Crown Castle
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065

September 25, 2018

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

RE: **Notice of Exempt Modification for T-Mobile Crown Site BU: 806369**
T-Mobile Site ID: CT11161D
439-455 Homestead Avenue, Hartford CT 06112
Latitude: 41.783719/ Longitude: -72.703743

Dear Ms. Bachman:

T-Mobile currently maintains nine (9) antennas at the 128-foot level of the existing 140-foot monopole at 439 Homestead Avenue, Hartford CT 06112. The tower is owned by Crown Castle and the property is owned by Talar Properties LLC. T-Mobile now intends to replace three (6) of its existing antennas with three (6) new antenna. The antenna would be installed at the 128-foot level of the tower. T-Mobile will also be replacing (3) RRUs with new models as well as adding (1) hybrid fiber cable and removing (1) line of coax.

This facility was approved by the City of Hartford PZC. The city file is no longer available – See attached letter from the City Planner.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b) (2). In accordance with R.S.C.A. § 16-50j-73, a copy of this letter is being sent to The Honorable Luke Bronin, Mayor, City of Hartford, Kiley A. Gosselin, Acting Director of Planning and Zoning, as well as the property owner, and Crown Castle as the tower owner.

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

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

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

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

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

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

For the foregoing reasons, T-Mobile respectfully submits that the proposed modifications to the above-reference telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2). Please send approval/rejection letter to Attn: William Stone.

Sincerely,

William Stone
Real Estate Specialist
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065
518-373-3543
William.stone@crowncastle.com

Attachments:

Tab 1: Exhibit-1: Compound plan and elevation depicting the planned changes
Tab 2: Exhibit-2: Structural Modification Report
Tab 3: Exhibit-3: General Power Density Table Report (RF Emissions Analysis Report)

cc:

The Honorable Luke Bronin, Mayor, City of Hartford
Office of the Mayor
550 Main Street Room 200
Hartford, CT 06103

Kiley A. Gosselin
Acting Director of Planning and Zoning
City of Hartford
250 Constitution Plaza, 4th Floor
Hartford, CT 06103

Talar Properties LLC
705 N. Mountain Road
Newington, CT 06111

LUKE BRONIN
MAYOR

CITY OF HARTFORD

DEPARTMENT OF DEVELOPMENT SERVICES
Planning and Economic Development Division
250 Constitution Plaza, 4th Floor
Hartford, Connecticut 06103

Telephone: (860) 757- 9025
Fax: (860) 722-6402
www.hartford.gov

JAMIE BRÄTT
DIRECTOR

June 7, 2016

Denise Sabo
Northeast Site Solutions
54 Main Street Unit 3
Sturbridge MA 01566

RE: 439 Homestead Avenue

Dear Ms. Sabo:

In response to your inquiry regarding cell towers at 439 Homestead Avenue, the Planning Division did not find any original zoning approvals. No Certificate of Occupancy was found for the use of cell towers; however, building permits indicate that the use of cell towers currently exists.

Please feel free to contact me at 860-757-9055, should you have any questions.

Sincerely,

Lynda Crespo,
Administrative Assistant

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Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

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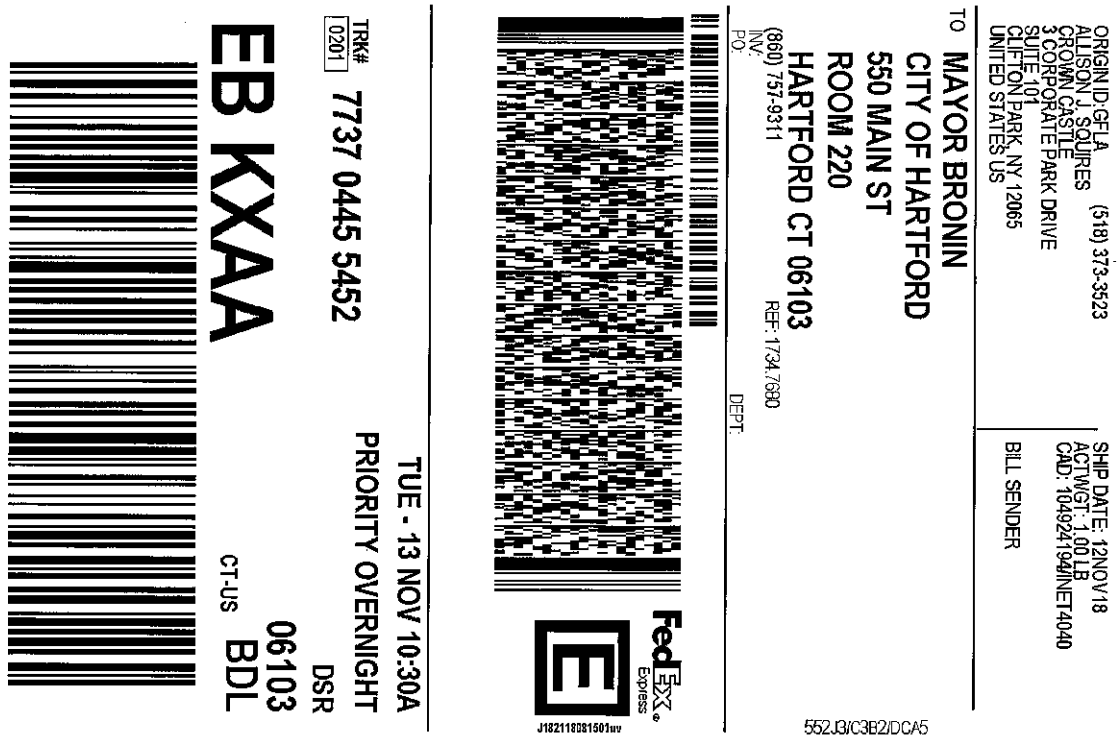

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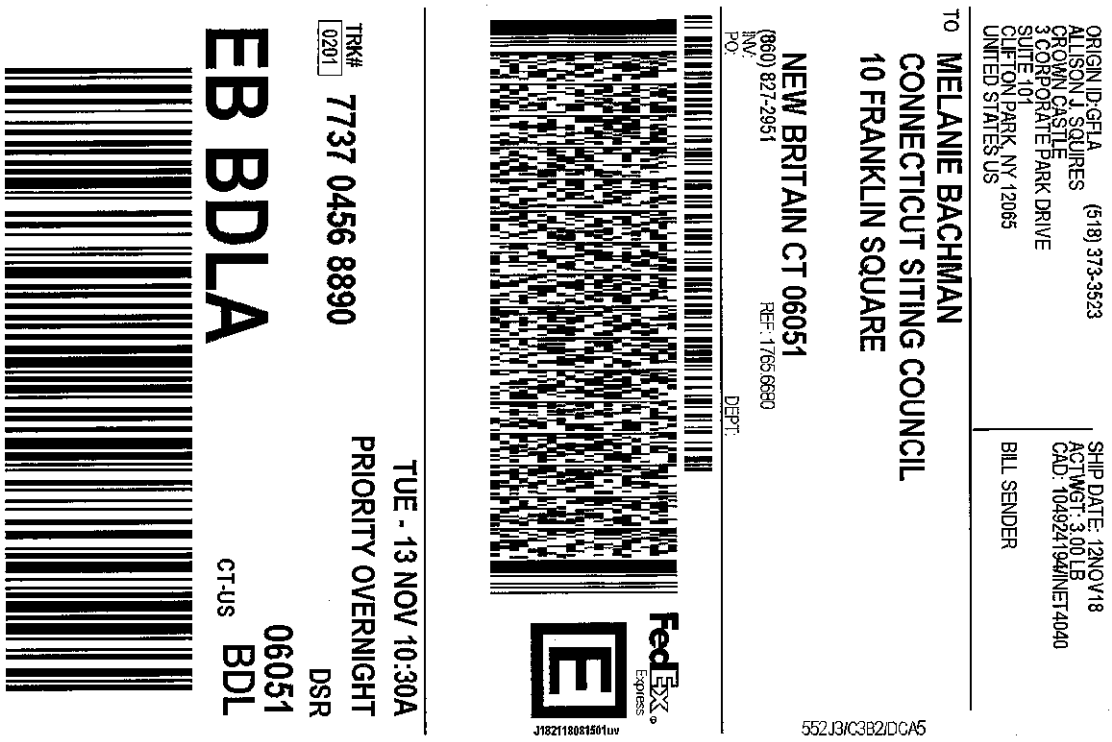

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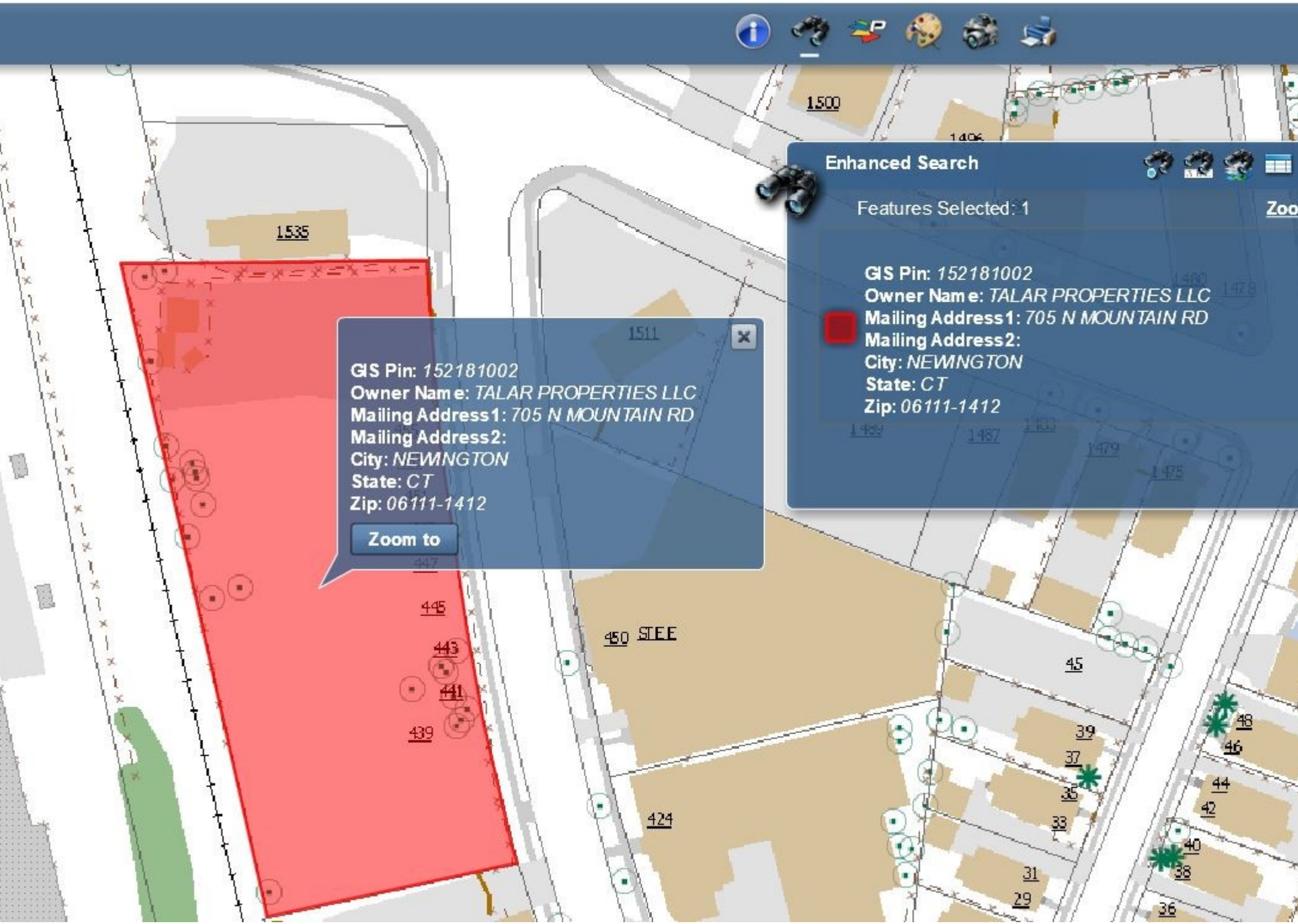
Enhanced Search
Features Selected: 1
Zoo
GIS Pin: 152181002
Owner Name: TALAR PROPERTIES LLC
Mailing Address1: 705 N MOUNTAIN RD
Mailing Address2:
City: NEWINGTON
State: CT
Zip: 06111-1412
GIS Pin: 152181002
Owner Name: TALAR PROPERTIES LLC
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Mailing Address2:
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State: CT
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SHEET INDEX

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T1	TITLE PAGE
N1	NOTES
C1	PLAN & ELEVATION
C2	RF CHART AND ORIENTATION
D1	EQUIPMENT DETAILS
E1	GROUNDING & ELECTRICAL DETAILS
E2	RF PLUMBING DIAGRAM

TOWER OWNER NOTIFICATION

ONCE THE CONTRACTOR HAS RECEIVED AND ACCEPTED THE NOTICE TO PROCEED, CONTRACTOR WILL CONTACT THE CROWN CASTLE CONSTRUCTION MANAGER OF RECORD (NOTED ON THE FIRST PAGE ON THIS CONSTRUCTION DRAWING) A MINIMUM OF 48 HOURS PRIOR TO WORK START. UPON ARRIVAL TO THE JOB SITE, CONTRACTOR CREW IS REQUIRED CALL 1-800-788-7011 TO NOTIFY THE CROWN CASTLE NOC WORK HAS BEGUN.

T-Mobile

CROWN CASTLE

CBU

CBU #806369

SITE ID

CT11161D

SITE NAME

CT161/JN OF ALBANY_1

SITE ADDRESS

439-455 HOMESTEAD AVE
HARTFORD, CT 06105

CONFIGURATION

67D92M_2XAIR+1OP.

PROJECT SITE INFORMATION

SITE ID:	CT11161D	
SITE NAME:	CT161/JN OF ALBANY_1	
SITE ADDRESS:	439-455 HOMESTEAD AVE HARTFORD, CT 06105	
PERMITTING JURISDICTION:	CITY OF HARTFORD	
COUNTY:	HARTFORD COUNTY	
ZONING:	CX-1	
SITE COORDINATES: LATITUDE:	41° 47' 01.4" N	(NAD 83)
LONGITUDE:	72° 42' 13.5" W	(NAD 83)
APPLICANT:	T-MOBILE NORTHEAST LLC 103 MONARCH DRIVE LIVERPOOL, NY 13088	

STRUCTURAL ANALYSIS INFORMATION

TOWER ANALYSIS

INFINIGY ENGINEERING HAS NOT EVALUATED THE EXISTING **TOWER** FOR THIS SITE, AND ASSUMES NO RESPONSIBILITY FOR ITS STRUCTURAL INTEGRITY. REFER TO STRUCTURAL ANALYSIS FROM TOWER OWNER PRIOR TO ANY CONSTRUCTION.

ANTENNA MOUNTS

INFINIGY ENGINEERING HAS NOT EVALUATED THE EXISTING **MOUNTS** FOR THIS SITE, AND ASSUMES NO RESPONSIBILITY FOR ITS STRUCTURAL INTEGRITY. REFER TO PASSING MOUNT ANALYSIS PRIOR TO ANY CONSTRUCTION.

PROJECT TEAM INFORMATION

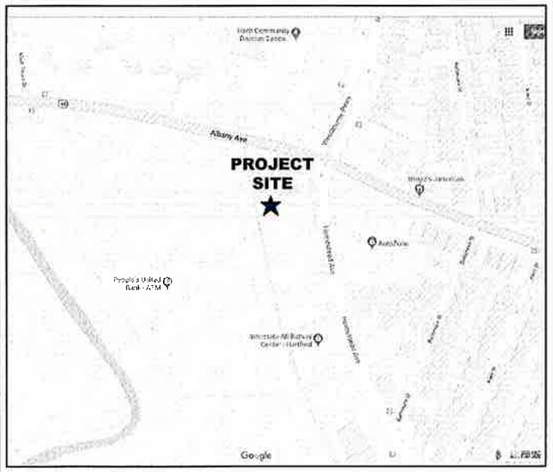
CLIENT REPRESENTATIVE:	CROWN CASTLE 3 CORPORATE PARK DRIVE SUITE 101 CLIFTON PARK, NY 12065
CLIENT REP. CONTACT:	WILL STONE (518) 373-3543
ENGINEER:	INFINIGY 6865 DEERPATH ROAD SUITE 152 ELKRIDGE, MD 21075
ENGINEER CONTACT:	MATTHEW LIVERETTE (518) 690-0790

SCOPE OF WORK

SCOPE OF WORK:
TMO L700 4X2 67D92M OUTDOOR (CONNECTICUT MARKET) REPLACING (6) EXISTING ANTENNAS WITH NEW MODELS. ADDING (1) HYBRID FIBER CABLE AND REMOVING (1) COAX LINE. REPLACING (3) RRUS WITH NEW MODELS. CURRENT INSTALL: (9) ANTENNAS, (11) COAX, (2) HYBRID FIBER CABLES, (3) TMA'S, AND (3) RRUS. NO CHANGES MADE TO LEASED GROUND SPACE. FINAL CONFIGURATION: (9) ANTENNAS, (10) COAX, (3) HYBRID FIBER CABLES, (3) TMA'S, AND (3) RRUS.

811 TO OBTAIN LOCATION OF PARTICIPANTS UNDERGROUND FACILITIES BEFORE YOU DIG IN NEW YORK (NORTH OF 5 BOROUGHS), CALL DIG SAFELY NEW YORK
TOLL FREE: 1-800-962-7962 OR www.digsafelynewyork.com
Know what's below. Call before you dig.
NEW YORK STATUTE REQUIRES MIN OF 2 WORKING DAYS NOTICE BEFORE YOU EXCAVATE

LOCATION MAP



GENERAL NOTES

- HANDICAP ACCESS REQUIREMENTS ARE NOT REQUIRED.
- FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION.
- FACILITY HAS NO PLUMBING OR REFRIGERANTS.
- THIS FACILITY SHALL MEET OR EXCEED ALL FAA AND FCC REGULATORY REQUIREMENTS.
- ALL NEW MATERIAL SHALL BE FURNISHED AND INSTALLED BY CONTRACTOR UNLESS NOTED OTHERWISE. EQUIPMENT, ANTENNAS/RRH AND CABLES FURNISHED BY OWNER AND INSTALLED BY CONTRACTOR.
- THE PROJECT WILL NOT RESULT IN ANY SIGNIFICANT DISTURBANCE OR EFFECT ON STORMWATER DRAINAGE.
- NO SANITARY SEWER, POTABLE WATER, OR TRASH DISPOSAL SERVICE IS REQUIRED
- NO COMMERCIAL SIGNAGE IS PROPOSED

CODE COMPLIANCE

ALL WORK AND MATERIALS SHALL BE PERFORMED AND INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED WITH ANY LOCAL AMENDMENTS BY THE LOCAL GOVERNING AUTHORITIES:

- INTERNATIONAL BUILDING CODE
- NATIONAL ELECTRICAL CODE
- NATIONAL FIRE PROTECTION ASSOCIATION 101
- NATIONAL FIRE PROTECTION ASSOCIATION 1
- LOCAL BUILDING CODES
- CITY/COUNTY ORDINANCES
- AMERICAN INSTITUTE OF STEEL CONSTRUCTION SPECIFICATIONS (AISC)
- UNDERWRITERS LABORATORIES APPROVED ELECTRICAL PRODUCTS.
- ANSI EIA/TIA 222 REV. G
- TIA 607
- INSTITUTE FOR ELECTRICAL AND ELECTRONICS ENGINEERS 81
- IEEE C2 (LATEST EDITION)
- TELCORDIA GR-1275
- ANSI T1.311

T-Mobile
T-MOBILE NORTHEAST LLC
103 MONARCH DRIVE
LIVERPOOL, NY 13088

INFINIGY
6865 DEERPATH ROAD SUITE 152
ELKRIDGE, MD 21075
TEL (443) 592-3143

STATE OF CONNECTICUT
JOHN S. STEVENS
No. 24705
REGISTERED PROFESSIONAL ENGINEER
LICENSED
9.4.2018

No	Submittal / Revision	App'd	Date
0	ISSUED FOR CONSTRUCTION	RMS	08/31/18
A	ISSUED FOR REVIEW	SL	08/21/18

Drawn: RCD
Designed: MRL
Checked: AJD

Project Number: 600-007

Project Title:
CT11161D
CT161/JN OF ALBANY_1
439-455 HOMESTEAD AVE
HARTFORD, CT 06105

Prepared For:
CROWN CASTLE

Drawing Title
TITLE PAGE

Drawing Number
T1

GENERAL NOTES

PART 1 – GENERAL REQUIREMENTS

1.1 THE WORK SHALL COMPLY WITH APPLICABLE NATIONAL CODES AND STANDARDS, LATEST EDITION, AND PORTIONS THEREOF, INCLUDED BUT NOT LIMITED TO THE FOLLOWING:
- A. GR-63-CORE NEBS REQUIREMENTS: PHYSICAL PROTECTION
- B. GR-78-CORE GENERIC REQUIREMENTS FOR THE PHYSICAL DESIGN AND MANUFACTURE OF TELECOMMUNICATIONS EQUIPMENT.
- C. NATIONAL FIRE PROTECTION ASSOCIATION CODES AND STANDARDS (NFPA) INCLUDING NFPA 70 (NATIONAL ELECTRICAL CODE – "NEC").
- D. AND NFPA 101 (LIFE SAFETY CODE).
- E. AMERICAN SOCIETY FOR TESTING OF MATERIALS (ASTM).
- F. INSTITUTE OF ELECTRONIC AND ELECTRICAL ENGINEERS (IEEE).

1.2 DEFINITIONS:
A: WORK: THE SUM OF TASKS AND RESPONSIBILITIES IDENTIFIED IN THE CONTRACT DOCUMENTS.
B: COMPANY: T-MOBILE CORPORATION
C. ENGINEER: SYNONYMOUS WITH ARCHITECT & ENGINEER AND "A&E". THE DESIGN PROFESSIONAL HAVING PROFESSIONAL RESPONSIBILITY FOR DESIGN OF THE PROJECT.
D: CONTRACTOR: CONSTRUCTION CONTRACTOR; CONSTRUCTION VENDOR; INDIVIDUAL OR ENTITY WHO AFTER EXECUTION OF A CONTRACT IS BOUND TO ACCOMPLISH THE WORK.
E: THIRD PARTY VENDOR OR AGENCY: A VENDOR OR AGENCY ENGAGED SEPARATELY BY THE COMPANY, A&E, OR CONTRACTOR TO PROVIDE MATERIALS OR TO ACCOMPLISH SPECIFIC TASKS RELATED TO BUT NOT INCLUDED IN THE WORK.

1.3 POINT OF CONTACT: COMMUNICATION BETWEEN THE COMPANY AND THE CONTRACTOR SHALL FLOW THROUGH THE SINGLE COMPANY SITE DEVELOPMENT SPECIALIST OR OTHER PROJECT COORDINATOR APPOINTED TO MANAGE THE PROJECT FOR THE COMPANY.

1.4 ON-SITE SUPERVISION: THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL EMPLOY A COMPETENT SUPERINTENDENT WHO SHALL BE IN ATTENDANCE AT THE SITE AT ALL TIMES DURING PERFORMANCE OF THE WORK.

1.5 DRAWINGS, SPECIFICATIONS AND DETAILS REQUIRED AT JOBSITE: THE CONSTRUCTION CONTRACTOR SHALL MAINTAIN A FULL SET OF THE CONSTRUCTION DRAWINGS, STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES, AND THE STANDARD CONSTRUCTION SPECIFICATIONS FOR WIRELESS SITES AT THE JOBSITE FROM MOBILIZATION THROUGH CONSTRUCTION COMPLETION.
A. THE JOBSITE DRAWINGS, SPECIFICATIONS AND DETAILS SHALL BE CLEARLY MARKED DAILY IN PENCIL WITH ANY CHANGES IN CONSTRUCTION OVER WHAT IS DEPICTED IN THE DOCUMENTS. AT CONSTRUCTION COMPLETION, THIS JOBSITE MARKUP SET SHALL BE DELIVERED TO THE COMPANY OR COMPANY'S DESIGNATED REPRESENTATIVE TO BE FORWARDED TO THE COMPANY'S A&E VENDOR FOR PRODUCTION OF "AS-BUILT" DRAWINGS.

1.6 USE OF JOB SITE: THE CONTRACTOR SHALL CONFINE ALL CONSTRUCTION AND RELATED OPERATIONS INCLUDING STAGING AND STORAGE OF MATERIALS AND EQUIPMENT, PARKING, TEMPORARY FACILITIES, AND WASTE STORAGE TO THE LEASE PARCEL UNLESS OTHERWISE PERMITTED BY THE CONTRACT DOCUMENTS.

1.7 NOTICE TO PROCEED:
A. NO WORK SHALL COMMENCE PRIOR TO COMPANY'S WRITTEN NOTICE TO PROCEED.
B. UPON RECEIVING NOTICE TO PROCEED, CONTRACTOR SHALL FULLY PERFORM ALL WORK NECESSARY TO PROVIDE T-MOBILE WITH AN OPERATIONAL WIRELESS FACILITY.

PART 2 – EXECUTION

2.1 TEMPORARY UTILITIES AND FACILITIES: THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TEMPORARY UTILITIES AND FACILITIES NECESSARY EXCEPT AS OTHERWISE INDICATED IN THE CONSTRUCTION DOCUMENTS. TEMPORARY UTILITIES AND FACILITIES INCLUDE, POTABLE WATER, HEAT, HVAC, ELECTRICITY, SANITARY FACILITIES, WASTE DISPOSAL FACILITIES, AND TELEPHONE/COMMUNICATION SERVICES. PROVIDE TEMPORARY UTILITIES AND FACILITIES IN ACCORDANCE WITH OSHA AND THE AUTHORITY HAVING JURISDICTION. CONTRACTOR MAY UTILIZE THE COMPANY ELECTRICAL SERVICE IN THE COMPLETION OF THE WORK WHEN IT BECOMES AVAILABLE. USE OF THE LESSORS OR SITE OWNER'S UTILITIES OR FACILITIES IS EXPRESSLY FORBIDDEN EXCEPT AS OTHERWISE ALLOWED IN THE CONTRACT DOCUMENTS.

2.2 ACCESS TO WORK: THE CONTRACTOR SHALL PROVIDE ACCESS TO THE JOB SITE FOR AUTHORIZED COMPANY PERSONNEL AND AUTHORIZED REPRESENTATIVES OF THE ARCHITECT/ENGINEER DURING ALL PHASES OF THE WORK.

2.3 TESTING: REQUIREMENTS FOR TESTING BY THIS CONTRACTOR SHALL BE AS INDICATED HEREWITH, ON THE CONSTRUCTION DRAWINGS, AND IN THE INDIVIDUAL SECTIONS OF THESE SPECIFICATIONS. SHOULD COMPANY CHOOSE TO ENGAGE ANY THIRD-PARTY TO CONDUCT ADDITIONAL TESTING, THE CONTRACTOR SHALL COOPERATE WITH AND PROVIDE A WORK AREA FOR COMPANY'S TEST AGENCY.

2.4 COMPANY FURNISHED MATERIAL AND EQUIPMENT: ALL HANDLING, STORAGE AND INSTALLATION OF COMPANY FURNISHED MATERIAL AND EQUIPMENT SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS AND WITH THE MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS.
A. CONTRACTOR SHALL PROCURE ALL OTHER REQUIRED WORK RELATED MATERIALS NOT PROVIDED BY T-MOBILE TO SUCCESSFULLY CONSTRUCT A WIRELESS FACILITY.

2.5 DIMENSIONS: VERIFY DIMENSIONS INDICATED ON DRAWINGS WITH FIELD DIMENSIONS BEFORE FABRICATION OR ORDERING OF MATERIALS. DO NOT SCALE DRAWINGS.

2.6 EXISTING CONDITIONS: NOTIFY THE COMPANY REPRESENTATIVE OF EXISTING CONDITIONS DIFFERING FROM THOSE INDICATED ON THE DRAWINGS. DO NOT REMOVE OR ALTER STRUCTURAL COMPONENTS WITHOUT PRIOR WRITTEN APPROVAL FROM THE ARCHITECT AND ENGINEER.

PART 3 – RECEIPT OF MATERIAL & EQUIPMENT

3.1 RECEIPT OF MATERIAL AND EQUIPMENT: CONTRACTOR IS RESPONSIBLE FOR T-MOBILE PROVIDED MATERIAL AND EQUIPMENT AND UPON RECEIPT SHALL:
- A. ACCEPT DELIVERIES AS SHIPPED AND TAKE RECEIPT.
- B. VERIFY COMPLETENESS AND CONDITION OF ALL DELIVERIES.
- C. TAKE RESPONSIBILITY FOR EQUIPMENT AND PROVIDE INSURANCE PROTECTION AS REQUIRED IN AGREEMENT.
- D. RECORD ANY DEFECTS OR DAMAGES AND WITHIN TWENTY-FOUR HOURS AFTER RECEIPT, REPORT TO T-MOBILE OR ITS DESIGNATED PROJECT REPRESENTATIVE OF SUCH.
- E. PROVIDE SECURE AND NECESSARY WEATHER PROTECTED WAREHOUSING.
- F. COORDINATE SAFE AND SECURE TRANSPORTATION OF MATERIAL AND EQUIPMENT, DELIVERING AND OFF-LOADING FROM CONTRACTOR'S WAREHOUSE TO SITE.

PART 4 – GENERAL REQUIREMENTS FOR CONSTRUCTION

4.1 CONTRACTOR SHALL KEEP THE SITE FREE FROM ACCUMULATING WASTE MATERIAL, DEBRIS, AND TRASH. AT THE COMPLETION OF THE WORK, CONTRACTOR SHALL REMOVE FROM THE SITE ALL REMAINING RUBBISH, IMPLEMENTS, TEMPORARY FACILITIES, AND SURPLUS MATERIALS.

4.2 EQUIPMENT ROOMS SHALL AT ALL TIMES BE MAINTAINED "BROOM CLEAN" AND CLEAR OF DEBRIS.

4.3 CONTRACTOR SHALL TAKE ALL REASONABLE PRECAUTIONS TO DISCOVER AND LOCATE ANY HAZARDOUS CONDITION.
A. IN THE EVENT CONTRACTOR ENCOUNTERS ANY HAZARDOUS CONDITION WHICH HAS NOT BEEN ABATED OR OTHERWISE MITIGATED, CONTRACTOR AND ALL OTHER PERSONS SHALL IMMEDIATELY STOP WORK IN THE AFFECTED AREA AND NOTIFY COMPANY IN WRITING. THE WORK IN THE AFFECTED AREA SHALL NOT BE RESUMED EXCEPT BY WRITTEN NOTIFICATION BY COMPANY.
B. CONTRACTOR AGREES TO USE CARE WHILE ON THE SITE AND SHALL NOT TAKE ANY ACTION THAT WILL OR MAY RESULT IN OR CAUSE THE HAZARDOUS CONDITION TO BE FURTHER RELEASED IN THE ENVIRONMENT, OR TO FURTHER EXPOSE INDIVIDUALS TO THE HAZARD.

4.4 CONTRACTOR'S ACTIVITIES SHALL BE RESTRICTED TO THE PROJECT LIMITS. SHOULD AREAS OUTSIDE THE PROJECT LIMITS BE AFFECTED BY CONTRACTOR'S ACTIVITIES, CONTRACTOR SHALL IMMEDIATELY RETURN THEM TO ORIGINAL CONDITION.

4.5 CONDUCT TESTING AS REQUIRED HEREIN.

PART 5 – TESTS AND INSPECTIONS

5.1 TESTS AND INSPECTIONS:
- A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONSTRUCTION TESTS, INSPECTIONS AND PROJECT DOCUMENTATION.
- B. CONTRACTOR SHALL COORDINATE TEST AND INSPECTION SCHEDULES WITH COMPANY'S REPRESENTATIVE WHO MUST BE ON SITE TO WITNESS SUCH TESTS AND INSPECTIONS.
- C. WHEN THE USE OF A THIRD PARTY INDEPENDENT TESTING AGENCY IS REQUIRED, THE AGENCY THAT IS SELECTED MUST PERFORM SUCH WORK ON A REGULAR BASIS IN THE STATE WHERE THE PROJECT IS LOCATED AND HAVE A THOROUGH UNDERSTANDING OF LOCAL AVAILABLE MATERIALS, INCLUDING THE SOIL, ROCK, AND GROUNDWATER CONDITIONS.
- D. THE THIRD PARTY TESTING AGENCY IS TO BE FAMILIAR WITH THE APPLICABLE REQUIREMENTS FOR THE TESTS TO BE DONE, EQUIPMENT TO BE USED, AND ASSOCIATED HEALTH AND SAFETY ISSUES.
- E. SITE RESISTANCE TO EARTH TESTING PER EXHIBIT: CELL SITE GROUNDING SYSTEM DESIGN.
- F. ANTENNA AND COAX SWEEP TESTS PER EXHIBIT: ANTENNA TRANSMISSION LINE ACCEPTANCE STANDARDS.
- G. ALL OTHER TESTS REQUIRED BY COMPANY OR JURISDICTION.

PART 6 – TRENCHING AND BACKFILLING

6.1 TRENCHING AND BACKFILLING: THE CONTRACTOR SHALL PERFORM ALL EXCAVATION OF EVERY DESCRIPTION AND OF WHATEVER SUBSTANCES ENCOUNTERED, TO THE DEPTHS INDICATED ON THE CONSTRUCTION DRAWINGS OR AS OTHERWISE SPECIFIED.

A. PROTECTION OF EXISTING UTILITIES: THE CONTRACTOR SHALL CHECK WITH THE LOCAL UTILITIES AND THE RESPECTIVE UTILITY LOCATOR COMPANIES PRIOR TO STARTING EXCAVATION OPERATIONS IN EACH RESPECTIVE AREA TO ASCERTAIN THE LOCATIONS OF KNOWN UTILITY LINES. THE LOCATIONS, NUMBER AND TYPES OF EXISTING UTILITY LINES DETAILED ON THE CONSTRUCTION DRAWINGS ARE APPROXIMATE AND DO NOT REPRESENT EXACT INFORMATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING ALL LINES DAMAGED DURING EXCAVATION AND ALL ASSOCIATED OPERATIONS. ALL UTILITY LINES UNCOVERED DURING THE EXCAVATION OPERATIONS, SHALL BE PROTECTED FROM DAMAGE DURING EXCAVATION AND ASSOCIATED OPERATIONS. ALL REPAIRS SHALL BE APPROVED BY THE UTILITY COMPANY.

B. HAND DIGGING: UNLESS APPROVED IN WRITING OTHERWISE, ALL DIGGING WITHIN AN EXISTING CELL SITE COMPOUND IS TO BE DONE BY HAND.

C. DURING EXCAVATION, MATERIAL SUITABLE FOR BACKFILLING SHALL BE STOCKPILED IN AN ORDERLY MANNER A SUFFICIENT DISTANCE FROM THE BANKS OF THE TRENCH TO AVOID OVERLOADING AND TO PREVENT SLIDES OR CAVE-INS. ALL EXCAVATED MATERIALS NOT REQUIRED OR SUITABLE FOR BACKFILL SHALL BE REMOVED AND DISPOSED OF AT THE CONTRACTOR'S EXPENSE.

D. GRADING SHALL BE DONE AS MAY BE NECESSARY TO PREVENT SURFACE WATER FROM FLOWING INTO TRENCHES OR OTHER EXCAVATIONS, AND ANY WATER ACCUMULATING THEREIN SHALL BE REMOVED BY PUMPING OR BY OTHER APPROVED METHOD.

E. SHEETING AND SHORING SHALL BE DONE AS NECESSARY FOR THE PROTECTION OF THE WORK AND FOR THE SAFETY OF PERSONNEL. UNLESS OTHERWISE INDICATED, EXCAVATION SHALL BE BY OPEN CUT, EXCEPT THAT SHORT SECTIONS OF A TRENCH MAY BE TUNNELED IF, THE CONDUIT CAN BE SAFELY AND PROPERLY INSTALLED AND BACKFILL CAN BE PROPERLY TAMPED IN SUCH TUNNEL SECTIONS. EARTH EXCAVATION SHALL COMPRISE ALL MATERIALS AND SHALL INCLUDE CLAY, SILT, SAND, MUCK, GRAVEL, HARDPAN, LOOSE SHALE, AND LOOSE STONE.

F. TRENCHES SHALL BE OF NECESSARY WIDTH FOR THE PROPER LAYING OF THE CONDUIT OR CABLE, AND THE BANKS SHALL BE AS NEARLY VERTICAL AS PRACTICABLE. THE BOTTOM OF THE TRENCHES SHALL BE ACCURATELY GRADED TO PROVIDE UNIFORM BEARING AND SUPPORT FOR EACH SECTION OF THE CONDUIT OR CABLE ON UNDISTURBED SOIL AT EVERY POINT ALONG ITS ENTIRE LENGTH. EXCEPT WHERE ROCK IS ENCOUNTERED, CARE SHALL BE TAKEN NOT TO EXCAVATE BELOW THE DEPTHS INDICATED. WHERE ROCK EXCAVATIONS ARE NECESSARY, THE ROCK SHALL BE EXCAVATED TO A MINIMUM OVER DEPTH OF 6 INCHES BELOW THE TRENCH DEPTHS INDICATED ON THE CONSTRUCTION DRAWINGS OR SPECIFIED. OVER DEPTHS IN THE ROCK EXCAVATION AND UNAUTHORIZED OVER DEPTHS SHALL BE THOROUGHLY BACK FILLED AND TAMPED TO THE APPROPRIATE GRADE. WHENEVER WET OR OTHERWISE UNSTABLE SOIL THAT IS INCAPABLE OF PROPERLY SUPPORTING THE CONDUIT OR CABLE IS ENCOUNTERED IN THE BOTTOM OF THE TRENCH, SUCH SOLID SHALL BE REMOVED TO A MINIMUM OVER DEPTH OF 6 INCHES AND THE TRENCH BACKFILLED TO THE PROPER GRADE WITH EARTH OF OTHER SUITABLE MATERIAL, AS HEREINAFTER SPECIFIED.

G. BACKFILLING OF TRENCHES. TRENCHES SHALL NOT BE BACKFILLED UNTIL ALL SPECIFIED TESTS HAVE BEEN PERFORMED AND ACCEPTED. WHERE COMPACTED BACKFILL IS NOT INDICATED THE TRENCHES SHALL BE CAREFULLY BACKFILLED WITH SELECT MATERIAL SUCH AS EXCAVATED SOILS THAT ARE FREE OF ROOTS, SOD, RUBBISH OR STONES, DEPOSITED IN 6 INCH LAYERS AND THOROUGHLY AND CAREFULLY RAMMED UNTIL THE CONDUIT OR CABLE HAS A COVER OF NOT LESS THAN 1 FOOT. THE REMAINDER OF THE BACKFILL MATERIAL SHALL BE GRANULAR IN NATURE AND SHALL NOT CONTAIN ROOTS, SOD, RUBBING, OR STONES OF 2-1/2 INCH MAXIMUM DIMENSION. BACKFILL SHALL BE CAREFULLY PLACED IN THE TRENCH AND IN 1 FOOT LAYERS AND EACH LAYER TAMPED. SETTLING THE BACKFILL WITH WATER WILL BE PERMITTED. THE SURFACE SHALL BE GRADED TO A REASONABLE UNIFORMITY AND THE MOUNDING OVER THE TRENCHES LEFT IN A UNIFORM AND NEAT CONDITION.

SYMBOL	DESCRIPTION
	CIRCUIT BREAKER
	NON-FUSIBLE DISCONNECT SWITCH
F	FUSIBLE DISCONNECT SWITCH
	SURFACE MOUNTED PANEL BOARD
T	TRANSFORMER
M	KILOWATT HOUR METER
JB	JUNCTION BOX
PB	PULL BOX TO NEC/TELCO STANDARDS
	UNDERGROUND UTILITIES
	EXOTHERMIC WELD CONNECTION
	MECHANICAL CONNECTION
OR	GROUND ROD
OR	GROUND ROD WITH INSPECTION SLEEVE
	GROUND BAR
	120AC DUPLEX RECEPTACLE
G	GROUND CONDUCTOR
	DC POWER AND FIBER OPTIC TRUNK CABLES
E	DC POWER CABLES
# / #	REPRESENTS DETAIL NUMBER / REF. DRAWING NUMBER

ABBREVIATIONS

CIGBE	COAX ISOLATED GROUND BAR EXTERNAL
MIGB	MASTER ISOLATED GROUND BAR
SST	SELF SUPPORTING TOWER
GPS	GLOBAL POSITIONING SYSTEM
TYP	TYPICAL
DWG	DRAWING
BCW	BARE COPPER WIRE
BFG	BELOW FINISH GRADE
PVC	POLYVINYL CHLORIDE
CAB	CABINET
C	CONDUIT
SS	STAINLESS STEEL
G	GROUND
AWG	AMERICAN WIRE GAUGE
RGS	RIGID GALVANIZED STEEL
AHJ	AUTHORITY HAVING JURISDICTION
TTLNA	TOWER TOP LOW NOISE AMPLIFIER
UNO	UNLESS NOTED OTHERWISE
EMT	ELECTRICAL METALLIC TUBING
AGL	ABOVE GROUND LEVEL

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STATE OF CONNECTICUT
JOHN S. STEVENS
PROFESSIONAL ENGINEER
LICENSED
SEP 04 2018

No	Submittal / Revision	Appd	Date
0	ISSUED FOR CONSTRUCTION	RMS	08/31/18
A	ISSUED FOR REVIEW	SL	08/21/18

Drawn: RCD
Designed: MRL
Checked: JMD

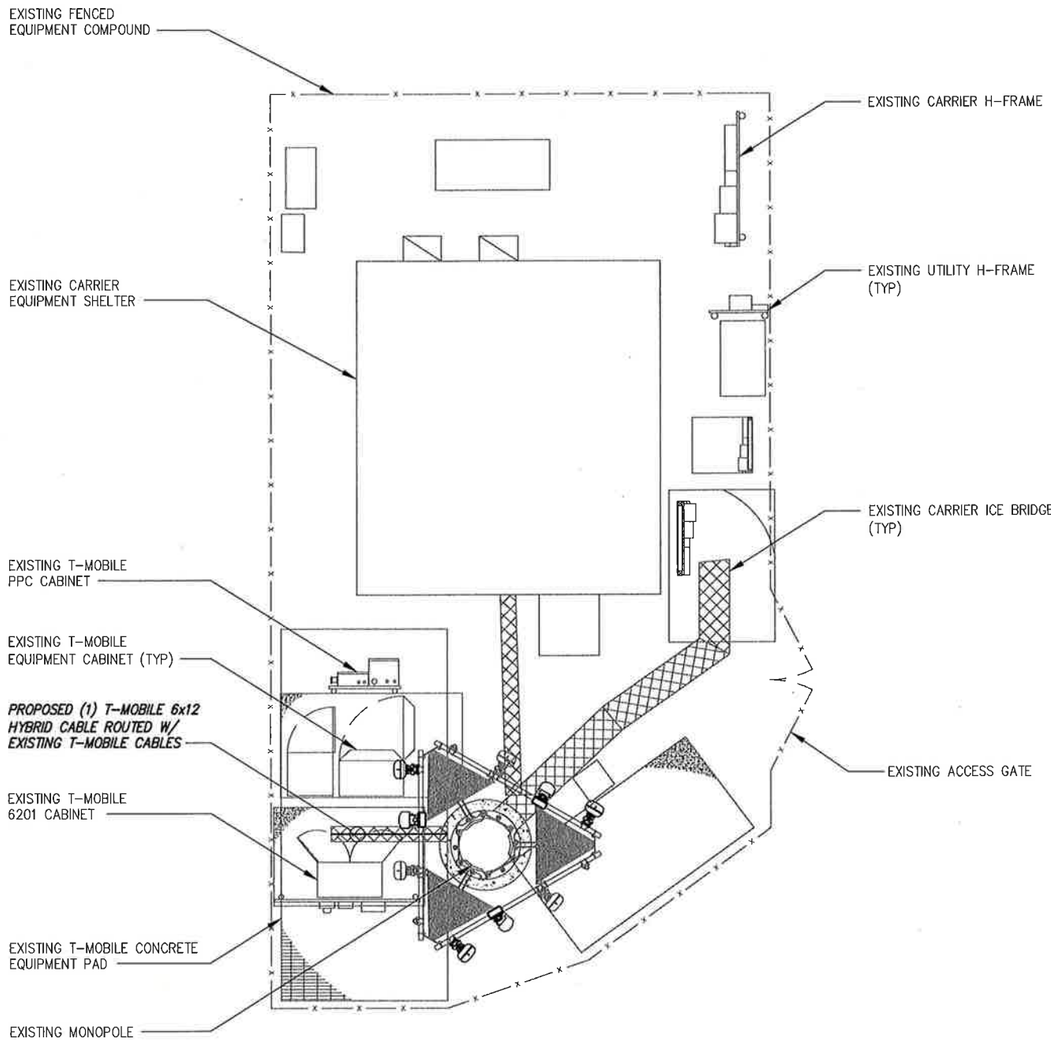
Project Number: 600-007

Project Title:
CT11161D
CT161/JN OF ALBANY 1
439-455 HOMESTEAD AVE
HARTFORD, CT 06105

Prepared For: CROWN CASTLE

Drawing Title: NOTES

Drawing Number: N1



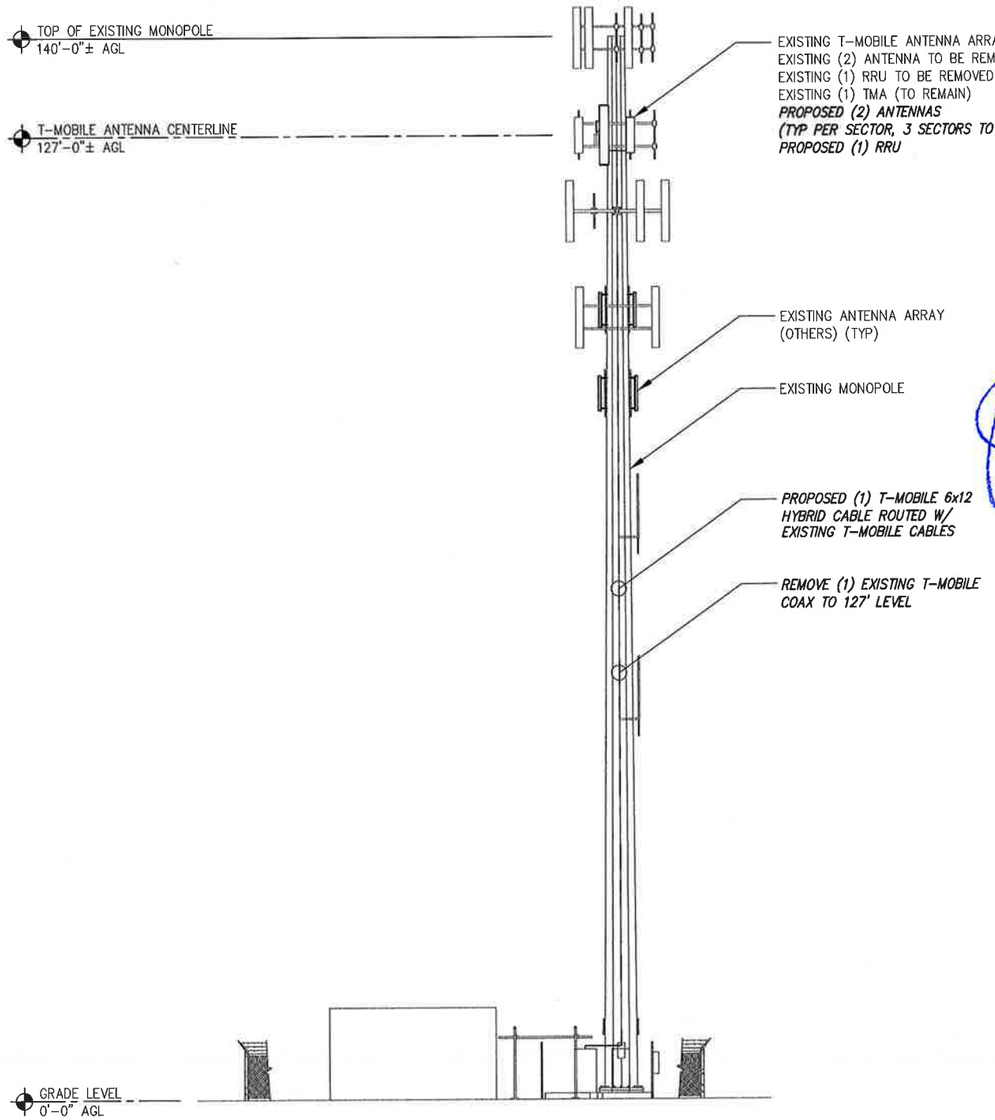
NORTH

1 / C1 PLAN VIEW
SCALE: AS NOTED

GRAPHIC SCALE:

10' 5' 0 5' 10'

SCALE (11x17): 1" = 10'-0"
SCALE (22x34): 1" = 5'-0"



2 / C1 ELEVATION
SCALE: NOT TO SCALE

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No. 24705
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9.4.2018

No	Submittal / Revision	App'd	Date
0	ISSUED FOR CONSTRUCTION	RMS	08/31/18
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Checked: AJD

Project Number: 800-007

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CT11161D
CT161/JN OF ALBANY 1
439-455 HOMESTEAD AVE
HARTFORD, CT 06105

Prepared For:
CROWN CASTLE

Drawing Title
PLAN AND ELEVATION

Drawing Number
C1

SECTOR	ANTENNA POSITION	ANTENNA MODEL #	VENDOR	AZIMUTH	M-TILT	E-TILT	ANTENNA CENTERLINE	TMA/RRU MODEL #	CABLE LENGTH	CABLE TYPE AND QUANTITY
ALPHA	A-1	AIR32 KRD901146-1_B66A_B2A	ERICSSON	30°	0	-	127'-0"	-	EXISTING	(1) 6x12 HCS (SHARED)
	A-2	**APXVAARR24_43_U_NA20**	**RFS**	**30°**	0	-	127'-0"	**(1) RRU 4449 B71+ B12** (1) 1B-AWS	**146'±** EXISTING	**(1) 6X12 HYBRID TRUNK CABLE (SHARED)** (2) 1-5/8" COAX
	A-3	**AIR3246 B66**	**ERICSSON**	**30°**	0	-	127'-0"	-	EXISTING	(1) 6x12 HCS (SHARED)
BETA	B-1	AIR32 KRD901146-1_B66A_B2A	ERICSSON	130°	0	-	127'-0"	-	EXISTING	(1) 6x12 HCS (SHARED)
	B-2	**APXVAARR24_43_U_NA20**	**RFS**	**130°**	0	-	127'-0"	**(1) RRU 4449 B71+ B12** (1) 1B-AWS	**146'±** EXISTING	**(1) 6X12 HYBRID TRUNK CABLE (SHARED)** (2) 1-5/8" COAX
	B-3	**AIR3246 B66**	**ERICSSON**	**130°**	0	-	127'-0"	-	EXISTING	(1) 6x12 HCS (SHARED)
GAMMA	C-1	AIR32 KRD901146-1_B66A_B2A	ERICSSON	270°	0	-	127'-0"	-	EXISTING	(1) 6x12 HCS (SHARED)
	C-2	**APXVAARR24_43_U_NA20**	**RFS**	**270°**	0	-	127'-0"	**(1) RRU 4449 B71+ B12** (1) 1B-AWS	**146'±** EXISTING	**(1) 6X12 HYBRID TRUNK CABLE (SHARED)** (2) 1-5/8" COAX
	C-3	**AIR3246 B66**	**ERICSSON**	**270°**	0	-	127'-0"	-	EXISTING	(1) 6x12 HCS (SHARED)

1 C2 RF SYSTEM CHART
SCALE: NOT TO SCALE

KEY

EXISTING
PROPOSED

ANTENNA LOCATION KEY

VIEWED FROM BEHIND

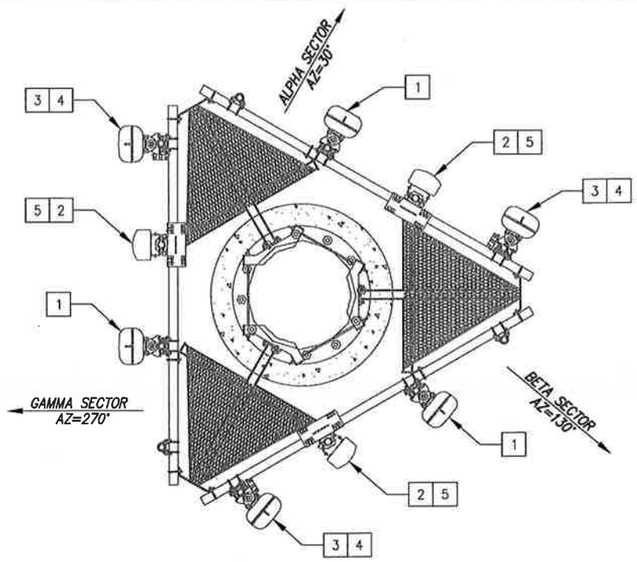
#2 #3 #4

GENERAL NOTES:

1. CONTRACTOR TO VERIFY PROPOSED ANTENNA INFORMATION IS THE MOST CURRENT AT TIME OF CONSTRUCTION.
2. CONTRACTOR TO CONFIRM CABLE LENGTHS FOR ANY PROPOSED CABLES/JUMPERS PRIOR TO CONSTRUCTION.

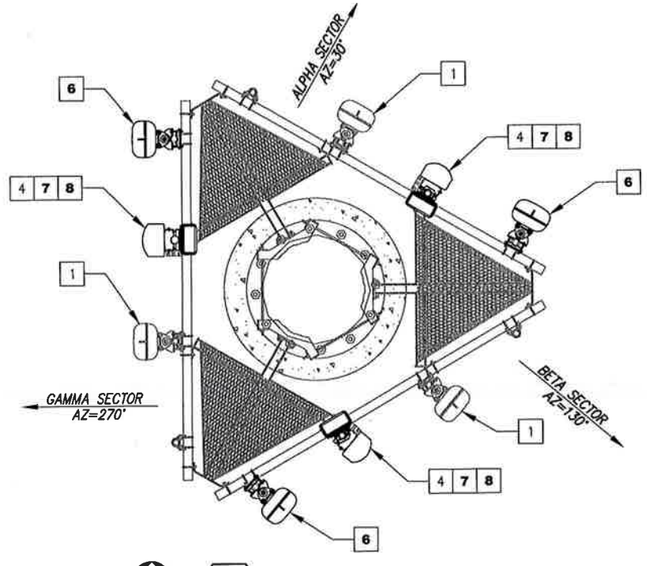
ORIENTATION PLAN KEY

KEY	DESCRIPTION	TYPE	QTY	STATUS
1	AIR32 KRD901146-1_B66A_B2A	ANTENNA	3	TO REMAIN
2	LNX-6515DS-A1M	ANTENNA	3	REMOVED
3	AIR21 KRC118023-1_B2A_B4P	ANTENNA	3	REMOVED
4	1B AWS TMA	TMA	3	TO BE RELOCATED
5	RRUS11 B12	RRU	3	REMOVED
6	**AIR3246 B66**	**ANTENNA**	**3**	**PROPOSED**
7	**APXVAARR24_43_U_NA20**	**ANTENNA**	**3**	**PROPOSED**
8	**RRU-4449 B71+B12**	**RRU**	**3**	**PROPOSED**



NORTH

2 C2 EXISTING ANTENNA ORIENTATION
SCALE: NOT TO SCALE



NORTH

3 C2 PROPOSED ANTENNA ORIENTATION
SCALE: NOT TO SCALE

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No. 24705
10-4-2018
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Checked: AJD

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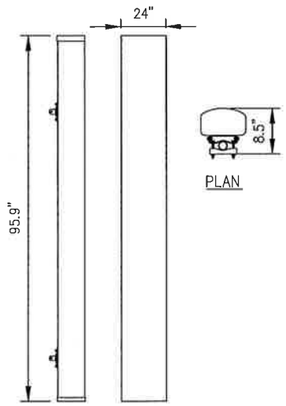
CT11161D
CT161/JN OF ALBANY 1
439-455 HOMESTEAD AVE
HARTFORD, CT 06105

Prepared For:
CROWN CASTLE

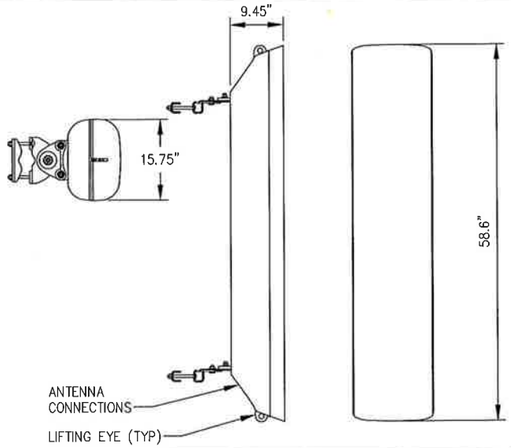
Drawing Title
RF CHART

Drawing Number
C2



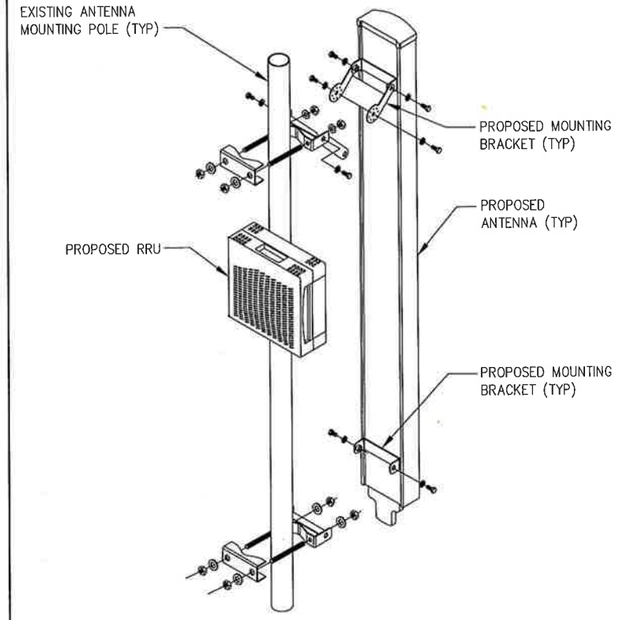
RFS MODEL NO.:	APXVAARR24_43-U-NA20
RADOME MATERIAL:	FIBERGLASS
RADOME COLOR:	LIGHT GREY
DIMENSIONS, HxWxD:	95.9"x24"x8.5"
WEIGHT, W/O MOUNTING KIT:	128 LBS

1 / D1 APX ANTENNA DETAIL
SCALE: NOT TO SCALE

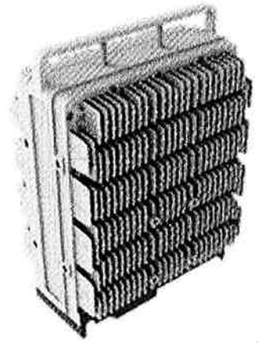


ERICSSON MODEL NO.:	AIR3246 B66
RADOME MATERIAL:	FIBERGLASS, UV RESISTANT
RADOME COLOR:	LIGHT GRAY
DIMENSIONS, HxWxD:	58.6"X15.75"x9.45"
WEIGHT, W/ PRE-MOUNTED BRACKETS:	198.41 LBS

2 / D1 AIR ANTENNA DETAIL
SCALE: NOT TO SCALE



3 / D1 ANTENNA/RRU MOUNTING DETAIL
SCALE: NOT TO SCALE



ERICSSON 4449 B71+B12 SPECIFICATIONS

- HxWxD, (INCHES) : 17.91"x13.19"x10.63"
- WEIGHT (LBS) : 74.96
- COLOR : GRAY

4 / D1 4449 B71+B12 RRU DETAIL
SCALE: NOT TO SCALE

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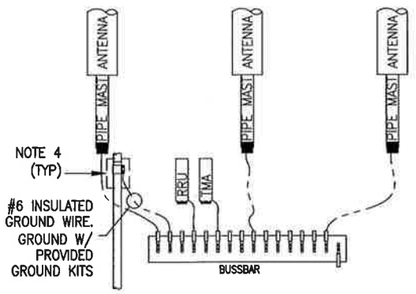
Project Title:
CT11161D
CT161/JN OF
ALBANY_1
439-455 HOMESTEAD AVE
HARTFORD, CT 06105

Prepared For: CROWN CASTLE

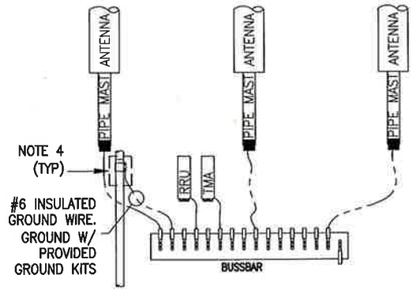
Drawing Title
EQUIPMENT DETAILS

Drawing Number
D1

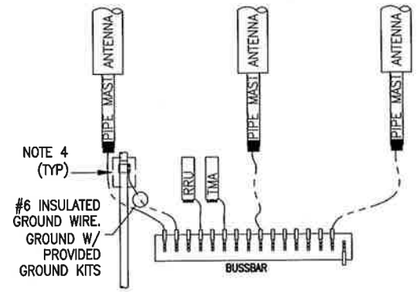
ALPHA SECTOR
(LAYOUT SHOWN GENERICALLY, SEE ANTENNA ORIENTATION)



BETA SECTOR
(LAYOUT SHOWN GENERICALLY, SEE ANTENNA ORIENTATION)

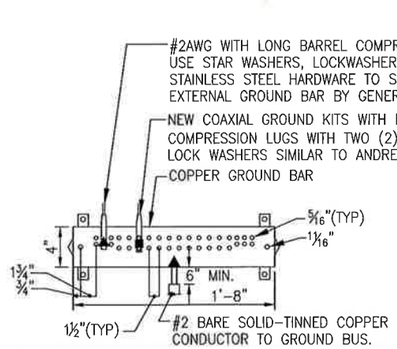


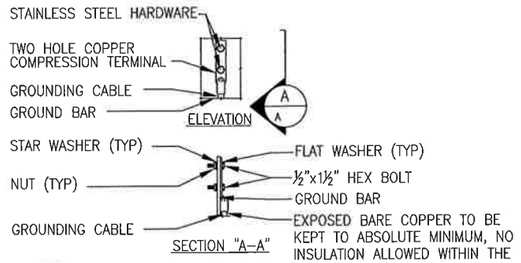
GAMMA SECTOR
(LAYOUT SHOWN GENERICALLY, SEE ANTENNA ORIENTATION)



NOTES:
1. PROVIDE #2AWG GROUNDING CONDUCTOR, U.O.N.
2. PROVIDE BONDING AND GROUNDING CONDUCTORS WITH GREEN TYPE THWN INSULATION, U.O.N.
3. PROVIDE SOLID TINNED BARE COPPER WIRE (BCW) GROUNDING CONDUCTOR.
4. PROVIDE STANDARD COAX OR HYBRID CABLE GROUNDING KIT OR FIELD FABRICATE TO SUIT CONDITIONS. TOTAL LENGTH OF GROUNDING CONDUCTOR SHALL NOT EXCEED 10'-0".
5. PROVIDE GROUNDING ELECTRODES QUANTITY, TYPE AND SIZE AS INDICATED ON SITE GROUNDING PLAN.
6. LEAVE GROUND WIRE COILED UP ABOVE GRADE. CAP END OF CONDUIT.
7. ADD COAX OR HYBRID CABLE GROUND KIT CONNECTION TO BUSSBAR WHEN LENGTH OF CABLE TRAY (FROM TOWER OR MONOPOLE TO EQUIPMENT) IS GREATER THAN 20'-0".
8. ADD #2/0 GREEN INSULATED CONDUCTOR BETWEEN CABLE TRAY AND GRIPSTRUT/COVER.
9. BUSSBARS ARE TO BE TINNED COPPER BARS (¼"X2"X12") MOUNTED ON INSULATORS, U.O.N.
10. GROUND ALL PROPOSED ANTENNAS, DIPLEXERS, TMAS, AND RRUS PER MANU. SPECS.

1 / E1 GROUNDING DIAGRAM
SCALE: NOT TO SCALE

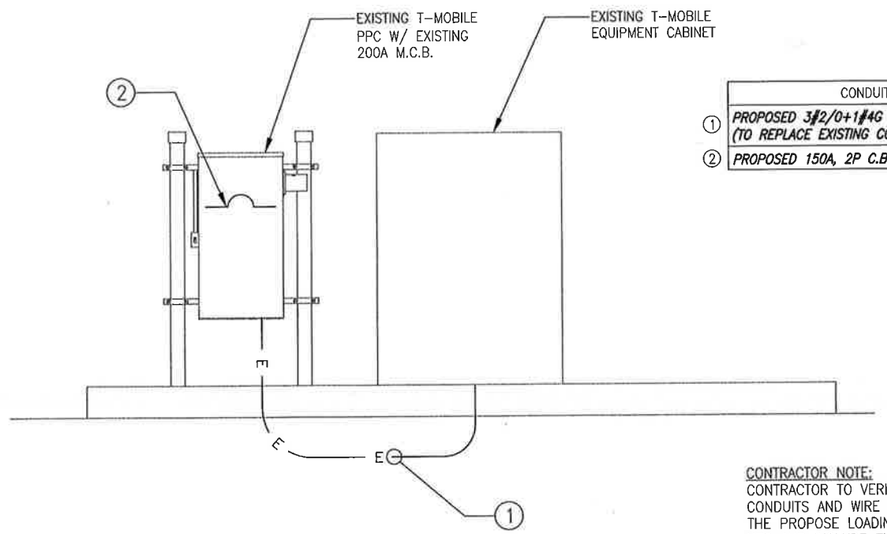




NOTES:
1. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.

NOTES:
1. ALL HARDWARE STAINLESS STEEL COAT ALL SURFACES WITH KOPR-SHIELD BEFORE MATING.
2. FOR GROUND BOND TO STEEL ONLY: INSERT A TOOTH WASHER BETWEEN LUG AND STEEL, COAT ALL SURFACES WITH KOPR-SHIELD.
3. ALL HOLES ARE COUNTERSUNK 1/16".

2 / E1 GROUND BAR CONNECTION DETAIL
SCALE: NOT TO SCALE



CONDUIT SCHEDULE
① PROPOSED 3#2/0+1#4G IN 2" CONDUIT (TO REPLACE EXISTING CONDUCTOR AND CONDUIT)
② PROPOSED 150A, 2P C.B.

CONTRACTOR NOTE:
CONTRACTOR TO VERIFY THAT THE EXISTING CONDUITS AND WIRE SIZES ARE ADEQUATE FOR THE PROPOSE LOADING IN ACCORDANCE WITH NEC AND INCLUDE ELECTRICAL UPGRADES IN THE SCOPE OF WORK AS REQUIRED.

3 / E1 ONE LINE DIAGRAM
SCALE: NOT TO SCALE

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No	Submittal / Revision	Appd	Date
0	ISSUED FOR CONSTRUCTION	RMS	08/31/18
A	ISSUED FOR REVIEW	SL	08/21/18

Drawn: RCD
Designed: MRL
Checked: AJD

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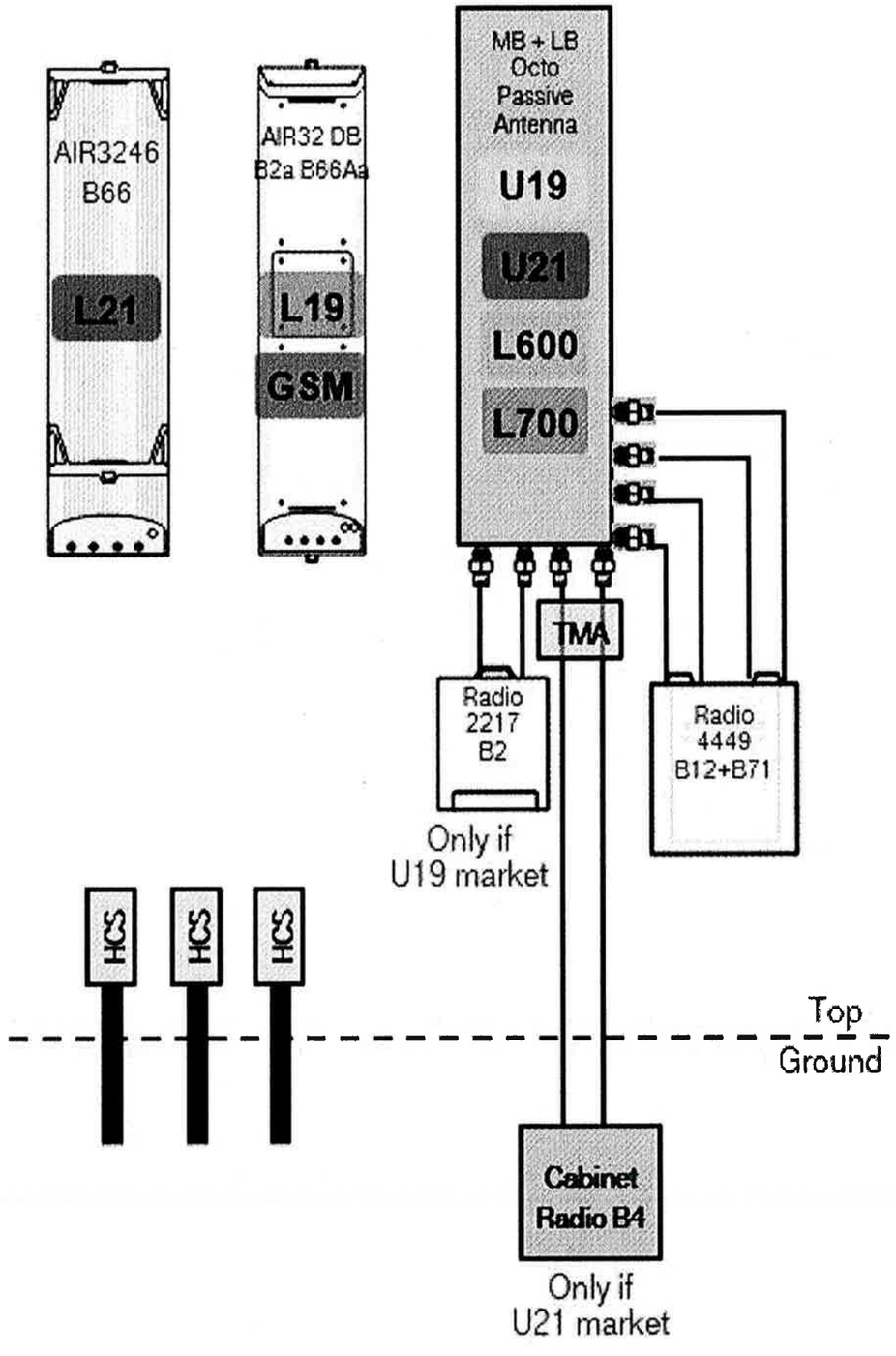
CT11161D
CT161/JN OF ALBANY 1
439-455 HOMESTEAD AVE
HARTFORD, CT 06105

Prepared For: CROWN CASTLE

Drawing Title
GROUNDING & ELECTRICAL DETAILS

Drawing Number
E1



1 / E2 RF PLUMBING DIAGRAM
SCALE: AS NOTED

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HARTFORD, CT 06105

Prepared For:
CROWN CASTLE

Drawing Title
RF PLUMBING DIAGRAM

Drawing Number
E2

Date: **September 21, 2018**

Stephanie Lipscomb
Crown Castle
370 Mallory Station Road, Suite 505
Franklin, TN 37067

Aero Solutions
5555 Central Ave., Suite 100
Boulder, CO 80301
(720) 304-6882

Subject:	**Structural Analysis Report**	
Carrier Designation:	***T-Mobile* Co-Locate**	
	Carrier Site Number:	CT11161D
	Carrier Site Name:	CT161/Jn of Albany_1
Crown Castle Designation:	**Crown Castle BU Number:**	806369
	Crown Castle Site Name:	HRT 094 943225
	Crown Castle JDE Job Number:	512701
	Crown Castle Work Order Number:	1602387
	Crown Castle Application Number:	446222 Rev. 0
Engineering Firm Designation:	**Aero Solutions Project Number:**	003-18-0174
Site Data:	**439-455 Homestead Ave, Hartford, Hartford County, CT 06105** **Latitude *41° 47' 1.61"*, Longitude *-72° 42' 13.66"*** **140 Foot - Monopole Tower**	

Dear Stephanie Lipscomb,

Aero Solutions is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC5: Proposed Equipment Configuration **Sufficient Capacity**

The analysis has been performed in accordance with the TIA-222-H Standard. This analysis utilizes an ultimate 3-second gust wind speed of 125 mph as required by the 2016 Connecticut State Building Code. Exposure Category B and Risk Category II were used in this analysis.

Structural analysis prepared by: Josh Rozina, P.E.

Respectfully submitted by:

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Professional Engineer
CT PE# 30849
Expires: 1/31/2019

STATE OF CONNECTICUT
RYAN C SPALDING
0030849
LICENSED
PROFESSIONAL ENGINEER
9.21.2018

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 140 ft Monopole tower designed by Valmont.

2) ANALYSIS CRITERIA

Building Code:	2016 Connecticut State Building Code
TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	125 mph
Exposure Category:	B
Topographic Factor:	1
Ice Thickness:	2.0 in
Wind Speed with Ice:	50 mph
Service Wind Speed:	60 mph

Table 1 - Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
126.0	128.0	3	Ericsson	AIR -32 B2A/B66AA w/ Mount Pipe	1 1 11	1-1/4 1-3/8 1-5/8
		3	Ericsson	AIR 3246 B66 w/ Mount Pipe		
		3	Ericsson	RADIO 4449 B12/B71		
		3	RFS Celwave	APXVAARR24_43-U-NA20 w/ Mount Pipe		
	126.0	3	RFS Celwave	ATMAA1412D-1A20		
		1	Tower Mounts	Platform Mount [LP 713-1]		

Table 2 - Other Considered Equipment

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
140.0	140.0	3	Alcatel Lucent	RRH2x40-AWS	13	1-5/8
		3	Amphenol	BXA-80063-4BF-EDIN-X w/ Mount Pipe		
		3	Antel	BXA-171063-8BF-EDIN-2 w/ Mount Pipe		
		3	Antel	BXA-171063/8CF-EDIN-2 w/ Mount Pipe		
		3	CSS	X7C-FRO-660-V w/ Mount Pipe		
		6	RFS Celwave	FD9R6004/2C-3L		
		1	Raycap	RRFDC-3315-PF-48		
		1	Tower Mounts	Platform Mount [LP 713-1]		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
117.0	120.0	1	CCI Antennas	TPA-65R-LCUUUU-H8 w/ Mount Pipe	2 4 12	3/8 3/4 1-5/8
		6	CCI Antennas	TPX-070821		
		3	Ericsson	RRUS 32		
		3	Ericsson	RRUS 32 B2		
		3	Ericsson	RRUS-11		
		1	Kmw Communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe		
		6	Powerwave Technologies	7020.00		
		3	Powerwave Technologies	7770.00 w/ Mount Pipe		
		6	Powerwave Technologies	LGP21401		
		1	Powerwave Technologies	P65-16-XLH-RR w/ Mount Pipe		
		1	Powerwave Technologies	P65-17-XLH-RR w/ Mount Pipe		
		2	Quintel Technology	QS66512-3 w/ Mount Pipe		
		2	Raycap	DC6-48-60-18-8F		
	117.0	1	Tower Mounts	Platform Mount [LP 712-1]		
104.0	104.0	3	Alcatel Lucent	800MHz 2X50W RRH W/FILTER	-	-
		3	Alcatel Lucent	PCS 1900MHz 4x45W-65MHz		
		1	Tower Mounts	Pipe Mount [PM 601-3]		
103.0	107.0	2	Dragonwave	Horizon Compact	4 3 3 3	1-1/4 1/4 5/16 1/2
		1	Andrew	VHLP2-180		
		1	Andrew	VHLP2.5-11		
	105.0	3	Alcatel Lucent	TD-RRH8x20-25		
		3	Argus Panel Antennas	LLPX310R-V1 w/ Mount Pipe		
		3	RFS Celwave	APXVSPP18-C-A20 w/ Mount Pipe		
		3	RFS Celwave	APXVTM14-C-120 w/ Mount Pipe		
		3	RFS Celwave	IBC1900BB-1		
		3	RFS Celwave	IBC1900HG-2A		
		3	Samsung Telecommunications	WIMAX DAP HEAD		
	103.0	1	Tower Mounts	Platform Mount [LP 713-1]		
93.0	93.0	3	Kathrein	742 213 w/ Mount Pipe	6	1-5/8
74.0	80.0	1	Antel	BCD-87010	1	7/8
	74.0	1	Tower Mounts	Side Arm Mount [SO 701-1]		
50.0	52.0	1	Lucent	KS24019-L112A	1	7/8
	50.0	1	Tower Mounts	Side Arm Mount [SO 701-1]		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
Geotechnical Reports	Tower Engineering Professionals	2294838	CCISites
Foundation Mapping	Tower Engineering Professionals	2294380	CCISites
Tower Mapping	Tower Engineering Professionals	2294379	CCISites

3.1) Analysis Method

tnxTower (version 8.0.4.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built and maintained in accordance with the manufacturer's specifications.
2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
3) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.
4) The existing base plate grout not considered in this analysis.
5) The following material grades were assumed based on previous experience with similar towers: Pole Shaft A572-65, Base Plate A572-50, Anchor Rods A615-75, Concrete f'c 3 ksi, and Rebar Yield Strength 60 ksi.

This analysis may be affected if any assumptions are not valid or have been made in error. Aero Solutions should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	Φ*P_allow (K)	% Capacity	Pass / Fail
L1	140 - 86.8333	Pole	TP39.223x26.216x0.3125	1	-23.42	2525.79	38.3	Pass
L2	86.8333 - 38	Pole	TP50.56x37.2117x0.4063	2	-38.90	4253.37	50.1	Pass
L3	38 - 0	Pole	TP59.05x48.033x0.5	3	-60.08	6383.20	47.9	Pass
							Summary	
						Pole (L2)	50.1	Pass
						RATING =	**50.1**	**Pass**

Table 5 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	52.3	Pass
1	Base Plate	0	28.0	Pass
1	Base Foundation	0	33.5	Pass
1	Base Foundation Soil Interaction	0	37.8	Pass

Structure Rating (max from all components) =	52.3%

Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity listed.

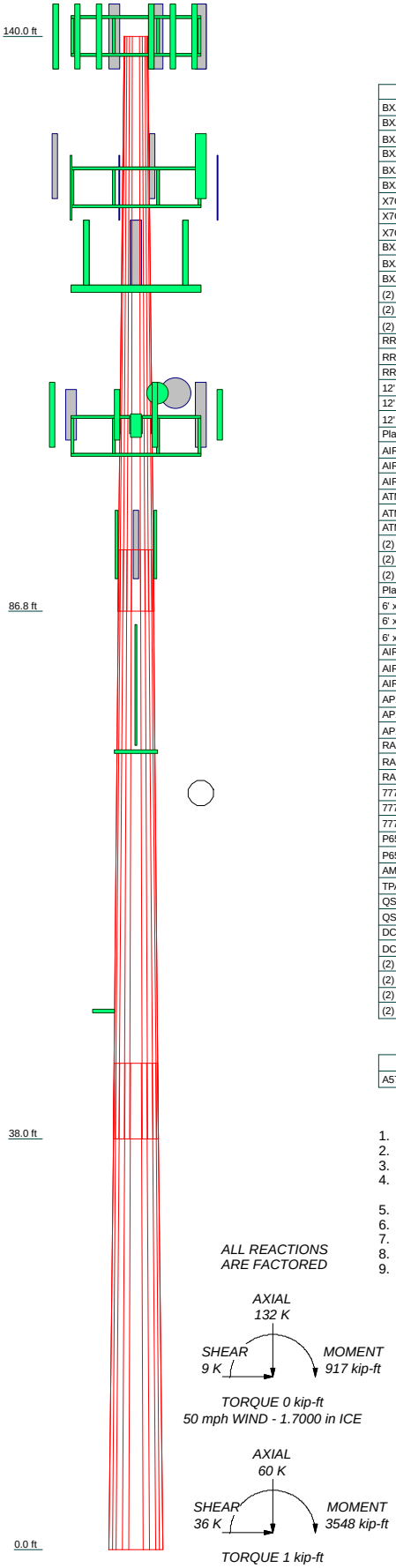
4.1) Recommendations

The tower and its foundation have sufficient capacity to carry the proposed load configuration. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	53.17	12	0.3125	5.67	26.2160	39.2230		5.9
2	54.50	12	0.4063	7.00	37.2117	50.5600	A572-65	10.5
3	45.00	12	0.5000		48.0330	59.0500		13.1
								29.5



ALL REACTIONS ARE FACTORED

AXIAL 132 K

SHEAR 9 K

MOMENT 917 kip-ft

TORQUE 0 kip-ft
50 mph WIND - 1.7000 in ICE

AXIAL 60 K

SHEAR 36 K

MOMENT 3548 kip-ft

TORQUE 1 kip-ft
REACTIONS - 125 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
BXA-80063-4BF-EDIN-X w/ Mount Pipe	140	(2) 7020.00	117
BXA-80063-4BF-EDIN-X w/ Mount Pipe	140	(2) 7020.00	117
BXA-80063-4BF-EDIN-X w/ Mount Pipe	140	RRUS-11	117
BXA-171063/8CF-EDIN-2 w/ Mount Pipe	140	RRUS-11	117
BXA-171063/8CF-EDIN-2 w/ Mount Pipe	140	RRUS-11	117
BXA-171063/8CF-EDIN-2 w/ Mount Pipe	140	RRUS 32 B2	117
X7C-FRO-660-V w/ Mount Pipe	140	RRUS 32 B2	117
X7C-FRO-660-V w/ Mount Pipe	140	RRUS 32 B2	117
X7C-FRO-660-V w/ Mount Pipe	140	RRUS 32	117
BXA-171063-8BF-EDIN-2 w/ Mount Pipe	140	RRUS 32	117
BXA-171063-8BF-EDIN-2 w/ Mount Pipe	140	RRUS 32	117
BXA-171063-8BF-EDIN-2 w/ Mount Pipe	140	(2) TPX-070821	117
(2) FD9R6004/2C-3L	140	(2) TPX-070821	117
(2) FD9R6004/2C-3L	140	(2) TPX-070821	117
(2) FD9R6004/2C-3L	140	Platform Mount [LP 712-1]	117
RRH2x40-AWS	140	8'x2 1/2" Pipe Mount	117
RRH2x40-AWS	140	8'x2 1/2" Pipe Mount	117
RRH2x40-AWS	140	8'x2 1/2" Pipe Mount	117
12' Hor x 4" x 4" Angle Mount	140	800MHz 2X50W RRH W/FILTER	104
12' Hor x 4" x 4" Angle Mount	140	800MHz 2X50W RRH W/FILTER	104
12' Hor x 4" x 4" Angle Mount	140	800MHz 2X50W RRH W/FILTER	104
Platform Mount [LP 713-1]	140	PCS 1900MHz 4x45W-65MHz	104
AIR -32 B2A/B66AA w/ Mount Pipe	126	PCS 1900MHz 4x45W-65MHz	104
AIR -32 B2A/B66AA w/ Mount Pipe	126	PCS 1900MHz 4x45W-65MHz	104
AIR -32 B2A/B66AA w/ Mount Pipe	126	Pipe Mount [PM 601-3]	104
ATMAA1412D-1A20	126	APXVTM14-C-120 w/ Mount Pipe	103
ATMAA1412D-1A20	126	APXVTM14-C-120 w/ Mount Pipe	103
ATMAA1412D-1A20	126	APXVTM14-C-120 w/ Mount Pipe	103
(2) 12' Hor x 4" x 4" Angle Mount	126	LLPX310R-V1 w/ Mount Pipe	103
(2) 12' Hor x 4" x 4" Angle Mount	126	LLPX310R-V1 w/ Mount Pipe	103
(2) 12' Hor x 4" x 4" Angle Mount	126	LLPX310R-V1 w/ Mount Pipe	103
Platform Mount [LP 713-1]	126	APXVSPP18-C-A20 w/ Mount Pipe	103
6' x 2" Mount Pipe	126	APXVSPP18-C-A20 w/ Mount Pipe	103
6' x 2" Mount Pipe	126	APXVSPP18-C-A20 w/ Mount Pipe	103
6' x 2" Mount Pipe	126	TD-RRH8x20-25	103
AIR 3246 B66 w/ Mount Pipe	126	TD-RRH8x20-25	103
AIR 3246 B66 w/ Mount Pipe	126	TD-RRH8x20-25	103
AIR 3246 B66 w/ Mount Pipe	126	WIMAX DAP HEAD	103
APXVAARR24_43-U-NA20 w/ Mount Pipe	126	WIMAX DAP HEAD	103
APXVAARR24_43-U-NA20 w/ Mount Pipe	126	WIMAX DAP HEAD	103
APXVAARR24_43-U-NA20 w/ Mount Pipe	126	IBC1900BB-1	103
RADIO 4449 B12/B71	126	IBC1900BB-1	103
RADIO 4449 B12/B71	126	IBC1900BB-1	103
RADIO 4449 B12/B71	126	IBC1900HG-2A	103
7770.00 w/ Mount Pipe	117	IBC1900HG-2A	103
7770.00 w/ Mount Pipe	117	IBC1900HG-2A	103
7770.00 w/ Mount Pipe	117	Horizon Compact	103
P65-17-XLH-RR w/ Mount Pipe	117	Horizon Compact	103
P65-16-XLH-RR w/ Mount Pipe	117	Platform Mount [LP 713-1]	103
AM-X-CD-16-65-00T-RET w/ Mount Pipe	117	VHLP2-180	103
TPA-65R-LCUUUU-H8 w/ Mount Pipe	117	VHLP2.5-11	103
QS66512-3 w/ Mount Pipe	117	742 213 w/ Mount Pipe	93
QS66512-3 w/ Mount Pipe	117	742 213 w/ Mount Pipe	93
DC6-48-60-18-8F	117	742 213 w/ Mount Pipe	93
DC6-48-60-18-8F	117	BCD-87010	74
(2) LGP21401	117	Side Arm Mount [SO 701-1]	74
(2) LGP21401	117	KS24019-L112A	50
(2) LGP21401	117	Side Arm Mount [SO 701-1]	50
(2) 7020.00	117		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-H Standard.
3. Tower designed for a 125 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 1.70 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TIA-222-H Annex S
9. TOWER RATING: 49.7%

Aero Solutions
5555 Central Ave., Suite 100
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FAX: (720) 304-6883

Job: ***HRT 094 943225 (BU 806369)***		
Project: ***AERO 003-18-0174***		
Client: Crown Castle	Drawn by: JDR	App'd:
Code: TIA-222-H	Date: 09/20/18	Scale: NTS
Path: P:\094_CO_SITES\806369 HRT 094 943225\003-18-0174\Engineering\Aero Calculations\Working RISA\806369 HRT 094 943225.eri		Dwg No. E-1

Tower Input Data

The tower is a monopole.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

- Tower is located in Hartford County, Connecticut.
- Tower base elevation above sea level: 60.00 ft.
- Basic wind speed of 125 mph.
- Risk Category II.
- Exposure Category B.
- Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- Topographic Category: 1.
- Crest Height 0.00 ft.
- Nominal ice thickness of 1.7000 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 50 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60 mph.
- TIA-222-H Annex S.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in pole design is 1.05.
- Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	140.00-86.83	53.17	5.67	12	26.2160	39.2230	0.3125	1.2500	A572-65 (65 ksi)
L2	86.83-38.00	54.50	7.00	12	37.2117	50.5600	0.4063	1.6250	A572-65 (65 ksi)
L3	38.00-0.00	45.00		12	48.0330	59.0500	0.5000	2.0000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	27.0306	26.0654	2232.3752	9.2735	13.5799	164.3883	4523.3974	12.8286	6.1884	19.803
	40.4964	39.1537	7566.4519	13.9300	20.3175	372.4103	15331.6830	19.2703	9.6743	30.958
L2	39.8179	48.1461	8324.7351	13.1763	19.2756	431.8785	16868.1703	23.6960	8.8840	21.868
	52.2003	65.6074	21064.2222	17.9550	26.1901	804.2825	42681.8251	32.2900	12.4613	30.674
L3	51.3253	76.5282	22069.8032	17.0168	24.8811	887.0103	44719.4048	37.6648	11.5329	23.066
	60.9567	94.2655	41247.0150	20.9609	30.5879	1348.4749	83577.6350	46.3946	14.4854	28.971

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 140.00-86.83				1	1	1			
L2 86.83-38.00				1	1	1			
L3 38.00-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
*										
5/8" Step Pegs	A	No	Surface Ar (CaAa)	140.00 - 10.00	1	1	-0.250 -0.250	0.3500		0.49
Safety Line 3/8	A	No	Surface Ar (CaAa)	140.00 - 10.00	1	1	-0.250 -0.250	0.3750		0.22
HB114-1-08U4-M5J(1-1/4)	A	No	Surface Ar (CaAa)	103.00 - 0.00	4	2	-0.250 -0.250	1.5400		1.30
LCF158-50JA(1-5/8)	A	No	Surface Ar (CaAa)	126.00 - 0.00	2	2	0.500 0.500	1.9800		0.80
LDF5-50A(7/8)	A	No	Surface Ar (CaAa)	126.00 - 0.00	1	1	-0.250 -0.250	1.0300		0.33
MLE HYBRID 9POWER/18FIBER RL 2(1-5/8)	A	No	Surface Ar (CaAa)	126.00 - 103.00	3	3	-0.250 -0.250	1.6250		1.07
*										
2" Rigid Conduit	C	No	Surface Ar (CaAa)	117.00 - 0.00	1	1	0.000 0.000	2.0000		2.80

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
LDF7-50A(1-5/8)	C	No	Surface Ar (CaAa)	117.00 - 0.00	12	1	0.000 0.000	1.9800		0.82
FB-L98B-034-XXX(3/8)	C	No	Surface Ar (CaAa)	117.00 - 0.00	1	1	0.000 0.000	0.3937		0.06
WR-VG86ST-BRD(3/4)	C	No	Surface Ar (CaAa)	117.00 - 0.00	2	2	0.000 0.000	0.7950		0.58
*										
LDF5-50A(7/8)	B	No	Surface Ar (CaAa)	74.00 - 50.00	1	1	0.250 0.250	1.0300		0.33
LDF5-50A(7/8)	B	No	Surface Ar (CaAa)	50.00 - 0.00	1	1	0.250 0.250	1.0300		0.33
*										

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
*****									
2" Rigid Conduit	A	No	No	CaAa (Out Of Face)	103.00 - 6.00	2	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	2.80 4.33 6.47 12.57
ATCB-B01-005(5/16)	A	No	No	Inside Pole	103.00 - 0.00	3	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.08 0.08 0.08 0.08
FSJ4-50B(1/2)	A	No	No	CaAa (Out Of Face)	103.00 - 0.00	3	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.14 0.77 2.01 6.32
LDF1-50A(1/4)	A	No	No	Inside Pole	103.00 - 0.00	3	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.06 0.06 0.06 0.06
*									
HCS 6X12 6AWG(1-3/8)	A	No	No	Inside Pole	126.00 - 0.00	1	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	1.70 1.70 1.70 1.70
LCF158-50JA(1-5/8)	A	No	No	Inside Pole	126.00 - 0.00	6	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.80 0.80 0.80 0.80
MLE HYBRID 9POWER/18FIBER RL 2(1-5/8)	A	No	No	CaAa (Out Of Face)	103.00 - 0.00	3	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	1.07 2.37 4.28 9.93
FB-L98B-034-XXXXXX(3/8)	C	No	No	Inside Pole	117.00 - 0.00	1	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.05 0.05 0.05 0.05
WR-VG86ST-BRD(3/4)	C	No	No	Inside Pole	117.00 - 0.00	2	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.58 0.58 0.58 0.58

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
2" Rigid Conduit	C	No	No	Inside Pole	117.00 - 0.00	1	No Ice	0.00	2.80
							1/2" Ice	0.00	2.80
							1" Ice	0.00	2.80
							2" Ice	0.00	2.80
*									
AVA7-50(1-5/8)	A	No	No	CaAa (Out Of Face)	93.00 - 0.00	6	No Ice	0.00	0.70
							1/2" Ice	0.00	2.23
							1" Ice	0.00	4.38
							2" Ice	0.00	10.50
*									
LDF7-50A(1-5/8)	C	No	No	Inside Pole	140.00 - 0.00	12	No Ice	0.00	0.82
							1/2" Ice	0.00	0.82
							1" Ice	0.00	0.82
							2" Ice	0.00	0.82
HB158-1-08U8-S8J 18(1-5/8)	C	No	No	Inside Pole	140.00 - 0.00	1	No Ice	0.00	1.30
							1/2" Ice	0.00	1.30
							1" Ice	0.00	1.30
							2" Ice	0.00	1.30
*									

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	140.00-86.83	A	0.000	0.000	39.591	0.000	0.71
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	17.991	0.000	1.13
L2	86.83-38.00	A	0.000	0.000	42.949	0.000	1.38
		B	0.000	0.000	3.708	0.000	0.01
		C	0.000	0.000	29.123	0.000	1.42
L3	38.00-0.00	A	0.000	0.000	32.696	0.000	1.03
		B	0.000	0.000	3.914	0.000	0.01
		C	0.000	0.000	22.662	0.000	1.10

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	140.00-86.83	A	1.921	0.000	0.000	141.043	0.000	3.90
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	68.450	0.000	5.12
L2	86.83-38.00	A	1.811	0.000	0.000	154.740	0.000	9.22
		B		0.000	0.000	17.540	0.000	0.26
		C		0.000	0.000	110.806	0.000	7.87
L3	38.00-0.00	A	1.604	0.000	0.000	107.828	0.000	6.47
		B		0.000	0.000	17.675	0.000	0.25
		C		0.000	0.000	82.658	0.000	5.70

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L1	140.00-86.83	-2.1370	0.5828	-3.7074	1.5718
L2	86.83-38.00	-1.8341	1.2894	-3.3030	2.7994
L3	38.00-0.00	-1.7124	1.2793	-2.9802	2.9962

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	2	5/8" Step Pegs	86.83 - 140.00	1.0000	1.0000
L1	3	Safety Line 3/8	86.83 - 140.00	1.0000	1.0000
L1	9	HB114-1-08U4-M5J(1-1/4)	86.83 - 103.00	1.0000	1.0000
L1	14	LCF158-50JA(1-5/8)	86.83 - 126.00	1.0000	1.0000
L1	15	LDF5-50A(7/8)	86.83 - 126.00	1.0000	1.0000
L1	17	MLE HYBRID 9POWER/18FIBER RL 2(1-5/8)	103.00 - 126.00	1.0000	1.0000
L1	19	2" Rigid Conduit	86.83 - 117.00	1.0000	1.0000
L1	22	LDF7-50A(1-5/8)	86.83 - 117.00	1.0000	1.0000
L1	23	FB-L98B-034-XXX(3/8)	86.83 - 117.00	1.0000	1.0000
L1	24	WR-VG86ST-BRD(3/4)	86.83 - 117.00	1.0000	1.0000
L1	27	LDF5-50A(7/8)	86.83 - 74.00	1.0000	1.0000
L1	28	LDF5-50A(7/8)	86.83 - 50.00	1.0000	1.0000
L2	2	5/8" Step Pegs	38.00 - 86.83	1.0000	1.0000
L2	3	Safety Line 3/8	38.00 - 86.83	1.0000	1.0000
L2	9	HB114-1-08U4-M5J(1-1/4)	38.00 - 86.83	1.0000	1.0000
L2	14	LCF158-50JA(1-5/8)	38.00 - 86.83	1.0000	1.0000
L2	15	LDF5-50A(7/8)	38.00 - 86.83	1.0000	1.0000
L2	19	2" Rigid Conduit	38.00 - 86.83	1.0000	1.0000
L2	22	LDF7-50A(1-5/8)	38.00 - 86.83	1.0000	1.0000
L2	23	FB-L98B-034-XXX(3/8)	38.00 - 86.83	1.0000	1.0000
L2	24	WR-VG86ST-BRD(3/4)	38.00 - 86.83	1.0000	1.0000
L2	28	LDF5-50A(7/8)	38.00 - 50.00	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
BXA-80063-4BF-EDIN-X w/ Mount Pipe	A	From Leg	4.00 -2.00 0.00	-30.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.62 4.99 5.36 6.13	3.47 4.04 4.63 5.83	0.03 0.07 0.12 0.23
BXA-80063-4BF-EDIN-X w/ Mount Pipe	B	From Leg	4.00 -2.00 0.00	-30.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.62 4.99 5.36 6.13	3.47 4.04 4.63 5.83	0.03 0.07 0.12 0.23
BXA-80063-4BF-EDIN-X w/ Mount Pipe	C	From Leg	4.00 -2.00 0.00	-35.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.62 4.99 5.36 6.13	3.47 4.04 4.63 5.83	0.03 0.07 0.12 0.23
BXA-171063/8CF-EDIN-2 w/ Mount Pipe	A	From Leg	4.00 2.00 0.00	-30.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.18 3.56 3.93 4.69	3.35 3.97 4.60 5.89	0.03 0.06 0.10 0.19
BXA-171063/8CF-EDIN-2 w/ Mount Pipe	B	From Leg	4.00 2.00 0.00	-30.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.18 3.56 3.93 4.69	3.35 3.97 4.60 5.89	0.03 0.06 0.10 0.19
BXA-171063/8CF-EDIN-2 w/ Mount Pipe	C	From Leg	4.00 2.00 0.00	-35.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.18 3.56 3.93 4.69	3.35 3.97 4.60 5.89	0.03 0.06 0.10 0.19
X7C-FRO-660-Vw/ Mount Pipe	A	From Leg	4.00 6.00 0.00	30.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice	9.79 10.36 10.90 12.00	7.53 8.72 9.62 11.45	0.06 0.14 0.22 0.43
X7C-FRO-660-Vw/ Mount Pipe	B	From Leg	4.00 6.00 0.00	30.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice	9.79 10.36 10.90 12.00	7.53 8.72 9.62 11.45	0.06 0.14 0.22 0.43
X7C-FRO-660-Vw/ Mount Pipe	C	From Leg	4.00 6.00 0.00	30.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice	9.79 10.36 10.90 12.00	7.53 8.72 9.62 11.45	0.06 0.14 0.22 0.43
BXA-171063-8BF-EDIN-2 w/ Mount Pipe	A	From Leg	4.00 6.00 0.00	30.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.18 3.56 3.93 4.69	3.35 3.97 4.60 5.89	0.03 0.06 0.10 0.19
BXA-171063-8BF-EDIN-2 w/ Mount Pipe	B	From Leg	4.00 6.00 0.00	30.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.18 3.56 3.93 4.69	3.35 3.97 4.60 5.89	0.03 0.06 0.10 0.19
BXA-171063-8BF-EDIN-2 w/ Mount Pipe	C	From Leg	4.00 6.00 0.00	30.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.18 3.56 3.93 4.69	3.35 3.97 4.60 5.89	0.03 0.06 0.10 0.19
(2) FD9R6004/2C-3L	A	From Leg	4.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.31 0.39 0.47 0.65	0.08 0.12 0.17 0.29	0.00 0.01 0.01 0.02
(2) FD9R6004/2C-3L	B	From Leg	4.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.31 0.39 0.47 0.65	0.08 0.12 0.17 0.29	0.00 0.01 0.01 0.02
(2) FD9R6004/2C-3L	C	From Leg	4.00	0.0000	140.00	No Ice	0.31	0.08	0.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2" Ice	0.39	0.12	0.01
			0.00			1" Ice	0.47	0.17	0.01
						2" Ice	0.65	0.29	0.02
RRH2x40-AWS	A	From Leg	4.00	0.0000	140.00	No Ice	2.16	1.42	0.04
			0.00			1/2" Ice	2.36	1.59	0.06
			0.00			1" Ice	2.57	1.77	0.08
						2" Ice	3.00	2.14	0.13
RRH2x40-AWS	B	From Leg	4.00	0.0000	140.00	No Ice	2.16	1.42	0.04
			0.00			1/2" Ice	2.36	1.59	0.06
			0.00			1" Ice	2.57	1.77	0.08
						2" Ice	3.00	2.14	0.13
RRH2x40-AWS	C	From Leg	4.00	0.0000	140.00	No Ice	2.16	1.42	0.04
			0.00			1/2" Ice	2.36	1.59	0.06
			0.00			1" Ice	2.57	1.77	0.08
						2" Ice	3.00	2.14	0.13
RRFDC-3315-PF-48	C	From Leg	4.00	0.0000	140.00	No Ice	3.71	2.19	0.02
			0.00			1/2" Ice	3.95	2.39	0.05
			0.00			1" Ice	4.20	2.61	0.09
						2" Ice	4.72	3.05	0.17
12' Hor x 4" x 4" Angle Mount	A	From Face	4.00	0.0000	140.00	No Ice	4.80	0.13	0.21
			0.00			1/2" Ice	5.63	0.18	0.25
			0.00			1" Ice	6.46	0.24	0.30
						2" Ice	8.15	0.37	0.44
12' Hor x 4" x 4" Angle Mount	B	From Face	4.00	0.0000	140.00	No Ice	4.80	0.13	0.21
			0.00			1/2" Ice	5.63	0.18	0.25
			0.00			1" Ice	6.46	0.24	0.30
						2" Ice	8.15	0.37	0.44
12' Hor x 4" x 4" Angle Mount	C	From Face	4.00	0.0000	140.00	No Ice	4.80	0.13	0.21
			0.00			1/2" Ice	5.63	0.18	0.25
			0.00			1" Ice	6.46	0.24	0.30
						2" Ice	8.15	0.37	0.44
Platform Mount [LP 713-1]	C	None		0.0000	140.00	No Ice	31.27	31.27	1.51
						1/2" Ice	39.68	39.68	1.93
						1" Ice	48.09	48.09	2.35
						2" Ice	64.91	64.91	3.19
***									
AIR -32 B2A/B66AA w/ Mount Pipe	A	From Face	4.00	30.0000	126.00	No Ice	6.75	6.07	0.15
			-6.00			1/2" Ice	7.20	6.87	0.21
			2.00			1" Ice	7.65	7.58	0.28
						2" Ice	8.57	9.06	0.44
AIR -32 B2A/B66AA w/ Mount Pipe	B	From Face	4.00	10.0000	126.00	No Ice	6.75	6.07	0.15
			-6.00			1/2" Ice	7.20	6.87	0.21
			2.00			1" Ice	7.65	7.58	0.28
						2" Ice	8.57	9.06	0.44
AIR -32 B2A/B66AA w/ Mount Pipe	C	From Face	4.00	30.0000	126.00	No Ice	6.75	6.07	0.15
			-6.00			1/2" Ice	7.20	6.87	0.21
			2.00			1" Ice	7.65	7.58	0.28
						2" Ice	8.57	9.06	0.44
ATMAA1412D-1A20	A	From Face	4.00	30.0000	126.00	No Ice	1.00	0.41	0.01
			0.00			1/2" Ice	1.13	0.50	0.02
			0.00			1" Ice	1.26	0.59	0.03
						2" Ice	1.55	0.81	0.06
ATMAA1412D-1A20	B	From Face	4.00	10.0000	126.00	No Ice	1.00	0.41	0.01
			0.00			1/2" Ice	1.13	0.50	0.02
			0.00			1" Ice	1.26	0.59	0.03
						2" Ice	1.55	0.81	0.06
ATMAA1412D-1A20	C	From Face	4.00	30.0000	126.00	No Ice	1.00	0.41	0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2" Ice	1.13	0.50	0.02
			0.00			1" Ice	1.26	0.59	0.03
						2" Ice	1.55	0.81	0.06
(2) 12' Hor x 4" x 4" Angle	A	From Face	4.00	30.0000	126.00	No Ice	4.80	0.13	0.21
Mount			0.00			1/2" Ice	5.63	0.18	0.25
			0.00			1" Ice	6.46	0.24	0.30
						2" Ice	8.15	0.37	0.44
(2) 12' Hor x 4" x 4" Angle	B	From Face	4.00	10.0000	126.00	No Ice	4.80	0.13	0.21
Mount			0.00			1/2" Ice	5.63	0.18	0.25
			0.00			1" Ice	6.46	0.24	0.30
						2" Ice	8.15	0.37	0.44
(2) 12' Hor x 4" x 4" Angle	C	From Face	4.00	30.0000	126.00	No Ice	4.80	0.13	0.21
Mount			0.00			1/2" Ice	5.63	0.18	0.25
			0.00			1" Ice	6.46	0.24	0.30
						2" Ice	8.15	0.37	0.44
Platform Mount [LP 713-1]	C	None		0.0000	126.00	No Ice	31.27	31.27	1.51
						1/2" Ice	39.68	39.68	1.93
						1" Ice	48.09	48.09	2.35
						2" Ice	64.91	64.91	3.19
6' x 2" Mount Pipe	A	From Face	4.00	30.0000	126.00	No Ice	1.43	1.43	0.02
			6.00			1/2" Ice	1.92	1.92	0.03
			0.00			1" Ice	2.29	2.29	0.05
						2" Ice	3.06	3.06	0.09
6' x 2" Mount Pipe	B	From Face	4.00	10.0000	126.00	No Ice	1.43	1.43	0.02
			6.00			1/2" Ice	1.92	1.92	0.03
			0.00			1" Ice	2.29	2.29	0.05
						2" Ice	3.06	3.06	0.09
6' x 2" Mount Pipe	C	From Face	4.00	30.0000	126.00	No Ice	1.43	1.43	0.02
			6.00			1/2" Ice	1.92	1.92	0.03
			0.00			1" Ice	2.29	2.29	0.05
						2" Ice	3.06	3.06	0.09
AIR 3246 B66 w/ Mount Pipe	A	From Leg	4.00	30.0000	126.00	No Ice	8.18	6.56	0.20
			0.00			1/2" Ice	8.66	7.39	0.27
			2.00			1" Ice	9.12	8.13	0.35
						2" Ice	10.09	9.65	0.53
AIR 3246 B66 w/ Mount Pipe	B	From Leg	4.00	10.0000	126.00	No Ice	8.18	6.56	0.20
			0.00			1/2" Ice	8.66	7.39	0.27
			2.00			1" Ice	9.12	8.13	0.35
						2" Ice	10.09	9.65	0.53
AIR 3246 B66 w/ Mount Pipe	C	From Leg	4.00	30.0000	126.00	No Ice	8.18	6.56	0.20
			0.00			1/2" Ice	8.66	7.39	0.27
			2.00			1" Ice	9.12	8.13	0.35
						2" Ice	10.09	9.65	0.53
APXVAARR24_43-U-NA20	A	From Leg	4.00	30.0000	126.00	No Ice	20.48	11.02	0.16
w/ Mount Pipe			0.00			1/2" Ice	21.23	12.55	0.30
			2.00			1" Ice	21.99	14.10	0.44
						2" Ice	23.44	16.45	0.78
APXVAARR24_43-U-NA20	B	From Leg	4.00	10.0000	126.00	No Ice	20.48	11.02	0.16
w/ Mount Pipe			0.00			1/2" Ice	21.23	12.55	0.30
			2.00			1" Ice	21.99	14.10	0.44
						2" Ice	23.44	16.45	0.78
APXVAARR24_43-U-NA20	C	From Leg	4.00	30.0000	126.00	No Ice	20.48	11.02	0.16
w/ Mount Pipe			0.00			1/2" Ice	21.23	12.55	0.30
			2.00			1" Ice	21.99	14.10	0.44
						2" Ice	23.44	16.45	0.78
RADIO 4449 B12/B71	A	From Leg	4.00	30.0000	126.00	No Ice	1.65	1.30	0.08
			0.00			1/2" Ice	1.81	1.44	0.09

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			2.00			1" Ice	1.98	1.60	0.11
						2" Ice	2.34	1.92	0.16
RADIO 4449 B12/B71	B	From Leg	4.00	10.0000	126.00	No Ice	1.65	1.30	0.08
			0.00			1/2" Ice	1.81	1.44	0.09
			2.00			1" Ice	1.98	1.60	0.11
						2" Ice	2.34	1.92	0.16
RADIO 4449 B12/B71	C	From Leg	4.00	30.0000	126.00	No Ice	1.65	1.30	0.08
			0.00			1/2" Ice	1.81	1.44	0.09
			2.00			1" Ice	1.98	1.60	0.11
						2" Ice	2.34	1.92	0.16
****									
7770.00 w/ Mount Pipe	A	From Leg	4.00	30.0000	117.00	No Ice	5.75	4.25	0.06
			0.00			1/2" Ice	6.18	5.01	0.10
			3.00			1" Ice	6.61	5.71	0.16
						2" Ice	7.49	7.16	0.29
7770.00 w/ Mount Pipe	B	From Leg	4.00	30.0000	117.00	No Ice	5.75	4.25	0.06
			0.00			1/2" Ice	6.18	5.01	0.10
			3.00			1" Ice	6.61	5.71	0.16
						2" Ice	7.49	7.16	0.29
7770.00 w/ Mount Pipe	C	From Leg	4.00	30.0000	117.00	No Ice	5.75	4.25	0.06
			0.00			1/2" Ice	6.18	5.01	0.10
			3.00			1" Ice	6.61	5.71	0.16
						2" Ice	7.49	7.16	0.29
P65-17-XLH-RR w/ Mount Pipe	A	From Leg	4.00	30.0000	117.00	No Ice	11.70	8.94	0.09
			0.00			1/2" Ice	12.42	10.45	0.18
			3.00			1" Ice	13.15	11.99	0.27
						2" Ice	14.52	14.31	0.50
P65-16-XLH-RR w/ Mount Pipe	C	From Leg	4.00	30.0000	117.00	No Ice	8.37	6.36	0.08
			0.00			1/2" Ice	8.93	7.54	0.14
			3.00			1" Ice	9.46	8.43	0.22
						2" Ice	10.53	10.24	0.39
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.00	30.0000	117.00	No Ice	8.26	6.30	0.07
			0.00			1/2" Ice	8.82	7.48	0.14
			3.00			1" Ice	9.35	8.37	0.21
						2" Ice	10.42	10.18	0.38
TPA-65R-LCUUUU-H8 w/ Mount Pipe	A	From Leg	4.00	30.0000	117.00	No Ice	13.54	10.96	0.11
			0.00			1/2" Ice	14.24	12.49	0.22
			3.00			1" Ice	14.95	14.04	0.33
						2" Ice	16.31	16.39	0.59
QS66512-3 w/ Mount Pipe	B	From Leg	4.00	30.0000	117.00	No Ice	8.37	8.46	0.13
			0.00			1/2" Ice	8.93	9.66	0.21
			3.00			1" Ice	9.46	10.55	0.29
						2" Ice	10.53	12.35	0.49
QS66512-3 w/ Mount Pipe	C	From Leg	4.00	30.0000	117.00	No Ice	8.37	8.46	0.13
			0.00			1/2" Ice	8.93	9.66	0.21
			3.00			1" Ice	9.46	10.55	0.29
						2" Ice	10.53	12.35	0.49
DC6-48-60-18-8F	A	From Leg	1.00	30.0000	117.00	No Ice	2.20	2.20	0.02
			0.00			1/2" Ice	2.40	2.40	0.04
			3.00			1" Ice	2.60	2.60	0.07
						2" Ice	3.04	3.04	0.13
DC6-48-60-18-8F	B	From Leg	1.00	30.0000	117.00	No Ice	2.20	2.20	0.02
			0.00			1/2" Ice	2.40	2.40	0.04
			3.00			1" Ice	2.60	2.60	0.07
						2" Ice	3.04	3.04	0.13
(2) LGP21401	A	From Leg	4.00	30.0000	117.00	No Ice	1.10	0.21	0.01
			0.00			1/2" Ice	1.24	0.27	0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			3.00			1" Ice	1.38	0.35	0.03
						2" Ice	1.69	0.52	0.05
(2) LGP21401	B	From Leg	4.00	30.0000	117.00	No Ice	1.10	0.21	0.01
			0.00			1/2" Ice	1.24	0.27	0.02
			3.00			1" Ice	1.38	0.35	0.03
						2" Ice	1.69	0.52	0.05
(2) LGP21401	C	From Leg	4.00	30.0000	117.00	No Ice	1.10	0.21	0.01
			0.00			1/2" Ice	1.24	0.27	0.02
			3.00			1" Ice	1.38	0.35	0.03
						2" Ice	1.69	0.52	0.05
(2) 7020.00	A	From Leg	4.00	30.0000	117.00	No Ice	0.10	0.17	0.00
			0.00			1/2" Ice	0.15	0.24	0.01
			3.00			1" Ice	0.20	0.31	0.01
						2" Ice	0.33	0.48	0.02
(2) 7020.00	B	From Leg	4.00	30.0000	117.00	No Ice	0.10	0.17	0.00
			0.00			1/2" Ice	0.15	0.24	0.01
			3.00			1" Ice	0.20	0.31	0.01
						2" Ice	0.33	0.48	0.02
(2) 7020.00	C	From Leg	4.00	30.0000	117.00	No Ice	0.10	0.17	0.00
			0.00			1/2" Ice	0.15	0.24	0.01
			3.00			1" Ice	0.20	0.31	0.01
						2" Ice	0.33	0.48	0.02
RRUS-11	A	From Leg	4.00	30.0000	117.00	No Ice	2.78	1.19	0.05
			0.00			1/2" Ice	2.99	1.33	0.07
			3.00			1" Ice	3.21	1.49	0.09
						2" Ice	3.66	1.83	0.15
RRUS-11	B	From Leg	4.00	30.0000	117.00	No Ice	2.78	1.19	0.05
			0.00			1/2" Ice	2.99	1.33	0.07
			3.00			1" Ice	3.21	1.49	0.09
						2" Ice	3.66	1.83	0.15
RRUS-11	C	From Leg	4.00	30.0000	117.00	No Ice	2.78	1.19	0.05
			0.00			1/2" Ice	2.99	1.33	0.07
			3.00			1" Ice	3.21	1.49	0.09
						2" Ice	3.66	1.83	0.15
RRUS 32 B2	A	From Leg	4.00	30.0000	117.00	No Ice	2.73	1.67	0.05
			0.00			1/2" Ice	2.95	1.86	0.07
			3.00			1" Ice	3.18	2.05	0.10
						2" Ice	3.66	2.46	0.16
RRUS 32 B2	B	From Leg	4.00	30.0000	117.00	No Ice	2.73	1.67	0.05
			0.00			1/2" Ice	2.95	1.86	0.07
			3.00			1" Ice	3.18	2.05	0.10
						2" Ice	3.66	2.46	0.16
RRUS 32 B2	C	From Leg	4.00	30.0000	117.00	No Ice	2.73	1.67	0.05
			0.00			1/2" Ice	2.95	1.86	0.07
			3.00			1" Ice	3.18	2.05	0.10
						2" Ice	3.66	2.46	0.16
RRUS 32	A	From Leg	4.00	30.0000	117.00	No Ice	2.86	1.78	0.06
			0.00			1/2" Ice	3.08	1.97	0.08
			3.00			1" Ice	3.32	2.17	0.10
						2" Ice	3.81	2.58	0.16
RRUS 32	B	From Leg	4.00	30.0000	117.00	No Ice	2.86	1.78	0.06
			0.00			1/2" Ice	3.08	1.97	0.08
			3.00			1" Ice	3.32	2.17	0.10
						2" Ice	3.81	2.58	0.16
RRUS 32	C	From Leg	4.00	30.0000	117.00	No Ice	2.86	1.78	0.06
			0.00			1/2" Ice	3.08	1.97	0.08
			3.00			1" Ice	3.32	2.17	0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	3.81	2.58	0.16
(2) TPX-070821	A	From Leg	4.00 0.00 3.00	30.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.47 0.56 0.66 0.87	0.10 0.15 0.20 0.33	0.01 0.01 0.02 0.03
(2) TPX-070821	B	From Leg	4.00 0.00 3.00	30.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.47 0.56 0.66 0.87	0.10 0.15 0.20 0.33	0.01 0.01 0.02 0.03
(2) TPX-070821	C	From Leg	4.00 0.00 3.00	30.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.47 0.56 0.66 0.87	0.10 0.15 0.20 0.33	0.01 0.01 0.02 0.03
Platform Mount [LP 712-1]	C	None		0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	24.53 29.94 35.35 46.17	24.53 29.94 35.35 46.17	1.34 1.65 1.96 2.58
8'x2 1/2" Pipe Mount	A	From Leg	4.00 0.00 2.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.30 3.13 3.62 4.62	2.30 3.13 3.62 4.62	0.04 0.06 0.08 0.14
8'x2 1/2" Pipe Mount	B	From Leg	4.00 0.00 2.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.30 3.13 3.62 4.62	2.30 3.13 3.62 4.62	0.04 0.06 0.08 0.14
8'x2 1/2" Pipe Mount	C	From Leg	4.00 0.00 2.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.30 3.13 3.62 4.62	2.30 3.13 3.62 4.62	0.04 0.06 0.08 0.14
****									
800MHz 2X50W RRH W/FILTER	A	From Face	0.50 0.00 0.00	0.0000	104.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.06 2.24 2.43 2.83	1.93 2.11 2.29 2.68	0.06 0.09 0.11 0.17
800MHz 2X50W RRH W/FILTER	B	From Face	0.50 0.00 0.00	0.0000	104.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.06 2.24 2.43 2.83	1.93 2.11 2.29 2.68	0.06 0.09 0.11 0.17
800MHz 2X50W RRH W/FILTER	C	From Face	0.50 0.00 0.00	0.0000	104.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.06 2.24 2.43 2.83	1.93 2.11 2.29 2.68	0.06 0.09 0.11 0.17
PCS 1900MHz 4x45W-65MHz	A	From Face	0.50 0.00 0.00	0.0000	104.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.32 2.53 2.74 3.19	2.24 2.44 2.65 3.09	0.06 0.08 0.11 0.17
PCS 1900MHz 4x45W-65MHz	B	From Face	0.50 0.00 0.00	0.0000	104.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.32 2.53 2.74 3.19	2.24 2.44 2.65 3.09	0.06 0.08 0.11 0.17
PCS 1900MHz 4x45W-65MHz	C	From Face	0.50 0.00 0.00	0.0000	104.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.32 2.53 2.74 3.19	2.24 2.44 2.65 3.09	0.06 0.08 0.11 0.17
Pipe Mount [PM 601-3]	C	None		0.0000	104.00	No Ice 1/2" Ice 1" Ice	4.39 5.48 6.57	4.39 5.48 6.57	0.20 0.24 0.28

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	8.75	8.75	0.36
****									
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.00 -6.00 2.00	15.0000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.58 7.03 7.47 8.38	4.96 5.75 6.47 7.94	0.08 0.13 0.19 0.34
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.00 -6.00 2.00	-10.0000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.58 7.03 7.47 8.38	4.96 5.75 6.47 7.94	0.08 0.13 0.19 0.34
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.00 -6.00 2.00	-10.0000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.58 7.03 7.47 8.38	4.96 5.75 6.47 7.94	0.08 0.13 0.19 0.34
LLPX310R-V1 w/ Mount Pipe	A	From Leg	4.00 2.00 2.00	30.0000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.57 4.93 5.29 6.04	3.01 3.55 4.11 5.27	0.04 0.08 0.13 0.23
LLPX310R-V1 w/ Mount Pipe	B	From Leg	4.00 2.00 2.00	30.0000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.57 4.93 5.29 6.04	3.01 3.55 4.11 5.27	0.04 0.08 0.13 0.23
LLPX310R-V1 w/ Mount Pipe	C	From Leg	4.00 2.00 2.00	30.0000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.57 4.93 5.29 6.04	3.01 3.55 4.11 5.27	0.04 0.08 0.13 0.23
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00 6.00 2.00	15.0000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.26 8.82 9.35 10.42	6.95 8.13 9.02 10.84	0.08 0.15 0.23 0.41
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.00 6.00 2.00	-10.0000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.26 8.82 9.35 10.42	6.95 8.13 9.02 10.84	0.08 0.15 0.23 0.41
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00 6.00 2.00	-10.0000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.26 8.82 9.35 10.42	6.95 8.13 9.02 10.84	0.08 0.15 0.23 0.41
TD-RRH8x20-25	A	From Leg	4.00 0.00 2.00	15.0000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.05 4.30 4.56 5.10	1.53 1.71 1.90 2.30	0.07 0.10 0.13 0.20
TD-RRH8x20-25	B	From Leg	4.00 0.00 2.00	-10.0000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.05 4.30 4.56 5.10	1.53 1.71 1.90 2.30	0.07 0.10 0.13 0.20
TD-RRH8x20-25	C	From Leg	4.00 0.00 2.00	-10.0000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.05 4.30 4.56 5.10	1.53 1.71 1.90 2.30	0.07 0.10 0.13 0.20
WIMAX DAP HEAD	A	From Leg	4.00 0.00 2.00	30.0000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.55 1.70 1.87 2.22	0.68 0.80 0.92 1.19	0.03 0.04 0.06 0.09
WIMAX DAP HEAD	B	From Leg	4.00 0.00 2.00	30.0000	103.00	No Ice 1/2" Ice 1" Ice	1.55 1.70 1.87	0.68 0.80 0.92	0.03 0.04 0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	2.22	1.19	0.09
WIMAX DAP HEAD	C	From Leg	4.00 0.00 2.00	30.0000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.55 1.70 1.87 2.22	0.68 0.80 0.92 1.19	0.03 0.04 0.06 0.09
IBC1900BB-1	A	From Leg	4.00 0.00 2.00	15.0000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.97 1.09 1.22 1.51	0.46 0.56 0.66 0.89	0.02 0.03 0.04 0.06
IBC1900BB-1	B	From Leg	4.00 0.00 2.00	-10.0000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.97 1.09 1.22 1.51	0.46 0.56 0.66 0.89	0.02 0.03 0.04 0.06
IBC1900BB-1	C	From Leg	4.00 0.00 2.00	-10.0000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.97 1.09 1.22 1.51	0.46 0.56 0.66 0.89	0.02 0.03 0.04 0.06
IBC1900HG-2A	A	From Leg	4.00 0.00 2.00	15.0000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.97 1.09 1.22 1.51	0.46 0.56 0.66 0.89	0.02 0.03 0.04 0.06
IBC1900HG-2A	B	From Leg	4.00 0.00 2.00	-10.0000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.97 1.09 1.22 1.51	0.46 0.56 0.66 0.89	0.02 0.03 0.04 0.06
IBC1900HG-2A	C	From Leg	4.00 0.00 2.00	-10.0000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.97 1.09 1.22 1.51	0.46 0.56 0.66 0.89	0.02 0.03 0.04 0.06
Horizon Compact	B	From Leg	4.00 0.00 4.00	3.0000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.72 0.83 0.94 1.19	0.37 0.45 0.54 0.74	0.01 0.02 0.03 0.05
Horizon Compact	C	From Leg	4.00 0.00 4.00	86.0000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.72 0.83 0.94 1.19	0.37 0.45 0.54 0.74	0.01 0.02 0.03 0.05
Platform Mount [LP 713-1]	C	None		0.0000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice	31.27 39.68 48.09 64.91	31.27 39.68 48.09 64.91	1.51 1.93 2.35 3.19
****									
742 213 w/ Mount Pipe	A	From Leg	0.50 0.00 0.00	-30.0000	93.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.37 5.95 6.50 7.61	4.62 6.00 6.98 8.85	0.05 0.09 0.15 0.28
742 213 w/ Mount Pipe	B	From Leg	0.50 0.00 0.00	-30.0000	93.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.37 5.95 6.50 7.61	4.62 6.00 6.98 8.85	0.05 0.09 0.15 0.28
742 213 w/ Mount Pipe	C	From Leg	0.50 0.00 0.00	-30.0000	93.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.37 5.95 6.50 7.61	4.62 6.00 6.98 8.85	0.05 0.09 0.15 0.28
****									
BCD-87010	C	From Face	3.00 0.00	0.0000	74.00	No Ice 1/2" Ice	2.90 4.05	2.90 4.05	0.03 0.05

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			6.00			1" Ice	5.21	5.21	0.08
						2" Ice	7.01	7.01	0.16
Side Arm Mount [SO 701-1]	C	From Face	1.50	0.0000	74.00	No Ice	0.85	1.67	0.07
			0.00			1/2" Ice	1.14	2.34	0.08
			0.00			1" Ice	1.43	3.01	0.09
						2" Ice	2.01	4.35	0.12
*									
KS24019-L112A	C	From Leg	3.00	0.0000	50.00	No Ice	0.14	0.14	0.01
			0.00			1/2" Ice	0.20	0.20	0.01
			2.00			1" Ice	0.26	0.26	0.01
						2" Ice	0.41	0.41	0.02
Side Arm Mount [SO 701-1]	C	From Leg	1.50	0.0000	50.00	No Ice	0.85	1.67	0.07
			0.00			1/2" Ice	1.14	2.34	0.08
			0.00			1" Ice	1.43	3.01	0.09
						2" Ice	2.01	4.35	0.12
*									

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
VHLP2-180	C	Paraboloid w/Shroud (HP)	From Face	4.00	86.0000		103.00	2.00	No Ice	3.14	0.03
				-2.00					1/2" Ice	3.41	0.04
				4.00					1" Ice	3.68	0.06
									2" Ice	4.21	0.09
VHLP2.5-11	B	Paraboloid w/Shroud (HP)	From Face	4.00	3.0000		103.00	2.92	No Ice	6.68	0.05
				-2.00					1/2" Ice	7.07	0.08
				4.00					1" Ice	7.46	0.12
									2" Ice	8.23	0.19
*											

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice

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

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	140 - 86.8333	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-59.64	2.38	-5.17
			Max. Mx	20	-23.44	713.37	-8.74
			Max. My	14	-23.47	9.52	-704.48
			Max. Vy	20	-25.14	713.37	-8.74
			Max. Vx	14	24.80	9.52	-704.48
			Max. Torque	12			-1.60
L2	86.8333 - 38	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-93.59	6.80	-11.78
			Max. Mx	20	-38.91	2048.15	-26.02
			Max. My	14	-38.92	30.75	-2021.99
			Max. Vy	20	-30.92	2048.15	-26.02
			Max. Vx	14	30.56	30.75	-2021.99

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Torque	14			-1.78
L3	38 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-132.33	10.46	-15.88
			Max. Mx	20	-60.08	3550.77	-41.12
			Max. My	14	-60.08	49.94	-3508.11
			Max. Vy	20	-35.77	3550.77	-41.12
			Max. Vx	14	35.42	49.94	-3508.11
			Max. Torque	14			-1.78

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	36	132.33	8.53	-0.05
	Max. H_x	20	60.09	35.75	-0.33
	Max. H_z	2	60.09	-0.33	35.39
	Max. M_x	2	3503.74	-0.33	35.39
	Max. M_z	8	3542.79	-35.71	0.31
	Max. Torsion	24	1.59	17.62	30.50
	Min. Vert	25	45.07	17.62	30.50
	Min. H_x	8	60.09	-35.71	0.31
	Min. H_z	14	60.09	0.40	-35.40
	Min. M_x	14	-3508.11	0.40	-35.40
	Min. M_z	20	-3550.77	35.75	-0.33
	Min. Torsion	14	-1.78	0.40	-35.40

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	50.08	0.00	0.00	1.25	1.63	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	60.09	0.33	-35.39	-3503.74	-37.57	-1.59
0.9 Dead+1.0 Wind 0 deg - No Ice	45.07	0.33	-35.39	-3479.33	-37.78	-1.58
1.2 Dead+1.0 Wind 30 deg - No Ice	60.09	18.17	-30.74	-3046.27	-1808.43	-0.90
0.9 Dead+1.0 Wind 30 deg - No Ice	45.07	18.17	-30.74	-3025.09	-1796.10	-0.89
1.2 Dead+1.0 Wind 60 deg - No Ice	60.09	31.07	-17.92	-1779.38	-3086.03	-0.04
0.9 Dead+1.0 Wind 60 deg - No Ice	45.07	31.07	-17.92	-1767.16	-3064.67	-0.04
1.2 Dead+1.0 Wind 90 deg - No Ice	60.09	35.71	-0.31	-36.06	-3542.79	0.75
0.9 Dead+1.0 Wind 90 deg - No Ice	45.07	35.71	-0.31	-36.18	-3518.20	0.75
1.2 Dead+1.0 Wind 120 deg - No Ice	60.09	30.84	17.39	1717.57	-3056.56	1.34
0.9 Dead+1.0 Wind 120 deg - No Ice	45.07	30.84	17.39	1705.04	-3035.42	1.34

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
1.2 Dead+1.0 Wind 150 deg - No Ice	60.09	17.68	30.47	3016.18	-1748.17	1.60
0.9 Dead+1.0 Wind 150 deg - No Ice	45.07	17.68	30.47	2994.45	-1736.29	1.60
1.2 Dead+1.0 Wind 180 deg - No Ice	60.09	-0.40	35.40	3508.11	49.94	1.78
0.9 Dead+1.0 Wind 180 deg - No Ice	45.07	-0.40	35.40	3482.90	49.08	1.78
1.2 Dead+1.0 Wind 210 deg - No Ice	60.09	-18.19	30.79	3054.51	1814.83	1.23
0.9 Dead+1.0 Wind 210 deg - No Ice	45.07	-18.19	30.79	3032.50	1801.48	1.23
1.2 Dead+1.0 Wind 240 deg - No Ice	60.09	-31.10	17.94	1784.96	3093.03	0.42
0.9 Dead+1.0 Wind 240 deg - No Ice	45.07	-31.10	17.94	1771.93	3070.63	0.41
1.2 Dead+1.0 Wind 270 deg - No Ice	60.09	-35.75	0.33	41.12	3550.77	-0.44
0.9 Dead+1.0 Wind 270 deg - No Ice	45.07	-35.75	0.33	40.42	3525.13	-0.44
1.2 Dead+1.0 Wind 300 deg - No Ice	60.09	-30.86	-17.34	-1709.49	3062.56	-1.23
0.9 Dead+1.0 Wind 300 deg - No Ice	45.07	-30.86	-17.34	-1697.79	3040.38	-1.23
1.2 Dead+1.0 Wind 330 deg - No Ice	60.09	-17.62	-30.50	-3016.30	1744.93	-1.59
0.9 Dead+1.0 Wind 330 deg - No Ice	45.07	-17.62	-30.50	-2995.35	1732.09	-1.59
1.2 Dead+1.0 Ice+1.0 Temp	132.33	-0.00	0.00	15.88	10.46	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	132.33	0.05	-8.47	-879.29	3.42	-0.22
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	132.33	4.31	-7.35	-761.34	-447.19	-0.02
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	132.33	7.40	-4.27	-436.60	-773.37	0.17
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	132.33	8.52	-0.05	9.28	-890.86	0.29
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	132.33	7.37	4.18	457.01	-768.26	0.34
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	132.33	4.24	7.31	787.55	-436.45	0.31
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	132.33	-0.07	8.47	911.65	19.47	0.25
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	132.33	-4.32	7.36	794.52	468.78	0.09
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	132.33	-7.41	4.28	469.21	795.09	-0.09
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	132.33	-8.53	0.05	23.21	912.75	-0.23
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	132.33	-7.37	-4.18	-423.89	789.74	-0.32
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	132.33	-4.22	-7.31	-756.13	456.07	-0.30
Dead+Wind 0 deg - Service	50.08	0.07	-7.30	-718.19	-6.46	-0.33
Dead+Wind 30 deg - Service	50.08	3.75	-6.34	-624.29	-369.94	-0.18
Dead+Wind 60 deg - Service	50.08	6.41	-3.69	-364.26	-632.18	-0.01
Dead+Wind 90 deg - Service	50.08	7.36	-0.06	-6.43	-725.93	0.16
Dead+Wind 120 deg - Service	50.08	6.36	3.58	353.51	-626.12	0.28
Dead+Wind 150 deg - Service	50.08	3.65	6.28	620.06	-357.57	0.33
Dead+Wind 180 deg - Service	50.08	-0.08	7.30	721.03	11.50	0.37
Dead+Wind 210 deg - Service	50.08	-3.75	6.35	627.93	373.76	0.25

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 240 deg - Service	50.08	-6.41	3.70	367.35	636.12	0.09
Dead+Wind 270 deg - Service	50.08	-7.37	0.07	9.41	730.07	-0.09
Dead+Wind 300 deg - Service	50.08	-6.36	-3.58	-349.91	629.85	-0.26
Dead+Wind 330 deg - Service	50.08	-3.63	-6.29	-618.13	359.41	-0.33

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-50.08	0.00	0.00	50.08	0.00	0.000%
2	0.33	-60.09	-35.39	-0.33	60.09	35.39	0.000%
3	0.33	-45.07	-35.39	-0.33	45.07	35.39	0.000%
4	18.17	-60.09	-30.74	-18.17	60.09	30.74	0.000%
5	18.17	-45.07	-30.74	-18.17	45.07	30.74	0.000%
6	31.07	-60.09	-17.92	-31.07	60.09	17.92	0.000%
7	31.07	-45.07	-17.92	-31.07	45.07	17.92	0.000%
8	35.71	-60.09	-0.31	-35.71	60.09	0.31	0.000%
9	35.71	-45.07	-0.31	-35.71	45.07	0.31	0.000%
10	30.84	-60.09	17.39	-30.84	60.09	-17.39	0.000%
11	30.84	-45.07	17.39	-30.84	45.07	-17.39	0.000%
12	17.68	-60.09	30.47	-17.68	60.09	-30.47	0.000%
13	17.68	-45.07	30.47	-17.68	45.07	-30.47	0.000%
14	-0.40	-60.09	35.40	0.40	60.09	-35.40	0.000%
15	-0.40	-45.07	35.40	0.40	45.07	-35.40	0.000%
16	-18.19	-60.09	30.79	18.19	60.09	-30.79	0.000%
17	-18.19	-45.07	30.79	18.19	45.07	-30.79	0.000%
18	-31.10	-60.09	17.94	31.10	60.09	-17.94	0.000%
19	-31.10	-45.07	17.94	31.10	45.07	-17.94	0.000%
20	-35.75	-60.09	0.33	35.75	60.09	-0.33	0.000%
21	-35.75	-45.07	0.33	35.75	45.07	-0.33	0.000%
22	-30.86	-60.09	-17.34	30.86	60.09	17.34	0.000%
23	-30.86	-45.07	-17.34	30.86	45.07	17.34	0.000%
24	-17.62	-60.09	-30.50	17.62	60.09	30.50	0.000%
25	-17.62	-45.07	-30.50	17.62	45.07	30.50	0.000%
26	0.00	-132.33	0.00	0.00	132.33	-0.00	0.000%
27	0.05	-132.33	-8.47	-0.05	132.33	8.47	0.000%
28	4.31	-132.33	-7.35	-4.31	132.33	7.35	0.000%
29	7.40	-132.33	-4.27	-7.40	132.33	4.27	0.000%
30	8.52	-132.33	-0.05	-8.52	132.33	0.05	0.000%
31	7.37	-132.33	4.18	-7.37	132.33	-4.18	0.000%
32	4.24	-132.33	7.31	-4.24	132.33	-7.31	0.000%
33	-0.07	-132.33	8.47	0.07	132.33	-8.47	0.000%
34	-4.32	-132.33	7.36	4.32	132.33	-7.36	0.000%
35	-7.41	-132.33	4.28	7.41	132.33	-4.28	0.000%
36	-8.53	-132.33	0.05	8.53	132.33	-0.05	0.000%
37	-7.37	-132.33	-4.18	7.37	132.33	4.18	0.000%
38	-4.22	-132.33	-7.31	4.22	132.33	7.31	0.000%
39	0.07	-50.08	-7.30	-0.07	50.08	7.30	0.000%
40	3.75	-50.08	-6.34	-3.75	50.08	6.34	0.000%
41	6.41	-50.08	-3.69	-6.41	50.08	3.69	0.000%
42	7.36	-50.08	-0.06	-7.36	50.08	0.06	0.000%
43	6.36	-50.08	3.58	-6.36	50.08	-3.58	0.000%
44	3.65	-50.08	6.28	-3.65	50.08	-6.28	0.000%
45	-0.08	-50.08	7.30	0.08	50.08	-7.30	0.000%
46	-3.75	-50.08	6.35	3.75	50.08	-6.35	0.000%
47	-6.41	-50.08	3.70	6.41	50.08	-3.70	0.000%
48	-7.37	-50.08	0.07	7.37	50.08	-0.07	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
49	-6.36	-50.08	-3.58	6.36	50.08	3.58	0.000%
50	-3.63	-50.08	-6.29	3.63	50.08	6.29	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00009597
3	Yes	4	0.00000001	0.00005919
4	Yes	5	0.00000001	0.00005961
5	Yes	5	0.00000001	0.00002815
6	Yes	5	0.00000001	0.00006139
7	Yes	5	0.00000001	0.00002900
8	Yes	4	0.00000001	0.00005541
9	Yes	4	0.00000001	0.00002778
10	Yes	5	0.00000001	0.00005955
11	Yes	5	0.00000001	0.00002826
12	Yes	5	0.00000001	0.00005597
13	Yes	5	0.00000001	0.00002650
14	Yes	4	0.00000001	0.00020229
15	Yes	4	0.00000001	0.00013102
16	Yes	5	0.00000001	0.00006337
17	Yes	5	0.00000001	0.00002996
18	Yes	5	0.00000001	0.00006054
19	Yes	5	0.00000001	0.00002853
20	Yes	4	0.00000001	0.00008442
21	Yes	4	0.00000001	0.00004965
22	Yes	5	0.00000001	0.00005625
23	Yes	5	0.00000001	0.00002663
24	Yes	5	0.00000001	0.00005987
25	Yes	5	0.00000001	0.00002846
26	Yes	4	0.00000001	0.00003164
27	Yes	4	0.00000001	0.00091402
28	Yes	4	0.00000001	0.00097416
29	Yes	4	0.00000001	0.00097906
30	Yes	4	0.00000001	0.00092951
31	Yes	4	0.00000001	0.00099475
32	Yes	4	0.00000001	0.00099890
33	Yes	4	0.00000001	0.00095662
34	Yes	5	0.00000001	0.00009157
35	Yes	5	0.00000001	0.00009155
36	Yes	4	0.00000001	0.00095455
37	Yes	4	0.00000001	0.00098648
38	Yes	4	0.00000001	0.00097634
39	Yes	4	0.00000001	0.00001063
40	Yes	4	0.00000001	0.00002143
41	Yes	4	0.00000001	0.00002280
42	Yes	4	0.00000001	0.00000949
43	Yes	4	0.00000001	0.00002321
44	Yes	4	0.00000001	0.00002022
45	Yes	4	0.00000001	0.00001154
46	Yes	4	0.00000001	0.00002491
47	Yes	4	0.00000001	0.00002214
48	Yes	4	0.00000001	0.00000952
49	Yes	4	0.00000001	0.00002033

50	Yes	4	0.00000001	0.00002367

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	140 - 86.8333	10.621	47	0.6368	0.0015
L2	92.5 - 38	4.749	47	0.4918	0.0006
L3	45 - 0	1.097	47	0.2209	0.0002

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
140.00	BXA-80063-4BF-EDIN-X w/ Mount Pipe	47	10.621	0.6368	0.0015	101573
126.00	AIR-32 B2A/B66AA w/ Mount Pipe	47	8.777	0.6038	0.0012	36276
117.00	7770.00 w/ Mount Pipe	47	7.621	0.5800	0.0010	22081
107.00	VHLP2-180	47	6.390	0.5491	0.0008	15389
104.00	800MHz 2X50W RRH W/FILTER	47	6.034	0.5386	0.0008	14107
103.00	APXVTM14-C-120 w/ Mount Pipe	47	5.918	0.5349	0.0008	13726
93.00	742 213 w/ Mount Pipe	47	4.802	0.4940	0.0006	10909
74.00	BCD-87010	47	2.989	0.3939	0.0004	9708
50.00	KS24019-L112A	47	1.343	0.2498	0.0002	8674

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	140 - 86.8333	51.663	18	3.0987	0.0074
L2	92.5 - 38	23.102	18	2.3939	0.0029
L3	45 - 0	5.337	18	1.0746	0.0009

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
140.00	BXA-80063-4BF-EDIN-X w/ Mount Pipe	18	51.663	3.0987	0.0074	20982
126.00	AIR-32 B2A/B66AA w/ Mount Pipe	18	42.693	2.9386	0.0060	7493
117.00	7770.00 w/ Mount Pipe	18	37.073	2.8230	0.0050	4560

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
107.00	VHLP2-180	18	31.083	2.6726	0.0041	3177
104.00	800MHz 2X50W RRH W/FILTER	18	29.355	2.6215	0.0038	2911
103.00	APXVTM14-C-120 w/ Mount Pipe	18	28.787	2.6038	0.0038	2833
93.00	742 213 w/ Mount Pipe	18	23.360	2.4049	0.0030	2250
74.00	BCD-87010	18	14.542	1.9171	0.0019	1999
50.00	KS24019-L112A	18	6.531	1.2153	0.0010	1784

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	140 - 86.8333 (1)	TP39.223x26.216x0.3125	53.17	0.00	0.0	37.7587	-23.42	2405.51	0.010
L2	86.8333 - 38 (2)	TP50.56x37.2117x0.4063	54.50	0.00	0.0	63.3646	-38.90	4050.83	0.010
L3	38 - 0 (3)	TP59.05x48.033x0.5	45.00	0.00	0.0	94.2655	-60.08	6079.24	0.010

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	140 - 86.8333 (1)	TP39.223x26.216x0.3125	717.84	1838.19	0.391	0.00	1838.19	0.000
L2	86.8333 - 38 (2)	TP50.56x37.2117x0.4063	2061.18	3995.68	0.516	0.00	3995.68	0.000
L3	38 - 0 (3)	TP59.05x48.033x0.5	3571.13	7247.00	0.493	0.00	7247.00	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	140 - 86.8333 (1)	TP39.223x26.216x0.3125	25.32	662.66	0.038	1.02	2151.00	0.000
L2	86.8333 - 38 (2)	TP50.56x37.2117x0.4063	31.08	1112.05	0.028	0.42	4659.14	0.000
L3	38 - 0 (3)	TP59.05x48.033x0.5	35.93	1654.36	0.022	0.42	8375.42	0.000

Pole Interaction Design Data

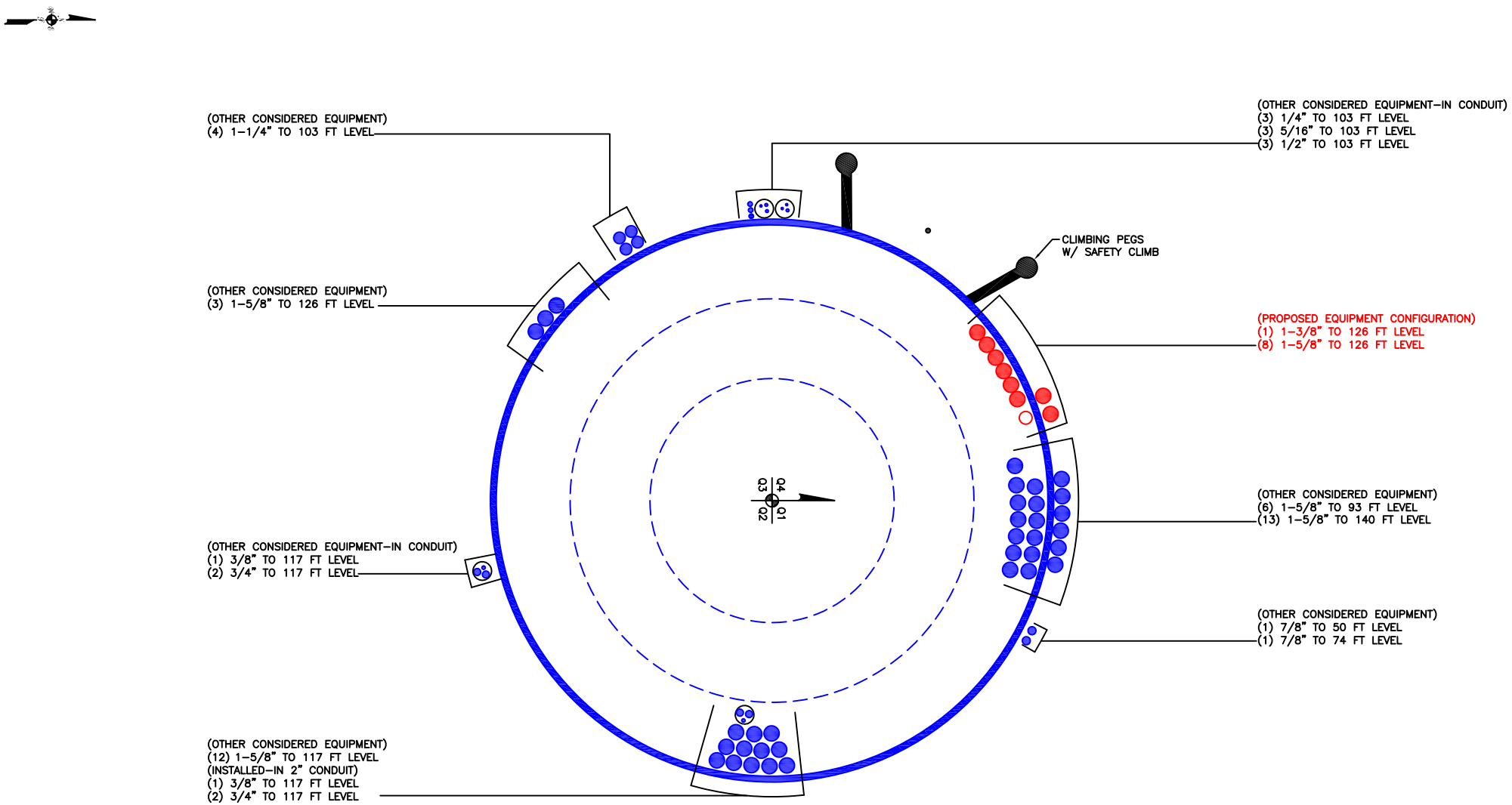
Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	140 - 86.8333 (1)	0.010	0.391	0.000	0.038	0.000	0.402	1.050	4.8.2
L2	86.8333 - 38 (2)	0.010	0.516	0.000	0.028	0.000	0.526	1.050	4.8.2
L3	38 - 0 (3)	0.010	0.493	0.000	0.022	0.000	0.503	1.050	4.8.2

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	140 - 86.8333	Pole	TP39.223x26.216x0.3125	1	-23.42	2525.79	38.3	Pass
L2	86.8333 - 38	Pole	TP50.56x37.2117x0.4063	2	-38.90	4253.37	50.1	Pass
L3	38 - 0	Pole	TP59.05x48.033x0.5	3	-60.08	6383.20	47.9	Pass
							Summary	
						Pole (L2)	50.1	Pass
						RATING =	**50.1**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 806369 TOWER ID: C_BASELEVEL

APPENDIX C

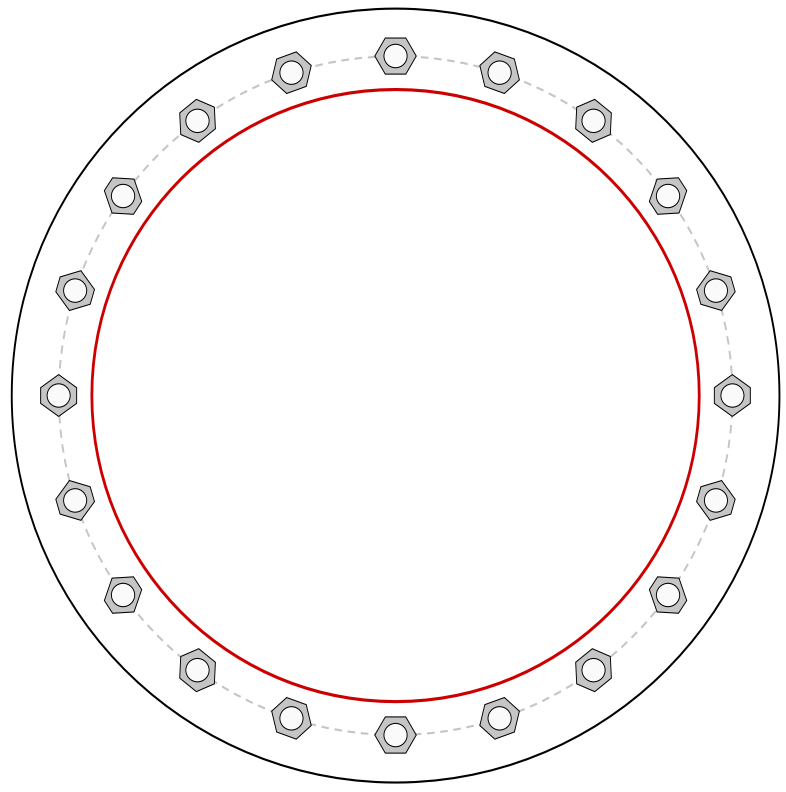
ADDITIONAL CALCULATIONS

Monopole Base Plate Connection

Site Info	
BU #	806369
Site Name	HRT 094 943225
Order #	446222 R0

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	0

Applied Loads	
Moment (kip-ft)	3571.13
Axial Force (kips)	60.08
Shear Force (kips)	35.93



Connection Properties

Anchor Rod Data

(20) 2-1/4" ø bolts (A615-75 N; Fy=75 ksi, Fu=100 ksi) on 65.5" BC

Base Plate Data

74.64" OD x 3" Plate (A572-50; Fy=50 ksi, Fu=65 ksi)

Stiffener Data

N/A

Pole Data

59.05" x 0.5" 12-sided pole (A572-65; Fy=65 ksi, Fu=80 ksi)

Analysis Results

Anchor Rod Summary *(units of kips, kip-in)*

Pu = 133.79	ϕPn = 243.75	**Stress Rating**
Vu = 1.8	ϕVn = 73.13	**52.3%**
Mu = n/a	ϕMn = n/a	**Pass**

Base Plate Summary

Max Stress (ksi):	13.25	(Flexural)
Allowable Stress (ksi):	45	
Stress Rating:	**28.0%**	**Pass**

Drilled Pier Foundation

BU # :	806369
Site Name:	HRT 094 943225
Order Number:	446222 R0

TIA-222 Revison:	H
Tower Type:	Monopole

Applied Loads	Comp.	Uplift
Moment (kip-ft)	3571.13	
Axial Force (kips)	60.08	
Shear Force (kips)	35.93	

Material Properties		
Concrete Strength, f'c:	3	ksi
Rebar Strength, Fy:	60	ksi

Pier Design Data		
Depth	47	ft
Ext. Above Grade	0	ft
Pier Section 1		
From 0' below grade to 47' below grade		
Pier Diameter	7.5	ft
Rebar Quantity	52	
Rebar Size	10	
Rebar Cage Diameter	82	in
Tie Size	4	

Analysis Results		
Soil Lateral Capacity	*Compression*	*Uplift*
$D_{v=0}$ (ft from TOC)	7.50	-
Soil Safety Factor	7.23	-
Max Moment (kip-ft)	3777.36	-
Rating*	*17.5%*	-
Soil Vertical Capacity	*Compression*	*Uplift*
Skin Friction (kips)	406.44	-
End Bearing (kips)	378.29	-
Weight of Concrete (kips)	251.35	-
Total Capacity (kips)	784.73	-
Axial (kips)	311.43	-
Rating*	*37.8%*	-
Reinforced Concrete Capacity	*Compression*	*Uplift*
Critical Depth (ft from TOC)	7.38	-
Critical Moment (kip-ft)	3777.29	-
Critical Moment Capacity	10726.53	-
Rating*	*33.5%*	-

Soil Interaction Rating*	**37.8%**
Structural Foundation Rating*	**33.5%**

Check Limitation	
Apply TIA-222-H Section 15.5:	☑

*Rating per TIA-222-H Section 15.5

Soil Profile

Groundwater Depth	10	ft	# of Layers	7

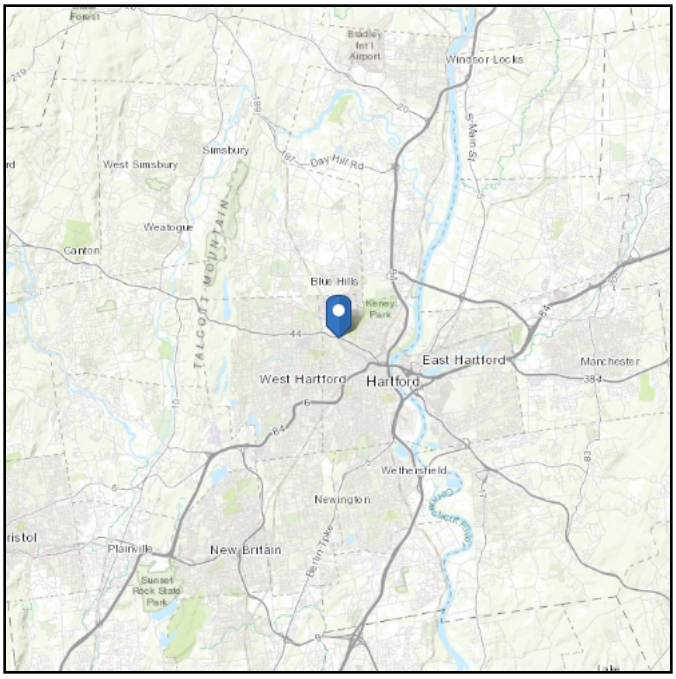
Layer	Top (ft)	Bottom (ft)	Thickness (ft)	γ_{soil} (pcf)	$\gamma_{concrete}$ (pcf)	Cohesion (ksf)	Angle of Friction (degrees)	Calculated Ultimate Skin Friction Comp (ksf)	Calculated Ultimate Skin Friction Uplift (ksf)	Ultimate Skin Friction Comp Override (ksf)	Ultimate Skin Friction Uplift Override (ksf)	Ult. Gross Bearing Capacity (ksf)	SPT Blow Count	Soil Type
1	0	3.75	3.75	105	150	0		0.000	0.000	0.00	0.00			Cohesionless
2	3.75	5	1.25	105	150	0.5	30	0.000	0.000	0.00	0.00			Cohesionless
3	5	10	5	100	150	0.5	30	0.000	0.000	0.60	0.60			Cohesionless
4	10	25	15	36	87.6	0.1	27	0.000	0.000	0.40	0.40			Cohesionless
5	25	35	10	36	87.6	0.1	27	0.000	0.000	0.60	0.60			Cohesionless
6	35	45	10	41	87.6	0.2		0.110	0.110	0.60	0.60			Cohesive
7	45	47	2	41	87.6		32	0.00	0.00	1.00	1.00	11.417		Cohesionless

ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-10
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 60.06 ft (NAVD 88)
Latitude: 41.783781
Longitude: -72.703794



Wind

Results:

Wind Speed:	122 Vmph
10-year MRI	76 Vmph
25-year MRI	86 Vmph
50-year MRI	92 Vmph
100-year MRI	99 Vmph

Data Source: ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, incorporating errata of March 12, 2014

Date Accessed: Wed Sep 19 2018

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-10 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

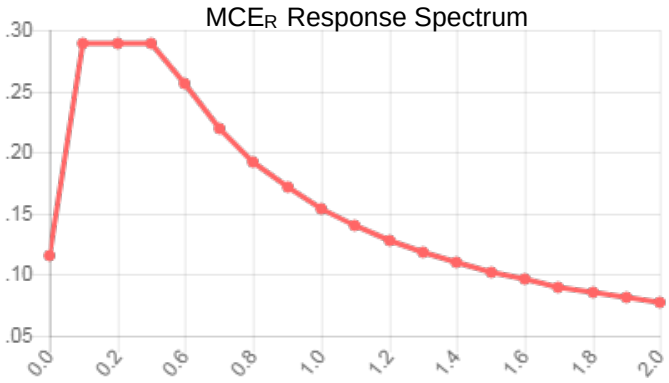
Seismic

Site Soil Class: D - Stiff Soil

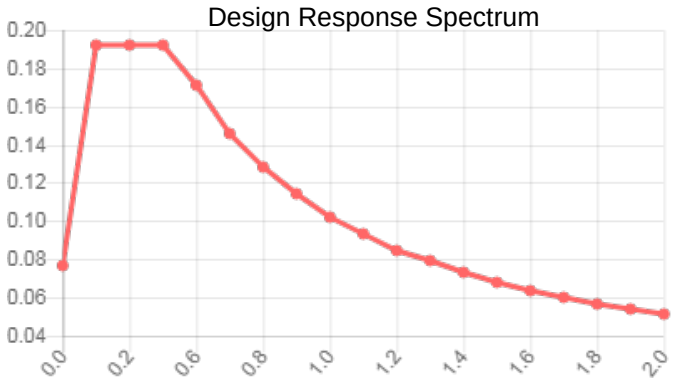
Results:

S_S :	0.180	S_{DS} :	0.192
S_1 :	0.064	S_{D1} :	0.102
F_a :	1.600	T_L :	6.000
F_v :	2.400	PGA :	0.091
S_{MS} :	0.289	PGA_M :	0.145
S_{M1} :	0.154	F_{PGA} :	1.600
		I_e :	1

Seismic Design Category B



S_a(g) vs T(s)



S_a(g) vs T(s)

Data Accessed: Wed Sep 19 2018

Date Source: USGS Seismic Design Maps based on ASCE/SEI 7-10, incorporating Supplement 1 and errata of March 31, 2013, and ASCE/SEI 7-10 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-10 Ch. 21 are available from USGS.

Ice

Results:

Ice Thickness:	1.00 in.
Concurrent Temperature:	5 F
Gust Speed:	50 mph
Data Source:	Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8
Date Accessed:	Wed Sep 19 2018

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 50-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Date: **September 21, 2018**

Charles McGuirt
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
(704) 405-6607

Maser Consulting Connecticut
331 Newman Springs Road, Suite 203
Red Bank, NJ 07701
(732) 383-1950

Subject:	**Mount Analysis Report**	
Carrier Designation:	**T-Mobile Equipment Change-Out**	
	Carrier Site Number:	CT11161D
	Carrier Site Name:	CT161/Jn of Albany_1
Crown Castle Designation:	**Crown Castle BU Number:**	806369
	Crown Castle Site Name:	HRT 094 943225
	Crown Castle JDE Job Number:	512701
	Crown Castle Order Number:	446222
Engineering Firm Designation:	Maser Consulting Connecticut **Report Designation:**	18922077A
Site Data:	**439-455 Homestead Ave, Hartford, Hartford County, CT, 06105 Latitude 41°47'1.61" Longitude -72°42'13.66"**	
Structure Information:	**Tower Height & Type:**	**140 ft Monopole**
	Mount Elevation:	**126 ft**
	Mount Type:	**12.83 ft Platform**

Dear Charles McGuirt,

Maser Consulting Connecticut is pleased to submit this **"Mount Analysis Report"** to determine the structural integrity of T-Mobile's antenna mounting system with the proposed appurtenance and equipment addition on the abovementioned supporting tower structure. Analysis of the existing supporting tower structure is to be completed by others and therefore is not part of this analysis.

The purpose of the analysis is to determine acceptability of the mount stress level. Based on our analysis we have determined the mount stress level to be:

Platform **Sufficient**

The analysis has been performed in accordance with the TIA-222-H Standard. This analysis utilizes an ultimate 3-second gust wind speed of 125 mph from the 2016 Connecticut State Building Code. Exposure Category C with a maximum topographic factor, Kzt, of 1 and Risk Category II were used in this analysis.

Mount structural analysis prepared by: Dejian Xu, P.E.
Respectfully Submitted by:

Petros E.Tsoukalas, P.E.
Principal Associate/Geographic Discipline Leader
Connecticut License: 32577
856-797-0412
Ptsoukalas@Maserconsulting.com

Dejian Xu, P.E.
Project Engineer

TABLE OF CONTENTS

1) INTRODUCTION

This mount is a existing 12.83 ft Platform mapped by Tower Engineering Professionals.This mount is installed at the 126 ft elevation on 1 sector(s) of the 140 ft Monopole**.**

2) ANALYSIS CRITERIA

Building Code:	2016 Connecticut State Building Code
TIA-222 Revision:	TIA-222-H
Risk Category:	II
Ultimate Wind Speed:	125mph
Exposure Category:	C
Topographic Factor at Base:	1
Topographic Factor at Mount:	1
Ice Thickness:	2 in
Wind Speed with Ice:	50 mph
Seismic S_s:	0.18
Seismic S_1:	0.064
Live Loading Wind Speed:	30 mph
Man Live Load at Mid/End-Points:	250 lb
Man Live Load at Mount Pipes:	500 lb

Table 1 - Proposed Equipment Configuration

Mount Centerline (ft)	Antenna Centerline (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Mount / Modification Details
126	128	3	ERICSSON	AIR -32 B2A/B66AA	12.83 ft Platform
		3	ERICSSON	AIR 3246 B66	
		3	RFS	APXVAARR24_43-UNA20	
		3	ERICSSON	RADIO 4449 B12/B71	
	126	3	RFS	ATMAA1412D-1A20	

3) ANALYSIS PROCEDURE

Table 2 - Documents Provided

Document	Remarks	Reference	Source
Mount Mapping Report	Tower Engineering Professionals	25689.177485	CCIsites

3.1) Analysis Method

RISA-3D, a commercially available analysis software package, was used to create a three-dimensional model of the antenna mounting system and calculate member stresses for various loading cases.The program performs design checks of structures under user specified loads. The user specified loads have been calculated separately based on the requirements of the above referenced codes. The program performs an analysis based on the steel code to determine the adequacy of the members and produces the reactions at the connection points of the mounts to the existing structure.

Proprietary excel sheets were used to calculate appurtenance and member loading for various load cases. Selected output from the analysis is included in Appendix B.

This analysis was performed in accordance with Crown Castle's ENG-SOW-10208 *Tower Mount Analysis* (Revision B).

3.2) Assumptions

1) The antenna mounting system was properly fabricated, installed and maintained in good condition in accordance with its original design and manufacturer's specifications.
2) The configuration of antennas, mounts, and other appurtenances are as specified in Table 1 and the referenced drawings.
3) All member connections are assumed to have been designed to meet or exceed the load carrying capacity of the connected member unless otherwise specified in this report.
4) Steel grades have been assumed as follows, unless noted otherwise:

Channel, Solid Round, Angle, Plate	ASTM A36 (GR 36)
HSS (Rectangular)	ASTM 500 (GR B-46)
Pipe	ASTM A53 (GR 35)
Connection Bolts	ASTM A325

This analysis may be affected if any assumptions are not valid or have been made in error. Maser Consulting Connecticut should be notified to determine the effect on the structural integrity of the antenna mounting system.

4) ANALYSIS RESULTS

Table 3(a) - Mount Component Stresses vs. Capacity (Platform, Alpha Sector)

Notes	Component	Critical Member	Centerline (ft)	% Capacity	Pass / Fail
1	Antenna Pipe	64	126	82.5	Pass
1	Standoff Arm	7	126	88.7	Pass
1	Platform Railing	58	126	53.9	Pass
1	Platform Channel	53	126	53.9	Pass
1	Mount to Tower Connection	-	126	87.8	Pass

Structure Rating (max from all components) =	88.7%

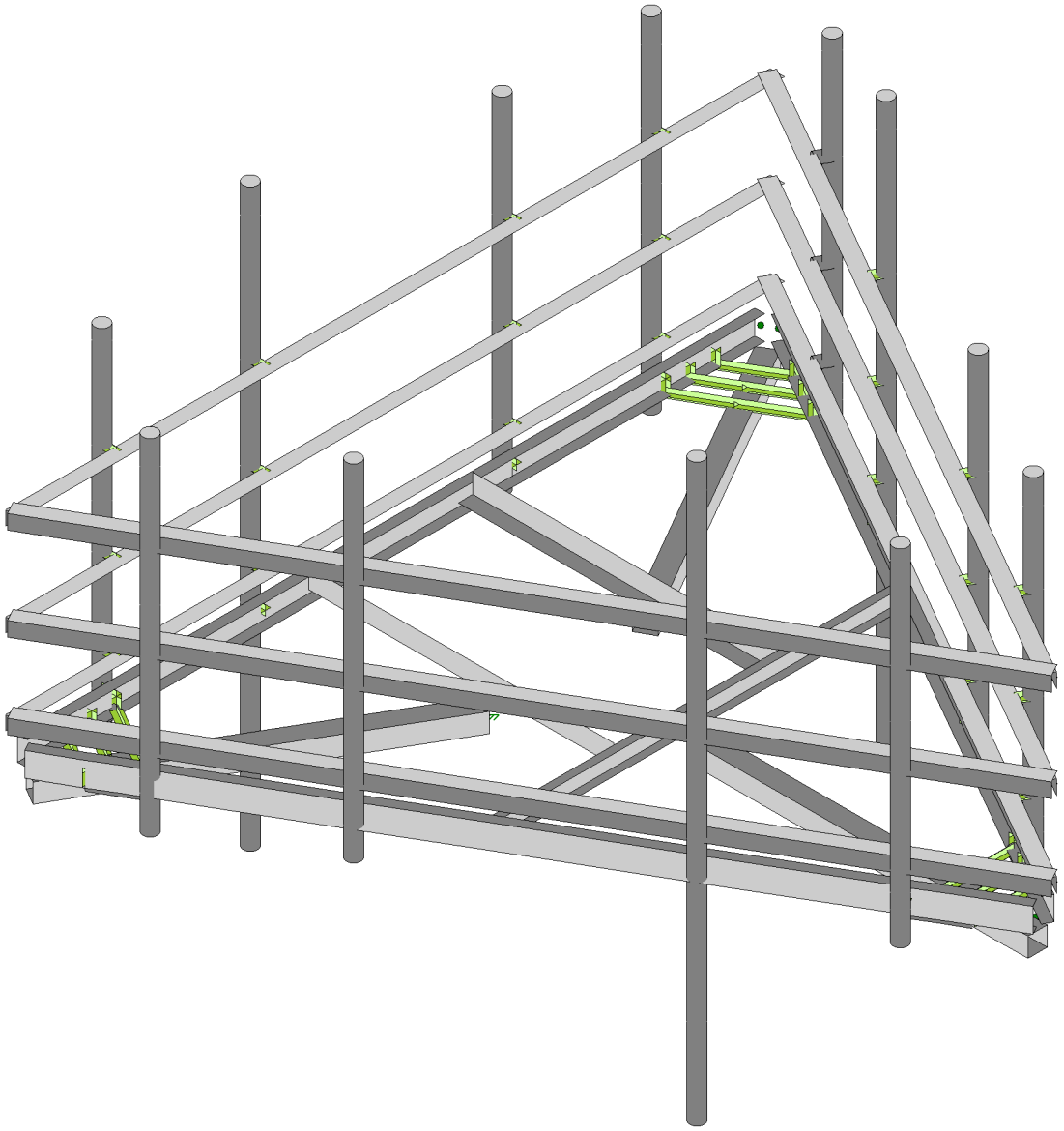
Notes:
1) See additional documentation in "Appendix C - Software Analysis Output" for calculations supporting the % capacity consumed.
2) All sectors are typical

4.1) Recommendations

The mount has insufficient capacity to support the proposed loading configuration. No modifications are required at this time.

APPENDIX A

WIRE FRAME AND RENDERED MODELS



Envelope Only Solution

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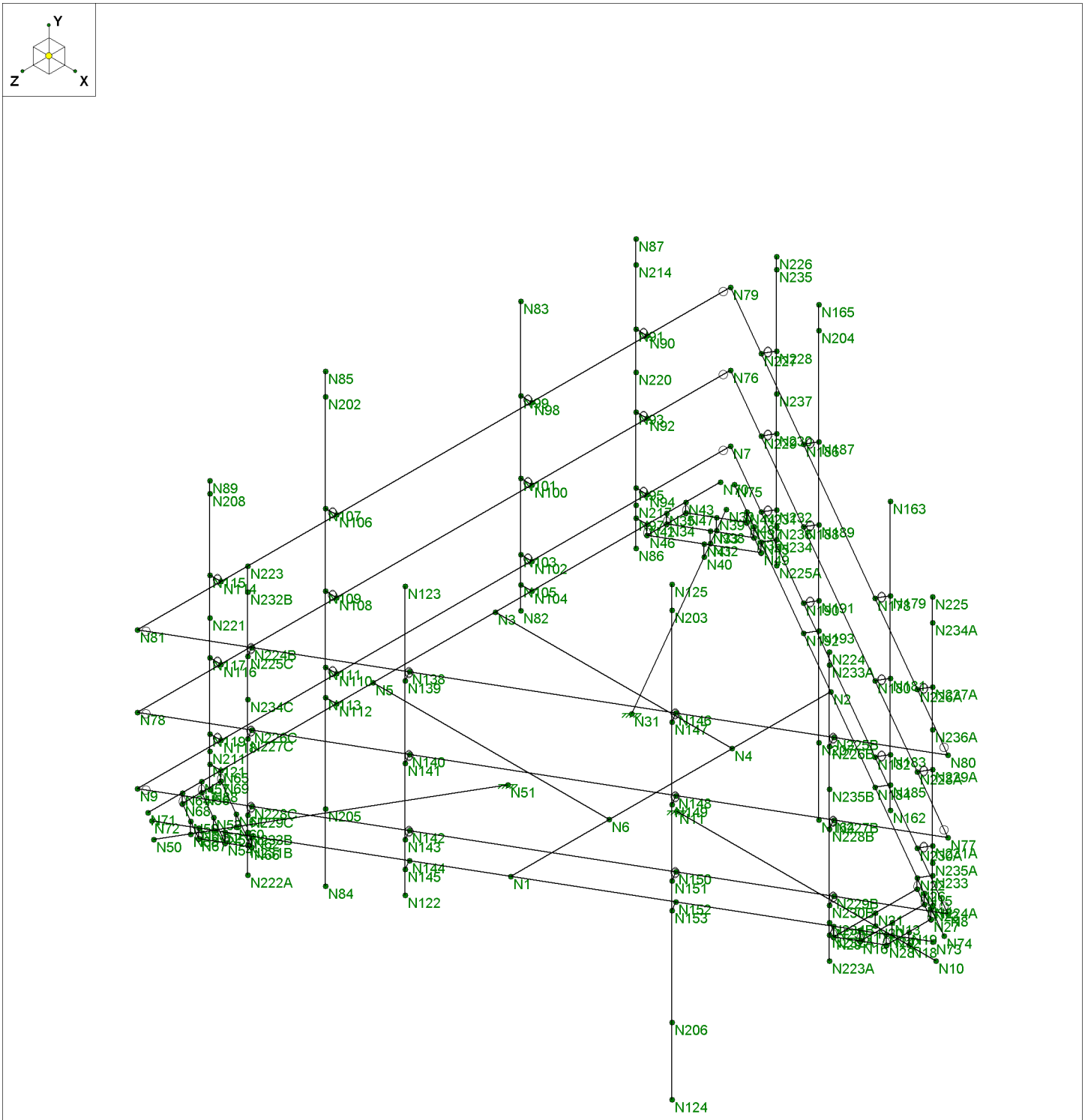
DX		Sept 21, 2018 at 3:43 PM
18922077		Platform.R3D



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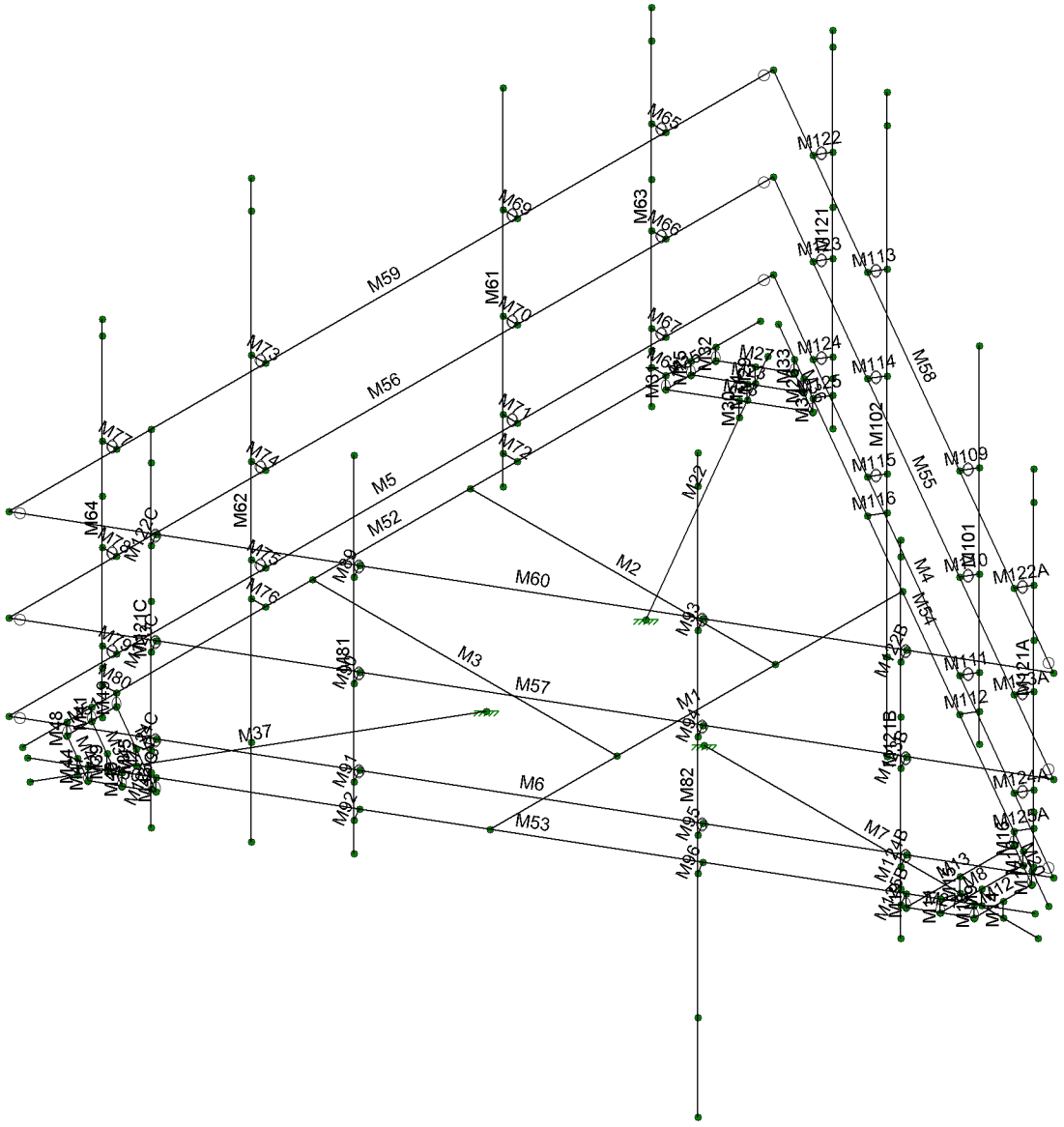

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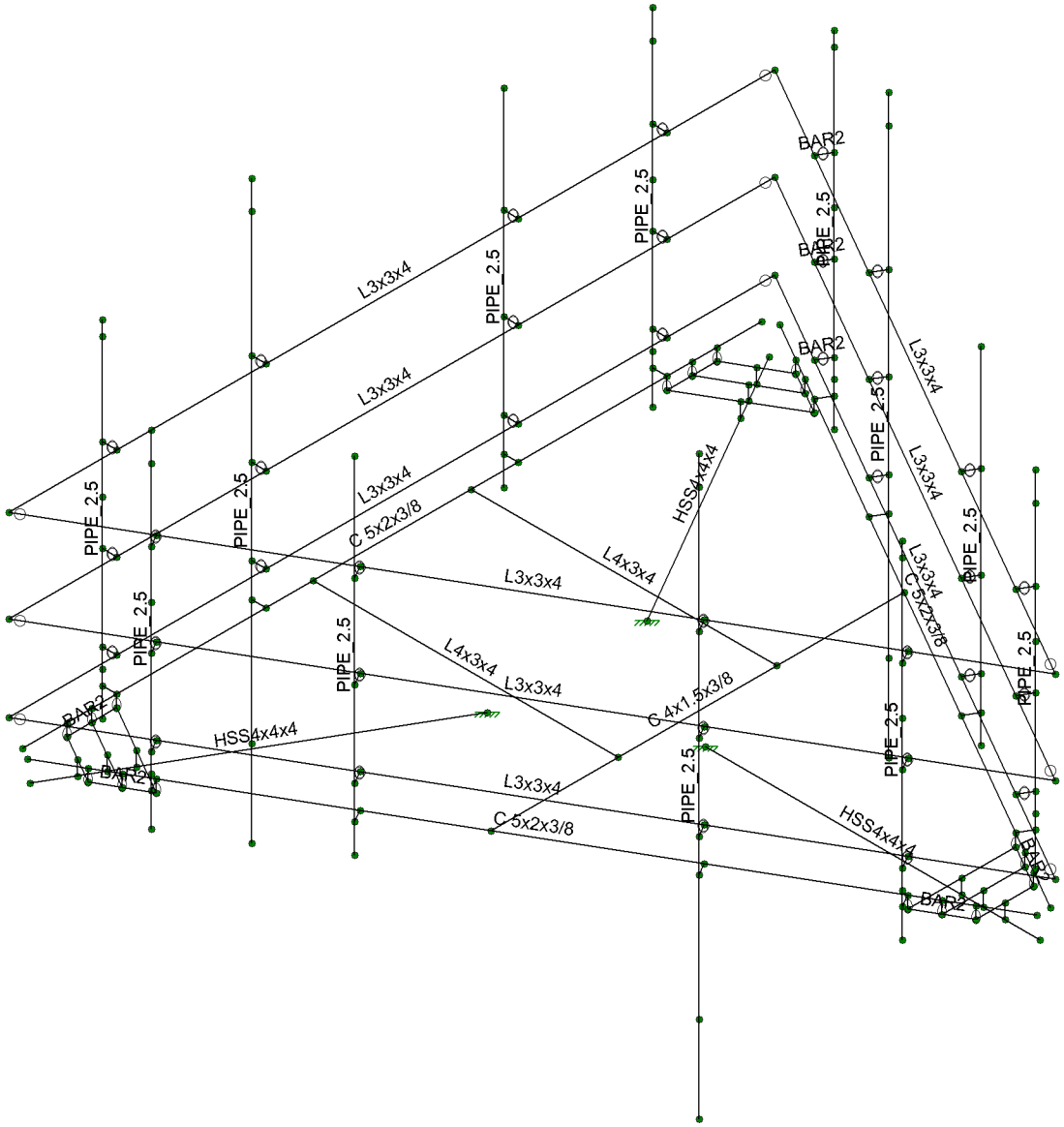

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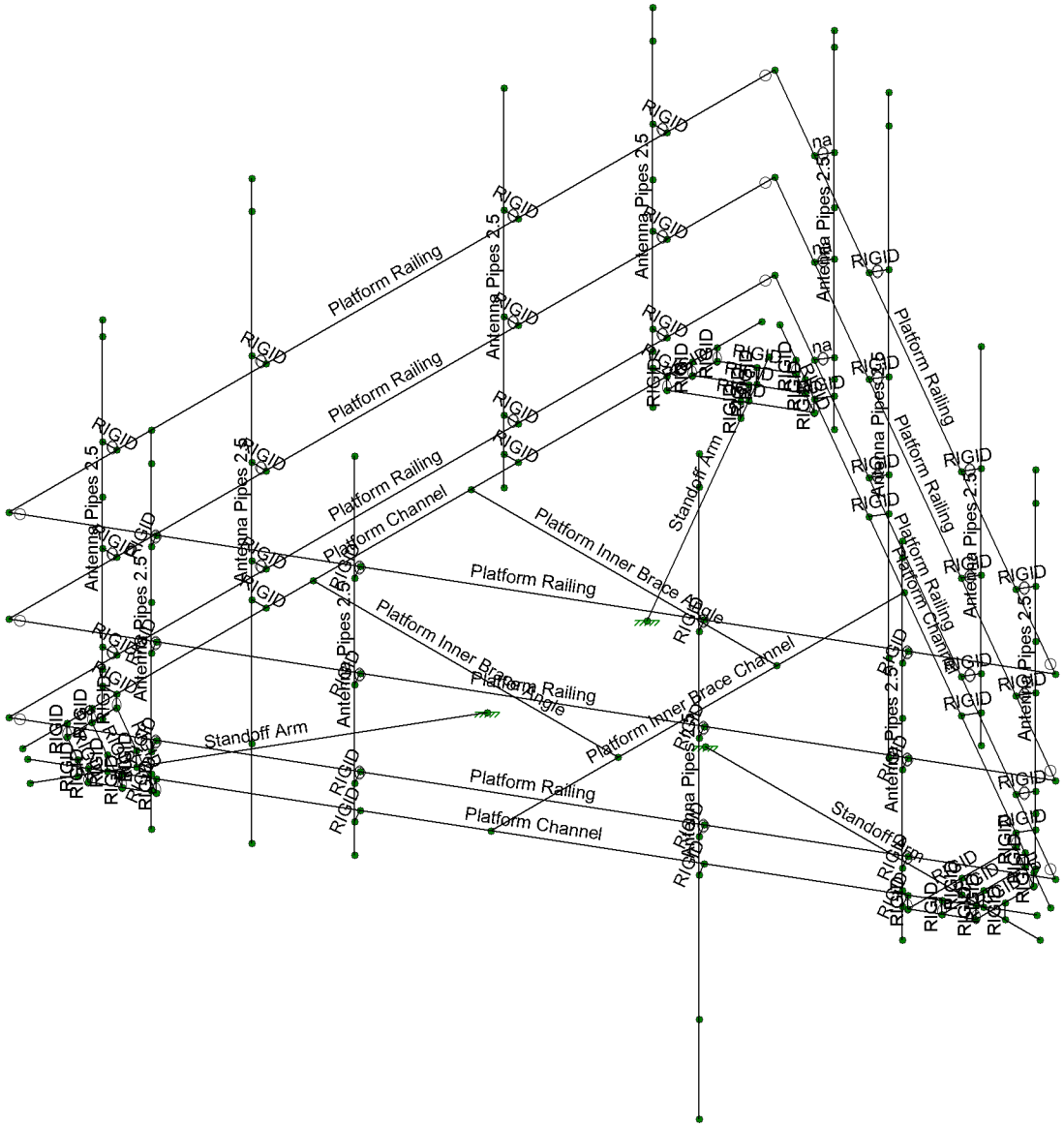

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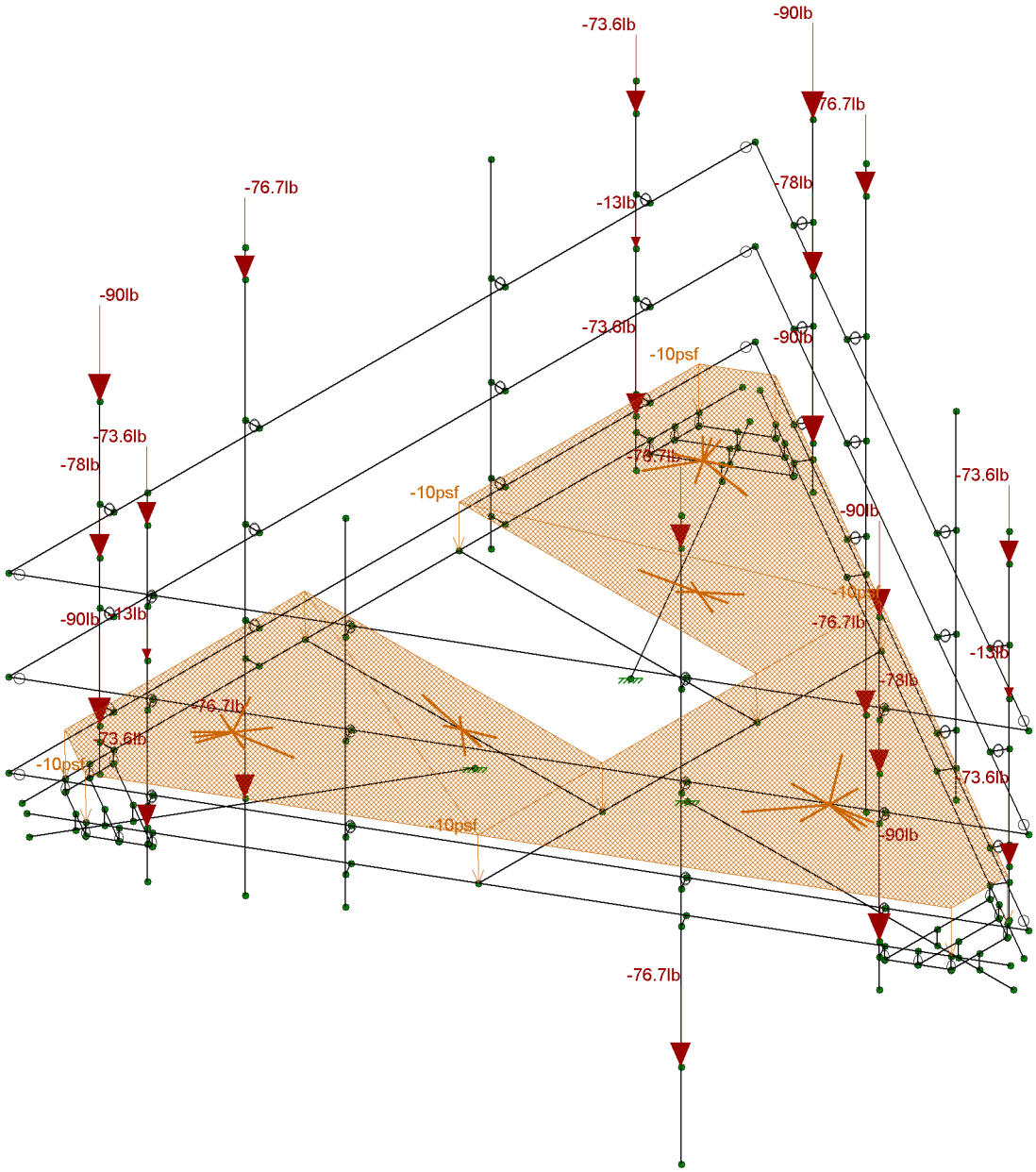

Loads: BLC 1, Dead
Envelope Only Solution

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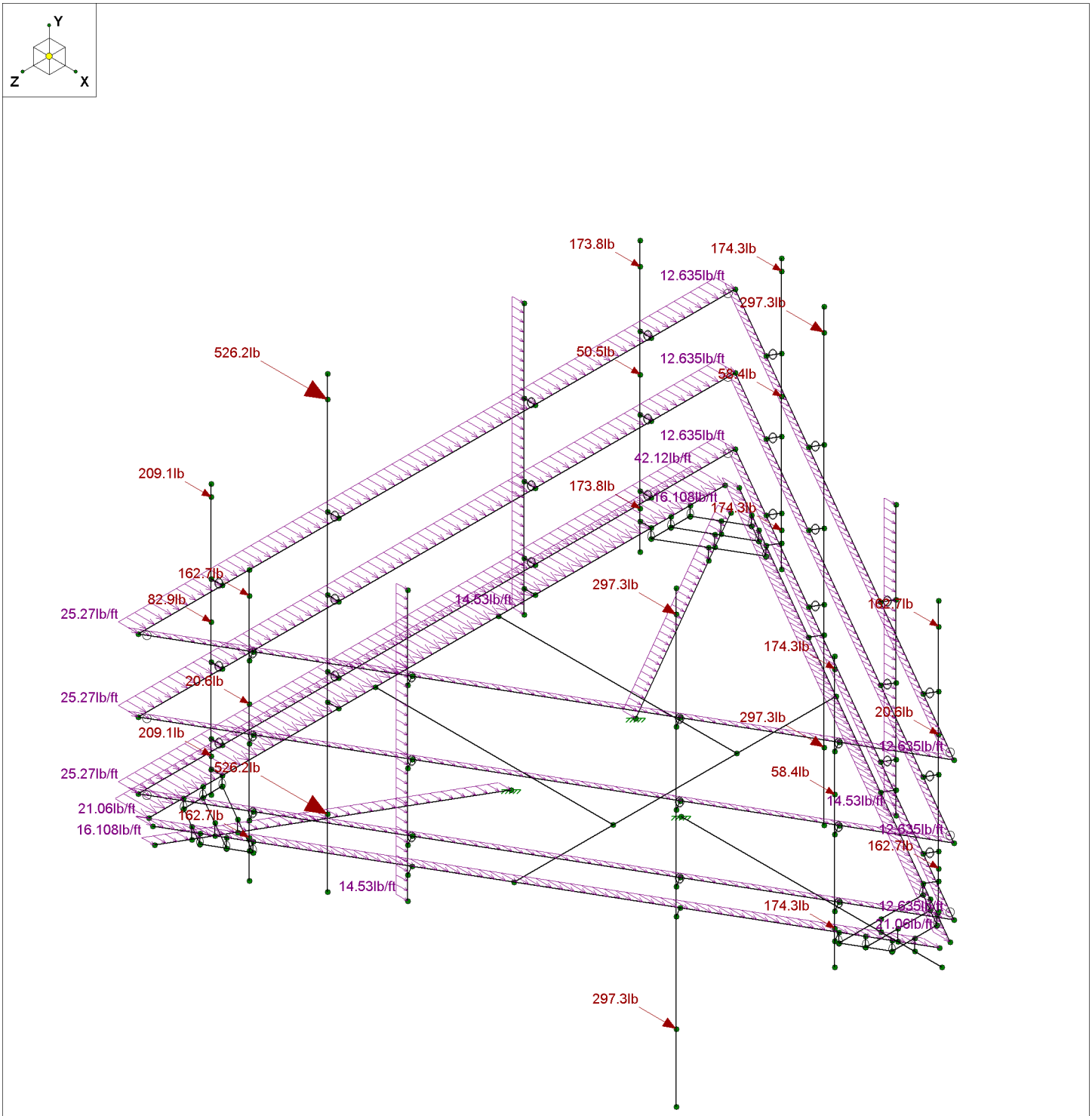

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Envelope Only Solution

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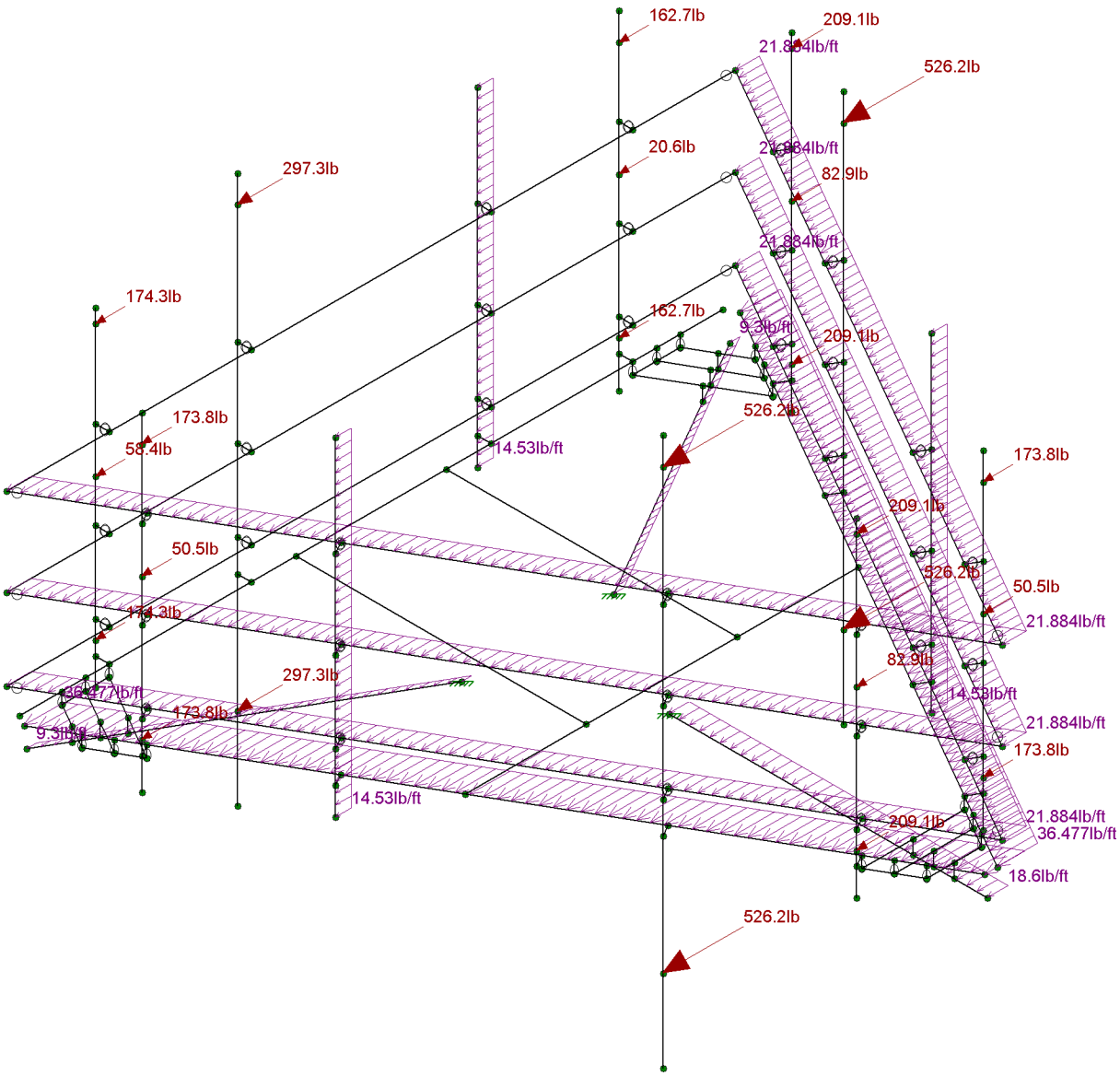

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Envelope Only Solution

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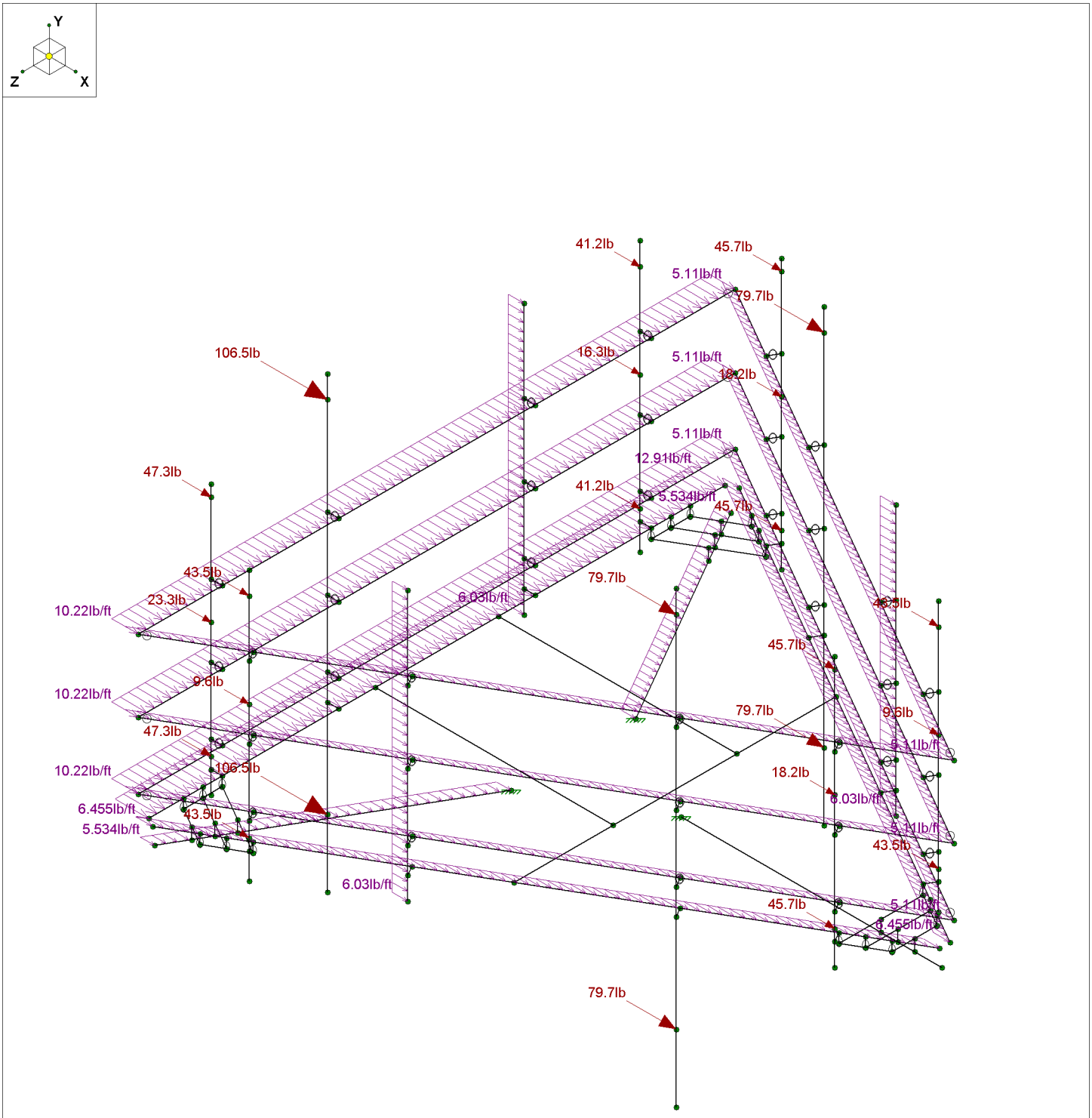

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Envelope Only Solution

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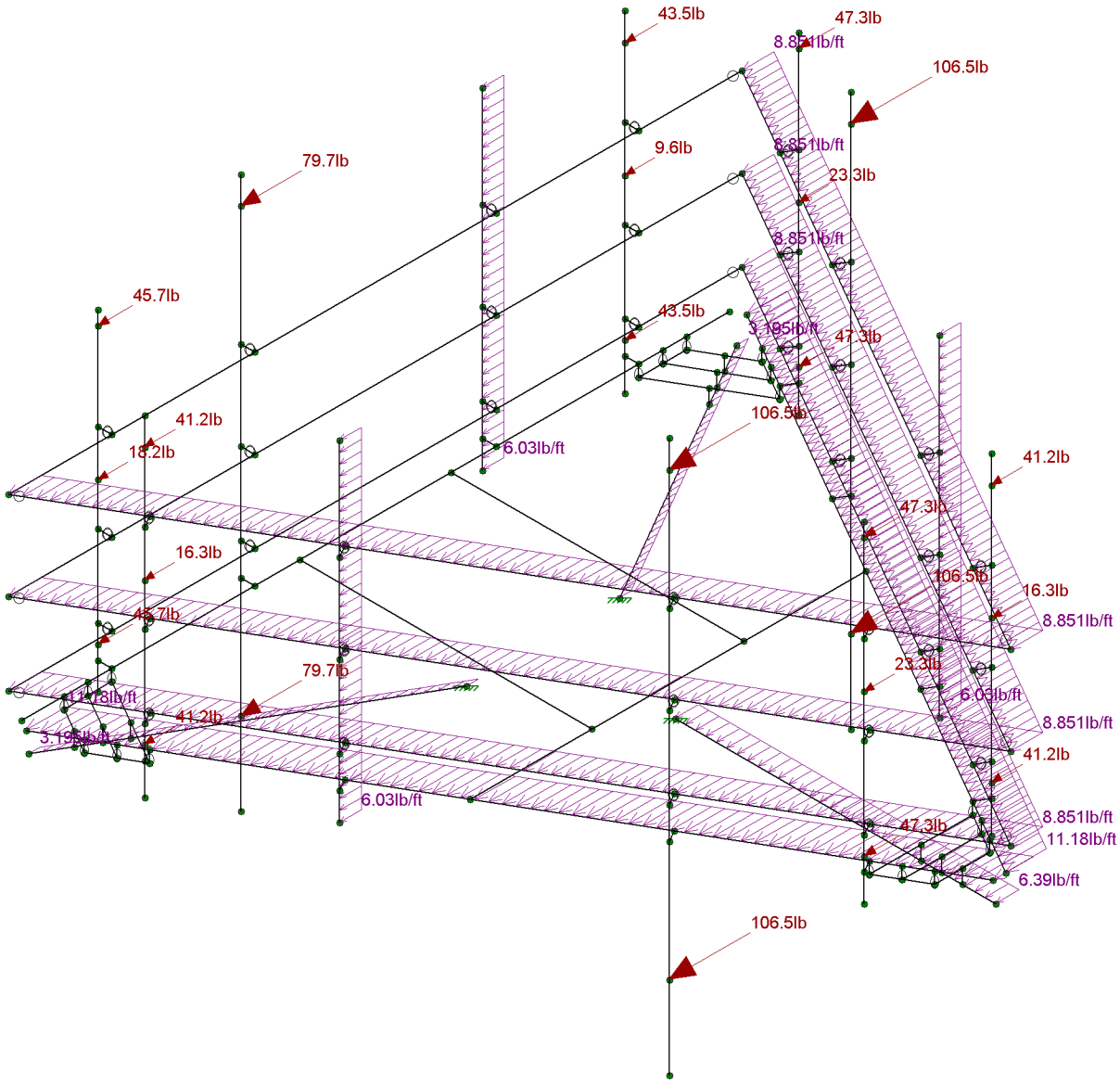

Loads: BLC 5, Ice Wz
Envelope Only Solution

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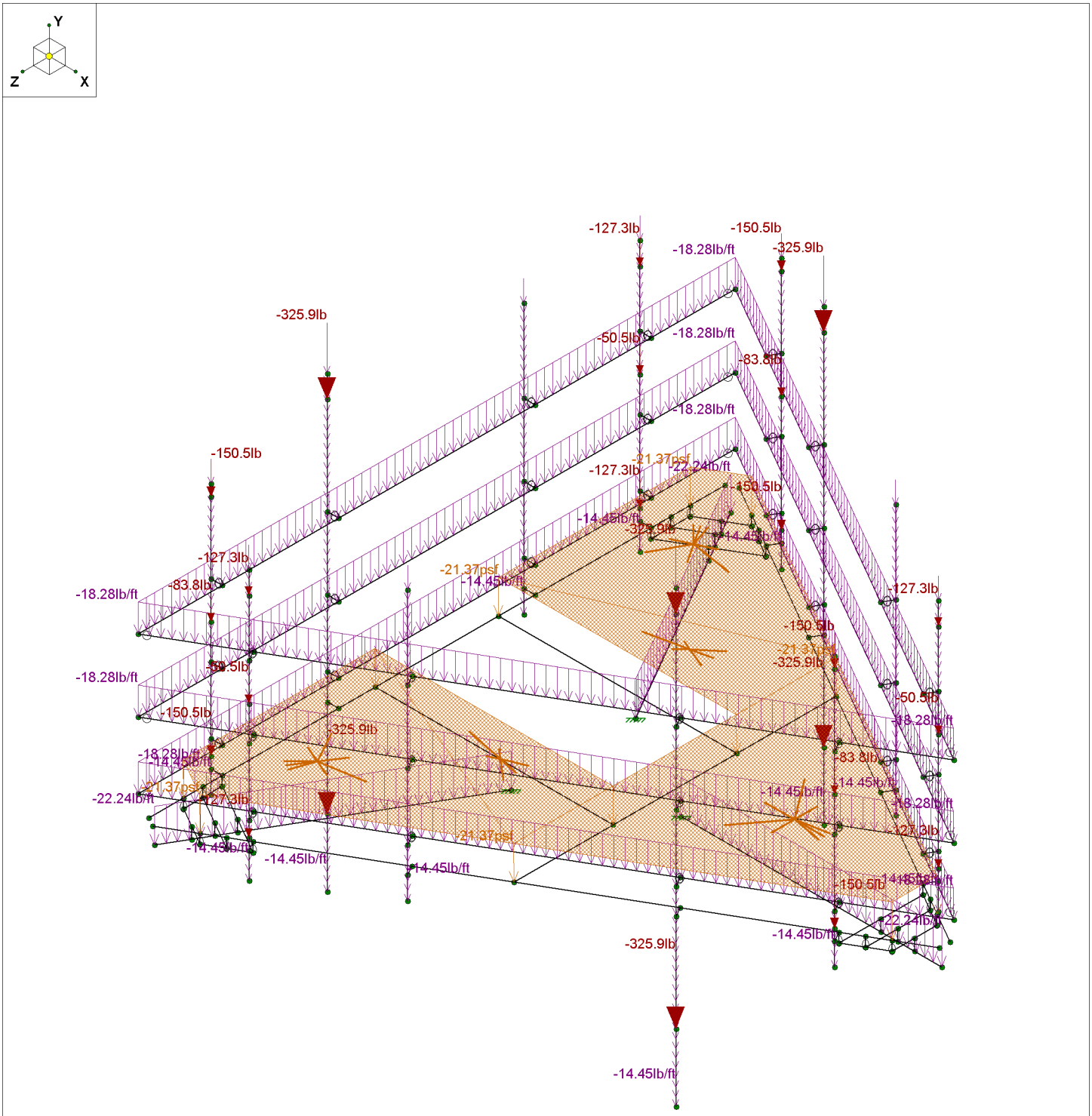

Loads: BLC 6, Ice weight
Envelope Only Solution

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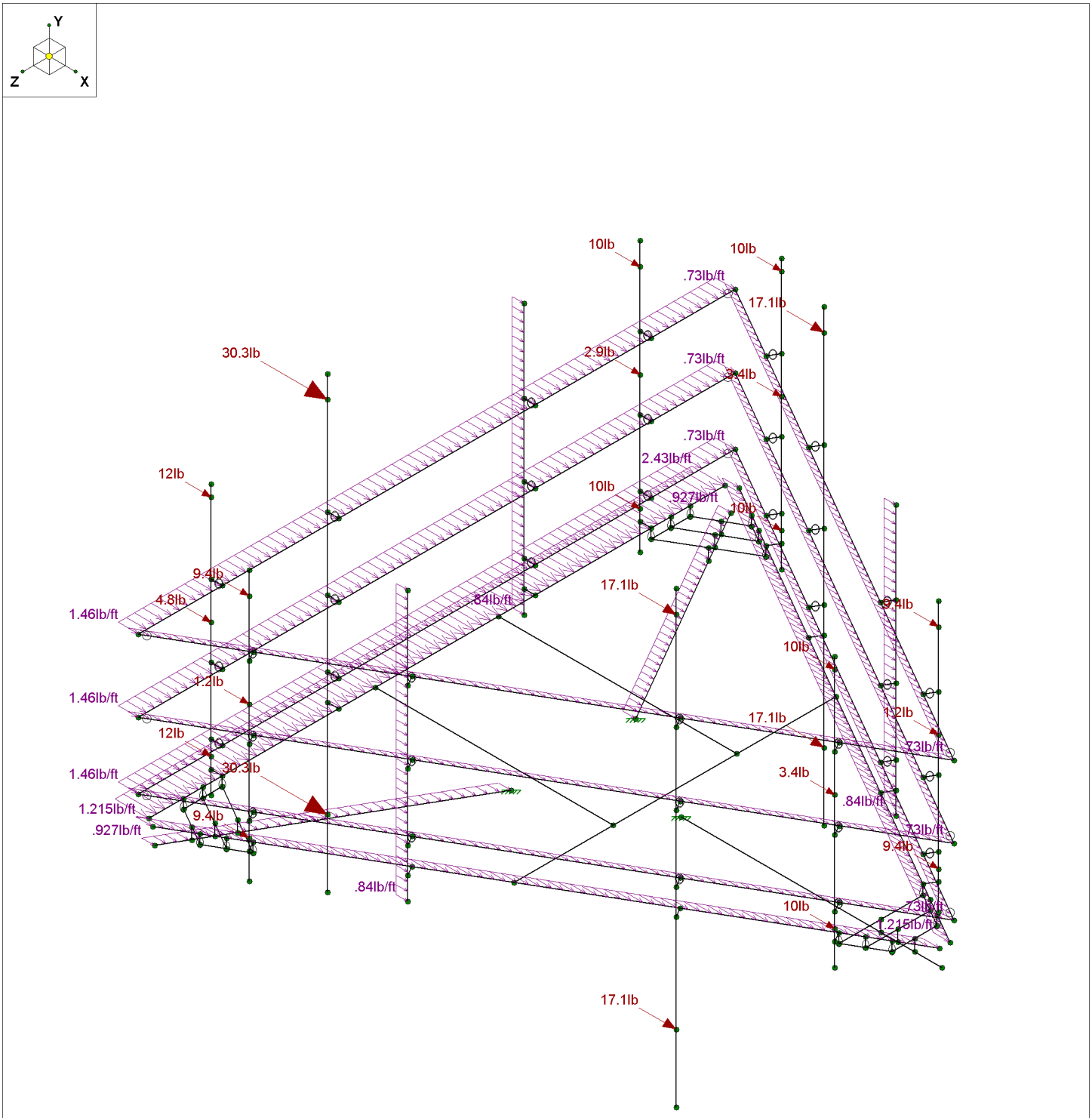

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Envelope Only Solution

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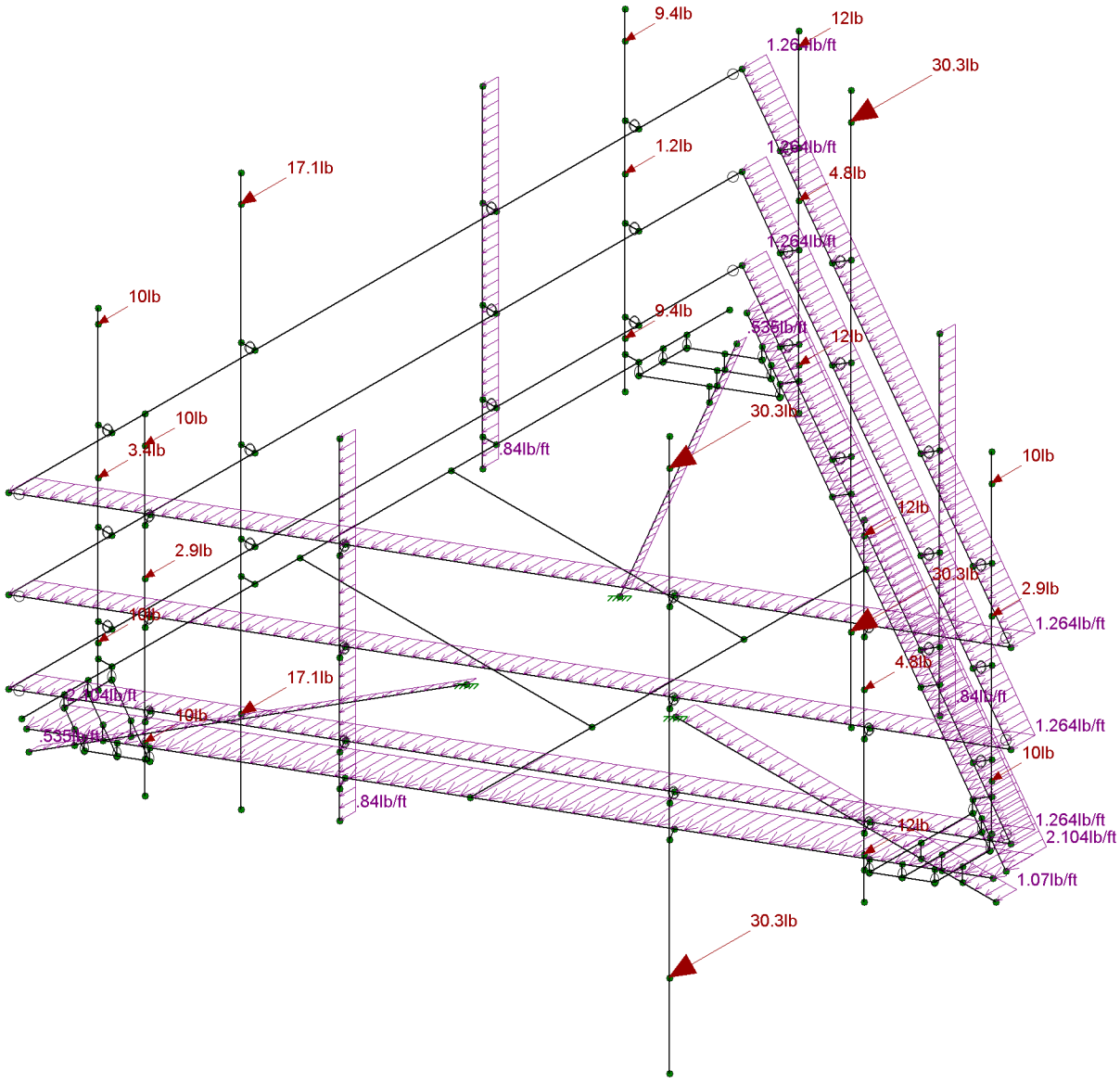

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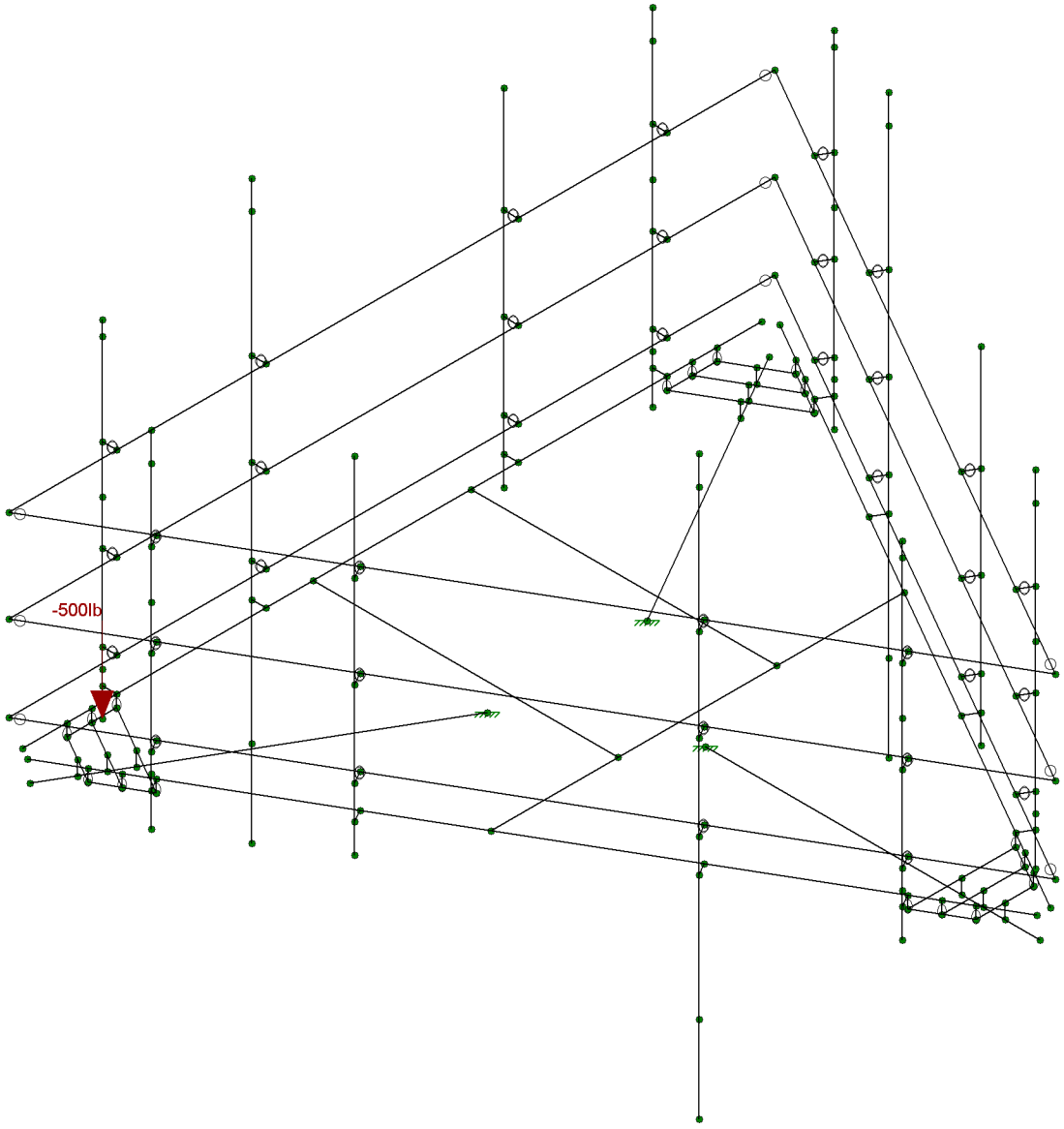

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Envelope Only Solution

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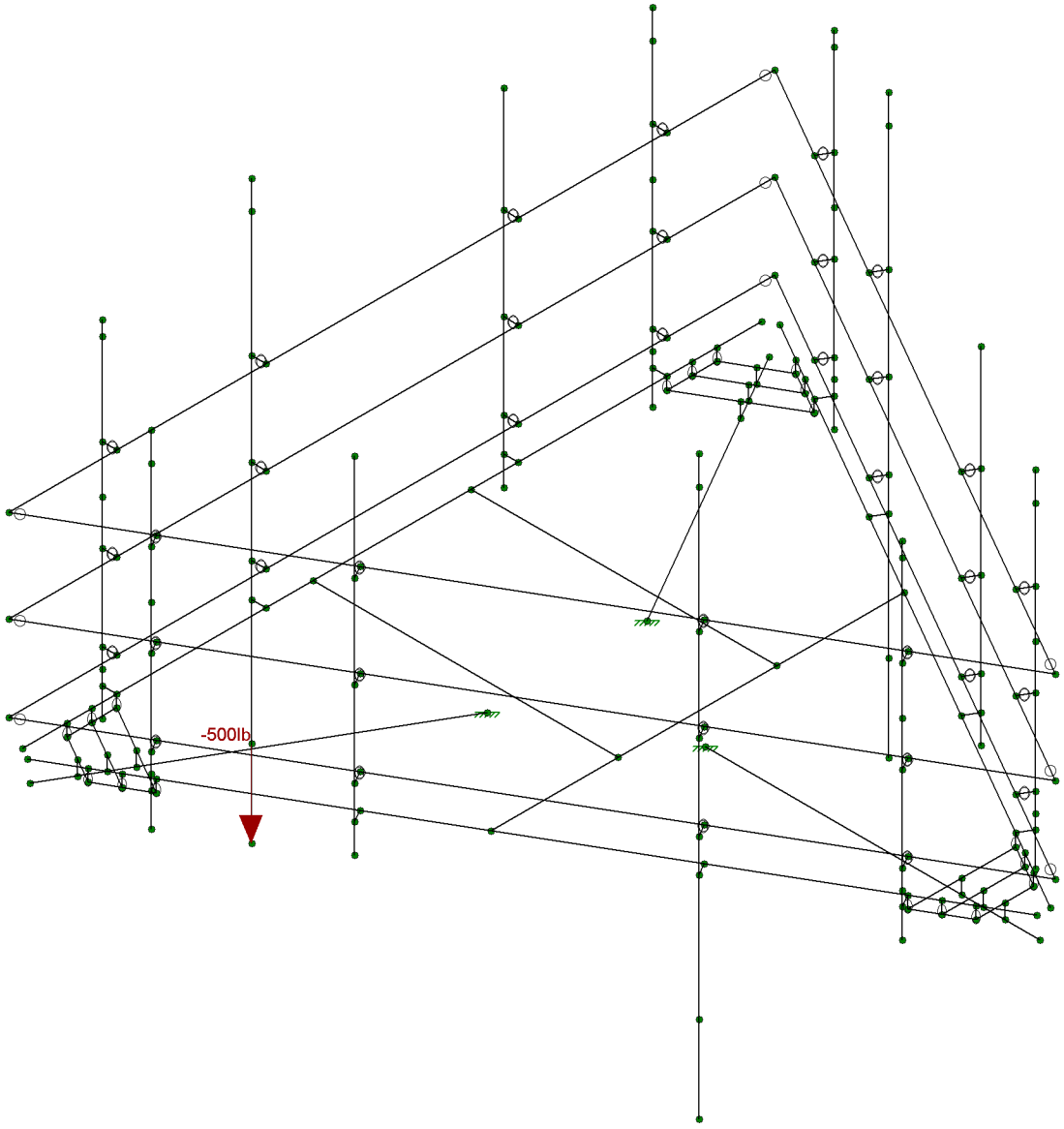

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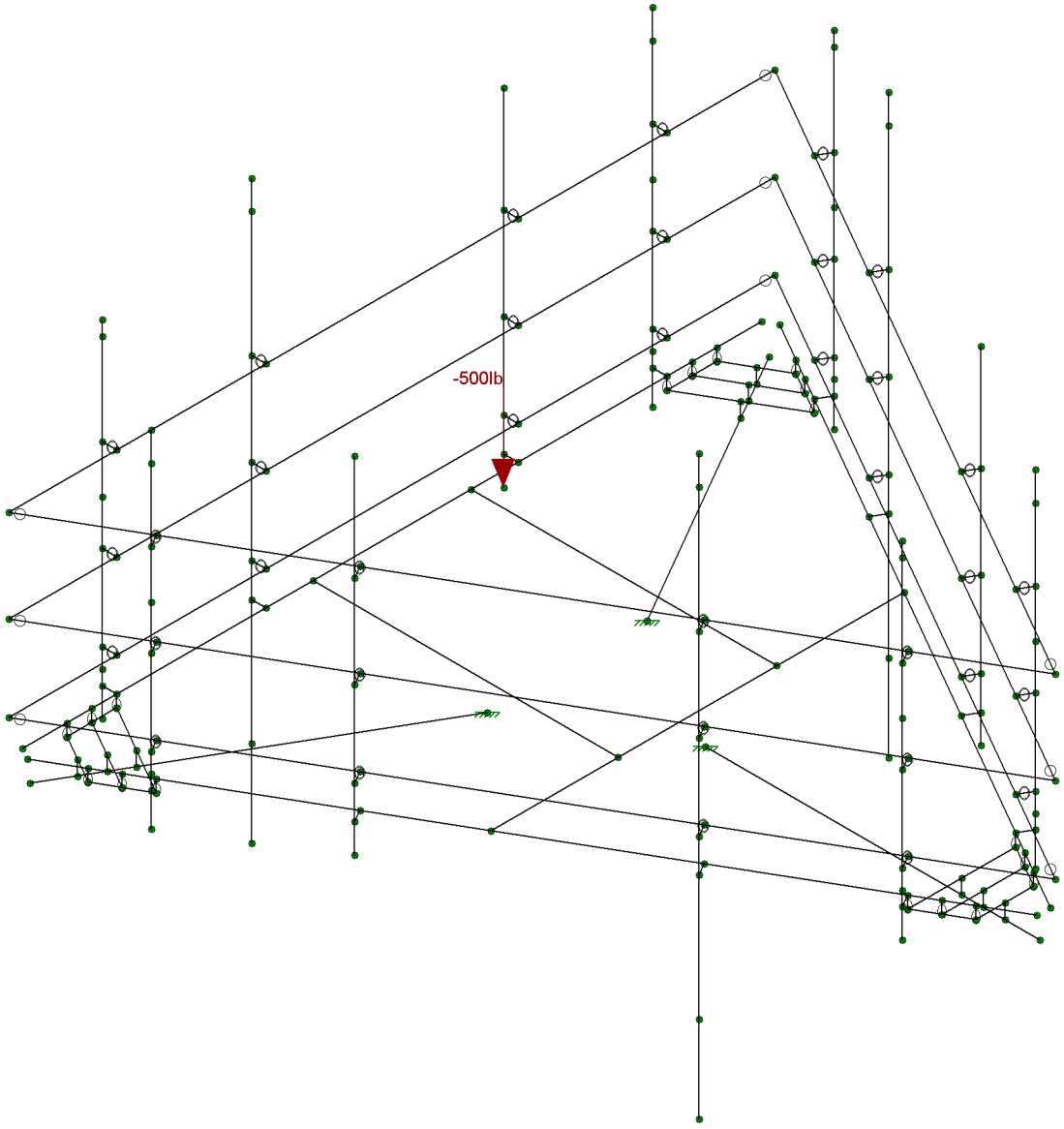

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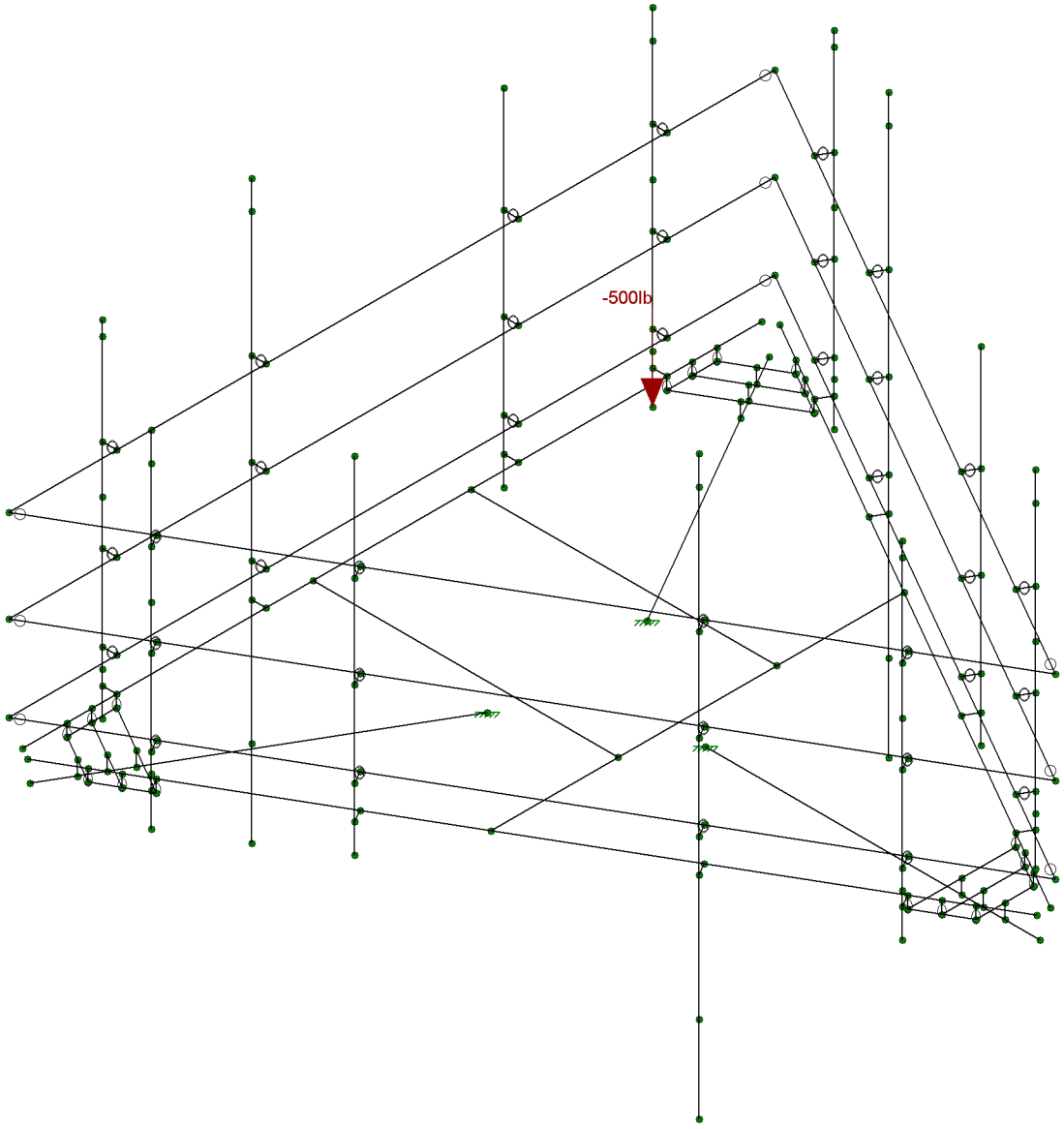

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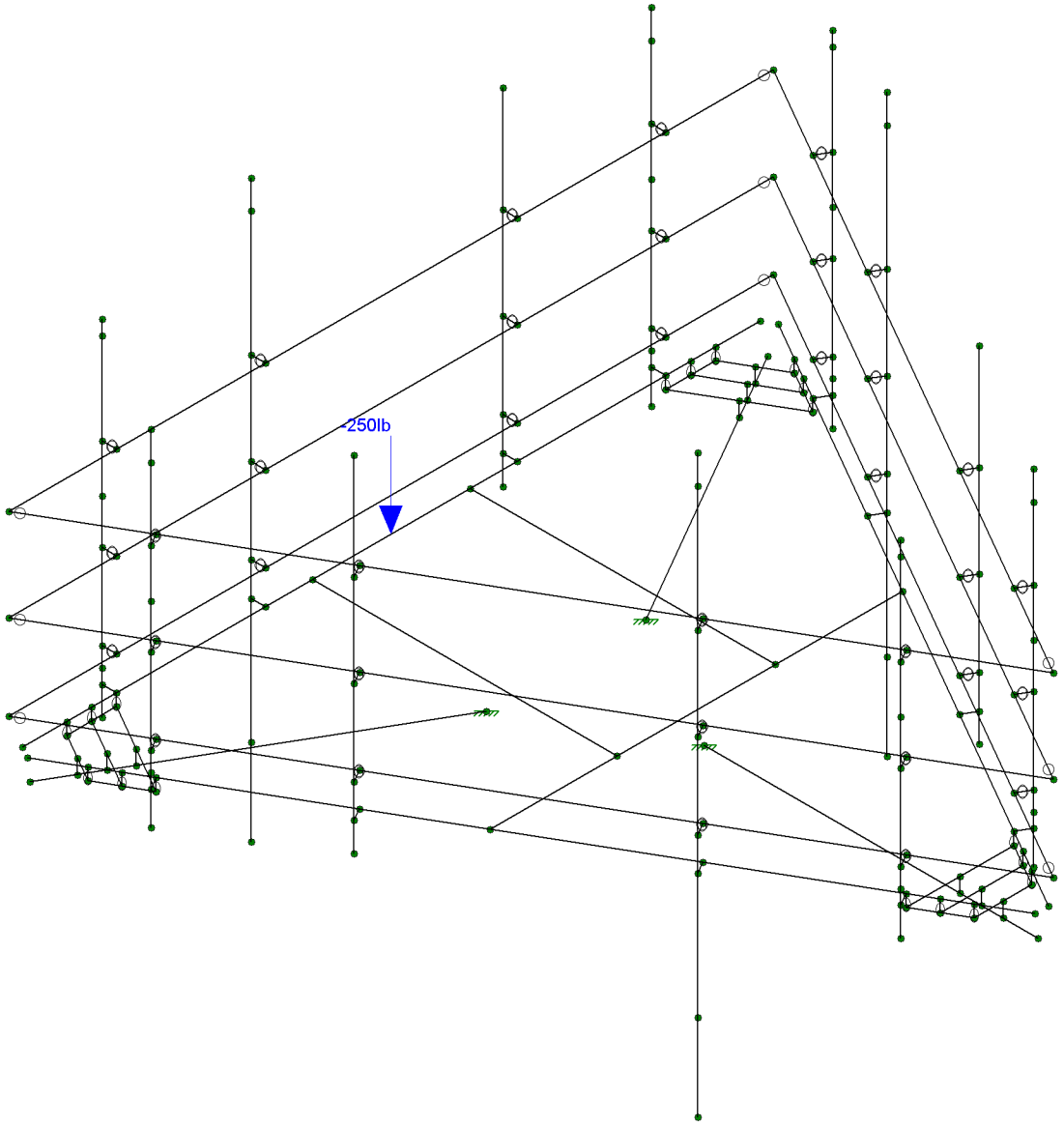

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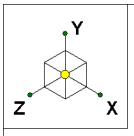

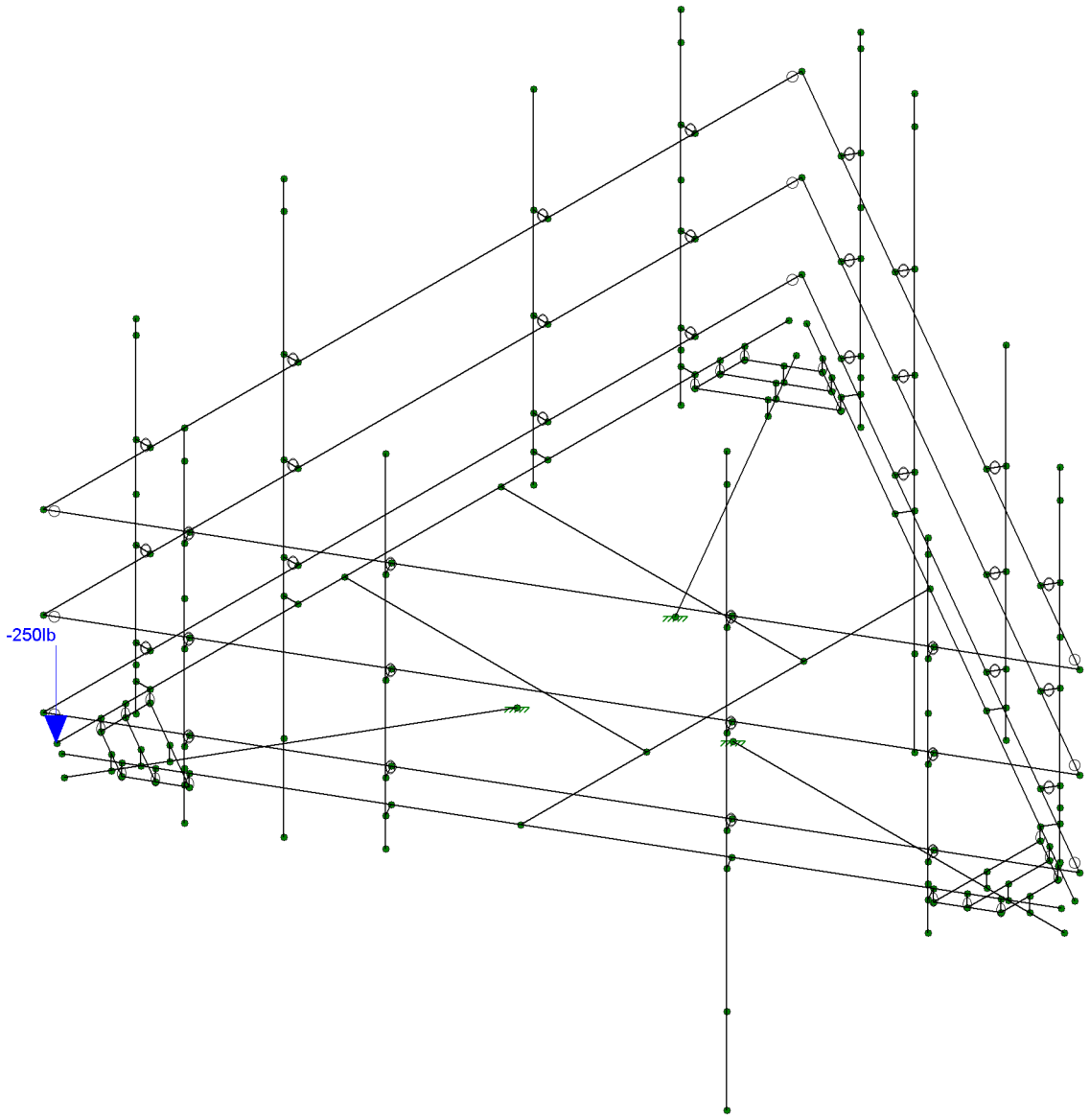

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18922077		Platform.R3D

APPENDIX B

SOFTWARE INPUT CALCULATIONS

Client:	TMobile	Computed By:	DX
Site Name:	HRT 094 943225	Date:	9/20/2018
Project No.	18922077A	Verified By:	SMS
Title:	Antenna Mount Analysis	Page:	1

Version 2.1

LOADING SUMMARY

Quantity	Manufacturer	Antenna/ Appurtenance	Status	Sector
3	ERICSSON	Air 32 DB B2A B66Aa	Existing	Alpha, Beta, & Gamma
3	**ERICSSON**	**AIR3246 B66**	**Proposed**	**Alpha, Beta, & Gamma**
3	**RFS**	**APXVAARR24_43-U-NA20**	**Proposed**	**Alpha, Beta, & Gamma**
3	**ERICSSON**	**RRU 4449 B71 + B12**	**Proposed**	**Alpha, Beta, & Gamma**
3	RFS	ATMAA1412D-1A20	Existing	Alpha, Beta, & Gamma

Client:	TMobile	Computed By:	DX
Site Name:	HRT 094 943225	Date:	9/20/2018
Project No.	18922077A	Verified By:	SMS
Title:	Antenna Mount Analysis	Page:	2

I. DESIGN INPUTS

Calculations for gravity and lateral loading on equipment and support mounts are determined as per the ANSI/TIA-222-H Code

				Reference	Equation
Wind Load Inputs Parameters					
Antenna Centerline	z	128	ft		
Ultimate Wind Speed	V_u	125	mph		
Normal Wind Speed with Ice (3 sec. Gust):	V_i	50	mph	Figure B9, p. 238	
Maintenace Wind Speed:	V_s	30	mph	Section 2.8.3	
Design Ice Thickness	t_i	2.0	in	Figure B9, p. 238	
Surface Roughness:		C		Section 2.6.5.1.1	
Exposure Category:		C		Section 2.6.5.1.2	
Risk Category:		II		Table 2-1	
Rooftop Wind Speed-Up Factor	K_s	1.0		Section 2.6.7	
Ground Elevation:		60.0	ft		
Ground Elevation Factor:	K_e	0.99783		Table 2-6	
Gust Effect Factor:	G_h	1.00		Section 2.6.9	
Wind Directionality Factor:	K_d	0.95		Table 2-2	
Topographic Category:		1		Section 2.6.6.2	
Wind Load Coefficients					
Importance Factors:					
Iced:	I_{ice}	1		Table 2-3	
Exposure Category Coefficients:					
3-s Gust-Speed Power Law Exponent:	α	9.5		Table 2-4	
Nominal Height of the Atmospheric Boundary Layer:	Z_g	900	ft	Table 2-4	
Min. Value for k_z:	Kz_{min}	1.03		Table 2-4	
Terrain Constant:	K_e	1.10		Table 2-4	
Velocity Pressure Exposure Coefficient:	K_z	1.333		Section 2.6.5.2	$=2.01 \cdot (z/z_g)^{2/\alpha'}$
Topographic Category Coefficients:					
Topographic Constant:	K_t	N/A		Table 2-5	
Height Attenuation Factor:	f	N/A		Table 2-5	
Height Reduction Factor:	K_h	N/A		Section 2.6.6.2.1	$=e^{(f \cdot z/H)}$
Topographic Factor:	K_{zt}	1.00		Section 2.6.6.2	$=[1+(K_c \cdot K_t/K_h)]^2$
Ice Accumulation:					
Ice Velocity Pressure Exposure Coefficient:	K_{iz}	1.15			$=(z/33)^{0.10}$
Factored Ice Thickness:	t_{iz}	2.29	in	Section 2.6.10	$=t_i \cdot I \cdot K_{iz} \cdot (K_{zt})^{0.35}$
Ice Density:	ρ_i	56.00	pcf		
Design Wind Pressures:					
Velocity Pressure:	q_z	50.55	psf	Section 2.6.11.6	$=0.00256 \cdot K_z \cdot K_{zt \cdot Ks \cdot Ke} \cdot K_d \cdot V^2$
Velocity Pressure (With Ice):	q_{zi}	8.09	psf	Section 2.6.11.6	$=0.00256 \cdot K_z \cdot K_{zt \cdot Ks \cdot Ke} \cdot K_d \cdot V_i^2$
Velocity Pressure (Maintenance):	q_{zm}	2.91	psf	Section 2.6.11.6	$=0.00256 \cdot K_z \cdot K_{zt \cdot Ks \cdot Ke} \cdot K_d \cdot V_m^2$

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II. CALCULATIONS

- ***Wind Load on Appurtenances***

Dimensions and Force Coefficients

Antenna/ Appurtenance	Non-Iced Condition								Iced Condition							
	Mounting Pipe			Equipment			Force Coefficient		Mounting Pipe			Equipment			Force Coefficient	
	Length (in)	Diameter (in)	Force Coefficient C_a	Height (in)	Width (in)	Depth (in)	$C_{a\ Front}$	$C_{a\ Side}$	Length (in)	Diameter (in)	Force Coefficient C_a	Height (in)	Width (in)	Depth (in)	$C_{a\ Front}$	$C_{a\ Side}$
Air 32 DB B2A B66Aa	72.0	2.875	1.200	56.60	12.90	8.70	1.28	1.38	76.6	7.5	0.873	61.18	17.48	13.28	1.24	1.29
AIR3246 B66	72.0	2.875	1.200	58.10	15.70	9.40	1.25	1.36	76.6	7.5	0.873	62.68	20.28	13.98	1.23	1.29
APXVAARR24_43-U-NA20	120.0	2.875	1.200	95.90	24.00	8.70	1.27	1.53	124.6	7.5	1.016	100.48	28.58	13.28	1.25	1.42
RRU 4449 B71 + B12	0.0	0.000	0.000	14.90	13.20	9.30	1.20	1.20	0.0	0.0	0.000	19.48	17.78	13.88	1.20	1.20
ATMAA1412D-1A20	0.0	0.000	0.000	12.00	10.00	4.00	1.20	1.22	0.0	0.0	0.000	16.58	14.58	8.58	1.20	1.20

Antenna/ Appurtenance	# of Brackets	Non-Iced Condition			Iced Condition			Maintenance Condition	
		Wind Force (lbs.)		Gravity (lbs.)	Wind Force (lbs.)		Gravity (lbs.)	Wind Force (lbs.)	
		F_N	F_T		F_N	F_T		F_N	F_T
Air 32 DB B2A B66Aa	2	173.8	162.7	**73.6**	41.2	43.5	**127.3**	10.0	9.4
AIR3246 B66	2	209.1	174.3	**90.0**	47.3	45.7	**150.5**	12.0	10.0
APXVAARR24_43-U-NA20	2	526.2	297.3	**76.7**	106.5	79.7	**325.9**	30.3	17.1
RRU 4449 B71 + B12	1	82.9	58.4	**78.0**	23.3	18.2	**83.8**	4.8	3.4
ATMAA1412D-1A20	1	50.5	20.6	**13.0**	16.3	9.6	**50.5**	2.9	1.2

**** ALL CALCULATED LOADS ARE PER MOUNTING BRACKET. TO GET THE TOTAL EQUIPMENT LOAD, MULTIPLY THE INDIVIDUAL LOADS BY THE NUMBER OF BRACKETS***

- ***Wind Load on Framing Members***

Member Category	Member Shape	Length (in)	Member Surface	Non-Iced Condition			Iced Condition						Maintenance Condition
				Exposed Wind Height (in)	Force Coefficient C_a	Wind Load (plf)	Exposed Wind Height (in)	Depth (in)	Length (in)	Force Coefficient C_a	Wind Load (plf)	Ice Weight (plf)	Wind Load (plf)
Pipe	Pipe 2.5	120	Round	2.88	1.20	14.53	7.46	7.46	124.58	1.20	6.03	14.45	0.84
Equal Angle	L3x3	154	Square	3.00	2.00	25.27	7.58	7.58	158.58	2.00	10.22	18.28	1.46
Channel	C5X9	154	Square	5.00	2.00	42.12	9.58	6.47	158.58	2.00	12.91	21.37	2.43
Channel	C4X6.25	86	Square	4.00	1.88	31.73	8.58	6.23	90.58	1.88	10.89	18.52	1.83
Unequal Angle	L4X3	64	Square	4.00	1.70	28.64	8.58	7.58	68.58	1.70	9.83	20.40	1.65

BASIC EQUATIONS

ANSI/TIA-222-H Reference

Force Coefficient: (Square)

$$C_{f\_square}(h,w) := \begin{cases} 1.2 & \text{if } \frac{h}{w} \le 2.5 \\ \left[1.2 + \frac{0.2}{4.5}\cdot\left(\frac{h}{w} - 2.5\right)\right] & \text{if } \frac{h}{w} > 2.5 \wedge \frac{h}{w} \le 7 \\ \left[1.4 + \frac{0.6}{18}\cdot\left(\frac{h}{w} - 7\right)\right] & \text{if } \frac{h}{w} > 7 \wedge \frac{h}{w} \le 25 \\ 2.0 & \text{otherwise} \end{cases}$$

Table 2-9

Force Coefficient: (Round)

$$C_{f\_round}(h,w) := \begin{cases} 0.7 & \text{if } \frac{h}{w} \le 2.5 \\ \left[0.7 + \frac{0.1}{4.5}\cdot\left(\frac{h}{w} - 2.5\right)\right] & \text{if } \frac{h}{w} > 2.5 \wedge \frac{h}{w} \le 7 \\ \left[0.8 + \frac{0.4}{18}\cdot\left(\frac{h}{w} - 7\right)\right] & \text{if } \frac{h}{w} > 7 \wedge \frac{h}{w} \le 25 \\ 1.2 & \text{otherwise} \end{cases}$$

Table 2-9

Terrain Exposure Constants:

Table 2-5

$$\alpha := \begin{cases} 7.0 & \text{if Exp} = \text{"B"} \\ 9.5 & \text{if Exp} = \text{"C"} \\ 11.5 & \text{if Exp} = \text{"D"} \end{cases} \quad Z_g := \begin{cases} 1200\text{ft} & \text{if Exp} = \text{"B"} \\ 900\text{ft} & \text{if Exp} = \text{"C"} \\ 700\text{ft} & \text{if Exp} = \text{"D"} \end{cases} \quad K_{zmin} := \begin{cases} 0.70 & \text{if Exp} = \text{"B"} \\ 0.85 & \text{if Exp} = \text{"C"} \\ 1.03 & \text{if Exp} = \text{"D"} \end{cases}$$

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BASIC EQUATIONS

ANSI/TIA-222-H Reference

Velocity Pressure Coefficient:

$$Kz(z) := \left| \begin{array}{l} K_z \leftarrow \max\left[2.01 \cdot \left(\frac{z}{Z_g} \right)^{\frac{2}{\alpha}}, K_{zmin} \right] \\ K_z \leftarrow \min\left(K_z, 2.01 \right) \end{array} \right.$$

Section 2.6.5.6

$$K_z := Kz(z)$$

$$Kzt(z) := K_{zt} \leftarrow \left| \begin{array}{l} 1.0 \text{ if Topo = "1"} \\ \text{otherwise} \\ \quad \left| \begin{array}{l} K_e \leftarrow \left| \begin{array}{l} 0.90 \text{ if Exp = "B"} \\ 1.00 \text{ if Exp = "C"} \\ 1.10 \text{ if Exp = "D"} \end{array} \right. \\ K_t \leftarrow \left| \begin{array}{l} 0.43 \text{ if Topo = "2"} \\ 0.53 \text{ if Topo = "3"} \\ 0.72 \text{ if Topo = "4"} \end{array} \right. \\ f \leftarrow \left| \begin{array}{l} 1.25 \text{ if Topo = "2"} \\ 2.00 \text{ if Topo = "3"} \\ 1.50 \text{ if Topo = "4"} \end{array} \right. \\ K_h \leftarrow e^{\left(\frac{f \cdot z}{CH} \right)} \\ \left(1 + \frac{K_e \cdot K_t}{K_h} \right)^2 \end{array} \right. \end{array} \right.$$

Table 2-4

$$K_{zt} := Kzt(z)$$

Velocity Pressure:

$$q_z := 0.00256 \cdot K_z \cdot K_{zt} \cdot K_s \cdot K_e \cdot K_d \cdot V^2 \cdot psf$$

Section 2.6.9.6

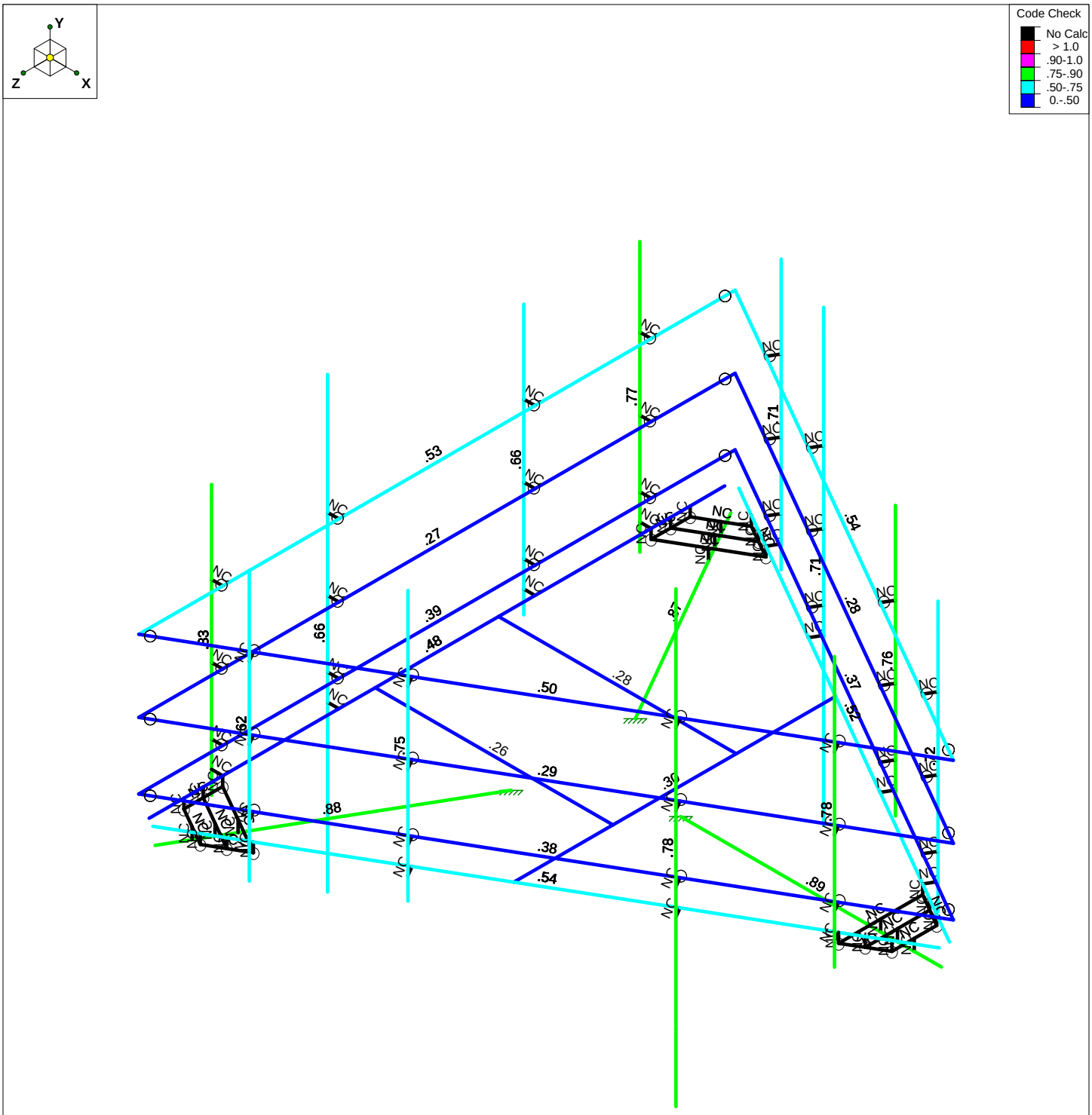
LOAD EQUATIONS

WIND LOAD

Area (Normal):	$AN_{area} = H_{ant} \cdot Want$
Area (Side):	$AT_{area} = H_{ant} \cdot Dant$
Force Coefficient (Normal):	$C_{fn} = C_{fsquare}(H_{ant}, Want)$
Force Coefficient (Side):	$C_{fs} = C_{fsquare}(H_{ant}, Dant)$
Pipe Area (Normal):	$AN_p = \max[(L_p - H_{ant}) * Dp, 0]$
Pipe Area (Side):	$AT_p = L_p \cdot Dp$
Force Coefficient (Normal):	$C_{fp} = C_{fround}(Lp, Dp)$
Normal Effective Projected Area:	$E_{pan} = (C_{fn} \cdot ANarea) + (Cfp \cdot ANp)$
Side Effective Projected Area:	$E_{pat} = (C_{fs} \cdot ATarea) + (Cfp \cdot ATp)$
Effective Projected Area:	$EPA = max(E_{pan}, Epat)$
Wind Force:	$F_{ant} = q_z \cdot Gh \cdot EPA$

APPENDIX C

SOFTWARE ANALYSIS OUTPUT



Member Code Checks Displayed
Envelope Only Solution

Maser Consulting Connec...	Antenna Mount Analysis	SK - 20
DX		Sept 21, 2018 at 4:00 PM
18922077		Platform.R3D

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotat...	Section/Shape	Type	Design ...	Material	Design Rules
1	M1	N1	N2			Platform Inner Brace Ch...	Beam	Channel	A36 Gr.36	Typical
2	M2	N3	N4			Platform Inner Brace An...	Beam	Single A...	A36 Gr.36	Typical
3	M3	N6	N5			Platform Inner Brace An...	Beam	Single A...	A36 Gr.36	Typical
4	M4	N7	N8		90	Platform Railing	Beam	Single A...	A36 Gr.36	Typical
5	M5	N9	N7		90	Platform Railing	Beam	Single A...	A36 Gr.36	Typical
6	M6	N8	N9		90	Platform Railing	Beam	Single A...	A36 Gr.36	Typical
7	M7	N10	N11			Standoff Arm	Beam	Square...	A500 Gr.46	Typical
8	M8	N16	N14			RIGID	None	None	RIGID	Typical
9	M9	N12	N13			RIGID	None	None	RIGID	Typical
10	M10	N14	N15			RIGID	None	None	RIGID	Typical
11	M11	N16	N17			RIGID	None	None	RIGID	Typical
12	M12	N27	N28			RIGID	None	None	RIGID	Typical
13	M13	N26	N29			RIGID	None	None	RIGID	Typical
14	M14	N18	N19			RIGID	None	None	RIGID	Typical
15	M15	N20	N21			RIGID	None	None	RIGID	Typical
16	M16	N26	N22			RIGID	None	None	RIGID	Typical
17	M17	N27	N23			RIGID	None	None	RIGID	Typical
18	M18	N28	N24			RIGID	None	None	RIGID	Typical
19	M19	N29	N25			RIGID	None	None	RIGID	Typical
20	M20	N26	N27			BAR2	Beam	None	gen_Conc3NW	Typical
21	M21	N28	N29			BAR2	Beam	None	gen_Conc3NW	Typical
22	M22	N30	N31			Standoff Arm	Beam	Square...	A500 Gr.46	Typical
23	M23	N36	N34			RIGID	None	None	RIGID	Typical
24	M24	N32	N33			RIGID	None	None	RIGID	Typical
25	M25	N34	N35			RIGID	None	None	RIGID	Typical
26	M26	N36	N37			RIGID	None	None	RIGID	Typical
27	M27	N47	N48			RIGID	None	None	RIGID	Typical
28	M28	N46	N49			RIGID	None	None	RIGID	Typical
29	M29	N38	N39			RIGID	None	None	RIGID	Typical
30	M30	N40	N41			RIGID	None	None	RIGID	Typical
31	M31	N46	N42			RIGID	None	None	RIGID	Typical
32	M32	N47	N43			RIGID	None	None	RIGID	Typical
33	M33	N48	N44			RIGID	None	None	RIGID	Typical
34	M34	N49	N45			RIGID	None	None	RIGID	Typical
35	M35	N46	N47			RIGID	None	None	RIGID	Typical
36	M36	N48	N49			RIGID	None	None	RIGID	Typical
37	M37	N50	N51			Standoff Arm	Beam	Square...	A500 Gr.46	Typical
38	M38	N56	N54			RIGID	None	None	RIGID	Typical
39	M39	N52	N53			RIGID	None	None	RIGID	Typical
40	M40	N54	N55			RIGID	None	None	RIGID	Typical
41	M41	N56	N57			RIGID	None	None	RIGID	Typical
42	M42	N67	N68			RIGID	None	None	RIGID	Typical
43	M43	N66	N69			RIGID	None	None	RIGID	Typical
44	M44	N58	N59			RIGID	None	None	RIGID	Typical
45	M45	N60	N61			RIGID	None	None	RIGID	Typical
46	M46	N66	N62			RIGID	None	None	RIGID	Typical
47	M47	N67	N63			RIGID	None	None	RIGID	Typical
48	M48	N68	N64			RIGID	None	None	RIGID	Typical
49	M49	N69	N65			RIGID	None	None	RIGID	Typical
50	M50	N66	N67			BAR2	Beam	None	gen_Conc3NW	Typical
51	M51	N68	N69			BAR2	Beam	None	gen_Conc3NW	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotat...	Section/Shape	Type	Design ...	Material	Design Rules
52	M52	N70	N71		180	Platform Channel	Beam	Channel	A36 Gr.36	Typical
53	M53	N72	N73		180	Platform Channel	Beam	Channel	A36 Gr.36	Typical
54	M54	N74	N75		180	Platform Channel	Beam	Channel	A36 Gr.36	Typical
55	M55	N76	N77		90	Platform Railing	Beam	Single A...	A36 Gr.36	Typical
56	M56	N78	N76		90	Platform Railing	Beam	Single A...	A36 Gr.36	Typical
57	M57	N77	N78		90	Platform Railing	Beam	Single A...	A36 Gr.36	Typical
58	M58	N79	N80		90	Platform Railing	Beam	Single A...	A36 Gr.36	Typical
59	M59	N81	N79		90	Platform Railing	Beam	Single A...	A36 Gr.36	Typical
60	M60	N80	N81		90	Platform Railing	Beam	Single A...	A36 Gr.36	Typical
61	M61	N82	N83			Antenna Pipes 2.5	Beam	Pipe	A53 Gr. B	Typical
62	M62	N84	N85			Antenna Pipes 2.5	Beam	Pipe	A53 Gr. B	Typical
63	M63	N86	N87			Antenna Pipes 2.5	Beam	Pipe	A53 Gr. B	Typical
64	M64	N88	N89			Antenna Pipes 2.5	Beam	Pipe	A53 Gr. B	Typical
65	M65	N90	N91			RIGID	None	None	RIGID	Typical
66	M66	N92	N93			RIGID	None	None	RIGID	Typical
67	M67	N94	N95			RIGID	None	None	RIGID	Typical
68	M68	N42	N97			RIGID	None	None	RIGID	Typical
69	M69	N98	N99			RIGID	None	None	RIGID	Typical
70	M70	N100	N101			RIGID	None	None	RIGID	Typical
71	M71	N102	N103			RIGID	None	None	RIGID	Typical
72	M72	N104	N105			RIGID	None	None	RIGID	Typical
73	M73	N106	N107			RIGID	None	None	RIGID	Typical
74	M74	N108	N109			RIGID	None	None	RIGID	Typical
75	M75	N110	N111			RIGID	None	None	RIGID	Typical
76	M76	N112	N113			RIGID	None	None	RIGID	Typical
77	M77	N114	N115			RIGID	None	None	RIGID	Typical
78	M78	N116	N117			RIGID	None	None	RIGID	Typical
79	M79	N118	N119			RIGID	None	None	RIGID	Typical
80	M80	N65	N121			RIGID	None	None	RIGID	Typical
81	M81	N122	N123			Antenna Pipes 2.5	Beam	Pipe	A53 Gr. B	Typical
82	M82	N124	N125			Antenna Pipes 2.5	Beam	Pipe	A53 Gr. B	Typical
83	M89	N138	N139			RIGID	None	None	RIGID	Typical
84	M90	N140	N141			RIGID	None	None	RIGID	Typical
85	M91	N142	N143			RIGID	None	None	RIGID	Typical
86	M92	N144	N145			RIGID	None	None	RIGID	Typical
87	M93	N146	N147			RIGID	None	None	RIGID	Typical
88	M94	N148	N149			RIGID	None	None	RIGID	Typical
89	M95	N150	N151			RIGID	None	None	RIGID	Typical
90	M96	N152	N153			RIGID	None	None	RIGID	Typical
91	M101	N162	N163			Antenna Pipes 2.5	Beam	Pipe	A53 Gr. B	Typical
92	M102	N164	N165			Antenna Pipes 2.5	Beam	Pipe	A53 Gr. B	Typical
93	M109	N178	N179			RIGID	None	None	RIGID	Typical
94	M110	N180	N181			RIGID	None	None	RIGID	Typical
95	M111	N182	N183			RIGID	None	None	RIGID	Typical
96	M112	N184	N185			RIGID	None	None	RIGID	Typical
97	M113	N186	N187			RIGID	None	None	RIGID	Typical
98	M114	N188	N189			RIGID	None	None	RIGID	Typical
99	M115	N190	N191			RIGID	None	None	RIGID	Typical
100	M116	N192	N193			RIGID	None	None	RIGID	Typical
101	M121	N225A	N226			Antenna Pipes 2.5	Beam	Pipe	A53 Gr. B	Typical
102	M122	N227	N228			BAR2	Beam	None	gen_Conc3NW	Typical
103	M123	N229	N230			BAR2	Beam	None	gen_Conc3NW	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotat...	Section/Shape	Type	Design ...	Material	Design Rules
104	M124	N231	N232			BAR2	Beam	None	gen_Conc3NW	Typical
105	M125	N45	N234			RIGID	None	None	RIGID	Typical
106	M121A	N224A	N225			Antenna Pipes 2.5	Beam	Pipe	A53 Gr. B	Typical
107	M122A	N226A	N227A			RIGID	None	None	RIGID	Typical
108	M123A	N228A	N229A			RIGID	None	None	RIGID	Typical
109	M124A	N230A	N231A			RIGID	None	None	RIGID	Typical
110	M125A	N22	N233			RIGID	None	None	RIGID	Typical
111	M121B	N223A	N224			Antenna Pipes 2.5	Beam	Pipe	A53 Gr. B	Typical
112	M122B	N225B	N226B			RIGID	None	None	RIGID	Typical
113	M123B	N227B	N228B			RIGID	None	None	RIGID	Typical
114	M124B	N229B	N230B			RIGID	None	None	RIGID	Typical
115	M125B	N25	N232A			RIGID	None	None	RIGID	Typical
116	M121C	N222A	N223			Antenna Pipes 2.5	Beam	Pipe	A53 Gr. B	Typical
117	M122C	N224B	N225C			RIGID	None	None	RIGID	Typical
118	M123C	N226C	N227C			RIGID	None	None	RIGID	Typical
119	M124C	N228C	N229C			RIGID	None	None	RIGID	Typical
120	M125C	N62	N231B			RIGID	None	None	RIGID	Typical

Joint Loads and Enforced Displacements (BLC 1 : Dead)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N214	L	Y	-73.6
2	N217	L	Y	-73.6
3	N208	L	Y	-90
4	N211	L	Y	-90
5	N202	L	Y	-76.7
6	N205	L	Y	-76.7
7	N204	L	Y	-76.7
8	N207	L	Y	-76.7
9	N203	L	Y	-76.7
10	N206	L	Y	-76.7
11	N221	L	Y	-78
12	N220	L	Y	-13
13	N235	L	Y	-90
14	N236	L	Y	-90
15	N237	L	Y	-78
16	N234A	L	Y	-73.6
17	N235A	L	Y	-73.6
18	N236A	L	Y	-13
19	N233A	L	Y	-90
20	N234B	L	Y	-90
21	N235B	L	Y	-78
22	N232B	L	Y	-73.6
23	N233B	L	Y	-73.6
24	N234C	L	Y	-13

Joint Loads and Enforced Displacements (BLC 2 : Wx)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N214	L	X	173.8
2	N217	L	X	173.8
3	N208	L	X	209.1

Joint Loads and Enforced Displacements (BLC 2 : Wx) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
4	N211	L	X	209.1
5	N202	L	X	526.2
6	N205	L	X	526.2
7	N204	L	X	297.3
8	N207	L	X	297.3
9	N203	L	X	297.3
10	N206	L	X	297.3
11	N221	L	X	82.9
12	N220	L	X	50.5
13	N235	L	X	174.3
14	N236	L	X	174.3
15	N237	L	X	58.4
16	N234A	L	X	162.7
17	N235A	L	X	162.7
18	N236A	L	X	20.6
19	N233A	L	X	174.3
20	N234B	L	X	174.3
21	N235B	L	X	58.4
22	N232B	L	X	162.7
23	N233B	L	X	162.7
24	N234C	L	X	20.6

Joint Loads and Enforced Displacements (BLC 3 : Wz)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N214	L	Z	162.7
2	N217	L	Z	162.7
3	N208	L	Z	174.3
4	N211	L	Z	174.3
5	N202	L	Z	297.3
6	N205	L	Z	297.3
7	N204	L	Z	526.2
8	N207	L	Z	526.2
9	N203	L	Z	526.2
10	N206	L	Z	526.2
11	N221	L	Z	58.4
12	N220	L	Z	20.6
13	N235	L	Z	209.1
14	N236	L	Z	209.1
15	N237	L	Z	82.9
16	N234A	L	Z	173.8
17	N235A	L	Z	173.8
18	N236A	L	Z	50.5
19	N233A	L	Z	209.1
20	N234B	L	Z	209.1
21	N235B	L	Z	82.9
22	N232B	L	Z	173.8
23	N233B	L	Z	173.8
24	N234C	L	Z	50.5

Joint Loads and Enforced Displacements (BLC 4 : Ice Wx)

Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]

Joint Loads and Enforced Displacements (BLC 4 : Ice Wx) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N214	L	X	41.2
2	N217	L	X	41.2
3	N208	L	X	47.3
4	N211	L	X	47.3
5	N202	L	X	106.5
6	N205	L	X	106.5
7	N204	L	X	79.7
8	N207	L	X	79.7
9	N203	L	X	79.7
10	N206	L	X	79.7
11	N221	L	X	23.3
12	N220	L	X	16.3
13	N235	L	X	45.7
14	N236	L	X	45.7
15	N237	L	X	18.2
16	N234A	L	X	43.5
17	N235A	L	X	43.5
18	N236A	L	X	9.6
19	N233A	L	X	45.7
20	N234B	L	X	45.7
21	N235B	L	X	18.2
22	N232B	L	X	43.5
23	N233B	L	X	43.5
24	N234C	L	X	9.6

Joint Loads and Enforced Displacements (BLC 5 : Ice Wz)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N214	L	Z	43.5
2	N217	L	Z	43.5
3	N208	L	Z	45.7
4	N211	L	Z	45.7
5	N202	L	Z	79.7
6	N205	L	Z	79.7
7	N204	L	Z	106.5
8	N207	L	Z	106.5
9	N203	L	Z	106.5
10	N206	L	Z	106.5
11	N221	L	Z	18.2
12	N220	L	Z	9.6
13	N235	L	Z	47.3
14	N236	L	Z	47.3
15	N237	L	Z	23.3
16	N234A	L	Z	41.2
17	N235A	L	Z	41.2
18	N236A	L	Z	16.3
19	N233A	L	Z	47.3
20	N234B	L	Z	47.3
21	N235B	L	Z	23.3
22	N232B	L	Z	41.2
23	N233B	L	Z	41.2
24	N234C	L	Z	16.3

Joint Loads and Enforced Displacements (BLC 6 : Ice weight)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N214	L	Y	-127.3
2	N217	L	Y	-127.3
3	N208	L	Y	-150.5
4	N211	L	Y	-150.5
5	N202	L	Y	-325.9
6	N205	L	Y	-325.9
7	N204	L	Y	-325.9
8	N207	L	Y	-325.9
9	N203	L	Y	-325.9
10	N206	L	Y	-325.9
11	N221	L	Y	-83.8
12	N220	L	Y	-50.5
13	N235	L	Y	-150.5
14	N236	L	Y	-150.5
15	N237	L	Y	-83.8
16	N234A	L	Y	-127.3
17	N235A	L	Y	-127.3
18	N236A	L	Y	-50.5
19	N233A	L	Y	-150.5
20	N234B	L	Y	-150.5
21	N235B	L	Y	-83.8
22	N232B	L	Y	-127.3
23	N233B	L	Y	-127.3
24	N234C	L	Y	-50.5

Joint Loads and Enforced Displacements (BLC 7 : Service X)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N214	L	X	10
2	N217	L	X	10
3	N208	L	X	12
4	N211	L	X	12
5	N202	L	X	30.3
6	N205	L	X	30.3
7	N204	L	X	17.1
8	N207	L	X	17.1
9	N203	L	X	17.1
10	N206	L	X	17.1
11	N221	L	X	4.8
12	N220	L	X	2.9
13	N235	L	X	10
14	N236	L	X	10
15	N237	L	X	3.4
16	N234A	L	X	9.4
17	N235A	L	X	9.4
18	N236A	L	X	1.2
19	N233A	L	X	10
20	N234B	L	X	10
21	N235B	L	X	3.4
22	N232B	L	X	9.4
23	N233B	L	X	9.4
24	N234C	L	X	1.2

Joint Loads and Enforced Displacements (BLC 8 : Service Z)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N214	L	Z	9.4
2	N217	L	Z	9.4
3	N208	L	Z	10
4	N211	L	Z	10
5	N202	L	Z	17.1
6	N205	L	Z	17.1
7	N204	L	Z	30.3
8	N207	L	Z	30.3
9	N203	L	Z	30.3
10	N206	L	Z	30.3
11	N221	L	Z	3.4
12	N220	L	Z	1.2
13	N235	L	Z	12
14	N236	L	Z	12
15	N237	L	Z	4.8
16	N234A	L	Z	10
17	N235A	L	Z	10
18	N236A	L	Z	2.9
19	N233A	L	Z	12
20	N234B	L	Z	12
21	N235B	L	Z	4.8
22	N232B	L	Z	10
23	N233B	L	Z	10
24	N234C	L	Z	2.9

Joint Loads and Enforced Displacements (BLC 9 : Service 1 Pipe)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N88	L	Y	-500

Joint Loads and Enforced Displacements (BLC 10 : Service 2 Pipe)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N84	L	Y	-500

Joint Loads and Enforced Displacements (BLC 11 : Service 3 Pipe)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N82	L	Y	-500

Joint Loads and Enforced Displacements (BLC 12 : Service 4 Pipe)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N86	L	Y	-500

Member Point Loads (BLC 13 : Service 5 Middle)

	Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
1	M52	Y	-250	%50

Member Point Loads (BLC 14 : Service 6 End)

	Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
1	M52	Y	-250	%100

Member Distributed Loads (BLC 2 : Wx)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,...
1	M61	PX	14.53	14.53	0	0
2	M101	PX	14.53	14.53	0	0
3	M81	PX	14.53	14.53	0	0
4	M59	PX	25.27	25.27	0	0
5	M56	PX	25.27	25.27	0	0
6	M5	PX	25.27	25.27	0	0
7	M58	PX	25.27	25.27	0	0
8	M55	PX	25.27	25.27	0	0
9	M4	PX	25.27	25.27	0	0
10	M60	PX	25.27	25.27	0	0
11	M57	PX	25.27	25.27	0	0
12	M6	PX	25.27	25.27	0	0
13	M52	PX	42.12	42.12	0	0
14	M54	PX	42.12	42.12	0	0
15	M53	PX	42.12	42.12	0	0
16	M22	PX	18.6	18.6	0	0
17	M37	PX	18.6	18.6	0	0

Member Distributed Loads (BLC 3 : Wz)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,...
1	M61	PZ	14.53	14.53	0	0
2	M101	PZ	14.53	14.53	0	0
3	M81	PZ	14.53	14.53	0	0
4	M58	PZ	25.27	25.27	0	0
5	M55	PZ	25.27	25.27	0	0
6	M4	PZ	25.27	25.27	0	0
7	M60	PZ	25.27	25.27	0	0
8	M57	PZ	25.27	25.27	0	0
9	M6	PZ	25.27	25.27	0	0
10	M54	PZ	42.12	42.12	0	0
11	M53	PZ	42.12	42.12	0	0
12	M7	PZ	18.6	18.6	0	0
13	M22	PZ	18.6	18.6	0	0
14	M37	PZ	18.6	18.6	0	0

Member Distributed Loads (BLC 4 : Ice Wx)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,...
1	M61	PX	6.03	6.03	0	0
2	M101	PX	6.03	6.03	0	0
3	M81	PX	6.03	6.03	0	0
4	M59	PX	10.22	10.22	0	0
5	M56	PX	10.22	10.22	0	0
6	M5	PX	10.22	10.22	0	0
7	M58	PX	10.22	10.22	0	0
8	M55	PX	10.22	10.22	0	0
9	M4	PX	10.22	10.22	0	0
10	M60	PX	10.22	10.22	0	0
11	M57	PX	10.22	10.22	0	0
12	M6	PX	10.22	10.22	0	0
13	M52	PX	12.91	12.91	0	0

Member Distributed Loads (BLC 4 : Ice Wx) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,...
14	M54	PX	12.91	12.91	0	0
15	M53	PX	12.91	12.91	0	0
16	M22	PX	6.39	6.39	0	0
17	M37	PX	6.39	6.39	0	0

Member Distributed Loads (BLC 5 : Ice Wz)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,...
1	M61	PZ	6.03	6.03	0	0
2	M101	PZ	6.03	6.03	0	0
3	M81	PZ	6.03	6.03	0	0
4	M58	PZ	10.22	10.22	0	0
5	M55	PZ	10.22	10.22	0	0
6	M4	PZ	10.22	10.22	0	0
7	M60	PZ	10.22	10.22	0	0
8	M57	PZ	10.22	10.22	0	0
9	M6	PZ	10.22	10.22	0	0
10	M54	PZ	12.91	12.91	0	0
11	M53	PZ	12.91	12.91	0	0
12	M7	PZ	6.39	6.39	0	0
13	M22	PZ	6.39	6.39	0	0
14	M37	PZ	6.39	6.39	0	0

Member Distributed Loads (BLC 6 : Ice weight)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,...
1	M102	Y	-14.45	-14.45	0	0
2	M101	Y	-14.45	-14.45	0	0
3	M82	Y	-14.45	-14.45	0	0
4	M81	Y	-14.45	-14.45	0	0
5	M64	Y	-14.45	-14.45	0	0
6	M62	Y	-14.45	-14.45	0	0
7	M61	Y	-14.45	-14.45	0	0
8	M63	Y	-14.45	-14.45	0	0
9	M58	Y	-18.28	-18.28	0	0
10	M55	Y	-18.28	-18.28	0	0
11	M4	Y	-18.28	-18.28	0	0
12	M60	Y	-18.28	-18.28	0	0
13	M57	Y	-18.28	-18.28	0	0
14	M6	Y	-18.28	-18.28	0	0
15	M59	Y	-18.28	-18.28	0	0
16	M56	Y	-18.28	-18.28	0	0
17	M5	Y	-18.28	-18.28	0	0
18	M22	Y	-22.24	-22.24	0	0
19	M37	Y	-22.24	-22.24	0	0
20	M7	Y	-22.24	-22.24	0	0
21	M121	Y	-14.45	-14.45	0	0
22	M121A	Y	-14.45	-14.45	0	0
23	M121B	Y	-14.45	-14.45	0	0
24	M121C	Y	-14.45	-14.45	0	0

Member Distributed Loads (BLC 7 : Service X)

Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,...

Member Distributed Loads (BLC 7 : Service X) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,...
1	M61	PX	.84	.84	0	0
2	M101	PX	.84	.84	0	0
3	M81	PX	.84	.84	0	0
4	M59	PX	1.46	1.46	0	0
5	M56	PX	1.46	1.46	0	0
6	M5	PX	1.46	1.46	0	0
7	M58	PX	1.46	1.46	0	0
8	M55	PX	1.46	1.46	0	0
9	M4	PX	1.46	1.46	0	0
10	M60	PX	1.46	1.46	0	0
11	M57	PX	1.46	1.46	0	0
12	M6	PX	1.46	1.46	0	0
13	M52	PX	2.43	2.43	0	0
14	M54	PX	2.43	2.43	0	0
15	M53	PX	2.43	2.43	0	0
16	M22	PX	1.07	1.07	0	0
17	M37	PX	1.07	1.07	0	0

Member Distributed Loads (BLC 8 : Service Z)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,...
1	M61	PZ	.84	.84	0	0
2	M101	PZ	.84	.84	0	0
3	M81	PZ	.84	.84	0	0
4	M58	PZ	1.46	1.46	0	0
5	M55	PZ	1.46	1.46	0	0
6	M4	PZ	1.46	1.46	0	0
7	M60	PZ	1.46	1.46	0	0
8	M57	PZ	1.46	1.46	0	0
9	M6	PZ	1.46	1.46	0	0
10	M54	PZ	2.43	2.43	0	0
11	M53	PZ	2.43	2.43	0	0
12	M7	PZ	1.07	1.07	0	0
13	M22	PZ	1.07	1.07	0	0
14	M37	PZ	1.07	1.07	0	0

Member Distributed Loads (BLC 15 : BLC 1 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,...
1	M1	Y	-.811	-8.905	0	17.219
2	M1	Y	-8.905	-16.173	17.219	34.438
3	M1	Y	-16.173	-16.242	34.438	51.657
4	M1	Y	-16.242	-9.007	51.657	68.875
5	M1	Y	-9.007	-.811	68.875	86.094
6	M2	Y	-.451	-.451	57.532	63.596
7	M3	Y	-.528	-.528	0	6.001
8	M53	Y	-.559	-5.655	61.6	80.08
9	M53	Y	-5.655	-13.897	80.08	98.56
10	M53	Y	-13.897	-16.507	98.56	117.04
11	M53	Y	-16.507	-9.971	117.04	135.52
12	M53	Y	-9.971	-.559	135.52	154
13	M54	Y	-.578	-10.314	0	18.48
14	M54	Y	-10.314	-16.608	18.48	36.96

Member Distributed Loads (BLC 15 : BLC 1 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,...
15	M54	Y	-16.608	-13.667	36.96	55.44
16	M54	Y	-13.667	-5.649	55.44	73.92
17	M54	Y	-5.649	-.578	73.92	92.4
18	M96	Y	-1.538	-1.538	0	3
19	M112	Y	-1.212	-1.212	0	3
20	M2	Y	-.242	-5.146	0	10.175
21	M2	Y	-5.146	-8.827	10.175	20.351
22	M2	Y	-8.827	-7.126	20.351	30.526
23	M2	Y	-7.126	-2.345	30.526	40.701
24	M2	Y	-2.345	-.242	40.701	50.877
25	M52	Y	-.32	-8.186	0	15.4
26	M52	Y	-8.186	-14.821	15.4	30.8
27	M52	Y	-14.821	-11.222	30.8	46.2
28	M52	Y	-11.222	-2.985	46.2	61.6
29	M52	Y	-2.985	-.32	61.6	77
30	M54	Y	-1.583	-10.337	77	92.4
31	M54	Y	-10.337	-17.763	92.4	107.8
32	M54	Y	-17.087	-15.844	107.8	123.2
33	M54	Y	-15.844	-8.61	123.2	138.6
34	M54	Y	-8.61	-.657	138.6	154
35	M72	Y	-.786	-.786	0	3
36	M116	Y	-1.59	-1.59	0	3
37	M1	Y	-.244	-.687	51.657	58.544
38	M1	Y	-.687	-4.966	58.544	65.432
39	M1	Y	-4.966	-9.846	65.432	72.319
40	M1	Y	-9.846	-8.454	72.319	79.207
41	M1	Y	-8.454	-3.578	79.207	86.094
42	M2	Y	-.594	-5.066	0	12.719
43	M2	Y	-5.066	-9.354	12.719	25.438
44	M2	Y	-9.354	-12.75	25.438	38.158
45	M2	Y	-12.75	-10.397	38.158	50.877
46	M2	Y	-10.397	-2.994	50.877	63.596
47	M3	Y	-.24	-2.29	12.719	22.895
48	M3	Y	-2.29	-7.033	22.895	33.07
49	M3	Y	-7.033	-8.575	33.07	43.245
50	M3	Y	-8.575	-5.024	43.245	53.421
51	M3	Y	-5.024	-.575	53.421	63.596
52	M52	Y	-.335	-3.082	77	92.4
53	M52	Y	-3.082	-11.336	92.4	107.8
54	M52	Y	-11.336	-14.744	107.8	123.2
55	M52	Y	-14.744	-8.167	123.2	138.6
56	M52	Y	-8.167	-.335	138.6	154
57	M53	Y	-.632	-8.522	0	15.4
58	M53	Y	-8.522	-16.006	15.4	30.8
59	M53	Y	-16.006	-17.022	30.8	46.2
60	M53	Y	-17.022	-9.358	46.2	61.6
61	M53	Y	-9.358	-.632	61.6	77
62	M80	Y	-1.36	-1.36	0	3
63	M92	Y	-2.553	-2.553	0	3
64	M1	Y	-2.137	-8.937	0	6.888
65	M1	Y	-8.937	-9.929	6.888	13.775
66	M1	Y	-9.929	-4.996	13.775	20.663

Member Distributed Loads (BLC 15 : BLC 1 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,...
67	M1	Y	-4.996	-1.406	20.663	27.55
68	M1	Y	-1.406	-.34	27.55	34.438
69	M3	Y	-2.544	-10.166	0	12.719
70	M3	Y	-10.166	-12.658	12.719	25.438
71	M3	Y	-12.658	-9.324	25.438	38.158
72	M3	Y	-9.324	-5.073	38.158	50.877
73	M3	Y	-5.073	-.604	50.877	63.596
74	M53	Y	-4.104	-3.838	58.953	60.5
75	M53	Y	-3.838	-3.617	60.5	62.047
76	M53	Y	-3.617	-3.436	62.047	63.595
77	M53	Y	-3.436	-3.255	63.595	65.142
78	M53	Y	-3.255	-3.081	65.142	66.689

Member Distributed Loads (BLC 16 : BLC 6 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,...
1	M1	Y	-1.734	-19.029	0	17.219
2	M1	Y	-19.029	-34.561	17.219	34.438
3	M1	Y	-34.561	-34.709	34.438	51.657
4	M1	Y	-34.709	-19.248	51.657	68.875
5	M1	Y	-19.248	-1.734	68.875	86.094
6	M2	Y	-.964	-.964	57.532	63.596
7	M3	Y	-1.129	-1.129	0	6.001
8	M53	Y	-1.195	-12.084	61.6	80.08
9	M53	Y	-12.084	-29.697	80.08	98.56
10	M53	Y	-29.697	-35.276	98.56	117.04
11	M53	Y	-35.276	-21.309	117.04	135.52
12	M53	Y	-21.309	-1.195	135.52	154
13	M54	Y	-1.235	-22.04	0	18.48
14	M54	Y	-22.04	-35.491	18.48	36.96
15	M54	Y	-35.491	-29.206	36.96	55.44
16	M54	Y	-29.206	-12.071	55.44	73.92
17	M54	Y	-12.071	-1.235	73.92	92.4
18	M96	Y	-3.287	-3.287	0	3
19	M112	Y	-2.591	-2.591	0	3
20	M2	Y	-.517	-10.996	0	10.175
21	M2	Y	-10.996	-18.863	10.175	20.351
22	M2	Y	-18.863	-15.229	20.351	30.526
23	M2	Y	-15.229	-5.012	30.526	40.701
24	M2	Y	-5.012	-.517	40.701	50.877
25	M52	Y	-.685	-17.493	0	15.4
26	M52	Y	-17.493	-31.673	15.4	30.8
27	M52	Y	-31.673	-23.982	30.8	46.2
28	M52	Y	-23.982	-6.379	46.2	61.6
29	M52	Y	-6.379	-.685	61.6	77
30	M54	Y	-3.383	-22.09	77	92.4
31	M54	Y	-22.09	-37.959	92.4	107.8
32	M54	Y	-36.514	-33.859	107.8	123.2
33	M54	Y	-33.859	-18.399	123.2	138.6
34	M54	Y	-18.399	-1.405	138.6	154
35	M72	Y	-1.679	-1.679	0	3
36	M116	Y	-3.397	-3.397	0	3

Member Distributed Loads (BLC 16 : BLC 6 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,...
37	M1	Y	-.521	-1.469	51.657	58.544
38	M1	Y	-1.469	-10.612	58.544	65.432
39	M1	Y	-10.612	-21.041	65.432	72.319
40	M1	Y	-21.041	-18.066	72.319	79.207
41	M1	Y	-18.066	-7.647	79.207	86.094
42	M2	Y	-1.268	-10.827	0	12.719
43	M2	Y	-10.827	-19.99	12.719	25.438
44	M2	Y	-19.99	-27.248	25.438	38.158
45	M2	Y	-27.248	-22.218	38.158	50.877
46	M2	Y	-22.218	-6.399	50.877	63.596
47	M3	Y	-.513	-4.893	12.719	22.895
48	M3	Y	-4.893	-15.029	22.895	33.07
49	M3	Y	-15.029	-18.324	33.07	43.245
50	M3	Y	-18.324	-10.736	43.245	53.421
51	M3	Y	-10.736	-1.229	53.421	63.596
52	M52	Y	-.716	-6.586	77	92.4
53	M52	Y	-6.586	-24.224	92.4	107.8
54	M52	Y	-24.224	-31.509	107.8	123.2
55	M52	Y	-31.509	-17.453	123.2	138.6
56	M52	Y	-17.453	-.716	138.6	154
57	M53	Y	-1.351	-18.212	0	15.4
58	M53	Y	-18.212	-34.205	15.4	30.8
59	M53	Y	-34.205	-36.377	30.8	46.2
60	M53	Y	-36.377	-19.999	46.2	61.6
61	M53	Y	-19.999	-1.351	61.6	77
62	M80	Y	-2.906	-2.906	0	3
63	M92	Y	-5.455	-5.455	0	3
64	M1	Y	-4.567	-19.098	0	6.888
65	M1	Y	-19.098	-21.218	6.888	13.775
66	M1	Y	-21.218	-10.677	13.775	20.663
67	M1	Y	-10.677	-3.004	20.663	27.55
68	M1	Y	-3.004	-.727	27.55	34.438
69	M3	Y	-5.436	-21.724	0	12.719
70	M3	Y	-21.724	-27.051	12.719	25.438
71	M3	Y	-27.051	-19.926	25.438	38.158
72	M3	Y	-19.926	-10.841	38.158	50.877
73	M3	Y	-10.841	-1.292	50.877	63.596
74	M53	Y	-8.77	-8.201	58.953	60.5
75	M53	Y	-8.201	-7.729	60.5	62.047
76	M53	Y	-7.729	-7.342	62.047	63.595
77	M53	Y	-7.342	-6.956	63.595	65.142
78	M53	Y	-6.956	-6.583	65.142	66.689

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distributed	Area(...	Surface(...
1	Dead	DL		-1.05		24			5	
2	Wx	WL				24		17		
3	Wz	WL				24		14		
4	Ice Wx	WL				24		17		
5	Ice Wz	WL				24		14		

Basic Load Cases (Continued)

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distributed	Area(...	Surface(...
6	Ice weight	DL				24		24	5	
7	Service X	WL				24		17		
8	Service Z	WL				24		14		
9	Service 1 Pipe	OL1				1				
10	Service 2 Pipe	OL1				1				
11	Service 3 Pipe	OL1				1				
12	Service 4 Pipe	OL1				1				
13	Service 5 Middle	OL1					1			
14	Service 6 End	OL1					1			
15	BLC 1 Transient Area Loads	None						78		
16	BLC 6 Transient Area Loads	None						78		

Load Combinations

	Description	Solve	PDel...	S...	BLC	Fact...	BLC	Fac...	BLC	Fac...	BLC	F.....	F.....	F.....	F.....	F...
1	1.4D	Yes	Y		1	1.4										
2	1.2D+1.0W1	Yes	Y		1	1.2	2	1	3							
3	1.2D+1.0W2	Yes	Y		1	1.2	2	.866	3	.5						
4	1.2D+1.0W3	Yes	Y		1	1.2	2	.5	3	.866						
5	1.2D+1.0W4	Yes	Y		1	1.2	2		3	1						
6	1.2D+1.0W5	Yes	Y		1	1.2	2	-.5	3	.866						
7	1.2D+1.0W6	Yes	Y		1	1.2	2	-.866	3	.5						
8	1.2D+1.0W7	Yes	Y		1	1.2	2	-1	3							
9	1.2D+1.0W8	Yes	Y		1	1.2	2	-.866	3	-.5						
10	1.2D+1.0W9	Yes	Y		1	1.2	2	-.5	3	-.866						
11	1.2D+1.0W10	Yes	Y		1	1.2	2		3	-1						
12	1.2D+1.0W11	Yes	Y		1	1.2	2	.5	3	-.866						
13	1.2D+1.0W12	Yes	Y		1	1.2	2	.866	3	-.5						
14	1.2D+1.0 Ice	Yes	Y		1	1.2	6	1								
15	1.2D+1.0ICE+1.0W1ICE	Yes	Y		1	1.2	6	1	4	1	5					
16	1.2D+1.0ICE+1.0W2ICE	Yes	Y		1	1.2	6	1	4	.866	5	.5				
17	1.2D+1.0ICE+1.0W3ICE	Yes	Y		1	1.2	6	1	4	.5	5	.8...				
18	1.2D+1.0ICE+1.0W4ICE	Yes	Y		1	1.2	6	1	4		5	1				
19	1.2D+1.0ICE+1.0W5ICE	Yes	Y		1	1.2	6	1	4	-.5	5	.8...				
20	1.2D+1.0ICE+1.0W6ICE	Yes	Y		1	1.2	6	1	4	-.866	5	.5				
21	1.2D+1.0ICE+1.0W7ICE	Yes	Y		1	1.2	6	1	4	-1	5					
22	1.2D+1.0ICE+1.0W8ICE	Yes	Y		1	1.2	6	1	4	-.866	5	-.5				
23	1.2D+1.0ICE+1.0W9ICE	Yes	Y		1	1.2	6	1	4	-.5	5	-....				
24	1.2D+1.0ICE+1.0W10ICE	Yes	Y		1	1.2	6	1	4		5	-1				
25	1.2D+1.0ICE+1.0W11ICE	Yes	Y		1	1.2	6	1	4	.5	5	-....				
26	1.2D+1.0ICE+1.0W12ICE	Yes	Y		1	1.2	6	1	4	.866	5	-.5				
27	1.2D+1.5LM1+1.0W1SER	Yes	Y		1	1.2	9	1.5	7	1	8					
28	1.2D+1.5LM1+1.0W2SER	Yes	Y		1	1.2	9	1.5	7	.866	8	.5				
29	1.2D+1.5LM1+1.0W3SER	Yes	Y		1	1.2	9	1.5	7	.5	8	.8...				
30	1.2D+1.5LM1+1.0W4SER	Yes	Y		1	1.2	9	1.5	7		8	1				
31	1.2D+1.5LM1+1.0W5SER	Yes	Y		1	1.2	9	1.5	7	-.5	8	.8...				
32	1.2D+1.5LM1+1.0W6SER	Yes	Y		1	1.2	9	1.5	7	-.866	8	.5				
33	1.2D+1.5LM1+1.0W7SER	Yes	Y		1	1.2	9	1.5	7	-1	8					
34	1.2D+1.5LM1+1.0W8SER	Yes	Y		1	1.2	9	1.5	7	-.866	8	-.5				
35	1.2D+1.5LM1+1.0W9SER	Yes	Y		1	1.2	9	1.5	7	-.5	8	-....				
36	1.2D+1.5LM1+1.0W10SER	Yes	Y		1	1.2	9	1.5	7		8	-1				

Load Combinations (Continued)

	Description	Solve	PDel...	S...	BLC	Fact...	BLC	Fac...	BLC	Fac...	BLC	F...	F...	F...	F...	F...	F...	F...	F...
37	1.2D+1.5LM1+1.0W11SER	Yes	Y		1	1.2	9	1.5	7	.5	8	-....							
38	1.2D+1.5LM1+1.0W12SER	Yes	Y		1	1.2	9	1.5	7	.866	8	-.5							
39																			
40	1.2D+1.5LM2+1.0W1SER	Yes	Y		1	1.2	10	1.5	7	1	8								
41	1.2D+1.5LM2+1.0W2SER	Yes	Y		1	1.2	10	1.5	7	.866	8	.5							
42	1.2D+1.5LM2+1.0W3SER	Yes	Y		1	1.2	10	1.5	7	.5	8	.8...							
43	1.2D+1.5LM2+1.0W4SER	Yes	Y		1	1.2	10	1.5	7		8	1							
44	1.2D+1.5LM2+1.0W5SER	Yes	Y		1	1.2	10	1.5	7	-.5	8	.8...							
45	1.2D+1.5LM2+1.0W6SER	Yes	Y		1	1.2	10	1.5	7	-.866	8	.5							
46	1.2D+1.5LM2+1.0W7SER	Yes	Y		1	1.2	10	1.5	7	-1	8								
47	1.2D+1.5LM2+1.0W8SER	Yes	Y		1	1.2	10	1.5	7	-.866	8	-.5							
48	1.2D+1.5LM2+1.0W9SER	Yes	Y		1	1.2	10	1.5	7	-.5	8	-....							
49	1.2D+1.5LM2+1.0W10SER	Yes	Y		1	1.2	10	1.5	7		8	-1							
50	1.2D+1.5LM2+1.0W11SER	Yes	Y		1	1.2	10	1.5	7	.5	8	-....							
51	1.2D+1.5LM2+1.0W12SER	Yes	Y		1	1.2	10	1.5	7	.866	8	-.5							
52																			
53	1.2D+1.5LV1	Yes	Y		1	1.2	13	1.5											
54	1.2D+1.5LV2	Yes	Y		1	1.2	14	1.5											
55			Y																
56	1.2D+1.5LM3+1.0W1SER	Yes	Y		1	1.2	11	1.5	7	1	8								
57	1.2D+1.5LM3+1.0W2SER	Yes	Y		1	1.2	11	1.5	7	.866	8	.5							
58	1.2D+1.5LM3+1.0W3SER	Yes	Y		1	1.2	11	1.5	7	.5	8	.8...							
59	1.2D+1.5LM3+1.0W4SER	Yes	Y		1	1.2	11	1.5	7		8	1							
60	1.2D+1.5LM3+1.0W5SER	Yes	Y		1	1.2	11	1.5	7	-.5	8	.8...							
61	1.2D+1.5LM3+1.0W6SER	Yes	Y		1	1.2	11	1.5	7	-.866	8	.5							
62	1.2D+1.5LM3+1.0W7SER	Yes	Y		1	1.2	11	1.5	7	-1	8								
63	1.2D+1.5LM3+1.0W8SER	Yes	Y		1	1.2	11	1.5	7	-.866	8	-.5							
64	1.2D+1.5LM3+1.0W9SER	Yes	Y		1	1.2	11	1.5	7	-.5	8	-....							
65	1.2D+1.5LM3+1.0W10SER	Yes	Y		1	1.2	11	1.5	7		8	-1							
66	1.2D+1.5LM3+1.0W11SER	Yes	Y		1	1.2	11	1.5	7	.5	8	-....							
67	1.2D+1.5LM3+1.0W12SER	Yes	Y		1	1.2	11	1.5	7	.866	8	-.5							
68			Y																
69	1.2D+1.5LM4+1.0W1SER	Yes	Y		1	1.2	12	1.5	7	1	8								
70	1.2D+1.5LM4+1.0W2SER	Yes	Y		1	1.2	12	1.5	7	.866	8	.5							
71	1.2D+1.5LM4+1.0W3SER	Yes	Y		1	1.2	12	1.5	7	.5	8	.8...							
72	1.2D+1.5LM4+1.0W4SER	Yes	Y		1	1.2	12	1.5	7		8	1							
73	1.2D+1.5LM4+1.0W5SER	Yes	Y		1	1.2	12	1.5	7	-.5	8	.8...							
74	1.2D+1.5LM4+1.0W6SER	Yes	Y		1	1.2	12	1.5	7	-.866	8	.5							
75	1.2D+1.5LM4+1.0W7SER	Yes	Y		1	1.2	12	1.5	7	-1	8								
76	1.2D+1.5LM4+1.0W8SER	Yes	Y		1	1.2	12	1.5	7	-.866	8	-.5							
77	1.2D+1.5LM4+1.0W9SER	Yes	Y		1	1.2	12	1.5	7	-.5	8	-....							
78	1.2D+1.5LM4+1.0W10SER	Yes	Y		1	1.2	12	1.5	7		8	-1							
79	1.2D+1.5LM4+1.0W11SER	Yes	Y		1	1.2	12	1.5	7	.5	8	-....							
80	1.2D+1.5LM4+1.0W12SER	Yes	Y		1	1.2	12	1.5	7	.866	8	-.5							

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N31	max	484.914	10	5335.926	23	469.601	10	11.475	23	1.367	3	2.226	3
2		min	-5391.361	16	-629.925	4	-9239.122	17	-3.562	4	-1.386	9	-6.473	22
3	N51	max	689.922	7	5345.963	19	9231.146	25	3.537	12	2.02	7	2.243	13

Envelope Joint Reactions (Continued)

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
4		min	-5450.897	26	-626.926	12	-425.202	6	-11.344	19	-1.982	13	-6.724	20
5	N11	max	10932.931	21	5463.706	15	1853.438	11	1.753	11	4.371	5	13.49	15
6		min	-1482.28	2	-517.297	8	-1846.202	5	-1.832	5	-4.362	11	-3.76	8
7	Totals:	max	8192.63	8	14140.707	21	8410.331	11						
8		min	-8192.615	2	5031.739	2	-8410.338	5						

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

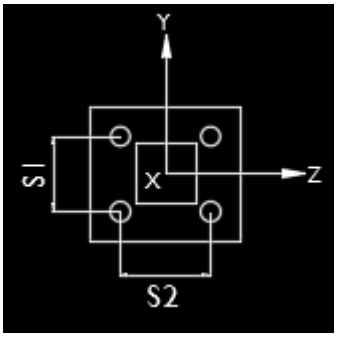
	Memb...	Shape	Code Check	Loc[in]	LC	Shear ...	Loc[in]	Dir	LC	phi*...	phi*...	phi*...	phi*.....	Eqn
1	M1	C 4x1.5x3/8	.303	0	13	.046	26.008	z	13	125...	759...	1.7	7.96	H1...
2	M2	L4x3x4	.280	63.596	4	.013	23.186	z	4	310...	547...	1.844	4.366	H2...
3	M3	L4x3x4	.264	0	12	.012	0	z	11	310...	547...	1.844	4.354	H2...
4	M4	L3x3x4	.372	136....	10	.183	137....	y	25	437...	466...	1.688	2.778	H2...
5	M5	L3x3x4	.392	136....	4	.185	137....	y	23	437...	466...	1.688	3.07	H2...
6	M6	L3x3x4	.383	106....	12	.180	137....	z	23	437...	466...	1.688	3.102	H2...
7	M7	HSS4x4x4	.887	69.747	16	.191	69.747	y	4	121...	139...	16....	16....	H1...
8	M22	HSS4x4x4	.870	69.747	23	.177	69.747	y	12	121...	139...	16....	16....	H1...
9	M37	HSS4x4x4	.876	69.747	19	.176	69.747	y	8	121...	139...	16....	16....	H1...
10	M52	C 5x2x3/8	.481	20.854	11	.362	59.354	y	8	980...	100...	3.133	13....	H1...
11	M53	C 5x2x3/8	.539	20.854	6	.184	51.333	y	4	980...	100...	3.133	13....	H1...
12	M54	C 5x2x3/8	.519	20.854	2	.146	83.417	z	12	980...	100...	3.133	13....	H1...
13	M55	L3x3x4	.283	53.176	5	.178	137....	z	18	437...	466...	1.688	2.803	H2...
14	M56	L3x3x4	.265	106....	8	.181	137....	z	25	437...	466...	1.688	2.715	H2...
15	M57	L3x3x4	.290	89.735	11	.178	137....	z	23	437...	466...	1.688	2.759	H2...
16	M58	L3x3x4	.539	53.176	12	.182	137....	z	18	437...	466...	1.688	2.899	H2...
17	M59	L3x3x4	.534	53.176	8	.184	137....	z	26	437...	466...	1.688	2.917	H2...
18	M60	L3x3x4	.496	54.838	5	.180	137....	z	23	437...	466...	1.688	2.893	H2...
19	M61	PIPE_2.5	.657	6	11	.262	6		12	377...	507...	3.596	3.596	H1...
20	M62	PIPE_2.5	.656	45	11	.270	45		4	223...	507...	3.596	3.596	H1...
21	M63	PIPE_2.5	.766	7.5	9	.366	10.5		10	377...	507...	3.596	3.596	H3...
22	M64	PIPE_2.5	.825	6	7	.341	6		7	377...	507...	3.596	3.596	H3...
23	M81	PIPE_2.5	.747	6	7	.273	6		8	377...	507...	3.596	3.596	H1...
24	M82	PIPE_2.5	.776	45	13	.311	45		12	223...	507...	3.596	3.596	H1...
25	M101	PIPE_2.5	.756	6	3	.291	6		4	377...	507...	3.596	3.596	H1...
26	M102	PIPE_2.5	.712	45	3	.272	45		3	223...	507...	3.596	3.596	H1...
27	M121	PIPE_2.5	.706	6	6	.274	9		11	377...	507...	3.596	3.596	H1...
28	M121A	PIPE_2.5	.719	7.5	12	.298	10.5		2	377...	507...	3.596	3.596	H1...
29	M121B	PIPE_2.5	.782	6	10	.275	9		3	377...	507...	3.596	3.596	H1...
30	M121C	PIPE_2.5	.618	7.5	4	.362	10.5		6	377...	507...	3.596	3.596	H1...

APPENDIX D

ADDITIONAL CALCUATIONS

Mount to Tower Connection Check:

Applied Tension:	$Rx := 1482 \cdot lbf$	From Risa 3D LRFD Loading
Applied Shear:	$Ry := 5464 lbf$	From Risa 3D LRFD Loading
Applied Shear:	$Rz := 1853 \cdot lbf$	From Risa 3D LRFD Loading
Applied Torque:	$Mx := 1832 \cdot lbf \cdot ft$	From Risa 3D LRFD Loading
Applied Moment:	$My := 4371 lbf \cdot ft$	From Risa 3D LRFD Loading
Applied Moment:	$Mz := 13460 \cdot lbf \cdot ft$	From Risa 3D LRFD Loading
Number of Bolts:	$n := 4$	Per Specifications
Bolts Vertical Spacing:	$S_1 := 6in$	Per Specifications
Bolts Horizontal Spacing:	$S_2 := 6in$	Per Specifications
Applied Tension at Bolt:	$P_{a.t} := \frac{Rx}{n} + \frac{2My}{n \cdot S_2} + \frac{2Mz}{n \cdot S_1} = 18201.5\,lbf$	
Applied Shear at Bolt:	$P_{a.v} := \frac{\sqrt{Ry^2 + Rz^2}}{n} + \frac{2Mx}{n\sqrt{S_1^2 + S_2^2}} = 2737.8\,lbf$	
Bolt Type Used:	**A325N**	
Nominal Tensile Stress, Fnt:	$F_{n.t} := 90ksi$	AISC, Table J3-2, P. 16.1-104
Nominal Shear Stress, Fnv:	$F_{n.v} := 54ksi$	AISC, Table J3-2, P. 16.1-104
Nominal Bolt Diameter:	$d_b := \frac{5}{8}in$	Per Specifications
Gross Area of the Bolt:	$A_{b.g} := 0.307in^2$	AISC, Table 7-18, P. 7-83
Net Area of the Bolt:	$A_{b.n} := 0.226in^2$	AISC, Table 7-18, P. 7-83
Strength Reduction Factor, ϕ:	$\phi := 0.75$	



Combined Tension And Shear Check

Nominal Tensile Reduced Fntr

$$F_{n.t.r} := 1.3 \cdot F_{n.t} - \frac{F_{n.t}}{\phi \cdot F_{n.v}} \cdot \frac{P_{a.v}}{A_{b.g}} = 97.2 \cdot ksi$$

AISC Eq. J3-3a, P. 16.1-109

Nominal Shear Reduced Fntv

$$F_{n.v.r} := 1.3 \cdot F_{n.v} - \frac{F_{n.v}}{\phi \cdot F_{n.t}} \cdot \frac{P_{a.t}}{A_{b.g}} = 22.8 \cdot ksi$$

AISC Eq. J3-3a, P. 16.1-109

Bolt Nominal Tensive Strength

$$R_{n.t} := F_{n.t} \cdot A_{b.g} = 27.6 \cdot kip$$

Tension Check

$$Check := \begin{cases} \text{"OK"} & \text{if } \phi \cdot R_{n.t} \geq P_{a.t} \\ \text{"NOT GOOD"} & \text{otherwise} \end{cases}$$

$$Check = \text{"OK"}$$

Tension Ratio

$$Ratio_t := \frac{P_{a.t}}{\phi \cdot R_{n.t}} \qquad Ratio_t = 87.8 \cdot \%$$

Bolt Nominal Shear Strength

$$R_{n.v} := F_{n.v} \cdot A_{b.g} = 16.6 \cdot kip$$

Shear Check

$$Check := \begin{cases} \text{"OK"} & \text{if } \phi \cdot R_{n.v} \geq P_{a.v} \\ \text{"NOT GOOD"} & \text{otherwise} \end{cases}$$

$$Check = \text{"OK"}$$

Shear Ratio

$$Ratio_v := \frac{P_{a.v}}{\phi \cdot R_{n.v}} \qquad Ratio_v = 22 \cdot \%$$