Centerline Communications
Andres Lopez
750 West Center Street, Floor 3
West Bridgewater, MA 02379
908-358-5305
alopez@clinellc.com

July 26, 2019

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

RE: Notice of Exempt Modification
231 Kettleton Road, Southbury, CT
Latitude: 41.471273200
Longitude: -73.2050978000
T-Mobile Site#: CT11126F_L600

Dear Ms. Bachman:

T-Mobile currently maintains six (6) antennas at the 195- foot level of the existing 195-foot monopole tower at 231 Kettleton Road, Southbury, CT. T-Mobile also maintains a 2 foot microwave dish at the 91-foot level. The 195-foot tower is owned by PTI US Assets and the property is owned by the Town of Southbury. T-Mobile now intends to replace its six (6) existing antennas with three (3) new 600/700/1900 MHz antennas at the 193-foot level and (3) new 2100 MHz at the 195-foot level. The structural analysis includes a reserved loading of a microwave at 91' that is not installed.

Planned Modifications:

Remove:
(3) Generic Twin Style 1B AWS TMAs
(3) Coax Cables
(3) Smart Bias-Ts

Remove and Replace:
(3) EMS RR90-17 Antennas **(Remove)** - (3) RFS APXVAARR24 Antennas **(Replace)**
(3) LNX 6515DS Antennas **(Remove)** – (3) RFS APX16DWV Antennas (**Replace)**

Install New:
(3) 4449 B71+12 Radios
(3) 4415 B25 Radios
(3) 4415 B66A Radios
(3) 6x12 Hybrid Cables
(9) 1-5/8 Coax cables

This facility was approved by the Town of Southbury Zoning Board of Appeals in Omnipoint Application #763 on February 2, 1999.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies§ 16- SOj-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.SA. § 16-SOj-73, a copy of this letter is being sent to First Selectman Jeff Manville as chief elected official and property owner, Chris McGinness, Zoning Enforcement Officer Town of Southbury, and PTI US Assets, as tower owner.

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

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

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

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

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

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

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

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

Respectfully submitted,

Andres Lopez

Andres Lopez
Mobile: 908-358-5305
Fax: 508-819-3017
Office: 750 West Center Street, Floor 3 West Bridgewater, MA 02379
Email: alopez@clinellc.com

Attachments

cc: Jeff Manville – as chief elected official and property owner
Chris McGinness –Zoning Enforcement Officer Town of Southbury
PTI US Assets – as tower owner

Exhibit A

Original Facility Approval

TOWN OF SOUTHBURY
ZONING BOARD OF APPEALS
February 2, 1999

At the Regular Meeting on February 2, 1999 the following motion was unanimously approved.

Peirce Behardt motioned to approve the request from Omnipoint Application # 763 for a variance of Section Schedule B 6 of the Zoning Regulations, relating to Height Requirements with all of the changes set forth by the Zoning Board of Appeals as to permit construction of a monopole telecommunications tower for PCS coverage.

I hereby move that the application of the Omnipoint communications, Inc. dated August 14, 1998 seeking a variance to construct a 199 foot monopole, and an associated equipment cabinet for use as a PCS communications facility on parcel of land to be leased from the town of Southbury on Kettletown Road adjacent to the existing recycling facility in the R-60 zone, as requested in said application and as shown on the site plan submitted therewith, be granted subject to the following conditions:

1. The monopole and equipment cabinet will be completely surrounded by and eight-foot high, chain link, security fence (30' x 30') topped with barbed wire.
2. Omnipoint will obtain access to the site by means of a proposed road leading from Kettletown Road as shown on the site plan submitted with its application.
3. An Omnipoint employee will visit the site as least once a month for equipment checks and routine maintenance.
4. There is no requirement for water supply or sewerage or solid waste disposal.
5. No lights will be mounted on the monopole
6. The monopole shall be able to support at least four (4) additional carriers and shall have a non-reflecting galvanized finish.

Exhibit B

Property Card

231 KETTLETOWN ROAD

Location	231 KETTLETOWN ROAD	**Mblu**	35/ 43/ 23/ /
Acct#	00369500	**Owner**	SOUTHBURY TOWN OF
Assessment	$264,210	**Appraisal**	$377,430
PID	4358	**Building Count**	1

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2017	$85,880	$291,550	$377,430

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2017	$60,120	$204,090	$264,210

Owner of Record

Owner SOUTHBURY TOWN OF
Co-Owner
Address 501 MAIN ST SO
SOUTHBURY, CT 06488

Sale Price $0
Certificate
Book & Page 112/ 334
Sale Date 03/15/1973
Instrument 25

Ownership History

Ownership History					
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Instrument**	**Sale Date**
SOUTHBURY TOWN OF	$0		112/ 334	25	03/15/1973

Building Information

Building 1 : Section 1

Year Built:
Living Area: 0
Replacement Cost: $0
Building Percent Good:
Replacement Cost Less Depreciation: $0

Building Attributes	
Field	**Description**

Style	Outbuildings
Model	
Grade:	
Stories	
Occupancy	
Exterior Wall 1	
Exterior Wall 2	
Roof Structure	
Roof Cover	
Interior Wall 1	
Interior Wall 2	
Interior Flr 1	
Interior Flr 2	
Heat Fuel	
Heat Type:	
AC Percent	
Total Bedrooms:	
Full Bthrms:	
Half Baths:	
Extra Fixtures	
Total Rooms:	
Bath Style:	
Kitchen Style:	
Num Kitchens	
Pln FPL:	
Det FPL:	
Gas Fireplace(s)	
% Attic Fin	
LF Dormer	
Foundation	
Bsmt Gar(s)	
Bsmt %	
SF FBM	
Fin Bsmt Qual	
Bsmt Access	

Building Photo

(http://images.vgsi.com/photos/SouthburyCTPhotos//default.jpg)

Building Layout

Building Layout
(http://images.vgsi.com/photos/SouthburyCTPhotos//Sketches/4

Building Sub-Areas (sq ft)	**Legend**
No Data for Building Sub-Areas	

Extra Features

Extra Features	**Legend**
No Data for Extra Features	

Land

Land Use

Use Code	929
Description	Exempt Comm Vac OB
Zone	R-60
Neighborhood	C200
Alt Land Appr	No
Category	

Land Line Valuation

Size (Acres)	9.95
Frontage	0
Depth	0
Assessed Value	$204,090
Appraised Value	$291,550

Outbuildings

Outbuildings **Legend**

Code	Description	Sub Code	Sub Description	Size	Value	Bldg #
SHD1	Shed	FR	Frame	180 S.F.	$1,350	1
SHD1	Shed	FR	Frame	128 S.F.	$960	1
SHD1	Shed	FR	Frame	208 S.F.	$1,560	1
SHD1	Shed	FR	Frame	168 S.F.	$1,260	1
PAV1	Paving	AS	Asphalt	64600 S.F.	$80,750	1

Valuation History

Appraisal

Valuation Year	Improvements	Land	Total
2017	$85,880	$291,550	$377,430
2016	$85,880	$291,550	$377,430
2012	$85,880	$291,550	$377,430

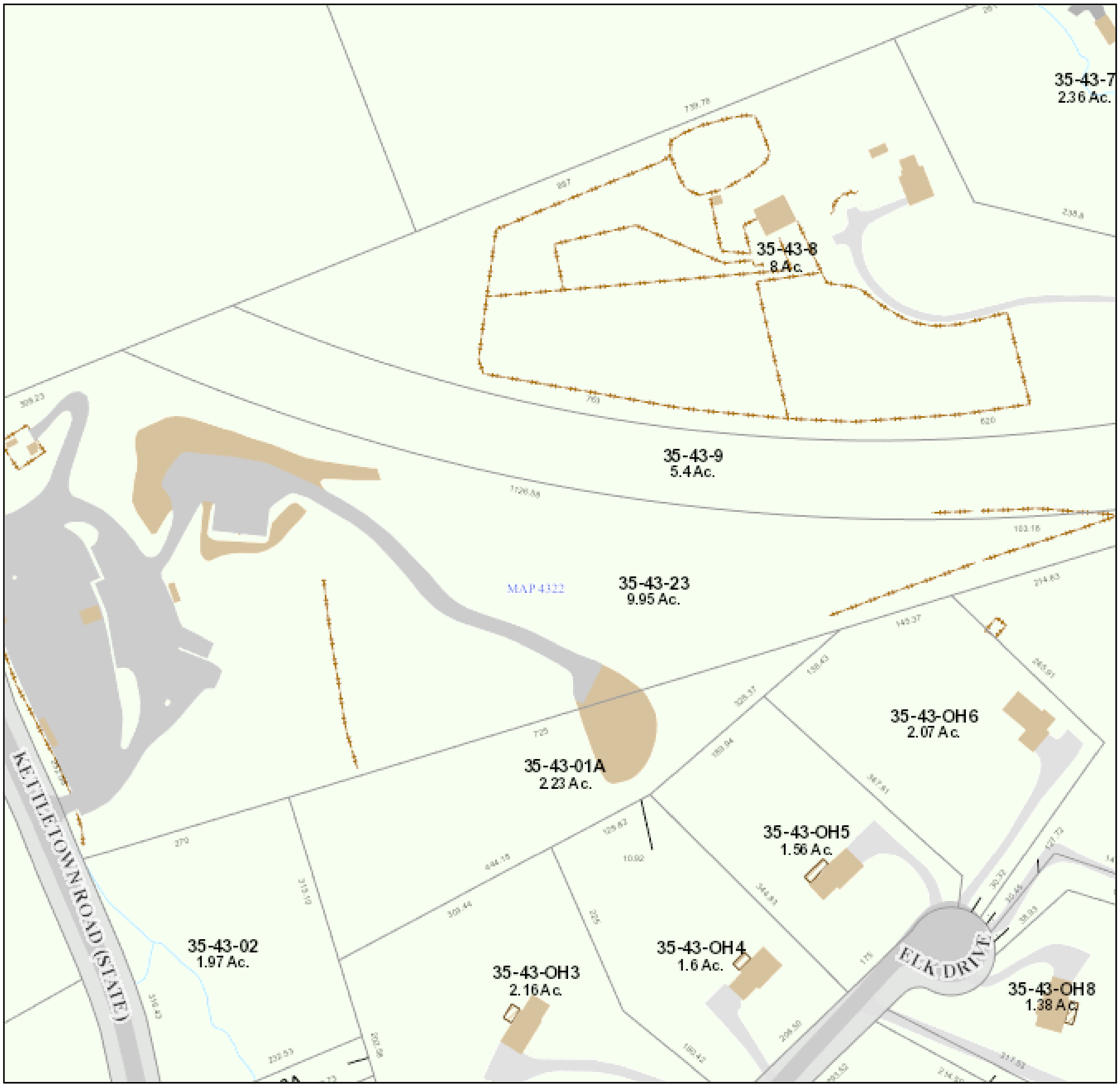
Assessment

Valuation Year	Improvements	Land	Total
2017	$60,120	$204,090	$264,210
2016	$60,120	$204,090	$264,210
2012	$60,120	$204,090	$264,210

Town of Southbury

Geographic Information System (GIS)

Date Printed: 6/6/2019



MAP DISCLAIMER - NOTICE OF LIABILITY

This map is for informational purposes only. It is not for legal description or conveyances. All information is subject to verification by any user. The Town of Southbury and its mapping contractors assume no legal responsibility for the information contained herein.

Approximate Scale: 1 inch = 200 feet

0 200 Feet

N W E S

Exhibit C

Construction Drawings

SITE NAME: SOUTHBURY/ I-84 X 15/ BAGL

231 KETTLETON ROAD
SOUTHBURY, CT 06488
NEW HAVEN COUNTY

SITE NUMBER: CT11126F

PROJECT: T-MOBILE L600

CONFIGURATION: 67D93D4 HYBRID

CONSTRUCTION

GENERAL NOTES

1. THIS DOCUMENT IS THE CREATION, DESIGN, PROPERTY AND COPYRIGHTED WORK OF T-MOBILE NORTHEAST, LLC. ANY DUPLICATION OR USE WITHOUT EXPRESS WRITTEN CONSENT IS STRICTLY PROHIBITED. DUPLICATION AND USE BY GOVERNMENT AGENCIES FOR THE PURPOSES OF CONDUCTING THEIR LAWFULLY AUTHORIZED REGULATORY AND ADMINISTRATIVE FUNCTIONS IS SPECIFICALLY ALLOWED.
2. THE FACILITY IS AN UNMANNED PRIVATE AND SECURED EQUIPMENT INSTALLATION. IT IS ONLY ACCESSED BY TRAINED TECHNICIANS FOR PERIODIC ROUTINE MAINTENANCE AND THEREFORE DOES NOT REQUIRE ANY WATER OR SANITARY SEWER SERVICE. THE FACILITY IS NOT GOVERNED BY REGULATIONS REQUIRING PUBLIC ACCESS PER ADA REQUIREMENTS.
3. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE T-MOBILE NORTHEAST. LLC REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

SPECIAL CONSTRUCTION NOTES

1. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE GLOBAL TOWER STRUCTURAL ANALYSIS PREPARED BY GPD ENGINEERING DATED 07/26/19.
2. PROTERRA DESIGN GROUP ASSUMES THAT THE MONOPOLE IS PROPERLY CONSTRUCTED AND MAINTAINED. ALL STRUCTURAL MEMBERS AND THEIR CONNECTION ARE ASSUMED TO BE IN GOOD CONDITION AND ARE FREE FROM DEFECTS WITH NO DETERIORATION TO ITS MEMBER CAPACITIES.
3. ANY REQUIRED ANTENNA MOUNT WORK SHALL BE COMPLETED PRIOR TO THE INSTALLATION OF ANY EQUIPMENT IN ACCORDANCE WITH THE ANTENNA MOUNT STRUCTURAL ANALYSIS, (MSA) PREPARED BY DESTEK ENGINEERING, LLC DATED 06/07/19.

T-MOBILE TECHNICIAN SITE SAFETY NOTES

LOCATION	SPECIAL RESTRICTIONS
SECTOR A:	ACCESS NOT PERMITTED
SECTOR B:	ACCESS NOT PERMITTED
SECTOR C:	ACCESS NOT PERMITTED
GPS/LMU:	UNRESTRICTED*
	(*CAUTION: OSHA-APPROVED PORTABLE 8' STEP-LADDER REQUIRED)
RADIO CABINETS:	UNRESTRICTED
PPC DISCONNECT:	UNRESTRICTED
MAIN CIRCUIT D/C:	UNRESTRICTED
NIU/T DEMARC:	UNRESTRICTED
OTHER/SPECIAL:	NONE

DIG SAFE SYSTEM
(MA, ME, NH, RI, VT):
1-888-344-7233

CALL BEFORE YOU DIG
(CT): 1-800-922-4455

PROJECT INFORMATION

SCOPE OF WORK:	UNMANNED TELECOMMUNICATIONS FACILITY T-MOBILE EQUIPMENT ALTERATION
ZONING JURISDICTION:	SPECIAL ZONING NOTE (ELIGIBLE FACILITY REQUEST): BASED ON INFORMATION PROVIDED BY T-MOBILE REGULATORY COMPLIANCE PROFESSIONALS AND LEGAL COUNSEL, THIS TELECOMMUNICATIONS EQUIPMENT DEPLOYMENT IS CONSIDERED AN ELIGIBLE FACILITY UNDER THE MIDDLE CLASS TAX RELIEF AND JOB CREATION ACT OF 2012, 47 USC 1455(A), SECTION 6409(A), AND IS SUBJECT TO AN ELIGIBLE FACILITY REQUEST, EXPEDITED REVIEW AND LIMITED/PARTIAL ZONING PRE-EMPTION FOR LOCAL DISCRETIONARY PERMITS (VARIANCE, SPECIAL PERMIT, SITE PLAN REVIEW OR ADMINISTRATIVE REVIEW).
SITE ADDRESS:	231 KETTLETON ROAD SOUTHBURY, CT 06488
LATITUDE:	41° 28' 16.58" N (FROM RFDS: 41.471272)
LONGITUDE:	73° 12' 18.35" W (FROM RFDS: -73.205098)
GROUND ELEVATION:	403'± (FROM GOOGLE EARTH)
JURISDICTION:	CONNECTICUT SITING COUNCIL / TOWN OF SOUTHBURY
BUILDING CODE:	2018 CONNECTICUT STATE BUILDING CODE WITH AMENDMENTS (IBC 2015 BASED)
ELECTRICAL CODE:	2017 NATIONAL ELECTRICAL CODE AND AMENDMENTS
CURRENT/ PROPOSED USE:	TELECOMMUNICATIONS FACILITY
TOWER OWNER:	PTI US ASSETS 1, LLC
TOWER OWNER SITE ID:	US-CT-1002
TOWER OWNER SITE NAME:	KETTLETON

DRAWING INDEX

SHEET NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	2
GN-1	GENERAL NOTES	2
A-1	COMPOUND & EQUIPMENT PLANS	2
A-2	ELEVATION & ANTENNA PLANS	2
A-3 & A-4	DETAILS	2
S-1	ANTENNA MOUNTING DETAILS	2
E-1	ONE-LINE DIAGRAM & GROUNDING DETAILS	2

T-MOBILE NORTHEAST LLC
35 Griffin Road South
Bloomfield, CT 06002
Office: (860) 648-1116

CENTERLINE COMMUNICATIONS
750 West Center St. Suite 301
West Bridgewater, MA 02379

ProTerra DESIGN GROUP, LLC
4 Bay Road, Building A
Suite 200
Hadley, MA 01035 Ph:(413) 320-4918

STATE OF CONNECTICUT THOMAS E. JOHNSON No. 28192 LICENSED PROFESSIONAL ENGINEER
07/26/19

APPROVALS

CONSTRUCTION	DATE
RF ENGINEERING	DATE
ZONING/SITE ACQ.	DATE
OPERATIONS	DATE
TOWER OWNER	DATE
PROJECT NO:	19-023
DRAWN BY:	TBD/PN
CHECKED BY:	TEJ/JMM

2	07/26/19	CONSTRUCTION REVISED
1	07/22/19	CONSTRUCTION REVISED
0	07/16/19	ISSUED FOR CONSTRUCTION
A	06/21/19	ISSUED FOR REVIEW

SITE NUMBER: CT11126F
SITE NAME:
SOUTHBURY/ I-84 X 15/ BAGL

231 KETTLETON ROAD
SOUTHBURY, CT 06488
NEW HAVEN COUNTY

SHEET TITLE

TITLE SHEET

SHEET NUMBER

T-1

GENERAL NOTES

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:

   CONTRACTOR – CENTERLINE COMMUNICATIONS
   SUBCONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
   OWNER – T-MOBILE

2. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING SUBCONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CONTRACTOR.

3. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. SUBCONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.

4. DRAWINGS PROVIDED HERE ARE NOT TO BE SCALED AND ARE INTENDED TO SHOW OUTLINE ONLY.

5. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.

6. "KITTING LIST" SUPPLIED WITH THE BID PACKAGE IDENTIFIES ITEMS THAT WILL BE SUPPLIED BY CONTRACTOR. ITEMS NOT INCLUDED IN THE BILL OF MATERIALS AND KITTING LIST SHALL BE SUPPLIED BY THE SUBCONTRACTOR.

7. THE SUBCONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.

8. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE SUBCONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION SPACE FOR APPROVAL BY THE CONTRACTOR.

9. SUBCONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND T1 CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. SUBCONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. SUBCONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH THE CONTRACTOR.

10. THE SUBCONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CUR\BS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT SUBCONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE OWNER.

11. SUBCONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.

12. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.

13. ALL CONCRETE REPAIR WORK SHALL BE DONE IN ACCORDANCE WITH AMERICAN CONCRETE INSTITUTE (ACI) 301.

14. ANY NEW CONCRETE NEEDED FOR CONSTRUCTION SHALL BE AIR-ENTRAINED AND SHALL HAVE 4000 PSI STRENGTH AT 28 DAYS. ALL CONCRETE WORK SHALL BE DONE IN ACCORDANCE WITH ACI 318 CODE REQUIREMENTS.

15. ALL STRUCTURAL STEEL WORK SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH AISC SPECIFICATIONS. ALL STRUCTURAL STEEL SHALL BE ASTM A36 (Fy = 36 ksi) UNLESS OTHERWISE NOTED. PIPES SHALL BE ASTM A53 TYPE E (Fy = 35 ksi). ALL STEEL EXPOSED TO WEATHER SHALL BE HOT DIPPED GALVANIZED. TOUCHUP ALL SCRATCHES AND OTHER MARKS IN THE FIELD AFTER STEEL IS ERECTED USING A COMPATIBLE ZINC RICH PAINT.

16. CONSTRUCTION SHALL COMPLY WITH LTE OR 700 MHz SPECIFICATIONS AND "GENERAL CONSTRUCTION SERVICES FOR CONSTRUCTION OF T-MOBILE SITES."

17. SUBCONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS MUST BE VERIFIED. SUBCONTRACTOR SHALL NOTIFY THE CONTRACTOR OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.

18. THE EXISTING CELL SITE IS IN FULL COMMERCIAL OPERATION. ANY CONSTRUCTION WORK BY SUBCONTRACTOR SHALL NOT DISRUPT THE EXISTING NORMAL OPERATION. ANY WORK ON EXISTING EQUIPMENT MUST BE COORDINATED WITH CONTRACTOR. ALSO, WORK SHOULD BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.

19. SINCE THE CELL SITE IS ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUTDOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE ADVISED TO BE WORN TO ALERT OF ANY DANGEROUS EXPOSURE LEVELS.

20. APPLICABLE BUILDING CODES:
    SUBCONTRACTOR'S WORK SHALL COMPLY WITH ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AS ADOPTED BY THE LOCAL AUTHORITY HAVING JURISDICTION (AHJ) FOR THE LOCATION. THE EDITION OF THE AHJ ADOPTED CODES AND STANDARDS IN EFFECT ON THE DATE OF CONTRACT AWARD SHALL GOVERN THE DESIGN.

    BUILDING CODE: 2018 CONNECTICUT STATE BUILDING CODE, (IBC 2015) WITH AMENDMENTS

    ELECTRICAL CODE: NEC 2017 AND AMENDMENTS

    SUBCONTRACTOR'S WORK SHALL COMPLY WITH THE LATEST EDITION OF THE FOLLOWING STANDARDS:

    AMERICAN CONCRETE INSTITUTE (ACI) 318; BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE;

    AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC), MANUAL OF STEEL CONSTRUCTION, 14TH EDITION;

    TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA) 222-G, STRUCTURAL STANDARDS FOR STEEL

    ANTENNA TOWER AND ANTENNA SUPPORTING STRUCTURES; REFER TO ELECTRICAL DRAWINGS FOR SPECIFIC ELECTRICAL STANDARDS.

    FOR ANY CONFLICTS BETWEEN SECTIONS OF LISTED CODES AND STANDARDS REGARDING MATERIAL, METHODS OF CONSTRUCTION, OR OTHER REQUIREMENTS, THE MOST RESTRICTIVE REQUIREMENT SHALL GOVERN. WHERE THERE IS CONFLICT BETWEEN A GENERAL REQUIREMENT AND A SPECIFIC REQUIREMENT, THE SPECIFIC REQUIREMENT SHALL GOVERN.

GROUNDING NOTES

1. THE SUBCONTRACTOR SHALL REVIEW AND INSPECT THE EXISTING FACILITY GROUNDING SYSTEM AND LIGHTNING PROTECTION SYSTEM (AS DESIGNED AND INSTALLED) FOR STRICT COMPLIANCE WITH THE NEC (AS ADOPTED BY THE AHJ), THE SITE-SPECIFIC (UL, LPI, OR NFPA) LIGHTNING PROTECTION CODE, AND GENERAL COMPLIANCE WITH TELCORDIA AND TIA GROUNDING STANDARDS. THE SUBCONTRACTOR SHALL REPORT ANY VIOLATIONS OR ADVERSE FINDINGS TO THE CONTRACTOR FOR RESOLUTION.

2. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION, AND AC POWER GES'S) SHALL BE BONDED TOGETHER, AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.

3. THE SUBCONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR NEW GROUND ELECTRODE SYSTEMS. THE SUBCONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS.

4. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER SURCUITS TO BTS EQUIPMENT.

5. EACH BTS CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, 6 AWG STRANDED COPPER OR LARGER FOR INDOOR BTS 2 AWG STRANDED COPPER FOR OUTDOOR BTS.

6. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.

7. APPROVED ANTIOXIDANT COATINGS (I.E., CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.

8. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED TO THE BRIDGE AND THE TOWER GROUND BAR.

9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.

10. MISCELLANEOUS ELECTRICL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.

11. METAL CONDUIT SHALL BE MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH 6 AWS COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.

12. ALL NEW STRUCTURES WITH A FOUNDATION AND/OR FOOTING HAVING 20 FT. OR MORE OF 1/2 IN. OR GREATER ELECTRICALLY CONDUCTIVE REINFORCING STEEL MUST HAVE IT BONDED TO THE GROUND RING USING AN EXOTHERMIC WELD CONNECTION USING #2 AWG SOLID BARE TINNED COPPER GROUND WIRE, PER NEC 250.50

ABBREVIATIONS

AGL	ABOVE GRADE LEVEL	EQ	EQUAL	RAN	RADIO ACCESS NETWORK
AWG	AMERICAN WIRE GAUGE	G.C.	GENERAL CONTRACTOR	REF	REFERENCE
BTCW	BARE TINNED SOLID COPPER WIRE	GRC	GALVANIZED RIGID CONDUIT	REQ	REQUIRED
BGR	BURIED GROUND RING	MSA	MOUNT STRUCTURAL ANALYSIS	RF	RADIO FREQUENCY
BTS	BASE TRANSCEIVER STATION	MGB	MASTER GROUND BAR	TBD	TO BE DETERMINED
EXISTING	EXISTING OR (E)	MIN	MINIMUM	TBR	TO BE REMOVED
EGB	EQUIPMENT GROUND BAR	PROPOSED	NEW OR (P)	TBRR	TO BE REMOVED AND REPLACED
EGR	EQUIPMENT GROUND RING	N.T.S.	NOT TO SCALE	TYP	TYPICAL
		RAD	RADIATION CENTERLINE (ANTENNA)	VIF	VERIFY IN FIELD

T-Mobile

T-MOBILE NORTHEAST LLC
35 Griffin Road South
Bloomfield, CT 06002
Office: (860) 648-1116

CENTERLINE COMMUNICATIONS
750 West Center St. Suite 301
West Bridgewater, MA 02379

ProTerra DESIGN GROUP, LLC
4 Bay Road, Building A
Suite 200
Hadley, MA 01035 Ph:(413) 320-4918

STATE OF CONNECTICUT THOMAS E. JOHNSON No. 28192 LICENSED PROFESSIONAL ENGINEER
07/26/19

APPROVALS

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231 KETTLETON ROAD
SOUTHBURY, CT 06488
NEW HAVEN COUNTY

SHEET TITLE

GENERAL NOTES

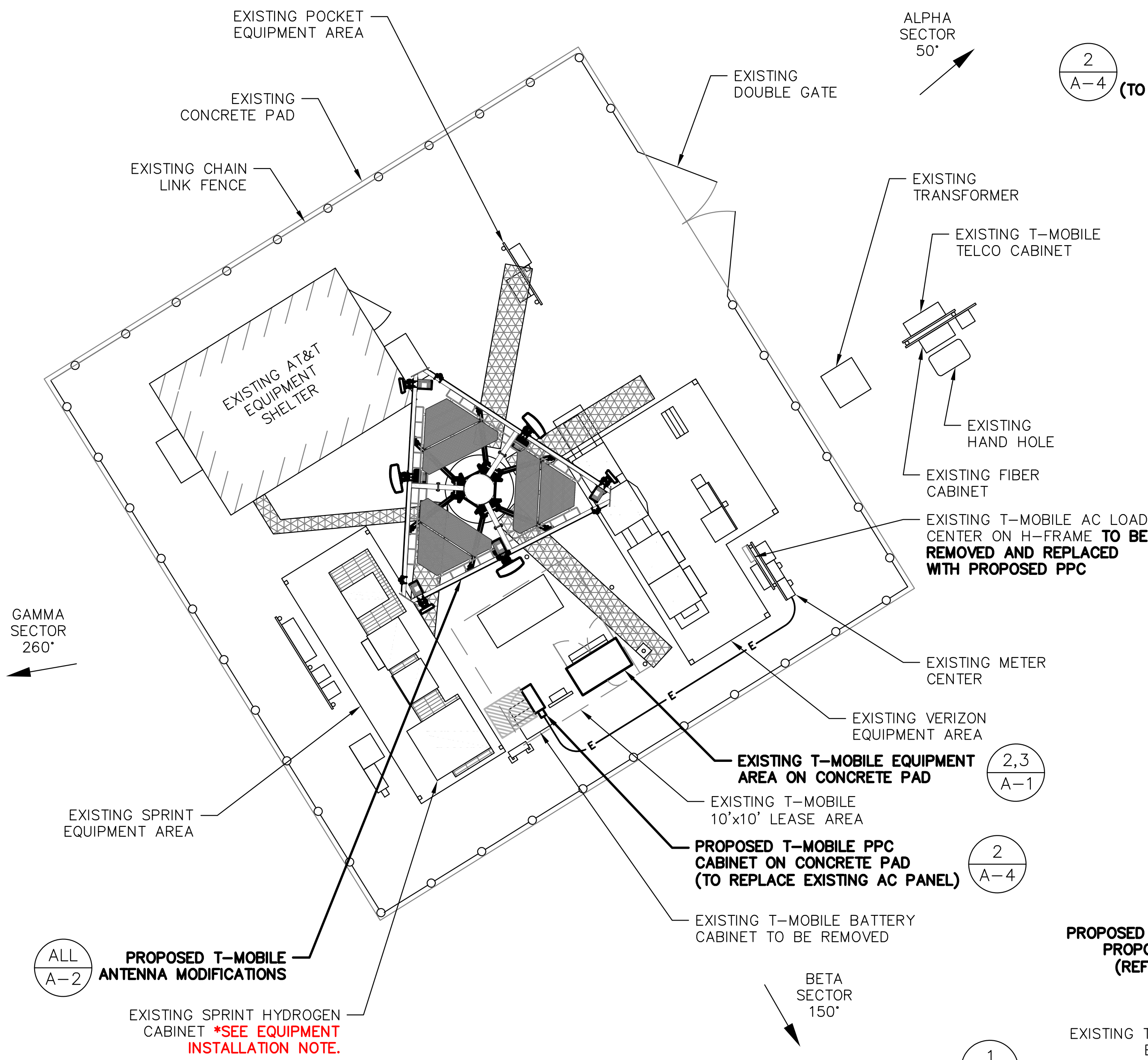
SHEET NUMBER

GN-1

NOTE:
REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

MOUNT MODIFICATIONS TO BE COMPLETED PRIOR TO THE INSTALLATION OF ANY EQUIPMENT. REFER TO THE MOUNT STRUCTURAL ANALYSIS REPORT AND DRAWING BY DESTEK ENGINEERING, LLC DATED 06/07/19.

ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE GLOBAL TOWER STRUCTURAL ANALYSIS PREPARED BY GPD ENGINEERING DATED 07/26/19.

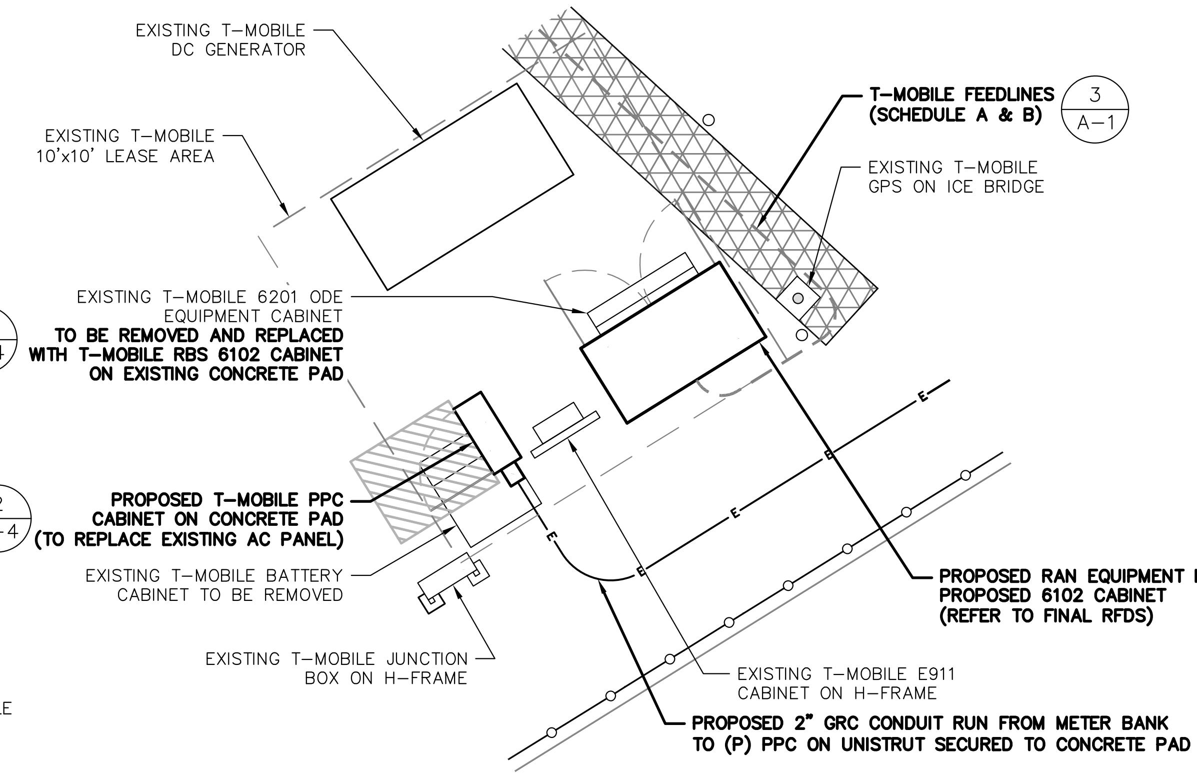


*EQUIPMENT INSTALLATION NOTE:
THE EXISTING SPRINT HYDROGEN CABINET IS TO BE REMOVED PRIOR TO T-MOBILE SITE ALTERATION WORK.

COMPOUND PLAN (1 / A-1)

SCALE: 1"=12' (11"x17")
1"=6' (22"x34")

12 6 0 12



EQUIPMENT LAYOUT (2 / A-1)

SCALE: 1"=5' (11"x17")
1"=2.5' (22"x34")

FEEDLINE SCHEDULE	FEEDLINE DESCRIPTION	LOCATION
A	EXISTING TO REMAIN: (9) 1⅝" COAX (CAP & WRAP) TO T-MOBILE RAD EXISTING TO BE REMOVED: (3) 1⅝" COAX	UP MONOPOLE TO RAD
B	PROPOSED: (3) 6x12 HYBRID TO T-MOBILE RAD	UP MONOPOLE TO RAD

NOTE: EXISTING T-MOBILE EQUIPMENT FEEDLINE LEASING ENTITLEMENTS BASED ON T-MOBILE RFDS. OBSERVED FIELD CONDITIONS MAY DIFFER.

EXISTING T-MOBILE DC GENERATOR

PROPOSED RAN EQUIPMENT IN PROPOSED 6102 CABINET (REFER TO FINAL RFDS)

EXISTING T-MOBILE 6201 ODE EQUIPMENT CABINET TO BE REMOVED AND REPLACED WITH T-MOBILE RBS 6102 CABINET ON EXISTING CONCRETE PAD (1 / A-4)

IMAGE SOURCE: PROTERRA 05/04/19

GROUND EQUIPMENT PHOTO DETAIL (3 / A-1)

SCALE: N.T.S.

T-Mobile
T-MOBILE NORTHEAST LLC
35 Griffin Road South
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Suite 200
Hadley, MA 01035 Ph:(413) 320-4918

STATE OF CONNECTICUT
THOMAS E. JOHNSON
No. 28192
LICENSED PROFESSIONAL ENGINEER
07/26/19

APPROVALS

CONSTRUCTION	DATE
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CHECKED BY:	TEJ/JMM

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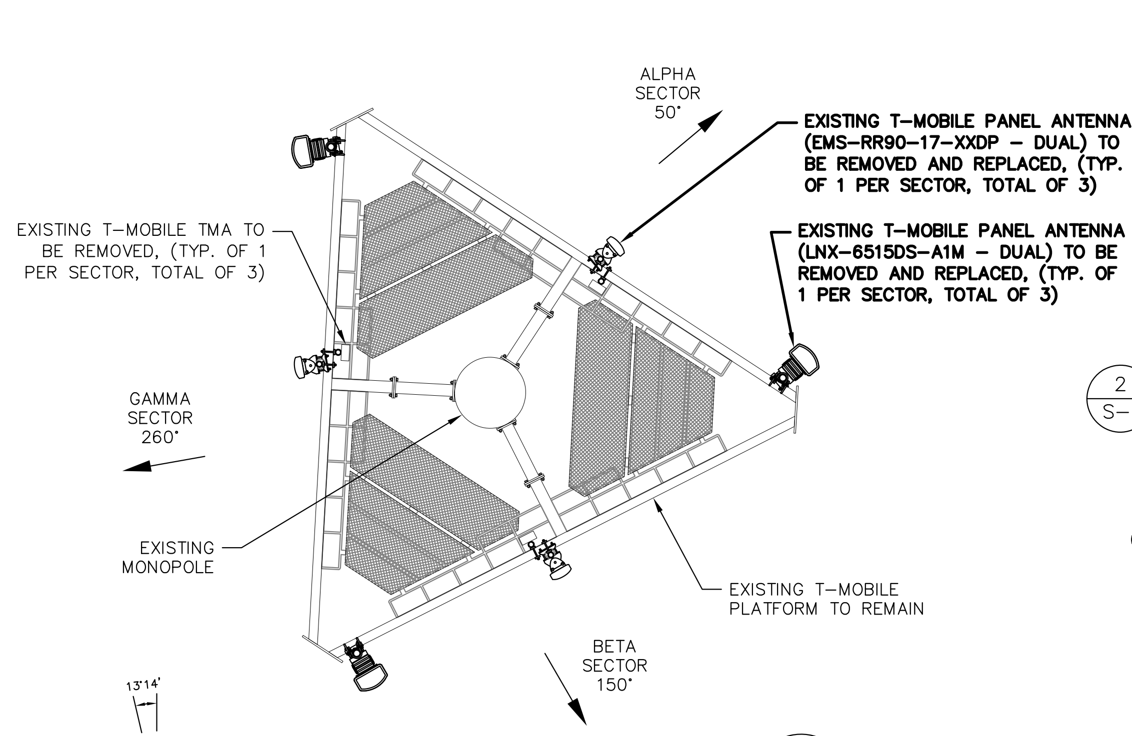
A	06/21/19	ISSUED FOR REVIEW

SITE NUMBER: CT11126F
SITE NAME:
SOUTHBURY/ I-84 X 15/ BAGL

231 KETTLETON ROAD
SOUTHBURY, CT 06488
NEW HAVEN COUNTY

SHEET TITLE
COMPOUND & EQUIPMENT PLANS

SHEET NUMBER
A-1



EXISTING ANTENNA PLAN

SCALE: N.T.S.

1 / A-2

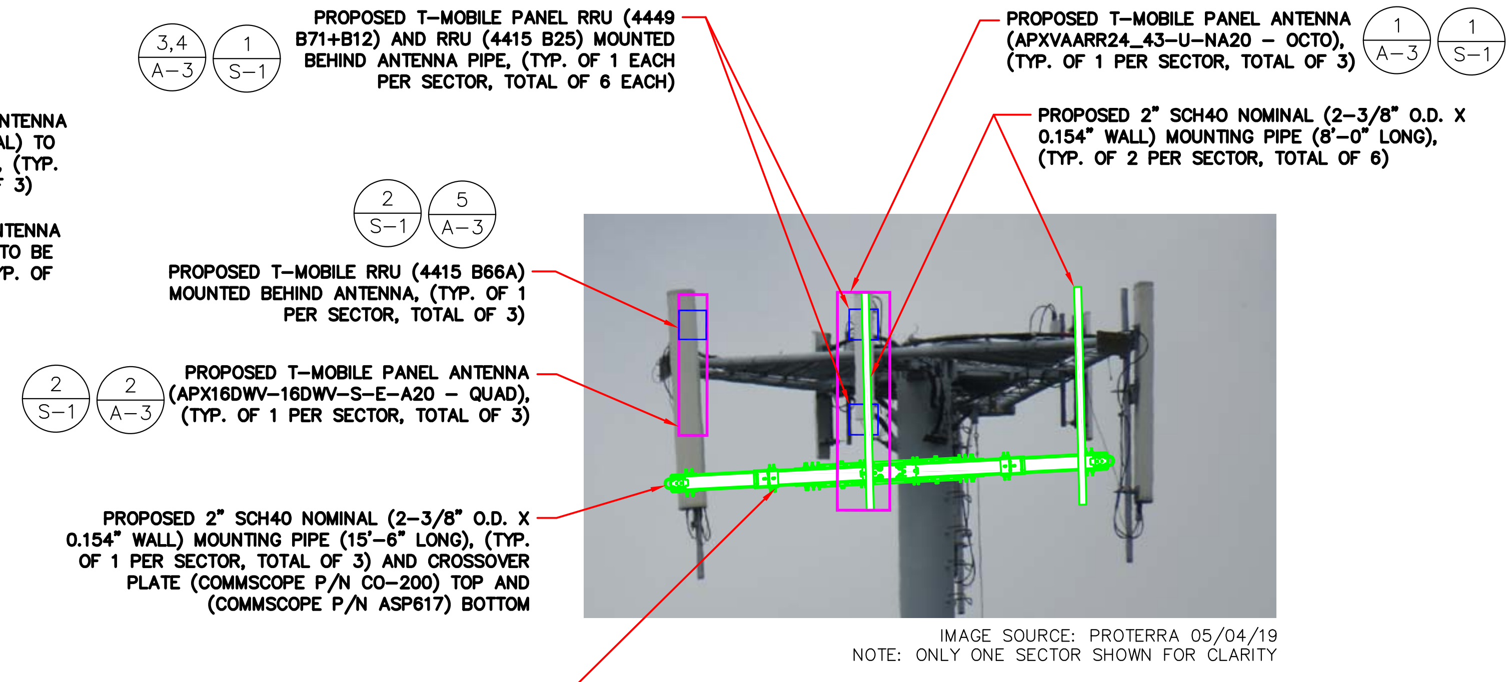
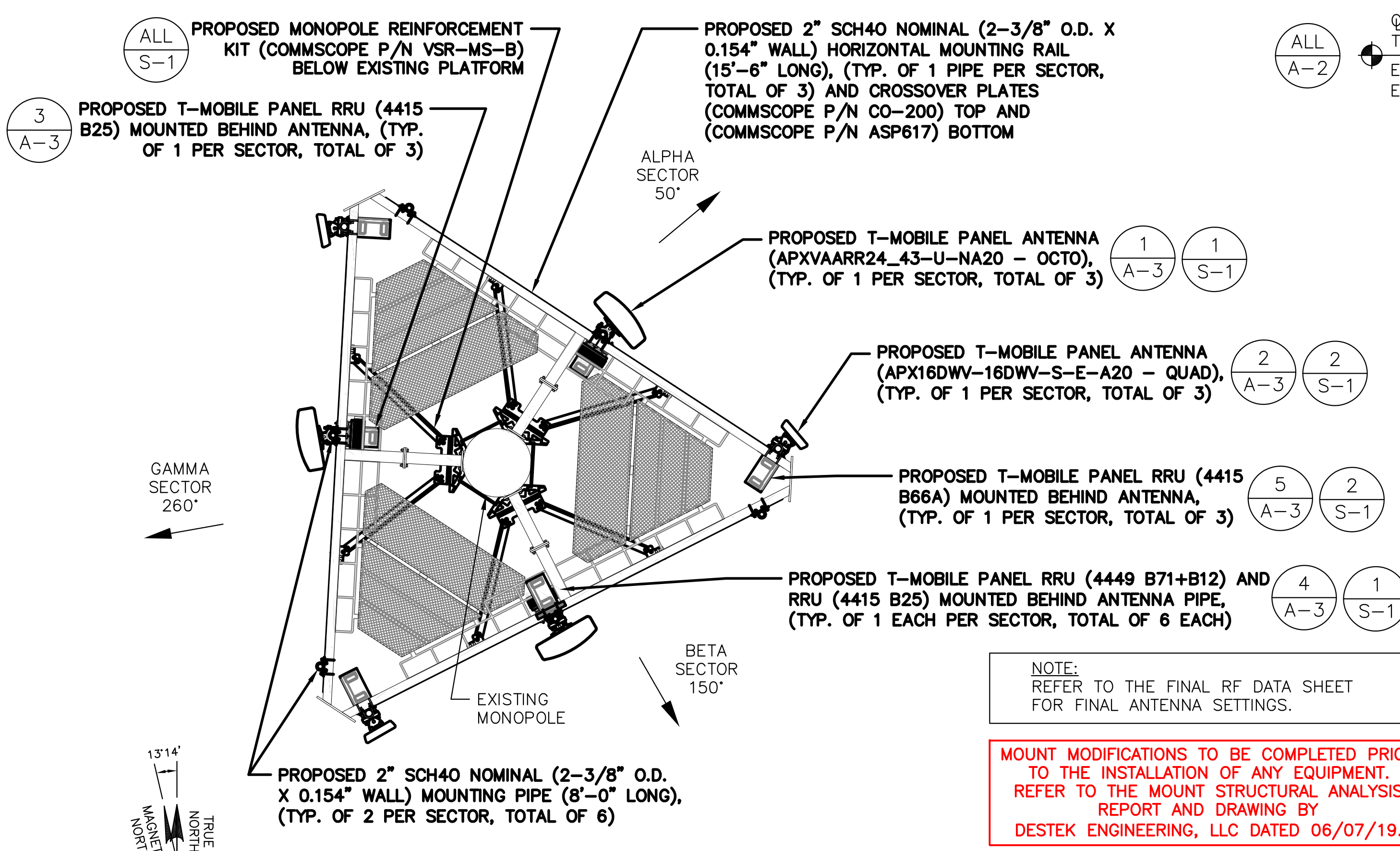


IMAGE SOURCE: PROTERRA 05/04/19
NOTE: ONLY ONE SECTOR SHOWN FOR CLARITY

ANTENNA PHOTO DETAIL

SCALE: N.T.S.

3 / A-2



NOTE:
REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

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PROPOSED ANTENNA PLAN

SCALE: N.T.S.

2 / A-2

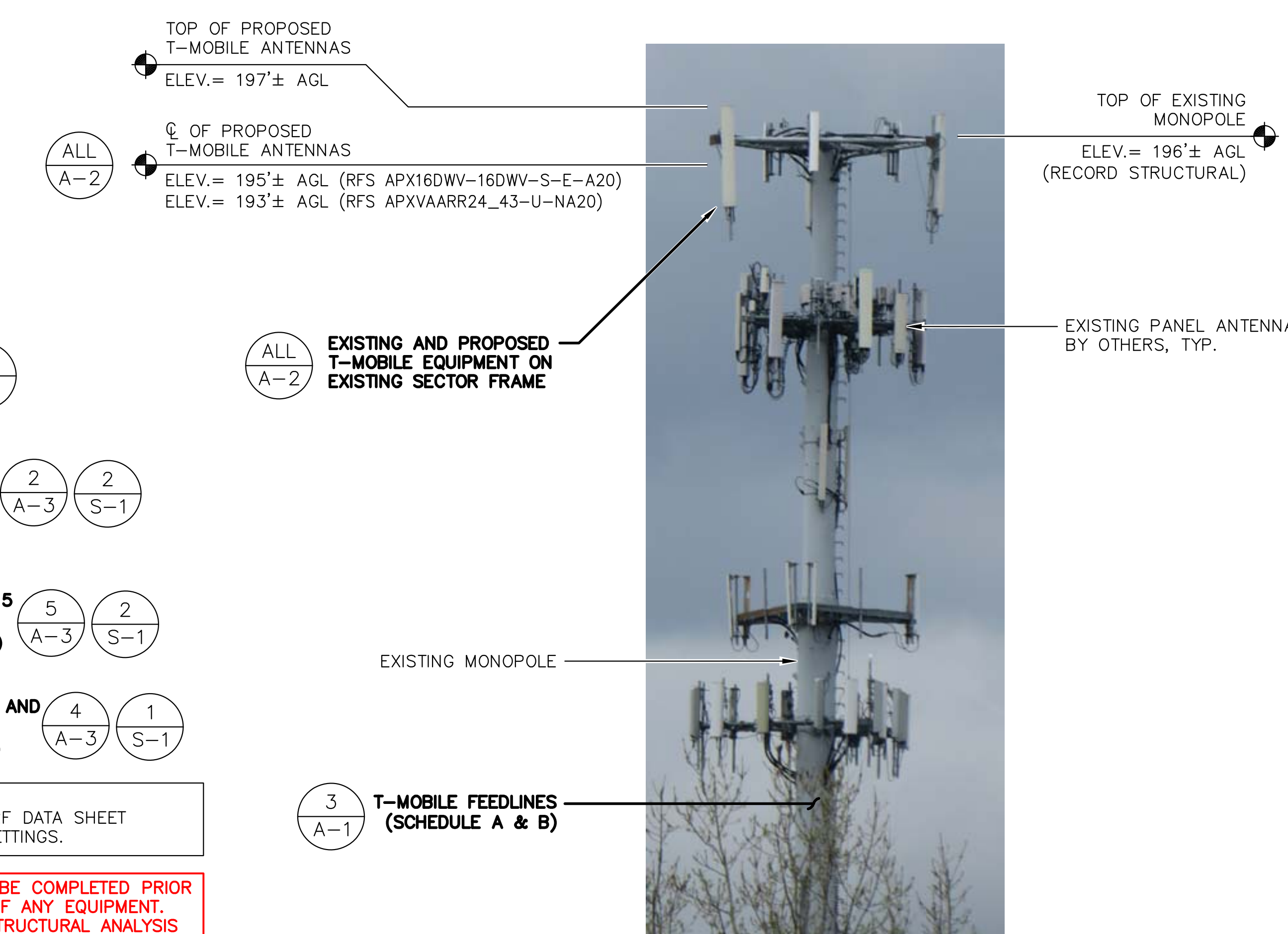

IMAGE SOURCE: PROTERRA 05/04/19

PARTIAL ELEVATION PHOTO DETAIL

SCALE: N.T.S.

4 / A-2

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THOMAS E. JOHNSON
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07/26/19

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231 KETTLETON ROAD
SOUTHBURY, CT 06488
NEW HAVEN COUNTY

SHEET TITLE

ELEVATION & ANTENNA PLANS

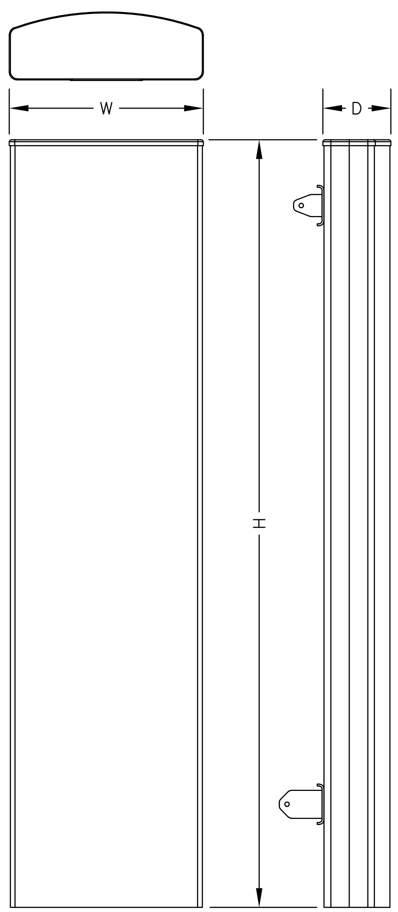
SHEET NUMBER

A-2

FINAL ANTENNA CONFIGURATION

SECTOR	BAND	ANTENNA MODEL	ANTENNA RAD (FROM RFDS)	AZIMUTH	DOWNTILT MECH./ELEC.		RADIOS	CABLE FEED LINES (APPROX. CABLE LENGTH 210')
ALPHA	L600, N600, L700, L1900, G1900	PROPOSED (1) RFS – APXVAARR24_43–U–NA20 (OCTO)	193'±	50°	0°	2°	PROPOSED (1) 4449 B71+B12 RRU & (1) 4415 B25 RRU	PROPOSED (1) SHARED 6x12 HYBRID CABLE TRUNK
	L2100	PROPOSED (1) RFS – APX16DWV–16DWV–S–E–A20 (QUAD)	195'±	50°	0°	–	PROPOSED (1) SHARED 4415 B66A RRU	
BETA	L600, N600, L700, L1900, G1900	PROPOSED (1) RFS – APXVAARR24_43–U–NA20 (OCTO)	193'±	150°	0°	2°	PROPOSED (1) 4449 B71+B12 RRU & (1) 4415 B25 RRU	PROPOSED (1) SHARED 6x12 HYBRID CABLE TRUNK
	L2100	PROPOSED (1) RFS – APX16DWV–16DWV–S–E–A20 (QUAD)	195'±	150°	0°	–	PROPOSED (1) SHARED 4415 B66A RRU	
GAMMA	L600, N600, L700, L1900, G1900	PROPOSED (1) RFS – APXVAARR24_43–U–NA20 (OCTO)	193'±	260°	0°	2°	PROPOSED (1) 4449 B71+B12 RRU & (1) 4415 B25 RRU	PROPOSED (1) SHARED 6x12 HYBRID CABLE TRUNK
	L2100	PROPOSED (1) RFS – APX16DWV–16DWV–S–E–A20 (QUAD)	195'±	260°	0°	–	PROPOSED (1) SHARED 4415 B66A RRU	

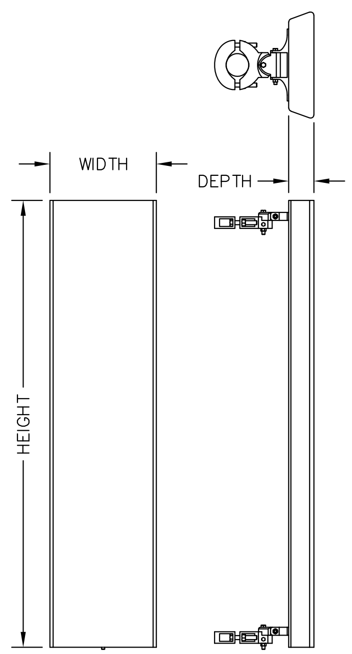
BASED ON RFDS DATED 07/15/19. REFER TO FINAL RFDS FOR FINAL ANTENNA SETTINGS, CONFIGURATION, QUANTITIES AND RAN WIRING.



APXVAARR24_43-U-NA20 (OCTO) ANTENNA SPECIFICATIONS

MANUF.	RFS
MODEL #	APXVAARR24_43–U–NA20 (OCTA)
HEIGHT	95.9"
WIDTH	24"
DEPTH	8.7"
WEIGHT	128± LBS.

L600, 6700, L1900 & G1900 ANTENNA DETAIL (1 / A–3)
SCALE: N.T.S.



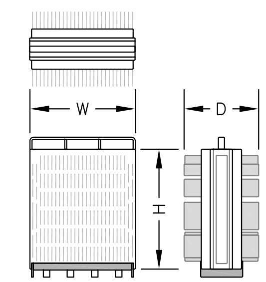
L2100 ANTENNA SPECIFICATIONS

MANUF.	RFS
MODEL #	APX16DWV–16DWV–S–E–A20 (QUAD)
HEIGHT	55.9"
WIDTH	13"
DEPTH	3.15"
WEIGHT	40.7± LBS.

L2100 ANTENNA DETAIL (2 / A–3)
SCALE: N.T.S.

4449 B71+B12 SPECIFICATIONS

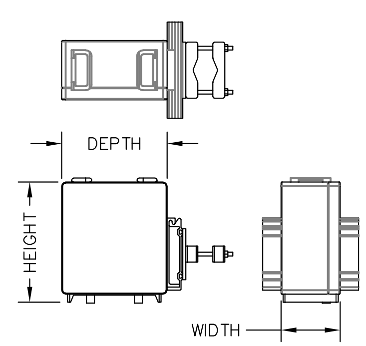
MANUF.	ERICSSON
MODEL #	4449 B71+B12
HEIGHT	14.9"
WIDTH	13.2"
DEPTH	9.2"
WEIGHT	74± LBS.



REMOTE RADIO UNIT (RRU) DETAIL (5 / A–3)
SCALE: N.T.S.

4415 B25 SPECIFICATIONS

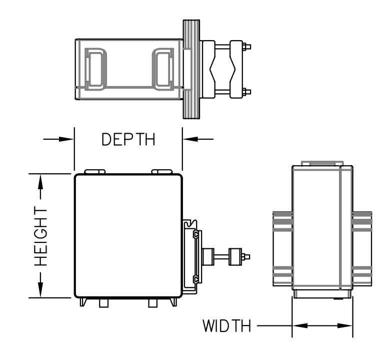
MANUF.	ERICSSON
MODEL #	4415 B25
HEIGHT	14.96"
WIDTH	13.19"
DEPTH	5.39"
WEIGHT	44± LBS.



REMOTE RADIO UNIT (RRU) DETAIL (3 / A–3)
SCALE: N.T.S.

4415 B66A SPECIFICATIONS

MANUF.	ERICSSON
MODEL #	4415 B66A (WITH FAN)
HEIGHT	16.5"
WIDTH	13.5"
DEPTH	6.3"
WEIGHT	50± LBS.



REMOTE RADIO UNIT (RRU) DETAIL (4 / A–3)
SCALE: N.T.S.

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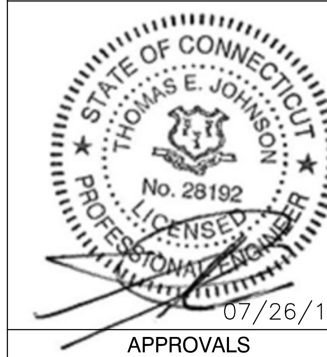

APPROVALS

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SITE NAME:
SOUTHBURY/ I-84 X 15/ BAGL

231 KETTLETON ROAD
SOUTHBURY, CT 06488
NEW HAVEN COUNTY

SHEET TITLE

DETAILS

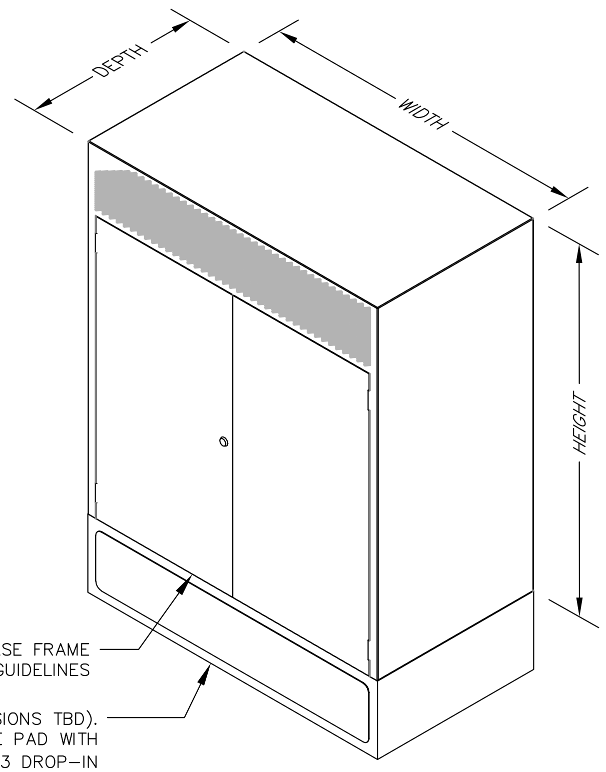
SHEET NUMBER

A–3

*SPECIAL WORK NOTE:
AN INTERNAL EQUIPMENT CABINET UPGRADE WITHIN THE PROPOSED RBS 6102 IS REQUIRED TO ALLOW THE CABINET TO BE WIRED FOR 125A SERVICE. THE POWER CONNECTION UNIT (PCU AC 08) SHALL BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS PRIOR TO CONNECTION TO THE 125A BREAKER.

RBS SPECIFICATIONS

MANUF.	ERICSSON
MODEL #	RBS 6102
HEIGHT	57.1"
WIDTH	51.2"
DEPTH	27.6"
WEIGHT	728± LBS. W/O BATTERIES
MAX WEIGHT	~1600 LBS.



ATTACH RBS CABINET TO BASE FRAME PER MANUFACTURER'S GUIDELINES

RBS BASE FRAME (DIMENSIONS TBD). ANCHOR TO CONCRETE PAD WITH HILTI HDI ½" SS 303 DROP-IN ANCHORS (TYP. OF 8) OR EQUAL PER MANUFACTURER'S GUIDELINES

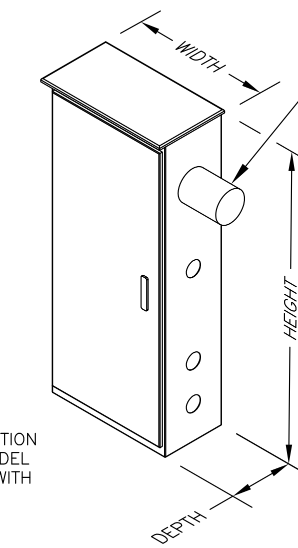
RBS 6102
SCALE: N.T.S.
1 / A-4

PPC SPECIFICATIONS

MANUF.	VERTIV NETXTEND
MODEL #	CS7S2-W836
HEIGHT	60"
WIDTH	25"
DEPTH	10"
WEIGHT	150± LBS.

TO BE PROVIDED BY T-MOBILE
CONFIRM MODEL NUMBER WITH CONSTRUCTION MANAGER PRIOR TO CONSTRUCTION – MODEL AND MANUFACTURER TO BE COMPATIBLE WITH UP TO A 150A BREAKER.

NOTE: CONFIRM WITH MANUFACTURER PAD MOUNTING REQUIREMENTS.



POWER PROTECTION CABINET (PPC)
SCALE: N.T.S.
2 / A-4

T-Mobile
T-MOBILE NORTHEAST LLC
35 Griffin Road South
Bloomfield, CT 06002
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STATE OF CONNECTICUT
THOMAS E. JOHNSON
No. 28192
LICENSED PROFESSIONAL ENGINEER
07/26/19

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SOUTHBURY, CT 06488
NEW HAVEN COUNTY

SHEET TITLE

DETAILS

SHEET NUMBER

A-4

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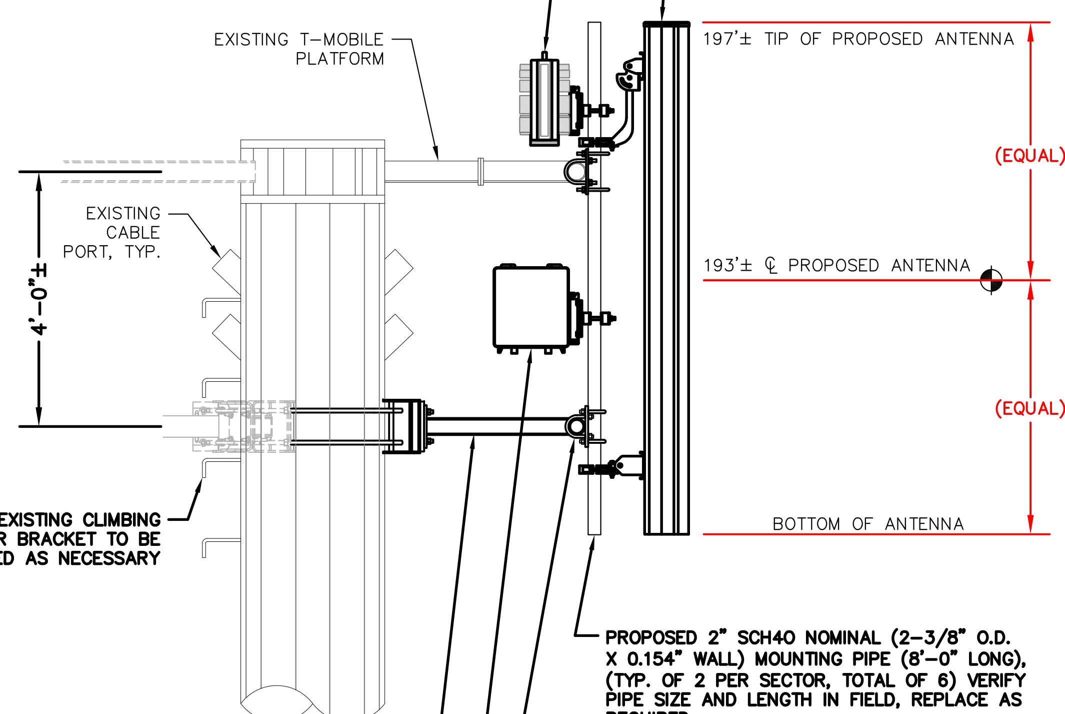
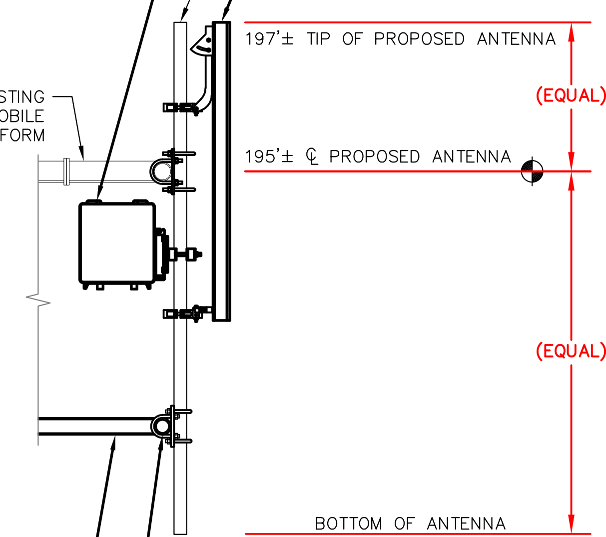


APXVAARR24 ANTENNA & RRU MOUNTING DETAIL (1 / S-1)

SCALE: N.T.S.

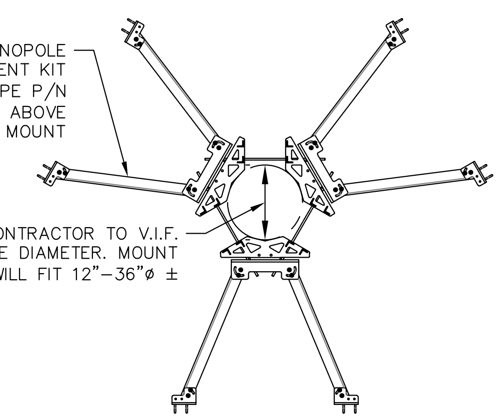


APX16DWV ANTENNA & RRU MOUNTING DETAIL (2 / S-1)

SCALE: N.T.S.

V-STABILIZER SPECIFICATIONS

MANUF.	COMMSCOPE
MODEL #	VSR-MS-B
WEIGHT	421.1± LBS.



REINFORCEMENT KIT (3 / S-1)

SCALE: N.T.S.

T-Mobile
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35 Griffin Road South
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STATE OF CONNECTICUT THOMAS E. JOHNSON No. 28192 LICENSED PROFESSIONAL ENGINEER
07/26/19

APPROVALS

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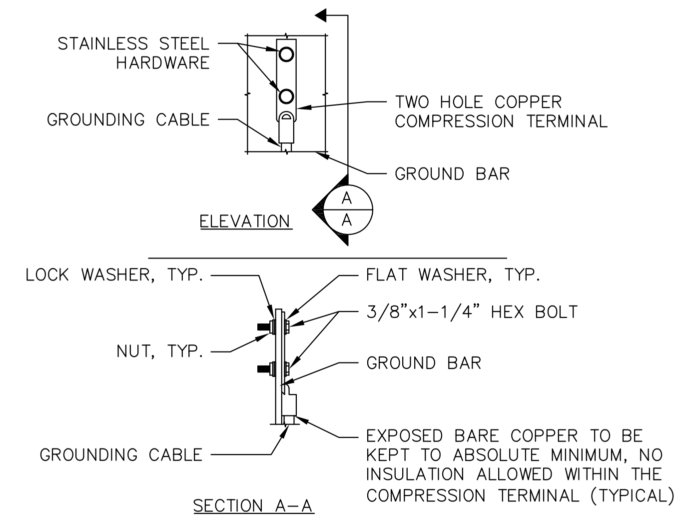
SOUTHBURY, CT 06488
NEW HAVEN COUNTY

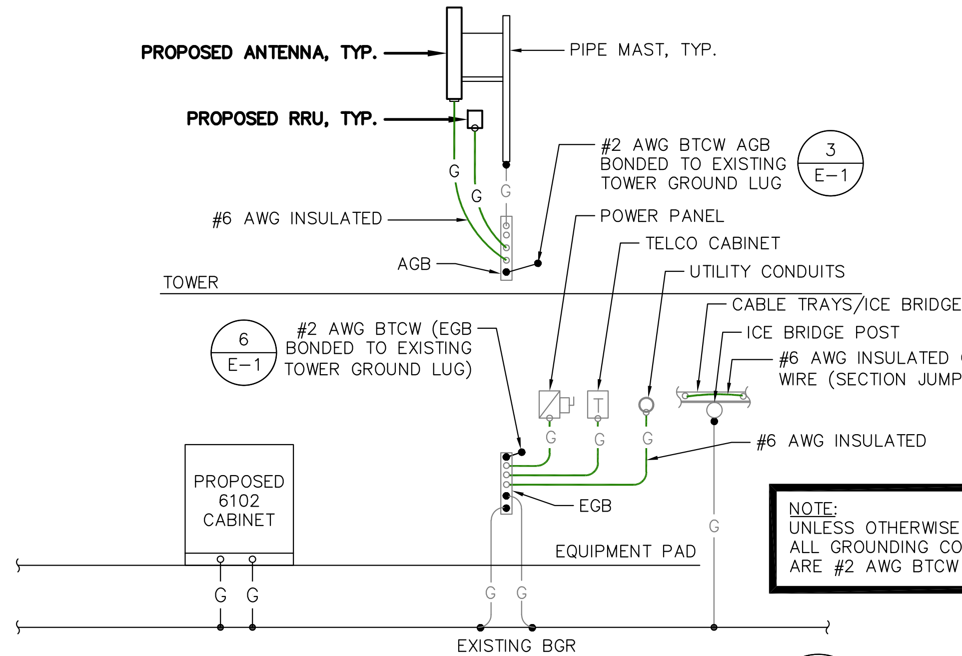
SHEET TITLE
ANTENNA MOUNTING DETAILS

SHEET NUMBER
S-1



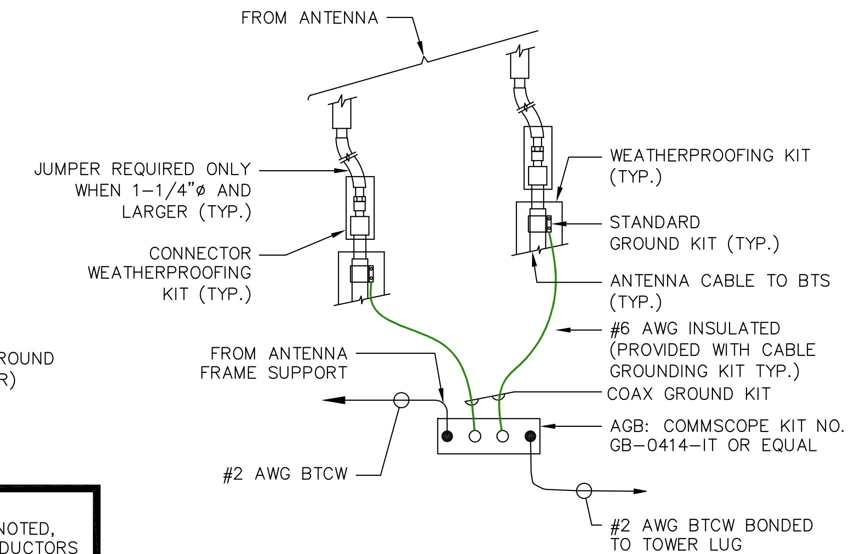
NOTES:
1. "DOUBLING UP" OR "STACKING " OF CONNECTION IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.
3. CADWELD DOWNLEADS FROM UPPER EGB, LOWER EGB, AND MGB.

TYPICAL GROUND BAR CONNECTION DETAIL
SCALE: N.T.S. — 1 / E-1



NOTE:
UNLESS OTHERWISE NOTED, ALL GROUNDING CONDUCTORS ARE #2 AWG BTCW

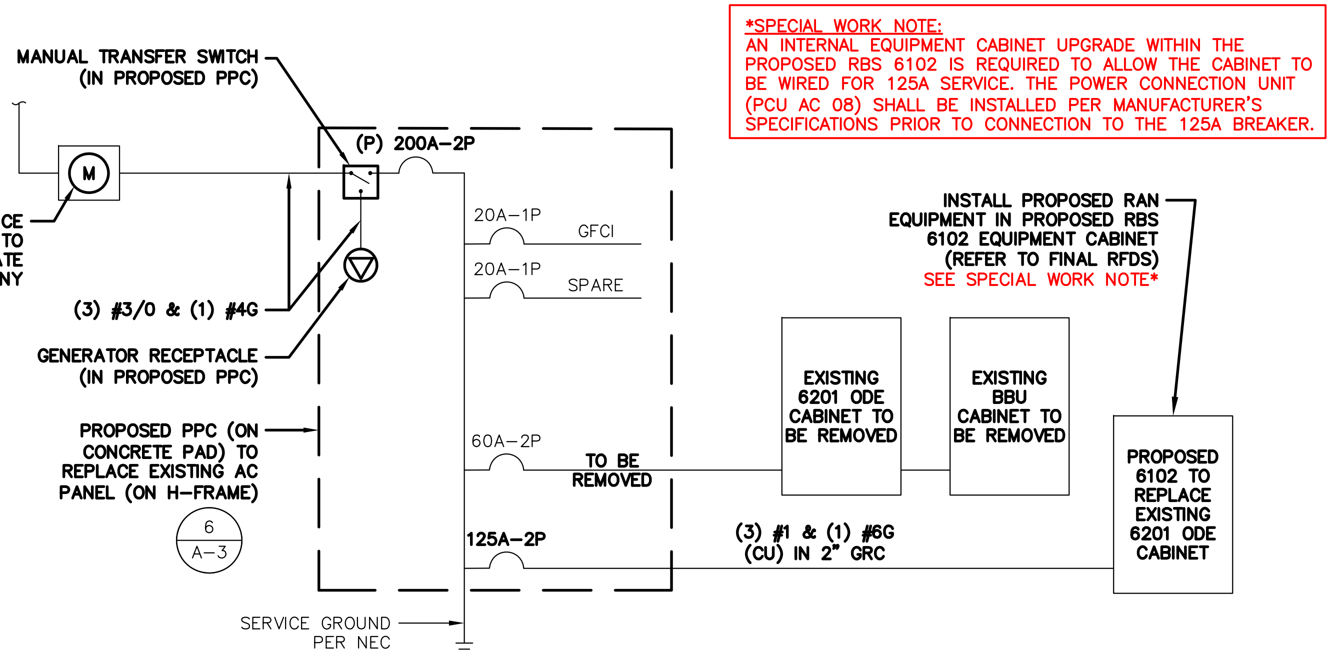
TYPICAL GROUNDING RISER DIAGRAM
SCALE: N.T.S. — 2 / E-1



NOTE:
INSTALL CABLE GROUND KIT ABOVE HORIZONTAL BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO AGB/EGB.

TOWER TOP CABLE GROUNDING DETAIL
SCALE: N.T.S. — 3 / E-1

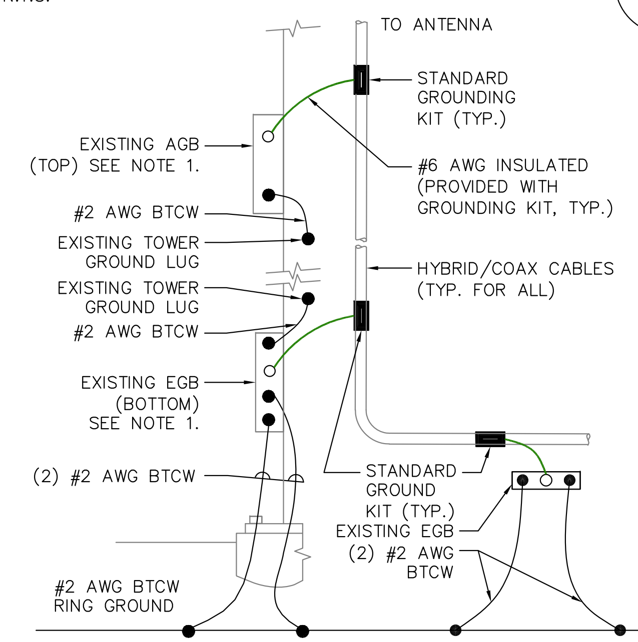
*SPECIAL WORK NOTE:
AN INTERNAL EQUIPMENT CABINET UPGRADE WITHIN THE PROPOSED RBS 6102 IS REQUIRED TO ALLOW THE CABINET TO BE WIRED FOR 125A SERVICE. THE POWER CONNECTION UNIT (PCU AC 08) SHALL BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS PRIOR TO CONNECTION TO THE 125A BREAKER.



NOTE:
ELECTRICAL UPGRADE DESIGN BASED ON RECOMMENDATIONS NOTED IN THE T-MOBILE ELECTRICAL SERVICE INVESTIGATION LETTER PREPARED BY McPHEE ELECTRIC LTD DATED JUNE 21, 2019.

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

ONE LINE POWER SCHEMATIC
SCALE: N.T.S. — 4 / E-1



NOTE:
1. NUMBER OF GROUND BARS MAY VARY DEPENDING ON THE TYPE OF TOWER, ANTENNA LOCATION, AND CONNECTION ORIENTATION. PROVIDE ADDITIONAL AGB/EGB AS REQUIRED.
2. A SEPARATE GROUND BAR TO BE USED FOR GPS ANTENNA IF REQUIRED

TOWER BOTTOM CABLE GROUNDING DETAIL
SCALE: N.T.S. — 5 / E-1

ELECTRICAL LEGEND

A	AMPERE
V	VOLT
KWH	KILOWATT - HOUR
C	CONDUIT
GRC	GALVANIZED RIGID CONDUIT
BTCW	BARE TINNED (SOLID) COPPER WIRE (#2 AWG, UNLESS NOTES OTHERWISE)
G	GROUND
⏚	GROUND
MGB	MASTER GROUND BAR — ○ MECHANICAL CONNECTION; ● CADWELD CONNECTION
AGB/EGB	EQUIPMENT GROUND BAR/ANTENNA GROUND BAR
—G—	GROUND COPPER WIRE, SIZE AS NOTED
——	EXPOSED WIRING
—— (green)	INSULATED GROUNDING CONDUCTOR (#6 AWG STRANDED, UNLESS NOTED OTHERWISE)
⊙	5/8"x10' COPPER CLAD STAINLESS STEEL GROUND ROD
○—●	● EXOTHERMIC (CAD WELD) OR ○ MECHANICAL (COMPRESSION TYPE) CONNECTION
PPC	POWER PROTECTION CABINET
⊗	OMNI-DIRECTIONAL ELECTRONIC MARKER SYSTEM (EMS) BALL

ELECTRICAL & GROUNDING NOTES:

1. ALL ELECTRICAL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC) 2017 AS WELL AS APPLICABLE STATE AND LOCAL CODES.
2. ALL ELECTRICAL ITEMS SHALL BE U.L. APPROVED OR LISTED AND PROCURED PER SPECIFICATION REQUIREMENTS.
3. THE ELECTRICAL WORK INCLUDES ALL LABOR AND MATERIAL DESCRIBED BY DRAWINGS AND SPECIFICATIONS INCLUDING INCIDENTAL WORK TO PROVIDE COMPLETE OPERATING AND APPROVED ELECTRICAL SYSTEM.
4. GENERAL CONTRACTOR SHALL PAY FEES FOR PERMITS, AND IS RESPONSIBLE FOR OBTAINING SAID PERMITS AND COORDINATION OF INSPECTIONS.
5. ELECTRICAL AND TELCO WIRING OUTSIDE A BUILDING AND EXPOSED TO WEATHER SHALL BE IN WATER TIGHT GALVANIZED RIGID STEEL CONDUITS OR SCHEDULE 80 PVC (AS PERMITTED BY CODE) AND WHERE REQUIRED IN LIQUID TIGHT FLEXIBLE METAL OR NONMETALLIC CONDUITS.
6. RIGID STEEL CONDUITS SHALL BE GROUNDED AT BOTH ENDS.
7. ELECTRICAL WIRING SHALL BE COPPER WITH TYPE XHHW, THWN, OR THHN INSULATION AS REQUIRED BY NEC.
8. RUN ELECTRICAL CONDUIT OR CABLE BETWEEN ELECTRICAL ROOM AND PROPOSED CELL SITE POWER PEDESTAL AS INDICATED ON THIS DRAWING. PROVIDE FULL LENGTH PULL ROPE. COORDINATE INSTALLATION WITH UTILITY COMPANY.
9. RUN TELCO CONDUIT OR CABLE BETWEEN TELEPHONE UTILITY DEMARCATION POINT AND PROPOSED CELL SITE TELCO CABINET AND BTS CABINET AS INDICATED ON DRAWING A-1. PROVIDE FULL LENGTH PULL ROPE IN INSTALLED TELCO CONDUIT. PROVIDE GREENLEE CONDUIT MEASURING TAPE AT EACH END.
10. ALL EQUIPMENT LOCATED OUTSIDE SHALL HAVE NEMA 3R ENCLOSURE.
11. GROUNDING SHALL COMPLY WITH NEC ART. 250.
12. GROUND COAXIAL CABLE SHIELDS MINIMUM AT BOTH ENDS USING MANUFACTURERS COAX CABLE GROUNDING KITS SUPPLIED BY PROJECT OWNER.
13. USE #6 COPPER STRANDED WIRE WITH GREEN COLOR INSULATION FOR ABOVE GRADE GROUNDING (UNLESS OTHERWISE SPECIFIED) AND #2 SOLID TINNED BARE COPPER WIRE FOR BELOW GRADE GROUNDING AS INDICATED ON THE DRAWING.
14. ALL GROUND CONNECTIONS TO BE BURNDY HYGROUND COMPRESSION TYPE CONNECTORS OR CADWELD EXOTHERMIC WELD. DO NOT ALLOW BARE COPPER WIRE TO BE IN CONTACT WITH GALVANIZED STEEL.
15. ROUTE GROUNDING CONDUCTORS ALONG THE SHORTEST AND STRAIGHTEST PATH POSSIBLE, EXCEPT AS OTHERWISE INDICATED. GROUNDING LEADS SHOULD NEVER BE BENT AT RIGHT ANGLE. ALWAYS MAKE AT LEAST 12" RADIUS BENDS. #6 WIRE CAN BE BENT AT 6" RADIUS WHEN NECESSARY. BOND ANY METAL OBJECTS WITHIN 7 FEET OF PROPOSED EQUIPMENT OR CABINET TO MASTER GROUND BAR.
16. CONNECTIONS TO MGB SHALL BE ARRANGED IN THREE MAIN GROUPS: SURGE PRODUCERS (COAXIAL CABLE GROUND KITS, TELCO AND POWER PANEL GROUND); (GROUNDING ELECTRODE RING OR BUILDING STEEL); NON-SURGING OBJECTS (EGB GROUND IN BTS UNIT).
17. CONNECTIONS TO GROUND BARS SHALL BE MADE WITH TWO HOLE COMPRESSION TYPE COPPER LYGS. APPLY OXIDE INHIBITING COMPOUND TO ALL LOCATIONS.
18. APPLY OXIDE INHIBITING COMPOUND TO ALL COMPRESSION TYPE GROUND CONNECTIONS.
19. BOND ANTENNA MOUNTING BRACKETS, COAXIAL CABLE GROUND KITS, AND ALNA TO EGB PLACED NEAR THE ANTENNA LOCATION.
20. BOND ANTENNA EGB'S AND MGB TO WATER MAIN/GROUND RING.
21. TEST COMPLETED GROUND SYSTEM AND RECORD RESULTS FOR PROJECT CLOSE-OUT DOCUMENTATION.
22. BOND ANY METAL OBJECTS WITHIN 7 FEET OF PROPOSED EQUIPMENT OR CABINET TO MASTER GROUND BAR.
23. VERIFY PROPOSED SERVICE UPGRADE WITH LOCAL UTILITY COMPANY PRIOR TO CONSTRUCTION.

T-Mobile
T-MOBILE NORTHEAST LLC
35 Griffin Road South
Bloomfield, CT 06002
Office: (860) 648-1116

CENTERLINE COMMUNICATIONS
750 West Center St. Suite 301
West Bridgewater, MA 02379

ProTerra DESIGN GROUP, LLC
4 Bay Road, Building A
Suite 200
Hadley, MA 01035 Ph:(413) 320-4918

STATE OF CONNECTICUT
THOMAS E. JOHNSON
No. 28192
LICENSED PROFESSIONAL ENGINEER
07/26/19

APPROVALS

CONSTRUCTION	DATE
RF ENGINEERING	DATE
ZONING/SITE ACQ.	DATE
OPERATIONS	DATE
TOWER OWNER	DATE
PROJECT NO:	19-023
DRAWN BY:	TBD/PN
CHECKED BY:	TEJ/JMM

2	07/26/19	CONSTRUCTION REVISED
1	07/22/19	CONSTRUCTION REVISED
0	07/16/19	ISSUED FOR CONSTRUCTION
A	06/21/19	ISSUED FOR REVIEW

SITE NUMBER: CT11126F
SITE NAME:
SOUTHBURY/ I-84 X 15/ BAGL

231 KETTLETON ROAD
SOUTHBURY, CT 06488
NEW HAVEN COUNTY

SHEET TITLE

ONE LINE DIAGRAM & GROUNDING DETAILS

SHEET NUMBER

E-1

Exhibit D

Structural Analysis Report

Phoenix Tower International
999 Yamato Road, Suite 100
Boca Raton, FL 33431
(818) 486-8248

GPD Engineering and Architecture Professional Corporation
Todd Rasey
520 South Main Street, Suite 2531
Akron, OH 44311
(330) 572-2198
trasey@gpdgroup.com

GPD# 2019791.CT1002.09 Rev 3
July 26, 2019

RIGOROUS STRUCTURAL ANALYSIS REPORT

SITE DESIGNATION:	**PTI Site #:**	**US-CT-1002**
	PTI Site Name:	**Kettleton**
	T-Mobile Site #:	**CT11126F**
	T-Mobile Site Name:	**Southbury/I-84 x 15/ BAGL**
ANALYSIS CRITERIA:	**Codes:**	**TIA-222-G, 2015 IBC & 2018 CSBC** **120-mph Ultimate (3-second gust) with 0" ice** **93-mph Nominal (3-second gust) with 0" ice** **50-mph Nominal (3-second gust) with 3/4" ice**
SITE DATA:		**231 Kettleton Road, Southbury, CT 6488, New Haven County** **Latitude 41° 28' 16.580" N, Longitude 73° 12′ 18.352″ W** **196′ Modified PiROD Monopole**

Mr. David Rodriguez,

GPD is pleased to submit this Rigorous Structural Analysis Report to determine the structural integrity of the aforementioned tower. The purpose of the analysis is to determine the suitability of the tower with the existing and proposed loading configuration detailed in the analysis report.

Analysis Results

Tower Stress Level with Proposed Equipment:	82.7%	Pass
Foundation Ratio with Proposed Equipment:	65.7%	Pass

We at GPD appreciate the opportunity of providing our continuing professional services to you and Phoenix Tower International. If you have any questions or need further assistance on this or any other projects please do not hesitate to call.

Respectfully submitted,

STATE OF CONNECTICUT
CHRISTOPHER J. SCHEKS
No. 30026
LICENSED
PROFESSIONAL ENGINEER

Christopher J. Scheks, P.E.
Connecticut #: 0030026

7/26/2019

SUMMARY & RESULTS

The purpose of this analysis was to verify whether the existing modified structure is capable of carrying the proposed loading configuration as specified by T-Mobile to Phoenix Tower International. This report was commissioned by Mr. David Rodriguez of Phoenix Tower International.

This analysis has been performed in accordance with the 2018 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 120 mph converted to a nominal 3-second gust wind speed of 93 mph per Section 1609.3 and Appendix N as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category B with a maximum topographic factor, Kzt, of 1.0 and Risk Category II were used in this analysis.

The proposed coax shall be installed internal to the monopole for the analysis results to be considered valid.

TOWER SUMMARY AND RESULTS

Member	Capacity	Results
Monopole	82.4%	Pass
Anchor Rods	82.7%	Pass
Base Plate	72.8%	Pass
Foundation	65.7%	Pass

ANALYSIS METHOD

tnxTower (Version 8.0.5.0), a commercially available software program, was used to create a three-dimensional model of the tower and calculate primary member stresses for various dead, live, wind, and ice load cases. Selected output from the analysis is included in Appendix B. The following table details the information provided to complete this structural analysis. This analysis is solely based on this information and is being completed without the benefit of a detailed site visit.

DOCUMENTS PROVIDED

Document	Remarks	Source
Collocation Application	T-Mobile Application, dated 6/17/2019	PTI
Tower Design	PiROD, File #: A-115080, dated 3/26/1999	PTI
Foundation Design	PiROD, File #: A-115080, dated 3/26/1999	PTI
Geotechnical Report	Dr. Clarence Welti, dated 10/7/1998	PTI
Previous Structural Analysis	GPD Project #: 2019791.CT1002.07 Rev. 1, dated 02/04/2019	PTI
Mount Modification Report	Destek Engineering Project #: 1978010, dated 6/7/2019	PTI
Modification Drawings	GPD Project #: 2010293.91, dated 9/14/2010	GPD
Modification Drawings	GPD Project #: 2013792.15 Rev. A, dated 3/11/2014	GPD
Post Modification Report	GPD Project #: 2010299.50, dated 01/12/2011	GPD
Post Modification Report	GPD Project #: 2014506.06, dated 6/3/2014	GPD

ASSUMPTIONS

This structural analysis is based on the theoretical capacity of the members and is not a condition assessment of the tower. This analysis is from information supplied, and therefore, its results are based on and are as accurate as that supplied data. GPD has made no independent determination, nor is it required to, of its accuracy. The following assumptions were made for this structural analysis.

1. The tower member sizes and shapes are considered accurate as supplied. The material grade is as per data supplied and/or as assumed and as stated in the materials section.
2. The appurtenance configuration is as supplied, determined from available photos, and/or as modeled in the analysis. It is assumed to be complete and accurate. All antennas, mounts, coax and waveguides are assumed to be properly installed and supported as per manufacturer requirements.
3. All mounts, if applicable, are considered adequate to support the loading. No actual analysis of the mount(s) is performed. This analysis is limited to analyzing the tower only.
4. The soil parameters are as per data supplied or as assumed and stated in the calculations.
5. Foundations are properly designed and constructed to resist the original design loads indicated in the documents provided.
6. The tower and structures have been properly maintained in accordance with TIA Standards and/or with manufacturer's specifications.
7. All welds and connections are assumed to develop at least the member capacity unless determined otherwise and explicitly stated in this report.
8. All prior structural modifications, if applicable, are assumed to be as per data supplied/available and to have been properly installed.
9. Loading interpreted from photos is accurate to ±5' AGL, antenna size accurate to ±3.3 sf, and coax equal to the number of existing antennas without reserve.
10. All existing loading has been modeled based on the Previous Structural Analysis by GPD (Project #: 2019791.CT1002.07 Rev. 1, dated 02/04/2019), site photos, and the provided Collocation Application and is assumed to be accurate.
11. T-Mobiles proposed loading has been modeled to reflect the final loading configuration found in the Collocation Application (T-Mobile Application, dated 6/17/2019) and is assumed to be accurate.

If any of these assumptions are not valid or have been made in error, this analysis may be affected, and GPD should be allowed to review any new information to determine its effect on the structural integrity of the tower.

DISCLAIMER OF WARRANTIES

GPD has not performed a site visit to the tower to verify the member sizes or antenna/coax loading. If the existing conditions are not as represented on the tower elevation contained in this report, we should be contacted immediately to evaluate the significance of the discrepancy. This is not a condition assessment of the tower or foundation. This report does not replace a full tower inspection. The tower and foundations are assumed to have been properly fabricated, erected, maintained, in good condition, twist free, and plumb.

The engineering services rendered by GPD in connection with this Rigorous Structural Analysis are limited to a computer analysis of the tower structure and theoretical capacity of its main structural members. No allowance was made for any damaged, bent, missing, loose, or rusted members (above and below ground). No allowance was made for loose bolts or cracked welds.

This analysis is limited to the designated maximum wind and seismic conditions per the governing tower standards and code. Wind forces resulting in tower vibrations near the structure's resonant frequencies were not considered in this analysis and are outside the scope of this analysis. Lateral loading from any dynamic response was not evaluated under a time-domain based fatigue analysis.

GPD does not analyze the fabrication of the structure (including welding). It is not possible to have all the very detailed information needed to perform a thorough analysis of every structural sub-component and connection of an existing tower. GPD provides a limited scope of service in that we cannot verify the adequacy of every weld, plate connection detail, etc. The purpose of this report is to assess the capability of adding appurtenances usually accompanied by transmission lines to the structure.

It is the owner's responsibility to determine the amount of ice accumulation in excess of the code specified amount, if any, that should be considered in the structural analysis.

The attached sketches are a schematic representation of the analyzed tower. If any material is fabricated from these sketches, the contractor shall be responsible for field verifying the existing conditions, proper fit, and clearance in the field. Any mentions of structural modifications are reasonable estimates and should not be used as a precise construction document. Precise modification drawings are obtainable from GPD, but are beyond the scope of this report.

Miscellaneous items such as antenna mounts, etc., have not been designed or detailed as a part of our work. We recommend that material of adequate size and strength be purchased from a reputable tower manufacturer.

Towers are designed to carry gravity, wind, and ice loads. All members, legs, diagonals, struts, and redundant members provide structural stability to the tower with little redundancy. Absence or removal of a member can trigger catastrophic failure unless a substitute is provided before any removal. Legs carry axial loads and derive their strength from shorter unbraced lengths by the presence of redundant members and their connection to the diagonals with bolts or welds. If the bolts or welds are removed without providing any substitute to the frame, the leg is subjected to a higher unbraced length that immediately reduces its load carrying capacity. If a diagonal is also removed in addition to the connection, the unbraced length of the leg is greatly increased, jeopardizing its load carrying capacity. Failure of one leg can result in a tower collapse because there is no redundancy. Redundant members and diagonals are critical to the stability of the tower.

GPD makes no warranties, expressed and/or implied, in connection with this report and disclaims any liability arising from material, fabrication, and erection of this tower. GPD will not be responsible whatsoever for, or on account of, consequential or incidental damages sustained by any person, firm, or organization as a result of any data or conclusions contained in this report. The maximum liability of GPD pursuant to this report will be limited to the total fee received for preparation of this report.

APPENDIX A

Tower Analysis Summary Form

Tower Analysis Summary Form

General Info

Site Name	Kettleton
Site Number	US-CT-1002
Proposed Carrier	T-Mobile
Date of Analysis	July 26, 2019
Company Performing Analysis	GPD

The information contained in this summary report is not to be used independently from the PE stamped tower analysis.

Tower Info	Description	Date
Tower Type (G, SST, MP)	Monopole	
Tower Height (top of steel AGL)	196'	
Tower Manufacturer	PiROD	
Tower Model	N/A	
Tower Design	PiROD, File #: A-115080	3/26/1999
Foundation Design	PiROD, File #: A-115080	3/26/1999
Geotech Report	Dr. Clarence Welti	10/7/1998
Previous Structural Analysis	GPD Project #: 2019791.CT1002.07 Rev. 1	2/4/2019
Tower Mapping	N/A	
Modification Design	GPD Project #: 2010293.91	9/14/2010
Modification Design	GPD Project #: 2013792.15 Rev. A	3/11/2014
Post Modification Inspection	GPD Project #: 2010299.50	1/12/2011
Post Modification Inspection	GPD Project #: 2014506.06	6/23/2014

Design Parameters

Design Code Used	TIA-222-G, 2015 IBC, 2018 CSBC, & ASCE 7-16
Location of Tower (County, State)	New Haven, Connecticut
Nominal Wind Speed (mph)	93 Nominal (3-second gust)
Ice Thickness (in)	0.75
Risk Category (I, II, III)	II
Exposure Category (B, C, D)	B
Topographic Category (1 to 5)	1

Analysis Results (% Maximum Usage)

Existing/Reserved + Future + Proposed Condition	
Tower (%)	82.4%
Tower Base (%)	82.7%
Foundation (%)	65.7%
Foundation Adequate?	Yes

T-Mobile Future Loading Information	
Existing Area (in^2)	9,622
Proposed Area (in^2)	9,166
Final Area (in^2)	18,788
Future Area (in^2)	3,212
Total Wind Area (in^2)	22,000
Does T-Mobile's Loading Exceed 22,000 in^2?	No
If yes, by how much? (in^2)	n/a

Steel Yield Strength (ksi)

Monopole Shaft	65
Base Plate	36
Anchor Rods	75

Existing/ Reserved Loading

Antenna								Mount			Transmission Line			
Antenna Owner	Mount Height (ft)	Antenna CL (ft)	Quantity	Type	Manufacturer	Model	Azimuth	Quantity	Manufacturer	Type	Quantity	Model	Size	Attachment Int./Ext.
T-Mobile	195	195	3	Panel	Andrew	RR90-17-02DP	110/230/350	1	Unknown	LP Platform	12*	Unknown	1-5/8"	Internal
T-Mobile	195	193	3	Panel	Commscope	LNX-6515DS-VTM	110/230/350			On The Same Mount				
T-Mobile	195	195	3	TMA	Generic	Twin Style 1A-PCS*				On The Same Mount				
T-Mobile	195	195	3	TMA	Andrew	Smart Bias T's				On The Same Mount				
AT&T Mobility	185	185	3	Panel	Powerwave	7770	23/143/263	1	Unknown	LP Platform	12	Unknown	1-1/4"	Internal
AT&T Mobility	185	185	3	Panel	CCI	HPA-65R-BUU-H8	23/143/263	1	SitePro 1	PRK-1245L Kicker Supports	4	DC Power	3/4"	Internal
AT&T Mobility	185	185	2	Panel	Quintel	QS66512-2	23/143			On The Same Mount	2	Fiber Cable	1.496"	Internal
AT&T Mobility	185	185	1	Panel	CCI	TPA-65R-LCUUUU-H8	263			On The Same Mount				
AT&T Mobility	185	185	3	TMA	Powerwave	TT19-08BP111-001				On The Same Mount				
AT&T Mobility	185	185	6	Diplexer	Powerwave	LGP 21901				On The Same Mount				
AT&T Mobility	185	185	6	Diplexer	Kathrein	782-10250				On The Same Mount				
AT&T Mobility	185	185	3	RRH	Ericsson	RRUS 11				On The Same Mount				
AT&T Mobility	185	185	3	RRH	Ericsson	RRUS 12				On The Same Mount				
AT&T Mobility	185	185	3	RRH	Ericsson	RRUS 32				On The Same Mount				
AT&T Mobility	185	185	3	RRH	Ericsson	RRUS 4426 B66				On The Same Mount				
AT&T Mobility	185	185	2	Surge	Raycap	DC6-48-60-18-8F				On The Same Mount				
Pocket	175	175	3	Panel	RFS	APXV18-206517S-C	110/230/350			Flush Mounted	6	Unknown	1-5/8"	External
Sprint	165	165	3	Panel	RFS	APXVTM14-ALU-I20	340/70/260	1	Unknown	LP Platform	4	Hybriflex	1-1/4"	External
Sprint	165	165	3	Panel	Commscope	NNVV-65B-R4	340/70/260			On The Same Mount				
Sprint	165	165	3	RRH	Alcatel Lucent	RRH 1900 4x45 65 MHz				On The Same Mount				
Sprint	165	165	3	RRH	Alcatel Lucent	800 MHz RRH				On The Same Mount				
Sprint	165	165	3	RRH	Alcatel Lucent	TD-RRH8x20-25 w/ Solar Shield				On The Same Mount				
Sprint	165	165	3	RRH	Alcatel Lucent	RRH2x50-08 (800 MHz)				On The Same Mount				
Verizon Wireless	155	155	6	Panel	Commscope	JAHH-65B-R3B	60/180/300	1	Unknown	LP Platform	6	Unknown	1-5/8"	External
Verizon Wireless	155	155	3	Panel	Amphenol	BXA-70063/4CF	60/180	1	SitePro 1	PRK-SFS-L Reinforcement Kit	2	Hybriflex	1-5/8"	External
Verizon Wireless	155	155	1	OVP	RFS	DB-C1-12C-24-AB-0Z		3	Commscope	BSAMNT SBS-2-2				
Verizon Wireless	155	155	3	RRH	Alcatel Lucent	B2B66A RRH PCS+AWS				On The Same Mount				
Verizon Wireless	155	155	3	RRH	Alcatel Lucent	B25 RRH4x30				On The Same Mount				
Verizon Wireless	155	155	3	RRH	Alcatel Lucent	B13 RRH 4x30				On The Same Mount				
Sprint	75	75	1	Panel	Pctel	TMG-HR-26N GPS	240			Pipe Mounted	1	Unknown	7/8"	External

Note: (3) RR90-17-02DP panels, (3) LNX-6515DS-VTM Panels, and (3) Smart Bias T's at 195' shall be removed prior to the installation of the proposed loading and have not been considered in this analysis. All remaining existing/reserved equipment shall be reused except as noted below.

*Note: The (3) Twin Style 1A-PCS TMA's and (3) 1-5/8" Coax at 195' shall be removed prior to the installation of the proposed loading but T-Mobile will still reserve lease rights to this equipment so it has been considered in this analysis.

Proposed Loading

Antenna								Mount			Transmission Line			
Antenna Owner	Mount Height (ft)	Antenna CL (ft)	Quantity	Type	Manufacturer	Model	Azimuth	Quantity	Manufacturer	Type	Quantity	Model	Size	Attachment Int./Ext.
T-Mobile	195	193	3	Panel	RFS	APXVAARR24_43-U-NA20	50/150/260	3	Commscope	VSR Stabilizer Kit Part #: VSR-MA-B	3	Fiber	1-1/4"	Internal
T-Mobile	195	195	3	Panel	RFS	APX16DWV-S-E-A20	50/150/260	3	Unknown	15.5' Long 2.0 STD Horizontal Pipes				
T-Mobile	195	193	3	RRH	Ericsson	4449 B71+B12				On The Modified Mounts				
T-Mobile	195	193	3	RRH	Ericsson	4415 B25				On The Modified Mounts				
T-Mobile	195	195	3	RRH	Ericsson	4415 B66A				On The Modified Mounts				
T-Mobile	195	195	1	Surge	Raycap	DC4-48-60-8-20F				On The Modified Mounts				

Note: The proposed equipment shall be installed in addition to the remaining loading at the same elevation.

Note: The proposed coax shall be installed inside the monopole in order for this analysis to be valid.

Reserved Loading

Antenna						Mount			Transmission Line			
Antenna Owner	Mount Height (ft)	Antenna CL (ft)	Quantity	Type	Azimuth	Quantity	Manufacturer	Type	Quantity	Model	Size	Attachment Int./Ext.
T-Mobile	195	195	1	3,212 in^2 Remaining Reserved Loading				On The Existing Mounts				

Note: T-Mobile's final loading configuration uses 18,788 in^2 of their MLA reserved loading.

APPENDIX B

tnxTower Output File

per TIA-222- G

Kettleton / US-CT-1002

2019791.CT1002.09

Pole Geometry

	Pole Height Above Base (ft)	Section Length (ft)	Lap Splice Length (ft)	Number of Sides	Top Diameter (in)	Bottom Diameter (in)	Wall Thickness (in)	Bend Radius (in)	Pole Material
1	196	1		0	18	18	0.375		A53-B-42
2	195	15		0	24.00	24	0.375		A53-B-42
3	180	20		0	30.00	30	0.375		A53-B-42
4	160	20		0	36.00	36	0.375		A53-B-42
5	140	20		0	42.00	42	0.375		A53-B-42
6	120	20		0	48.00	48	0.375		A53-B-42
7	100	20		0	54.00	54	0.375		A53-B-42
8	80	20		0	60.00	60	0.375		A53-B-42
9	60	20		0	60.00	60	0.5		A53-B-42
10	40	40		0	60.00	60	0.625		A53-B-42

Reinforcement Configuration

	Bottom Effective Elevation (ft)	Top Effective Elevation (ft)	Type	Model	Pole Flat Width (in)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	0	20	plate	6-1/2"x1-1/2" FP	-	0						120						240					
2	20	40	plate	6-1/2"x1-1/2" FP	-	0						120						240					
3	40	60	plate	6-1/2"x1-1/2" FP	-	0						120						240					
4	60	80	plate	6-1/2"x1-1/2" FP	-	0						120						240					
5	80	100	plate	6-1/2"x1-1/2" FP	-	0						120						240					
6	100	120	plate	6-1/2"x1-1/2" FP	-	0						120						240					
7	120	136	plate	6-1/2"x1-1/2" FP	-	0						120						240					
8																							
9																							
10																							

Reinforcement Details

	B (in)	H (in)	Gross Area (in^2)	Pole Face to Centroid (in)	Bottom Termination Length (in)	Top Termination Length (in)	L_u (in)	Net Area (in^2)	Bolt Hole Size (in)	Reinforcement Material
1	6.5	1.5	9.75	0.75	33.000	33.000	18.000	7.875	1.1875	A572-65
2	6.5	1.5	9.75	0.75	33.000	33.000	18.000	7.875	1.1875	A572-65
3	6.5	1.5	9.75	0.75	33.000	33.000	18.000	7.875	1.1875	A572-65
4	6.5	1.5	9.75	0.75	33.000	33.000	18.000	7.875	1.1875	A572-65
5	6.5	1.5	9.75	0.75	33.000	33.000	18.000	7.875	1.1875	A572-65
6	6.5	1.5	9.75	0.75	33.000	33.000	18.000	7.875	1.1875	A572-65
7	6.5	1.5	9.75	0.75	33.000	33.000	18.000	7.875	1.1875	A572-65

Analysis Date: 7/26/2019

Analysis Results

Elevation (ft)	Component Type	Size	Critical Element	% Capacity	Pass / Fail
196 - 195	Pole	TP18x18x0.375	Pole	0.0%	Pass
195 - 190	Pole	TP24x24x0.375	Pole	5.2%	Pass
190 - 185	Pole	TP24x24x0.375	Pole	11.2%	Pass
185 - 180	Pole	TP24x24x0.375	Pole	22.2%	Pass
180 - 175	Pole	TP30x30x0.375	Pole	21.9%	Pass
175 - 170	Pole	TP30x30x0.375	Pole	29.7%	Pass
170 - 165	Pole	TP30x30x0.375	Pole	37.5%	Pass
165 - 160	Pole	TP30x30x0.375	Pole	47.6%	Pass
160 - 155	Pole	TP36x36x0.375	Pole	41.0%	Pass
155 - 150	Pole	TP36x36x0.375	Pole	50.2%	Pass
150 - 145	Pole	TP36x36x0.375	Pole	59.3%	Pass
145 - 140	Pole	TP36x36x0.375	Pole	68.5%	Pass
140 - 136	Pole	TP42x42x0.375	Pole	56.8%	Pass
136 - 135.75	Pole + Reinf.	TP42x42x0.6375	Pole	34.4%	Pass
135.75 - 130.75	Pole + Reinf.	TP42x42x0.6375	Pole	38.6%	Pass
130.75 - 125.75	Pole + Reinf.	TP42x42x0.6375	Pole	43.0%	Pass
125.75 - 120.75	Pole + Reinf.	TP42x42x0.6375	Pole	47.4%	Pass
120.75 - 120	Pole + Reinf.	TP42x42x0.6375	Pole	48.1%	Pass
120 - 119.75	Pole + Reinf.	TP48x48x0.6	Pole	39.7%	Pass
119.75 - 114.75	Pole + Reinf.	TP48x48x0.6	Pole	43.4%	Pass
114.75 - 109.75	Pole + Reinf.	TP48x48x0.6	Pole	47.3%	Pass
109.75 - 104.75	Pole + Reinf.	TP48x48x0.6	Pole	51.1%	Pass
104.75 - 100	Pole + Reinf.	TP48x48x0.6	Pole	54.9%	Pass
100 - 99.75	Pole + Reinf.	TP54x54x0.5625	Pole	46.0%	Pass
99.75 - 94.75	Pole + Reinf.	TP54x54x0.5625	Pole	49.4%	Pass
94.75 - 89.75	Pole + Reinf.	TP54x54x0.5625	Pole	52.9%	Pass
89.75 - 84.75	Pole + Reinf.	TP54x54x0.5625	Pole	56.3%	Pass
84.75 - 80	Pole + Reinf.	TP54x54x0.5625	Pole	59.7%	Pass
80 - 79.75	Pole + Reinf.	TP60x60x0.55	Pole	50.8%	Pass
79.75 - 74.75	Pole + Reinf.	TP60x60x0.55	Pole	53.9%	Pass
74.75 - 69.75	Pole + Reinf.	TP60x60x0.55	Pole	57.0%	Pass
69.75 - 64.75	Pole + Reinf.	TP60x60x0.55	Pole	60.2%	Pass
64.75 - 60	Pole + Reinf.	TP60x60x0.55	Pole	63.3%	Pass
60 - 59.75	Pole + Reinf.	TP60x60x0.675	Pole	50.4%	Pass
59.75 - 54.75	Pole + Reinf.	TP60x60x0.675	Pole	53.0%	Pass
54.75 - 49.75	Pole + Reinf.	TP60x60x0.675	Pole	55.7%	Pass
49.75 - 44.75	Pole + Reinf.	TP60x60x0.675	Pole	58.3%	Pass
44.75 - 40	Pole + Reinf.	TP60x60x0.675	Pole	60.9%	Pass
40 - 39.75	Pole + Reinf.	TP60x60x0.8	Reinf. 2 Bolt Shear	50.5%	Pass
39.75 - 34.75	Pole + Reinf.	TP60x60x0.8	Pole	52.6%	Pass
34.75 - 29.75	Pole + Reinf.	TP60x60x0.8	Pole	54.9%	Pass
29.75 - 24.75	Pole + Reinf.	TP60x60x0.8	Pole	57.2%	Pass
24.75 - 20	Pole + Reinf.	TP60x60x0.8	Reinf. 2 Bolt Shear	59.6%	Pass
20 - 19.75	Pole + Reinf.	TP60x60x0.8	Reinf. 1 Bolt Shear	59.7%	Pass
19.75 - 14.75	Pole + Reinf.	TP60x60x0.8	Pole	61.8%	Pass
14.75 - 9.75	Pole + Reinf.	TP60x60x0.8	Pole	64.2%	Pass
9.75 - 4.75	Pole + Reinf.	TP60x60x0.8	Pole	66.5%	Pass
4.75 - 0	Pole + Reinf.	TP60x60x0.8	Reinf. 1 Bolt Shear	69.0%	Pass
				Summary	
			Pole	68.8%	Pass
			Reinforcement	69.0%	Pass
			Overall	69.0%	Pass

Analysis Date: 7/26/2019

Additional Calculations

Section Elevation (ft)	Moment of Inertia (in^4)			Area (in^2)			% Capacity							
	Pole	Reinf.	Total	Pole	Reinf.	Total	Pole	R1	R2	R3	R4	R5	R6	R7
196 - 195	807	n/a	807	20.76	n/a	20.76	0.0%							
195 - 190	1942	n/a	1942	27.83	n/a	27.83	5.2%							
190 - 185	1942	n/a	1942	27.83	n/a	27.83	11.2%							
185 - 180	1942	n/a	1942	27.83	n/a	27.83	22.2%							
180 - 175	3829	n/a	3829	34.90	n/a	34.90	21.9%							
175 - 170	3829	n/a	3829	34.90	n/a	34.90	29.7%							
170 - 165	3829	n/a	3829	34.90	n/a	34.90	37.5%							
165 - 160	3829	n/a	3829	34.90	n/a	34.90	47.6%							
160 - 155	6659	n/a	6659	41.97	n/a	41.97	41.0%							
155 - 150	6659	n/a	6659	41.97	n/a	41.97	50.2%							
150 - 145	6659	n/a	6659	41.97	n/a	41.97	59.3%							
145 - 140	6659	n/a	6659	41.97	n/a	41.97	68.5%							
140 - 136	10622	n/a	10622	49.04	n/a	49.04	56.8%							
136 - 135.75	10622	6973	17594	49.04	29.25	78.29	34.4%							34.2%
135.75 - 130.75	10622	6973	17594	49.04	29.25	78.29	38.6%							35.3%
130.75 - 125.75	10622	6973	17594	49.04	29.25	78.29	43.0%							39.3%
125.75 - 120.75	10622	6973	17594	49.04	29.25	78.29	47.4%							43.3%
120.75 - 120	10622	6973	17594	49.04	29.25	78.29	48.1%							47.9%
120 - 119.75	15908	9013	24921	56.11	29.25	85.36	39.7%						38.8%	
119.75 - 114.75	15908	9013	24921	56.11	29.25	85.36	43.4%						39.0%	
114.75 - 109.75	15908	9013	24921	56.11	29.25	85.36	47.3%						42.4%	
109.75 - 104.75	15908	9013	24921	56.11	29.25	85.36	51.1%						45.9%	
104.75 - 100	15908	9013	24921	56.11	29.25	85.36	54.9%						53.7%	
100 - 99.75	22710	11316	34026	63.18	29.25	92.43	46.0%					44.4%		
99.75 - 94.75	22710	11316	34026	63.18	29.25	92.43	49.4%					43.7%		
94.75 - 89.75	22710	11316	34026	63.18	29.25	92.43	52.9%					46.7%		
89.75 - 84.75	22710	11316	34026	63.18	29.25	92.43	56.3%					49.8%		
84.75 - 80	22710	11316	34026	63.18	29.25	92.43	59.7%					57.5%		
80 - 79.75	31217	13883	45100	70.24	29.25	99.49	50.8%				48.4%			
79.75 - 74.75	31217	13883	45100	70.24	29.25	99.49	53.9%				47.1%			
74.75 - 69.75	31217	13883	45100	70.24	29.25	99.49	57.0%				49.8%			
69.75 - 64.75	31217	13883	45100	70.24	29.25	99.49	60.2%				52.6%			
64.75 - 60	31217	13883	45100	70.24	29.25	99.49	63.3%				60.3%			
60 - 59.75	41363	13883	55246	93.46	29.25	122.71	50.4%			49.3%				
59.75 - 54.75	41363	13883	55246	93.46	29.25	122.71	53.0%			47.6%				
54.75 - 49.75	41363	13883	55246	93.46	29.25	122.71	55.7%			49.9%				
49.75 - 44.75	41363	13883	55246	93.46	29.25	122.71	58.3%			52.3%				
44.75 - 40	41363	13883	55246	93.46	29.25	122.71	60.9%			59.6%				
40 - 39.75	51381	13883	65264	116.58	29.25	145.83	50.3%		50.5%					
39.75 - 34.75	51381	13883	65264	116.58	29.25	145.83	52.6%		48.4%					
34.75 - 29.75	51381	13883	65264	116.58	29.25	145.83	54.9%		50.5%					
29.75 - 24.75	51381	13883	65264	116.58	29.25	145.83	57.2%		52.6%					
24.75 - 20	51381	13883	65264	116.58	29.25	145.83	59.4%		59.6%					
20 - 19.75	51381	13883	65264	116.58	29.25	145.83	59.5%	59.7%						
19.75 - 14.75	51381	13883	65264	116.58	29.25	145.83	61.8%	56.9%						
14.75 - 9.75	51381	13883	65264	116.58	29.25	145.83	64.2%	59.1%						
9.75 - 4.75	51381	13883	65264	116.58	29.25	145.83	66.5%	61.3%						
4.75 - 0	51381	13883	65264	116.58	29.25	145.83	68.8%	69.0%						

Note: Section capacity checked in 5 degree increments.

Tower Input Data

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

- ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
- Basic wind speed of 93 mph.
- Structure Class II.
- Exposure Category B.
- Topographic Category 1.
- Crest Height 0.00 ft.
- Nominal ice thickness of 0.7500 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.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in pole design is 1.
- Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs
Consider Moments - Horizontals
Consider Moments - Diagonals
Use Moment Magnification
√ Use Code Stress Ratios
√ Use Code Safety Factors - Guys
Escalate Ice
Always Use Max Kz
Use Special Wind Profile
Include Bolts In Member Capacity
Leg Bolts Are At Top Of Section
Secondary Horizontal Braces Leg
Use Diamond Inner Bracing (4 Sided)
SR Members Have Cut Ends
SR Members Are Concentric

Distribute Leg Loads As Uniform
Assume Legs Pinned
√ Assume Rigid Index Plate
√ Use Clear Spans For Wind Area
Use Clear Spans For KL/r
Retension Guys To Initial Tension
√ Bypass Mast Stability Checks
√ Use Azimuth Dish Coefficients
√ Project Wind Area of Appurt.
Autocalc Torque Arm Areas
Add IBC .6D+W Combination
Sort Capacity Reports By Component
Triangulate Diamond Inner Bracing
Treat Feed Line Bundles As Cylinder
Ignore KL/ry For 60 Deg. Angle Legs

Use ASCE 10 X-Brace Ly Rules
Calculate Redundant Bracing Forces
Ignore Redundant Members in FEA
SR Leg Bolts Resist Compression
All Leg Panels Have Same Allowable
Offset Girt At Foundation
√ Consider Feed Line Torque
Include Angle Block Shear Check
Use TIA-222-G Bracing Resist. Exemption
Use TIA-222-G Tension Splice Exemption

Poles

√ Include Shear-Torsion Interaction
Always Use Sub-Critical Flow
Use Top Mounted Sockets
Pole Without Linear Attachments
Pole With Shroud Or No Appurtenances
Outside and Inside Corner Radii Are Known

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* *klf*
PiROD Climbing Rungs	C	No	Surface Ar (CaAa)	196.00 - 8.00	1	1	0.000 0.000	0.6250		0.00
LDF7-50A (1-5/8 FOAM)	A	No	Surface Ar (CaAa)	175.00 - 8.00	1	1	0.000 0.000	1.9800		0.00
LDF7-50A (1-5/8	A	No	Surface Ar	175.00 -	5	5	0.000	0.0000		0.00

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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 klf
FOAM)			(CaAa)	8.00			0.000			
Hybriflex	A	No	Surface Ar (CaAa)	165.00 - 8.00	4	4	0.000 0.000	1.2500		0.00
LDF7-50A (1-5/8 FOAM)	B	No	Surface Ar (CaAa)	155.00 - 8.00	6	6	0.000 0.000	1.9800		0.00
1-5/8" Hybrid Cable	B	No	Surface Ar (CaAa)	155.00 - 8.00	2	2	0.000 0.000	1.9800		0.00
LDF5-50A (7/8 FOAM)	C	No	Surface Ar (CaAa)	75.00 - 8.00	1	1	0.000 0.000	1.0900		0.00
4" x 1-1/4" Mod Plate	A	No	Surface Af (CaAa)	22.00 - 18.00	2	2	0.000 0.000	1.2500	10.5000	0.02
4" x 1-1/4" Mod Plate	B	No	Surface Af (CaAa)	22.00 - 18.00	2	2	0.000 0.000	1.2500	10.5000	0.02
4" x 1-1/4" Mod Plate	C	No	Surface Af (CaAa)	22.00 - 18.00	2	2	0.000 0.000	1.2500	10.5000	0.02
4" x 1-1/4" Mod Plate	A	No	Surface Af (CaAa)	42.00 - 38.00	2	2	0.000 0.000	1.2500	10.5000	0.02
4" x 1-1/4" Mod Plate	B	No	Surface Af (CaAa)	42.00 - 38.00	2	2	0.000 0.000	1.2500	10.5000	0.02
4" x 1-1/4" Mod Plate	C	No	Surface Af (CaAa)	42.00 - 38.00	2	2	0.000 0.000	1.2500	10.5000	0.02
6" x 1-1/2" Mod Plate	A	No	Surface Af (CaAa)	24.00 - 16.00	2	2	0.000 0.000	0.0000	0.0000	0.03
6" x 1-1/2" Mod Plate	B	No	Surface Af (CaAa)	24.00 - 16.00	2	1	0.000 0.000	0.0000	0.0000	0.03
6" x 1-1/2" Mod Plate	C	No	Surface Af (CaAa)	24.00 - 16.00	2	1	0.000 0.000	0.0000	0.0000	0.03
6" x 1-1/2" Mod Plate	A	No	Surface Af (CaAa)	44.00 - 36.00	2	1	0.000 0.000	0.0000	0.0000	0.03
6" x 1-1/2" Mod Plate	B	No	Surface Af (CaAa)	44.00 - 36.00	2	1	0.000 0.000	0.0000	0.0000	0.03
6" x 1-1/2" Mod Plate	C	No	Surface Af (CaAa)	44.00 - 36.00	2	1	0.000 0.000	0.0000	0.0000	0.03
6" x 1-1/2" Mod Plate	A	No	Surface Af (CaAa)	64.00 - 56.00	2	1	0.000 0.000	0.0000	0.0000	0.03
6" x 1-1/2" Mod Plate	B	No	Surface Af (CaAa)	64.00 - 56.00	2	1	0.000 0.000	0.0000	0.0000	0.03
6" x 1-1/2" Mod Plate	C	No	Surface Af (CaAa)	64.00 - 56.00	2	1	0.000 0.000	0.0000	0.0000	0.03

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 klf
Safety Line 3/8	C	No	No	CaAa (Out Of Face)	196.00 - 8.00	1	No Ice	0.04	0.00
							1/2" Ice	0.14	0.00
							1" Ice	0.24	0.00
LDF7-50A (1-5/8 FOAM)	C	No	No	Inside Pole	195.00 - 8.00	12	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
LDF6-50A (1-1/4 FOAM)	A	No	No	Inside Pole	185.00 - 8.00	12	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
1.496" Fiber Cable	A	No	No	Inside Pole	185.00 - 8.00	2	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
							1" Ice	0.00	0.00
3/4" DC Power Line	A	No	No	Inside Pole	185.00 - 8.00	4	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
1-1/4" Fiber Cable	C	No	No	Inside Pole	195.00 - 8.00	3	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
Pirod 16.5' LP Platform	C	None		0.0000	195.00	No Ice	20.80	20.80	1800.00
						1/2" Ice	28.10	28.10	2066.00
						1" Ice	35.40	35.40	2332.00
(3) Commscope VSR-MA-B w/ 15.5' Horizontal Pipe	C	None		0.0000	193.00	No Ice	16.65	16.65	558.00
						1/2" Ice	25.43	25.43	725.40
						1" Ice	34.21	34.21	892.80
Twin Style 1A-PCS	A	From Centroid-Leg	4.00	-10.0000	195.00	No Ice	0.73	0.25	8.40
			0.00			1/2" Ice	0.84	0.32	13.69
			0.00			1" Ice	0.96	0.40	20.57
Twin Style 1A-PCS	B	From Centroid-Leg	4.00	-10.0000	195.00	No Ice	0.73	0.25	8.40
			0.00			1/2" Ice	0.84	0.32	13.69
			0.00			1" Ice	0.96	0.40	20.57
Twin Style 1A-PCS	C	From Centroid-Leg	4.00	-10.0000	195.00	No Ice	0.73	0.25	8.40
			0.00			1/2" Ice	0.84	0.32	13.69
			0.00			1" Ice	0.96	0.40	20.57
APXVAARR24_43-U-NA20 w/ Mount Pipe	A	From Centroid-Leg	4.00	50.0000	195.00	No Ice	20.24	10.79	157.20
			0.00			1/2" Ice	20.89	12.21	290.89
			-2.00			1" Ice	21.55	13.49	435.20
APXVAARR24_43-U-NA20 w/ Mount Pipe	B	From Centroid-Leg	4.00	30.0000	195.00	No Ice	20.24	10.79	157.20
			0.00			1/2" Ice	20.89	12.21	290.89
			-2.00			1" Ice	21.55	13.49	435.20
APXVAARR24_43-U-NA20 w/ Mount Pipe	C	From Centroid-Leg	4.00	20.0000	195.00	No Ice	20.24	10.79	157.20
			0.00			1/2" Ice	20.89	12.21	290.89
			-2.00			1" Ice	21.55	13.49	435.20
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	A	From Centroid-Leg	4.00	50.0000	195.00	No Ice	7.14	3.81	66.25
			0.00			1/2" Ice	7.76	4.88	118.28
			0.00			1" Ice	8.29	5.66	177.07
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	B	From Centroid-Leg	4.00	30.0000	195.00	No Ice	7.14	3.81	66.25
			0.00			1/2" Ice	7.76	4.88	118.28
			0.00			1" Ice	8.29	5.66	177.07
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	C	From Centroid-Leg	4.00	20.0000	195.00	No Ice	7.14	3.81	66.25
			0.00			1/2" Ice	7.76	4.88	118.28
			0.00			1" Ice	8.29	5.66	177.07
RADIO 4449 B12/B71	A	From Centroid-Leg	4.00	0.0000	195.00	No Ice	1.65	1.16	74.00
			0.00			1/2" Ice	1.81	1.30	90.16
			-2.00			1" Ice	1.98	1.45	108.95
RADIO 4449 B12/B71	B	From Centroid-Leg	4.00	0.0000	195.00	No Ice	1.65	1.16	74.00
			0.00			1/2" Ice	1.81	1.30	90.16
			-2.00			1" Ice	1.98	1.45	108.95
RADIO 4449 B12/B71	C	From Centroid-Leg	4.00	0.0000	195.00	No Ice	1.65	1.16	74.00
			0.00			1/2" Ice	1.81	1.30	90.16
			-2.00			1" Ice	1.98	1.45	108.95

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft*	*Azimuth Adjustment* *°*	*Placement* *ft*		*C_AA_A Front* *ft²*	*C_AA_A Side* *ft²*	*Weight* *lb*
4415 B25	A	From	4.00	0.0000	195.00	No Ice	1.65	0.68	46.00
		Centroid-Le	0.00			1/2" Ice	1.81	0.79	58.47
		g	-2.00			1" Ice	1.98	0.92	73.32
4415 B25	B	From	4.00	0.0000	195.00	No Ice	1.65	0.68	46.00
		Centroid-Le	0.00			1/2" Ice	1.81	0.79	58.47
		g	-2.00			1" Ice	1.98	0.92	73.32
4415 B25	C	From	4.00	0.0000	195.00	No Ice	1.65	0.68	46.00
		Centroid-Le	0.00			1/2" Ice	1.81	0.79	58.47
		g	-2.00			1" Ice	1.98	0.92	73.32
RADIO 4415 B66A	A	From	4.00	0.0000	195.00	No Ice	1.86	0.87	49.60
		Centroid-Le	0.00			1/2" Ice	2.03	1.00	64.15
		g	0.00			1" Ice	2.20	1.13	81.25
RADIO 4415 B66A	B	From	4.00	0.0000	195.00	No Ice	1.86	0.87	49.60
		Centroid-Le	0.00			1/2" Ice	2.03	1.00	64.15
		g	0.00			1" Ice	2.20	1.13	81.25
RADIO 4415 B66A	C	From	4.00	0.0000	195.00	No Ice	1.86	0.87	49.60
		Centroid-Le	0.00			1/2" Ice	2.03	1.00	64.15
		g	0.00			1" Ice	2.20	1.13	81.25
DC4-48-60-8-20F	A	From	4.00	0.0000	195.00	No Ice	1.43	0.59	9.00
		Centroid-Le	0.00			1/2" Ice	1.58	0.70	20.06
		g	0.00			1" Ice	1.74	0.81	33.36
DC4-48-60-8-20F	B	From	4.00	0.0000	195.00	No Ice	1.43	0.59	9.00
		Centroid-Le	0.00			1/2" Ice	1.58	0.70	20.06
		g	0.00			1" Ice	1.74	0.81	33.36
1,070.52 Sq In Generic	A	From	4.00	50.0000	195.00	No Ice	14.87	13.63	135.91
Appurtenances		Centroid-Le	0.00			1/2" Ice	16.21	15.02	211.04
		g	0.00			1" Ice	17.44	16.26	298.03
1,070.52 Sq In Generic	B	From	4.00	30.0000	195.00	No Ice	14.87	13.63	135.91
Appurtenances		Centroid-Le	0.00			1/2" Ice	14.87	15.02	211.04
		g	0.00			1" Ice	17.44	16.26	298.03
1,070.52 Sq In Generic	C	From	4.00	20.0000	195.00	No Ice	14.87	13.63	135.91
Appurtenances		Centroid-Le	0.00			1/2" Ice	14.87	15.02	211.04
		g	0.00			1" Ice	17.44	16.26	298.03
PiROD 13' Low Profile	C	None		0.0000	185.00	No Ice	15.70	15.70	1300.00
Platform (Monopole)						1/2" Ice	20.10	20.10	1765.00
						1" Ice	24.50	24.50	2230.00
PRK-1245L Stabilizer Kit (1)	C	None		0.0000	185.00	No Ice	14.55	14.55	517.21
						1/2" Ice	16.00	16.00	600.00
						1" Ice	17.00	17.00	682.79
7770.00 w/Mount Pipe	A	From	4.00	23.0000	185.00	No Ice	5.51	4.10	61.54
		Centroid-Le	0.00			1/2" Ice	5.87	4.73	108.55
		g	0.00			1" Ice	6.23	5.37	162.39
7770.00 w/Mount Pipe	B	From	4.00	23.0000	185.00	No Ice	5.51	4.10	61.54
		Centroid-Le	0.00			1/2" Ice	5.87	4.73	108.55
		g	0.00			1" Ice	6.23	5.37	162.39
7770.00 w/Mount Pipe	C	From	4.00	23.0000	185.00	No Ice	5.51	4.10	61.54
		Centroid-Le	0.00			1/2" Ice	5.87	4.73	108.55
		g	0.00			1" Ice	6.23	5.37	162.39
QS66512-2 w/ Mount Pipe	A	From	4.00	23.0000	185.00	No Ice	8.37	8.46	136.55
		Centroid-Le	0.00			1/2" Ice	8.93	9.66	212.24
		g	0.00			1" Ice	9.46	10.55	296.07
QS66512-2 w/ Mount Pipe	B	From	4.00	23.0000	185.00	No Ice	8.37	8.46	136.55
		Centroid-Le	0.00			1/2" Ice	8.93	9.66	212.24
		g	0.00			1" Ice	9.46	10.55	296.07
TPA-65R-LCUUUU-H8 w/	C	From	4.00	23.0000	185.00	No Ice	13.54	10.96	114.45
Mount Pipe		Centroid-Le	0.00			1/2" Ice	14.24	12.49	217.61
		g	0.00			1" Ice	14.95	14.04	330.97
HPA-65R-BUU-H8 w/	A	From	4.00	23.0000	185.00	No Ice	13.05	9.42	94.20
Mount Pipe		Centroid-Le	0.00			1/2" Ice	13.66	10.82	189.07

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* ft	*Azimuth Adjustment* °	*Placement* ft		*C_AA_A Front* ft^2	*C_AA_A Side* ft^2	*Weight* lb
		g	0.00			1" Ice	14.27	12.07	293.65
HPA-65R-BUU-H8 w/	B	From	4.00	23.0000	185.00	No Ice	13.05	9.42	94.20
Mount Pipe		Centroid-Le	0.00			1/2" Ice	13.66	10.82	189.07
		g	0.00			1" Ice	14.27	12.07	293.65
HPA-65R-BUU-H8 w/	C	From	4.00	23.0000	185.00	No Ice	13.05	9.42	94.20
Mount Pipe		Centroid-Le	0.00			1/2" Ice	13.66	10.82	189.07
		g	0.00			1" Ice	14.27	12.07	293.65
TT19-08BP111-001	A	From	4.00	23.0000	185.00	No Ice	0.55	0.45	16.00
		Centroid-Le	0.00			1/2" Ice	0.65	0.53	21.80
		g	0.00			1" Ice	0.75	0.63	29.22
TT19-08BP111-001	B	From	4.00	23.0000	185.00	No Ice	0.55	0.45	16.00
		Centroid-Le	0.00			1/2" Ice	0.65	0.53	21.80
		g	0.00			1" Ice	0.75	0.63	29.22
TT19-08BP111-001	C	From	4.00	23.0000	185.00	No Ice	0.55	0.45	16.00
		Centroid-Le	0.00			1/2" Ice	0.65	0.53	21.80
		g	0.00			1" Ice	0.75	0.63	29.22
(2) LGP21901	A	From	4.00	23.0000	185.00	No Ice	0.23	0.16	5.50
		Centroid-Le	0.00			1/2" Ice	0.29	0.21	7.92
		g	0.00			1" Ice	0.36	0.28	11.41
(2) LGP21901	B	From	4.00	23.0000	185.00	No Ice	0.23	0.16	5.50
		Centroid-Le	0.00			1/2" Ice	0.29	0.21	7.92
		g	0.00			1" Ice	0.36	0.28	11.41
(2) LGP21901	C	From	4.00	23.0000	185.00	No Ice	0.23	0.16	5.50
		Centroid-Le	0.00			1/2" Ice	0.29	0.21	7.92
		g	0.00			1" Ice	0.36	0.28	11.41
(2) 782 10250	A	From	4.00	23.0000	185.00	No Ice	0.45	0.25	6.40
		Centroid-Le	0.00			1/2" Ice	0.54	0.32	10.06
		g	0.00			1" Ice	0.64	0.40	15.11
(2) 782 10250	B	From	4.00	23.0000	185.00	No Ice	0.45	0.25	6.40
		Centroid-Le	0.00			1/2" Ice	0.54	0.32	10.06
		g	0.00			1" Ice	0.64	0.40	15.11
(2) 782 10250	C	From	4.00	23.0000	185.00	No Ice	0.45	0.25	6.40
		Centroid-Le	0.00			1/2" Ice	0.54	0.32	10.06
		g	0.00			1" Ice	0.64	0.40	15.11
RRUS 11	A	From	4.00	23.0000	185.00	No Ice	2.78	1.19	50.70
		Centroid-Le	0.00			1/2" Ice	2.99	1.33	71.50
		g	0.00			1" Ice	3.21	1.49	95.33
RRUS 11	B	From	4.00	23.0000	185.00	No Ice	2.78	1.19	50.70
		Centroid-Le	0.00			1/2" Ice	2.99	1.33	71.50
		g	0.00			1" Ice	3.21	1.49	95.33
RRUS 11	C	From	4.00	23.0000	185.00	No Ice	2.78	1.19	50.70
		Centroid-Le	0.00			1/2" Ice	2.99	1.33	71.50
		g	0.00			1" Ice	3.21	1.49	95.33
RRUS 12	A	From	4.00	23.0000	185.00	No Ice	3.15	1.29	58.00
		Centroid-Le	0.00			1/2" Ice	3.36	1.44	81.22
		g	0.00			1" Ice	3.59	1.60	107.64
RRUS 12	B	From	4.00	23.0000	185.00	No Ice	3.15	1.29	58.00
		Centroid-Le	0.00			1/2" Ice	3.36	1.44	81.22
		g	0.00			1" Ice	3.59	1.60	107.64
RRUS 12	C	From	4.00	23.0000	185.00	No Ice	3.15	1.29	58.00
		Centroid-Le	0.00			1/2" Ice	3.36	1.44	81.22
		g	0.00			1" Ice	3.59	1.60	107.64
RRUS 32	A	From	4.00	23.0000	185.00	No Ice	3.31	2.42	77.00
		Centroid-Le	0.00			1/2" Ice	3.56	2.64	104.93
		g	0.00			1" Ice	3.81	2.86	136.47
RRUS 32	B	From	4.00	23.0000	185.00	No Ice	3.31	2.42	77.00
		Centroid-Le	0.00			1/2" Ice	3.56	2.64	104.93
		g	0.00			1" Ice	3.81	2.86	136.47
RRUS 32	C	From	4.00	23.0000	185.00	No Ice	3.31	2.42	77.00

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert*	*Azimuth Adjustment*	*Placement*		*C_AA_A Front*	*C_AA_A Side*	*Weight*
			ft	*°*	*ft*		*ft²*	*ft²*	*lb*
		Centroid-Le	0.00			1/2" Ice	3.56	2.64	104.93
		g	0.00			1" Ice	3.81	2.86	136.47
RRUS 4426 B66	A	From	4.00	23.0000	185.00	No Ice	1.64	0.73	48.40
		Centroid-Le	0.00			1/2" Ice	1.80	0.84	61.22
		g	0.00			1" Ice	1.97	0.97	76.43
RRUS 4426 B66	B	From	4.00	23.0000	185.00	No Ice	1.64	0.73	48.40
		Centroid-Le	0.00			1/2" Ice	1.80	0.84	61.22
		g	0.00			1" Ice	1.97	0.97	76.43
RRUS 4426 B66	C	From	4.00	23.0000	185.00	No Ice	1.64	0.73	48.40
		Centroid-Le	0.00			1/2" Ice	1.80	0.84	61.22
		g	0.00			1" Ice	1.97	0.97	76.43
DC6-48-60-18-8F Surge Suppression Unit	B	From	4.00	23.0000	185.00	No Ice	0.92	0.92	18.90
		Centroid-Le	0.00			1/2" Ice	1.46	1.46	36.62
		g	0.00			1" Ice	1.64	1.64	56.82
DC6-48-60-18-8F Surge Suppression Unit	C	From	4.00	23.0000	185.00	No Ice	0.92	0.92	18.90
		Centroid-Le	0.00			1/2" Ice	1.46	1.46	36.62
		g	0.00			1" Ice	1.64	1.64	56.82
Valmont Light Duty Tri-Bracket (1)	C	None		0.0000	175.00	No Ice	1.76	1.76	54.00
						1/2" Ice	2.08	2.08	70.00
						1" Ice	2.40	2.40	86.00
APXV18-206517S-C w/ Mount Pipe	A	From Leg	0.50	-10.0000	175.00	No Ice	5.17	4.46	48.30
			0.00			1/2" Ice	5.62	5.39	90.79
			0.00			1" Ice	6.08	6.20	140.46
APXV18-206517S-C w/ Mount Pipe	B	From Leg	0.50	-10.0000	175.00	No Ice	5.17	4.46	48.30
			0.00			1/2" Ice	5.62	5.39	90.79
			0.00			1" Ice	6.08	6.20	140.46
APXV18-206517S-C w/ Mount Pipe	C	From Leg	0.50	-10.0000	175.00	No Ice	5.17	4.46	48.30
			0.00			1/2" Ice	5.62	5.39	90.79
			0.00			1" Ice	6.08	6.20	140.46
MTS 12.5' LP Platform	C	None		0.0000	165.00	No Ice	14.66	14.66	1250.00
						1/2" Ice	18.87	18.87	1481.33
						1" Ice	23.08	23.08	1712.66
APXVTM14-ALU-I20 w/ Mount Pipe	A	From	4.00	40.0000	165.00	No Ice	6.58	4.96	76.99
		Centroid-Fa	0.00			1/2" Ice	7.03	5.75	131.60
		ce	0.00			1" Ice	7.47	6.47	192.90
APXVTM14-ALU-I20 w/ Mount Pipe	B	From	4.00	10.0000	165.00	No Ice	6.58	4.96	76.99
		Centroid-Fa	0.00			1/2" Ice	7.03	5.75	131.60
		ce	0.00			1" Ice	7.47	6.47	192.90
APXVTM14-ALU-I20 w/ Mount Pipe	C	From	4.00	80.0000	165.00	No Ice	6.58	4.96	76.99
		Centroid-Fa	0.00			1/2" Ice	7.03	5.75	131.60
		ce	0.00			1" Ice	7.47	6.47	192.90
NNVV-65B-R4 w/ Mount Pipe	A	From	4.00	40.0000	165.00	No Ice	12.27	7.17	99.30
		Centroid-Fa	0.00			1/2" Ice	12.77	8.13	187.33
		ce	0.00			1" Ice	13.27	8.97	283.67
NNVV-65B-R4 w/ Mount Pipe	B	From	4.00	10.0000	165.00	No Ice	12.27	7.17	99.30
		Centroid-Fa	0.00			1/2" Ice	12.77	8.13	187.33
		ce	0.00			1" Ice	13.27	8.97	283.67
NNVV-65B-R4 w/ Mount Pipe	C	From	4.00	80.0000	165.00	No Ice	12.27	7.17	99.30
		Centroid-Fa	0.00			1/2" Ice	12.77	8.13	187.33
		ce	0.00			1" Ice	13.27	8.97	283.67
RRH 1900 4x45 65 MHz	A	From	4.00	40.0000	165.00	No Ice	2.29	2.29	60.00
		Centroid-Fa	0.00			1/2" Ice	2.50	2.50	83.30
		ce	0.00			1" Ice	2.71	2.71	109.84
RRH 1900 4x45 65 MHz	B	From	4.00	10.0000	165.00	No Ice	2.29	2.29	60.00
		Centroid-Fa	0.00			1/2" Ice	2.50	2.50	83.30
		ce	0.00			1" Ice	2.71	2.71	109.84
RRH 1900 4x45 65 MHz	C	From	4.00	80.0000	165.00	No Ice	2.29	2.29	60.00
		Centroid-Fa	0.00			1/2" Ice	2.50	2.50	83.30
		ce	0.00			1" Ice	2.71	2.71	109.84

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight lb
800 MHz RRH	A	From Centroid-Face	4.00 0.00 0.00	40.0000	165.00	No Ice 1/2" Ice 1" Ice	1.70 1.86 2.03	1.28 1.43 1.58	53.00 70.01 89.71
800 MHz RRH	B	From Centroid-Face	4.00 0.00 0.00	10.0000	165.00	No Ice 1/2" Ice 1" Ice	1.70 1.86 2.03	1.28 1.43 1.58	53.00 70.01 89.71
800 MHz RRH	C	From Centroid-Face	4.00 0.00 0.00	80.0000	165.00	No Ice 1/2" Ice 1" Ice	1.70 1.86 2.03	1.28 1.43 1.58	53.00 70.01 89.71
TD-RRH8x20-25 w/ Solar Shield	A	From Centroid-Face	4.00 0.00 0.00	40.0000	165.00	No Ice 1/2" Ice 1" Ice	3.70 3.95 4.20	1.29 1.46 1.64	70.00 89.94 117.22
TD-RRH8x20-25 w/ Solar Shield	B	From Centroid-Face	4.00 0.00 0.00	10.0000	165.00	No Ice 1/2" Ice 1" Ice	3.70 3.95 4.20	1.29 1.46 1.64	70.00 89.94 117.22
TD-RRH8x20-25 w/ Solar Shield	C	From Centroid-Face	4.00 0.00 0.00	80.0000	165.00	No Ice 1/2" Ice 1" Ice	3.70 3.95 4.20	1.29 1.46 1.64	70.00 89.94 117.22
RRH2X50-08 (800 MHz)	A	From Centroid-Face	4.00 0.00 0.00	40.0000	165.00	No Ice 1/2" Ice 1" Ice	1.70 1.86 2.03	1.28 1.43 1.58	50.00 69.91 89.61
RRH2X50-08 (800 MHz)	B	From Centroid-Face	4.00 0.00 0.00	10.0000	165.00	No Ice 1/2" Ice 1" Ice	1.70 1.86 2.03	1.28 1.43 1.58	50.00 69.91 89.61
RRH2X50-08 (800 MHz)	C	From Centroid-Face	4.00 0.00 0.00	80.0000	165.00	No Ice 1/2" Ice 1" Ice	1.70 1.86 2.03	1.28 1.43 1.58	50.00 69.91 89.61
PiROD 15' Low Profile Platform (Monopole)	C	None		0.0000	155.00	No Ice 1/2" Ice 1" Ice	17.30 22.10 26.90	17.30 22.10 26.90	1500.00 2030.00 2560.00
PRK-SFS-L Stabilizer Kit (1)	C	None		0.0000	155.00	No Ice 1/2" Ice 1" Ice	14.55 16.00 17.00	14.55 16.00 17.00	517.21 600.00 682.79
(2) JAHH-65B-R3B w/ Mount Pipe	A	From Centroid-Face	4.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice 1" Ice	9.35 9.92 10.46	7.65 8.83 9.73	86.15 162.72 247.46
(2) JAHH-65B-R3B w/ Mount Pipe	B	From Centroid-Face	4.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice 1" Ice	9.35 9.92 10.46	7.65 8.83 9.73	86.15 162.72 247.46
(2) JAHH-65B-R3B w/ Mount Pipe	C	From Centroid-Face	4.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice 1" Ice	9.35 9.92 10.46	7.65 8.83 9.73	86.15 162.72 247.46
BXA-70063-4CF-EDIN-6 w/ Mount Pipe	A	From Centroid-Face	4.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice 1" Ice	4.95 5.32 5.71	3.69 4.29 4.91	27.97 70.30 118.42
BXA-70063-4CF-EDIN-6 w/ Mount Pipe	B	From Centroid-Face	4.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice 1" Ice	4.95 5.32 5.71	3.69 4.29 4.91	27.97 70.30 118.42
BXA-70063-4CF-EDIN-6 w/ Mount Pipe	C	From Centroid-Face	4.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice 1" Ice	4.95 5.32 5.71	3.69 4.29 4.91	27.97 70.30 118.42
DB-C1-12C-24AB-0Z	A	From Centroid-Face	4.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice 1" Ice	4.06 4.32 4.58	3.10 3.34 3.58	32.00 68.49 108.97
B2B66A RRH PCS+AWS	A	From Centroid-Face	4.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice 1" Ice	1.88 2.05 2.22	1.25 1.39 1.54	53.00 71.34 92.47
B2B66A RRH PCS+AWS	B	From Centroid-Fa	4.00 0.00	0.0000	155.00	No Ice 1/2" Ice	1.88 2.05	1.25 1.39	53.00 71.34

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft*	*Azimuth Adjustment* *°*	*Placement* *ft*		*C_AA_A Front* *ft^2*	*C_AA_A Side* *ft^2*	*Weight* *lb*
		ce	0.00			1" Ice	2.22	1.54	92.47
B2B66A RRH PCS+AWS	C	From	4.00	0.0000	155.00	No Ice	1.88	1.25	53.00
		Centroid-Fa	0.00			1/2" Ice	2.05	1.39	71.34
		ce	0.00			1" Ice	2.22	1.54	92.47
B25 RRH4X30	A	From	4.00	0.0000	155.00	No Ice	2.20	1.74	55.00
		Centroid-Fa	0.00			1/2" Ice	2.39	1.92	75.47
		ce	0.00			1" Ice	2.59	2.11	98.94
B25 RRH4X30	B	From	4.00	0.0000	155.00	No Ice	2.20	1.74	55.00
		Centroid-Fa	0.00			1/2" Ice	2.39	1.92	75.47
		ce	0.00			1" Ice	2.59	2.11	98.94
B25 RRH4X30	C	From	4.00	0.0000	155.00	No Ice	2.20	1.74	55.00
		Centroid-Fa	0.00			1/2" Ice	2.39	1.92	75.47
		ce	0.00			1" Ice	2.59	2.11	98.94
B13 RRH 4X30	A	From	4.00	0.0000	155.00	No Ice	2.06	1.32	55.60
		Centroid-Fa	0.00			1/2" Ice	2.24	1.48	72.88
		ce	0.00			1" Ice	2.43	1.64	92.95
B13 RRH 4X30	B	From	4.00	0.0000	155.00	No Ice	2.06	1.32	55.60
		Centroid-Fa	0.00			1/2" Ice	2.24	1.48	72.88
		ce	0.00			1" Ice	2.43	1.64	92.95
B13 RRH 4X30	C	From	4.00	0.0000	155.00	No Ice	2.06	1.32	55.60
		Centroid-Fa	0.00			1/2" Ice	2.24	1.48	72.88
		ce	0.00			1" Ice	2.43	1.64	92.95
BSAMNT SBS-2-2	A	From	4.00	0.0000	155.00	No Ice	0.00	1.43	26.10
		Centroid-Fa	0.00			1/2" Ice	0.00	1.92	36.93
		ce	0.00			1" Ice	0.00	2.29	51.81
BSAMNT SBS-2-2	B	From	4.00	0.0000	155.00	No Ice	0.00	1.43	26.10
		Centroid-Fa	0.00			1/2" Ice	0.00	1.92	36.93
		ce	0.00			1" Ice	0.00	2.29	51.81
BSAMNT SBS-2-2	C	From	4.00	0.0000	155.00	No Ice	0.00	1.43	26.10
		Centroid-Fa	0.00			1/2" Ice	0.00	1.92	36.93
		ce	0.00			1" Ice	0.00	2.29	51.81
Pipe Mount 3'x4.5"	C	From Leg	0.50	0.0000	75.00	No Ice	0.91	0.91	32.40
			0.00			1/2" Ice	1.12	1.12	42.33
			0.00			1" Ice	1.33	1.33	54.71
GPS-TMG-HR-26N	C	From Leg	0.50	0.0000	75.00	No Ice	0.13	0.13	0.60
			0.00			1/2" Ice	0.18	0.18	2.37
			0.00			1" Ice	0.24	0.24	5.07
Bridge Stiffener (3.25 sq ft)	A	From Leg	0.50	0.0000	120.00	No Ice	3.25	0.74	0.13
			0.00			1/2" Ice	3.60	1.25	0.15
			0.00			1" Ice	3.94	1.73	0.17
Bridge Stiffener (3.25 sq ft)	B	From Leg	0.50	0.0000	120.00	No Ice	3.25	0.74	0.13
			0.00			1/2" Ice	3.60	1.25	0.15
			0.00			1" Ice	3.94	1.73	0.17
Bridge Stiffener (3.25 sq ft)	C	From Leg	0.50	0.0000	120.00	No Ice	3.25	0.74	0.13
			0.00			1/2" Ice	3.60	1.25	0.15
			0.00			1" Ice	3.94	1.73	0.17
Bridge Stiffener (3.25 sq ft)	A	From Leg	0.50	0.0000	100.00	No Ice	3.25	0.74	0.13
			0.00			1/2" Ice	3.60	1.25	0.15
			0.00			1" Ice	3.94	1.73	0.17
Bridge Stiffener (3.25 sq ft)	B	From Leg	0.50	0.0000	100.00	No Ice	3.25	0.74	0.13
			0.00			1/2" Ice	3.60	1.25	0.15
			0.00			1" Ice	3.94	1.73	0.17
Bridge Stiffener (3.25 sq ft)	C	From Leg	0.50	0.0000	100.00	No Ice	3.25	0.74	0.13
			0.00			1/2" Ice	3.60	1.25	0.15
			0.00			1" Ice	3.94	1.73	0.17
Bridge Stiffener (3.25 sq ft)	A	From Leg	0.50	0.0000	80.00	No Ice	3.25	0.74	0.13
			0.00			1/2" Ice	3.60	1.25	0.15
			0.00			1" Ice	3.94	1.73	0.17
Bridge Stiffener (3.25 sq ft)	B	From Leg	0.50	0.0000	80.00	No Ice	3.25	0.74	0.13

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert (ft)	Azimuth Adjustment (°)	Placement (ft)		C_AA_A Front (ft^2)	C_AA_A Side (ft^2)	Weight (lb)
			0.00			1/2" Ice	3.60	1.25	0.15
			0.00			1" Ice	3.94	1.73	0.17
Bridge Stiffener (3.25 sq ft)	C	From Leg	0.50	0.0000	80.00	No Ice	3.25	0.74	0.13
			0.00			1/2" Ice	3.60	1.25	0.15
			0.00			1" Ice	3.94	1.73	0.17

Critical Deflections and Radius of Curvature - Service Wind

Elevation (ft)	Appurtenance	Gov. Load Comb.	Deflection (in)	Tilt (°)	Twist (°)	Radius of Curvature (ft)
195.00	Pirod 16.5' LP Platform	48	18.123	0.8701	0.0012	76067
193.00	(3) Commscope VSR-MA-B w/ 15.5' Horizontal Pipe	48	17.758	0.8697	0.0011	76067
185.00	PiROD 13' Low Profile Platform (Monopole)	48	16.307	0.8600	0.0011	23762
175.00	Valmont Light Duty Tri-Bracket (1)	48	14.538	0.8292	0.0010	16678
165.00	MTS 12.5' LP Platform	48	12.846	0.7826	0.0010	9576
155.00	PiROD 15' Low Profile Platform (Monopole)	48	11.271	0.7251	0.0008	10824
120.00	Bridge Stiffener (3.25 sq ft)	48	6.748	0.5255	0.0004	12987
100.00	Bridge Stiffener (3.25 sq ft)	48	4.720	0.4378	0.0003	12893
80.00	Bridge Stiffener (3.25 sq ft)	48	3.062	0.3503	0.0002	13288
75.00	Pipe Mount 3'x4.5"	48	2.705	0.3313	0.0002	14650

Compression Checks

Pole Design Data

Section No.	Elevation (ft)	Size	L (ft)	L_u (ft)	Kl/r	A (in^2)	P_u (lb)	ϕP_n (lb)	Ratio $\frac{P_u}{\phi P_n}$
L1	196 - 195 (1)	P18x0.375	1.00	0.00	0.0	20.7640	-139.68	784878.00	0.000 [1]
L2	195 - 190 (2)	P24x0.375	5.00	0.00	0.0	27.8325	-5080.93	1052070.00	0.005
L3	190 - 185 (3)	P24x0.375	5.00	0.00	0.0	27.8325	-5735.44	1052070.00	0.005
L4	185 - 180 (4)	P24x0.375	5.00	0.00	0.0	27.8325	-10361.30	1052070.00	0.010
L5	180 - 175 (5)	P30x0.375	5.00	0.00	0.0	34.9011	-11231.70	1311060.00	0.009
L6	175 - 170 (6)	P30x0.375	5.00	0.00	0.0	34.9011	-12337.30	1311060.00	0.009
L7	170 - 165 (7)	P30x0.375	5.00	0.00	0.0	34.9011	-13252.40	1311060.00	0.010
L8	165 - 160 (8)	P30x0.375	5.00	0.00	0.0	34.9011	-16993.90	1311060.00	0.013
L9	160 - 155 (9)	P36x0.375	5.00	0.00	0.0	41.9697	-18082.60	1490100.00	0.012
L10	155 - 150 (10)	P36x0.375	5.00	0.00	0.0	41.9697	-22852.30	1490100.00	0.015
L11	150 - 145 (11)	P36x0.375	5.00	0.00	0.0	41.9697	-24009.40	1490100.00	0.016
L12	145 - 140 (12)	P36x0.375	5.00	0.00	0.0	41.9697	-25179.80	1490100.00	0.017
L13	140 - 136 (13)	P42x0.375	4.00	0.00	0.0	49.0383	-26216.70	1668870.00	0.016
L14	136 - 135.75 (14)	P42x0.6375	0.25	0.00	0.0	82.8394	-26315.00	3131330.00	0.008
L15	135.75 - 130.75 (15)	P42x0.6375	5.00	0.00	0.0	82.8394	-28185.60	3131330.00	0.009
L16	130.75 -	P42x0.6375	5.00	0.00	0.0	82.8394	-30064.90	3131330.00	0.010

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
	125.75 (16)								
L17	125.75 - 120.75 (17)	P42x0.6375	5.00	0.00	0.0	82.8394	-31950.80	3131330.00	0.010
L18	120.75 - 120 (18)	P42x0.6375	0.75	0.00	0.0	82.8394	-32235.50	3131330.00	0.010
L19	120 - 119.75 (19)	P48x0.6	0.25	0.00	0.0	89.3469	-32330.60	3356310.00	0.010
L20	119.75 - 114.75 (20)	P48x0.6	5.00	0.00	0.0	89.3469	-34348.10	3356310.00	0.010
L21	114.75 - 109.75 (21)	P48x0.6	5.00	0.00	0.0	89.3469	-36373.80	3356310.00	0.011
L22	109.75 - 104.75 (22)	P48x0.6	5.00	0.00	0.0	89.3469	-38405.10	3356310.00	0.011
L23	104.75 - 100 (23)	P48x0.6	4.75	0.00	0.0	89.3469	-40339.10	3356310.00	0.012
L24	100 - 99.75 (24)	P54x0.5625	0.25	0.00	0.0	94.4319	-40446.30	3352710.00	0.012
L25	99.75 - 94.75 (25)	P54x0.5625	5.00	0.00	0.0	94.4319	-42614.50	3352710.00	0.013
L26	94.75 - 89.75 (26)	P54x0.5625	5.00	0.00	0.0	94.4319	-44790.70	3352710.00	0.013
L27	89.75 - 84.75 (27)	P54x0.5625	5.00	0.00	0.0	94.4319	-46972.20	3352710.00	0.014
L28	84.75 - 80 (28)	P54x0.5625	4.75	0.00	0.0	94.4319	-49048.40	3352710.00	0.015
L29	80 - 79.75 (29)	P60x0.55	0.25	0.00	0.0	102.7220	-49165.00	3520040.00	0.014
L30	79.75 - 74.75 (30)	P60x0.55	5.00	0.00	0.0	102.7220	-51520.80	3520040.00	0.015
L31	74.75 - 69.75 (31)	P60x0.55	5.00	0.00	0.0	102.7220	-53847.40	3520040.00	0.015
L32	69.75 - 64.75 (32)	P60x0.55	5.00	0.00	0.0	102.7220	-56178.70	3520040.00	0.016
L33	64.75 - 60 (33)	P60x0.55	4.75	0.00	0.0	102.7220	-59278.50	3520040.00	0.017
L34	60 - 59.75 (34)	P60x0.675	0.25	0.00	0.0	125.8030	-59479.30	4570220.00	0.013
L35	59.75 - 54.75 (35)	P60x0.675	5.00	0.00	0.0	125.8030	-63106.70	4570220.00	0.014
L36	54.75 - 49.75 (36)	P60x0.675	5.00	0.00	0.0	125.8030	-65915.00	4570220.00	0.014
L37	49.75 - 44.75 (37)	P60x0.675	5.00	0.00	0.0	125.8030	-68727.50	4570220.00	0.015
L38	44.75 - 40 (38)	P60x0.675	4.75	0.00	0.0	125.8030	-72529.00	4570220.00	0.016
L39	40 - 39.75 (39)	P60x0.8	0.25	0.00	0.0	148.7860	-72784.60	5624100.00	0.013
L40	39.75 - 34.75 (40)	P60x0.8	5.00	0.00	0.0	148.7860	-77105.70	5624100.00	0.014
L41	34.75 - 29.75 (41)	P60x0.8	5.00	0.00	0.0	148.7860	-80393.20	5624100.00	0.014
L42	29.75 - 24.75 (42)	P60x0.8	5.00	0.00	0.0	148.7860	-83684.30	5624100.00	0.015
L43	24.75 - 20 (43)	P60x0.8	4.75	0.00	0.0	148.7860	-87939.90	5624100.00	0.016
L44	20 - 19.75 (44)	P60x0.8	0.25	0.00	0.0	148.7860	-88196.20	5624100.00	0.016
L45	19.75 - 14.75 (45)	P60x0.8	5.00	0.00	0.0	148.7860	-92531.00	5624100.00	0.016
L46	14.75 - 9.75 (46)	P60x0.8	5.00	0.00	0.0	148.7860	-95832.90	5624100.00	0.017

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $P_u / \phi P_n$
L47	9.75 - 4.75 (47)	P60x0.8	5.00	0.00	0.0	148.786 0	-98969.20	5624100.00	0.018
L48	4.75 - 0 (48)	P60x0.8	4.75	0.00	0.0	148.786 0	-101864.00	5624100.00	0.018

[1] P_u / ϕP_n controls

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $M_{ux} / \phi M_{nx}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $M_{uy} / \phi M_{ny}$
L1	196 - 195 (1)	P18x0.375	20.21	367000.00	0.000	0.00	367000.00	0.000
L2	195 - 190 (2)	P24x0.375	29448.83	623716.67	0.047	0.00	623716.67	0.000
L3	190 - 185 (3)	P24x0.375	66463.00	623716.67	0.107	0.00	623716.67	0.000
L4	185 - 180 (4)	P24x0.375	132088.33	623716.67	0.212	0.00	623716.67	0.000
L5	180 - 175 (5)	P30x0.375	199340.00	947858.33	0.210	0.00	947858.33	0.000
L6	175 - 170 (6)	P30x0.375	271660.83	947858.33	0.287	0.00	947858.33	0.000
L7	170 - 165 (7)	P30x0.375	345829.17	947858.33	0.365	0.00	947858.33	0.000
L8	165 - 160 (8)	P30x0.375	438139.17	947858.33	0.462	0.00	947858.33	0.000
L9	160 - 155 (9)	P36x0.375	532318.33	1338808.33	0.398	0.00	1338808.33	0.000
L10	155 - 150 (10)	P36x0.375	650568.33	1338808.33	0.486	0.00	1338808.33	0.000
L11	150 - 145 (11)	P36x0.375	770634.17	1338808.33	0.576	0.00	1338808.33	0.000
L12	145 - 140 (12)	P36x0.375	892500.00	1338808.33	0.667	0.00	1338808.33	0.000
L13	140 - 136 (13)	P42x0.375	991375.00	1796558.33	0.552	0.00	1796558.33	0.000
L14	136 - 135.75 (14)	P42x0.6375	997600.00	3234641.67	0.308	0.00	3234641.67	0.000
L15	135.75 - 130.75 (15)	P42x0.6375	1123341.67	3234641.67	0.347	0.00	3234641.67	0.000
L16	130.75 - 125.75 (16)	P42x0.6375	1251366.67	3234641.67	0.387	0.00	3234641.67	0.000
L17	125.75 - 120.75 (17)	P42x0.6375	1381608.33	3234641.67	0.427	0.00	3234641.67	0.000
L18	120.75 - 120 (18)	P42x0.6375	1401325.00	3234641.67	0.433	0.00	3234641.67	0.000
L19	120 - 119.75 (19)	P48x0.6	1407966.67	3882433.33	0.363	0.00	3882433.33	0.000
L20	119.75 - 114.75 (20)	P48x0.6	1542125.00	3882433.33	0.397	0.00	3882433.33	0.000
L21	114.75 - 109.75 (21)	P48x0.6	1678725.00	3882433.33	0.432	0.00	3882433.33	0.000
L22	109.75 - 104.75 (22)	P48x0.6	1817666.67	3882433.33	0.468	0.00	3882433.33	0.000
L23	104.75 - 100 (23)	P48x0.6	1951758.33	3882433.33	0.503	0.00	3882433.33	0.000
L24	100 - 99.75 (24)	P54x0.5625	1958933.33	4518475.00	0.434	0.00	4518475.00	0.000
L25	99.75 - 94.75 (25)	P54x0.5625	2103616.67	4518475.00	0.466	0.00	4518475.00	0.000
L26	94.75 - 89.75 (26)	P54x0.5625	2250783.33	4518475.00	0.498	0.00	4518475.00	0.000
L27	89.75 - 84.75 (27)	P54x0.5625	2400316.67	4518475.00	0.531	0.00	4518475.00	0.000
L28	84.75 - 80 (28)	P54x0.5625	2544483.33	4518475.00	0.563	0.00	4518475.00	0.000
L29	80 - 79.75 (29)	P60x0.55	2552175.00	5389816.67	0.474	0.00	5389816.67	0.000
L30	79.75 - 74.75 (30)	P60x0.55	2707516.67	5389816.67	0.502	0.00	5389816.67	0.000

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L31	74.75 - 69.75 (31)	P60x0.55	2865383.33	5389816.67	0.532	0.00	5389816.67	0.000
L32	69.75 - 64.75 (32)	P60x0.55	3025600.00	5389816.67	0.561	0.00	5389816.67	0.000
L33	64.75 - 60 (33)	P60x0.55	3179925.00	5389816.67	0.590	0.00	5389816.67	0.000
L34	60 - 59.75 (34)	P60x0.675	3188100.00	6746491.33	0.473	0.00	6746491.33	0.000
L35	59.75 - 54.75 (35)	P60x0.675	3352883.33	6746491.33	0.497	0.00	6746491.33	0.000
L36	54.75 - 49.75 (36)	P60x0.675	3519816.67	6746491.33	0.522	0.00	6746491.33	0.000
L37	49.75 - 44.75 (37)	P60x0.675	3688750.00	6746491.33	0.547	0.00	6746491.33	0.000
L38	44.75 - 40 (38)	P60x0.675	3850991.67	6746491.33	0.571	0.00	6746491.33	0.000
L39	40 - 39.75 (39)	P60x0.8	3859575.00	8149650.00	0.474	0.00	8149650.00	0.000
L40	39.75 - 34.75 (40)	P60x0.8	4032250.00	8149650.00	0.495	0.00	8149650.00	0.000
L41	34.75 - 29.75 (41)	P60x0.8	4206608.33	8149650.00	0.516	0.00	8149650.00	0.000
L42	29.75 - 24.75 (42)	P60x0.8	4382491.67	8149650.00	0.538	0.00	8149650.00	0.000
L43	24.75 - 20 (43)	P60x0.8	4550916.67	8149650.00	0.558	0.00	8149650.00	0.000
L44	20 - 19.75 (44)	P60x0.8	4559816.67	8149650.00	0.560	0.00	8149650.00	0.000
L45	19.75 - 14.75 (45)	P60x0.8	4738508.33	8149650.00	0.581	0.00	8149650.00	0.000
L46	14.75 - 9.75 (46)	P60x0.8	4918433.33	8149650.00	0.604	0.00	8149650.00	0.000
L47	9.75 - 4.75 (47)	P60x0.8	5099466.67	8149650.00	0.626	0.00	8149650.00	0.000
L48	4.75 - 0 (48)	P60x0.8	5272375.00	8149650.00	0.647	0.00	8149650.00	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u lb-ft	ϕT_n lb-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	196 - 195 (1)	P18x0.375	23.42	392439.00	0.000	2.06	564641.67	0.000
L2	195 - 190 (2)	P24x0.375	7250.06	526035.00	0.014	968.67	1019708.33	0.001
L3	190 - 185 (3)	P24x0.375	7560.95	526035.00	0.014	968.64	1019708.33	0.001
L4	185 - 180 (4)	P24x0.375	13267.60	526035.00	0.025	719.37	1019708.33	0.001
L5	180 - 175 (5)	P30x0.375	13641.80	655528.00	0.021	719.33	1598366.67	0.000
L6	175 - 170 (6)	P30x0.375	14655.70	655528.00	0.022	719.27	1598366.67	0.000
L7	170 - 165 (7)	P30x0.375	15010.80	655528.00	0.023	710.12	1598366.67	0.000
L8	165 - 160 (8)	P30x0.375	18622.80	655528.00	0.028	153.56	1598366.67	0.000
L9	160 - 155 (9)	P36x0.375	19031.70	745048.00	0.026	153.56	2189066.67	0.000
L10	155 - 150 (10)	P36x0.375	23828.80	745048.00	0.032	497.01	2189066.67	0.000
L11	150 - 145 (11)	P36x0.375	24200.20	745048.00	0.032	502.67	2189066.67	0.000
L12	145 - 140 (12)	P36x0.375	24550.80	745048.00	0.033	508.26	2189066.67	0.000
L13	140 - 136 (13)	P42x0.375	24892.10	834437.00	0.030	513.46	2868841.67	0.000
L14	136 - 135.75 (14)	P42x0.6375	24912.00	1565660.00	0.016	513.78	5316000.00	0.000
L15	135.75 - 130.75 (15)	P42x0.6375	25379.70	1565660.00	0.016	520.24	5316000.00	0.000
L16	130.75 - 125.75 (16)	P42x0.6375	25830.70	1565660.00	0.016	526.63	5316000.00	0.000
L17	125.75 - 120.75 (17)	P42x0.6375	26265.00	1565660.00	0.017	532.93	5316000.00	0.000
L18	120.75 - 120	P42x0.6375	26327.10	1565660.00	0.017	533.87	5316000.00	0.000

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u lb-ft	ϕT_n lb-ft	Ratio $\frac{T_u}{\phi T_n}$
	(18)							
L19	120 - 119.75 (19)	P48x0.6	26581.40	1678150.00	0.016	534.23	6546891.33	0.000
L20	119.75 - 114.75 (20)	P48x0.6	27079.00	1678150.00	0.016	541.35	6546891.33	0.000
L21	114.75 - 109.75 (21)	P48x0.6	27558.70	1678150.00	0.016	548.38	6546891.33	0.000
L22	109.75 - 104.75 (22)	P48x0.6	28020.80	1678150.00	0.017	555.32	6546891.33	0.000
L23	104.75 - 100 (23)	P48x0.6	28444.10	1678150.00	0.017	561.81	6546891.33	0.000
L24	100 - 99.75 (24)	P54x0.5625	28683.60	1676360.00	0.017	562.19	7388083.33	0.000
L25	99.75 - 94.75 (25)	P54x0.5625	29189.80	1676360.00	0.017	569.80	7388083.33	0.000
L26	94.75 - 89.75 (26)	P54x0.5625	29675.50	1676360.00	0.018	577.28	7388083.33	0.000
L27	89.75 - 84.75 (27)	P54x0.5625	30141.50	1676360.00	0.018	584.64	7388083.33	0.000
L28	84.75 - 80 (28)	P54x0.5625	30566.50	1676360.00	0.018	591.52	7388083.33	0.000
L29	80 - 79.75 (29)	P60x0.55	30791.50	1760020.00	0.017	591.91	8640250.00	0.000
L30	79.75 - 74.75 (30)	P60x0.55	31333.00	1760020.00	0.018	652.29	8640250.00	0.000
L31	74.75 - 69.75 (31)	P60x0.55	31815.00	1760020.00	0.018	660.05	8640250.00	0.000
L32	69.75 - 64.75 (32)	P60x0.55	32275.00	1760020.00	0.018	667.65	8640250.00	0.000
L33	64.75 - 60 (33)	P60x0.55	32710.10	1760020.00	0.019	674.72	8640250.00	0.000
L34	60 - 59.75 (34)	P60x0.675	32726.20	2285110.00	0.014	675.09	11171416.67	0.000
L35	59.75 - 54.75 (35)	P60x0.675	33184.40	2285110.00	0.015	682.36	11171416.67	0.000
L36	54.75 - 49.75 (36)	P60x0.675	33596.80	2285110.00	0.015	689.44	11171416.67	0.000
L37	49.75 - 44.75 (37)	P60x0.675	33982.40	2285110.00	0.015	696.32	11171416.67	0.000
L38	44.75 - 40 (38)	P60x0.675	34340.50	2285110.00	0.015	702.65	11171416.67	0.000
L39	40 - 39.75 (39)	P60x0.8	34349.90	2812050.00	0.012	702.98	13690333.33	0.000
L40	39.75 - 34.75 (40)	P60x0.8	34719.30	2812050.00	0.012	709.41	13690333.33	0.000
L41	34.75 - 29.75 (41)	P60x0.8	35036.10	2812050.00	0.012	715.59	13690333.33	0.000
L42	29.75 - 24.75 (42)	P60x0.8	35328.70	2812050.00	0.013	721.63	13690333.33	0.000
L43	24.75 - 20 (43)	P60x0.8	35602.80	2812050.00	0.013	727.38	13690333.33	0.000
L44	20 - 19.75 (44)	P60x0.8	35603.80	2812050.00	0.013	727.68	13690333.33	0.000
L45	19.75 - 14.75 (45)	P60x0.8	35876.80	2812050.00	0.013	733.73	13690333.33	0.000
L46	14.75 - 9.75 (46)	P60x0.8	36113.60	2812050.00	0.013	739.79	13690333.33	0.000
L47	9.75 - 4.75 (47)	P60x0.8	36328.10	2812050.00	0.013	741.90	13690333.33	0.000
L48	4.75 - 0 (48)	P60x0.8	36516.70	2812050.00	0.013	741.90	13690333.33	0.000

Pole Interaction Design Data

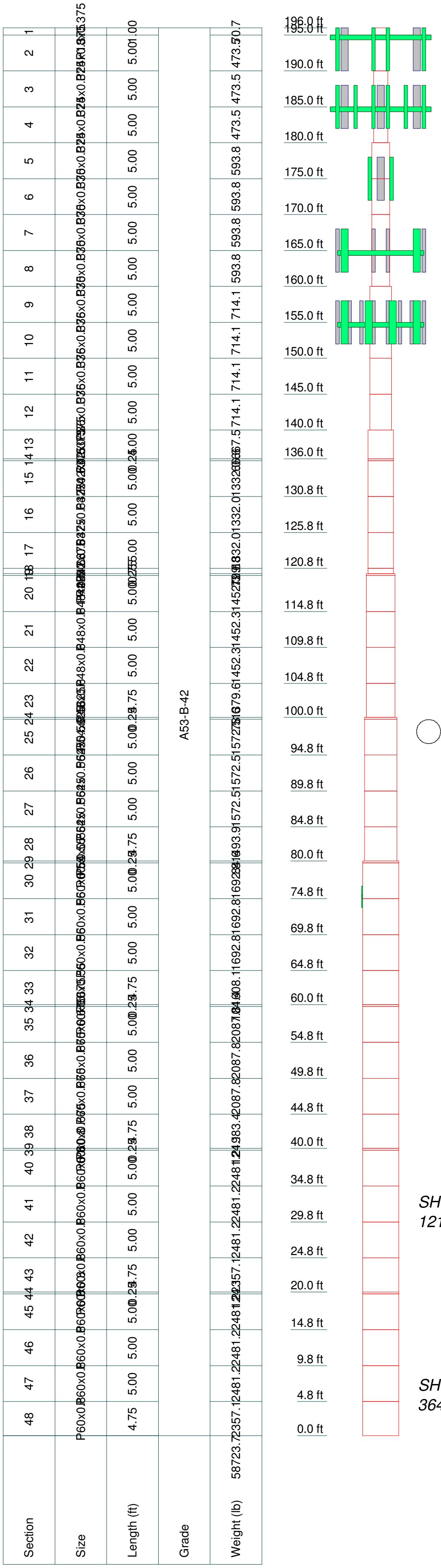
Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	196 - 195 (1)	0.000	0.000	0.000	0.000	0.000	0.000 [1]	1.000	4.8.2
L2	195 - 190 (2)	0.005	0.047	0.000	0.014	0.001	0.052	1.000	4.8.2
L3	190 - 185 (3)	0.005	0.107	0.000	0.014	0.001	0.112	1.000	4.8.2
L4	185 - 180 (4)	0.010	0.212	0.000	0.025	0.001	0.222	1.000	4.8.2
L5	180 - 175 (5)	0.009	0.210	0.000	0.021	0.000	0.219	1.000	4.8.2
L6	175 - 170 (6)	0.009	0.287	0.000	0.022	0.000	0.297	1.000	4.8.2
L7	170 - 165 (7)	0.010	0.365	0.000	0.023	0.000	0.376	1.000	4.8.2
L8	165 - 160 (8)	0.013	0.462	0.000	0.028	0.000	0.476	1.000	4.8.2
L9	160 - 155 (9)	0.012	0.398	0.000	0.026	0.000	0.410	1.000	4.8.2
L10	155 - 150 (10)	0.015	0.486	0.000	0.032	0.000	0.502	1.000	4.8.2
L11	150 - 145 (11)	0.016	0.576	0.000	0.032	0.000	0.593	1.000	4.8.2
L12	145 - 140 (12)	0.017	0.667	0.000	0.033	0.000	0.685	1.000	4.8.2
L13	140 - 136 (13)	0.016	0.552	0.000	0.030	0.000	0.568	1.000	4.8.2
L14	136 - 135.75 (14)	0.008	0.308	0.000	0.016	0.000	0.317	1.000	4.8.2
L15	135.75 - 130.75 (15)	0.009	0.347	0.000	0.016	0.000	0.357	1.000	4.8.2
L16	130.75 - 125.75 (16)	0.010	0.387	0.000	0.016	0.000	0.397	1.000	4.8.2
L17	125.75 - 120.75 (17)	0.010	0.427	0.000	0.017	0.000	0.438	1.000	4.8.2
L18	120.75 - 120 (18)	0.010	0.433	0.000	0.017	0.000	0.444	1.000	4.8.2
L19	120 - 119.75 (19)	0.010	0.363	0.000	0.016	0.000	0.373	1.000	4.8.2
L20	119.75 - 114.75 (20)	0.010	0.397	0.000	0.016	0.000	0.408	1.000	4.8.2
L21	114.75 - 109.75 (21)	0.011	0.432	0.000	0.016	0.000	0.443	1.000	4.8.2
L22	109.75 - 104.75 (22)	0.011	0.468	0.000	0.017	0.000	0.480	1.000	4.8.2
L23	104.75 - 100 (23)	0.012	0.503	0.000	0.017	0.000	0.515	1.000	4.8.2
L24	100 - 99.75 (24)	0.012	0.434	0.000	0.017	0.000	0.446	1.000	4.8.2
L25	99.75 - 94.75 (25)	0.013	0.466	0.000	0.017	0.000	0.479	1.000	4.8.2
L26	94.75 - 89.75 (26)	0.013	0.498	0.000	0.018	0.000	0.512	1.000	4.8.2
L27	89.75 - 84.75 (27)	0.014	0.531	0.000	0.018	0.000	0.546	1.000	4.8.2
L28	84.75 - 80 (28)	0.015	0.563	0.000	0.018	0.000	0.578	1.000	4.8.2
L29	80 - 79.75 (29)	0.014	0.474	0.000	0.017	0.000	0.488	1.000	4.8.2
L30	79.75 - 74.75 (30)	0.015	0.502	0.000	0.018	0.000	0.517	1.000	4.8.2
L31	74.75 - 69.75 (31)	0.015	0.532	0.000	0.018	0.000	0.547	1.000	4.8.2
L32	69.75 - 64.75 (32)	0.016	0.561	0.000	0.018	0.000	0.578	1.000	4.8.2
L33	64.75 - 60 (33)	0.017	0.590	0.000	0.019	0.000	0.607	1.000	4.8.2
L34	60 - 59.75 (34)	0.013	0.473	0.000	0.014	0.000	0.486	1.000	4.8.2
L35	59.75 - 54.75 (35)	0.014	0.497	0.000	0.015	0.000	0.511	1.000	4.8.2
L36	54.75 - 49.75 (36)	0.014	0.522	0.000	0.015	0.000	0.536	1.000	4.8.2
L37	49.75 - 44.75	0.015	0.547	0.000	0.015	0.000	0.562	1.000	4.8.2

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*
	(37)								
L38	44.75 - 40 (38)	0.016	0.571	0.000	0.015	0.000	0.587	1.000	4.8.2
L39	40 - 39.75 (39)	0.013	0.474	0.000	0.012	0.000	0.487	1.000	4.8.2
L40	39.75 - 34.75 (40)	0.014	0.495	0.000	0.012	0.000	0.509	1.000	4.8.2
L41	34.75 - 29.75 (41)	0.014	0.516	0.000	0.012	0.000	0.531	1.000	4.8.2
L42	29.75 - 24.75 (42)	0.015	0.538	0.000	0.013	0.000	0.553	1.000	4.8.2
L43	24.75 - 20 (43)	0.016	0.558	0.000	0.013	0.000	0.574	1.000	4.8.2
L44	20 - 19.75 (44)	0.016	0.560	0.000	0.013	0.000	0.575	1.000	4.8.2
L45	19.75 - 14.75 (45)	0.016	0.581	0.000	0.013	0.000	0.598	1.000	4.8.2
L46	14.75 - 9.75 (46)	0.017	0.604	0.000	0.013	0.000	0.621	1.000	4.8.2
L47	9.75 - 4.75 (47)	0.018	0.626	0.000	0.013	0.000	0.643	1.000	4.8.2
L48	4.75 - 0 (48)	0.018	0.647	0.000	0.013	0.000	0.665	1.000	4.8.2

[1] P_u / ϕP_n controls

APPENDIX C

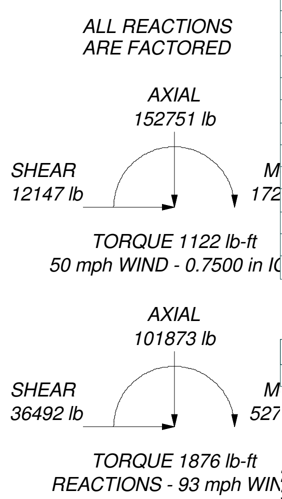
Tower Elevation Drawing



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION
Pirod 16.5' LP Platform	195
Twin Style 1A-PCS	195
Twin Style 1A-PCS	195
Twin Style 1A-PCS	195
APXVAARR24_43-U-NA20 w/ Mount Pipe	195
APXVAARR24_43-U-NA20 w/ Mount Pipe	195
APXVAARR24_43-U-NA20 w/ Mount Pipe	195
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	195
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	195
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	195
RADIO 4449 B12/B71	195
RADIO 4449 B12/B71	195
RADIO 4449 B12/B71	195
4415 B25	195
4415 B25	195
4415 B25	195
RADIO 4415 B66A	195
RADIO 4415 B66A	195
RADIO 4415 B66A	195
DC4-48-60-8-20F	195
DC4-48-60-8-20F	195
1,070.52 Sq In Generic Appurtenances	195
1,070.52 Sq In Generic Appurtenances	195
1,070.52 Sq In Generic Appurtenances	195
(3) Commscope VSR-MA-B w/ 15.5' Horizontal Pipe	193
PiROD 13' Low Profile Platform (Monopole)	185
PRK-1245L Stabilizer Kit (1)	185
7770.00 w/Mount Pipe	185
7770.00 w/Mount Pipe	185
7770.00 w/Mount Pipe	185
QS66512-2 w/ Mount Pipe	185
QS66512-2 w/ Mount Pipe	185
TPA-65R-LCUUUU-H8 w/ Mount Pipe	185
HPA-65R-BUU-H8 w/ Mount Pipe	185
HPA-65R-BUU-H8 w/ Mount Pipe	185
HPA-65R-BUU-H8 w/ Mount Pipe	185
TT19-08BP111-001	185
TT19-08BP111-001	185
TT19-08BP111-001	185
(2) LGP21901	185
(2) LGP21901	185
(2) LGP21901	185
(2) 782 10250	185
(2) 782 10250	185
(2) 782 10250	185
RRUS 11	185
RRUS 11	185
RRUS 11	185
RRUS 12	185
RRUS 12	185
RRUS 12	185
RRUS 32	185
RRUS 32	185
RRUS 32	185
RRUS 4426 B66	185
RRUS 4426 B66	185

TYPE	ELEVATION
RRUS 4426 B66	185
DC6-48-60-18-8F Surge Suppression Unit	185
DC6-48-60-18-8F Surge Suppression Unit	185
Valmont Light Duty Tri-Bracket (1)	175
APXV18-206517S-C w/ Mount Pipe	175
APXV18-206517S-C w/ Mount Pipe	175
APXV18-206517S-C w/ Mount Pipe	175
MTS 12.5' LP Platform	165
APXVTM14-ALU-I20 w/ Mount Pipe	165
APXVTM14-ALU-I20 w/ Mount Pipe	165
APXVTM14-ALU-I20 w/ Mount Pipe	165
NNVV-65B-R4 w/ Mount Pipe	165
NNVV-65B-R4 w/ Mount Pipe	165
NNVV-65B-R4 w/ Mount Pipe	165
RRH 1900 4x45 65 MHz	165
RRH 1900 4x45 65 MHz	165
RRH 1900 4x45 65 MHz	165
800 MHz RRH	165
800 MHz RRH	165
800 MHz RRH	165
TD-RRH8x20-25 w/ Solar Shield	165
TD-RRH8x20-25 w/ Solar Shield	165
TD-RRH8x20-25 w/ Solar Shield	165
RRH2X50-08 (800 MHz)	165
RRH2X50-08 (800 MHz)	165
RRH2X50-08 (800 MHz)	165
PiROD 15' Low Profile Platform (Monopole)	155
PRK-SFS-L Stabilizer Kit (1)	155
(2) JAHH-65B-R3B w/ Mount Pipe	155
(2) JAHH-65B-R3B w/ Mount Pipe	155
(2) JAHH-65B-R3B w/ Mount Pipe	155
BXA-70063-4CF-EDIN-6 w/ Mount Pipe	155
BXA-70063-4CF-EDIN-6 w/ Mount Pipe	155
BXA-70063-4CF-EDIN-6 w/ Mount Pipe	155
DB-C1-12C-24AB-0Z	155
B2B66A RRH PCS+AWS	155
B2B66A RRH PCS+AWS	155
B2B66A RRH PCS+AWS	155
B25 RRH4X30	155
B25 RRH4X30	155
B25 RRH4X30	155
B13 RRH 4X30	155
B13 RRH 4X30	155
B13 RRH 4X30	155
BSAMNT SBS-2-2	155
BSAMNT SBS-2-2	155
BSAMNT SBS-2-2	155
Bridge Stiffener (3.25 sq ft)	120
Bridge Stiffener (3.25 sq ft)	120
Bridge Stiffener (3.25 sq ft)	120
Bridge Stiffener (3.25 sq ft)	100
Bridge Stiffener (3.25 sq ft)	100
Bridge Stiffener (3.25 sq ft)	100
Bridge Stiffener (3.25 sq ft)	80
Bridge Stiffener (3.25 sq ft)	80
Bridge Stiffener (3.25 sq ft)	80
GPS-TMG-HR-26N	75
Pipe Mount 3'x4.5"	75



MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-42	42 ksi	63 ksi			

TOWER DESIGN NOTES

1. Tower designed for Exposure B to the TIA-222-G Standard.
2. Tower designed for a 93 mph basic wind in accordance with the TIA-222-G Standard.
3. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class II.
6. Topographic Category 1 with Crest Height of 0.00 ft

GPD
520 South Main Street Suite 2531
Akron, Ohio 44311
Phone: (330) 572-2100
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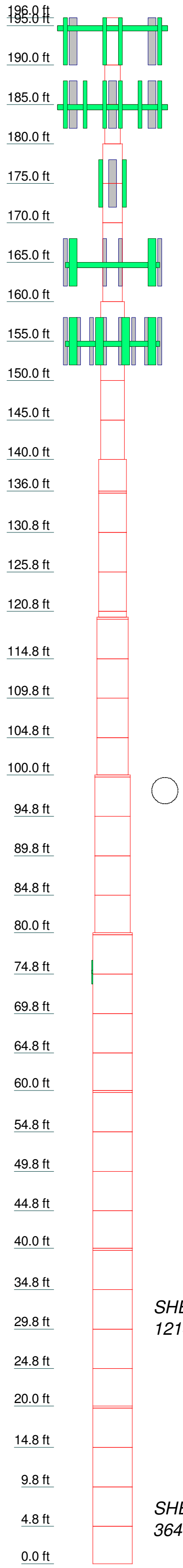
Job: **Kettleton / US-CT-1002**		
Project: **2019791.CT1002.08**		
Client: PTI	Drawn by: Dmerwin	App'd:
Code: TIA-222-G	Date: 07/26/19	Scale: NTS
Path: T:\PTI\US-CT-1002 (CT11126F)\09 2019791 CT1002 09 PTI TMO SA Rerun\TNX\US-CT-1002 Modified TNX.eri		Dwg No. E-1

Section	Size	Length (ft)	Grade	Weight (lb)
1	[illegible]	1.00	A53-B-42	70.7
2	[illegible]	5.00	A53-B-42	473.5
3	[illegible]	5.00	A53-B-42	473.5
4	[illegible]	5.00	A53-B-42	473.5
5	[illegible]	5.00	A53-B-42	593.8
6	[illegible]	5.00	A53-B-42	593.8
7	[illegible]	5.00	A53-B-42	593.8
8	[illegible]	5.00	A53-B-42	593.8
9	[illegible]	5.00	A53-B-42	714.1
10	[illegible]	5.00	A53-B-42	714.1
11	[illegible]	5.00	A53-B-42	714.1
12	[illegible]	5.00	A53-B-42	714.1
13	[illegible]	[illegible]	A53-B-42	[illegible]
14	[illegible]	[illegible]	A53-B-42	[illegible]
15	[illegible]	5.00	A53-B-42	[illegible]
16	[illegible]	5.00	A53-B-42	1332.0
17	[illegible]	[illegible]	A53-B-42	[illegible]
18	[illegible]	[illegible]	A53-B-42	[illegible]
19	[illegible]	[illegible]	A53-B-42	[illegible]
20	[illegible]	[illegible]	A53-B-42	[illegible]
21	[illegible]	5.00	A53-B-42	1452.3
22	[illegible]	5.00	A53-B-42	1452.3
23	[illegible]	[illegible]	A53-B-42	[illegible]
24	[illegible]	[illegible]	A53-B-42	[illegible]
25	[illegible]	[illegible]	A53-B-42	[illegible]
26	[illegible]	5.00	A53-B-42	1572.5
27	[illegible]	5.00	A53-B-42	1572.5
28	[illegible]	[illegible]	A53-B-42	[illegible]
29	[illegible]	[illegible]	A53-B-42	[illegible]
30	[illegible]	[illegible]	A53-B-42	[illegible]
31	[illegible]	5.00	A53-B-42	1692.8
32	[illegible]	5.00	A53-B-42	1692.8
33	[illegible]	[illegible]	A53-B-42	[illegible]
34	[illegible]	[illegible]	A53-B-42	[illegible]
35	[illegible]	[illegible]	A53-B-42	[illegible]
36	[illegible]	5.00	A53-B-42	2087.8
37	[illegible]	5.00	A53-B-42	2087.8
38	[illegible]	[illegible]	A53-B-42	[illegible]
39	[illegible]	[illegible]	A53-B-42	[illegible]
40	[illegible]	[illegible]	A53-B-42	[illegible]
41	[illegible]	5.00	A53-B-42	2481.2
42	[illegible]	5.00	A53-B-42	2481.2
43	[illegible]	[illegible]	A53-B-42	[illegible]
44	[illegible]	[illegible]	A53-B-42	[illegible]
45	[illegible]	[illegible]	A53-B-42	[illegible]
46	[illegible]	5.00	A53-B-42	2481.2
47	[illegible]	5.00	A53-B-42	2481.2
48	P60x0.[illegible]	4.75	A53-B-42	2357.1
				58723.7



MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-42	42 ksi	63 ksi			

TOWER DESIGN NOTES

1. Tower designed for Exposure B to the TIA-222-G Standard.
2. Tower designed for a 93 mph basic wind in accordance with the TIA-222-G Standard.
3. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class II.
6. Topographic Category 1 with Crest Height of 0.00 ft

ALL REACTIONS ARE FACTORED

AXIAL 152751 lb
SHEAR 12147 lb
MOMENT 1724339 lb-ft
TORQUE 1122 lb-ft
50 mph WIND - 0.7500 in ICE

AXIAL 101873 lb
SHEAR 36492 lb
MOMENT 5272374 lb-ft
TORQUE 1876 lb-ft
REACTIONS - 93 mph WIND

GPD
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Job: **Kettleton / US-CT-1002**		
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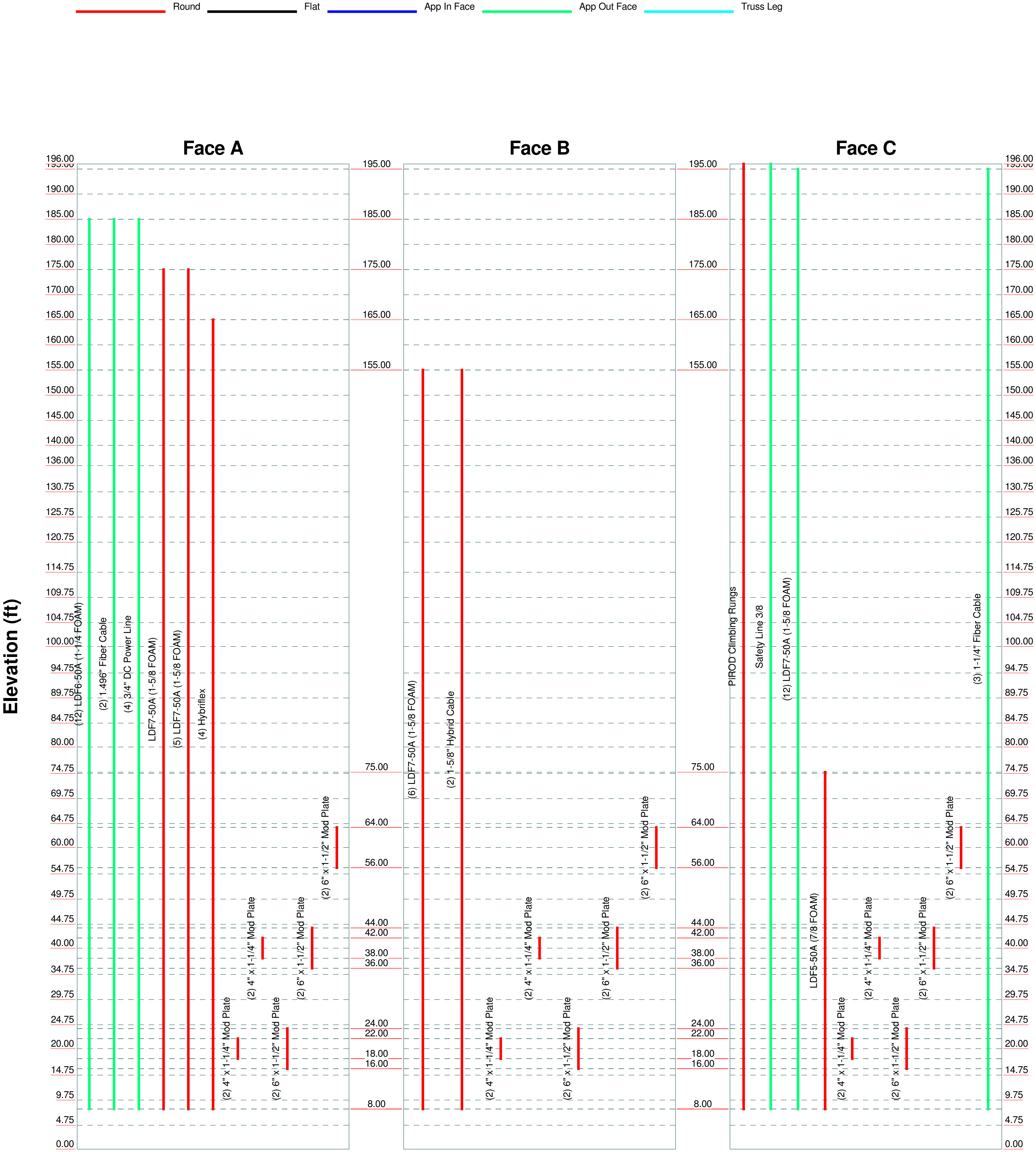
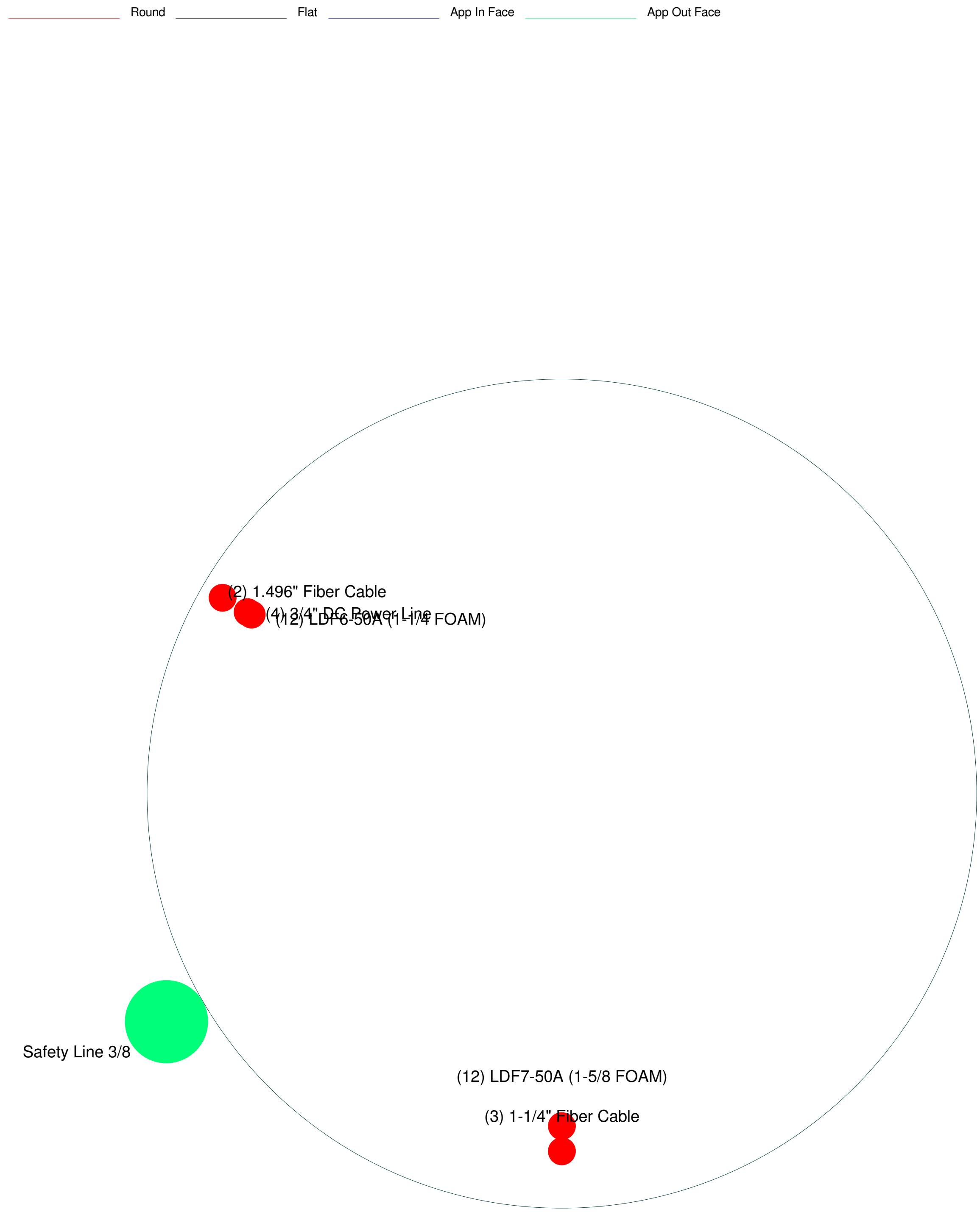
Client: PTI	Drawn by: Dmerwin	App'd:
Code: TIA-222-G	Date: 07/26/19	Scale: NTS
Path: T:\PTI\US-CT-1002 (CT11126F)\09 2019791.CT1002.09 PTI TMO SA Rerun\TNX\US-CT-1002 Modified TNX.eri		Dwg No. E-1

Feed Line Distribution Chart
0' - 196'



GPD 520 South Main Street Suite 2531 Akron, Ohio 44311 Phone: (330) 572-2100 FAX: (614) 210-0752	Job: ***Kettleton / US-CT-1002***		
	Project: ***2019791.CT1002.08***		
	Client: PTI	Drawn by: Dmerwin	App'd:
	Code: TIA-222-G	Date: 07/26/19	Scale: NTS
	Path:		Dwg No. E-7

Feed Line Plan



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Job: ***Kettleton / US-CT-1002***		
Project: ***2019791.CT1002.08***		
Client: PTI	Drawn by: Dmerwin	App'd:
Code: TIA-222-G	Date: 07/26/19	Scale: NTS
Path: T:\PTI\US-CT-1002 (CT11126F)\09 2019791 CT1002 09 PTI TMO SA Rerun\TNX\US-CT-1002 Modified TNX.eri		Dwg No. E-7

APPENDIX D

Flange Bolt & Flange Plate Analysis

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Project #: 2019791.CT1002.09

BOLT AND BRIDGE STIFFENER CALCULATIONS @ 20'

Moment from TNX (M) =	4550.92	kip-ft	ASIF =	1.00				
Axial from TNX (P) =	87.94	kip						
Inner Bolt Diameter =	1.25	in						
Inner Bolt Area (A_{inner}) =	1.23	in^2	Inner Bolt Circle (BC_{inner}) =	47	in			
Inner Bolt MOI ($I_{o.inner}$) =	0.12	in^4	Total Area ($A_{tot.in}$) =	39.27	in^2			
Number Inner Bolts (N_{inner}) =	32		Percent Total Area (η_{in}) =	24.2%		Axial, Inner Bolts ($P*\eta_{in}$) =	21.25	kips
Outer Bolt Diameter =	1.25	in						
Outer Bolt Area (A_{outer}) =	1.23	in^2	Outer Bolt Circle (BC_{outer}) =	53	in			
Outer Bolt MOI ($I_{o.outer}$) =	0.12	in^4	Total Area ($A_{tot.out}$) =	39.27	in^2			
Number Outer Bolts (N_{outer}) =	32		Percent Total Area (η_{out}) =	24.2%		Axial, Outer Bolts ($P*\eta_{out}$) =	21.25	kips
Bridge Stiffener Width =	6.00	in						
Bridge Stiffener Thickness =	1.50	in	Connection Bolt Hole Size =	1.21875	in			
Bridge Stiffener Unbraced Length =	30.00	in	Net Bridge Stiffener Area ($A_{e.pl}$) =	7.17188	in			
Bridge Stiffener Area (A_{pl}) =	9.00	in^2	Bridge Stiffener Circle (BC_{pl}) =	60.75	in			
Bridge Stiffener MOI (I_o) =	27.00	in^4	Total Area ($A_{tot.pl}$) =	54.00	in^2			
Number Bridge Stiffeners (N_{pl})	6		Percent Total Area (η_{pl}) =	33.2%		Axial, Bridge Stiffener ($P*\eta_{pl}$) =	29.22	kips
Bridge Stiffener Width =	4.00	in						
Bridge Stiffener Thickness =	1.25	in	Connection Bolt Hole Size =	1.21875	in			
Bridge Stiffener Unbraced Length =	12.00	in	Net Bridge Stiffener Area ($A_{e.pl}$) =	3.47656	in			
Bridge Stiffener Area (A_{pl}) =	5.00	in^2	Bridge Stiffener Circle (BC_{pl}) =	60.625	in			
Bridge Stiffener MOI (I_o) =	6.67	in^4	Total Area ($A_{tot.pl}$) =	30.00	in^2			
Number Bridge Stiffeners (N_{pl})	6		Percent Total Area (η_{pl}) =	18.5%		Axial, Bridge Stiffener ($P*\eta_{pl}$) =	16.23	kips

I_{inner} =	10847.24	$in.^4$	$(N_{inner}*A_{inner}*BC_{inner}^2/8+N_{inner}*I_{o.inner})$
I_{outer} =	13792.48	$in.^4$	$(N_{outer}*A_{outer}*BC_{outer}^2/8+N_{outer}*I_{o.outer})$
I_{pl} =	25073.30	$in.^4$	$(N_{pl}*A_{pl}*BC_{pl}^2/8+N_{pl}*I_{o.pl})$
I_{pl} =	13822.71	$in.^4$	$(N_{pl}*A_{pl}*BC_{pl}^2/8+N_{pl}*I_{o.pl})$
I_{tot} =	63535.73	$in.^4$	$(I_{inner} + I_{outer} + I_{pl})$
$P_{u.t.inner}$ =	24.1	kips	$(M*(BC_{inner}/2)*A_{inner})/I_{total} - P*\eta_{in}/N_{inner})$
$P_{u.t.outer}$ =	27.3	kips	$(M*(BC_{outer}/2)*A_{outer})/I_{total} - P*\eta_{out}/N_{outer})$
$P_{u.t.pl}$ =	230.1	kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total} - P*\eta_{pl}/N_{pl})$
$P_{u.c.pl}$ =	239.8	kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total} + P*\eta_{pl}/N_{pl})$
$P_{u.t.pl}$ =	127.6	kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total} - P*\eta_{pl}/N_{pl})$
$P_{u.c.pl}$ =	133.0	kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total} + P*\eta_{pl}/N_{pl})$
$ØP_{nt.bolt}$ =	96.64	kips	
Bolt Rating =	28.2%	OK	

Bridge Stiffener Check

f_y =	50	ksi
f_u =	65	ksi
E =	29000	ksi
K =	0.85	
KL/r =	58.890	
F_e =	82.53	ksi
F_{cr} =	38.80	ksi
$ØP_{nc}$ =	314.29	kips
$ØP_{nt}$ =	349.63	kips
Bridge Stiffener Rating =	76.3%	OK

Existing Flange Connection @ 20'
US-CT-1002, Kettleton
2019791.CT1002.09

*O.T. Moment =	1002.217	k*ft
Axial =	87.94	kips
Shear =	35.60	kips

Acceptable Stress Ratio =	105.0%

*Above reactions have been adjusted due to consideration of modifications. See attached hand calculations for determination of flange bolt forces used in the analysis.

Flange Bolts

# Bolts =	32	
Bolt Type =	A325	
Threads Included? =	Yes	
Bolt Diameter =	1.75	in
Bolt Circle =	50	in
ϕ_t =	0.75	
ϕ_v =	0.75	

Tension & Shear (TIA-222-G-1, Section 4.9.6)

F_{ub} =	105	ksi
A_b =	2.405282	in^2
A_n =	1.9	in^2
ϕR_{nv} =	85.24	kips
ϕR_{nt} =	149.63	kips
ϕR_{nt} (adjusted)=	149.61	kips
V_{ub} =	1.11	kips
T_{ub} =	27.30	kips

Prying Action Check

N/A for stiffened flange

Max Comp. on Bolt =	32.80	kips
Shear Capacity =	1.3%	
Tensile Capacity =	18.2%	
Interaction Capacity =	18.2%	
Bolt Capacity =	**18.2%**	**OK**

Pole Information

Shaft Diam. (Upper) =	60	in
Thickness (Upper)=	0.625	in
# of Sides (Upper) =	Round	
F_y (Upper) =	42	ksi
Shaft Diam. (Lower) =	60	in
Thickness (Lower)=	0.625	in
# of Sides (Lower) =	Round	
F_y (Lower) =	42	ksi

Upper Flange Plate

Location =	Internal	
Plate Strength (F_y) =	36	ksi
Plate Tensile (F_u) =	58	ksi
Plate Thickness =	1.25	in
Hole Diameter =	43	in
ϕ_f =	0.9	
b =	4.28	in
Le =	7.00	in
Z =	2.34	in^3
M_u =	20.87	k-in
ϕM_n =	75.9375	k-in
UP Capacity =	**27.5%**	**OK**

Lower Flange Plate

Location =	Internal	
Plate Strength (F_y) =	36	ksi
Plate Thickness =	1.25	in
Hole Diameter =	43	in
b =	4.28	in
Le =	7.00	in
Z =	2.34	in^3
M_u =	20.87	k-in
ϕM_n =	75.9375	k-in
LP Capacity =	**27.5%**	**OK**

UpperStiffeners

Configuration =	Every Bolt	
Thickness =	0.625	in
Width =	7	in
Notch =	0.5	in
Height =	10	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	No	
Stiffener Vertical Force =	14.73	kips
Vert. Weld Capacity =	*Not Verified*	kips
Horiz. Weld Capacity =	*Not Verified*	kips
Stiffener Capacity =	26.9%	kips
Controlling Capacity =	**26.9%**	**OK**

Lower Stiffeners

Configuration =	Every Bolt	
Thickness =	0.625	in
Width =	7	in
Notch =	0.5	in
Height =	10	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	No	
Stiffener Vertical Force =	14.73	kips
Vert. Weld Capacity =	*Not Verified*	kips
Horiz. Weld Capacity =	*Not Verified*	kips
Stiffener Capacity =	26.9%	kips
Controlling Capacity =	**26.9%**	**OK**

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BOLT AND BRIDGE STIFFENER CALCULATIONS @ 40'

Moment from TNX (M) =	3850.99	kip-ft	ASIF =	1.00				
Axial from TNX (P) =	72.53	kip						
Inner Bolt Diameter =	1.25	in						
Inner Bolt Area (A_{inner}) =	1.23	in^2	Inner Bolt Circle (BC_{inner}) =	47	in			
Inner Bolt MOI ($I_{o.inner}$) =	0.12	in^4	Total Area ($A_{tot.in}$) =	39.27	in^2			
Number Inner Bolts (N_{inner}) =	32		Percent Total Area (η_{in}) =	29.6%		Axial, Inner Bolts ($P*\eta_{in}$) =	21.49	kips
Outer Bolt Diameter =	1.25	in						
Outer Bolt Area (A_{outer}) =	1.23	in^2	Outer Bolt Circle (BC_{outer}) =	53	in			
Outer Bolt MOI ($I_{o.outer}$) =	0.12	in^4	Total Area ($A_{tot.out}$) =	39.27	in^2			
Number Outer Bolts (N_{outer}) =	32		Percent Total Area (η_{out}) =	29.6%		Axial, Outer Bolts ($P*\eta_{out}$) =	21.49	kips
Bridge Stiffener Width =	6.00	in						
Bridge Stiffener Thickness =	1.50	in	Connection Bolt Hole Size =	1.18	in			
Bridge Stiffener Unbraced Length =	30.00	in	Net Bridge Stiffener Area ($A_{e.pl}$)	7.23	in			
Bridge Stiffener Area (A_{pl}) =	9.00	in^2	Bridge Stiffener Circle (BC_{pl}) =	63	in			
Bridge Stiffener MOI (I_o) =	27.00	in^4	Total Area ($A_{tot.pl}$) =	54.00	in^2			
Number Bridge Stiffeners (N_{pl})	6		Percent Total Area (η_{pl}) =	40.7%		Axial, Bridge Stiffener ($P*\eta_{pl}$) =	29.55	kips

I_{inner} =	10847.24	in.^{4}	$(N_{inner}*A_{inner}*BC_{inner}^2/8+N_{inner}*I_{o.inner})$
I_{outer} =	13792.48	in.^{4}	$(N_{outer}*A_{outer}*BC_{outer}^2/8+N_{outer}*I_{o.outer})$
I_{pl} =	26952.75	in.^{4}	$(N_{pl}*A_{pl}*BC_{pl}^2/8+N_{pl}*I_{o.pl})$
I_{tot} =	51592.47	in.^{4}	$(I_{inner} + I_{outer} + I_{pl})$
$P_{u.t.inner}$ =	25.2	kips	$(M*(BC_{inner}/2)*A_{inner})/I_{total}$ - $P*\eta_{in}/N_{inner})$
$P_{u.t.outer}$ =	28.5	kips	$(M*(BC_{outer}/2)*A_{outer})/I_{total}$ - $P*\eta_{out}/N_{outer})$
$P_{u.t.pl}$ =	249.0	kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total}$ - $P*\eta_{pl}/N_{pl})$
$P_{u.c.pl}$ =	258.9	kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total} + P*\eta_{pl}/N_{pl})$
$ØP_{nt.bolt}$ =	96.64	kips	
Bolt Rating =	29.4%	OK	

Bridge Stiffener Check

f_y =	50	ksi
f_u =	65	ksi
E =	29000	ksi
K =	0.85	
KL/r =	58.890	
F_e =	82.53	ksi
F_{cr} =	38.80	ksi
$ØP_{nc}$ =	314.29	kips
$ØP_{nt}$ =	352.46	kips
Bridge Stiffener Rating =	82.4%	OK

Existing Flange Connection @ 40'
US-CT-1002, Kettleton
2019791.CT1002.09

*O.T. Moment =	1026.178	k*ft
Axial =	72.529	kips
Shear =	34.34	kips

Acceptable Stress Ratio = 105.0%

*Above reactions have been adjusted due to consideration of modifications. See attached hand calculations for determination of flange bolt forces used in the analysis.

Flange Bolts

# Bolts =	32	
Bolt Type =	A325	
Threads Included? =	Yes	
Bolt Diameter =	1.75	in
Bolt Circle =	50	in
ϕ_t =	0.75	
ϕ_v =	0.75	

Tension & Shear (TIA-222-G-1, Section 4.9.6)

F_{ub} =	105	ksi
A_b =	2.405282	in^2
A_n =	1.9	in^2
ϕR_{nv} =	85.24	kips
ϕR_{nt} =	149.63	kips
ϕR_{nt} (adjusted)=	149.61	kips
V_{ub} =	1.07	kips
T_{ub} =	28.50	kips

Prying Action Check

N/A for stiffened flange

Max Comp. on Bolt =	33.03	kips
Shear Capacity =	1.3%	
Tensile Capacity =	19.0%	
Interaction Capacity =	19.0%	
Bolt Capacity =	**19.0%**	**OK**

Pole Information

Shaft Diam. (Upper) =	60	in
Thickness (Upper)=	0.5	in
# of Sides (Upper) =	Round	
F_y (Upper) =	42	ksi
Shaft Diam. (Lower) =	60	in
Thickness (Lower)=	0.625	in
# of Sides (Lower) =	Round	
F_y (Lower) =	42	ksi

Upper Flange Plate

Location =	Internal	
Plate Strength (F_y) =	36	ksi
Plate Tensile (F_u) =	58	ksi
Plate Thickness =	1.25	in
Hole Diameter =	43	in
ϕ_f =	0.9	
b =	4.28	in
Le =	7.00	in
Z =	2.34	in^3
M_u =	21.02	k-in
ϕM_n =	75.9375	k-in
UP Capacity =	**27.7%**	**OK**

Lower Flange Plate

Location =	Internal	
Plate Strength (F_y) =	36	ksi
Plate Thickness =	1.25	in
Hole Diameter =	43	in
b =	4.28	in
Le =	7.00	in
Z =	2.34	in^3
M_u =	21.02	k-in
ϕM_n =	75.9375	k-in
LP Capacity =	**27.7%**	**OK**

UpperStiffeners

Configuration =	Every Bolt	
Thickness =	0.625	in
Width =	7	in
Notch =	0.5	in
Height =	10	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	No	
Stiffener Vertical Force =	16.53	kips
Vert. Weld Capacity =	*Not Verified*	kips
Horiz. Weld Capacity =	*Not Verified*	kips
Stiffener Capacity =	30.2%	kips
Controlling Capacity =	**30.2%**	**OK**

Lower Stiffeners

Configuration =	Every Bolt	
Thickness =	0.625	in
Width =	7	in
Notch =	0.5	in
Height =	10	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	No	
Stiffener Vertical Force =	14.79	kips
Vert. Weld Capacity =	*Not Verified*	kips
Horiz. Weld Capacity =	*Not Verified*	kips
Stiffener Capacity =	27.0%	kips
Controlling Capacity =	**27.0%**	**OK**

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BOLT AND BRIDGE STIFFENER CALCULATIONS @ 60'

Moment from TNX (M) =	3179.92	kip-ft	ASIF =	1.00				
Axial from TNX (P) =	59.28	kip						
Inner Bolt Diameter =	1.25	in						
Inner Bolt Area (A_{inner}) =	1.23	in^2	Inner Bolt Circle (BC_{inner}) =	47	in			
Inner Bolt MOI ($I_{o.inner}$) =	0.12	in^4	Total Area ($A_{tot.in}$) =	39.27	in^2			
Number Inner Bolts (N_{inner}) =	32		Percent Total Area (η_{in}) =	29.6%		Axial, Inner Bolts ($P*\eta_{in}$) =	17.56	kips
Outer Bolt Diameter =	1.25	in						
Outer Bolt Area (A_{outer}) =	1.23	in^2	Outer Bolt Circle (BC_{outer}) =	53	in			
Outer Bolt MOI ($I_{o.outer}$) =	0.12	in^4	Total Area ($A_{tot.out}$) =	39.27	in^2			
Number Outer Bolts (N_{outer}) =	32		Percent Total Area (η_{out}) =	29.6%		Axial, Outer Bolts ($P*\eta_{out}$) =	17.56	kips
Bridge Stiffener Width =	6.00	in						
Bridge Stiffener Thickness =	1.50	in	Connection Bolt Hole Size =	1.21875	in			
Bridge Stiffener Unbraced Length =	30.00	in	Net Bridge Stiffener Area ($A_{e.pl}$)	7.17188	in			
Bridge Stiffener Area (A_{pl}) =	9.00	in^2	Bridge Stiffener Circle (BC_{pl}) =	63	in			
Bridge Stiffener MOI (I_o) =	27.00	in^4	Total Area ($A_{tot.pl}$) =	54.00	in^2			
Number Bridge Stiffeners (N_{pl})	6		Percent Total Area (η_{pl}) =	40.7%		Axial, Bridge Stiffener ($P*\eta_{pl}$) =	24.15	kips

I_{inner} =	10847.24	$in.^4$	$(N_{inner}*A_{inner}*BC_{inner}^2/8 + N_{inner}*I_{o.inner})$
I_{outer} =	13792.48	$in.^4$	$(N_{outer}*A_{outer}*BC_{outer}^2/8 + N_{outer}*I_{o.outer})$
I_{pl} =	26952.75	$in.^4$	$(N_{pl}*A_{pl}*BC_{pl}^2/8 + N_{pl}*I_{o.pl})$
I_{tot} =	51592.47	$in.^4$	$(I_{inner} + I_{outer} + I_{pl})$
$P_{u.t.inner}$ =	20.8	kips	$(M*(BC_{inner}/2)*A_{inner})/I_{total}$ - $P*\eta_{in}/N_{inner})$
$P_{u.t.outer}$ =	23.5	kips	$(M*(BC_{outer}/2)*A_{outer})/I_{total}$ - $P*\eta_{out}/N_{outer})$
$P_{u.t.pl}$ =	205.7	kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total}$ - $P*\eta_{pl}/N_{pl})$
$P_{u.c.pl}$ =	213.7	kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total}$ + $P*\eta_{pl}/N_{pl})$
$ØP_{nt.bolt}$ =	96.64	kips	
Bolt Rating =	24.3%	OK	

Bridge Stiffener Check

f_y =	50	ksi
f_u =	65	ksi
E =	29000	ksi
K =	0.85	
KL/r =	58.890	
F_e =	82.53	ksi
F_{cr} =	38.80	ksi
$ØP_{nc}$ =	314.29	kips
$ØP_{nt}$ =	349.63	kips
Bridge Stiffener Rating =	68.0%	OK

Existing Flange Connection @ **60'**

US-CT-1002, Kettleton

2019791.CT1002.09

*O.T. Moment =	744.2588	k*ft
Axial =	59.28	kips
Shear =	32.71	kips

Acceptable Stress Ratio =	105.0%

*Above reactions have been adjusted due to consideration of modifications. See attached hand calculations for determination of flange bolt forces used in the analysis.

Flange Bolts		
# Bolts =	32	
Bolt Type =	A325	
Threads Included? =	Yes	
Bolt Diameter =	1.75	in
Bolt Circle =	44	in
ϕ_t =	0.75	
ϕ_v =	0.75	
Tension & Shear (TIA-222-G-1, Section 4.9.6)		
F_{ub} =	105	ksi
A_b =	2.405282	in^2
A_n =	1.9	in^2
ϕR_{nv} =	85.24	kips
ϕR_{nt} =	149.63	kips
ϕR_{nt} (adjusted)=	149.61	kips
V_{ub} =	1.02	kips
T_{ub} =	23.50	kips
Prying Action Check		
N/A for stiffened flange		
Max Comp. on Bolt =	27.20	kips
Shear Capacity =	1.2%	
Tensile Capacity =	15.7%	
Interaction Capacity =	15.7%	
Bolt Capacity =	**15.7%**	**OK**

Pole Information		
Shaft Diam. (Upper) =	60	in
Thickness (Upper)=	0.375	in
# of Sides (Upper) =	Round	
F_y (Upper) =	42	ksi
Shaft Diam. (Lower) =	60	in
Thickness (Lower)=	0.5	in
# of Sides (Lower) =	Round	
F_y (Lower) =	42	ksi

Upper Flange Plate		
Location =	Internal	
Plate Strength (F_y) =	36	ksi
Plate Tensile (F_u) =	58	ksi
Plate Thickness =	1.25	in
Hole Diameter =	43	in
ϕ_f =	0.9	
b =	3.69	in
Le =	7.00	in
Z =	2.34	in^3
M_u =	16.06	k-in
ϕM_n =	75.9375	k-in
UP Capacity =	**21.1%**	**OK**

Lower Flange Plate		
Location =	Internal	
Plate Strength (F_y) =	36	ksi
Plate Thickness =	1.25	in
Hole Diameter =	43	in
b =	3.69	in
Le =	7.00	in
Z =	2.34	in^3
M_u =	16.06	k-in
ϕM_n =	75.9375	k-in
LP Capacity =	**21.1%**	**OK**

UpperStiffeners		
Configuration =	Every Bolt	
Thickness =	0.625	in
Width =	7	in
Notch =	0.5	in
Height =	10	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	No	
Stiffener Vertical Force =	13.73	kips
Vert. Weld Capacity =	*Not Verified*	kips
Horiz. Weld Capacity =	*Not Verified*	kips
Stiffener Capacity =	25.1%	kips
Controlling Capacity =	**25.1%**	**OK**

Lower Stiffeners		
Configuration =	Every Bolt	
Thickness =	0.625	in
Width =	7	in
Notch =	0.5	in
Height =	10	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	No	
Stiffener Vertical Force =	12.11	kips
Vert. Weld Capacity =	*Not Verified*	kips
Horiz. Weld Capacity =	*Not Verified*	kips
Stiffener Capacity =	22.1%	kips
Controlling Capacity =	**22.1%**	**OK**

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BOLT AND BRIDGE STIFFENER CALCULATIONS @ 80'

Moment from TNX (M) =	2544.48	kip-ft	ASIF =	1.00				
Axial from TNX (P) =	49.05	kip						
Inner Bolt Diameter =	1	in						
Inner Bolt Area (A_{inner}) =	0.79	in^2	Inner Bolt Circle (BC_{inner}) =	57	in			
Inner Bolt MOI ($I_{o.inner}$) =	0.05	in^4	Total Area ($A_{tot.in}$) =	37.70	in^2			
Number Inner Bolts (N_{inner}) =	48		Percent Total Area (η_{in}) =	58.3%		Axial, Inner Bolts ($P*\eta_{in}$) =	28.58	kips
Bridge Stiffener Width =	6.00	in						
Bridge Stiffener Thickness =	1.50	in	Connection Bolt Hole Size =	0	in			
Bridge Stiffener Unbraced Length =	12.00	in	Net Bridge Stiffener Area ($A_{e.pl}$)	9	in			
Bridge Stiffener Area (A_{pl}) =	9.00	in^2	Bridge Stiffener Circle (BC_{pl}) =	63	in			
Bridge Stiffener MOI (I_o) =	27.00	in^4	Total Area ($A_{tot.pl}$) =	27.00	in^2			
Number Bridge Stiffeners (N_{pl})	3		Percent Total Area (η_{pl}) =	41.7%		Axial, Bridge Stiffener ($P*\eta_{pl}$) =	20.47	kips

I_{inner} =	15312.91	$in.^4$	$(N_{inner}*A_{inner}*BC_{inner}^2/8+N_{inner}*I_{o.inner})$
I_{pl} =	13476.38	$in.^4$	$(N_{pl}*A_{pl}*BC_{pl}^2/8+N_{pl}*I_{o.pl})$
I_{tot} =	28789.28	$in.^4$	$(I_{inner} + I_{outer} + I_{pl})$
$P_{u.t.inner}$ =	23.1	kips	$(M*(BC_{inner}/2)*A_{inner})/I_{total} - P*\eta_{in}/N_{inner})$
$P_{u.t.pl}$ =	293.9	kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total} - P*\eta_{pl}/N_{pl})$
$P_{u.c.pl}$ =	307.5	kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total} + P*\eta_{pl}/N_{pl})$
$ØP_{nt.bolt}$ =	61.85	kips	
Bolt Rating =	37.4%	OK	

Bridge Stiffener Check

f_y =	50	ksi
f_u =	65	ksi
E =	29000	ksi
K =	0.85	
KL/r =	23.556	
F_e =	515.82	ksi
F_{cr} =	48.01	ksi
$ØP_{nc}$ =	388.90	kips
$ØP_{nt}$ =	438.75	kips
Bridge Stiffener Rating =	79.1%	OK

Existing Flange Connection @ 80'
US-CT-1002, Kettleton
2019791.CT1002.09

*O.T. Moment =	1375.156	k*ft
Axial =	49.05	kips
Shear =	30.57	kips

Acceptable Stress Ratio =	105.0%

*Above reactions have been adjusted due to consideration of modifications. See attached hand calculations for determination of flange bolt forces used in the analysis.

Flange Bolts

# Bolts =	48	
Bolt Type =	A325	
Threads Included? =	Yes	
Bolt Diameter =	1	in
Bolt Circle =	57	in
ϕ_t =	0.75	
ϕ_v =	0.75	
Tension & Shear (TIA-222-G-1, Section 4.9.6)		
F_{ub} =	120	ksi
A_b =	0.785398	in^2
A_n =	0.606	in^2
ϕR_{nv} =	31.81	kips
ϕR_{nt} =	54.54	kips
ϕR_{nt} (adjusted)=	54.53	kips
V_{ub} =	0.64	kips
T_{ub} =	23.10	kips

Prying Action Check

N/A, top flange thickness > tc

Max Comp. on Bolt =	25.14	kips
Shear Capacity =	2.0%	
Tensile Capacity =	42.4%	
Interaction Capacity =	42.4%	
Bolt Capacity =	**42.4%**	**OK**

Pole Information

Shaft Diam. (Upper) =	54	in
Thickness (Upper)=	0.375	in
# of Sides (Upper) =	Round	
F_y (Upper) =	42	ksi
Shaft Diam. (Lower) =	60	in
Thickness (Lower)=	0.375	in
# of Sides (Lower) =	Round	
F_y (Lower) =	42	ksi

Upper Flange Plate

Location =	External	
Plate Strength (F_y) =	36	ksi
Plate Tensile (F_u) =	58	ksi
Plate Thickness =	1.25	in
Outer Diameter =	60.375	in
ϕ_f =	0.9	
b =	3.11	in
Le =	3.00	in
Z =	2.34	in^3
M_u =	31.94	k-in
ϕM_n =	75.9375	k-in
UP Capacity =	**42.1%**	**OK**

Lower Flange Plate

Location =	Internal	
Plate Strength (F_y) =	36	ksi
Plate Thickness =	1.25	in
Hole Diameter =	51.375	in
b =	3.11	in
Le =	2.00	in
Z =	2.34	in^3
M_u =	38.14	k-in
ϕM_n =	75.9375	k-in
LP Capacity =	**50.2%**	**OK**

UpperStiffeners

Configuration =	Every Bolt	
Thickness =	0.625	in
Width =	3	in
Notch =	0.5	in
Height =	5	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	Yes	
Vertical Weld Size =	0.3125	in
Horiz. Weld Type =	Fillet	
Fillet Size =	0.3125	in
Weld Strength =	70	ksi
Stiffener Vertical Force =	14.35	kips
Vert. Weld Capacity =	31.5%	kips
Horiz. Weld Capacity =	45.0%	kips
Stiffener Capacity =	49.9%	kips
Controlling Capacity =	**49.9%**	**OK**

Lower Stiffeners

Configuration =	Every Bolt	
Thickness =	0.625	in
Width =	2	in
Notch =	0.5	in
Height =	3.5	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	Yes	
Vertical Weld Size =	0.3125	in
Horiz. Weld Type =	Fillet	
Fillet Size =	0.3125	in
Weld Strength =	70	ksi
Stiffener Vertical Force =	9.30	kips
Vert. Weld Capacity =	30.3%	kips
Horiz. Weld Capacity =	48.6%	kips
Stiffener Capacity =	45.8%	kips
Controlling Capacity =	**48.6%**	**OK** - Welds Control

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BOLT AND BRIDGE STIFFENER CALCULATIONS @ 100'

Moment from TNX (M) =	1951.76	kip-ft	ASIF =	1.00				
Axial from TNX (P) =	40.34	kip						
Inner Bolt Diameter =	1	in						
Inner Bolt Area (A_{inner}) =	0.79	in^2	Inner Bolt Circle (BC_{inner}) =	51	in			
Inner Bolt MOI ($I_{o.inner}$) =	0.05	in^4	Total Area ($A_{tot.in}$) =	25.92	in^2			
Number Inner Bolts (N_{inner}) =	33		Percent Total Area (η_{in}) =	49.0%		Axial, Inner Bolts ($P*\eta_{in}$) =	19.76	kips
Bridge Stiffener Width =	6.00	in						
Bridge Stiffener Thickness =	1.50	in	Connection Bolt Hole Size =	0	in			
Bridge Stiffener Unbraced Length =	12.00	in	Net Bridge Stiffener Area ($A_{e.pl}$)	9	in2			
Bridge Stiffener Area (A_{pl}) =	9.00	in^2	Bridge Stiffener Circle (BC_{pl}) =	57	in			
Bridge Stiffener MOI (I_o) =	27.00	in^4	Total Area ($A_{tot.pl}$) =	27.00	in^2			
Number Bridge Stiffeners (N_{pl})	3		Percent Total Area (η_{pl}) =	51.0%		Axial, Bridge Stiffener ($P*\eta_{pl}$) =	20.58	kips

I_{inner} =	8428.25	$in.^4$	$(N_{inner}*A_{inner}*BC_{inner}^2/8+N_{inner}*I_{o.inner})$
I_{pl} =	11046.38	$in.^4$	$(N_{pl}*A_{pl}*BC_{pl}^2/8+N_{pl}*I_{o.pl})$
I_{tot} =	19474.63	$in.^4$	$(I_{inner} + I_{outer} + I_{pl})$
$P_{u.t.inner}$ =	23.5	kips	$(M*(BC_{inner}/2)*A_{inner})/I_{total}$ - $P*\eta_{in}/N_{inner})$
$P_{u.t.pl}$ =	301.6	kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total}$ - $P*\eta_{pl}/N_{pl})$
$P_{u.c.pl}$ =	315.3	kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total} + P*\eta_{pl}/N_{pl})$
$ØP_{nt.bolt}$ =	61.85	kips	
Bolt Rating =	38.0%	OK	

Bridge Stiffener Check

f_y =	50	ksi
f_u =	65	ksi
E =	29000	ksi
K =	0.85	
KL/r =	23.556	
F_e =	515.82	ksi
F_{cr} =	48.01	ksi
$ØP_{nc}$ =	388.90	kips
$ØP_{nt}$ =	438.75	kips
Bridge Stiffener Rating =	81.1%	OK

Existing Flange Connection @ **100'**
US-CT-1002, Kettleton
2019791.CT1002.09

*O.T. Moment =	941.9162	k*ft
Axial =	40.34	kips
Shear =	28.44	kips

Acceptable Stress Ratio =	105.0%

*Above reactions have been adjusted due to consideration of modifications. See attached hand calculations for determination of flange bolt forces used in the analysis.

Flange Bolts		
# Bolts =	36	
Bolt Type =	A325	
Threads Included? =	Yes	
Bolt Diameter =	1	in
Bolt Circle =	51	in
ϕ_t =	0.75	
ϕ_v =	0.75	
Tension & Shear (TIA-222-G-1, Section 4.9.6)		
F_{ub} =	120	ksi
A_b =	0.785398	in^2
A_n =	0.606	in^2
ϕR_{nv} =	31.81	kips
ϕR_{nt} =	54.54	kips
ϕR_{nt} (adjusted)=	54.52	kips
V_{ub} =	0.79	kips
T_{ub} =	23.50	kips
Prying Action Check		
N/A, top flange thickness > tc		
Max Comp. on Bolt =	25.74	kips
Shear Capacity =	2.5%	
Tensile Capacity =	43.1%	
Interaction Capacity =	43.1%	
Bolt Capacity =	**43.1% OK**	

Pole Information		
Shaft Diam. (Upper) =	48	in
Thickness (Upper)=	0.375	in
# of Sides (Upper) =	Round	
F_y (Upper) =	42	ksi
Shaft Diam. (Lower) =	54	in
Thickness (Lower)=	0.375	in
# of Sides (Lower) =	Round	
F_y (Lower) =	42	ksi

Upper Flange Plate		
Location =	External	
Plate Strength (F_y) =	36	ksi
Plate Tensile (F_u) =	58	ksi
Plate Thickness =	1.25	in
Outer Diameter =	54.375	in
ϕ_f =	0.9	
wcalc =	17.23	in
wmax =	25.70	in
w =	17.23	in
Z =	6.73	in^3
M_u =	103.40	k-in
ϕM_n =	218.1139	k-in
UP Capacity =	**47.4% OK**	

Lower Flange Plate		
Location =	Internal	
Plate Strength (F_y) =	36	ksi
Plate Thickness =	1.25	in
Hole Diameter =	45.375	in
Pole Inner Diameter =	53.25	in
e =	1.13	in
w =	4.65	in
Z =	1.82	in^3
M_u =	28.96	k-in
ϕM_n =	58.81282	k-in
LP Capacity =	**49.2% OK**	

UpperStiffeners		
Configuration =	Every Other	
Thickness =	0.625	in
Width =	3	in
Notch =	0.5	in
Height =	5	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	Yes	
Vertical Weld Size =	0.3125	in
Horiz. Weld Type =	Fillet	
Fillet Size =	0.3125	in
Weld Strength =	70	ksi

Stiffeners ineffective - check plate unstiffened

Lower Stiffeners		
Configuration =	Every Other	
Thickness =	0.625	in
Width =	2	in
Notch =	0.5	in
Height =	3.5	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	Yes	
Vertical Weld Size =	0.3125	in
Horiz. Weld Type =	Fillet	
Fillet Size =	0.3125	in
Weld Strength =	70	ksi

Stiffeners ineffective - check plate unstiffened

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BOLT AND BRIDGE STIFFENER CALCULATIONS @ 120'

Moment from TNX (M) =	1401.33	kip-ft	ASIF =	1.00					
Axial from TNX (P) =	32.24	kip							
Inner Bolt Diameter =	1	in							
Inner Bolt Area (A_{inner}) =	0.79	in^2	Inner Bolt Circle (BC_{inner}) =	45	in				
Inner Bolt MOI ($I_{o.inner}$) =	0.05	in^4	Total Area ($A_{tot.in}$) =	25.13	in^2				
Number Inner Bolts (N_{inner}) =	32		Percent Total Area (η_{in}) =	48.2%		Axial, Inner Bolts ($P*\eta_{in}$) =	15.54	kips	
Bridge Stiffener Width =	6.00	in							
Bridge Stiffener Thickness =	1.50	in	Connection Bolt Hole Size =	0	in				
Bridge Stiffener Unbraced Length =	12.00	in	Net Bridge Stiffener Area ($A_{e.pl}$)	9	in2				
Bridge Stiffener Area (A_{pl}) =	9.00	in^2	Bridge Stiffener Circle (BC_{pl}) =	51	in				
Bridge Stiffener MOI (I_o) =	27.00	in^4	Total Area ($A_{tot.pl}$) =	27.00	in^2				
Number Bridge Stiffeners (N_{pl})	3		Percent Total Area (η_{pl}) =	51.8%		Axial, Bridge Stiffener ($P*\eta_{pl}$) =	16.69	kips	

I_{inner} =	6363.30	$in.^4$	$(N_{inner}*A_{inner}*BC_{inner}^2/8+N_{inner}*I_{o.inner})$
I_{pl} =	8859.38	$in.^4$	$(N_{pl}*A_{pl}*BC_{pl}^2/8+N_{pl}*I_{o.pl})$
I_{tot} =	15222.67	$in.^4$	$(I_{inner} + I_{outer} + I_{pl})$
$P_{u.t.inner}$ =	19.0	kips	$(M*(BC_{inner}/2)*A_{inner})/I_{total}$ - $P*\eta_{in}/N_{inner})$
$P_{u.t.pl}$ =	248.0	kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total}$ - $P*\eta_{pl}/N_{pl})$
$P_{u.c.pl}$ =	259.1	kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total} + P*\eta_{pl}/N_{pl})$
$ØP_{nt.bolt}$ =	61.85	kips	
Bolt Rating =	30.8%	OK	

Bridge Stiffener Check

f_y =	50	ksi
f_u =	65	ksi
E =	29000	ksi
K =	0.85	
KL/r =	23.556	
F_e =	515.82	ksi
F_{cr} =	48.01	ksi
$ØP_{nc}$ =	388.90	kips
$ØP_{nt}$ =	438.75	kips
Bridge Stiffener Rating =	66.6%	OK

Existing Flange Connection @ 120'
US-CT-1002, Kettleton
2019791.CT1002.09

*O.T. Moment =	600.3685	k*ft
Axial =	32.24	kips
Shear =	26.33	kips

Acceptable Stress Ratio =	105.0%

*Above reactions have been adjusted due to consideration of modifications. See attached hand calculations for determination of flange bolt forces used in the analysis.

Flange Bolts

# Bolts =	32	
Bolt Type =	A325	
Threads Included? =	Yes	
Bolt Diameter =	1	in
Bolt Circle =	45	in
ϕ_t =	0.75	
ϕ_v =	0.75	

Tension & Shear (TIA-222-G-1, Section 4.9.6)

F_{ub} =	120	ksi
A_b =	0.785398	in^2
A_n =	0.606	in^2
ϕR_{nv} =	31.81	kips
ϕR_{nt} =	54.54	kips
ϕR_{nt} (adjusted)=	54.52	kips
V_{ub} =	0.82	kips
T_{ub} =	19.00	kips

Prying Action Check

N/A, top flange thickness > tc

Max Comp. on Bolt =	21.01	kips
Shear Capacity =	2.6%	
Tensile Capacity =	34.8%	
Interaction Capacity =	34.8%	
Bolt Capacity =	**34.8%**	**OK**

Pole Information

Shaft Diam. (Upper) =	42	in
Thickness (Upper)=	0.375	in
# of Sides (Upper) =	Round	
F_y (Upper) =	42	ksi
Shaft Diam. (Lower) =	48	in
Thickness (Lower)=	0.375	in
# of Sides (Lower) =	Round	
F_y (Lower) =	42	ksi

Upper Flange Plate

Location =	External	
Plate Strength (F_y) =	36	ksi
Plate Tensile (F_u) =	58	ksi
Plate Thickness =	1.25	in
Outer Diameter =	48.375	in
ϕ_f =	0.9	
wcalc =	16.16	in
wmax =	25.56	in
w =	16.16	in
Z =	6.31	in^3
M_u =	79.63	k-in
ϕM_n =	204.468	k-in
UP Capacity =	**38.9%**	**OK**

Lower Flange Plate

Location =	Internal	
Plate Strength (F_y) =	36	ksi
Plate Thickness =	1.25	in
Hole Diameter =	39.375	in
Pole Inner Diameter =	47.25	in
e =	1.13	in
w =	4.64	in
Z =	1.81	in^3
M_u =	23.64	k-in
ϕM_n =	58.70928	k-in
LP Capacity =	**40.3%**	**OK**

UpperStiffeners

Configuration =	Every Other	
Thickness =	0.625	in
Width =	3	in
Notch =	0.5	in
Height =	5	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	Yes	
Vertical Weld Size =	0.3125	in
Horiz. Weld Type =	Fillet	
Fillet Size =	0.3125	in
Weld Strength =	70	ksi

Stiffeners ineffective - check plate unstiffened

Lower Stiffeners

Configuration =	Every Other	
Thickness =	0.625	in
Width =	2	in
Notch =	0.5	in
Height =	3.5	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	Yes	
Vertical Weld Size =	0.3125	in
Horiz. Weld Type =	Fillet	
Fillet Size =	0.3125	in
Weld Strength =	70	ksi

Stiffeners ineffective - check plate unstiffened

Existing Flange Connection @ 140'
US-CT-1002, Kettleton
2019791.CT1002.09

O.T. Moment =	892.50	k*ft
Axial =	25.18	kips
Shear =	24.55	kips

Acceptable Stress Ratio =	105.0%

Flange Bolts

# Bolts =	28	
Bolt Type =	A325	
Threads Included? =	Yes	
Bolt Diameter =	1	in
Bolt Circle =	39	in
ϕ_t =	0.75	
ϕ_v =	0.75	

Tension & Shear (TIA-222-G-1, Section 4.9.6)

F_{ub} =	120	ksi
A_b =	0.785398	in^2
A_n =	0.606	in^2
ϕR_{nv} =	31.81	kips
ϕR_{nt} =	54.54	kips
ϕR_{nt} (adjusted)=	54.52	kips
V_{ub} =	0.88	kips
T_{ub} =	38.32	kips

Prying Action Check

N/A, top flange thickness > tc

Max Comp. on Bolt =	40.12	kips
Shear Capacity =	2.8%	
Tensile Capacity =	70.3%	
Interaction Capacity =	70.3%	
Bolt Capacity =	**70.3%**	**OK**

Pole Information

Shaft Diam. (Upper) =	36	in
Thickness (Upper)=	0.375	in
# of Sides (Upper) =	Round	
F_y (Upper) =	42	ksi
Shaft Diam. (Lower) =	42	in
Thickness (Lower)=	0.375	in
# of Sides (Lower) =	Round	
F_y (Lower) =	42	ksi

Upper Flange Plate

Location =	External	
Plate Strength (F_y) =	36	ksi
Plate Tensile (F_u) =	58	ksi
Plate Thickness =	1.25	in
Outer Diameter =	42.375	in
ϕ_f =	0.9	
wcalc =	15.00	in
wmax =	25.38	in
w =	15.00	in
Z =	5.86	in^3
M_u =	140.60	k-in
ϕM_n =	189.8438	k-in
UP Capacity =	**74.1%**	**OK**

Lower Flange Plate

Location =	Internal	
Plate Strength (F_y) =	36	ksi
Plate Thickness =	1.25	in
Hole Diameter =	33.375	in
Pole Inner Diameter =	41.25	in
e =	1.13	in
w =	4.63	in
Z =	1.81	in^3
M_u =	45.13	k-in
ϕM_n =	58.57615	k-in
LP Capacity =	**77.0%**	**OK**

UpperStiffeners

Configuration =	Every Other	
Thickness =	0.5	in
Width =	3	in
Notch =	0.5	in
Height =	5	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	Yes	
Vertical Weld Size =	0.3125	in
Horiz. Weld Type =	Fillet	
Fillet Size =	0.3125	in
Weld Strength =	70	ksi

Stiffeners ineffective - check plate unstiffened

Lower Stiffeners

Configuration =	Every Other	
Thickness =	0.5	in
Width =	2	in
Notch =	0.5	in
Height =	3.5	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	Yes	
Vertical Weld Size =	0.3125	in
Horiz. Weld Type =	Fillet	
Fillet Size =	0.3125	in
Weld Strength =	70	ksi

Stiffeners ineffective - check plate unstiffened

Existing Flange Connection @ **160'**
US-CT-1002, Kettleton
2019791.CT1002.09

O.T. Moment =	438.14	k*ft
Axial =	16.99	kips
Shear =	18.62	kips

Acceptable Stress Ratio =	105.0%

Flange Bolts		
# Bolts =	24	
Bolt Type =	A325	
Threads Included? =	Yes	
Bolt Diameter =	1	in
Bolt Circle =	33	in
ϕ_t =	0.75	
ϕ_v =	0.75	
Tension & Shear (TIA-222-G-1, Section 4.9.6)		
F_{ub} =	120	ksi
A_b =	0.785398	in^2
A_n =	0.606	in^2
ϕR_{nv} =	31.81	kips
ϕR_{nt} =	54.54	kips
ϕR_{nt} (adjusted)=	54.52	kips
V_{ub} =	0.78	kips
T_{ub} =	25.83	kips
Prying Action Check		
N/A, top flange thickness > tc		
Max Comp. on Bolt =	27.25	kips
Shear Capacity =	2.4%	
Tensile Capacity =	47.4%	
Interaction Capacity =	47.4%	
Bolt Capacity =	**47.4% OK**	

Pole Information		
Shaft Diam. (Upper) =	30	in
Thickness (Upper)=	0.375	in
# of Sides (Upper) =	Round	
F_y (Upper) =	42	ksi
Shaft Diam. (Lower) =	36	in
Thickness (Lower)=	0.375	in
# of Sides (Lower) =	Round	
F_y (Lower) =	42	ksi

Upper Flange Plate		
Location =	External	
Plate Strength (F_y) =	36	ksi
Plate Tensile (F_u) =	58	ksi
Plate Thickness =	1.25	in
Outer Diameter =	36.375	in
ϕ_f =	0.9	
wcalc =	13.75	in
wmax =	21.04	in
w =	13.75	in
Z =	5.37	in^3
M_u =	90.29	k-in
ϕM_n =	173.9947	k-in
UP Capacity =	**51.9% OK**	

Lower Flange Plate		
Location =	Internal	
Plate Strength (F_y) =	36	ksi
Plate Thickness =	1.25	in
Hole Diameter =	27.375	in
Pole Inner Diameter =	35.25	in
e =	1.13	in
w =	4.61	in
Z =	1.80	in^3
M_u =	30.66	k-in
ϕM_n =	58.39865	k-in
LP Capacity =	**52.5% OK**	

UpperStiffeners		
Configuration =	Every Other	
Thickness =	0.625	in
Width =	3	in
Notch =	0.5	in
Height =	5	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	Yes	
Vertical Weld Size =	0.3125	in
Horiz. Weld Type =	Fillet	
Fillet Size =	0.3125	in
Weld Strength =	70	ksi

Stiffeners ineffective - check plate unstiffened

Lower Stiffeners		
Configuration =	Every Other	
Thickness =	0.625	in
Width =	2	in
Notch =	0.5	in
Height =	3.5	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	Yes	
Vertical Weld Size =	0.3125	in
Horiz. Weld Type =	Fillet	
Fillet Size =	0.3125	in
Weld Strength =	70	ksi

Stiffeners ineffective - check plate unstiffened

Existing Flange Connection @ **180'**

US-CT-1002, Kettleton

2019791.CT1002.09

O.T. Moment =	132.09	k*ft
Axial =	10.36	kips
Shear =	13.27	kips

Acceptable Stress Ratio =	105.0%

Flange Bolts

# Bolts =	20	
Bolt Type =	A325	
Threads Included? =	Yes	
Bolt Diameter =	1	in
Bolt Circle =	27	in
ϕ_t =	0.75	
ϕ_v =	0.75	
Tension & Shear (TIA-222-G-1, Section 4.9.6)		
F_{ub} =	120	ksi
A_b =	0.785398	in^2
A_n =	0.606	in^2
ϕR_{nv} =	31.81	kips
ϕR_{nt} =	54.54	kips
ϕR_{nt} (adjusted)=	54.53	kips
V_{ub} =	0.66	kips
T_{ub} =	11.22	kips
Prying Action Check		
N/A, top flange thickness > tc		
Max Comp. on Bolt =	12.25	kips
Shear Capacity =	2.1%	
Tensile Capacity =	20.6%	
Interaction Capacity =	20.6%	
Bolt Capacity =	**20.6% OK**	

Pole Information

Shaft Diam. (Upper) =	24	in
Thickness (Upper)=	0.375	in
# of Sides (Upper) =	Round	
F_y (Upper) =	42	ksi
Shaft Diam. (Lower) =	30	in
Thickness (Lower)=	0.375	in
# of Sides (Lower) =	Round	
F_y (Lower) =	42	ksi

Upper Flange Plate

Location =	External	
Plate Strength (F_y) =	36	ksi
Plate Tensile (F_u) =	58	ksi
Plate Thickness =	1.25	in
Outer Diameter =	30.375	in
ϕ_f =	0.9	
wcalc =	12.37	in
wmax =	20.84	in
w =	12.37	in
Z =	4.83	in^3
M_u =	37.98	k-in
ϕM_n =	156.5492	k-in
UP Capacity =	**24.3% OK**	

Lower Flange Plate

Location =	Internal	
Plate Strength (F_y) =	36	ksi
Plate Thickness =	1.25	in
Hole Diameter =	24.25	in
Pole Inner Diameter =	29.25	in
e =	1.13	in
w =	4.59	in
Z =	1.79	in^3
M_u =	13.78	k-in
ϕM_n =	58.15014	k-in
LP Capacity =	**23.7% OK**	

UpperStiffeners

Configuration =	Every Other	
Thickness =	0.625	in
Width =	3	in
Notch =	0.5	in
Height =	5	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	Yes	
Vertical Weld Size =	0.3125	in
Horiz. Weld Type =	Fillet	
Fillet Size =	0.3125	in
Weld Strength =	70	ksi

Stiffeners ineffective - check plate unstiffened

Lower Stiffeners

Configuration =	Every Other	
Thickness =	0.625	in
Width =	2	in
Notch =	0.5	in
Height =	3.5	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	Yes	
Vertical Weld Size =	0.3125	in
Horiz. Weld Type =	Fillet	
Fillet Size =	0.3125	in
Weld Strength =	70	ksi

Stiffeners ineffective - check plate unstiffened

APPENDIX E

Base Plate and Anchor Rod Analysis

Anchor Rod Interaction, TIA-222-G
Kettleton / US-CT-1002
2019791.CT1002.09

Analysis Criteria		
Analysis Type =	Wind	
Analysis Interaction =	Pole to Added Rod	
Acceptable Stress Ratio =	1.05	
ASIF =	1.00	

tnx Reactions		
Overturning Moment =	5272.37	k*ft
Axial Force =	101.87	k
Shear Force =	36.49	k

Existing Anchor Rods		
Number of Rods =	52	
Rod Circle =	67	in
Rod Diameter =	1.25	in
Est. Dist. b/w ea. Rod =		in
Plate Type =	Round	
Plate Diameter =	69.75	in

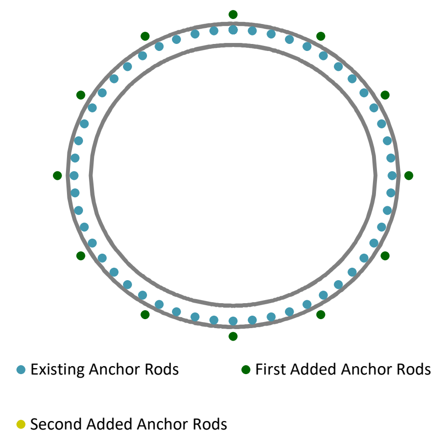
Pole		
Pole Diameter =	60	in
Number of Sides =	Round	
Thickness =	0.625	in

First Added Anchor Rods		
Number of Rods =	12	
Rod Circle =	74.00	in
Rod Diameter =	1.25	in
Anchor Rod Grade =	F1554 GR 105	
Unbraced Length, lar =	1.25	in

Rod Number	Initial Angle
1	0
2	30
3	60
4	90
5	120
6	150
7	180
8	210
9	240
10	270
11	300
12	330

First Added Anchor Rods		
Max Rod Force =	46.74	k
ϕRnt =	96.90	k
Anchor Rod Capacity =	48.2%	**OK**

Reactions in Existing Rods		
Overturning Moment =	**4407.55**	k*ft
Axial Force =	**101.87**	k
Shear Force =	**36.49**	k
Centroid Offset =	**0.00**	in
Max Existing Rod (Pu + Vu / η) =	64.08	kips



Second Added Anchor Rods		
Number of Rods =		
Rod Circle =		in
Rod Diameter =		in
Anchor Rod Grade =		
Unbraced Length, lar =		in

Anchor Rod and Base Plate Stresses, TIA-222-G-1
Kettleton / US-CT-1002
2019791.CT1002.09

Overturning Moment =	4407.55	k*ft
Axial Force =	101.87	k
Shear Force =	36.49	k

Acceptable Stress Ratio =	105.0%

Anchor Rods

(Section 4.9.9, TIA-222-G-1)

Number of Rods =	52	
ϕ =	0.8	
Rod Ultimate Strength (F_u) =	100	ksi
Base Plate Detail Type* =	d	
Rod Circle =	67	in
Rod Diameter =	1.25	in
Net Tensile Area =	0.97	in^2
Max Tension on Rod =	58.75	kips
Max Compression on Rod =	62.67	kips
P_u =	62.67	kips
V_u =	0.70	kips
η =	0.50	
$P_u + V_u / η$ =	64.08	
$φR_{nt}$ =	77.52	kips
Anchor Rod Capacity =	**82.7%**	**OK**

***This analysis assumes the clear distance from the top of the concrete to the bottom of the leveling nut is less than the diameter of the anchor rod. Notify GPD Group immediately if existing field conditions do not meet this assumption.**

Stiffeners

Configuration =	Every Rod	
Thickness =	0.625	in
Width =	4.5	in
Notch =	0.5	in
Height =	8	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	Yes	
Vertical Weld Size =	0.375	in
Horiz. Weld Type =	Fillet	
Fillet Size =	0.375	in
Weld Strength =	70	ksi
Stiffener Vertical Force =	36.82	kips
Vert. Weld Capacity =	39.1%	kips
Horiz. Weld Capacity =	59.1%	kips
Stiffener Capacity =	79.3%	kips
Controlling Capacity =	**79.3%**	**OK**

Base Plate

Location =	External	
Plate Strength (Fy) =	36	ksi
ϕ =	0.9	
Outside Diameter =	69.75	in
Plate Thickness =	1.25	in
b =	3.42	in
Le =	4.50	in
Z =	2.34	in^3
M_u =	55.25	k-in
$φM_n$ =	75.94	k-in
BP Capacity =	**72.8%**	**OK**

Pole

Pole Diameter =	60	in
Number of Sides =	Round	
Thickness =	0.625	in
Pole Yield Strength =	42	ksi

APPENDIX F

Foundation Analysis

Pile Analysis

Kettleton / US-CT-1002

2019791.CT1002.09

M	5272.37	k-ft
P	101.87	k
V	36.49	k
M tot	5473.08	k-ft
M tot 45	3870.052	k-ft
d	5.5	ft
h	46	ft
Vconc	11638	ft^3
wconc	1745.7	k

Pile Ultimate Capacities

Existing

Compression	150	k
Tension	100	k

Modification

Compression	100	k
Tension	100	k

Wequip 75 k (weight of the equipment above the pad)

n existing	24
n mod	48

Total force on piles

				X			45	
	n	x (ft)	y (ft)	Pc (k)	Pt (k)	Mu (k-ft)	Pc (k)	Pt (k)
Existing	4	0	0	25.66	25.66	0.00	25.66	25.66
	10	6	6	27.72	23.60	831.54	28.57	22.75
	10	12	12	29.78	21.55	1786.53	31.48	19.84
	24							
Mod	2	0	0	25.66	25.66	0.00	25.66	25.66
	4	3.5	3.5	26.86	24.46	188.03	27.36	23.96
	4	7	7	28.06	23.26	392.85	29.06	22.27
	4	10.5	10.5	29.26	22.06	614.49	30.75	20.57
	4	14	14	30.46	20.86	852.92	32.45	18.87
	4	17.5	17.5	31.66	19.66	1108.15	34.15	17.17
	26	21	21	32.86	18.46	8971.25	35.84	15.48
	48							

Pile Capacities

Existing

Compression	39.7%
Tension	51.3%

Modification

Compression	65.7%
Tension	51.3%

Reinforcement Capacity

Mu	14745.76	k-ft
a	4.262575	in
d	60.885	in
Phi Mn	22473.3	k-ft

Capacity 65.6%

Exhibit E

Mount Analysis

ProTerra DESIGN GROUP, LLC

DESTEK ENGINEERING

Date: 6/7/2019

To: Mr. Peter Nute
ProTerra Design Group, LLC
4 Bay Road, Building A, Suite 200
Hadley, MA 01035

Subject:	**Mount Structural Analysis Report**	
T-Mobile Designation:	**Site ID:**	CT11126F
	Site Name:	SouthBury/ I-84 X15/ Bagl
Destek Designation:	**Project Number:**	1978010
Site Data:	**231 Kettleton Road, Southbury, CT 06488**	
	Latitude 41.47127232°, Longitude -73.2050978°	

Dear Mr. Nute,

Destek Engineering, LLC is pleased to submit this **"Mount Structural Analysis Report"** to determine the structural capacity of the antenna mount utilized by T-Mobile at the above referenced site.

The purpose of the analysis is to determine acceptability of the mount stress level for the changes proposed by T-Mobile. Under the following load case we have determined the mount to have:

Existing + Proposed Equipment **Adequate Capacity with Mods (74.0%)**
Note: See Analysis Criteria for loading configuration

The analysis has been performed in accordance with TIA-222-G Standard and the 2018 Connecticut State Building Code (2015 IBC).

We at *Destek Engineering, LLC* appreciate the opportunity of providing our continuing professional services to you. If you have any questions or need further assistance on this or any other projects, please give us a call.

Sincerely,
Destek Engineering, LLC
License No: PEC 0001429

6/7/2019

Ahmet Colakoglu, PE
Connecticut Professional Engineer
License No: PEN 27057

1) ANALYSIS CRITERIA

The analysis was performed for the existing and proposed appurtenances as specified in the loading information referenced below, and per the following loading criteria of Table 1.

Table 1 – Loading and Analysis Criteria

Rad Center	193' & 195'
Structure Type	Monopole Tower
Exposure Category	B
Wind Speed	120 mph* √0.6 = 93 mph (ASD)
Ice Loading	0.75" with 50 mph Wind
Risk Category	II
Topographic Factor	Kzt = 1.0

Table 1.1 – Existing Appurtenance Configuration

Qty	Model
3	EMS RR90-17-XXDP – Antennas
3	Andrew LNX-6515DS-A1M – Antennas
3	Generic Twin Style 1A – PCS - TMAs

Table 1.2 – Proposed and Final Appurtenance Configuration

Qty	Model
3	RFS APXVAARR24_43-U-NA20 – Antennas
3	RFS APX16DWV-16DWV-S-E-A20 – Antennas
3	Radio 4449 B71+B12 – RRUs*
3	Radio 4415 B25 – RRUs*
3	Radio 4415 B66A – RRUs*

***To be mounted behind antennas.**

Table 1.3 – Assumed Material Properties

Member Type	ASTM Material Designation	Fy (ksi)	Fu (ksi)
Pipes	A53 Gr. B	35	60
Angles/Channels	A36	36	58
Rectangular HSS	A500 Gr. B - 46	46	58
Round HSS	A500 Gr. B - 42	42	58
Others (UNO)	A572 Gr. 50	50	65

2) ANALYSIS PROCEDURE

The analysis is based on the following information:

Table 2 – Documents

Document	Provided By	Date
Site Photographs	ProTerra	05/04/2019
RFDS	T-Mobile	04/25/2019

2.1) Analysis Method

Risa-3D, a commercially available analysis software package, was used to create a three-dimensional model of the mount and calculate member stresses for various loading cases. Selected output from the analysis is included in the Appendix.

2.2) Analysis Conditions and Assumptions

1) The mount was built and installed in accordance with the manufacturer's specifications.
2) The mount has been maintained and will be maintained in accordance with the manufacturer's specifications. All structural members and connections of the mount are in good condition and can achieve theoretical strength.
3) The configuration of antennas is as specified in "1) Analysis Criteria".
4) The analysis was performed for the subject mount only. It does not include an evaluation of the other mounts or the tower, which should be analyzed by others.
5) The evaluation does not include any antenna rigging loads. The equipment should not be rigged using the subject antenna mount as the support.
6) The analysis includes a minimum 250 lbf maintenance point load at the worst-case location on the mount, as well as a minimum 250 lbf maintenance point load at each antenna location in conjunction with a 30 mph wind load.
7) Any steel grating represented in this model is for loading purposes only and it is not considered to provide any structural restraint or support.
8) Member sizes per the available site photographs and assumed based on our experience with similar structures. Please refer to calculation output in the appendix of this report for sizes and lengths assumed.
9) 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.

Destek Engineering, LLC must be notified immediately if any of these assumptions are discovered to be incorrect. The results of this analysis may be affected if any of the assumptions are not valid or have been made in error.

3) ANALYSIS RESULTS AND CONCLUSION

The analysis results are shown on the table below.

Table 3.1 – Mount Component Stresses vs. Capacity

Component	% Capacity	Pass / Fail
Horizontal Face Pipe	41.4	Pass
Horizontal Standoff Tube	51.7	Pass
Connection Plates	43.7	Pass
Antenna Mount Pipe	74.0	Pass

Platform Mount: The existing platform mount **will have adequate** capacity for the proposed changes by T-Mobile, once the platform has been modified. **A new 72" 2.0 STD pipe mount should be installed at position 1 and attached to the existing platform using Commscope Crossover Plates (Part #: CO-200). A new Commscope VSR Stabilizer Kit (Part #: VSR-MA-B) should be mounted to the pole 24" below the existing platform. New 15'-6" long 2.0 STD pipe should be used as the face members of the stabilizer kits. The face member should be attached to all the mount pipes using Commscope Universal Crossover Clamps (Part #: ASP617).** For the code specified load combinations and as a maximum, the mount members are stressed to **74.0%** of their structural capacity.

APPENDIX

INPUT LOADS
ANALYSIS OUTPUT

DESTEK ENGINEERING, LLC
1281 Kennestone Circle, Suite 100, Marietta, GA 30066 - Tel: (770) 693-0835

CLIENT: ProTerra

PROJECT: 1978010 - CT11126F

SUBJECT: Antenna Loads -TIA 222 G Stanadard (chapter 16 revisions)

Tower Height	195.00	ft	Type of Mount: Platform
Basic Wind Speed, V	93	mph (=Ultimate Speed*Sqrt(0.6))	
Basic Wind Speed with Ice, V_i	50	mph	
Maintanence Load Factor, L_{FM}	0.1041	Load Factor for Maint. Load Cases (Basic Wind Speed=30 mph)	
Design Ice Thickness, t_i		0.75	inches

Table 2-3 Importance Factors

Structure Classification	Wind Load Without Ice	Wind Load With Ice	Ice Thickness	Earthquake
II	1	1	1	1

0

1

Table 2-4 Exposure Category Coefficients

Exposure Category	Zg	α	Kzmin	Ke	m
B	1200	7	0.7	0.9	0.55

Table 2-5 Topographic Categories

Kzt 1.000

Table 2-2 Wind Directionality Factor, Kd

Structure Type	Kd	
Lattice Tower 1	0.95	DOES NOT CHANGE

Gust Effect Factor Gh

Structure Type	Gh	
Lattice Tower 1	1.00	DOES NOT CHANGE

Shielding Factor, Ka

Structure Type	Ka	
Lattice Tower	0.90	DOES NOT CHANGE

Seismic Factors

Ss	0.198	
S1	0.065	
Fa	1.6	
Fv	2.4	
R	3	Truss or Pole

CLIENT: ProTerra

PROJECT: 1978010 - CT11126F

SUBJECT: Antenna Loads -TIA 222 G Stanadard (chapter 16 revisions)

Rad Center 193.00 ft

Antenna AND Mount Without Ice

Mounting Pole	Height (ft)	Model Number	#	Weight (lbs)	H (in)	*W (in)	D (in)	Ka	**A_N (ft2)	***A_T (ft2)	Aspect (FRONT)	Aspect (SIDE)	Ca (FRONT)	Ca (SIDE)	K_z	q_z (psf)	Wind Load (Front)	Wind Load (Side)	Dead Load	Pounds: Total Wind Load (Front)	Total Wind Load (Side)	Total Dead Load	Lateral Load (Seismic)	Vertical Load (Seismic)
Pos. 1		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0	0	0	0	0	0
		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0					
		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0					
		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0					
		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0					
																				0	0	0	0	0
Pos.2	193.00	RFS APXVAARR24_43-U-NA20	1	128.0	95.9	24.0	8.7	0.90	15.98	5.79	4.00	11.02	1.27	1.53	1.192	25.1	456.9	200.6	128	457	242	247	8	10
	193.00	Radio 4449 B71+B12	1	75.0	15.0	N/A	9.3	0.90	-	0.96	-	1.62	-	1.20	1.192	25.1	0.0	26.0	75					
	193.00	Radio 4415 B25	1	44.0	15.0	N/A	5.4	0.90	-	0.56	-	2.78	-	1.21	1.192	25.1	0.0	15.4	44					
		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0					
		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0					
																				229	122	124	4	5
Pos.3	193.00	RFS APX16DWV-16DWV-S-E-A20	1	40.7	55.9	13.3	3.2	0.90	5.16	1.22	4.20	17.75	1.28	1.76	1.192	25.1	148.7	48.5	40.7	149	68	90	3	4
	193.00	Radio 4415 B66A	1	49.6	16.5	N/A	6.3	0.90	-	0.72	-	2.62	-	1.21	1.192	25.1	0.0	19.6	49.6					
		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0					
		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0					
		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0					
																				75	35	46	1	2
Pos.4		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0	0	0	0	0	0
		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0					
		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0					
		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0					
		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0					
																				0	0	0	0	0

* Enter N/A in the W column for front sheilded apurtanances.
** A_N is the product of H and W
*** A_T is the product of H and D

DL 337

Mount	Height (ft)	Member	*L (in)	**W (in)	D (in)	Weight (lb/ft)	*** Ca	K_z	q_z (psf)	Wind Load (PLF)	Lateral Load (Seismic)	Vertical Load (Seismic)
	193.00	1.25 STD Pipe	0.00	1.66	0.00		-	-	-	-	-	-
	193.00	2 STD Pipe	12.00	2.38	0.00		1.20	1.192	22.6	5	-	-
	193.00	2.5 STD Pipe	0.00	3.00	0.00		-	-	-	-	-	-
	193.00	3 STD Pipe	12.00	3.50	0.00		1.20	1.192	22.6	8	-	-
	193.00	(L3x3)	0.00	3.00	3.00		-	-	-	-	-	-
	193.00	(L2.5x2.5)	12.00	2.50	2.50		2.00	1.192	22.6	9	-	-
	193.00	Plate Horizontal (PL6x1/4)	12.00	0.25	6.00		2.00	1.192	22.6	1	-	-
	193.00	HSS4.5x4.5x4	12.00	4.50	4.50		2.00	1.192	22.6	17	-	-
	193.00	Double Angle (LL2x2x3x0)	0.00	2.00	2.00		-	-	-	-	-	-
	193.00	Andrew VSR	12.00	5.44	3.96		2.00	1.192	22.6	20	-	-
	193.00	Invert U 5.375x3.625x.375	0.00	3.63	5.38		-	-	-	-	-	-

* The dimension L is the longest dimension of the member
** The dimension W is the height or width of the member that resists wind load
*** Ca will equal 1.2 for round members and 2.0 for flat members

CLIENT: ProTerra

PROJECT: 1978010 - CT11126F

SUBJECT: Antenna Loads -TIA 222 G Stanadard (chapter 16 revisions)

ti (in) 1.789763 Kiz 1.1931755 reduction 0.28905

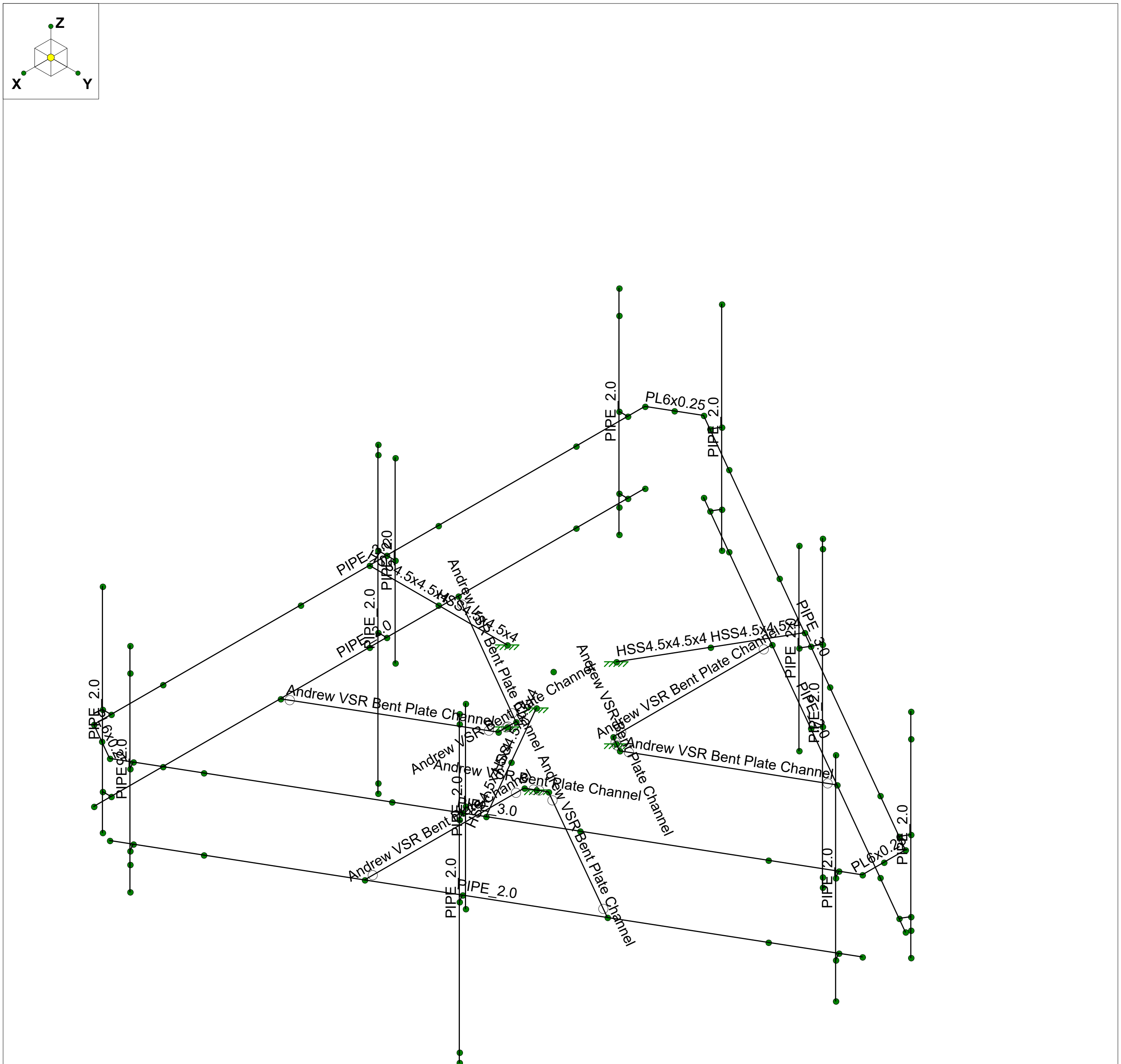
Antenna AND Mount With Ice

Mounting Pole	Height (ft)	Model Number	#	H (in)	W (in)	D (in)	Ka	$*A_N$ (ft2)	$*A_T$ (ft2)	*Volume Ice (ft3)	*Weight Ice (lbs)	**Ca (FRONT)	**Ca (SIDE)	Kz	q_z (psf)	Pounds: Ice Wind Load (Front)	Ice Wind Load (Side)	Combined Wind Load (Front)	Combined Wind Load (Side)	Ice Dead Load	**Total Wind Load (Front)	**Total Wind Load (Side)	Total Ice Load
Pos. 1		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0	0	0	0
		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0			
		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0			
		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0			
		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0			
																					0	0	0
Pos.2	193.00	RFS APXVAARR24_43-U-NA20	1	95.9	24.0	8.7	0.90	3.07	2.69	7.91	442.89	0.72	0.82	1.192	7.3	14.5	14.5	146.6	72.5	443	147	90	569
	193.00	Radio 4449 B71+B12	1	15.0	13.2	9.3	0.90	-	0.69	1.25	70.08	0.70	0.70	1.192	7.3	0.0	3.2	0.0	10.7	70			
	193.00	Radio 4415 B25	1	15.0	13.2	5.4	0.90	-	0.60	1.00	56.07	0.70	0.70	1.192	7.3	0.0	2.7	0.0	7.2	56			
		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0			
		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0			
																					74	46	285
Pos.3	193.00	RFS APX16DWV-16DWV-S-E-A20	1	55.9	13.3	3.2	0.90	1.81	1.56	2.55	143.06	0.72	0.84	1.192	7.3	8.5	8.5	51.5	22.6	143	52	31	207
	193.00	Radio 4415 B66A	1	16.5	13.5	6.3	0.90	-	0.66	1.15	64.32	0.70	0.70	1.192	7.3	0.0	3.0	0.0	8.7	64			
		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0			
		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0			
		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0			
																					26	16	104
Pos.4		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0	0	0	0
		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0			
		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0			
		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0			
		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0			
																					0	0	0

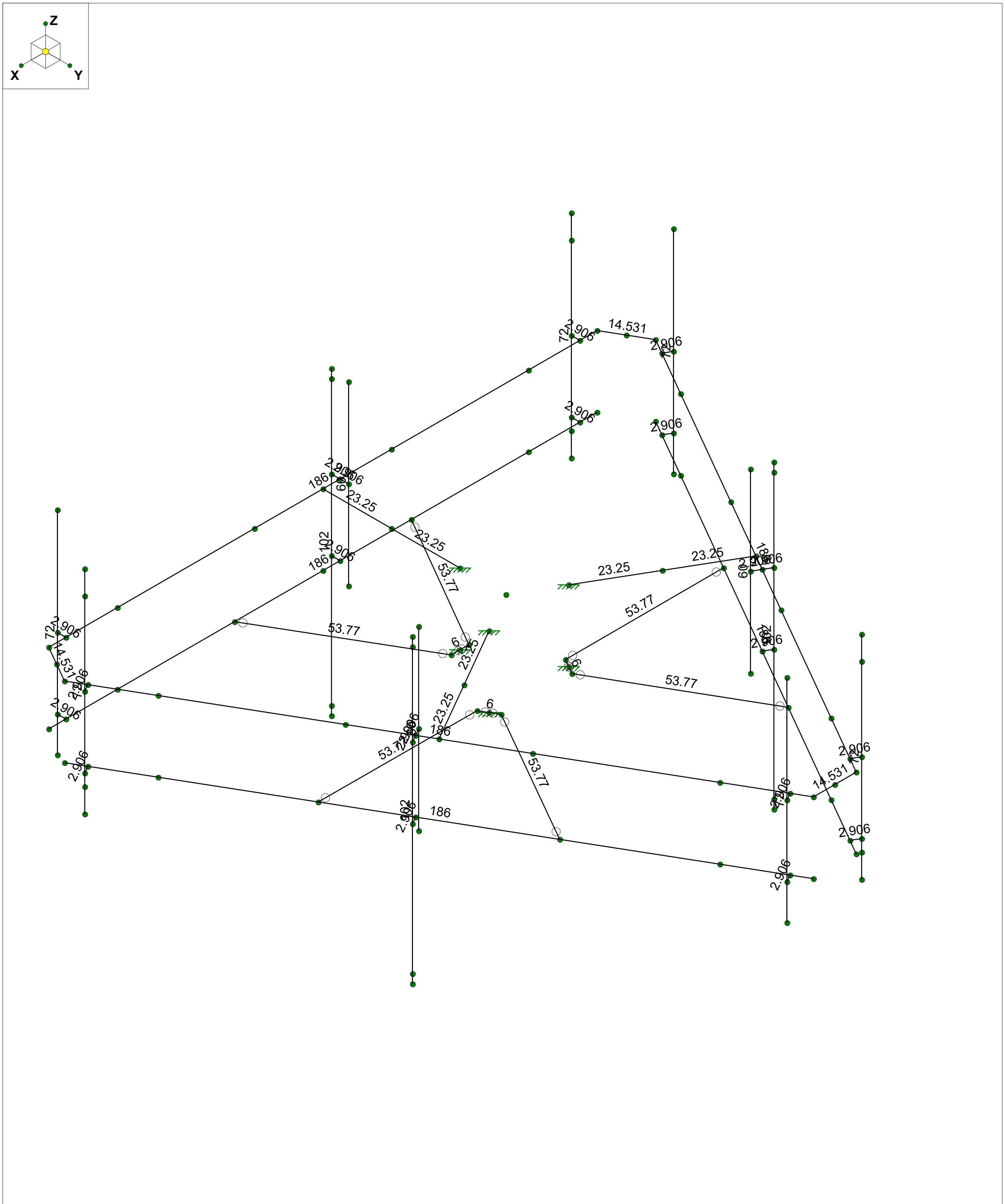
* A_N ,A_T, Volume Ice and Weight Ice are calculated per unit
** Ca will equal 1.2 for all ice load calculations

Mount	Height (ft)	Member	*L (in)	**W (in)	D (in)	$***A_N$ (ft2)	Volume Ice (ft3)	Weight Ice (lbs)	****Ca (FRONT)	Kz	q_z (psf)	PLF: Ice Wind Load (Front)	Combined Wind Load (Front)	Ice Dead Load
	193.00	1.25 STD Pipe	0.00	1.66	0.00	-	-	-	-	-	-	-	-	-
	193.00	2 STD Pipe	12.00	2.38	0.00	0.45	0.16	9.12	1.20	1.192	6.5	3.5	5.0	9
	193.00	2.5 STD Pipe	0.00	3.00	0.00	-	-	-	-	-	-	-	-	-
	193.00	3 STD Pipe	12.00	3.50	0.00	0.47	0.21	11.57	1.20	1.192	6.5	3.7	6.0	12
	193.00	(L3x3)	0.00	3.00	3.00	-	-	-	-	-	-	-	-	-
	193.00	(L2.5x2.5)	12.00	2.50	2.50	0.45	0.12	6.96	1.20	1.192	6.5	3.5	6.2	7
	193.00	Plate Horizontal (PL6x1/4)	12.00	0.25	6.00	0.39	0.32	17.94	1.20	1.192	6.5	3.1	3.4	18
	193.00	HSS4.5x4.5x4	12.00	4.50	4.50	0.50	0.45	25.08	1.20	1.192	6.5	3.9	8.8	25
	193.00	Double Angle (LL2x2x3x0)	0.00	2.00	2.00	-	-	-	-	-	-	-	-	-
	193.00	Andrew VSR	12.00	5.44	3.96	0.52	0.37	20.66	1.20	1.192	6.5	4.1	10.0	21
	193.00	Invert U 5.375x3.625x.375	0.00	3.63	5.38	-	-	-	-	-	-	-	-	-

* The dimension L is the longest dimension of the member
** The dimension W is the height or width of the member that resists wind load
*** A_N is the area of ice built up on the LW plane
**** Ca will equal 1.2 for all ice load calculations

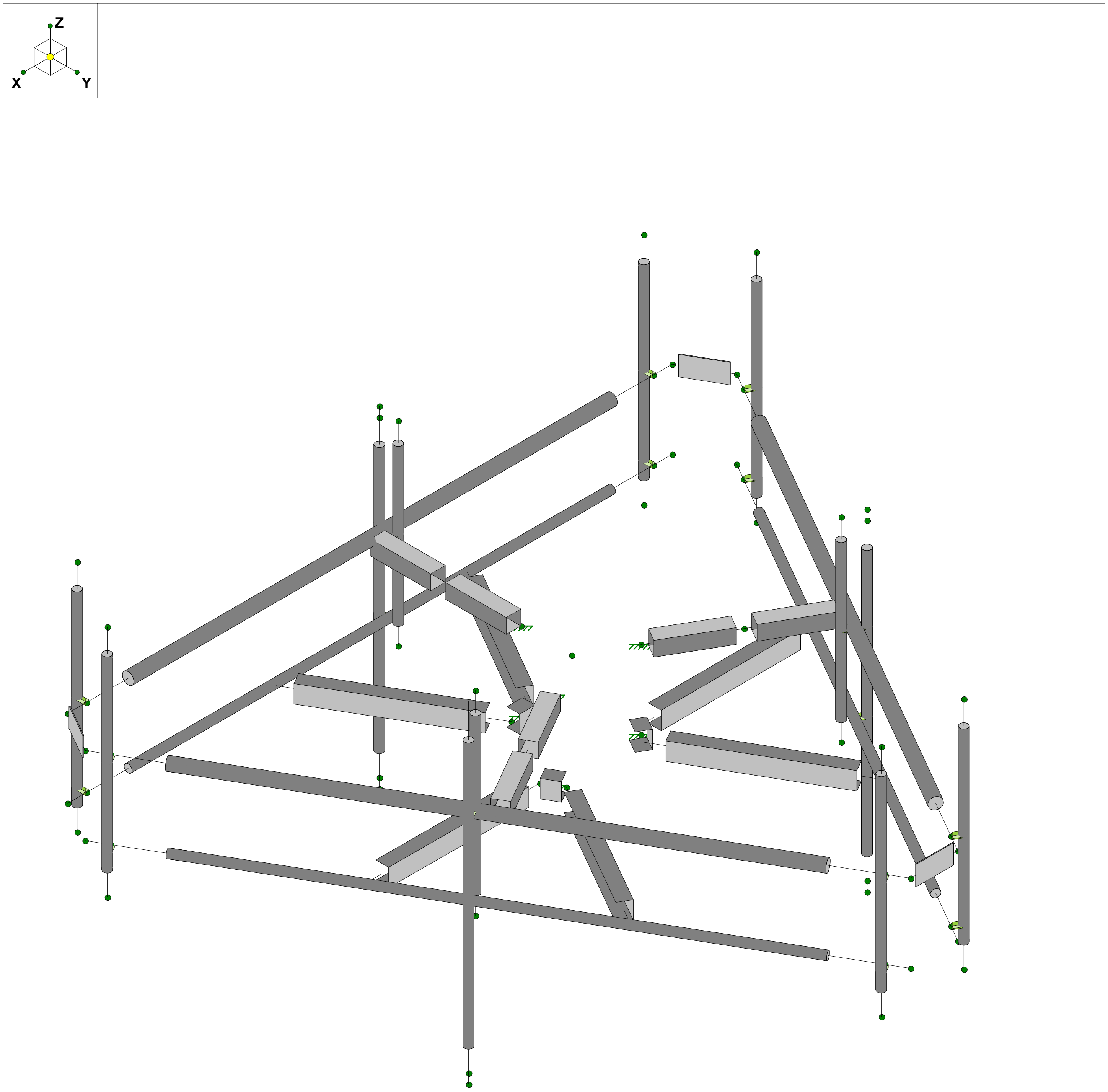


ProTerra/DESTEK	CT11126F	SK - 1
MAZ		June 7, 2019 at 3:57 PM
1978010		1978010 - CT11126F-With HR bel...



Member Length (in) Displayed

ProTerra/DESTEK	CT11126F	SK - 2
MAZ		June 7, 2019 at 3:57 PM
1978010		1978010 - CT11126F-With HR bel...



ProTerra/DESTEK		SK - 3
MAZ	CT11126F	June 7, 2019 at 3:58 PM
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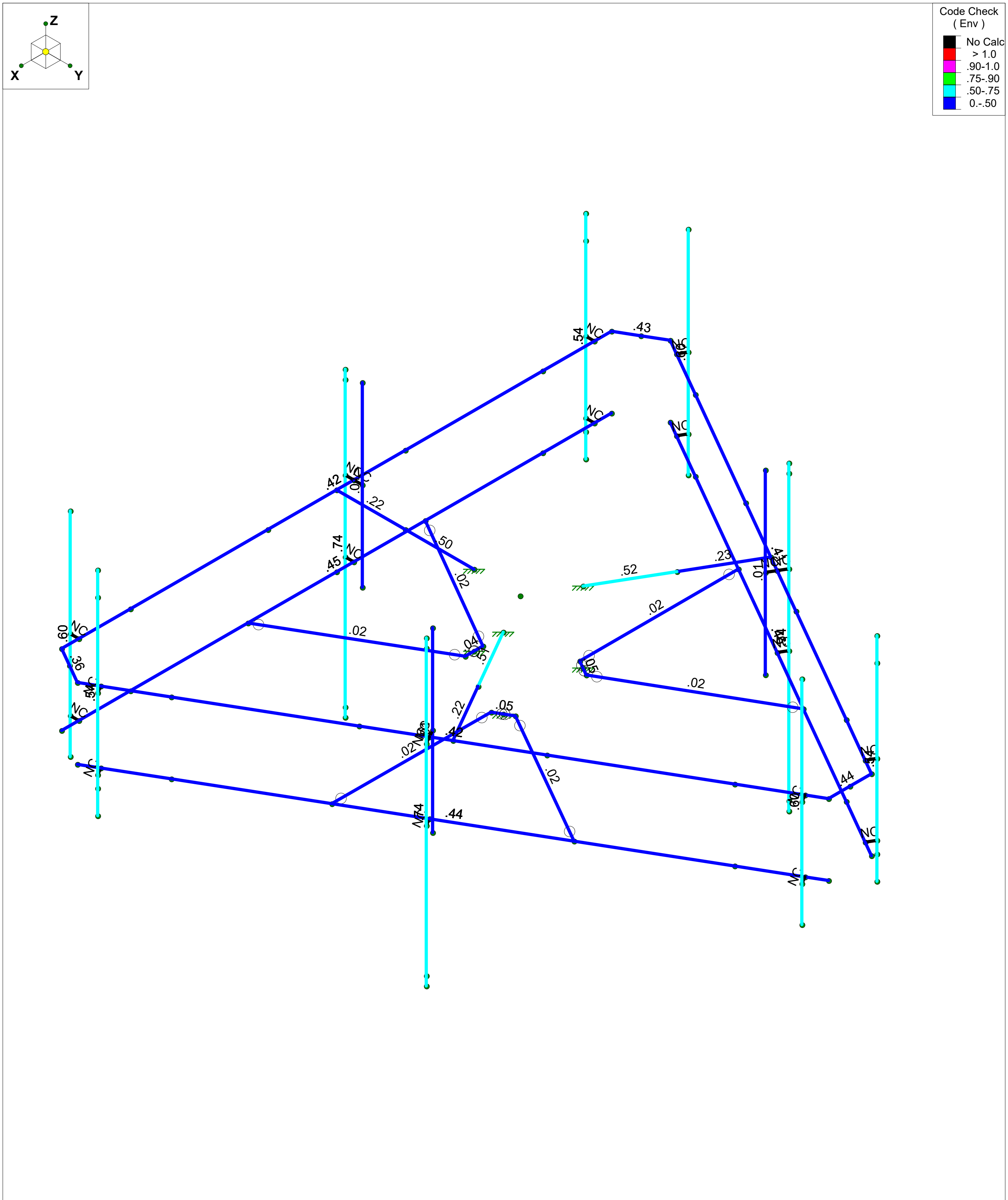
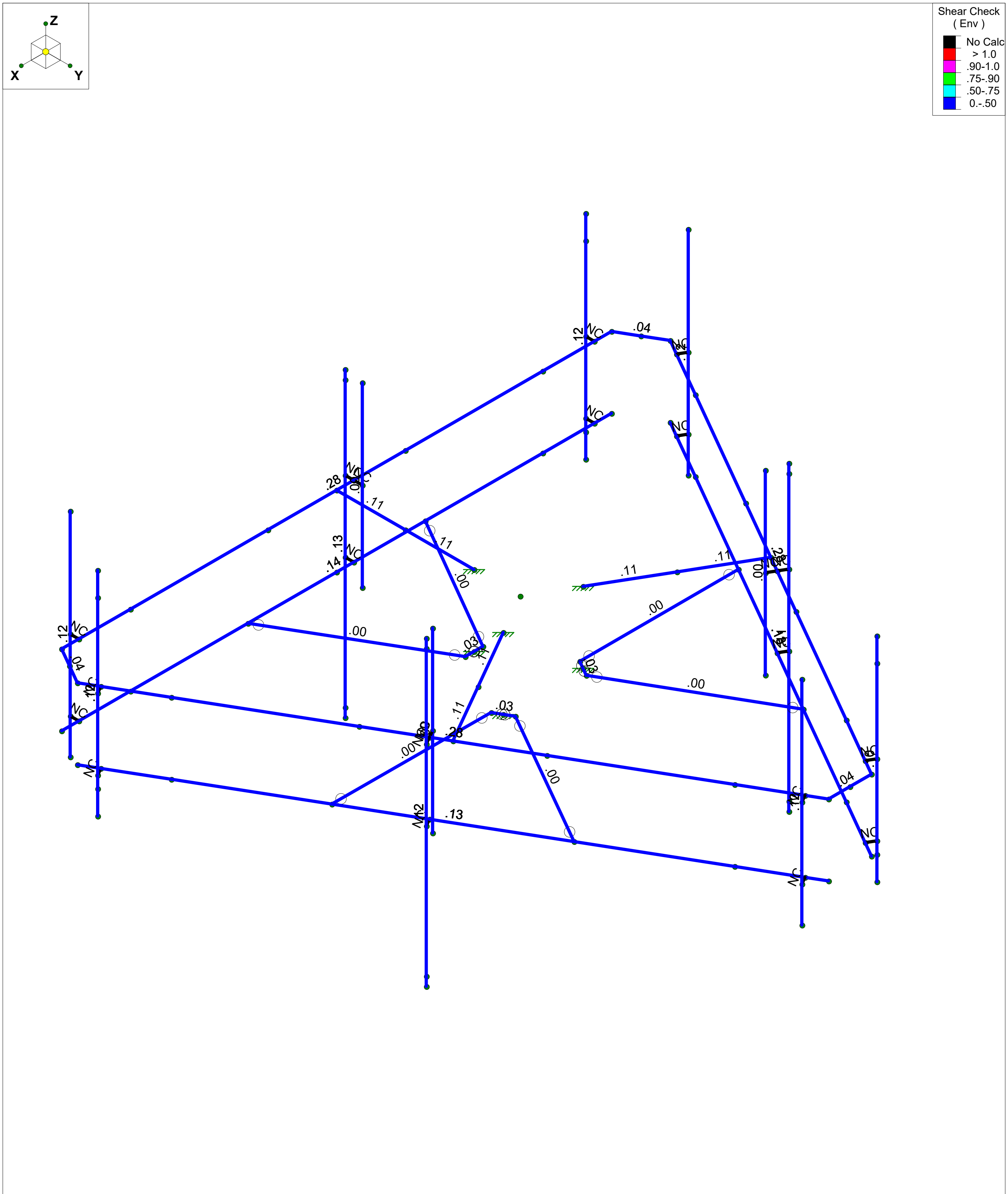


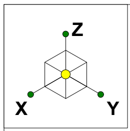
Member Code Checks Displayed (Enveloped)
Envelope Only Solution

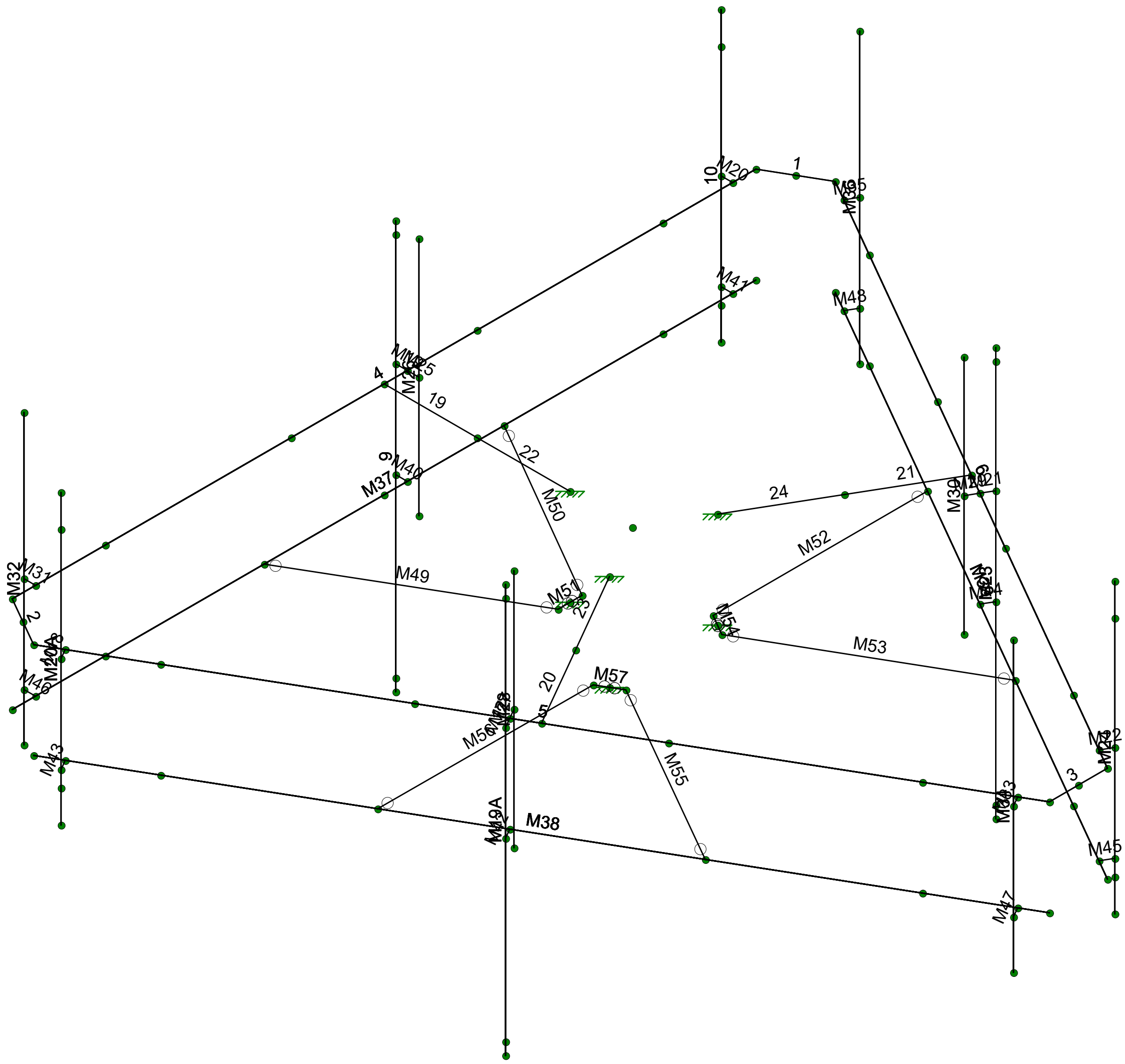
ProTerra/DESTEK	CT11126F	SK - 4
MAZ		June 7, 2019 at 3:58 PM
1978010		1978010 - CT11126F-With HR bel...



Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

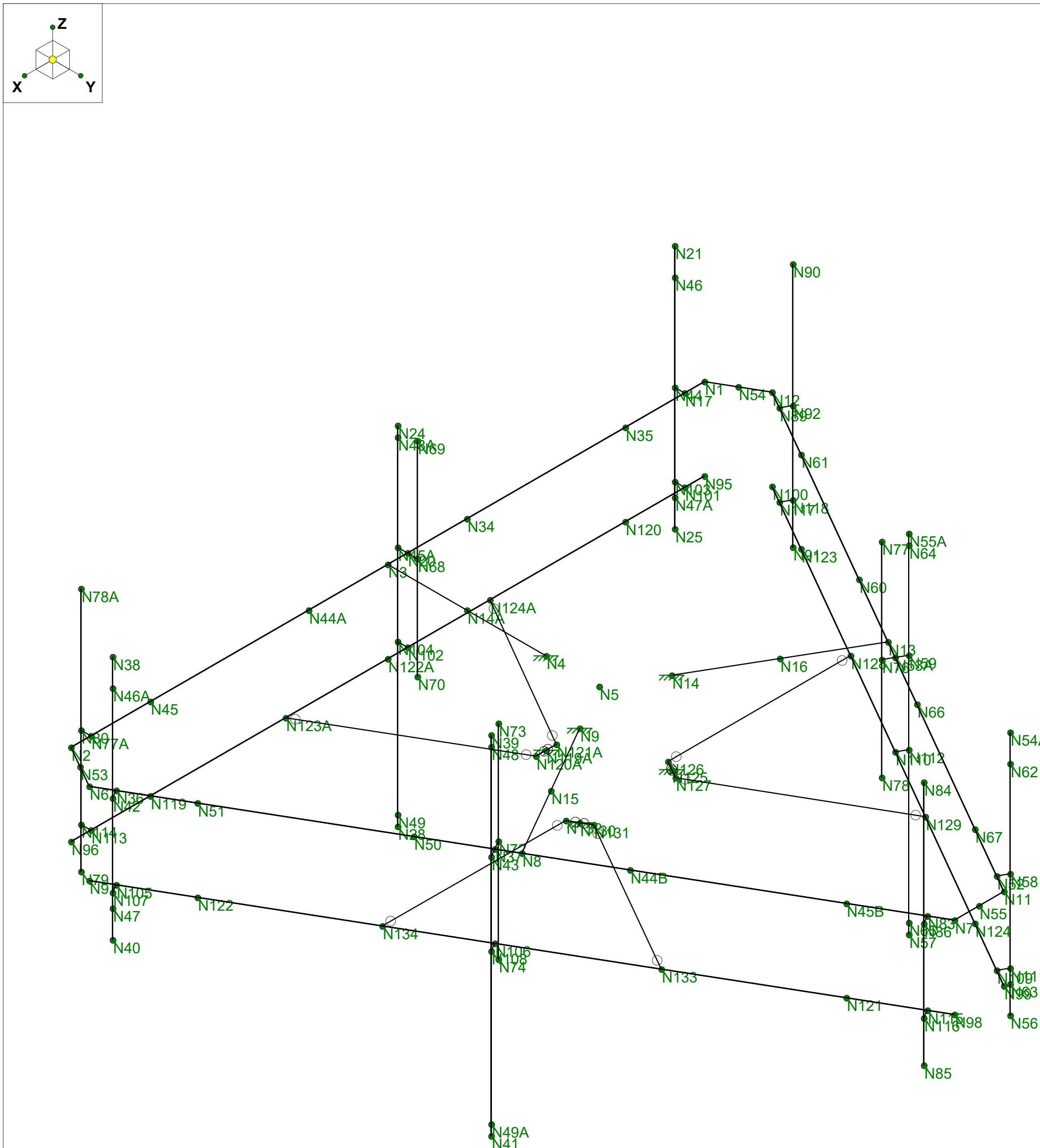
ProTerra/DESTEK	CT11126F	SK - 5
MAZ		June 7, 2019 at 3:59 PM
1978010		1978010 - CT11126F-With HR bel...





Envelope Only Solution

ProTerra/DESTEK	CT11126F	SK - 6
MAZ		June 7, 2019 at 3:59 PM
1978010		1978010 - CT11126F-With HR bel...



Envelope Only Solution

ProTerra/DESTEK	CT11126F	SK - 7
MAZ		June 7, 2019 at 3:59 PM
1978010		1978010 - CT11126F-With HR bel...

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	No
Max Iterations for Wall Stiffness	3
Gravity Acceleration (in/sec^2)	386.4
Wall Mesh Size (in)	12
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Z
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Standard Solver

Hot Rolled Steel Code	AISC 14th(360-10): LRFD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	AISC 14th(360-10): ASD
Cold Formed Steel Code	AISI NAS-01: ASD
Wood Code	AF&PA NDS-05/08: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-05
Masonry Code	ACI 530-05: ASD
Aluminum Code	AA ADM1-10: ASD - Building
	AISC 14th(360-10): ASD

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

(Global) Model Settings, Continued

Seismic Code	ASCE 7-05
Seismic Base Elevation (in)	Not Entered
Add Base Weight?	Yes
Ct X	.035
Ct Z	.035
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	8.5
R Z	8.5
Ct Exp. X	.75
Ct Exp. Z	.75
SD1	1
SDS	1
S1	1
TL (sec)	Not Entered
Occupancy Cat	I or II
Drift Cat	Other
Om Z	1
Om X	1
Cd Z	4
Cd X	4
Rho Z	1
Rho X	1

Project Grid Lines

Label	Start X [in]	End X [in]	Start Y [in]	End Y [in]	Start Bubble	End Bubble
No Data to Print ...						

Hot Rolled Steel Properties

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

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rules	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	HR1A	C15X50_HRA	Beam	Wide Flange	A36 Gr.36	Typical	14.7	11	404	2.65

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M19	N20	N45A			RIGID	None	None	LINK	Typical
2	M20	N17	N44			RIGID	None	None	LINK	Typical
3	M17	N37	N43			RIGID	None	None	LINK	Typical
4	M18	N36	N42			RIGID	None	None	LINK	Typical
5	M21	N53A	N59			RIGID	None	None	LINK	Typical
6	M22	N52	N58			RIGID	None	None	LINK	Typical
7	1	N1	N12		90	PL6x0.25	Beam	Wide Flange	A36 Gr.36	Typical
8	2	N2	N6		90	PL6x0.25	Beam	Wide Flange	A36 Gr.36	Typical
9	3	N7	N11		90	PL6x0.25	Beam	Wide Flange	A36 Gr.36	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
10	4	N1	N2		90	PIPE_3.0	Beam	Wide Flange	A53 Gr.B	Typical
11	5	N6	N7		90	PIPE_3.0	Beam	Wide Flange	A53 Gr.B	Typical
12	6	N11	N12		90	PIPE_3.0	Beam	Wide Flange	A53 Gr.B	Typical
13	9	N24	N28			PIPE_2.0	Beam	Wide Flange	A53 Gr.B	Typical
14	10	N21	N25			PIPE_2.0	Beam	Wide Flange	A53 Gr.B	Typical
15	M19A	N39	N41			PIPE_2.0	Beam	Wide Flange	A53 Gr.B	Typical
16	M20A	N38	N40			PIPE_2.0	Beam	Wide Flange	A53 Gr.B	Typical
17	M23	N55A	N57			PIPE_2.0	Beam	Wide Flange	A53 Gr.B	Typical
18	M24	N54A	N56			PIPE_2.0	Beam	Wide Flange	A53 Gr.B	Typical
19	19	N3	N14A			HSS4.5x4.5x4	Beam	Wide Flange	A500 Gr.46	Typical
20	20	N8	N15		180	HSS4.5x4.5x4	Beam	Wide Flange	A500 Gr.46	Typical
21	21	N13	N16			HSS4.5x4.5x4	Beam	Wide Flange	A500 Gr.46	Typical
22	22	N14A	N4			HSS4.5x4.5x4	Beam	Wide Flange	A500 Gr.46	Typical
23	23	N15	N9		180	HSS4.5x4.5x4	Beam	Wide Flange	A500 Gr.46	Typical
24	24	N16	N14			HSS4.5x4.5x4	Beam	Wide Flange	A500 Gr.46	Typical
25	M25	N20	N68			RIGID	None	None	LINK	Typical
26	M26	N70	N69			PIPE_2.0	Beam	Wide Flange	A53 Gr.B	Typical
27	M27	N37	N72			RIGID	None	None	LINK	Typical
28	M28	N74	N73			PIPE_2.0	Beam	Wide Flange	A53 Gr.B	Typical
29	M29	N53A	N76			RIGID	None	None	LINK	Typical
30	M30	N78	N77			PIPE_2.0	Beam	Wide Flange	A53 Gr.B	Typical
31	M31	N77A	N80			RIGID	None	None	LINK	Typical
32	M32	N78A	N79			PIPE_2.0	Beam	Wide Flange	A53 Gr.B	Typical
33	M33	N83	N86			RIGID	None	None	LINK	Typical
34	M34	N84	N85			PIPE_2.0	Beam	Wide Flange	A53 Gr.B	Typical
35	M35	N89	N92			RIGID	None	None	LINK	Typical
36	M36	N90	N91			PIPE_2.0	Beam	Wide Flange	A53 Gr.B	Typical
37	M37	N95	N96		90	PIPE_2.0	Beam	Pipe	A53 Gr.B	Typical
38	M38	N97	N98		90	PIPE_2.0	Beam	Pipe	A53 Gr.B	Typical
39	M39	N99	N100		90	PIPE_2.0	Beam	Pipe	A53 Gr.B	Typical
40	M40	N102	N104			RIGID	None	None	LINK	Typical
41	M41	N101	N103			RIGID	None	None	LINK	Typical
42	M42	N106	N108			RIGID	None	None	LINK	Typical
43	M43	N105	N107			RIGID	None	None	LINK	Typical
44	M44	N110	N112			RIGID	None	None	LINK	Typical
45	M45	N109	N111			RIGID	None	None	LINK	Typical
46	M46	N113	N114			RIGID	None	None	LINK	Typical
47	M47	N115	N116			RIGID	None	None	LINK	Typical
48	M48	N117	N118			RIGID	None	None	LINK	Typical
49	M49	N123A	N120A		90	Andrew VSR Bent ...	Beam	Channel	A36 Gr.36	Typical
50	M50	N121A	N124A		90	Andrew VSR Bent ...	Beam	Channel	A36 Gr.36	Typical
51	M51	N121A	N120A		90	Andrew VSR Bent ...	Beam	Channel	A36 Gr.36	Typical
52	M52	N128	N126		90	Andrew VSR Bent ...	Beam	Channel	A36 Gr.36	Typical
53	M53	N127	N129		90	Andrew VSR Bent ...	Beam	Channel	A36 Gr.36	Typical
54	M54	N127	N126		90	Andrew VSR Bent ...	Beam	Channel	A36 Gr.36	Typical
55	M55	N133	N131		90	Andrew VSR Bent ...	Beam	Channel	A36 Gr.36	Typical
56	M56	N132	N134		90	Andrew VSR Bent ...	Beam	Channel	A36 Gr.36	Typical
57	M57	N132	N131		90	Andrew VSR Bent ...	Beam	Channel	A36 Gr.36	Typical

Member Advanced Data

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	Analysis ...	Inactive	Seismic Design ...
1	M19						Yes			None
2	M20						Yes			None
3	M17						Yes			None
4	M18						Yes			None

Member Advanced Data (Continued)

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	Analysis ...	Inactive	Seismic Design ...
5	M21						Yes			None
6	M22						Yes			None
7	1						Yes			None
8	2						Yes			None
9	3						Yes			None
10	4						Yes			None
11	5						Yes			None
12	6						Yes			None
13	9						Yes			None
14	10						Yes			None
15	M19A						Yes			None
16	M20A						Yes			None
17	M23						Yes			None
18	M24						Yes			None
19	19						Yes			None
20	20						Yes			None
21	21						Yes			None
22	22						Yes			None
23	23						Yes			None
24	24						Yes			None
25	M25						Yes			None
26	M26						Yes			None
27	M27						Yes			None
28	M28						Yes			None
29	M29						Yes			None
30	M30						Yes			None
31	M31						Yes			None
32	M32						Yes			None
33	M33						Yes			None
34	M34						Yes			None
35	M35						Yes			None
36	M36						Yes			None
37	M37						Yes			None
38	M38						Yes			None
39	M39						Yes			None
40	M40						Yes			None
41	M41						Yes			None
42	M42						Yes			None
43	M43						Yes			None
44	M44						Yes			None
45	M45						Yes			None
46	M46						Yes			None
47	M47						Yes			None
48	M48						Yes			None
49	M49	BenPIN	BenPIN				Yes			None
50	M50	BenPIN	BenPIN				Yes			None
51	M51	BenPIN	BenPIN				Yes			None
52	M52	BenPIN	BenPIN				Yes			None
53	M53	BenPIN	BenPIN				Yes			None
54	M54	BenPIN	BenPIN				Yes			None
55	M55	BenPIN	BenPIN				Yes			None
56	M56	BenPIN	BenPIN				Yes			None
57	M57	BenPIN	BenPIN				Yes			None

Hot Rolled Steel Design Parameters

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp top[in]	Lcomp bot[in]	L-torq...	Kyy	Kzz	Cb	Function
1	1	PL6x0.25	14.531			Lbyy						Lateral
2	2	PL6x0.25	14.531			Lbyy						Lateral
3	3	PL6x0.25	14.531			Lbyy						Lateral
4	4	PIPE_3.0	186	96	96	Lbyy						Lateral
5	5	PIPE_3.0	186	96	96	Lbyy						Lateral
6	6	PIPE_3.0	186	96	96	Lbyy						Lateral
7	9	PIPE_2.0	102			Lbyy						Lateral
8	10	PIPE_2.0	72			Lbyy						Lateral
9	M19A	PIPE_2.0	102			Lbyy						Lateral
10	M20A	PIPE_2.0	72			Lbyy						Lateral
11	M23	PIPE_2.0	102			Lbyy						Lateral
12	M24	PIPE_2.0	72			Lbyy						Lateral
13	19	HSS4.5x4.5...	23.25			Lbyy						Lateral
14	20	HSS4.5x4.5...	23.25			Lbyy						Lateral
15	21	HSS4.5x4.5...	23.25			Lbyy						Lateral
16	22	HSS4.5x4.5...	23.25			Lbyy						Lateral
17	23	HSS4.5x4.5...	23.25			Lbyy						Lateral
18	24	HSS4.5x4.5...	23.25			Lbyy						Lateral
19	M26	PIPE_2.0	60			Lbyy						Lateral
20	M28	PIPE_2.0	60			Lbyy						Lateral
21	M30	PIPE_2.0	60			Lbyy						Lateral
22	M32	PIPE_2.0	72			Lbyy						Lateral
23	M34	PIPE_2.0	72			Lbyy						Lateral
24	M36	PIPE_2.0	72			Lbyy						Lateral
25	M37	PIPE_2.0	186	96	96	Lbyy						Lateral
26	M38	PIPE_2.0	186	96	96	Lbyy						Lateral
27	M39	PIPE_2.0	186	96	96	Lbyy						Lateral
28	M49	Andrew VS...	53.77			Lbyy						Lateral
29	M50	Andrew VS...	53.77			Lbyy						Lateral
30	M51	Andrew VS...	6			Lbyy						Lateral
31	M52	Andrew VS...	53.77			Lbyy						Lateral
32	M53	Andrew VS...	53.77			Lbyy						Lateral
33	M54	Andrew VS...	6			Lbyy						Lateral
34	M55	Andrew VS...	53.77			Lbyy						Lateral
35	M56	Andrew VS...	53.77			Lbyy						Lateral
36	M57	Andrew VS...	6			Lbyy						Lateral

Joint Coordinates and Temperatures

	Label	X [in]	Y [in]	Z [in]	Temp [F]	Detach From Diap...
1	N1	-93	-62.083196	0	0	
2	N2	93	-62.083196	0	0	
3	N3	0	-62.083196	0	0	
4	N4	0	-15.583196	0	0	
5	N5	0	0	0	0	
6	N6	100.265625	-49.498764	0	0	
7	N7	7.265625	111.581961	0	0	
8	N8	53.765625	31.041598	0	0	
9	N9	13.495444	7.791598	0	0	
10	N11	-7.265625	111.581961	0	0	
11	N12	-100.265625	-49.498764	0	0	
12	N13	-53.765625	31.041598	0	0	
13	N14	-13.495444	7.791598	0	0	
14	N14A	0	-38.833196	0	0	
15	N15	33.630534	19.416598	0	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [in]	Y [in]	Z [in]	Temp [F]	Detach From Diap...
16	N16	-33.630534	19.416598	0	0	
17	N17	-87.1875	-62.083196	0	0	
18	N20	-5.8125	-62.083196	0	0	
19	N21	-87.1875	-64.989446	36	0	
20	N24	-5.8125	-64.989446	31	0	
21	N25	-87.1875	-64.989446	-36	0	
22	N28	-5.8125	-64.989446	-71	0	
23	N53	96.632812	-55.79098	0	0	
24	N54	-96.632812	-55.79098	0	0	
25	N55	-0.	111.581961	0	0	
26	N44	-87.1875	-64.989446	0	0	
27	N45A	-5.8125	-64.989446	0	0	
28	N44A	23.25	-62.083196	0	0	
29	N45	69.75	-62.083196	0	0	
30	N46	-87.1875	-64.989446	28	0	
31	N47A	-87.1875	-64.989446	-28	0	
32	N48A	-5.8125	-64.989446	28	0	
33	N49	-5.8125	-64.989446	-68	0	
34	N34	-23.25	-62.083196	0	0	
35	N35	-69.75	-62.083196	0	0	
36	N36	97.359375	-44.464992	0	0	
37	N37	56.671875	26.007825	0	0	
38	N38	99.876261	-43.011867	36	0	
39	N39	59.188761	27.46095	31	0	
40	N40	99.876261	-43.011867	-36	0	
41	N41	59.188761	27.46095	-71	0	
42	N42	99.876261	-43.011867	0	0	
43	N43	59.188761	27.46095	0	0	
44	N44B	42.140625	51.176689	0	0	
45	N45B	18.890625	91.44687	0	0	
46	N46A	99.876261	-43.011867	28	0	
47	N47	99.876261	-43.011867	-28	0	
48	N48	59.188761	27.46095	28	0	
49	N49A	59.188761	27.46095	-68	0	
50	N50	65.390625	10.906507	0	0	
51	N51	88.640625	-29.363674	0	0	
52	N52	-10.171875	106.548188	0	0	
53	N53A	-50.859375	36.075371	0	0	
54	N54A	-12.688761	108.001313	36	0	
55	N55A	-53.376261	37.528496	31	0	
56	N56	-12.688761	108.001313	-36	0	
57	N57	-53.376261	37.528496	-71	0	
58	N58	-12.688761	108.001313	0	0	
59	N59	-53.376261	37.528496	0	0	
60	N60	-65.390625	10.906507	0	0	
61	N61	-88.640625	-29.363674	0	0	
62	N62	-12.688761	108.001313	28	0	
63	N63	-12.688761	108.001313	-28	0	
64	N64	-53.376261	37.528496	28	0	
65	N65	-53.376261	37.528496	-68	0	
66	N66	-42.140625	51.176689	0	0	
67	N67	-18.890625	91.44687	0	0	
68	N68	-5.8125	-59.176946	0	0	
69	N69	-5.8125	-59.176946	30	0	
70	N70	-5.8125	-59.176946	-30	0	
71	N72	54.154989	24.5547	0	0	
72	N73	54.154989	24.5547	30	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [in]	Y [in]	Z [in]	Temp [F]	Detach From Diap...
73	N74	54.154989	24.5547	-30	0	
74	N76	-48.342489	34.622246	0	0	
75	N77	-48.342489	34.622246	30	0	
76	N78	-48.342489	34.622246	-30	0	
77	N77A	87.1875	-62.083196	0	0	
78	N78A	87.1875	-64.989446	36	0	
79	N79	87.1875	-64.989446	-36	0	
80	N80	87.1875	-64.989446	0	0	
81	N83	10.171875	106.548188	0	0	
82	N84	12.688761	108.001313	36	0	
83	N85	12.688761	108.001313	-36	0	
84	N86	12.688761	108.001313	0	0	
85	N89	-97.359375	-44.464992	0	0	
86	N90	-99.876261	-43.011867	36	0	
87	N91	-99.876261	-43.011867	-36	0	
88	N92	-99.876261	-43.011867	0	0	
89	N95	-93	-62.083196	-24	0	
90	N96	93	-62.083196	-24	0	
91	N97	100.265625	-49.498764	-24	0	
92	N98	7.265625	111.581961	-24	0	
93	N99	-7.265625	111.581961	-24	0	
94	N100	-100.265625	-49.498764	-24	0	
95	N101	-87.1875	-62.083196	-24	0	
96	N102	-5.8125	-62.083196	-24	0	
97	N103	-87.1875	-64.989446	-24	0	
98	N104	-5.8125	-64.989446	-24	0	
99	N105	97.359375	-44.464992	-24	0	
100	N106	56.671875	26.007825	-24	0	
101	N107	99.876261	-43.011867	-24	0	
102	N108	59.188761	27.46095	-24	0	
103	N109	-10.171875	106.548188	-24	0	
104	N110	-50.859375	36.075371	-24	0	
105	N111	-12.688761	108.001313	-24	0	
106	N112	-53.376261	37.528496	-24	0	
107	N113	87.1875	-62.083196	-24	0	
108	N114	87.1875	-64.989446	-24	0	
109	N115	10.171875	106.548188	-24	0	
110	N116	12.688761	108.001313	-24	0	
111	N117	-97.359375	-44.464992	-24	0	
112	N118	-99.876261	-43.011867	-24	0	
113	N119	69.75	-62.083196	-24	0	
114	N120	-69.75	-62.083196	-24	0	
115	N121	18.890625	91.44687	-24	0	
116	N122	88.640625	-29.363674	-24	0	
117	N123	-88.640625	-29.363674	-24	0	
118	N124	-18.890625	91.44687	-24	0	
119	N119A	0	-15.583196	-24	0	
120	N120A	3	-15.583196	-24	0	
121	N121A	-3	-15.583196	-24	0	
122	N122A	0	-62.083196	-24	0	
123	N123A	30	-62.083196	-24	0	
124	N124A	-30	-62.083196	-24	0	
125	N125	-13.495444	7.791598	-24	0	
126	N126	-14.995444	5.193522	-24	0	
127	N127	-11.995444	10.389674	-24	0	
128	N128	-68.765625	5.060836	-24	0	
129	N129	-38.765625	57.02236	-24	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [in]	Y [in]	Z [in]	Temp [F]	Detach From Diap...
130	N130	13.495444	7.791598	-24	0	
131	N131	11.995444	10.389674	-24	0	
132	N132	14.995444	5.193522	-24	0	
133	N133	38.765625	57.02236	-24	0	
134	N134	68.765625	5.060836	-24	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N4	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N9	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N14	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
4	N119A	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
5	N120A						
6	N121A						
7	N125	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
8	N126						
9	N127						
10	N130	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
11	N131						
12	N132						

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribut...	Area(Me...	Surface(...
1	DEAD LOAD	None			-1	12			6	
2	DEAD LOAD ICE	None				12		36	6	
3	WIND LOAD (NO ICE) FRONT	None				12		36		
4	WIND LOAD (NO ICE) SIDE	None				12		36		
5	WIND LOAD (ICE) FRONT	None				12		36		
6	WIND LOAD (ICE) SIDE	None				12		36		
7	LIVE LOAD1	None				1				
8	LIVE LOAD2	None				1				
9	LIVE LOAD3	None				1				
10	MAINTENANCE LOAD1	None				1				
11	MAINTENANCE LOAD2	None				1				
12	MAINTENANCE LOAD3	None				1				
13	MAINTENANCE LOAD4	None								
17	BLC 1 Transient Area Loads	None						47		
18	BLC 2 Transient Area Loads	None						47		

Joint Loads and Enforced Displacements (BLC 1 : DEAD LOAD)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2...
1	N64	L	Z	-124
2	N65	L	Z	-124
3	N48	L	Z	-124
4	N49A	L	Z	-124
5	N48A	L	Z	-124
6	N49	L	Z	-124
7	N62	L	Z	-46
8	N63	L	Z	-46
9	N46A	L	Z	-46
10	N47	L	Z	-46
11	N46	L	Z	-46

Joint Loads and Enforced Displacements (BLC 1 : DEAD LOAD) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2...
12	N47A	L	Z	-46

Joint Loads and Enforced Displacements (BLC 2 : DEAD LOAD ICE)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2...
1	N48A	L	Z	-285
2	N49	L	Z	-285
3	N64	L	Z	-285
4	N65	L	Z	-285
5	N48	L	Z	-285
6	N49A	L	Z	-285
7	N46	L	Z	-104
8	N47A	L	Z	-104
9	N62	L	Z	-104
10	N63	L	Z	-104
11	N46A	L	Z	-104
12	N47	L	Z	-104

Joint Loads and Enforced Displacements (BLC 3 : WIND LOAD (NO ICE) FRONT)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2...
1	N48A	L	Y	229
2	N49	L	Y	229
3	N64	L	Y	122
4	N65	L	Y	122
5	N48	L	Y	122
6	N49A	L	Y	122
7	N46	L	Y	75
8	N47A	L	Y	75
9	N62	L	Y	35
10	N63	L	Y	35
11	N46A	L	Y	35
12	N47	L	Y	35

Joint Loads and Enforced Displacements (BLC 4 : WIND LOAD (NO ICE) SIDE)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2...
1	N48A	L	X	122
2	N49	L	X	122
3	N64	L	X	229
4	N65	L	X	229
5	N48	L	X	229
6	N49A	L	X	229
7	N46	L	X	35
8	N47A	L	X	35
9	N62	L	X	75
10	N63	L	X	75
11	N46A	L	X	75
12	N47	L	X	75

Joint Loads and Enforced Displacements (BLC 5 : WIND LOAD (ICE) FRONT)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2...
1	N48A	L	Y	74
2	N49	L	Y	74
3	N64	L	Y	46
4	N65	L	Y	46
5	N48	L	Y	46
6	N49A	L	Y	46

Joint Loads and Enforced Displacements (BLC 5 : WIND LOAD (ICE) FRONT) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2...
7	N46	L	Y	26
8	N47A	L	Y	26
9	N62	L	Y	16
10	N63	L	Y	16
11	N46A	L	Y	16
12	N47	L	Y	16

Joint Loads and Enforced Displacements (BLC 6 : WIND LOAD (ICE) SIDE)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2...
1	N48A	L	X	46
2	N49	L	X	46
3	N64	L	X	74
4	N65	L	X	74
5	N48	L	X	74
6	N49A	L	X	74
7	N46	L	X	16
8	N47A	L	X	16
9	N62	L	X	26
10	N63	L	X	26
11	N46A	L	X	26
12	N47	L	X	26

Joint Loads and Enforced Displacements (BLC 7 : LIVE LOAD1)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2...
1	N53	L	Z	-500

Joint Loads and Enforced Displacements (BLC 8 : LIVE LOAD2)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2...
1	N54	L	Z	-500

Joint Loads and Enforced Displacements (BLC 9 : LIVE LOAD3)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2...
1	N55	L	Z	-500

Joint Loads and Enforced Displacements (BLC 10 : MAINTENANCE LOAD1)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2...
1	N25	L	Z	-500

Joint Loads and Enforced Displacements (BLC 11 : MAINTENANCE LOAD2)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2...
1	N28	L	Z	-500

Joint Loads and Enforced Displacements (BLC 12 : MAINTENANCE LOAD3)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2...
1	N40	L	Z	-500

Member Point Loads

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

Member Distributed Loads (BLC 2 : DEAD LOAD ICE)

	Member Label	Direction	Start Magnitude[lb/ft,...	End Magnitude[lb/ft,...	Start Location[in,%]	End Location[in,%]
1	M26	Z	-9	-9	0	0
2	M28	Z	-9	-9	0	0
3	M30	Z	-9	-9	0	0
4	1	Z	-18	-18	0	0
5	2	Z	-18	-18	0	0
6	3	Z	-18	-18	0	0
7	4	Z	-12	-12	0	0
8	5	Z	-12	-12	0	0
9	6	Z	-12	-12	0	0
10	9	Z	-9	-9	0	0
11	10	Z	-9	-9	0	0
12	M19A	Z	-9	-9	0	0
13	M20A	Z	-9	-9	0	0
14	M23	Z	-9	-9	0	0
15	M24	Z	-9	-9	0	0
16	19	Z	-25	-25	0	0
17	20	Z	-25	-25	0	0
18	21	Z	-25	-25	0	0
19	22	Z	-25	-25	0	0
20	23	Z	-25	-25	0	0
21	24	Z	-25	-25	0	0
22	M32	Z	-9	-9	0	0
23	M34	Z	-9	-9	0	0
24	M36	Z	-9	-9	0	0
25	M37	Z	-9	-9	0	0
26	M38	Z	-9	-9	0	0
27	M39	Z	-9	-9	0	0
28	M49	Z	-21	-21	0	0
29	M50	Z	-21	-21	0	0
30	M51	Z	-21	-21	0	0
31	M52	Z	-21	-21	0	0
32	M53	Z	-21	-21	0	0
33	M54	Z	-21	-21	0	0
34	M55	Z	-21	-21	0	0
35	M56	Z	-21	-21	0	0
36	M57	Z	-21	-21	0	0

Member Distributed Loads (BLC 3 : WIND LOAD (NO ICE) FRONT)

	Member Label	Direction	Start Magnitude[lb/ft,...	End Magnitude[lb/ft,...	Start Location[in,%]	End Location[in,%]
1	M26	PY	5	5	0	0
2	M28	PY	5	5	0	0
3	M30	PY	5	5	0	0
4	1	PY	1	1	0	0
5	2	PY	1	1	0	0
6	3	PY	1	1	0	0
7	4	PY	8	8	0	0
8	5	PY	8	8	0	0
9	6	PY	8	8	0	0
10	9	PY	5	5	0	0
11	10	PY	5	5	0	0
12	M19A	PY	5	5	0	0
13	M20A	PY	5	5	0	0
14	M23	PY	5	5	0	0
15	M24	PY	5	5	0	0
16	19	PY	17	17	0	0

Member Distributed Loads (BLC 3 : WIND LOAD (NO ICE) FRONT) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,...	End Magnitude[lb/ft,...	Start Location[in,%]	End Location[in,%]
17	20	PY	17	17	0	0
18	21	PY	17	17	0	0
19	22	PY	17	17	0	0
20	23	PY	17	17	0	0
21	24	PY	17	17	0	0
22	M32	PY	5	5	0	0
23	M34	PY	5	5	0	0
24	M36	PY	5	5	0	0
25	M37	PY	5	5	0	0
26	M38	PY	5	5	0	0
27	M39	PY	5	5	0	0
28	M49	PY	20	20	0	0
29	M50	PY	20	20	0	0
30	M51	PY	20	20	0	0
31	M52	PY	20	20	0	0
32	M53	PY	20	20	0	0
33	M54	PY	20	20	0	0
34	M55	PY	20	20	0	0
35	M56	PY	20	20	0	0
36	M57	PY	20	20	0	0

Member Distributed Loads (BLC 4 : WIND LOAD (NO ICE) SIDE)

	Member Label	Direction	Start Magnitude[lb/ft,...	End Magnitude[lb/ft,...	Start Location[in,%]	End Location[in,%]
1	M26	PX	5	5	0	0
2	M28	PX	5	5	0	0
3	M30	PX	5	5	0	0
4	1	PX	1	1	0	0
5	2	PX	1	1	0	0
6	3	PX	1	1	0	0
7	4	PX	8	8	0	0
8	5	PX	8	8	0	0
9	6	PX	8	8	0	0
10	9	PX	5	5	0	0
11	10	PX	5	5	0	0
12	M19A	PX	5	5	0	0
13	M20A	PX	5	5	0	0
14	M23	PX	5	5	0	0
15	M24	PX	5	5	0	0
16	19	PX	17	17	0	0
17	20	PX	17	17	0	0
18	21	PX	17	17	0	0
19	22	PX	17	17	0	0
20	23	PX	17	17	0	0
21	24	PX	17	17	0	0
22	M32	PX	5	5	0	0
23	M34	PX	5	5	0	0
24	M36	PX	5	5	0	0
25	M37	PX	5	5	0	0
26	M38	PX	5	5	0	0
27	M39	PX	5	5	0	0
28	M49	PX	20	20	0	0
29	M50	PX	20	20	0	0
30	M51	PX	20	20	0	0
31	M52	PX	20	20	0	0
32	M53	PX	20	20	0	0
33	M54	PX	20	20	0	0

Member Distributed Loads (BLC 4 : WIND LOAD (NO ICE) SIDE) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,...	End Magnitude[lb/ft,...	Start Location[in,%]	End Location[in,%]
34	M55	PX	20	20	0	0
35	M56	PX	20	20	0	0
36	M57	PX	20	20	0	0

Member Distributed Loads (BLC 5 : WIND LOAD (ICE) FRONT)

	Member Label	Direction	Start Magnitude[lb/ft,...	End Magnitude[lb/ft,...	Start Location[in,%]	End Location[in,%]
1	M26	PY	5	5	0	0
2	M28	PY	5	5	0	0
3	M30	PY	5	5	0	0
4	1	PY	3.4	3.4	0	0
5	2	PY	3.4	3.4	0	0
6	3	PY	3.4	3.4	0	0
7	4	PY	6	6	0	0
8	5	PY	6	6	0	0
9	6	PY	6	6	0	0
10	9	PY	5	5	0	0
11	10	PY	5	5	0	0
12	M19A	PY	5	5	0	0
13	M20A	PY	5	5	0	0
14	M23	PY	5	5	0	0
15	M24	PY	5	5	0	0
16	19	PY	8.8	8.8	0	0
17	20	PY	8.8	8.8	0	0
18	21	PY	8.8	8.8	0	0
19	22	PY	8.8	8.8	0	0
20	23	PY	8.8	8.8	0	0
21	24	PY	8.8	8.8	0	0
22	M32	PY	5	5	0	0
23	M34	PY	5	5	0	0
24	M36	PY	5	5	0	0
25	M37	PY	5	5	0	0
26	M38	PY	5	5	0	0
27	M39	PY	5	5	0	0
28	M49	PY	10	10	0	0
29	M50	PY	10	10	0	0
30	M51	PY	10	10	0	0
31	M52	PY	10	10	0	0
32	M53	PY	10	10	0	0
33	M54	PY	10	10	0	0
34	M55	PY	10	10	0	0
35	M56	PY	10	10	0	0
36	M57	PY	10	10	0	0

Member Distributed Loads (BLC 6 : WIND LOAD (ICE) SIDE)

	Member Label	Direction	Start Magnitude[lb/ft,...	End Magnitude[lb/ft,...	Start Location[in,%]	End Location[in,%]
1	M26	PX	5	5	0	0
2	M28	PX	5	5	0	0
3	M30	PX	5	5	0	0
4	1	PX	3.4	3.4	0	0
5	2	PX	3.4	3.4	0	0
6	3	PX	3.4	3.4	0	0
7	4	PX	6	6	0	0
8	5	PX	6	6	0	0
9	6	PX	6	6	0	0
10	9	PX	5	5	0	0
11	10	PX	5	5	0	0

Member Distributed Loads (BLC 6 : WIND LOAD (ICE) SIDE) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,...	End Magnitude[lb/ft,...	Start Location[in,%]	End Location[in,%]
12	M19A	PX	5	5	0	0
13	M20A	PX	5	5	0	0
14	M23	PX	5	5	0	0
15	M24	PX	5	5	0	0
16	19	PX	8.8	8.8	0	0
17	20	PX	8.8	8.8	0	0
18	21	PX	8.8	8.8	0	0
19	22	PX	8.8	8.8	0	0
20	23	PX	8.8	8.8	0	0
21	24	PX	8.8	8.8	0	0
22	M32	PX	5	5	0	0
23	M34	PX	5	5	0	0
24	M36	PX	5	5	0	0
25	M37	PX	5	5	0	0
26	M38	PX	5	5	0	0
27	M39	PX	5	5	0	0
28	M49	PX	10	10	0	0
29	M50	PX	10	10	0	0
30	M51	PX	10	10	0	0
31	M52	PX	10	10	0	0
32	M53	PX	10	10	0	0
33	M54	PX	10	10	0	0
34	M55	PX	10	10	0	0
35	M56	PX	10	10	0	0
36	M57	PX	10	10	0	0

Member Distributed Loads (BLC 17 : BLC 1 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft,...	End Magnitude[lb/ft,...	Start Location[in,%]	End Location[in,%]
1	4	Z	-3.737	-3.7	93	120.9
2	4	Z	-3.7	-3.664	120.9	148.8
3	5	Z	-13.219	-13.219	59.499	75.563
4	19	Z	-20.715	-20.715	15.573	23.25
5	20	Z	-10.39	-10.39	16.219	23.25
6	22	Z	-16.279	-20.78	0	23.25
7	23	Z	-16.962	-16.962	6.942	19.67
8	4	Z	-.202	-8.493	111.6	126.48
9	4	Z	-8.493	-13.421	126.48	141.36
10	4	Z	-13.421	-9.386	141.36	156.24
11	4	Z	-9.386	-3.447	156.24	171.12
12	4	Z	-3.447	-.202	171.12	186
13	5	Z	-.274	-3.485	0	14.88
14	5	Z	-3.485	-9.867	14.88	29.76
15	5	Z	-9.867	-12.63	29.76	44.64
16	5	Z	-12.63	-7.618	44.64	59.52
17	5	Z	-7.618	-.274	59.52	74.4
18	5	Z	-3.737	-3.701	93	120.9
19	5	Z	-3.701	-3.665	120.9	148.8
20	6	Z	-13.22	-13.22	59.5	75.562
21	20	Z	-10.356	-10.356	15.573	23.25
22	21	Z	-20.78	-20.78	16.219	23.25
23	23	Z	-8.138	-10.39	0	23.25
24	24	Z	-33.925	-33.925	6.943	19.671
25	5	Z	-.202	-8.584	111.6	126.48
26	5	Z	-8.584	-13.298	126.48	141.36
27	5	Z	-13.298	-9.023	141.36	156.24
28	5	Z	-9.023	-3.299	156.24	171.12

Member Distributed Loads (BLC 17 : BLC 1 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,...	End Magnitude[lb/ft,...	Start Location[in,%]	End Location[in,%]
29	5	Z	-3.299	-.202	171.12	186
30	6	Z	-.202	-3.3	0	14.88
31	6	Z	-3.3	-9.026	14.88	29.76
32	6	Z	-9.026	-13.302	29.76	44.64
33	6	Z	-13.302	-8.586	44.64	59.52
34	6	Z	-8.586	-.202	59.52	74.4
35	4	Z	-3.665	-3.701	37.2	65.1
36	4	Z	-3.701	-3.737	65.1	93
37	6	Z	-13.22	-13.22	110.437	126.5
38	4	Z	-.202	-3.447	0	14.88
39	4	Z	-3.447	-9.379	14.88	29.76
40	4	Z	-9.379	-13.414	29.76	44.64
41	4	Z	-13.414	-8.492	44.64	59.52
42	4	Z	-8.492	-.202	59.52	74.4
43	6	Z	-.274	-7.624	111.6	126.48
44	6	Z	-7.624	-12.634	126.48	141.36
45	6	Z	-12.634	-9.868	141.36	156.24
46	6	Z	-9.868	-3.488	156.24	171.12
47	6	Z	-3.488	-.274	171.12	186

Member Distributed Loads (BLC 18 : BLC 2 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft,...	End Magnitude[lb/ft,...	Start Location[in,%]	End Location[in,%]
1	5	Z	-22.081	-22.081	110.438	126.501
2	6	Z	-6.12	-6.181	37.2	65.1
3	6	Z	-6.181	-6.242	65.1	93
4	20	Z	-34.712	-34.712	16.219	23.25
5	21	Z	-17.303	-17.303	15.573	23.25
6	23	Z	-56.668	-56.668	6.942	19.67
7	24	Z	-2.622	-28.334	0	23.25
8	5	Z	-.337	-14.338	111.6	126.48
9	5	Z	-14.338	-22.213	126.48	141.36
10	5	Z	-22.213	-15.072	141.36	156.24
11	5	Z	-15.072	-5.511	156.24	171.12
12	5	Z	-5.511	-.337	171.12	186
13	6	Z	-.337	-5.512	0	14.88
14	6	Z	-5.512	-15.077	14.88	29.76
15	6	Z	-15.077	-22.22	29.76	44.64
16	6	Z	-22.22	-14.342	44.64	59.52
17	6	Z	-14.342	-.337	59.52	74.4
18	4	Z	-6.12	-6.181	37.2	65.1
19	4	Z	-6.181	-6.242	65.1	93
20	6	Z	-22.081	-22.081	110.437	126.501
21	19	Z	-34.606	-34.606	15.573	23.25
22	21	Z	-17.356	-17.356	16.219	23.25
23	22	Z	-27.199	-34.712	0	23.25
24	24	Z	-28.334	-28.334	6.942	19.67
25	4	Z	-.337	-5.758	0	14.88
26	4	Z	-5.758	-15.678	14.88	29.76
27	4	Z	-15.678	-22.419	29.76	44.64
28	4	Z	-22.419	-14.186	44.64	59.52
29	4	Z	-14.186	-.337	59.52	74.4
30	6	Z	-.457	-12.725	111.6	126.48
31	6	Z	-12.725	-21.097	126.48	141.36
32	6	Z	-21.097	-16.481	141.36	156.24
33	6	Z	-16.481	-5.822	156.24	171.12
34	6	Z	-5.822	-.457	171.12	186

Member Distributed Loads (BLC 18 : BLC 2 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,...	End Magnitude[lb/ft,...	Start Location[in,%]	End Location[in,%]
35	4	Z	-6.242	-6.181	93	120.9
36	4	Z	-6.181	-6.12	120.9	148.8
37	5	Z	-22.081	-22.081	59.499	75.563
38	4	Z	-.337	-14.187	111.6	126.48
39	4	Z	-14.187	-22.411	126.48	141.36
40	4	Z	-22.411	-15.666	141.36	156.24
41	4	Z	-15.666	-5.755	156.24	171.12
42	4	Z	-5.755	-.337	171.12	186
43	5	Z	-.457	-5.819	0	14.88
44	5	Z	-5.819	-16.486	14.88	29.76
45	5	Z	-16.486	-21.111	29.76	44.64
46	5	Z	-21.111	-12.731	44.64	59.52
47	5	Z	-12.731	-.457	59.52	74.4

Member Area Loads (BLC 1 : DEAD LOAD)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N14A	N44A	N50	N15	Z	Two Way	-5
2	N45	N44A	N50	N51	Z	Two Way	-5
3	N44B	N15	N16	N66	Z	Two Way	-5
4	N66	N44B	N45B	N67	Z	Two Way	-5
5	N34	N14A	N16	N60	Z	Two Way	-5
6	N34	N35	N61	N60	Z	Two Way	-5

Member Area Loads (BLC 2 : DEAD LOAD ICE)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N15	N16	N66	N44B	Z	Two Way	-8.352
2	N44B	N45B	N67	N66	Z	Two Way	-8.352
3	N16	N14A	N34	N60	Z	Two Way	-8.352
4	N61	N35	N34	N60	Z	Two Way	-8.352
5	N14A	N44A	N50	N15	Z	Two Way	-8.352
6	N45	N51	N50	N44A	Z	Two Way	-8.352

Load Combinations

	Description	So..	P...	S...	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac...
1	DL + WL (NO ICE) 0 ...	Yes	Y		1	1.2			3	1.6														
2	DL + WL (NO ICE) 30 ...	Yes	Y		1	1.2			3	1.3...	4	.8												
3	DL + WL (NO ICE) 60 ...	Yes	Y		1	1.2			3	.8	4	1.3...												
4	DL + WL (NO ICE) 90 ...	Yes	Y		1	1.2					4	1.6												
5	DL + WL (NO ICE) 12...	Yes	Y		1	1.2			3	-.8	4	1.3...												
6	DL + WL (NO ICE) 15...	Yes	Y		1	1.2			3	-1.3...	4	.8												
7	DL + WL (NO ICE) 18...	Yes	Y		1	1.2			3	-1.6														
8	DL + WL (NO ICE) 21...	Yes	Y		1	1.2			3	-1.3...	4	-.8												
9	DL + WL (NO ICE) 24...	Yes	Y		1	1.2			3	-.8	4	-1.3...												
10	DL + WL (NO ICE) 27...	Yes	Y		1	1.2					4	-1.6												
11	DL + WL (NO ICE) 30...	Yes	Y		1	1.2			3	.8	4	-1.3...												
12	DL + WL (NO ICE) 33...	Yes	Y		1	1.2			3	1.3...	4	-.8												
13	DL + DL ICE + WL (IC...	Yes	Y		1	1.2	2	1	5	1														
14	DL + DL ICE + WL (IC...	Yes	Y		1	1.2	2	1	5	.866	6	.5												
15	DL + DL ICE + WL (IC...	Yes	Y		1	1.2	2	1	5	.5	6	.866												
16	DL + DL ICE + WL (IC...	Yes	Y		1	1.2	2	1			6	1												
17	DL + DL ICE + WL (IC...	Yes	Y		1	1.2	2	1	5	-.5	6	.866												
18	DL + DL ICE + WL (IC...	Yes	Y		1	1.2	2	1	5	-.866	6	.5												
19	DL + DL ICE + WL (IC...	Yes	Y		1	1.2	2	1	5	-1														

Load Combinations (Continued)

	Description	So...	P...	S...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...
20	DL + DL ICE + WL (IC...	Yes	Y		1	1.2	2	1	5	-.866	6	-.5												
21	DL + DL ICE + WL (IC...	Yes	Y		1	1.2	2	1	5	-.5	6	-.866												
22	DL + DL ICE + WL (IC...	Yes	Y		1	1.2	2	1			6	-1												
23	DL + DL ICE + WL (IC...	Yes	Y		1	1.2	2	1	5	.5	6	-.866												
24	DL + DL ICE + WL (IC...	Yes	Y		1	1.2	2	1	5	.866	6	-.5												
25	DEAD LOAD + LIVE L...	Yes	Y		1	1.2					7	1.5												
26	DEAD LOAD + LIVE L...	Yes	Y		1	1.2					8	1.5												
27	DEAD LOAD + LIVE L...	Yes	Y		1	1.2					9	1.5												
28	DL + MAIN L1+30MP...	Yes	Y		1	1.2	10	1.5	3	.104														
29	DL + MAIN L2+30MP...	Yes	Y		1	1.2	11	1.5	3	.104														
30	DL + MAIN L3+30MP...	Yes	Y		1	1.2	12	1.5	3	.104														
31	DL + MAIN L4+30MP...	Yes	Y		1	1.2	13	1.5	3	.104														
32	DL + MAIN L1+30MP...	Yes	Y		1	1.2	10	1.5	4	.104														
33	DL + MAIN L2+30MP...	Yes	Y		1	1.2	11	1.5	4	.104														
34	DL + MAIN L3+30MP...	Yes	Y		1	1.2	12	1.5	4	.104														
35	DL + MAIN L4+30MP...	Yes	Y		1	1.2	13	1.5	4	.104														
36	DL + MAIN L1+30MP...	Yes	Y		1	1.2	10	1.5	3	-.104														
37	DL + MAIN L2+30MP...	Yes	Y		1	1.2	11	1.5	3	-.104														
38	DL + MAIN L3+30MP...	Yes	Y		1	1.2	12	1.5	3	-.104														
39	DL + MAIN L4+30MP...	Yes	Y		1	1.2	13	1.5	3	-.104														
40	DL + MAIN L1+30MP...	Yes	Y		1	1.2	10	1.5	4	-.104														
41	DL + MAIN L2+30MP...	Yes	Y		1	1.2	11	1.5	4	-.104														
42	DL + MAIN L3+30MP...	Yes	Y		1	1.2	12	1.5	4	-.104														
43	DL + MAIN L4+30MP...	Yes	Y		1	1.2	12	1.5	4	-.104														
44	DL + 1.0 EQ Hor. Y + ...	Yes	Y		1	1.2	14	1	16	1														
45	DL + 1.0 EQ Hor. X + ...	Yes	Y		1	1.2	15	1	16	1														

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	N4	max	880.749	10	589.853	19	2905.519	13	-2.395	27	1.324	32	2.617	10
2		min	-842.9	4	-80.707	1	774.157	27	-9.334	14	-1.18	25	-2.617	4
3	N9	max	529.584	11	892.072	6	2904.33	21	4.493	19	-2.114	26	3.531	6
4		min	-831.739	5	-1024.305	12	772.648	26	1.116	26	-8.2	23	-3.534	12
5	N14	max	856.939	9	986.326	8	2902.965	17	4.905	20	7.956	16	4.093	2
6		min	-594.166	3	-1182.844	2	773.389	25	1.27	25	2.026	25	-4.091	8
7	N119A	max	268.938	9	1110.085	7	152.253	19	0	1	0	25	.108	28
8		min	-321.259	3	-1495.039	1	44.82	28	0	7	-.001	28	-.071	8
9	N125	max	800.121	11	837.617	5	151.969	23	0	26	0	27	.098	27
10		min	-1102.978	5	-597.363	11	45.623	5	0	27	0	26	-.061	26
11	N130	max	1248.487	10	595.628	9	151.99	15	0	42	0	42	.107	42
12		min	-891.012	4	-451.804	3	44.847	42	0	27	0	27	-.06	27
13	Totals:	max	4357.704	10	4026.387	7	9022.333	18						
14		min	-4357.706	4	-4026.392	1	3224.821	12						

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation ...	LC	Y Rotation ...	LC	Z Rotation [...	LC
1	N1	max	.078	4	.291	1	-.127	42	8.989e-03	36	7.765e-04	25	4.136e-03	8
2		min	-.077	10	-.306	7	-1.177	26	-5.588e-04	12	-1.027e-02	26	-4.464e-03	2
3	N2	max	.08	4	.192	2	-.12	27	5.518e-03	25	1.029e-02	42	3.105e-03	1
4		min	-.076	10	-.177	8	-1.177	25	-1.285e-03	4	-8.052e-04	26	-2.603e-03	7
5	N3	max	.078	4	0	1	-.072	27	8.611e-03	19	3.19e-03	25	2.243e-03	5
6		min	-.076	10	0	19	-.29	19	2.09e-03	27	-3.58e-03	32	-2.098e-03	11
7	N4	max	0	4	0	1	0	27	0	14	0	25	0	4
8		min	0	10	0	19	0	13	0	27	0	32	0	10

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation ...	LC	Y Rotation ...	LC	Z Rotation [...	LC
9	N5	max	0	1	0	1	0	1	0	1	0	1	0	1
10		min	0	1	0	1	0	1	0	1	0	1	0	1
11	N6	max	.194	3	.128	1	-.127	26	6.164e-03	25	1.214e-02	30	3.258e-03	4
12		min	-.181	9	-.119	7	-1.177	25	-1.063e-03	27	3.116e-04	27	-3.583e-03	10
13	N7	max	.318	4	.128	3	-.115	28	8.563e-04	25	1.073e-03	4	4.569e-03	9
14		min	-.332	10	-.132	9	-1.175	27	-1.162e-02	27	-1.728e-03	10	-4.093e-03	3
15	N8	max	.053	6	.093	12	-.072	26	7.862e-04	25	7.802e-03	15	3.077e-03	12
16		min	-.054	12	-.091	6	-.289	16	-5.184e-03	27	1.926e-03	26	-2.918e-03	6
17	N9	max	0	5	0	12	0	26	0	26	0	23	0	12
18		min	0	11	0	6	0	21	0	19	0	26	0	6
19	N11	max	.318	4	.139	12	-.125	25	3.487e-04	32	1.01e-03	5	3.821e-03	11
20		min	-.332	10	-.132	6	-1.175	27	-1.162e-02	27	-1.918e-03	11	-4.141e-03	5
21	N12	max	.207	6	.203	1	-.116	42	8.119e-03	32	1.121e-03	8	3.548e-03	5
22		min	-.197	12	-.213	7	-1.177	26	-5.417e-04	27	-9.898e-03	26	-3.067e-03	12
23	N13	max	.063	3	.109	3	-.072	25	3.445e-04	32	-1.688e-03	25	3.755e-03	9
24		min	-.064	9	-.11	9	-.289	22	-5.347e-03	27	-7.108e-03	24	-3.614e-03	3
25	N14	max	0	3	0	2	0	25	0	25	0	25	0	8
26		min	0	9	0	8	0	17	0	20	0	16	0	2
27	N14A	max	.026	4	0	1	-.024	27	6.996e-03	19	1.595e-03	25	1.918e-03	4
28		min	-.026	10	0	19	-.095	18	1.762e-03	27	-1.79e-03	32	-1.879e-03	10
29	N15	max	.018	6	.031	12	-.024	26	-3.524e-04	25	6.231e-03	14	2.62e-03	12
30		min	-.018	12	-.031	6	-.095	18	-3.333e-03	27	1.582e-03	26	-2.578e-03	6
31	N16	max	.021	3	.036	2	-.024	25	-5.436e-04	32	-1.462e-03	25	3.078e-03	8
32		min	-.021	8	-.036	8	-.095	20	-3.822e-03	21	-5.884e-03	13	-3.048e-03	3
33	N17	max	.078	4	.267	1	-.126	27	8.57e-03	36	9.339e-04	25	4.247e-03	8
34		min	-.077	10	-.284	7	-1.117	26	-4.795e-04	12	-1.037e-02	26	-4.562e-03	2
35	N20	max	.079	4	.012	11	-.075	27	8.007e-03	19	2.424e-03	25	2.274e-03	5
36		min	-.076	10	-.013	5	-.301	18	1.233e-03	1	-5.729e-03	32	-2.003e-03	11
37	N21	max	.045	25	.376	1	-.127	27	8.819e-03	36	9.355e-04	25	4.247e-03	8
38		min	-.386	26	-.503	7	-1.14	32	-3.934e-03	1	-1.039e-02	26	-4.562e-03	2
39	N24	max	.164	4	.188	1	-.081	27	1.433e-02	7	4.196e-03	4	2.274e-03	5
40		min	-.216	10	-.358	7	-.324	18	-8.892e-03	1	-6.054e-03	40	-2.003e-03	11
41	N25	max	.184	26	.341	1	-.127	27	4.774e-03	28	3.724e-03	25	6.442e-03	8
42		min	-.159	11	-.287	7	-1.141	32	-1.674e-03	7	-5.508e-03	32	-6.826e-03	2
43	N28	max	.86	4	1.46	1	-.081	27	3.639e-02	1	1.897e-02	10	3.681e-03	4
44		min	-.838	10	-1.463	7	-.326	18	-3.71e-02	7	-1.909e-02	4	-2.873e-03	10
45	N53	max	.14	4	.157	2	-.126	26	5.831e-03	25	1.125e-02	30	1.593e-02	9
46		min	-.133	10	-.145	8	-1.179	25	-9.598e-04	4	-1.726e-04	26	-1.711e-02	3
47	N54	max	.134	5	.249	1	-.121	42	8.609e-03	32	4.913e-04	25	1.958e-02	1
48		min	-.127	11	-.26	7	-1.179	26	-1.398e-04	11	-1.008e-02	26	-2.067e-02	7
49	N55	max	.318	4	.106	1	-.12	28	2.585e-04	25	1.035e-03	4	1.969e-02	4
50		min	-.332	10	-.107	7	-1.177	27	-1.162e-02	27	-1.84e-03	10	-2.076e-02	10
51	N44	max	.079	5	.267	1	-.127	27	8.57e-03	36	9.339e-04	25	4.247e-03	8
52		min	-.078	11	-.284	7	-1.14	32	-4.795e-04	12	-1.037e-02	26	-4.562e-03	2
53	N45A	max	.084	5	.012	11	-.08	27	8.007e-03	19	2.424e-03	25	2.274e-03	5
54		min	-.081	11	-.013	5	-.324	18	1.233e-03	1	-5.729e-03	32	-2.003e-03	11
55	N44A	max	.079	4	.042	4	-.078	27	6.992e-03	21	1.012e-02	25	1.777e-03	3
56		min	-.076	10	-.04	10	-.359	23	1.432e-03	27	-4.354e-04	36	-1.751e-03	9
57	N45	max	.079	4	.13	2	-.109	27	5.157e-03	25	1.273e-02	25	2.783e-03	1
58		min	-.076	10	-.124	8	-.913	25	-2.07e-04	4	2.214e-04	26	-2.532e-03	7
59	N46	max	.037	25	.344	1	-.127	27	8.819e-03	36	9.355e-04	25	4.247e-03	8
60		min	-.303	26	-.447	7	-1.14	32	-3.93e-03	1	-1.039e-02	26	-4.562e-03	2
61	N47A	max	.159	5	.315	1	-.127	27	4.781e-03	28	3.724e-03	25	6.442e-03	8
62		min	-.143	11	-.273	7	-1.14	32	-1.67e-03	7	-5.517e-03	32	-6.826e-03	2
63	N48A	max	.152	4	.161	1	-.081	27	1.433e-02	7	4.196e-03	4	2.274e-03	5
64		min	-.198	10	-.315	7	-.324	18	-8.892e-03	1	-6.054e-03	40	-2.003e-03	11
65	N49	max	.803	4	1.351	1	-.081	27	3.639e-02	1	1.896e-02	10	3.681e-03	4

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation ...	LC	Y Rotation ...	LC	Z Rotation [...	LC
66		min	-.781	10	-1.351	7	-.326	18	-3.71e-02	7	-1.909e-02	4	-2.873e-03	10
67	N34	max	.079	4	.046	12	-.087	27	7.338e-03	19	4.132e-04	25	2.736e-03	7
68		min	-.076	10	-.053	6	-.383	16	8.958e-04	1	-1.046e-02	32	-2.38e-03	1
69	N35	max	.078	4	.194	1	-.121	27	7.764e-03	36	-1.91e-04	25	4.283e-03	8
70		min	-.077	10	-.214	7	-.926	32	-6.336e-05	12	-1.268e-02	26	-4.256e-03	2
71	N36	max	.179	3	.128	1	-.126	26	6.428e-03	25	1.194e-02	30	3.349e-03	4
72		min	-.164	9	-.118	7	-1.117	25	-1.323e-03	27	4.373e-04	36	-3.661e-03	10
73	N37	max	.039	5	.102	12	-.075	26	2.835e-03	25	8.159e-03	15	2.73e-03	12
74		min	-.039	11	-.099	6	-.3	15	-4.248e-03	27	1.548e-03	9	-2.443e-03	6
75	N38	max	.485	34	.148	2	-.127	26	6.439e-03	25	1.211e-02	34	3.349e-03	4
76		min	-.208	9	-.23	25	-1.137	30	-1.325e-03	27	-2.156e-03	9	-3.661e-03	10
77	N39	max	.375	4	.22	12	-.08	26	4.825e-03	7	1.409e-02	4	2.73e-03	12
78		min	-.202	10	-.18	6	-.323	15	-6.009e-03	1	-8.504e-03	10	-2.443e-03	6
79	N40	max	.18	4	.199	1	-.127	26	3.606e-03	25	6.812e-03	42	5.627e-03	4
80		min	-.239	42	-.205	7	-1.138	30	-3.779e-03	27	-1.27e-03	4	-6.005e-03	10
81	N41	max	1.414	4	.882	1	-.081	26	1.977e-02	1	3.518e-02	10	4.879e-03	11
82		min	-1.424	10	-.86	7	-.325	15	-1.929e-02	7	-3.571e-02	4	-4.039e-03	5
83	N42	max	.174	3	.128	1	-.127	26	6.428e-03	25	1.194e-02	30	3.349e-03	4
84		min	-.159	9	-.119	7	-1.136	30	-1.323e-03	27	4.373e-04	36	-3.661e-03	10
85	N43	max	.043	6	.109	12	-.08	26	2.835e-03	25	8.159e-03	15	2.73e-03	12
86		min	-.043	12	-.105	6	-.323	15	-4.248e-03	27	1.548e-03	9	-2.443e-03	6
87	N44B	max	.113	5	.064	12	-.078	26	-1.194e-03	26	3.488e-03	34	3.239e-03	10
88		min	-.116	11	-.062	6	-.358	19	-1.123e-02	27	-7.622e-04	27	-3.219e-03	4
89	N45B	max	.241	4	.085	2	-.107	28	-4.891e-04	28	1.202e-03	4	4.316e-03	9
90		min	-.247	10	-.085	8	-.912	27	-1.358e-02	27	-1.899e-03	27	-4.087e-03	3
91	N46A	max	.388	34	.139	2	-.127	26	6.439e-03	25	1.211e-02	34	3.349e-03	4
92		min	-.191	9	-.178	25	-1.137	30	-1.325e-03	27	-2.153e-03	9	-3.661e-03	10
93	N47	max	.17	4	.181	1	-.127	26	3.606e-03	25	6.823e-03	42	5.627e-03	4
94		min	-.213	10	-.186	7	-1.137	30	-3.779e-03	27	-1.266e-03	4	-6.005e-03	10
95	N48	max	.333	4	.205	12	-.08	26	4.825e-03	7	1.409e-02	4	2.73e-03	12
96		min	-.177	10	-.169	6	-.323	15	-6.009e-03	1	-8.504e-03	10	-2.443e-03	6
97	N49A	max	1.307	4	.822	1	-.081	26	1.977e-02	1	3.518e-02	10	4.879e-03	11
98		min	-1.318	10	-.803	7	-.325	15	-1.929e-02	7	-3.571e-02	4	-4.039e-03	5
99	N50	max	.026	4	.119	12	-.087	26	6.686e-03	25	1.001e-02	30	1.917e-03	2
100		min	-.02	10	-.113	6	-.382	24	-2.164e-03	27	1.787e-03	26	-1.556e-03	8
101	N51	max	.13	3	.123	1	-.121	26	8.528e-03	25	1.274e-02	30	3.349e-03	4
102		min	-.114	9	-.112	7	-.923	42	-7.019e-04	27	8.561e-04	36	-3.318e-03	10
103	N52	max	.301	4	.129	12	-.124	25	3.627e-04	32	9.931e-04	5	3.959e-03	11
104		min	-.316	10	-.121	6	-1.115	27	-1.154e-02	27	-1.983e-03	11	-4.266e-03	5
105	N53A	max	.081	3	.098	2	-.075	25	-4.572e-05	32	-7.546e-04	5	3.772e-03	9
106		min	-.083	9	-.1	8	-.3	22	-7.01e-03	27	-5.681e-03	23	-3.505e-03	3
107	N54A	max	.433	4	.44	27	-.126	25	3.633e-04	32	4.452e-03	4	3.959e-03	11
108		min	-.483	10	-.08	5	-1.13	27	-1.156e-02	27	-5.439e-03	10	-4.266e-03	5
109	N55A	max	.259	4	.266	2	-.08	25	3.386e-03	7	9.262e-03	4	3.772e-03	9
110		min	-.38	10	-.137	8	-.323	22	-7.627e-03	1	-1.309e-02	10	-3.505e-03	3
111	N56	max	.407	4	.136	1	-.126	25	2.673e-03	26	2.692e-03	10	5.371e-03	11
112		min	-.371	10	-.2	27	-1.13	27	-5.927e-03	27	-3.725e-03	4	-5.737e-03	5
113	N57	max	1.509	4	.811	1	-.081	25	1.891e-02	1	3.667e-02	10	4.629e-03	8
114		min	-1.52	10	-.828	7	-.325	22	-1.866e-02	7	-3.602e-02	4	-3.831e-03	2
115	N58	max	.306	4	.12	12	-.126	25	3.627e-04	32	9.931e-04	5	3.959e-03	11
116		min	-.32	10	-.111	6	-1.13	27	-1.154e-02	27	-1.983e-03	11	-4.266e-03	5
117	N59	max	.086	3	.107	3	-.08	25	-4.572e-05	32	-7.546e-04	5	3.772e-03	9
118		min	-.088	9	-.109	9	-.323	22	-7.01e-03	27	-5.681e-03	23	-3.505e-03	3
119	N60	max	.019	5	.145	2	-.078	25	6.363e-03	32	-1.518e-03	25	2.861e-03	7
120		min	-.019	11	-.148	8	-.357	15	-2.03e-03	27	-9.351e-03	26	-2.843e-03	1
121	N61	max	.135	6	.19	2	-.107	42	9.512e-03	32	-2.72e-04	8	3.447e-03	6
122		min	-.133	12	-.195	8	-.913	26	-2.685e-04	27	-1.082e-02	26	-3.223e-03	12

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation ...	LC	Y Rotation ...	LC	Z Rotation [...	LC
123	N62	max	.398	4	.347	27	-.126	25	3.633e-04	32	4.448e-03	4	3.959e-03	11
124		min	-.44	10	-.082	5	-1.13	27	-1.156e-02	27	-5.435e-03	10	-4.266e-03	5
125	N63	max	.378	4	.128	1	-.126	25	2.673e-03	26	2.688e-03	10	5.371e-03	11
126		min	-.35	10	-.163	7	-1.13	27	-5.927e-03	27	-3.722e-03	4	-5.737e-03	5
127	N64	max	.231	4	.247	2	-.08	25	3.386e-03	7	9.261e-03	4	3.772e-03	9
128		min	-.34	10	-.13	8	-.323	22	-7.627e-03	1	-1.309e-02	10	-3.505e-03	3
129	N65	max	1.401	4	.754	1	-.081	25	1.891e-02	1	3.667e-02	10	4.629e-03	8
130		min	-1.41	10	-.772	7	-.325	22	-1.866e-02	7	-3.602e-02	4	-3.831e-03	2
131	N66	max	.13	3	.077	2	-.087	25	-1.393e-03	32	1.32e-03	27	3.6e-03	10
132		min	-.137	9	-.075	8	-.382	20	-1.106e-02	27	-3.344e-03	26	-3.248e-03	4
133	N67	max	.246	4	.097	12	-.12	25	-7.303e-04	25	2.07e-03	27	4.114e-03	11
134		min	-.264	10	-.089	6	-.911	27	-1.343e-02	27	-1.949e-03	11	-4.082e-03	5
135	N68	max	.073	4	.012	11	-.069	27	8.007e-03	19	2.424e-03	25	2.274e-03	5
136		min	-.071	10	-.013	5	-.277	18	1.233e-03	1	-5.729e-03	32	-2.003e-03	11
137	N69	max	.085	25	-.028	1	-.069	27	8.14e-03	19	2.424e-03	25	2.274e-03	5
138		min	-.185	40	-.247	18	-.278	18	1.027e-03	1	-5.716e-03	32	-2.003e-03	11
139	N70	max	.167	32	.235	20	-.069	27	7.874e-03	19	2.424e-03	25	2.274e-03	5
140		min	-.063	10	.044	2	-.278	18	1.439e-03	1	-5.741e-03	32	-2.003e-03	11
141	N72	max	.036	5	.095	12	-.069	26	2.835e-03	25	8.159e-03	15	2.73e-03	12
142		min	-.036	11	-.093	6	-.277	14	-4.248e-03	27	1.548e-03	9	-2.443e-03	6
143	N73	max	.257	17	.139	27	-.069	26	2.836e-03	25	8.275e-03	15	2.73e-03	12
144		min	.017	10	-.094	25	-.277	14	-4.249e-03	27	1.37e-03	9	-2.443e-03	6
145	N74	max	-.044	7	.094	11	-.069	26	2.835e-03	25	8.067e-03	14	2.73e-03	12
146		min	-.251	24	-.127	5	-.277	14	-4.248e-03	27	1.726e-03	9	-2.443e-03	6
147	N76	max	.075	3	.09	2	-.069	25	-4.572e-05	32	-7.546e-04	5	3.772e-03	9
148		min	-.077	9	-.091	8	-.277	21	-7.01e-03	27	-5.681e-03	23	-3.505e-03	3
149	N77	max	.042	3	.22	27	-.069	25	-4.573e-05	32	-5.761e-04	5	3.772e-03	9
150		min	-.197	21	-.022	8	-.277	21	-7.012e-03	27	-5.796e-03	23	-3.505e-03	3
151	N78	max	.189	14	.046	3	-.069	25	-4.571e-05	32	-7.855e-04	27	3.772e-03	9
152		min	-.019	8	-.219	20	-.277	21	-7.009e-03	27	-5.603e-03	24	-3.505e-03	3
153	N77A	max	.08	4	.176	2	-.118	27	5.23e-03	25	1.03e-02	25	3.147e-03	1
154		min	-.076	10	-.164	8	-1.117	25	-9.927e-04	4	-1.027e-03	26	-2.644e-03	7
155	N78A	max	.387	25	.196	2	-.116	27	5.232e-03	25	1.03e-02	25	3.147e-03	1
156		min	-.045	26	-.242	8	-1.132	25	-1.066e-03	3	-1.028e-03	26	-2.644e-03	7
157	N79	max	.175	26	.192	1	-.116	27	2.82e-03	25	3.725e-03	25	4.447e-03	12
158		min	-.151	10	-.15	7	-1.132	25	-1.179e-03	6	-5.197e-03	26	-4.506e-03	6
159	N80	max	.08	4	.176	2	-.116	27	5.23e-03	25	1.03e-02	25	3.147e-03	1
160		min	-.075	10	-.164	8	-1.132	25	-9.927e-04	4	-1.027e-03	26	-2.644e-03	7
161	N83	max	.299	4	.116	3	-.113	28	8.932e-04	25	1.098e-03	4	4.643e-03	9
162		min	-.31	10	-.118	9	-1.116	27	-1.152e-02	27	-1.509e-03	10	-4.165e-03	3
163	N84	max	.354	4	.428	27	-.112	28	8.934e-04	25	1.455e-03	4	4.643e-03	9
164		min	-.381	10	-.045	25	-1.131	27	-1.152e-02	27	-1.866e-03	10	-4.165e-03	3
165	N85	max	.296	4	.156	1	-.112	28	4.414e-03	25	2.789e-03	42	5.559e-03	9
166		min	-.344	10	-.177	27	-1.131	27	-4.626e-03	27	-4.152e-04	5	-5.664e-03	3
167	N86	max	.305	4	.105	3	-.112	28	8.932e-04	25	1.098e-03	4	4.643e-03	9
168		min	-.316	10	-.107	8	-1.131	27	-1.152e-02	27	-1.509e-03	10	-4.165e-03	3
169	N89	max	.189	6	.198	2	-.114	42	8.036e-03	32	9.627e-04	8	3.628e-03	6
170		min	-.181	12	-.207	8	-1.117	26	-8.905e-04	27	-9.674e-03	26	-3.154e-03	12
171	N90	max	.177	7	.178	1	-.113	42	8.038e-03	32	7.847e-04	8	3.628e-03	6
172		min	-.354	26	-.324	36	-1.132	26	-8.908e-04	27	-9.677e-03	26	-3.154e-03	12
173	N91	max	.192	5	.247	2	-.113	42	2.96e-03	28	2.516e-03	9	4.913e-03	5
174		min	-.166	11	-.286	8	-1.132	26	-4.591e-03	27	-4.299e-03	26	-5.007e-03	11
175	N92	max	.183	6	.203	1	-.113	42	8.036e-03	32	9.627e-04	8	3.628e-03	6
176		min	-.177	12	-.212	7	-1.132	26	-8.905e-04	27	-9.674e-03	26	-3.154e-03	12
177	N95	max	.148	4	.337	1	-.11	42	4.786e-03	28	3.723e-03	25	6.444e-03	8
178		min	-.133	10	-.3	7	-1.159	32	-1.595e-03	7	-5.527e-03	32	-6.827e-03	2
179	N96	max	.147	4	.199	1	-.1	26	2.82e-03	25	3.726e-03	25	4.448e-03	12

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation ...	LC	Y Rotation ...	LC	Z Rotation [...	LC
180		min	-.135	10	-.164	7	-1.146	25	-1.168e-03	6	-5.196e-03	26	-4.507e-03	6
181	N97	max	.202	4	.172	1	-.116	27	3.607e-03	25	6.833e-03	42	5.628e-03	4
182		min	-.24	10	-.177	7	-1.157	25	-3.779e-03	27	-1.191e-03	4	-6.006e-03	10
183	N98	max	.31	4	.159	2	-.099	25	4.414e-03	25	2.788e-03	42	5.56e-03	9
184		min	-.345	10	-.166	8	-1.144	27	-4.626e-03	27	-4.041e-04	5	-5.665e-03	3
185	N99	max	.379	4	.143	1	-.11	28	2.672e-03	26	2.613e-03	10	5.372e-03	11
186		min	-.354	10	-.174	7	-1.155	27	-5.928e-03	27	-3.646e-03	4	-5.738e-03	5
187	N100	max	.209	5	.235	2	-.1	27	2.96e-03	28	2.504e-03	9	4.915e-03	5
188		min	-.186	11	-.262	8	-1.145	26	-4.59e-03	27	-4.299e-03	26	-5.008e-03	11
189	N101	max	.148	4	.301	1	-.127	27	4.786e-03	28	3.724e-03	25	6.442e-03	8
190		min	-.133	10	-.267	7	-1.127	32	-1.595e-03	7	-5.526e-03	32	-6.826e-03	2
191	N102	max	.148	4	.11	1	-.062	1	1.151e-02	1	5.563e-03	42	3.681e-03	4
192		min	-.134	10	-.079	7	-.335	19	-1.222e-02	7	-6.144e-03	26	-2.873e-03	10
193	N103	max	.148	5	.301	1	-.127	27	4.786e-03	28	3.724e-03	25	6.442e-03	8
194		min	-.135	11	-.267	7	-1.14	32	-1.595e-03	7	-5.526e-03	32	-6.826e-03	2
195	N104	max	.159	4	.11	1	-.081	27	1.151e-02	1	5.563e-03	42	3.681e-03	4
196		min	-.143	10	-.079	7	-.325	18	-1.222e-02	7	-6.144e-03	26	-2.873e-03	10
197	N105	max	.173	4	.173	1	-.127	26	3.606e-03	25	6.832e-03	42	5.627e-03	4
198		min	-.21	10	-.176	7	-1.125	25	-3.779e-03	27	-1.191e-03	4	-6.005e-03	10
199	N106	max	.093	5	.154	12	-.07	9	6.146e-03	1	1.028e-02	10	4.879e-03	11
200		min	-.127	11	-.157	6	-.333	15	-5.66e-03	8	-1.082e-02	4	-4.039e-03	5
201	N107	max	.165	4	.172	1	-.127	26	3.606e-03	25	6.832e-03	42	5.627e-03	4
202		min	-.201	10	-.177	7	-1.137	30	-3.779e-03	27	-1.191e-03	4	-6.005e-03	10
203	N108	max	.099	5	.166	12	-.081	26	6.146e-03	1	1.028e-02	10	4.879e-03	11
204		min	-.134	11	-.166	6	-.324	15	-5.66e-03	8	-1.082e-02	4	-4.039e-03	5
205	N109	max	.356	4	.133	1	-.125	25	2.673e-03	26	2.612e-03	10	5.371e-03	11
206		min	-.333	10	-.163	7	-1.123	27	-5.927e-03	27	-3.646e-03	4	-5.737e-03	5
207	N110	max	.187	3	.138	2	-.07	4	5.28e-03	1	1.179e-02	10	4.629e-03	8
208		min	-.166	9	-.164	8	-.333	22	-5.022e-03	7	-1.113e-02	4	-3.831e-03	2
209	N111	max	.363	4	.125	1	-.126	25	2.673e-03	26	2.612e-03	10	5.371e-03	11
210		min	-.339	10	-.153	7	-1.13	27	-5.927e-03	27	-3.646e-03	4	-5.737e-03	5
211	N112	max	.192	3	.147	2	-.08	25	5.28e-03	1	1.179e-02	10	4.629e-03	8
212		min	-.173	9	-.176	8	-.324	22	-5.022e-03	7	-1.113e-02	4	-3.831e-03	2
213	N113	max	.147	4	.179	2	-.118	27	2.82e-03	25	3.725e-03	25	4.447e-03	12
214		min	-.135	10	-.144	8	-1.124	25	-1.168e-03	6	-5.197e-03	26	-4.506e-03	6
215	N114	max	.143	4	.179	2	-.116	27	2.82e-03	25	3.725e-03	25	4.447e-03	12
216		min	-.131	10	-.144	8	-1.132	25	-1.168e-03	6	-5.197e-03	26	-4.506e-03	6
217	N115	max	.287	4	.144	2	-.114	28	4.414e-03	25	2.788e-03	42	5.559e-03	9
218		min	-.323	10	-.151	8	-1.122	27	-4.626e-03	27	-4.038e-04	5	-5.664e-03	3
219	N116	max	.293	4	.131	2	-.112	28	4.414e-03	25	2.788e-03	42	5.559e-03	9
220		min	-.329	10	-.138	8	-1.131	27	-4.626e-03	27	-4.038e-04	5	-5.664e-03	3
221	N117	max	.184	5	.236	2	-.114	42	2.959e-03	28	2.504e-03	9	4.913e-03	5
222		min	-.161	11	-.264	8	-1.124	26	-4.591e-03	27	-4.299e-03	26	-5.007e-03	11
223	N118	max	.177	5	.235	2	-.113	42	2.959e-03	28	2.504e-03	9	4.913e-03	5
224		min	-.153	11	-.262	8	-1.132	26	-4.591e-03	27	-4.299e-03	26	-5.007e-03	11
225	N119	max	.147	4	.117	3	-.121	27	3.412e-03	1	8.96e-03	25	5.18e-03	1
226		min	-.134	10	-.089	9	-1.01	25	-3.042e-03	7	-1.223e-03	36	-4.402e-03	7
227	N120	max	.148	4	.179	1	-.122	27	4.983e-03	1	-8.109e-05	25	6.54e-03	8
228		min	-.134	10	-.161	7	-.98	32	-3.873e-03	7	-1.101e-02	26	-7.847e-03	2
229	N121	max	.228	5	.109	1	-.119	28	1.297e-03	3	8.323e-04	9	6.443e-03	9
230		min	-.259	11	-.112	7	-1.009	27	-8.883e-03	27	-2.508e-03	27	-5.701e-03	3
231	N122	max	.086	4	.188	12	-.122	26	8.768e-03	25	8.575e-03	42	5.592e-03	4
232		min	-.108	10	-.183	6	-.977	30	-3.579e-04	27	-1.968e-03	3	-6.891e-03	10
233	N123	max	.108	6	.243	2	-.119	42	7.197e-03	40	2.357e-03	10	5.636e-03	5
234		min	-.091	12	-.267	8	-1.01	26	-9.847e-04	27	-6.444e-03	26	-4.881e-03	11
235	N124	max	.284	3	.104	1	-.121	25	5.815e-04	11	4.165e-03	27	5.532e-03	11
236		min	-.275	9	-.126	7	-.975	27	-1.029e-02	27	-2.625e-03	4	-6.816e-03	5

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation ...	LC	Y Rotation ...	LC	Z Rotation [...	LC
237	N119A	max	0	3	0	1	0	28	0	7	0	28	0	8
238		min	0	9	0	7	0	19	0	1	0	25	0	28
239	N120A	max	0	6	0	1	0	25	0	38	1.254e-02	25	0	1
240		min	0	12	0	7	0	19	0	1	6.875e-05	1	0	1
241	N121A	max	0	2	0	1	0	28	0	26	1.893e-03	12	0	8
242		min	0	8	0	7	0	19	0	12	-1.32e-02	26	0	28
243	N122A	max	.148	4	.106	1	-.063	2	1.089e-02	1	7.635e-03	25	3.828e-03	5
244		min	-.134	10	-.073	7	-.343	20	-1.152e-02	7	-4.18e-03	26	-3.874e-03	11
245	N123A	max	.148	4	.086	4	-.1	4	7.674e-03	1	1.314e-02	25	2.33e-03	6
246		min	-.134	10	-.078	10	-.549	22	-7.873e-03	7	8.082e-04	27	-2.868e-03	12
247	N124A	max	.148	4	.078	11	-.061	11	9.043e-03	1	-6.102e-04	25	2.541e-03	2
248		min	-.134	11	-.086	5	-.468	17	-9.065e-03	7	-1.305e-02	26	-1.438e-03	8
249	N125	max	0	5	0	11	0	5	0	27	0	26	0	26
250		min	0	11	0	5	0	23	0	26	0	27	0	27
251	N126	max	0	5	0	11	0	26	1.086e-02	26	-2.194e-04	4	0	1
252		min	0	11	0	5	0	22	3.8e-04	4	-6.269e-03	26	0	1
253	N127	max	0	5	0	11	0	27	1.431e-03	4	6.593e-03	27	0	1
254		min	0	11	0	5	0	23	-1.142e-02	27	-8.26e-04	4	0	1
255	N128	max	0	6	.232	3	-.101	8	1.086e-02	26	5.346e-03	10	3.592e-03	9
256		min	0	12	-.246	9	-.549	14	3.995e-04	4	-8.101e-03	4	-4.129e-03	3
257	N129	max	.202	3	.115	3	-.046	3	2.386e-03	11	8.272e-03	10	2.421e-03	7
258		min	-.215	9	-.123	9	-.47	21	-1.115e-02	27	-5.441e-03	4	-1.313e-03	1
259	N130	max	0	4	0	3	0	42	0	27	0	27	0	27
260		min	0	10	0	9	0	15	0	42	0	42	0	42
261	N131	max	0	3	0	3	0	27	-7.786e-04	40	-4.495e-04	40	0	1
262		min	0	9	0	9	0	15	-1.085e-02	27	-6.262e-03	27	0	1
263	N132	max	0	4	0	3	0	42	1.144e-02	25	6.604e-03	25	0	1
264		min	0	10	0	9	0	16	-5.427e-04	9	-3.133e-04	9	0	1
265	N133	max	.169	6	.105	12	-.084	12	2.453e-03	3	3.174e-03	9	1.393e-03	12
266		min	-.184	12	-.097	6	-.551	18	-1.188e-02	27	-6.267e-03	3	-1.915e-03	6
267	N134	max	0	3	.212	12	-.08	6	1.144e-02	25	8.767e-03	10	3.804e-03	11
268		min	0	9	-.195	6	-.467	24	-5.203e-04	9	-5.962e-03	4	-2.692e-03	5

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

	Member	Shape	Code C...	Loc[in]	LC	Shear ...	Loc[in]	Dir	LC	phi*Pnc [lb]	phi*Pnt [lb]	phi*Mn y-...	phi*Mn z-...	Cb	Eqn
1	1	PL6x0.25	.433	14.531	7	.044	14.531	y	36	4832.292	48600	.253	5.683	1....	H1-1b
2	2	PL6x0.25	.360	0	3	.044	0	y	34	4832.292	48600	.253	5.492	1....	H1-1b
3	3	PL6x0.25	.437	0	10	.039	0	y	10	4832.292	48600	.253	6.075	1....	H1-1b
4	4	PIPE_3.0	.418	93	40	.278	93		13	46290.523	65205	5.749	5.749	1....	H1-1b
5	5	PIPE_3.0	.418	93	38	.276	93		21	46290.523	65205	5.749	5.749	1	H1-1b
6	6	PIPE_3.0	.414	93	27	.276	93		17	46290.523	65205	5.749	5.749	1	H1-1b
7	9	PIPE_2.0	.740	55.25	1	.126	54.188		2	13511.278	32130	1.872	1.872	1....	H1-1b
8	10	PIPE_2.0	.536	36	26	.124	60		28	20866.733	32130	1.872	1.872	1....	H1-1b
9	M19A	PIPE_2.0	.740	55.25	10	.123	54.188		10	13511.278	32130	1.872	1.872	2....	H1-1b
10	M20A	PIPE_2.0	.536	36	25	.123	60		42	20866.733	32130	1.872	1.872	1....	H1-1b
11	M23	PIPE_2.0	.740	55.25	4	.107	31.875		27	13511.278	32130	1.872	1.872	2....	H1-1b
12	M24	PIPE_2.0	.535	36	27	.100	36		27	20866.733	32130	1.872	1.872	1....	H1-1b
13	19	HSS4.5x4.5x4	.215	23.25	17	.110	23.25	z	32	157040.6...	158976	20.907	20.907	1....	H1-1b
14	20	HSS4.5x4.5x4	.221	23.25	24	.110	23.25	z	30	157040.6...	158976	20.907	20.907	1....	H1-1b
15	21	HSS4.5x4.5x4	.226	23.25	21	.108	23.25	z	27	157040.6...	158976	20.907	20.907	1....	H1-1b
16	22	HSS4.5x4.5x4	.496	23.25	16	.111	23.25	z	32	157040.6...	158976	20.907	20.907	1....	H1-1b
17	23	HSS4.5x4.5x4	.513	23.25	18	.111	23.25	z	30	157040.6...	158976	20.907	20.907	1....	H1-1b
18	24	HSS4.5x4.5x4	.517	23.25	20	.109	23.25	z	27	157040.6...	158976	20.907	20.907	1....	H1-1b
19	M26	PIPE_2.0	.014	30	8	.002	30		8	23808.54	32130	1.872	1.872	1....	H1-1b
20	M28	PIPE_2.0	.014	30	3	.002	30		3	23808.54	32130	1.872	1.872	1....	H1-1b

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

	Member	Shape	Code C...	Loc[in]	LC	Shear ...	Loc[in]	Dir	LC	phi*Pnc [lb]	phi*Pnt [lb]	phi*Mn y-...	phi*Mn z-...	Cb	Eqn
21	M30	PIPE_2.0	.014	30	11	.002	30		11	23808.54	32130	1.872	1.872	1....	H1-1b
22	M32	PIPE_2.0	.599	36	25	.121	36		26	20866.733	32130	1.872	1.872	1....	H1-1b
23	M34	PIPE_2.0	.598	36	27	.121	36		25	20866.733	32130	1.872	1.872	1....	H1-1b
24	M36	PIPE_2.0	.599	36	26	.121	36		27	20866.733	32130	1.872	1.872	1....	H1-1b
25	M37	PIPE_2.0	.446	87.188	24	.140	87.188		1	14916.096	32130	1.872	1.872	2....	H1-1b
26	M38	PIPE_2.0	.438	87.187	19	.129	87.187		10	14916.096	32130	1.872	1.872	1	H1-1b
27	M39	PIPE_2.0	.458	87.187	4	.126	87.187		5	14916.096	32130	1.872	1.872	1	H1-1b
28	M49	Andrew VSR ...	.019	26.885	3	.003	0	y	22	54807.665	79088.141	4.288	13.811	1....	H1-1b
29	M50	Andrew VSR ...	.020	26.885	11	.003	53.77	y	16	54807.665	79088.141	4.288	13.811	1....	H1-1b
30	M51	Andrew VSR ...	.041	3	7	.031	3	z	1	68257.623	79088.141	4.288	13.811	1....	H1-1b
31	M52	Andrew VSR ...	.021	26.885	1	.003	0	y	14	54807.665	79088.141	4.288	13.811	1....	H1-1b
32	M53	Andrew VSR ...	.023	26.885	4	.003	53.77	y	19	54807.665	79088.141	4.288	13.811	1....	H1-1b
33	M54	Andrew VSR ...	.052	3	5	.029	3	z	5	68257.623	79088.141	4.288	13.811	1....	H1-1b
34	M55	Andrew VSR ...	.021	26.885	10	.003	0	y	16	54807.665	79088.141	4.288	13.811	1....	H1-1b
35	M56	Andrew VSR ...	.022	26.885	12	.003	53.77	y	13	54807.665	79088.141	4.288	13.811	1....	H1-1b
36	M57	Andrew VSR ...	.050	3	10	.027	3	z	10	68257.623	79088.141	4.288	13.811	1....	H1-1b

Exhibit F

Power Density/RF Emissions Report

EBI Consulting

environmental | engineering | due diligence

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

T-Mobile Existing Facility

Site ID: CT11126F

SouthBury/ I-84 X15/ Bagl
231 Kettletown Road
Southbury, Connecticut 06488

July 16, 2019

EBI Project Number: 6219001638

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**7.30%**

July 16, 2019

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

Emissions Analysis for Site: CT11126F - SouthBury/ I-84 X15/ Bagl

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **231 Kettletown Road** in **Southbury, Connecticut** for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ($\mu W/cm^2$). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits; therefore, it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general population may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general population would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limits for the 600 MHz and 700 MHz frequency bands are approximately 400 $\mu W/cm^2$ and 467 $\mu W/cm^2$, respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 11 GHz frequency bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at 231 Kettletown Road in Southbury, Connecticut using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was focused at the base of the tower. For this report, the sample point is the top of a 6-foot person standing at the base of the tower.

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

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

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

3) 4 GSM channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

4) 2 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

5) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

6) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.

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

8) The antennas used in this modeling are the RFS APXVAARR24_43-U-NA20 for the 1900 MHz / 600 MHz / 700 MHz / 1900 MHz channel(s), the RFS APX16DWV-16DWV-S-E-A20 for the 2100 MHz channel(s) in Sector A, , the RFS APXVAARR24_43-U-NA20 for the 1900 MHz / 600 MHz / 700 MHz / 1900 MHz channel(s), the RFS APX16DWV-16DWV-S-E-A20 for the 2100 MHz channel(s) in Sector B, , the RFS APXVAARR24_43-U-NA20 for the 1900 MHz / 600 MHz / 700 MHz / 1900 MHz channel(s), the RFS APX16DWV-16DWV-S-E-A20 for the 2100 MHz channel(s) in Sector C. This is based on feedback from the carrier with regard to anticipated antenna selection. All Antenna gain values and associated transmit power levels are shown in the Site Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

9) The antenna mounting height centerlines of the proposed antennas are 193 and 195 feet above ground level (AGL).

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

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

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20
Frequency Bands:	1900 MHz / 600 MHz / 700 MHz / 1900 MHz	Frequency Bands:	1900 MHz / 600 MHz / 700 MHz / 1900 MHz	Frequency Bands:	1900 MHz / 600 MHz / 700 MHz / 1900 MHz
Gain:	15.65 dBd / 12.95 dBd / 13.35 dBd / 15.65 dBd	Gain:	15.65 dBd / 12.95 dBd / 13.35 dBd / 15.65 dBd	Gain:	15.65 dBd / 12.95 dBd / 13.35 dBd / 15.65 dBd
Height (AGL):	193 feet	Height (AGL):	193 feet	Height (AGL):	193 feet
Channel Count:	10	Channel Count:	10	Channel Count:	10
Total TX Power (W):	360 Watts	Total TX Power (W):	360 Watts	Total TX Power (W):	360 Watts
ERP (W):	11,295.86	ERP (W):	11,295.86	ERP (W):	11,295.86
Antenna A2 MPE %:	**1.40%**	Antenna B2 MPE %:	**1.40%**	Antenna C2 MPE %:	**1.40%**
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	RFS APX16DWV-16DWV-S-E-A20	Make / Model:	RFS APX16DWV-16DWV-S-E-A20	Make / Model:	RFS APX16DWV-16DWV-S-E-A20
Frequency Bands:	2100 MHz	Frequency Bands:	2100 MHz	Frequency Bands:	2100 MHz
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	195 feet	Height (AGL):	195 feet	Height (AGL):	195 feet
Channel Count:	2	Channel Count:	2	Channel Count:	2
Total TX Power (W):	120 Watts	Total TX Power (W):	120 Watts	Total TX Power (W):	120 Watts
ERP (W):	4,668.54	ERP (W):	4,668.54	ERP (W):	4,668.54
Antenna A3 MPE %:	**0.44%**	Antenna B3 MPE %:	**0.44%**	Antenna C3 MPE %:	**0.44%**

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Site Composite MPE %	
Carrier	**MPE %**
T-Mobile (Max at Sector A):	1.85%
AT&T	1.57%
Metro PCS	0.24%
Verizon	1.46%
Sprint	2.18%
Site Total MPE % :	7.30%

T-Mobile Sector A Total:	1.85%
T-Mobile Sector B Total:	1.85%
T-Mobile Sector C Total:	1.85%
Site Total:	7.30%

T-Mobile Maximum MPE Power Values (Sector A)

T-Mobile Frequency Band / Technology (Sector A)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density (μW/cm²)	Frequency (MHz)	Allowable MPE (μW/cm²)	Calculated % MPE
T-Mobile 1900 MHz GSM	4	1101.85	193.0	4.25	1900 MHz GSM	1000	0.43%
T-Mobile 600 MHz LTE	2	591.73	193.0	1.14	600 MHz LTE	400	0.29%
T-Mobile 700 MHz LTE	2	648.82	193.0	1.25	700 MHz LTE	467	0.27%
T-Mobile 1900 MHz LTE	2	2203.69	193.0	4.25	1900 MHz LTE	1000	0.43%
T-Mobile 2100 MHz LTE	2	2334.27	195.0	4.41	2100 MHz LTE	1000	0.44%
						Total:	**1.85%**

Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general population exposure to RF Emissions.

The anticipated maximum composite contributions from the T-Mobile facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general population exposure to RF Emissions are shown here:

T-Mobile Sector	Power Density Value (%)
Sector A:	1.85%
Sector B:	1.85%
Sector C:	1.85%
T-Mobile Maximum MPE % (Sector A):	1.85%
Site Total:	7.30%
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **7.30**% of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were well within the allowable 100% threshold standard per the federal government.

Exhibit G

Mailing Receipts/Proof of Notice

UPS CampusShip: View/Print Label

1. **Ensure there are no other shipping or tracking labels attached to your package.** Select the Print button on the print dialog box that appears. Note: If your browser does not support this function select Print from the File menu to print the label.

2. **Fold the printed label at the solid line below.** Place the label in a UPS Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.

3. **GETTING YOUR SHIPMENT TO UPS**
   Customers with a Daily Pickup
   Your driver will pickup your shipment(s) as usual.

   Customers without a Daily Pickup
   Take your package to any location of The UPS Store®, UPS Access Point(TM) location, UPS Drop Box, UPS Customer Center, Staples® or Authorized Shipping Outlet near you. Items sent via UPS Return Services(SM) (including via Ground) are also accepted at Drop Boxes. To find the location nearest you, please visit the Resources area of CampusShip and select UPS Locations.
   Schedule a same day or future day Pickup to have a UPS driver pickup all your CampusShip packages.
   Hand the package to any UPS driver in your area.

UPS Access Point[TM]
THE UPS STORE
41 CROSSROADS PLZ
WEST HARTFORD ,CT 06117

UPS Access Point[TM]
UNIVERSITY OF HARTFORD BOOKSTO
200 BLOOMFIELD AVE
WEST HARTFORD ,CT 06117

UPS Access Point[TM]
THE UPS STORE
1022 BOULEVARD
WEST HARTFORD ,CT 06119

FOLD HERE

ANDRES LOPEZ
9083585305
CENTERLINE COMMUNICATIONS, LLC
28 SENECA ROAD
WEST HARTFORD CT 06117

2.0 LBS LTR 1 OF 1

SHIP TO:
ATTN: JACKIE DONAHUE
570-362-1147
PHOENIX TOWER INTERNATIONAL
SUITE 100
999 YAMATO ROAD
BOCA RATON FL 33431-4478

FL 332 6-25

UPS 2ND DAY AIR 2
TRACKING #: 1Z 9Y4 503 NY 2564 4986

BILLING: P/P
ATTENTION UPS DRIVER: SHIPPER RELEASE

Reference # 1: CT11126F

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UPS CampusShip: View/Print Label

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   Take your package to any location of The UPS Store®, UPS Access Point(TM) location, UPS Drop Box, UPS Customer Center, Staples® or Authorized Shipping Outlet near you. Items sent via UPS Return Services(SM) (including via Ground) are also accepted at Drop Boxes. To find the location nearest you, please visit the Resources area of CampusShip and select UPS Locations.
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1022 BOULEVARD
WEST HARTFORD ,CT 06119

FOLD HERE

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9083585305
CENTERLINE COMMUNICATIONS, LLC
28 SENECA ROAD
WEST HARTFORD CT 06117

2.0 LBS LTR 1 OF 1

SHIP TO:
ATTN: JEFF MANVILLE FIRST SELECTMAN
2032620647
TOWN OF SOUTHBURY
ROOM 212
501 MAIN STREET SOUTH
SOUTHBURY CT 06488-4217

CT 067 9-04

UPS 2ND DAY AIR 2
TRACKING #: 1Z 9Y4 503 NY 3794 4371

BILLING: P/P
ATTENTION UPS DRIVER: SHIPPER RELEASE

Reference # 1: CT11126F

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2. **Fold the printed label at the solid line below.** Place the label in a UPS Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.

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   Customers with a Daily Pickup
   Your driver will pickup your shipment(s) as usual.

   Customers without a Daily Pickup
   Take your package to any location of The UPS Store®, UPS Access Point(TM) location, UPS Drop Box, UPS Customer Center, Staples® or Authorized Shipping Outlet near you. Items sent via UPS Return Services(SM) (including via Ground) are also accepted at Drop Boxes. To find the location nearest you, please visit the Resources area of CampusShip and select UPS Locations.
   Schedule a same day or future day Pickup to have a UPS driver pickup all your CampusShip packages.
   Hand the package to any UPS driver in your area.

UPS Access Point™	UPS Access Point™	UPS Access Point™
THE UPS STORE	UNIVERSITY OF HARTFORD BOOKSTO	THE UPS STORE
41 CROSSROADS PLZ	200 BLOOMFIELD AVE	1022 BOULEVARD
WEST HARTFORD ,CT 06117	WEST HARTFORD ,CT 06117	WEST HARTFORD ,CT 06119

FOLD HERE

ANDRES LOPEZ
9083585305
CENTERLINE COMMUNICATIONS, LLC
28 SENECA ROAD
WEST HARTFORD CT 06117

2.0 LBS LTR 1 OF 1

SHIP TO:
ATTN: CHRIS MCGINNESS
2032620665
TOWN OF SOUTHBURY
3RD FLOOR
501 MAIN STREET SOUTH
SOUTHBURY CT 06488-4217

CT 067 9-04

UPS 2ND DAY AIR 2

TRACKING #: 1Z 9Y4 503 NY 2013 6767

BILLING: P/P
ATTENTION UPS DRIVER: SHIPPER RELEASE

Reference # 1: CT11126F

CS 21.5.22. WNTNV50 12.0A 04/2019