Dir)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.007	.007	0	0
2	M1	X	.002	.002	0	12
3	M1	X	.004	.004	12	18

Member Distributed Loads (BLC 5 : NESC Extreme Wind X-Dir)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.061	.061	0	12
2	M1	X	.077	.077	12	0
3	M1	X	.015	.015	0	12
4	M1	X	.037	.037	12	18

Member Distributed Loads (BLC 6 : NESC Heavy Wind Z-Dir)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	Z	.007	.007	0	0
2	M1	Z	.002	.002	0	12
3	M1	Z	.004	.004	12	18

Member Distributed Loads (BLC 7 : NESC Extreme Wind Z-Dir)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	Z	.061	.061	0	12
2	M1	Z	.077	.077	12	0
3	M1	Z	.015	.015	0	12
4	M1	Z	.037	.037	12	18

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 Equipment	None					3	2		
3	Weight of Ice Only	None					3	3		
4	NESC Heavy Wind X-Dir	None					3	3		
5	NESC Extreme Wind X-Dir	None					3	4		
6	NESC Heavy Wind Z-Dir	None					3	3		
7	NESC Extreme Wind Z-Dir	None					3	4		

Load Combinations

	Description	Solve	P...	S...	B...	Fa...	BLC	Fact...	BLC	Fa...	BLC	Fa...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	NESC Heavy Wind ...	Yes	Y		1	1.5	2	1.5	3	1.5	4	2.5												
2	NESC Extreme Win...	Yes	Y		1	1	2	1	5	1														
3	NESC Heavy Wind ...	Yes	Y		1	1.5	2	1.5	3	1.5	6	2.5												
4	NESC Extreme Win...	Yes	Y		1	1	2	1	7	1														

Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	N4	-2.869	.027	-1.152	0	-4.302	0
2	1	N5	1.451	6.942	1.152	0	2.177	0
3	1	Totals:	-1.417	6.969	0			
4	1	COG (ft):	X: 0	Y: 16.984	Z: -.011			

Joint Reactions

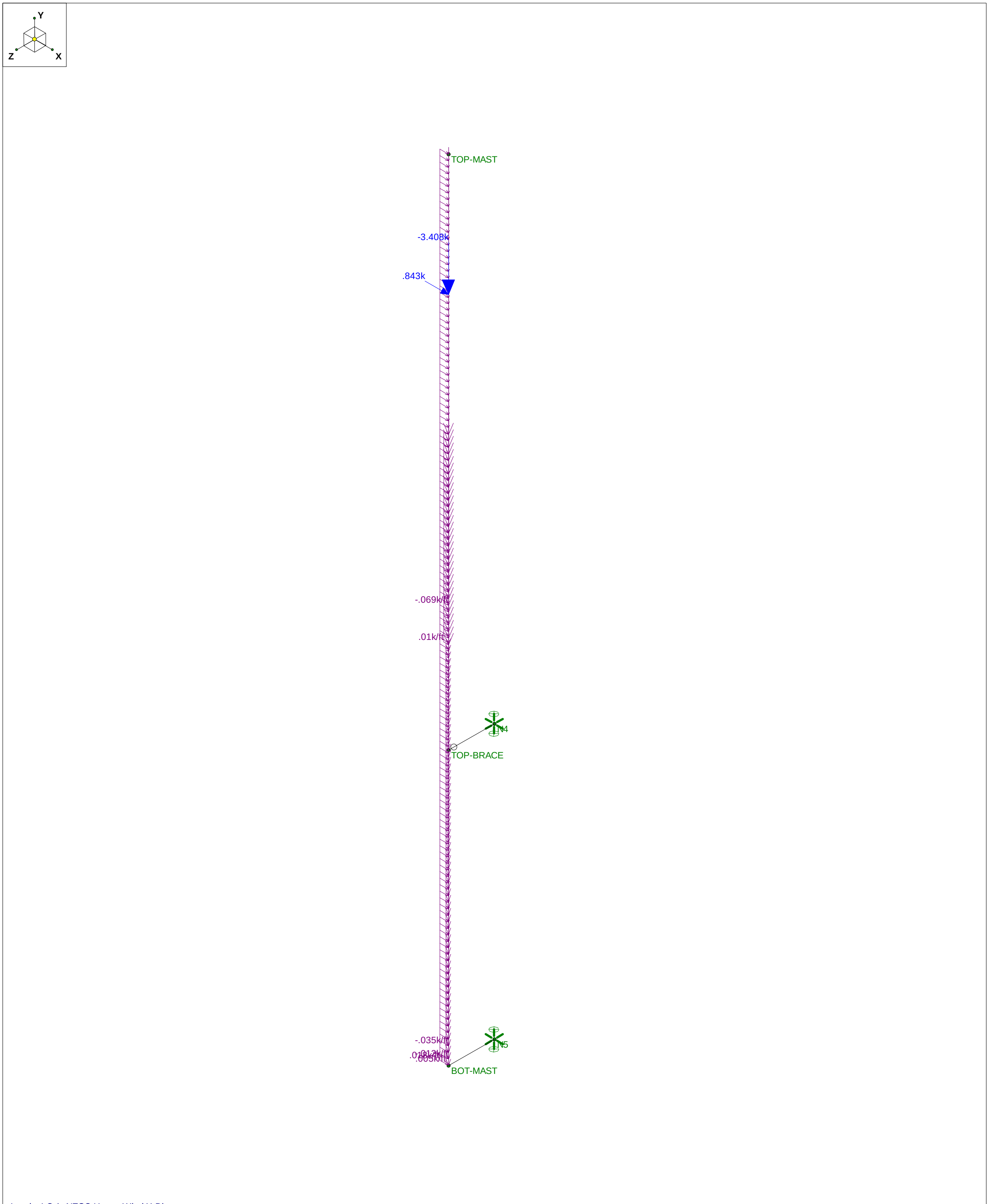
	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	N4	-11.461	.017	-.573	0	-17.191	0
2	2	N5	5.901	3.454	.573	0	8.853	0
3	2	Totals:	-5.56	3.471	0			
4	2	COG (ft):	X: 0	Y: 17.018	Z: -.014			

Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	3	N4	0	.031	-4.019	0	0	0
2	3	N5	0	6.938	2.601	0	0	0
3	3	Totals:	0	6.969	-1.417			
4	3	COG (ft):	X: 0	Y: 16.984	Z: -.011			

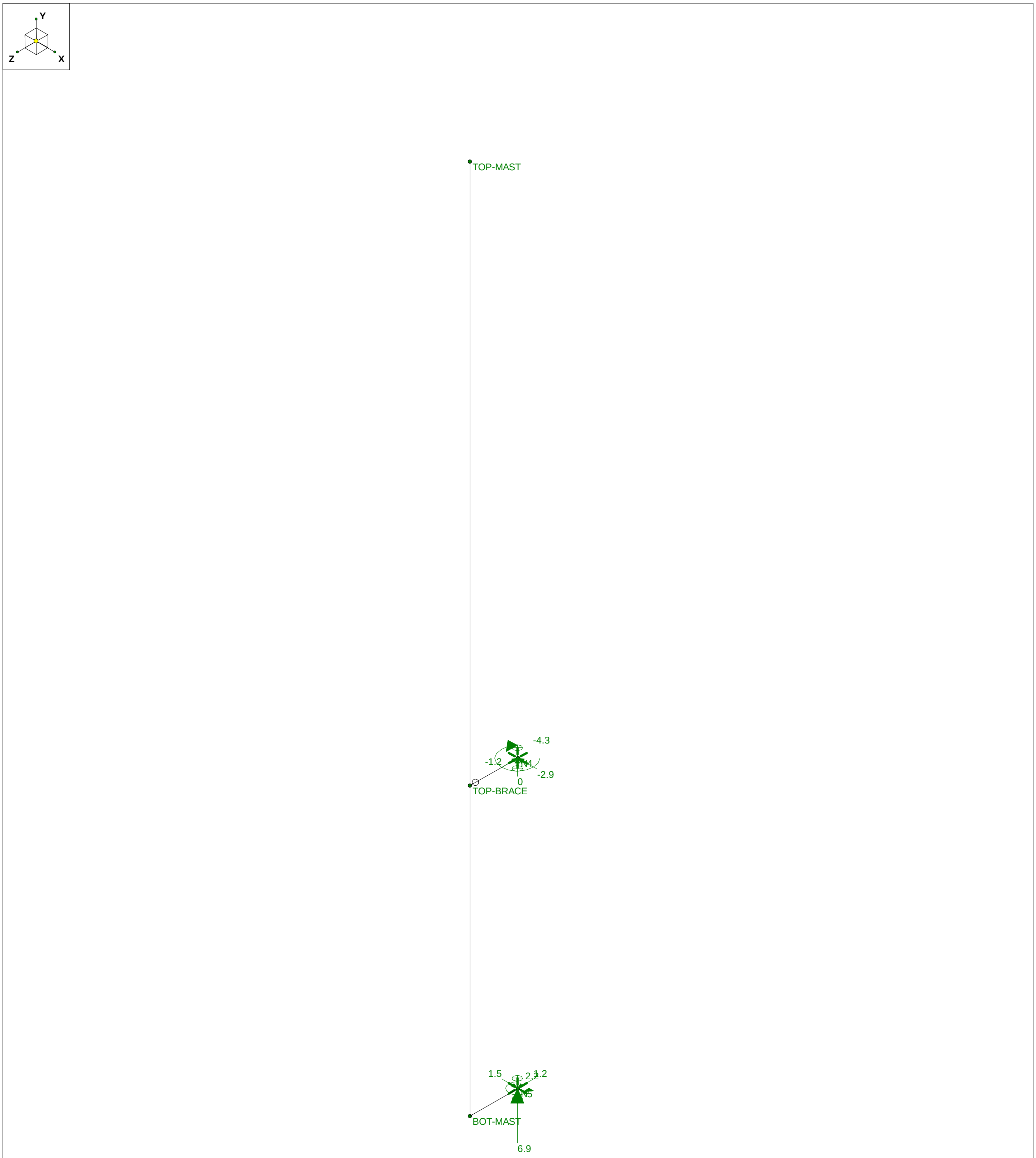
Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	4	N4	0	.01	-12.054	0	0	0
2	4	N5	0	3.461	6.485	0	0	0
3	4	Totals:	0	3.471	-5.569			
4	4	COG (ft):	X: 0	Y: 17.018	Z: -.014			



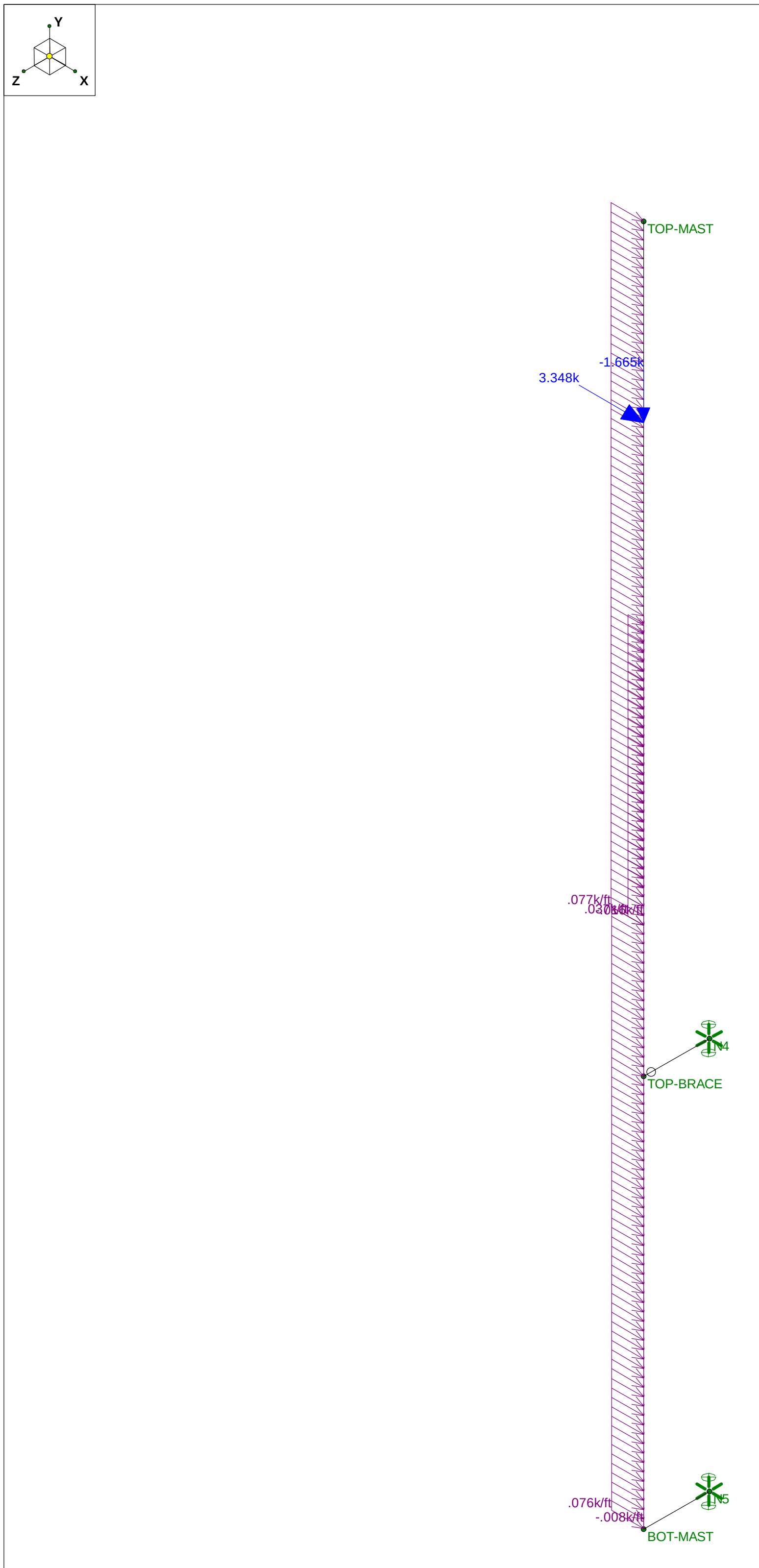
Loads: LC 1, NESC Heavy Wind X-Dir

Centek	Pole # 845 - T-Mobile Mast LC #1 Loads	
TJL		July 13, 2021 at 3:17 PM
20150.03		T-Mobile Antenna Mast - NESC.r3d



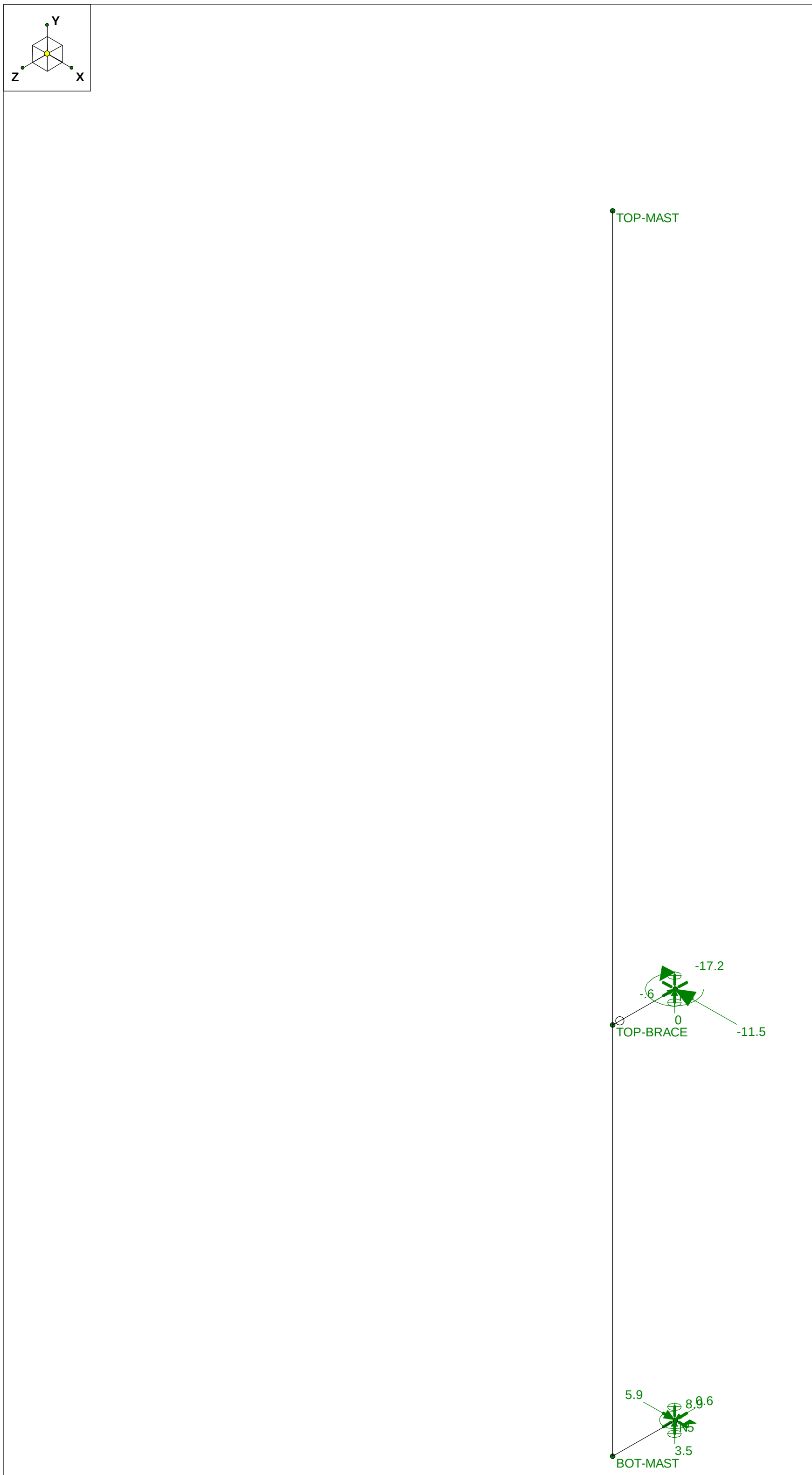
Results for LC 1, NESC Heavy Wind X-Dir
Reaction and Moment Units are k and k-ft

Centek	Pole # 845 - T-Mobile Mast	
TJL		July 13, 2021 at 3:18 PM
20150.03	LC #1 Reactions	T-Mobile Antenna Mast - NESC.r3d



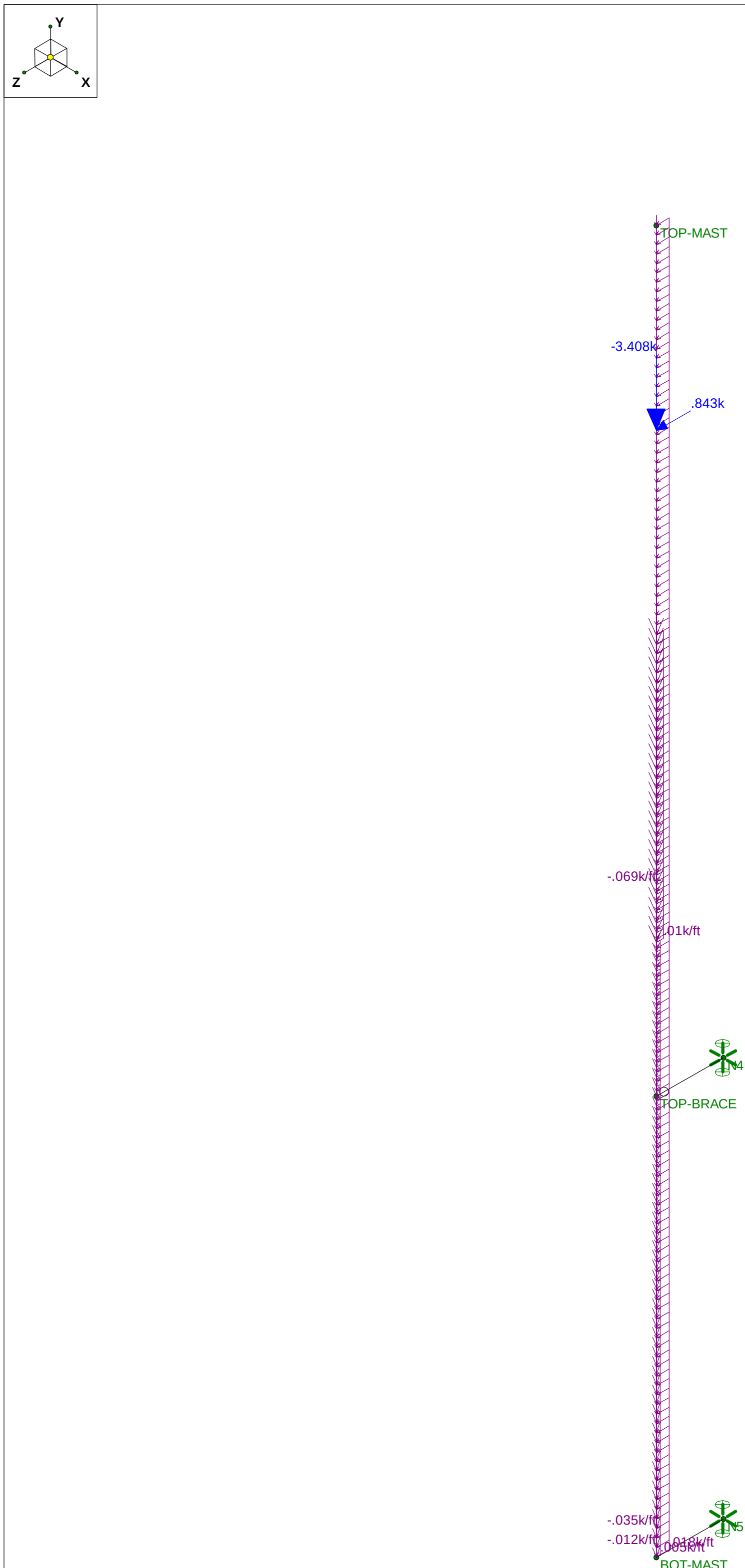
Loads: LC 2, NESC Extreme Wind X-Dir

Centek	Pole # 845 - T-Mobile Mast	
TJL		July 13, 2021 at 3:17 PM
20150.03	LC #2 Loads	T-Mobile Antenna Mast - NESC.r3d



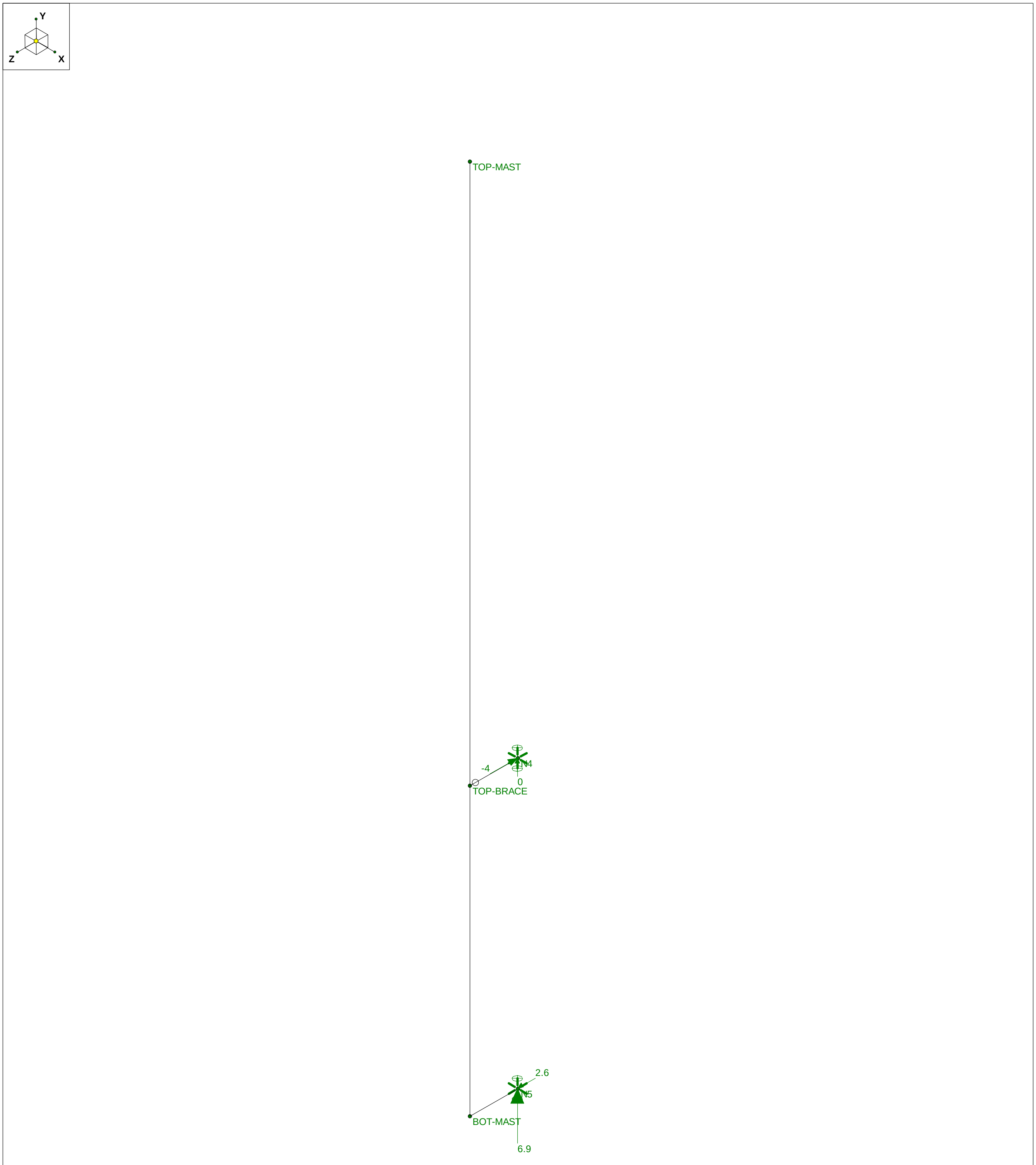
Results for LC 2, NESC Extreme Wind X-Dir
Reaction and Moment Units are k and k-ft

Centek	Pole # 845 - T-Mobile Mast	
TJL		July 13, 2021 at 3:19 PM
20150.03	LC #2 Reactions	T-Mobile Antenna Mast - NESC.r3d



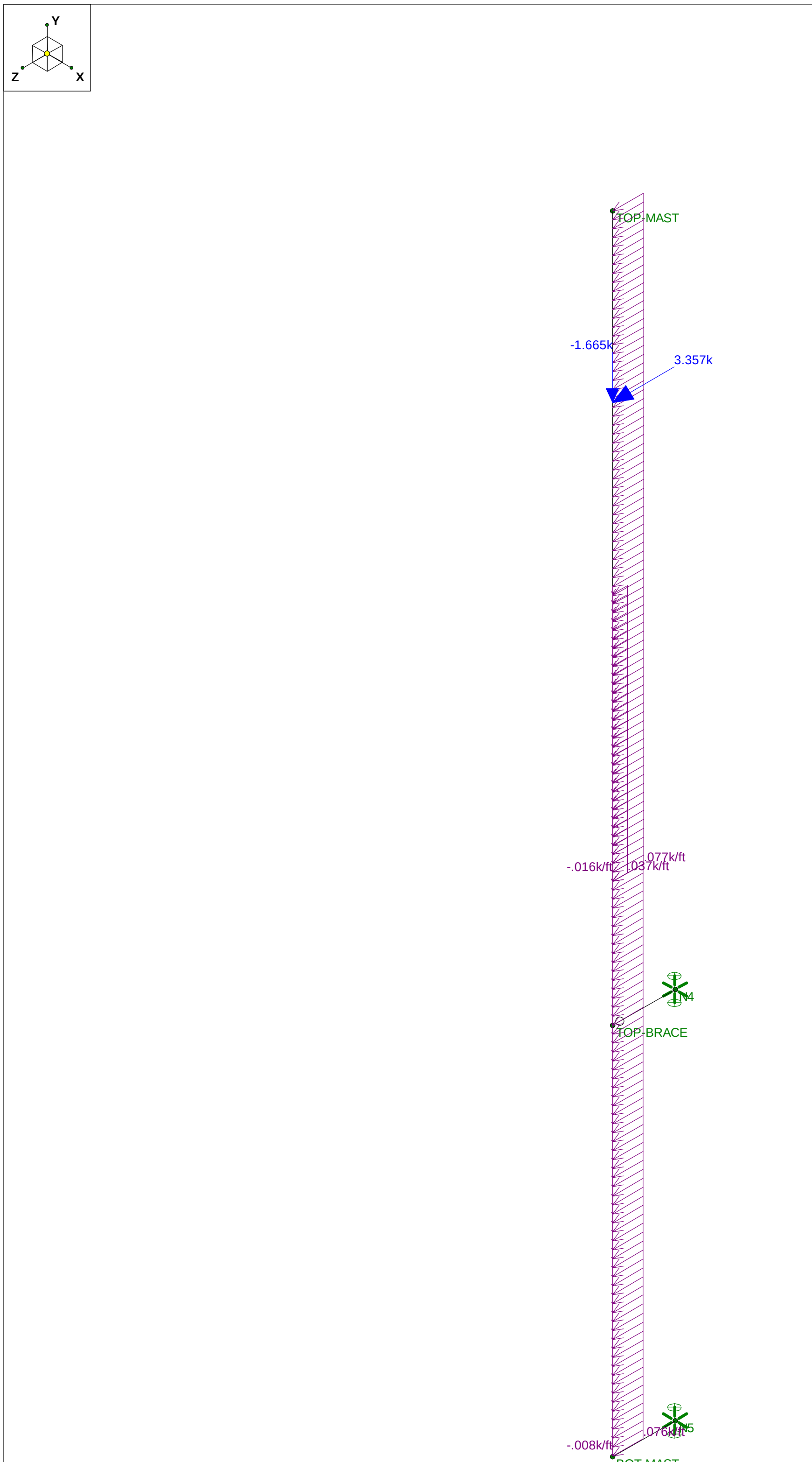
Loads: LC 3, NESC Heavy Wind Z-Dir

Centek	Pole # 845 - T-Mobile Mast	
TJL		July 13, 2021 at 3:17 PM
20150.03	LC #3 Loads	T-Mobile Antenna Mast - NESC.r3d



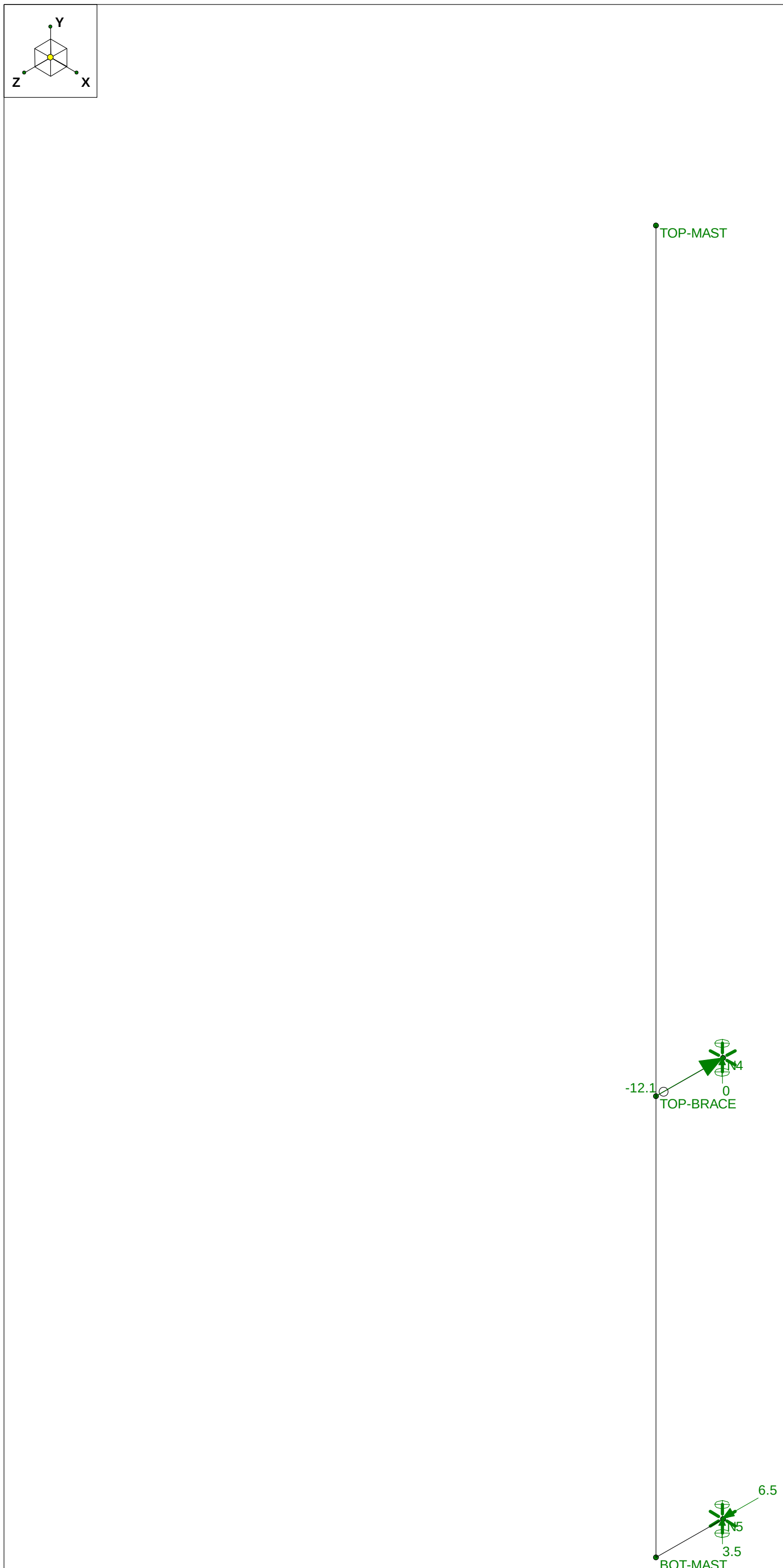
Results for LC 3, NESC Heavy Wind Z-Dir
Reaction and Moment Units are k and k-ft

Centek		
TJL	Pole # 845 - T-Mobile Mast	July 13, 2021 at 3:20 PM
20150.03	LC #3 Reactions	T-Mobile Antenna Mast - NESC.r3d



Loads: LC 4, NESC Extreme Wind Z-Dir

Centek	Pole # 845 - T-Mobile Mast	
TJL		July 13, 2021 at 3:17 PM
20150.03	LC #4 Loads	T-Mobile Antenna Mast - NESC.r3d



Results for LC 4, NESC Extreme Wind Z-Dir
Reaction and Moment Units are k and k-ft

Centek		
TJL	Pole # 845 - T-Mobile Mast	July 13, 2021 at 3:22 PM
20150.03	LC #4 Reactions	T-Mobile Antenna Mast - NESC.r3d

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	No
Max Iterations for Wall Stiffness	3
Gravity Acceleration (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 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 Ru...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Horz Mast	PIPE_3.0X	Beam	Pipe	A53 Gr. B	Typical	2.83	3.7	3.7	7.4
2	Pipe Mast	PIPE_2.0	Column	Pipe	A53 Gr. B	Typical	1.02	.627	.627	1.25
3	Outrigger	HSS4X4X4	Beam	Tube	A500 Gr.46	Typical	3.37	7.8	7.8	12.8
4	Plate	6"X3/4" PL	Beam	Tube	A36 Gr.36	Typical	4.5	.211	13.5	.777

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	1			Lbyy						Lateral
2	M2	Horz Mast	8.5			Lbyy						Lateral
3	M3	Plate	2			Lbyy						Lateral
4	M4	Pipe Mast	6			Lbyy						Lateral
5	M5	Pipe Mast	6			Lbyy						Lateral
6	M6	Pipe Mast	6			Lbyy						Lateral
7	M7	Pipe Mast	6			Lbyy						Lateral
8	M8	Outrigger	1			Lbyy						Lateral
9	M9	Horz Mast	8.5			Lbyy						Lateral
10	M10	Plate	2			Lbyy						Lateral
11	M11	Outrigger	1			Lbyy						Lateral
12	M12	Horz Mast	8.5			Lbyy						Lateral
13	M13	Plate	2			Lbyy						Lateral
14	M14	Pipe Mast	6			Lbyy						Lateral
15	M15	Pipe Mast	6			Lbyy						Lateral
16	M16	Pipe Mast	6			Lbyy						Lateral
17	M17	Pipe Mast	6			Lbyy						Lateral
18	M18	Outrigger	1			Lbyy						Lateral
19	M19	Horz Mast	8.5			Lbyy						Lateral
20	M20	Plate	2			Lbyy						Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design R...
1	M1	N3	N4			Outrigger	Beam	Tube	A500 Gr.46	Typical
2	M2	N5	N9			Horz Mast	Beam	Pipe	A53 Gr. B	Typical
3	M3	N2	N1			Plate	Beam	Tube	A36 Gr.36	Typical
4	M4	N10	N11			Pipe Mast	Column	Pipe	A53 Gr. B	Typical
5	M5	N12	N13			Pipe Mast	Column	Pipe	A53 Gr. B	Typical
6	M6	N14	N15			Pipe Mast	Column	Pipe	A53 Gr. B	Typical
7	M7	N16	N17			Pipe Mast	Column	Pipe	A53 Gr. B	Typical
8	M8	N20	N21			Outrigger	Beam	Tube	A500 Gr.46	Typical
9	M9	N22	N26			Horz Mast	Beam	Pipe	A53 Gr. B	Typical
10	M10	N19	N18			Plate	Beam	Tube	A36 Gr.36	Typical
11	M11	N29	N30			Outrigger	Beam	Tube	A500 Gr.46	Typical
12	M12	N31	N35			Horz Mast	Beam	Pipe	A53 Gr. B	Typical
13	M13	N28	N27			Plate	Beam	Tube	A36 Gr.36	Typical
14	M14	N36	N37			Pipe Mast	Column	Pipe	A53 Gr. B	Typical
15	M15	N38	N39			Pipe Mast	Column	Pipe	A53 Gr. B	Typical
16	M16	N40	N41			Pipe Mast	Column	Pipe	A53 Gr. B	Typical
17	M17	N42	N43			Pipe Mast	Column	Pipe	A53 Gr. B	Typical
18	M18	N46	N47			Outrigger	Beam	Tube	A500 Gr.46	Typical
19	M19	N48	N52			Horz Mast	Beam	Pipe	A53 Gr. B	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design R...
20	M20	N45	N44			Plate	Beam	Tube	A36 Gr.36	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	1	0	1.25	0	
2	N2	-1	0	1.25	0	
3	N3	0	0	1.25	0	
4	N4	0	0	2.25	0	
5	N5	-4.5	0	2.25	0	
6	N6	-4	0	2.25	0	
7	N7	-2	0	2.25	0	
8	N8	2	0	2.25	0	
9	N9	4	0	2.25	0	
10	N10	-4	3	2.25	0	
11	N11	-4	-3	2.25	0	
12	N12	-2	3	2.25	0	
13	N13	-2	-3	2.25	0	
14	N14	2	3	2.25	0	
15	N15	2	-3	2.25	0	
16	N16	4	3	2.25	0	
17	N17	4	-3	2.25	0	
18	N18	1	2.5	1.25	0	
19	N19	-1	2.5	1.25	0	
20	N20	0	2.5	1.25	0	
21	N21	0	2.5	2.25	0	
22	N22	-4.5	2.5	2.25	0	
23	N23	-4	2.5	2.25	0	
24	N24	-2	2.5	2.25	0	
25	N25	2	2.5	2.25	0	
26	N26	4	2.5	2.25	0	
27	N27	1	0	-1.25	0	
28	N28	-1	0	-1.25	0	
29	N29	0	0	-1.25	0	
30	N30	0	0	-2.25	0	
31	N31	-4.5	0	-2.25	0	
32	N32	-4	0	-2.25	0	
33	N33	-2	0	-2.25	0	
34	N34	2	0	-2.25	0	
35	N35	4	0	-2.25	0	
36	N36	-4	3	-2.25	0	
37	N37	-4	-3	-2.25	0	
38	N38	-2	3	-2.25	0	
39	N39	-2	-3	-2.25	0	
40	N40	2	3	-2.25	0	
41	N41	2	-3	-2.25	0	
42	N42	4	3	-2.25	0	
43	N43	4	-3	-2.25	0	
44	N44	1	2.5	-1.25	0	
45	N45	-1	2.5	-1.25	0	
46	N46	0	2.5	-1.25	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
47	N47	0	2.5	-2.25	0	
48	N48	-4.5	2.5	-2.25	0	
49	N49	-4	2.5	-2.25	0	
50	N50	-2	2.5	-2.25	0	
51	N51	2	2.5	-2.25	0	
52	N52	4	2.5	-2.25	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N2	Reaction	Reaction	Reaction			
2	N1	Reaction	Reaction	Reaction			
3	N18	Reaction	Reaction	Reaction			
4	N19	Reaction	Reaction	Reaction			
5	N27	Reaction	Reaction	Reaction			
6	N28	Reaction	Reaction	Reaction			
7	N44	Reaction	Reaction	Reaction			
8	N45	Reaction	Reaction	Reaction			

Member Point Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	Y	-.059	1
2	M15	Y	-.059	1
3	M17	Y	-.059	1
4	M5	Y	-.059	5
5	M15	Y	-.059	5
6	M17	Y	-.059	5
7	M4	Y	-.044	1
8	M7	Y	-.044	1
9	M14	Y	-.044	1
10	M4	Y	-.044	3.5
11	M7	Y	-.044	3.5
12	M14	Y	-.044	3.5
13	M5	Y	-.084	2.5
14	M15	Y	-.084	2.5
15	M17	Y	-.084	2.5
16	M5	Y	-.07	4
17	M15	Y	-.07	4
18	M17	Y	-.07	4
19	M6	Y	-.045	2
20	M16	Y	-.045	2

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	Y	-.036	1
2	M15	Y	-.036	1
3	M17	Y	-.036	1
4	M5	Y	-.036	5
5	M15	Y	-.036	5

Member Point Loads (BLC 3 : Weight of Ice Only) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
6	M17	Y	-.036	5
7	M4	Y	-.015	1
8	M7	Y	-.015	1
9	M14	Y	-.015	1
10	M4	Y	-.015	3.5
11	M7	Y	-.015	3.5
12	M14	Y	-.015	3.5
13	M5	Y	-.018	2.5
14	M15	Y	-.018	2.5
15	M17	Y	-.018	2.5
16	M5	Y	-.016	4
17	M15	Y	-.016	4
18	M17	Y	-.016	4
19	M6	Y	-.036	2
20	M16	Y	-.036	2

Member Point Loads (BLC 4 : x-dir NESC Heavy Wind)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	X	.014	1
2	M15	X	.014	1
3	M5	X	.014	5
4	M15	X	.014	5
5	M17	X	.034	1
6	M17	X	.034	5
7	M4	X	.005	1
8	M14	X	.005	1
9	M4	X	.005	3.5
10	M14	X	.005	3.5
11	M7	X	.014	1
12	M7	X	.014	3.5
13	M5	X	.008	2.5
14	M15	X	.008	2.5
15	M5	X	.006	4
16	M15	X	.006	4
17	M6	X	.012	2
18	M16	X	.012	2
19	M17	X	.011	2.5
20	M17	X	.011	4

Member Point Loads (BLC 5 : x-dir NESC Extreme Wind)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	X	.105	1
2	M15	X	.105	1
3	M5	X	.105	5
4	M15	X	.105	5
5	M17	X	.265	1
6	M17	X	.265	5
7	M4	X	.036	1
8	M14	X	.036	1
9	M4	X	.036	3.5
10	M14	X	.036	3.5

Member Point Loads (BLC 5 : x-dir NESC Extreme Wind) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
11	M7	X	.106	1
12	M7	X	.106	3.5
13	M5	X	.056	2.5
14	M15	X	.056	2.5
15	M5	X	.046	4
16	M15	X	.046	4
17	M6	X	.09	2
18	M16	X	.09	2
19	M17	X	.084	2.5
20	M17	X	.084	4

Member Point Loads (BLC 6 : z-dir NESC Heavy Wind)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	Z	-.034	1
2	M15	Z	-.034	1
3	M5	Z	-.034	5
4	M15	Z	-.034	5
5	M17	Z	-.014	1
6	M17	Z	-.014	5
7	M4	Z	-.014	1
8	M14	Z	-.014	1
9	M4	Z	-.014	3.5
10	M14	Z	-.014	3.5
11	M7	Z	-.005	1
12	M7	Z	-.005	3.5
13	M17	Z	-.008	2.5
14	M17	Z	-.006	4
15	M6	Z	-.028	2
16	M16	Z	-.028	2
17	M5	Z	-.011	2.5
18	M15	Z	-.011	2.5
19	M5	Z	-.011	4
20	M15	Z	-.011	4

Member Point Loads (BLC 7 : z-dir NESC Extreme Wind)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	Z	-.265	1
2	M15	Z	-.265	1
3	M5	Z	-.265	5
4	M15	Z	-.265	5
5	M17	Z	-.105	1
6	M17	Z	-.105	5
7	M4	Z	-.106	1
8	M14	Z	-.106	1
9	M4	Z	-.106	3.5
10	M14	Z	-.106	3.5
11	M7	Z	-.036	1
12	M7	Z	-.036	3.5
13	M17	Z	-.056	2.5
14	M17	Z	-.046	4
15	M6	Z	-.216	2

Member Point Loads (BLC 7 : z-dir NESC Extreme Wind) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
16	M16	Z	-.216	2
17	M5	Z	-.084	2.5
18	M15	Z	-.084	2.5
19	M5	Z	-.084	4
20	M15	Z	-.084	4

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M2	Y	-.002	-.002	0	0
2	M9	Y	-.002	-.002	0	0
3	M12	Y	-.002	-.002	0	0
4	M19	Y	-.002	-.002	0	0
5	M4	Y	-.002	-.002	0	0
6	M5	Y	-.002	-.002	0	0
7	M6	Y	-.002	-.002	0	0
8	M7	Y	-.002	-.002	0	0
9	M1	Y	-.004	-.004	0	0
10	M3	Y	-.002	-.002	0	0
11	M8	Y	-.004	-.004	0	0
12	M10	Y	-.002	-.002	0	0
13	M11	Y	-.004	-.004	0	0
14	M13	Y	-.002	-.002	0	0
15	M20	Y	-.002	-.002	0	0
16	M18	Y	-.004	-.004	0	0
17	M17	Y	-.002	-.002	0	0
18	M16	Y	-.002	-.002	0	0
19	M15	Y	-.002	-.002	0	0
20	M14	Y	-.002	-.002	0	0

Member Distributed Loads (BLC 4 : x-dir NESC Heavy Wind)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M4	X	.001	.001	0	0
2	M5	X	.001	.001	0	0
3	M6	X	.001	.001	0	0
4	M7	X	.001	.001	0	0
5	M17	X	.001	.001	0	0
6	M16	X	.001	.001	0	0
7	M15	X	.001	.001	0	0
8	M14	X	.001	.001	0	0
9	M18	X	.003	.003	0	0
10	M11	X	.003	.003	0	0
11	M1	X	.003	.003	0	0
12	M8	X	.003	.003	0	0

Member Distributed Loads (BLC 5 : x-dir NESC Extreme Wind)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M4	X	.009	.009	0	0
2	M5	X	.009	.009	0	0
3	M6	X	.009	.009	0	0

Member Distributed Loads (BLC 5 : x-dir NESC Extreme Wind) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
4	M7	X	.009	.009	0	0
5	M17	X	.009	.009	0	0
6	M16	X	.009	.009	0	0
7	M15	X	.009	.009	0	0
8	M14	X	.009	.009	0	0
9	M18	X	.018	.018	0	0
10	M11	X	.018	.018	0	0
11	M1	X	.018	.018	0	0
12	M8	X	.018	.018	0	0

Member Distributed Loads (BLC 6 : z-dir NESC Heavy Wind)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M2	Z	-.002	-.002	0	0
2	M9	Z	-.002	-.002	0	0
3	M12	Z	-.002	-.002	0	0
4	M19	Z	-.002	-.002	0	0
5	M4	Z	-.001	-.001	0	0
6	M5	Z	-.001	-.001	0	0
7	M6	Z	-.001	-.001	0	0
8	M7	Z	-.001	-.001	0	0
9	M14	Z	-.001	-.001	0	0
10	M15	Z	-.001	-.001	0	0
11	M16	Z	-.001	-.001	0	0
12	M17	Z	-.001	-.001	0	0

Member Distributed Loads (BLC 7 : z-dir NESC Extreme Wind)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M2	Z	-.013	-.013	0	0
2	M9	Z	-.013	-.013	0	0
3	M12	Z	-.013	-.013	0	0
4	M19	Z	-.013	-.013	0	0
5	M4	Z	-.009	-.009	0	0
6	M5	Z	-.009	-.009	0	0
7	M6	Z	-.009	-.009	0	0
8	M7	Z	-.009	-.009	0	0
9	M14	Z	-.009	-.009	0	0
10	M15	Z	-.009	-.009	0	0
11	M16	Z	-.009	-.009	0	0
12	M17	Z	-.009	-.009	0	0

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distrib..	Area(...	Surfa...
1	Self Weigh	None		-1						
2	Weight of Appurtenances	None					20			
3	Weight of Ice Only	None					20	20		
4	x-dir NESC Heavy Wind	None					20	12		
5	x-dir NESC Extreme Wind	None					20	12		
6	z-dir NESC Heavy Wind	None					20	12		
7	z-dir NESC Extreme Wind	None					20	12		

Load Combinations

	Description	Solve	P...	S...	B...	Fa...	BLC	Fact...	BLC	Fa...	BLC	Fa...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	x-dir NESC Heavy ...	Yes	Y		1	1.5	2	1.5	3	1.5	4	2.5												
2	x-dir NESC Extreme...	Yes	Y		1	1	2	1	5	1														
3	z-dir NESC Heavy ...	Yes	Y		1	1.5	2	1.5	3	1.5	6	2.5												
4	z-dir NESC Extreme...	Yes	Y		1	1	2	1	7	1														

Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	N2	-.19	.585	.208	0	0	0
2	1	N1	-.19	.254	.413	0	0	0
3	1	N18	.037	.257	-.265	0	0	0
4	1	N19	.037	.59	-.356	0	0	0
5	1	N27	-.109	.524	-.499	0	0	0
6	1	N28	-.109	.507	-.276	0	0	0
7	1	N44	-.121	.533	.273	0	0	0
8	1	N45	-.121	.513	.502	0	0	0
9	1	Totals:	-.765	3.763	0			
10	1	COG (ft):	X: -.098	Y: .425	Z: -.233			

Joint Reactions

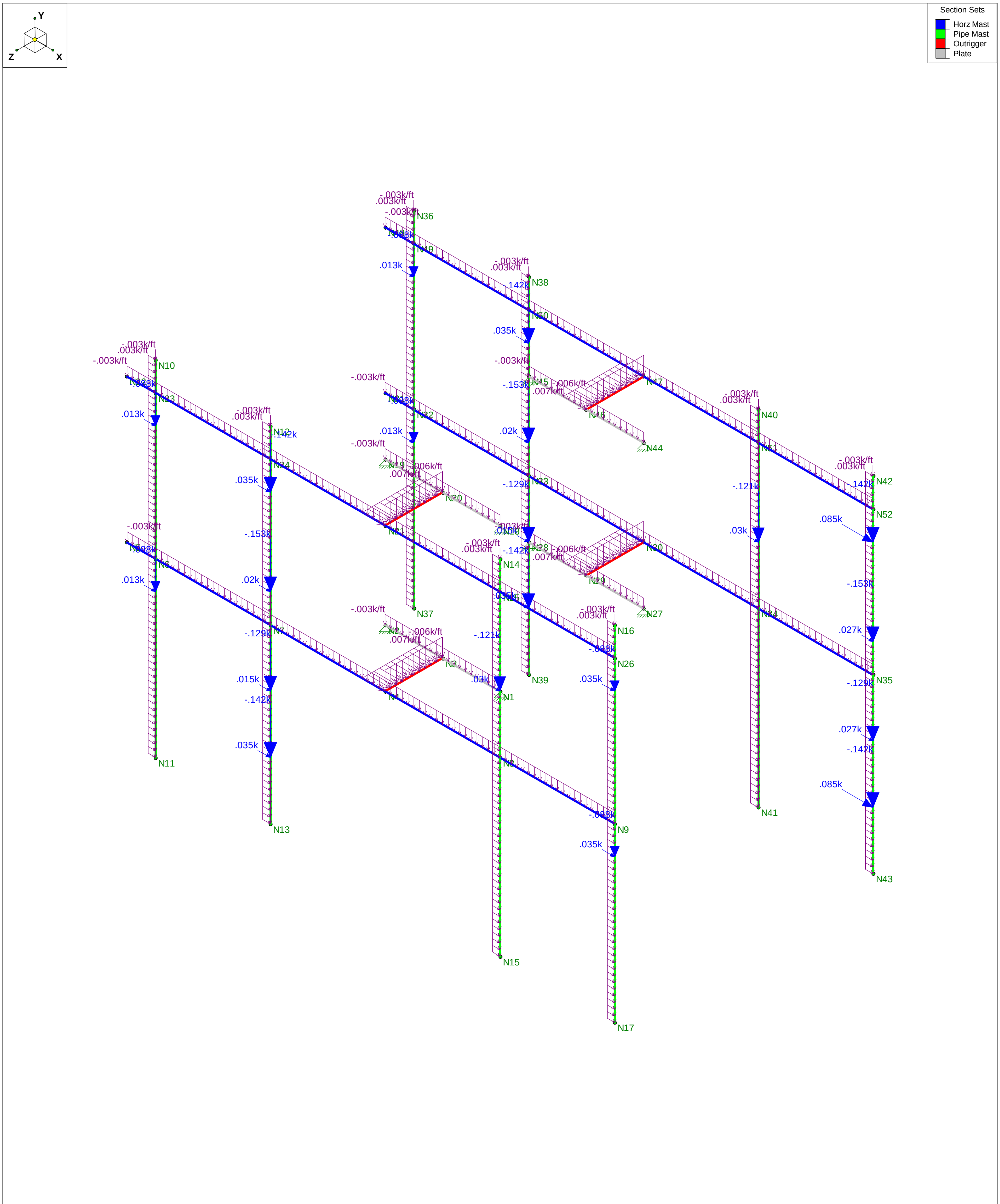
	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	N2	-.39	.339	-.119	0	0	0
2	2	N1	-.39	.065	.419	0	0	0
3	2	N18	-.079	.067	.04	0	0	0
4	2	N19	-.079	.353	-.34	0	0	0
5	2	N27	-.554	.141	-.586	0	0	0
6	2	N28	-.554	.35	.213	0	0	0
7	2	N44	-.158	.154	-.112	0	0	0
8	2	N45	-.158	.364	.486	0	0	0
9	2	Totals:	-2.362	1.832	0			
10	2	COG (ft):	X: -.139	Y: .45	Z: -.226			

Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	3	N2	-.083	.539	.648	0	0	0
2	3	N1	-.083	.263	.415	0	0	0
3	3	N18	.083	.305	-.405	0	0	0
4	3	N19	.083	.579	-.123	0	0	0
5	3	N27	.083	.588	-.153	0	0	0
6	3	N28	.083	.499	-.092	0	0	0
7	3	N44	-.083	.541	.364	0	0	0
8	3	N45	-.083	.449	.495	0	0	0
9	3	Totals:	0	3.763	1.15			
10	3	COG (ft):	X: -.098	Y: .425	Z: -.233			

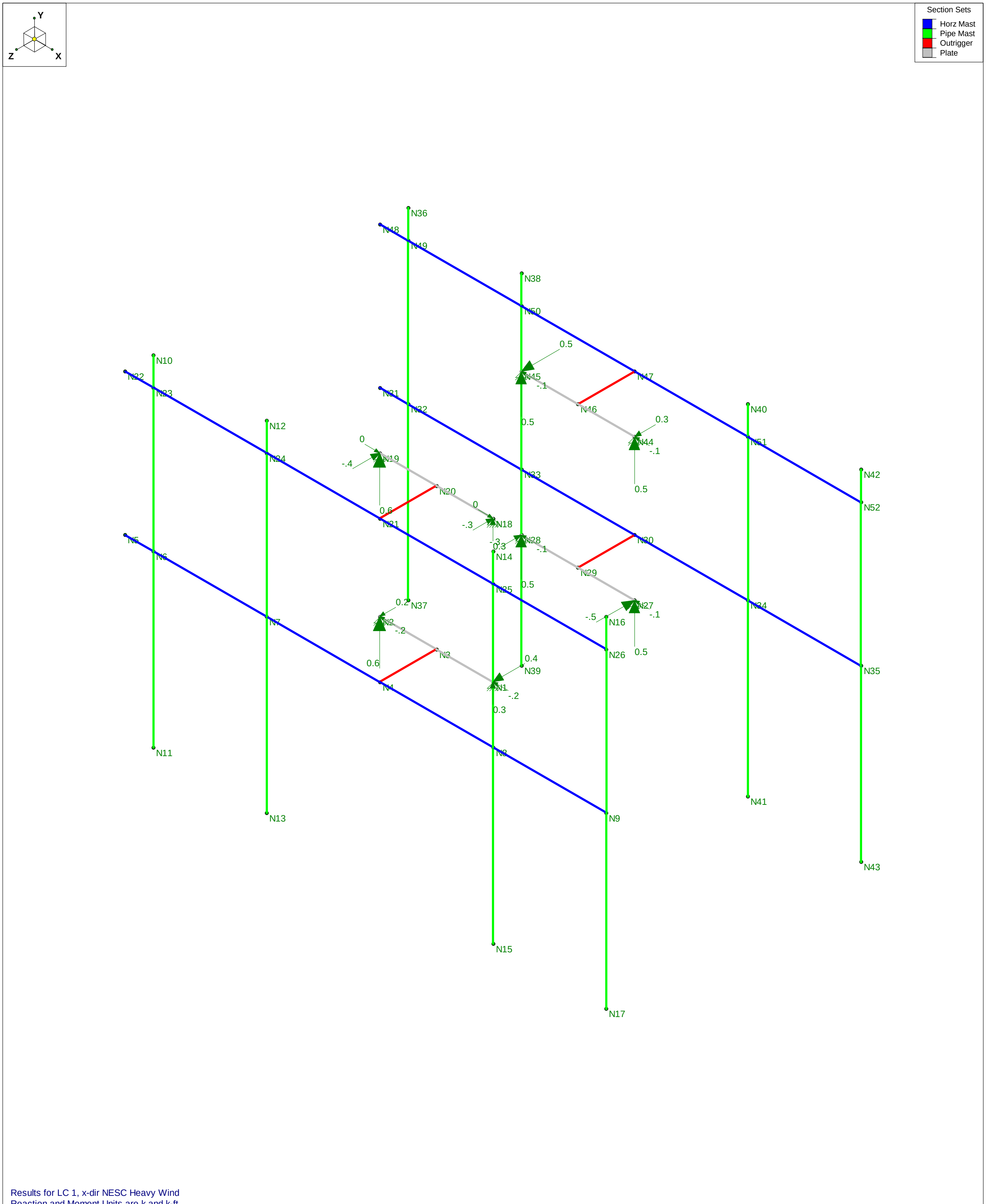
Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	4	N2	-.059	.194	1.247	0	0	0
2	4	N1	-.059	.092	.426	0	0	0
3	4	N18	.059	.219	-.402	0	0	0
4	4	N19	.059	.319	.365	0	0	0
5	4	N27	.043	.338	.476	0	0	0
6	4	N28	.043	.326	.786	0	0	0
7	4	N44	-.043	.179	.154	0	0	0
8	4	N45	-.043	.165	.459	0	0	0
9	4	Totals:	0	1.832	3.51			
10	4	COG (ft):	X: -.139	Y: .45	Z: -.226			



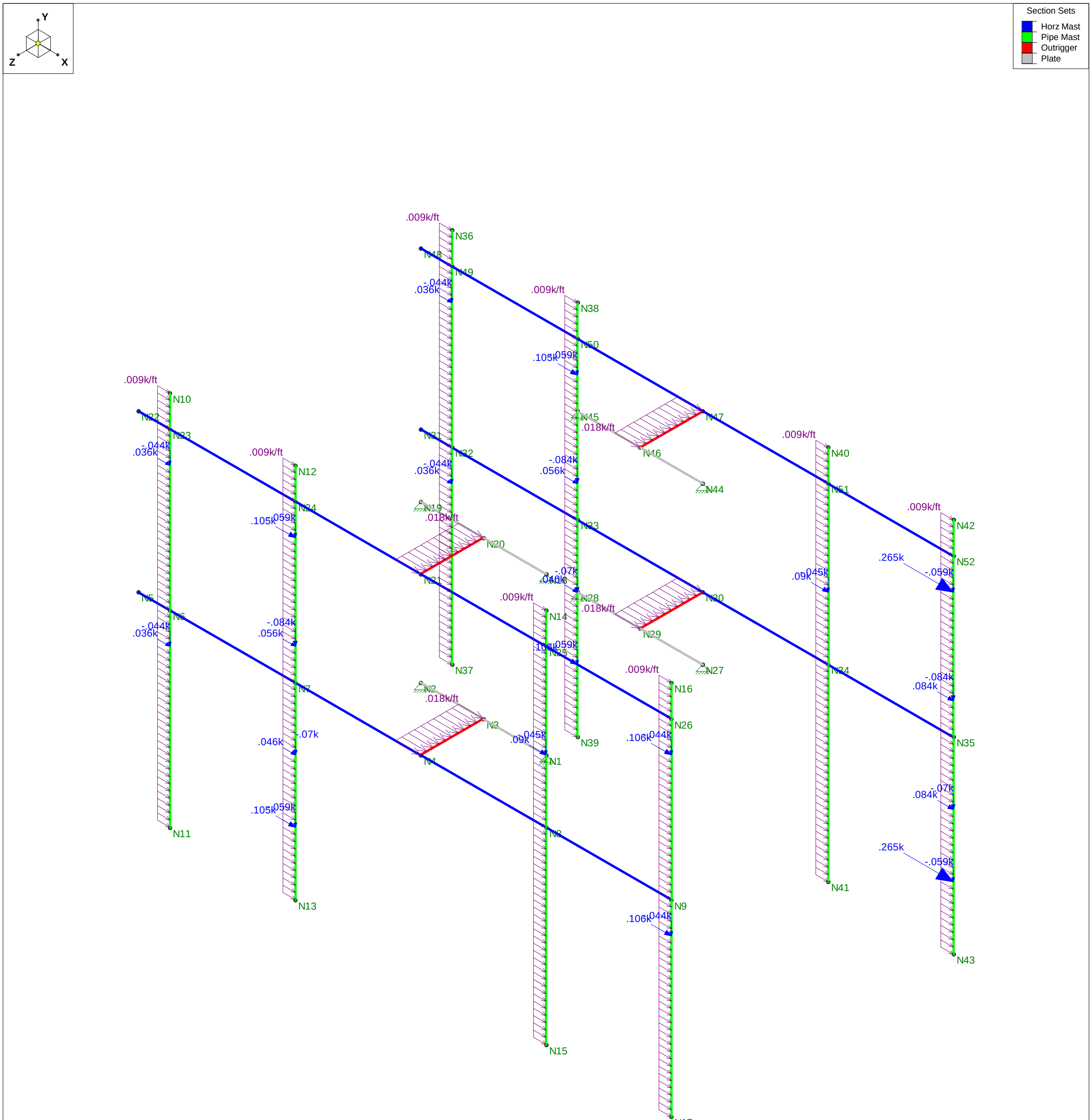
Loads: LC 1, x-dir NESC Heavy Wind

CENTEK Engineering, Inc.	Tower # 845 - Verizon Mast	
TJL		July 13, 2021 at 3:11 PM
20150.03	LC #1 Loads	Verizon Antenna Mast - NESC.r3d



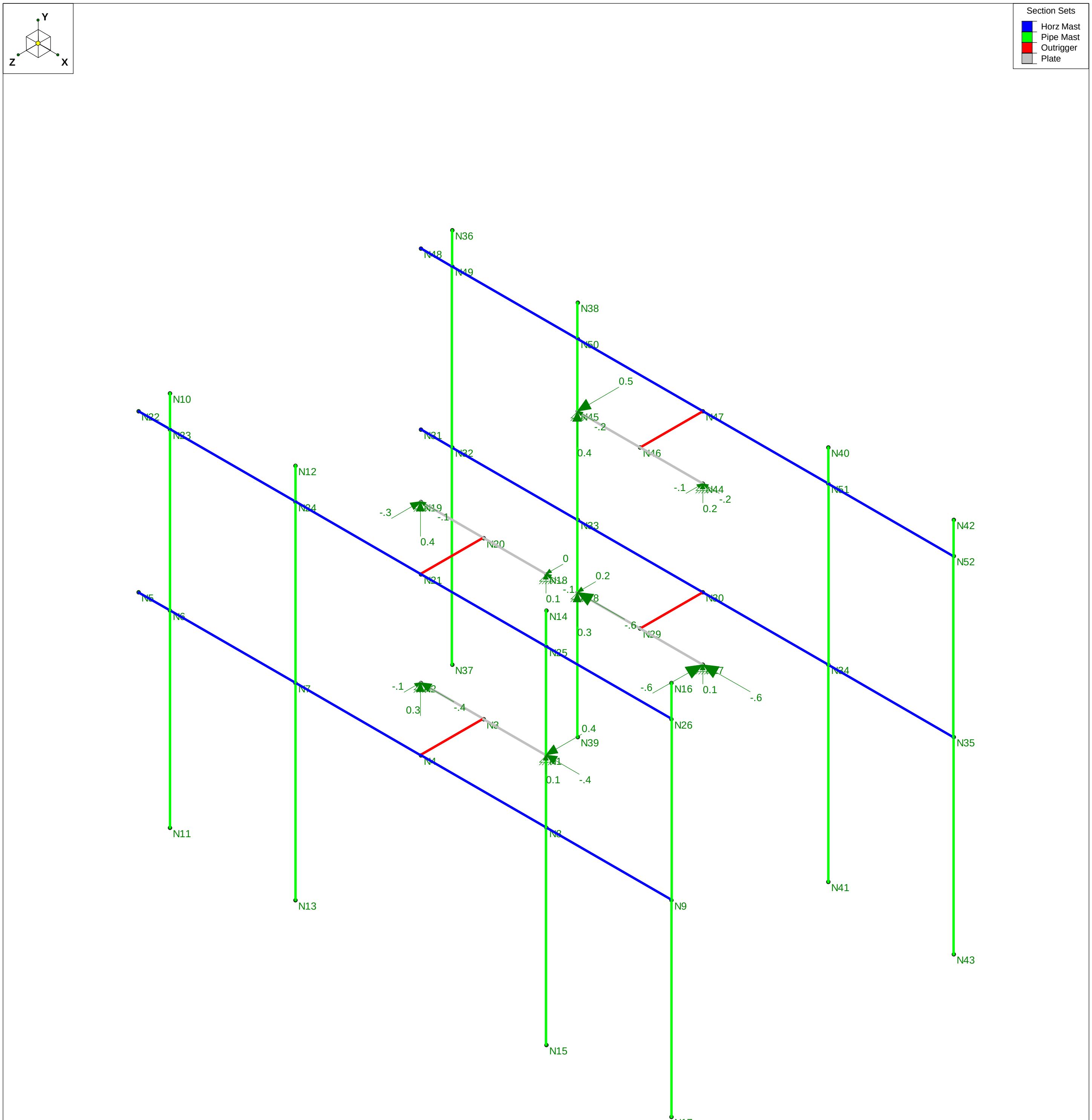
Results for LC 1, x-dir NESC Heavy Wind
Reaction and Moment Units are k and k-ft

CENTEK Engineering, Inc.		
TJL	Tower # 845 - Verizon Mast	July 13, 2021 at 3:12 PM
20150.03	LC #1 Reactions	Verizon Antenna Mast - NESC.r3d



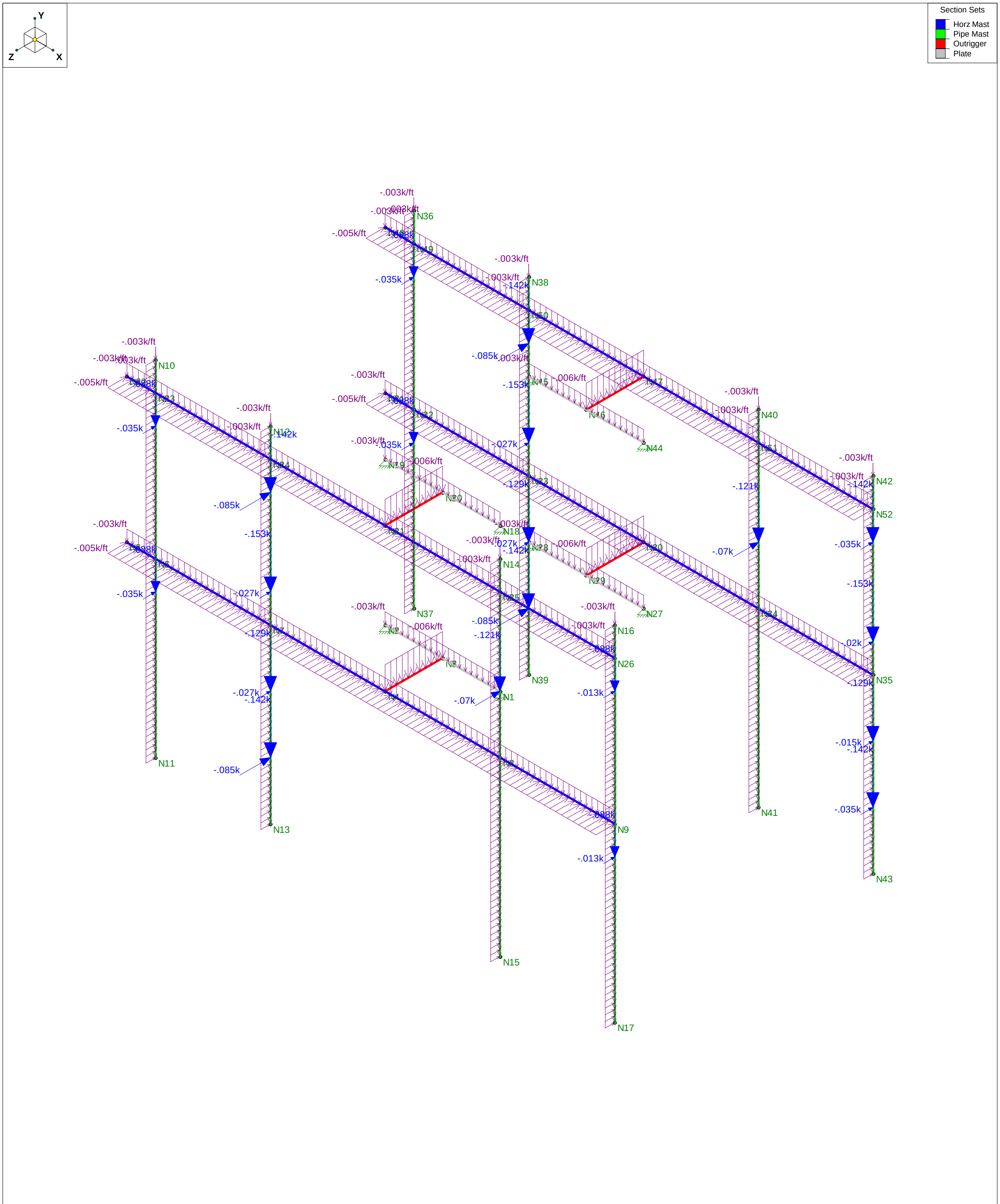
Loads: LC 2, x-dir NESC Extreme Wind

CENTEK Engineering, Inc.		
TJL	Tower # 845 - Verizon Mast	July 13, 2021 at 3:11 PM
20150.03	LC #2 Loads	Verizon Antenna Mast - NESC.r3d



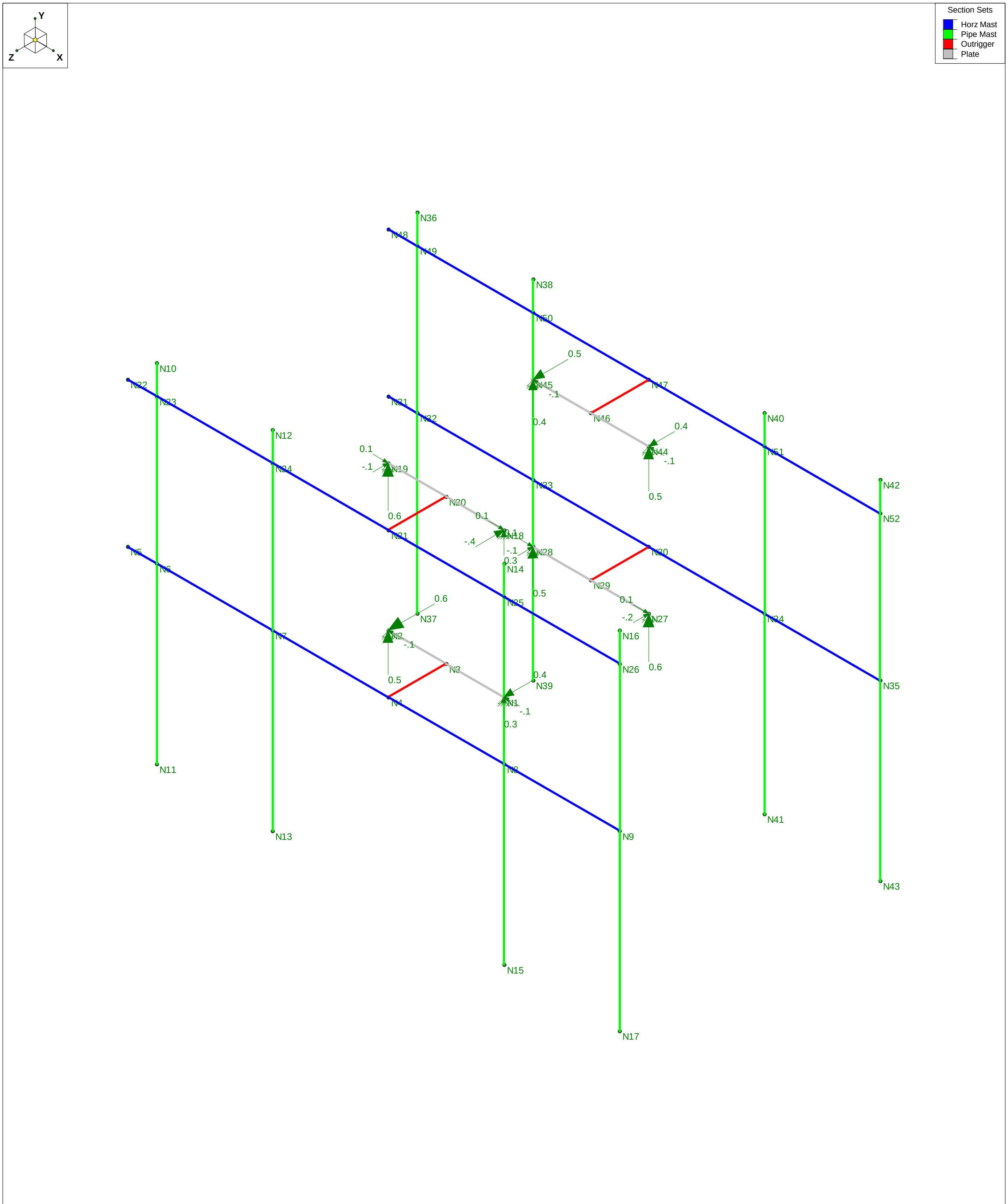
Results for LC 2, x-dir NESC Extreme Wind
Reaction and Moment Units are k and k-ft

CENTEK Engineering, Inc.		
TJL	Tower # 845 - Verizon Mast	July 13, 2021 at 3:13 PM
20150.03	LC #2 Reactions	Verizon Antenna Mast - NESC.r3d



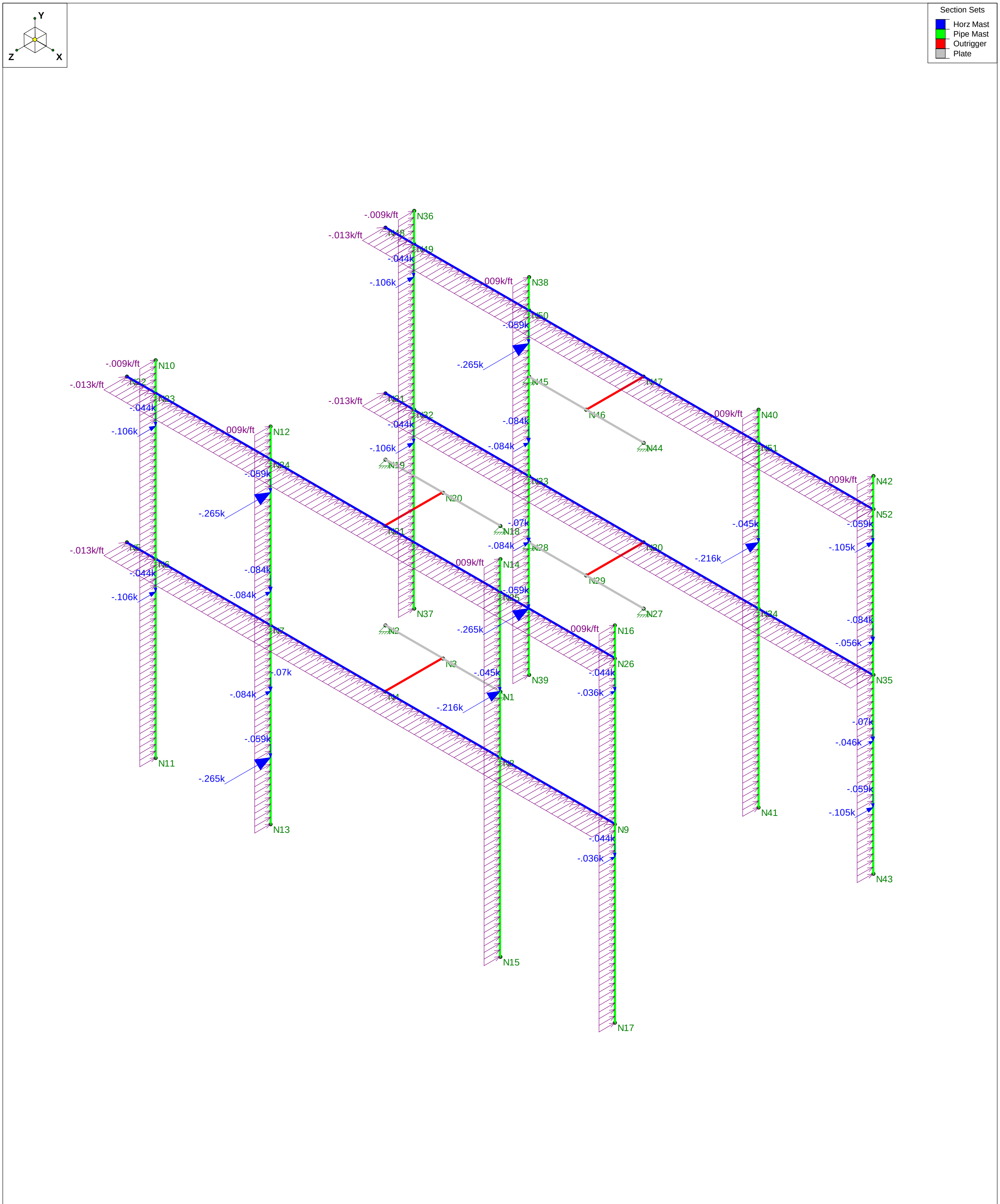
Loads: LC 3, z-dir NESC Heavy Wind

CENTEK Engineering, Inc.	Tower # 845 - Verizon Mast	
TJL		July 13, 2021 at 3:12 PM
20150.03	LC #3 Loads	Verizon Antenna Mast - NESC.r3d



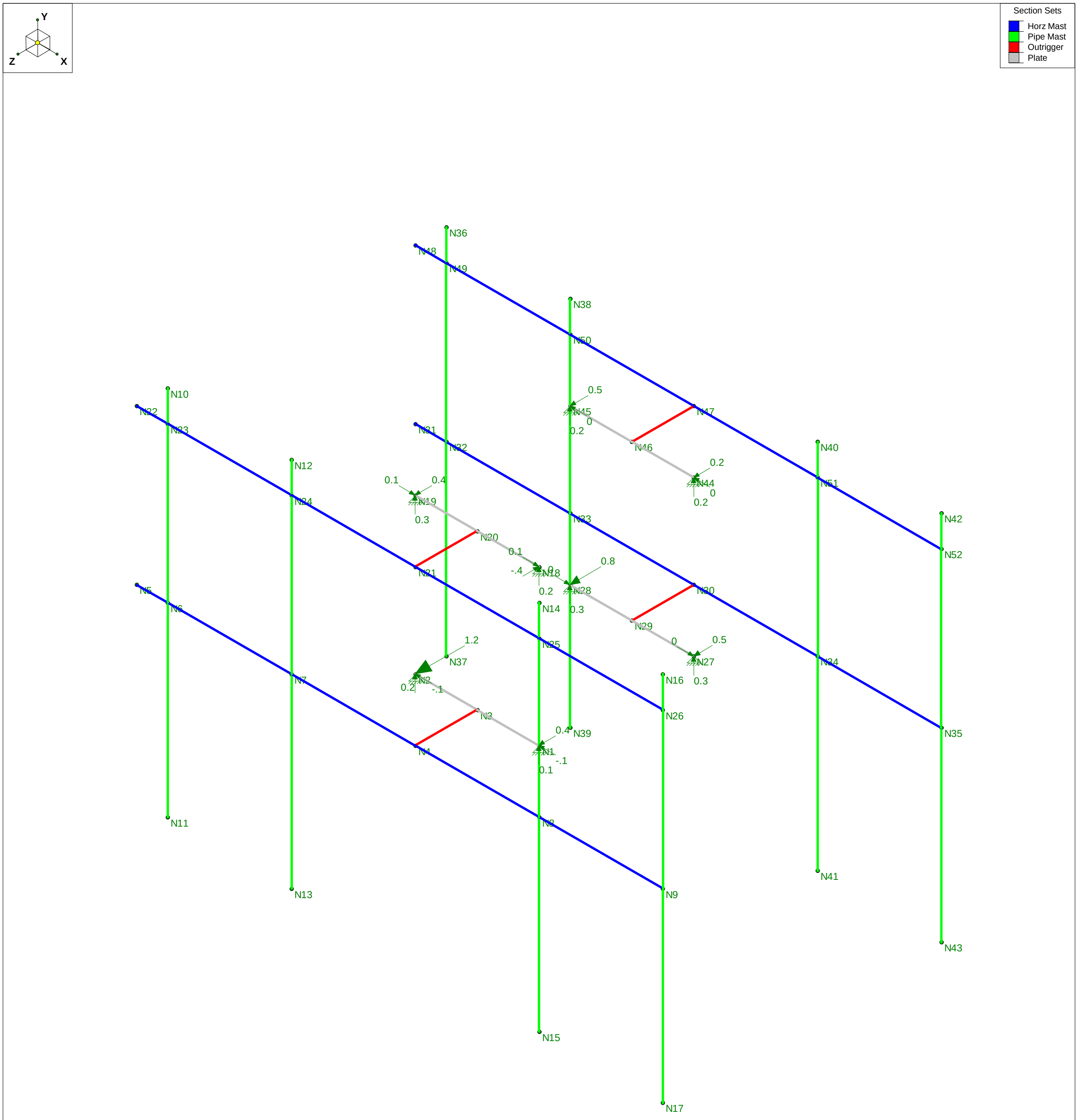
Results for LC 3, z-dir NESC Heavy Wind
Reaction and Moment Units are k and k-ft

CENTEK Engineering, Inc.		
TJL	Tower # 845 - Verizon Mast	July 13, 2021 at 3:13 PM
20150.03	LC #3 Reactions	Verizon Antenna Mast - NESC.r3d



Loads: LC 4, z-dir NESC Extreme Wind

CENTEK Engineering, Inc.		
TJL	Tower # 845 - Verizon Mast	July 13, 2021 at 3:12 PM
20150.03	LC #4 Loads	Verizon Antenna Mast - NESC.r3d



Results for LC 4, z-dir NESC Extreme Wind
Reaction and Moment Units are k and k-ft

CENTEK Engineering, Inc.		
TJL	Tower # 845 - Verizon Mast	July 13, 2021 at 3:14 PM
20150.03	LC #4 Reactions	Verizon Antenna Mast - NESC.r3d

Built-Up Section Properties

Description Pole #845 Section Properties @ Top

General Information

	Type...					X cg	Y cg
#1	Rectangular	Height	0.1875 in	Width	13.0000 in	0.0000 in	10.4238 in
#2	Rectangular	Height	0.1875 in	Width	13.0000 in	0.0000 in	-10.4238 in

Steel Shapes

#1: Name **W21x44** Angle **0** deg
Location of Centroid from Datum
Xcg **3.250** in Ycg **0.000** in

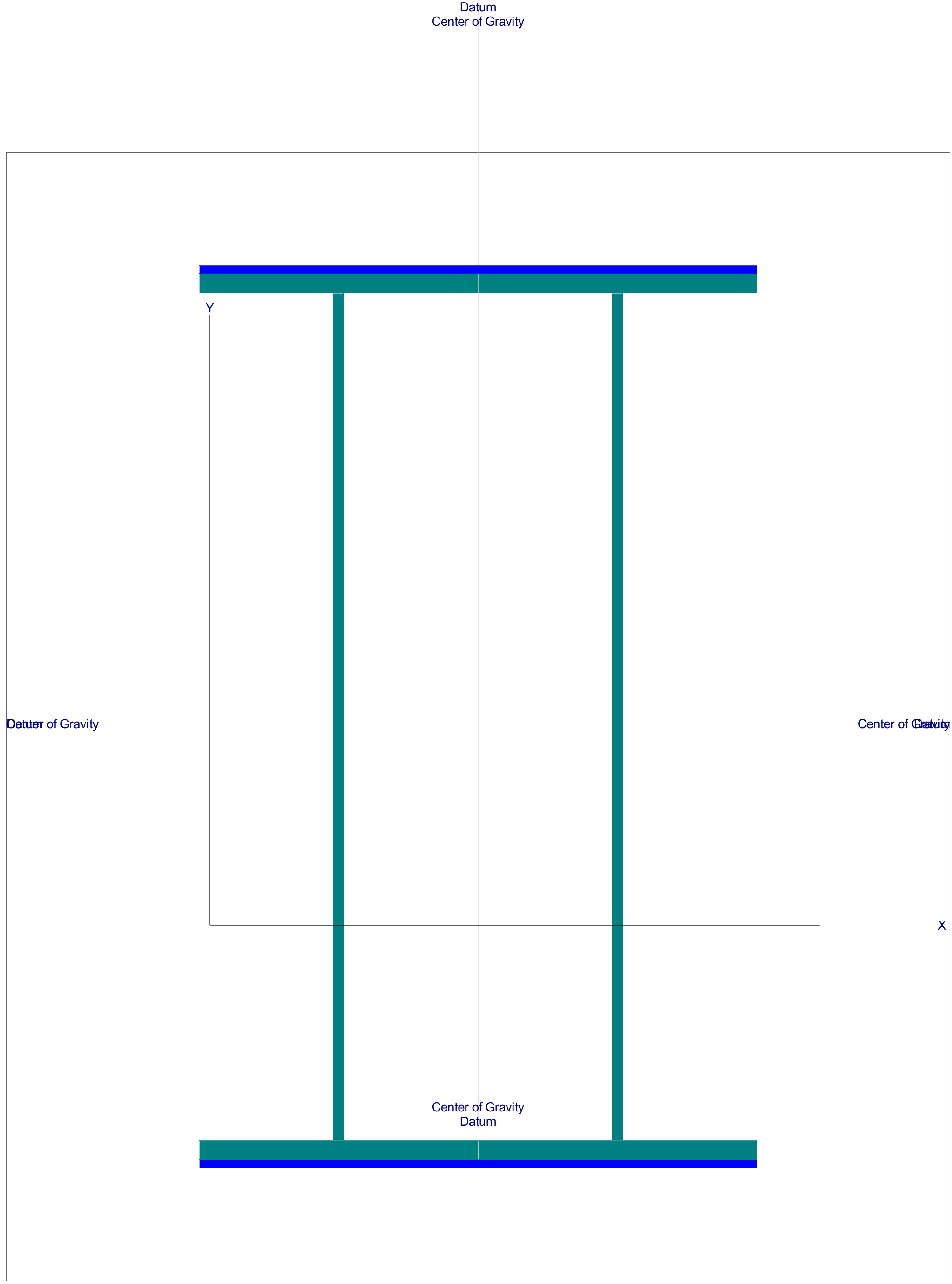
Depth	20.6600 in	Ixx	843.0000 in4
Width	6.5000 in	Iyy	20.7000 in4
Area	13.0000 in2	Xbar	3.250 in
		Ybar	10.330 in

#2: Name **W21x44** Angle **0** deg
Location of Centroid from Datum
Xcg **-3.250** in Ycg **0.000** in

Depth	20.6600 in	Ixx	843.0000 in4
Width	6.5000	Iyy	20.7000 in4
Area	13.0000 in2	Xbar	3.250 in
		Ybar	10.330 in

Summary

Total Area	30.8750 in2	Ixx	2,215.710 in4	r xx	8.4714 in
		Iyy	384.681 in4	r yy	3.5298 in
X cg Dist.	0.0000 in	Edge Distances from CG...			
Y cg Dist.	0.0000 in	+X	6.5000 in	S left	59.1817 in3
		-X	-6.5000 in	S right	59.1817 in3
		+Y	10.5176 in	S top	210.6679 in3
		-Y	-10.5176 in	S bottom	210.6679 in3



Datum
Center of Gravity
Y
Datum
Center of Gravity
Center of Gravity
Datum
X
Center of Gravity
Datum

Built-Up Section Properties

Description Pole #845 Section Properties @ Base

General Information

	Type...					X cg	Y cg
#1	Rectangular	Height	0.5000 in	Width	54.0000 in	0.0000 in	10.5800 in
#2	Rectangular	Height	0.5000 in	Width	54.0000 in	0.0000 in	-10.5800 in

Steel Shapes

#1: Name **W21x44** Angle **0** deg
Location of Centroid from Datum
Xcg **23.750** in Ycg **0.000** in

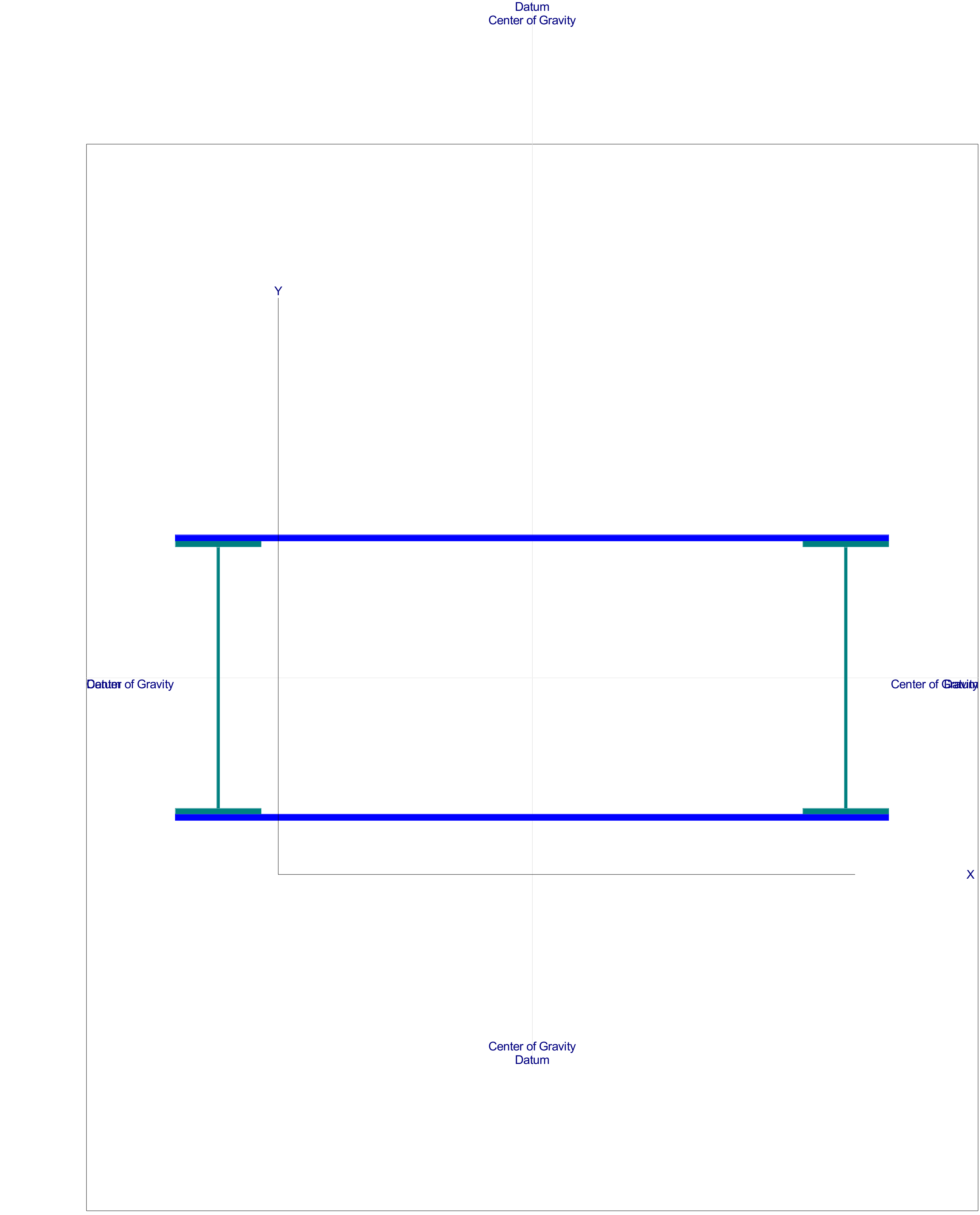
Depth	20.6600 in	Ixx	843.0000 in4
Width	6.5000 in	Iyy	20.7000 in4
Area	13.0000 in2	Xbar	3.250 in
		Ybar	10.330 in

#2: Name **W21x44** Angle **0** deg
Location of Centroid from Datum
Xcg **-23.750** in Ycg **0.000** in

Depth	20.6600 in	Ixx	843.0000 in4
Width	6.5000	Iyy	20.7000 in4
Area	13.0000 in2	Xbar	3.250 in
		Ybar	10.330 in

Summary

Total Area	80.0000 in2	Ixx	7,731.691 in4	r xx	9.8309 in
		Iyy	27,829.025 in4	r yy	18.6511 in
X cg Dist.	0.0000 in	Edge Distances from CG...			
Y cg Dist.	0.0000 in	+X	27.0000 in	S left	1,030.7046 in3
		-X	-27.0000 in	S right	1,030.7046 in3
		+Y	10.8300 in	S top	713.9142 in3
		-Y	-10.8300 in	S bottom	713.9142 in3


Datum
Center of Gravity
Y
Datum
Center of Gravity
Center of Gravity
Datum
X
Center of Gravity
Datum

Basic Components

Heavy Wind Pressure =	$p := 4.00$	psf	(User Input NESC 2007 Figure 250-1 & Table 250-1)
Basic Windspeed =	$V := 110$	mph	(User Input NESC 2007 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 Pole Above Grade = $TME := 150$ 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 2007 Table 250-3 equation)

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

Velocity Pressure Coefficient = $Kz := 2.01 \cdot \left(0.67 \cdot \frac{TME}{900}\right)^{\frac{2}{9.5}} = 1.267$ (NESC 2007 Table 250-2)

Exposure Factor = $Es := 0.346 \left[\frac{33}{(0.67 \cdot TME)}\right]^{\frac{1}{7}} = 0.295$ (NESC 2007 Table 250-3)

Response Term = $Bs := \frac{1}{\left(1 + 0.375 \cdot \frac{TME}{220}\right)} = 0.796$ (NESC 2007 Table 250-3)

Gust Response Factor = $Grf := \frac{\left[1 + \left(2.7 \cdot Es \cdot Bs^{\frac{1}{2}}\right)\right]}{kv^2} = 0.837$ (NESC 2007 Table 250-3)

Wind Pressure = $qz := 0.00256 \cdot Kz \cdot V^2 \cdot Grf \cdot I = 32.8$ psf (NESC 2007 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

NU 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

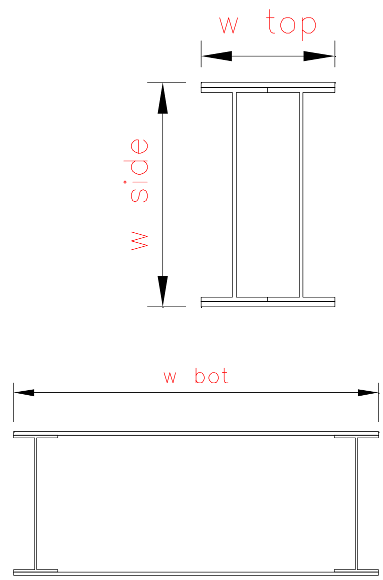
Overload Factors for Vertical Loads:

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 Pole

Pole Data:

Shape =	Flat	
Width Side =	$W_{side} := 21.7$	in
Width Top =	$W_{top} := 13$	in
Width Bottom =	$W_{bot} := 54$	in
Length =	$L := 150$	ft
Area Top =	$A_{top} := 30.9$	sq in
Area Bottom =	$A_{bot} := 80.0$	sq in
Weight of Steel =	$W_{steel} := 490$	pcf
Area Ice Top =	$Ai_{top} := 40$	sq in
Area Ice Bottom =	$Ai_{bot} := 82$	sq in



Gravity Loads (without ice)

Weight Pole Top =	$Wt_{top} := \frac{A_{top}}{144} \cdot W_{steel} = 105$	plf	**BLC 2**
Weight Pole Bottom =	$Wt_{bot} := \frac{A_{bot}}{144} \cdot W_{steel} = 272$	plf	**BLC 2**

Gravity Loads (ice only)

Weight of Ice on Pole Top =	$W_{ICE.top} := Id \cdot \frac{Ai_{top}}{144} = 16$	plf	**BLC 3**
Weight of Ice on Pole Bottom =	$W_{ICE.bot} := Id \cdot \frac{Ai_{bot}}{144} = 32$	plf	**BLC 3**

Wind Load (NESC Extreme)

Pole Projected Surface Area Top =	$A_{top} := \frac{W_{top}}{12} = 1.083$	sq ft/ft	
Pole Projected Surface Area Bottom =	$A_{bot} := \frac{W_{bot}}{12} = 4.5$	sq ft/ft	
Pole Projected Surface Area Side =	$A_{side} := \frac{W_{side}}{12} = 1.808$	sq ft/ft	
Total Pole Wind Force Top =	$qz \cdot Cd_F \cdot A_{top} = 57$	plf	**BLC 7**
Total Pole Wind Force Bottom =	$qz \cdot Cd_F \cdot A_{bot} = 236$	plf	**BLC 7**
Total Pole Wind Force Side =	$qz \cdot Cd_F \cdot A_{side} = 95$	plf	**BLC 5**

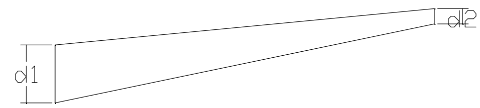
Wind Load (NESE Heavy)

Pole Projected Surface Area w/ Ice Top =	$AICE_{top} := \frac{(W_{top} + 2 \cdot Ir)}{12} = 1.167$	sq ft/ft	
Pole Projected Surface Area w/ Ice Bottom =	$AICE_{bot} := \frac{(W_{bot} + 2 \cdot Ir)}{12} = 4.583$	sq ft/ft	
Pole Projected Surface Area w/ Ice Side =	$AICE_{side} := \frac{(W_{side} + 2 \cdot Ir)}{12} = 1.892$	sq ft/ft	
Total Pole Wind Force w/ Ice Top =	$p \cdot Cd_F \cdot AICE_{top} = 7$	plf	**BLC 6**
Total Pole Wind Force w/ Ice Bottom =	$p \cdot Cd_F \cdot AICE_{bot} = 29$	plf	**BLC 6**
Total Pole Wind Force w/ Ice Side =	$p \cdot Cd_F \cdot AICE_{side} = 12$	plf	**BLC 4**

Development of Wind & Ice Load on Pole Arms

ARM Data:

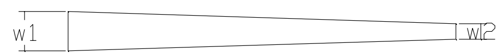
Shape = Flat



Depth of Arm at Top = $ARM_{d1} := 12$

Depth of Arm at Bottom = $ARM_{d2} := 4$

Width of Arm at Top = $ARM_{W1} := 8$



Width of Arm at Bottom = $ARM_{W2} := 4$

Thickness of Arm Wall = $ARM_t := 0.25$

Gravity Loads (without ice)

Arm Area Top = $A_{armtop} := \left(ARM_{d1} \cdot ARM_{W1}\right) - \left[\left(ARM_{W1} - 2ARM_t\right) \cdot \left(ARM_{d1} - 2ARM_t\right)\right]$

Arm Area Bottom = $A_{armbot} := \left(ARM_{d2} \cdot ARM_{W2}\right) - \left[\left(ARM_{W2} - 2ARM_t\right) \cdot \left(ARM_{d2} - 2ARM_t\right)\right]$

Weight Arm Top = $Wt_{top} := \frac{A_{armtop}}{144} \cdot W_{steel} = 33$ plf **BLC 2**

Weight Arm Bottom = $Wt_{bot} := \frac{A_{armbot}}{144} \cdot W_{steel} = 13$ plf **BLC 2**

Gravity Loads (ice only)

Arm Area w/ Ice Top = $Ai_{armtop} := \left(ARM_{d1} + 2 \cdot Ir\right) \cdot \left(ARM_{W1} + 2 \cdot Ir\right) - ARM_{d1} \cdot ARM_{W1} = 21$

Arm Area w/ Ice Bottom = $Ai_{armbot} := \left(ARM_{d2} + 2 \cdot Ir\right) \cdot \left(ARM_{W2} + 2 \cdot Ir\right) - ARM_{d2} \cdot ARM_{W2} = 9$

Weight of Ice on Arm Top = $W_{ICE.top} := Id \cdot \frac{Ai_{armtop}}{144} = 8$ plf **BLC 3**

Weight of Ice on Arm Bottom = $W_{ICE.bot} := Id \cdot \frac{Ai_{armbot}}{144} = 4$ plf **BLC 3**

Wind Load (NESC Extreme)

Arm Projected Surface Area Top = $A_{top} := \frac{ARM_{d1}}{12} = 1$ sq ft/ft

Arm Projected Surface Area Bottom = $A_{bot} := \frac{ARM_{d2}}{12} = 0.333$ sq ft/ft

Total Arm Wind Force Top = $qz \cdot Cd_F \cdot A_{top} = 53$ plf **BLC 7**

Total Arm Wind Force Bottom = $qz \cdot Cd_F \cdot A_{bot} = 18$ plf **BLC 7**

Wind Load (NESE Heavy)

Arm Projected Surface Area w/ Ice Top = $AICE_{top} := \frac{(ARM_{d1} + 2 \cdot Ir)}{12} = 1.083$ sq ft/ft

Arm Projected Surface Area w/ Ice Bottom = $AICE_{bot} := \frac{(ARM_{d2} + 2 \cdot Ir)}{12} = 0.417$ sq ft/ft

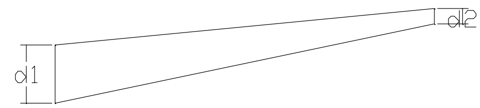
Total Arm Wind Force w/ Ice Top = $p \cdot Cd_F \cdot AICE_{top} = 7$ plf **BLC 6**

Total Arm Wind Force w/ Ice Bottom = $p \cdot Cd_F \cdot AICE_{bot} = 3$ plf **BLC 6**

Development of Wind & Ice Load on Pole Arms

ARM Data:

Shape = Flat



Depth of Arm at Top = $ARM_{d1} := 15$

Depth of Arm at Bottom = $ARM_{d2} := 4$

Width of Arm at Top = $ARM_{W1} := 10$

Width of Arm at Bottom = $ARM_{W2} := 4$

Thickness of Arm Wall = $ARM_t := 0.25$

Gravity Loads (without ice)

Arm Area Top = $A_{armtop} := \left(ARM_{d1} \cdot ARM_{W1}\right) - \left[\left(ARM_{W1} - 2ARM_t\right) \cdot \left(ARM_{d1} - 2ARM_t\right)\right]$

Arm Area Bottom = $A_{armbot} := \left(ARM_{d2} \cdot ARM_{W2}\right) - \left[\left(ARM_{W2} - 2ARM_t\right) \cdot \left(ARM_{d2} - 2ARM_t\right)\right]$

Weight Arm Top = $Wt_{top} := \frac{A_{armtop}}{144} \cdot W_{steel} = 42$ plf **BLC 2**

Weight Arm Bottom = $Wt_{bot} := \frac{A_{armbot}}{144} \cdot W_{steel} = 13$ plf **BLC 2**

Gravity Loads (ice only)

Arm Area w/ Ice Top = $Ai_{armtop} := \left(ARM_{d1} + 2 \cdot Ir\right) \cdot \left(ARM_{W1} + 2 \cdot Ir\right) - ARM_{d1} \cdot ARM_{W1} = 26$

Arm Area w/ Ice Bottom = $Ai_{armbot} := \left(ARM_{d2} + 2 \cdot Ir\right) \cdot \left(ARM_{W2} + 2 \cdot Ir\right) - ARM_{d2} \cdot ARM_{W2} = 9$

Weight of Ice on Arm Top = $W_{ICE.top} := Id \cdot \frac{Ai_{armtop}}{144} = 10$ plf **BLC 3**

Weight of Ice on Arm Bottom = $W_{ICE.bot} := Id \cdot \frac{Ai_{armbot}}{144} = 4$ plf **BLC 3**

Wind Load (NESC Extreme)

Arm Projected Surface Area Top = $A_{top} := \frac{ARM_{d1}}{12} = 1.25$ sq ft/ft

Arm Projected Surface Area Bottom = $A_{bot} := \frac{ARM_{d2}}{12} = 0.333$ sq ft/ft

Total Arm Wind Force Top = $qz \cdot Cd_F \cdot A_{top} = 66$ plf **BLC 7**

Total Arm Wind Force Bottom = $qz \cdot Cd_F \cdot A_{bot} = 18$ plf **BLC 7**

Wind Load (NESE Heavy)

Arm Projected Surface Area w/ Ice Top = $AICE_{top} := \frac{(ARM_{d1} + 2 \cdot Ir)}{12} = 1.333$ sq ft/ft

Arm Projected Surface Area w/ Ice Bottom = $AICE_{bot} := \frac{(ARM_{d2} + 2 \cdot Ir)}{12} = 0.417$ sq ft/ft

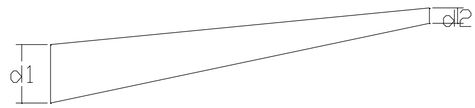
Total Arm Wind Force w/ Ice Top = $p \cdot Cd_F \cdot AICE_{top} = 9$ plf **BLC 6**

Total Arm Wind Force w/ Ice Bottom = $p \cdot Cd_F \cdot AICE_{bot} = 3$ plf **BLC 6**

Development of Wind & Ice Load on Pole Arms

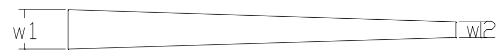
ARM Data:

Shape = Flat



Depth of Arm at Top = $ARM_{d1} := 18$

Depth of Arm at Bottom = $ARM_{d2} := 4$



Width of Arm at Top = $ARM_{W1} := 12$

Width of Arm at Bottom = $ARM_{W2} := 4$

Thickness of Arm Wall = $ARM_t := 0.25$

Gravity Loads (without ice)

Arm Area Top = $A_{armtop} := (ARM_{d1} \cdot ARM_{W1}) - [(ARM_{W1} - 2ARM_t) \cdot (ARM_{d1} - 2ARM_t)]$

Arm Area Bottom = $A_{armbot} := (ARM_{d2} \cdot ARM_{W2}) - [(ARM_{W2} - 2ARM_t) \cdot (ARM_{d2} - 2ARM_t)]$

Weight Arm Top = $Wt_{top} := \frac{A_{armtop}}{144} \cdot W_{steel} = 50$ plf **BLC 2**

Weight Arm Bottom = $Wt_{bot} := \frac{A_{armbot}}{144} \cdot W_{steel} = 13$ plf **BLC 2**

Gravity Loads (ice only)

Arm Area w/ Ice Top = $Ai_{armtop} := (ARM_{d1} + 2 \cdot Ir) \cdot (ARM_{W1} + 2 \cdot Ir) - ARM_{d1} \cdot ARM_{W1} = 31$

Arm Area w/ Ice Bottom = $Ai_{armbot} := (ARM_{d2} + 2 \cdot Ir) \cdot (ARM_{W2} + 2 \cdot Ir) - ARM_{d2} \cdot ARM_{W2} = 9$

Weight of Ice on Arm Top = $W_{ICE.top} := Id \cdot \frac{Ai_{armtop}}{144} = 12$ plf **BLC 3**

Weight of Ice on Arm Bottom = $W_{ICE.bot} := Id \cdot \frac{Ai_{armbot}}{144} = 4$ plf **BLC 3**

Wind Load (NESC Extreme)

Arm Projected Surface Area Top =	$A_{top} := \frac{ARM_{d1}}{12} = 1.5$	sq ft/ft	
Arm Projected Surface Area Bottom =	$A_{bot} := \frac{ARM_{d2}}{12} = 0.333$	sq ft/ft	
Total Arm Wind Force Top =	$qz \cdot Cd_F \cdot A_{top} = 79$	plf	**BLC 7**
Total Arm Wind Force Bottom =	$qz \cdot Cd_F \cdot A_{bot} = 18$	plf	**BLC 7**

Wind Load (NESE Heavy)

Arm Projected Surface Area w/ Ice Top =	$AICE_{top} := \frac{(ARM_{d1} + 2 \cdot Ir)}{12} = 1.583$	sq ft/ft	
Arm Projected Surface Area w/ Ice Bottom =	$AICE_{bot} := \frac{(ARM_{d2} + 2 \cdot Ir)}{12} = 0.417$	sq ft/ft	
Total Arm Wind Force w/ Ice Top =	$p \cdot Cd_F \cdot AICE_{top} = 10$	plf	**BLC 6**
Total Arm Wind Force w/ Ice Bottom =	$p \cdot Cd_F \cdot AICE_{bot} = 3$	plf	**BLC 6**

Development of Wind & Ice Load on Coax Cables

Coax Cable Data: (0-ft to 140-ft)

Coax Type = HELIAX 1-5/8"

Shape = Round (User Input)

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

Coax Cable Length = $L_{coax} := 100$ ft (User Input)

Weight of Coax per foot = $Wt_{coax} := 1.04$ plf (User Input)

Total Number of Coax = $N_{coax} := 26$ (User Input) (24 T-Mobile & 2 Verizon)

No. of Coax Projecting Outside Face of Pole X-DIR = $NP_{coaxX} := 2$ (User Input)

No. of Coax Projecting Outside Face of Pole Z-DIR = $NP_{coaxZ} := 2$ (User Input)

Wind Load (NESC Extreme)

Coax projected surface area X-DIR = $A_{coaxX} := \frac{(NP_{coaxX} D_{coax})}{12} = 0.3$ ft

Total Coax Wind Force X-DIR = $F_{coaxX} := qz \cdot Cd_{coax} \cdot A_{coaxX} = 17$ plf **BLC 19**

Coax projected surface area Z-DIR = $A_{coaxZ} := \frac{(NP_{coaxZ} D_{coax})}{12} = 0.3$ ft

Total Coax Wind Force Z-DIR = $F_{coaxZ} := qz \cdot Cd_{coax} \cdot A_{coaxZ} = 17$ plf **BLC 21**

Wind Load (NESC Heavy)

Coax projected surface area w/ Ice X-DIR = $AICE_{coaxX} := \frac{(NP_{coaxX} \cdot D_{coax} + 2 \cdot Ir)}{12} = 0.4$ ft

Total Coax Wind Force w/ Ice X-DIR = $Fi_{coaxX} := p \cdot Cd_{coax} \cdot AICE_{coaxX} = 3$ plf **BLC 18**

Coax projected surface area w/ Ice Z-DIR = $AICE_{coaxZ} := \frac{(NP_{coaxZ} \cdot D_{coax} + 2 \cdot Ir)}{12} = 0.4$ ft

Total Coax Wind Force w/ Ice Z-DIR = $Fi_{coaxZ} := p \cdot Cd_{coax} \cdot AICE_{coaxZ} = 3$ plf **BLC 20**

Gravity Loads (without ice)

Weight of all cables w/o ice $WT_{coax} := Wt_{coax} \cdot N_{coax} = 27$ plf **BLC 16**

Gravity Load (ice only)

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

Ice Weight All Coax per foot = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 39$ plf **BLC 17**

Development of Wind & Ice Load on Coax Cables

Coax Cable Data:	(90-ft to 140-ft)			
Coax Type =	HELIAX 1-5/8"			
Shape =	Round		(User Input)	
Coax Outside Diameter =	$D_{coax} := 1.98$	in	(User Input)	
Coax Cable Length =	$L_{coax} := 100$	ft	(User Input)	
Weight of Coax per foot =	$Wt_{coax} := 1.04$	plf	(User Input)	
Total Number of Coax =	$N_{coax} := 24$		(User Input)	(24 T-Mobile)
No. of Coax Projecting Outside Face of Pole X-DIR =	$NP_{coaxX} := 2$		(User Input)	
No. of Coax Projecting Outside Face of Pole Z-DIR =	$NP_{coaxZ} := 2$		(User Input)	

Wind Load (NESC Extreme)

Coax projected surface area X-DIR = $A_{coaxX} := \frac{(NP_{coaxX} D_{coax})}{12} = 0.3$ ft

Total Coax Wind Force X-DIR = $F_{coaxX} := qz \cdot Cd_{coax} \cdot A_{coaxX} = 17$ plf **BLC 19**

Coax projected surface area Z-DIR = $A_{coaxZ} := \frac{(NP_{coaxZ} D_{coax})}{12} = 0.3$ ft

Total Coax Wind Force Z-DIR = $F_{coaxZ} := qz \cdot Cd_{coax} \cdot A_{coaxZ} = 17$ plf **BLC 21**

Wind Load (NESC Heavy)

Coax projected surface area w/ Ice X-DIR = $AICE_{coaxX} := \frac{(NP_{coaxX} \cdot D_{coax} + 2 \cdot Ir)}{12} = 0.4$ ft

Total Coax Wind Force w/ Ice X-DIR = $Fi_{coaxX} := p \cdot Cd_{coax} \cdot AICE_{coaxX} = 3$ plf **BLC 18**

Coax projected surface area w/ Ice Z-DIR = $AICE_{coaxZ} := \frac{(NP_{coaxZ} \cdot D_{coax} + 2 \cdot Ir)}{12} = 0.4$ ft

Total Coax Wind Force w/ Ice Z-DIR = $Fi_{coaxZ} := p \cdot Cd_{coax} \cdot AICE_{coaxZ} = 3$ plf **BLC 20**

Gravity Loads (without ice)

Weight of all cables w/o ice $WT_{coax} := Wt_{coax} \cdot N_{coax} = 25$ plf **BLC 16**

Gravity Load (ice only)

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

Ice Weight All Coax per foot = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 36$ plf **BLC 17**

(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	Accelerated Solver

Hot Rolled Steel Code	None
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 530-11: 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	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
7	A572 Gr.60	29000	11154	.3	.65	.49	60	1.5	75	1.2

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Ru...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Pole 0'	0'_HRA	Column	Wide Flange	A572 Gr.60	Typical	79.56	27580...	7721	13783...
2	Pole 5'	5'_HRA	Column	Wide Flange	A572 Gr.60	Typical	78.189	25786...	7566....	13245...
3	Pole 10'	10'_HRA	Column	Wide Flange	A572 Gr.60	Typical	76.818	24065...	7412....	12710...
4	Pole 15'	15	Column	Wide Flange	A572 Gr.60	Typical	75.447	22416...	7258....	12178...
5	Pole 20'	20'_HRA	Column	Wide Flange	A572 Gr.60	Typical	74.076	20881...	7104.7	11681...
6	Pole 25'	25'_HRA	Column	Wide Flange	A572 Gr.60	Typical	72.705	19330	6950....	11125...
7	Pole 30'	30'_HRA	Column	Wide Flange	A572 Gr.60	Typical	65.658	16898...	6132....	9804....
8	Pole 35'	35'_HRA	Column	Wide Flange	A572 Gr.60	Typical	64.461	15617	5998....	9340....
9	Pole 40'	40'_HRA	Column	Wide Flange	A572 Gr.60	Typical	63.266	14395...	5864....	8880....
10	Pole 45'	45'_HRA	Column	Wide Flange	A572 Gr.60	Typical	62.069	13233	5731....	8424....
11	Pole 50'	50'_HRA	Column	Wide Flange	A572 Gr.60	Typical	60.872	12128...	5597....	7972....
12	Pole 55'	55'_HRA	Column	Wide Flange	A572 Gr.60	Typical	59.677	11080...	5463....	7522....
13	Pole 60'	60'_HRA	Column	Wide Flange	A572 Gr.60	Typical	53.745	9530.9	4782.4	6497....
14	Pole 65'	65'_HRA	Column	Wide Flange	A572 Gr.60	Typical	52.721	8652....	4668....	6107
15	Pole 70'	70'_HRA	Column	Wide Flange	A572 Gr.60	Typical	51.697	7821....	4554....	5720....
16	Pole 75'	75'_HRA	Column	Wide Flange	A572 Gr.60	Typical	50.673	7040....	4441....	5337....
17	Pole 80'	80'_HRA	Column	Wide Flange	A572 Gr.60	Typical	49.648	6305....	4327....	4958....
18	Pole 85'	85'_HRA	Column	Wide Flange	A572 Gr.60	Typical	48.625	5617....	4213.8	4585.5
19	Pole 90'	90'_HRA	Column	Wide Flange	A572 Gr.60	Typical	40.254	4445....	3264....	3431....
20	Pole 95'	95'_HRA	Column	Wide Flange	A572 Gr.60	Typical	39.571	3917....	3189....	3161....
21	Pole 100'	100'_HRA	Column	Wide Flange	A572 Gr.60	Typical	38.888	3426....	3114....	2895....
22	Pole 105'	105'	Column	Wide Flange	A572 Gr.60	Typical	38.205	2971....	3039....	2632....
23	Pole 110'	110'	Column	Wide Flange	A572 Gr.60	Typical	37.522	2551....	2965....	2373....
24	Pole 115'	115'	Column	Wide Flange	A572 Gr.60	Typical	36.84	2167....	2890....	2117....
25	Pole 120'	120'	Column	Wide Flange	A572 Gr.60	Typical	33.523	1718....	2521....	1659....
26	Pole 125'	125'	Column	Wide Flange	A572 Gr.60	Typical	33.009	1420.3	2465	1457....
27	Pole 130'	130'	Column	Wide Flange	A572 Gr.60	Typical	32.496	1152....	2409....	1259....
28	Pole 135'	135'	Column	Wide Flange	A572 Gr.60	Typical	31.983	915.2...	2353....	1065....
29	Pole 140'	140'	Column	Wide Flange	A572 Gr.60	Typical	31.47	707.6...	2297....	876.4...
30	Pole 145'	145'	Column	Wide Flange	A572 Gr.60	Typical	30.956	529.4...	2241....	694.6...
31	5' Arm Base	5' Arm Base_HRA	Beam	Tube	A36 Gr.36	Typical	9.75	107.7...	201.4...	215.5...
32	5' Arm Mid	5' Arm Mid_HRA	Beam	Tube	A36 Gr.36	Typical	6.75	40.016	62.641	75.013
33	8' Arm Base	8' Arm Base_HRA	Beam	Tube	A36 Gr.36	Typical	12.25	214.0...	399.0...	426.7...
34	8' Arm Mid	8' Arm Mid_HRA	Beam	Tube	A36 Gr.36	Typical	8	65.573	105.26	123.8...
35	10.5' Arm Base	10.5' Arm Base_HRA	Beam	Tube	A36 Gr.36	Typical	14.75	374.0...	695.9...	743.9...
36	10.5 Arm Mid	10.5' Arm Mid_HRA	Beam	Tube	A36 Gr.36	Typical	9.25	100.1...	163.8...	190.3...

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	M1	Pole 0'	5			Lbyy									Lateral
2	M2	8' Arm Mid	4.482			Lbyy									Lateral
3	M3	8' Arm Mid	4.482			Lbyy									Lateral
4	M4	10.5 Arm Mid	5.672			Lbyy									Lateral
5	M5	10.5 Arm Mid	5.672			Lbyy									Lateral
6	M6	8' Arm Mid	4.349			Lbyy									Lateral
7	M7	8' Arm Mid	4.349			Lbyy									Lateral
8	M8	5' Arm Mid	2.795			Lbyy									Lateral
9	M9	5' Arm Mid	2.795			Lbyy									Lateral
10	M11	Pole 5'	5			Lbyy									Lateral

Hot Rolled Steel Design Parameters (Continued)

	Label	Shape	Lengt...	Lbyy[ft]	Lbzz[ft]	Lcomp to...	Lcomp b...	Kyy	Kzz	Cm-yy	Cm-zz	Cb	y sway	z sway	Function
11	M12	Pole 10'	5			Lbyy									Lateral
12	M13	Pole 15'	5			Lbyy									Lateral
13	M14	Pole 20'	5			Lbyy									Lateral
14	M15	Pole 25'	5			Lbyy									Lateral
15	M16	Pole 30'	5			Lbyy									Lateral
16	M17	Pole 35'	5			Lbyy									Lateral
17	M18	Pole 40'	5			Lbyy									Lateral
18	M19	Pole 45'	5			Lbyy									Lateral
19	M20	Pole 50'	5			Lbyy									Lateral
20	M21	Pole 55'	5			Lbyy									Lateral
21	M22	Pole 60'	5			Lbyy									Lateral
22	M23	Pole 65'	5			Lbyy									Lateral
23	M24	Pole 70'	5			Lbyy									Lateral
24	M25	Pole 75'	5			Lbyy									Lateral
25	M26	Pole 80'	5			Lbyy									Lateral
26	M27	Pole 85'	5			Lbyy									Lateral
27	M28	Pole 90'	5			Lbyy									Lateral
28	M29	Pole 95'	5			Lbyy									Lateral
29	M30	Pole 100'	5			Lbyy									Lateral
30	M31	Pole 105'	5			Lbyy									Lateral
31	M32	Pole 110'	5			Lbyy									Lateral
32	M33	Pole 115'	5			Lbyy									Lateral
33	M34	Pole 120'	5			Lbyy									Lateral
34	M35	Pole 125'	5			Lbyy									Lateral
35	M36	Pole 130'	5			Lbyy									Lateral
36	M37	Pole 135'	5			Lbyy									Lateral
37	M38	Pole 140'	5			Lbyy									Lateral
38	M39	Pole 145'	5			Lbyy									Lateral
39	M40	8' Arm Base	4.482			Lbyy									Lateral
40	M41	8' Arm Base	4.482			Lbyy									Lateral
41	M42	10.5' Arm Base	5.672			Lbyy									Lateral
42	M43	10.5' Arm Base	5.672			Lbyy									Lateral
43	M44	8' Arm Base	4.349			Lbyy									Lateral
44	M45	8' Arm Base	4.349			Lbyy									Lateral
45	M46	5' Arm Base	2.795			Lbyy									Lateral
46	M47	5' Arm Base	2.795			Lbyy									Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design R...
1	M1	BOTTO...	N21		90	Pole 0'	Column	Wide Flange	A572 Gr.60	Typical
2	M2	ARM1-...	N49			8' Arm Mid	Beam	Tube	A36 Gr.36	Typical
3	M3	ARM1-...	N50			8' Arm Mid	Beam	Tube	A36 Gr.36	Typical
4	M4	ARM2-...	N51			10.5 Arm Mid	Beam	Tube	A36 Gr.36	Typical
5	M5	ARM2-...	N52			10.5 Arm Mid	Beam	Tube	A36 Gr.36	Typical
6	M6	ARM3-...	N53			8' Arm Mid	Beam	Tube	A36 Gr.36	Typical
7	M7	ARM3-...	N54			8' Arm Mid	Beam	Tube	A36 Gr.36	Typical
8	M8	ARM4-...	N55			5' Arm Mid	Beam	Tube	A36 Gr.36	Typical
9	M9	ARM4-...	N56			5' Arm Mid	Beam	Tube	A36 Gr.36	Typical
10	M10	N18	N19			RIGID	None	None	RIGID	Typical
11	M11	N21	N22		90	Pole 5'	Column	Wide Flange	A572 Gr.60	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design R...
12	M12	N22	N23		90	Pole 10'	Column	Wide Flange	A572 Gr.60	Typical
13	M13	N23	N24		90	Pole 15'	Column	Wide Flange	A572 Gr.60	Typical
14	M14	N24	N25		90	Pole 20'	Column	Wide Flange	A572 Gr.60	Typical
15	M15	N25	N26		90	Pole 25'	Column	Wide Flange	A572 Gr.60	Typical
16	M16	N26	N27		90	Pole 30'	Column	Wide Flange	A572 Gr.60	Typical
17	M17	N27	N28		90	Pole 35'	Column	Wide Flange	A572 Gr.60	Typical
18	M18	N28	N29		90	Pole 40'	Column	Wide Flange	A572 Gr.60	Typical
19	M19	N29	N30		90	Pole 45'	Column	Wide Flange	A572 Gr.60	Typical
20	M20	N30	N31		90	Pole 50'	Column	Wide Flange	A572 Gr.60	Typical
21	M21	N31	N32		90	Pole 55'	Column	Wide Flange	A572 Gr.60	Typical
22	M22	N32	N33		90	Pole 60'	Column	Wide Flange	A572 Gr.60	Typical
23	M23	N33	N34		90	Pole 65'	Column	Wide Flange	A572 Gr.60	Typical
24	M24	N34	N35		90	Pole 70'	Column	Wide Flange	A572 Gr.60	Typical
25	M25	N35	N36		90	Pole 75'	Column	Wide Flange	A572 Gr.60	Typical
26	M26	N36	N37		90	Pole 80'	Column	Wide Flange	A572 Gr.60	Typical
27	M27	N37	POLE-...		90	Pole 85'	Column	Wide Flange	A572 Gr.60	Typical
28	M28	POLE-...	N38		90	Pole 90'	Column	Wide Flange	A572 Gr.60	Typical
29	M29	N38	N39		90	Pole 95'	Column	Wide Flange	A572 Gr.60	Typical
30	M30	N39	N40		90	Pole 100'	Column	Wide Flange	A572 Gr.60	Typical
31	M31	N40	N41		90	Pole 105'	Column	Wide Flange	A572 Gr.60	Typical
32	M32	N41	N42		90	Pole 110'	Column	Wide Flange	A572 Gr.60	Typical
33	M33	N42	N43		90	Pole 115'	Column	Wide Flange	A572 Gr.60	Typical
34	M34	N43	N44		90	Pole 120'	Column	Wide Flange	A572 Gr.60	Typical
35	M35	N44	N45		90	Pole 125'	Column	Wide Flange	A572 Gr.60	Typical
36	M36	N45	N46		90	Pole 130'	Column	Wide Flange	A572 Gr.60	Typical
37	M37	N46	N47		90	Pole 135'	Column	Wide Flange	A572 Gr.60	Typical
38	M38	N47	N48		90	Pole 140'	Column	Wide Flange	A572 Gr.60	Typical
39	M39	N48	TOP-P...		90	Pole 145'	Column	Wide Flange	A572 Gr.60	Typical
40	M40	N49	ARM1			8' Arm Base	Beam	Tube	A36 Gr.36	Typical
41	M41	N50	ARM1			8' Arm Base	Beam	Tube	A36 Gr.36	Typical
42	M42	N51	ARM2			10.5' Arm Base	Beam	Tube	A36 Gr.36	Typical
43	M43	N52	ARM2			10.5' Arm Base	Beam	Tube	A36 Gr.36	Typical
44	M44	N53	ARM3			8' Arm Base	Beam	Tube	A36 Gr.36	Typical
45	M45	N54	ARM3			8' Arm Base	Beam	Tube	A36 Gr.36	Typical
46	M46	N55	ARM4			5' Arm Base	Beam	Tube	A36 Gr.36	Typical
47	M47	N56	ARM4			5' Arm Base	Beam	Tube	A36 Gr.36	Typical
48	M48	N57	N58			RIGID	None	None	RIGID	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	BOTTOM-POLE	0	0	0	0	
2	POLE-CONNECTION	0	90	0	0	
3	ARM1-LEFT	-8.88	119.83	0	0	
4	ARM2-LEFT	-11.26	131.83	0	0	
5	ARM3-LEFT	-8.61	143.83	0	0	
6	ARM4-LEFT	-5.54	149.83	0	0	
7	TOP-POLE	0	150	0	0	
8	ARM1-RIGHT	8.88	119.83	0	0	
9	ARM2-RIGHT	11.26	131.83	0	0	
10	ARM3-RIGHT	8.61	143.83	0	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
11	ARM4-RIGHT	5.54	149.83	0	0	
12	ARM1	0	118.6	0	0	
13	ARM2	0	130.45	0	0	
14	ARM3	0	142.6	0	0	
15	ARM4	0	149.08	0	0	
16	BOTTOM-BRACE	0	138	0	0	
17	TOP-BRACE	0	147	0	0	
18	N18	0.	89.75	1	0	
19	N19	-0.	89.75	-1	0	
20	N20	0	89.75	0	0	
21	N21	0	5	0	0	
22	N22	0	10	0	0	
23	N23	0	15	0	0	
24	N24	0	20	0	0	
25	N25	0	25	0	0	
26	N26	0	30	0	0	
27	N27	0	35	0	0	
28	N28	0	40	0	0	
29	N29	0	45	0	0	
30	N30	0	50	0	0	
31	N31	0	55	0	0	
32	N32	0	60	0	0	
33	N33	0	65	0	0	
34	N34	0	70	0	0	
35	N35	0	75	0	0	
36	N36	0	80	0	0	
37	N37	0	85	0	0	
38	N38	0	95	0	0	
39	N39	0	100	0	0	
40	N40	0	105	0	0	
41	N41	0	110	0	0	
42	N42	0	115	0	0	
43	N43	0	120	0	0	
44	N44	0	125	0	0	
45	N45	0	130	0	0	
46	N46	0	135	0	0	
47	N47	0	140	0	0	
48	N48	0	145	0	0	
49	N49	-4.44	119.215	0	0	
50	N50	4.44	119.215	0	0	
51	N51	-5.63	131.14	0	0	
52	N52	5.63	131.14	0	0	
53	N53	-4.305	143.215	0	0	
54	N54	4.305	143.215	0	0	
55	N55	2.77	149.455	0	0	
56	N56	-2.77	149.455	0	0	
57	N57	0.	92.25	1	0	
58	N58	-0.	92.25	-1	0	
59	N59	0	92.25	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	BOTTOM-POLE	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	POLE-CONNECTION						
3	ARM2-LEFT						
4	ARM1-LEFT						

Member Point Loads

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

Joint Loads and Enforced Displacements (BLC 8 : x-direction NESC Heavy Wire Load)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	ARM4-LEFT	L	Y	-1.973
2	ARM4-RIGHT	L	Y	-1.202
3	ARM3-LEFT	L	Y	-4.759
4	ARM3-RIGHT	L	Y	-4.759
5	ARM2-RIGHT	L	Y	-4.759
6	ARM2-LEFT	L	Y	-4.759
7	ARM1-LEFT	L	Y	-4.759
8	ARM1-RIGHT	L	Y	-4.759
9	ARM4-LEFT	L	X	1.475
10	ARM4-RIGHT	L	X	1.101
11	ARM3-LEFT	L	X	2.046
12	ARM3-RIGHT	L	X	2.046
13	ARM2-LEFT	L	X	2.046
14	ARM2-RIGHT	L	X	2.046
15	ARM1-LEFT	L	X	2.046
16	ARM1-RIGHT	L	X	2.046

Joint Loads and Enforced Displacements (BLC 9 : x-driection NESC Extreme Wire Lo)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	ARM4-LEFT	L	Y	-.675
2	ARM4-RIGHT	L	Y	-.329
3	ARM3-LEFT	L	Y	-2.109
4	ARM3-RIGHT	L	Y	-2.109
5	ARM2-LEFT	L	Y	-2.109
6	ARM2-RIGHT	L	Y	-2.109
7	ARM1-RIGHT	L	Y	-2.109
8	ARM1-LEFT	L	Y	-2.109
9	ARM4-LEFT	L	X	1.185
10	ARM4-RIGHT	L	X	.607
11	ARM3-LEFT	L	X	2.349
12	ARM3-RIGHT	L	X	2.349
13	ARM2-RIGHT	L	X	2.349
14	ARM2-LEFT	L	X	2.349
15	ARM1-LEFT	L	X	2.349
16	ARM1-RIGHT	L	X	2.349

Joint Loads and Enforced Displacements (BLC 10 : z-direction NESC Heavy Wire Lo)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	ARM4-LEFT	L	Y	-1.973
2	ARM4-RIGHT	L	Y	-1.202
3	ARM3-LEFT	L	Y	-4.759
4	ARM3-RIGHT	L	Y	-4.759
5	ARM2-LEFT	L	Y	-4.759
6	ARM2-RIGHT	L	Y	-4.759
7	ARM1-LEFT	L	Y	-4.759
8	ARM1-RIGHT	L	Y	-4.759

Joint Loads and Enforced Displacements (BLC 11 : z-direction NESC Extreme Wire Lo)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	ARM4-LEFT	L	Y	-.675
2	ARM4-RIGHT	L	Y	-.329
3	ARM3-LEFT	L	Y	-2.109
4	ARM3-RIGHT	L	Y	-2.109
5	ARM2-LEFT	L	Y	-2.109
6	ARM2-RIGHT	L	Y	-2.109
7	ARM1-LEFT	L	Y	-2.109
8	ARM1-RIGHT	L	Y	-2.109

Joint Loads and Enforced Displacements (BLC 12 : x-direction NESC Heavy Mast Reac)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	TOP-BRACE	L	X	2.869
2	TOP-BRACE	L	Y	-.027
3	TOP-BRACE	L	Z	1.152
4	TOP-BRACE	L	My	4.302
5	BOTTOM-BRACE	L	X	-1.451
6	BOTTOM-BRACE	L	Y	-6.942
7	BOTTOM-BRACE	L	Z	-1.152
8	BOTTOM-BRACE	L	My	-2.177
9	N58	L	Z	0
10	N58	L	Y	-1.028
11	N58	L	X	.372
12	N57	L	Z	0
13	N57	L	Y	-.846
14	N57	L	X	-.041
15	N19	L	Z	0
16	N19	L	Y	-1.038
17	N19	L	X	.556
18	N18	L	Z	0
19	N18	L	Y	-.851
20	N18	L	X	.262

Joint Loads and Enforced Displacements (BLC 13 : x-direction NESC Extreme Mast Re)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	TOP-BRACE	L	X	11.461
2	TOP-BRACE	L	Y	-.017
3	TOP-BRACE	L	Z	.573
4	TOP-BRACE	L	My	17.191
5	BOTTOM-BRACE	L	X	-5.901

Joint Loads and Enforced Displacements (BLC 13 : x-direction NESC Extreme Mast Re) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
6	BOTTOM-BRACE	L	Y	-3.454
7	BOTTOM-BRACE	L	Z	-.573
8	BOTTOM-BRACE	L	My	-8.853
9	N58	L	Z	-.016
10	N58	L	Y	-.484
11	N58	L	X	.824
12	N57	L	Z	-.016
13	N57	L	Y	-.398
14	N57	L	X	-.248
15	N19	L	Z	.016
16	N19	L	Y	-.52
17	N19	L	X	2.033
18	N18	L	Z	.016
19	N18	L	Y	-.43
20	N18	L	X	.902

Joint Loads and Enforced Displacements (BLC 14 : z-direction NESC Heavy Mast Reac)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	TOP-BRACE	L	X	0
2	TOP-BRACE	L	Y	-.031
3	TOP-BRACE	L	Z	4.019
4	TOP-BRACE	L	My	0
5	BOTTOM-BRACE	L	X	0
6	BOTTOM-BRACE	L	Y	-6.938
7	BOTTOM-BRACE	L	Z	-2.601
8	BOTTOM-BRACE	L	My	0
9	N58	L	Z	.084
10	N58	L	Y	-1.103
11	N58	L	X	.146
12	N57	L	Z	.084
13	N57	L	Y	-.79
14	N57	L	X	.008
15	N19	L	Z	.299
16	N19	L	Y	-1.092
17	N19	L	X	-.068
18	N18	L	Z	.299
19	N18	L	Y	-.778
20	N18	L	X	-.086

Joint Loads and Enforced Displacements (BLC 15 : z-direction NESC Extreme Mast Re)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	TOP-BRACE	L	X	0
2	TOP-BRACE	L	Y	-.01
3	TOP-BRACE	L	Z	12.054
4	TOP-BRACE	L	My	0
5	BOTTOM-BRACE	L	X	0
6	BOTTOM-BRACE	L	Y	-3.461
7	BOTTOM-BRACE	L	Z	-6.485
8	BOTTOM-BRACE	L	My	0
9	N58	L	Z	.237
10	N58	L	Y	-.717

Joint Loads and Enforced Displacements (BLC 15 : z-direction NESC Extreme Mast Re) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
11	N58	L	X	.146
12	N57	L	Z	.237
13	N57	L	Y	-.221
14	N57	L	X	-.072
15	N19	L	Z	.944
16	N19	L	Y	-.689
17	N19	L	X	.094
18	N18	L	Z	.944
19	N18	L	Y	-.206
20	N18	L	X	-.167

Member Distributed Loads (BLC 3 : Weight of Ice Only on Pole and A)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.032	-.031	0	0
2	M9	Y	-.004	-.006	0	0
3	M8	Y	-.004	-.006	0	0
4	M6	Y	-.004	-.007	0	0
5	M7	Y	-.004	-.007	0	0
6	M3	Y	-.004	-.007	0	0
7	M2	Y	-.004	-.007	0	0
8	M4	Y	-.004	-.008	0	0
9	M5	Y	-.004	-.008	0	0
10	M11	Y	-.031	-.031	0	0
11	M12	Y	-.031	-.03	0	0
12	M13	Y	-.03	-.03	0	0
13	M14	Y	-.03	-.029	0	0
14	M15	Y	-.029	-.029	0	0
15	M16	Y	-.029	-.028	0	0
16	M17	Y	-.028	-.028	0	0
17	M18	Y	-.028	-.027	0	0
18	M19	Y	-.027	-.027	0	0
19	M20	Y	-.027	-.026	0	0
20	M21	Y	-.026	-.026	0	0
21	M22	Y	-.026	-.025	0	0
22	M23	Y	-.025	-.025	0	0
23	M24	Y	-.025	-.024	0	0
24	M25	Y	-.024	-.023	0	0
25	M26	Y	-.023	-.023	0	0
26	M27	Y	-.023	-.022	0	0
27	M28	Y	-.022	-.022	0	0
28	M29	Y	-.022	-.021	0	0
29	M30	Y	-.021	-.021	0	0
30	M31	Y	-.021	-.02	0	0
31	M32	Y	-.02	-.02	0	0
32	M33	Y	-.02	-.019	0	0
33	M34	Y	-.019	-.019	0	0
34	M35	Y	-.019	-.018	0	0
35	M36	Y	-.018	-.018	0	0
36	M37	Y	-.018	-.017	0	0
37	M38	Y	-.017	-.017	0	0

Member Distributed Loads (BLC 3 : Weight of Ice Only on Pole and A) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
38	M39	Y	-.017	-.016	0	0
39	M40	Y	-.007	-.01	0	0
40	M41	Y	-.007	-.01	0	0
41	M42	Y	-.008	-.012	0	0
42	M43	Y	-.008	-.012	0	0
43	M44	Y	-.007	-.01	0	0
44	M45	Y	-.007	-.01	0	0
45	M46	Y	-.006	-.008	0	0
46	M47	Y	-.006	-.008	0	0

Member Distributed Loads (BLC 4 : x-direction NESC Heavy Wind on P)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.012	.012	0	0
2	M11	X	.012	.012	0	0
3	M12	X	.012	.012	0	0
4	M13	X	.012	.012	0	0
5	M14	X	.012	.012	0	0
6	M15	X	.012	.012	0	0
7	M16	X	.012	.012	0	0
8	M17	X	.012	.012	0	0
9	M18	X	.012	.012	0	0
10	M19	X	.012	.012	0	0
11	M20	X	.012	.012	0	0
12	M21	X	.012	.012	0	0
13	M22	X	.012	.012	0	0
14	M23	X	.012	.012	0	0
15	M24	X	.012	.012	0	0
16	M25	X	.012	.012	0	0
17	M26	X	.012	.012	0	0
18	M27	X	.012	.012	0	0
19	M28	X	.012	.012	0	0
20	M29	X	.012	.012	0	0
21	M30	X	.012	.012	0	0
22	M31	X	.012	.012	0	0
23	M32	X	.012	.012	0	0
24	M33	X	.012	.012	0	0
25	M34	X	.012	.012	0	0
26	M35	X	.012	.012	0	0
27	M36	X	.012	.012	0	0
28	M37	X	.012	.012	0	0
29	M38	X	.012	.012	0	0
30	M39	X	.012	.012	0	0

Member Distributed Loads (BLC 5 : x-direction NESC Extreme Wind on)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.095	.095	0	0
2	M11	X	.095	.095	0	0
3	M12	X	.095	.095	0	0
4	M13	X	.095	.095	0	0
5	M14	X	.095	.095	0	0
6	M15	X	.095	.095	0	0

Member Distributed Loads (BLC 5 : x-direction NESC Extreme Wind on) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
7	M16	X	.095	.095	0	0
8	M17	X	.095	.095	0	0
9	M18	X	.095	.095	0	0
10	M19	X	.095	.095	0	0
11	M20	X	.095	.095	0	0
12	M21	X	.095	.095	0	0
13	M22	X	.094	.094	0	0
14	M23	X	.094	.094	0	0
15	M24	X	.094	.094	0	0
16	M25	X	.094	.094	0	0
17	M26	X	.094	.094	0	0
18	M27	X	.094	.094	0	0
19	M28	X	.093	.093	0	0
20	M29	X	.093	.093	0	0
21	M30	X	.093	.093	0	0
22	M31	X	.093	.093	0	0
23	M32	X	.093	.093	0	0
24	M33	X	.093	.093	0	0
25	M34	X	.092	.092	0	0
26	M35	X	.092	.092	0	0
27	M36	X	.092	.092	0	0
28	M37	X	.092	.092	0	0
29	M38	X	.092	.092	0	0
30	M39	X	.092	.092	0	0

Member Distributed Loads (BLC 6 : z-direction NESC Heavy Wind)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	Z	.029	.028	0	0
2	M8	Z	.003	.005	0	0
3	M9	Z	.003	.005	0	0
4	M7	Z	.003	.006	0	0
5	M6	Z	.003	.006	0	0
6	M3	Z	.003	.006	0	0
7	M2	Z	.003	.006	0	0
8	M5	Z	.003	.006	0	0
9	M4	Z	.003	.006	0	0
10	M11	Z	.028	.028	0	0
11	M12	Z	.028	.027	0	0
12	M13	Z	.027	.026	0	0
13	M14	Z	.026	.025	0	0
14	M15	Z	.025	.025	0	0
15	M16	Z	.025	.024	0	0
16	M17	Z	.024	.023	0	0
17	M18	Z	.023	.022	0	0
18	M19	Z	.022	.022	0	0
19	M20	Z	.022	.021	0	0
20	M21	Z	.021	.02	0	0
21	M22	Z	.02	.019	0	0
22	M23	Z	.019	.019	0	0
23	M24	Z	.019	.018	0	0
24	M25	Z	.018	.017	0	0

Member Distributed Loads (BLC 6 : z-direction NESC Heavy Wind) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
25	M26	Z	.017	.017	0	0
26	M27	Z	.017	.016	0	0
27	M28	Z	.016	.015	0	0
28	M29	Z	.015	.014	0	0
29	M30	Z	.014	.014	0	0
30	M31	Z	.014	.013	0	0
31	M32	Z	.013	.012	0	0
32	M33	Z	.012	.011	0	0
33	M34	Z	.011	.011	0	0
34	M35	Z	.011	.01	0	0
35	M36	Z	.01	.009	0	0
36	M37	Z	.009	.008	0	0
37	M38	Z	.008	.008	0	0
38	M39	Z	.008	.007	0	0
39	M40	Z	.006	.009	0	0
40	M41	Z	.006	.009	0	0
41	M42	Z	.006	.01	0	0
42	M43	Z	.006	.01	0	0
43	M44	Z	.006	.009	0	0
44	M45	Z	.006	.009	0	0
45	M46	Z	.005	.007	0	0
46	M47	Z	.005	.007	0	0

Member Distributed Loads (BLC 7 : z-direction NESC Extreme Wind)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	Z	.236	.23	0	0
2	M8	Z	.018	.035	0	0
3	M9	Z	.018	.035	0	0
4	M7	Z	.018	.042	0	0
5	M6	Z	.018	.042	0	0
6	M2	Z	.018	.042	0	0
7	M3	Z	.018	.042	0	0
8	M5	Z	.018	.049	0	0
9	M4	Z	.018	.049	0	0
10	M11	Z	.23	.224	0	0
11	M12	Z	.224	.218	0	0
12	M13	Z	.218	.212	0	0
13	M14	Z	.212	.206	0	0
14	M15	Z	.206	.2	0	0
15	M16	Z	.2	.194	0	0
16	M17	Z	.194	.188	0	0
17	M18	Z	.188	.182	0	0
18	M19	Z	.182	.176	0	0
19	M20	Z	.176	.17	0	0
20	M21	Z	.17	.164	0	0
21	M22	Z	.164	.158	0	0
22	M23	Z	.158	.152	0	0
23	M24	Z	.152	.146	0	0
24	M25	Z	.146	.141	0	0
25	M26	Z	.141	.135	0	0
26	M27	Z	.135	.129	0	0

Member Distributed Loads (BLC 7 : z-direction NESC Extreme Wind) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
27	M28	Z	.129	.123	0	0
28	M29	Z	.123	.117	0	0
29	M30	Z	.117	.111	0	0
30	M31	Z	.111	.105	0	0
31	M32	Z	.105	.099	0	0
32	M33	Z	.099	.093	0	0
33	M34	Z	.093	.087	0	0
34	M35	Z	.087	.081	0	0
35	M36	Z	.081	.075	0	0
36	M37	Z	.075	.069	0	0
37	M38	Z	.069	.063	0	0
38	M39	Z	.063	.057	0	0
39	M40	Z	.042	.066	0	0
40	M41	Z	.042	.066	0	0
41	M42	Z	.049	.079	0	0
42	M43	Z	.049	.079	0	0
43	M44	Z	.042	.066	0	0
44	M45	Z	.042	.066	0	0
45	M46	Z	.035	.053	0	0
46	M47	Z	.035	.053	0	0

Member Distributed Loads (BLC 16 : Weight of Coax Cables)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.027	-.027	0	0
2	M28	Y	-.025	-.025	0	0
3	M11	Y	-.027	-.027	0	0
4	M12	Y	-.027	-.027	0	0
5	M13	Y	-.027	-.027	0	0
6	M14	Y	-.027	-.027	0	0
7	M15	Y	-.027	-.027	0	0
8	M16	Y	-.027	-.027	0	0
9	M17	Y	-.027	-.027	0	0
10	M18	Y	-.027	-.027	0	0
11	M19	Y	-.027	-.027	0	0
12	M20	Y	-.027	-.027	0	0
13	M21	Y	-.027	-.027	0	0
14	M22	Y	-.027	-.027	0	0
15	M23	Y	-.027	-.027	0	0
16	M24	Y	-.027	-.027	0	0
17	M25	Y	-.027	-.027	0	0
18	M26	Y	-.027	-.027	0	0
19	M27	Y	-.027	-.027	0	5
20	M29	Y	-.025	-.025	0	0
21	M30	Y	-.025	-.025	0	0
22	M31	Y	-.025	-.025	0	0
23	M32	Y	-.025	-.025	0	0
24	M33	Y	-.025	-.025	0	0
25	M34	Y	-.025	-.025	0	0
26	M35	Y	-.025	-.025	0	0
27	M36	Y	-.025	-.025	0	0
28	M37	Y	-.025	-.025	0	0

Member Distributed Loads (BLC 16 : Weight of Coax Cables) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
29	M38	Y	-.025	-.025	0	0
30	M39	Y	-.025	-.025	0	5

Member Distributed Loads (BLC 17 : Weight of Ice on Coax Cables)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.039	-.039	0	0
2	M28	Y	-.036	-.036	0	0
3	M11	Y	-.039	-.039	0	0
4	M12	Y	-.039	-.039	0	0
5	M13	Y	-.039	-.039	0	0
6	M14	Y	-.039	-.039	0	0
7	M15	Y	-.039	-.039	0	0
8	M16	Y	-.039	-.039	0	0
9	M17	Y	-.039	-.039	0	0
10	M18	Y	-.039	-.039	0	0
11	M19	Y	-.039	-.039	0	0
12	M20	Y	-.039	-.039	0	0
13	M21	Y	-.039	-.039	0	0
14	M22	Y	-.039	-.039	0	0
15	M23	Y	-.039	-.039	0	0
16	M24	Y	-.039	-.039	0	0
17	M25	Y	-.039	-.039	0	0
18	M26	Y	-.039	-.039	0	0
19	M27	Y	-.039	-.039	0	5
20	M29	Y	-.036	-.036	0	0
21	M30	Y	-.036	-.036	0	0
22	M31	Y	-.036	-.036	0	0
23	M32	Y	-.036	-.036	0	0
24	M33	Y	-.036	-.036	0	0
25	M34	Y	-.036	-.036	0	0
26	M35	Y	-.036	-.036	0	0
27	M36	Y	-.036	-.036	0	0
28	M37	Y	-.036	-.036	0	0
29	M38	Y	-.036	-.036	0	0
30	M39	Y	-.036	-.036	0	5

Member Distributed Loads (BLC 18 : x-direction NESC Heavy Coax)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.003	.003	0	0
2	M11	X	.003	.003	0	0
3	M12	X	.003	.003	0	0
4	M13	X	.003	.003	0	0
5	M14	X	.003	.003	0	0
6	M15	X	.003	.003	0	0
7	M16	X	.003	.003	0	0
8	M17	X	.003	.003	0	0
9	M18	X	.003	.003	0	0
10	M19	X	.003	.003	0	0
11	M20	X	.003	.003	0	0
12	M21	X	.003	.003	0	0
13	M22	X	.003	.003	0	0

Member Distributed Loads (BLC 18 : x-direction NESC Heavy Coax) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
14	M23	X	.003	.003	0	0
15	M24	X	.003	.003	0	0
16	M25	X	.003	.003	0	0
17	M26	X	.003	.003	0	0
18	M27	X	.003	.003	0	0
19	M28	X	.003	.003	0	0
20	M29	X	.003	.003	0	0
21	M30	X	.003	.003	0	0
22	M31	X	.003	.003	0	0
23	M32	X	.003	.003	0	0
24	M33	X	.003	.003	0	0
25	M34	X	.003	.003	0	0
26	M35	X	.003	.003	0	0
27	M36	X	.003	.003	0	0
28	M37	X	.003	.003	0	0
29	M38	X	.003	.003	0	0
30	M39	X	.003	.003	0	5

Member Distributed Loads (BLC 19 : x-direction NESC Extreme Coax)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.017	.017	0	0
2	M11	X	.017	.017	0	0
3	M12	X	.017	.017	0	0
4	M13	X	.017	.017	0	0
5	M14	X	.017	.017	0	0
6	M15	X	.017	.017	0	0
7	M16	X	.017	.017	0	0
8	M17	X	.017	.017	0	0
9	M18	X	.017	.017	0	0
10	M19	X	.017	.017	0	0
11	M20	X	.017	.017	0	0
12	M21	X	.017	.017	0	0
13	M22	X	.017	.017	0	0
14	M23	X	.017	.017	0	0
15	M24	X	.017	.017	0	0
16	M25	X	.017	.017	0	0
17	M26	X	.017	.017	0	0
18	M27	X	.017	.017	0	0
19	M28	X	.017	.017	0	0
20	M29	X	.017	.017	0	0
21	M30	X	.017	.017	0	0
22	M31	X	.017	.017	0	0
23	M32	X	.017	.017	0	0
24	M33	X	.017	.017	0	0
25	M34	X	.017	.017	0	0
26	M35	X	.017	.017	0	0
27	M36	X	.017	.017	0	0
28	M37	X	.017	.017	0	0
29	M38	X	.017	.017	0	0
30	M39	X	.017	.017	0	5

Member Distributed Loads (BLC 20 : z-direction NESC Heavy Coax)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	Z	.003	.003	0	0
2	M11	Z	.003	.003	0	0
3	M12	Z	.003	.003	0	0
4	M13	Z	.003	.003	0	0
5	M14	Z	.003	.003	0	0
6	M15	Z	.003	.003	0	0
7	M16	Z	.003	.003	0	0
8	M17	Z	.003	.003	0	0
9	M18	Z	.003	.003	0	0
10	M19	Z	.003	.003	0	0
11	M20	Z	.003	.003	0	0
12	M21	Z	.003	.003	0	0
13	M22	Z	.003	.003	0	0
14	M23	Z	.003	.003	0	0
15	M24	Z	.003	.003	0	0
16	M25	Z	.003	.003	0	0
17	M26	Z	.003	.003	0	0
18	M27	Z	.003	.003	0	0
19	M28	Z	.003	.003	0	0
20	M29	Z	.003	.003	0	0
21	M30	Z	.003	.003	0	0
22	M31	Z	.003	.003	0	0
23	M32	Z	.003	.003	0	0
24	M33	Z	.003	.003	0	0
25	M34	Z	.003	.003	0	0
26	M35	Z	.003	.003	0	0
27	M36	Z	.003	.003	0	0
28	M37	Z	.003	.003	0	0
29	M38	Z	.003	.003	0	0
30	M39	Z	.003	.003	0	5

Member Distributed Loads (BLC 21 : z-direction NESC Extreme Coax)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	Z	.017	.017	0	0
2	M11	Z	.017	.017	0	0
3	M12	Z	.017	.017	0	0
4	M13	Z	.017	.017	0	0
5	M14	Z	.017	.017	0	0
6	M15	Z	.017	.017	0	0
7	M16	Z	.017	.017	0	0
8	M17	Z	.017	.017	0	0
9	M18	Z	.017	.017	0	0
10	M19	Z	.017	.017	0	0
11	M20	Z	.017	.017	0	0
12	M21	Z	.017	.017	0	0
13	M22	Z	.017	.017	0	0
14	M23	Z	.017	.017	0	0
15	M24	Z	.017	.017	0	0
16	M25	Z	.017	.017	0	0
17	M26	Z	.017	.017	0	0
18	M27	Z	.017	.017	0	0

Member Distributed Loads (BLC 21 : z-direction NESC Extreme Coax) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
19	M28	Z	.017	.017	0	0
20	M29	Z	.017	.017	0	0
21	M30	Z	.017	.017	0	0
22	M31	Z	.017	.017	0	0
23	M32	Z	.017	.017	0	0
24	M33	Z	.017	.017	0	0
25	M34	Z	.017	.017	0	0
26	M35	Z	.017	.017	0	0
27	M36	Z	.017	.017	0	0
28	M37	Z	.017	.017	0	0
29	M38	Z	.017	.017	0	0
30	M39	Z	.017	.017	0	5

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distrib..	Area(...	Surfa...
1	Self Weight	None		-1						
2	Weight Pole and Arms	None								
3	Weight of Ice Only on Pole and A	None						46		
4	x-direction NESC Heavy Wind on P	None						30		
5	x-direction NESC Extreme Wind on	None						30		
6	z-direction NESC Heavy Wind	None						46		
7	z-direction NESC Extreme Wind	None						46		
8	x-direction NESC Heavy Wire Load	None				16				
9	x-driection NESC Extreme Wire Lo	None				16				
10	z-direction NESC Heavy Wire Lo	None				8				
11	z-direction NESC Extreme Wire Lo	None				8				
12	x-direction NESC Heavy Mast Reac	None				20				
13	x-direction NESC Extreme Mast Re	None				20				
14	z-direction NESC Heavy Mast Reac	None				20				
15	z-direction NESC Extreme Mast Re	None				20				
16	Weight of Coax Cables	None						30		
17	Weight of Ice on Coax Cables	None						30		
18	x-direction NESC Heavy Coax	None						30		
19	x-direction NESC Extreme Coax	None						30		
20	z-direction NESC Heavy Coax	None						30		
21	z-direction NESC Extreme Coax	None						30		

Load Combinations

	Description	Solve	P...	S...	B...	Fa...	BLC	Fact...	BLC	Fa...	BLC	Fa...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	x-direction NESC H...	Yes	Y		1	1.5	3	1.5	4	2.5	8	1	12	1	16	1.5	17	1.5	18	2.5				
2	x-direction NESC E...	Yes	Y		1	1	5	1	9	1	13	1	16	1	19	1								
3	z-direction NESC H...	Yes	Y		1	1.5	3	1.5	6	2.5	10	1	14	1	16	1.5	17	1.5	20	2.5				
4	z-direction NESC E...	Yes	Y		1	1	7	1	11	1	15	1	16	1	21	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	BOTTOM-POLE	max	0	3	106.621	3	0	2	-6.446	2	.474	4	4845.084	2
2		min	-41.577	2	51.969	2	-35.445	4	-3456.297	4	-6.23	2	-5.33	3
3	Totals:	max	0	3	106.621	3	0	2						
4		min	-41.577	2	51.969	2	-35.445	4						

Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	BOTTOM-POLE	-23.044	106.621	0	-18.683	-1.495	3190.435
2	1	Totals:	-23.044	106.621	0			
3	1	COG (ft):	X: -.04	Y: 94.024	Z: -.003			

Member Section Stresses (By Combination)

	LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bendi...	z bot Bendi...
1	1	M22	1	1.43	-.004	-.855	.448	-.448	42.025	-42.025
2			2	1.42	-.004	-.853	.446	-.446	41.313	-41.313
3			3	1.41	-.004	-.852	.444	-.444	40.602	-40.602
4			4	1.401	-.004	-.85	.442	-.442	39.893	-39.893
5			5	1.391	-.004	-.848	.44	-.44	39.185	-39.185
6	1	M28	1	1.567	-.006	-1.586	.568	-.568	41.762	-41.762
7			2	1.556	-.006	-1.583	.563	-.563	40.608	-40.608
8			3	1.499	-.006	-1.555	.566	-.566	39.46	-39.46
9			4	1.489	-.006	-1.552	.562	-.562	38.328	-38.328
10			5	1.479	-.006	-1.549	.558	-.558	37.198	-37.198
11	1	M23	1	1.418	-.005	-.889	.45	-.45	41.597	-41.597
12			2	1.409	-.005	-.888	.448	-.448	40.84	-40.84
13			3	1.399	-.005	-.886	.445	-.445	40.084	-40.084
14			4	1.39	-.005	-.884	.443	-.443	39.329	-39.329
15			5	1.38	-.005	-.883	.441	-.441	38.575	-38.575
16	1	M24	1	1.407	-.005	-.926	.452	-.452	41.06	-41.06
17			2	1.398	-.005	-.924	.449	-.449	40.252	-40.252
18			3	1.388	-.005	-.923	.446	-.446	39.445	-39.445
19			4	1.378	-.005	-.921	.444	-.444	38.64	-38.64
20			5	1.369	-.005	-.919	.441	-.441	37.837	-37.837
21	1	M17	1	1.369	-.003	-.612	.388	-.388	40.474	-40.474
22			2	1.36	-.003	-.611	.387	-.387	39.967	-39.967
23			3	1.351	-.003	-.609	.385	-.385	39.461	-39.461
24			4	1.342	-.003	-.608	.384	-.384	38.956	-38.956
25			5	1.332	-.003	-.607	.383	-.383	38.452	-38.452
26	1	M16	1	1.38	-.002	-.591	.383	-.383	40.474	-40.474
27			2	1.371	-.002	-.59	.382	-.382	39.992	-39.992
28			3	1.362	-.002	-.589	.381	-.381	39.512	-39.512
29			4	1.353	-.002	-.588	.38	-.38	39.033	-39.033
30			5	1.344	-.002	-.587	.379	-.379	38.554	-38.554
31	1	M18	1	1.358	-.003	-.633	.392	-.392	40.432	-40.432
32			2	1.348	-.003	-.632	.391	-.391	39.897	-39.897
33			3	1.339	-.003	-.631	.389	-.389	39.363	-39.363
34			4	1.33	-.003	-.629	.388	-.388	38.831	-38.831
35			5	1.321	-.003	-.628	.387	-.387	38.299	-38.299
36	1	M25	1	1.396	-.005	-.965	.452	-.452	40.391	-40.391
37			2	1.387	-.005	-.964	.449	-.449	39.527	-39.527
38			3	1.377	-.005	-.962	.447	-.447	38.665	-38.665
39			4	1.367	-.005	-.96	.444	-.444	37.804	-37.804
40			5	1.358	-.005	-.958	.441	-.441	36.945	-36.945
41	1	M19	1	1.346	-.003	-.656	.396	-.396	40.342	-40.342
42			2	1.337	-.003	-.654	.394	-.394	39.777	-39.777
43			3	1.328	-.003	-.653	.393	-.393	39.213	-39.213

Member Section Stresses (By Combination) (Continued)

	LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bendi...	z bot Bendi...
44			4	1.319	-.003	-.652	.391	-.391	38.651	-38.651
45			5	1.31	-.003	-.651	.39	-.39	38.089	-38.089
46	1	M29	1	1.505	-.006	-1.636	.571	-.571	40.252	-40.252
47			2	1.494	-.006	-1.633	.567	-.567	39.024	-39.024
48			3	1.484	-.006	-1.629	.562	-.562	37.798	-37.798
49			4	1.474	-.006	-1.626	.558	-.558	36.575	-36.575
50			5	1.463	-.006	-1.623	.554	-.554	35.354	-35.354
51	1	M20	1	1.335	-.004	-.68	.399	-.399	40.197	-40.197
52			2	1.326	-.004	-.678	.397	-.397	39.599	-39.599
53			3	1.317	-.004	-.677	.396	-.396	39.003	-39.003
54			4	1.308	-.004	-.676	.394	-.394	38.408	-38.408
55			5	1.299	-.004	-.674	.392	-.392	37.814	-37.814
56	1	M21	1	1.325	-.004	-.705	.402	-.402	39.987	-39.987
57			2	1.315	-.004	-.703	.4	-.4	39.354	-39.354
58			3	1.306	-.004	-.702	.398	-.398	38.722	-38.722
59			4	1.297	-.004	-.701	.397	-.397	38.091	-38.091
60			5	1.288	-.004	-.699	.395	-.395	37.461	-37.461
61	1	M26	1	1.386	-.005	-1.008	.453	-.453	39.566	-39.566
62			2	1.376	-.005	-1.006	.45	-.45	38.64	-38.64
63			3	1.366	-.005	-1.004	.446	-.446	37.715	-37.715
64			4	1.356	-.005	-1.002	.443	-.443	36.792	-36.792
65			5	1.347	-.005	-1	.44	-.44	35.871	-35.871
66	1	M27	1	1.375	-.006	-1.053	.452	-.452	38.553	-38.553
67			2	1.365	-.006	-1.051	.449	-.449	37.557	-37.557
68			3	1.355	-.006	-1.049	.446	-.446	36.563	-36.563
69			4	1.345	-.006	-1.047	.442	-.442	35.571	-35.571
70			5	1.297	-.006	-1.008	.445	-.445	34.588	-34.588
71	1	M30	1	1.489	-.006	-1.72	.567	-.567	38.453	-38.453
72			2	1.479	-.006	-1.717	.562	-.562	37.117	-37.117
73			3	1.468	-.006	-1.713	.557	-.557	35.784	-35.784
74			4	1.458	-.006	-1.71	.553	-.553	34.453	-34.453
75			5	1.448	-.006	-1.706	.548	-.548	33.125	-33.125
76	1	M15	1	1.282	-.002	-.501	.343	-.343	38.166	-38.166
77			2	1.273	-.002	-.5	.342	-.342	37.734	-37.734
78			3	1.264	-.002	-.499	.341	-.341	37.303	-37.303
79			4	1.255	-.002	-.498	.341	-.341	36.873	-36.873
80			5	1.246	-.002	-.497	.34	-.34	36.443	-36.443
81	1	M14	1	1.293	-.002	-.485	.338	-.338	38.057	-38.057
82			2	1.284	-.002	-.484	.337	-.337	37.646	-37.646
83			3	1.276	-.002	-.483	.337	-.337	37.236	-37.236
84			4	1.267	-.002	-.482	.336	-.336	36.826	-36.826
85			5	1.258	-.002	-.481	.335	-.335	36.418	-36.418
86	1	M13	1	1.305	-.001	-.471	.333	-.333	37.954	-37.954
87			2	1.296	-.001	-.47	.332	-.332	37.562	-37.562
88			3	1.287	-.001	-.469	.332	-.332	37.172	-37.172
89			4	1.279	-.001	-.468	.331	-.331	36.782	-36.782
90			5	1.27	-.001	-.467	.331	-.331	36.392	-36.392
91	1	M12	1	1.317	-.001	-.456	.327	-.327	37.814	-37.814
92			2	1.308	-.001	-.455	.327	-.327	37.441	-37.441
93			3	1.299	-.001	-.455	.326	-.326	37.068	-37.068
94			4	1.29	-.001	-.454	.326	-.326	36.696	-36.696
95			5	1.282	-.001	-.453	.326	-.326	36.325	-36.325

Member Section Stresses (By Combination) (Continued)

	LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bendi...	z bot Bendi...
96	1	M11	1	1.328	0	-.443	.321	-.321	37.655	-37.655
97			2	1.32	0	-.442	.321	-.321	37.299	-37.299
98			3	1.311	0	-.441	.321	-.321	36.943	-36.943
99			4	1.302	0	-.44	.321	-.321	36.588	-36.588
100			5	1.293	0	-.439	.32	-.32	36.234	-36.234
101	1	M1	1	1.34	0	-.43	.315	-.315	37.479	-37.479
102			2	1.331	0	-.429	.315	-.315	37.139	-37.139
103			3	1.323	0	-.428	.315	-.315	36.799	-36.799
104			4	1.314	0	-.427	.315	-.315	36.46	-36.46
105			5	1.305	0	-.426	.315	-.315	36.122	-36.122
106	1	M31	1	1.474	-.006	-1.812	.562	-.562	36.241	-36.241
107			2	1.463	-.006	-1.808	.557	-.557	34.78	-34.78
108			3	1.453	-.006	-1.804	.552	-.552	33.322	-33.322
109			4	1.442	-.006	-1.801	.547	-.547	31.867	-31.867
110			5	1.432	-.006	-1.797	.542	-.542	30.415	-30.415
111	1	M32	1	1.458	-.007	-1.912	.555	-.555	33.501	-33.501
112			2	1.448	-.007	-1.908	.55	-.55	31.895	-31.895
113			3	1.437	-.007	-1.904	.545	-.545	30.291	-30.291
114			4	1.427	-.007	-1.9	.539	-.539	28.692	-28.692
115			5	1.416	-.007	-1.896	.534	-.534	27.095	-27.095
116	1	M33	1	1.443	-.007	-2.02	.548	-.548	30.079	-30.079
117			2	1.432	-.007	-2.016	.542	-.542	28.302	-28.302
118			3	1.422	-.007	-2.012	.537	-.537	26.529	-26.529
119			4	1.123	-.005	-1.554	.531	-.531	24.42	-24.42
120			5	1.112	-.005	-1.549	.527	-.527	23.054	-23.054
121	1	M34	1	1.222	-.006	-2.198	.6	-.6	27.313	-27.313
122			2	1.211	-.006	-2.192	.595	-.595	25.696	-25.696
123			3	1.2	-.006	-2.186	.59	-.59	24.084	-24.084
124			4	1.19	-.006	-2.18	.585	-.585	22.476	-22.476
125			5	1.179	-.006	-2.174	.58	-.58	20.872	-20.872
126	1	M35	1	1.197	-.006	-2.327	.593	-.593	23.631	-23.631
127			2	1.186	-.006	-2.321	.588	-.588	21.817	-21.817
128			3	1.175	-.006	-2.314	.582	-.582	20.009	-20.009
129			4	1.164	-.006	-2.308	.577	-.577	18.205	-18.205
130			5	1.153	-.006	-2.302	.571	-.571	16.407	-16.407
131	1	M36	1	1.172	-.006	-2.472	.585	-.585	18.824	-18.824
132			2	.817	-.004	-1.691	.58	-.58	16.495	-16.495
133			3	.806	-.004	-1.684	.576	-.576	15.088	-15.088
134			4	.795	-.004	-1.678	.572	-.572	13.687	-13.687
135			5	.784	-.004	-1.671	.568	-.568	12.291	-12.291
136	1	M37	1	.797	-.004	-1.795	.582	-.582	14.334	-14.334
137			2	.786	-.004	-1.787	.578	-.578	12.721	-12.721
138			3	.775	-.004	-1.78	.574	-.574	11.115	-11.115
139			4	.547	-.081	-1.865	.524	-.524	9.466	-9.466
140			5	.536	-.081	-1.858	.444	-.444	7.789	-7.789
141	1	M38	1	.544	-.081	-2.009	.455	-.455	9.269	-9.269
142			2	.533	-.081	-2.001	.373	-.373	7.292	-7.292
143			3	.522	-.081	-1.993	.291	-.291	5.323	-5.323
144			4	.174	-.079	-1.07	.21	-.21	3.337	-3.337
145			5	.163	-.079	-1.062	.13	-.13	2.286	-2.286
146	1	M39	1	.166	-.079	-1.15	.133	-.133	2.791	-2.791
147			2	.155	-.079	-1.141	.051	-.051	1.532	-1.532

Member Section Stresses (By Combination) (Continued)

	LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bendi...	z bot Bendi...
148			3	.143	0	-.588	.001	-.001	.522	-.522
149			4	.132	0	-.58	0	0	-.12	.12
150			5	0	0	-.003	0	0	0	0
151	1	M6	1	.337	-.865	.001	0	0	0	0
152			2	.338	-.876	.001	-2.435	2.435	.003	-.003
153			3	.339	-.887	.001	-4.9	4.9	.006	-.006
154			4	.34	-.898	.001	-7.396	7.396	.009	-.009
155			5	.341	-.91	.001	-9.924	9.924	.011	-.011
156	1	M44	1	.223	-.575	0	-4.134	4.134	.005	-.005
157			2	.224	-.585	0	-5.2	5.2	.006	-.006
158			3	.225	-.596	0	-6.287	6.287	.008	-.008
159			4	.226	-.607	0	-7.393	7.393	.009	-.009
160			5	.227	-.618	0	-8.52	8.52	.01	-.01
161	1	M9	1	.256	-.388	.001	0	0	0	0
162			2	.256	-.395	.001	-.839	.839	.002	-.002
163			3	.257	-.403	.001	-1.694	1.694	.004	-.004
164			4	.257	-.41	.001	-2.564	2.564	.006	-.006
165			5	.258	-.417	.001	-3.45	3.45	.008	-.008
166	1	M47	1	.179	-.278	0	-1.609	1.609	.004	-.004
167			2	.179	-.285	0	-2.031	2.031	.005	-.005
168			3	.18	-.291	0	-2.462	2.462	.006	-.006
169			4	.18	-.298	0	-2.904	2.904	.007	-.007
170			5	.181	-.306	0	-3.357	3.357	.008	-.008
171	1	M4	1	.282	-.762	0	0	0	0	0
172			2	.283	-.776	0	-2.416	2.416	.002	-.002
173			3	.284	-.79	0	-4.875	4.875	.004	-.004
174			4	.285	-.805	0	-7.38	7.38	.005	-.005
175			5	.286	-.819	0	-9.932	9.932	.007	-.007
176	1	M2	1	.335	-.878	0	0	0	0	0
177			2	.336	-.889	0	-2.547	2.547	.002	-.002
178			3	.337	-.9	0	-5.126	5.126	.003	-.003
179			4	.338	-.912	0	-7.738	7.738	.005	-.005
180			5	.339	-.924	0	-10.383	10.383	.006	-.006
181	1	M42	1	.18	-.5	0	-3.826	3.826	.003	-.003
182			2	.181	-.513	0	-4.829	4.829	.004	-.004
183			3	.182	-.527	0	-5.859	5.859	.004	-.004
184			4	.183	-.542	0	-6.918	6.918	.005	-.005
185			5	.184	-.556	0	-8.004	8.004	.006	-.006
186	1	M40	1	.221	-.584	0	-4.325	4.325	.003	-.003
187			2	.222	-.595	0	-5.442	5.442	.003	-.003
188			3	.223	-.606	0	-6.58	6.58	.004	-.004
189			4	.224	-.617	0	-7.739	7.739	.005	-.005
190			5	.225	-.628	0	-8.92	8.92	.005	-.005
191	1	M3	1	-.172	-1.022	0	0	0	0	0
192			2	-.171	-1.033	0	-2.961	2.961	0	0
193			3	-.17	-1.044	0	-5.954	5.954	0	0
194			4	-.169	-1.056	0	-8.98	8.98	0	0
195			5	-.168	-1.068	0	-12.041	12.041	0	0
196	1	M5	1	-.157	-.874	0	0	0	0	0
197			2	-.156	-.888	0	-2.769	2.769	0	0
198			3	-.155	-.902	0	-5.581	5.581	0	0
199			4	-.154	-.917	0	-8.439	8.439	-.001	.001

Member Section Stresses (By Combination) (Continued)

	LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bendi...	z bot Bendi...
200			5	-.153	-.932	0	-11.344	11.344	-.002	.002
201	1	M7	1	-.169	-1.019	0	0	0	0	0
202			2	-.168	-1.029	0	-2.864	2.864	0	0
203			3	-.167	-1.04	0	-5.757	5.757	-.002	.002
204			4	-.166	-1.052	0	-8.682	8.682	-.002	.002
205			5	-.165	-1.063	0	-11.639	11.639	-.003	.003
206	1	M8	1	-.138	-.307	0	0	0	0	0
207			2	-.137	-.314	0	-.666	.666	0	0
208			3	-.137	-.322	0	-1.347	1.347	-.001	.001
209			4	-.136	-.329	0	-2.043	2.043	-.002	.002
210			5	-.135	-.336	0	-2.756	2.756	-.003	.003
211	1	M10	1	0	0	0	0	0	0	0
212			2	0	0	0	0	0	0	0
213			3	0	0	0	0	0	0	0
214			4	0	0	0	0	0	0	0
215			5	0	0	0	0	0	0	0
216	1	M48	1	0	0	0	0	0	0	0
217			2	0	0	0	0	0	0	0
218			3	0	0	0	0	0	0	0
219			4	0	0	0	0	0	0	0
220			5	0	0	0	0	0	0	0
221	1	M41	1	-.11	-.677	0	-5.015	5.015	0	0
222			2	-.109	-.688	0	-6.309	6.309	0	0
223			3	-.108	-.699	0	-7.624	7.624	0	0
224			4	-.107	-.71	0	-8.96	8.96	0	0
225			5	-.106	-.722	0	-10.317	10.317	0	0
226	1	M43	1	-.096	-.57	0	-4.369	4.369	0	0
227			2	-.095	-.584	0	-5.513	5.513	0	0
228			3	-.094	-.598	0	-6.684	6.684	-.001	.001
229			4	-.093	-.612	0	-7.883	7.883	-.001	.001
230			5	-.092	-.627	0	-9.11	9.11	-.001	.001
231	1	M46	1	-.094	-.225	0	-1.285	1.285	-.001	.001
232			2	-.093	-.231	0	-1.627	1.627	-.002	.002
233			3	-.093	-.238	0	-1.979	1.979	-.002	.002
234			4	-.092	-.245	0	-2.342	2.342	-.002	.002
235			5	-.091	-.252	0	-2.715	2.715	-.003	.003
236	1	M45	1	-.108	-.674	0	-4.848	4.848	-.001	.001
237			2	-.107	-.685	0	-6.098	6.098	-.002	.002
238			3	-.106	-.696	0	-7.368	7.368	-.002	.002
239			4	-.105	-.706	0	-8.657	8.657	-.002	.002
240			5	-.104	-.718	0	-9.966	9.966	-.003	.003

Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	BOTTOM-POLE	-41.577	51.969	0	-6.446	-6.23	4845.084
2	2	Totals:	-41.577	51.969	0			
3	2	COG (ft):	X: -.037	Y: 90.98	Z: -.003			

Member Section Stresses (By Combination)

	LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bendi...	z bot Bendi...
1	2	M16	1	.661	0	-.985	.134	-.134	58.99	-58.99
2			2	.656	0	-.981	.134	-.134	58.189	-58.189
3			3	.651	0	-.978	.134	-.134	57.391	-57.391
4			4	.646	0	-.974	.134	-.134	56.596	-56.596
5			5	.642	0	-.971	.134	-.134	55.803	-55.803
6	2	M22	1	.673	0	-1.317	.164	-.164	58.729	-58.729
7			2	.668	0	-1.312	.164	-.164	57.634	-57.634
8			3	.663	0	-1.307	.164	-.164	56.543	-56.543
9			4	.659	0	-1.302	.163	-.163	55.455	-55.455
10			5	.654	0	-1.297	.163	-.163	54.372	-54.372
11	2	M17	1	.654	0	-1.005	.137	-.137	58.582	-58.582
12			2	.649	0	-1.002	.136	-.136	57.75	-57.75
13			3	.644	0	-.998	.136	-.136	56.92	-56.92
14			4	.639	0	-.995	.136	-.136	56.093	-56.093
15			5	.635	0	-.991	.136	-.136	55.27	-55.27
16	2	M18	1	.647	0	-1.027	.139	-.139	58.115	-58.115
17			2	.642	0	-1.023	.139	-.139	57.248	-57.248
18			3	.637	0	-1.02	.138	-.138	56.384	-56.384
19			4	.632	0	-1.016	.138	-.138	55.524	-55.524
20			5	.627	0	-1.012	.138	-.138	54.666	-54.666
21	2	M23	1	.666	0	-1.352	.167	-.167	57.72	-57.72
22			2	.661	0	-1.346	.166	-.166	56.57	-56.57
23			3	.657	0	-1.341	.166	-.166	55.424	-55.424
24			4	.652	0	-1.336	.166	-.166	54.282	-54.282
25			5	.647	0	-1.331	.165	-.165	53.145	-53.145
26	2	M19	1	.639	0	-1.05	.141	-.141	57.582	-57.582
27			2	.635	0	-1.046	.141	-.141	56.678	-56.678
28			3	.63	0	-1.042	.141	-.141	55.778	-55.778
29			4	.625	0	-1.038	.14	-.14	54.881	-54.881
30			5	.62	0	-1.035	.14	-.14	53.987	-53.987
31	2	M20	1	.632	0	-1.074	.144	-.144	56.975	-56.975
32			2	.628	0	-1.07	.143	-.143	56.031	-56.031
33			3	.623	0	-1.066	.143	-.143	55.09	-55.09
34			4	.618	0	-1.062	.143	-.143	54.154	-54.154
35			5	.613	0	-1.058	.142	-.142	53.22	-53.22
36	2	M1	1	.653	0	-.772	.109	-.109	56.917	-56.917
37			2	.649	0	-.769	.109	-.109	56.306	-56.306
38			3	.644	0	-.767	.109	-.109	55.697	-55.697
39			4	.639	0	-.764	.109	-.109	55.09	-55.09
40			5	.634	0	-.762	.109	-.109	54.485	-54.485
41	2	M11	1	.646	0	-.786	.111	-.111	56.797	-56.797
42			2	.641	0	-.783	.111	-.111	56.165	-56.165
43			3	.636	0	-.78	.111	-.111	55.535	-55.535

Member Section Stresses (By Combination) (Continued)

	LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bendi...	z bot Bendi...
44			4	.632	0	-.778	.111	-.111	54.908	-54.908
45			5	.627	0	-.775	.111	-.111	54.282	-54.282
46	2	M12	1	.638	0	-.8	.113	-.113	56.649	-56.649
47			2	.633	0	-.797	.113	-.113	55.996	-55.996
48			3	.629	0	-.794	.113	-.113	55.344	-55.344
49			4	.624	0	-.791	.113	-.113	54.695	-54.695
50			5	.619	0	-.789	.113	-.113	54.048	-54.048
51	2	M24	1	.66	0	-1.389	.169	-.169	56.567	-56.567
52			2	.655	0	-1.383	.169	-.169	55.357	-55.357
53			3	.65	0	-1.378	.169	-.169	54.151	-54.151
54			4	.645	0	-1.373	.168	-.168	52.95	-52.95
55			5	.64	0	-1.368	.168	-.168	51.753	-51.753
56	2	M13	1	.631	0	-.814	.115	-.115	56.472	-56.472
57			2	.626	0	-.811	.115	-.115	55.795	-55.795
58			3	.621	0	-.809	.115	-.115	55.12	-55.12
59			4	.616	0	-.806	.115	-.115	54.448	-54.448
60			5	.612	0	-.803	.115	-.115	53.778	-53.778
61	2	M21	1	.626	0	-1.1	.146	-.146	56.279	-56.279
62			2	.621	0	-1.096	.146	-.146	55.292	-55.292
63			3	.616	0	-1.092	.145	-.145	54.308	-54.308
64			4	.611	0	-1.087	.145	-.145	53.329	-53.329
65			5	.606	0	-1.083	.145	-.145	52.352	-52.352
66	2	M14	1	.623	0	-.828	.117	-.117	56.238	-56.238
67			2	.618	0	-.825	.117	-.117	55.536	-55.536
68			3	.614	0	-.823	.117	-.117	54.837	-54.837
69			4	.609	0	-.82	.117	-.117	54.141	-54.141
70			5	.604	0	-.817	.117	-.117	53.447	-53.447
71	2	M15	1	.616	0	-.846	.12	-.12	56.012	-56.012
72			2	.611	0	-.843	.119	-.119	55.284	-55.284
73			3	.606	0	-.84	.119	-.119	54.559	-54.559
74			4	.601	0	-.837	.119	-.119	53.836	-53.836
75			5	.597	0	-.834	.119	-.119	53.115	-53.115
76	2	M28	1	.725	.001	-2.145	.227	-.227	55.889	-55.889
77			2	.72	.001	-2.135	.228	-.228	54.33	-54.33
78			3	.693	0	-2.085	.232	-.232	52.785	-52.785
79			4	.688	0	-2.076	.231	-.231	51.269	-51.269
80			5	.683	0	-2.066	.23	-.23	49.761	-49.761
81	2	M25	1	.653	0	-1.429	.172	-.172	55.247	-55.247
82			2	.648	0	-1.423	.171	-.171	53.969	-53.969
83			3	.643	0	-1.418	.171	-.171	52.697	-52.697
84			4	.638	0	-1.412	.171	-.171	51.429	-51.429
85			5	.633	0	-1.407	.17	-.17	50.167	-50.167
86	2	M29	1	.695	-.001	-2.173	.236	-.236	53.846	-53.846
87			2	.69	-.001	-2.164	.235	-.235	52.216	-52.216
88			3	.685	-.001	-2.154	.234	-.234	50.594	-50.594
89			4	.68	-.001	-2.144	.233	-.233	48.979	-48.979
90			5	.675	-.001	-2.134	.233	-.233	47.371	-47.371
91	2	M26	1	.646	0	-1.472	.174	-.174	53.726	-53.726
92			2	.641	0	-1.466	.174	-.174	52.374	-52.374
93			3	.636	0	-1.46	.173	-.173	51.028	-51.028
94			4	.631	0	-1.454	.173	-.173	49.687	-49.687
95			5	.627	0	-1.449	.172	-.172	48.352	-48.352

Member Section Stresses (By Combination) (Continued)

	LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bendi...	z bot Bendi...
96	2	M27	1	.64	0	-1.518	.177	-.177	51.967	-51.967
97			2	.635	0	-1.512	.177	-.177	50.533	-50.533
98			3	.63	0	-1.506	.176	-.176	49.104	-49.104
99			4	.625	0	-1.5	.175	-.175	47.681	-47.681
100			5	.6	.001	-1.365	.178	-.178	46.288	-46.288
101	2	M30	1	.687	-.001	-2.252	.238	-.238	51.524	-51.524
102			2	.682	-.001	-2.241	.237	-.237	49.777	-49.777
103			3	.677	-.001	-2.231	.237	-.237	48.038	-48.038
104			4	.672	-.001	-2.221	.236	-.236	46.307	-46.307
105			5	.666	-.001	-2.21	.235	-.235	44.584	-44.584
106	2	M31	1	.678	-.001	-2.338	.241	-.241	48.777	-48.777
107			2	.673	-.001	-2.327	.24	-.24	46.895	-46.895
108			3	.668	-.001	-2.316	.239	-.239	45.021	-45.021
109			4	.663	-.001	-2.305	.238	-.238	43.156	-43.156
110			5	.658	-.001	-2.294	.237	-.237	41.3	-41.3
111	2	M32	1	.67	-.001	-2.432	.243	-.243	45.492	-45.492
112			2	.665	-.001	-2.421	.242	-.242	43.451	-43.451
113			3	.66	-.001	-2.409	.242	-.242	41.42	-41.42
114			4	.655	-.001	-2.398	.241	-.241	39.398	-39.398
115			5	.65	-.001	-2.386	.24	-.24	37.387	-37.387
116	2	M33	1	.662	-.001	-2.536	.246	-.246	41.505	-41.505
117			2	.657	-.001	-2.524	.245	-.245	39.277	-39.277
118			3	.652	-.001	-2.511	.244	-.244	37.061	-37.061
119			4	.515	0	-2.024	.242	-.242	34.498	-34.498
120			5	.51	0	-2.012	.242	-.242	32.721	-32.721
121	2	M34	1	.561	0	-2.851	.275	-.275	38.766	-38.766
122			2	.555	0	-2.834	.275	-.275	36.672	-36.672
123			3	.55	0	-2.817	.274	-.274	34.59	-34.59
124			4	.545	0	-2.8	.273	-.273	32.521	-32.521
125			5	.54	0	-2.783	.272	-.272	30.465	-30.465
126	2	M35	1	.548	-.001	-2.976	.278	-.278	34.492	-34.492
127			2	.543	-.001	-2.958	.277	-.277	32.176	-32.176
128			3	.538	-.001	-2.94	.276	-.276	29.875	-29.875
129			4	.533	-.001	-2.922	.275	-.275	27.588	-27.588
130			5	.527	-.001	-2.903	.274	-.274	25.315	-25.315
131	2	M36	1	.536	-.001	-3.118	.28	-.28	29.046	-29.046
132			2	.372	0	-2.303	.279	-.279	26.164	-26.164
133			3	.367	0	-2.283	.278	-.278	24.253	-24.253
134			4	.362	0	-2.264	.277	-.277	22.357	-22.357
135			5	.357	0	-2.244	.277	-.277	20.478	-20.478
136	2	M37	1	.362	0	-2.417	.283	-.283	23.882	-23.882
137			2	.357	0	-2.396	.282	-.282	21.715	-21.715
138			3	.352	0	-2.375	.282	-.282	19.567	-19.567
139			4	.239	-.039	-3.179	.258	-.258	16.992	-16.992
140			5	.233	-.039	-3.157	.219	-.219	14.14	-14.14
141	2	M38	1	.237	-.039	-3.425	.224	-.224	16.826	-16.826
142			2	.232	-.039	-3.402	.184	-.184	13.46	-13.46
143			3	.227	-.039	-3.379	.145	-.145	10.117	-10.117
144			4	.068	-.039	-2.417	.104	-.104	6.759	-6.759
145			5	.063	-.039	-2.394	.064	-.064	4.387	-4.387
146	2	M39	1	.064	-.039	-2.613	.066	-.066	5.355	-5.355
147			2	.059	-.039	-2.587	.025	-.025	2.497	-2.497

Member Section Stresses (By Combination) (Continued)

	LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bendi...	z bot Bendi...
148			3	.053	0	-.431	0	0	.604	-.604
149			4	.048	0	-.406	0	0	.144	-.144
150			5	0	0	-.002	0	0	0	0
151	2	M6	1	.328	-.277	.004	0	0	0	0
152			2	.328	-.284	.004	-.784	.784	.009	-.009
153			3	.329	-.29	.004	-1.586	1.586	.017	-.017
154			4	.33	-.296	.004	-2.405	2.405	.026	-.026
155			5	.33	-.302	.004	-3.241	3.241	.035	-.035
156	2	M44	1	.216	-.191	.003	-1.35	1.35	.015	-.015
157			2	.216	-.197	.003	-1.706	1.706	.019	-.019
158			3	.217	-.203	.003	-2.073	2.073	.023	-.023
159			4	.217	-.209	.003	-2.451	2.451	.027	-.027
160			5	.218	-.215	.003	-2.84	2.84	.031	-.031
161	2	M4	1	.28	-.255	.002	0	0	0	0
162			2	.28	-.264	.002	-.815	.815	.005	-.005
163			3	.281	-.272	.002	-1.656	1.656	.01	-.01
164			4	.282	-.28	.002	-2.522	2.522	.016	-.016
165			5	.282	-.288	.002	-3.413	3.413	.021	-.021
166	2	M9	1	.187	-.074	.003	0	0	0	0
167			2	.188	-.078	.003	-.163	.163	.005	-.005
168			3	.188	-.082	.003	-.334	.334	.01	-.01
169			4	.188	-.086	.003	-.514	.514	.014	-.014
170			5	.189	-.09	.003	-.703	.703	.019	-.019
171	2	M47	1	.131	-.06	.002	-.328	.328	.009	-.009
172			2	.131	-.063	.002	-.42	.42	.012	-.012
173			3	.131	-.067	.002	-.518	.518	.014	-.014
174			4	.132	-.071	.002	-.622	.622	.017	-.017
175			5	.132	-.075	.002	-.731	.731	.019	-.019
176	2	M42	1	.177	-.175	.001	-1.315	1.315	.008	-.008
177			2	.178	-.183	.001	-1.669	1.669	.011	-.011
178			3	.178	-.191	.001	-2.039	2.039	.013	-.013
179			4	.179	-.199	.001	-2.425	2.425	.015	-.015
180			5	.179	-.207	.001	-2.826	2.826	.017	-.017
181	2	M2	1	.327	-.295	.002	0	0	0	0
182			2	.328	-.301	.002	-.859	.859	.004	-.004
183			3	.328	-.308	.002	-1.736	1.736	.008	-.008
184			4	.329	-.314	.002	-2.632	2.632	.012	-.012
185			5	.329	-.32	.002	-3.546	3.546	.016	-.016
186	2	M40	1	.215	-.202	.001	-1.477	1.477	.007	-.007
187			2	.215	-.208	.001	-1.866	1.866	.009	-.009
188			3	.216	-.215	.001	-2.267	2.267	.011	-.011
189			4	.216	-.221	.001	-2.679	2.679	.012	-.012
190			5	.217	-.227	.001	-3.104	3.104	.014	-.014
191	2	M3	1	-.255	-.447	-.001	0	0	0	0
192			2	-.254	-.453	-.001	-1.297	1.297	-.003	.003
193			3	-.254	-.46	-.001	-2.613	2.613	-.006	.006
194			4	-.253	-.466	-.001	-3.947	3.947	-.008	.008
195			5	-.253	-.472	-.001	-5.299	5.299	-.011	.011
196	2	M5	1	-.224	-.373	-.001	0	0	0	0
197			2	-.224	-.382	-.001	-1.186	1.186	-.004	.004
198			3	-.223	-.39	-.001	-2.398	2.398	-.008	.008
199			4	-.223	-.398	-.001	-3.635	3.635	-.011	.011

Member Section Stresses (By Combination) (Continued)

	LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bendi...	z bot Bendi...
200			5	-.222	-.406	-.001	-4.897	4.897	-.015	.015
201	2	M7	1	-.253	-.438	-.003	0	0	0	0
202			2	-.253	-.444	-.003	-1.233	1.233	-.006	.006
203			3	-.252	-.45	-.003	-2.483	2.483	-.012	.012
204			4	-.252	-.456	-.003	-3.75	3.75	-.019	.019
205			5	-.251	-.462	-.003	-5.035	5.035	-.025	.025
206	2	M8	1	-.083	-.079	-.001	0	0	0	0
207			2	-.082	-.083	-.001	-.172	.172	-.002	.002
208			3	-.082	-.086	-.001	-.353	.353	-.004	.004
209			4	-.082	-.09	-.001	-.543	.543	-.006	.006
210			5	-.081	-.094	-.001	-.741	.741	-.008	.008
211	2	M10	1	0	0	0	0	0	0	0
212			2	0	0	0	0	0	0	0
213			3	0	0	0	0	0	0	0
214			4	0	0	0	0	0	0	0
215			5	0	0	0	0	0	0	0
216	2	M48	1	0	0	0	0	0	0	0
217			2	0	0	0	0	0	0	0
218			3	0	0	0	0	0	0	0
219			4	0	0	0	0	0	0	0
220			5	0	0	0	0	0	0	0
221	2	M46	1	-.056	-.063	0	-.346	.346	-.004	.004
222			2	-.056	-.067	0	-.443	.443	-.005	.005
223			3	-.056	-.071	0	-.547	.547	-.006	.006
224			4	-.055	-.075	0	-.656	.656	-.007	.007
225			5	-.055	-.079	0	-.771	.771	-.008	.008
226	2	M41	1	-.165	-.3	0	-2.207	2.207	-.005	.005
227			2	-.164	-.306	0	-2.782	2.782	-.006	.006
228			3	-.164	-.312	0	-3.368	3.368	-.007	.007
229			4	-.163	-.318	0	-3.965	3.965	-.009	.009
230			5	-.163	-.325	0	-4.575	4.575	-.01	.01
231	2	M43	1	-.139	-.249	0	-1.886	1.886	-.006	.006
232			2	-.139	-.257	0	-2.386	2.386	-.008	.008
233			3	-.138	-.264	0	-2.902	2.902	-.009	.009
234			4	-.137	-.272	0	-3.433	3.433	-.011	.011
235			5	-.137	-.28	0	-3.98	3.98	-.012	.012
236	2	M45	1	-.164	-.294	-.002	-2.097	2.097	-.011	.011
237			2	-.164	-.3	-.002	-2.643	2.643	-.014	.014
238			3	-.163	-.306	-.002	-3.199	3.199	-.016	.016
239			4	-.163	-.312	-.002	-3.767	3.767	-.019	.019
240			5	-.162	-.318	-.002	-4.345	4.345	-.022	.022

Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	3	BOTTOM-POLE	0	106.621	-11.101	-1334.69	.151	-5.33
2	3	Totals:	0	106.621	-11.101			
3	3	COG (ft):	X: -.04	Y: 94.025	Z: -.006			

Member Section Stresses (By Combination)

	LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bendi...	z bot Bendi...
1	3	M1	1	1.34	-.746	0	22.507	-22.507	-.063	.063
2			2	1.331	-.739	0	22.269	-22.269	-.063	.063
3			3	1.323	-.733	0	22.033	-22.033	-.063	.063
4			4	1.314	-.726	0	21.8	-21.8	-.063	.063
5			5	1.305	-.72	0	21.568	-21.568	-.063	.063
6	3	M11	1	1.328	-.748	0	22.007	-22.007	-.065	.065
7			2	1.32	-.741	0	21.764	-21.764	-.065	.065
8			3	1.311	-.735	0	21.523	-21.523	-.065	.065
9			4	1.302	-.728	0	21.284	-21.284	-.065	.065
10			5	1.293	-.722	0	21.047	-21.047	-.065	.065
11	3	M12	1	1.317	-.748	0	21.485	-21.485	-.068	.068
12			2	1.308	-.741	0	21.236	-21.236	-.068	.068
13			3	1.299	-.735	0	20.99	-20.99	-.068	.068
14			4	1.29	-.729	0	20.746	-20.746	-.068	.068
15			5	1.282	-.723	0	20.504	-20.504	-.068	.068
16	3	M16	1	1.38	-.739	0	21.128	-21.128	-.086	.086
17			2	1.371	-.733	0	20.835	-20.835	-.086	.086
18			3	1.362	-.728	0	20.543	-20.543	-.086	.086
19			4	1.353	-.722	0	20.254	-20.254	-.086	.086
20			5	1.344	-.717	0	19.968	-19.968	-.086	.086
21	3	M13	1	1.305	-.746	0	20.939	-20.939	-.071	.071
22			2	1.296	-.74	0	20.686	-20.686	-.071	.071
23			3	1.287	-.734	0	20.435	-20.435	-.071	.071
24			4	1.279	-.728	0	20.186	-20.186	-.071	.071
25			5	1.27	-.722	0	19.939	-19.939	-.071	.071
26	3	M17	1	1.369	-.735	0	20.413	-20.413	-.09	.09
27			2	1.36	-.729	0	20.115	-20.115	-.09	.09
28			3	1.351	-.724	0	19.818	-19.818	-.09	.09
29			4	1.342	-.718	0	19.525	-19.525	-.09	.09
30			5	1.332	-.713	0	19.233	-19.233	-.09	.09
31	3	M14	1	1.293	-.743	0	20.372	-20.372	-.074	.074
32			2	1.284	-.737	0	20.114	-20.114	-.074	.074
33			3	1.276	-.731	0	19.858	-19.858	-.074	.074
34			4	1.267	-.726	0	19.605	-19.605	-.074	.074
35			5	1.258	-.72	0	19.353	-19.353	-.074	.074
36	3	M15	1	1.282	-.739	0	19.782	-19.782	-.078	.078
37			2	1.273	-.733	0	19.521	-19.521	-.077	.077
38			3	1.264	-.728	0	19.261	-19.261	-.077	.077
39			4	1.255	-.722	0	19.003	-19.003	-.077	.077
40			5	1.246	-.716	0	18.747	-18.747	-.077	.077
41	3	M18	1	1.358	-.729	0	19.671	-19.671	-.094	.094
42			2	1.348	-.724	0	19.368	-19.368	-.094	.094
43			3	1.339	-.718	0	19.068	-19.068	-.094	.094

Member Section Stresses (By Combination) (Continued)

	LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bendi...	z bot Bendi...
44			4	1.33	-.713	0	18.77	-18.77	-.094	.094
45			5	1.321	-.708	0	18.473	-18.473	-.094	.094
46	3	M19	1	1.346	-.722	0	18.904	-18.904	-.099	.099
47			2	1.337	-.717	0	18.598	-18.598	-.099	.099
48			3	1.328	-.712	0	18.293	-18.293	-.098	.098
49			4	1.319	-.707	0	17.99	-17.99	-.098	.098
50			5	1.31	-.702	0	17.69	-17.69	-.098	.098
51	3	M22	1	1.43	-.7	0	18.232	-18.232	-.121	.121
52			2	1.42	-.695	0	17.88	-17.88	-.121	.121
53			3	1.41	-.69	0	17.53	-17.53	-.121	.121
54			4	1.401	-.686	0	17.182	-17.182	-.121	.121
55			5	1.391	-.681	0	16.837	-16.837	-.121	.121
56	3	M20	1	1.335	-.714	0	18.113	-18.113	-.104	.104
57			2	1.326	-.709	0	17.802	-17.802	-.103	.103
58			3	1.317	-.704	0	17.493	-17.493	-.103	.103
59			4	1.308	-.699	0	17.187	-17.187	-.103	.103
60			5	1.299	-.694	0	16.883	-16.883	-.103	.103
61	3	M21	1	1.325	-.705	0	17.295	-17.295	-.109	.109
62			2	1.315	-.7	0	16.981	-16.981	-.109	.109
63			3	1.306	-.695	0	16.669	-16.669	-.109	.109
64			4	1.297	-.69	0	16.359	-16.359	-.108	.108
65			5	1.288	-.686	0	16.052	-16.052	-.108	.108
66	3	M23	1	1.418	-.691	0	17.247	-17.247	-.128	.128
67			2	1.409	-.686	0	16.891	-16.891	-.128	.128
68			3	1.399	-.681	0	16.537	-16.537	-.127	.127
69			4	1.39	-.677	0	16.186	-16.186	-.127	.127
70			5	1.38	-.672	0	15.837	-15.837	-.127	.127
71	3	M24	1	1.407	-.68	0	16.232	-16.232	-.135	.135
72			2	1.398	-.676	0	15.873	-15.873	-.135	.135
73			3	1.388	-.671	0	15.515	-15.515	-.135	.135
74			4	1.378	-.667	0	15.161	-15.161	-.134	.134
75			5	1.369	-.663	0	14.808	-14.808	-.134	.134
76	3	M25	1	1.396	-.669	0	15.187	-15.187	-.143	.143
77			2	1.387	-.665	0	14.825	-14.825	-.143	.143
78			3	1.377	-.66	0	14.464	-14.464	-.142	.142
79			4	1.367	-.656	0	14.106	-14.106	-.142	.142
80			5	1.358	-.652	0	13.751	-13.751	-.142	.142
81	3	M28	1	1.567	-.589	-.01	14.753	-14.753	-.194	.194
82			2	1.557	-.585	-.01	14.329	-14.329	-.201	.201
83			3	1.499	-.563	0	13.923	-13.923	-.206	.206
84			4	1.489	-.56	0	13.517	-13.517	-.205	.205
85			5	1.479	-.556	0	13.114	-13.114	-.205	.205
86	3	M26	1	1.386	-.657	0	14.112	-14.112	-.152	.152
87			2	1.376	-.652	0	13.747	-13.747	-.151	.151
88			3	1.366	-.648	0	13.384	-13.384	-.151	.151
89			4	1.356	-.644	0	13.023	-13.023	-.15	.15
90			5	1.347	-.64	0	12.665	-12.665	-.15	.15
91	3	M29	1	1.505	-.558	.001	13.422	-13.422	-.222	.222
92			2	1.494	-.554	.001	13.011	-13.011	-.221	.221
93			3	1.484	-.55	.001	12.602	-12.602	-.22	.22
94			4	1.474	-.547	.001	12.196	-12.196	-.219	.219
95			5	1.463	-.543	.001	11.793	-11.793	-.219	.219

Member Section Stresses (By Combination) (Continued)

	LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bendi...	z bot Bendi...
96	3	M27	1	1.375	-.643	0	13.007	-13.007	-.161	.161
97			2	1.365	-.639	0	12.639	-12.639	-.161	.161
98			3	1.355	-.635	0	12.274	-12.274	-.16	.16
99			4	1.345	-.631	0	11.911	-11.911	-.16	.16
100			5	1.297	-.581	-.006	11.565	-11.565	-.16	.16
101	3	M30	1	1.489	-.545	.001	12.077	-12.077	-.238	.238
102			2	1.479	-.541	.001	11.665	-11.665	-.237	.237
103			3	1.468	-.538	.001	11.257	-11.257	-.236	.236
104			4	1.458	-.534	.001	10.851	-10.851	-.235	.235
105			5	1.448	-.53	.001	10.448	-10.448	-.234	.234
106	3	M31	1	1.474	-.531	.001	10.705	-10.705	-.256	.256
107			2	1.463	-.527	.001	10.295	-10.295	-.255	.255
108			3	1.453	-.524	.001	9.887	-9.887	-.254	.254
109			4	1.442	-.52	.001	9.482	-9.482	-.253	.253
110			5	1.432	-.517	.001	9.079	-9.079	-.252	.252
111	3	M32	1	1.458	-.516	.002	9.308	-9.308	-.277	.277
112			2	1.448	-.513	.002	8.899	-8.899	-.276	.276
113			3	1.437	-.509	.002	8.492	-8.492	-.275	.275
114			4	1.427	-.506	.002	8.088	-8.088	-.273	.273
115			5	1.416	-.503	.002	7.687	-7.687	-.272	.272
116	3	M33	1	1.443	-.501	.002	7.886	-7.886	-.302	.302
117			2	1.432	-.498	.002	7.478	-7.478	-.3	.3
118			3	1.422	-.495	.002	7.073	-7.073	-.299	.299
119			4	1.123	-.419	.002	6.67	-6.67	-.297	.297
120			5	1.112	-.416	.002	6.329	-6.329	-.295	.295
121	3	M34	1	1.222	-.416	.002	7.214	-7.214	-.35	.35
122			2	1.211	-.413	.002	6.831	-6.831	-.348	.348
123			3	1.2	-.41	.002	6.45	-6.45	-.346	.346
124			4	1.19	-.407	.002	6.073	-6.073	-.345	.345
125			5	1.179	-.404	.002	5.698	-5.698	-.343	.343
126	3	M35	1	1.197	-.399	.003	5.827	-5.827	-.388	.388
127			2	1.186	-.397	.003	5.451	-5.451	-.386	.386
128			3	1.175	-.394	.003	5.077	-5.077	-.384	.384
129			4	1.164	-.391	.003	4.706	-4.706	-.382	.382
130			5	1.153	-.388	.003	4.337	-4.337	-.379	.379
131	3	M36	1	1.172	-.385	.003	4.438	-4.438	-.435	.435
132			2	.817	-.296	.002	4.108	-4.108	-.432	.432
133			3	.806	-.294	.002	3.822	-3.822	-.43	.43
134			4	.795	-.291	.002	3.539	-3.539	-.428	.428
135			5	.784	-.288	.002	3.259	-3.259	-.426	.426
136	3	M37	1	.797	-.284	.003	3.336	-3.336	-.497	.497
137			2	.786	-.281	.003	3.057	-3.057	-.494	.494
138			3	.775	-.279	.003	2.779	-2.779	-.492	.492
139			4	.547	-.412	.002	2.423	-2.423	-.49	.49
140			5	.536	-.41	.002	2.016	-2.016	-.488	.488
141	3	M38	1	.544	-.407	.002	2.065	-2.065	-.581	.581
142			2	.533	-.404	.002	1.653	-1.653	-.578	.578
143			3	.522	-.402	.002	1.244	-1.244	-.576	.576
144			4	.175	-.322	0	.901	-.901	-.574	.574
145			5	.164	-.32	0	.575	-.575	-.573	.573
146	3	M39	1	.166	-.317	0	.59	-.59	-.699	.699
147			2	.155	-.314	0	.261	-.261	-.698	.698

Member Section Stresses (By Combination) (Continued)

	LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bendi...	z bot Bendi...
148			3	.143	-.037	0	.05	-.05	-.697	.697
149			4	.132	-.034	0	.013	-.013	-.696	.696
150			5	0	0	0	0	0	0	0
151	3	M2	1	.082	-.993	.002	0	0	0	0
152			2	.083	-1.004	.005	-2.878	2.878	.008	-.008
153			3	.083	-1.015	.008	-5.788	5.788	.024	-.024
154			4	.084	-1.027	.012	-8.732	8.732	.049	-.049
155			5	.085	-1.039	.016	-11.709	11.709	.084	-.084
156	3	M3	1	.082	-.993	-.002	0	0	0	0
157			2	.083	-1.004	-.005	-2.878	2.878	-.008	.008
158			3	.083	-1.015	-.008	-5.788	5.788	-.024	.024
159			4	.084	-1.027	-.012	-8.731	8.731	-.049	.049
160			5	.085	-1.039	-.016	-11.708	11.708	-.084	.084
161	3	M4	1	.063	-.859	.001	0	0	0	0
162			2	.064	-.873	.004	-2.722	2.722	.008	-.008
163			3	.065	-.887	.008	-5.487	5.487	.025	-.025
164			4	.066	-.902	.013	-8.298	8.298	.053	-.053
165			5	.067	-.917	.018	-11.155	11.155	.096	-.096
166	3	M5	1	.063	-.859	-.001	0	0	0	0
167			2	.064	-.873	-.004	-2.721	2.721	-.008	.008
168			3	.065	-.887	-.008	-5.486	5.486	-.025	.025
169			4	.066	-.902	-.013	-8.297	8.297	-.054	.054
170			5	.067	-.917	-.018	-11.154	11.154	-.096	.096
171	3	M6	1	.084	-.992	.002	0	0	0	0
172			2	.085	-1.003	.005	-2.79	2.79	.008	-.008
173			3	.086	-1.014	.008	-5.611	5.611	.024	-.024
174			4	.087	-1.025	.012	-8.462	8.462	.048	-.048
175			5	.088	-1.037	.016	-11.346	11.346	.082	-.082
176	3	M7	1	.084	-.992	-.002	0	0	0	0
177			2	.085	-1.003	-.005	-2.789	2.789	-.008	.008
178			3	.086	-1.014	-.008	-5.609	5.609	-.024	.024
179			4	.087	-1.025	-.012	-8.46	8.46	-.048	.048
180			5	.088	-1.037	-.016	-11.343	11.343	-.082	.082
181	3	M8	1	.024	-.298	0	0	0	0	0
182			2	.024	-.305	-.002	-.645	.645	-.003	.003
183			3	.025	-.312	-.005	-1.306	1.306	-.01	.01
184			4	.026	-.319	-.007	-1.982	1.982	-.021	.021
185			5	.026	-.327	-.01	-2.674	2.674	-.037	.037
186	3	M9	1	.039	-.489	0	0	0	0	0
187			2	.04	-.496	.003	-1.055	1.055	.004	-.004
188			3	.04	-.503	.005	-2.125	2.125	.011	-.011
189			4	.041	-.511	.008	-3.211	3.211	.023	-.023
190			5	.042	-.518	.01	-4.312	4.312	.039	-.039
191	3	M10	1	0	0	0	0	0	0	0
192			2	0	0	0	0	0	0	0
193			3	0	0	0	0	0	0	0
194			4	0	0	0	0	0	0	0
195			5	0	0	0	0	0	0	0
196	3	M48	1	0	0	0	0	0	0	0
197			2	0	0	0	0	0	0	0
198			3	0	0	0	0	0	0	0
199			4	0	0	0	0	0	0	0

Member Section Stresses (By Combination) (Continued)

	LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bendi...	z bot Bendi...
200			5	0	0	0	0	0	0	0
201	3	M46	1	.018	-.218	-.007	-1.247	1.247	-.018	.018
202			2	.019	-.225	-.01	-1.579	1.579	-.029	.029
203			3	.019	-.232	-.012	-1.921	1.921	-.043	.043
204			4	.02	-.239	-.015	-2.273	2.273	-.06	.06
205			5	.02	-.246	-.018	-2.636	2.636	-.08	.08
206	3	M47	1	.029	-.345	.008	-2.011	2.011	.02	-.02
207			2	.029	-.352	.01	-2.534	2.534	.031	-.031
208			3	.03	-.359	.013	-3.067	3.067	.045	-.045
209			4	.03	-.366	.015	-3.61	3.61	.062	-.062
210			5	.031	-.373	.018	-4.164	4.164	.083	-.083
211	3	M43	1	.042	-.56	-.012	-4.296	4.296	-.038	.038
212			2	.043	-.574	-.016	-5.419	5.419	-.062	.062
213			3	.044	-.588	-.021	-6.569	6.569	-.092	.092
214			4	.045	-.602	-.026	-7.748	7.748	-.131	.131
215			5	.046	-.617	-.032	-8.954	8.954	-.178	.178
216	3	M42	1	.042	-.56	.012	-4.297	4.297	.038	-.038
217			2	.043	-.574	.016	-5.42	5.42	.062	-.062
218			3	.044	-.588	.021	-6.57	6.57	.092	-.092
219			4	.045	-.602	.026	-7.749	7.749	.131	-.131
220			5	.046	-.617	.032	-8.956	8.956	.178	-.178
221	3	M45	1	.057	-.656	-.011	-4.725	4.725	-.036	.036
222			2	.058	-.667	-.015	-5.942	5.942	-.056	.056
223			3	.059	-.678	-.019	-7.178	7.178	-.081	.081
224			4	.06	-.689	-.023	-8.434	8.434	-.113	.113
225			5	.061	-.7	-.028	-9.711	9.711	-.152	.152
226	3	M44	1	.057	-.657	.011	-4.726	4.726	.036	-.036
227			2	.058	-.667	.015	-5.943	5.943	.056	-.056
228			3	.059	-.678	.019	-7.18	7.18	.081	-.081
229			4	.06	-.689	.023	-8.436	8.436	.113	-.113
230			5	.061	-.7	.028	-9.713	9.713	.152	-.152
231	3	M41	1	.056	-.658	-.012	-4.877	4.877	-.037	.037
232			2	.057	-.669	-.015	-6.134	6.134	-.058	.058
233			3	.058	-.68	-.019	-7.411	7.411	-.084	.084
234			4	.059	-.691	-.024	-8.71	8.71	-.118	.118
235			5	.06	-.702	-.028	-10.031	10.031	-.159	.159
236	3	M40	1	.056	-.658	.012	-4.877	4.877	.037	-.037
237			2	.057	-.669	.015	-6.134	6.134	.058	-.058
238			3	.058	-.68	.019	-7.412	7.412	.084	-.084
239			4	.059	-.691	.024	-8.711	8.711	.118	-.118
240			5	.06	-.702	.028	-10.032	10.032	.158	-.158

Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	4	BOTTOM-POLE	0	51.97	-35.445	-3456.297	.474	-1.898
2	4	Totals:	0	51.97	-35.445			
3	4	COG (ft):	X: -.037	Y: 90.982	Z: -.019			

Member Section Stresses (By Combination)

	LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bendi...	z bot Bendi...
1	4	M1	1	.653	-2.353	0	58.284	-58.284	-.022	.022
2			2	.649	-2.332	0	57.534	-57.534	-.022	.022
3			3	.644	-2.311	0	56.79	-56.79	-.022	.022
4			4	.639	-2.291	0	56.054	-56.054	-.022	.022
5			5	.635	-2.27	0	55.323	-55.323	-.022	.022
6	4	M11	1	.646	-2.305	0	56.45	-56.45	-.023	.023
7			2	.641	-2.284	0	55.7	-55.7	-.023	.023
8			3	.636	-2.264	0	54.957	-54.957	-.023	.023
9			4	.632	-2.244	0	54.221	-54.221	-.023	.023
10			5	.627	-2.224	0	53.491	-53.491	-.023	.023
11	4	M12	1	.638	-2.255	0	54.603	-54.603	-.024	.024
12			2	.633	-2.236	0	53.854	-53.854	-.024	.024
13			3	.629	-2.216	0	53.111	-53.111	-.024	.024
14			4	.624	-2.196	0	52.376	-52.376	-.024	.024
15			5	.619	-2.177	0	51.646	-51.646	-.024	.024
16	4	M13	1	.631	-2.205	0	52.743	-52.743	-.026	.026
17			2	.626	-2.186	0	51.995	-51.995	-.026	.026
18			3	.621	-2.167	0	51.254	-51.254	-.026	.026
19			4	.616	-2.148	0	50.519	-50.519	-.026	.026
20			5	.612	-2.129	0	49.791	-49.791	-.026	.026
21	4	M16	1	.661	-2.063	0	51.897	-51.897	-.031	.031
22			2	.656	-2.045	0	51.078	-51.078	-.031	.031
23			3	.651	-2.027	0	50.267	-50.267	-.031	.031
24			4	.647	-2.009	0	49.462	-49.462	-.031	.031
25			5	.642	-1.992	0	48.665	-48.665	-.031	.031
26	4	M14	1	.623	-2.154	0	50.871	-50.871	-.027	.027
27			2	.618	-2.135	0	50.125	-50.125	-.027	.027
28			3	.614	-2.116	0	49.385	-49.385	-.027	.027
29			4	.609	-2.098	0	48.652	-48.652	-.027	.027
30			5	.604	-2.079	0	47.925	-47.925	-.027	.027
31	4	M17	1	.654	-2.012	0	49.75	-49.75	-.033	.033
32			2	.649	-1.995	0	48.933	-48.933	-.033	.033
33			3	.644	-1.977	0	48.124	-48.124	-.033	.033
34			4	.639	-1.96	0	47.322	-47.322	-.033	.033
35			5	.635	-1.943	0	46.527	-46.527	-.033	.033
36	4	M15	1	.616	-2.102	0	48.987	-48.987	-.028	.028
37			2	.611	-2.084	0	48.243	-48.243	-.028	.028
38			3	.606	-2.065	0	47.505	-47.505	-.028	.028
39			4	.601	-2.047	0	46.774	-46.774	-.028	.028
40			5	.597	-2.029	0	46.049	-46.049	-.028	.028
41	4	M18	1	.647	-1.961	0	47.586	-47.586	-.035	.035
42			2	.642	-1.944	0	46.773	-46.773	-.035	.035
43			3	.637	-1.927	0	45.966	-45.966	-.035	.035

Member Section Stresses (By Combination) (Continued)

	LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bendi...	z bot Bendi...
44			4	.632	-1.911	0	45.166	-45.166	-.035	.035
45			5	.627	-1.894	0	44.373	-44.373	-.035	.035
46	4	M19	1	.639	-1.91	0	45.409	-45.409	-.036	.036
47			2	.635	-1.893	0	44.598	-44.598	-.036	.036
48			3	.63	-1.877	0	43.794	-43.794	-.036	.036
49			4	.625	-1.861	0	42.997	-42.997	-.036	.036
50			5	.62	-1.845	0	42.207	-42.207	-.036	.036
51	4	M20	1	.632	-1.858	0	43.215	-43.215	-.038	.038
52			2	.628	-1.842	0	42.407	-42.407	-.038	.038
53			3	.623	-1.826	0	41.606	-41.606	-.038	.038
54			4	.618	-1.811	0	40.812	-40.812	-.038	.038
55			5	.613	-1.795	0	40.025	-40.025	-.038	.038
56	4	M22	1	.673	-1.766	0	42.965	-42.965	-.046	.046
57			2	.668	-1.751	0	42.077	-42.077	-.046	.046
58			3	.663	-1.736	0	41.196	-41.196	-.045	.045
59			4	.659	-1.721	0	40.323	-40.323	-.045	.045
60			5	.654	-1.706	0	39.458	-39.458	-.045	.045
61	4	M21	1	.626	-1.806	0	41.003	-41.003	-.041	.041
62			2	.621	-1.791	0	40.199	-40.199	-.041	.041
63			3	.616	-1.775	0	39.401	-39.401	-.041	.041
64			4	.611	-1.76	0	38.61	-38.61	-.041	.041
65			5	.606	-1.745	0	37.827	-37.827	-.041	.041
66	4	M23	1	.666	-1.716	0	40.418	-40.418	-.048	.048
67			2	.661	-1.702	0	39.534	-39.534	-.048	.048
68			3	.657	-1.687	0	38.657	-38.657	-.048	.048
69			4	.652	-1.673	0	37.788	-37.788	-.048	.048
70			5	.647	-1.659	0	36.926	-36.926	-.048	.048
71	4	M24	1	.66	-1.666	0	37.849	-37.849	-.051	.051
72			2	.655	-1.652	0	36.969	-36.969	-.051	.051
73			3	.65	-1.638	0	36.096	-36.096	-.051	.051
74			4	.645	-1.625	0	35.231	-35.231	-.051	.051
75			5	.64	-1.611	0	34.373	-34.373	-.051	.051
76	4	M25	1	.653	-1.617	0	35.253	-35.253	-.055	.055
77			2	.648	-1.603	0	34.377	-34.377	-.055	.055
78			3	.643	-1.59	0	33.509	-33.509	-.055	.055
79			4	.638	-1.576	0	32.648	-32.648	-.055	.055
80			5	.633	-1.563	0	31.794	-31.794	-.055	.055
81	4	M28	1	.727	-1.35	-.005	33.91	-33.91	-.076	.076
82			2	.722	-1.338	-.005	32.938	-32.938	-.08	.08
83			3	.693	-1.286	0	32.001	-32.001	-.083	.083
84			4	.688	-1.274	0	31.075	-31.075	-.082	.082
85			5	.683	-1.263	0	30.158	-30.158	-.082	.082
86	4	M26	1	.646	-1.567	0	32.63	-32.63	-.058	.058
87			2	.641	-1.554	0	31.759	-31.759	-.058	.058
88			3	.636	-1.541	0	30.895	-30.895	-.058	.058
89			4	.631	-1.528	0	30.038	-30.038	-.058	.058
90			5	.627	-1.516	0	29.189	-29.189	-.058	.058
91	4	M29	1	.695	-1.264	0	30.867	-30.867	-.089	.089
92			2	.69	-1.253	0	29.936	-29.936	-.089	.089
93			3	.685	-1.241	0	29.014	-29.014	-.089	.089
94			4	.68	-1.23	0	28.1	-28.1	-.089	.089
95			5	.675	-1.218	0	27.195	-27.195	-.089	.089

Member Section Stresses (By Combination) (Continued)

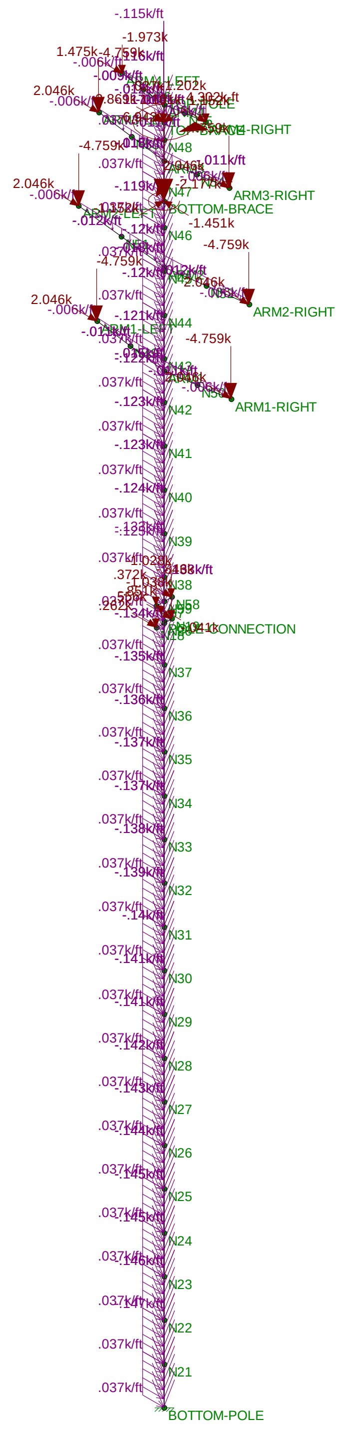
	LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bendi...	z bot Bendi...
96	4	M27	1	.64	-1.518	0	29.976	-29.976	-.063	.063
97			2	.635	-1.506	0	29.11	-29.11	-.063	.063
98			3	.63	-1.493	0	28.25	-28.25	-.063	.063
99			4	.625	-1.481	0	27.398	-27.398	-.063	.063
100			5	.602	-1.334	-.003	26.583	-26.583	-.063	.063
101	4	M30	1	.687	-1.219	0	27.848	-27.848	-.096	.096
102			2	.682	-1.208	0	26.929	-26.929	-.096	.096
103			3	.677	-1.197	0	26.018	-26.018	-.096	.096
104			4	.672	-1.186	0	25.116	-25.116	-.096	.096
105			5	.666	-1.175	0	24.221	-24.221	-.096	.096
106	4	M31	1	.678	-1.175	0	24.819	-24.819	-.105	.105
107			2	.673	-1.164	0	23.911	-23.911	-.105	.105
108			3	.668	-1.153	0	23.012	-23.012	-.104	.104
109			4	.663	-1.143	0	22.121	-22.121	-.104	.104
110			5	.658	-1.133	0	21.237	-21.237	-.104	.104
111	4	M32	1	.67	-1.131	0	21.774	-21.774	-.115	.115
112			2	.665	-1.121	0	20.878	-20.878	-.114	.114
113			3	.66	-1.111	0	19.991	-19.991	-.114	.114
114			4	.655	-1.101	0	19.111	-19.111	-.114	.114
115			5	.65	-1.091	0	18.239	-18.239	-.114	.114
116	4	M33	1	.662	-1.088	0	18.712	-18.712	-.126	.126
117			2	.657	-1.078	0	17.827	-17.827	-.126	.126
118			3	.652	-1.069	0	16.951	-16.951	-.125	.125
119			4	.515	-.948	0	16.075	-16.075	-.125	.125
120			5	.51	-.939	0	15.305	-15.305	-.125	.125
121	4	M34	1	.561	-.942	0	17.443	-17.443	-.148	.148
122			2	.555	-.932	0	16.576	-16.576	-.148	.148
123			3	.55	-.923	0	15.718	-15.718	-.147	.147
124			4	.545	-.914	0	14.868	-14.868	-.147	.147
125			5	.54	-.906	0	14.026	-14.026	-.147	.147
126	4	M35	1	.548	-.9	0	14.345	-14.345	-.166	.166
127			2	.543	-.892	0	13.497	-13.497	-.166	.166
128			3	.538	-.883	0	12.657	-12.657	-.165	.165
129			4	.533	-.875	0	11.826	-11.826	-.165	.165
130			5	.527	-.866	0	11.003	-11.003	-.164	.164
131	4	M36	1	.536	-.863	0	11.258	-11.258	-.189	.189
132			2	.372	-.712	0	10.483	-10.483	-.188	.188
133			3	.367	-.704	0	9.797	-9.797	-.188	.188
134			4	.362	-.696	0	9.12	-9.12	-.187	.187
135			5	.357	-.688	0	8.45	-8.45	-.187	.187
136	4	M37	1	.362	-.683	0	8.65	-8.65	-.218	.218
137			2	.357	-.675	0	7.978	-7.978	-.218	.218
138			3	.352	-.668	0	7.312	-7.312	-.217	.217
139			4	.238	-1.052	0	6.421	-6.421	-.217	.217
140			5	.233	-1.044	0	5.383	-5.383	-.216	.216
141	4	M38	1	.237	-1.041	0	5.514	-5.514	-.258	.258
142			2	.232	-1.034	0	4.461	-4.461	-.257	.257
143			3	.226	-1.027	0	3.415	-3.415	-.257	.257
144			4	.068	-.904	0	2.463	-2.463	-.256	.256
145			5	.063	-.897	0	1.549	-1.549	-.256	.256
146	4	M39	1	.064	-.894	0	1.587	-1.587	-.313	.313
147			2	.059	-.887	0	.661	-.661	-.312	.312

Member Section Stresses (By Combination) (Continued)

	LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bendi...	z bot Bendi...
148			3	.053	-.06	0	.083	-.083	-.312	.312
149			4	.048	-.053	0	.024	-.024	-.312	.312
150			5	0	0	0	0	0	0	0
151	4	M2	1	.036	-.44	.002	0	0	0	0
152			2	.037	-.446	.009	-1.277	1.277	.013	-.013
153			3	.037	-.453	.017	-2.573	2.573	.046	-.046
154			4	.038	-.459	.028	-3.886	3.886	.103	-.103
155			5	.038	-.465	.041	-5.219	5.219	.188	-.188
156	4	M3	1	.036	-.44	-.002	0	0	0	0
157			2	.037	-.446	-.009	-1.277	1.277	-.013	.013
158			3	.037	-.453	-.017	-2.573	2.573	-.046	.046
159			4	.038	-.459	-.028	-3.886	3.886	-.103	.103
160			5	.038	-.465	-.041	-5.218	5.218	-.188	.188
161	4	M4	1	.028	-.381	.002	0	0	0	0
162			2	.028	-.389	.009	-1.209	1.209	.014	-.014
163			3	.029	-.397	.02	-2.443	2.443	.053	-.053
164			4	.029	-.405	.033	-3.703	3.703	.123	-.123
165			5	.03	-.413	.049	-4.987	4.987	.233	-.233
166	4	M5	1	.028	-.381	-.002	0	0	0	0
167			2	.028	-.389	-.009	-1.209	1.209	-.014	.014
168			3	.029	-.397	-.02	-2.443	2.443	-.053	.053
169			4	.029	-.405	-.033	-3.702	3.702	-.123	.123
170			5	.03	-.413	-.049	-4.987	4.987	-.234	.234
171	4	M6	1	.037	-.44	.002	0	0	0	0
172			2	.038	-.446	.009	-1.238	1.238	.013	-.013
173			3	.038	-.452	.017	-2.493	2.493	.045	-.045
174			4	.039	-.458	.028	-3.766	3.766	.099	-.099
175			5	.039	-.464	.04	-5.056	5.056	.18	-.18
176	4	M7	1	.037	-.44	-.002	0	0	0	0
177			2	.038	-.446	-.009	-1.238	1.238	-.013	.013
178			3	.038	-.452	-.017	-2.493	2.493	-.045	.045
179			4	.039	-.458	-.028	-3.766	3.766	-.099	.099
180			5	.039	-.464	-.04	-5.055	5.055	-.18	.18
181	4	M8	1	.007	-.082	0	0	0	0	0
182			2	.007	-.085	-.005	-.179	.179	-.005	.005
183			3	.007	-.089	-.011	-.366	.366	-.02	.02
184			4	.007	-.093	-.018	-.562	.562	-.047	.047
185			5	.008	-.097	-.025	-.766	.766	-.087	.087
186	4	M9	1	.013	-.167	0	0	0	0	0
187			2	.014	-.171	.006	-.362	.362	.006	-.006
188			3	.014	-.175	.011	-.733	.733	.021	-.021
189			4	.014	-.179	.018	-1.113	1.113	.049	-.049
190			5	.015	-.183	.026	-1.501	1.501	.09	-.09
191	4	M10	1	0	0	0	0	0	0	0
192			2	0	0	0	0	0	0	0
193			3	0	0	0	0	0	0	0
194			4	0	0	0	0	0	0	0
195			5	0	0	0	0	0	0	0
196	4	M48	1	0	0	0	0	0	0	0
197			2	0	0	0	0	0	0	0
198			3	0	0	0	0	0	0	0
199			4	0	0	0	0	0	0	0

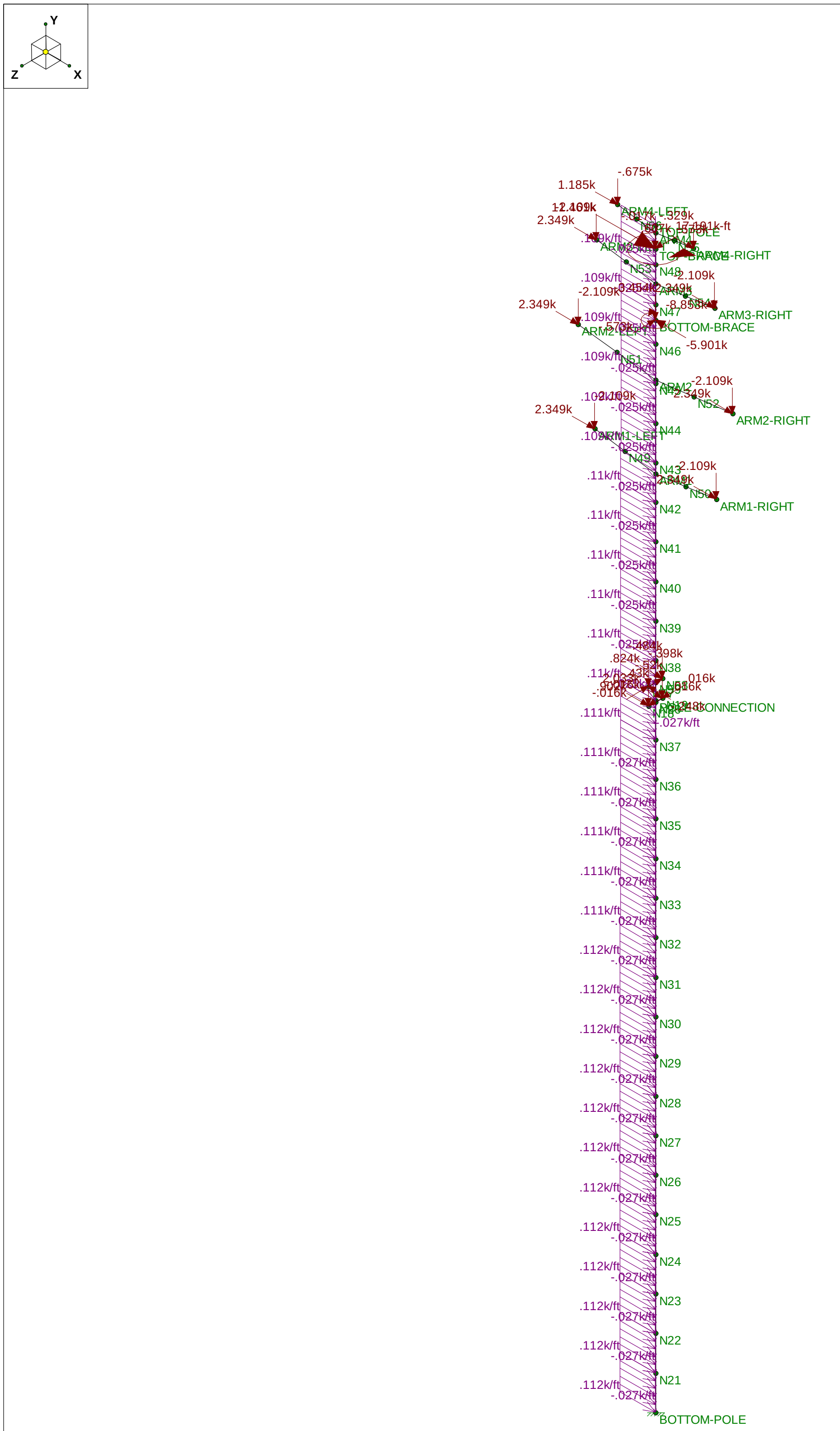
Member Section Stresses (By Combination) (Continued)

	LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bendi...	z bot Bendi...
200			5	0	0	0	0	0	0	0
201	4	M46	1	.005	-.065	-.019	-.357	.357	-.043	.043
202			2	.006	-.069	-.026	-.458	.458	-.071	.071
203			3	.006	-.073	-.033	-.564	.564	-.107	.107
204			4	.006	-.076	-.041	-.675	.675	-.153	.153
205			5	.007	-.08	-.05	-.793	.793	-.21	.21
206	4	M47	1	.01	-.122	.019	-.7	.7	.044	-.044
207			2	.01	-.126	.026	-.886	.886	.073	-.073
208			3	.011	-.13	.033	-1.078	1.078	.109	-.109
209			4	.011	-.134	.041	-1.275	1.275	.156	-.156
210			5	.011	-.137	.05	-1.478	1.478	.213	-.213
211	4	M43	1	.019	-.252	-.033	-1.921	1.921	-.094	.094
212			2	.019	-.26	-.045	-2.428	2.428	-.157	.157
213			3	.02	-.268	-.059	-2.951	2.951	-.242	.242
214			4	.021	-.276	-.075	-3.49	3.49	-.352	.352
215			5	.021	-.284	-.093	-4.044	4.044	-.489	.489
216	4	M42	1	.019	-.252	.033	-1.921	1.921	.094	-.094
217			2	.019	-.26	.045	-2.429	2.429	.157	-.157
218			3	.02	-.268	.059	-2.952	2.952	.242	-.242
219			4	.021	-.276	.075	-3.49	3.49	.351	-.351
220			5	.021	-.284	.093	-4.044	4.044	.489	-.489
221	4	M45	1	.026	-.294	-.028	-2.106	2.106	-.079	.079
222			2	.026	-.3	-.038	-2.652	2.652	-.129	.129
223			3	.027	-.306	-.049	-3.209	3.209	-.194	.194
224			4	.027	-.312	-.061	-3.777	3.777	-.278	.278
225			5	.028	-.318	-.075	-4.357	4.357	-.381	.381
226	4	M44	1	.026	-.294	.028	-2.106	2.106	.079	-.079
227			2	.026	-.3	.038	-2.652	2.652	.129	-.129
228			3	.027	-.306	.049	-3.21	3.21	.194	-.194
229			4	.027	-.312	.061	-3.778	3.778	.278	-.278
230			5	.028	-.318	.075	-4.357	4.357	.381	-.381
231	4	M41	1	.025	-.295	-.028	-2.174	2.174	-.082	.082
232			2	.026	-.301	-.039	-2.738	2.738	-.135	.135
233			3	.026	-.307	-.05	-3.314	3.314	-.204	.204
234			4	.027	-.313	-.063	-3.902	3.902	-.293	.293
235			5	.027	-.319	-.077	-4.502	4.502	-.402	.402
236	4	M40	1	.025	-.295	.028	-2.174	2.174	.082	-.082
237			2	.026	-.301	.039	-2.738	2.738	.135	-.135
238			3	.026	-.307	.05	-3.314	3.314	.204	-.204
239			4	.027	-.313	.063	-3.902	3.902	.293	-.293
240			5	.027	-.319	.077	-4.502	4.502	.402	-.402



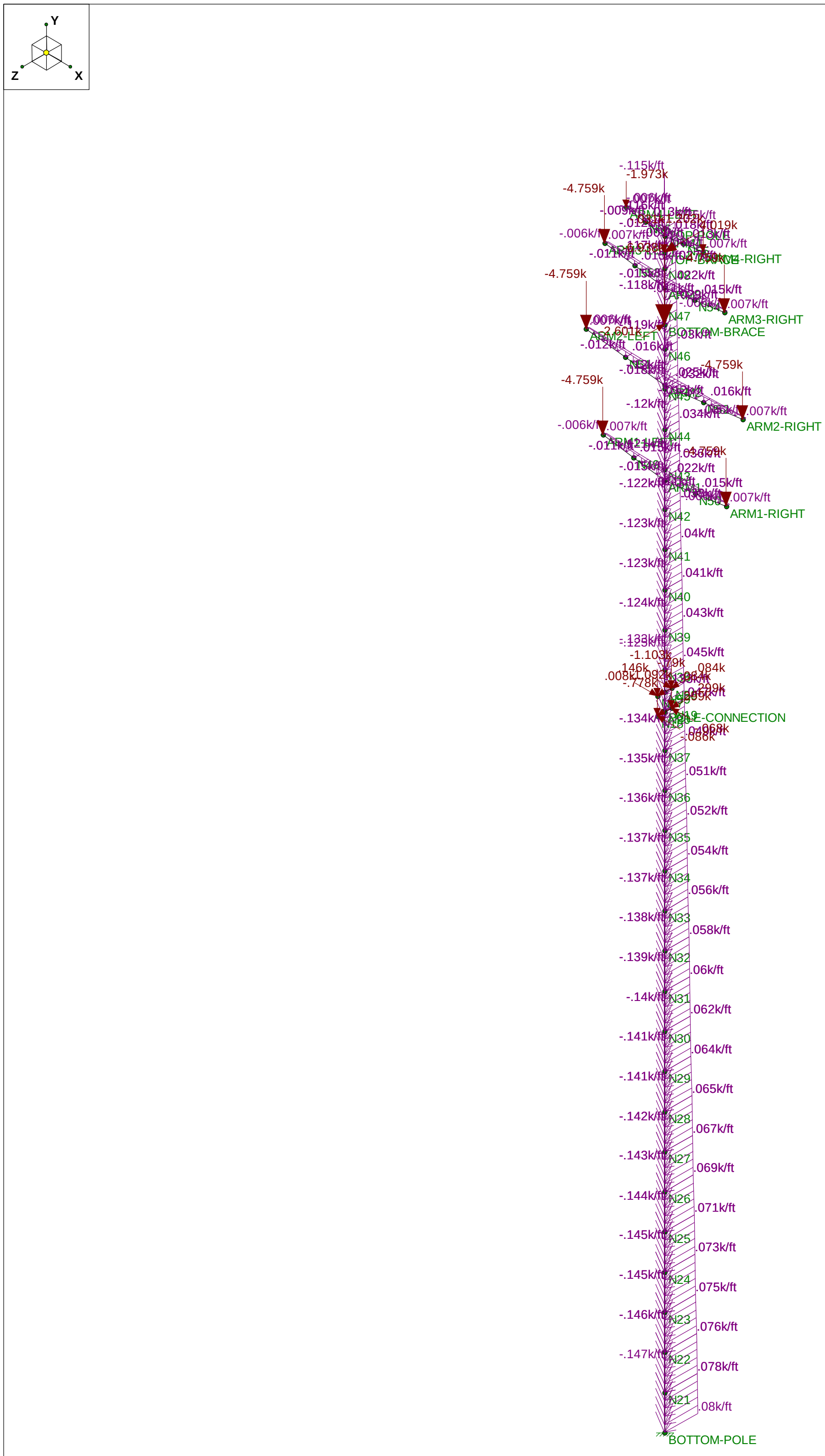
Loads: LC 1, x-direction NESC Heavy Wind
Envelope Only Solution

Centek		
TJL	Pole # 845	July 13, 2021 at 4:08 PM
20150.03	LC #1 Loads	Utility Pole.r3d



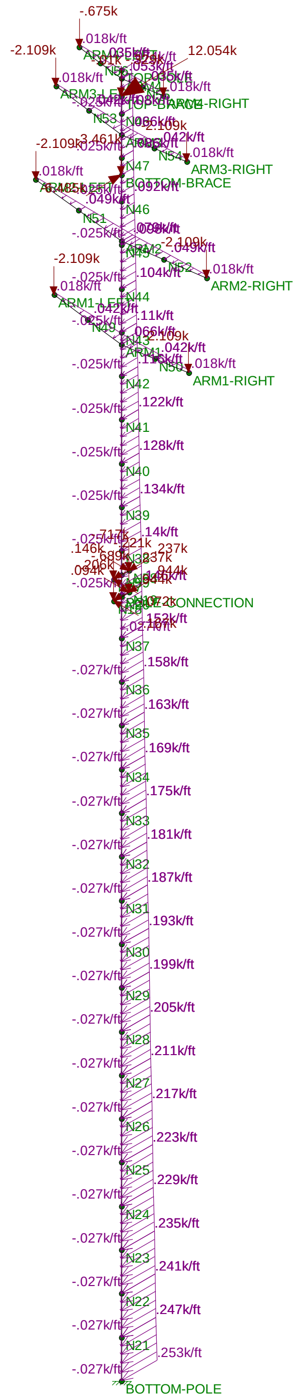
Loads: LC 2, x-direction NESC Extreme Wind
Envelope Only Solution

Centek	Pole # 845	
TJL		July 13, 2021 at 4:08 PM
20150.03	LC #2 Loads	Utility Pole.r3d



Loads: LC 3, z-direction NESC Heavy Wind
Envelope Only Solution

Centek		
TJL	Pole # 845	July 13, 2021 at 4:08 PM
20150.03	LC #3 Loads	Utility Pole.r3d



Loads: LC 4, z-direction NESC Extreme Wind
Envelope Only Solution

Centek		
TJL	Pole # 845	July 13, 2021 at 4:09 PM
20150.03	LC #4 Loads	Utility Pole.r3d

Pole Analysis:

Pole Properties:

Wide Flange Moment of Inertia Iy =	$I_{yy} := 20.7 \cdot in^4$	(User Input)
Wide Flange Moment of Inertia Ix =	$I_{xx} := 843 \cdot in^4$	(User Input)
Wide Flange Area =	$A_{wf} := 13.0 \cdot in^2$	(User Input)
Flange Width =	$b_f := 6.5 \cdot in$	(User Input)
Wide Flange Depth =	$d_{wf} := 20.7 \cdot in$	(User Input)
Tower Width Top =	$W_{TTop} := 13 \cdot in$	(User Input)
Tower Width Base =	$W_{TBase} := 54 \cdot in$	(User Input)
Plate Thickness Top =	$Plt_{tTop} := 0.1875 \cdot in$	(User Input)
Plate Thickness Base =	$Plt_{tBase} := 0.5 \cdot in$	(User Input)
Length of Pole =	$L_{pole} := 150 \cdot ft$	(User Input)
Nominal Bending Stress =	$F_b := 60 \cdot ksi$	(User Input)
Modulus of Elasticity =	$E := 29000 \cdot ksi$	(User Input)

Member Forces:

Maximum Bending Stress x-direction = $f_{bxmax} := 58.3 \cdot ksi$ From Risa3D

Percent Stressed = $\frac{f_{bxmax}}{F_b} = 97.2 \cdot \%$

Bending_Check_x := if($f_{bxmax} < F_b$, "OK" , "NG")

Bending_Check_x = "OK"

Maximum Bending Stress y-direction = $f_{bymax} := 59 \cdot ksi$ From Risa3D

Percent Stressed = $\frac{f_{bymax}}{F_b} = 98.3 \cdot \%$

Bending_Check_y := if($f_{bymax} < F_b$, "OK" , "NG")

Bending_Check_y = "OK"

Flange Bolts and Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	$OM := 1409 \cdot ft \cdot kips$	(Input From Risa-3D)
Shear Force =	$Shear := 31.5 \cdot kips$	(Input From Risa-3D)
Axial Force =	$Axial := 29.2 \cdot kips$	(Input From Risa-3D)

Flange Bolt Data:

Use ASTM A490

Number of Flange Bolts =	$N := 24$	(User Input)
Bolt Ultimate Strength =	$F_u := 150 \cdot ksi$	(User Input)
Bolt Yield Strength =	$F_y := 125 \cdot ksi$	(User Input)
Bolt Modulus =	$E := 29000 \cdot ksi$	(User Input)
Diameter of Flange Bolts =	$D := 1 \cdot in$	(User Input)
Threads per Inch =	$n := 8$	(User Input)

Flange Plate Data:

Use ASTM A572 Gr 60

Plate Yield Strength =	$Fy_{bp} := 60 \cdot ksi$	(User Input)
Flange Plate Thickness =	$t_{bp} := 1.75 \cdot in$	(User Input)

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

$d_1 := 2.0in$ (User Input)

$d_2 := 7.0in$ (User Input)

$d_3 := 12.0in$ (User Input)

$d_4 := 15.5in$ (User Input)

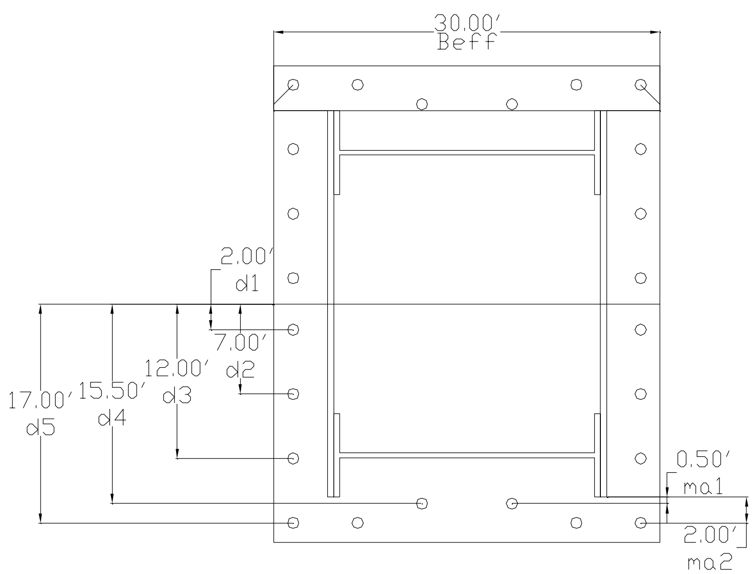
$d_5 := 17.0in$ (User Input)

Critical Distances For Bending in Plate:

$ma_1 := 0.5in$ (User Input)

$ma_2 := 2.0in$ (User Input)

Effective Width of Flange Plate for Bending = $B_{eff} := 30.0in$ (User Input)



FLANGE BOLT AND PLATE GEOMETRY

Flange Bolt Analysis:

Calculated Flange Bolt Properties:

Polar Moment of Inertia = $I_p := \left[(d_1)^2 \cdot 4 + (d_2)^2 \cdot 4 + (d_3)^2 \cdot 4 + (d_4)^2 \cdot 4 + (d_5)^2 \cdot 8\right] = 4061 \cdot in^2$

Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 0.785 \cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 = 0.606 \cdot in^2$

Net Diameter = $D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 0.878 \cdot in$

Radius of Gyration of Bolt = $r := \frac{D_n}{4} = 0.22 \cdot in$

Section Modulus of Bolt = $S_x := \frac{\pi \cdot D_n^{\;3}}{32} = 0.066 \cdot in^3$

Check Flange Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{d_5}{I_p} - \frac{Axial}{N} = 69.6 \cdot kips$

Design Tensile Force = $T_S := F_y \cdot A_n = 75.7 \cdot kips$

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_S} \cdot 100 = 91.9$

Condition1 = Condition1 := if$\left(\frac{T_{Max}}{T_S} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

Condition1 = "OK"

Flange Plate Analysis:

Force from Bolts =

$$C_1 := \frac{OM \cdot d_4}{I_p} + \frac{Axial}{N} = 65.8 \cdot kips$$

$$C_2 := \frac{OM \cdot d_5}{I_p} + \frac{Axial}{N} = 72 \cdot kips$$

Applied Bending Stress in Plate =

$$f_{bp} := \frac{6 \cdot \left(2C_1 \cdot ma_1 + 4 \cdot C_2 \cdot ma_2\right)}{B_{eff} \cdot t_{bp}^{\,2}} = 41.91 \cdot ksi$$

Allowable Bending Stress in Plate =

$$F_{bp} := 0.9 \cdot Fy_{bp} = 54 \cdot ksi$$

Plate Bending Stress % of Capacity =

$$\frac{f_{bp}}{F_{bp}} \cdot 100 = 77.6$$

Condition3 =

$$Condition2 := if\left(\frac{f_{bp}}{F_{bp}} < 1.00, \text{"Ok"}, \text{"Overstressed"}\right)$$

Condition2 = "Ok"

Flange Bolts and Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	$OM := 871 \cdot ft \cdot kips$	(Input From Risa-3D)
Shear Force =	$Shear := 20.1 \cdot kips$	(Input From Risa-3D)
Axial Force =	$Axial := 29.3 \cdot kips$	(Input From Risa-3D)

Flange Bolt Data:

Use ASTM A490

Number of Flange Bolts =	$N := 24$	(User Input)
Bolt Ultimate Strength =	$F_u := 150 \cdot ksi$	(User Input)
Bolt Yield Strength =	$F_y := 125 \cdot ksi$	(User Input)
Bolt Modulus =	$E := 29000 \cdot ksi$	(User Input)
Diameter of Flange Bolts =	$D := 1 \cdot in$	(User Input)
Threads per Inch =	$n := 8$	(User Input)

Flange Plate Data:

Use ASTM A572 Gr 60

Plate Yield Strength =	$Fy_{bp} := 60 \cdot ksi$	(User Input)
Flange Plate Thickness =	$t_{bp} := 1.75 \cdot in$	(User Input)

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

$d_1 := 3.5in$ (User Input)

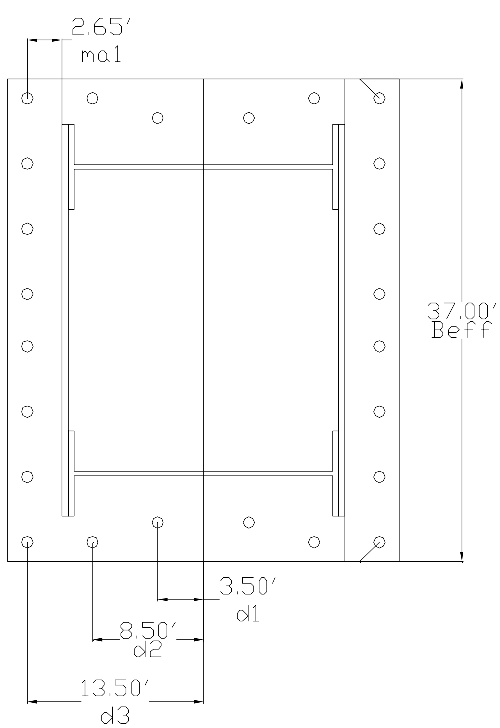
$d_2 := 8.5in$ (User Input)

$d_3 := 13.5in$ (User Input)

Critical Distances For Bending in Plate:

$ma_1 := 2.65in$ (User Input)

Effective Width of Flange Plate for Bending = $B_{eff} := 37.0in$ (User Input)



FLANGE BOLT AND PLATE GEOMETRY

Flange Bolt Analysis:

Calculated Flange Bolt Properties:

Polar Moment of Inertia = $I_p := \left[(d_1)^2 \cdot 4 + (d_2)^2 \cdot 4 + (d_3)^2 \cdot 16\right] = 3254 \cdot in^2$

Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 0.785 \cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 = 0.606 \cdot in^2$

Net Diameter = $D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 0.878 \cdot in$

Radius of Gyration of Bolt = $r := \frac{D_n}{4} = 0.22 \cdot in$

Section Modulus of Bolt = $S_x := \frac{\pi \cdot D_n^{\ 3}}{32} = 0.066 \cdot in^3$

Check Flange Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{d_3}{I_p} - \frac{Axial}{N} = 42.1 \cdot kips$

Design Tensile Force = $T_S := F_y \cdot A_n = 75.7 \cdot kips$

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_S} \cdot 100 = 55.7$

Condition1 = $Condition1 := if\left(\frac{T_{Max}}{T_S} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

Condition1 = "OK"

Flange Plate Analysis:

Force from Bolts = $C_1 := \frac{OM \cdot d_3}{I_p} + \frac{Axial}{N} = 44.6 \cdot kips$

Applied Bending Stress in Plate = $f_{bp} := \frac{6 \cdot \left(8C_1 \cdot ma_1\right)}{B_{eff} \, t_{bp}^{\ 2}} = 50.05 \cdot ksi$

Allowable Bending Stress in Plate = $F_{bp} := 0.9 \cdot Fy_{bp} = 54 \cdot ksi$

Plate Bending Stress % of Capacity = $\frac{f_{bp}}{F_{bp}} \cdot 100 = 92.7$

Condition3 = Condition2 := if$\left(\frac{f_{bp}}{F_{bp}} < 1.00, \text{"Ok"}, \text{"Overstressed"}\right)$

Condition2 = "Ok"

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	$OM := 4845 \cdot ft \cdot kips$	(Input From Risa3D)
Shear Force =	$Shear := 41.6 \cdot kips$	(Input From Risa3D)
Axial Force =	$Axial := 52 \cdot kips$	(Input From Risa3D)

Anchor Bolt Data:

Use ASTM A615 Grade 60

Number of Anchor Bolts =	$N := 26$	(User Input)
Bolt "Column" Distance =	$l := 3.0 \cdot in$	(User Input)
Bolt Ultimate Strength =	$F_u := 90 \cdot ksi$	(User Input)
Bolt Yield Strength =	$F_y := 60 \cdot ksi$	(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)

Base Plate Data:

Use ASTM A572 Grade 42

Plate Yield Strength =	$Fy_{bp} := 42 \cdot ksi$	(User Input)
Base Plate Thickness =	$t_{bp} := 3.0 \cdot in$	(User Input)

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

$d_1 := 7.5in$ (User Input)

$d_2 := 15.0in$ (User Input)

$d_3 := 22.5in$ (User Input)

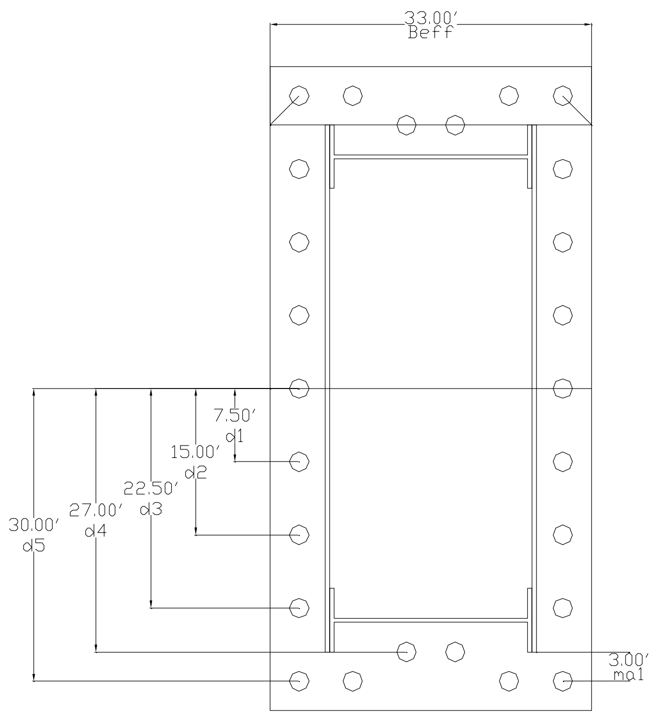
$d_4 := 27.0in$ (User Input)

$d_5 := 30in$ (User Input)

Critical Distances For Bending in Plate:

$ma_1 := 3.0in$ (User Input)

Effective Width of Baseplate for Bending = $B_{eff} := 33.0in$ (User Input)



ANCHOR BOLT AND PLATE GEOMETRY

Anchor Bolt Analysis:

Calculated Anchor Bolt Properties:

Polar Moment of Inertia = $I_p := \left[(d_1)^2 \cdot 4 + (d_2)^2 \cdot 4 + (d_3)^2 \cdot 4 + (d_4)^2 \cdot 4 + (d_5)^2 \cdot 8\right] = 1.327 \times 10^4 \cdot in^2$

Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 3.976 \cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 = 3.248 \cdot in^2$

Net Diameter = $D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 2.033 \cdot in$

Radius of Gyration of Bolt = $r := \frac{D_n}{4} = 0.508 \cdot in$

Section Modulus of Bolt = $S_x := \frac{\pi \cdot D_n^{\ 3}}{32} = 0.826 \cdot in^3$

Check Anchor Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{d_5}{I_p} - \frac{Axial}{N} = 129.5 \cdot kips$

Allowable Tensile Force (Gross Area) = $T_{ALL} := (A_n \cdot F_y) = 194.9 \cdot kips$

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL}} \cdot 100 = 66.4$

Condition1 = $Condition1 := if\left(\frac{T_{Max}}{T_{ALL}} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

$Condition1 = \text{"OK"}$

Note Shear stress is negligible

Base Plate Analysis:

Force from Bolts = $C_1 := \frac{OM \cdot d_5}{I_p} + \frac{Axial}{N} = 133.5 \cdot kips$

Applied Bending Stress in Plate = $f_{bp} := \frac{6 \cdot \left(4C_1 \cdot ma_1\right)}{B_{eff} \cdot t_{bp}^{2}} = 32.36 \cdot ksi$

Allowable Bending Stress in Plate = $F_{bp} := Fy_{bp} = 42 \cdot ksi$

Plate Bending Stress % of Capacity = $\frac{f_{bp}}{F_{bp}} \cdot 100 = 77$

Condition3 = $Condition2 := if\left(\frac{f_{bp}}{F_{bp}} < 1.00, "Ok", "Overstressed"\right)$

$Condition2 = "Ok"$

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	$OM := 3456 \cdot ft \cdot kips$	(Input From RISA-3D)
Shear Force =	$Shear := 35.5 \cdot kips$	(Input From Risa-3D)
Axial Force =	$Axial := 52 \cdot kips$	(Input From Risa-3D)

Anchor Bolt Data:

Use ASTM A615 Grade 60

Number of Anchor Bolts =	$N := 26$	(User Input)
Bolt "Column" Distance =	$l := 3.0 \cdot in$	(User Input)
Bolt Ultimate Strength =	$F_u := 90 \cdot ksi$	(User Input)
Bolt Yield Strength =	$F_y := 60 \cdot ksi$	(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)

Base Plate Data:

Use ASTM A572 Grade 42

Plate Yield Strength =	$Fy_{bp} := 42 \cdot ksi$	(User Input)
Base Plate Thickness =	$t_{bp} := 3.0 \cdot in$	(User Input)

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

$d_1 := 2.5in$ (User Input)

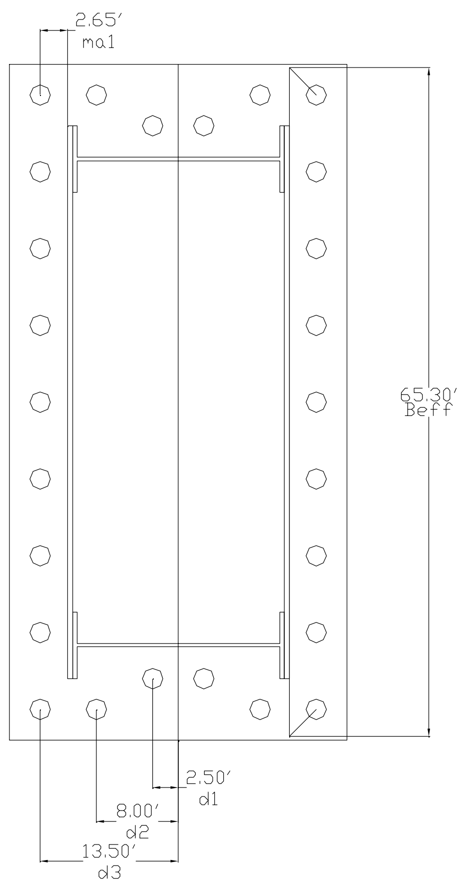
$d_2 := 8.0in$ (User Input)

$d_3 := 13.5in$ (User Input)

Critical Distances For Bending in Plate:

$ma_1 := 2.65in$ (User Input)

Effective Width of Baseplate for Bending = $B_{eff} := 65.3in$ (User Input)



ANCHOR BOLT AND PLATE GEOMETRY

Anchor Bolt Analysis:

Calculated Anchor Bolt Properties:

Polar Moment of Inertia = $I_p := \left[(d_1)^2 \cdot 4 + (d_2)^2 \cdot 4 + (d_3)^2 \cdot 18\right] = 3.562 \times 10^3 \cdot in^2$

Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 3.976 \cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 = 3.248 \cdot in^2$

Net Diameter = $D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 2.033 \cdot in$

Radius of Gyration of Bolt = $r := \frac{D_n}{4} = 0.508 \cdot in$

Section Modulus of Bolt = $S_x := \frac{\pi \cdot D_n^3}{32} = 0.826 \cdot in^3$

Check Anchor Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{d_3}{I_p} - \frac{Axial}{N} = 155.2 \cdot kips$

Allowable Tensile Force (Gross Area) = $T_{ALL} := (A_n \cdot F_y) = 194.9 \cdot kips$

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL}} \cdot 100 = 79.6$

Condition1 = $Condition1 := if\left(\frac{T_{Max}}{T_{ALL}} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

Condition1 = "OK"

Note Shear stress is negligible

Base Plate Analysis:

Force from Bolts = $C_1 := \frac{OM \cdot d_3}{I_p} + \frac{Axial}{N} = 159.201 \cdot kips$

Applied Bending Stress in Plate = $f_{bp} := \frac{6 \cdot (9C_1 \cdot ma_1)}{B_{eff} \, t_{bp}^2} = 38.76 \cdot ksi$

Allowable Bending Stress in Plate = $F_{bp} := Fy_{bp} = 42 \cdot ksi$

Plate Bending Stress % of Capacity = $\frac{f_{bp}}{F_{bp}} \cdot 100 = 92.3$

Condition3 = $Condition3 := if\left(\frac{f_{bp}}{F_{bp}} < 1.00, \text{"Ok"}, \text{"Overstressed"}\right)$

Condition3 = "Ok"

Foundation:

Input Data:

Tower Data

Overturning Moment =	$OM := 4845 \cdot ft \cdot kips \cdot 1.1 = 5330 \cdot ft \cdot kips$	(User Input)
Shear Force =	$Shear := 41.6 \cdot kip \cdot 1.1 = 45.76 \cdot kips$	(User Input)
Axial Force =	$Axial := 52 \cdot kip \cdot 1.1 = 57.2 \cdot kips$	(User Input)
Tower Height =	$H_t := 150 \cdot ft$	(User Input)

Footing Data:

Overall Depth of Footing =	$D_f := 16 \cdot ft$	(User Input)
Length of Pier =	$L_p := 14 \cdot ft$	(User Input)
Extension of Pier Above Grade =	$L_{pag} := 0.5 \cdot ft$	(User Input)
Width of Pier =	$W_{p1} := 7.5 \cdot ft$	(User Input)
Width of Pier =	$W_{p2} := 4 \cdot ft$	(User Input)
Thickness of Footing =	$T_f := 2.5 \cdot ft$	(User Input)
Width of Footing =	$W_{f1} := 22 \cdot ft$	(User Input)
Width of Footing =	$W_{f2} := 18 \cdot ft$	(User Input)

Material Properties:

Concrete Compressive Strength =	$f_c := 3500 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 30 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_a := 6000 \cdot psf$	(User Input)	
Ultimate Soil Bearing Capacity =	$q_s := 2 \cdot q_a = 12000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 120 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	
Coefficient of Lateral Soil Pressure =	$K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3$		

Stability of Footing:

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

Adjusted Soil Unit Weight = $\gamma_s := \text{if}(\text{Bouyancy} = 1, \gamma_{soil} - 62.4\text{pcf}, \gamma_{soil}) = 120 \cdot \text{pcf}$

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

$$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 4.86 \cdot \text{ksf}$$

$$P_{top} := \text{if}\left[n < (D_f - T_f), P_{pt}, P_{pn}\right] = 4.86 \cdot \text{ksf}$$

$$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 5.76 \cdot \text{ksf}$$

$$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 5.31 \cdot \text{ksf}$$

$$T_p := \text{if}\left[n < (D_f - T_f), T_f, (D_f - n)\right] = 2.5$$

$$A_p := W_{f2} \cdot T_p = 45$$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 238.95 \cdot \text{kip}$

Weight of Concrete Pad = $WT_c := (W_{f1} \cdot W_{f2} \cdot T_f + W_{p1} \cdot W_{p2} \cdot L_p) \cdot \gamma_c = 211.5 \cdot \text{kip}$

Weight of Soil Above Footing = $WT_{s1} := \left[(W_{f1} \cdot W_{f2} - W_{p1} \cdot W_{p2}) \cdot (L_p - L_{pag} - n)\right] \cdot \gamma_s = 592.92 \cdot \text{kip}$

Weight of Soil Wedge at Back Face = $WT_{s2} := \left[\frac{(L_p - L_{pag})^2 \cdot \tan(\Phi_s)}{2} \cdot W_{f2}\right] \cdot \gamma_s = 113.64 \cdot \text{kip}$

Weight of Soil Wedge at back face Corners = $WT_{s3} := 2 \cdot \left[(L_p - L_{pag})^3 \cdot \frac{\tan(\Phi_s)^2}{3}\right] \cdot \gamma_s = 65.61 \cdot \text{kips}$

Total Weight = $WT_{tot} := WT_c + WT_{s1} + \text{Axial} = 861.62 \cdot \text{kip}$

Resisting Moment = $M_r := (WT_{tot}) \cdot \frac{W_{f1}}{2} + \text{Shear} \cdot \frac{T_f}{3} + \left[(WT_{s2} + WT_{s3}) \cdot \left(W_{f1} + \frac{D_f \cdot \tan(\Phi_s)}{3}\right)\right] = 14011 \cdot \text{kip} \cdot \text{ft}$

Overturning Moment = $M_{ot} := OM + \text{Shear} \cdot (L_p + T_f) = 6085 \cdot \text{kip} \cdot \text{ft}$

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 2.3$

Factor of Safety Required = $FS_{req} := 1$

OverTurning_Moment_Check := if$(FS \geq FS_{req}$, "Okay" , "No Good")

OverTurning_Moment_Check = "Okay"

Bearing Pressure Caused by Footing:

Total Weight = $WT_{tot} := WT_c + WT_{s1} + WT_{s2} + WT_{s3} + Axial = 1040.9 \cdot kip$

Area of the Mat = $A_{mat} := W_{f1} \cdot W_{f2} = 396$

Section Modulus of Mat = $S := \frac{W_{f1}^2 \cdot W_{f2}}{6} = 1452 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{WT_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 6.819 \cdot ksf$

Max_Pressure_Check := if$\left(P_{max} < q_s\right.$, "Okay" , "No Good"$\left.\right)$

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat = $P_{min} := \frac{WT_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -1.562 \cdot ksf$

Min_Pressure_Check := if$\left[\left(P_{min} \geq 0\right) \cdot \left(P_{min} < q_s\right)\right.$, "Okay" , "No Good"$\left.\right]$

Min_Pressure_Check = "No Good"

Eccentricity = $e := \frac{M_{ot}}{WT_{tot}} = 5.846$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot WT_{tot}}{3 \cdot W_{f2} \cdot \left(\frac{W_{f1}}{2} - e\right)} = 7.479 \cdot ksf$

$q_{adj} := if\left(P_{min} < 0, P_a, P_{max}\right) = 7.479 \cdot ksf$

Pressure_Check := if$\left(q_{adj} < q_s\right.$, "Okay" , "No Good"$\left.\right)$

Pressure_Check = "Okay"

Foundation:

Input Data:

Tower Data

Overturning Moment =	$OM := 3456 \cdot ft \cdot kips \cdot 1.1 = 3802 \cdot ft \cdot kips$	(User Input)
Shear Force =	$Shear := 35.5 \cdot kip \cdot 1.1 = 39.05 \cdot kips$	(User Input)
Axial Force =	$Axial := 52 \cdot kip \cdot 1.1 = 57.2 \cdot kips$	(User Input)
Tower Height =	$H_t := 150 \cdot ft$	(User Input)

Footing Data:

Overall Depth of Footing =	$D_f := 16 \cdot ft$	(User Input)
Length of Pier =	$L_p := 14 \cdot ft$	(User Input)
Extension of Pier Above Grade =	$L_{pag} := 0.5 \cdot ft$	(User Input)
Width of Pier =	$W_{p1} := 7.5 \cdot ft$	(User Input)
Width of Pier =	$W_{p2} := 4 \cdot ft$	(User Input)
Thickness of Footing =	$T_f := 2.5 \cdot ft$	(User Input)
Width of Footing =	$W_{f1} := 18 \cdot ft$	(User Input)
Width of Footing =	$W_{f2} := 22 \cdot ft$	(User Input)

Material Properties:

Concrete Compressive Strength =	$f_c := 3500 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 30 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_a := 6000 \cdot psf$	(User Input)	
Ultimate Soil Bearing Capacity =	$q_s := 2 \cdot q_a = 12000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 120 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	
Coefficient of Lateral Soil Pressure =	$K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3$		

Stability of Footing:

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

Adjusted Soil Unit Weight = $\gamma_s := \text{if}(\text{Bouyancy} = 1, \gamma_{soil} - 62.4\text{pcf}, \gamma_{soil}) = 120 \cdot \text{pcf}$

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

$$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 4.86 \cdot \text{ksf}$$

$$P_{top} := \text{if}\left[n < (D_f - T_f), P_{pt}, P_{pn}\right] = 4.86 \cdot \text{ksf}$$

$$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 5.76 \cdot \text{ksf}$$

$$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 5.31 \cdot \text{ksf}$$

$$T_p := \text{if}\left[n < (D_f - T_f), T_f, (D_f - n)\right] = 2.5$$

$$A_p := W_{f2} \cdot T_p = 55$$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 292.05 \cdot \text{kip}$

Weight of Concrete Pad = $WT_c := (W_{f1} \cdot W_{f2} \cdot T_f + W_{p1} \cdot W_{p2} \cdot L_p) \cdot \gamma_c = 211.5 \cdot \text{kip}$

Weight of Soil Above Footing = $WT_{s1} := \left[(W_{f1} \cdot W_{f2} - W_{p1} \cdot W_{p2}) \cdot (L_p - L_{pag} - n)\right] \cdot \gamma_s = 592.92 \cdot \text{kip}$

Weight of Soil Wedge at Back Face = $WT_{s2} := \left[\frac{(L_p - L_{pag})^2 \cdot \tan(\Phi_s)}{2} \cdot W_{f2}\right] \cdot \gamma_s = 138.893 \cdot \text{kip}$

Weight of Soil Wedge at back face Corners = $WT_{s3} := 2 \cdot \left[(L_p - L_{pag})^3 \cdot \frac{\tan(\Phi_s)^2}{3}\right] \cdot \gamma_s = 65.61 \cdot \text{kips}$

Total Weight = $WT_{tot} := WT_c + WT_{s1} + \text{Axial} = 861.62 \cdot \text{kip}$

Resisting Moment = $M_r := (WT_{tot}) \cdot \frac{W_{f1}}{2} + \text{Shear} \cdot \frac{T_f}{3} + \left[(WT_{s2} + WT_{s3}) \cdot \left(W_{f1} + \frac{D_f \cdot \tan(\Phi_s)}{3}\right)\right] = 12098 \cdot \text{kip} \cdot \text{ft}$

Overturning Moment = $M_{ot} := OM + \text{Shear} \cdot (L_p + T_f) = 4446 \cdot \text{kip} \cdot \text{ft}$

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 2.72$

Factor of Safety Required = $FS_{req} := 1$

OverTurning_Moment_Check := if($FS \geq FS_{req}$, "Okay" , "No Good")

OverTurning_Moment_Check = "Okay"

Bearing Pressure Caused by Footing:

Total Weight = $WT_{tot} := WT_c + WT_{s1} + WT_{s2} + WT_{s3} + Axial = 1066.1 \cdot kip$

Area of the Mat = $A_{mat} := W_{f1} \cdot W_{f2} = 396$

Section Modulus of Mat = $S := \frac{W_{f1}^2 \cdot W_{f2}}{6} = 1188 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{WT_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 6.435 \cdot ksf$

Max_Pressure_Check := if($P_{max} < q_s$, "Okay", "No Good")

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat = $P_{min} := \frac{WT_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -1.05 \cdot ksf$

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

Min_Pressure_Check = "No Good"

Eccentricity = $e := \frac{M_{ot}}{WT_{tot}} = 4.17$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot WT_{tot}}{3 \cdot W_{f2} \cdot \left(\frac{W_{f1}}{2} - e\right)} = 6.689 \cdot ksf$

$q_{adj} := if(P_{min} < 0, P_a, P_{max}) = 6.689 \cdot ksf$

Pressure_Check := if($q_{adj} < q_s$, "Okay", "No Good")

Pressure_Check = "Okay"

NORTH EAST > North East > New England > New England West > TRUMBULL 4 CT - A

Summers, Melissa - melissa.summers@verizonwireless.com - 9/9/2020 15:45:25

Project Details

Carrier Aggregation:	false
MPT Id:	
eCIP-0:	false
Project Name:	5G L-Sub6 - Carrier Add
FUZE Project ID:	16231993
Designed Sector Carrier 4G:	14
Designed Sector Carrier 5G:	N/A
Additional Sector Carrier 4G:	N/A
Additional Sector Carrier 5G:	N/A
SiteTraker Project Id:	
FP Solution Type & Tech Type:	MODIFICATION;5G_L-Sub6-Prep
RFDS Project Scope:	RFDS SOW: 850A/ PCS/ L-Sub6 carrier add, Samsung dual band RRH swap, antenna change NOTE: RFDS assumes that standoffs can be created to accommodate the new L-Sub6 antennas at the same C/L. An alternative is to request a second C/L below the existing C/L 1- Retain 700/ AWS carriers and add 850A/ PCS/ L-Sub6 carrier 3- Replace (3) existing antennas with (3) new Commscope NNH4-65B-R6 antennas 4- Add (3) L-Sub6 All-in-One antenna/ RRHs to position 2 on new stand-off mounts 5- Remove (6) existing Nokia RRHs from tower and add (3) new Samsung B5/B13 RRH-BR04C (RFV01U-D2A) and (3) new Samsung B2/B66A RRH-BR049 (RFV01U-D1A) to tower 6- Plumb 700/ 850/ PCS/ AWS/ L-Sub6 according to the plumbing diagram 7- Daisy chain AISG cables between RET capable antennas and connect via RRH 8- Cap and weatherproof unused ports/connectors

Suffix: REV0

Location Information

Site ID:	5011082
E-NodeB ID:	0065149,065149
PSLC:	468796
Switch Name:	Wallingford 2,Wallingford 2
Tower Owner:	
Tower Type:	Utility pole/tower
Site Type:	MACRO
Street Address:	Rocky Hill Rd Assessor: 900 Old Town Rd structure#845
City:	Trumbull
State:	CT
Zip Code:	06611
County:	Fairfield
Latitude:	41.23160222 / 41° 13' 53.768" N
Longitude:	-73.19000027 / 73° 11' 24.001" W

Antenna Summary

Added

700	850	1900	AWS	AWS3	28 GHz	31 GHz	39 GHz	CBRS	LAA	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity
LTE	LTE	LTE	LTE								COMMSCOPE	NNH4-65B-R6	90	93	10(D1) 130(D2) 260(D3)	true	true	PHYSICAL	3
											TBD	nL-Sub6 Antenna	90	92.1	10(0001) 130(0002) 260(0003)	false	false	PHYSICAL	3

Removed

700	850	1900	AWS	AWS3	28 GHz	31 GHz	39 GHz	CBRS	LAA	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity
LTE			LTE								ANDREW	SBNHH-1D65B	90	93	10(D1) 130(D2) 260(D3)	false	false	PHYSICAL	3

Retained

700	850	1900	AWS	AWS3	28 GHz	31 GHz	39 GHz	CBRS	LAA	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity

No data available.

Added: 6 **Removed:** 3 **Retained:** 0

Equipment Summary

Added

Equipment Type	Location	700	850	1900	AWS	AWS3	28 GHz	31 GHz	39 GHz	CBRS	LAA	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity
RRU	Tower			LTE	LTE								Samsung	B2/B66A RRH-BR049 (RFV01U-D1A)			PHYSICAL	3
RRU	Tower	LTE	LTE										Samsung	B5/B13 RRH-BR04C (RFV01U-D2A)			PHYSICAL	3
RRU	Tower												Samsung	VZS01			PHYSICAL	3

Removed

Equipment Type	Location	700	850	1900	AWS	AWS3	28 GHz	31 GHz	39 GHz	CBRS	LAA	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity
RRU	Tower	LTE											Nokia	UHBA B13 RRH 4x30			PHYSICAL	3
RRU	Tower				LTE								Nokia	UHIE B66A RRH 4x45			PHYSICAL	3

Retained

Equipment Type	Location	700	850	1900	AWS	AWS3	28 GHz	31 GHz	39 GHz	CBRS	LAA	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity
Hybrid Cable	Tower	LTE	LTE	LTE	LTE							5G		6x12 Hybriflex		1 5/8"	PHYSICAL	2
OVP Box	Tower	LTE	LTE	LTE	LTE							5G		OVP-6			PHYSICAL	2

Service Info

2100 MHZ LTE

	0000			5GLS		
Sector	**D1**	**D2**	**D3**	**D1**	**D2**	**D3**
Azimuth	10	130	260	10	130	260
Cell / ENode B ID	065149	065149	065149	065149	065149	065149
Antenna Model	SBNHH-1D65B	SBNHH-1D65B	SBNHH-1D65B	NNH4-65B-R6	NNH4-65B-R6	NNH4-65B-R6
Antenna Make	ANDREW	ANDREW	ANDREW	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	90	90	90	90	90	90
Mechanical Down-Tilt(Deg.)	0	0	0	0	0	0
Electrical Down-Tilt	2	4	0	2	4	2
Tip Height	93	93	93	93	93	93
Regulatory Power	159.82	155.36	161.63	93.89	91.69	93.89
TMA Make						
TMA Model						
RRU Make	Nokia	Nokia	Nokia	Samsung	Samsung	Samsung
RRU Model	UHIE B66A RRH 4x45	UHIE B66A RRH 4x45	UHIE B66A RRH 4x45	B2/B66A RRH-BR049 (RFV01U-D1A)	B2/B66A RRH-BR049 (RFV01U-D1A)	B2/B66A RRH-BR049 (RFV01U-D1A)
Number of Tx, Rx Lines	4,4	4,4	4,4	4,4	4,4	4,4
Position						
Transmitter Id	1956891	1956899	1962563	7476362	7476359	7476360
Source	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API

700 MHZ LTE

	0000			5GLS		
Sector	**D1**	**D2**	**D3**	**D1**	**D2**	**D3**
Azimuth	10	130	260	10	130	260
Cell / ENode B ID	065149	065149	065149	065149	065149	065149
Antenna Model	SBNHH-1D65B	SBNHH-1D65B	SBNHH-1D65B	NNH4-65B-R6	NNH4-65B-R6	NNH4-65B-R6
Antenna Make	ANDREW	ANDREW	ANDREW	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	90	90	90	90	90	90
Mechanical Down-Tilt(Deg.)	0	0	0	0	0	0
Electrical Down-Tilt	2	7	4	2	7	4
Tip Height	93	93	93	93	93	93
Regulatory Power	115.87	116.08	117.24	65.96	65.28	64.83
TMA Make						
TMA Model						
RRU Make	Nokia	Nokia	Nokia	Samsung	Samsung	Samsung
RRU Model	UHBA B13 RRH 4x30	UHBA B13 RRH 4x30	UHBA B13 RRH 4x30	B5/B13 RRH-BR04C (RFV01U-D2A)	B5/B13 RRH-BR04C (RFV01U-D2A)	B5/B13 RRH-BR04C (RFV01U-D2A)
Number of Tx, Rx Lines	2,2	2,2	2,2	4,4	4,4	4,4
Position						
Transmitter Id	1956888	1956892	1959543	7476357	7476358	7476361
Source	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API

nL-Sub6

	5GLS		
Sector	**0001**	**0002**	**0003**
Azimuth	10	130	260
Cell / ENode B ID	0065149	0065149	0065149
Antenna Model	nL-Sub6 Antenna	nL-Sub6 Antenna	nL-Sub6 Antenna
Antenna Make	TBD	TBD	TBD
Antenna Centerline(Ft)	90	90	90
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	3	3	3
Tip Height	92.1	92.1	92.1
Regulatory Power	160.7	155.36	161.63
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	VZS01	VZS01	VZS01
Number of Tx, Rx Lines	4,4	4,4	4,4
Position			
Transmitter Id	7476375	7476376	7476377
Source	ATOLL_API	ATOLL_API	ATOLL_API

1900 MHZ LTE

	5GLS		
Sector	**D1**	**D2**	**D3**
Azimuth	10	130	260
Cell / ENode B ID	065149	065149	065149
Antenna Model	NNH4-65B-R6	NNH4-65B-R6	NNH4-65B-R6
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	90	90	90
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	2	4	2
Tip Height	93	93	93
Regulatory Power	86.94	87.34	86.94
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	B2/B66A RRH-BR049 (RFV01U-D1A)	B2/B66A RRH-BR049 (RFV01U-D1A)	B2/B66A RRH-BR049 (RFV01U-D1A)
Number of Tx, Rx Lines	4,4	4,4	4,4
Position			
Transmitter Id	8200834	8200835	8200836
Source	ATOLL_API	ATOLL_API	ATOLL_API

850 MHZ LTE

	5GLS		
Sector	**D1**	**D2**	**D3**
Azimuth	10	130	260
Cell / ENode B ID	065149	065149	065149
Antenna Model	NNH4-65B-R6	NNH4-65B-R6	NNH4-65B-R6
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	90	90	90
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	2	7	4
Tip Height	93	93	93
Regulatory Power	272.81	273.56	272.62
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	B5/B13 RRH-BR04C (RFV01U-D2A)	B5/B13 RRH-BR04C (RFV01U-D2A)	B5/B13 RRH-BR04C (RFV01U-D2A)
Number of Tx, Rx Lines	4,4	4,4	4,4
Position			
Transmitter Id	8200831	8200832	8200833
Source	ATOLL_API	ATOLL_API	ATOLL_API

Service Comments

Callsigns Per Antenna

Sector	Antenna Make	Antenna Model	Ant CL Height AGL	Tip Height	Azimuth (TN)	Electrical Tilt	Mechanical Tilt	Gain	Beamwidth	Regulatory Power	Callsigns						
											700	850	1900	2100	28 GHz	31 GHz	39 GHz
D3	COMMSCOPE	NNH4-65B-R6	90	93	260	4	0	11.86	69.25	64.83	WQJQ689						
D1	COMMSCOPE	NNH4-65B-R6	90	93	10	2	0	14.329	57.5	93.89				WQGA906 WQGB279			
D2	COMMSCOPE	NNH4-65B-R6	90	93	130	4	0	14.015	60	87.34			KNLF644 KNLH264 WQBT539				
D3	COMMSCOPE	NNH4-65B-R6	90	93	260	2	0	13.995	60	86.94			KNLF644 KNLH264 WQBT539				
D2	COMMSCOPE	NNH4-65B-R6	90	93	130	7	0	12.55	64.75	273.56		KNKA363					
D3	COMMSCOPE	NNH4-65B-R6	90	93	260	4	0	12.535	65	272.62		KNKA363					
D1	COMMSCOPE	NNH4-65B-R6	90	93	10	2	0	13.995	60	86.94			KNLF644 KNLH264 WQBT539				
D3	COMMSCOPE	NNH4-65B-R6	90	93	260	2	0	14.329	57.5	93.89				WQGA906 WQGB279			
D1	COMMSCOPE	NNH4-65B-R6	90	93	10	2	0	12.538	65	272.81		KNKA363					
D2	COMMSCOPE	NNH4-65B-R6	90	93	130	4	0	14.226	58.75	91.69				WQGA906 WQGB279			
D1	COMMSCOPE	NNH4-65B-R6	90	93	10	2	0	11.935	69.75	65.96	WQJQ689						
D2	COMMSCOPE	NNH4-65B-R6	90	93	130	7	0	11.89	69	65.28	WQJQ689						

Callsigns

Callsign	Market	Radio Code	Market Number	Block	State	County	Licensee Name	Wholly Owned	Total MHZ	Freq Range 1	Freq Range 2	Freq Range 3	Freq Range 4	Regulatory Power	Threshold (W)	POPs/Sq Mi	Status	Action	Approved for Insvc
WQJQ689	*Northeast*	*WU*	*REA001*	*C*	*CT*	*Fairfield*	*Cellco Partnership*	*Yes*	*22.000*	*746.000-757.000*	*776.000-787.000*	*.000-.000*	*.000-.000*	*65.96*	*1000*	*1467.18*	*Active*	*added*	*Yes*
KNKA363	*Bridgeport-Stamford-Norwalk-Danbury, CT*	*CL*	*CMA042*	*A*	*CT*	*Fairfield*	*Cellco Partnership*	*Yes*	*25.000*	*824.000-835.000*	*869.000-880.000*	*845.000-846.500*	*890.000-891.500*	*273.56*	*400*	*1467.18*	*Active*	*added*	*Yes*
WQBT539	*New York, NY*	*CW*	*BTA321*	*C*	*CT*	*Fairfield*	*Cellco Partnership*	*Yes*	*10.000*	*1895.000-1900.000*	*1975.000-1980.000*	*.000-.000*	*.000-.000*	*87.34*	*1640*	*1467.18*	*Active*	*added*	*Yes*
KNLF644	*New York, NY*	*CW*	*BTA321*	*C*	*CT*	*Fairfield*	*AirTouch Cellular*	*Yes*	*20.000*	*1900.000-1910.000*	*1980.000-1990.000*	*.000-.000*	*.000-.000*	*87.34*	*1640*	*1467.18*	*Active*	*added*	*Yes*
KNLH264	*New York, NY*	*CW*	*BTA321*	*F*	*CT*	*Fairfield*	*Cellco Partnership*	*Yes*	*10.000*	*1890.000-1895.000*	*1970.000-1975.000*	*.000-.000*	*.000-.000*	*87.34*	*1640*	*1467.18*	*Active*	*added*	*Yes*
WQGB279	*Bridgeport-Stamford-Norwalk-Danbury, CT*	*AW*	*CMA042*	*A*	*CT*	*Fairfield*	*Cellco Partnership*	*Yes*	*20.000*	*1710.000-1720.000*	*2110.000-2120.000*	*.000-.000*	*.000-.000*	*93.89*	*1640*	*1467.18*	*Active*	*added*	*Yes*
WQGA906	*New York-No. New Jer.-Long Island, NY-NJ-CT-PA-MA-*	*AW*	*BEA010*	*B*	*CT*	*Fairfield*	*Cellco Partnership*	*Yes*	*20.000*	*1720.000-1730.000*	*2120.000-2130.000*	*.000-.000*	*.000-.000*	*93.89*	*1640*	*1467.18*	*Active*	*added*	*Yes*
WPOH942	New York, NY	LD	BTA321	A	CT	Fairfield	Cellco Partnership	Yes	300.000	29100.000-29250.000	31075.000-31225.000	.000-.000	.000-.000			1467.18	Active		No
WPLM397	New York, NY	LD	BTA321	B	CT	Fairfield	Cellco Partnership	Yes	150.000	31000.000-31075.000	31225.000-31300.000	.000-.000	.000-.000			1467.18	Active		No
WRBA702	New York, NY	UU	BTA321	L1	CT	Fairfield	Cellco Partnership	Yes	325.000	27600.000-27925.000	.000-.000	.000-.000	.000-.000			1467.18	Active		Yes
WRBA703	New York, NY	UU	BTA321	L2	CT	Fairfield	Cellco Partnership	Yes	325.000	27925.000-27950.000	28050.000-28350.000	.000-.000	.000-.000			1467.18	Active		Yes
WRHD609	New York, NY	UU	PEA001	M1	CT	Fairfield	Straight Path Spectrum, LLC	Yes	100.000	37600.000-37700.000	.000-.000	.000-.000	.000-.000			1467.18	Active		Yes
WRHD610	New York, NY	UU	PEA001	M10	CT	Fairfield	Straight Path Spectrum, LLC	Yes	100.000	38500.000-38600.000	.000-.000	.000-.000	.000-.000			1467.18	Active		Yes
WRHD611	New York, NY	UU	PEA001	M2	CT	Fairfield	Straight Path Spectrum, LLC	Yes	100.000	37700.000-37800.000	.000-.000	.000-.000	.000-.000			1467.18	Active		Yes
WRHD612	New York, NY	UU	PEA001	M3	CT	Fairfield	Straight Path Spectrum, LLC	Yes	100.000	37800.000-37900.000	.000-.000	.000-.000	.000-.000			1467.18	Active		Yes
WRHD613	New York, NY	UU	PEA001	M4	CT	Fairfield	Straight Path Spectrum, LLC	Yes	100.000	37900.000-38000.000	.000-.000	.000-.000	.000-.000			1467.18	Active		Yes
WRHD614	New York, NY	UU	PEA001	M5	CT	Fairfield	Straight Path Spectrum, LLC	Yes	100.000	38000.000-38100.000	.000-.000	.000-.000	.000-.000			1467.18	Active		Yes

WRHD615	New York, NY	UU	PEA001	M6	CT	Fairfield	Straight Path Spectrum, LLC	Yes	100.000	38100.000-38200.000	.000-.000	.000-.000	.000-.000			1467.18	Active		Yes
WRHD616	New York, NY	UU	PEA001	M7	CT	Fairfield	Straight Path Spectrum, LLC	Yes	100.000	38200.000-38300.000	.000-.000	.000-.000	.000-.000			1467.18	Active		Yes
WRHD617	New York, NY	UU	PEA001	M8	CT	Fairfield	Straight Path Spectrum, LLC	Yes	100.000	38300.000-38400.000	.000-.000	.000-.000	.000-.000			1467.18	Active		Yes
WRHD618	New York, NY	UU	PEA001	M9	CT	Fairfield	Straight Path Spectrum, LLC	Yes	100.000	38400.000-38500.000	.000-.000	.000-.000	.000-.000			1467.18	Active		Yes
WRHD619	New York, NY	UU	PEA001	N1	CT	Fairfield	Straight Path Spectrum, LLC	Yes	100.000	38600.000-38700.000	.000-.000	.000-.000	.000-.000			1467.18	Active		No
WRDG500	New York, NY	UU	PEA001	S2	CT	Fairfield	Cellco Partnership	Yes	400.000	37800.000-38200.000	.000-.000	.000-.000	.000-.000			1467.18	Active		Yes

Band	Sector 1 (Alpha) Color Codes							
850 CDMA		R						
		R	R					
700		R	P					
		R	R	P				
		R	R	R	P			
		R	R	R	R	P		
850 LTE		R	P	P				
		R	R	P	P			
		R	R	R	P	P		
		R	R	R	R	P	P	
700 / 850		R	P	P	P			
		R	R	P	P	P		
		R	R	R	P	P	P	
		R	R	R	R	P	P	P
AWS		R	W					
		R	R	W				
		R	R	R	W			
		R	R	R	R	W		
PCS		R	W	W				
		R	R	W	W			
		R	R	R	W	W		
		R	R	R	R	W	W	
AWS / PCS		R	W	W	W			
		R	R	W	W	W		
		R	R	R	W	W	W	
		R	R	R	R	W	W	W
CBRS		R	Y					
		R	R	Y				
		R	R	R	Y			
		R	R	R	R	Y		
LAA		R	Y	Y				
		R	R	Y	Y			

Band	Sector 2 (Beta) Color Codes							
850 CDMA		B						
		B	B					
700		B	P					
		B	B	P				
		B	B	B	P			
		B	B	B	B	P		
850 LTE		B	P	P				
		B	B	P	P			
		B	B	B	P	P		
		B	B	B	B	P	P	
700 / 850		B	P	P	P			
		B	B	P	P	P		
		B	B	B	P	P	P	
		B	B	B	B	P	P	P
AWS		B	W					
		B	B	W				
		B	B	B	W			
		B	B	B	B	W		
PCS		B	W	W				
		B	B	W	W			
		B	B	B	W	W		
		B	B	B	B	W	W	
AWS / PCS		B	W	W	W			
		B	B	W	W	W		
		B	B	B	W	W	W	
		B	B	B	B	W	W	W
CBRS		B	Y					
		B	B	Y				
		B	B	B	Y			
		B	B	B	B	Y		
LAA		B	Y	Y				
		B	B	Y	Y			

Band	Sector 3 (Gamma) Color Codes							
850 CDMA		G						
		G	G					
700		G	P					
		G	G	P				
		G	G	G	P			
		G	G	G	G	P		
850 LTE		G	P	P				
		G	G	P	P			
		G	G	G	P	P		
		G	G	G	G	P	P	
700 / 850		G	P	P	P			
		G	G	P	P	P		
		G	G	G	P	P	P	
		G	G	G	G	P	P	P
AWS		G	W					
		G	G	W				
		G	G	G	W			
		G	G	G	G	W		
PCS		G	W	W				
		G	G	W	W			
		G	G	G	W	W		
		G	G	G	G	W	W	
AWS / PCS		G	W	W	W			
		G	G	W	W	W		
		G	G	G	W	W	W	
		G	G	G	G	W	W	W
CBRS		G	Y					
		G	G	Y				
		G	G	G	Y			
		G	G	G	G	Y		
LAA		G	Y	Y				
		G	G	Y	Y			

Band	Sector 4 (Delta) Color Codes							
850 CDMA	Gray	R						
	Gray	R	R					
700	Gray	R	P					
	Gray	R	R	P				
	Gray	R	R	R	P			
	Gray	R	R	R	R	P		
850 LTE	Gray	R	P	P				
	Gray	R	R	P	P			
	Gray	R	R	R	P	P		
	Gray	R	R	R	R	P	P	
700 / 850	Gray	R	P	P	P			
	Gray	R	R	P	P	P		
	Gray	R	R	R	P	P	P	
	Gray	R	R	R	R	P	P	P
AWS	Gray	R	W					
	Gray	R	R	W				
	Gray	R	R	R	W			
	Gray	R	R	R	R	W		
PCS	Gray	R	W	W				
	Gray	R	R	W	W			
	Gray	R	R	R	W	W		
	Gray	R	R	R	R	W	W	
AWS / PCS	Gray	R	W	W	W			
	Gray	R	R	W	W	W		
	Gray	R	R	R	W	W	W	
	Gray	R	R	R	R	W	W	W
CBRS	Gray	R	Y					
	Gray	R	R	Y				
	Gray	R	R	R	Y			
	Gray	R	R	R	R	Y		
LAA	Gray	R	Y	Y				
	Gray	R	R	Y	Y			

Band	Sector 5 (Epsilon) Color Codes							
850 CDMA	Gray	B						
	Gray	B	B					
700	Gray	B	P					
	Gray	B	B	P				
	Gray	B	B	B	P			
	Gray	B	B	B	B	P		
850 LTE	Gray	B	P	P				
	Gray	B	B	P	P			
	Gray	B	B	B	P	P		
	Gray	B	B	B	B	P	P	
700 / 850	Gray	B	P	P	P			
	Gray	B	B	P	P	P		
	Gray	B	B	B	P	P	P	
	Gray	B	B	B	B	P	P	P
AWS	Gray	B	W					
	Gray	B	B	W				
	Gray	B	B	B	W			
	Gray	B	B	B	B	W		
PCS	Gray	B	W	W				
	Gray	B	B	W	W			
	Gray	B	B	B	W	W		
	Gray	B	B	B	B	W	W	
AWS / PCS	Gray	B	W	W	W			
	Gray	B	B	W	W	W		
	Gray	B	B	B	W	W	W	
	Gray	B	B	B	B	W	W	W
CBRS	Gray	B	Y					
	Gray	B	B	Y				
	Gray	B	B	B	Y			
	Gray	B	B	B	B	Y		
LAA	Gray	B	Y	Y				
	Gray	B	B	Y	Y			

Band	Sector 6 (Zeta) Color Codes							
850 CDMA	Gray	G						
	Gray	G	G					
700	Gray	G	P					
	Gray	G	G	P				
	Gray	G	G	G	P			
	Gray	G	G	G	G	P		
850 LTE	Gray	G	P	P				
	Gray	G	G	P	P			
	Gray	G	G	G	P	P		
	Gray	G	G	G	G	P	P	
700 / 850	Gray	G	P	P	P			
	Gray	G	G	P	P	P		
	Gray	G	G	G	P	P	P	
	Gray	G	G	G	G	P	P	P
AWS	Gray	G	W					
	Gray	G	G	W				
	Gray	G	G	G	W			
	Gray	G	G	G	G	W		
PCS	Gray	G	W	W				
	Gray	G	G	W	W			
	Gray	G	G	G	W	W		
	Gray	G	G	G	G	W	W	
AWS / PCS	Gray	G	W	W	W			
	Gray	G	G	W	W	W		
	Gray	G	G	G	W	W	W	
	Gray	G	G	G	G	W	W	W
CBRS	Gray	G	Y					
	Gray	G	G	Y				
	Gray	G	G	G	Y			
	Gray	G	G	G	G	Y		
LAA	Gray	G	Y	Y				
	Gray	G	G	Y	Y			

Port are for low band MHz

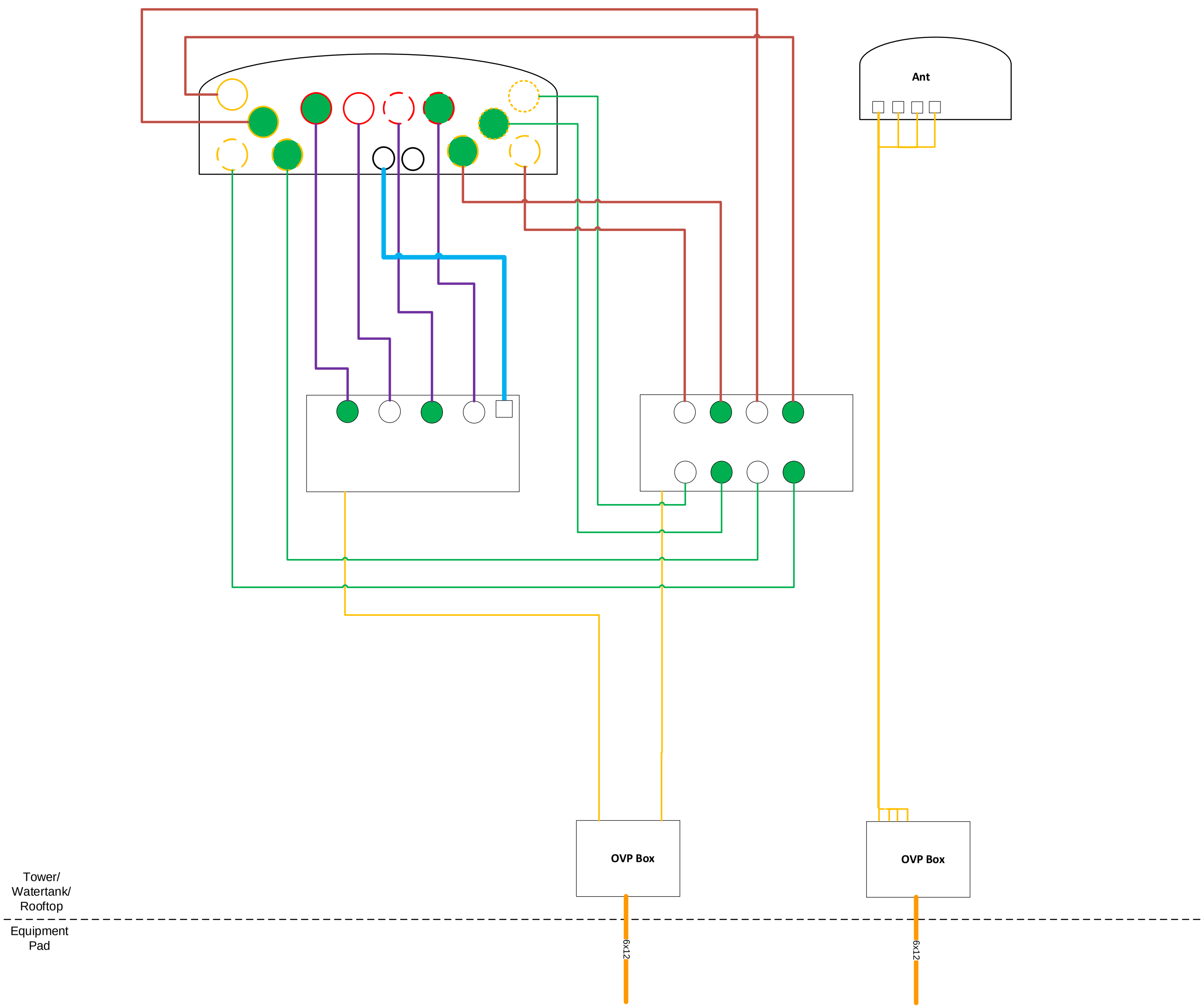
Port are for high band MHz

Smart Bias Tee is through port for low band and port for high band

AISG cable is only needed when drawn in the diagrams below if it is not drawn then SBT is enough to control all RET motors

Not all SBT ports are needed to control RET only green port connection to green port will control RET

RET DC signal pass for RET Port that will control RET



DC signal capable Port

AISG Cable

RET DC signal pass for RET Port that will control RET

Hybriflex cables

Comments:

Diagram shows antenna port configuration as viewed from below antennas.

Antenna positions are indicated as viewed from IN FRONT of antennas.

Cap and weatherproof unused antenna ports.

All plumbing diagram colors are irrelevant except for AISG & Hybriflex cable. (For the coax colors follow Coax Colors guide above)

Sector	Antenna Desc	Base Station ID	Sector ID
Alpha	700	065149_1_1	065149_1
Alpha	850	065149_1_6	065149_1_6
Alpha	AWS	065149_1_2	065149_1_2
Alpha	PCS	065149_1_4	065149_1_4
Beta	700	065149_2_1	065149_2
Beta	850	065149_2_6	065149_2_6
Beta	AWS	065149_2_2	065149_2_2
Beta	PCS	065149_2_4	065149_2_4
Gamma	700	065149_3_1	065149_3
Gamma	850	065149_3_6	065149_3_6
Gamma	AWS	065149_3_2	065149_3_2
Gamma	PCS	065149_3_4	065149_3_4

[illegible]H4[illegible]6[illegible]B[illegible]6

[illegible]2-port sector antenna, 4x 698–896 and 8x [illegible]69[illegible]2360 MHz, [illegible]6[illegible] HPBW, [illegible]6x RET

- Features broadband Low Band [illegible]98–89[illegible] MHz and High Band [illegible]95[illegible] MHz arrays for 4T4R [illegible]4X MIMO capability for Band [illegible]4, AWS, PCS and WCS applications
- Independent tilt for all arrays
- Array configuration provides capability for 4T4R [illegible]4R MIMO on Low band and Dual 4T4R [illegible]4R MIMO on High band
- Optimized SUM performance across all operating bands
- Excellent wind loading characteristics

General Specifications

Antenna Type	Sector
Band	Multiband
Effective Projective Area (EPA), frontal	[illegible]4 m² / [illegible]889 ft²
Effective Projective Area (EPA), lateral	[illegible] m² / [illegible]8 ft²
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Performance Note	Outdoor usage / Wind loading figures are validated by wind tunnel measurements described in White paper WP-[illegible]5[illegible]4-EN
Radome Material	Fiberglass, UV resistant
Radiator Material	Low loss circuit board
Reflector Material	Aluminum
RF Connector Interface	4.3-10 Female
RF Connector Location	Bottom
RF Connector Quantity, high band	8
RF Connector Quantity, low band	4
RF Connector Quantity, total	[illegible]

Remote Electrical Tilt (RET) Information, General

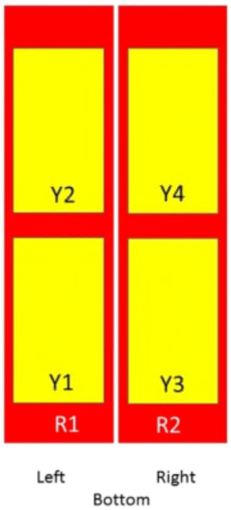
RET Hardware	[illegible] RET [illegible]
RET Interface	8-pin DIN Female / 8-pin DIN Male
RET Interface, quantity	[illegible] female / [illegible] male

Dimensions

[illegible]H4[illegible]6[illegible]B[illegible]6

Width	498 [illegible] 9[illegible] in
Depth	[illegible]9[illegible] 5[illegible] in
Length	[illegible]8[illegible]8 [illegible] 9[illegible]9 in

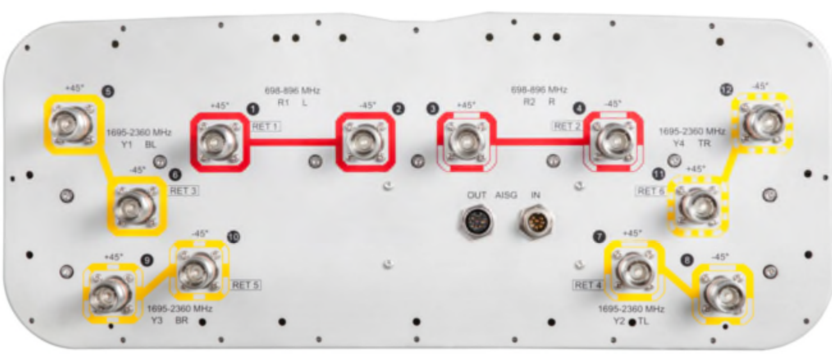
Array Layout



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

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

Port Configuration



□ □ H4□6□B□□6

□o□er□nce, d□						
G□in □y □e□□ □i□t, □ver□ge, d□i	□ □□□4□ 8 □□□4□ □4 □□□□□	□ □□□4□8 8 □□□4□8 □4 □□□4□	□ □□□5□ 8 □□□5□ □4 □□□5□	□ □□□□□ 8 □□□□□ □4 □□□5□9	□ □□□□□ 8 □□□□□ □4 □□□□□	□ □□□□□5 8 □□□□□4 □4 □□□□□4
□e□□ width, Hori□ont□□ □o□er□nce, degrees	±□□	±4□	±5□	±□□8	±□□8	±□□
□e□□ width, □ertic□□ □o□er□nce, degrees	±□□9	±□□9	±□□8	±□□5	±□□	±□□4
□□L□, □e□□ pe□k to □□□□□ove □e□□ pe□k, d□	□□	□□	□8	□9	□□	□□
□ront□to□□□ck □ot□□□ower □t □8□□□ □□□, d□	□□	□□	□8	□□	□8	□8
C□R □t □oresight, d□	□□	□4	□5	□□	□□	□□
C□R □t □ector, d□	□□	5	9	8	□	9

Mech□□ic□l □pecific□tio□□

□ind Lo□ding □t □e□ocity, front□□	□54□ lbf @ □5□ k□ □h □ □85□□ □ @ □5□ k□ □h
□ind Lo□ding □t □e□ocity, □□ter□□	□□□□ □ @ □5□ k□ □h □ 5□□ lbf @ □5□ k□ □h
□ind Lo□ding □t □e□ocity, □□xi□u□	□99□9 lbf @ □5□ k□ □h □ 889□□ □ @ □5□ k□ □h
□ind Lo□ding □t □e□ocity, re□r	□□□8 lbf @ □5□ k□ □h □ 5□4□□ □ @ □5□ k□ □h
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□idth, p□cked	□□8 □□ □ □□□9□□ in
Depth, p□cked	□5□ □□ □ □□□858 in
Length, p□cked	□□□□ □□ □ □9□□4 in
Net □eight, without □ounting kit	□□□ kg □ 8□□□4 lb
□eight, gross	5□ kg □ □□□845 lb

□eg□l□tory Co□pli□□ce□Certific□tio□□

□gency	C□□ssific□tion
CHI□A□□□HS	Abo□□□ □ a□i□ □□ conc□ntration □al□□
IS□ 9□□□:□□□5	D□sign□d, □an□fact□r□d and□or distrib□t□d □nd□r this q□alit□ □anag□□□nt s□st□□
□□HS	Co□pliant□E□□□pt□d

COMMSCOPE®

SAMSUNG

Dual-Band Radio Unit
AWS/PCS (B66/B2)

RFV01U-D1A

Samsung's RFV01U-D1A is a compact remote Radio Unit (RU) designed for deployments that require flexibility in installation and rapid onlining, without compromising on coverage, capacity or operational expenses.

The RFV01U-D1A RU targets dual-band support across Band 66 (AWS) and Band 2 (PCS), making it an ideal product for broad coverage footprints across multiple common mid-range frequencies.

The RU handles all Radio Frequency (RF) processing in a single, compact unit, and is designed to interface via CPRI with Samsung's CDU baseband offerings, in both distributed- and central-RAN configurations.

In addition to its minimal footprint and ease of installation, the RU is also designed to reduce cost of ownership through its integrated spectrum analyzer, which allows for remote RF monitoring, greatly reducing the need for on-site maintenance visits.

Features and Benefits

- Dual-band support for broad frequency coverage
- Minimal footprint reduces site costs
- Rapid, easy installation
- Flexibly deployable in any location
- Remote RF monitoring capability
- Convection cooled, silent operation
- Built-in Broadcast Auxiliary Services (BAS) filter ensures compliant AWS operation without impacting footprint

Key Technical Specifications

Duplex Type: FDD
Operating Frequencies:
B66: DL(2,110-2,180MHz)/UL(1,710-1,780MHz)
B2: DL(1,930-1,990MHz)/UL(1,850-1,910MHz)
Instantaneous Bandwidth:
70MHz(B66) + 60MHz(B2)
RF Chain: 4T4R/2T4R/2T2R
Output Power: Total 320W
DU-RU Interface: CPRI (10Gbps)
Dimensions: 380 x 380 x 255mm (36.8L)
Weight: 38.3kg
Input Power: -48V DC
Operating Temp.: -40 - 55°(w/o solar load)
Cooling: Natural convection

SAMSUNG

Dual-Band Radio Unit 700/850MHz (B13/B5)

RFV01U-D2A

Samsung's RFV01U-D2A is a compact remote Radio Unit (RU) designed for deployments that require flexibility in installation and rapid onlining, without compromising on coverage, capacity or operational expenses.

The RFV01U-D2A RU targets dual-band support across Band 13 (700MHz) and Band 5 (850MHz), making it an ideal product for broad coverage footprints across multiple common low-end, long-range frequencies.

The RU handles all Radio Frequency (RF) processing in a single, compact unit, and is designed to interface via CPRI with Samsung's CDU baseband offerings, in both distributed- and central-RAN configurations.

In addition to its minimal footprint and ease of installation, the RU is also designed to reduce cost of ownership through its integrated spectrum analyzer, which allows for remote RF monitoring, greatly reducing the need for on-site maintenance visits.

Features and Benefits

- Dual-band support for broad frequency coverage
- Minimal footprint reduces site costs
- Rapid, easy installation
- Flexibly deployable in any location
- Remote RF monitoring capability
- Convection cooled, silent operation

Key Technical Specifications

Duplex Type: FDD
Operating Frequencies:
B13: DL(746-756MHz)/UL(777-787MHz)
B5: DL(869-894MHz)/UL(824-849MHz)
Instantaneous Bandwidth: 10MHz(B13) + 25MHz(B5)
RF Chain: 4T4R/2T4R/2T2R
Output Power: Total 320W
DU-RU Interface: CPRI (10Gbps)
Dimensions: 380 x 380 x 207mm (29.9L)
Weight: 31.9kg
Input Power: -48V DC
Operating Temp.: -40 - 55°(w/o solar load)
Cooling: Natural convection

DR. CLARENCE WELTI, P.E., P.C.

GEOTECHNICAL ENGINEERING

227 Williams Street • P.O. Box 397
Glastonbury, CT 06033
(860) 633-4623 / FAX (860) 657-2514

July 7, 2009

Mr. Jason Mead, Structural Engineer
Natcomm, Inc.
63-2 North Branford Road
Branford, CT 06405

Re: CL&P Tower - Pole #845, Rocky Hill Terrace, Trumbull, CT - Geotechnical Study to Evaluate the Existing Monopole Foundation for Supporting Additional Loads

Dear Mr. Mead:

1.0 Herewith is the data from the test boring taken at the above referenced site. One boring was drilled thru the existing tower foundation and to the depth of 24 feet. The boring was cored 5 feet into the bedrock. The boring was located about 4 feet from the existing foundation pier. *The boring was drilled by Clarence Welti Associates, Inc. and sampling was conducted by this firm solely to obtain indications of subsurface conditions as part of a geotechnical exploration program. No services were performed to evaluate subsurface environmental conditions.*

2.0 The **Subject Project** will include placing the additional loading on the existing CL&P transmission pole. The existing monopole and foundation will be analyzed for the increased loads. The top of the existing monopole is 150± feet above the ground surface elevation. Based on the CL&P foundation plan dated October 1, 1975, the existing foundation consist of a 18' x 22' x 2.5' thick footing supporting a 4' x 7.5' x 14' high pier. The pier extends about 6" above the existing grades, which places the bottom of foundation at 16± feet below the existing ground surface. The test boring, which was taken thru the tower foundation, confirmed the depth and thickness of the foundation.

3.0 The **Soils Cross Section** from the boring is generally as follows:

FILL; Fine to coarse SAND, some Gravel and Cobbles, little Silt to 13.5 feet, medium compact

Concrete Foundation from 13.5 to 16 feet

Fine to coarse SAND and GRAVEL, few Cobbles, little Silt to the top of bedrock at 19 feet, dense

Bedrock; Granitic Gneiss

3.1 The **Ground Water Table** was not evident above the bedrock at the completion of the boring. For design it should be assumed that the high water table could be at 16 feet below grade.

4.0 In general the criteria for tower support is that the foundation capacity would exceed the loads, which might collapse the tower. **Movements from strains in the soils should be limited to differential settlement (or lateral movements of less than ½").**

5.0 Based on the test boring the existing foundation is atop 3 feet of sand and gravel overlying the bedrock. Resistance to uplift and shear forces would be provided by the weight of the foundation and soil backfill. The allowable bearing pressure used to evaluate the existing foundation can be 3 Tons/sf.

5.1 The foundation design parameters used to evaluate the existing mat foundation can be as follows:

Design Parameter	Value
Allowable Bearing Pressure at Existing Foundation Subgrade	3 Tons/sf
Soil Unit Weight of Backfill (0 to 13.5 ft below grade)	125 pcf
Soil Unit Weight (16 to 19 ft below grade)	135 pcf
Internal Friction Angle (0 to 13.5ft below grade)	32°
Internal Friction Angle (16 to 19 feet)	36°
Ultimate Sliding Factor, concrete on soil	0.50
Frost Protection Depth	3.5 feet
Water Table (Design)	16 feet below grade

6.0 The soils at the subject site are generally in OSHA class C which would require excavations that exceed 5 feet high, to have the slopes cut back to 34° from the horizontal.

7.0 This report has been prepared for specific a application to the subject project in accordance with generally accepted soil and foundation engineering practices. No other warranty, express or implied, is made. In the event that any changes in the nature, design and location of structures are planned, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing.

The analyses and recommendations submitted in this report are based in part upon data obtained from referenced explorations. The extent of variations between explorations may not become evident until construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations of this report.

Dr. Clarence Welti, P.E., P.C., should perform a general review of the final design and specifications in order that geotechnical design recommendations may be properly interpreted and implemented as they were intended.

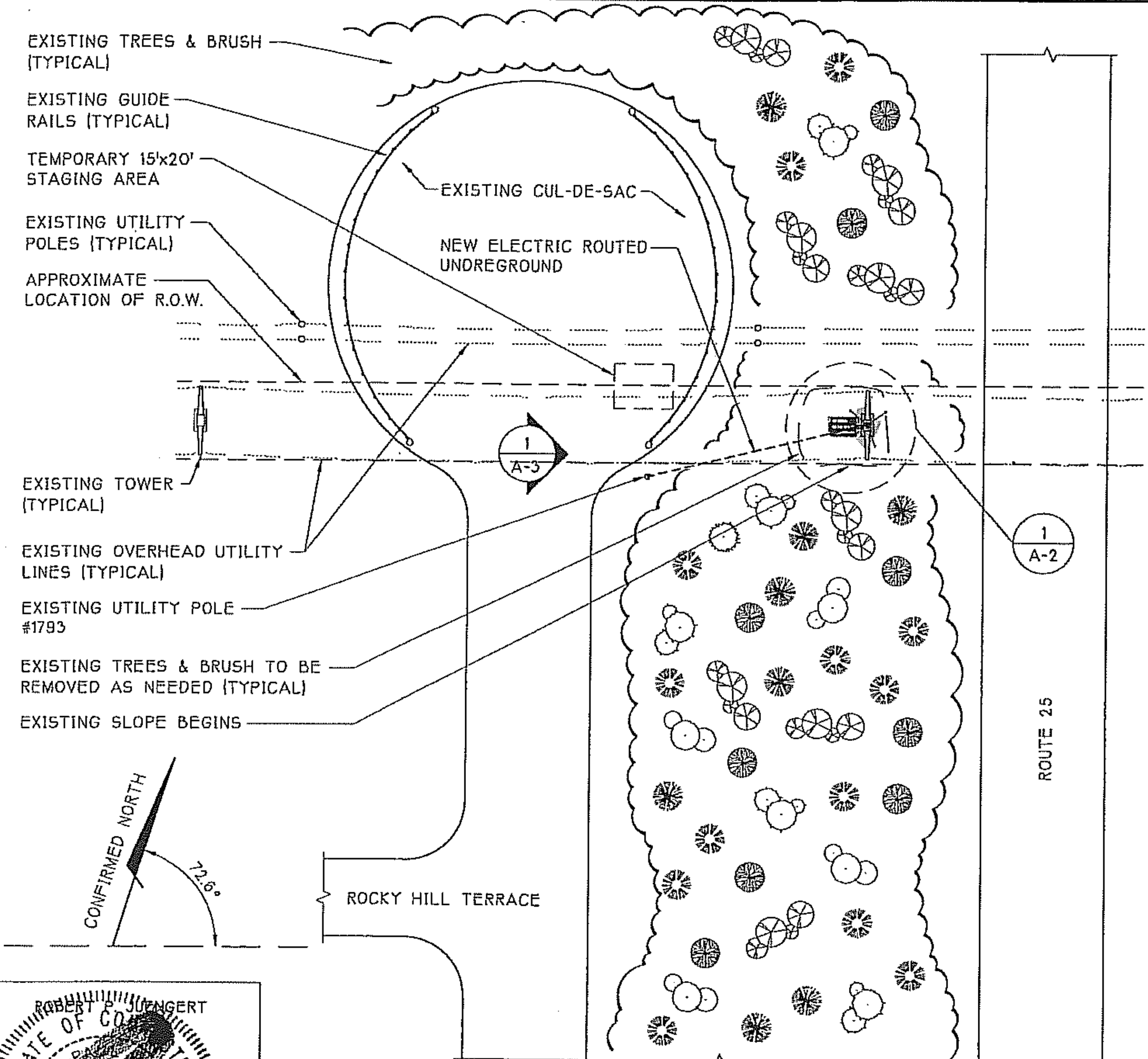
If you have any questions please call me.

Very truly yours,

Max Welti

Max Welti, P. E.

C:\NfmWork\7288\7288_A-1.dwg Thu Sep 03 34:55 1998 DCa



1 A-1 SITE LAYOUT
SCALE: 1"= 50'-0"

ROBERT P. JUENGERT
STATE OF CONNECTICUT
No. 4208
REGISTERED ARCHITECT
CT- 4208

NOTE:
FOR ITEMS SUPPLIED BY OTHERS SEE GENERAL NOTES DRAWING A-14, A-15 & A-16

NOTE:
ALL NEW EQUIPMENT SHALL NOT OBSTRUCT ANY EXISTING EQUIPMENT OR CLIMBING APPARATUS.

ARCNET ARCHITECTS, INC.
670 North Beers Street, Building 2, Holmdel, NJ 07733
Tel: 732.739.3200 Fax: 732.739.0440

Drawing Title: SITE LAYOUT

Client: OCS

Project: CL&P TOWER - POLE #845
Address: ROCKY HILL TERRACE
TRUMBULL, C.T.

Approved By:
PROJ. MGR: ________ DATE: ________
R.F. ENGR: ________ DATE: ________
SAC: ________ DATE: ________
OWNER: ________ DATE: ________

Revision No.	Date
REV.1 DCa	7/1/98

Search Area: CL&P-TRUMBULL/MPX49
Site ID No: CT-11-080B

P.C.	P.C. Chkd	Chkd. by	ARCNET Project No.	Drawn	Date
GMc			A96.506.728B	DCa	5/21/98

Drawing No. A-1

CLARENCE WELTI ASSOC., INC.
P.O. BOX 397
GLASTONBURY, CONN 06033

CLIENT: NATCOMM, INC.

PROJECT NAME: CL&P TOWER #845

LOCATION: ROCKY HILL TERRACE, TRUMBULL, CT

	AUGER	CASING	SAMPLER	CORE BAR.
TYPE	HSA		SS	NQ
SIZE I.D.	3.75"		1.375"	2.0"
HAMMER WT.			140lbs	
HAMMER FALL			30"	

OFFSET
LINE & STA.
N. COORDINATE
E. COORDINATE

SURFACE ELEV.
HOLE NO. **B-1**

GROUND WATER OBSERVATIONS
AT none FT. AFTER 0 HOURS
AT FT. AFTER HOURS

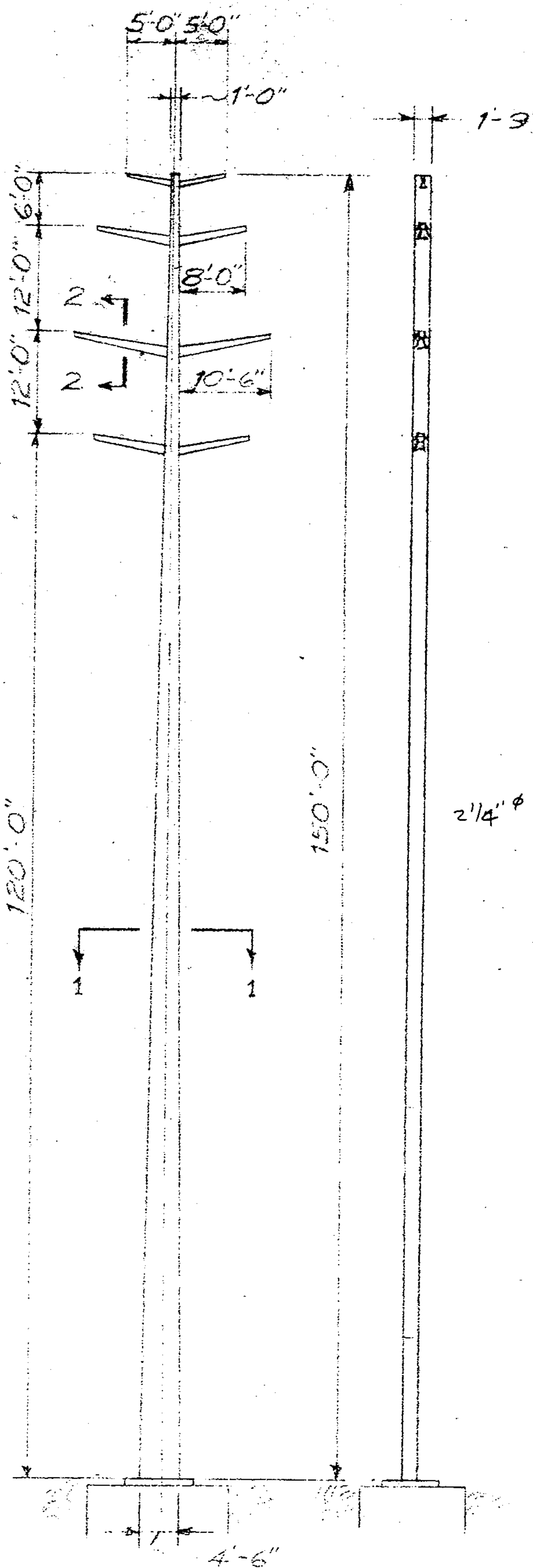
START DATE 7/1/09
FINISH DATE 7/1/09

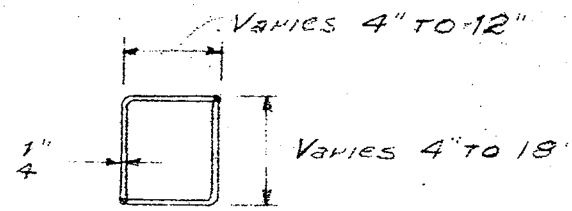
DEPTH	SAMPLE NO.	SAMPLE BLOWS/6"	SAMPLE DEPTH	A	STRATUM DESCRIPTION + REMARKS	ELEV.
0	1	2-6-7-10	0.00'-2.00'		BR.FINE-CRS.SAND, SOME GRAVEL & COBBLES, LITTLE SILT - FILL	
	2	6-3-2-2	2.00'-4.00'			
5	3	6-9-8-8	4.00'-6.00'			
	4	5-7-7-7	6.00'-8.00'			
	5	6-7-7-18	8.00'-10.00'			
10	6	30-20-7-6	10.00'-12.00'			
	7	7-7-60	12.00'-13.50'			
					CONCRETE FOUNDATION	13.5
15						
					CORED - BR.FINE-CRS.SAND AND GRAVEL, FEW COBBLES, LITTLE SILT	16.0
					CORED BEDROCK - GRANITIC GNEISS RUN#1 19.0'- 24.0' RECOVERED 36" RQD=25%	19.0
20						
					BOTTOM OF BORING @ 24'	24.0
25						
30						
35						

LEGEND: COL. A:
SAMPLE TYPE: D=DRY A=AUGER C=CORE U=UNDISTURBED PISTON S=SPLIT SPOON
PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%

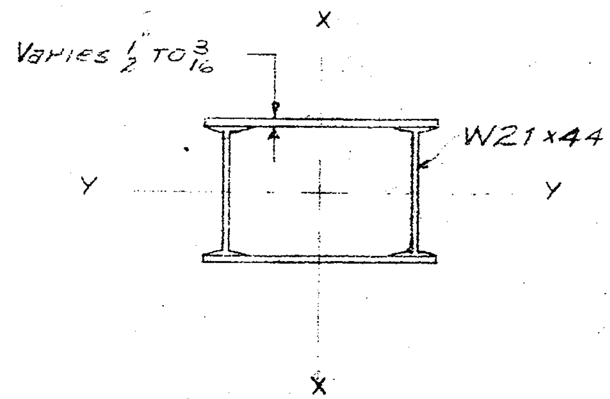
DRILLER: LINDENBERGER
INSPECTOR:

SHEET 1 OF 1 HOLE NO. **B-1**





SECTION 2-2



SECTION 1-1

NOTES:

1. ALL STEEL ASTM A572 GR.60 EXCEPT AS NOTED.
2. CROSS-ARM STEEL IS ASTM A36.
3. BASE PLATE ASTM A572 GR. 42.
4. ALL ANCHOR BOLTS 18S ASTM A615 GR. 60.
5. WEIGHTS:
   a) POLE - 13.2 TONS
   b) CROSS-ARMS - 1.78 T
   c) BASE PLATE - 0.93 T
   d) ANCHOR BOLTS - 1.38 T
   e) Miscellaneous - 0.25 T
   TOTAL ASSEMBLY WEIGHT - 16.7 TONS
6. CONTROLLING LOAD CONDITION IS N.E.S.C. HEAVY WITH TOP CONDUCTOR BROKEN.
7. MAX. GROUND LINE MOMENTS: $M_{x-x} = 2166.2^{1-K}$ $M_{y-y} = 1656.0^{1-K}$
8. POLES ARE ALSO CAPABLE OF RESISTING THE ADDED MOMENTS DUE TO DISPLACED VERTICAL LOADS, WITHOUT EXCEEDING THE YIELD POINT OF THE MATERIAL.

QUOTATION OUTLINE DRAWING

THE FINNEY STEEL POLE CO., INC.
1500 SHAWSHEEN ST. P.O. BOX 306
TEWKSBURY, MASS. 01876

CUSTOMER NORTHEAST UTILITIES P.O.

150' TANGENT POLE - 115 KV.

(2 REQ'D)

JOB NO. 1300.8 DWG NO. B-150-1

	Issue	Rev. 1	Rev. 2	Rev. 3	Rev. 4
DWN	4-14-71				
CKD					
APPD					
SHOP					

K+E ALBANENE® TRACING PAPER B.L.M. 10302

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

Antenna Mount Analysis

Verizon Site Ref: Trumbull 4

900 Old Town Road
Trumbull, CT

Centek Project No. 20150.03

Date: March 23, 2021

Max Stress Ratio = 92.2%

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

Prepared for:
Verizon Wireless
20 Alexander Drive
Wallingford, CT 06492

Table of Contents

CENTEK engineering

Centered on Solutions℠

March 23, 2021

Mr. Andrew Leone
Structure Consulting
20 Alexander Drive
Wallingford, CT 06492

Re: Structural Letter ~ Antenna Mount
Verizon Site Ref: Trumbull 4
900 Old Town Road
Trumbull, CT

Centek Project No. 20150.03

Dear Mr. Leone,

Centek Engineering, Inc. has reviewed the Verizon antenna installation at the above referenced site. The purpose of the review is to determine the structural adequacy of the existing/modified mount, consisting of four (4) 3 x-strong horizontal pipes and HSS outriggers, to support the equipment configuration. The review considered the effects of wind load, dead load and ice load in accordance with the 2015 International Building Code as modified by the 2018 Connecticut State Building Code (CTBC) including ASCE 7-10 and ANSI/TIA-222-G *Structural Standards for Steel Antenna Towers and Supporting Structures*.

The loads considered in this analysis consist of the following:

- **Verizon:**
  Pipe Frames: Three (3) Commscope NNH4-65B-R6 panel antennas, three (3) Samsung MT6407-77A panel antennas, three (3) Samsung B2/B66A remote radio units, three (3) Samsung B5/B13 remote radio units and two (2) OVP boxes mounted on two (2) pipe frames with a RAD center elevation of 90 ft +/- AGL.

The antenna mount was analyzed per the requirements of the 2015 International Building Code as modified by the 2018 Connecticut State Building Code considering a nominal design wind speed of 105 mph for Trumbull as required in Appendix N of the 2018 Connecticut State Building Code.

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

Based on our review of the installation, it is our opinion that the **subject modified antenna mount has sufficient capacity** to support the aforementioned antenna configuration. If there are any questions regarding this matter, please feel free to call.

Respectfully Submitted by:

Timothy J. Lynn, PE
Structural Engineer

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

Section 2 - Calculations

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

Wind Speeds

Basic Wind Speed	$V := 97$	mph	(User Input - 2018 CSBC Appendix N)
Basic Wind Speed with Ice	$V_i := 50$	mph	(User Input per Annex B of TIA-222-G)
Basic Wind Speed Service Loads	$V_{Ser} := 60$	mph	(User Input - TIA-222-G Section 2.8.3)

Input

Structure Type =	Structure_Type := Pole		(User Input)
Structure Category =	SC := III		(User Input)
Exposure Category =	Exp := C		(User Input)
Structure Height =	$h := 150$	ft	(User Input)
Height to Center of Antennas =	$z_{ant} := 90$	ft	(User Input)
Height to Center of Mast =	$z_{mast} := 90$	ft	(User Input)
Radial Ice Thickness =	$t_i := 0.75$	in	(User Input per Annex B of TIA-222-G)
Radial Ice Density =	$Id := 56.00$	pcf	(User Input)
Topograpic Factor =	$K_{zt} := 1.0$		(User Input)
	$K_a := 1.0$		(User Input)
Gust Response Factor =	$G_H := 1.35$		(User Input)

Output

Wind Direction Probability Factor =

$$K_d := \begin{cases} 0.95 & \text{if Structure\_Type = Pole} \\ 0.85 & \text{if Structure\_Type = Lattice} \end{cases} = 0.95$$

(Per Table 2-2 of TIA-222-G)

Importance Factors =

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

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

$$I_{Wind\_w\_Ice} := \begin{cases} 0 & \text{if } SC = 1 \\ 1.00 & \text{if } SC = 2 \\ 1.00 & \text{if } SC = 3 \end{cases} = 1$$

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

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

Importance Factor (Service) = $I_{Ser} := 1$ (Per Section 2.8.3 of TIA-222-G)

$K_{iz} := \left(\frac{z_{ant}}{33}\right)^{0.1} = 1.106$ $t_{iz.ant} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 2.073$

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

Velocity Pressure w/o Ice Antennas = $qz_{ant} := 0.00256 \cdot K_d \cdot Kz_{ant} \cdot V^2 \cdot I_{Wind} = 32.574$

Velocity Pressure with Ice Antennas = $qz_{ice.ant} := 0.00256 \cdot K_d \cdot Kz_{ant} \cdot V_i^2 \cdot I_{Wind\_w\_Ice} = 7.526$

Velocity Pressure Service = $qz_{ant.Ser} := 0.00256 \cdot K_{dSer} \cdot Kz_{ant} \cdot V_{Ser}^2 \cdot I_{Ser} = 9.697$

$K_{izmast} := \left(\frac{z_{mast}}{33}\right)^{0.1} = 1.106$ $t_{izmast} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{izmast} \cdot K_{zt}^{0.35} = 2.073$

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

Velocity Pressure w/o Ice Mast = $qz_{mast} := 0.00256 \cdot K_d \cdot Kz_{mast} \cdot V^2 \cdot I_{Wind} = 32.574$

Velocity Pressure with Ice Mast = $qz_{ice.mast} := 0.00256 \cdot K_d \cdot Kz_{mast} \cdot V_i^2 \cdot I_{Wind\_w\_Ice} = 7.526$

Velocity Pressure Service = $qz_{mast.Ser} := 0.00256 \cdot K_{dSer} \cdot Kz_{mast} \cdot V_{Ser}^2 \cdot I_{Ser} = 9.697$

Development of Wind & Ice Load on Mast

Mast Data: (3" Sch. 80 Pipe) (User Input)

Mast Shape = Round (User Input)

Mast Diameter = $D_{mast} := 3.5$ in (User Input)

Mast Length = $L_{mast} := 8.5$ ft (User Input)

Mast Thickness = $t_{mast} := 0.3$ in (User Input)

Velocity Coefficient = $C := \sqrt{I \cdot Kz_{mast}} \cdot V \cdot \frac{D_{mast}}{12} = 31$

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

Wind Load (without ice)

Mast Projected Surface Area = $A_{mast} := \frac{D_{mast}}{12} = 0.292$ sf/ft

Total Mast Wind Force = $qz_{mast} \cdot G_H \cdot CF_{mast} \cdot A_{mast} = 15$ plf **BLC 5,7**

Wind Load (with ice)

Mast Projected Surface Area w/ Ice = $AICE_{mast} := \frac{(D_{mast} + 2 \cdot t_{izmast})}{12} = 0.637$ sf/ft

Total Mast Wind Force w/ Ice = $qz_{ice.mast} \cdot G_H \cdot CF_{mast} \cdot AICE_{mast} = 8$ plf **BLC 4,6**

Gravity Loads (without ice)

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

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{mast} := \frac{\pi}{4}\left[(D_{mast} + t_{izmast} \cdot 2)^2 - D_{mast}^{\,2}\right] = 36.3$ sq in

Weight of Ice on Mast = $W_{ICEmast} := Id \cdot \frac{Ai_{mast}}{144} = 14$ plf **BLC 3**

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model = Commscope NNH4-65B-R6

Antenna Shape = Flat (User Input)

Antenna Height = $L_{ant} := 71.97$ in (User Input)

Antenna Width = $W_{ant} := 19.61$ in (User Input)

Antenna Thickness = $T_{ant} := 7.76$ in (User Input)

Antenna Weight = $WT_{ant} := 117$ lbs (User Input)

Number of Antennas = $N_{ant} := 1$ (User Input) (One per pipe mast / tot. of 3)

Antenna Aspect Ratio = $Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 3.7$

Antenna Force Coefficient = $Ca_{ant} = 1.25$

Wind Load (without ice)

Surface Area for One Antenna = $SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 9.8$ sf

Total Antenna Wind Force = $F_{antF} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 540$ lbs

Surface Area for One Antenna = $SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 3.9$ sf

Total Antenna Wind Force = $F_{antS} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 214$ lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz.ant}) \cdot (W_{ant} + 2 \cdot t_{iz.ant})}{144} = 12.6$ sf

Total Antenna Wind Force w/ Ice = $Fi_{antF} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 160$ lbs

Surface Area for One Antenna w/ Ice = $SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz.ant}) \cdot (T_{ant} + 2 \cdot t_{iz.ant})}{144} = 6.3$ sf

Total Antenna Wind Force w/ Ice = $Fi_{antS} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 80$ lbs

Gravity Load (without ice)

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

Gravity Loads (ice only)

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

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

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 343$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 343$ lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Samsung VZS01			
Antenna Shape =	Flat		(User Input)	
Antenna Height =	$L_{ant} := 35.1$	in	(User Input)	
Antenna Width =	$W_{ant} := 16.1$	in	(User Input)	
Antenna Thickness =	$T_{ant} := 5.5$	in	(User Input)	
Antenna Weight =	$WT_{ant} := 87.1$	lbs	(User Input)	
Number of Antennas =	$N_{ant} := 1$		(User Input)	(One per pipe mast / tot. of 3)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 2.2$			
Antenna Force Coefficient =	$Ca_{ant} = 1.2$			

Wind Load (without ice)

Surface Area for One Antenna = $SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 3.9$ sf

Total Antenna Wind Force = $F_{antF} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 207$ lbs

Surface Area for One Antenna = $SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 1.3$ sf

Total Antenna Wind Force = $F_{antS} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 71$ lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz.ant}) \cdot (W_{ant} + 2 \cdot t_{iz.ant})}{144} = 5.5$ sf

Total Antenna Wind Force w/ Ice = $Fi_{antF} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 67$ lbs

Surface Area for One Antenna w/ Ice = $SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz.ant}) \cdot (T_{ant} + 2 \cdot t_{iz.ant})}{144} = 2.6$ sf

Total Antenna Wind Force w/ Ice = $Fi_{antS} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 32$ lbs

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 87$ lbs

Gravity Loads (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 3108$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot t_{iz.ant})(W_{ant} + 2 \cdot t_{iz.ant}) \cdot (T_{ant} + 2 \cdot t_{iz.ant}) - V_{ant} = 4556$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 148$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 148$ lbs

Development of Wind & Ice Load on RRHs

RRH Data:

RRH Model = Samsung B2/B66A RRH

RRH Shape = Flat (User Input)

RRH Height = $L_{RRH} := 15$ in (User Input)

RRH Width = $W_{RRH} := 15$ in (User Input)

RRH Thickness = $T_{RRH} := 10$ in (User Input)

RRH Weight = $WT_{RRH} := 84.4$ lbs (User Input)

Number of RRHs = $N_{RRH} := 1$ (User Input) (One per pipe mast / tot. of 3)

RRH Aspect Ratio = $Ar_{RRH} := \frac{L_{RRH}}{W_{RRH}} = 1.0$

RRH Force Coefficient = $Ca_{RRH} = 1.2$

Wind Load (without ice)

Surface Area for One RRH = $SA_{RRHF} := \frac{L_{RRH} \cdot W_{RRH}}{144} = 1.6$ sf

Total RRH Wind Force = $F_{RRHF} := qz_{ant} \cdot G_H \cdot Ca_{RRH} \cdot K_a \cdot SA_{RRHF} = 82$ lbs

Surface Area for One RRH = $SA_{RRHS} := \frac{L_{RRH} \cdot T_{RRH}}{144} = 1$ sf

Total RRH Wind Force = $F_{RRHS} := qz_{ant} \cdot G_H \cdot Ca_{RRH} \cdot K_a \cdot SA_{RRHS} = 55$ lbs

Wind Load (with ice)

Surface Area for One RRH w/ Ice = $SA_{ICERRHF} := \frac{(L_{RRH} + 2 \cdot t_{iz.ant}) \cdot (W_{RRH} + 2 \cdot t_{iz.ant})}{144} = 2.5$ sf

Total RRH Wind Force w/ Ice = $Fi_{RRHF} := qz_{ice.ant} \cdot G_H \cdot Ca_{RRH} \cdot K_a \cdot SA_{ICERRHF} = 31$ lbs

Surface Area for One RRH w/ Ice = $SA_{ICERRHS} := \frac{(L_{RRH} + 2 \cdot t_{iz.ant}) \cdot (T_{RRH} + 2 \cdot t_{iz.ant})}{144} = 1.9$ sf

Total RRH Wind Force w/ Ice = $Fi_{RRHS} := qz_{ice.ant} \cdot G_H \cdot Ca_{RRH} \cdot K_a \cdot SA_{ICERRHS} = 23$ lbs

Gravity Load (without ice)

Weight of All RRHs = $WT_{RRH} \cdot N_{RRH} = 84$ lbs

Gravity Loads (ice only)

Volume of Each RRH = $V_{RRH} := L_{RRH} \cdot W_{RRH} \cdot T_{RRH} = 2250$ cu in

Volume of Ice on Each RRH = $V_{ice} := (L_{RRH} + 2 \cdot t_{iz.ant})(W_{RRH} + 2 \cdot t_{iz.ant}) \cdot (T_{RRH} + 2 \cdot t_{iz.ant}) - V_{RRH} = 2935$ cu in

Weight of Ice on Each RRH = $W_{ICERRH} := \frac{V_{ice}}{1728} \cdot Id = 95$ lbs

Weight of Ice on All RRHs = $W_{ICERRH} \cdot N_{RRH} = 95$ lbs

Development of Wind & Ice Load on RRHs

RRH Data:

RRH Model = Samsung B5/B13 RRH

RRH Shape = Flat (User Input)

RRH Height = $L_{RRH} := 15$ in (User Input)

RRH Width = $W_{RRH} := 15$ in (User Input)

RRH Thickness = $T_{RRH} := 8.1$ in (User Input)

RRH Weight = $WT_{RRH} := 70.3$ lbs (User Input)

Number of RRHs = $N_{RRH} := 1$ (User Input) (One per pipe mast / tot. of 3)

RRH Aspect Ratio = $Ar_{RRH} := \frac{L_{RRH}}{W_{RRH}} = 1.0$

RRH Force Coefficient = $Ca_{RRH} = 1.2$

Wind Load (without ice)

Surface Area for One RRH = $SA_{RRHF} := \frac{L_{RRH} \cdot W_{RRH}}{144} = 1.6$ sf

Total RRH Wind Force = $F_{RRHF} := qz_{ant} \cdot G_H \cdot Ca_{RRH} \cdot K_a \cdot SA_{RRHF} = 82$ lbs

Surface Area for One RRH = $SA_{RRHS} := \frac{L_{RRH} \cdot T_{RRH}}{144} = 0.8$ sf

Total RRH Wind Force = $F_{RRHS} := qz_{ant} \cdot G_H \cdot Ca_{RRH} \cdot K_a \cdot SA_{RRHS} = 45$ lbs

Wind Load (with ice)

Surface Area for One RRH w/ Ice = $SA_{ICERRHF} := \frac{(L_{RRH} + 2 \cdot t_{iz.ant}) \cdot (W_{RRH} + 2 \cdot t_{iz.ant})}{144} = 2.5$ sf

Total RRH Wind Force w/ Ice = $Fi_{RRHF} := qz_{ice.ant} \cdot G_H \cdot Ca_{RRH} \cdot K_a \cdot SA_{ICERRHF} = 31$ lbs

Surface Area for One RRH w/ Ice = $SA_{ICERRHS} := \frac{(L_{RRH} + 2 \cdot t_{iz.ant}) \cdot (T_{RRH} + 2 \cdot t_{iz.ant})}{144} = 1.6$ sf

Total RRH Wind Force w/ Ice = $Fi_{RRHS} := qz_{ice.ant} \cdot G_H \cdot Ca_{RRH} \cdot K_a \cdot SA_{ICERRHS} = 20$ lbs

Gravity Load (without ice)

Weight of All RRHs = $WT_{RRH} \cdot N_{RRH} = 70$ lbs

Gravity Loads (ice only)

Volume of Each RRH = $V_{RRH} := L_{RRH} \cdot W_{RRH} \cdot T_{RRH} = 1823$ cu in

Volume of Ice on Each RRH = $V_{ice} := (L_{RRH} + 2 \cdot t_{iz.ant})(W_{RRH} + 2 \cdot t_{iz.ant}) \cdot (T_{RRH} + 2 \cdot t_{iz.ant}) - V_{RRH} = 2666$ cu in

Weight of Ice on Each RRH = $W_{ICERRH} := \frac{V_{ice}}{1728} \cdot Id = 86$ lbs

Weight of Ice on All RRHs = $W_{ICERRH} \cdot N_{RRH} = 86$ lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFS DB-T1-6Z-8AB-0Z			
Antenna Shape =	Flat		(User Input)	
Antenna Height =	$L_{ant} := 24$	in	(User Input)	
Antenna Width =	$W_{ant} := 24$	in	(User Input)	
Antenna Thickness =	$T_{ant} := 10$	in	(User Input)	
Antenna Weight =	$WT_{ant} := 45$	lbs	(User Input)	
Number of Antennas =	$N_{ant} := 1$		(User Input)	(One per pipe mast / tot. of 2)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 1.0$			
Antenna Force Coefficient =	$Ca_{ant} = 1.2$			

Wind Load (without ice)

Surface Area for One Antenna = $SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 4$ sf

Total Antenna Wind Force = $F_{antF} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 211$ lbs

Surface Area for One Antenna = $SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 1.7$ sf

Total Antenna Wind Force = $F_{antS} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 88$ lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz.ant}) \cdot (W_{ant} + 2 \cdot t_{iz.ant})}{144} = 5.5$ sf

Total Antenna Wind Force w/ Ice = $Fi_{antF} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 67$ lbs

Surface Area for One Antenna w/ Ice = $SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz.ant}) \cdot (T_{ant} + 2 \cdot t_{iz.ant})}{144} = 2.8$ sf

Total Antenna Wind Force w/ Ice = $Fi_{antS} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 34$ lbs

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 45$ lbs

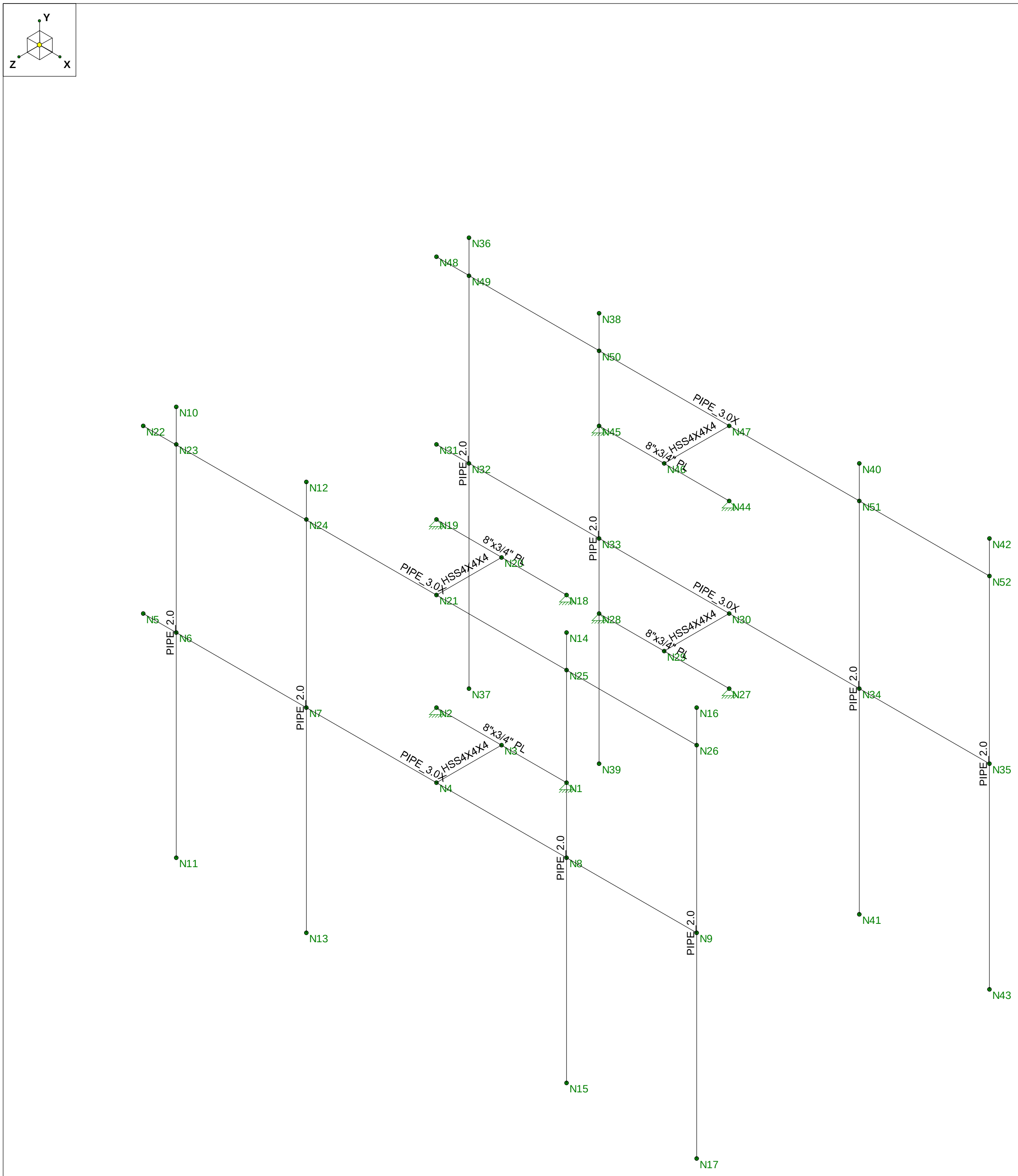
Gravity Loads (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 5760$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot t_{iz.ant})(W_{ant} + 2 \cdot t_{iz.ant}) \cdot (T_{ant} + 2 \cdot t_{iz.ant}) - V_{ant} = 5446$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 176$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 176$ lbs



Envelope Only Solution

CENTEK Engineering, Inc.		
TJL	Tower # 845 - Verizon Mount	Mar 23, 2021 at 7:51 AM
20150.03	Member Framing	Verizon Antenna Mast - TIA.r3d

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	No
Max Iterations for Wall Stiffness	3
Gravity Acceleration (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 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 Rul...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Horz Mast	PIPE_3.0X	Beam	Pipe	A53 Gr. B	Typical	2.83	3.7	3.7	7.4
2	Pipe Mast	PIPE_2.0	Column	Pipe	A53 Gr. B	Typical	1.02	.627	.627	1.25
3	Outrigger	HSS4X4X4	Beam	Tube	A500 Gr.46	Typical	3.37	7.8	7.8	12.8
4	Plate	8"x3/4" PL	Beam	Tube	A36 Gr.36	Typical	6	.281	32	1.059

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	M1	Outrigger	1			Lbyy									Lateral
2	M2	Horz Mast	8.5			Lbyy									Lateral
3	M3	Plate	2			Lbyy									Lateral
4	M4	Pipe Mast	6			Lbyy									Lateral
5	M5	Pipe Mast	6			Lbyy									Lateral
6	M6	Pipe Mast	6			Lbyy									Lateral
7	M7	Pipe Mast	6			Lbyy									Lateral
8	M8	Outrigger	1			Lbyy									Lateral
9	M9	Horz Mast	8.5			Lbyy									Lateral
10	M10	Plate	2			Lbyy									Lateral
11	M11	Outrigger	1			Lbyy									Lateral
12	M12	Horz Mast	8.5			Lbyy									Lateral
13	M13	Plate	2			Lbyy									Lateral
14	M14	Pipe Mast	6			Lbyy									Lateral
15	M15	Pipe Mast	6			Lbyy									Lateral
16	M16	Pipe Mast	6			Lbyy									Lateral
17	M17	Pipe Mast	6			Lbyy									Lateral
18	M18	Outrigger	1			Lbyy									Lateral
19	M19	Horz Mast	8.5			Lbyy									Lateral
20	M20	Plate	2			Lbyy									Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design R...
1	M1	N3	N4			Outrigger	Beam	Tube	A500 Gr.46	Typical
2	M2	N5	N9			Horz Mast	Beam	Pipe	A53 Gr. B	Typical
3	M3	N2	N1			Plate	Beam	Tube	A36 Gr.36	Typical
4	M4	N10	N11			Pipe Mast	Column	Pipe	A53 Gr. B	Typical
5	M5	N12	N13			Pipe Mast	Column	Pipe	A53 Gr. B	Typical
6	M6	N14	N15			Pipe Mast	Column	Pipe	A53 Gr. B	Typical
7	M7	N16	N17			Pipe Mast	Column	Pipe	A53 Gr. B	Typical
8	M8	N20	N21			Outrigger	Beam	Tube	A500 Gr.46	Typical
9	M9	N22	N26			Horz Mast	Beam	Pipe	A53 Gr. B	Typical
10	M10	N19	N18			Plate	Beam	Tube	A36 Gr.36	Typical
11	M11	N29	N30			Outrigger	Beam	Tube	A500 Gr.46	Typical
12	M12	N31	N35			Horz Mast	Beam	Pipe	A53 Gr. B	Typical
13	M13	N28	N27			Plate	Beam	Tube	A36 Gr.36	Typical
14	M14	N36	N37			Pipe Mast	Column	Pipe	A53 Gr. B	Typical
15	M15	N38	N39			Pipe Mast	Column	Pipe	A53 Gr. B	Typical
16	M16	N40	N41			Pipe Mast	Column	Pipe	A53 Gr. B	Typical
17	M17	N42	N43			Pipe Mast	Column	Pipe	A53 Gr. B	Typical
18	M18	N46	N47			Outrigger	Beam	Tube	A500 Gr.46	Typical
19	M19	N48	N52			Horz Mast	Beam	Pipe	A53 Gr. B	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design R...
20	M20	N45	N44			Plate	Beam	Tube	A36 Gr.36	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Dia...
1	N1	1	0	1.25	0	
2	N2	-1	0	1.25	0	
3	N3	0	0	1.25	0	
4	N4	0	0	2.25	0	
5	N5	-4.5	0	2.25	0	
6	N6	-4	0	2.25	0	
7	N7	-2	0	2.25	0	
8	N8	2	0	2.25	0	
9	N9	4	0	2.25	0	
10	N10	-4	3	2.25	0	
11	N11	-4	-3	2.25	0	
12	N12	-2	3	2.25	0	
13	N13	-2	-3	2.25	0	
14	N14	2	3	2.25	0	
15	N15	2	-3	2.25	0	
16	N16	4	3	2.25	0	
17	N17	4	-3	2.25	0	
18	N18	1	2.5	1.25	0	
19	N19	-1	2.5	1.25	0	
20	N20	0	2.5	1.25	0	
21	N21	0	2.5	2.25	0	
22	N22	-4.5	2.5	2.25	0	
23	N23	-4	2.5	2.25	0	
24	N24	-2	2.5	2.25	0	
25	N25	2	2.5	2.25	0	
26	N26	4	2.5	2.25	0	
27	N27	1	0	-1.25	0	
28	N28	-1	0	-1.25	0	
29	N29	0	0	-1.25	0	
30	N30	0	0	-2.25	0	
31	N31	-4.5	0	-2.25	0	
32	N32	-4	0	-2.25	0	
33	N33	-2	0	-2.25	0	
34	N34	2	0	-2.25	0	
35	N35	4	0	-2.25	0	
36	N36	-4	3	-2.25	0	
37	N37	-4	-3	-2.25	0	
38	N38	-2	3	-2.25	0	
39	N39	-2	-3	-2.25	0	
40	N40	2	3	-2.25	0	
41	N41	2	-3	-2.25	0	
42	N42	4	3	-2.25	0	
43	N43	4	-3	-2.25	0	
44	N44	1	2.5	-1.25	0	
45	N45	-1	2.5	-1.25	0	
46	N46	0	2.5	-1.25	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Dia...
47	N47	0	2.5	-2.25	0	
48	N48	-4.5	2.5	-2.25	0	
49	N49	-4	2.5	-2.25	0	
50	N50	-2	2.5	-2.25	0	
51	N51	2	2.5	-2.25	0	
52	N52	4	2.5	-2.25	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N2	Reaction	Reaction	Reaction			
2	N1	Reaction	Reaction	Reaction			
3	N18	Reaction	Reaction	Reaction			
4	N19	Reaction	Reaction	Reaction			
5	N27	Reaction	Reaction	Reaction			
6	N28	Reaction	Reaction	Reaction			
7	N44	Reaction	Reaction	Reaction			
8	N45	Reaction	Reaction	Reaction			

Member Point Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	Y	-.059	1
2	M15	Y	-.059	1
3	M17	Y	-.059	1
4	M5	Y	-.059	5
5	M15	Y	-.059	5
6	M17	Y	-.059	5
7	M4	Y	-.044	1
8	M7	Y	-.044	1
9	M14	Y	-.044	1
10	M4	Y	-.044	3.5
11	M7	Y	-.044	3.5
12	M14	Y	-.044	3.5
13	M5	Y	-.084	2.5
14	M15	Y	-.084	2.5
15	M17	Y	-.084	2.5
16	M5	Y	-.07	4
17	M15	Y	-.07	4
18	M17	Y	-.07	4
19	M6	Y	-.045	2
20	M16	Y	-.045	2

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	Y	-.172	1
2	M15	Y	-.172	1
3	M17	Y	-.172	1
4	M5	Y	-.172	5
5	M15	Y	-.172	5

Member Point Loads (BLC 3 : Weight of Ice Only) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
6	M17	Y	-.172	5
7	M4	Y	-.074	1
8	M7	Y	-.074	1
9	M14	Y	-.074	1
10	M4	Y	-.074	3.5
11	M7	Y	-.074	3.5
12	M14	Y	-.074	3.5
13	M5	Y	-.095	2.5
14	M15	Y	-.095	2.5
15	M17	Y	-.095	2.5
16	M5	Y	-.086	4
17	M15	Y	-.086	4
18	M17	Y	-.086	4
19	M6	Y	-.176	2
20	M16	Y	-.176	2

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	X	.04	1
2	M15	X	.04	1
3	M5	X	.04	5
4	M15	X	.04	5
5	M17	X	.08	1
6	M17	X	.08	5
7	M4	X	.016	1
8	M14	X	.016	1
9	M4	X	.016	3.5
10	M14	X	.016	3.5
11	M7	X	.034	1
12	M7	X	.034	3.5
13	M5	X	.023	2.5
14	M15	X	.023	2.5
15	M5	X	.02	4
16	M15	X	.02	4
17	M6	X	.034	2
18	M16	X	.034	2

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	X	.107	1
2	M15	X	.107	1
3	M5	X	.107	5
4	M15	X	.107	5
5	M17	X	.27	1
6	M17	X	.27	5
7	M4	X	.036	1
8	M14	X	.036	1
9	M4	X	.036	3.5
10	M14	X	.036	3.5
11	M7	X	.104	1
12	M7	X	.104	3.5

Member Point Loads (BLC 5 : (x) TIA Wind) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
13	M5	X	.055	2.5
14	M15	X	.055	2.5
15	M5	X	.045	4
16	M15	X	.045	4
17	M6	X	.088	2
18	M16	X	.088	2

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	Z	.08	1
2	M15	Z	.08	1
3	M5	Z	.08	5
4	M15	Z	.08	5
5	M17	Z	.04	1
6	M17	Z	.04	5
7	M4	Z	.034	1
8	M14	Z	.034	1
9	M4	Z	.034	3.5
10	M14	Z	.034	3.5
11	M7	Z	.016	1
12	M7	Z	.016	3.5
13	M17	Z	.023	2.5
14	M17	Z	.02	4
15	M6	Z	.067	2
16	M16	Z	.067	2

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	Z	.27	1
2	M15	Z	.27	1
3	M5	Z	.27	5
4	M15	Z	.27	5
5	M17	Z	.107	1
6	M17	Z	.107	5
7	M4	Z	.104	1
8	M14	Z	.104	1
9	M4	Z	.104	3.5
10	M14	Z	.104	3.5
11	M7	Z	.036	1
12	M7	Z	.036	3.5
13	M17	Z	.055	2.5
14	M17	Z	.045	4
15	M6	Z	.211	2
16	M16	Z	.211	2

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.005	-.005	0	0
2	M2	Y	-.005	-.005	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
3	M3	Y	-.005	-.005	0	0
4	M4	Y	-.005	-.005	0	0
5	M5	Y	-.005	-.005	0	0
6	M6	Y	-.005	-.005	0	0
7	M7	Y	-.005	-.005	0	0
8	M8	Y	-.005	-.005	0	0
9	M9	Y	-.005	-.005	0	0
10	M10	Y	-.005	-.005	0	0
11	M11	Y	-.005	-.005	0	0
12	M12	Y	-.005	-.005	0	0
13	M13	Y	-.005	-.005	0	0
14	M14	Y	-.005	-.005	0	0
15	M15	Y	-.005	-.005	0	0
16	M16	Y	-.005	-.005	0	0
17	M17	Y	-.005	-.005	0	0
18	M18	Y	-.005	-.005	0	0
19	M19	Y	-.005	-.005	0	0
20	M20	Y	-.005	-.005	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M4	X	.003	.003	0	0
2	M5	X	.003	.003	0	0
3	M6	X	.003	.003	0	0
4	M7	X	.003	.003	0	0
5	M1	X	.003	.003	0	0
6	M8	X	.003	.003	0	0
7	M14	X	.003	.003	0	0
8	M15	X	.003	.003	0	0
9	M16	X	.003	.003	0	0
10	M17	X	.003	.003	0	0
11	M18	X	.003	.003	0	0
12	M11	X	.003	.003	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M4	X	.009	.009	0	0
2	M5	X	.009	.009	0	0
3	M6	X	.009	.009	0	0
4	M7	X	.009	.009	0	0
5	M1	X	.009	.009	0	0
6	M8	X	.009	.009	0	0
7	M14	X	.009	.009	0	0
8	M15	X	.009	.009	0	0
9	M16	X	.009	.009	0	0
10	M17	X	.009	.009	0	0
11	M18	X	.009	.009	0	0
12	M11	X	.009	.009	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M19	Z	.003	.003	0	0
2	M12	Z	.003	.003	0	0
3	M9	Z	.003	.003	0	0
4	M2	Z	.003	.003	0	0
5	M6	Z	.003	.003	0	0
6	M16	Z	.003	.003	0	0
7	M7	Z	.003	.003	0	0
8	M17	Z	.003	.003	0	0

Member Distributed Loads (BLC 7 : (z) TIA Wind)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M19	Z	.009	.009	0	0
2	M12	Z	.009	.009	0	0
3	M9	Z	.009	.009	0	0
4	M2	Z	.009	.009	0	0
5	M6	Z	.009	.009	0	0
6	M16	Z	.009	.009	0	0
7	M7	Z	.009	.009	0	0
8	M17	Z	.009	.009	0	0

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distrib..	Area(...	Surfa...
1	Self Weigh	None		-1						
2	Weight of Appurtenances	None					20			
3	Weight of Ice Only	None					20	20		
4	(x) TIA Wind with Ice	None					18	12		
5	(x) TIA Wind	None					18	12		
6	(z) TIA Wind with Ice	None					16	8		
7	(z) TIA Wind	None					16	8		

Load Combinations

	Description	Solve	P...	S...	B...	Fa...	BLC	Fact...	BLC	Fa...	BLC	Fa...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1.2D + 1.6W (X-dir...	Yes	Y		1	1.2	2	1.2	5	1.6														
2	0.9D + 1.6W (X-dir...	Yes	Y		1	.9	2	.9	5	1.6														
3	1.2D + 1.0Di + 1.0...	Yes	Y		1	1.2	2	1.2	3	1	4	1												
4	1.2D + 1.6W (Z-dire...	Yes	Y		1	1.2	2	1.2	7	1.6														
5	0.9D + 1.6W (Z-dire...	Yes	Y		1	.9	2	.9	7	1.6														
6	1.2D + 1.0Di + 1.0...	Yes	Y		1	1.2	2	1.2	3	1	6	1												

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N2	max	-.022	5	.771	3	.288	3	0	6	0	6	0	6
2		min	-.606	1	.344	2	-1.105	5	0	1	0	1	0	1
3	N1	max	-.022	5	.38	6	.619	1	0	6	0	6	0	6
4		min	-.606	1	.025	2	-.298	5	0	1	0	1	0	1
5	N18	max	.108	6	.356	6	.155	2	0	6	0	6	0	6
6		min	-.139	2	.027	2	-.443	6	0	1	0	1	0	1

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
7	N19	max	.108	6	.777	3	-.425	2	0	6	0	6	0	6
8		min	-.139	2	.2	5	-.7	4	0	1	0	1	0	1
9	N27	max	.142	6	.778	6	-.621	3	0	6	0	6	0	6
10		min	-.786	2	.071	2	-1.292	4	0	1	0	1	0	1
11	N28	max	.142	6	.648	3	.416	2	0	6	0	6	0	6
12		min	-.786	2	.115	5	-1.269	4	0	1	0	1	0	1
13	N44	max	-.034	5	.827	6	.429	6	0	6	0	6	0	6
14		min	-.224	1	.087	2	-.234	2	0	1	0	1	0	1
15	N45	max	-.034	5	.657	3	.668	3	0	6	0	6	0	6
16		min	-.224	1	.324	5	.025	5	0	1	0	1	0	1
17	Totals:	max	0	6	5.089	6	0	3						
18		min	-3.462	1	1.686	2	-4.522	4						

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotation [rad]	LC
1	N1	max	0	6	0	6	0	6	6.915e-03	3	5.012e-03	5	4.217e-05	6
2		min	0	1	0	1	0	1	-1.257e-03	5	-4.095e-03	3	1.25e-05	2
3	N2	max	0	6	0	6	0	6	6.915e-03	3	3.32e-03	3	-1.514e-05	2
4		min	0	1	0	1	0	1	-1.257e-03	5	-7.372e-03	5	-4.538e-05	6
5	N3	max	0	1	0	2	.05	5	6.915e-03	3	2.594e-03	1	1.474e-05	3
6		min	0	5	0	6	-.03	3	-1.257e-03	5	5.819e-04	6	5.823e-06	5
7	N4	max	.034	1	.015	5	.05	5	6.579e-03	3	2.904e-03	4	4.438e-04	3
8		min	.008	6	-.083	3	-.03	3	-1.412e-03	5	6.387e-04	6	1.753e-04	5
9	N5	max	.034	1	-.014	5	.357	5	4.388e-03	3	6.42e-03	5	1.267e-03	3
10		min	.008	6	-.159	3	-.039	3	-3.376e-03	5	-2.667e-04	3	4.755e-04	5
11	N6	max	.034	1	-.011	5	.319	5	4.388e-03	3	6.42e-03	5	1.267e-03	3
12		min	.008	6	-.151	3	-.037	3	-3.376e-03	5	-2.667e-04	3	4.752e-04	5
13	N7	max	.034	1	.002	5	.167	5	4.586e-03	3	6.012e-03	5	1.581e-03	3
14		min	.008	6	-.115	3	-.03	3	-3.334e-03	5	-3.142e-04	3	6.08e-04	5
15	N8	max	.034	1	.014	5	.011	5	4.891e-03	3	2.86e-03	1	1.813e-04	2
16		min	.008	6	-.086	3	-.082	1	-1.188e-03	5	8.503e-04	5	-4.562e-04	6
17	N9	max	.034	1	.012	5	-.004	5	4.828e-03	3	2.748e-03	1	3.726e-04	2
18		min	.007	6	-.097	3	-.149	1	-1.428e-03	5	5.264e-04	5	-4.141e-04	6
19	N10	max	.023	5	-.011	5	.234	4	4.402e-03	3	5.391e-03	4	1.282e-03	3
20		min	-.006	6	-.151	3	.115	3	-2.056e-03	5	1.347e-03	3	5.117e-04	5
21	N11	max	.088	1	-.011	5	.446	5	4.376e-03	3	6.42e-03	5	1.611e-03	1
22		min	.049	5	-.151	3	-.195	3	-3.538e-03	5	-2.667e-04	3	4.748e-04	5
23	N12	max	.023	5	.002	5	.112	4	4.601e-03	3	4.812e-03	4	1.541e-03	3
24		min	-.007	6	-.115	3	.075	2	-1.606e-03	5	1.395e-03	3	5.119e-04	5
25	N13	max	.181	1	.002	5	.48	5	4.55e-03	3	6.012e-03	5	4.809e-03	1
26		min	.054	5	-.115	3	-.194	3	-1.016e-02	5	-3.142e-04	3	6.066e-04	5
27	N14	max	.026	5	.014	5	.071	6	4.9e-03	3	1.976e-03	2	2.402e-04	2
28		min	.004	6	-.086	3	-.026	2	-1.211e-03	5	-7.889e-04	6	-4.418e-04	6
29	N15	max	.054	2	.014	5	.068	5	4.889e-03	3	2.86e-03	1	6.944e-04	2
30		min	-.009	6	-.086	3	-.239	3	-1.701e-03	5	8.503e-04	5	-4.559e-04	6
31	N16	max	.026	5	.012	5	.089	6	4.838e-03	3	2.072e-03	2	2.982e-04	2
32		min	.004	6	-.097	3	-.075	2	-1.296e-03	5	-7.375e-04	6	-4.19e-04	6
33	N17	max	.067	2	.012	5	.064	5	4.815e-03	3	2.748e-03	1	1.05e-03	2
34		min	-.007	6	-.097	3	-.271	3	-1.996e-03	5	5.264e-04	5	-4.13e-04	6
35	N18	max	0	6	0	6	0	6	6.926e-03	3	4.016e-03	6	4.124e-05	3

Envelope Joint Displacements (Continued)

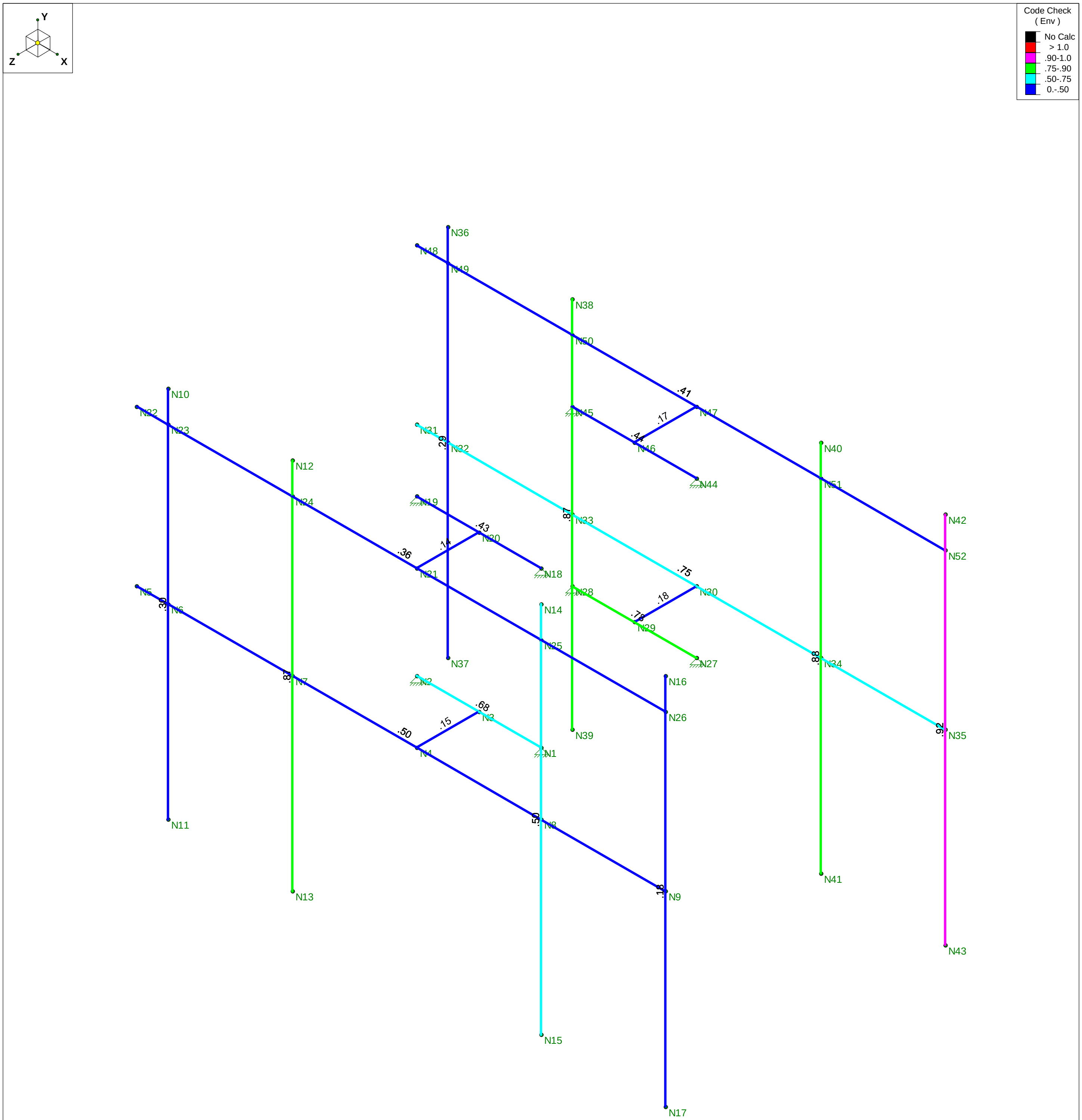
	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotation [rad]	LC
36		min	0	1	0	1	0	1	-1.012e-03	5	3.445e-04	2	7.901e-06	5
37	N19	max	0	6	0	6	0	6	6.926e-03	3	-2.041e-03	2	-9.281e-06	5
38		min	0	1	0	1	0	1	-1.012e-03	5	-4.273e-03	4	-4.477e-05	3
39	N20	max	0	2	0	5	.033	6	6.926e-03	3	1.931e-03	5	1.478e-05	3
40		min	0	6	0	3	.01	2	-1.012e-03	5	1.109e-04	6	5.779e-06	5
41	N21	max	.026	5	.012	5	.033	6	6.589e-03	3	2.363e-03	5	4.449e-04	3
42		min	.002	6	-.083	3	.01	2	-1.074e-03	5	2.035e-04	6	1.74e-04	5
43	N22	max	.026	5	-.014	5	.275	4	4.401e-03	3	5.391e-03	4	1.283e-03	3
44		min	.001	6	-.159	3	.097	3	-2.056e-03	5	1.347e-03	3	5.119e-04	5
45	N23	max	.026	5	-.011	5	.243	4	4.401e-03	3	5.391e-03	4	1.283e-03	3
46		min	.001	6	-.151	3	.089	3	-2.056e-03	5	1.347e-03	3	5.117e-04	5
47	N24	max	.026	5	.002	5	.118	4	4.601e-03	3	4.812e-03	4	1.542e-03	3
48		min	.001	6	-.115	3	.056	3	-1.606e-03	5	1.395e-03	3	5.119e-04	5
49	N25	max	.026	5	.014	5	.045	6	4.9e-03	3	1.976e-03	2	2.426e-04	2
50		min	.002	6	-.086	3	-.037	2	-1.213e-03	5	-7.889e-04	6	-4.418e-04	6
51	N26	max	.026	5	.012	5	.064	6	4.838e-03	3	2.072e-03	2	3.005e-04	2
52		min	.002	6	-.097	3	-.086	2	-1.299e-03	5	-7.375e-04	6	-4.19e-04	6
53	N27	max	0	6	0	6	0	6	-2.676e-03	2	1.133e-02	4	5.451e-05	3
54		min	0	1	0	1	0	1	-9.899e-03	6	3.196e-03	2	9.46e-06	5
55	N28	max	0	6	0	6	0	6	-2.676e-03	2	2.277e-04	2	-9.269e-06	5
56		min	0	1	0	1	0	1	-9.899e-03	6	-1.127e-02	4	-5.355e-05	3
57	N29	max	0	2	0	5	.091	4	-2.676e-03	2	5.494e-05	6	1.049e-05	2
58		min	0	6	0	3	.012	2	-9.899e-03	6	-3.454e-03	2	-6.276e-06	6
59	N30	max	.045	2	-.032	2	.091	4	-2.547e-03	2	-2.375e-05	6	3.159e-04	2
60		min	0	6	-.119	6	.012	2	-9.478e-03	6	-3.701e-03	2	-1.889e-04	6
61	N31	max	.045	2	-.085	2	.289	4	-1.403e-03	2	4.481e-03	4	1.062e-03	1
62		min	0	6	-.161	6	-.154	2	-8.2e-03	4	-2.938e-03	2	2.94e-04	5
63	N32	max	.045	2	-.079	2	.262	4	-1.403e-03	2	4.481e-03	4	1.062e-03	1
64		min	0	6	-.157	6	-.136	2	-8.2e-03	4	-2.938e-03	2	2.938e-04	5
65	N33	max	.045	2	-.053	2	.155	4	-1.568e-03	2	4.129e-03	4	1.318e-03	1
66		min	0	6	-.135	6	-.065	2	-8.359e-03	4	-2.985e-03	2	2.744e-04	5
67	N34	max	.045	2	-.028	2	.166	4	-2.119e-03	2	-1.845e-03	3	1.835e-04	2
68		min	0	6	-.151	6	.074	3	-7.297e-03	4	-4.951e-03	4	-1.858e-03	6
69	N35	max	.045	2	-.015	2	.3	4	-2.204e-03	2	-1.746e-03	3	1.236e-03	2
70		min	0	6	-.201	6	.118	3	-8.493e-03	4	-5.746e-03	4	-1.859e-03	6
71	N36	max	.025	2	-.079	2	.013	5	-1.478e-03	2	1.812e-03	5	1.101e-03	1
72		min	0	4	-.157	6	-.196	1	-6.976e-03	6	-3.636e-03	1	2.488e-04	5
73	N37	max	.099	1	-.079	2	.562	4	-1.401e-03	2	4.481e-03	4	1.63e-03	1
74		min	.012	5	-.157	6	-.086	2	-8.355e-03	4	-2.938e-03	2	2.935e-04	5
75	N38	max	.025	2	-.053	2	-.023	5	-1.67e-03	2	1.185e-03	5	1.115e-03	1
76		min	0	4	-.135	6	-.114	3	-7.023e-03	6	-3.604e-03	1	4.131e-04	5
77	N39	max	.192	1	-.053	2	.649	4	-1.564e-03	2	4.129e-03	4	4.816e-03	1
78		min	.011	5	-.136	6	-.009	2	-1.516e-02	4	-2.985e-03	2	2.738e-04	5
79	N40	max	.03	1	-.028	2	.039	2	-2.221e-03	2	4.526e-04	3	3.823e-04	2
80		min	.006	5	-.151	6	-.083	6	-6.853e-03	6	-2.727e-03	2	-1.887e-03	6
81	N41	max	.066	2	-.028	2	.443	4	-2.119e-03	2	-1.845e-03	3	6.965e-04	2
82		min	-.068	6	-.151	6	.178	2	-7.809e-03	4	-4.951e-03	4	-1.857e-03	6
83	N42	max	.029	1	-.015	2	.106	2	-2.281e-03	2	3.52e-04	3	6.23e-04	2
84		min	.005	5	-.201	6	-.09	6	-7.155e-03	4	-2.844e-03	2	-1.841e-03	6
85	N43	max	.297	2	-.015	2	.705	4	-2.199e-03	2	-1.746e-03	3	8.576e-03	2
86		min	-.067	6	-.201	6	.268	2	-1.197e-02	4	-5.746e-03	4	-1.845e-03	6
87	N44	max	0	6	0	6	0	6	-2.851e-03	2	1.05e-04	5	5.7e-05	6

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotation [rad]	LC
88		min	0	1	0	1	0	1	-9.809e-03	6	-4.372e-03	3	1.693e-05	2
89	N45	max	0	6	0	6	0	6	-2.851e-03	2	5.128e-03	3	-1.947e-05	2
90		min	0	1	0	1	0	1	-9.809e-03	6	5.624e-05	5	-5.547e-05	6
91	N46	max	0	1	0	2	0	5	-2.851e-03	2	-1.627e-04	5	1.065e-05	2
92		min	0	5	0	6	-.038	3	-9.809e-03	6	-2.393e-03	1	-6.416e-06	6
93	N47	max	.032	1	-.034	2	0	5	-2.711e-03	2	-1.762e-04	5	3.205e-04	2
94		min	.002	5	-.117	6	-.038	3	-9.365e-03	6	-2.769e-03	1	-1.931e-04	6
95	N48	max	.032	1	-.085	2	.061	5	-1.478e-03	2	1.812e-03	5	1.104e-03	1
96		min	.002	5	-.161	6	-.205	1	-6.976e-03	6	-3.636e-03	1	2.49e-04	5
97	N49	max	.032	1	-.079	2	.05	5	-1.478e-03	2	1.812e-03	5	1.103e-03	1
98		min	.002	5	-.157	6	-.183	1	-6.976e-03	6	-3.636e-03	1	2.488e-04	5
99	N50	max	.032	1	-.053	2	.013	5	-1.67e-03	2	1.185e-03	5	1.117e-03	1
100		min	.002	5	-.135	6	-.096	1	-7.023e-03	6	-3.604e-03	1	4.131e-04	5
101	N51	max	.032	1	-.028	2	.053	2	-2.221e-03	2	4.526e-04	3	3.847e-04	2
102		min	.002	5	-.151	6	-.042	6	-6.853e-03	6	-2.727e-03	2	-1.887e-03	6
103	N52	max	.032	1	-.015	2	.12	2	-2.281e-03	2	3.52e-04	3	6.254e-04	2
104		min	.002	5	-.201	6	-.051	3	-7.157e-03	4	-2.844e-03	2	-1.841e-03	6

Envelope AISC ASD Steel Code Checks

	Mem...	Shape	Code Check	Loc[ft]	LC	She...	Lo...	...	...	Fa [...	Ft [...	Fb y..	Fb z...	...	C...	C...	AS...
1	M17	PIPE_2.0	.922	3	2	.144	3		4	13.7...	21	23.1	23.1	1	.6	.85	H1-2
2	M16	PIPE_2.0	.877	3	6	.207	3		4	13.7...	21	23.1	23.1	1	.85	.6	H1-2
3	M5	PIPE_2.0	.868	3	4	.128	3		3	13.7...	21	23.1	23.1	1	.85	.6	H2-1
4	M15	PIPE_2.0	.865	3	4	.185	1.0...		4	13.7...	21	23.1	23.1	1	.85	.6	H2-1
5	M13	8"x3/4" PL	.779	1	4	.022	1	z	4	11.5...	21.6	27	23.76	1	.6	.85	H1-2
6	M12	PIPE_3.0X	.747	4.516	4	.196	4.5...		6	14.0...	21	23.1	23.1	1	.85	.85	H1-2
7	M3	8"x3/4" PL	.676	1	5	.019	0	z	5	11.5...	21.6	27	23.76	1	.6	.85	H2-1
8	M6	PIPE_2.0	.503	.5	3	.119	.5		3	13.7...	21	23.1	23.1	1	.6	.85	H2-1
9	M2	PIPE_3.0X	.499	4.427	5	.170	4.4...		4	14.0...	21	23.1	23.1	1	.85	.85	H1-2
10	M20	8"x3/4" PL	.445	1	3	.014	2	y	6	11.5...	21.6	27	23.76	1	.6	.85	H2-1
11	M10	8"x3/4" PL	.432	1	4	.013	0	y	3	11.5...	21.6	27	23.76	1	.6	.85	H1-2
12	M19	PIPE_3.0X	.406	4.516	3	.190	4.5...		6	14.0...	21	23.1	23.1	1	.6	.85	H2-1
13	M9	PIPE_3.0X	.355	4.427	6	.157	4.4...		3	14.0...	21	23.1	23.1	1	.85	.85	H2-1
14	M4	PIPE_2.0	.304	3	3	.085	3		3	13.7...	21	23.1	23.1	1	.6	.85	H2-1
15	M14	PIPE_2.0	.287	3	3	.111	3		4	13.7...	21	23.1	23.1	1	.6	.85	H2-1
16	M7	PIPE_2.0	.185	.5	3	.077	.5		3	13.7...	21	23.1	23.1	1	.6	.85	H2-1
17	M11	HSS4X4X4	.177	1	6	.076	0	z	2	27.1...	27.6	30.36	30.36	...	.5...	.85	H1-2
18	M18	HSS4X4X4	.165	1	6	.059	0	y	6	27.1...	27.6	30.36	30.36	...	.2...	.85	H2-1
19	M1	HSS4X4X4	.151	1	4	.073	0	y	3	27.1...	27.6	30.36	30.36	...	.9...	.85	H2-1
20	M8	HSS4X4X4	.139	1	6	.073	0	y	3	27.1...	27.6	30.36	30.36	...	.6...	.85	H2-1



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

CENTEK Engineering, Inc.	Tower # 845 - Verizon Mount Unity Check	
TJL		Mar 23, 2021 at 7:51 AM
20150.03		Verizon Antenna Mast - TIA.r3d

ATTACHMENT 5

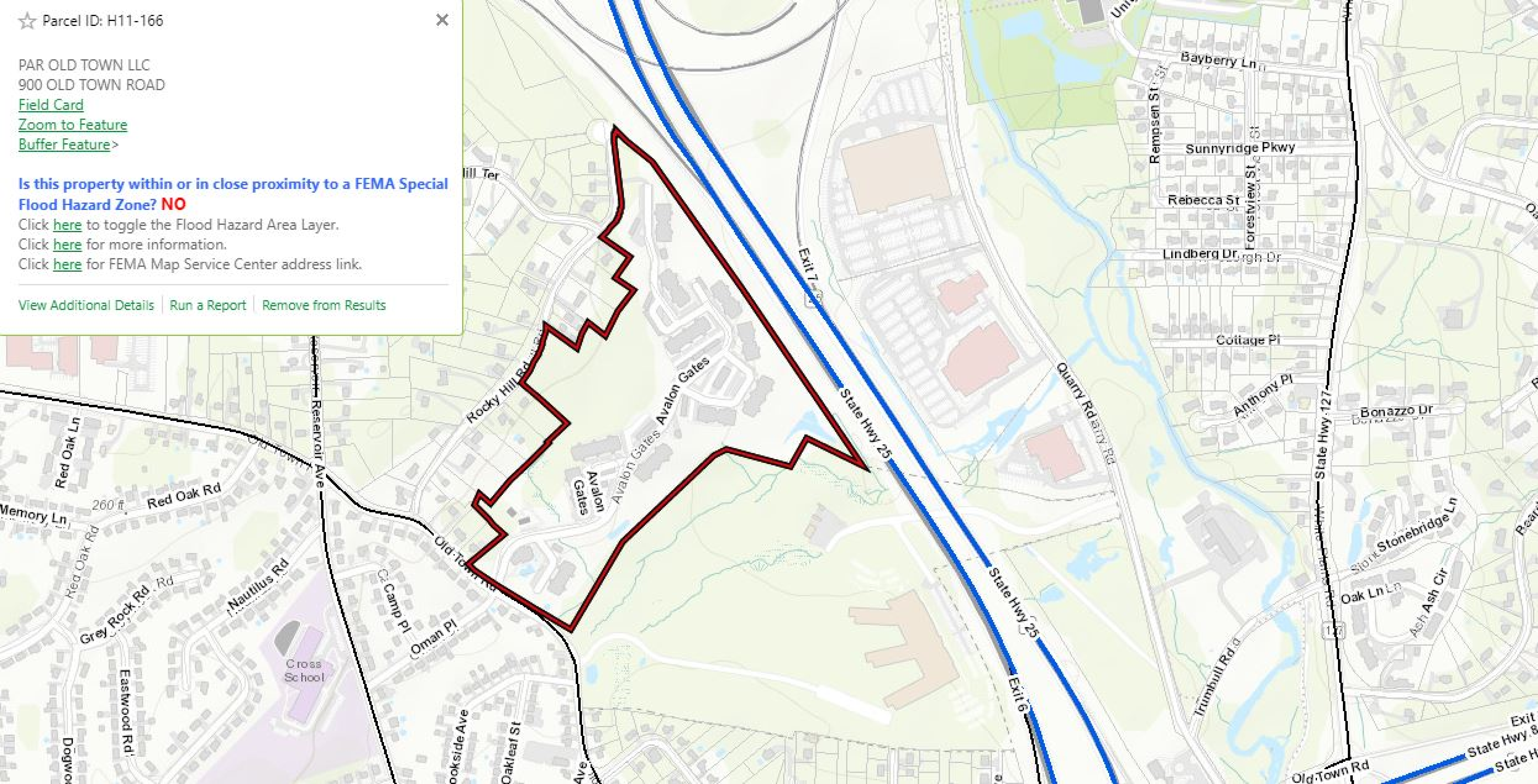
☆ Parcel ID: H11-166 ✕

PAR OLD TOWN LLC
900 OLD TOWN ROAD
Field Card
Zoom to Feature
Buffer Feature>

Is this property within or in close proximity to a FEMA Special Flood Hazard Zone? NO

Click here to toggle the Flood Hazard Area Layer.
Click here for more information.
Click here for FEMA Map Service Center address link.

View Additional Details | Run a Report | Remove from Results



TRUMBULL,CT

900 OLD TOWN ROAD

Sales Print Map It

Location
900 OLD TOWN ROAD
Mblu
H/11 / 00166/ 000/
Acct#
Owner
ROYCE AT TRUMBULL LLC &
Assessment
$44,178,260
Appraisal
$63,111,800
PID
406
Building Count
12
Fire District
T

Current Value

Appraisal

Valuation Year	Total
2015	$63,111,800

Assessment

Valuation Year	Total
2015	$44,178,260

Owner of Record

Owner ROYCE AT TRUMBULL LLC &

Co-Owner THE ROYCE AT TRUMBULL LLC

Address 900 OLD TOWN ROAD
TRUMBULL, CT 06611

Sale Price $82,000,000

Book & Page 1845/ 766

Sale Date 03/01/2021

Instrument 00

Ownership History

Ownership History

Owner	Sale Price	Book & Page	Instrument	Sale Date
ROYCE AT TRUMBULL LLC &	$82,000,000	1845/ 766	00	03/01/2021
PAR OLD TOWN LLC	$70,250,000	1709/ 123		03/01/2016
GATES FINANCING LLC	$10	1491/ 7	04	04/27/2009
AVALON PROPERTIES INC	$0	845/ 742		07/07/1994

Building Information

Building 1 : Section 1

Year Built: 1994

Living Area: 25,774

Building Attributes

Field	Description
STYLE	Apartment Bldg
Stories:	3 Stories
Occupancy	24
Exterior Wall 1	Vinyl Siding

ATTACHMENT 6

UNITED STATES POSTAL SERVICE ®

TRUMBULL 4

Certificate of Mailing — Firm

Name and Address of Sender	TOTAL NO. of Pieces Listed by Sender	TOTAL NO. of Pieces Received at Post Office™	Affix Stamp Here *Postmark with Date of Receipt.*
Kenneth C. Baldwin, Esq. Robinson & Cole LLP 280 Trumbull Street Hartford, CT 06103 USPS OLD STATE HOUSE STATION OCT 1 2021	3	3	neopost 10/01/2021 US POSTAGE $002.99º ZIP 06103 041L12203937
	Postmaster, per *(name of receiving employee)*		

USPS® Tracking Number Firm-specific Identifier	Address (Name, Street, City, State, and ZIP Code™)	Postage	Fee	Special Handling	Parcel Airlift
1.	Vicki A. Tesoro, First Selectman Town of Trumbull 5866 Main Street Trumbull, CT 06611				
2.	Roberto Librandi, Land Use Planner Town of Trumbull 5866 Main Street Trumbull, CT 06611				
3.	Royce at Trumbull LLC and The Royce at Trumbull LLC 900 Old Town Road Trumbull, CT 06611				
4.					
5.					
6.					