NORTHEAST SITE SOLUTIONS
Turnkey Wireless Development

Northeast Site Solutions
Denise Sabo
199 Brickyard Rd Farmington, CT 06032
860-209-4690
denise@northeastsitesolutions.com

April 13, 2017

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

RE: Notice of Exempt Modification
8 Chimney Drive, Bethel CT 06801
Latitude: 41.41080000
Longitude: -73.40020000
T-Mobile Site#: CT11110C_L700

Dear Ms. Bachman:

T-Mobile currently maintains six (6) antennas at the 154-foot and 162-foot level of the existing 145-foot transmission pole (#10256) located at 8 Chimney Drive, Bethel CT. The electric transmission pole (#10256) is owned by CL&P d/b/a Eversource. The property which holds the utility easement is owned by CL&P d/b/a Eversource. T-Mobile now intends to install three (3) new 700MHz antenna and three (3) new 1900/2100MHz antenna. The new antennas would be installed at the 154-foot and 162-foot level of the tower. T-Mobile also intends to make the following modifications.

Planned Modifications:

Remove:
(1) Microwave Antenna
(1) 7/8" Coax Line

Remove and Replace:
(3) RR90-17-02DP Antenna (Remove) - (3) Commscope LNX 6512DS-A1M Antenna (Replace)
(3) RR90-17-02DP Antenna (Remove) - (3) APX18-20914 Antenna (Replace)

Install New:
(3) Smart Bias-T

Existing to Remain:
(12) 1-5/8" Coax

This facility was approved by the CT Siting Council. Per the attached Petition No. 457 – Dated May 10, 2000. T-Mobile (formally Voicestream) received approval to install on the existing transmission tower, with a total height of 175'-4". Please see attached.

NORTHEAST SITE SOLUTIONS

Turnkey Wireless Development

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 Matthew Knickerbocker, Elected Official and Beth Cavagna, Planning Director for the Town of Bethel, as well as the property owner and the 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).

Sincerely,

Denise Sabo
Mobile: 860-209-4690
Fax: 413-521-0558
Office: 199 Brickyard Rd, Farmington, CT 06032
Email: denise@northeastsitesolutions.com

Attachments
cc: Matthew Knickerbocker– First Selectman - as elected official
Beth Cavagna- Planning Director
CL&P d/b/a Eversource - as tower owner & property owner

Exhibit A

Petition No. 457
Voicestream Wireless
Bethel, Connecticut
Staff Report
May 10, 2000

On May 4, 2000, Connecticut Siting Council (Council) member Gerald J. Heffernan, and Fred Cunliffe of Council staff met Voicestream Wireless (Voicestream) representatives J. Brendan Sharkey, Esq., Chetan Dharduk, and Brian Raggazine for inspection of a Connecticut Light & Power Company (CL&P) electric transmission line structure (no. 10256) located off Chimney Drive, Bethel. Voicestream, with the agreement of CL&P, proposes to modify the transmission structure for telecommunications use and is petitioning the Council for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need (Certificate) is required for the modification.

Voicestream proposes to attach a 4.5-inch diameter pipe extending the existing monopole height of 150 feet by 25 feet 4 inches for a total height of 175 feet 4 inches. A structural analysis concludes no additional reinforcement is necessary. No microwave antenna is proposed as depicted in the antenna drawing. Voicestream proposes to install two low profile antenna cluster mounts with centers of radiation at 173 feet and 163 feet 4 inches on the pipe, and place associated equipment cabinets on a concrete foundation within a 10-foot by 20-foot compound secured by a six-foot chain link fence. Utilities would be placed underground 150 feet from an existing electric transformer and telephone junction box to the site. No trees would be cleared to install the utilities.

The proposed site is within a CL&P easement within a residential area. The nearest home is across Chimney Drive approximately 200 feet west of the site with other homes nearby. The same trees not to be cleared for installation of utilities would provide a buffer to these homes.

The worst case power density for the telecommunications operations at the site has been calculated to be less than 3.6% of the applicable standard for uncontrolled environments.

Voicestream contends that the proposed installation will not cause a substantial adverse environmental effect, and for this reason would not require a Certificate.

Exhibit B

Bethel, CT : Residential Property Record Card

[Back to Search Results]

[Start a New Search][Help with Printing]

Search For Properties

Account	Map Block Lot	Street #	Street Name

Search
Reset Search

Account	Card	Map-Block-Lot	Location	Zoning	State Class	Acres
R01101	1	59 091 49	8 CHIMNEY DRIVE	R-30	130 - Developable Land	3.060

Living Units
0

Owner Information

Conn Light & Power Co % Tax Department
Po Box 270
Hartford CT 061410270

Property Picture

Deed Information

Book/Page: 1006/996
Deed Date: 2011/09/07

Dwelling Information

Style:	
Story Height:	0
Attic:	
Basement:	
Year Built:	0
Ground Flr Area:	0
Tot Living Area:	0
Rooms:	0
Bedrooms:	0
Full Baths:	0
Half Baths:	0
Ext Walls:	
Finished Basement Size:	0
Rec Room Size:	0 x 0
WB FP Stacks/Openings	0 / 0
MT FP Stacks/Openings	0 / 0
Heating Type:	Undefined
Fuel Type:	
System Type:	None

Valuation

Land:	$159,810
Building:	$0
Total:	$159,810
Net Assessment:	$111,870

Sales History

Book/Page	Date	Price	Type	Validity
1006/996	2011/09/07	$0	Land Only	04

Permit History

Date	Purpose	Price

Out Building Information

Type	Qty	Year	Size1	Size2	Grade	Cond

Building Sketch

Notice

The information delivered through this on-line database is provided in the spirit of open access to government information and is intended as an enhanced service and convenience for citizens of Bethel, CT.

The providers of this database: CLT, Big Room Studios, and Bethel, CT assume no liability for any error or omission in the information provided here.

Currently All Values Have Not Been Finalized and Are Subject To Change.

Comments regarding this service should be directed to: Assessor@betheltownhall.org

BUILT BY bigRoom STUDIOS

imney Dr

search results for **8 Chimne...**

Parcels:

Parcel ID	59 091 49
Type	Parcel
Map	59
Block	091
Lot	49
Address	8 CHIMNEY DRIVE
Size	3.06 AC
Account Number	R01101
Owner	CONN LIGHT & POWER CO
Mailing Address	PO BOX 270
City	HARTFORD

Zoom to

Exhibit C

ANTENNA UPGRADES
BY

T-Mobile

T-MOBILE NORTHEAST LLC

SITE NUMBER: CT11110C
SITE NAME: Danbury/I-84/X8
SITE ADDRESS: 8 Chimney Drive, Bethel, CT 06801
EVERSOURCE STRUCTURE 10256
(704Bu CONFIGURATION)

PROJECT SCOPE:

T-MOBILE, A WIRELESS TELECOMMUNICATIONS PROVIDER PROPOSES TO UPGRADE THEIR EXISTING FACILITY AS FOLLOWS:
REMOVE: (6) ANTENNAS
ADD: (6) ANTENNAS,(6) TMAS, (3) SMART BIAS TEE, AND (3) PERIPHERAL REMOTE RADIO UNIT.

PROJECT NOTES:

1. THIS IS AN UNMANNED TELECOMMUNICATION FACILITY AND NOT FOR HUMAN HABITATION:
   HANDICAPPED ACCESS IS NOT REQUIRED.
   POTABLE WATER OR SANITARY SERVICE IS NOT REQUIRED.
   NO OUTDOOR STORAGE OR ANY SOLID WASTE RECEPTACLES REQUIRED.
2. CONTRACTOR SHALL VERIFY ALL PLANS, EXISTING DIMENSIONS, AND CONDITIONS ON THE JOB SITE. CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ARCHITECT/ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK. FAILURE TO NOTIFY THE ARCHITECT/ENGINEER PLACES THE RESPONSIBILITY ON THE CONTRACTOR TO CORRECT THE DISCREPANCIES AT THE CONTRACTOR'S EXPENSE.
3. DEVELOPMENT AND USE OF THE SITE WILL CONFORM TO ALL APPLICABLE CODES, ORDINANCES AND SPECIFICATIONS.
4. REFER TO STRUCTURAL ANALYSIS REPORT BY CENTEK ENGINEERING DATED FEBRUARY 08, 2017 FOR STRUCTURAL EVALUATION OF THE TOWER AND CONDITION.

APPLICABLE STATE ADOPTION CODES:

2016 CONNECTICUT STATE BUILDING CODE (CSBC).

ANSI/TIA-222-G-2005 STRUCTURAL STANDARD FOR ANTENNA SUPPORTING STRUCTURES AND ANTENNAS.

2014 NATIONAL ELECTRICAL CODE (NFPA 70) FOR POWER AND GROUNDING REQUIREMENTS.

SITE IMAGE:

ZONING / VICINITY MAP:

PROJECT INFORMATION:

ADDRESS:	8 CHIMNEY DRIVE BETHEL, CT 06801
STRUCTURE TYPE:	ELECTRIC TRANSMISSION TOWER
ZONING DISTRICT:	R30
COORDINATES:	N 41.41080000, W -73.40020000
STRUCTURE HEIGHT:	168' AGL

PROJECT TEAM:

APPLICANT:	T-MOBILE NORTHEAST, LLC. 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002 860-692-7100
LANDLOARD:	EVERSOURCE CL&P 56 PROSPECT ST HARTFORD, CT 06103
PROJECT MANGER:	NORTHEAST SITE SOLUTIONS 420 MAIN STREET, BLDG 4 STURBRIDGE, MA 01566 SHELDON FREINCLE SHELDON@NORTHEASTSITE SOLUTIONS.COM 201-776-8521
CONSULTANTS:	FORESITE LLC 462 WALNUT ST NEWTON, MA 02460 SAEED MOSSAVAT SMOSSAVAT@FORESITELLC.COM 617-212-3123

SHEET INDEX:

APPLICANT:
T-Mobile
T-MOBILE NORTHEAST LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
860-692-7100

PROJECT MANGER
NSS NORTHEAST SITE SOLUTIONS
Turnkey Wireless Development
420 Main Street, Bldg 4
Sturbridge, MA 01566
203-275-6669

CONSULTANT:
FORESITE LLC
Architects . Engineers . Surveyors
462 Walnut street
Newton, MA 02460
617-212-3123

PROFESSIONAL SEAL

REV	DESCRIPTION	DATE
A	PRELIMINARY	01/13/17
0	FINAL ISSUED	02/14/17

SITE NUMBER: CT11110C
SITE NAME: Danbury/I-84/X8
SITE ADDRESS: 8 Chimney Drive
Bethel, CT 06801

SHEET TITLE:
T-1: TITLE SHEET

NOTES AND DISCLAIMERS:

1. THE CONTRACTOR SHALL GIVE ALL NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY, MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS, AND LOCAL AND STATE JURISDICTIONAL CODES BEARING ON THE PERFORMANCE OF THE WORK. THE WORK PERFORMED ON THE PROJECT AND THE MATERIALS INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES.

2. THE ARCHITECT/ENGINEER HAS MADE EVERY EFFORT TO SET FORTH IN THE CONSTRUCTION AND CONTRACT DOCUMENTS THE COMPLETE SCOPE OF WORK. THE CONTRACTOR BIDDING THE JOB IS NEVERTHELESS CAUTIONED THAT MINOR OMISSIONS OR ERRORS IN THE DRAWINGS AND OR SPECIFICATIONS SHALL NOT EXCUSE SAID CONTRACTOR FROM COMPLETING THE PROJECT AND IMPROVEMENTS IN ACCORDANCE WITH THE INTENT OF THESE DOCUMENTS.

3. THE CONTRACTOR OR BIDDER SHALL BEAR THE RESPONSIBILITY OF NOTIFYING (IN WRITING) THE CLIENT'S REPRESENTATIVE OF ANY CONFLICTS, ERRORS, OR OMISSIONS PRIOR TO THE SUBMISSION OF CONTRACTOR'S PROPOSAL OR PERFORMANCE OF WORK.

5. THE CONTRACTOR SHALL VISIT THE JOB SITE PRIOR TO THE SUBMISSION OF BIDS OR PERFORMING WORK TO FAMILIARIZE HIMSELF WITH THE FIELD CONDITIONS AND TO VERIFY THAT THE PROJECT CAN BE CONSTRUCTED IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS.

6. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS ACCORDING TO THE MANUFACTURER'S / VENDOR'S SPECIFICATIONS UNLESS NOTED OTHERWISE OR WHERE LOCAL CODES OR ORDINANCES TAKE PRECEDENCE.

7. THE CONTRACTOR SHALL MAKE NECESSARY PROVISIONS TO PROTECT EXISTING IMPROVEMENTS DURING CONSTRUCTION.

8. THE CONTRACTOR SHALL COMPLY WITH ALL PERTINENT SECTIONS OF THE BASIC STATE BUILDING CODE, LATEST EDITION, AND ALL OSHA REQUIREMENTS AS THEY APPLY TO THIS PROJEC

9. THE CONTRACTOR SHALL NOTIFY THE CLIENT'S REPRESENTATIVE IN WRITING WHERE A CONFLICT OCCURS ON ANY OF THE CONTRACT DOCUMENTS. THE CONTRACTOR IS NOT TO ORDER MATERIAL OR CONSTRUCT ANY PORTION OF THE WORK THAT IS IN CONFLICT UNTIL CONFLICT IS RESOLVED BY THE CLIENT'S REPRESENTATIVE.

10. THE WORK SHALL CONFORM TO THE CODES AND STANDARDS OF THE FOLLOWING AGENCIES AS FURTHER CITED HEREIN:

A. ASTM: AMERICAN SOCIETY FOR TESTING AND MATERIALS, AS PUBLISHED IN "COMPILATION OF ASTM STANDARDS BUILDING CODES" OR LATEST EDITION.

B. AWS: AMERICAN WELDING SOCIETY INC. AS PUBLISHED IN "STANDARD D1.1–08, STRUCTURAL WELDING CODE" OR LATEST EDITION.

C. AISC: AMERICAN INSTITUTE FOR STEEL CONSTRUCTION AS PUBLISHED IN "CODE FOR STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES"; "SPECIFICATIONS FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS" (LATEST EDITION).

11. BOLTING:

A. BOLTS SHALL BE CONFORMING TO ASTM A325 HIGH STRENGTH, HOT DIP GALVANIZED WITH ASTM A153 HEAVY HEX TYPE NUTS.

B. BOLTS SHALL BE 3/4"ø MINIMUM (UNLESS OTHERWISE NOTED)

C. ALL CONNECTIONS SHALL BE 2 BOLTS MINIMUM.

12. FABRICATION:

A. FABRICATION OF STEEL SHALL CONFORM TO THE AISC AND AWS STANDARDS AND CODES (LATEST EDITION).

B. ALL STRUCTURAL STEEL SHALL BE HOT–DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 (LATEST EDITION), UNLESS OTHERWISE NOTED.

13. ERECTION OF STEEL:

A. PROVIDE ALL ERECTION EQUIPMENT, BRACING, PLANKING, FIELD BOLTS, NUTS, WASHERS, DRIFT PINS, AND SIMILAR MATERIALS WHICH DO NOT FORM A PART OF THE COMPLETED CONSTRUCTION BUT ARE NECESSARY FOR ITS PROPER ERECTION.

B. ERECT AND ANCHOR ALL STRUCTURAL STEEL IN ACCORDANCE WITH AISC REFERENCE STANDARDS. ALL WORK SHALL BE ACCURATELY SET TO ESTABLISHED LINES AND ELEVATIONS AND RIGIDLY FASTENED IN PLACE WITH SUITABLE ATTACHMENTS TO THE CONSTRUCTION OF THE BUILDING.

C. TEMPORARY BRACING, GUYING AND SUPPORT SHALL BE PROVIDED TO KEEP THE STRUCTURE SAFE AND ALIGNED AT ALL TIMES DURING CONSTRUCTION, AND TO PREVENT DANGER TO PERSONS AND PROPERTY. CHECK ALL TEMPORARY LOADS AND STAY WITHIN SAFE CAPACITY OF ALL BUILDING COMPONENTS.

14. ANTENNA INSTALLATION:

A. INSTALL ANTENNAS AS INDICATED ON DRAWINGS AND CLIENT'S REPRESENTATIVE SPECIFICATIONS.

B. INSTALL GALVANIZED STEEL ANTENNA MOUNTS AS INDICATED ON DRAWINGS.

C. INSTALL COAXIAL / FIBER CABLES AND TERMINATIONS BETWEEN ANTENNAS AND EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS. WEATHERPROOF ALL CONNECTORS BETWEEN THE ANTENNA AND EQUIPMENT PER MANUFACTURER'S REQUIREMENTS.

15. ANTENNA AND COAXIAL / FIBER CABLE GROUNDING:

A. ALL EXTERIOR #6 GREEN GROUND WIRE "DAISY CHAIN" CONNECTIONS ARE TO BE WEATHER SEALED WITH ANDREWS CONNECTOR/SPLICE WEATHERPROOFING KIT TYPE #221213 OR EQUAL.

B. ALL COAXIAL / FIBER CABLE GROUNDING KITS ARE TO BE INSTALLED ON STRAIGHT RUNS OF COAXIAL / FIBER CABLE (NOT WITHIN BENDS).

16. RELATED WORK, FURNISH THE FOLLOWING WORK AS SPECIFIED UNDER CONSTRUCTION DOCUMENTS, BUT COORDINATE WITH OTHER TRADES PRIOR TO BID:

A. FLASHING OF OPENING INTO OUTSIDE WALLS

B. SEALING AND CAULKING ALL OPENINGS

C. PAINTING

D. CUTTING AND PATCHING

17. REQUIREMENTS OF REGULATORY AGENCIES:

A. FURNISH U.L. LISTED EQUIPMENT WHERE SUCH LABEL IS AVAILABLE. INSTALL IN CONFORMANCE WITH U.L. STANDARDS WHERE APPLICABLE.

B. INSTALL ANTENNA, ANTENNA CABLES, GROUNDING SYSTEM IN ACCORDANCE WITH DRAWINGS AND SPECIFICATION IN EFFECT AT PROJECT LOCATION AND RECOMMENDATIONS OF STATE AND LOCAL BUILDING CODES, AND SPECIAL CODES HAVING JURISDICTION OVER SPECIFIC PORTIONS OF WORK. THIS WORK INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING:

C. TIA–EIA – 222 (LATEST EDITION). STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES.

D. FAA – FEDERAL AVIATION ADMINISTRATION ADVISORY CIRCULAR AC 70/7460–IH, OBSTRUCTION MARKING AND LIGHTING.

E. FCC – FEDERAL COMMUNICATIONS COMMISSION RULES AND REGULATIONS FORM 715, OBSTRUCTION MARKING AND LIGHTING SPECIFICATION FOR ANTENNA STRUCTURES AND FORM 715A, HIGH INTENSITY OBSTRUCTION LIGHTING SPECIFICATIONS FOR ANTENNA STRUCTURES.

F. AISC – AMERICAN INSTITUTE OF STEEL CONSTRUCTION SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 BOLTS (LATEST EDITION).

G. NEC – NATIONAL ELECTRICAL CODE – ON TOWER LIGHTING KITS.

H. UL – UNDERWRITER'S LABORATORIES APPROVED ELECTRICAL PRODUCTS.

I. IN ALL CASES, PART 77 OF THE FAA RULES AND PARTS 17 AND 22 OF THE FCC RULES ARE APPLICABLE AND IN THE EVENT OF CONFLICT, SUPERSEDE ANY OTHER STANDARDS OR SPECIFICATIONS.

J. 2009 LIFE SAFETY CODE NFPA – 101.

APPLICANT:
T-Mobile
T-MOBILE NORTHEAST LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
860-692-7100

PROJECT MANGER
NSS NORTHEAST SITE SOLUTIONS
Turnkey Wireless Development
420 Main Street, Bldg 4
Sturbridge, MA 01566
203-275-6669

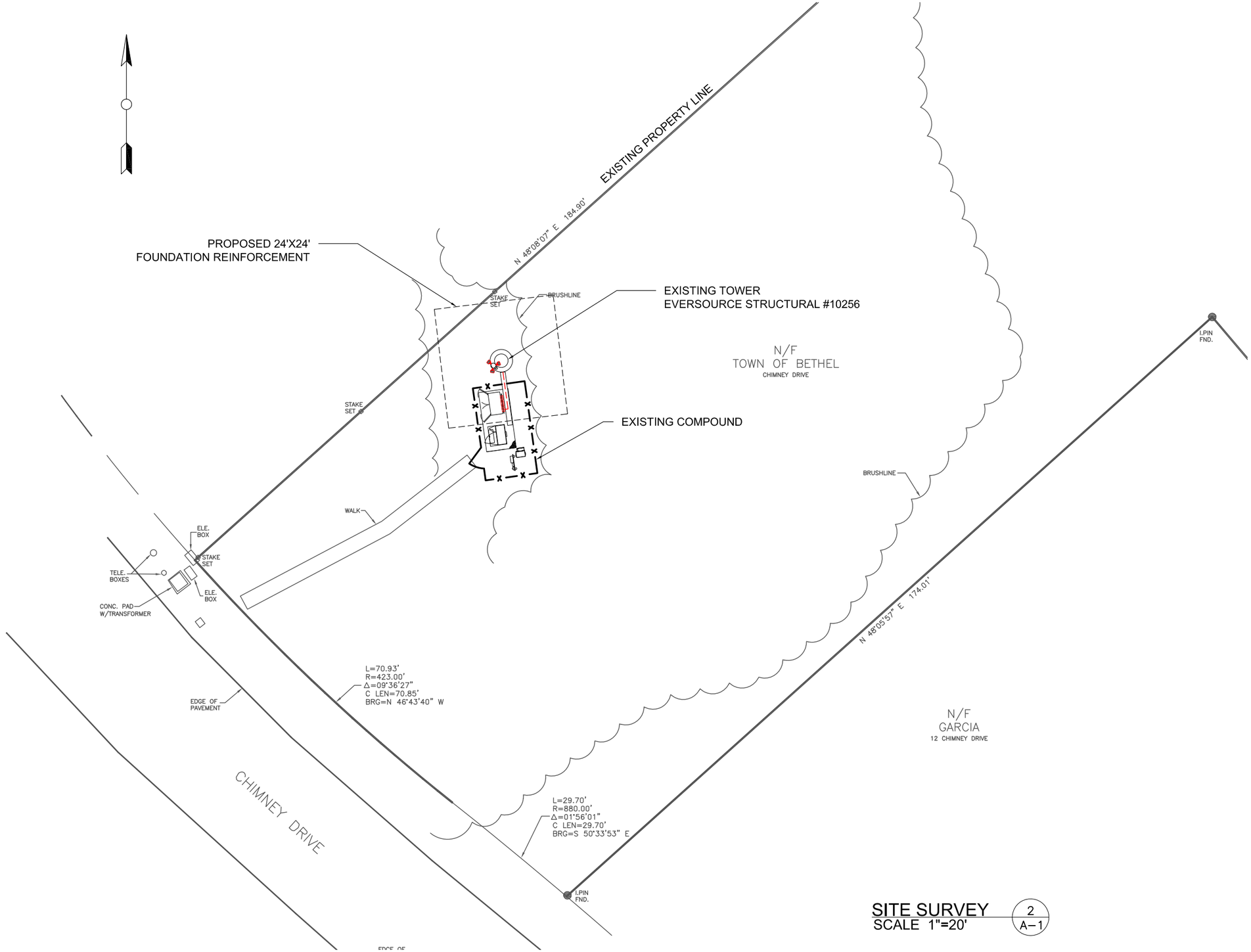
CONSULTANT:
FORESITE LLC
Architects . Engineers . Surveyors
462 Walnut street
Newton, MA 02460
617-212-3123

PROFESSIONAL SEAL

REV	DESCRIPTION	DATE
A	PRELIMINARY	01/13/17
0	FINAL ISSUED	02/14/17

SITE NUMBER: CT11110C
SITE NAME: Danbury/I-84/X8
SITE ADDRESS: 8 Chimney Drive
Bethel, CT 06801

SHEET TITLE:
N-1: NOTES AND DISCLAIMERS



SITE SURVEY
SCALE 1"=20'

2
A–1

APPLICANT:

T-MOBILE NORTHEAST LLC

35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
860-692-7100

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PROFESSIONAL SEAL

STATE OF CONNECTICUT
HOSSEIN VAHEDI
NO. ARI. 11162
LICENSED ARCHITECT

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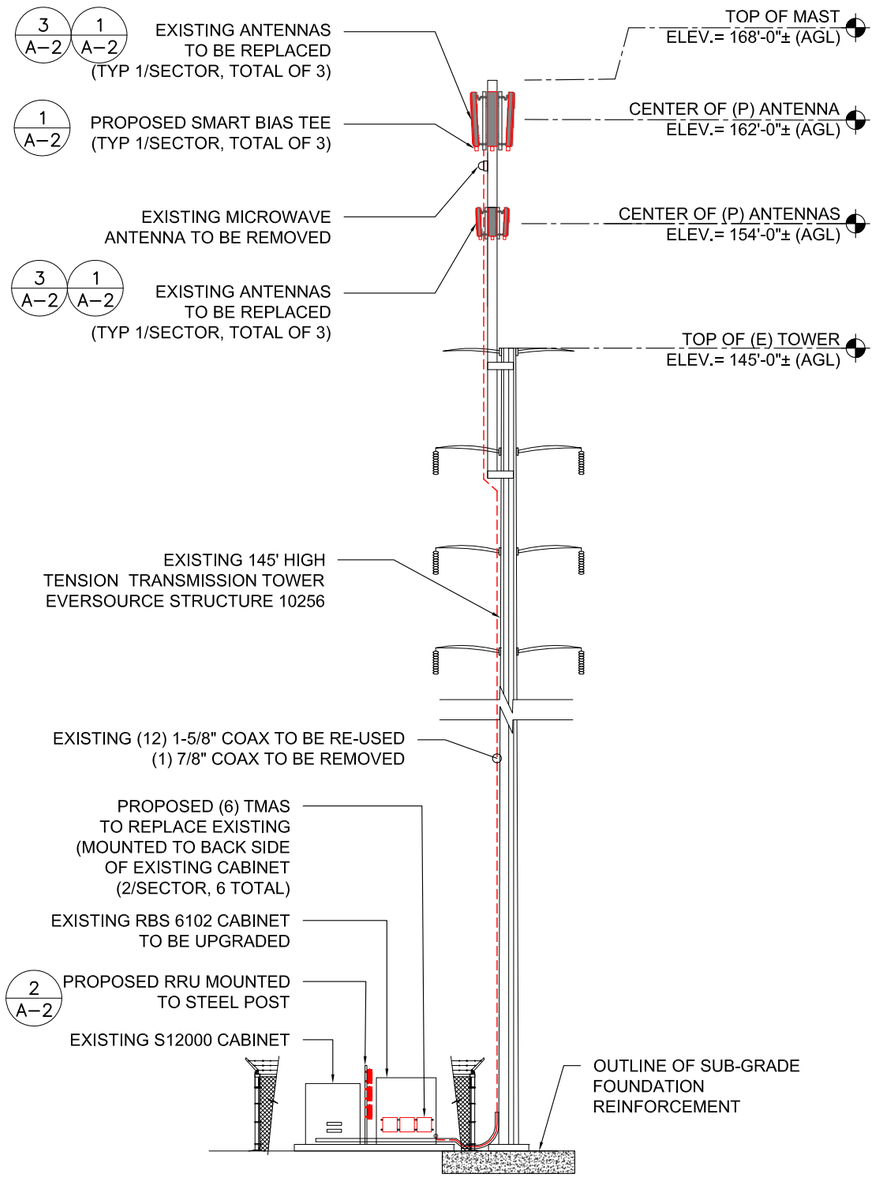
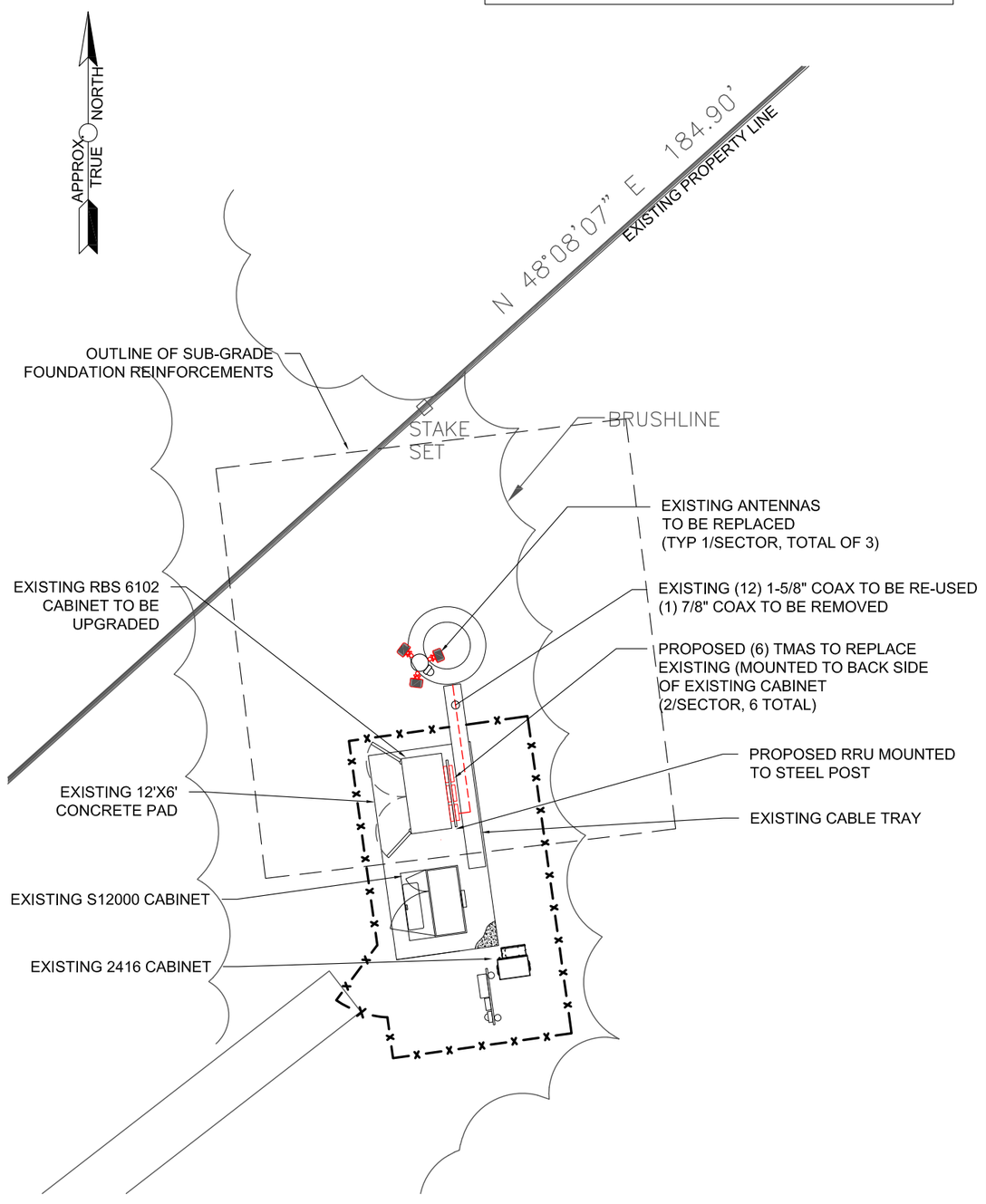
SHEET TITLE:
A-1: SITE PLAN



ELEVATION
SCALE 1"=16'

1 A–1

REFER TO STRUCTURAL ANALYSIS REPORT BY CENTEK ENGINEERING DATED FEBRUARY 08, 2017 FOR STRUCTURAL EVALUATION OF THE TOWER AND CONDITION.



SITE PLAN
SCALE 1"=8'

2 A–1

APPLICANT:
T-MOBILE NORTHEAST LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
860-692-7100

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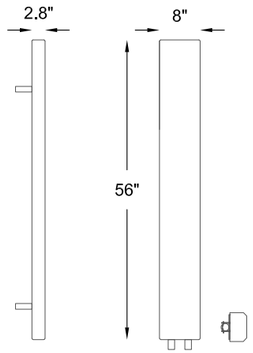
Bethel, CT 06801

SHEET TITLE:
A-2: PLANS AND ELEVATIONS

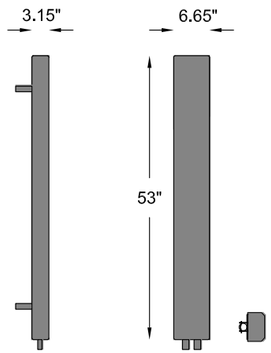
REMOVE:
(6) ANTENNAS

Manufacturer:	ANDREW
Model	RR90-17-02DPL2
Footprint:	56.0"Hx8.0"Wx2.8"D
weight:	13.5 lbs



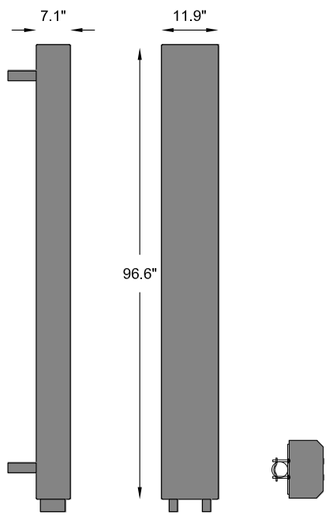
ADD:
(3) ANTENNAS AT ELEVATION 154'

Manufacturer:	RFS
Model	APX18D-209014-C
Footprint:	53.0"Hx6.65"Wx3.15"D
weight:	34.1 lbs
Frequency band	1710-1900 MHZ
Antenna type	DUAL Sector
Wind loading lateral	236 km/h
Wind loading rear	196 km/h
Wind loading maximum	406 km/h

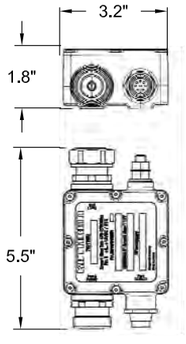


ADD:
(3) ANTENNAS AT ELEVATION 162'

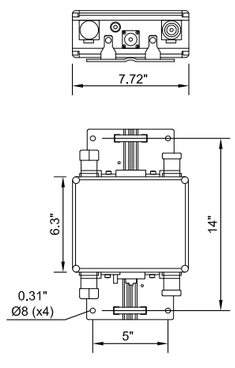
Manufacturer:	COMMSCOPE
Model	LNX-6515DS-A1M
Footprint:	96.6"Hx11.9"Wx7.1"D
weight:	43.7 lbs
Frequency band	698-896 MHZ
Antenna type	Single Sector
Wind loading lateral	150 km/h
Wind loading rear	150 km/h
Wind loading maximum	241 km/h



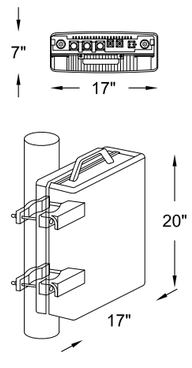
ADD:
(3) SMART BIAS TEES AT ELEVATION 162'



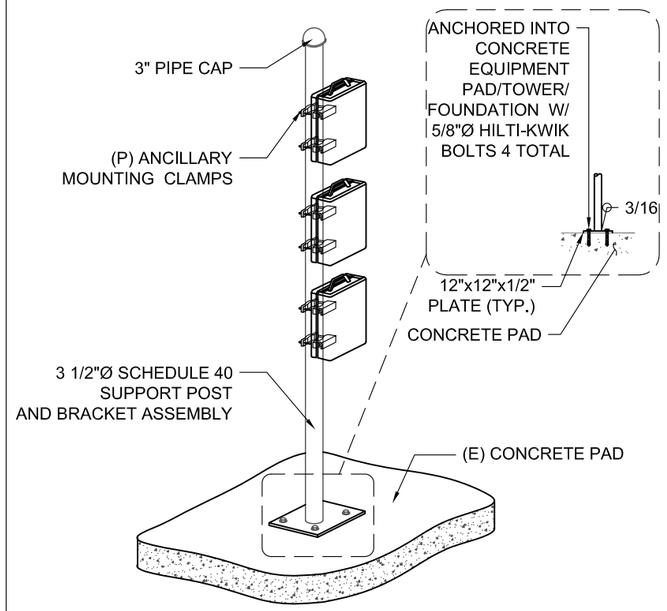
ADD:
(6) TWIN TMAS AT GROUND LEVEL



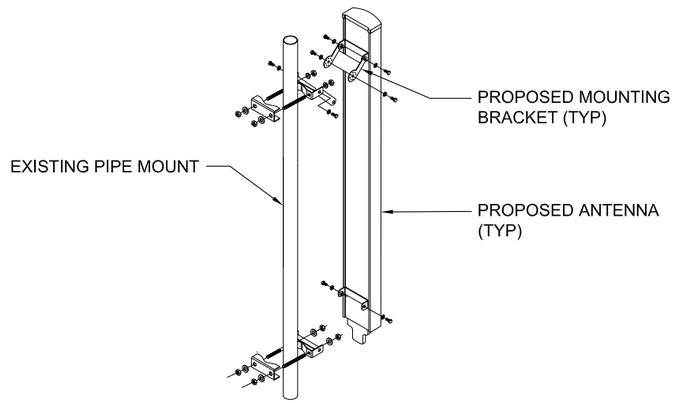
ADD:
(3) RRUS AT GROUND LEVEL



ANTENNA AND EQUIPMENT DETAILS 1 A–2
N.T.S



RRU MOUNTING DETAILS 2 A–2
N.T.S



ANTENNA MOUNTING DETAIL 3 A–2
N.T.S

APPLICANT:
T-MOBILE NORTHEAST LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
860-692-7100

PROJECT MANGER
NSS NORTHEAST SITE SOLUTIONS
Turnkey Wireless Development
420 Main Street, Bldg 4
Sturbridge, MA 01566
203-275-6669

CONSULTANT:
FORESITE LLC
Architects . Engineers . Surveyors
462 Walnut street
Newton, MA 02460
617-212-3123

PROFESSIONAL SEAL

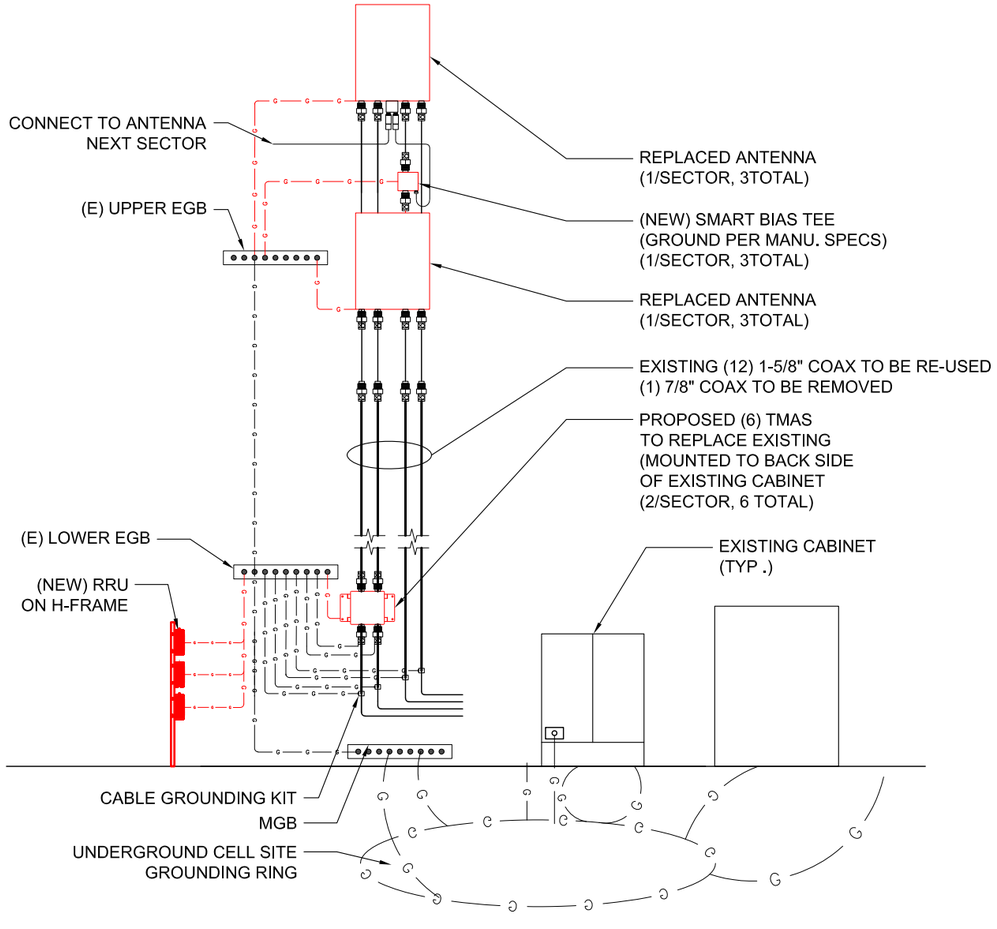
REV	DESCRIPTION	DATE
A	PRELIMINARY	01/13/17
0	FINAL ISSUED	02/14/17

SITE NUMBER: CT11110C
SITE NAME: Danbury/I-84/X8
SITE ADDRESS: 8 Chimney Drive
Bethel, CT 06801

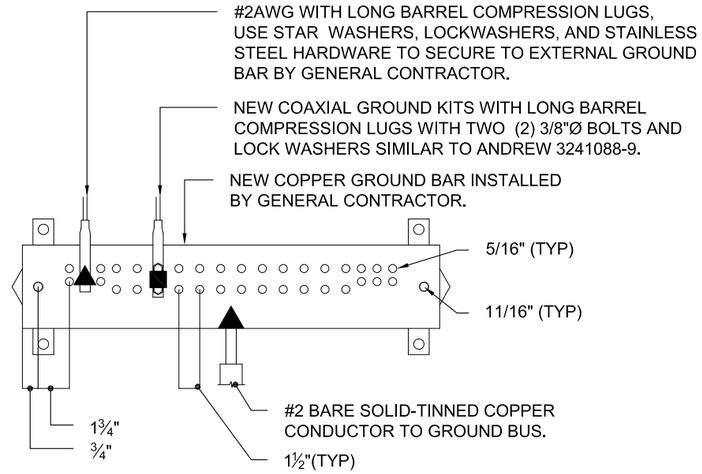
SHEET TITLE:
A-3: ANTENNAS, EQUIPMENT AND DETAILS

NOTES TO CONTRACTOR

1. THE ENTIRE ELECTRICAL INSTALLATION SHALL BE GROUNDED AS REQUIRED BY ALL APPLICABLE CODES.
2. ALL GROUNDING WORK SHALL BE IN ACCORDANCE WITH T-MOBILE STANDARD PRACTICE.
3. ALL BUS CONNECTORS SHALL BE TWO-HOLE, LONG-BARREL TYPE COMPRESSION LUGS, T&B OR EQUAL, UNLESS OTHERWISE NOTED ON DRAWINGS. ALL LUGS SHALL BE ATTACHED TO BUSSES USING BOLTS, NUTS, AND LOCK WASHERS. NO WASHERS ARE ALLOWED BETWEEN THE ITEMS BEING GROUNDED.
4. ALL CONNECTORS SHALL BE CRIMPED USING HYDRAULIC CRIMPING TOOLS, T&B #TBM 8 OR EQUIVALENT.
5. ALL CONNECTIONS SHALL BE MADE TO BARE METAL. ALL PAINTED SURFACES SHALL BE FILED TO ENSURE PROPER CONTACT . NO WASHERS ARE ALLOWED BETWEEN THE ITEMS BEING GROUNDED. ALL CONNECTIONS ARE TO HAVE A NON-OXIDIZING AGENT APPLIED PRIOR TO INSTALLAT ION.
6. ALL COPPER BUSSES SHALL BE CLEANED, POLISHED, AND A NON-OXIDIZING AGENT APPLIED. NO FINGERPRINTS OR DISCOLORED COPPER WILL BE PERMITTED.
7. ALL BENDS SHALL BE AS SHALLOW AS POSSIBLE, WITH NO TURN SHORTER THAN AN 8-INCH NOMINAL
8. GROUNDING CONDUCTORS SHALL BE SOLID TINNED COPPER AND ANNEALED #2. ALL GROUNDING CONDUCTORS SHALL RUN THROUGH PVC SLEEVES WHEREVER CONDUCTORS RUN THROUGH WALLS, FLOORS, OR CEILINGS. IF CONDUCTORS MUST RUN THROUGH EMT, BOTH ENDS OF CONDUIT SHALL BE GROUNDED. SEAL BOTH ENDS OF CONDUIT WITH SILICONE CAULK.
9. GROUNDING SYSTEM RESISTANCE SHALL NOT EXCEED 10 OHMS. IF THE RESISTANCE VALUE IS EXCEEDED, NOTIFY THE PROJECT MANAGER FOR FURTHER INSTRUCTION ON METHODS FOR REDUCING THE RESISTANCE
10. ALL ROOF TOP ANTENNA MOUNTS SHALL BE GROUNDED WITH A #2 GROUND WIRE CONNECTED TO THE NEAREST GROUND BUS. ALL CONNECTIONS ARE TO BE CAD-WELDED IF POSSIBLE.
11. UPON COMPLETION OF WORK, CONDUCT CONTINUITY, SHORT CIRCUIT, AND FALL OF POTENTIAL GROUNDING TESTS FOR APPROVAL. SUBMIT TEST REPORTS TO THE PROJECT MANAGER.
12. GROUNDING CONNECTION TO TRAVEL IN A DOWNWARD DIRECTION.
13. ALL EXPOSED #2 WIRE MUST BE TINN NOT BTW.

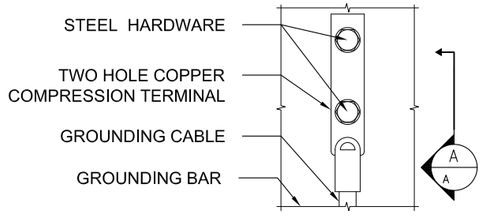


GROUNDING DIAGRAM
SCALE: N.T.S
1 E-1

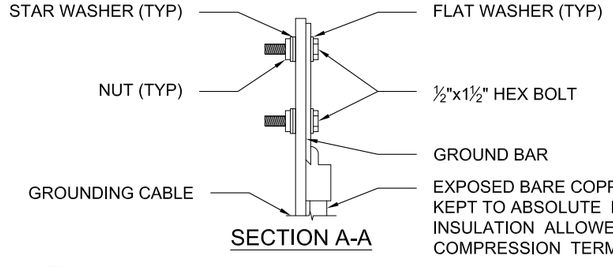


NOTES:
1. ALL HARDWARE STAINLESS STEEL COAT ALL SURFACES WITH KOPR-SHIELD BEFORE MATING.
2. FOR GROUND BOND TO STEEL ONLY: INSERT A TOOTH WASHER BETWEEN LUG AND STEEL, COAT ALL SURFACES WITH KOPR-SHIELD.
3. ALL HOLES ARE COUNTERSUNK 1/16".

GROUND BAR DETAILS
SCALE: N.T.S
2 E-1



ELEVATION



SECTION A-A

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

TYPICAL GROUND BAR CONNECTIOS DETAIL
SCALE: N.T.S
3 E-1

APPLICANT:
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Bethel, CT 06801

SHEET TITLE:
E-1: GROUNDING DETAILS

EVERSOURCE

MAST DESIGN AND FOUNDATION REINFORCEMENT

STRUCT. NO. 10256
8 CHIMNEY DRIVE
BETHEL, CT 06801

VICINITY MAP

NORTH

PROJECT SUMMARY

SITE ADDRESS:	8 CHIMNEY DRIVE BETHEL, CT 06801
PROJECT COORDINATES:	LAT: 41°–24'–38.90N LON: 73°–24'–00.70W ELEV:±487' AMSL
STRUCT NO:	10256
EVERSOURCE CONTACT:	ROBERT GRAY 860.665.3175
T–MOBILE SITE REF.:	CT11110C
T–MOBILE CONTACT:	SHELDON FREINCLE 201.776.8521
ANTENNA CL HEIGHT:	154'–0" AND 162'–0"
ENGINEER OF RECORD:	CENTEK ENGINEERING, INC. 63–2 NORTH BRANFORD ROAD BRANFORD, CT 06405
CENTEK CONTACT:	CARLO F. CENTORE, PE 203.488.0580 ext. 122

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T–1	TITLE SHEET	1
N–1	DESIGN BASIS & GENERAL NOTES	1
N–2	BORING LOG, EARTHWORK & FOUNDATION NOTES	1
N–3	CONCRETE CONSTRUCTION NOTES	1
N–4	STRUCTURAL STEEL NOTES	1
MI–1	MODIFICATION INSPECTION REQUIREMENTS	1
S–1	TOWER ELEVATION & FEEDLINE PLAN	1
S–2	COMPOUND PLAN	1
S–3	CAISSON COLLAR PLAN	1
S–4	CAISSON SECTION	1
S–5	TOP CONNECTION DETAILS	1
S–6	BOTTOM CONNECTION DETAILS	1

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

T-MOBILE
REINFORCEMENT DESIGN

CT11110C
EVERSOURCE STRUCTURE 10256

8 CHIMNEY DRIVE
BETHEL, CT 06801

DATE:	1/18/17
SCALE:	AS SHOWN
JOB NO.	16162.07

TITLE SHEET

SHEET NO.
T–1
Sheet No. 1 of 12

DESIGN BASIS

1. GOVERNING CODE: 2012 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2016 CT STATE SUPPLEMENT.

2. TIA–222–G, ASCE–48–05 – "DESIGN OF STEEL TRANSMISSION POLE STRUCTURES", NESC C2–2007 AND NORTHEAST UTILITIES DESIGN CRITERIA.

3. DESIGN CRITERIA

   WIND LOAD: (ANTENNA MAST)
   NOMINAL DESIGN WIND SPEED (V) = 93 MPH (2016 CSBC: APPENDIX 'N')

   WIND LOAD: (UTILITY POLE & FOUNDATION)
   BASIC WIND SPEED (V) =100 MPH (3–SECOND GUST) BASED ON NESC C2–2007, SECTION 25 RULE 250C.

GENERAL NOTES

1. REFER TO STRUCTURAL ANALYSIS AND REINFORCEMENT DESIGN PREPARED BY CENTEK ENGINEERING, INC., FOR T–MOBILE, DATED 1/26/17.

2. TOWER GEOMETRY AND STRUCTURE MEMBER SIZES WERE OBTAINED FROM THE ORIGINAL TOWER DESIGN DOCUMENTS PREPARED BY AMERICAN POLE STRUCTURES COMBUSTION ENGINEERING, INC., CUST. ORDER NO. CLP–409642, CIRCA 1976/1977. CAISSON DESIGN INFORMATION WAS OBTAINED FROM THE ORIGINAL DESIGN DOCUMENTS PREPARED BY NORTHEAST UTILITIES SERVICE CO., DWG. NO. 01143–60001 SH. 6, DATED MARCH, 1977.

3. THE CONTRACTOR SHALL LIMIT THE DURATION OF THE FOUNDATION REINFORCEMENT WORK. THE EXISTING CAISSON WITHIN THE SHOWN LIMITS IS STABLE FOR WIND SPEEDS LESS THAN 50 MPH WITHOUT ICE LOADING. IF HIGHER WIND SPEED OR ICE EVENT IS EXPECTED, THE EXCAVATION AREA SHALL BE FILLED WITH COMPACT FILL MATERIAL.

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

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

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

7. BEFORE BEGINNING THE WORK, THE CONTRACTOR IS RESPONSIBLE FOR MAKING SUCH INVESTIGATIONS CONCERNING PHYSICAL CONDITIONS (SURFACE AND SUBSURFACE) AT OR CONTIGUOUS TO THE SITE WHICH MAY AFFECT PERFORMANCE AND COST OF THE WORK. THIS INCLUDES VERIFYING ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA. CONTRACTOR SHALL TAKE FIELD MEASUREMENTS NECESSARY TO ASSURE PROPER FIT OF ALL FINISHED WORK.

8. FOUNDATION REINFORCEMENTS SHALL BE CONDUCTED BY FIELD CREWS EXPERIENCED IN THE ASSEMBLY AND ERECTION OF TRANSMISSION STRUCTURES. ALL SAFETY PROCEDURES, RIGGING AND ERECTION METHODS SHALL BE STANDARD TO THE INDUSTRY AND IN COMPLIANCE WITH OSHA.

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

10. IF ANY FIELD CONDITIONS EXIST WHICH PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL PROCEED WITH AFFECTED WORK AFTER CONFLICT IS SATISFACTORILY RESOLVED.

11. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.

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

SITE NOTES

1. THE CONTRACTOR SHALL CALL UTILITIES PRIOR TO THE START OF CONSTRUCTION.

2. ACTIVE EXISTING UTILITIES, WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES. THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY, PRIOR TO PROCEEDING, SHOULD ANY UNCOVERED EXISTING UTILITY PRECLUDE COMPLETION OF THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

3. ALL RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED OFF SITE AND BE LEGALLY DISPOSED, AT NO ADDITIONAL COST.

4. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE EQUIPMENT AND TOWER AREAS.

5. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.

6. THE SUBGRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.

7. THE AREAS OF THE COMPOUND DISTURBED BY THE WORK SHALL BE RETURNED TO THEIR ORIGINAL CONDITION.

8. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.

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(203) 488-0580
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Branford, CT 06405
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T-MOBILE
REINFORCEMENT DESIGN

CT11110C
EVERSOURCE STRUCTURE 10256

8 CHIMNEY DRIVE
BETHEL, CT 06801

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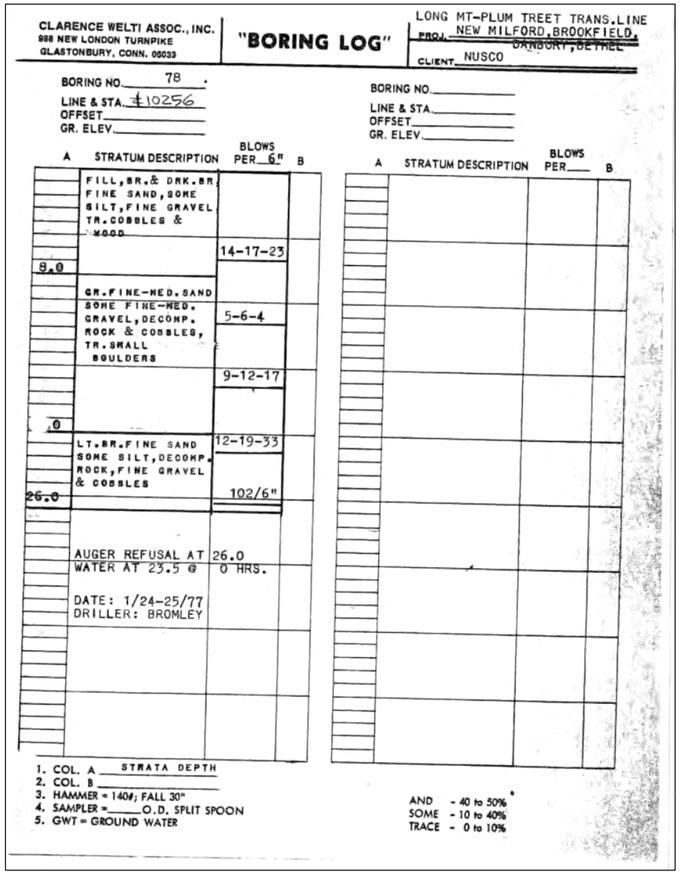
DESIGN BASIS AND GENERAL NOTES

SHEET NO.
N-1
Sheet No. 2 of 12



CLARENCE WELTI ASSOC., INC.
988 NEW LONDON TURNPIKE
GLASTONBURY, CONN. 06033

"BORING LOG"

LONG MT-PLUM TREET TRANS. LINE
PROJ. NEW MILFORD, BROOKFIELD, DANBURY, BETHEL
CLIENT NUSCO

BORING NO. 78
LINE & STA. ± 10256
OFFSET
GR. ELEV.

A	STRATUM DESCRIPTION	BLOWS PER 6"	B
	FILL, BR. & DRK. BR FINE SAND, SOME SILT, FINE GRAVEL TR. COBBLES & WOOD		
		14-17-23	
8.0			
	GR. FINE-MED. SAND SOME FINE-MED. GRAVEL, DECOMP. ROCK & COBBLES, TR. SMALL BOULDERS	5-6-4	
		9-12-17	
20			
	LT. BR. FINE SAND SOME SILT, DECOMP. ROCK, FINE GRAVEL & COBBLES	12-19-33	
26.0		102/6"	
	AUGER REFUSAL AT 26.0		
	WATER AT 23.5 @ 0 HRS.		
	DATE: 1/24-25/77		
	DRILLER: BROMLEY		

BORING NO.
LINE & STA.
OFFSET
GR. ELEV.

A	STRATUM DESCRIPTION	BLOWS PER	B

1. COL. A STRATA DEPTH
2. COL. B
3. HAMMER = 140#; FALL 30"
4. SAMPLER = O.D. SPLIT SPOON
5. GWT = GROUND WATER

AND - 40 to 50%
SOME - 10 to 40%
TRACE - 0 to 10%

EARTHWORK NOTES

1. COMPACTED GRAVEL FILL SHALL BE FURNISHED AND PLACED AS A FOUNDATION FOR STRUCTURES, WHERE SHOWN ON THE CONTRACT DRAWINGS OR DIRECTED BY THE ENGINEER.

2. CRUSHED STONE FILL SHALL BE PLACED IN 12" MAX. LIFTS AND CONSOLIDATED USING A HAND OPERATED VIBRATORY PLATE COMPACTOR WITH A MINIMUM OF 2 PASSES OF COMPACTOR PER LIFT.

3. COMPACTED GRAVEL FILL TO BE WELL GRADED BANK RUN GRAVEL MEETING THE FOLLOWING GRADATION REQUIREMENTS:

SIEVE DESIGNATION	% PASSING
1 ½"	100
No. 4	40–70
No. 100	5–20
No. 200	4–8

4. CRUSHED STONE TO BE UNIFORMLY GRADED, CLEAN, HARD PROCESS AGGREGATE MEETING THE FOLLOWING GRADATION REQUIREMENTS:

SIEVE DESIGNATION	% PASSING
1"	100
¾"	90–100
½"	0–15
⅜"	0–5

5. SELECT BACKFILL FOR FOUNDATION WALLS SHALL BE FREE OF ORGANIC MATERIAL, TOPSOIL, DEBRIS AND BOULDERS LARGER THAN 6".

6. GRAVEL AND GRANULAR FILL SHALL BE INSTALLED IN 10" MAX. LIFTS. COMPACTED TO 95% MIN. AT MAX. DRY DENSITY.

7. NON WOVEN GEOTEXTILE FOR SEPARATION PURPOSES SHALL BE MIRAFI 140N, OR ENGINEER APPROVED EQUAL.

FOUNDATION CONSTRUCTION NOTES

1. ALL FOOTINGS SHALL BE PLACED ON SUITABLE, COMPACTED SOIL HAVING ADEQUATE BEARING CAPACITY AND FREE OF ORGANIC CONTENT, CLAY, OR OTHER UNSUITABLE MATERIAL. ADDITIONAL EXCAVATION MAY BE REQUIRED BELOW FOOTING ELEVATIONS INDICATED IF UNSUITABLE MATERIAL IS ENCOUNTERED.

2. SUBGRADE PREPARATION: IF UNSUITABLE SOIL IS ENCOUNTERED, REMOVE ALL UNSUITABLE MATERIALS FROM BELOW PROPOSED STRUCTURE FOUNDATIONS AND COMPACT EXPOSED SOIL SURFACES. PLACE AND COMPACT APPROVED GRAVEL FILL. PLACEMENT OF ALL COMPACTED FILL MUST BE UNDER SUPERVISION OF AN APPROVED TESTING LABORATORY. FILL SHALL BE COMPACTED IN LAYERS NOT TO EXCEED 10" BEFORE COMPACTION. DETERMINE MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D1557–70 AND MAKE ONE (1) FIELD DENSITY TEST IN ACCORDANCE WITH ASTM D2167–66 FOR EACH 50 CUBIC YARDS OF COMPACTED FILL. BUT NOT LESS THAN ONE (1) PER LAYER, TO INSURE COMPACTION TO 95% OF MAX. DRY DENSITY.

3. ALL SOIL SURROUNDING AND UNDER ALL FOOTINGS SHALL BE KEPT REASONABLY DRY AND PROTECTED FROM FREEZING AND FROST ACTION DURING THE COURSE OF CONSTRUCTION.

4. WHERE GROUNDWATER IS ENCOUNTERED, DEWATERING SHALL BE ACCOMPLISHED CONTINUOUSLY AND COMPLETELY DURING FOUNDATION CONSTRUCTION. PROVIDE CRUSHED STONE AS REQUIRED TO STABILIZE FOOTING SUBGRADE.

5. ALL FOOTINGS ARE TO REST ON FIRM SOIL, REGARDLESS OF ELEVATIONS SHOWN ON THE DRAWINGS, BUT IN NO CASE MAY FOOTING ELEVATIONS BE HIGHER THAN INDICATED ON THE FOUNDATION PLAN, UNLESS SPECIFICALLY DIRECTED BY THE ENGINEER.

6. FOUNDATION WATERPROOFING AND DAMPPROOFING SHALL COMPLY WITH BUILDING CODE REQUIREMENTS UNLESS A MORE SUBSTANTIAL SYSTEM IS INDICATED OR SPECIFIED.

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BORING LOG, EARTHWORK AND FOUNDATION CONSTRUCTION NOTES

SHEET NO.
N-2
Sheet No. 3 of 12

CONCRETE CONSTRUCTION

1. CONCRETE CONSTRUCTION SHALL CONFORM TO THE FOLLOWING STANDARDS:

   ACI 211 – STANDARD PRACTICE FOR SELECTING PROPORTIONS FOR NORMAL AND HEAVYWEIGHT CONCRETE.

   ACI 301 – SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS.

   ACI 302 – GUIDE FOR CONCRETE FLOOR AND SLAB CONSTRUCTION

   ACI 304 – RECOMMENDED PRACTICE FOR MEASURING, MIXING, TRANSPORTING, AND PLACING CONCRETE.

   ACI 306.1 – STANDARD SPECIFICATION FOR COLD WEATHER CONCRETING

   ACI 318 – BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE.

2. CONCRETE SHALL BE AIR ENTRAINED AND SHALL DEVELOP COMPRESSIVE STRENGTH IN 28 DAYS AS FOLLOWS:

   ALL CONCRETE 3,500 PSI

3. REINFORCING STEEL SHALL BE 60,000 PSI YIELD STRENGTH.

4. ALL DETAILING, FABRICATION, AND ERECTION OF REINFORCING BARS, UNLESS OTHERWISE NOTED, MUST FOLLOW THE LATEST ACI CODE AND LATEST ACI "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES".

5. CONCRETE COVER OVER REINFORCING SHALL BE 3 INCHES.

6. NO STEEL WIRE, METAL FORM TIES, OR ANY OTHER METAL SHALL REMAIN WITHIN THE REQUIRED COVER OF ANY CONCRETE SURFACE.

7. ALL REINFORCEMENT SHALL BE CONTINUOUS. SPLICES WILL NOT BE ALLOWED.

8. NO TACK WELDING OF REINFORCING WILL BE PERMITTED.

9. NO CALCIUM CHLORIDE OR ADMIXTURES CONTAINING MORE THAN 1 % CHLORIDE BY WEIGHT OF ADMIXTURE SHALL BE USED IN THE CONCRETE.

10. TOP OF FOOTING SURFACES SHALL RECEIVE A UNIFORM FLOAT FINISH. CURE FOOTING SURFACE WITH SONNEBORN KURE–N–SEAL WB OR APPROVED EQUAL, APPLIED AS RECOMMENDED BY MANUFACTURER.

11. PREPARATION OF SURFACES WHERE NEW CONCRETE WILL INTERFACE WITH EXISTING CAISSON:
    THE PERIMETER OF THE EXISTING CAISSON SHALL BE THOROUGHLY CLEANED OF ALL DIRT AND DELETERIOUS MATERIALS PRIOR TO APPLICATION OF BONDING AGENT. CONTRACTOR SHALL NOTIFY NORTHEAST UTILITIES 24 HOURS IN ADVANCE OF CLEANING.

    SIKADUR 32, HI–MOD OR ENGINEER APPROVED EQUAL SHALL BE APPLIED, IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, TO ALL INTERFACING SURFACES BEFORE CONCRETE IS PLACED.

    CAULK JOINT BETWEEN EXISTING CONCRETE PIER AND NEW CONCRETE WITH SIKAFLEX 1–A BY SIKA CORP. OR ENGINEER APRROVED EQUAL.

    SUBMIT MANUFACTURER'S PRODUCT SPECIFICATION DATA AND INSTALLATION INSTRUCTIONS FOR REVIEW AND APPROVAL BY OWNER.

12. NEW CONCRETE FOOTING SHALL BE ALLOWED TO CURE AT LEAST 14 DAYS BEFORE WIRELESS ANTENNA MOUNT, ANTENNAS, AND CABLES ARE INSTALLED.

13. INSPECTION AND TESTING OF CONCRETE WORK SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY, APPROVED AND PAID BY THE OWNER. THE INSPECTOR SHALL OBSERVE THE CONDITION OF SOILS AND FORMWORK BEFORE FOOTINGS ARE PLACED, SIZE, SPACING AND LOCATION OF REINFORCEMENT, AND PLACEMENT OF CONCRETE.

14. THE TESTING COMPANY SHALL ALSO OBTAIN A MINIMUM OF THREE (3) COMPRESSIVE STRENGTH TEST SPECIMENS FOR EACH CONCRETE MIX DESIGN. ONE SPECIMEN TESTED AT 7 DAYS, ONE AT 28 DAYS, AND ONE HELD IN RESERVE FOR FUTURE TESTING, IF NEEDED.

15. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE OWNER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

16. THE CONTRACTOR SHALL LIMIT THE DURATION OF THE FOUNDATION REINFORCEMENT WORK. THE EXISTING CAISSON WITHIN THE SHOWN LIMITS IS STABLE FOR WIND SPEEDS LESS THAN 50 MPH WITHOUT ICE LOADING. IF HIGHER WIND SPEED OR ICE EVENT IS EXPECTED, THE EXCAVATION AREA SHALL BE FILLED WITH COMPACT FILL MATERIAL.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
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CONCRETE CONSTRUCTION NOTES

SHEET NO.
N-3
Sheet No. 4 of 12

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD).

2. MATERIAL SPECIFICATIONS

   A. STRUCTURAL STEEL (W SHAPES)---ASTM A992 (FY = 50 KSI)
   B. STRUCTURAL STEEL (OTHER SHAPES)---ASTM A36 (FY = 36 KSI).
   C. STRUCTURAL STEEL (TOWER REINF. SOLID ROUND BAR)--- ASTM A572_GR50 (50 KSI)
   D. STRUCTURAL HSS (RECTANGULAR SHAPES)---ASTM A500 GRADE B, (FY = 46 KSI)
   E. STRUCTURAL HSS (ROUND SHAPES)---ASTM A500 GRADE B, (FY = 42 KSI)
   F. PIPE---ASTM A53 GRADE B (FY = 35 KSI)

3. FASTENER SPECIFICATIONS

   A. CONNECTION BOLTS---ASTM A325-N, UNLESS OTHERWISE SCHEDULED.
   B U-BOLTS---ASTM A307
   C. ANCHOR RODS---ASTM F1554
   D. WELDING ELECTRODES---ASTM E70XX FOR A36 & A572_GR50 STEELS, ASTM E80XX FOR A572_GR65 STEEL.
   E. BLIND BOLTS---AS1252 PROPERTY CLASS 8.8 (FU=120 KSI).

4. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING: SECTION PROFILES, SIZES, CONNECTION ATTACHMENTS, REINFORCING, ANCHORAGE, SIZE AND TYPE OF FASTENERS AND ACCESSORIES. INCLUDE ERECTION DRAWINGS, ELEVATIONS AND DETAILS.

5. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.

6. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.

7. FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.

8. INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.

9. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON-GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.

10. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.

11. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE".

12. CONTRACTOR SHALL COMPLY WITH AWS CODE FOR PROCEDURES APPEARANCE AND QUALITY OF WELDS, AND WELDING PROCESSES SHALL BE QUALIFIED IN ACCORDANCE WITH AWS "STANDARD QUALIFICATION PROCEDURES". ALL WELDING SHALL BE DONE USING THE SCHEDULED ELECTRODES AND WELDING SHALL CONFORM TO AISC AND D1.1 WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLET J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION" 9TH EDITION. AT THE COMPLETION OF WELDING, ALL DAMAGE TO GALVANIZED COATING SHALL BE REPAIRED.

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

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

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

16. ALL BOLTS SHALL BE INSTALLED PER THE REQUIREMENTS OF AISC 14TH EDITION & RCSC "SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH STRENGTH BOLTS".

17. ALL BOLTS SHALL BE INSTALLED AS SNUG-TIGHT CONNECTIONS UNLESS OTHERWISE INDICATED. CONNECTIONS SPECIFIED AS PRETENSIONED OR SLIP-CRITICAL SHALL BE TIGHTENED TO A BOLT TENSION NOT LESS THAN THAT GIVEN IN TABLE J3.1 OF AISC 14TH EDITION.

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

19. LOAD INDICATOR WASHERS SHALL BE UTILIZED ON ALL PRETENSIONED OR SLIP-CRITICAL CONNECTIONS.

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

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

22. FABRICATE BEAMS WITH MILL CAMBER UP.

23. LEVEL AND PLUMB INDIVIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.

24. COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.

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STRUCTURAL STEEL NOTES

SHEET NO.
N-4
Sheet No. 5 of 12

MODIFICATION INSPECTION REPORT REQUIREMENTS

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

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

GENERAL

1. THE MODIFICATION INSPECTION IS A VISUAL INSPECTION OF STRUCTURAL MODIFICATIONS, TO INCLUDE A REVIEW AND COMPILATION OF SPECIFIED SUBMITTALS AND CONSTRUCTION INSPECTIONS, AS AN ASSURANCE OF COMPLIANCE WITH THE CONSTRUCTION DOCUMENTS PREPARED UNDER THE DIRECTION OF THE ENGINEER OF RECORD (EOR).

2. THE MODIFICATION INSPECTION IS TO CONFIRM INSTALLATION CONFIGURATION AND GENERAL WORKMANSHIP AND IS NOT A REVIEW OF THE MODIFICATION DESIGN. OWNERSHIP OF THE MODIFICATION DESIGN EFFECTIVENESS AND INTENT RESIDES WITH THE ENGINEER OF RECORD.

3. TO ENSURE COMPLIANCE WITH THE MODIFICATION INSPECTION REQUIREMENTS THE GENERAL CONTRACTOR (GC) AND THE MODIFICATION INSPECTOR (MI) COMMENCE COMMUNICATION UPON AUTHORIZATION TO PROCEED BY THE CLIENT. EACH PARTY SHALL BE PROACTIVE IN CONTACTING THE OTHER. THE EOR SHALL BE CONTACTED IF SPECIFIC GC/MI CONTACT INFORMATION IS NOT MADE AVAILABLE.

4. THE GC SHALL PROVIDE THE MI WITH A MINIMUM OF 5 BUSINESS DAYS NOTICE OF IMPENDING INSPECTIONS.

5. WHEN POSSIBLE, THE GC AND MI SHALL BE ON SITE DURING THE MODIFICATION INSPECTION TO HAVE ANY NOTED DEFICIENCIES ADDRESSED DURING THE INITIAL MODIFICATION INSPECTION.

MODIFICATION INSPECTOR (MI)

1. THE MI SHALL CONTACT THE GC UPON AUTHORIZATION BY THE CLIENT TO:

   – REVIEW THE MODIFICATION INSPECTION REPORT REQUIREMENTS.
   – WORK WITH THE GC IN DEVELOPMENT OF A SCHEDULE FOR ON–SITE INSPECTIONS.
   – DISCUSS CRITICAL INSPECTIONS AND PROJECT CONCERNS.

2. THE MI IS RESPONSIBLE FOR COLLECTION OF ALL INSPECTION AND TEST REPORTS, REVIEWING REPORTS FOR ADHERENCE TO THE CONTRACT DOCUMENTS, CONDUCTING ON–SITE INSPECTIONS AND COMPILATION & SUBMISSION OF THE MODIFICATION INSPECTION REPORT TO THE CLIENT AND THE EOR.

GENERAL CONTRACTOR (GC)

1. THE GC IS REQUIRED TO CONTACT THE GC UPON AUTHORIZATION TO PROCEED WITH CONSTRUCTION BY THE CLIENT TO:

   – REVIEW THE MODIFICATION INSPECTION REPORT REQUIREMENTS.
   – WORK WITH THE MI IN DEVELOPMENT OF A SCHEDULE FOR ON–SITE INSPECTIONS.
   – DISCUSS CRITICAL INSPECTIONS AND PROJECT CONCERNS.

2. THE GC IS RESPONSIBLE FOR COORDINATING AND SCHEDULING IN ADVANCE ALL REQUIRED INSPECTIONS AND TESTS WITH THE MI.

CORRECTION OF FAILING MODIFICATION INSPECTION

1. SHOULD THE STRUCTURAL MODIFICATION NOT COMPLY WITH THE REQUIREMENTS OF THE CONSTRUCTION DOCUMENTS, THE GC SHALL WORK WITH THE MODIFICATION INSPECTOR IN A VIABLE REMEDIATION PLAN AS FOLLOWS:

   – CORRECT ALL DEFICIENCIES TO COMPLY WITH THE CONTRACT DOCUMENTS AND COORDINATE WITH THE MI FOR A FOLLOW UP INSPECTION.
   – WITH CLIENT AUTHORIZATION, THE GC MAY WORK WITH THE EOR TO REANALYZE THE MODIFICATION USING THE AS–BUILT CONDITION.

REQUIRED PHOTOGRAPHS

1. THE GC AND MI SHALL AT MINIMUM PHOTO DOCUMENT THE FOLLOWING FOR INCLUSION IN THE MODIFICATION INSPECTION REPORT:

   – PRE–CONSTRUCTION: GENERAL CONDITION OF THE SITE.
   – DURING CONSTRUCTION: RAW MATERIALS, CRITICAL DETAILS, WELD PREPARATION, BOLT INSTALLATION & TORQUE, FINAL INSTALLED CONDITION & SURFACE COATING REPAIRS.
   – POST–CONSTRUCTION: FINAL CONDITION OF THE SITE

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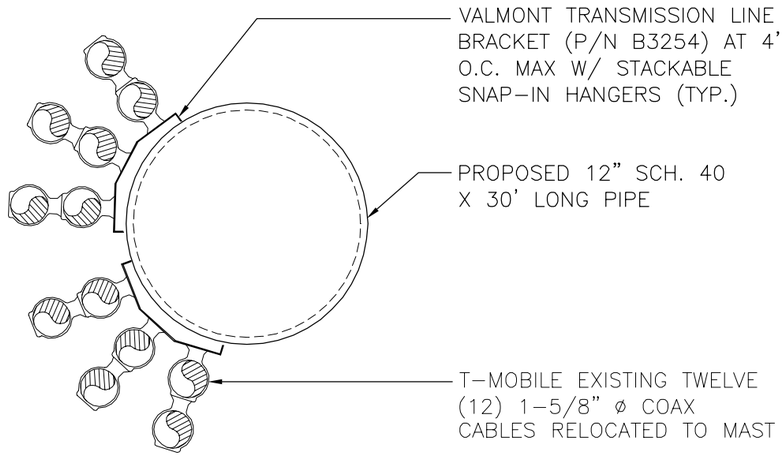
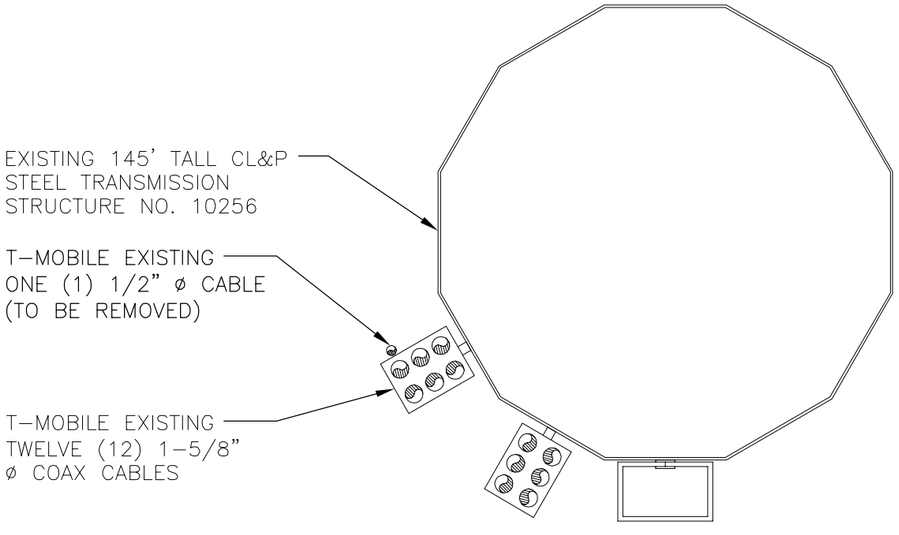
MODIFICATION INSPECTION REQUIREMENTS

SHEET NO.
MI-1
Sheet No. 6 of 12



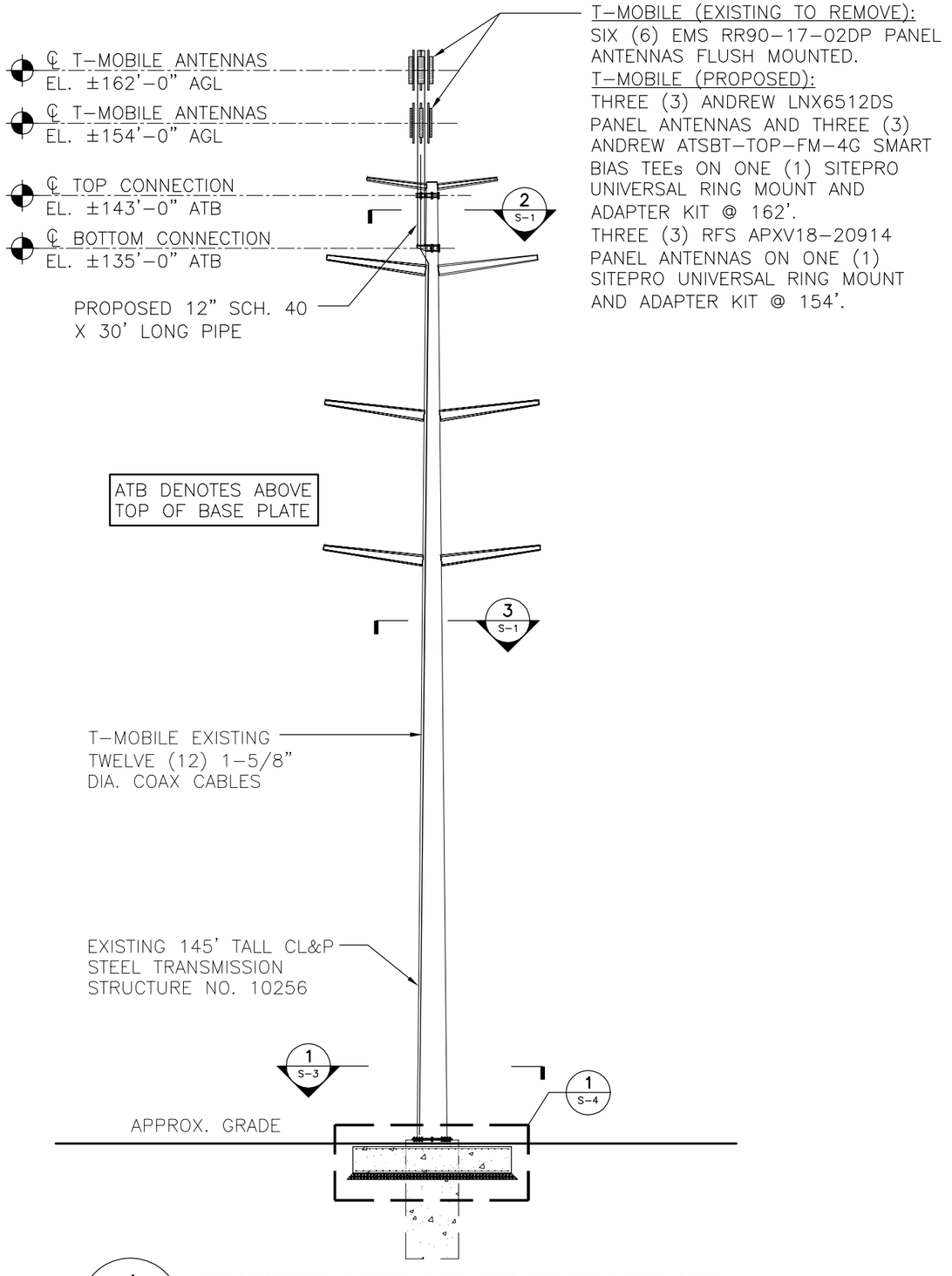
2 / S-1 COAX CABLE PLAN ANTENNA MAST

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



3 / S-1 COAX CABLE PLAN TOWER

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



1 / S-1 TOWER AND MAST ELEVATION

SCALE: NTS

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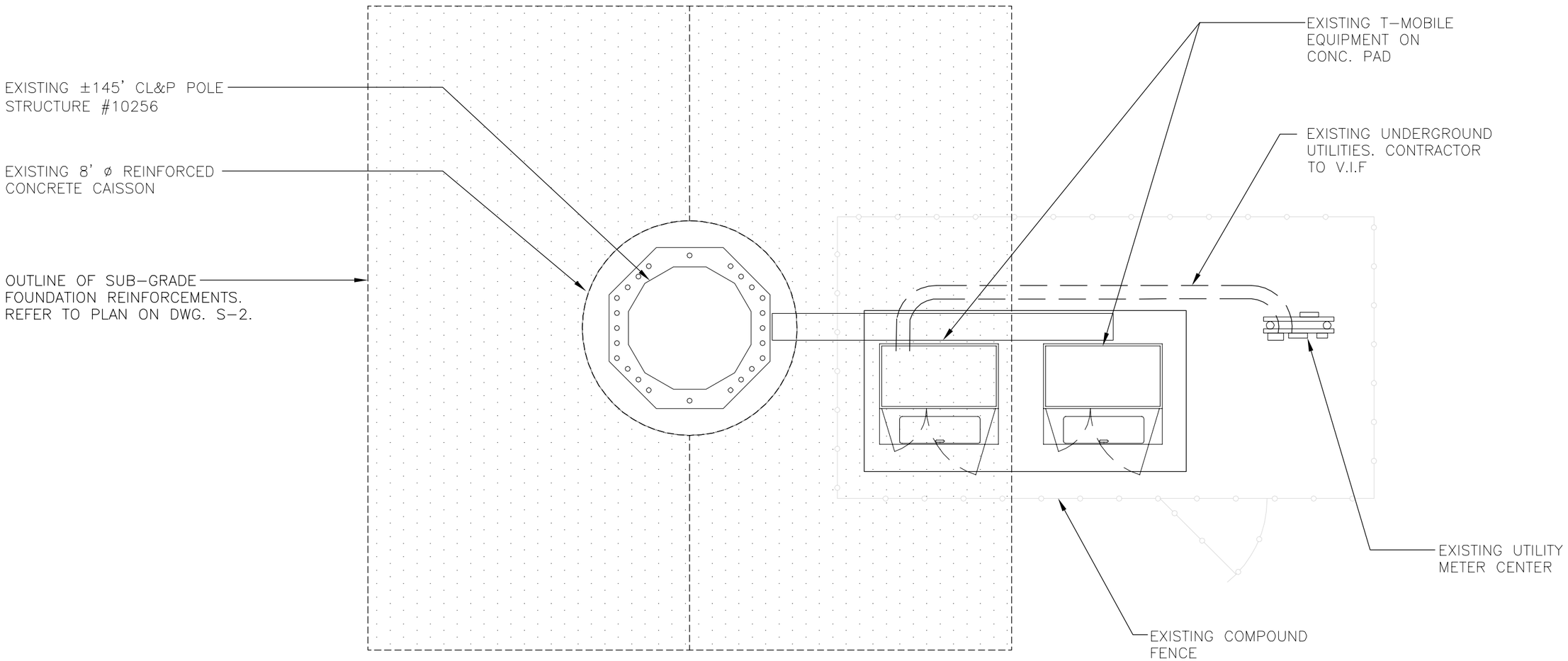
TOWER ELEVATION AND FEEDLINE PLAN

SHEET NO.
S-1
Sheet No. 7 of 12



1 / S-2 **COMPOUND PLAN**

SCALE: 1" = 4'

APPROX. NORTH

GRAPHIC SCALE

4 0 2 4 8 16

(IN FEET)

1 inch = 4 ft.

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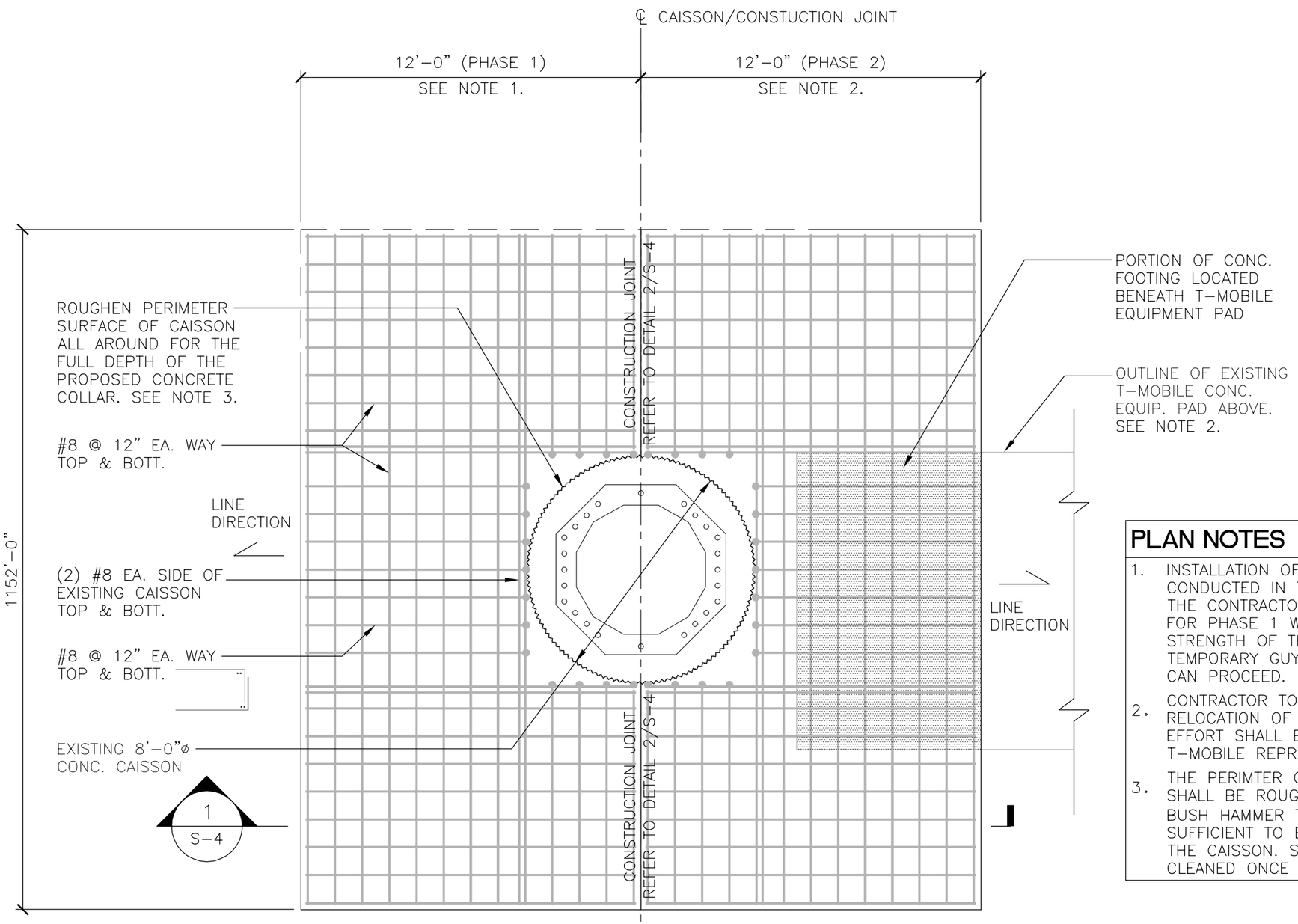
COMPOUND PLAN

SHEET NO.
S-2
Sheet No. 8 of 12



1 S-3 **CAISSON COLLAR PLAN**

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

APPROX. NORTH

PLAN NOTES

1. INSTALLATION OF THE CAISSON COLLAR SHALL BE CONDUCTED IN TWO PHASES AS NOTED ON THE PLAN. THE CONTRACTOR SHALL TEMPORARILY GUY THE TOWER FOR PHASE 1 WORK. ONCE THE DESIGN CONCRETE STRENGTH OF THE PHASE 1 COLLAR IS ACHIEVED, THE TEMPORARY GUYS CAN BE REMOVED & PHASE 2 WORK CAN PROCEED.
2. CONTRACTOR TO PROVIDE TEMPORARY SHORING OR RELOCATION OF THE T-MOBILE PAD & EQUIPMENT. THIS EFFORT SHALL BE COORDINATED WITH AN AUTHORIZED T-MOBILE REPRESENTATIVE.
3. THE PERIMTER OF THE EXISTING CAISSON SURFACE SHALL BE ROUGHENED WITH A LIGHT DUTY PNEUMATIC BUSH HAMMER TO A DEPTH OF APPROXIMATELY 1/4" - SUFFICIENT TO EXPOSE AGGREGATE WITHOUT DAMAGING THE CAISSON. SURFACES SHALL BE THOROUGHLY CLEANED ONCE ROUGHENED.

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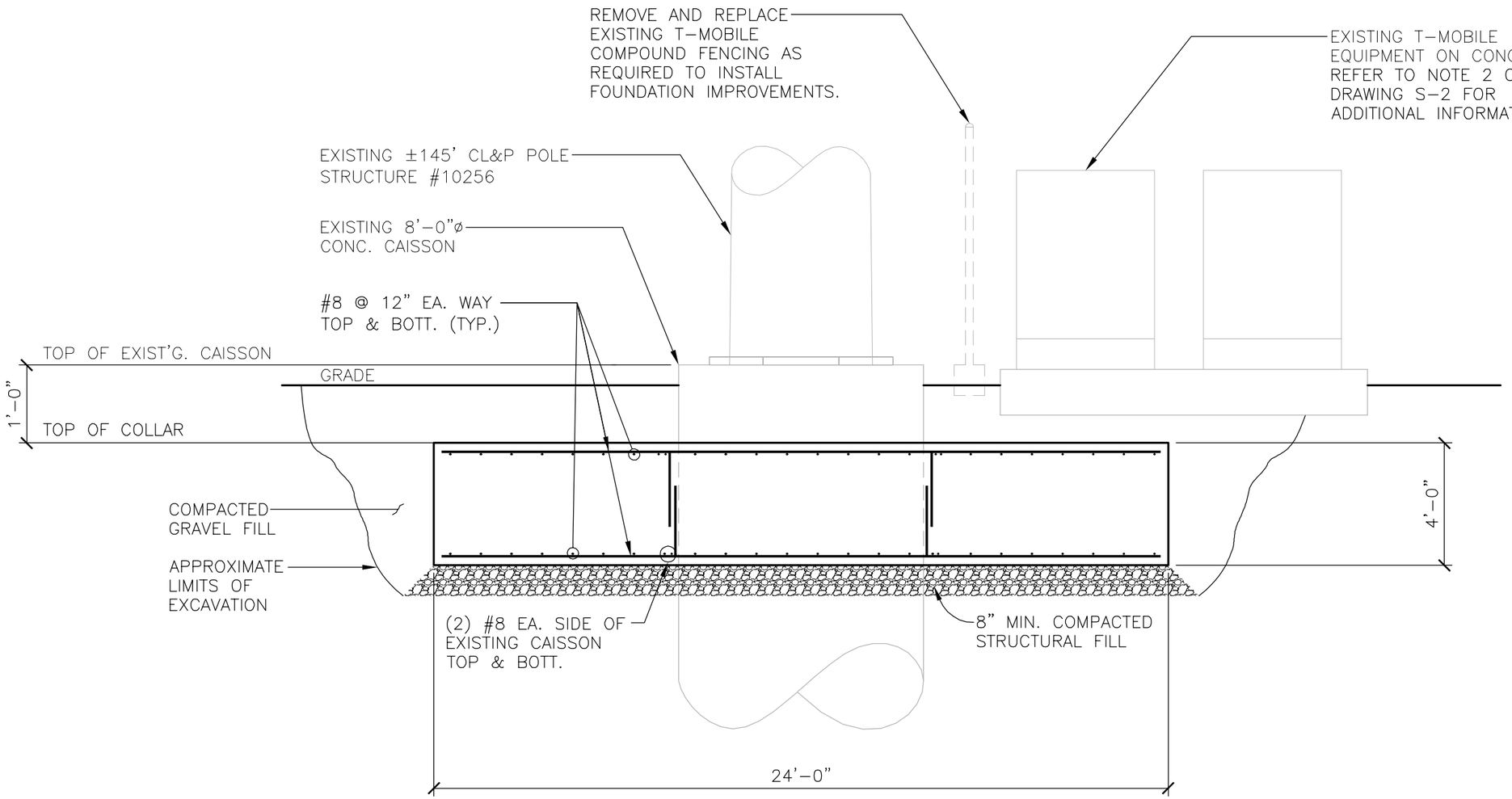
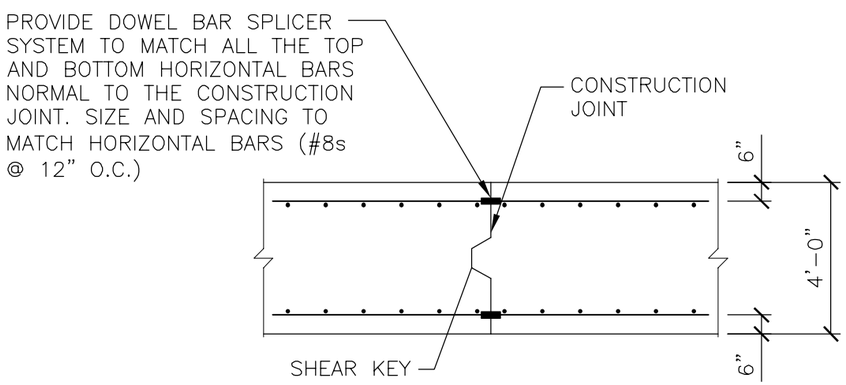
CAISSON COLLAR PLAN

SHEET NO.
S-3
Sheet No. 9 of 12



1 / S–4 **SECTION (CAISSON BEYOND)**

SCALE: 1/4" = 1'–0"



2 / S–4 **CONSTRUCTION JOINT DETAIL**

NOT TO SCALE

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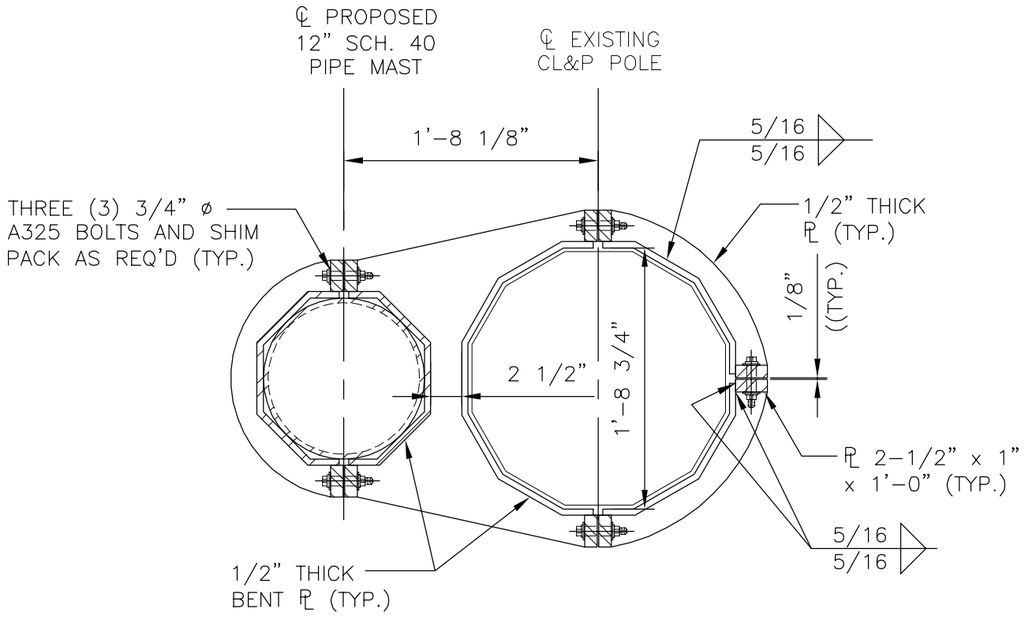
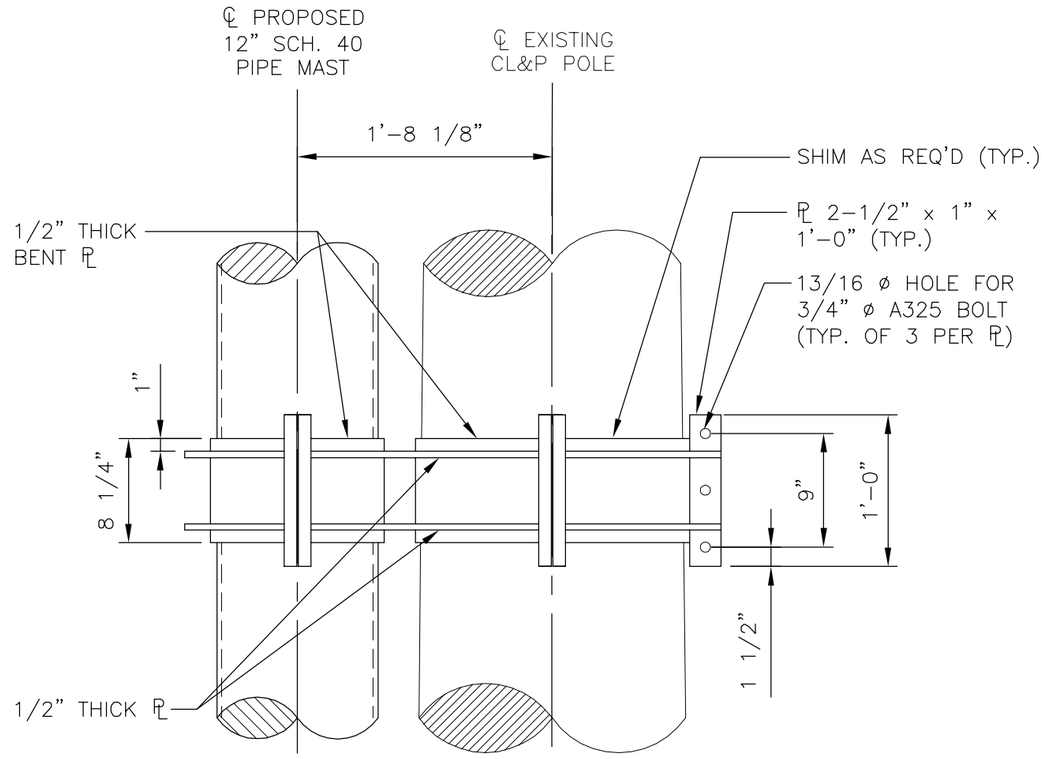
CAISSON SECTION

SHEET NO.
S-4
Sheet No. 10 of 12



2 / S-5 TOP PCS BRACKET PLAN VIEW

SCALE: 1" = 1'-0"



1 / S-5 TOP PCS BRACKET DETAIL

SCALE: 1" = 1'-0"

NOTE:

1. CL&P POLE TAPER = 0.2511"/FT (V.I.F.)

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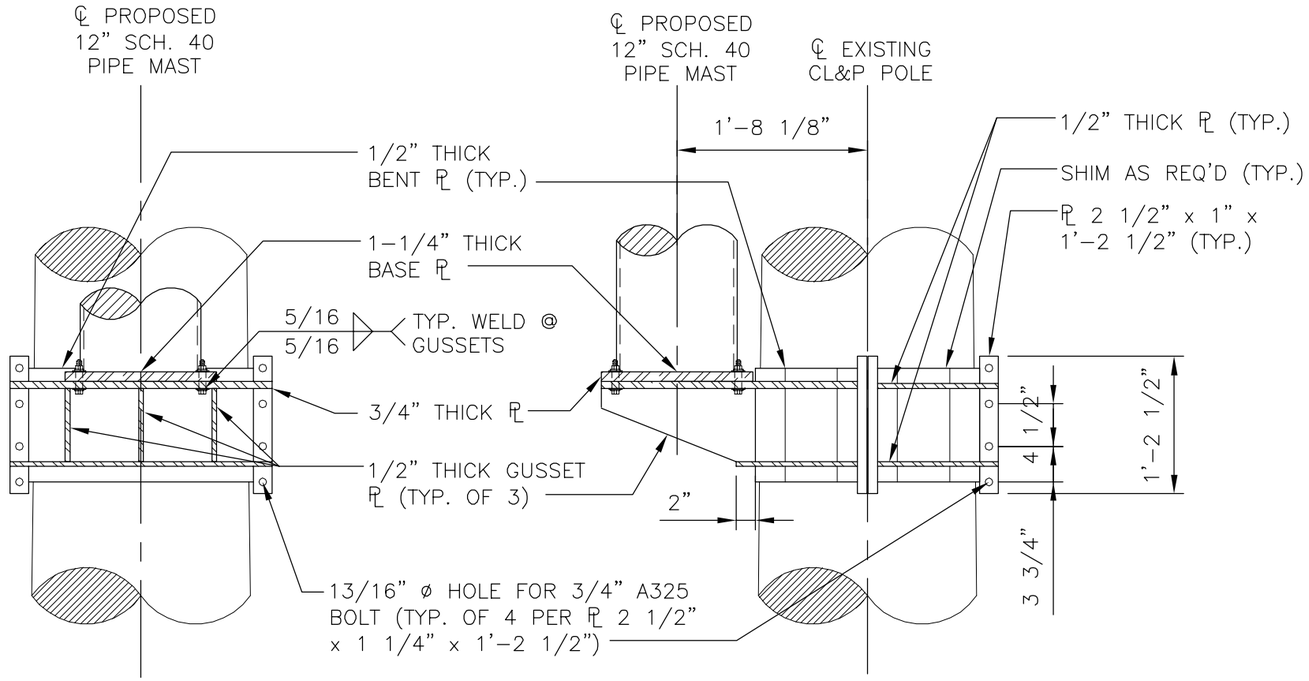
TOP
CONNECTION
DETAILS

SHEET NO.
S-5
Sheet No. 11 of 12

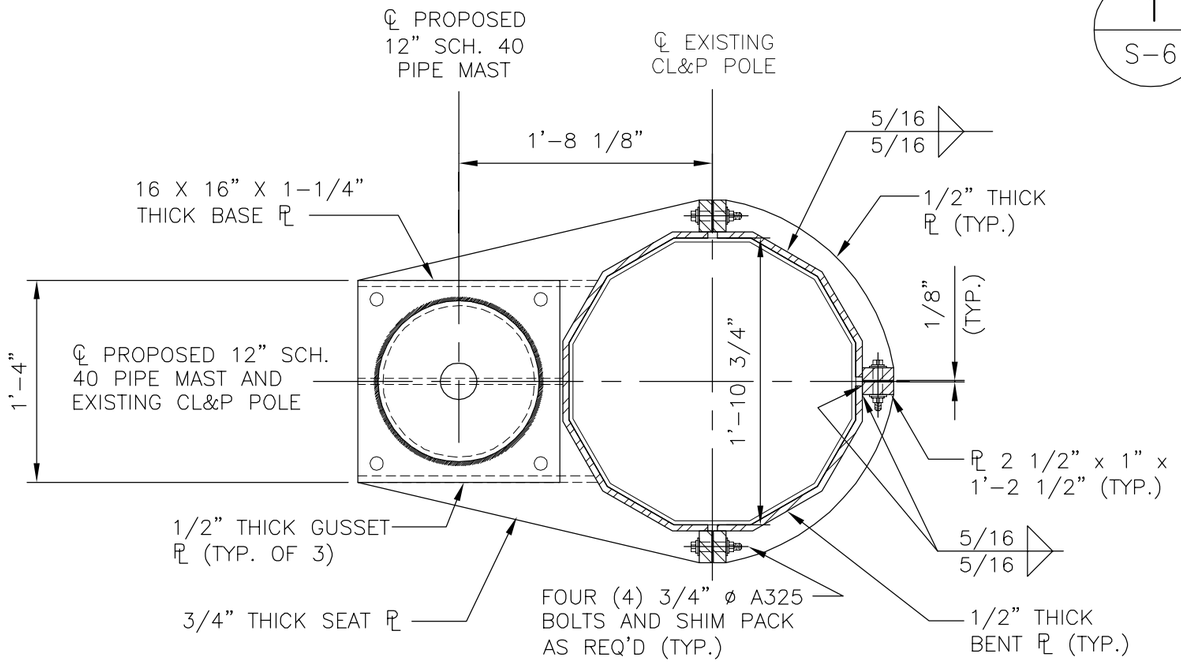
NOTE:

1. CL&P POLE TAPER = 0.2511"/FT (V.I.F.)



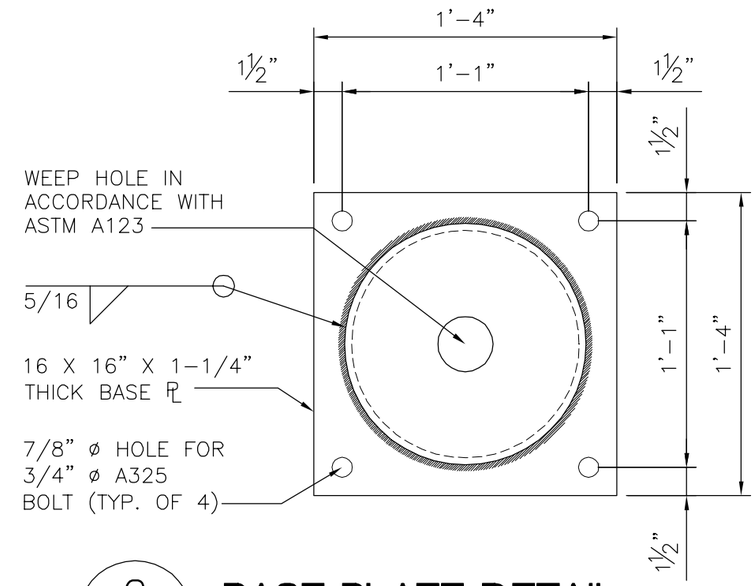
1 / S-6 BOTTOM PCS BRACKET DETAIL

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



3 / S-6 BOTTOM PCS BRACKET PLAN VIEW

SCALE: 1" = 1'-0"



2 / S-6 BASE PLATE DETAIL

SCALE: 1-1/2" = 1'-0"

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BOTTOM CONNECTION DETAILS

SHEET NO.
S-6
Sheet No. 12 of 12

Exhibit D

CENTEK engineering

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Structural Analysis of Antenna Mast and Pole

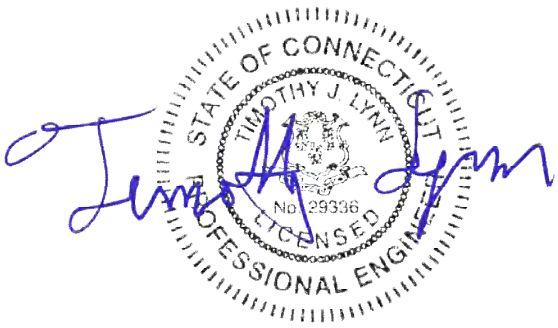
T-Mobile Site Ref: CT11110C

Eversource Structure No. 10256
145' Electric Transmission Pole

8 Chimney Drive
Bethel, CT

CENTEK Project No. 16162.07

~~Date: January 18, 2017~~
Rev 1: February 8, 2017



Prepared for:
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Table of Contents

Introduction

The purpose of this report is to analyze the existing mast and 145' utility pole located at 8 Chimney Drive in Bethel, CT for the proposed antenna and equipment upgrade by T-Mobile.

The existing/proposed loads consist of the following:

- T-MOBILE (Existing to Remain):
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables mounted to the exterior of the pole.
- T-MOBILE (Existing to be Removed):
  Antennas: Six (6) RR90-17-02DP panel antennas mounted in two (2) clusters on a mast with RAD center elevations of 154-ft and 162-ft above grade. One (1) MW dish and one (1) 7/8" coax. Mast: 4" Sch. 40 pipe mast.
- **T-MOBILE (Proposed):**
  Antennas: Three (3) Andrew LNX-6512DS panel antennas and three (3) Andrew ATSBT-TOP-FM-4G Smart Bias Tees mounted on the proposed pipe mast with a RAD center elevation of 162-ft above grade.
- **T-MOBILE (Proposed):**
  Antennas: Three (3) RFS APXV18-20914 panel antennas mounted on the proposed pipe mast with a RAD center elevation of 154-ft above grade.

Primary assumptions used in the analysis

- ASCE 48-05, "Design of Steel Transmission Pole Structures", defines steel stresses for evaluation of the utility pole.
- All utility pole members are adequately protected to prevent corrosion of steel members.
- All proposed antenna mounts are modeled as listed above.
- Pipe mast will be properly installed and maintained.
- No residual stresses exist due to incorrect pole erection.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds conform to the requirements of AWS D1.1.
- Pipe mast and utility pole will be in plumb condition.
- Utility pole was properly installed and maintained and all members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
- Any deviation from the analyzed loading will require a new analysis for verification of structural adequacy.

Analysis

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

The existing mast consisting of a 4-in x 35-ft long SCH. 40 pipe (O.D. = 4.5") connected at two points to the existing tower was analyzed for its ability to resist loads prescribed by the TIA-222G standard. Section 5 of this report details these gravity and lateral wind loads. NESC prescribed loads were also applied to the mast in order to obtain reactions needed for analyzing the utility pole structure. These loads are developed in Section 7 of this report. Load cases and combinations used in RISA-3D for TIA-222-G loading and for NESC/NU loading are listed in report Sections 6 and 8, respectively.

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

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

Design Basis

Our analysis was performed in accordance with TIA-222-G, ASCE 48-05, "Design of Steel Transmission Pole Structures", NESC C2-2007 and Northeast Utilities Design Criteria.

- UTILITY POLE ANALYSIS

  The purpose of this analysis is to determine the adequacy of the existing utility pole to support the proposed antenna loads. The loading and design requirements were analyzed in accordance with the NU Design Criteria Table, NESC C2-2007 ~ Construction Grade B, and ASCE 48-05.

  Load cases considered:

  Load Case 1: NESC Heavy

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

  Load Case 2: NESC Extreme

Wind Speed……..	100 mph (1)
Radial Ice Thickness……..	0"

  Note 1: NESC C2-2007, Section25, Rule 250C: Extreme Wind Loading, 1.25 x Gust Response Factor (wind speed: 3-second gust)

- MAST ASSEMBLY ANALYSIS

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

  Load cases considered:

  Load Case 1:
  Wind Speed…….... 93 mph (2016 CSBC Appendix-N)
  Radial Ice Thickness…….. 0”

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

R e s u l t s

- MAST ASSEMBLY

  The existing pipe mast was determined to be structurally **inadequate**. Replacement of the existing antenna mast with a **12 SCH. 40 Pipe x 30-ft long (O.D. = 12.75”)**, conforming to ASTM A53, Grade B, F_y = 35 ksi specifications will be required.

Component	Stress Ratio (percentage of capacity)	Result
12” Sch. 40 Pipe	33.4%	**PASS**
Connection to Tower	58.3%	**PASS**

- UTILITY POLE

  This analysis finds that the subject utility pole is adequate to support the proposed antenna mast and related appurtenances. The pole stresses meet the requirements set forth by the ASCE 48-05, “Design of Steel Transmission Pole Structures” for the applied NESC Heavy and Extreme load cases. The detailed analysis results are provided in Section 9 of this report. The analysis results are summarized as follows:

  A maximum usage of **85.71%** occurs in the utility pole base plate under the **NESC Extreme** loading condition.

  POLE SECTION:

  The utility pole was found to be within allowable limits.

Tower Section	Elevation	Stress Ratio (% of capacity)	Result
Tube Number 3	0.00’ -46.17’ (AGL)	83.72%	**PASS**

  BASE PLATE:
  The base plate was found to be within allowable limits from the PLS output based on 24 bend lines.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Base Plate	Bending	85.71%	**PASS**

- FOUNDATION AND ANCHORS

The existing foundation consists of a 8-ft ∅ x 18.0-ft long reinforced concrete caisson. The base of the tower is connected to the foundation by means of (24) 2.25"∅, ASTM A615-75 anchor bolts embedded approximately 8-ft into the concrete foundation structure. Foundation information was obtained from NUSCO drawing # 01143-60001.

BASE REACTIONS:

From PLS-Pole analysis of CL&P pole based on NESC/EVERSOURCE prescribed loads.

Load Case	Shear	Axial	Moment
NESC Heavy Wind	29.81 kips	109.16 kips	3434.09 ft-kips
NESC Extreme Wind	47.75 kips	57.19 kips	5049.09 ft-kips

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

ANCHOR BOLTS:

The anchor bolts were found to be within allowable limits.

Tower Component	Design Limit	Stress Ratio (% of capacity)	Result
Anchor Bolts	Tension	48.44%	**PASS**

FOUNDATION:

The existing caisson foundation was found to be structurally **inadequate**. Reinforcement of the existing foundation with a 24-ft square by 4-ft thick reinforced concrete mat installed at the periphery of the existing caisson is required.

Foundation	Design Limit	Allowable Limit	Proposed Loading (2)	Result
Reinforced Conc. Caisson with Mat	Overturning	1.0 FS (1)	1.56 FS (1)	**PASS**

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

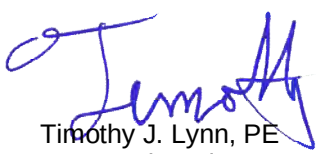
Conclusion

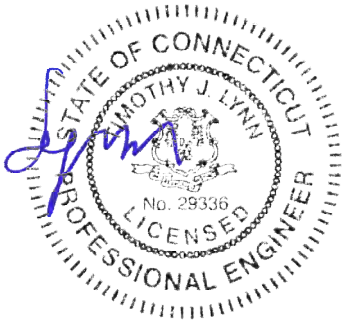
This analysis shows that the subject tower **with the reinforcements detailed in section 4 of the report is adequate** to support the proposed modified antenna configuration.

The analysis is based, in part on the information provided to this office by Eversource and T-Mobile. If the existing conditions are different than the information in this report, CENTEK engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:





Timothy J. Lynn, PE
Structural Engineer

STANDARD CONDITIONS FOR FURNISHING OF PROFESSIONAL ENGINEERING SERVICES ON EXISTING STRUCTURES

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessarily limited to:

- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.

- Information from the field and/or drawings in the possession of CENTEK engineering, Inc. or generated by field inspections or measurements of the structure.

- It is the responsibility of the client to ensure that the information provided to CENTEK engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the “as new” condition.

- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222.

- All services are performed, results obtained, and recommendations made in accordance with generally accepted engineering principles and practices. CENTEK engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM ~ RISA-3D

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

Modeling Features:

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

Analysis Features:

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

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

Graphics Features:

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

Design Features:

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

Results Features:

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

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM ~ PLS-TOWER

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

Modeling Features:

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

Analysis Features:

- Automatic handling of tension-only members
- Automatic distribution of loads in 2-part suspension insulators (v-strings, horizontal vees, etc.)
- Automatic calculation of tower dead, ice, and wind loads as well as drag coefficients according to:
  - ASCE 74-1991
  - NESC 2002
  - NESC 2007
  - IEC 60826:2003
  - EN50341-1:2001 (CENELEC)
  - EN50341-3-9:2001 (UK NNA)
  - EN50341-3-17:2001 (Portugal NNA)
  - ESAA C(b)1-2003 (Australia)
  - TPNZ (New Zealand)
  - REE (Spain)
  - EIA/TIA 222-F
  - ANSI/TIA 222-G
  - CSA S37-01
- Automated microwave antenna loading as per EIA/TIA 222-F and ANSI/TIA 222-G
- Minimization of problems caused by unstable joints and mechanisms
- Automatic bandwidth minimization and ability to solve large problems
- Design checks according to (other standards can be added easily):
  - ASCE Standard 10-90

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

Results Features:

- Design summaries printed for each group of members
- Easy to interpret text, spreadsheet and graphics design summaries
- Automatic determination of allowable wind and weight spans
- Automatic determination of interaction diagrams between allowable wind and weight spans
- Capability to batch run multiple tower configurations and consolidate the results
- Automated optimum angle member size selection and bolt quantity determination

Tool for interactive angle member sizing and bolt quantity determination.

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

Introduction

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

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

ANSI Standard C2-2007 (National Electrical Safety Code) covering the design of electric transmission metal structures is based upon an ultimate strength/yield stress design approach. This approach applies a multiplier (overload capacity factor) to the loads possible from extreme weather loading conditions, and designs the structure so that it does not exceed its ultimate strength (yield stress).

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

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

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

Note 1: Prepared from documentation provide from Northeast Utilities.

P C S M a s t

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

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

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

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

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

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

Attachment A

NU Design Criteria

			Basic Wind Speed	Pressure	Height Factor	Gust Factor	Load or Stress Factor	Force Coef - Shape Factor
			V (MPH)	Q (PSF)	Kz	Gh		
Ice Condition	TIA/EIA	Antenna Mount	TIA	TIA (.75Wi)	TIA	TIA	TIA, Section 3.1.1.1 disallowed for connection design	TIA
	NESC Heavy	Tower/Pole Analysis with antennas extending above top of Tower/Pole (Yield Stress)	------	4	1.00	1.00	2.50	1.6 Flat Surfaces 1.3 Round Surfaces
		Tower/Pole Analysis with Antennas below top of Tower/Pole (on two faces)	-----	4	1.00	1.00	2.50	1.6 Flat Surfaces 1.3 Round Surfaces
		Conductors:	Conductor loads provided by NU					
High Wind Condtion	TIA/EIA	Antenna Mount	85	TIA	TIA	TIA	TIA, Section 3.1.1.1 disallowed for connection design	TIA
	NESC Extreme Wind	Tower/Pole Analysis with antennas extending above top of Tower/Pole	Use NESC C2-2007, Section 25, Rule 250C: Extreme Wind Loading 1.25 x Gust Response Factor Height above ground level based on top of Mast/Antenna					1.6 Flat Surfaces 1.3 Round Surfaces
		Tower/Pole Analysis with Antennas below top of Tower/Pole	Use NESC C2-2007, Section 25, Rule 250C: Extreme Wind Loading Height above ground level based on top of Tower/Pole					1.6 Flat Surfaces 1.3 Round Surfaces
		Conductors:	Conductor loads provided by NU					
NESC Extreme Ice with Wind Conditon*		Tower/Pole Analysis with antennas extending above top of Tower/Pole	Use NESC C2-2007, Section 25, Rule 250D: Extreme Ice with Wind Loading 4PSF Wind Load 1.25 x Gust Response Factor Height above ground level based on top of Mast/Antenna					1.6 Flat Surfaces 1.3 Round Surfaces
		Tower/Pole Analysis with Antennas below top of Tower/Pole	Use NESC C2-2007, Section 25, Rule 250D: Extreme Ice with Wind Loading 4PSF Wind Load Height above ground level based on top of Tower/Pole					1.6 Flat Surfaces 1.3 Round Surfaces
		Conductors:	Conductor loads provided by NU					
		* Only for Structures Installed after 2007						

Shape Factor Criteria shall be per TIA Shape Factors.

2) STEP 2 - The electric transmission structure analysis and evaluation shall be performed in accordance with NESC requirements and shall include the mast and antenna loads determined from NESC applied loading conditions (not TIA/EIA Loads) on the structure and mount as specified below, and shall include the wireless communication mast and antenna loads per NESC criteria)

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

a) Wireless communication mast for its total height above ground level, including the initial and any planned future equipment (Support Platforms, Antennas, TMA's etc.) above the top of an electric transmission structure.

b) Conductors and related devices and hardware (wire loads will be provided by NU).

c) Electric Transmission Structure

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

ii) Shape Factor Multiplier:

NESC Structure Shape	Cd
Polyround (for polygonal steel poles)	1.3
Flat	1.6
Open Lattice	3.2

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

Mount Type	Cable Cd	Pole Cd
Coaxial Cables on outside periphery (One layer)	1.45	1.45
Coaxial Cables mounted on stand offs	1.6	1.3

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

Note: The NESC does not require ice load be included in the supporting structure. (Ice on conductors and shield wire only, and NU will provide these loads).

e) Mast reaction loads shall be evaluated for local effects on the transmission structure members at the attachment points.

EVERSOURCE

		Page	of
Job :	Spec. Number	Sheet	of
Description:	Computed by	Date	3/13/15
	Checked by	Date	

INPUT DATA

TOWER ID: 10256

Structure Height (ft) : 145

Wind Zone : NW CT and MA (blue)

Wind Speed : 100 mph

Tower Type : (●) Suspension ( ) Strain

Extreme Wind Model : PCS Addition

Shield Wire Properties:

	BACK	AHEAD
NAME =	*3/8 AW*	*3/8 AW*
DESCRIPTION =	3/8	3/8
STRANDING =	7 #8 Al Weld	7 #8 Al Weld
DIAMETER =	0.385 in	0.385 in
WEIGHT =	0.262 lb/ft	0.262 lb/ft

Conductor Properties:

	BACK	AHEAD		
NAME =	*BITTERN*	*BITTERN*		
Number of Conductors per phase: 2	1272.000 45/7 ACSR	1272.000 45/7 ACSR	2	Number of Conductors per phase
DIAMETER =	1.345 in	1.345 in		
WEIGHT =	1.432 lb/ft	1.432 lb/ft		

Insulator Weight = 200 lbs

Broken Wire Side = AHEAD SPAN

Horizontal Line Tensions:

	BACK		AHEAD	
	Shield	Conductor	Shield	Conductor
NESC HEAVY =	4,200	10,000	4,200	10,000
EXTREME WIND =	3,060	9,475	3,060	9,475
LONG. WIND =	na	na	na	na
250D COMBINED =	na	na	na	na
NESC W/O OLF =	na	na	na	na
60 DEG F NO WIND =	1,243	4,615	1,243	4,615

Line Geometry:

					SUM
LINE ANGLE (deg) =	BACK:	0	AHEAD:	0	**0**
WIND SPAN (ft) =	BACK:	493	AHEAD:	358	**851**
WEIGHT SPAN (ft) =	BACK:	614	AHEAD:	302	**916**

EVERSOURCE

		Page	of
Job :	Spec. Number	Sheet	of
Description:	Computed by	Date	3/13/15
	Checked by	Date	

WIRE LOADING AT ATTACHMENTS

TOWER ID: 10256

Wind Span =	851	ft	Broken Wire Span =	AHEAD SPAN
Weight Span =	916	ft	Type of Insulator Attachment =	SUSPENSION
Total Angle =	0	degrees		

1. NESC RULE 250B Heavy Loading:

	INTACT CONDITION			BROKEN WIRE CONDITION		
	Horizontal	Longitudinal	Vertical	Horizontal	Longitudinal	Vertical
Shield Wire =	982 lb	0 lb	1,116 lb	569 lb	6,930 lb	748 lb
Conductor =	3,326 lb	0 lb	7,688 lb	1,927 lb	33,000 lb	5,051 lb

2. NESC RULE 250C Transverse Extreme Wind Loading:

	Horizontal	Longitudinal	Vertical
Shield Wire =	680 lb	0 lb	240 lb
Conductor =	4,748 lb	0 lb	3,024 lb

3. NESC RULE 250C Longitudinal Extreme Wind Loading:

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	240 lb
Conductor =	#VALUE!	#VALUE!	3,024 lb

4. NESC RULE 250D Extreme Ice & Wind Loading:

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	1,818 lb
Conductor =	#VALUE!	#VALUE!	8,367 lb

5. NESC RULE 250B w/o OLF's

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	744 lb
Conductor =	#VALUE!	#VALUE!	5,126 lb

6. 60 Deg. F, No Wind

	Horizontal	Longitudinal	Vertical
Shield Wire =	0 lb	0 lb	240 lb
Conductor =	0 lb	0 lb	3,024 lb

7. Construction

	Horizontal	Longitudinal	Vertical
Shield Wire =	0 lb	0 lb	240 lb
Conductor =	0 lb	0 lb	3,024 lb

EVERSOURCE

		Page	of
Job :	Spec. Number	Sheet	of
Description:	Computed by	Date	3/13/15
	Checked by	Date	

INPUT DATA

TOWER ID: 10256

Structure Height (ft) : 145

Wind Zone : NW CT and MA (blue)

Wind Speed : 100 mph

Tower Type : (●) Suspension ( ) Strain

Extreme Wind Model : PCS Addition

Shield Wire Properties:

	BACK	AHEAD
NAME =	*DNO4963*	*DNO4963*
DESCRIPTION =	-	-
STRANDING =	24.000 Fiber	24.000 Fiber
DIAMETER =	0.457 in	0.457 in
WEIGHT =	0.245 lb/ft	0.245 lb/ft

Conductor Properties:

	BACK	AHEAD		
NAME =	*BITTERN*	*BITTERN*		
Number of Conductors per phase: 2	1272.000 45/7 ACSR	1272.000 45/7 ACSR	2	Number of Conductors per phase
DIAMETER =	1.345 in	1.345 in		
WEIGHT =	1.432 lb/ft	1.432 lb/ft		

Insulator Weight = 200 lbs

Broken Wire Side = AHEAD SPAN

Horizontal Line Tensions:

	BACK		AHEAD	
	Shield	Conductor	Shield	Conductor
NESC HEAVY =	4,200	10,000	4,200	10,000
EXTREME WIND =	3,315	9,475	3,315	9,475
LONG. WIND =	na	na	na	na
250D COMBINED =	na	na	na	na
NESC W/O OLF =	na	na	na	na
60 DEG F NO WIND =	1,185	4,615	1,185	4,615

Line Geometry:

					SUM
LINE ANGLE (deg) =	BACK:	0	AHEAD:	0	**0**
WIND SPAN (ft) =	BACK:	493	AHEAD:	358	**851**
WEIGHT SPAN (ft) =	BACK:	614	AHEAD:	302	**916**

EVERSOURCE

		Page	of
Job :	Spec. Number	Sheet	of
Description:	Computed by	Date	3/13/15
	Checked by	Date	

WIRE LOADING AT ATTACHMENTS

TOWER ID: 10256

Wind Span =	851	ft	Broken Wire Span =	AHEAD SPAN
Weight Span =	916	ft	Type of Insulator Attachment =	SUSPENSION
Total Angle =	0	degrees		

1. NESC RULE 250B Heavy Loading:

	INTACT CONDITION			BROKEN WIRE CONDITION		
	Horizontal	Longitudinal	Vertical	Horizontal	Longitudinal	Vertical
Shield Wire =	1,033 lb	0 lb	1,154 lb	599 lb	6,930 lb	774 lb
Conductor =	3,326 lb	0 lb	7,688 lb	1,927 lb	33,000 lb	5,051 lb

2. NESC RULE 250C Transverse Extreme Wind Loading:

	Horizontal	Longitudinal	Vertical
Shield Wire =	807 lb	0 lb	224 lb
Conductor =	4,748 lb	0 lb	3,024 lb

3. NESC RULE 250C Longitudinal Extreme Wind Loading:

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	224 lb
Conductor =	#VALUE!	#VALUE!	3,024 lb

4. NESC RULE 250D Extreme Ice & Wind Loading:

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	1,884 lb
Conductor =	#VALUE!	#VALUE!	8,367 lb

5. NESC RULE 250B w/o OLF's

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	770 lb
Conductor =	#VALUE!	#VALUE!	5,126 lb

6. 60 Deg. F, No Wind

	Horizontal	Longitudinal	Vertical
Shield Wire =	0 lb	0 lb	224 lb
Conductor =	0 lb	0 lb	3,024 lb

7. Construction

	Horizontal	Longitudinal	Vertical
Shield Wire =	0 lb	0 lb	224 lb
Conductor =	0 lb	0 lb	3,024 lb

EVERSOURCE

MAST DESIGN AND FOUNDATION REINFORCEMENT

STRUCT. NO. 10256
8 CHIMNEY DRIVE
BETHEL, CT 06801

VICINITY MAP

NORTH

PROJECT SUMMARY

SITE ADDRESS:	8 CHIMNEY DRIVE BETHEL, CT 06801
PROJECT COORDINATES:	LAT: 41°–24'–38.90N LON: 73°–24'–00.70W ELEV:±487' AMSL
STRUCT NO:	10256
EVERSOURCE CONTACT:	ROBERT GRAY 860.665.3175
T–MOBILE SITE REF.:	CT11110C
T–MOBILE CONTACT:	SHELDON FREINCLE 201.776.8521
ANTENNA CL HEIGHT:	154'–0" AND 162'–0"
ENGINEER OF RECORD:	CENTEK ENGINEERING, INC. 63–2 NORTH BRANFORD ROAD BRANFORD, CT 06405
CENTEK CONTACT:	CARLO F. CENTORE, PE 203.488.0580 ext. 122

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T–1	TITLE SHEET	1
N–1	DESIGN BASIS & GENERAL NOTES	1
N–2	BORING LOG, EARTHWORK & FOUNDATION NOTES	1
N–3	CONCRETE CONSTRUCTION NOTES	1
N–4	STRUCTURAL STEEL NOTES	1
MI–1	MODIFICATION INSPECTION REQUIREMENTS	1
S–1	TOWER ELEVATION & FEEDLINE PLAN	1
S–2	COMPOUND PLAN	1
S–3	CAISSON COLLAR PLAN	1
S–4	CAISSON SECTION	1
S–5	TOP CONNECTION DETAILS	1
S–6	BOTTOM CONNECTION DETAILS	1

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REINFORCEMENT DESIGN

CT11110C
EVERSOURCE STRUCTURE 10256

8 CHIMNEY DRIVE
BETHEL, CT 06801

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TITLE SHEET

SHEET NO.
T-1
Sheet No. 1 of 12

DESIGN BASIS

1. GOVERNING CODE: 2012 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2016 CT STATE SUPPLEMENT.

2. TIA–222–G, ASCE–48–05 – "DESIGN OF STEEL TRANSMISSION POLE STRUCTURES", NESC C2–2007 AND NORTHEAST UTILITIES DESIGN CRITERIA.

3. DESIGN CRITERIA

   WIND LOAD: (ANTENNA MAST)
   NOMINAL DESIGN WIND SPEED (V) = 93 MPH (2016 CSBC: APPENDIX 'N')

   WIND LOAD: (UTILITY POLE & FOUNDATION)
   BASIC WIND SPEED (V) =100 MPH (3–SECOND GUST) BASED ON NESC C2–2007, SECTION 25 RULE 250C.

GENERAL NOTES

1. REFER TO STRUCTURAL ANALYSIS AND REINFORCEMENT DESIGN PREPARED BY CENTEK ENGINEERING, INC., FOR T–MOBILE, DATED 1/26/17.

2. TOWER GEOMETRY AND STRUCTURE MEMBER SIZES WERE OBTAINED FROM THE ORIGINAL TOWER DESIGN DOCUMENTS PREPARED BY AMERICAN POLE STRUCTURES COMBUSTION ENGINEERING, INC., CUST. ORDER NO. CLP–409642, CIRCA 1976/1977. CAISSON DESIGN INFORMATION WAS OBTAINED FROM THE ORIGINAL DESIGN DOCUMENTS PREPARED BY NORTHEAST UTILITIES SERVICE CO., DWG. NO. 01143–60001 SH. 6, DATED MARCH, 1977.

3. THE CONTRACTOR SHALL LIMIT THE DURATION OF THE FOUNDATION REINFORCEMENT WORK. THE EXISTING CAISSON WITHIN THE SHOWN LIMITS IS STABLE FOR WIND SPEEDS LESS THAN 50 MPH WITHOUT ICE LOADING. IF HIGHER WIND SPEED OR ICE EVENT IS EXPECTED, THE EXCAVATION AREA SHALL BE FILLED WITH COMPACT FILL MATERIAL.

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

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

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

7. BEFORE BEGINNING THE WORK, THE CONTRACTOR IS RESPONSIBLE FOR MAKING SUCH INVESTIGATIONS CONCERNING PHYSICAL CONDITIONS (SURFACE AND SUBSURFACE) AT OR CONTIGUOUS TO THE SITE WHICH MAY AFFECT PERFORMANCE AND COST OF THE WORK. THIS INCLUDES VERIFYING ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA. CONTRACTOR SHALL TAKE FIELD MEASUREMENTS NECESSARY TO ASSURE PROPER FIT OF ALL FINISHED WORK.

8. FOUNDATION REINFORCEMENTS SHALL BE CONDUCTED BY FIELD CREWS EXPERIENCED IN THE ASSEMBLY AND ERECTION OF TRANSMISSION STRUCTURES. ALL SAFETY PROCEDURES, RIGGING AND ERECTION METHODS SHALL BE STANDARD TO THE INDUSTRY AND IN COMPLIANCE WITH OSHA.

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

10. IF ANY FIELD CONDITIONS EXIST WHICH PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL PROCEED WITH AFFECTED WORK AFTER CONFLICT IS SATISFACTORILY RESOLVED.

11. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.

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

SITE NOTES

1. THE CONTRACTOR SHALL CALL UTILITIES PRIOR TO THE START OF CONSTRUCTION.

2. ACTIVE EXISTING UTILITIES, WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES. THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY, PRIOR TO PROCEEDING, SHOULD ANY UNCOVERED EXISTING UTILITY PRECLUDE COMPLETION OF THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

3. ALL RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED OFF SITE AND BE LEGALLY DISPOSED, AT NO ADDITIONAL COST.

4. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE EQUIPMENT AND TOWER AREAS.

5. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.

6. THE SUBGRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.

7. THE AREAS OF THE COMPOUND DISTURBED BY THE WORK SHALL BE RETURNED TO THEIR ORIGINAL CONDITION.

8. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.

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DESIGN BASIS AND GENERAL NOTES

SHEET NO.
N-1
Sheet No. 2 of 12

CLARENCE WELTI ASSOC., INC.
988 NEW LONDON TURNPIKE
GLASTONBURY, CONN. 06033

"BORING LOG"

LONG MT-PLUM TREET TRANS. LINE
PROJ. NEW MILFORD, BROOKFIELD, DANBURY, BETHEL
CLIENT NUSCO

BORING NO. 78
LINE & STA. 10256
OFFSET
GR. ELEV.

A	STRATUM DESCRIPTION	BLOWS PER 6"	B
	FILL, BR. & DRK. BR FINE SAND, SOME SILT, FINE GRAVEL TR. COBBLES & WOOD		
		14-17-23	
8.0			
	GR. FINE-MED. SAND SOME FINE-MED. GRAVEL, DECOMP. ROCK & COBBLES, TR. SMALL BOULDERS	5-6-4	
		9-12-17	
20			
	LT. BR. FINE SAND SOME SILT, DECOMP. ROCK, FINE GRAVEL & COBBLES	12-19-33	
26.0		102/6"	
	AUGER REFUSAL AT 26.0		
	WATER AT 23.5 @ 0 HRS.		
	DATE: 1/24-25/77		
	DRILLER: BROMLEY		

BORING NO.
LINE & STA.
OFFSET
GR. ELEV.

A	STRATUM DESCRIPTION	BLOWS PER	B

1. COL. A STRATA DEPTH
2. COL. B
3. HAMMER = 140#; FALL 30"
4. SAMPLER = O.D. SPLIT SPOON
5. GWT = GROUND WATER

AND - 40 to 50%
SOME - 10 to 40%
TRACE - 0 to 10%

EARTHWORK NOTES

1. COMPACTED GRAVEL FILL SHALL BE FURNISHED AND PLACED AS A FOUNDATION FOR STRUCTURES, WHERE SHOWN ON THE CONTRACT DRAWINGS OR DIRECTED BY THE ENGINEER.

2. CRUSHED STONE FILL SHALL BE PLACED IN 12" MAX. LIFTS AND CONSOLIDATED USING A HAND OPERATED VIBRATORY PLATE COMPACTOR WITH A MINIMUM OF 2 PASSES OF COMPACTOR PER LIFT.

3. COMPACTED GRAVEL FILL TO BE WELL GRADED BANK RUN GRAVEL MEETING THE FOLLOWING GRADATION REQUIREMENTS:

SIEVE DESIGNATION	% PASSING
1 ½"	100
No. 4	40–70
No. 100	5–20
No. 200	4–8

4. CRUSHED STONE TO BE UNIFORMLY GRADED, CLEAN, HARD PROCESS AGGREGATE MEETING THE FOLLOWING GRADATION REQUIREMENTS:

SIEVE DESIGNATION	% PASSING
1"	100
¾"	90–100
½"	0–15
⅜"	0–5

5. SELECT BACKFILL FOR FOUNDATION WALLS SHALL BE FREE OF ORGANIC MATERIAL, TOPSOIL, DEBRIS AND BOULDERS LARGER THAN 6".

6. GRAVEL AND GRANULAR FILL SHALL BE INSTALLED IN 10" MAX. LIFTS. COMPACTED TO 95% MIN. AT MAX. DRY DENSITY.

7. NON WOVEN GEOTEXTILE FOR SEPARATION PURPOSES SHALL BE MIRAFI 140N, OR ENGINEER APPROVED EQUAL.

FOUNDATION CONSTRUCTION NOTES

1. ALL FOOTINGS SHALL BE PLACED ON SUITABLE, COMPACTED SOIL HAVING ADEQUATE BEARING CAPACITY AND FREE OF ORGANIC CONTENT, CLAY, OR OTHER UNSUITABLE MATERIAL. ADDITIONAL EXCAVATION MAY BE REQUIRED BELOW FOOTING ELEVATIONS INDICATED IF UNSUITABLE MATERIAL IS ENCOUNTERED.

2. SUBGRADE PREPARATION: IF UNSUITABLE SOIL IS ENCOUNTERED, REMOVE ALL UNSUITABLE MATERIALS FROM BELOW PROPOSED STRUCTURE FOUNDATIONS AND COMPACT EXPOSED SOIL SURFACES. PLACE AND COMPACT APPROVED GRAVEL FILL. PLACEMENT OF ALL COMPACTED FILL MUST BE UNDER SUPERVISION OF AN APPROVED TESTING LABORATORY. FILL SHALL BE COMPACTED IN LAYERS NOT TO EXCEED 10" BEFORE COMPACTION. DETERMINE MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D1557–70 AND MAKE ONE (1) FIELD DENSITY TEST IN ACCORDANCE WITH ASTM D2167–66 FOR EACH 50 CUBIC YARDS OF COMPACTED FILL. BUT NOT LESS THAN ONE (1) PER LAYER, TO INSURE COMPACTION TO 95% OF MAX. DRY DENSITY.

3. ALL SOIL SURROUNDING AND UNDER ALL FOOTINGS SHALL BE KEPT REASONABLY DRY AND PROTECTED FROM FREEZING AND FROST ACTION DURING THE COURSE OF CONSTRUCTION.

4. WHERE GROUNDWATER IS ENCOUNTERED, DEWATERING SHALL BE ACCOMPLISHED CONTINUOUSLY AND COMPLETELY DURING FOUNDATION CONSTRUCTION. PROVIDE CRUSHED STONE AS REQUIRED TO STABILIZE FOOTING SUBGRADE.

5. ALL FOOTINGS ARE TO REST ON FIRM SOIL, REGARDLESS OF ELEVATIONS SHOWN ON THE DRAWINGS, BUT IN NO CASE MAY FOOTING ELEVATIONS BE HIGHER THAN INDICATED ON THE FOUNDATION PLAN, UNLESS SPECIFICALLY DIRECTED BY THE ENGINEER.

6. FOUNDATION WATERPROOFING AND DAMPPROOFING SHALL COMPLY WITH BUILDING CODE REQUIREMENTS UNLESS A MORE SUBSTANTIAL SYSTEM IS INDICATED OR SPECIFIED.

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BORING LOG, EARTHWORK AND FOUNDATION CONSTRUCTION NOTES

SHEET NO.
N-2
Sheet No. 3 of 12

CONCRETE CONSTRUCTION

1. CONCRETE CONSTRUCTION SHALL CONFORM TO THE FOLLOWING STANDARDS:

   ACI 211 – STANDARD PRACTICE FOR SELECTING PROPORTIONS FOR NORMAL AND HEAVYWEIGHT CONCRETE.

   ACI 301 – SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS.

   ACI 302 – GUIDE FOR CONCRETE FLOOR AND SLAB CONSTRUCTION

   ACI 304 – RECOMMENDED PRACTICE FOR MEASURING, MIXING, TRANSPORTING, AND PLACING CONCRETE.

   ACI 306.1 – STANDARD SPECIFICATION FOR COLD WEATHER CONCRETING

   ACI 318 – BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE.

2. CONCRETE SHALL BE AIR ENTRAINED AND SHALL DEVELOP COMPRESSIVE STRENGTH IN 28 DAYS AS FOLLOWS:

   ALL CONCRETE 3,500 PSI

3. REINFORCING STEEL SHALL BE 60,000 PSI YIELD STRENGTH.

4. ALL DETAILING, FABRICATION, AND ERECTION OF REINFORCING BARS, UNLESS OTHERWISE NOTED, MUST FOLLOW THE LATEST ACI CODE AND LATEST ACI "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES".

5. CONCRETE COVER OVER REINFORCING SHALL BE 3 INCHES.

6. NO STEEL WIRE, METAL FORM TIES, OR ANY OTHER METAL SHALL REMAIN WITHIN THE REQUIRED COVER OF ANY CONCRETE SURFACE.

7. ALL REINFORCEMENT SHALL BE CONTINUOUS. SPLICES WILL NOT BE ALLOWED.

8. NO TACK WELDING OF REINFORCING WILL BE PERMITTED.

9. NO CALCIUM CHLORIDE OR ADMIXTURES CONTAINING MORE THAN 1 % CHLORIDE BY WEIGHT OF ADMIXTURE SHALL BE USED IN THE CONCRETE.

10. TOP OF FOOTING SURFACES SHALL RECEIVE A UNIFORM FLOAT FINISH. CURE FOOTING SURFACE WITH SONNEBORN KURE–N–SEAL WB OR APPROVED EQUAL, APPLIED AS RECOMMENDED BY MANUFACTURER.

11. PREPARATION OF SURFACES WHERE NEW CONCRETE WILL INTERFACE WITH EXISTING CAISSON:
    THE PERIMETER OF THE EXISTING CAISSON SHALL BE THOROUGHLY CLEANED OF ALL DIRT AND DELETERIOUS MATERIALS PRIOR TO APPLICATION OF BONDING AGENT. CONTRACTOR SHALL NOTIFY NORTHEAST UTILITIES 24 HOURS IN ADVANCE OF CLEANING.

    SIKADUR 32, HI–MOD OR ENGINEER APPROVED EQUAL SHALL BE APPLIED, IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, TO ALL INTERFACING SURFACES BEFORE CONCRETE IS PLACED.

    CAULK JOINT BETWEEN EXISTING CONCRETE PIER AND NEW CONCRETE WITH SIKAFLEX 1–A BY SIKA CORP. OR ENGINEER APRROVED EQUAL.

    SUBMIT MANUFACTURER'S PRODUCT SPECIFICATION DATA AND INSTALLATION INSTRUCTIONS FOR REVIEW AND APPROVAL BY OWNER.

12. NEW CONCRETE FOOTING SHALL BE ALLOWED TO CURE AT LEAST 14 DAYS BEFORE WIRELESS ANTENNA MOUNT, ANTENNAS, AND CABLES ARE INSTALLED.

13. INSPECTION AND TESTING OF CONCRETE WORK SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY, APPROVED AND PAID BY THE OWNER. THE INSPECTOR SHALL OBSERVE THE CONDITION OF SOILS AND FORMWORK BEFORE FOOTINGS ARE PLACED, SIZE, SPACING AND LOCATION OF REINFORCEMENT, AND PLACEMENT OF CONCRETE.

14. THE TESTING COMPANY SHALL ALSO OBTAIN A MINIMUM OF THREE (3) COMPRESSIVE STRENGTH TEST SPECIMENS FOR EACH CONCRETE MIX DESIGN. ONE SPECIMEN TESTED AT 7 DAYS, ONE AT 28 DAYS, AND ONE HELD IN RESERVE FOR FUTURE TESTING, IF NEEDED.

15. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE OWNER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

16. THE CONTRACTOR SHALL LIMIT THE DURATION OF THE FOUNDATION REINFORCEMENT WORK. THE EXISTING CAISSON WITHIN THE SHOWN LIMITS IS STABLE FOR WIND SPEEDS LESS THAN 50 MPH WITHOUT ICE LOADING. IF HIGHER WIND SPEED OR ICE EVENT IS EXPECTED, THE EXCAVATION AREA SHALL BE FILLED WITH COMPACT FILL MATERIAL.

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CONCRETE CONSTRUCTION NOTES

SHEET NO.
N-3
Sheet No. 4 of 12

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD).

2. MATERIAL SPECIFICATIONS

   A. STRUCTURAL STEEL (W SHAPES)---ASTM A992 (FY = 50 KSI)
   B. STRUCTURAL STEEL (OTHER SHAPES)---ASTM A36 (FY = 36 KSI).
   C. STRUCTURAL STEEL (TOWER REINF. SOLID ROUND BAR)--- ASTM A572_GR50 (50 KSI)
   D. STRUCTURAL HSS (RECTANGULAR SHAPES)---ASTM A500 GRADE B, (FY = 46 KSI)
   E. STRUCTURAL HSS (ROUND SHAPES)---ASTM A500 GRADE B, (FY = 42 KSI)
   F. PIPE---ASTM A53 GRADE B (FY = 35 KSI)

3. FASTENER SPECIFICATIONS

   A. CONNECTION BOLTS---ASTM A325-N, UNLESS OTHERWISE SCHEDULED.
   B U-BOLTS---ASTM A307
   C. ANCHOR RODS---ASTM F1554
   D. WELDING ELECTRODES---ASTM E70XX FOR A36 & A572_GR50 STEELS, ASTM E80XX FOR A572_GR65 STEEL.
   E. BLIND BOLTS---AS1252 PROPERTY CLASS 8.8 (FU=120 KSI).

4. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING: SECTION PROFILES, SIZES, CONNECTION ATTACHMENTS, REINFORCING, ANCHORAGE, SIZE AND TYPE OF FASTENERS AND ACCESSORIES. INCLUDE ERECTION DRAWINGS, ELEVATIONS AND DETAILS.

5. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.

6. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.

7. FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.

8. INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.

9. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON-GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.

10. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.

11. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE".

12. CONTRACTOR SHALL COMPLY WITH AWS CODE FOR PROCEDURES APPEARANCE AND QUALITY OF WELDS, AND WELDING PROCESSES SHALL BE QUALIFIED IN ACCORDANCE WITH AWS "STANDARD QUALIFICATION PROCEDURES". ALL WELDING SHALL BE DONE USING THE SCHEDULED ELECTRODES AND WELDING SHALL CONFORM TO AISC AND D1.1 WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLET J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION" 9TH EDITION. AT THE COMPLETION OF WELDING, ALL DAMAGE TO GALVANIZED COATING SHALL BE REPAIRED.

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

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

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

16. ALL BOLTS SHALL BE INSTALLED PER THE REQUIREMENTS OF AISC 14TH EDITION & RCSC "SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH STRENGTH BOLTS".

17. ALL BOLTS SHALL BE INSTALLED AS SNUG-TIGHT CONNECTIONS UNLESS OTHERWISE INDICATED. CONNECTIONS SPECIFIED AS PRETENSIONED OR SLIP-CRITICAL SHALL BE TIGHTENED TO A BOLT TENSION NOT LESS THAN THAT GIVEN IN TABLE J3.1 OF AISC 14TH EDITION.

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

19. LOAD INDICATOR WASHERS SHALL BE UTILIZED ON ALL PRETENSIONED OR SLIP-CRITICAL CONNECTIONS.

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

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

22. FABRICATE BEAMS WITH MILL CAMBER UP.

23. LEVEL AND PLUMB INDIVIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.

24. COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.

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STRUCTURAL STEEL NOTES

SHEET NO.
N-4
Sheet No. 5 of 12

MODIFICATION INSPECTION REPORT REQUIREMENTS

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

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

GENERAL

1. THE MODIFICATION INSPECTION IS A VISUAL INSPECTION OF STRUCTURAL MODIFICATIONS, TO INCLUDE A REVIEW AND COMPILATION OF SPECIFIED SUBMITTALS AND CONSTRUCTION INSPECTIONS, AS AN ASSURANCE OF COMPLIANCE WITH THE CONSTRUCTION DOCUMENTS PREPARED UNDER THE DIRECTION OF THE ENGINEER OF RECORD (EOR).

2. THE MODIFICATION INSPECTION IS TO CONFIRM INSTALLATION CONFIGURATION AND GENERAL WORKMANSHIP AND IS NOT A REVIEW OF THE MODIFICATION DESIGN. OWNERSHIP OF THE MODIFICATION DESIGN EFFECTIVENESS AND INTENT RESIDES WITH THE ENGINEER OF RECORD.

3. TO ENSURE COMPLIANCE WITH THE MODIFICATION INSPECTION REQUIREMENTS THE GENERAL CONTRACTOR (GC) AND THE MODIFICATION INSPECTOR (MI) COMMENCE COMMUNICATION UPON AUTHORIZATION TO PROCEED BY THE CLIENT. EACH PARTY SHALL BE PROACTIVE IN CONTACTING THE OTHER. THE EOR SHALL BE CONTACTED IF SPECIFIC GC/MI CONTACT INFORMATION IS NOT MADE AVAILABLE.

4. THE GC SHALL PROVIDE THE MI WITH A MINIMUM OF 5 BUSINESS DAYS NOTICE OF IMPENDING INSPECTIONS.

5. WHEN POSSIBLE, THE GC AND MI SHALL BE ON SITE DURING THE MODIFICATION INSPECTION TO HAVE ANY NOTED DEFICIENCIES ADDRESSED DURING THE INITIAL MODIFICATION INSPECTION.

MODIFICATION INSPECTOR (MI)

1. THE MI SHALL CONTACT THE GC UPON AUTHORIZATION BY THE CLIENT TO:

   – REVIEW THE MODIFICATION INSPECTION REPORT REQUIREMENTS.
   – WORK WITH THE GC IN DEVELOPMENT OF A SCHEDULE FOR ON–SITE INSPECTIONS.
   – DISCUSS CRITICAL INSPECTIONS AND PROJECT CONCERNS.

2. THE MI IS RESPONSIBLE FOR COLLECTION OF ALL INSPECTION AND TEST REPORTS, REVIEWING REPORTS FOR ADHERENCE TO THE CONTRACT DOCUMENTS, CONDUCTING ON–SITE INSPECTIONS AND COMPILATION & SUBMISSION OF THE MODIFICATION INSPECTION REPORT TO THE CLIENT AND THE EOR.

GENERAL CONTRACTOR (GC)

1. THE GC IS REQUIRED TO CONTACT THE GC UPON AUTHORIZATION TO PROCEED WITH CONSTRUCTION BY THE CLIENT TO:

   – REVIEW THE MODIFICATION INSPECTION REPORT REQUIREMENTS.
   – WORK WITH THE MI IN DEVELOPMENT OF A SCHEDULE FOR ON–SITE INSPECTIONS.
   – DISCUSS CRITICAL INSPECTIONS AND PROJECT CONCERNS.

2. THE GC IS RESPONSIBLE FOR COORDINATING AND SCHEDULING IN ADVANCE ALL REQUIRED INSPECTIONS AND TESTS WITH THE MI.

CORRECTION OF FAILING MODIFICATION INSPECTION

1. SHOULD THE STRUCTURAL MODIFICATION NOT COMPLY WITH THE REQUIREMENTS OF THE CONSTRUCTION DOCUMENTS, THE GC SHALL WORK WITH THE MODIFICATION INSPECTOR IN A VIABLE REMEDIATION PLAN AS FOLLOWS:

   – CORRECT ALL DEFICIENCIES TO COMPLY WITH THE CONTRACT DOCUMENTS AND COORDINATE WITH THE MI FOR A FOLLOW UP INSPECTION.
   – WITH CLIENT AUTHORIZATION, THE GC MAY WORK WITH THE EOR TO REANALYZE THE MODIFICATION USING THE AS–BUILT CONDITION.

REQUIRED PHOTOGRAPHS

1. THE GC AND MI SHALL AT MINIMUM PHOTO DOCUMENT THE FOLLOWING FOR INCLUSION IN THE MODIFICATION INSPECTION REPORT:

   – PRE–CONSTRUCTION: GENERAL CONDITION OF THE SITE.
   – DURING CONSTRUCTION: RAW MATERIALS, CRITICAL DETAILS, WELD PREPARATION, BOLT INSTALLATION & TORQUE, FINAL INSTALLED CONDITION & SURFACE COATING REPAIRS.
   – POST–CONSTRUCTION: FINAL CONDITION OF THE SITE

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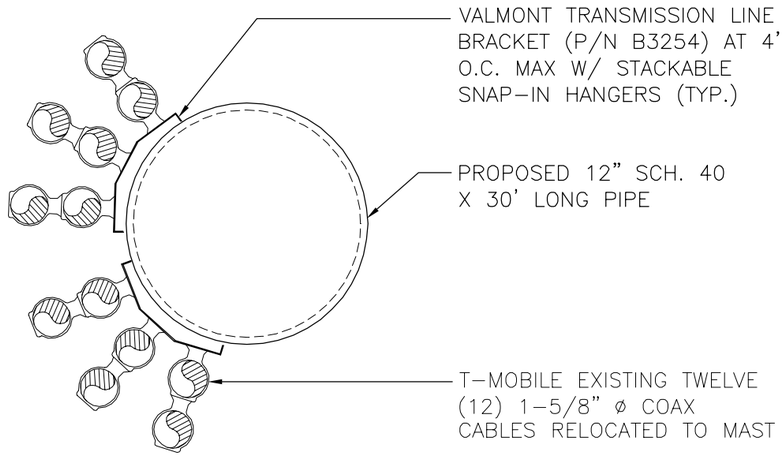
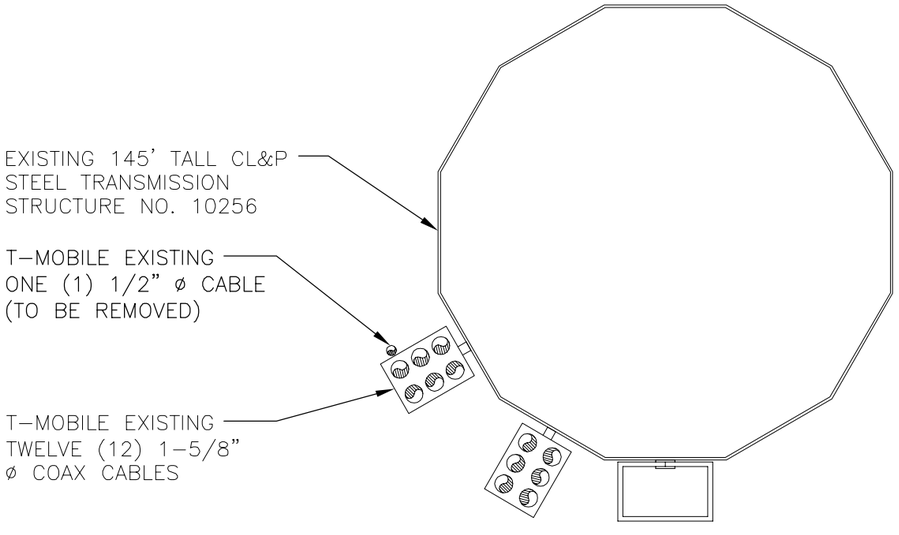
MODIFICATION INSPECTION REQUIREMENTS

SHEET NO.
MI-1
Sheet No. 6 of 12



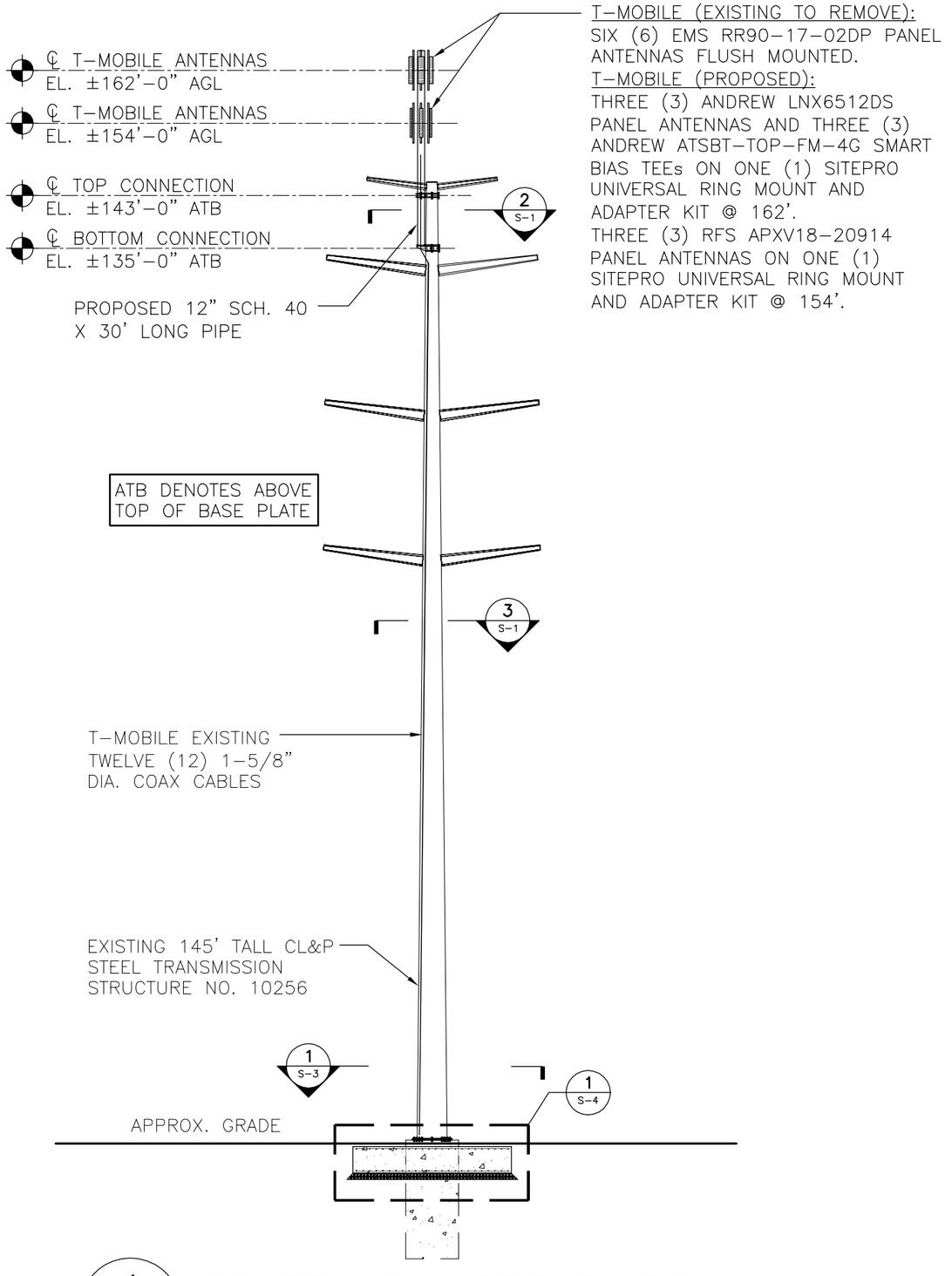
2 / S-1 COAX CABLE PLAN ANTENNA MAST

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



3 / S-1 COAX CABLE PLAN TOWER

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



1 / S-1 TOWER AND MAST ELEVATION

SCALE: NTS

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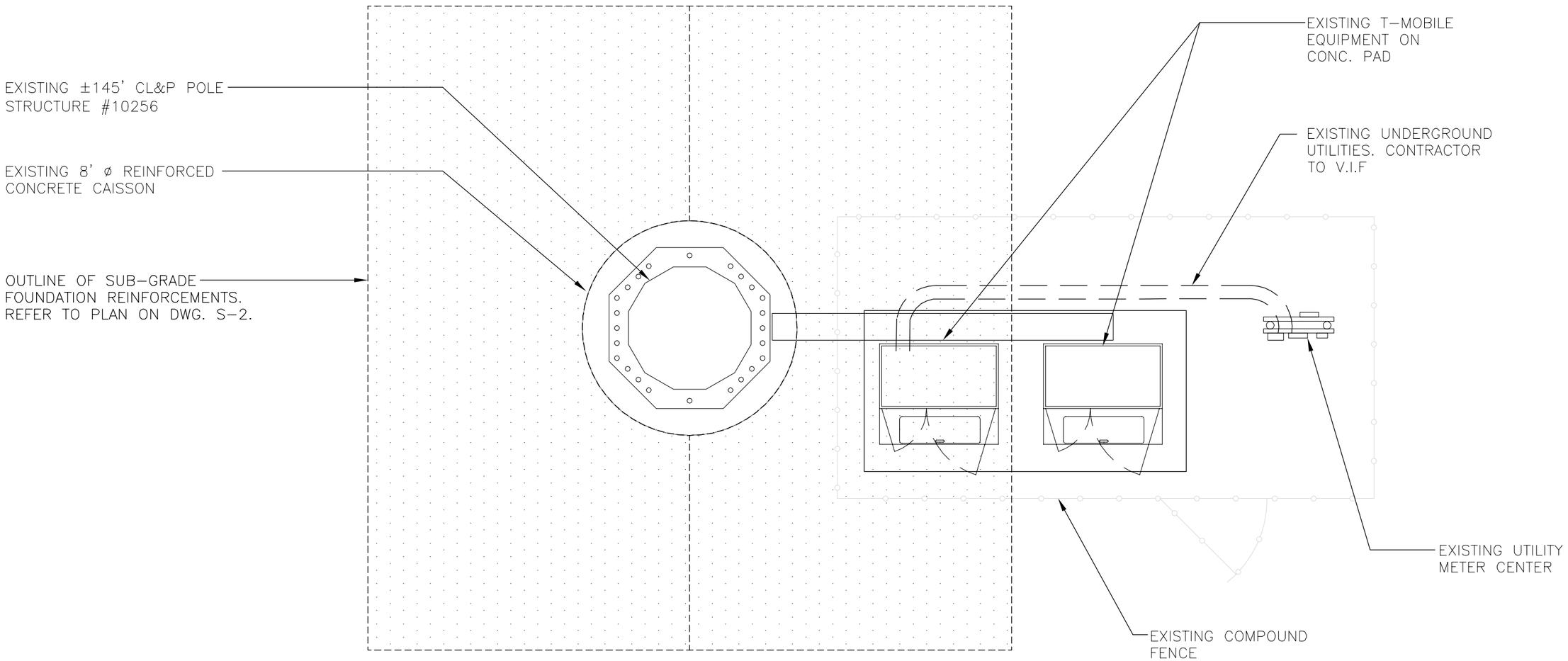
TOWER ELEVATION AND FEEDLINE PLAN

SHEET NO.
S-1
Sheet No. 7 of 12



1 / S-2 **COMPOUND PLAN**

SCALE: 1" = 4'

APPROX. NORTH

GRAPHIC SCALE

4 0 2 4 8 16

(IN FEET)

1 inch = 4 ft.

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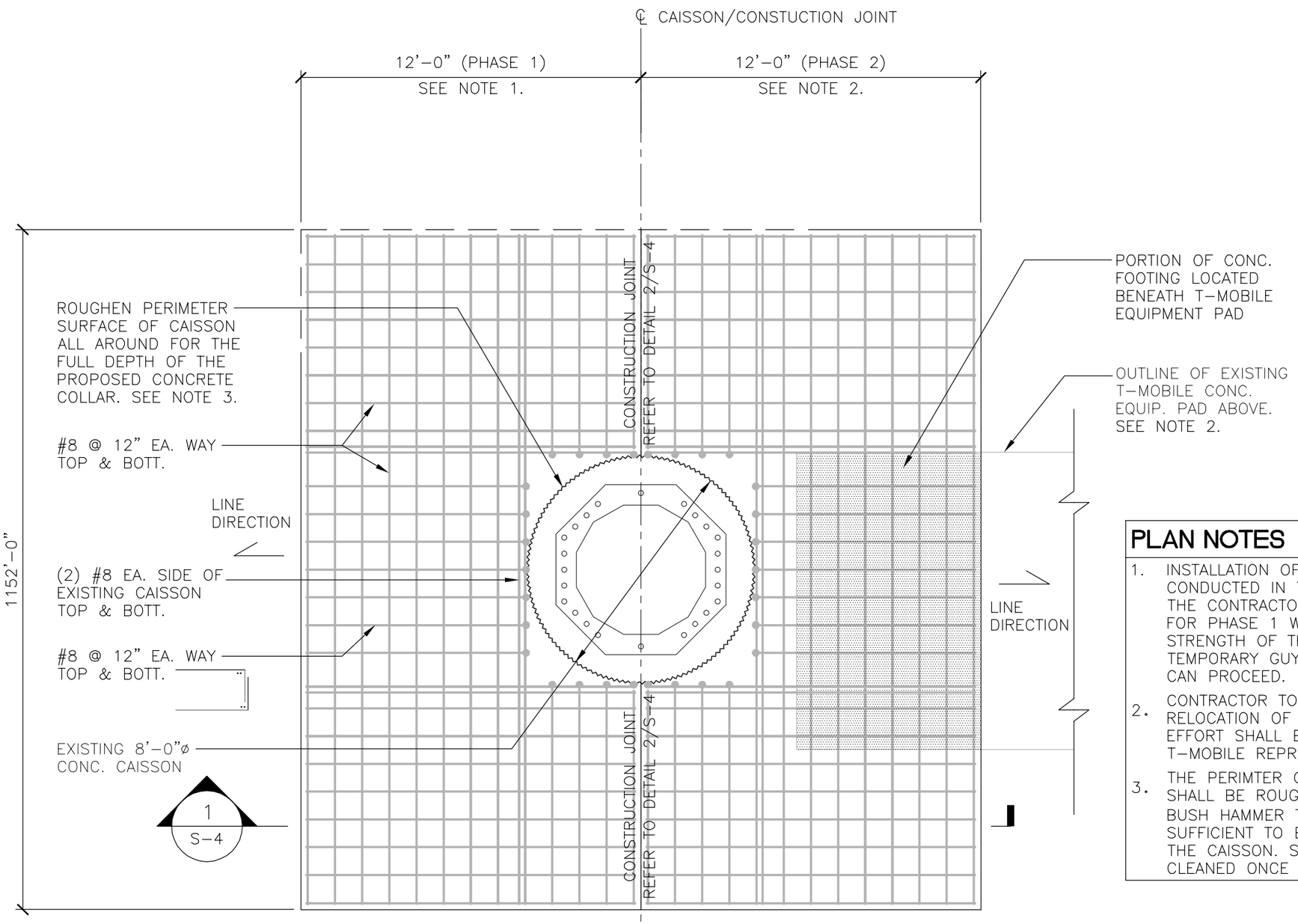
COMPOUND PLAN

SHEET NO.
S-2
Sheet No. 8 of 12



1 S-3 **CAISSON COLLAR PLAN**

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

APPROX. NORTH

PLAN NOTES

1. INSTALLATION OF THE CAISSON COLLAR SHALL BE CONDUCTED IN TWO PHASES AS NOTED ON THE PLAN. THE CONTRACTOR SHALL TEMPORARILY GUY THE TOWER FOR PHASE 1 WORK. ONCE THE DESIGN CONCRETE STRENGTH OF THE PHASE 1 COLLAR IS ACHIEVED, THE TEMPORARY GUYS CAN BE REMOVED & PHASE 2 WORK CAN PROCEED.
2. CONTRACTOR TO PROVIDE TEMPORARY SHORING OR RELOCATION OF THE T-MOBILE PAD & EQUIPMENT. THIS EFFORT SHALL BE COORDINATED WITH AN AUTHORIZED T-MOBILE REPRESENTATIVE.
3. THE PERIMTER OF THE EXISTING CAISSON SURFACE SHALL BE ROUGHENED WITH A LIGHT DUTY PNEUMATIC BUSH HAMMER TO A DEPTH OF APPROXIMATELY 1/4" - SUFFICIENT TO EXPOSE AGGREGATE WITHOUT DAMAGING THE CAISSON. SURFACES SHALL BE THOROUGHLY CLEANED ONCE ROUGHENED.

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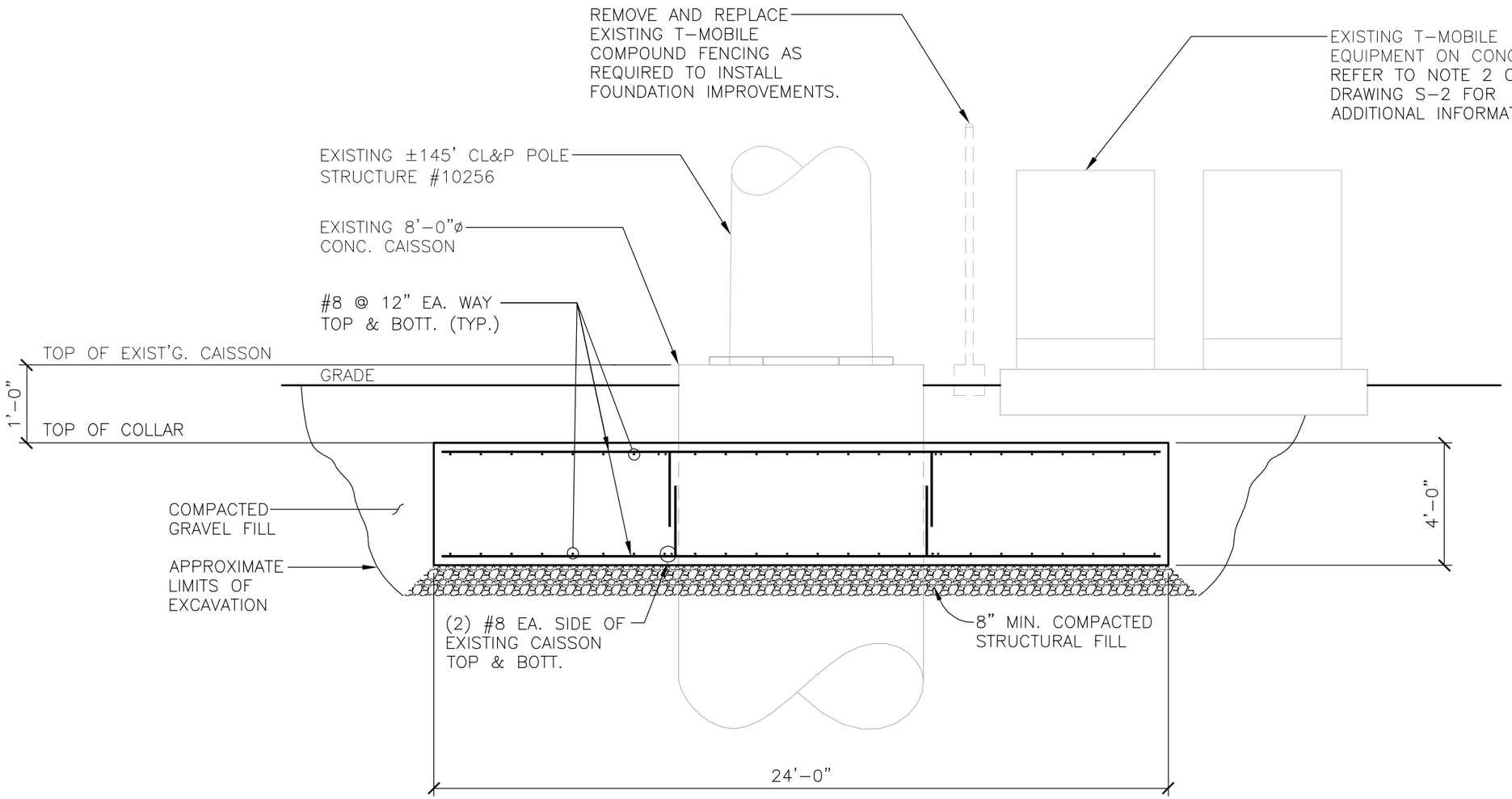
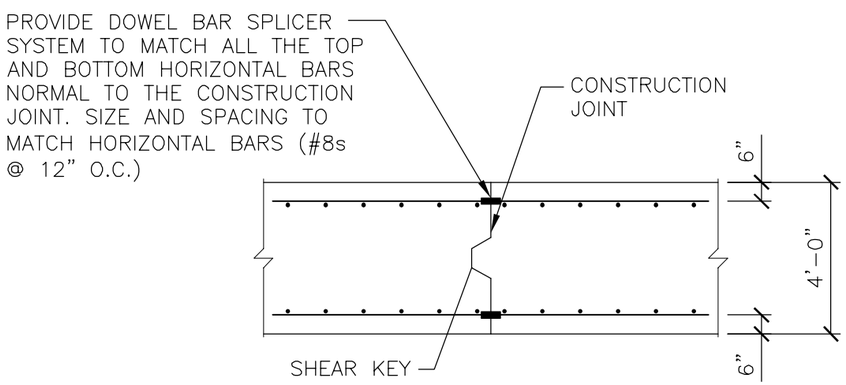
CAISSON COLLAR PLAN

SHEET NO.
S-3
Sheet No. 9 of 12



1 / S–4 **SECTION (CAISSON BEYOND)**

SCALE: 1/4" = 1'–0"



2 / S–4 **CONSTRUCTION JOINT DETAIL**

NOT TO SCALE

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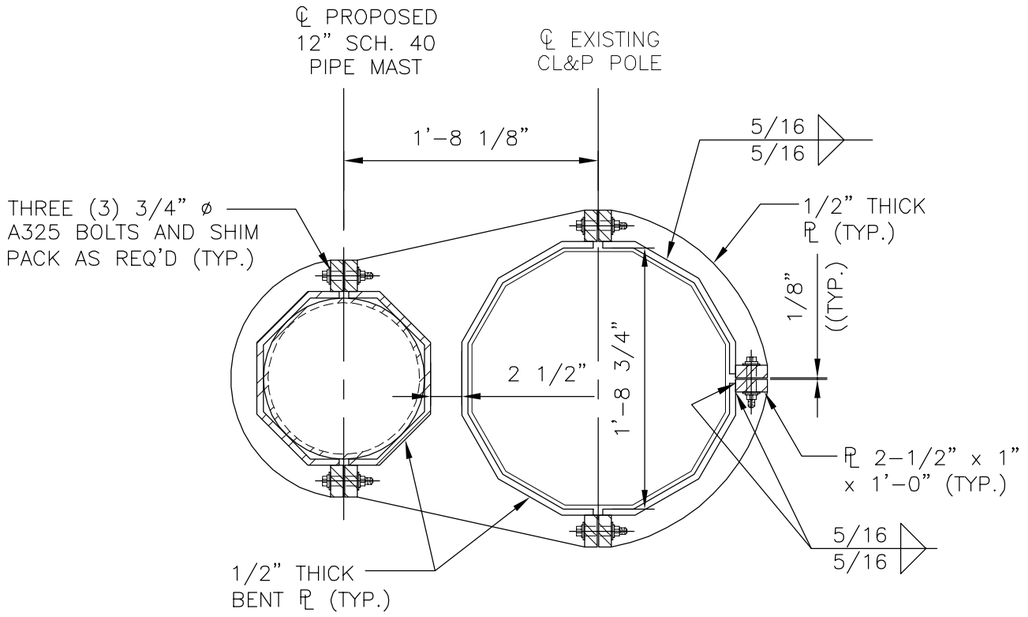
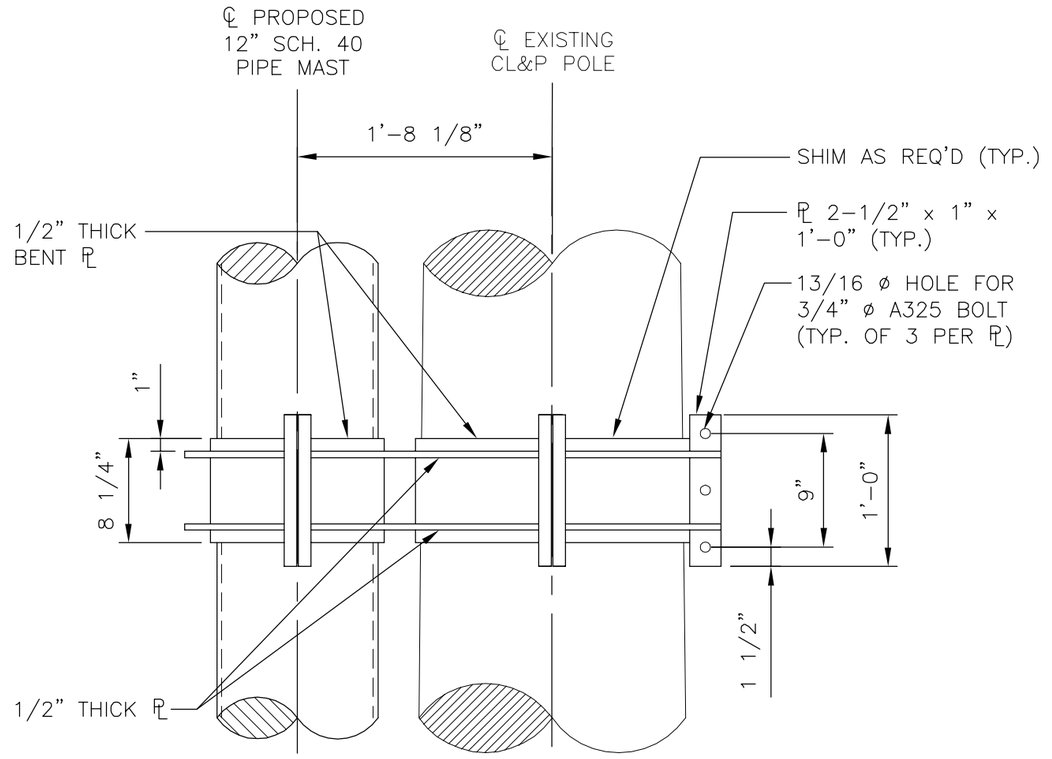
CAISSON SECTION

SHEET NO.
S-4
Sheet No. 10 of 12



2 / S-5 TOP PCS BRACKET PLAN VIEW

SCALE: 1" = 1'-0"



1 / S-5 TOP PCS BRACKET DETAIL

SCALE: 1" = 1'-0"

NOTE:

1. CL&P POLE TAPER = 0.2511"/FT (V.I.F.)

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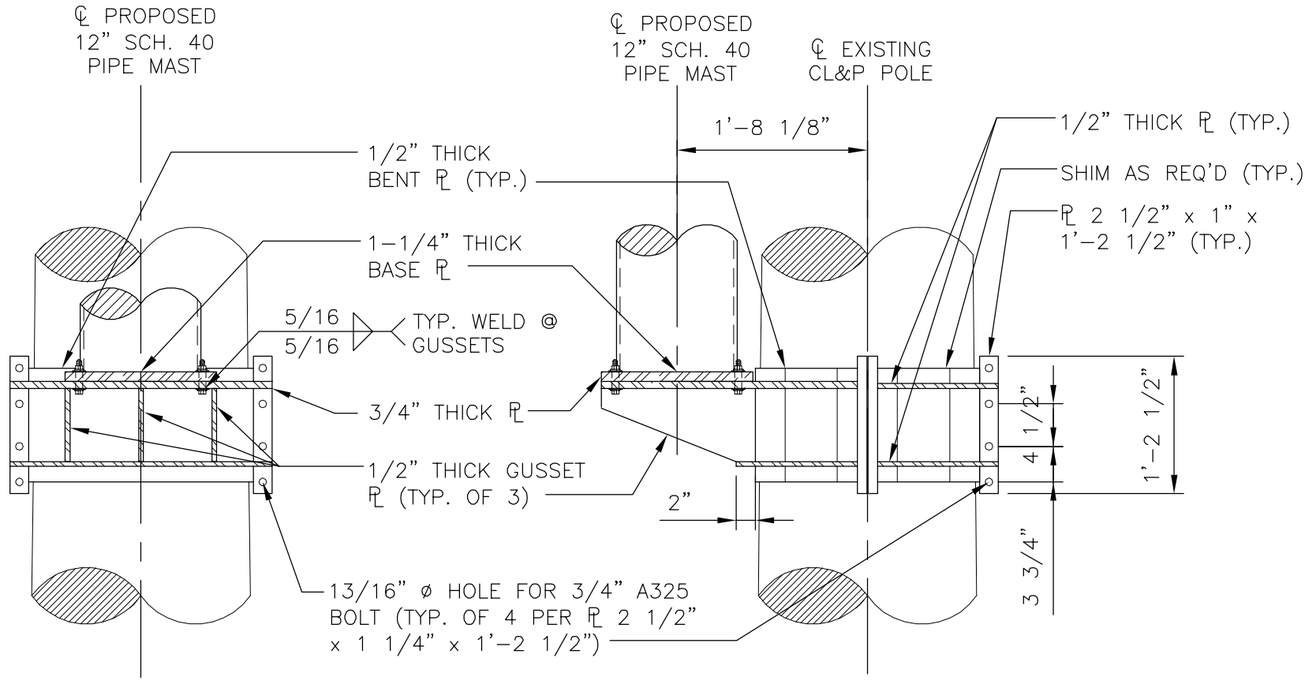
TOP
CONNECTION
DETAILS

SHEET NO.
S-5
Sheet No. 11 of 12

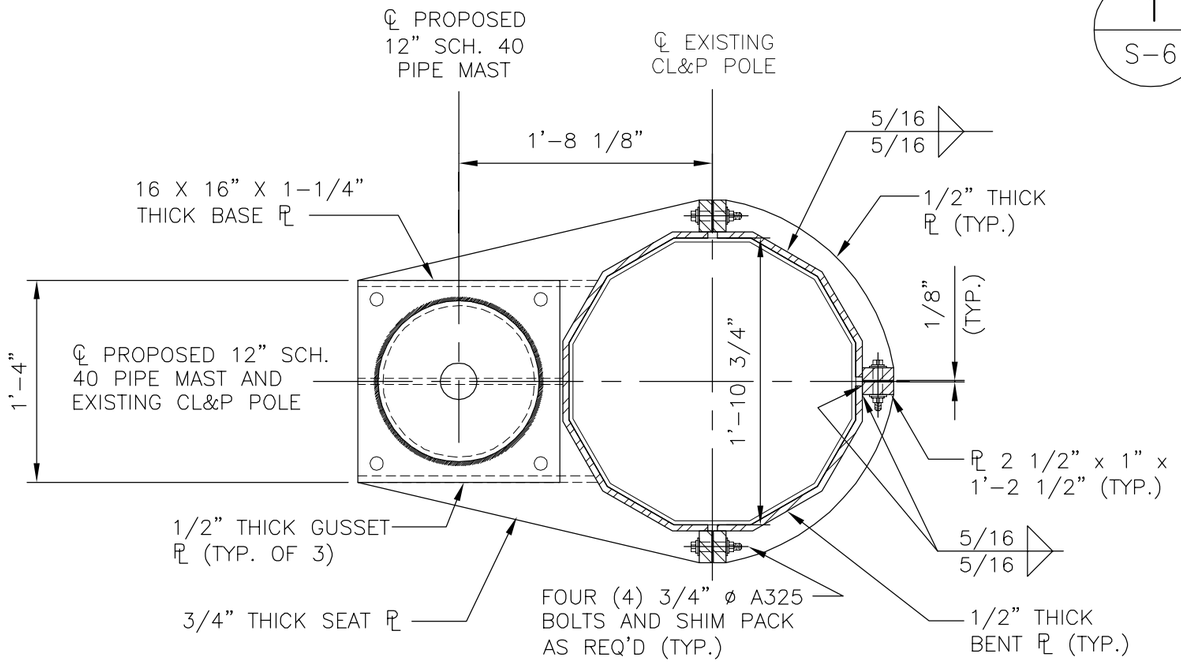
NOTE:

1. CL&P POLE TAPER = 0.2511"/FT (V.I.F.)



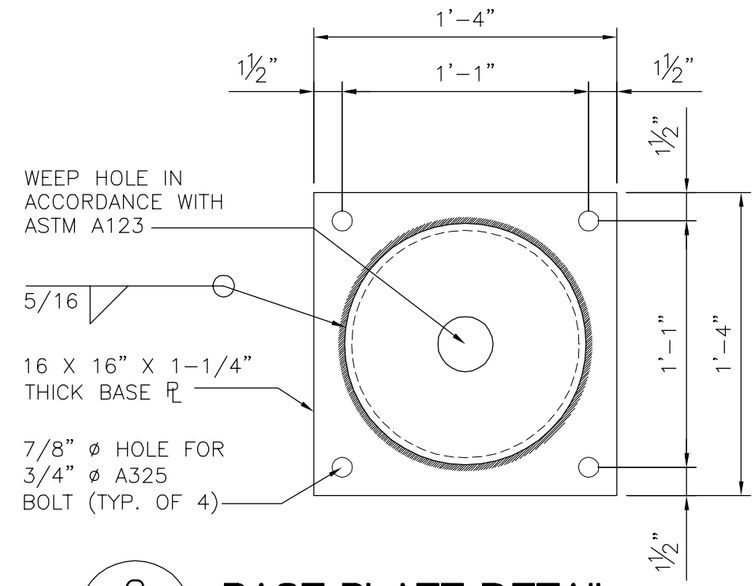
1 / S-6 BOTTOM PCS BRACKET DETAIL

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



3 / S-6 BOTTOM PCS BRACKET PLAN VIEW

SCALE: 1" = 1'-0"



2 / S-6 BASE PLATE DETAIL

SCALE: 1-1/2" = 1'-0"

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BOTTOM CONNECTION DETAILS

SHEET NO.
S-6
Sheet No. 12 of 12

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Subject:	Loads on T-Mobile Equipmnet Structure # 10256
Location:	Bethel, CT
Rev. 0: 1/18/17	Prepared by: T.J.L. Checked by: C.F.C. Job No. 16162.07

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

Wind Speeds

Basic Wind Speed: $V := 93$ mph (User Input - 2016 CSBC Appendix N)

Basic Wind Speed with Ice: $V_i := 50$ mph (User Input per Annex B of TIA-222-G)

Input

Structure Type = $Structure\_Type := Pole$ (User Input)

Structure Category = $SC := III$ (User Input)

Exposure Category = $Exp := C$ (User Input)

Structure Height = $h := 145$ ft (User Input)

Height to Center of Antennas = $z_{ant} := 162$ ft (User Input)

Radial Ice Thickness = $t_i := 0.75$ in (User Input per Annex B of TIA-222-G)

Radial Ice Density = $Id := 56.00$ pcf (User Input)

Topograpic Factor = $K_{zt} := 1.0$ (User Input)

$K_a := 1.0$ (User Input)

Gust Response Factor = $G_H := 1.35$ (User Input)

Output

Wind Direction Probability Factor = (Per Table 2-2 of TIA-222-G)

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

Importance Factors = (Per Table 2-3 of TIA-222-G)

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

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

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

$$K_{iz} := \left(\frac{z_{ant}}{33}\right)^{0.1} = 1.172$$

$$t_{iz} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 2.198$$

Velocity Pressure Coefficient =

$$Kz_{ant} := 2.01\left(\left(\frac{z_{ant}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.401$$

Velocity Pressure w/o Ice = $qz_{ant} := 0.00256 \cdot K_d \cdot Kz_{ant} \cdot K_{zt} \cdot V^2 \cdot I_{Wind} = 33.887$

Velocity Pressure with Ice = $qz_{ice.ant} := 0.00256 \cdot K_d \cdot Kz_{ant} \cdot K_{zt} \cdot V_i^2 \cdot I_{Wind\_w\_Ice} = 8.518$

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Subject:	Loads on T-Mobile Equipmnet Structure # 10256
Location:	Bethel, CT
Rev. 0: 1/18/17	Prepared by: T.J.L. Checked by: C.F.C. Job No. 16162.07

Development of Wind & Ice Load on Mast

Mast Data: (Pipe 12" SCH. 80) (User Input)

Mast Shape = Round (User Input)

Mast Diameter = $D_{mast} := 12.75$ in (User Input)

Mast Length = $L_{mast} := 30$ ft (User Input)

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

Mast Aspect Ratio = $Ar_{mast} := \frac{12 L_{mast}}{D_{mast}} = 28.2$

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

Wind Load (without ice)

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

Total Mast Wind Force = $qz_{ant} \cdot G_H \cdot Ca_{mast} \cdot A_{mast} = 58$ plf **BLC 5**

Wind Load (with ice)

Mast Projected Surface Area w/ Ice = $AICE_{mast} := \frac{\left(D_{mast} + 2 \cdot t_{iz}\right)}{12} = 1.429$ sf/ft

Total Mast Wind Force w/ Ice = $qz_{ice.ant} \cdot G_H \cdot Ca_{mast} \cdot AICE_{mast} = 20$ plf **BLC 4**

Gravity Loads (without ice)

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

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{mast} := \frac{\pi}{4}\left[\left(D_{mast} + t_{iz} \cdot 2\right)^2 - D_{mast}^2\right] = 103.2$ sq in

Weight of Ice on Mast = $W_{ICEmast} := Id \cdot \frac{Ai_{mast}}{144} = 40$ plf **BLC 3**

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Subject:	Loads on T-Mobile Equipmnet Structure # 10256
Location:	Bethel, CT
Rev. 0: 1/18/17	Prepared by: T.J.L. Checked by: C.F.C. Job No. 16162.07

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Andrew LNX-6512DS		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 48.5$	in	(User Input)
Antenna Width =	$W_{ant} := 11.9$	in	(User Input)
Antenna Thickness =	$T_{ant} := 7.1$	in	(User Input)
Antenna Weight =	$WT_{ant} := 29$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.1$		
Antenna Force Coefficient =	$Ca_{ant} = 1.27$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 4$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 12$	sf	
Total Antenna Wind Force =	$F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 699$	lbs	**BLC 5**

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 6$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 18$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 262$	lbs	**BLC 4**

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 87$	lbs	**BLC 2**

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 4098$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 5813$		cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 188$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 565$	lbs	**BLC 3**

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Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFS APXV18-209014-C		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 53$	in	(User Input)
Antenna Width =	$W_{ant} := 6.65$	in	(User Input)
Antenna Thickness =	$T_{ant} := 3.15$	in	(User Input)
Antenna Weight =	$WT_{ant} := 26$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 8.0$		
Antenna Force Coefficient =	$Ca_{ant} = 1.43$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 2.4$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 7.3$	sf	
Total Antenna Wind Force =	$F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 481$	lbs	**BLC 5**

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 4.4$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 13.2$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 218$	lbs	**BLC 4**

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 78$	lbs	**BLC 2**

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 1110$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 3675$	cu in	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 119$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 357$	lbs	**BLC 3**

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Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Andrew ATSBT-TOP-FM-4G		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 5.63$	in	(User Input)
Antenna Width =	$W_{ant} := 3.7$	in	(User Input)
Antenna Thickness =	$T_{ant} := 2.0$	in	(User Input)
Antenna Weight =	$WT_{ant} := 2$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 1.5$		
Antenna Force Coefficient =	$Ca_{ant} = 1.2$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 0.1$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 0.4$	sf	
Total Antenna Wind Force =	$F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 24$	lbs	**BLC 5**

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 0.6$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 1.7$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 23$	lbs	**BLC 4**

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 6$	lbs	**BLC 2**

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 42$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 478$	cu in	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 15$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 46$	lbs	**BLC 3**

Development of Wind & Ice Load on Antenna Mounts

Mount Data:

Mount Type:	Site Pro Universal Ring Mount & Adapter Kit w/ 3 Pipes		
Mount Shape =	Round		(User Input)
Pipe Mount Length =	$L_{mnt} := 60$	in	(User Input)
2 inch Pipe Mount Linear Weight =	$W_{mnt} := 3.66$	plf	(User Input)
Pipe Mount Outside Diameter =	$D_{mnt} := 2.375$	in	(User Input)
Number of Mounting Pipes =	$N_{mnt} := 3$		(User Input)
Tri Sector Adapter and Bracket Mount Weight =	$W_{tsa.mnt} := 300$	lbs	(User Input)
Mount Aspect Ratio =	$Ar_{mnt} := \frac{L_{mnt}}{D_{mnt}} = 25$		
Mount Force Coefficient =	$Ca_{mnt} = 1.2$		

Wind Load (without ice)

Assumes Mount is Shielded by Antenna

Mount Projected Surface Area =	$A_{mnt} := 0.0$	sf	
Total Mount Wind Force =	$F_{mnt} := qz_{ant} \cdot G_H \cdot Ca_{mnt} \cdot A_{mnt} = 0$	lbs	**BLC 5**

Wind Load (with ice)

Assumes Mount is Shielded by Antenna

Mount Projected Surface Area w/ Ice =	$A_{ICEmnt} := 0.0$	sf	
Total Mount Wind Force =	$Fi_{mnt} := qz_{ice.ant} \cdot G_H \cdot Ca_{mnt} \cdot A_{ICEmnt} = 0$	lbs	**BLC 4**

Gravity Loads (without ice)

Weight Each Pipe Mount =	$WT_{mnt} := W_{mnt} \cdot \frac{L_{mnt}}{12} = 18$	lbs	
Weight of All Mounts =	$WT_{mnt} \cdot N_{mnt} + W_{tsa.mnt} = 355$	lbs	**BLC 2**

Gravity Loads (ice only)

Volume of Each Pipe =	$V_{mnt} := \frac{\pi}{4} \cdot D_{mnt}^{2} \cdot L_{mnt} = 266$	cu in	
Volume of Ice on Each Pipe =	$V_{ice} := \left[\frac{\pi}{4} \cdot \left[\left(D_{mnt} + 2 \cdot t_{iz}\right)^2\right] \cdot \left(L_{mnt} + 2 \cdot t_{iz}\right)\right] - V_{mnt} = 2 \times 10^{3}$	cu in	
Weight of Ice each mount (incl, hardware) =	$W_{ICEmnt} := \frac{V_{ice}}{1728} \cdot Id = 67$	lbs	
Weight of Ice on All Mounts =	$W_{ICEmnt} \cdot N_{mnt} + 5 = 205$	lbs	**BLC 3**

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Location:	Bethel, CT
Rev. 0: 1/18/17	Prepared by: T.J.L. Checked by: C.F.C. Job No. 16162.07

Development of Wind & Ice Load on Coax Cables

Coax Cable Data:

Coax Type =	HELIAX 1-5/8"		
Shape =	Round		(User Input)
Coax Outside Diameter =	$D_{coax} := 1.98$	in	(User Input)
Coax Cable Length =	$L_{coax} := 25$	ft	(User Input)
Weight of Coax per foot =	$Wt_{coax} := 1.04$	plf	(User Input)
Total Number of Coax =	$N_{coax} := 12$		(User Input)
No. of Coax Projecting Outside Face of PCS Mast =	$NP_{coax} := 4$		(User Input)

Coax aspect ratio, $Ar_{coax} := \frac{(L_{coax} \cdot 12)}{D_{coax}} = 151.5$

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

Wind Load (without ice)

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

Total Coax Wind Force = $F_{coax} := Ca_{coax} \cdot qz_{ant} \cdot G_H \cdot A_{coax} = 36$ plf **BLC 5**

Wind Load (with ice)

Coax projected surface area w/ Ice = $AICE_{coax} := \frac{(NP_{coax} \cdot D_{coax} + 2 \cdot t_{iz})}{12} = 1$ sf/ft

Total Coax Wind Force w/ Ice = $Fi_{coax} := Ca_{coax} \cdot qz_{ice.ant} \cdot G_H \cdot AICE_{coax} = 14$ plf **BLC 4**

Gravity Loads (without ice)

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

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{coax} := \frac{\pi}{4}\left[(D_{coax} + 2 \cdot t_{iz})^2 - D_{coax}^2\right] = 28.9$ sq in

Ice Weight All Coax per foot = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 135$ plf **BLC 3**

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Subject: **Analysis of TIA-222G Wind and Ice Loads for Analysis of Mast Only**
Tabulated Load Cases
Location: **Bethel, CT**
Date: 1/18/17 Prepared by: T.J.L. Checked by: C.F.C. Job No. 16162.07

Load Case	Description
1	Self Weight (Mast)
2	Weight of Appurtenances
3	Weight of Ice Only
4	TIA Wind with Ice
5	TIA Wind

Footnotes:

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Subject: **Analysis of TIA-222G Wind and Ice Loads for Analysis of Mast Only Load Combinations Table**

Location: **Bethel, CT**

Date: 1/18/17 Prepared by: T.J.L. Checked by: C.F.C. Job No. 16162.07

Load Combination	Description	Envelope Soultion	Wind Factor	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	1.2D + 1.6W		1	Y	1	1.2	2	1.2	5	1.6				
2	0.9D + 1.6W		1	Y	1	0.9	2	0.9	5	1.6				
3	1.2D + 1.0Di + 1.0Wi		1	Y	1	1.2	2	1.2	3	1.0	4	1.0		

Footnotes:
BLC = Basic Load Case
D = Dead Load
Di = Dead Load of Ice
W = Wind Load
W = Wind Load w/ Ice

Global

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

Hot Rolled Steel Code	AISC 14th(360-10): LRFD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	AISC 14th(360-10): ASD
Cold Formed Steel Code	AISI 1999: ASD
Wood Code	AF&PA NDS-97: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-02
Masonry Code	ACI 530-05: ASD
Aluminum Code	AA ADM1-05: ASD - Building

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

Global, Continued

Seismic Code	UBC 1997
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	No
Ct Z	.035
Ct X	.035
T Z (sec)	Not Entered
T X (sec)	Not Entered
R Z	8.5
R X	8.5
Ca	.36
Cv	.54
Nv	1
Occupancy Category	4
Seismic Zone	3
Seismic Detailing Code	ASCE 7-05
Om Z	1
Om X	1
Rho Z	1
Rho X	1

Footing Overturning Safety Factor	1.5
Check Concrete Bearing	No
Footing Concrete Weight (k/ft^3)	0
Footing Concrete f'c (ksi)	3
Footing Concrete Ec (ksi)	4000
Lamda	1
Footing Steel fy (ksi)	60
Minimum Steel	0.0018
Maximum Steel	0.0075
Footing Top Bar	#3
Footing Top Bar Cover (in)	3.5
Footing Bottom Bar	#3
Footing Bottom Bar Cover (in)	3.5
Pedestal Bar	#3
Pedestal Bar Cover (in)	1.5
Pedestal Ties	#3

Hot Rolled Steel Properties

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

Hot Rolled Steel Design Parameters

	Label	Shape	Lengt...	Lbyy[ft]	Lbzz[ft]	Lcomp t...	Lcomp b...	L-torqu...	Kyy	Kzz	Cb	Function
1	M1	Existing Mast	30									Lateral

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Existing Mast	PIPE_12.0X	Beam	Pipe	A53 Gr. B	Typical	17.5	339	339	678

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design R...
1	M1	BOTCO...	TOPMA...			Existing Mast	Beam	Pipe	A53 Gr. B	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From ...
1	BOTCONNECTION	0	0	0	0	
2	TOPCONNECTION	0	8	0	0	
3	TOPMAST	0	30	0	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]	Footing
1	BOTCONNECTION	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction	
2	TOPCONNECTION	Reaction		Reaction		Reaction		

Member Point Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Y	-.087	27
2	M1	Y	-.006	27
3	M1	Y	-.355	27
4	M1	Y	-.078	19
5	M1	Y	-.355	19

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Y	-.565	27
2	M1	Y	-.046	27
3	M1	Y	-.205	27
4	M1	Y	-.357	19
5	M1	Y	-.205	19

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	X	.262	27
2	M1	X	.023	27
3	M1	X	.218	19

Member Point Loads (BLC 5 : TIA Wind)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	X	.699	27
2	M1	X	.024	27
3	M1	X	.481	19

Joint Loads and Enforced Displacements

Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*s^2*ft)]
No Data to Print ...			

Member Distributed Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.012	-.012	0	25

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

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.04	-.04	0	0
2	M1	Y	-.135	-.135	0	25

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

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.02	.02	0	0
2	M1	X	.014	.014	0	25

Member Distributed Loads (BLC 5 : TIA Wind)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.058	.058	0	0
2	M1	X	.036	.036	0	25

Basic Load Cases

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

Load Combinations

	Description	Sol...	PDelta	SR..	BLC	Fact..	BLC	Fact..	BLC	Fact..	BLC	Fact..	BLC	Fact..	BLC	Fact..	BLC	Fact..	BLC	Fact...
1	1.2D + 1.6W	Yes	Y		1	1.2	2	1.2	5	1.6										
2	0.9D + 1.6W	Yes	Y		1	.9	2	.9	5	1.6										
3	1.2D +1.0Di + 1.0Wi	Yes	Y		1	1.2	2	1.2	3	1	4	1								

Envelope Member Section Forces

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torqu...	LC	y-y Mo...	LC	z-z Mo...	LC
1	M1	1	max	9.514	3	-2.548	3	0	1	0	1	0	1	-6.624	3
2			min	2.671	2	-10.506	1	0	1	0	1	0	1	-27.358	1
3		2	max	7.558	3	-2.803	3	0	1	0	1	0	1	55.669	1
4			min	2.188	2	-11.634	1	0	1	0	1	0	1	13.444	3
5		3	max	5.601	3	3.907	1	0	1	0	1	0	1	30.472	1
6			min	1.705	2	.951	3	0	1	0	1	0	1	7.361	3
7		4	max	2.563	3	2.01	1	0	1	0	1	0	1	8.092	1
8			min	.832	2	.478	3	0	1	0	1	0	1	1.948	3
9		5	max	0	1	.013	1	0	1	0	1	0	1	0	1
10			min	0	1	.008	3	0	1	0	1	0	1	0	1

Envelope Member Section Stresses

	Member	Sec		Axial[ksi]	LC	y Shear[...	LC	z Shear[...	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
1	M1	1	max	.544	3	-.291	3	0	1	6.198	1	-1.501	3	0	1	0	1
2			min	.153	2	-1.201	1	0	1	1.501	3	-6.198	1	0	1	0	1
3		2	max	.432	3	-.32	3	0	1	-3.046	3	12.612	1	0	1	0	1
4			min	.125	2	-1.33	1	0	1	-12.612	1	3.046	3	0	1	0	1
5		3	max	.32	3	.447	1	0	1	-1.668	3	6.903	1	0	1	0	1
6			min	.097	2	.109	3	0	1	-6.903	1	1.668	3	0	1	0	1
7		4	max	.146	3	.23	1	0	1	-.441	3	1.833	1	0	1	0	1
8			min	.048	2	.055	3	0	1	-1.833	1	.441	3	0	1	0	1
9		5	max	0	1	.001	1	0	1	0	1	0	1	0	1	0	1
10			min	0	1	0	3	0	1	0	1	0	1	0	1	0	1

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	BOTCONNE...	max	10.506	1	9.514	3	0	1	0	1	0	1	-6.624	3
2		min	2.548	3	2.671	2	0	1	0	1	0	1	-27.358	1
3	TOPCONNE...	max	-4.001	3	0	1	0	1	0	1	0	1	0	1
4		min	-16.657	1	0	1	0	1	0	1	0	1	0	1
5	Totals:	max	-1.453	3	9.514	3	0	1						
6		min	-6.15	2	2.671	2	0	1						

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotatio...	LC	Y Rotatio...	LC	Z Rotation...	LC
1	BOTCONNE...	max	0	3	0	2	0	1	0	1	0	1	0	1
2		min	0	1	0	3	0	1	0	1	0	1	0	3
3	TOPCONNE...	max	0	1	0	2	0	1	0	1	0	1	-5.759e-4	3
4		min	0	3	-.002	3	0	1	0	1	0	1	-2.383e-3	1
5	TOPMAST	max	2.334	1	-.001	2	0	1	0	1	0	1	-2.654e-3	3
6		min	.564	3	-.004	3	0	1	0	1	0	1	-1.099e-2	1

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

	Member	Shape	Code Check	Loc...	LC	Sh...	Loc[ft]	Dir	LC	phi*Pn..	phi*...	phi*...	phi*...	...	Eqn
1	M1	PIPE_12.0X	.334	8.125	1	.071	7.813		1	391.414	551...	184...	184...	...	H1...

Joint Reactions

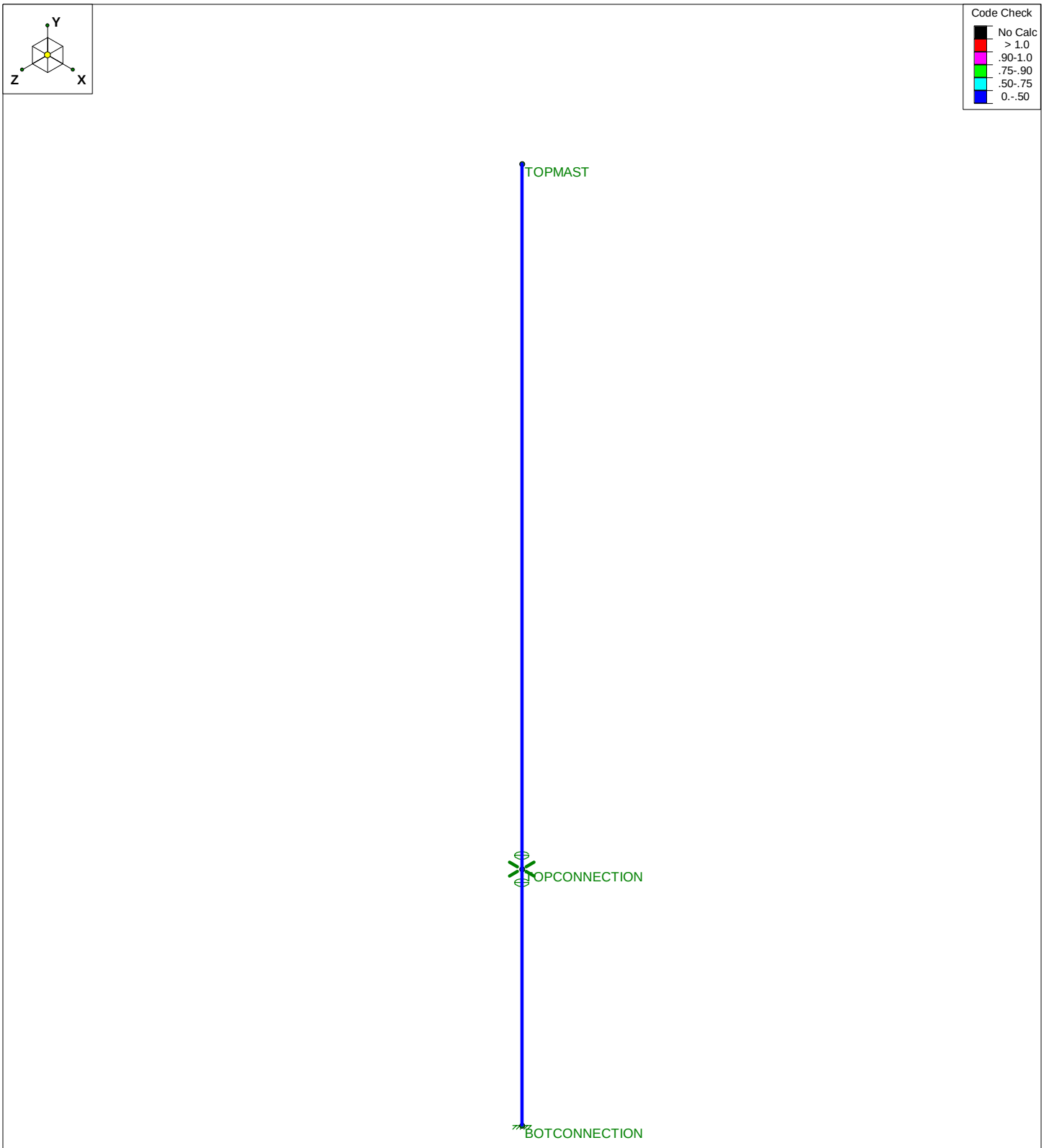
	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	BOTCONNECTION	10.506	3.561	0	0	0	-27.358
2	1	TOPCONNECTION	-16.657	0	0	0	0	0
3	1	Totals:	-6.15	3.561	0			
4	1	COG (ft):	X: 0	Y: 17.143	Z: 0			

Joint Reactions

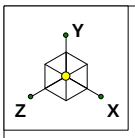
	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	BOTCONNECTION	10.493	2.671	0	0	0	-27.325
2	2	TOPCONNECTION	-16.644	0	0	0	0	0
3	2	Totals:	-6.15	2.671	0			
4	2	COG (ft):	X: 0	Y: 17.143	Z: 0			

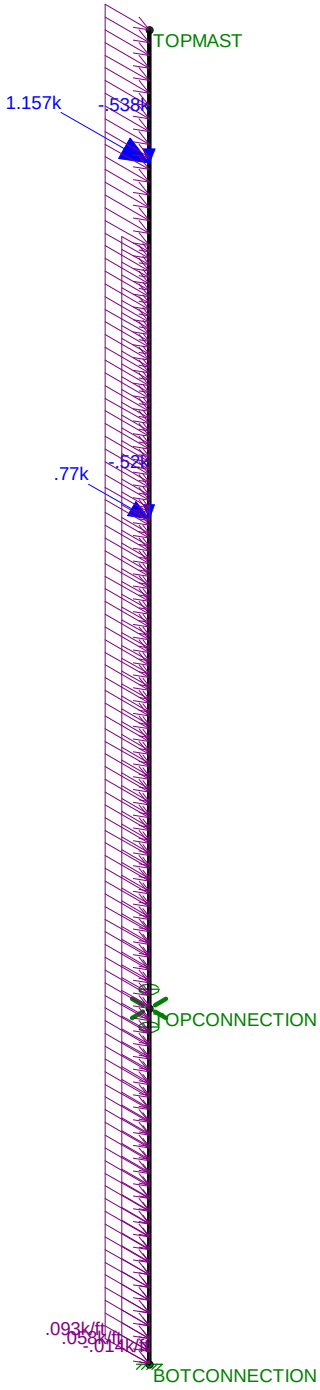
Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	3	BOTCONNECTION	2.548	9.514	0	0	0	-6.624
2	3	TOPCONNECTION	-4.001	0	0	0	0	0
3	3	Totals:	-1.453	9.514	0			
4	3	COG (ft):	X: 0	Y: 16.181	Z: 0			



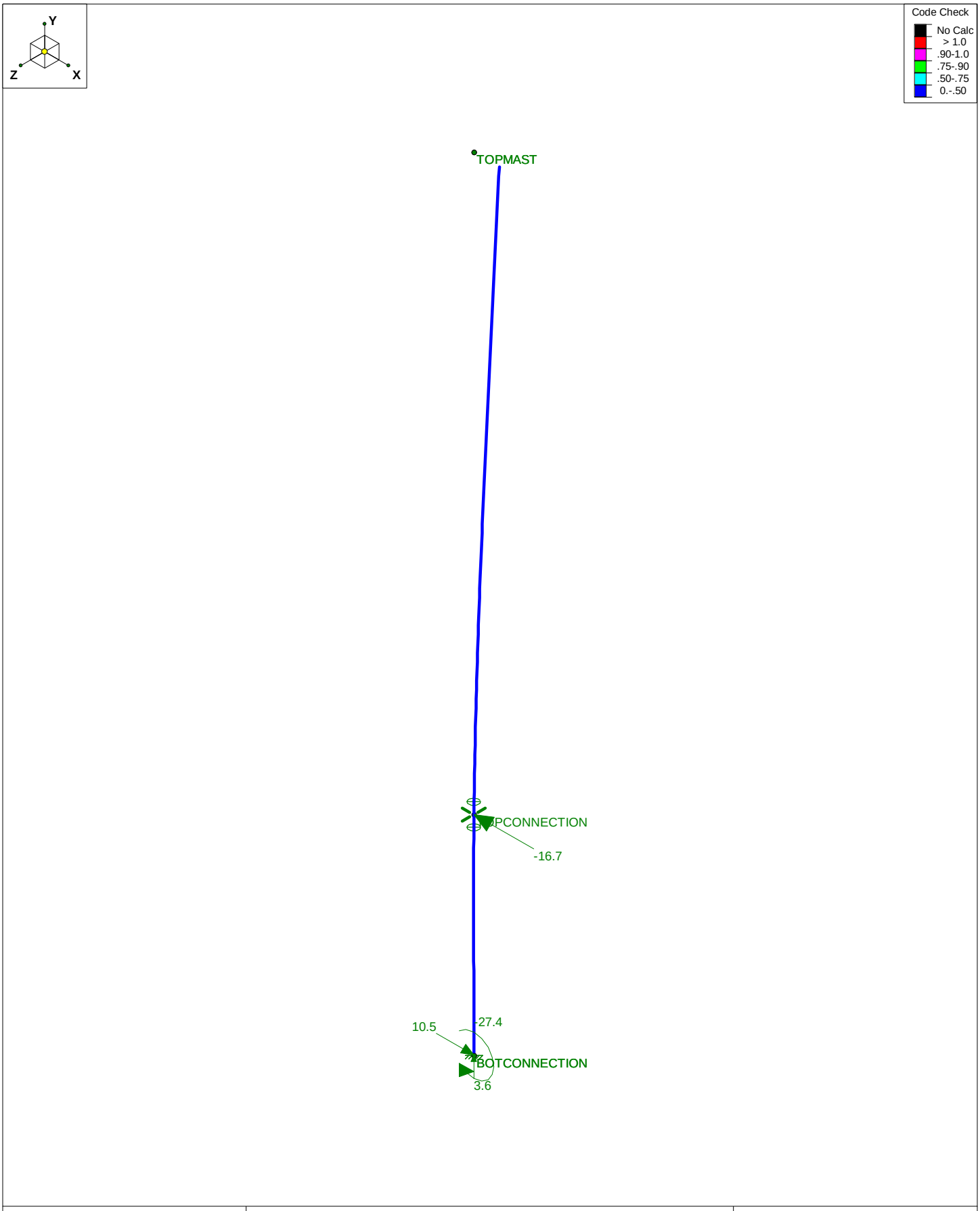
CENTEK Engineering, INC.		
tjl, cfc	Strcuture #10256 - Mast	Jan 18, 2017 at 1:12 PM
16162.07 /T-Mobile CT111...	Unity Check	TIA.r3d



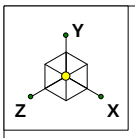


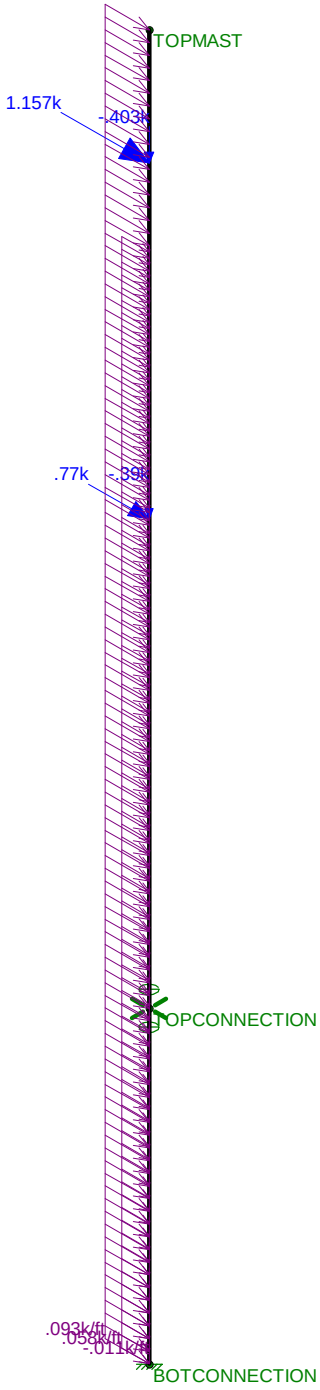
Loads: LC 1, 1.2D + 1.6W

CENTEK Engineering, INC.		
tjl, cfc	Strcuture #10256 - Mast	Jan 18, 2017 at 1:12 PM
16162.07 /T-Mobile CT111...	LC #1 Loads	TIA.r3d



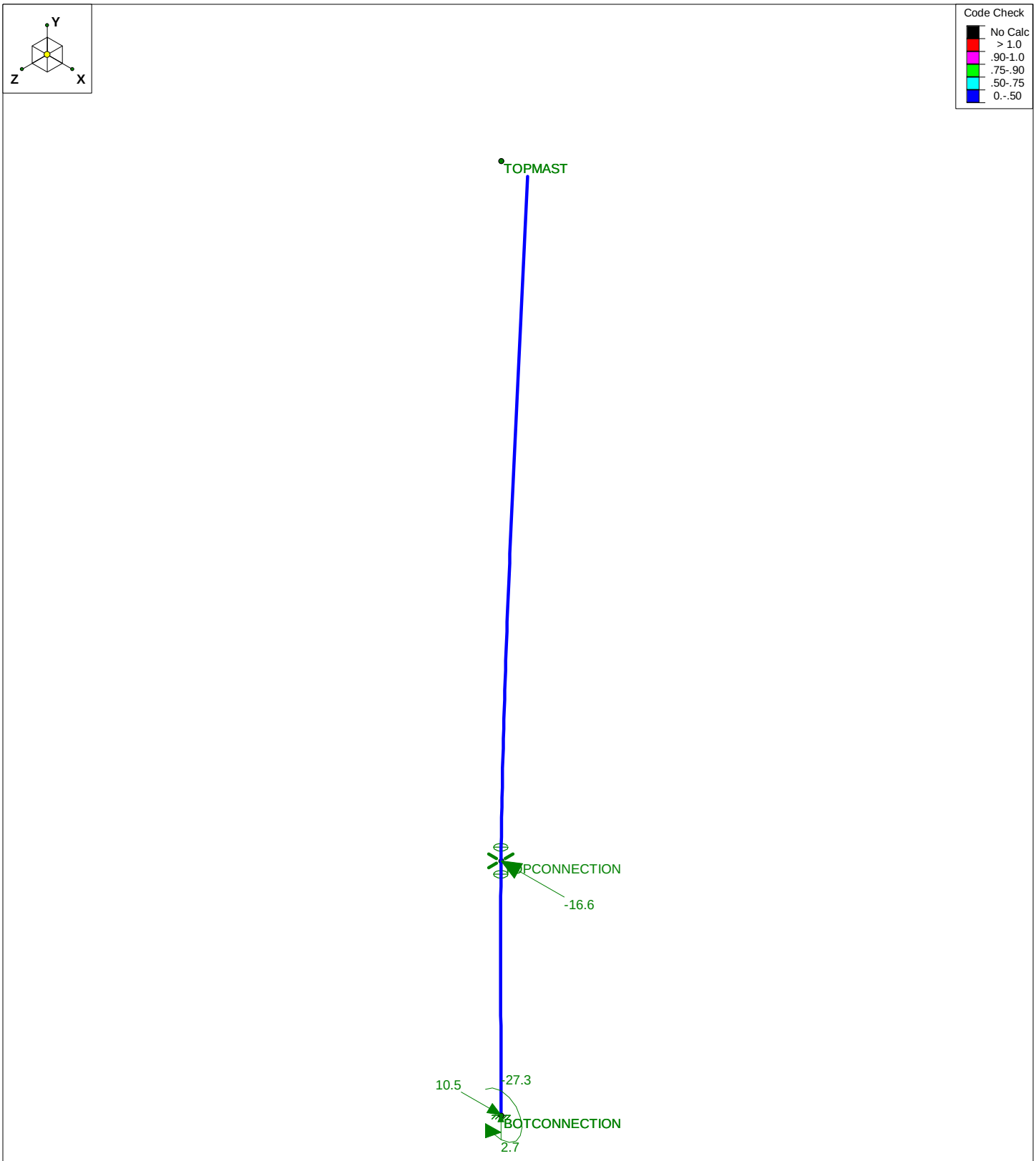
CENTEK Engineering, INC.		
tjl, cfc	Strcuture #10256 - Mast	Jan 18, 2017 at 1:13 PM
16162.07 /T-Mobile CT111...	LC #1 Reactions and Deflected Shape	TIA.r3d



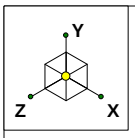


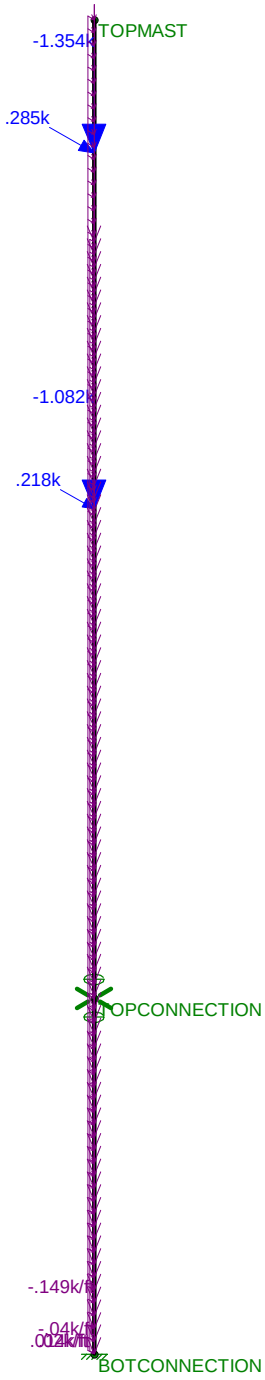
Loads: LC 2, 0.9D + 1.6W

CENTEK Engineering, INC.		
tjl, cfc	Strcuture #10256 - Mast	Jan 18, 2017 at 1:12 PM
16162.07 /T-Mobile CT111...	LC #2 Loads	TIA.r3d



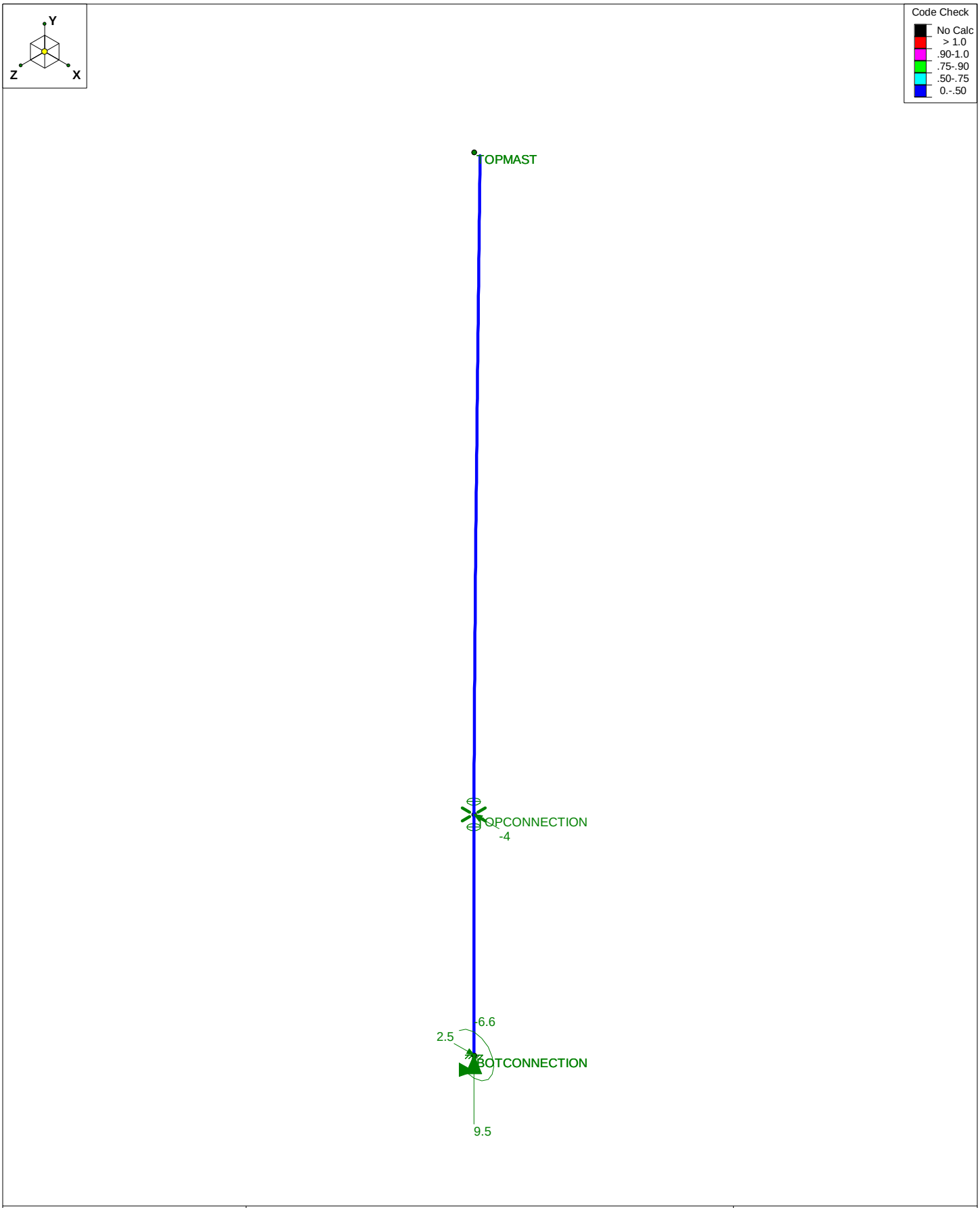
CENTEK Engineering, INC.		
tjl, cfc	Strcuture #10256 - Mast	Jan 18, 2017 at 1:14 PM
16162.07 /T-Mobile CT111...	LC #2 Reactions and Deflected Shape	TIA.r3d





Loads: LC 3, 1.2D +1.0Di + 1.0Wi

CENTEK Engineering, INC.		
tjl, cfc	Strcuture #10256 - Mast	Jan 18, 2017 at 1:13 PM
16162.07 /T-Mobile CT111...	LC #3 Loads	TIA.r3d



CENTEK Engineering, INC.		
tjl, cfc	Strcuture #10256 - Mast	Jan 18, 2017 at 1:14 PM
16162.07 /T-Mobile CT111...	LC #3 Reactions and Deflected Shape	TIA.r3d

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Subject:	Mast Connection to Pole # 10256
Location:	Bethel, CT
Rev. 0: 1/18/17	Prepared by: T.J.L. Checked by: C.F.C. Job No. 16162.07

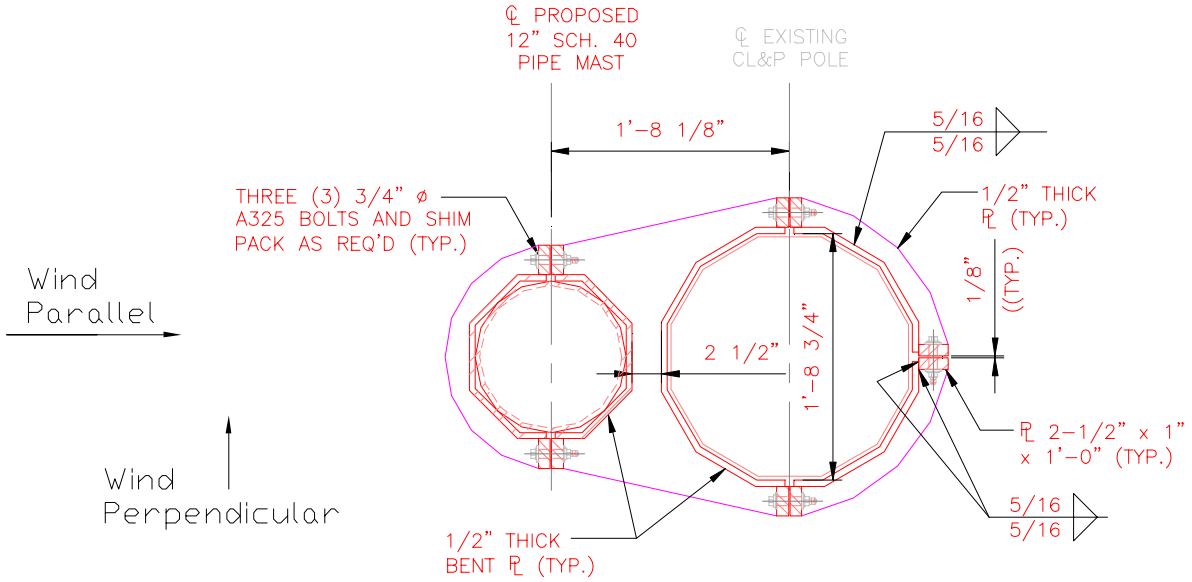
Mast Top Connection:

Maximum Design Reactions at Brace:

Vertical =	Vert := 0·kips	(User Input)
Horizontal =	Horz := 16.7·kips	(User Input)
Moment =	Moment := 0	(User Input)

Bolt Data:

Bolt Grade =	A325	(User Input)
Number of Bolts =	$n_b := 6$	(User Input)
Bolt Diameter =	$d_b := 0.75in$	(User Input)
Nomianl Tensile Strength =	$F_{nt} := 90 \cdot ksi$	(User Input)
Nomianl Shear Strength =	$F_{nv} := 54 \cdot ksi$	(User Input)
Resistance Factor =	$\phi := 0.75$	(User Input)
Bolt Eccentricity from C.L. Mast =	$e := 20.125 \cdot in$	(User Input)
Vetical Spacing Between Top and Bottom Bolts =	$S_{vert} := 9 \cdot in$	(User Input)
Horizontal Spacing Between Bolts =	$S_{horz} := 24.1875 \cdot in$	(User Input)
Bolt Area =	$a_b := \frac{1}{4} \cdot \pi \cdot d_b^2 = 0.442 \cdot in^2$	



Check Bolt Stresses:

Wind Acting Parallel to Stiffiner Plate:

Shear Stress per Bolt =

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

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

Condition1 = "OK"

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

Tensile Stress Adjusted for Shear =

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

Tension Force Each Bolt =

$$F_{tension.bolt} := \frac{Horz}{n_b} + \frac{Vert \cdot e}{S_{vert} \cdot 2} = 2.783 \cdot kips$$

Tension Stress Each Bolt =

$$f_t := \frac{F_{tension.bolt}}{a_b} = 6.3 \cdot ksi$$

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

Condition2 = "OK"

$$\frac{f_t}{\left(\phi \cdot F'_{nt}\right)} = 9.3\%$$

Wind Acting Perpendicular to Stiffiner Plate:

Shear Stress per Bolt =

$$f_v := \frac{\sqrt{Vert^2 + Horz^2}}{n_b \cdot a_b} = 6.3 \cdot ksi$$

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

Condition3 = "OK"

$$\frac{f_v}{\left(\phi \cdot F_{nv}\right)} = 15.6\%$$

Tensile Stress Adjusted for Shear =

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

Tension Force per Bolt =

$$F_{tension.conn} := \frac{Horz \cdot e}{S_{horz} \cdot \frac{n_b}{2}} + \frac{Vert \cdot e}{S_{vert} \cdot 2} = 4.632 \cdot kips$$

Tension Stress Each Bolt =

$$f_t := \frac{F_{tension.conn}}{a_b} = 10.484 \cdot ksi$$

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

Condition4 = "OK"

$$\frac{f_t}{\left(\phi \cdot F'_{nt}\right)} = 15.5\%$$

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Subject:	Mast Connection to Bottom Bracket
Location:	Bethel, CT
Rev. 0: 1/18/17	Prepared by: T.J.L. Checked by: C.F.C. Job No. 16162.07

Mast Connection to Bottom Bracket:

Design Reactions:

Axial =	Axial := 3.6·kips	(User Input)
Shear =	Shear := 10.5·kips	(User Input)
Moment =	Moment := 28·kips·ft	(User Input)

Bolt Data:

Use ASTM A325

Number of Bolts =	N := 4	(User Input)
Distance Between Bolts x-dir=	$S_x := 13 \cdot in$	(User Input)
Distance Between Bolts x-dir=	$S_y := 13 \cdot in$	(User Input)
Nomianl Tensile Strength =	$F_{nt} := 90 \cdot ksi$	(User Input)
Nomianl Shear Strength =	$F_{nv} := 54 \cdot ksi$	(User Input)
Resistance Factor =	$\phi := 0.75$	(User Input)
Bolt Modulus =	E := 29000·ksi	(User Input)
Diameter of Flange Bolts =	D := 0.75·in	(User Input)
Threads per Inch =	n := 10	(User Input)

Base Plate Data:

Base Plate Steel =	A36	(User Input)
Yield Stress =	$F_y := 36 \cdot ksi$	(User Input)
Resistance Factor =	$\phi_b := 0.9$	(User Input)
Base Plate Width =	$Pl_w := 16 \cdot in$	(User Input)
Base Plate Length =	$Pl_L := 16 \cdot in$	(User Input)
Base Plate Thickness =	$Pl_t := 1.25 \cdot in$	(User Input)
Pole Diameter =	$D_p := 12.75 \cdot in$	(User Input)

Base Plate Data:

Weld Grade	E70XX	(User Input)
Weld Yield Stress =	$F_{EXX} := 70 \cdot ksi$	(User Input)
Resistance Factor =	$\phi_w := 0.75$	(User Input)
Weld Size =	sw := 0.3125·in	(User Input)

Bolt Analysis:

Area of Bolt = $A_b := \frac{\pi}{4} \cdot D^2 = 0.442 \cdot in^2$

Shear Stress per Bolt = $f_v := \frac{Shear}{N \cdot A_b} = 5.942 \cdot ksi$

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

$\frac{f_v}{(\phi \cdot F_{nv})} = 14.7$

Condition1 = "OK"

Tensile Force Horizontal = $T_x := \frac{Moment}{S_x \cdot \frac{N}{2}} - \frac{Axial}{N} = 12 \cdot kips$

Tensile Force Horizontal = $T_y := \frac{Moment}{S_y \cdot \frac{N}{2}} - \frac{Axial}{N} = 12 \cdot kips$

Spacing Diagonal = $S_d := \sqrt{S_x^2 + S_y^2} = 18.4 \cdot in$

Tensile Force Diagonal = $T_D := \frac{Moment}{S_d} - \frac{Axial}{N} = 17.4 \cdot kips$

Maximum Tension per Bolt = $T_{max} := max(T_x, T_y, T_D) = 0.1 ft^2 \cdot ksi$

Tensile Stress per Bolt = $f_t := \frac{T_{max}}{A_b} = 39.3 \cdot ksi$

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

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

$\frac{f_t}{(\phi \cdot F'_{nt})} = 58.3\%$

Condition2 = "OK"

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Subject:	Mast Connection to Bottom Bracket
Location:	Bethel, CT
Rev. 0: 1/18/17	Prepared by: T.J.L. Checked by: C.F.C. Job No. 16162.07

Base Plate Check:

Moment Arm = $K := \frac{(S_d - D_p)}{2} = 2.82 \cdot in$

Moment in Base Plate = $M := K \cdot T_{max} = 48.95 \cdot kips \cdot in$

Plate Bending Width = $W := \left(Pl_w \cdot \sqrt{2} - D_p\right) = 9.88 \cdot in$

Plastic Modulus = $Z := \frac{1}{4} \cdot W \cdot Pl_t^2 = 3.86 \cdot in^3$

Bending Stress = $f_b := \frac{M}{Z} = 12.69 \cdot ksi$

$Condition3 := if(f_b < \phi_b \cdot F_y, "OK", "Overstressed")$ $\frac{f_b}{(\phi_b \cdot F_y)} = 39.2 \cdot \%$

Condition3 = "OK"

Base Plate to Mast Weld Check:

Nominal Weld Stress = $F_w := 0.6 \cdot F_{EXX} = 42 \cdot ksi$

Weld Area = $A_w := \frac{\pi}{4} \cdot \left[\left(D_p + 2sw \cdot 0.707\right)^2 - D_p^2\right] = 9 \cdot in^2$

Weld Moment of Inertia = $I_w := \frac{\pi}{64} \cdot \left[\left(D_p + 2sw \cdot 0.707\right)^4 - D_p^4\right] = 189.4 \cdot in^4$

$c := \frac{D_p}{2} + sw \cdot 0.707 = 6.6 \cdot in$

Section Modulus of Weld = $S_w := \frac{I_w}{c} = 28.71 \cdot in^3$

Weld Stress = $f_w := \frac{Moment}{S_w} + \frac{Shear}{A_w} = 12.87 \cdot ksi$

$Condition3 := if(f_w < \phi_w \cdot F_w, "OK", "Overstressed")$ $\frac{f_w}{(\phi_w \cdot F_w)} = 40.9 \cdot \%$

Condition3 = "OK"

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Subject:	Mast Connection to Pole # 10256
Location:	Bethel, CT
Rev. 0: 1/18/17	Prepared by: T.J.L. Checked by: C.F.C. Job No. 16162.07

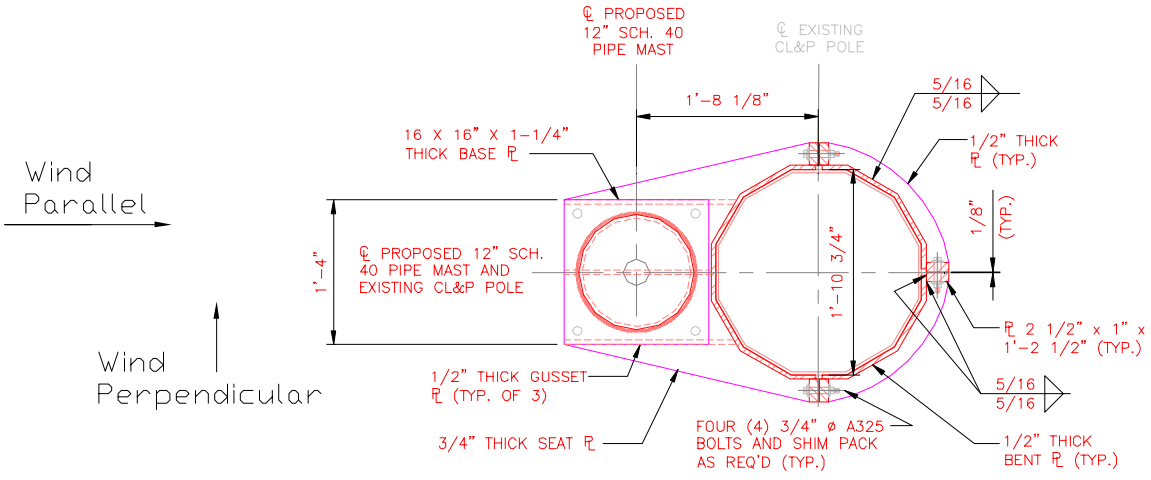
Mast Bottom Connection:

Maximum Design Reactions at Brace:

Vertical =	Vert := 3.6·kips	(User Input)
Horizontal =	Horz := 10.5·kips	(User Input)
Moment =	Moment := 28·ft·kips	(User Input)

Bolt Data:

Bolt Grade =	A325	(User Input)
Number of Bolts =	$n_b := 8$	(User Input)
Bolt Diameter =	$d_b := 0.75in$	(User Input)
Nomianl Tensile Strength =	$F_{nt} := 90 \cdot ksi$	(User Input)
Nomianl Shear Strength =	$F_{nv} := 54 \cdot ksi$	(User Input)
Resistance Factor =	$\phi := 0.75$	(User Input)
Bolt Eccentricity from C.L. Mast =	$e := 20.125 \cdot in$	(User Input)
Horizontal Spacing Between Bolts =	$S_{horz} := 26.1875 \cdot in$	(User Input)
Vetical Spacing From Plate CL to Bolt 1 =	$S_{vert1} := 2 \cdot in$	(User Input)
Vetical Spacing From Plate CL to Bolt 2 =	$S_{vert2} := 6 \cdot in$	(User Input)
Bolt Polar Moment of Inertia =	$I_p := 4 \cdot S_{vert1}^2 + 4 \cdot S_{vert2}^2 = 160 \cdot in^2$	
Bolt Area =	$a_b := \frac{1}{4} \cdot \pi \cdot d_b^2 = 0.442 \cdot in^2$	



Check Bolt Stresses:

Wind Acting Parallel to Stiffiner Plate:

Shear Stress per Bolt =

$$f_v := \frac{Vert}{n_b \cdot a_b} = 1.019 \cdot ksi$$

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

$$\frac{f_v}{\left(\phi \cdot F_{nv}\right)} = 2.5\%$$

Condition1 = "OK"

Tensile Stress Adjusted for Shear =

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

Tension Force Each Bolt =

$$F_{tension.bolt} := \frac{Horz}{n_b} + \frac{(Vert \cdot e + Moment) \cdot S_{vert2}}{I_p} = 16.629 \cdot kips$$

Tension Stress Each Bolt =

$$f_t := \frac{F_{tension.bolt}}{a_b} = 37.6 \cdot ksi$$

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

$$\frac{f_t}{\left(\phi \cdot F'_{nt}\right)} = 55.8\%$$

Condition2 = "OK"

Wind Acting Perpendicular to Stiffiner Plate:

Shear Stress per Bolt =

$$f_v := \frac{\sqrt{\left(\frac{Vert}{n_b} + \frac{Moment \cdot 2}{S_{horz} \cdot n_b}\right)^2 + \left(\frac{Horz}{n_b}\right)^2}}{a_b} = 8.796 \cdot ksi$$

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

$$\frac{f_v}{\left(\phi \cdot F_{nv}\right)} = 21.7\%$$

Condition3 = "OK"

Tensile Stress Adjusted for Shear =

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

Tension Force per Bolt =

$$F_{tension.conn} := \frac{Horz \cdot e}{\frac{n_b}{S_{horz} \cdot \frac{1}{2}}} + \frac{(Vert \cdot e) \cdot S_{vert2}}{I_p} = 4.734 \cdot kips$$

Tension Stress Each Bolt =

$$f_t := \frac{F_{tension.conn}}{a_b} = 10.716 \cdot ksi$$

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

$$\frac{f_t}{\left(\phi \cdot F'_{nt}\right)} = 15.9\%$$

Condition4 = "OK"

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Subject:	Load Analysis of T-Mobile Equipment on Structure #10256
Location:	Bethel, CT
Rev. 0: 1/18/17	Prepared by: T.J.L Checked by: C.F.C. Job No. 16162.07

Basic Components

Heavy Wind Pressure =	p := 4.00	psf	(User Input NESC 2007 Figure 250-1 & Table 250-1)
Basic Windspeed =	V := 100	mph	(User Input NESC 2007 Figure 250-2(e))
Radial Ice Thickness =	Ir := 0.50	in	(User Input)
Radial Ice Density =	Id := 56.0	pcf	(User Input)

Factors for Extreme Wind Calculation

Elevation of Top of Mast Above Grade =	TME := 165	ft	(User Input)
Multiplier Gust Response Factor =	m := 1.25		(User Input - Only for NESC Extreme wind case)
NESC Factor =	kv := 1.43		(User Input from NESC 2007 Table 250-3 equation)
Importance Factor =	I := 1.0		(User Input from NESC 2007 Section 250.C.2)
Velocity Pressure Coefficient =	$Kz := 2.01\cdot\left(\frac{TME}{900}\right)^{\frac{2}{9.5}} = 1.406$		(NESC 2007 Table 250-2)
Exposure Factor =	$Es := 0.346\left[\frac{33}{(0.67\cdot TME)}\right]^{\frac{1}{7}} = 0.291$		(NESC 2007 Table 250-3)
Response Term =	$Bs := \frac{1}{\left(1 + 0.375\cdot\frac{TME}{220}\right)} = 0.78$		(NESC 2007 Table 250-3)
Gust Response Factor =	$Grf := \frac{\left[1 + \left(2.7\cdot Es\cdot Bs^{\frac{1}{2}}\right)\right]}{kv^2} = 0.829$		(NESC 2007 Table 250-3)
Wind Pressure =	$qz := 0.00256\cdot Kz\cdot V^2\cdot Grf\cdot I = 29.8$	psf	(NESC 2007 Section 250.C.2)

Shape Factors

NUS Design Criteria Issued April 12, 2007

Shape Factor for Round Members =	$Cd_R := 1.3$	(User Input)
Shape Factor for Flat Members =	$Cd_F := 1.6$	(User Input)
Shape Factor for Coax Cables Attached to Outside of Pole =	$Cd_{coax} := 1.45$	(User Input)

Overload Factors

NU Design Criteria Table

Overload Factors for Wind Loads:

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

Overload Factors for Vertical Loads:

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

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Subject:	Load Analysis of T-Mobile Equipment on Structure #10256
Location:	Bethel, CT
Rev. 0: 1/18/17	Prepared by: T.J.L Checked by: C.F.C. Job No. 16162.07

Development of Wind & Ice Load on PCS Mast

Mast Data: (Pipe 12" Sch. 80)

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

Wind Load (NESC Extreme)

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

Total Mast Wind Force (Above NU Structure) = $qz \cdot Cd_R \cdot A_{mast} \cdot m = 52$ plf **BLC 5**

Total Mast Wind Force (Below NU Structure) = $qz \cdot Cd_R \cdot A_{mast} = 41$ plf **BLC 5**

Wind Load (NESE Heavy)

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

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

Gravity Loads (without ice)

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

Gravity Loads (ice only)

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

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

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Subject:	Load Analysis of T-Mobile Equipment on Structure #10256
Location:	Bethel, CT
Rev. 0: 1/18/17	Prepared by: T.J.L Checked by: C.F.C. Job No. 16162.07

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Andrew LNX-6512DS		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 48.5$	in	(User Input)
Antenna Width =	$W_{ant} := 11.9$	in	(User Input)
Antenna Thickness =	$T_{ant} := 7.1$	in	(User Input)
Antenna Weight =	$WT_{ant} := 29$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 4$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 12$	sf	
Total Antenna Wind Force =	$F_{ant} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 717$	lbs	**BLC 5**

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 4.4$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 13.3$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := p \cdot Cd_F \cdot A_{ICEant} = 85$	lbs	**BLC 4**

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 87$	lbs	**BLC 2**

Gravity Load (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 4098$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 1)(W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 1074$	cu in	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 35$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 104$	lbs	**BLC 3**

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFS APXV18-209014-C		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 53$	in	(User Input)
Antenna Width =	$W_{ant} := 6.65$	in	(User Input)
Antenna Thickness =	$T_{ant} := 3.15$	in	(User Input)
Antenna Weight =	$WT_{ant} := 26$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 2.4$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 7.3$	sf	
Total Antenna Wind Force =	$F_{ant} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 438$	lbs	**BLC 5**

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 2.9$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 8.6$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := p \cdot Cd_F \cdot A_{ICEant} = 55$	lbs	**BLC 4**

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 78$	lbs	**BLC 2**

Gravity Load (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 1110$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 1)(W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 604$	cu in	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 20$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 59$	lbs	**BLC 3**

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Andrew ATSBT-TOP-FM-4G		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 5.63$	in	(User Input)
Antenna Width =	$W_{ant} := 3.7$	in	(User Input)
Antenna Thickness =	$T_{ant} := 2.0$	in	(User Input)
Antenna Weight =	$WT_{ant} := 2$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 0.1$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 0.4$	sf	
Total Antenna Wind Force =	$F_{ant} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 26$	lbs	**BLC 5**

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 0.2$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 0.6$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := p \cdot Cd_F \cdot A_{ICEant} = 4$	lbs	**BLC 4**

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 6$	lbs	**BLC 2**

Gravity Load (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 42$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 1)(W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 52$	cu in	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 2$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 5$	lbs	**BLC 3**

Development of Wind & Ice Load on Antenna Mounts

Mount Data:

Mount Type:	Site Pro Universal Ring Mount & Adapter Kit w/ 3 Pipes			
Mount Shape =	Round		(User Input)	
Pipe Mount Length =	$L_{mnt} := 60$	in	(User Input)	
2 inch Pipe Mount Linear Weight =	$W_{mnt} := 3.66$	plf	(User Input)	
Pipe Mount Outside Diameter =	$D_{mnt} := 2.375$	in	(User Input)	
Number of Mounting Pipes =	$N_{mnt} := 3$		(User Input)	
Site Pro Universal Ring Mount & Adapter Weight =	$W_{tsa.mnt} := 300$	lbs	(User Input)	

Wind Load (NESC Extreme)

Assumes Mount is Shielded by Antenna

Mount Projected Surface Area =	$A_{mnt} := 0.0$	sf	
Total Mount Wind Force =	$F_{mnt} := qz \cdot Cd_F \cdot A_{mnt} \cdot m = 0$	lbs	**BLC 5**

Wind Load (NESC Heavy)

Assumes Mount is Shielded by Antenna

Mount Projected Surface Area w/ Ice =	$A_{ICEmnt} := 0.0$	sf	
Total Mount Wind Force =	$Fi_{mnt} := p \cdot Cd_F \cdot A_{ICEmnt} = 0$	lbs	**BLC 4**

Gravity Loads (without ice)

(per TIA/EIA-222-F-1996)

Weight Each Pipe Mount =	$WT_{mnt} := W_{mnt} \cdot \frac{L_{mnt}}{12} = 18$	lbs	
Weight of All Mounts =	$WT_{mnt} \cdot N_{mnt} + W_{tsa.mnt} = 355$	lbs	**BLC 2**

Gravity Load (ice only)

(per TIA/EIA-222-F-1996)

Volume of Each Pipe =	$V_{mnt} := \frac{\pi}{4} \cdot D_{mnt}^{2} \cdot L_{mnt} = 266$	cu in	
Volume of Ice on Each Pipe =	$V_{ice} := \left[\frac{\pi}{4} \cdot \left[(D_{mnt} + 1)^2\right] \cdot (L_{mnt} + 1)\right] - V_{mnt} = 280$	cu in	
Weight of Ice each mount (incl, hardware) =	$W_{ICEmnt} := \frac{V_{ice}}{1728} \cdot Id = 9$	lbs	
Weight of Ice on All Mounts =	$W_{ICEmnt} \cdot N_{mnt} + 5 = 32$	lbs	**BLC 3**

Development of Wind & Ice Load on Coax Cables

Coax Cable Data:

Coax Type =	HELIAX 1-5/8"		
Shape =	Round		(User Input)
Coax Outside Diameter =	$D_{coax} := 1.98$	in	(User Input)
Coax Cable Length =	$L_{coax} := 25$	ft	(User Input)
Weight of Coax per foot =	$Wt_{coax} := 1.04$	plf	(User Input)
Total Number of Coax =	$N_{coax} := 12$		(User Input)
No. of Coax Projecting Outside Face of PCS Mast =	$NP_{coax} := 4$		(User Input)

Wind Load (NESC Extreme)

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

Total Coax Wind Force (Above NU Structure) = $F_{coax} := qz \cdot Cd_{coax} \cdot A_{coax} \cdot m = 36$ plf **BLC 5**

Total Coax Wind Force (Below NU Structure) = $F_{coax} := qz \cdot Cd_{coax} \cdot A_{coax} = 29$ plf **BLC 5**

Wind Load (NESC Heavy)

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

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

Gravity Loads (without ice)

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

Gravity Load (ice only)

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

Ice Weight All Coax per foot = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 18$ plf **BLC 3**

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Subject: **Analysis of NESC Heavy Wind and NESC Extreme Wind for Obtaining Reactions Applied to Utility Pole Tabulated Load Cases**

Location: **Bethel, CT**

Date:1/18/17 Prepared by: T.J.L. Checked by: C.F.C. Job No. 16162.07

Load Case	Description
1	Self Weight (Mast)
2	Weight of Appurtenances
3	Weight of Ice Only
4	NESC Heavy Wind
5	NESC Extreme Wind

Footnotes:

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Subject: **Analysis of NESC Heavy Wind and NESC Extreme Wind for Obtaining Reactions Applied to Utility Pole**
Load Combinations Table

Location: **Bethel, CT**

Date: 1/18/17 Prepared by: T.J.L. Checked by: C.F.C. Job No. 16162.07

Load Combination	Description	Envelope Soultion	Wind Factor	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	NESC Heavy Wind		1		1	1.5	2	1.5	3	1.5	4	2.5		
2	NESC Extreme Wind		1		1	1	2	1	5	1				

Footnotes:
(1) BLC = Basic Load Case

Global

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

Hot Rolled Steel Code	AISC 9th: ASD
RISAConnection Code	AISC 14th(360-10): ASD
Cold Formed Steel Code	AISI 1999: ASD
Wood Code	AF&PA NDS-97: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-02
Masonry Code	ACI 530-05: ASD
Aluminum Code	AA ADM1-05: ASD - Building

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

Global, Continued

Seismic Code	UBC 1997
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	No
Ct Z	.035
Ct X	.035
T Z (sec)	Not Entered
T X (sec)	Not Entered
R Z	8.5
R X	8.5
Ca	.36
Cv	.54
Nv	1
Occupancy Category	4
Seismic Zone	3
Seismic Detailing Code	ASCE 7-05
Om Z	1
Om X	1
Rho Z	1
Rho X	1

Footing Overturning Safety Factor	1.5
Check Concrete Bearing	No
Footing Concrete Weight (k/ft^3)	0
Footing Concrete f'c (ksi)	3
Footing Concrete Ec (ksi)	4000
Lamda	1
Footing Steel fy (ksi)	60
Minimum Steel	0.0018
Maximum Steel	0.0075
Footing Top Bar	#3
Footing Top Bar Cover (in)	3.5
Footing Bottom Bar	#3
Footing Bottom Bar Cover (in)	3.5
Pedestal Bar	#3
Pedestal Bar Cover (in)	1.5
Pedestal Ties	#3

Hot Rolled Steel Properties

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

Hot Rolled Steel Design Parameters

	Label	Shape	Leng...	Lbyy[ft]	Lbzz[ft]	Lcomp ...	Lcomp ...	Kyy	Kzz	Cm...	Cm...	Cb	y s...	z s...	Functi...
1	M1	Existing Mast	30												Lateral

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Existing Mast	PIPE_12.0X	Beam	Pipe	A53 Gr. B	Typical	17.5	339	339	678

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design R...
1	M1	BOTCO...	TOPMA...			Existing Mast	Beam	Pipe	A53 Gr. B	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From ...
1	BOTCONNECTION	0	0	0	0	
2	TOPCONNECTION	0	8	0	0	
3	TOPMAST	0	30	0	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]	Footing
1	BOTCONNECTION	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction	
2	TOPCONNECTION	Reaction		Reaction		Reaction		

Member Point Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Y	-.087	27
2	M1	Y	-.006	27
3	M1	Y	-.355	27
4	M1	Y	-.078	19
5	M1	Y	-.355	19

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Y	-.104	27
2	M1	Y	-.005	27
3	M1	Y	-.032	27
4	M1	Y	-.059	19
5	M1	Y	-.032	19

Member Point Loads (BLC 4 : NESC Heavy Wind)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	X	.085	27
2	M1	X	.004	27
3	M1	X	.055	19

Member Point Loads (BLC 5 : NESC Extreme Wind)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	X	.717	27
2	M1	X	.026	27
3	M1	X	.438	19

Joint Loads and Enforced Displacements

Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*s^2*ft)]
No Data to Print ...			

Member Distributed Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.012	-.012	0	25

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

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.008	-.008	0	0
2	M1	Y	-.018	-.018	0	25

Member Distributed Loads (BLC 4 : NESC Heavy Wind)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.006	.006	0	0
2	M1	X	.004	.004	0	25

Member Distributed Loads (BLC 5 : NESC Extreme Wind)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.052	.052	10	30
2	M1	X	.041	.041	0	10
3	M1	X	.036	.036	10	25
4	M1	X	.029	.029	0	10

Basic Load Cases

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

Load Combinations

	Description	Sol...	PDelta	SR..	BLC	Fact..	BLC	Fact..	BLC	Fact..	BLC	Fact..	BLC	Fact..	BLC	Fact..	BLC	Fact..	BLC	Fact..	BLC	Fact...
1	NESC Heavy Wind	Yes			1	1.5	2	1.5	3	1.5	4	2.5										
2	NESC Extreme Wind	Yes			1	1	2	1	5	1												
3	Self Weight				1	1																

Envelope Joint Reactions

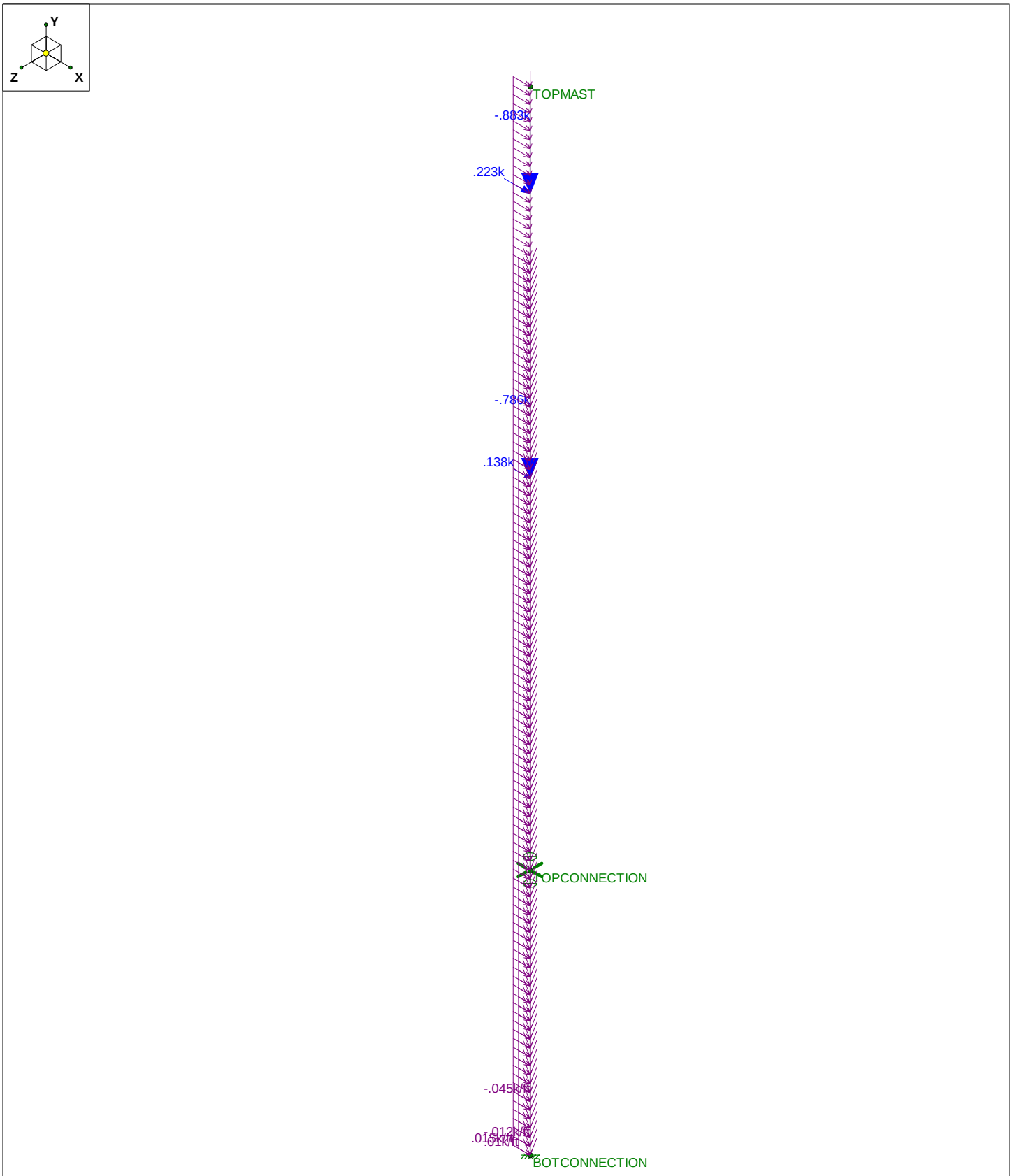
	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	BOTCONNE...	max	6.325	2	5.834	1	0	1	0	1	0	1	-4.728	1
2		min	1.843	1	2.967	2	0	1	0	1	0	1	-16.154	2
3	TOPCONNE...	max	-2.903	1	0	1	0	1	0	1	0	1	0	1
4		min	-9.786	2	0	1	0	1	0	1	0	1	0	1
5	Totals:	max	-1.06	1	5.834	1	0	1						
6		min	-3.461	2	2.967	2	0	1						

Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	BOTCONNECTION	1.843	5.834	0	0	0	-4.728
2	1	TOPCONNECTION	-2.903	0	0	0	0	0
3	1	Totals:	-1.06	5.834	0			
4	1	COG (ft):	X: 0	Y: 16.874	Z: 0			

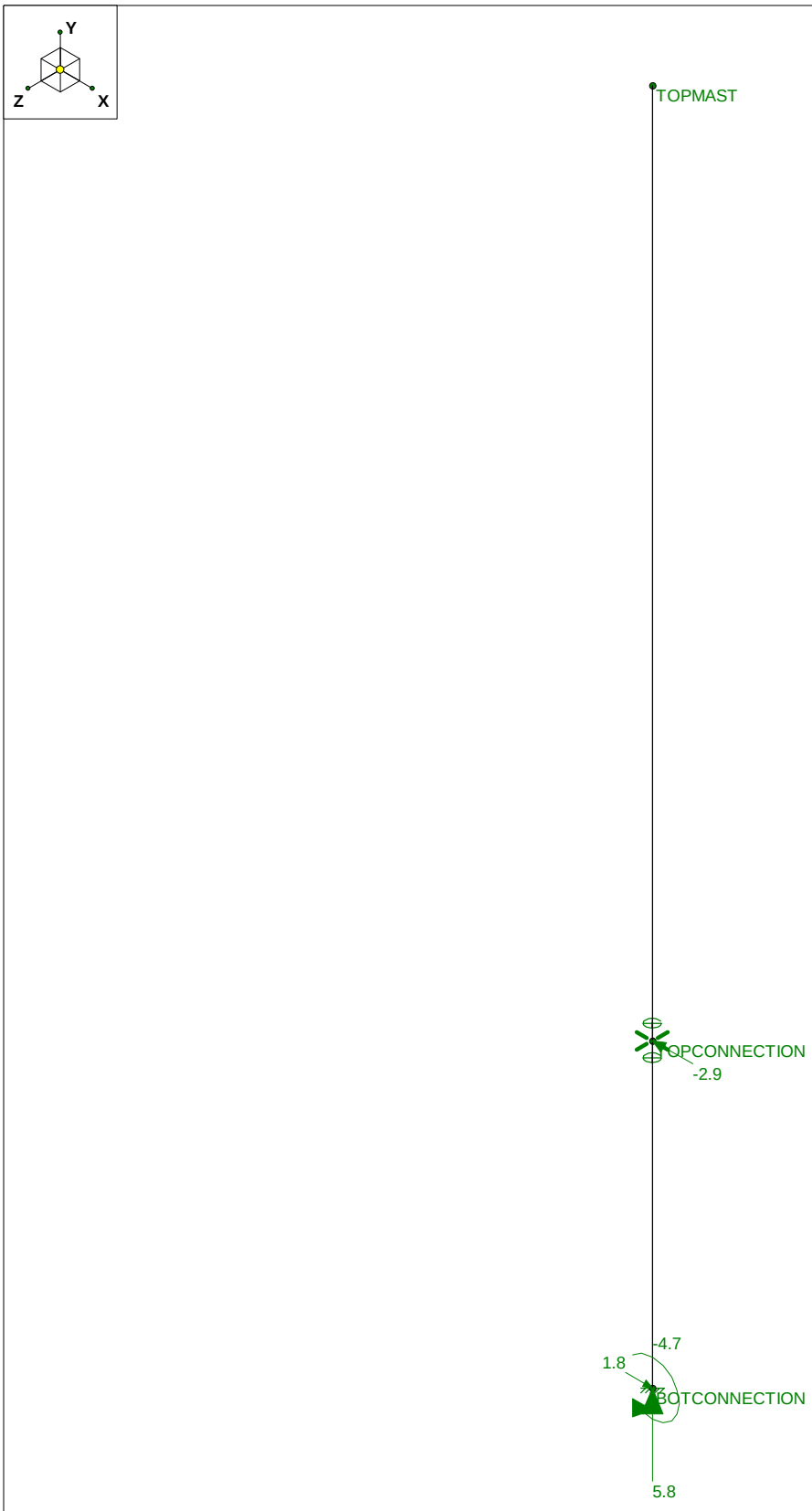
Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	BOTCONNECTION	6.325	2.967	0	0	0	-16.154
2	2	TOPCONNECTION	-9.786	0	0	0	0	0
3	2	Totals:	-3.461	2.967	0			
4	2	COG (ft):	X: 0	Y: 17.143	Z: 0			



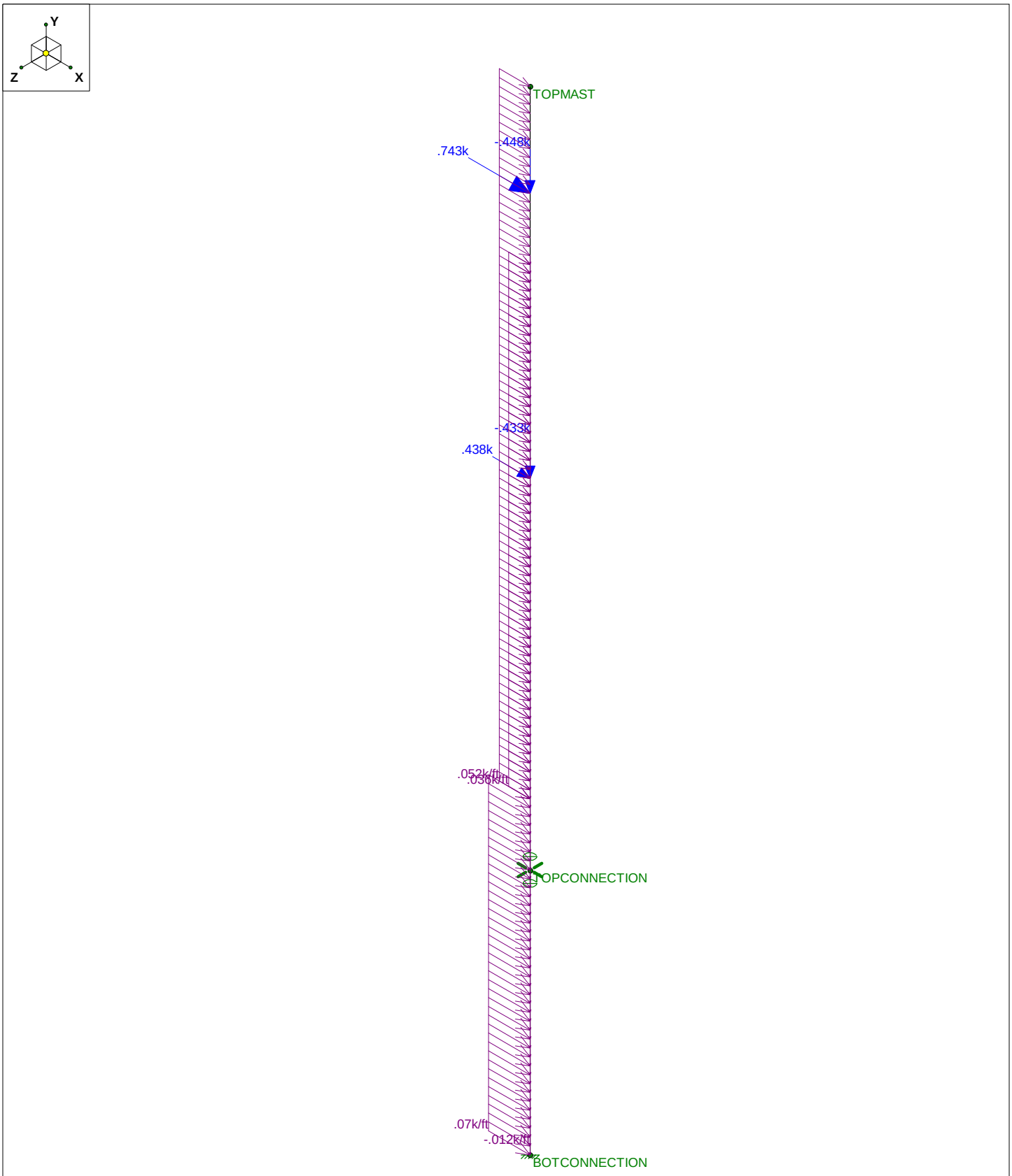
Loads: LC 1, NESC Heavy Wind

CENTEK Engineering, Inc.		
tjl, cfc	Structure # 10256 - Mast	Jan 18, 2017 at 11:54 AM
16162.07 /T-Mobile CT111...	LC #1 Loads	NESC.r3d



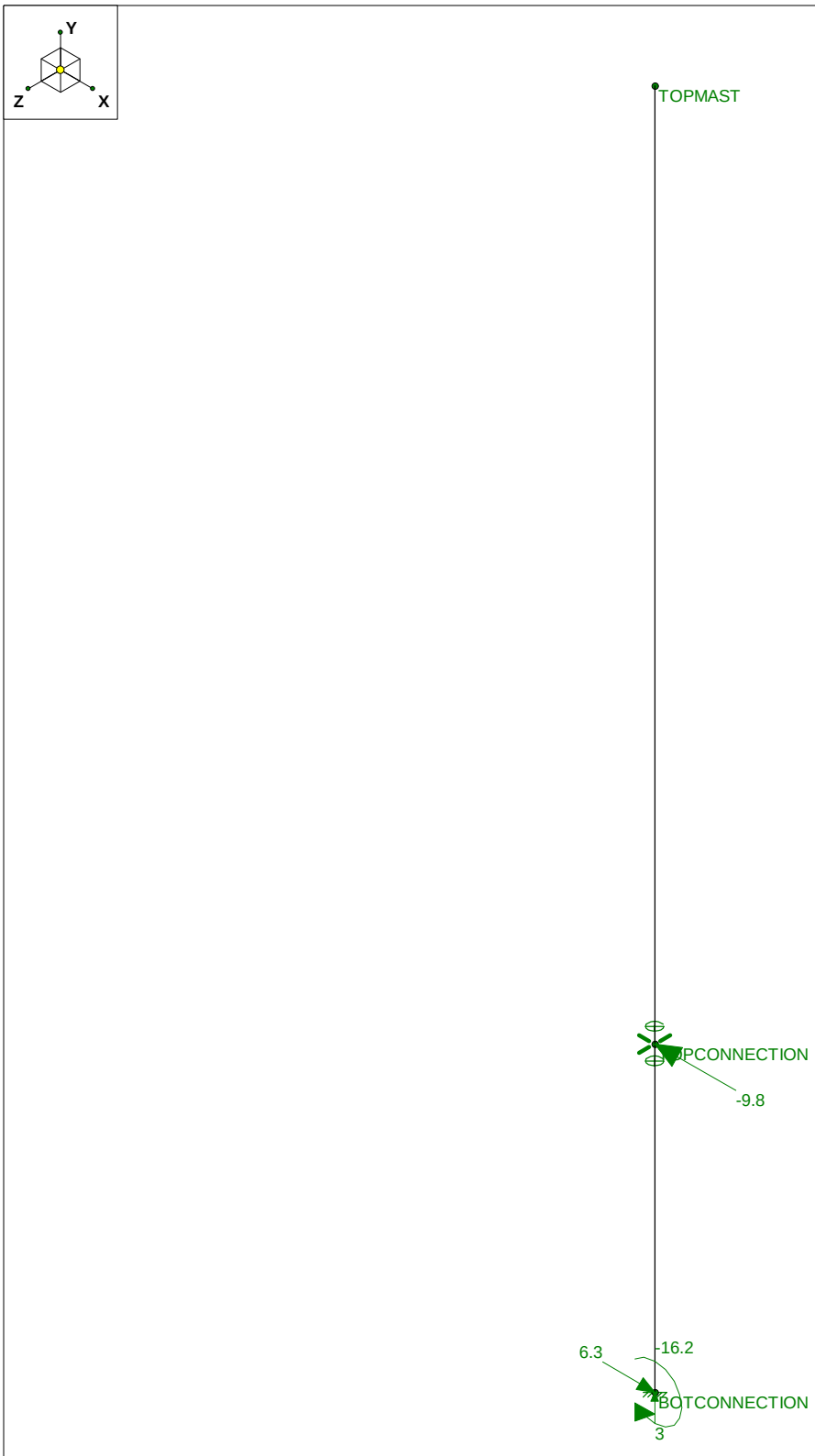
Results for LC 1, NESC Heavy Wind
Z-moment Reaction Units are k and k-ft

CENTEK Engineering, Inc.		
tjl, cfc	Structure # 10256 - Mast	Jan 18, 2017 at 11:55 AM
16162.07 /T-Mobile CT111...	LC #1 Reactions	NESC.r3d



Loads: LC 2, NESC Extreme Wind

CENTEK Engineering, Inc.		
tjl, cfc	Structure # 10256 - Mast	Jan 18, 2017 at 11:54 AM
16162.07 /T-Mobile CT111...	LC #2 Loads	NESC.r3d



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

CENTEK Engineering, Inc.		
tjl, cfc	Structure # 10256 - Mast	Jan 18, 2017 at 11:56 AM
16162.07 /T-Mobile CT111...	LC #2 Reactions	NESC.r3d

CENTEK engineering
Centered on Solutions
63-2 North Branford Road
Branford, CT 06405
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P: (203) 488-0580
F: (203) 488-8587

Subject:	Coax Cable on Pole #10256
Location:	Bethel, CT
Rev. 0: 1/18/17	Prepared by: T.J.L Checked by: C.F.C. Job No. 16162.07

Coax Cable on CL&P Pole

Distance Between Coax Cable Attach Points =

Coaxial Cable Span $Coax_{Span} := \begin{pmatrix} 15 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \end{pmatrix} \cdot ft$ *(User Input)*

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

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

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

Number of Projected Coax Cables = $NP_{coax} := 2$ *(User Input)*

Extreme Wind Pressure = $qz := 29.8 \cdot psf$ *(User Input)*

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

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

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

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

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

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

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

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

Wind Area without Ice = $A := \left(NP_{coax} \cdot D_{coax}\right) = 3.96 \cdot in$

Wind Area with Ice = $A_{ice} := \left(NP_{coax} \cdot D_{coax} + 2 \cdot Ir\right) = 4.96 \cdot in$

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

Weight of Ice on All Coax Cables = $W_{ice} := Ai_{coax} \cdot Id \cdot N_{coax} = 18.179 \cdot plf$

Heavy Wind Vertical Load =

$$\overrightarrow{Heavy\_WInd_{Vert} := \left[\left(N_{coax} \cdot W_{coax} + W_{ice}\right) \cdot Coax_{Span} \cdot OF_{HWV}\right]}$$

Heavy Wind Transverse Load =

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

$$Heavy\_WInd_{Vert} = \begin{pmatrix} 690 \\ 460 \\ 460 \\ 460 \\ 460 \\ 460 \\ 460 \\ 460 \\ 460 \\ 460 \\ 460 \\ 460 \\ 460 \end{pmatrix} lb \qquad Heavy\_Wind_{Trans} = \begin{pmatrix} 99 \\ 66 \\ 66 \\ 66 \\ 66 \\ 66 \\ 66 \\ 66 \\ 66 \\ 66 \\ 66 \\ 66 \\ 66 \end{pmatrix} lb$$

Extreme Wind Vertical Load =

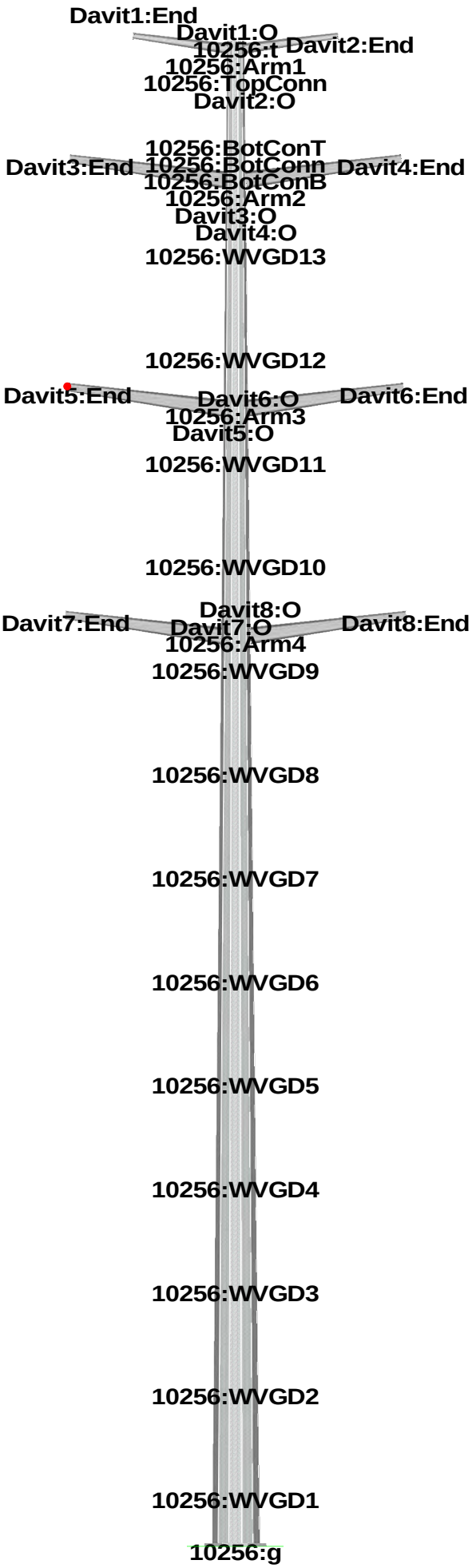
$$\overrightarrow{Extreme\_Wind_{Vert} := \left(N_{coax} \cdot W_{coax} \cdot Coax_{Span} \cdot OF_{EWV}\right)}$$

Extreme Wind Transverse Load =

$$\overrightarrow{Extreme\_Wind_{Trans} := \left[\left(qz \cdot A \cdot Cd_{coax}\right) \cdot Coax_{Span} \cdot OF_{EWT}\right]}$$

$$Extreme\_Wind_{Vert} = \begin{pmatrix} 187 \\ 125 \\ 125 \\ 125 \\ 125 \\ 125 \\ 125 \\ 125 \\ 125 \\ 125 \\ 125 \\ 125 \\ 125 \end{pmatrix} lb \qquad Extreme\_Wind_{Trans} = \begin{pmatrix} 236 \\ 157 \\ 157 \\ 157 \\ 157 \\ 157 \\ 157 \\ 157 \\ 157 \\ 157 \\ 157 \\ 157 \\ 157 \end{pmatrix} lb$$

Centek Engineering Inc, Project: "cl&p structure # 10256"
PLS-POLE Version 12.50, 1:20:28 PM Wednesday, January 18, 2017
Undeformed geometry displayed



Project Name : 16162.07 - Bethel, CT
Project Notes: Str # 10256/ T-Mobile - CT11110C
Project File : J:\Jobs\1616200.WI\07_CT11110C\04_Structural\Backup Documentation\Calcs\PLS-Pole\cl&p structure # 10256.pol
Date run : 1:19:47 PM Wednesday, January 18, 2017
by : PLS-POLE Version 12.50
Licensed to : Centek Engineering Inc

Successfully performed nonlinear analysis

The model has 0 warnings.

Loads from file: j:\jobs\1616200.wi\07_ct11110c\04_structural\backup documentation\calcs\pls-pole\cl&p #10256.lca

*** Analysis Results:

Maximum element usage is 85.71% for Base Plate "10256" in load case "NESC Extreme"
Maximum insulator usage is 20.19% for Clamp "Clamp11" in load case "NESC Extreme"

Summary of Joint Support Reactions For All Load Cases:

Load Case	Joint Label	Long. Force (kips)	Tran. Force (kips)	Vert. Force (kips)	Shear Force (kips)	Tran. Moment (ft-k)	Long. Moment (ft-k)	Bending Moment (ft-k)	Vert. Moment (ft-k)	Found. Usage %
NESC Heavy	10256:g	-0.16	-29.80	-109.16	29.81	3434.07	-10.71	3434.09	-0.02	0.00
NESC Extreme	10256:g	-0.05	-47.75	-57.19	47.75	5049.09	-3.37	5049.09	-0.01	0.00

Summary of Tip Deflections For All Load Cases:

Note: postive tip load results in positive deflection

Load Case	Joint Label	Long. Defl. (in)	Tran. Defl. (in)	Vert. Defl. (in)	Resultant Defl. (in)	Long. Rot. (deg)	Tran. Rot. (deg)	Twist (deg)
NESC Heavy	10256:t	0.19	80.10	-2.54	80.14	0.01	-4.82	0.00
NESC Extreme	10256:t	0.06	115.27	-5.15	115.39	0.00	-7.01	0.00

Tubes Summary:

Pole Label	Tube Num.	Weight (lbs)	Load Case	Maximum Usage %	Resultant Moment (ft-k)
10256	1	5024	NESC Extreme	68.97	983.63
10256	2	10060	NESC Extreme	80.81	2944.63
10256	3	11494	NESC Extreme	83.72	5049.09

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

Summary of Steel Pole Usages:

Steel Pole Label	Maximum Usage %	Load Case	Segment Number	Weight (lbs)
10256	83.72	NESC Extreme	38	29548.2

Summary of Tubular Davit Usages:

Tubular Davit Label	Maximum Usage %	Load Case	Segment Number	Weight (lbs)
Davit1	9.98	NESC Heavy	1	164.3
Davit2	13.08	NESC Heavy	1	164.3
Davit3	30.94	NESC Heavy	1	575.0
Davit4	34.94	NESC Heavy	1	575.0
Davit5	31.14	NESC Heavy	1	575.0
Davit6	35.06	NESC Heavy	1	575.0
Davit7	31.44	NESC Heavy	1	575.0
Davit8	35.23	NESC Heavy	1	575.0

*** Maximum Stress Summary for Each Load Case

Summary of Maximum Usages by Load Case:

Load Case	Maximum Usage %	Element Label	Element Type
NESC Heavy	60.41	10256	Base Plate
NESC Extreme	85.71	10256	Base Plate

Summary of Steel Pole Usages by Load Case:

Load Case	Maximum Usage %	Steel Pole Label	Segment Number
NESC Heavy	58.53	10256	36
NESC Extreme	83.72	10256	38

Summary of Base Plate Usages by Load Case:

Load Case	Pole Label	Bend Line #	Length (in)	Vertical Load (kips)	X Moment (ft-k)	Y Moment (ft-k)	Bending Stress (ksi)	Bolt Moment Sum (ft-k)	# Bolts Acting On Bend Line	Max Bolt Load For Bend Line (kips)	Minimum Plate Thickness (in)	Usage %
NESC Heavy	10256	12	40.000	106.185	3434.072	-10.713	36.246	181.229	7	82.970	2.332	60.41
NESC Extreme	10256	12	40.000	54.220	5049.092	-3.367	51.426	257.128	7	117.535	2.777	85.71

Summary of Tubular Davit Usages by Load Case:

Load Case	Maximum Usage %	Tubular Davit Label	Segment Number
NESC Heavy	35.23	Davit8	1
NESC Extreme	15.26	Davit8	1

Summary of Insulator Usages:

Insulator Label	Insulator Type	Maximum Usage %	Load Case	Weight (lbs)
Clamp1	Clamp	1.86	NESC Heavy	0.0
Clamp2	Clamp	1.94	NESC Heavy	0.0
Clamp3	Clamp	10.47	NESC Heavy	0.0

Clamp4	Clamp	10.47	NESC Heavy	0.0
Clamp5	Clamp	10.47	NESC Heavy	0.0
Clamp6	Clamp	10.47	NESC Heavy	0.0
Clamp7	Clamp	10.47	NESC Heavy	0.0
Clamp8	Clamp	10.47	NESC Heavy	0.0
Clamp9	Clamp	12.23	NESC Extreme	0.0
Clamp10	Clamp	8.73	NESC Extreme	0.0
Clamp11	Clamp	20.19	NESC Extreme	0.0
Clamp12	Clamp	20.19	NESC Extreme	0.0
Clamp13	Clamp	0.87	NESC Heavy	0.0
Clamp14	Clamp	0.58	NESC Heavy	0.0
Clamp15	Clamp	0.58	NESC Heavy	0.0
Clamp16	Clamp	0.58	NESC Heavy	0.0
Clamp17	Clamp	0.58	NESC Heavy	0.0
Clamp18	Clamp	0.58	NESC Heavy	0.0
Clamp19	Clamp	0.58	NESC Heavy	0.0
Clamp20	Clamp	0.58	NESC Heavy	0.0
Clamp21	Clamp	0.58	NESC Heavy	0.0
Clamp22	Clamp	0.58	NESC Heavy	0.0
Clamp23	Clamp	0.58	NESC Heavy	0.0
Clamp24	Clamp	0.58	NESC Heavy	0.0
Clamp25	Clamp	0.58	NESC Heavy	0.0

*** Weight of structure (lbs):

Weight of Tubular Davit Arms:	3778.8
Weight of Steel Poles:	29548.2
Total:	33327.0

*** End of Report

```
**************************************************************************
*                                                                        *
*                              PLS-POLE                                  *
*                   POLE AND FRAME ANALYSIS AND DESIGN                   *
*               Copyright Power Line Systems, Inc. 1999-2011             *
*                                                                        *
**************************************************************************

Project Name : 16162.07 - Bethel, CT
Project Notes: Str # 10256/ T-Mobile - CT11110C
Project File : J:\Jobs\1616200.WI\07_CT11110C\04_Structural\Backup Documentation\Calcs\PLS-Pole\cl&p structure # 10256.pol
Date run     : 1:19:46 PM Wednesday, January 18, 2017
by           : PLS-POLE Version 12.50
Licensed to  : Centek Engineering Inc

Successfully performed nonlinear analysis

The model has 0 warnings.
```

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


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

Steel Pole Properties:

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

Label	Length (ft)	Length (ft)		Coef. (in)	Override (in)	(in/ft)		Override (ksi)	Override (lbs/ft^3)	Base	Type	Tip (ft)	Trans. Load (kips)	Long. Load (kips)
CL&P10256	10256	145.00	0	Yes	12F	20.19	54.75	0	1.3	3 tubes	0	0	Calculated	0.000	0.0000	0.0000

Steel Tubes Properties:

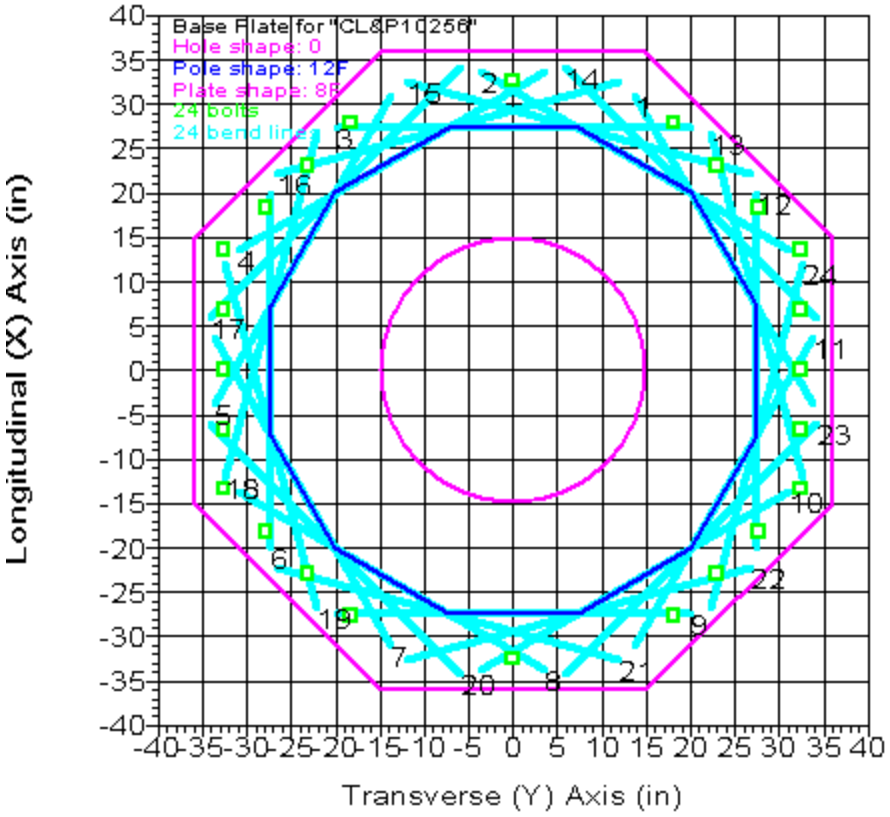
Property	Pole Tube No.	Length (ft)	Thickness (in)	Lap Length (ft)	Lap Factor	Lap Gap (in)	Yield Stress (ksi)	Moment Cap. Override (ft-k)	Tube Weight (lbs)	Center of Gravity (ft)	Calculated Taper (in/ft)	Tube Top Diameter (in)	Tube Bot. Diameter (in)	1.5x Lap Length (ft)	Diam. Actual Overlap (ft)
CL&P10256	1	55	0.3125	4.670	0.000	0.000	65.000	0.000	5024	29.85	0.24871	20.19	33.87	4.155	4.670
CL&P10256	2	54.67	0.4375	6.170	0.000	0.000	65.000	0.000	10060	28.95	0.24871	32.08	45.68	5.600	6.170
CL&P10256	3	46.17	0.46875	0.000	0.000	0.000	65.000	0.000	11494	24.00	0.24871	43.27	54.75	0.000	0.000

Base Plate Properties:

Property	Plate Diam. (in)	Plate Shape	Plate Thick. (in)	Plate Weight (lbs)	Bend Line Length Override (in)	Hole Diam. (in)	Hole Shape	Steel Density (lbs/ft^3)	Steel Yield Stress (ksi)	Bolt Diam. (in)	Bolt Pattern Diam. (in)	Num. Of Bolts	Bolt Cage X Inertia (in^4)	Bolt Cage Y Inertia (in^4)
CL&P10256	72.000	8F	3.000	2971	40.000	30.000	0	490.00	60.000	2.250	65.000	24	67953.29	37978.89

Base Plate Bolt Coordinates for Property "CL&P10256":

Bolt X Coord.	Bolt Y Coord.	Bolt Angle (deg)
0	1	0
0.8538	0.5615	0
0.7077	0.7077	0
0.5615	0.8538	0
0.4154	1	0
0.2077	1	0
1	0	0



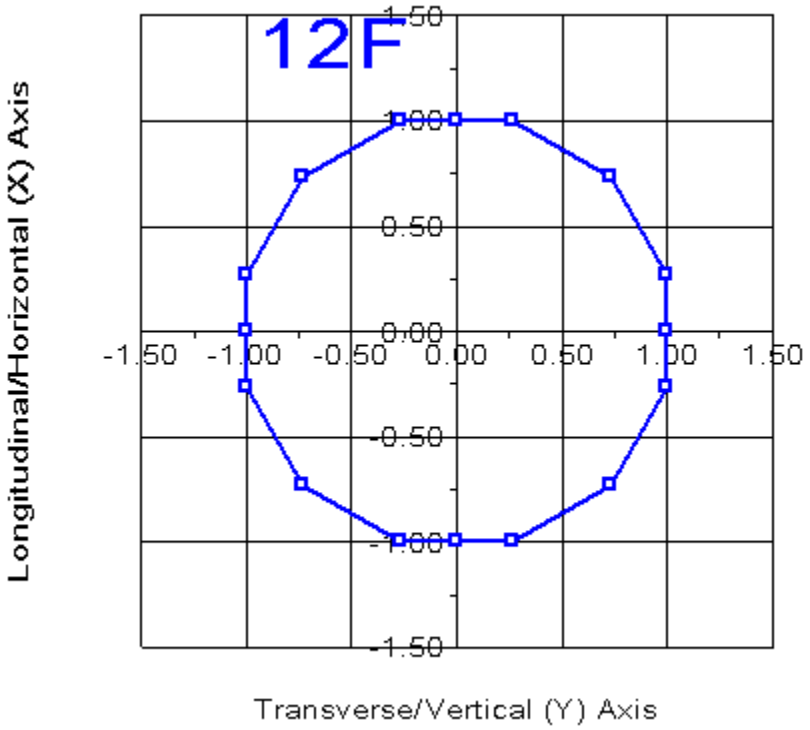
Steel Pole Connectivity:

Pole Label	Tip Joint	Base Joint	X of Base (ft)	Y of Base (ft)	Z of Base (ft)	Inclin. About X (deg)	Inclin. About Y (deg)	Property Set	Attach. Labels	Base Connect	Embed % Override	Embed C. Override (ft)
10256			0	0	0	0	0	CL&P10256	21 labels		0.00	0

Relative Attachment Labels for Steel Pole "10256":

Joint Label	Distance From Origin/Top Joint (ft)	Global Z of Attach (ft)
10256:Arm1	0.00	144.30
10256:Arm2	0.00	131.63
10256:Arm3	0.00	109.63
10256:Arm4	0.00	87.63
10256:TopConn	0.00	143.00

10256:BotConn	0.00	135.00
10256:BotConT	0.00	135.50
10256:BotConB	0.00	134.50
10256:WVGD1	0.00	5.00
10256:WVGD2	0.00	15.00
10256:WVGD3	0.00	25.00
10256:WVGD4	0.00	35.00
10256:WVGD5	0.00	45.00
10256:WVGD6	0.00	55.00
10256:WVGD7	0.00	65.00
10256:WVGD8	0.00	75.00
10256:WVGD9	0.00	85.00
10256:WVGD10	0.00	95.00
10256:WVGD11	0.00	105.00
10256:WVGD12	0.00	115.00
10256:WVGD13	0.00	125.00



Pole Steel Properties:

Warning: Capacities and usages printed in splices are listed for the inner tube except at the splice top which uses the outer tube. ??

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Outer Diam. (in)	Area (in^2)	T-Moment Inertia (in^4)	L-Moment Inertia (in^4)	D/t	W/t	Fy Max. (ksi)	Fa Min. (ksi)	T-Moment Capacity (ft-k)	L-Moment Capacity (ft-k)

10256	10256:t	10256:t	Ori	0.00	20.19	19.97	1009.93	1009.93	0.00	14.6	65.00	65.00	541.96	541.96
10256	10256:Arm1	10256:Arm1	End	0.70	20.36	20.15	1036.70	1036.70	0.00	14.8	65.00	65.00	551.57	551.57
10256	10256:Arm1	10256:Arm1	Ori	0.70	20.36	20.15	1036.70	1036.70	0.00	14.8	65.00	65.00	551.57	551.57
10256	10256:TopConn	10256:TopConn	End	2.00	20.68	20.47	1087.66	1087.66	0.00	15.1	65.00	65.00	569.64	569.64
10256	10256:TopConn	10256:TopConn	Ori	2.00	20.68	20.47	1087.66	1087.66	0.00	15.1	65.00	65.00	569.64	569.64
10256	#10256:0	Tube 1	End	5.75	21.62	21.41	1243.95	1243.95	0.00	15.9	65.00	65.00	623.39	623.39
10256	#10256:0	Tube 1	Ori	5.75	21.62	21.41	1243.95	1243.95	0.00	15.9	65.00	65.00	623.39	623.39
10256	10256:BotConT	10256:BotConT	End	9.50	22.55	22.34	1414.55	1414.55	0.00	16.7	65.00	65.00	679.56	679.56
10256	10256:BotConT	10256:BotConT	Ori	9.50	22.55	22.34	1414.55	1414.55	0.00	16.7	65.00	65.00	679.56	679.56
10256	10256:BotConn	10256:BotConn	End	10.00	22.67	22.47	1438.41	1438.41	0.00	16.8	65.00	65.00	687.24	687.24
10256	10256:BotConn	10256:BotConn	Ori	10.00	22.67	22.47	1438.41	1438.41	0.00	16.8	65.00	65.00	687.24	687.24
10256	10256:BotConB	10256:BotConB	End	10.50	22.80	22.59	1462.54	1462.54	0.00	16.9	65.00	65.00	694.95	694.95
10256	10256:BotConB	10256:BotConB	Ori	10.50	22.80	22.59	1462.54	1462.54	0.00	16.9	65.00	65.00	694.95	694.95
10256	10256:Arm2	10256:Arm2	End	13.38	23.51	23.31	1606.52	1606.52	0.00	17.5	65.00	65.00	740.16	740.16
10256	10256:Arm2	10256:Arm2	Ori	13.38	23.51	23.31	1606.52	1606.52	0.00	17.5	65.00	65.00	740.16	740.16
10256	#10256:1	Tube 1	End	16.69	24.34	24.14	1783.79	1783.79	0.00	18.2	65.00	65.00	794.00	794.00
10256	#10256:1	Tube 1	Ori	16.69	24.34	24.14	1783.79	1783.79	0.00	18.2	65.00	65.00	794.00	794.00
10256	10256:WVGD13	10256:WVGD13	End	20.00	25.16	24.97	1973.63	1973.63	0.00	18.9	65.00	65.00	849.74	849.74
10256	10256:WVGD13	10256:WVGD13	Ori	20.00	25.16	24.97	1973.63	1973.63	0.00	18.9	65.00	65.00	849.74	849.74
10256	#10256:2	Tube 1	End	25.00	26.41	26.22	2284.97	2284.97	0.00	20.0	65.00	65.00	937.46	937.46
10256	#10256:2	Tube 1	Ori	25.00	26.41	26.22	2284.98	2284.98	0.00	20.0	65.00	65.00	937.46	937.46
10256	10256:WVGD12	10256:WVGD12	End	30.00	27.65	27.47	2627.45	2627.45	0.00	21.0	65.00	65.00	1029.49	1029.49
10256	10256:WVGD12	10256:WVGD12	Ori	30.00	27.65	27.47	2627.45	2627.45	0.00	21.0	65.00	65.00	1029.49	1029.49
10256	#10256:3	Tube 1	End	32.69	28.32	28.14	2824.92	2824.92	0.00	21.6	65.00	65.00	1080.73	1080.73
10256	#10256:3	Tube 1	Ori	32.69	28.32	28.14	2824.92	2824.92	0.00	21.6	65.00	65.00	1080.73	1080.73
10256	10256:Arm3	10256:Arm3	End	35.38	28.99	28.81	3032.04	3032.04	0.00	22.2	65.00	65.00	1133.22	1133.22
10256	10256:Arm3	10256:Arm3	Ori	35.38	28.99	28.81	3032.04	3032.04	0.00	22.2	65.00	65.00	1133.22	1133.22
10256	10256:WVGD11	10256:WVGD11	End	40.00	30.14	29.97	3411.75	3411.75	0.00	23.2	65.00	65.00	1226.47	1226.47
10256	10256:WVGD11	10256:WVGD11	Ori	40.00	30.14	29.97	3411.75	3411.75	0.00	23.2	65.00	65.00	1226.47	1226.47
10256	#10256:4	Tube 1	End	45.00	31.38	31.22	3856.54	3856.54	0.00	24.2	65.00	65.00	1331.42	1331.42
10256	#10256:4	Tube 1	Ori	45.00	31.38	31.22	3856.54	3856.54	0.00	24.2	65.00	65.00	1331.42	1331.42
10256	10256:WVGD10	10256:WVGD10	End	50.00	32.62	32.47	4338.40	4338.40	0.00	25.3	65.00	65.00	1440.68	1440.68
10256	10256:WVGD10	10256:WVGD10	Ori	50.00	32.62	32.47	4338.40	4338.40	0.00	25.3	65.00	65.00	1440.69	1440.69
10256	#10256:5	SpliceT	End	50.33	32.70	32.55	4371.54	4371.54	0.00	25.4	65.00	65.00	1448.05	1448.05
10256	#10256:5	SpliceT	Ori	50.33	32.70	32.55	4371.54	4371.54	0.00	25.4	65.00	65.00	1448.05	1448.05
10256	#10256:6	SpliceB	End	55.00	33.24	46.15	6356.88	6356.88	0.00	17.7	65.00	65.00	2071.70	2071.70
10256	#10256:6	SpliceB	Ori	55.00	33.24	46.15	6356.88	6356.88	0.00	17.7	65.00	65.00	2071.70	2071.70
10256	10256:Arm4	10256:Arm4	End	57.38	33.83	46.98	6706.45	6706.45	0.00	18.0	65.00	65.00	2147.46	2147.46
10256	10256:Arm4	10256:Arm4	Ori	57.38	33.83	46.98	6706.45	6706.45	0.00	18.0	65.00	65.00	2147.46	2147.46
10256	10256:WVGD9	10256:WVGD9	End	60.00	34.48	47.90	7107.47	7107.47	0.00	18.4	65.00	65.00	2232.79	2232.79
10256	10256:WVGD9	10256:WVGD9	Ori	60.00	34.48	47.90	7107.47	7107.47	0.00	18.4	65.00	65.00	2232.79	2232.79
10256	#10256:7	Tube 2	End	65.00	35.73	49.64	7914.95	7914.95	0.00	19.2	65.00	65.00	2399.91	2399.91
10256	#10256:7	Tube 2	Ori	65.00	35.73	49.64	7914.95	7914.95	0.00	19.2	65.00	65.00	2399.91	2399.91
10256	10256:WVGD8	10256:WVGD8	End	70.00	36.97	51.39	8781.38	8781.38	0.00	20.0	65.00	65.00	2573.07	2573.07
10256	10256:WVGD8	10256:WVGD8	Ori	70.00	36.97	51.39	8781.38	8781.38	0.00	20.0	65.00	65.00	2573.07	2573.07
10256	#10256:8	Tube 2	End	75.00	38.22	53.14	9708.84	9708.84	0.00	20.7	65.00	65.00	2752.26	2752.26
10256	#10256:8	Tube 2	Ori	75.00	38.22	53.14	9708.84	9708.84	0.00	20.7	65.00	65.00	2752.26	2752.26
10256	10256:WVGD7	10256:WVGD7	End	80.00	39.46	54.89	10699.41	10699.41	0.00	21.5	65.00	65.00	2937.48	2937.48
10256	10256:WVGD7	10256:WVGD7	Ori	80.00	39.46	54.89	10699.41	10699.41	0.00	21.5	65.00	65.00	2937.48	2937.48
10256	#10256:9	Tube 2	End	85.00	40.70	56.64	11755.17	11755.17	0.00	22.2	65.00	65.00	3128.73	3128.73
10256	#10256:9	Tube 2	Ori	85.00	40.70	56.64	11755.17	11755.17	0.00	22.2	65.00	65.00	3128.73	3128.73
10256	10256:WVGD6	10256:WVGD6	End	90.00	41.95	58.39	12878.19	12878.19	0.00	23.0	65.00	65.00	3326.02	3326.02
10256	10256:WVGD6	10256:WVGD6	Ori	90.00	41.95	58.39	12878.20	12878.20	0.00	23.0	65.00	65.00	3326.02	3326.02
10256	#10256:10	Tube 2	End	94.42	43.04	59.94	13927.41	13927.41	0.00	23.7	65.00	65.00	3505.24	3505.24
10256	#10256:10	Tube 2	Ori	94.42	43.04	59.94	13927.41	13927.41	0.00	23.7	65.00	65.00	3505.24	3505.24
10256	#10256:11	SpliceT	End	98.83	44.14	61.48	15032.11	15032.11	0.00	24.4	65.00	65.00	3689.16	3689.16
10256	#10256:11	SpliceT	Ori	98.83	44.14	61.48	15032.11	15032.11	0.00	24.4	65.00	65.00	3689.16	3689.16
10256	10256:WVGD5	10256:WVGD5	End	100.00	43.56	64.94	15435.44	15435.44	0.00	22.2	65.00	65.00	3838.93	3838.93

10256	10256:WVGD5	10256:WVGD5	Ori	100.00	43.56	64.95	15435.44	15435.44	0.00	22.2	65.00	65.00	3838.93	3838.93
10256	#10256:12	SpliceB	End	105.00	44.80	66.82	16810.64	16810.64	0.00	22.9	65.00	65.00	4064.91	4064.91
10256	#10256:12	SpliceB	Ori	105.00	44.80	66.82	16810.64	16810.64	0.00	22.9	65.00	65.00	4064.91	4064.91
10256	10256:WVGD4	10256:WVGD4	End	110.00	46.05	68.69	18265.19	18265.19	0.00	23.6	65.00	65.00	4297.35	4297.35
10256	10256:WVGD4	10256:WVGD4	Ori	110.00	46.05	68.69	18265.19	18265.19	0.00	23.6	65.00	65.00	4297.35	4297.35
10256	#10256:13	Tube 3	End	115.00	47.29	70.57	19801.32	19801.32	0.00	24.4	65.00	65.00	4536.25	4536.25
10256	#10256:13	Tube 3	Ori	115.00	47.29	70.57	19801.32	19801.32	0.00	24.4	65.00	65.00	4536.25	4536.25
10256	10256:WVGD3	10256:WVGD3	End	120.00	48.53	72.44	21421.25	21421.25	0.00	25.1	65.00	65.00	4781.62	4781.62
10256	10256:WVGD3	10256:WVGD3	Ori	120.00	48.53	72.44	21421.25	21421.25	0.00	25.1	65.00	65.00	4781.62	4781.62
10256	#10256:14	Tube 3	End	125.00	49.78	74.32	23127.21	23127.21	0.00	25.8	65.00	65.00	5033.45	5033.45
10256	#10256:14	Tube 3	Ori	125.00	49.78	74.32	23127.21	23127.21	0.00	25.8	65.00	65.00	5033.45	5033.45
10256	10256:WVGD2	10256:WVGD2	End	130.00	51.02	76.19	24921.42	24921.42	0.00	26.5	65.00	65.00	5291.75	5291.75
10256	10256:WVGD2	10256:WVGD2	Ori	130.00	51.02	76.19	24921.42	24921.42	0.00	26.5	65.00	65.00	5291.75	5291.75
10256	#10256:15	Tube 3	End	135.00	52.26	78.06	26806.11	26806.11	0.00	27.2	65.00	65.00	5556.50	5556.50
10256	#10256:15	Tube 3	Ori	135.00	52.26	78.06	26806.12	26806.12	0.00	27.2	65.00	65.00	5556.50	5556.50
10256	10256:WVGD1	10256:WVGD1	End	140.00	53.51	79.94	28783.51	28783.51	0.00	27.9	65.00	65.00	5827.72	5827.72
10256	10256:WVGD1	10256:WVGD1	Ori	140.00	53.51	79.94	28783.51	28783.51	0.00	27.9	65.00	65.00	5827.72	5827.72
10256	10256:g	10256:g	End	145.00	54.75	81.81	30855.84	30855.84	0.00	28.6	65.00	65.00	6105.41	6105.41

Tubular Davit Properties:

Davit Property Label	Stock Number	Steel Shape	Thickness (in)	Base Diameter or Depth (in)	Tip Diameter or Depth (in)	Taper (in/ft)	Drag Coef.	Modulus of Elasticity (ksi)	Geometry Check Type	Strength Capacity (lbs)	Vertical Capacity (lbs)	Tension Capacity (lbs)	Compres. Capacity (lbs)	Long. Stress (ksi)	Yield Steel Shape Override	Weight Density At End (lbs/ft^3)
ARM1	601420	6T	0.1875	10.75	6	0	1	29000	1 point Calculated	0	0	0	0	65		0
ARM2	601515	8T	0.25	18.46	9	0	1	29000	1 point Calculated	0	0	0	0	65		0

Intermediate Joints for Davit Property "ARM1":

Joint Label	Horz. Offset (ft)	Vert. Offset (ft)
End	9	-1.2

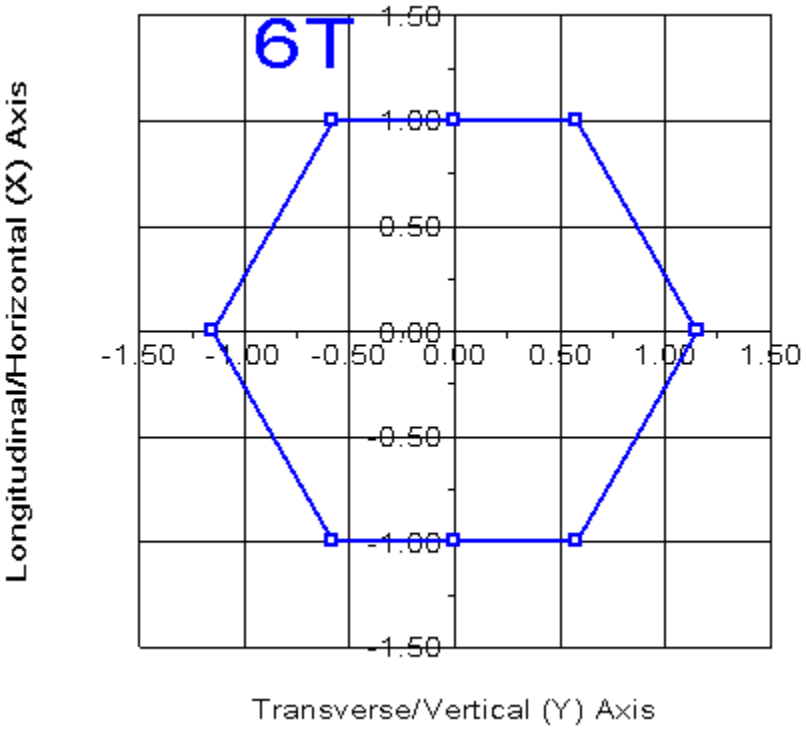
Intermediate Joints for Davit Property "ARM2":

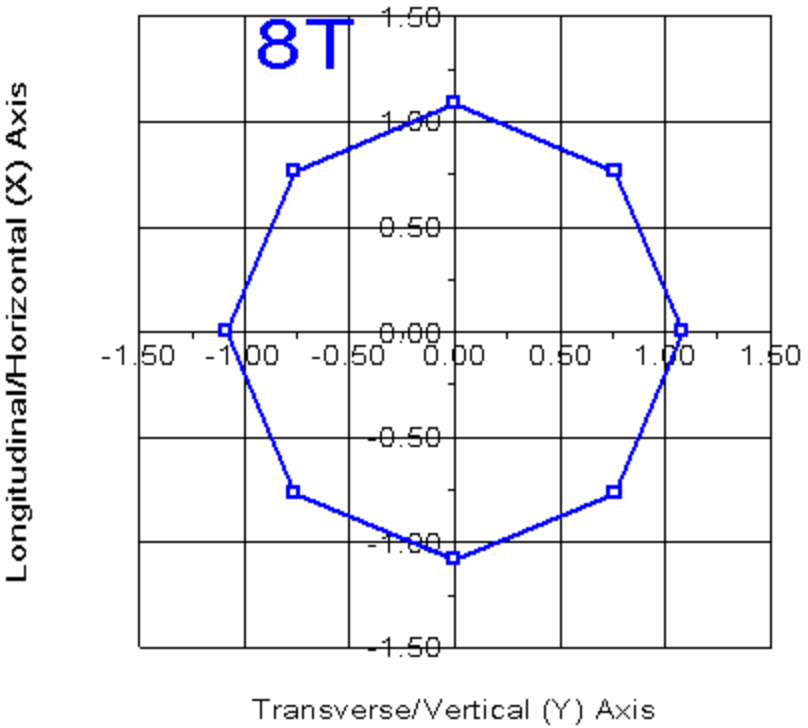
Joint Label	Horz. Offset (ft)	Vert. Offset (ft)
End	15	-2

Tubular Davit Arm Connectivity:

Davit Label	Attach Label	Davit Property Set	Azimuth (deg)
Davit1	10256:Arm1	ARM1	180
Davit2	10256:Arm1	ARM1	0
Davit3	10256:Arm2	ARM2	180

Davit4	10256:Arm2	ARM2	0
Davit5	10256:Arm3	ARM2	180
Davit6	10256:Arm3	ARM2	0
Davit7	10256:Arm4	ARM2	180
Davit8	10256:Arm4	ARM2	0





Tubular Davit Arm Steel Properties:

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Outer Diam. (in)	Area (in^2)	V-Moment Inertia (in^4)	H-Moment Inertia (in^4)	D/t	W/t Max.	Fy (ksi)	Fa Min. (ksi)	V-Moment Capacity (ft-k)	H-Moment Capacity (ft-k)
Davit1	Davit1:O	Origin	0.00	10.75	6.86	106.34	106.34	0.00	27.3	65.00	65.00	92.80	107.16
Davit1	#Davit1:0	End	4.54	8.38	5.32	49.54	49.54	0.00	20.0	65.00	65.00	55.49	64.08
Davit1	#Davit1:0	Origin	4.54	8.38	5.32	49.54	49.54	0.00	20.0	65.00	65.00	55.49	64.08
Davit1	Davit1:End	End	9.08	6.00	3.78	17.73	17.73	0.00	12.7	65.00	65.00	27.73	32.02
Davit2	Davit2:O	Origin	0.00	10.75	6.86	106.34	106.34	0.00	27.3	65.00	65.00	92.80	107.16
Davit2	#Davit2:0	End	4.54	8.38	5.32	49.54	49.54	0.00	20.0	65.00	65.00	55.49	64.08
Davit2	#Davit2:0	Origin	4.54	8.38	5.32	49.54	49.54	0.00	20.0	65.00	65.00	55.49	64.08
Davit2	Davit2:End	End	9.08	6.00	3.78	17.73	17.73	0.00	12.7	65.00	65.00	27.73	32.02
Davit3	Davit3:O	Origin	0.00	18.46	15.09	661.20	661.20	0.00	26.4	65.00	65.00	358.49	358.49
Davit3	#Davit3:0	End	5.00	15.33	12.50	375.85	375.85	0.00	21.3	65.00	65.00	245.32	245.32
Davit3	#Davit3:0	Origin	5.00	15.33	12.50	375.85	375.85	0.00	21.3	65.00	65.00	245.32	245.32
Davit3	#Davit3:1	End	10.00	12.21	9.91	187.31	187.31	0.00	16.1	65.00	65.00	153.55	153.55
Davit3	#Davit3:1	Origin	10.00	12.21	9.91	187.31	187.31	0.00	16.1	65.00	65.00	153.55	153.55
Davit3	#Davit3:2	End	12.57	10.60	8.58	121.60	121.60	0.00	13.4	65.00	65.00	114.77	114.77
Davit3	#Davit3:2	Origin	12.57	10.60	8.58	121.60	121.60	0.00	13.4	65.00	65.00	114.77	114.77

Davit3	Davit3:End	End	15.13	9.00	7.25	73.40	73.40	0.00	10.8	65.00	65.00	81.63	81.63
Davit4	Davit4:O	Origin	0.00	18.46	15.09	661.20	661.20	0.00	26.4	65.00	65.00	358.49	358.49
Davit4	#Davit4:0	End	5.00	15.33	12.50	375.85	375.85	0.00	21.3	65.00	65.00	245.32	245.32
Davit4	#Davit4:0	Origin	5.00	15.33	12.50	375.85	375.85	0.00	21.3	65.00	65.00	245.32	245.32
Davit4	#Davit4:1	End	10.00	12.21	9.91	187.31	187.31	0.00	16.1	65.00	65.00	153.55	153.55
Davit4	#Davit4:1	Origin	10.00	12.21	9.91	187.31	187.31	0.00	16.1	65.00	65.00	153.55	153.55
Davit4	#Davit4:2	End	12.57	10.60	8.58	121.60	121.60	0.00	13.4	65.00	65.00	114.77	114.77
Davit4	#Davit4:2	Origin	12.57	10.60	8.58	121.60	121.60	0.00	13.4	65.00	65.00	114.77	114.77
Davit4	Davit4:End	End	15.13	9.00	7.25	73.40	73.40	0.00	10.8	65.00	65.00	81.63	81.63
Davit5	Davit5:O	Origin	0.00	18.46	15.09	661.20	661.20	0.00	26.4	65.00	65.00	358.49	358.49
Davit5	#Davit5:0	End	5.00	15.33	12.50	375.85	375.85	0.00	21.3	65.00	65.00	245.32	245.32
Davit5	#Davit5:0	Origin	5.00	15.33	12.50	375.85	375.85	0.00	21.3	65.00	65.00	245.32	245.32
Davit5	#Davit5:1	End	10.00	12.21	9.91	187.31	187.31	0.00	16.1	65.00	65.00	153.55	153.55
Davit5	#Davit5:1	Origin	10.00	12.21	9.91	187.31	187.31	0.00	16.1	65.00	65.00	153.55	153.55
Davit5	#Davit5:2	End	12.57	10.60	8.58	121.60	121.60	0.00	13.4	65.00	65.00	114.77	114.77
Davit5	#Davit5:2	Origin	12.57	10.60	8.58	121.60	121.60	0.00	13.4	65.00	65.00	114.77	114.77
Davit5	Davit5:End	End	15.13	9.00	7.25	73.40	73.40	0.00	10.8	65.00	65.00	81.63	81.63
Davit6	Davit6:O	Origin	0.00	18.46	15.09	661.20	661.20	0.00	26.4	65.00	65.00	358.49	358.49
Davit6	#Davit6:0	End	5.00	15.33	12.50	375.85	375.85	0.00	21.3	65.00	65.00	245.32	245.32
Davit6	#Davit6:0	Origin	5.00	15.33	12.50	375.85	375.85	0.00	21.3	65.00	65.00	245.32	245.32
Davit6	#Davit6:1	End	10.00	12.21	9.91	187.31	187.31	0.00	16.1	65.00	65.00	153.55	153.55
Davit6	#Davit6:1	Origin	10.00	12.21	9.91	187.31	187.31	0.00	16.1	65.00	65.00	153.55	153.55
Davit6	#Davit6:2	End	12.57	10.60	8.58	121.60	121.60	0.00	13.4	65.00	65.00	114.77	114.77
Davit6	#Davit6:2	Origin	12.57	10.60	8.58	121.60	121.60	0.00	13.4	65.00	65.00	114.77	114.77
Davit6	Davit6:End	End	15.13	9.00	7.25	73.40	73.40	0.00	10.8	65.00	65.00	81.63	81.63
Davit7	Davit7:O	Origin	0.00	18.46	15.09	661.20	661.20	0.00	26.4	65.00	65.00	358.49	358.49
Davit7	#Davit7:0	End	5.00	15.33	12.50	375.85	375.85	0.00	21.3	65.00	65.00	245.32	245.32
Davit7	#Davit7:0	Origin	5.00	15.33	12.50	375.85	375.85	0.00	21.3	65.00	65.00	245.32	245.32
Davit7	#Davit7:1	End	10.00	12.21	9.91	187.31	187.31	0.00	16.1	65.00	65.00	153.55	153.55
Davit7	#Davit7:1	Origin	10.00	12.21	9.91	187.31	187.31	0.00	16.1	65.00	65.00	153.55	153.55
Davit7	#Davit7:2	End	12.57	10.60	8.58	121.60	121.60	0.00	13.4	65.00	65.00	114.77	114.77
Davit7	#Davit7:2	Origin	12.57	10.60	8.58	121.60	121.60	0.00	13.4	65.00	65.00	114.77	114.77
Davit7	Davit7:End	End	15.13	9.00	7.25	73.40	73.40	0.00	10.8	65.00	65.00	81.63	81.63
Davit8	Davit8:O	Origin	0.00	18.46	15.09	661.20	661.20	0.00	26.4	65.00	65.00	358.49	358.49
Davit8	#Davit8:0	End	5.00	15.33	12.50	375.85	375.85	0.00	21.3	65.00	65.00	245.32	245.32
Davit8	#Davit8:0	Origin	5.00	15.33	12.50	375.85	375.85	0.00	21.3	65.00	65.00	245.32	245.32
Davit8	#Davit8:1	End	10.00	12.21	9.91	187.31	187.31	0.00	16.1	65.00	65.00	153.55	153.55
Davit8	#Davit8:1	Origin	10.00	12.21	9.91	187.31	187.31	0.00	16.1	65.00	65.00	153.55	153.55
Davit8	#Davit8:2	End	12.57	10.60	8.58	121.60	121.60	0.00	13.4	65.00	65.00	114.77	114.77
Davit8	#Davit8:2	Origin	12.57	10.60	8.58	121.60	121.60	0.00	13.4	65.00	65.00	114.77	114.77
Davit8	Davit8:End	End	15.13	9.00	7.25	73.40	73.40	0.00	10.8	65.00	65.00	81.63	81.63

*** Insulator Data

Clamp Properties:

Label	Stock Number	Holding Capacity (lbs)
clamp	clamp1	8e+004

Clamp Insulator Connectivity:

Clamp Label	Structure And Tip Attach	Property Set	Min. Required Vertical Load (uplift) (lbs)
Clamp1	Davit1:End	clamp	No Limit
Clamp2	Davit2:End	clamp	No Limit
Clamp3	Davit3:End	clamp	No Limit
Clamp4	Davit4:End	clamp	No Limit
Clamp5	Davit5:End	clamp	No Limit
Clamp6	Davit6:End	clamp	No Limit
Clamp7	Davit7:End	clamp	No Limit
Clamp8	Davit8:End	clamp	No Limit
Clamp9	10256:TopConn	clamp	No Limit
Clamp10	10256:BotConn	clamp	No Limit
Clamp11	10256:BotConT	clamp	No Limit
Clamp12	10256:BotConB	clamp	No Limit
Clamp13	10256:WVGD1	clamp	No Limit
Clamp14	10256:WVGD2	clamp	No Limit
Clamp15	10256:WVGD3	clamp	No Limit
Clamp16	10256:WVGD4	clamp	No Limit
Clamp17	10256:WVGD5	clamp	No Limit
Clamp18	10256:WVGD6	clamp	No Limit
Clamp19	10256:WVGD7	clamp	No Limit
Clamp20	10256:WVGD8	clamp	No Limit
Clamp21	10256:WVGD9	clamp	No Limit
Clamp22	10256:WVGD10	clamp	No Limit
Clamp23	10256:WVGD11	clamp	No Limit
Clamp24	10256:WVGD12	clamp	No Limit
Clamp25	10256:WVGD13	clamp	No Limit

*** Loads Data

Loads from file: j:\jobs\1616200.wi\07_ct11110c\04_structural\backup documentation\calcs\pls-pole\cl&p #10256.lca

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

Loading Method Parameters:

Structure Height Summary (used for calculating wind/ice adjust with height):
  Z of ground for wind height adjust 0.00 (ft) and structure Z coordinate that will be put on the centerline ground profile in PLS-CADD.
  Ground elevation shift 0.00 (ft)
  Z of ground with shift 0.00 (ft)
  Z of structure top (highest joint) 145.50 (ft)
  Structure height 145.50 (ft)
  Structure height above ground 145.50 (ft)

Vector Load Cases:

Load Case Description	Dead Load Factor	Wind Area Factor	SF for Steel Poles and Towers	SF for Wood Poles	SF for Conc. Poles	SF for Conc. Ult.	SF for Conc. First Crack	SF for Guys Zero Tens.	SF for Non Tubular Cables	SF for Braces and Tubular Arms	SF for Insuls.	SF For Found.	Point Loads	Wind/Ice Model	Trans. Wind Pressure (psf)	Longit. Wind Pressure (psf)	Ice Thick. (in)	Ice Density (lbs/ft^3)	Ice Temperature (deg F)	Pole Deflection Check	Pole Deflection Limit
NESC Heavy	1.5000	2.5000	1.00000	0.6500	0.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	25 loads	Wind on All	4	0	0.000	0.000	0.0	No Limit	0
NESC Extreme	1.0000	1.0000	1.00000	0.6500	0.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	25 loads	NESC 2012	25.6	0	0.000	0.000	0.0	No Limit	0

Point Loads for Load Case "NESC Heavy":

Joint Label	Vertical Load (lbs)	Transverse Load (lbs)	Longitudinal Load (lbs)	Load Comment
Davit1:End	1116	982	0	Shield Wire
Davit2:End	1154	1033	0	OPGW
Davit3:End	7688	3326	0	Conductor
Davit4:End	7688	3326	0	Conductor
Davit5:End	7688	3326	0	Conductor
Davit6:End	7688	3326	0	Conductor
Davit7:End	7688	3326	0	Conductor
Davit8:End	7688	3326	0	Conductor
10256:TopConn	0	2903	0	
10256:BotConn	5834	-1843	0	
10256:BotConT	0	4728	0	
10256:BotConB	0	-4728	0	
10256:WVGD1	690	99	0	Coax Cables
10256:WVGD2	460	66	0	Coax Cables
10256:WVGD3	460	66	0	Coax Cables
10256:WVGD4	460	66	0	Coax Cables

10256:WVGD5	460	66	0	Coax Cables
10256:WVGD6	460	66	0	Coax Cables
10256:WVGD7	460	66	0	Coax Cables
10256:WVGD8	460	66	0	Coax Cables
10256:WVGD9	460	66	0	Coax Cables
10256:WVGD10	460	66	0	Coax Cables
10256:WVGD11	460	66	0	Coax Cables
10256:WVGD12	460	66	0	Coax Cables
10256:WVGD13	460	66	0	Coax Cables

Point Loads for Load Case "NESC Extreme":

Joint Label	Vertical Load (lbs)	Transverse Load (lbs)	Longitudinal Load (lbs)	Load Comment
Davit1:End	240	680	0	Shield Wire
Davit2:End	224	807	0	OPGW
Davit3:End	3024	4748	0	Conductor
Davit4:End	3024	4748	0	Conductor
Davit5:End	3024	4748	0	Conductor
Davit6:End	3024	4748	0	Conductor
Davit7:End	3024	4748	0	Conductor
Davit8:End	3024	4748	0	Conductor
10256:TopConn	0	9786	0	
10256:BotConn	2967	-6325	0	
10256:BotConT	0	16154	0	
10256:BotConB	0	-16154	0	
10256:WVGD1	187	236	0	Coax Cables
10256:WVGD2	125	157	0	Coax Cables
10256:WVGD3	125	157	0	Coax Cables
10256:WVGD4	125	157	0	Coax Cables
10256:WVGD5	125	157	0	Coax Cables
10256:WVGD6	125	157	0	Coax Cables
10256:WVGD7	125	157	0	Coax Cables
10256:WVGD8	125	157	0	Coax Cables
10256:WVGD9	125	157	0	Coax Cables
10256:WVGD10	125	157	0	Coax Cables
10256:WVGD11	125	157	0	Coax Cables
10256:WVGD12	125	157	0	Coax Cables
10256:WVGD13	125	157	0	Coax Cables

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

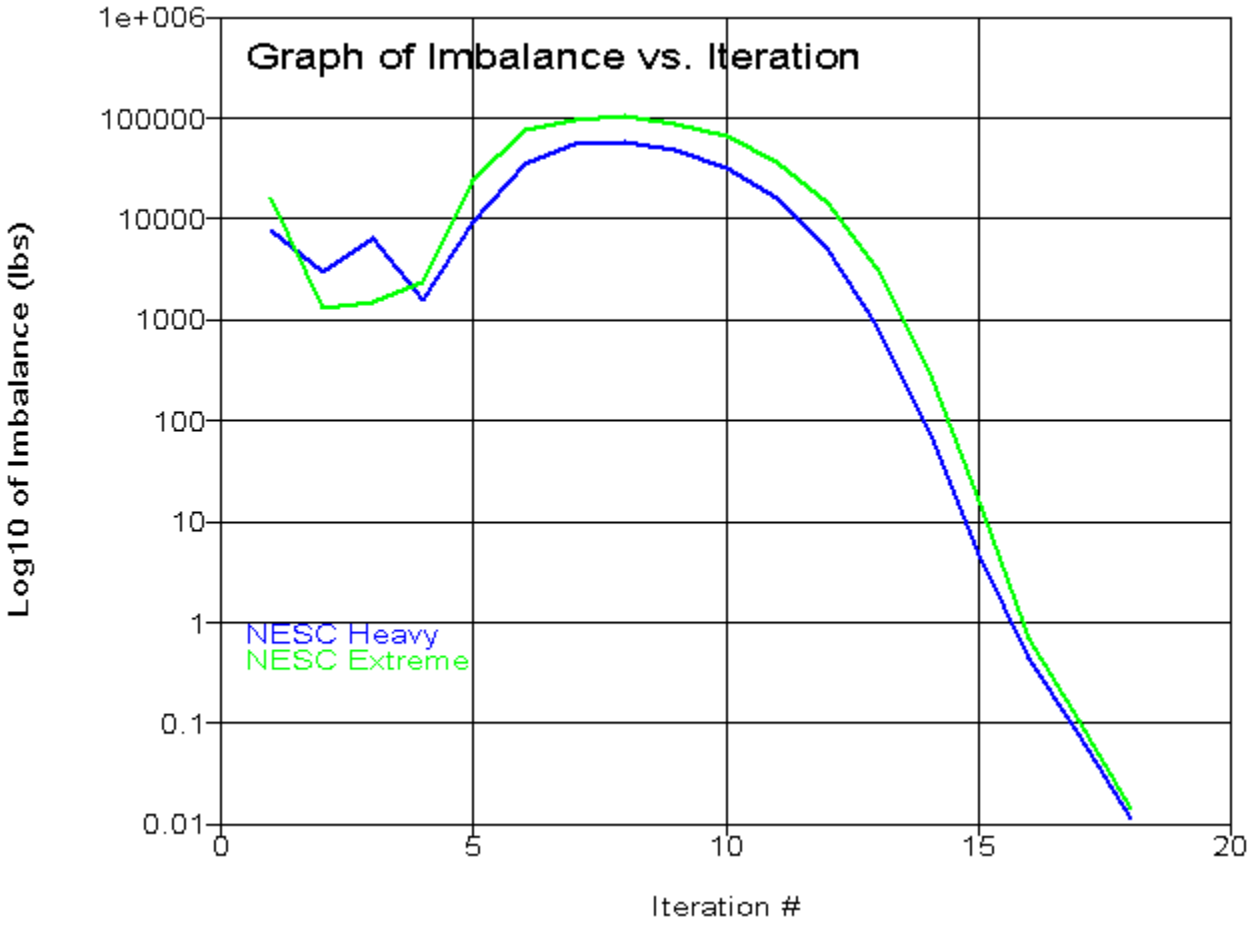
Notes: Does not include loads from equipment, arms, guys, braces, etc. or user input loads.
Wind load is calculated for the undeformed shape of a pole.

Pole Label	Top Joint	Bottom Joint	Section Top Z (ft)	Section Bottom Z (ft)	Section Average Elevation (ft)	Outer Diameter (in)	Reynolds Number	Drag Coef.	Adjusted Wind Pressure (psf)	Adjusted Ice Thickness (in)	Pole Vert. Load (lbs)	Pole Wind Load (lbs)	Pole Vertical Load (lbs)	Pole Ice Wind Load (lbs)	Tran. Wind Load (lbs)	Long. Wind Load (lbs)
10256	10256:t	10256:Arm1	145.00	144.30	144.65	20.275	1.58e+006	1.000	27.02	0.00	47.78	31.96	0.00	0.00	31.96	0.00
10256	10256:Arm1	10256:TopConn	144.30	143.00	143.65	20.523	1.6e+006	1.000	27.02	0.00	89.83	60.09	0.00	0.00	60.09	0.00
10256	10256:TopConn		143.00	139.25	141.13	21.151	1.65e+006	1.000	27.02	0.00	267.19	178.63	0.00	0.00	178.63	0.00
10256		10256:BotConT	139.25	135.50	137.38	22.084	1.72e+006	1.000	27.02	0.00	279.15	186.50	0.00	0.00	186.50	0.00
10256	10256:BotConT	10256:BotConn	135.50	135.00	135.25	22.612	1.76e+006	1.000	27.02	0.00	38.12	25.46	0.00	0.00	25.46	0.00
10256	10256:BotConn	10256:BotConB	135.00	134.50	134.75	22.737	1.77e+006	1.000	27.02	0.00	38.34	25.60	0.00	0.00	25.60	0.00
10256	10256:BotConB	10256:Arm2	134.50	131.63	133.06	23.156	1.8e+006	1.000	27.02	0.00	224.56	149.93	0.00	0.00	149.93	0.00

10256	10256:Arm2		131.63	128.31	129.97	23.926	1.86e+006	1.000	27.02	0.00	267.44	178.49	0.00	0.00	178.49	0.00
10256		10256:WVGD13	128.31	125.00	126.66	24.750	1.93e+006	1.000	27.02	0.00	276.77	184.63	0.00	0.00	184.63	0.00
10256	10256:WVGD13		125.00	120.00	122.50	25.783	2.01e+006	1.000	27.02	0.00	435.44	290.33	0.00	0.00	290.33	0.00
10256		10256:WVGD12	120.00	115.00	117.50	27.027	2.1e+006	1.000	27.02	0.00	456.70	304.33	0.00	0.00	304.33	0.00
10256	10256:WVGD12		115.00	112.31	113.66	27.983	2.18e+006	1.000	27.02	0.00	254.26	169.36	0.00	0.00	169.36	0.00
10256		10256:Arm3	112.31	109.63	110.97	28.651	2.23e+006	1.000	27.02	0.00	260.40	173.41	0.00	0.00	173.41	0.00
10256	10256:Arm3	10256:WVGD11	109.63	105.00	107.31	29.561	2.3e+006	1.000	27.02	0.00	462.52	307.90	0.00	0.00	307.90	0.00
10256	10256:WVGD11		105.00	100.00	102.50	30.758	2.39e+006	1.000	27.02	0.00	520.48	346.34	0.00	0.00	346.34	0.00
10256		10256:WVGD10	100.00	95.00	97.50	32.001	2.49e+006	1.000	27.02	0.00	541.74	360.34	0.00	0.00	360.34	0.00
10256	10256:WVGD10		95.00	94.67	94.84	32.664	2.54e+006	1.000	27.02	0.00	36.50	24.28	0.00	0.00	24.28	0.00
10256			94.67	90.00	92.34	32.973	2.57e+006	1.000	27.02	0.00	1246.82	346.78	0.00	0.00	346.78	0.00
10256		10256:Arm4	90.00	87.63	88.81	33.537	2.61e+006	1.000	27.02	0.00	376.39	179.38	0.00	0.00	179.38	0.00
10256	10256:Arm4	10256:WVGD9	87.63	85.00	86.31	34.158	2.66e+006	1.000	27.02	0.00	423.72	201.93	0.00	0.00	201.93	0.00
10256	10256:WVGD9		85.00	80.00	82.50	35.107	2.73e+006	1.000	27.02	0.00	829.77	395.31	0.00	0.00	395.31	0.00
10256		10256:WVGD8	80.00	75.00	77.50	36.350	2.83e+006	1.000	27.02	0.00	859.53	409.31	0.00	0.00	409.31	0.00
10256	10256:WVGD8		75.00	70.00	72.50	37.594	2.93e+006	1.000	27.02	0.00	889.30	423.32	0.00	0.00	423.32	0.00
10256		10256:WVGD7	70.00	65.00	67.50	38.837	3.02e+006	1.000	27.02	0.00	919.06	437.32	0.00	0.00	437.32	0.00
10256	10256:WVGD7		65.00	60.00	62.50	40.081	3.12e+006	1.000	27.02	0.00	948.82	451.32	0.00	0.00	451.32	0.00
10256		10256:WVGD6	60.00	55.00	57.50	41.324	3.22e+006	1.000	27.02	0.00	978.59	465.32	0.00	0.00	465.32	0.00
10256	10256:WVGD6		55.00	50.59	52.79	42.495	3.31e+006	1.000	27.02	0.00	888.83	422.52	0.00	0.00	422.52	0.00
10256			50.59	46.17	48.38	43.593	3.39e+006	1.000	27.02	0.00	912.04	433.44	0.00	0.00	433.44	0.00
10256		10256:WVGD5	46.17	45.00	45.59	43.850	3.41e+006	1.000	27.02	0.00	503.27	115.54	0.00	0.00	115.54	0.00
10256	10256:WVGD5		45.00	40.00	42.50	44.180	3.44e+006	1.000	27.02	0.00	2188.79	497.48	0.00	0.00	497.48	0.00
10256		10256:WVGD4	40.00	35.00	37.50	45.423	3.54e+006	1.000	27.02	0.00	1152.80	511.48	0.00	0.00	511.48	0.00
10256	10256:WVGD4		35.00	30.00	32.50	46.667	3.63e+006	1.000	27.02	0.00	1184.69	525.48	0.00	0.00	525.48	0.00
10256		10256:WVGD3	30.00	25.00	27.50	47.911	3.73e+006	1.000	27.02	0.00	1216.58	539.49	0.00	0.00	539.49	0.00
10256	10256:WVGD3		25.00	20.00	22.50	49.154	3.83e+006	1.000	27.02	0.00	1248.47	553.49	0.00	0.00	553.49	0.00
10256		10256:WVGD2	20.00	15.00	17.50	50.398	3.92e+006	1.000	27.02	0.00	1280.35	567.49	0.00	0.00	567.49	0.00
10256	10256:WVGD2		15.00	10.00	12.50	51.641	4.02e+006	1.000	27.02	0.00	1312.24	581.49	0.00	0.00	581.49	0.00
10256		10256:WVGD1	10.00	5.00	7.50	52.885	4.12e+006	1.000	27.02	0.00	1344.13	595.50	0.00	0.00	595.50	0.00
10256	10256:WVGD1	10256:g	5.00	0.00	2.50	54.128	4.21e+006	1.000	27.02	0.00	1376.02	609.50	0.00	0.00	609.50	0.00

*** Analysis Results:

Maximum element usage is 85.71% for Base Plate "10256" in load case "NESC Extreme"
Maximum insulator usage is 20.19% for Clamp "Clamp11" in load case "NESC Extreme"



*** Analysis Results for Load Case No. 1 "NESC Heavy" - Number of iterations in SAPS 18

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

Joint Label	X-Displ (ft)	Y-Displ (ft)	Z-Displ (ft)	X-Rot (deg)	Y-Rot (deg)	Z-Rot (deg)	X-Pos (ft)	Y-Pos (ft)	Z-Pos (ft)
10256:g	0	0	0	0.0000	0.0000	0.0000	0	0	0
10256:t	0.01559	6.675	-0.2119	-4.8180	0.0101	0.0002	0.01559	6.675	144.8
10256:Arm1	0.01546	6.616	-0.2095	-4.8180	0.0101	0.0002	0.01546	6.616	144.1

10256:TopConn	0.01524	6.507	-0.2049	-4.8165	0.0101	0.0002	0.01524	6.507	142.8
10256:BotConT	0.01392	5.879	-0.1785	-4.7734	0.0100	0.0002	0.01392	5.879	135.3
10256:BotConn	0.01383	5.838	-0.1768	-4.7685	0.0100	0.0002	0.01383	5.838	134.8
10256:BotConB	0.01375	5.796	-0.175	-4.7633	0.0100	0.0002	0.01375	5.796	134.3
10256:Arm2	0.01325	5.558	-0.1651	-4.7307	0.0100	0.0002	0.01325	5.558	131.5
10256:WVGD13	0.0121	5.018	-0.1429	-4.6015	0.0099	0.0002	0.0121	5.018	124.9
10256:WVGD12	0.01041	4.238	-0.112	-4.3209	0.0095	0.0001	0.01041	4.238	114.9
10256:Arm3	0.009533	3.841	-0.09714	-4.1449	0.0092	0.0001	0.009533	3.841	109.5
10256:WVGD11	0.008799	3.514	-0.08525	-3.9719	0.0090	0.0001	0.008799	3.514	104.9
10256:WVGD10	0.007296	2.856	-0.06306	-3.5479	0.0082	0.0001	0.007296	2.856	94.94
10256:Arm4	0.006268	2.418	-0.0497	-3.2657	0.0077	0.0001	0.006268	2.418	87.58
10256:WVGD9	0.005917	2.27	-0.04542	-3.1692	0.0076	0.0001	0.005917	2.27	84.95
10256:WVGD8	0.004658	1.75	-0.03135	-2.7835	0.0068	0.0001	0.004658	1.75	74.97
10256:WVGD7	0.003532	1.298	-0.02065	-2.3835	0.0060	0.0000	0.003532	1.298	64.98
10256:WVGD6	0.002549	0.9167	-0.01287	-1.9822	0.0052	0.0000	0.002549	0.9167	54.99
10256:WVGD5	0.00172	0.6048	-0.007516	-1.5876	0.0043	0.0000	0.00172	0.6048	44.99
10256:WVGD4	0.001048	0.3605	-0.004064	-1.2074	0.0034	0.0000	0.001048	0.3605	35
10256:WVGD3	0.0005389	0.1813	-0.001994	-0.8422	0.0024	0.0000	0.0005389	0.1813	25
10256:WVGD2	0.0001962	0.06449	-0.0008512	-0.4930	0.0015	0.0000	0.0001962	0.06449	15
10256:WVGD1	2.262e-005	0.007209	-0.0002293	-0.1603	0.0005	0.0000	2.262e-005	0.007209	5
Davit1:O	0.01548	6.619	-0.1382	-4.8180	0.0101	0.0002	0.01548	5.771	144.2
Davit1:End	0.01586	6.748	0.5959	-4.6270	0.0101	0.0002	0.01586	-3.101	146.1
Davit2:O	0.01545	6.613	-0.2807	-4.8180	0.0101	0.0002	0.01545	7.461	144
Davit2:End	0.01549	6.683	-1.065	-5.0731	0.0101	0.0002	0.01549	16.53	144.4
Davit3:O	0.01326	5.561	-0.08434	-4.7307	0.0100	0.0002	0.01326	4.582	131.5
Davit3:End	0.01387	5.756	1.044	-4.0187	0.0100	0.0002	0.01387	-10.22	134.7
Davit4:O	0.01323	5.555	-0.2459	-4.7307	0.0100	0.0002	0.01323	6.534	131.4
Davit4:End	0.01329	5.674	-1.609	-5.5407	0.0100	0.0002	0.01329	21.65	132
Davit5:O	0.00955	3.845	-0.009851	-4.1449	0.0092	0.0001	0.00955	2.637	109.6
Davit5:End	0.01007	4.008	0.9659	-3.4279	0.0093	0.0002	0.01007	-12.2	112.6
Davit6:O	0.009516	3.838	-0.1844	-4.1449	0.0092	0.0001	0.009516	5.046	109.4
Davit6:End	0.009609	3.95	-1.393	-4.9580	0.0092	0.0001	0.009609	20.16	110.2
Davit7:O	0.00628	2.42	0.03061	-3.2657	0.0077	0.0001	0.00628	1.01	87.66
Davit7:End	0.006677	2.539	0.7772	-2.5412	0.0078	0.0001	0.006677	-13.87	90.4
Davit8:O	0.006255	2.415	-0.13	-3.2657	0.0077	0.0001	0.006255	3.825	87.49
Davit8:End	0.006374	2.514	-1.108	-4.0832	0.0077	0.0001	0.006374	18.92	88.52

Joint Support Reactions for Load Case "NESC Heavy":

Joint Label	X Force (kips)	X Usage %	Y Force (kips)	Y Usage %	H-Shear Usage %	Z Force (kips)	Comp. Uplift Usage %	Usage %	Result. Force (kips)	Result. Usage %	X Moment (ft-k)	X-M. Usage %	Y Moment (ft-k)	Y-M. Usage %	H-Bend-M Usage %	Z Moment (ft-k)	Z-M. Usage %	Max. Usage %
10256:g	-0.16	0.0	-29.80	0.0	0.0	-109.16	0.0	0.0	113.15	0.0	3434.07	0.0	-10.7	0.0	0.0	-0.02	0.0	0.0

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

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Trans. Mom. (Local Mx) (ft-k)	Long. Mom. (Local My) (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Tran. Shear (kips)	Long. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage At Pt. %
10256	10256:t	Origin	0.00	80.10	0.19	-2.54	-0.00	-0.00	0.0	-0.04	0.01	-0.00	-0.00	0.00	0.00	0.00	0.00	0.0 5
10256	10256:Arm1	End	0.70	79.39	0.19	-2.51	0.01	-0.00	0.0	-0.04	0.01	-0.00	-0.00	0.00	0.00	0.00	0.00	0.0 3

10256	10256:Arm1	Origin	0.70	79.39	0.19	-2.51	2.97	-0.00	0.0	-2.72	2.28	-0.00	-0.14	0.35	0.06	0.00	0.50	0.8
2																			
10256	10256:TopConn	End	2.00	78.08	0.18	-2.46	5.94	-0.00	0.0	-2.72	2.28	-0.00	-0.13	0.68	0.06	0.00	0.82	1.3
2																			
10256	10256:TopConn	Origin	2.00	78.08	0.18	-2.46	5.94	-0.00	0.0	-2.74	5.25	-0.00	-0.13	0.18	0.51	0.00	0.93	1.4
4																			
10256	Tube 1	End	5.75	74.31	0.17	-2.30	25.64	-0.02	0.0	-2.74	5.25	-0.00	-0.13	2.67	0.13	0.00	2.81	4.3
2																			
10256	Tube 1	Origin	5.75	74.31	0.17	-2.30	25.64	-0.02	0.0	-3.15	5.37	-0.01	-0.15	2.67	0.13	0.00	2.83	4.4
2																			
10256	10256:BotConT	End	9.50	70.55	0.17	-2.14	45.79	-0.04	0.0	-3.15	5.37	-0.01	-0.14	4.38	0.13	0.00	4.53	7.0
2																			
10256	10256:BotConT	Origin	9.50	70.55	0.17	-2.14	45.79	-0.04	0.0	-3.00	10.16	-0.01	-0.13	4.38	0.24	0.00	4.53	7.0
2																			
10256	10256:BotConn	End	10.00	70.05	0.17	-2.12	50.87	-0.04	0.0	-3.00	10.16	-0.01	-0.13	4.81	0.24	0.00	4.96	7.6
2																			
10256	10256:BotConn	Origin	10.00	70.05	0.17	-2.12	50.87	-0.04	0.0	-9.02	8.82	-0.01	-0.40	4.81	0.21	0.00	5.23	8.0
2																			
10256	10256:BotConB	End	10.50	69.55	0.16	-2.10	55.28	-0.04	0.0	-9.02	8.82	-0.01	-0.40	5.17	0.21	0.00	5.58	8.6
2																			
10256	10256:BotConB	Origin	10.50	69.55	0.16	-2.10	55.28	-0.04	0.0	-9.61	4.16	-0.01	-0.43	5.17	0.10	0.00	5.60	8.6
2																			
10256	10256:Arm2	End	13.38	66.70	0.16	-1.98	67.25	-0.07	0.0	-9.61	4.16	-0.01	-0.41	5.91	0.09	0.00	6.32	9.7
2																			
10256	10256:Arm2	Origin	13.38	66.70	0.16	-1.98	82.36	-0.08	0.0	-26.48	12.30	-0.02	-1.14	7.23	0.28	0.00	8.38	12.9
2																			
10256	Tube 1	End	16.69	63.43	0.15	-1.85	123.10	-0.13	0.0	-26.48	12.30	-0.02	-1.10	10.08	0.27	0.00	11.19	17.2
2																			
10256	Tube 1	Origin	16.69	63.43	0.15	-1.85	123.10	-0.13	0.0	-26.90	12.39	-0.02	-1.11	10.08	0.27	0.00	11.20	17.2
2																			
10256	10256:WVGD13	End	20.00	60.22	0.15	-1.71	164.14	-0.19	0.0	-26.90	12.39	-0.02	-1.08	12.56	0.26	0.00	13.64	21.0
2																			
10256	10256:WVGD13	Origin	20.00	60.22	0.15	-1.71	164.14	-0.19	0.0	-27.90	12.60	-0.02	-1.12	12.56	0.27	0.00	13.68	21.1
2																			
10256	Tube 1	End	25.00	55.47	0.13	-1.52	227.14	-0.30	0.0	-27.90	12.60	-0.02	-1.06	15.75	0.25	0.00	16.82	25.9
2																			
10256	Tube 1	Origin	25.00	55.47	0.13	-1.52	227.14	-0.30	0.0	-28.60	12.72	-0.02	-1.09	15.75	0.26	0.00	16.85	25.9
2																			
10256	10256:WVGD12	End	30.00	50.86	0.12	-1.34	290.76	-0.42	0.0	-28.60	12.72	-0.02	-1.04	18.37	0.25	0.00	19.41	29.9
2																			
10256	10256:WVGD12	Origin	30.00	50.86	0.12	-1.34	290.76	-0.42	0.0	-29.61	12.92	-0.03	-1.08	18.37	0.25	0.00	19.45	29.9
2																			
10256	Tube 1	End	32.69	48.45	0.12	-1.25	325.47	-0.50	0.0	-29.61	12.92	-0.03	-1.05	19.58	0.24	0.00	20.64	31.8
2																			
10256	Tube 1	Origin	32.69	48.45	0.12	-1.25	325.47	-0.50	0.0	-30.02	12.98	-0.03	-1.07	19.58	0.24	0.00	20.65	31.8
2																			
10256	10256:Arm3	End	35.38	46.10	0.11	-1.17	360.36	-0.58	0.0	-30.02	12.98	-0.03	-1.04	20.68	0.24	0.00	21.72	33.4
2																			
10256	10256:Arm3	Origin	35.38	46.10	0.11	-1.17	375.17	-0.58	0.0	-47.17	20.92	-0.04	-1.64	21.53	0.38	0.00	23.18	35.7
2																			
10256	10256:WVGD11	End	40.00	42.16	0.11	-1.02	471.91	-0.75	0.0	-47.17	20.92	-0.04	-1.57	25.02	0.37	0.00	26.60	40.9
2																			
10256	10256:WVGD11	Origin	40.00	42.16	0.11	-1.02	471.91	-0.75	0.0	-48.43	21.07	-0.04	-1.62	25.02	0.37	0.00	26.64	41.0
2																			
10256	Tube 1	End	45.00	38.11	0.10	-0.88	577.24	-0.96	0.0	-48.43	21.07	-0.04	-1.55	28.19	0.36	0.00	29.75	45.8
2																			
10256	Tube 1	Origin	45.00	38.11	0.10	-0.88	577.24	-0.96	0.0	-49.30	21.11	-0.05	-1.58	28.19	0.36	0.00	29.78	45.8
2																			
10256	10256:WVGD10	End	50.00	34.27	0.09	-0.76	682.76	-1.18	0.0	-49.30	21.11	-0.05	-1.52	30.82	0.34	0.00	32.34	49.8

10256	10256:WVGD10	Origin	50.00	34.27	0.09	-0.76	682.76	-1.18	0.0	-50.23	21.22	-0.05	-1.55	30.82	0.35	0.00	32.37	49.8
10256	SpliceT	End	50.33	34.03	0.09	-0.75	689.76	-1.20	0.0	-50.23	21.22	-0.05	-1.54	30.98	0.34	0.00	32.53	50.0
10256	SpliceT	Origin	50.33	34.03	0.09	-0.75	689.76	-1.20	0.0	-51.23	21.28	-0.05	-1.57	30.98	0.35	0.00	32.56	50.1
10256	SpliceB	End	55.00	30.66	0.08	-0.65	789.12	-1.43	0.0	-51.23	21.28	-0.05	-1.11	24.77	0.24	0.00	25.88	39.8
10256	SpliceB	Origin	55.00	30.66	0.08	-0.65	789.12	-1.43	0.0	-52.50	21.35	-0.05	-1.14	24.77	0.25	0.00	25.91	39.9
10256	10256:Arm4	End	57.38	29.01	0.08	-0.60	839.83	-1.56	0.0	-52.50	21.35	-0.05	-1.12	25.43	0.24	0.00	26.55	40.9
10256	10256:Arm4	Origin	57.38	29.01	0.08	-0.60	854.17	-1.56	0.0	-69.82	29.00	-0.06	-1.49	25.87	0.33	0.00	27.36	42.1
10256	10256:WVGD9	End	60.00	27.24	0.07	-0.54	930.29	-1.72	0.0	-69.82	29.00	-0.06	-1.46	27.10	0.32	0.00	28.56	43.9
10256	10256:WVGD9	Origin	60.00	27.24	0.07	-0.54	930.29	-1.72	0.0	-71.29	29.11	-0.06	-1.49	27.10	0.32	0.00	28.59	44.0
10256	Tube 2	End	65.00	24.02	0.06	-0.46	1075.84	-2.03	0.0	-71.29	29.11	-0.06	-1.44	29.15	0.31	0.00	30.59	47.1
10256	Tube 2	Origin	65.00	24.02	0.06	-0.46	1075.84	-2.03	0.0	-72.65	29.13	-0.07	-1.46	29.15	0.31	0.00	30.62	47.1
10256	10256:WVGD8	End	70.00	21.00	0.06	-0.38	1221.46	-2.37	0.0	-72.65	29.13	-0.07	-1.41	30.87	0.30	0.00	32.29	49.7
10256	10256:WVGD8	Origin	70.00	21.00	0.06	-0.38	1221.46	-2.37	0.0	-74.52	29.22	-0.07	-1.45	30.87	0.30	0.00	32.33	49.7
10256	Tube 2	End	75.00	18.18	0.05	-0.31	1367.58	-2.73	0.0	-74.52	29.22	-0.07	-1.40	32.32	0.29	0.00	33.72	51.9
10256	Tube 2	Origin	75.00	18.18	0.05	-0.31	1367.58	-2.73	0.0	-75.98	29.23	-0.08	-1.43	32.32	0.29	0.00	33.75	51.9
10256	10256:WVGD7	End	80.00	15.58	0.04	-0.25	1513.72	-3.11	0.0	-75.98	29.23	-0.08	-1.38	33.51	0.28	0.00	34.90	53.7
10256	10256:WVGD7	Origin	80.00	15.58	0.04	-0.25	1513.72	-3.11	0.0	-77.94	29.32	-0.08	-1.42	33.51	0.28	0.00	34.94	53.7
10256	Tube 2	End	85.00	13.19	0.04	-0.20	1660.29	-3.52	0.0	-77.94	29.32	-0.08	-1.38	34.51	0.27	0.00	35.89	55.2
10256	Tube 2	Origin	85.00	13.19	0.04	-0.20	1660.29	-3.52	0.0	-79.48	29.32	-0.09	-1.40	34.51	0.27	0.00	35.92	55.3
10256	10256:WVGD6	End	90.00	11.00	0.03	-0.15	1806.86	-3.96	0.0	-79.48	29.32	-0.09	-1.36	35.33	0.27	0.00	36.70	56.5
10256	10256:WVGD6	Origin	90.00	11.00	0.03	-0.15	1806.86	-3.96	0.0	-81.44	29.39	-0.09	-1.39	35.33	0.27	0.00	36.73	56.5
10256	Tube 2	End	94.42	9.25	0.03	-0.12	1936.63	-4.37	0.0	-81.44	29.39	-0.09	-1.36	35.93	0.26	0.00	37.30	57.4
10256	Tube 2	Origin	94.42	9.25	0.03	-0.12	1936.63	-4.37	0.0	-82.88	29.39	-0.10	-1.38	35.93	0.26	0.00	37.32	57.4
10256	SpliceT	End	98.83	7.65	0.02	-0.10	2066.39	-4.80	0.0	-82.88	29.39	-0.10	-1.35	36.43	0.25	0.00	37.78	58.1
10256	SpliceT	Origin	98.83	7.65	0.02	-0.10	2066.39	-4.80	0.0	-84.00	29.39	-0.10	-1.37	36.43	0.25	0.00	37.80	58.2
10256	10256:WVGD5	End	100.00	7.26	0.02	-0.09	2100.78	-4.92	0.0	-84.00	29.39	-0.10	-1.29	35.59	0.24	0.00	36.89	56.8
10256	10256:WVGD5	Origin	100.00	7.26	0.02	-0.09	2100.78	-4.92	0.0	-86.53	29.50	-0.10	-1.33	35.59	0.24	0.00	36.93	56.8
10256	SpliceB	End	105.00	5.69	0.02	-0.07	2248.28	-5.44	0.0	-86.53	29.50	-0.10	-1.30	35.97	0.23	0.00	37.27	57.3
10256	SpliceB	Origin	105.00	5.69	0.02	-0.07	2248.28	-5.44	0.0	-89.14	29.51	-0.11	-1.33	35.97	0.23	0.00	37.31	57.4

10256	10256:WVGD4	End	110.00	4.33	0.01	-0.05	2395.83	-5.99	0.0	-89.14	29.51	-0.11	-1.30	36.26	0.23	0.00	37.56	57.8	2
10256	10256:WVGD4	Origin	110.00	4.33	0.01	-0.05	2395.83	-5.99	0.0	-91.44	29.58	-0.12	-1.33	36.26	0.23	0.00	37.60	57.8	2
10256	Tube 3	End	115.00	3.16	0.01	-0.03	2543.72	-6.57	0.0	-91.44	29.58	-0.12	-1.30	36.47	0.22	0.00	37.77	58.1	2
10256	Tube 3	Origin	115.00	3.16	0.01	-0.03	2543.72	-6.57	0.0	-93.34	29.57	-0.12	-1.32	36.47	0.22	0.00	37.80	58.2	2
10256	10256:WVGD3	End	120.00	2.18	0.01	-0.02	2691.58	-7.18	0.0	-93.34	29.57	-0.12	-1.29	36.61	0.22	0.00	37.91	58.3	2
10256	10256:WVGD3	Origin	120.00	2.18	0.01	-0.02	2691.58	-7.18	0.0	-95.74	29.64	-0.13	-1.32	36.61	0.22	0.00	37.94	58.4	2
10256	Tube 3	End	125.00	1.38	0.00	-0.02	2839.79	-7.82	0.0	-95.74	29.64	-0.13	-1.29	36.70	0.21	0.00	37.99	58.4	2
10256	Tube 3	Origin	125.00	1.38	0.00	-0.02	2839.79	-7.82	0.0	-97.73	29.64	-0.13	-1.31	36.70	0.21	0.00	38.02	58.5	2
10256	10256:WVGD2	End	130.00	0.77	0.00	-0.01	2987.97	-8.50	0.0	-97.73	29.64	-0.13	-1.28	36.73	0.21	0.00	38.01	58.5	2
10256	10256:WVGD2	Origin	130.00	0.77	0.00	-0.01	2987.97	-8.50	0.0	-100.22	29.71	-0.14	-1.32	36.73	0.21	0.00	38.05	58.5	2
10256	Tube 3	End	135.00	0.34	0.00	-0.01	3136.50	-9.20	0.0	-100.22	29.71	-0.14	-1.28	36.72	0.20	0.00	38.01	58.5	2
10256	Tube 3	Origin	135.00	0.34	0.00	-0.01	3136.50	-9.20	0.0	-102.30	29.71	-0.15	-1.31	36.72	0.20	0.00	38.03	58.5	2
10256	10256:WVGD1	End	140.00	0.09	0.00	-0.00	3285.03	-9.94	0.0	-102.30	29.71	-0.15	-1.28	36.67	0.20	0.00	37.95	58.4	2
10256	10256:WVGD1	Origin	140.00	0.09	0.00	-0.00	3285.03	-9.94	0.0	-105.11	29.81	-0.15	-1.31	36.67	0.20	0.00	37.99	58.4	2
10256	10256:g	End	145.00	0.00	0.00	0.00	3434.07	-10.71	0.0	-105.11	29.81	-0.15	-1.28	36.59	0.19	0.00	37.88	58.3	2

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

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Vert. Mom. (ft-k)	Horz. Mom. (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Vert. Shear (kips)	Horz. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Pt.
Davit1	Davit1:O	Origin	0.00	79.43	0.19	-1.66	-9.00	0.00	0.0	-1.24	1.05	-0.00	-0.18	6.31	0.00	0.00	6.49	10.0	1
Davit1	#Davit1:0	End	4.54	80.21	0.19	2.79	-4.24	0.00	0.0	-1.24	1.05	-0.00	-0.23	4.96	0.00	0.00	5.19	8.0	1
Davit1	#Davit1:0	Origin	4.54	80.21	0.19	2.79	-4.24	0.00	0.0	-1.21	0.93	-0.00	-0.23	4.96	0.00	0.00	5.19	8.0	1
Davit1	Davit1:End	End	9.08	80.97	0.19	7.15	-0.00	0.00	0.0	-1.21	0.93	-0.00	-0.32	0.00	0.53	0.00	0.97	1.5	3
Davit2	Davit2:O	Origin	0.00	79.36	0.19	-3.37	-11.93	-0.00	-0.0	0.97	1.38	0.00	0.14	8.36	0.00	0.00	8.50	13.1	1
Davit2	#Davit2:0	End	4.54	79.77	0.19	-8.01	-5.68	-0.00	-0.0	0.97	1.38	0.00	0.18	6.66	0.00	0.00	6.84	10.5	1
Davit2	#Davit2:0	Origin	4.54	79.77	0.19	-8.01	-5.68	-0.00	0.0	0.98	1.25	0.00	0.18	6.66	0.00	0.00	6.84	10.5	1
Davit2	Davit2:End	End	9.08	80.20	0.19	-12.78	0.00	0.00	0.0	0.98	1.25	0.00	0.26	0.00	0.71	0.00	1.25	1.9	3
Davit3	Davit3:O	Origin	0.00	66.74	0.16	-1.01	-109.07	0.03	0.0	-5.02	7.48	-0.00	-0.33	19.78	0.00	0.00	20.11	30.9	1
Davit3	#Davit3:0	End	5.00	67.56	0.16	3.73	-71.68	0.02	0.0	-5.02	7.48	-0.00	-0.40	18.99	0.00	0.00	19.39	29.8	1
Davit3	#Davit3:0	Origin	5.00	67.56	0.16	3.73	-71.68	0.02	0.0	-4.92	7.19	-0.00	-0.39	18.99	0.00	0.00	19.39	29.8	1
Davit3	#Davit3:1	End	10.00	68.33	0.16	8.19	-35.72	0.01	0.0	-4.92	7.19	-0.00	-0.50	15.12	0.00	0.00	15.62	24.0	1
Davit3	#Davit3:1	Origin	10.00	68.33	0.16	8.19	-35.72	0.01	0.0	-4.85	7.01	-0.00	-0.49	15.12	0.00	0.00	15.61	24.0	1
Davit3	#Davit3:2	End	12.57	68.71	0.17	10.39	-17.73	0.00	0.0	-4.85	7.01	-0.00	-0.57	10.04	0.00	0.00	10.61	16.3	1
Davit3	#Davit3:2	Origin	12.57	68.71	0.17	10.39	-17.73	0.00	0.0	-4.82	6.91	-0.00	-0.56	10.04	0.00	0.00	10.60	16.3	1
Davit3	Davit3:End	End	15.13	69.07	0.17	12.52	-0.00	0.00	0.0	-4.82	6.91	-0.00	-0.66	0.00	1.98	0.00	3.49	5.4	3
Davit4	Davit4:O	Origin	0.00	66.66	0.16	-2.95	-124.18	-0.02	-0.0	2.93	8.52	0.00	0.19	22.52	0.00	0.00	22.71	34.9	1
Davit4	#Davit4:0	End	5.00	67.12	0.16	-8.04	-81.56	-0.01	-0.0	2.93	8.52	0.00	0.23	21.61	0.00	0.00	21.85	33.6	1

Davit4	#Davit4:0	Origin	5.00	67.12	0.16	-8.04	-81.56	-0.01	-0.0	2.98	8.19	0.00	0.24	21.61	0.00	0.00	21.85	33.6	1
Davit4	#Davit4:1	End	10.00	67.59	0.16	-13.45	-40.62	-0.01	-0.0	2.98	8.19	0.00	0.30	17.20	0.00	0.00	17.50	26.9	1
Davit4	#Davit4:1	Origin	10.00	67.59	0.16	-13.45	-40.62	-0.01	-0.0	3.02	7.97	0.00	0.31	17.20	0.00	0.00	17.50	26.9	1
Davit4	#Davit4:2	End	12.57	67.84	0.16	-16.35	-20.16	-0.00	-0.0	3.02	7.97	0.00	0.35	11.42	0.00	0.00	11.77	18.1	1
Davit4	#Davit4:2	Origin	12.57	67.84	0.16	-16.35	-20.16	-0.00	0.0	3.04	7.86	0.00	0.35	11.42	0.00	0.00	11.77	18.1	1
Davit4	Davit4:End	End	15.13	68.09	0.16	-19.30	-0.00	0.00	0.0	3.04	7.86	0.00	0.42	0.00	2.25	0.00	3.91	6.0	3
Davit5	Davit5:O	Origin	0.00	46.13	0.11	-0.12	-109.83	0.02	0.0	-4.94	7.53	-0.00	-0.33	19.91	0.00	0.00	20.24	31.1	1
Davit5	#Davit5:0	End	5.00	46.83	0.12	4.02	-72.19	0.01	0.0	-4.94	7.53	-0.00	-0.40	19.13	0.00	0.00	19.52	30.0	1
Davit5	#Davit5:0	Origin	5.00	46.83	0.12	4.02	-72.19	0.01	0.0	-4.84	7.24	-0.00	-0.39	19.13	0.00	0.00	19.51	30.0	1
Davit5	#Davit5:1	End	10.00	47.48	0.12	7.88	-35.98	0.01	0.0	-4.84	7.24	-0.00	-0.49	15.23	0.00	0.00	15.72	24.2	1
Davit5	#Davit5:1	Origin	10.00	47.48	0.12	7.88	-35.98	0.01	0.0	-4.78	7.06	-0.00	-0.48	15.23	0.00	0.00	15.71	24.2	1
Davit5	#Davit5:2	End	12.57	47.79	0.12	9.76	-17.86	0.00	0.0	-4.78	7.06	-0.00	-0.56	10.11	0.00	0.00	10.67	16.4	1
Davit5	#Davit5:2	Origin	12.57	47.79	0.12	9.76	-17.86	0.00	0.0	-4.75	6.96	-0.00	-0.55	10.11	0.00	0.00	10.67	16.4	1
Davit5	Davit5:End	End	15.13	48.09	0.12	11.59	-0.00	0.00	0.0	-4.75	6.96	-0.00	-0.65	0.00	1.99	0.00	3.51	5.4	3
Davit6	Davit6:O	Origin	0.00	46.06	0.11	-2.21	-124.63	-0.02	-0.0	2.84	8.55	0.00	0.19	22.60	0.00	0.00	22.79	35.1	1
Davit6	#Davit6:0	End	5.00	46.49	0.11	-6.69	-81.87	-0.01	-0.0	2.84	8.55	0.00	0.23	21.69	0.00	0.00	21.92	33.7	1
Davit6	#Davit6:0	Origin	5.00	46.49	0.11	-6.69	-81.87	-0.01	-0.0	2.90	8.22	0.00	0.23	21.69	0.00	0.00	21.93	33.7	1
Davit6	#Davit6:1	End	10.00	46.93	0.11	-11.49	-40.78	-0.01	-0.0	2.90	8.22	0.00	0.29	17.26	0.00	0.00	17.55	27.0	1
Davit6	#Davit6:1	Origin	10.00	46.93	0.11	-11.49	-40.78	-0.01	-0.0	2.94	8.00	0.00	0.30	17.26	0.00	0.00	17.56	27.0	1
Davit6	#Davit6:2	End	12.57	47.17	0.12	-14.07	-20.24	-0.00	-0.0	2.94	8.00	0.00	0.34	11.46	0.00	0.00	11.80	18.2	1
Davit6	#Davit6:2	Origin	12.57	47.17	0.12	-14.07	-20.24	-0.00	0.0	2.96	7.89	0.00	0.35	11.46	0.00	0.00	11.81	18.2	1
Davit6	Davit6:End	End	15.13	47.40	0.12	-16.72	-0.00	0.00	0.0	2.96	7.89	0.00	0.41	0.00	2.25	0.00	3.93	6.0	3
Davit7	Davit7:O	Origin	0.00	29.04	0.08	0.37	-110.96	0.02	0.0	-4.83	7.60	-0.00	-0.32	20.12	0.00	0.00	20.44	31.4	1
Davit7	#Davit7:0	End	5.00	29.56	0.08	3.60	-72.93	0.01	0.0	-4.83	7.60	-0.00	-0.39	19.32	0.00	0.00	19.71	30.3	1
Davit7	#Davit7:0	Origin	5.00	29.56	0.08	3.60	-72.93	0.01	0.0	-4.73	7.32	-0.00	-0.38	19.32	0.00	0.00	19.70	30.3	1
Davit7	#Davit7:1	End	10.00	30.03	0.08	6.55	-36.35	0.01	0.0	-4.73	7.32	-0.00	-0.48	15.39	0.00	0.00	15.87	24.4	1
Davit7	#Davit7:1	Origin	10.00	30.03	0.08	6.55	-36.35	0.01	0.0	-4.67	7.13	-0.00	-0.47	15.39	0.00	0.00	15.86	24.4	1
Davit7	#Davit7:2	End	12.57	30.26	0.08	7.97	-18.05	0.00	0.0	-4.67	7.13	-0.00	-0.54	10.22	0.00	0.00	10.77	16.6	1
Davit7	#Davit7:2	Origin	12.57	30.26	0.08	7.97	-18.05	0.00	0.0	-4.64	7.03	-0.00	-0.54	10.22	0.00	0.00	10.76	16.6	1
Davit7	Davit7:End	End	15.13	30.47	0.08	9.33	-0.00	0.00	0.0	-4.64	7.03	-0.00	-0.64	0.00	2.01	0.00	3.54	5.4	3
Davit8	Davit8:O	Origin	0.00	28.99	0.08	-1.56	-125.29	-0.02	-0.0	2.71	8.60	0.00	0.18	22.72	0.00	0.00	22.90	35.2	1
Davit8	#Davit8:0	End	5.00	29.35	0.08	-5.12	-82.32	-0.01	-0.0	2.71	8.60	0.00	0.22	21.81	0.00	0.00	22.03	33.9	1
Davit8	#Davit8:0	Origin	5.00	29.35	0.08	-5.12	-82.32	-0.01	-0.0	2.78	8.26	0.00	0.22	21.81	0.00	0.00	22.03	33.9	1
Davit8	#Davit8:1	End	10.00	29.74	0.08	-9.01	-41.01	-0.01	-0.0	2.78	8.26	0.00	0.28	17.36	0.00	0.00	17.64	27.1	1
Davit8	#Davit8:1	Origin	10.00	29.74	0.08	-9.01	-41.01	-0.01	-0.0	2.82	8.05	0.00	0.28	17.36	0.00	0.00	17.64	27.1	1
Davit8	#Davit8:2	End	12.57	29.95	0.08	-11.12	-20.35	-0.00	-0.0	2.82	8.05	0.00	0.33	11.53	0.00	0.00	11.85	18.2	1
Davit8	#Davit8:2	Origin	12.57	29.95	0.08	-11.12	-20.35	-0.00	0.0	2.84	7.93	0.00	0.33	11.53	0.00	0.00	11.86	18.2	1
Davit8	Davit8:End	End	15.13	30.16	0.08	-13.29	-0.00	0.00	0.0	2.84	7.93	0.00	0.39	0.00	2.27	0.00	3.95	6.1	3

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

Clamp Label	Force (kips)	Input Holding Capacity (kips)	Factored Holding Capacity (kips)	Usage %
Clamp1	1.487	80.00	80.00	1.86
Clamp2	1.549	80.00	80.00	1.94
Clamp3	8.377	80.00	80.00	10.47
Clamp4	8.377	80.00	80.00	10.47
Clamp5	8.377	80.00	80.00	10.47
Clamp6	8.377	80.00	80.00	10.47
Clamp7	8.377	80.00	80.00	10.47
Clamp8	8.377	80.00	80.00	10.47

Clamp9	2.903	80.00	80.00	3.63
Clamp10	6.118	80.00	80.00	7.65
Clamp11	4.728	80.00	80.00	5.91
Clamp12	4.728	80.00	80.00	5.91
Clamp13	0.697	80.00	80.00	0.87
Clamp14	0.465	80.00	80.00	0.58
Clamp15	0.465	80.00	80.00	0.58
Clamp16	0.465	80.00	80.00	0.58
Clamp17	0.465	80.00	80.00	0.58
Clamp18	0.465	80.00	80.00	0.58
Clamp19	0.465	80.00	80.00	0.58
Clamp20	0.465	80.00	80.00	0.58
Clamp21	0.465	80.00	80.00	0.58
Clamp22	0.465	80.00	80.00	0.58
Clamp23	0.465	80.00	80.00	0.58
Clamp24	0.465	80.00	80.00	0.58
Clamp25	0.465	80.00	80.00	0.58

*** Analysis Results for Load Case No. 2 "NESC Extreme" - Number of iterations in SAPS 18

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

Joint Label	X-Displ (ft)	Y-Displ (ft)	Z-Displ (ft)	X-Rot (deg)	Y-Rot (deg)	Z-Rot (deg)	X-Pos (ft)	Y-Pos (ft)	Z-Pos (ft)
10256:g	0	0	0	0.0000	0.0000	0.0000	0	0	0
10256:t	0.004742	9.606	-0.4294	-7.0145	0.0030	0.0001	0.004742	9.606	144.6
10256:Arm1	0.004705	9.521	-0.4241	-7.0145	0.0030	0.0001	0.004705	9.521	143.9
10256:TopConn	0.004637	9.362	-0.4144	-7.0135	0.0030	0.0001	0.004637	9.362	142.6
10256:BotConT	0.004242	8.449	-0.3587	-6.9351	0.0030	0.0001	0.004242	8.449	135.1
10256:BotConn	0.004216	8.389	-0.355	-6.9254	0.0030	0.0001	0.004216	8.389	134.6
10256:BotConB	0.00419	8.329	-0.3514	-6.9145	0.0030	0.0001	0.00419	8.329	134.1
10256:Arm2	0.004039	7.984	-0.3307	-6.8482	0.0030	0.0001	0.004039	7.984	131.3
10256:WVGD13	0.003695	7.206	-0.2846	-6.6295	0.0030	0.0001	0.003695	7.206	124.7
10256:WVGD12	0.003187	6.086	-0.2216	-6.1976	0.0029	0.0001	0.003187	6.086	114.8
10256:Arm3	0.002922	5.518	-0.1914	-5.9359	0.0028	0.0001	0.002922	5.518	109.4
10256:WVGD11	0.0027	5.049	-0.1675	-5.6834	0.0027	0.0001	0.0027	5.049	104.8
10256:WVGD10	0.002245	4.109	-0.1229	-5.0747	0.0025	0.0000	0.002245	4.109	94.88
10256:Arm4	0.001932	3.482	-0.09613	-4.6730	0.0024	0.0000	0.001932	3.482	87.53
10256:WVGD9	0.001825	3.272	-0.08758	-4.5362	0.0023	0.0000	0.001825	3.272	84.91
10256:WVGD8	0.00144	2.526	-0.05955	-3.9907	0.0021	0.0000	0.00144	2.526	74.94
10256:WVGD7	0.001094	1.879	-0.03829	-3.4254	0.0019	0.0000	0.001094	1.879	64.96
10256:WVGD6	0.000792	1.33	-0.02296	-2.8571	0.0016	0.0000	0.000792	1.33	54.98
10256:WVGD5	0.0005355	0.8793	-0.01257	-2.2958	0.0013	0.0000	0.0005355	0.8793	44.99
10256:WVGD4	0.0003271	0.5255	-0.006063	-1.7521	0.0010	0.0000	0.0003271	0.5255	34.99
10256:WVGD3	0.0001686	0.265	-0.002424	-1.2266	0.0008	0.0000	0.0001686	0.265	25
10256:WVGD2	6.15e-005	0.09452	-0.0007246	-0.7207	0.0005	0.0000	6.15e-005	0.09452	15
10256:WVGD1	7.113e-006	0.01061	-0.0001252	-0.2352	0.0002	0.0000	7.113e-006	0.01061	5
Davit1:O	0.004712	9.527	-0.3205	-7.0145	0.0030	0.0001	0.004712	8.679	144
Davit1:End	0.004854	9.741	0.7675	-6.9932	0.0030	0.0001	0.004854	-0.1079	146.3
Davit2:O	0.004698	9.514	-0.5278	-7.0145	0.0030	0.0001	0.004698	10.36	143.8
Davit2:End	0.004683	9.594	-1.641	-7.0709	0.0030	0.0001	0.004683	19.44	143.9
Davit3:O	0.004047	7.991	-0.2138	-6.8482	0.0030	0.0001	0.004047	7.011	131.4
Davit3:End	0.004278	8.33	1.533	-6.6579	0.0030	0.0001	0.004278	-7.65	135.2
Davit4:O	0.004031	7.977	-0.4475	-6.8482	0.0030	0.0001	0.004031	8.957	131.2
Davit4:End	0.00401	8.109	-2.298	-7.1718	0.0030	0.0001	0.00401	24.09	131.3
Davit5:O	0.002929	5.524	-0.06649	-5.9359	0.0028	0.0001	0.002929	4.316	109.6
Davit5:End	0.003123	5.805	1.445	-5.7367	0.0028	0.0001	0.003123	-10.4	113.1
Davit6:O	0.002914	5.511	-0.3163	-5.9359	0.0028	0.0001	0.002914	6.719	109.3
Davit6:End	0.002914	5.639	-1.927	-6.2669	0.0028	0.0001	0.002914	21.85	109.7
Davit7:O	0.001937	3.487	0.01872	-4.6730	0.0024	0.0000	0.001937	2.077	87.64
Davit7:End	0.002082	3.694	1.203	-4.4618	0.0024	0.0001	0.002082	-12.72	90.83
Davit8:O	0.001926	3.478	-0.211	-4.6730	0.0024	0.0000	0.001926	4.887	87.41
Davit8:End	0.001945	3.594	-1.49	-5.0143	0.0024	0.0000	0.001945	20	88.14

Joint Support Reactions for Load Case "NESC Extreme":

Joint Label	X Force (kips)	X Usage %	Y Force (kips)	Y Usage %	H-Shear Usage %	Z Force (kips)	Comp. Usage %	Uplift Usage %	Result. Force (kips)	Result. Usage %	X Moment (ft-k)	X-M. Usage %	Y Moment (ft-k)	Y-M. Usage %	H-Bend-M Usage %	Z Moment (ft-k)	Z-M. Usage %	Max. Usage %
10256:g	-0.05	0.0	-47.75	0.0	0.0	-57.19	0.0	0.0	74.51	0.0	5049.09	0.0	-3.4	0.0	0.0	-0.01	0.0	0.0

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

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Trans. Mom. (Local Mx) (ft-k)	Long. Mom. (Local My) (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Tran. Shear (kips)	Long. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Pt.
10256	10256:t	Origin	0.00	115.27	0.06	-5.15	-0.00	0.00	0.0	-0.02	0.02	-0.00	-0.00	0.00	0.00	0.00	0.00	0.0	5
10256	10256:Arm1	End	0.70	114.25	0.06	-5.09	0.01	-0.00	0.0	-0.02	0.02	-0.00	-0.00	0.00	0.00	0.00	0.00	0.0	4
10256	10256:Arm1	Origin	0.70	114.25	0.06	-5.09	1.61	-0.00	0.0	-0.69	1.65	-0.00	-0.03	0.05	0.16	0.00	0.29	0.4	4
10256	10256:TopConn	End	2.00	112.34	0.06	-4.97	3.75	-0.00	0.0	-0.69	1.65	-0.00	-0.03	0.43	0.04	0.00	0.47	0.7	2
10256	10256:TopConn	Origin	2.00	112.34	0.06	-4.97	3.75	-0.00	0.0	0.33	11.50	-0.00	0.02	0.00	1.14	0.00	1.98	3.0	5
10256	Tube 1	End	5.75	106.85	0.05	-4.64	46.87	-0.00	0.0	0.33	11.50	-0.00	0.02	4.89	0.29	0.00	4.93	7.6	2
10256	Tube 1	Origin	5.75	106.85	0.05	-4.64	46.87	-0.00	0.0	0.05	11.71	-0.00	0.00	4.89	0.29	0.00	4.92	7.6	2
10256	10256:BotConT	End	9.50	101.39	0.05	-4.30	90.79	-0.01	0.0	0.05	11.71	-0.00	0.00	8.68	0.28	0.00	8.70	13.4	2
10256	10256:BotConT	Origin	9.50	101.39	0.05	-4.30	90.79	-0.01	0.0	1.84	27.87	-0.00	0.08	8.68	0.66	0.00	8.84	13.6	2
10256	10256:BotConn	End	10.00	100.67	0.05	-4.26	104.73	-0.01	0.0	1.84	27.87	-0.00	0.08	9.91	0.66	0.00	10.05	15.5	2
10256	10256:BotConn	Origin	10.00	100.67	0.05	-4.26	104.73	-0.01	0.0	-1.91	21.98	-0.00	-0.09	9.91	0.52	0.00	10.03	15.4	2
10256	10256:BotConB	End	10.50	99.95	0.05	-4.22	115.72	-0.01	0.0	-1.91	21.98	-0.00	-0.08	10.82	0.52	0.00	10.95	16.8	2
10256	10256:BotConB	Origin	10.50	99.95	0.05	-4.22	115.72	-0.01	0.0	-4.00	6.04	-0.00	-0.18	10.82	0.14	0.00	11.00	16.9	2
10256	10256:Arm2	End	13.38	95.81	0.05	-3.97	133.10	-0.02	0.0	-4.00	6.04	-0.00	-0.17	11.69	0.14	0.00	11.86	18.3	2
10256	10256:Arm2	Origin	13.38	95.81	0.05	-3.97	153.36	-0.02	0.0	-10.24	16.51	-0.00	-0.44	13.47	0.38	0.00	13.92	21.4	2
10256	Tube 1	End	16.69	91.10	0.05	-3.69	208.07	-0.04	0.0	-10.24	16.51	-0.00	-0.42	17.03	0.36	0.00	17.47	26.9	2
10256	Tube 1	Origin	16.69	91.10	0.05	-3.69	208.07	-0.04	0.0	-10.54	16.71	-0.01	-0.44	17.03	0.37	0.00	17.48	26.9	2
10256	10256:WVGD13	End	20.00	86.47	0.04	-3.42	263.40	-0.05	0.0	-10.54	16.71	-0.01	-0.42	20.15	0.35	0.00	20.58	31.7	2
10256	10256:WVGD13	Origin	20.00	86.47	0.04	-3.42	263.40	-0.05	0.0	-11.05	17.12	-0.01	-0.44	20.15	0.36	0.00	20.60	31.7	2
10256	Tube 1	End	25.00	79.64	0.04	-3.02	349.01	-0.08	0.0	-11.05	17.12	-0.01	-0.42	24.20	0.35	0.00	24.63	37.9	2
10256	Tube 1	Origin	25.00	79.64	0.04	-3.02	349.01	-0.08	0.0	-11.56	17.42	-0.01	-0.44	24.20	0.35	0.00	24.65	37.9	2
10256	10256:WVGD12	End	30.00	73.04	0.04	-2.66	436.12	-0.12	0.0	-11.56	17.42	-0.01	-0.42	27.54	0.34	0.00	27.96	43.0	2
10256	10256:WVGD12	Origin	30.00	73.04	0.04	-2.66	436.12	-0.12	0.0	-12.08	17.83	-0.01	-0.44	27.54	0.34	0.00	27.98	43.1	2
10256	Tube 1	End	32.69	69.59	0.04	-2.47	484.03	-0.14	0.0	-12.08	17.83	-0.01	-0.43	29.11	0.34	0.00	29.55	45.5	2
10256	Tube 1	Origin	32.69	69.59	0.04	-2.47	484.03	-0.14	0.0	-12.37	18.00	-0.01	-0.44	29.11	0.34	0.00	29.56	45.5	2
10256	10256:Arm3	End	35.38	66.21	0.04	-2.30	532.40	-0.17	0.0	-12.37	18.00	-0.01	-0.43	30.54	0.33	0.00	30.97	47.7	2
10256	10256:Arm3	Origin	35.38	66.21	0.04	-2.30	552.46	-0.17	0.0	-18.97	28.41	-0.01	-0.66	31.69	0.52	0.00	32.36	49.8	2
10256	10256:WVGD11	End	40.00	60.59	0.03	-2.01	683.86	-0.22	0.0	-18.97	28.41	-0.01	-0.63	36.25	0.50	0.00	36.89	56.8	2
10256	10256:WVGD11	Origin	40.00	60.59	0.03	-2.01	683.86	-0.22	0.0	-19.70	28.86	-0.01	-0.66	36.25	0.51	0.00	36.91	56.8	2
10256	Tube 1	End	45.00	54.79	0.03	-1.73	828.15	-0.28	0.0	-19.70	28.86	-0.01	-0.63	40.43	0.49	0.00	41.07	63.2	2
10256	Tube 1	Origin	45.00	54.79	0.03	-1.73	828.15	-0.28	0.0	-20.38	29.15	-0.01	-0.65	40.43	0.49	0.00	41.10	63.2	2
10256	10256:WVGD10	End	50.00	49.31	0.03	-1.48	973.91	-0.35	0.0	-20.38	29.15	-0.01	-0.63	43.94	0.47	0.00	44.58	68.6	2
10256	10256:WVGD10	Origin	50.00	49.31	0.03	-1.48	973.91	-0.35	0.0	-20.87	29.48	-0.01	-0.64	43.94	0.48	0.00	44.59	68.6	2
10256	SpliceT	End	50.33	48.96	0.03	-1.46	983.63	-0.35	0.0	-20.87	29.48	-0.01	-0.64	44.16	0.48	0.00	44.81	68.9	2
10256	SpliceT	Origin	50.33	48.96	0.03	-1.46	983.63	-0.35	0.0	-21.58	29.66	-0.02	-0.66	44.16	0.48	0.00	44.83	69.0	2
10256	SpliceB	End	55.00	44.14	0.02	-1.25	1122.16	-0.42	0.0	-21.58	29.66	-0.02	-0.47	35.21	0.34	0.00	35.68	54.9	2
10256	SpliceB	Origin	55.00	44.14	0.02	-1.25	1122.16	-0.42	0.0	-22.49	29.92	-0.02	-0.49	35.21	0.34	0.00	35.70	54.9	2
10256	10256:Arm4	End	57.38	41.79	0.02	-1.15	1193.22	-0.46	0.0	-22.49	29.92	-0.02	-0.48	36.12	0.34	0.00	36.60	56.3	2
10256	10256:Arm4	Origin	57.38	41.79	0.02	-1.15	1213.00	-0.46	0.0	-29.35	40.14	-0.02	-0.62	36.72	0.45	0.00	37.35	57.5	2
10256	10256:WVGD9	End	60.00	39.26	0.02	-1.05	1318.36	-0.51	0.0	-29.35	40.14	-0.02	-0.61	38.38	0.44	0.00	39.00	60.0	2
10256	10256:WVGD9	Origin	60.00	39.26	0.02	-1.05	1318.36	-0.51	0.0	-30.23	40.55	-0.02	-0.63	38.38	0.45	0.00	39.02	60.0	2
10256	Tube 2	End	65.00	34.65	0.02	-0.87	1521.08	-0.60	0.0	-30.23	40.55	-0.02	-0.61	41.20	0.43	0.00	41.82	64.3	2
10256	Tube 2	Origin	65.00	34.65	0.02	-0.87	1521.08	-0.60	0.0	-31.26	40.86	-0.02	-0.63	41.20	0.44	0.00	41.84	64.4	2
10256	10256:WVGD8	End	70.00	30.32	0.02	-0.71	1725.39	-0.70	0.0	-31.26	40.86	-0.02	-0.61	43.59	0.42	0.00	44.21	68.0	2
10256	10256:WVGD8	Origin	70.00	30.32	0.02	-0.71	1725.39	-0.70	0.0	-32.45	41.35	-0.02	-0.63	43.59	0.43	0.00	44.23	68.0	2
10256	Tube 2	End	75.00	26.28	0.02	-0.58	1932.12	-0.81	0.0	-32.45	41.35	-0.02	-0.61	45.64	0.41	0.00	46.25	71.2	2
10256	Tube 2	Origin	75.00	26.28	0.02	-0.58	1932.12	-0.81	0.0	-33.56	41.67	-0.02	-0.63	45.64	0.42	0.00	46.27	71.2	2
10256	10256:WVGD7	End	80.00	22.54	0.01	-0.46	2140.47	-0.93	0.0	-33.56	41.67	-0.02	-0.61	47.37	0.40	0.00	47.99	73.8	2
10256	10256:WVGD7	Origin	80.00	22.54	0.01	-0.46	2140.47	-0.93	0.0	-34.81	42.16	-0.03	-0.63	47.37	0.41	0.00	48.01	73.9	2
10256	Tube 2	End	85.00	19.10	0.01	-0.36	2351.29	-1.06	0.0	-34.81	42.16	-0.03	-0.61	48.85	0.39	0.00	49.47	76.1	2
10256	Tube 2	Origin	85.00	19.10	0.01	-0.36	2351.29	-1.06	0.0	-35.98	42.50	-0.03	-0.64	48.85	0.40	0.00	49.49	76.1	2
10256	10256:WVGD6	End	90.00	15.95	0.01	-0.28	2563.78	-1.20	0.0	-35.98	42.50	-0.03	-0.62	50.11	0.38	0.00	50.73	78.0	2
10256	10256:WVGD6	Origin	90.00	15.95	0.01	-0.28	2563.78	-1.20	0.0	-37.23	42.98	-0.03	-0.64	50.11	0.39	0.00	50.75	78.1	2
10256	Tube 2	End	94.42	13.42	0.01	-0.21	2753.53	-1.33	0.0	-37.23	42.98	-0.03	-0.62	51.07	0.38	0.00	51.69	79.5	2

10256	Tube 2	Origin	94.42	13.42	0.01	-0.21	2753.53	-1.33	0.0	-38.32	43.28	-0.03	-0.64	51.07	0.38	0.00	51.71	79.6	2
10256	SpliceT	End	98.83	11.12	0.01	-0.16	2944.63	-1.46	0.0	-38.32	43.28	-0.03	-0.62	51.89	0.37	0.00	52.52	80.8	2
10256	SpliceT	Origin	98.83	11.12	0.01	-0.16	2944.63	-1.46	0.0	-39.14	43.48	-0.03	-0.64	51.89	0.37	0.00	52.53	80.8	2
10256	10256:WVGD5	End	100.00	10.55	0.01	-0.15	2995.50	-1.50	0.0	-39.14	43.48	-0.03	-0.60	50.73	0.35	0.00	51.33	79.0	2
10256	10256:WVGD5	Origin	100.00	10.55	0.01	-0.15	2995.50	-1.50	0.0	-40.74	43.89	-0.03	-0.63	50.73	0.36	0.00	51.36	79.0	2
10256	SpliceB	End	105.00	8.29	0.01	-0.11	3214.93	-1.66	0.0	-40.74	43.89	-0.03	-0.61	51.42	0.35	0.00	52.03	80.0	2
10256	SpliceB	Origin	105.00	8.29	0.01	-0.11	3214.93	-1.66	0.0	-42.62	44.25	-0.04	-0.64	51.42	0.35	0.00	52.06	80.1	2
10256	10256:WVGD4	End	110.00	6.31	0.00	-0.07	3436.18	-1.84	0.0	-42.62	44.25	-0.04	-0.62	51.98	0.34	0.00	52.61	80.9	2
10256	10256:WVGD4	Origin	110.00	6.31	0.00	-0.07	3436.18	-1.84	0.0	-44.11	44.76	-0.04	-0.64	51.98	0.34	0.00	52.63	81.0	2
10256	Tube 3	End	115.00	4.61	0.00	-0.05	3659.99	-2.03	0.0	-44.11	44.76	-0.04	-0.63	52.45	0.34	0.00	53.08	81.7	2
10256	Tube 3	Origin	115.00	4.61	0.00	-0.05	3659.99	-2.03	0.0	-45.52	45.12	-0.04	-0.65	52.45	0.34	0.00	53.10	81.7	2
10256	10256:WVGD3	End	120.00	3.18	0.00	-0.03	3885.58	-2.22	0.0	-45.52	45.12	-0.04	-0.63	52.83	0.33	0.00	53.46	82.2	2
10256	10256:WVGD3	Origin	120.00	3.18	0.00	-0.03	3885.58	-2.22	0.0	-47.08	45.64	-0.04	-0.65	52.83	0.33	0.00	53.48	82.3	2
10256	Tube 3	End	125.00	2.02	0.00	-0.02	4113.80	-2.43	0.0	-47.08	45.64	-0.04	-0.63	53.13	0.32	0.00	53.77	82.7	2
10256	Tube 3	Origin	125.00	2.02	0.00	-0.02	4113.80	-2.43	0.0	-48.54	46.02	-0.04	-0.65	53.13	0.33	0.00	53.79	82.8	2
10256	10256:WVGD2	End	130.00	1.13	0.00	-0.01	4343.87	-2.65	0.0	-48.54	46.02	-0.04	-0.64	53.37	0.32	0.00	54.01	83.1	2
10256	10256:WVGD2	Origin	130.00	1.13	0.00	-0.01	4343.87	-2.65	0.0	-50.16	46.55	-0.05	-0.66	53.37	0.32	0.00	54.03	83.1	2
10256	Tube 3	End	135.00	0.50	0.00	-0.00	4576.62	-2.88	0.0	-50.16	46.55	-0.05	-0.64	53.55	0.31	0.00	54.19	83.4	2
10256	Tube 3	Origin	135.00	0.50	0.00	-0.00	4576.62	-2.88	0.0	-51.69	46.93	-0.05	-0.66	53.55	0.32	0.00	54.21	83.4	2
10256	10256:WVGD1	End	140.00	0.13	0.00	-0.00	4811.29	-3.12	0.0	-51.69	46.93	-0.05	-0.65	53.67	0.31	0.00	54.32	83.6	2
10256	10256:WVGD1	Origin	140.00	0.13	0.00	-0.00	4811.29	-3.12	0.0	-53.43	47.56	-0.05	-0.67	53.67	0.31	0.00	54.34	83.6	2
10256	10256:g	End	145.00	0.00	0.00	0.00	5049.09	-3.37	0.0	-53.43	47.56	-0.05	-0.65	53.76	0.31	0.00	54.42	83.7	2

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

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Vert. Mom. (ft-k)	Horz. Mom. (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Vert. Shear (kips)	Horz. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Pt.
Davit1	Davit1:O	Origin	0.00	114.33	0.06	-3.85	-1.18	0.00	0.0	-0.75	0.17	-0.00	-0.11	0.82	0.00	0.00	0.93	1.4	1
Davit1	#Davit1:0	End	4.54	115.61	0.06	2.69	-0.42	0.00	0.0	-0.75	0.17	-0.00	-0.14	0.49	0.00	0.00	0.63	1.0	1
Davit1	#Davit1:0	Origin	4.54	115.61	0.06	2.69	-0.42	0.00	0.0	-0.73	0.09	-0.00	-0.14	0.49	0.00	0.00	0.63	1.0	1
Davit1	Davit1:End	End	9.08	116.89	0.06	9.21	-0.00	0.00	0.0	-0.73	0.09	-0.00	-0.19	0.00	0.05	0.00	0.21	0.3	3
Davit2	Davit2:O	Origin	0.00	114.17	0.06	-6.33	-2.80	-0.00	-0.0	0.80	0.35	0.00	0.12	1.96	0.00	0.00	2.08	3.2	1
Davit2	#Davit2:0	End	4.54	114.65	0.06	-13.00	-1.21	-0.00	-0.0	0.80	0.35	0.00	0.15	1.42	0.00	0.00	1.57	2.4	1
Davit2	#Davit2:0	Origin	4.54	114.65	0.06	-13.00	-1.21	-0.00	0.0	0.80	0.27	0.00	0.15	1.42	0.00	0.00	1.57	2.4	1
Davit2	Davit2:End	End	9.08	115.12	0.06	-19.69	0.00	0.00	0.0	0.80	0.27	0.00	0.21	0.00	0.15	0.00	0.34	0.5	3
Davit3	Davit3:O	Origin	0.00	95.89	0.05	-2.57	-30.11	0.01	0.0	-5.46	2.17	-0.00	-0.36	5.46	0.00	0.00	5.82	9.0	1
Davit3	#Davit3:0	End	5.00	97.26	0.05	4.43	-19.27	0.00	0.0	-5.46	2.17	-0.00	-0.44	5.11	0.00	0.00	5.54	8.5	1
Davit3	#Davit3:0	Origin	5.00	97.26	0.05	4.43	-19.27	0.00	0.0	-5.41	1.98	-0.00	-0.43	5.11	0.00	0.00	5.54	8.5	1
Davit3	#Davit3:1	End	10.00	98.60	0.05	11.36	-9.37	0.00	0.0	-5.41	1.98	-0.00	-0.55	3.97	0.00	0.00	4.51	6.9	1
Davit3	#Davit3:1	Origin	10.00	98.60	0.05	11.36	-9.37	0.00	0.0	-5.37	1.86	-0.00	-0.54	3.97	0.00	0.00	4.51	6.9	1
Davit3	#Davit3:2	End	12.57	99.28	0.05	14.88	-4.60	0.00	0.0	-5.37	1.86	-0.00	-0.63	2.61	0.00	0.00	3.23	5.0	1
Davit3	#Davit3:2	Origin	12.57	99.28	0.05	14.88	-4.60	0.00	0.0	-5.36	1.79	-0.00	-0.62	2.61	0.00	0.00	3.23	5.0	1
Davit3	Davit3:End	End	15.13	99.96	0.05	18.40	-0.00	0.00	0.0	-5.36	1.79	-0.00	-0.74	0.00	0.51	0.00	1.16	1.8	3
Davit4	Davit4:O	Origin	0.00	95.73	0.05	-5.37	-50.35	-0.00	-0.0	4.71	3.54	0.00	0.31	9.13	0.00	0.00	9.44	14.5	1
Davit4	#Davit4:0	End	5.00	96.25	0.05	-12.58	-32.66	-0.00	-0.0	4.71	3.54	0.00	0.38	8.65	0.00	0.00	9.03	13.9	1
Davit4	#Davit4:0	Origin	5.00	96.25	0.05	-12.58	-32.66	-0.00	-0.0	4.72	3.32	0.00	0.38	8.65	0.00	0.00	9.03	13.9	1
Davit4	#Davit4:1	End	10.00	96.77	0.05	-19.92	-16.08	-0.00	-0.0	4.72	3.32	0.00	0.48	6.81	0.00	0.00	7.28	11.2	1
Davit4	#Davit4:1	Origin	10.00	96.77	0.05	-19.92	-16.08	-0.00	-0.0	4.72	3.17	0.00	0.48	6.81	0.00	0.00	7.28	11.2	1
Davit4	#Davit4:2	End	12.57	97.04	0.05	-23.74	-7.94	-0.00	-0.0	4.72	3.17	0.00	0.55	4.50	0.00	0.00	5.05	7.8	1
Davit4	#Davit4:2	Origin	12.57	97.04	0.05	-23.74	-7.94	-0.00	0.0	4.72	3.09	0.00	0.55	4.50	0.00	0.00	5.05	7.8	1
Davit4	Davit4:End	End	15.13	97.31	0.05	-27.58	-0.00	0.00	0.0	4.72	3.09	0.00	0.65	0.00	0.88	0.00	1.67	2.6	3
Davit5	Davit5:O	Origin	0.00	66.29	0.04	-0.80	-31.44	0.01	0.0	-5.43	2.26	-0.00	-0.36	5.70	0.00	0.00	6.06	9.3	1

Davit5	#Davit5:0	End	5.00	67.42	0.04	5.27	-20.16	0.00	0.0	-5.43	2.26	-0.00	-0.43	5.34	0.00	0.00	5.77	8.9	1
Davit5	#Davit5:0	Origin	5.00	67.42	0.04	5.27	-20.16	0.00	0.0	-5.38	2.07	-0.00	-0.43	5.34	0.00	0.00	5.77	8.9	1
Davit5	#Davit5:1	End	10.00	68.53	0.04	11.26	-9.82	0.00	0.0	-5.38	2.07	-0.00	-0.54	4.16	0.00	0.00	4.70	7.2	1
Davit5	#Davit5:1	Origin	10.00	68.53	0.04	11.26	-9.82	0.00	0.0	-5.34	1.95	-0.00	-0.54	4.16	0.00	0.00	4.70	7.2	1
Davit5	#Davit5:2	End	12.57	69.10	0.04	14.31	-4.82	0.00	0.0	-5.34	1.95	-0.00	-0.62	2.73	0.00	0.00	3.35	5.2	1
Davit5	#Davit5:2	Origin	12.57	69.10	0.04	14.31	-4.82	0.00	0.0	-5.33	1.88	-0.00	-0.62	2.73	0.00	0.00	3.35	5.2	1
Davit5	Davit5:End	End	15.13	69.66	0.04	17.34	-0.00	0.00	0.0	-5.33	1.88	-0.00	-0.73	0.00	0.54	0.00	1.19	1.8	3
Davit6	Davit6:O	Origin	0.00	66.14	0.03	-3.80	-51.48	-0.00	-0.0	4.65	3.61	0.00	0.31	9.33	0.00	0.00	9.64	14.8	1
Davit6	#Davit6:0	End	5.00	66.64	0.03	-10.06	-33.42	-0.00	-0.0	4.65	3.61	0.00	0.37	8.85	0.00	0.00	9.23	14.2	1
Davit6	#Davit6:0	Origin	5.00	66.64	0.03	-10.06	-33.42	-0.00	-0.0	4.66	3.39	0.00	0.37	8.85	0.00	0.00	9.23	14.2	1
Davit6	#Davit6:1	End	10.00	67.15	0.03	-16.45	-16.47	-0.00	-0.0	4.66	3.39	0.00	0.47	6.97	0.00	0.00	7.44	11.4	1
Davit6	#Davit6:1	Origin	10.00	67.15	0.03	-16.45	-16.47	-0.00	-0.0	4.67	3.25	0.00	0.47	6.97	0.00	0.00	7.44	11.4	1
Davit6	#Davit6:2	End	12.57	67.41	0.03	-19.77	-8.13	-0.00	-0.0	4.67	3.25	0.00	0.54	4.61	0.00	0.00	5.15	7.9	1
Davit6	#Davit6:2	Origin	12.57	67.41	0.03	-19.77	-8.13	-0.00	0.0	4.68	3.17	0.00	0.55	4.61	0.00	0.00	5.15	7.9	1
Davit6	Davit6:End	End	15.13	67.67	0.03	-23.12	-0.00	0.00	0.0	4.68	3.17	0.00	0.64	0.00	0.91	0.00	1.70	2.6	3
Davit7	Davit7:O	Origin	0.00	41.85	0.02	0.22	-33.27	0.00	0.0	-5.38	2.38	-0.00	-0.36	6.03	0.00	0.00	6.39	9.8	1
Davit7	#Davit7:0	End	5.00	42.68	0.02	5.00	-21.37	0.00	0.0	-5.38	2.38	-0.00	-0.43	5.66	0.00	0.00	6.09	9.4	1
Davit7	#Davit7:0	Origin	5.00	42.68	0.02	5.00	-21.37	0.00	0.0	-5.33	2.19	-0.00	-0.43	5.66	0.00	0.00	6.09	9.4	1
Davit7	#Davit7:1	End	10.00	43.50	0.02	9.70	-10.43	0.00	0.0	-5.33	2.19	-0.00	-0.54	4.41	0.00	0.00	4.95	7.6	1
Davit7	#Davit7:1	Origin	10.00	43.50	0.02	9.70	-10.43	0.00	0.0	-5.30	2.07	-0.00	-0.53	4.41	0.00	0.00	4.95	7.6	1
Davit7	#Davit7:2	End	12.57	43.91	0.02	12.08	-5.13	0.00	0.0	-5.30	2.07	-0.00	-0.62	2.90	0.00	0.00	3.52	5.4	1
Davit7	#Davit7:2	Origin	12.57	43.91	0.02	12.08	-5.13	0.00	0.0	-5.28	2.00	-0.00	-0.62	2.90	0.00	0.00	3.52	5.4	1
Davit7	Davit7:End	End	15.13	44.32	0.02	14.44	-0.00	0.00	0.0	-5.28	2.00	-0.00	-0.73	0.00	0.57	0.00	1.23	1.9	3
Davit8	Davit8:O	Origin	0.00	41.73	0.02	-2.53	-53.02	-0.00	-0.0	4.57	3.71	0.00	0.30	9.61	0.00	0.00	9.92	15.3	1
Davit8	#Davit8:0	End	5.00	42.19	0.02	-7.47	-34.45	-0.00	-0.0	4.57	3.71	0.00	0.37	9.13	0.00	0.00	9.49	14.6	1
Davit8	#Davit8:0	Origin	5.00	42.19	0.02	-7.47	-34.45	-0.00	-0.0	4.59	3.49	0.00	0.37	9.13	0.00	0.00	9.49	14.6	1
Davit8	#Davit8:1	End	10.00	42.65	0.02	-12.55	-16.99	-0.00	-0.0	4.59	3.49	0.00	0.46	7.19	0.00	0.00	7.65	11.8	1
Davit8	#Davit8:1	Origin	10.00	42.65	0.02	-12.55	-16.99	-0.00	-0.0	4.60	3.35	0.00	0.46	7.19	0.00	0.00	7.65	11.8	1
Davit8	#Davit8:2	End	12.57	42.88	0.02	-15.20	-8.39	-0.00	-0.0	4.60	3.35	0.00	0.54	4.75	0.00	0.00	5.29	8.1	1
Davit8	#Davit8:2	Origin	12.57	42.88	0.02	-15.20	-8.39	-0.00	0.0	4.61	3.27	0.00	0.54	4.75	0.00	0.00	5.29	8.1	1
Davit8	Davit8:End	End	15.13	43.12	0.02	-17.88	-0.00	0.00	0.0	4.61	3.27	0.00	0.64	0.00	0.93	0.00	1.74	2.7	3

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

Clamp Label	Force (kips)	Input Holding Capacity (kips)	Factored Holding Capacity (kips)	Usage %
Clamp1	0.721	80.00	80.00	0.90
Clamp2	0.838	80.00	80.00	1.05
Clamp3	5.629	80.00	80.00	7.04
Clamp4	5.629	80.00	80.00	7.04
Clamp5	5.629	80.00	80.00	7.04
Clamp6	5.629	80.00	80.00	7.04
Clamp7	5.629	80.00	80.00	7.04
Clamp8	5.629	80.00	80.00	7.04
Clamp9	9.786	80.00	80.00	12.23
Clamp10	6.986	80.00	80.00	8.73
Clamp11	16.154	80.00	80.00	20.19
Clamp12	16.154	80.00	80.00	20.19
Clamp13	0.301	80.00	80.00	0.38
Clamp14	0.201	80.00	80.00	0.25
Clamp15	0.201	80.00	80.00	0.25
Clamp16	0.201	80.00	80.00	0.25

Clamp17	0.201	80.00	80.00	0.25
Clamp18	0.201	80.00	80.00	0.25
Clamp19	0.201	80.00	80.00	0.25
Clamp20	0.201	80.00	80.00	0.25
Clamp21	0.201	80.00	80.00	0.25
Clamp22	0.201	80.00	80.00	0.25
Clamp23	0.201	80.00	80.00	0.25
Clamp24	0.201	80.00	80.00	0.25
Clamp25	0.201	80.00	80.00	0.25

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

Summary of Steel Pole Usages:

Steel Pole Label	Maximum Usage %	Load Case	Segment Number	Weight (lbs)
10256	83.72	NESC Extreme	38	29548.2

Base Plate Results by Bend Line:

Pole Label	Load Case	Bend Line #	Start X (ft)	Start Y (ft)	End X (ft)	End Y (ft)	Length (in)	Bending Stress (ksi)	Bolt Mom. Sum (ft-k)	# Bolts Acting	Bolt Max Load (kips)	Min Plate Thickness (in)	Actual Thickness (in)	Usage %
10256	NESC Heavy	1	2.584	1.142	-0.303	2.809	40.000	29.841	149.204	6	82.789	2.116	3.000	49.73
10256	NESC Heavy	2	2.809	-0.303	1.142	2.584	40.000	11.424	57.122	4	71.086	1.309	3.000	19.04
10256	NESC Heavy	3	2.281	-1.667	2.281	1.667	40.000	0.888	4.442	3	48.053	0.365	3.000	1.48
10256	NESC Heavy	4	1.142	-2.584	2.809	0.303	40.000	9.768	48.842	4	-62.729	1.210	3.000	16.28
10256	NESC Heavy	5	-0.303	-2.809	2.584	-1.142	40.000	26.394	131.969	6	-74.122	1.990	3.000	43.99
10256	NESC Heavy	6	-1.667	-2.281	1.667	-2.281	40.000	32.356	161.782	7	-74.122	2.203	3.000	53.93
10256	NESC Heavy	7	-2.584	-1.142	0.303	-2.809	40.000	26.218	131.090	6	-73.940	1.983	3.000	43.70
10256	NESC Heavy	8	-2.809	0.303	-1.142	-2.584	40.000	9.647	48.236	4	-62.237	1.203	3.000	16.08
10256	NESC Heavy	9	-2.281	1.667	-2.281	-1.667	40.000	0.963	4.815	3	48.799	0.380	3.000	1.61
10256	NESC Heavy	10	-1.142	2.584	-2.809	-0.303	40.000	11.568	57.841	4	71.577	1.317	3.000	19.28
10256	NESC Heavy	11	0.303	2.809	-2.584	1.142	40.000	30.017	150.083	6	82.970	2.122	3.000	50.03
10256	NESC Heavy	12	1.667	2.281	-1.667	2.281	40.000	36.246	181.229	7	82.970	2.332	3.000	60.41
10256	NESC Heavy	13	2.221	1.850	-0.999	2.713	40.000	25.414	127.072	5	82.880	1.952	3.000	42.36
10256	NESC Heavy	14	2.849	0.491	0.491	2.849	40.000	18.229	91.147	4	82.607	1.654	3.000	30.38
10256	NESC Heavy	15	2.713	-0.999	1.850	2.221	40.000	2.754	13.770	2	48.053	0.643	3.000	4.59
10256	NESC Heavy	16	1.850	-2.221	2.713	0.999	40.000	2.324	11.619	2	-39.951	0.590	3.000	3.87
10256	NESC Heavy	17	0.491	-2.849	2.849	-0.491	40.000	15.915	79.576	4	-74.122	1.545	3.000	26.53
10256	NESC Heavy	18	-0.999	-2.713	2.221	-1.850	40.000	22.705	113.526	5	-74.122	1.845	3.000	37.84
10256	NESC Heavy	19	-2.221	-1.850	0.999	-2.713	40.000	22.629	113.144	5	-74.031	1.842	3.000	37.71
10256	NESC Heavy	20	-2.849	-0.491	-0.491	-2.849	40.000	15.760	78.802	4	-73.758	1.538	3.000	26.27
10256	NESC Heavy	21	-2.713	0.999	-1.850	-2.221	40.000	2.329	11.643	2	-39.204	0.591	3.000	3.88
10256	NESC Heavy	22	-1.850	2.221	-2.713	-0.999	40.000	2.838	14.190	2	48.799	0.652	3.000	4.73
10256	NESC Heavy	23	-0.491	2.849	-2.849	0.491	40.000	18.384	91.922	4	82.970	1.661	3.000	30.64
10256	NESC Heavy	24	0.999	2.713	-2.221	1.850	40.000	25.491	127.453	5	82.970	1.955	3.000	42.48
10256	NESC Extreme	1	2.584	1.142	-0.303	2.809	40.000	42.238	211.190	6	117.478	2.517	3.000	70.40
10256	NESC Extreme	2	2.809	-0.303	1.142	2.584	40.000	15.968	79.838	4	100.556	1.548	3.000	26.61
10256	NESC Extreme	3	2.281	-1.667	2.281	1.667	40.000	0.987	4.933	3	66.837	0.385	3.000	1.64
10256	NESC Extreme	4	1.142	-2.584	2.809	0.303	40.000	15.096	75.480	4	-96.192	1.505	3.000	25.16
10256	NESC Extreme	5	-0.303	-2.809	2.584	-1.142	40.000	40.443	202.217	6	-113.016	2.463	3.000	67.41
10256	NESC Extreme	6	-1.667	-2.281	1.667	-2.281	40.000	49.440	247.198	7	-113.016	2.723	3.000	82.40
10256	NESC Extreme	7	-2.584	-1.142	0.303	-2.809	40.000	40.388	201.941	6	-112.959	2.461	3.000	67.31
10256	NESC Extreme	8	-2.809	0.303	-1.142	-2.584	40.000	15.058	75.290	4	-96.037	1.503	3.000	25.10
10256	NESC Extreme	9	-2.281	1.667	-2.281	-1.667	40.000	1.010	5.051	3	67.072	0.389	3.000	1.68
10256	NESC Extreme	10	-1.142	2.584	-2.809	-0.303	40.000	16.013	80.064	4	100.710	1.550	3.000	26.69
10256	NESC Extreme	11	0.303	2.809	-2.584	1.142	40.000	42.293	211.467	6	117.535	2.519	3.000	70.49
10256	NESC Extreme	12	1.667	2.281	-1.667	2.281	40.000	51.426	257.128	7	117.535	2.777	3.000	85.71
10256	NESC Extreme	13	2.221	1.850	-0.999	2.713	40.000	36.074	180.371	5	117.506	2.326	3.000	60.12
10256	NESC Extreme	14	2.849	0.491	0.491	2.849	40.000	25.707	128.537	4	117.421	1.964	3.000	42.85
10256	NESC Extreme	15	2.713	-0.999	1.850	2.221	40.000	3.656	18.282	2	66.837	0.741	3.000	6.09
10256	NESC Extreme	16	1.850	-2.221	2.713	0.999	40.000	3.429	17.145	2	-62.553	0.717	3.000	5.71
10256	NESC Extreme	17	0.491	-2.849	2.849	-0.491	40.000	24.495	122.477	4	-113.016	1.917	3.000	40.83

10256	NESC Extreme	18	-0.999	-2.713	2.221	-1.850	40.000	34.676	173.379	5	-113.016	2.281	3.000	57.79
10256	NESC Extreme	19	-2.221	-1.850	0.999	-2.713	40.000	34.652	173.259	5	-112.988	2.280	3.000	57.75
10256	NESC Extreme	20	-2.849	-0.491	-0.491	-2.849	40.000	24.447	122.233	4	-112.902	1.915	3.000	40.74
10256	NESC Extreme	21	-2.713	0.999	-1.850	-2.221	40.000	3.430	17.152	2	-62.319	0.717	3.000	5.72
10256	NESC Extreme	22	-1.850	2.221	-2.713	-0.999	40.000	3.683	18.414	2	67.072	0.743	3.000	6.14
10256	NESC Extreme	23	-0.491	2.849	-2.849	0.491	40.000	25.756	128.781	4	117.535	1.966	3.000	42.93
10256	NESC Extreme	24	0.999	2.713	-2.221	1.850	40.000	36.098	180.490	5	117.535	2.327	3.000	60.16

Summary of Tubular Davit Usages:

Tubular Davit Label	Maximum Usage %	Load Case	Segment Number	Weight (lbs)
Davit1	9.98	NESC Heavy	1	164.3
Davit2	13.08	NESC Heavy	1	164.3
Davit3	30.94	NESC Heavy	1	575.0
Davit4	34.94	NESC Heavy	1	575.0
Davit5	31.14	NESC Heavy	1	575.0
Davit6	35.06	NESC Heavy	1	575.0
Davit7	31.44	NESC Heavy	1	575.0
Davit8	35.23	NESC Heavy	1	575.0

*** Maximum Stress Summary for Each Load Case

Summary of Maximum Usages by Load Case:

Load Case	Maximum Usage %	Element Label	Element Type
NESC Heavy	60.41	10256	Base Plate
NESC Extreme	85.71	10256	Base Plate

Summary of Steel Pole Usages by Load Case:

Load Case	Maximum Usage %	Steel Pole Label	Segment Number
NESC Heavy	58.53	10256	36
NESC Extreme	83.72	10256	38

Summary of Base Plate Usages by Load Case:

Load Case	Pole Label	Bend Line #	Length (in)	Vertical Load (kips)	X Moment (ft-k)	Y Moment (ft-k)	Bending Stress (ksi)	Bolt Moment Sum (ft-k)	# Bolts Acting On Bend Line	Max Bolt Load For Bend Line (kips)	Minimum Plate Thickness (in)	Usage %
NESC Heavy	10256	12	40.000	106.185	3434.072	-10.713	36.246	181.229	7	82.970	2.332	60.41
NESC Extreme	10256	12	40.000	54.220	5049.092	-3.367	51.426	257.128	7	117.535	2.777	85.71

Summary of Tubular Davit Usages by Load Case:

Load Case	Maximum Usage %	Tubular Davit Label	Segment Number
NESC Heavy	35.23	Davit8	1
NESC Extreme	15.26	Davit8	1

Summary of Insulator Usages:

Insulator Label	Insulator Type	Maximum Usage %	Load Case	Weight (lbs)
Clamp1	Clamp	1.86	NESC Heavy	0.0
Clamp2	Clamp	1.94	NESC Heavy	0.0
Clamp3	Clamp	10.47	NESC Heavy	0.0
Clamp4	Clamp	10.47	NESC Heavy	0.0
Clamp5	Clamp	10.47	NESC Heavy	0.0
Clamp6	Clamp	10.47	NESC Heavy	0.0
Clamp7	Clamp	10.47	NESC Heavy	0.0
Clamp8	Clamp	10.47	NESC Heavy	0.0
Clamp9	Clamp	12.23	NESC Extreme	0.0
Clamp10	Clamp	8.73	NESC Extreme	0.0
Clamp11	Clamp	20.19	NESC Extreme	0.0
Clamp12	Clamp	20.19	NESC Extreme	0.0
Clamp13	Clamp	0.87	NESC Heavy	0.0
Clamp14	Clamp	0.58	NESC Heavy	0.0
Clamp15	Clamp	0.58	NESC Heavy	0.0
Clamp16	Clamp	0.58	NESC Heavy	0.0
Clamp17	Clamp	0.58	NESC Heavy	0.0
Clamp18	Clamp	0.58	NESC Heavy	0.0
Clamp19	Clamp	0.58	NESC Heavy	0.0
Clamp20	Clamp	0.58	NESC Heavy	0.0
Clamp21	Clamp	0.58	NESC Heavy	0.0
Clamp22	Clamp	0.58	NESC Heavy	0.0
Clamp23	Clamp	0.58	NESC Heavy	0.0
Clamp24	Clamp	0.58	NESC Heavy	0.0
Clamp25	Clamp	0.58	NESC Heavy	0.0

Loads At Insulator Attachments For All Load Cases:

Load Case	Insulator Label	Insulator Type	Structure Attach Label	Structure Attach Load X (kips)	Structure Attach Load Y (kips)	Structure Attach Load Z (kips)	Structure Attach Load Res. (kips)
NESC Heavy	Clamp1	Clamp	Davit1:End	0.000	0.982	1.116	1.487
NESC Heavy	Clamp2	Clamp	Davit2:End	0.000	1.033	1.154	1.549
NESC Heavy	Clamp3	Clamp	Davit3:End	0.000	3.326	7.688	8.377
NESC Heavy	Clamp4	Clamp	Davit4:End	0.000	3.326	7.688	8.377
NESC Heavy	Clamp5	Clamp	Davit5:End	0.000	3.326	7.688	8.377
NESC Heavy	Clamp6	Clamp	Davit6:End	0.000	3.326	7.688	8.377
NESC Heavy	Clamp7	Clamp	Davit7:End	0.000	3.326	7.688	8.377
NESC Heavy	Clamp8	Clamp	Davit8:End	0.000	3.326	7.688	8.377
NESC Heavy	Clamp9	Clamp	10256:TopConn	0.000	2.903	0.000	2.903
NESC Heavy	Clamp10	Clamp	10256:BotConn	0.000	-1.843	5.834	6.118
NESC Heavy	Clamp11	Clamp	10256:BotConT	0.000	4.728	0.000	4.728
NESC Heavy	Clamp12	Clamp	10256:BotConB	0.000	-4.728	0.000	4.728
NESC Heavy	Clamp13	Clamp	10256:WVGD1	0.000	0.099	0.690	0.697
NESC Heavy	Clamp14	Clamp	10256:WVGD2	0.000	0.066	0.460	0.465
NESC Heavy	Clamp15	Clamp	10256:WVGD3	0.000	0.066	0.460	0.465
NESC Heavy	Clamp16	Clamp	10256:WVGD4	0.000	0.066	0.460	0.465
NESC Heavy	Clamp17	Clamp	10256:WVGD5	0.000	0.066	0.460	0.465
NESC Heavy	Clamp18	Clamp	10256:WVGD6	0.000	0.066	0.460	0.465
NESC Heavy	Clamp19	Clamp	10256:WVGD7	0.000	0.066	0.460	0.465

NESC Heavy	Clamp20	Clamp	10256:WVGD8	0.000	0.066	0.460	0.465
NESC Heavy	Clamp21	Clamp	10256:WVGD9	0.000	0.066	0.460	0.465
NESC Heavy	Clamp22	Clamp	10256:WVGD10	0.000	0.066	0.460	0.465
NESC Heavy	Clamp23	Clamp	10256:WVGD11	0.000	0.066	0.460	0.465
NESC Heavy	Clamp24	Clamp	10256:WVGD12	0.000	0.066	0.460	0.465
NESC Heavy	Clamp25	Clamp	10256:WVGD13	0.000	0.066	0.460	0.465
NESC Extreme	Clamp1	Clamp	Davit1:End	0.000	0.680	0.240	0.721
NESC Extreme	Clamp2	Clamp	Davit2:End	0.000	0.807	0.224	0.838
NESC Extreme	Clamp3	Clamp	Davit3:End	0.000	4.748	3.024	5.629
NESC Extreme	Clamp4	Clamp	Davit4:End	0.000	4.748	3.024	5.629
NESC Extreme	Clamp5	Clamp	Davit5:End	0.000	4.748	3.024	5.629
NESC Extreme	Clamp6	Clamp	Davit6:End	0.000	4.748	3.024	5.629
NESC Extreme	Clamp7	Clamp	Davit7:End	0.000	4.748	3.024	5.629
NESC Extreme	Clamp8	Clamp	Davit8:End	0.000	4.748	3.024	5.629
NESC Extreme	Clamp9	Clamp	10256:TopConn	0.000	9.786	0.000	9.786
NESC Extreme	Clamp10	Clamp	10256:BotConn	0.000	-6.325	2.967	6.986
NESC Extreme	Clamp11	Clamp	10256:BotConT	0.000	16.154	0.000	16.154
NESC Extreme	Clamp12	Clamp	10256:BotConB	0.000	-16.154	0.000	16.154
NESC Extreme	Clamp13	Clamp	10256:WVGD1	0.000	0.236	0.187	0.301
NESC Extreme	Clamp14	Clamp	10256:WVGD2	0.000	0.157	0.125	0.201
NESC Extreme	Clamp15	Clamp	10256:WVGD3	0.000	0.157	0.125	0.201
NESC Extreme	Clamp16	Clamp	10256:WVGD4	0.000	0.157	0.125	0.201
NESC Extreme	Clamp17	Clamp	10256:WVGD5	0.000	0.157	0.125	0.201
NESC Extreme	Clamp18	Clamp	10256:WVGD6	0.000	0.157	0.125	0.201
NESC Extreme	Clamp19	Clamp	10256:WVGD7	0.000	0.157	0.125	0.201
NESC Extreme	Clamp20	Clamp	10256:WVGD8	0.000	0.157	0.125	0.201
NESC Extreme	Clamp21	Clamp	10256:WVGD9	0.000	0.157	0.125	0.201
NESC Extreme	Clamp22	Clamp	10256:WVGD10	0.000	0.157	0.125	0.201
NESC Extreme	Clamp23	Clamp	10256:WVGD11	0.000	0.157	0.125	0.201
NESC Extreme	Clamp24	Clamp	10256:WVGD12	0.000	0.157	0.125	0.201
NESC Extreme	Clamp25	Clamp	10256:WVGD13	0.000	0.157	0.125	0.201

Overturning Moments For User Input Concentrated Loads:

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

Load Case	Total Tran. Load (kips)	Total Long. Load (kips)	Total Vert. Load (kips)	Transverse Overturning Moment (ft-k)	Longitudinal Overturning Moment (ft-k)	Torsional Moment (ft-k)
NESC Heavy	23.922	0.000	60.442	2748.132	-0.000	-0.000
NESC Extreme	35.556	0.000	23.262	4090.911	-0.000	-0.000

*** Weight of structure (lbs):
Weight of Tubular Davit Arms: 3778.8
Weight of Steel Poles: 29548.2
Total: 33327.0

*** End of Report

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Subject:	Anchor Bolt Analysis Pole #10256
Location:	Bethel, CT
Rev. 0: 1/18/17	Prepared by: T.J.L. Checked by: C.F.C. Job No. 16162.07

Anchor Bolt Analysis:

Input Data:

Bolt Force:

Maximum Tensile Force = $T_{Max} := 118 \cdot kips$ (User Input from PLS-Pole)

Anchor Bolt Data:

Use ASTM A615 Grade 75

Number of Anchor Bolts = $N := 24$ (User Input)

Bolt "Column" Distance = $l := 3.0 \cdot in$ (User Input)

Bolt Ultimate Strength = $F_u := 100 \cdot ksi$ (User Input)

Bolt Yeild Strength= $F_y := 75 \cdot ksi$ (User Input)

Bolt Modulus = $E := 29000 \cdot ksi$ (User Input)

Diameter of Anchor Bolts = $D := 2.25 \cdot in$ (User Input)

Threads per Inch = $n := 4.5$ (User Input)

Anchor Bolt Analysis:

Calculated Anchor Bolt Properties:

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n} \right)^2 = 3.248 \cdot in^2$

Bolt Tension Check:

Allowable Tensile Force (Net Area) = $T_{ALL.Net} := 1.0 \cdot \left(A_n \cdot F_y \right) = 243.576 \cdot kips$

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL.Net}} = 48.44 \cdot \%$

Condition1 = $Condition1 := if\left(\frac{T_{Max}}{T_{ALL.Net}} \le 1.00, "OK", "Overstressed" \right)$

Condition1 = "OK"

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Subject:	FOUNDATION ANALYSIS
Location:	Bethel, CT
Rev. 0: 1/18/17	Prepared by: T.J.L. Checked by: C.F.C. Job No. 16162.07

Foundation:

Input Data:

Tower Data

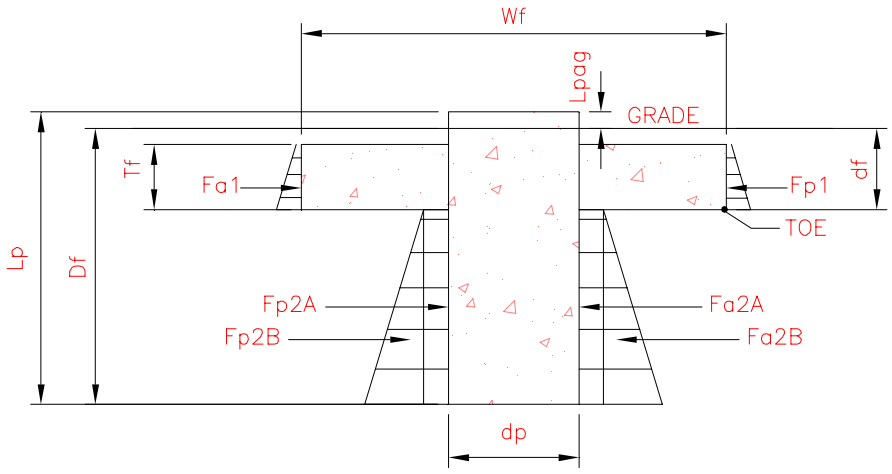
Overturning Moment =	OM := 5049.09·ft·kips·1.1 = 5554·ft·kips		(User Input)
Shear Force =	Shear := 47.75·kip·1.1 = 53·kips		(User Input)
Axial Force =	Axial := 57.19·kip·1.1 = 63·kips		(User Input)
Tower Height =	$H_t := 145 \cdot ft$		(User Input)

Footing Data:

Overall Depth of Footing =	$D_f := 17.5 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 18 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 0.5 \cdot ft$	(User Input)	
Diameter of Cassion =	$d_p := 8 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 4 \cdot ft$	(User Input)	
Width of Footing =	$W_f := 24 \cdot ft$	(User Input)	
Water Depth =	$D_{water} := 0 \cdot ft$	(User Input)	
Distance From Grade to Bottom of Pad =	$d_f := 5 \cdot ft$	(User Input)	

Material Properties:

Concrete Compressive Strength =	$f_c := 3000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Anchor Bolt Yield Strength =	$f_{ya} := 75000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil (mat) =	$\Phi_{s1} := 30 \cdot deg$	(User Input)	
Internal Friction Angle of Soil (below mat) =	$\Phi_{s2} := 30 \cdot deg$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil1} := 100 \cdot pcf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil2} := 100 \cdot pcf$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 4000 \cdot psf$	(User Input)	(Conservative)
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	Bouyancy := 0	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	Z := 2	(User Input)	(UBC-1997 Fig 23-2)



Calculated Factors:

Coefficient of Lateral Soil Pressure =

$$K_{p1} := \frac{1+\sin(\Phi_{s1})}{1-\sin(\Phi_{s1})} = 3 \qquad Ka1 := \frac{(1-\sin(\Phi_{s1}))}{(1+\sin(\Phi_{s1}))} = 0.333$$

$$K_{p2} := \frac{1+\sin(\Phi_{s2})}{1-\sin(\Phi_{s2})} = 3 \qquad Ka2 := \frac{(1-\sin(\Phi_{s2}))}{(1+\sin(\Phi_{s2}))} = 0.333$$

Stability of Footing:

Passive Pressure 1 =

$$P_{p1.top} := K_{p1}\cdot\gamma_{soil1}\cdot(0) = 0\cdot ksf$$

$$P_{p1.bot} := K_{p1}\cdot\gamma_{soil1}\cdot d_f = 1.5\cdot ksf$$

$$P_{p1.ave} := \frac{P_{p1.top}+P_{p1.bot}}{2} = 0.75\cdot ksf$$

Active Pressure 1 =

$$P_{a1.top} := Ka1\cdot\gamma_{soil1}\cdot(0) = 0\cdot ksf$$

$$P_{a1.bot} := Ka1\cdot\gamma_{soil1}\cdot d_f = 0.167\cdot ksf$$

$$P_{a1.ave} := \frac{P_{a1.top}+P_{a1.bot}}{2} = 0.083\cdot ksf$$

Area of Pressure 1 =

$$A_{p1} := T_f\cdot W_f = 96\,ft^2$$

Forces 1 =

$$F_{p1} := P_{p1.ave}\cdot A_{p1} = 72\cdot kip$$

$$F_{a1} := P_{a1.ave}\cdot A_{p1} = 8\cdot kip$$

Ultimate Shear 1 =

$$S_{u1} := (F_{p1}-F_{a1}) = 64\cdot kip$$

Passive Pressure 2 = $P_{p2.top} := K_{p2} \cdot \gamma_{soil2} \cdot d_f = 1.5 \cdot ksf$

$P_{p2.bot} := K_{p2} \cdot \gamma_{soil2} \cdot D_f = 5.25 \cdot ksf$

Active Pressure 2 = $P_{a2.top} := Ka2 \cdot \gamma_{soil2} \cdot d_f = 0.167 \cdot ksf$

$P_{a2.bot} := Ka2 \cdot \gamma_{soil2} \cdot D_f = 0.583 \cdot ksf$

Area of Pressure 2 = $A_{p2} := \left(D_f - d_f\right) \cdot d_p = 100 ft^2$

Forces 2 = $F_{p2A} := P_{p2.top} \cdot A_{p2} = 150 \cdot kips$

$F_{a2A} := P_{a2.top} \cdot A_{p2} = 16.7 \cdot kips$

$F_{p2B} := \frac{1}{2} \cdot \left(P_{p2.bot} - P_{p2.top}\right) \cdot A_{p2} = 187.5 \cdot kips$

$F_{a2B} := \frac{1}{2} \cdot \left(P_{a2.bot} - P_{a2.top}\right) \cdot A_{p2} = 20.8 \cdot kips$

Ultimate Shear 2 = $S_{u2A} := F_{p2A} - F_{a2A} = 133.3 \cdot kip$

$S_{u2B} := F_{p2B} - F_{a2B} = 166.7 \cdot kip$

Weight of Concrete Mat = $WT_{mat} := \left(W_f^2 - \frac{d_p^2 \cdot \pi}{4}\right) \cdot T_f \cdot \gamma_{conc} = 315.44 \cdot kip$

Weight of Concrete Caission = $WT_{caission} := \left(\frac{d_p^2 \cdot \pi}{4} L_p\right) \cdot \gamma_{conc} = 135.72 \cdot kip$

Weight of Soil Above Mat = $WT_s := \left[\left(W_f^2 - \frac{d_p^2 \cdot \pi}{4}\right) \cdot \left(d_f - T_f\right)\right] \cdot \gamma_{soil1} = 52.57 \cdot kip$

Total Weight = $W_{tot} := WT_{mat} + WT_{caission} + WT_s + Axial = 566.64 \cdot kips$

Overturning Moment = $M_{ot} := OM + Shear \cdot \left(d_f + L_{pag}\right) = 5843 \cdot kip \cdot ft$

Resisting Moment = $M_r := \left(W_{tot}\right) \cdot \frac{W_f}{2} + S_{u1} \cdot T_f \cdot \frac{1}{3} + S_{u2A} \cdot \frac{\left(D_f - d_f\right)}{2} + S_{u2B} \cdot \frac{2 \cdot \left(D_f - d_f\right)}{3} = 9107 \cdot kip \cdot ft$

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 1.56$

Factor of Safety Required = $FS_{req} := 1.0$

$Overturing\_Check := if\left(FS \geq FS_{req}, "Okay", "No\ Good"\right)$

$Overturing\_Check = "Okay"$

Bearing Pressure Check:

Area of Mat = $A_{mat} := W_f^2 - \frac{d_p^2 \cdot \pi}{4} = 525.735\,ft^2$

Section Modulus of Mat = $S_{mat} := \frac{W_f^3}{6} - \frac{d_p^3 \cdot \pi}{32} = 2254 \cdot ft^3$

Axial Force @ Base of Mat = $P_{mat} := WT_{mat} + WT_s = 368.014 \cdot kips$

Resisting Moment Capacity of Caissson = $M_{cap} := S_{u2A} \cdot \left[\frac{1}{2} \cdot (D_f - d_f) + d_f + L_{pag}\right] + S_{u2B} \cdot \left[\frac{2}{3} \cdot (D_f - d_f) + d_f + L_{pag}\right] = 3872 \cdot kip \cdot ft$

Residual Moment @ Base of Mat = $M_{mat} := (OM - M_{cap}) + Shear \cdot (d_f + L_{pag}) - \left(S_{u1} \cdot T_f \cdot \frac{1}{3}\right) = 1885 \cdot kip \cdot ft$

Maximum Pressure in Mat = $P_{max} := \frac{P_{mat}}{A_{mat}} + \frac{M_{mat}}{S_{mat}} = 1.537 \cdot ksf$

$Max\_Pressure\_Check := if(P_{max} < q_s, "Okay", "No Good")$

$Max\_Pressure\_Check = "Okay"$

Minimum Pressure in Mat = $P_{min} := \frac{P_{mat}}{A_{mat}} - \frac{M_{mat}}{S_{mat}} = -0.137 \cdot ksf$

$Min\_Pressure\_Check := if\left[(P_{min} \geq 0) \cdot (P_{min} < q_s), "Okay", "No Good"\right]$

$Min\_Pressure\_Check = "No Good"$

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 7.347\,ft$

Distance to Kern = $X_k := \frac{W_f}{6} = 4\,ft$

Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity = $e := \frac{M_{mat}}{P_{mat}} = 5.123\,ft$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot P_{mat}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 1.486 \cdot ksf$

$q_{adj} := if(P_{min} < 0, P_a, P_{max}) = 1.486 \cdot ksf$

$Pressure\_Check := if(q_{adj} < q_s, "Okay", "No Good")$

$Pressure\_Check = "Okay"$

RAN Template: 704Bu Outdoor	A&L Template: 704Bu

CT11110C_1.2_L700

Section 1 - Site Information

Site ID: CT11110C
Status: Draft
Version: 1.2
Project Type: L700
Approved: Not Approved
Approved By: Not Approved
Last Modified: 12/1/2016 7:44:31 AM
Last Modified By: GSM1900\VJaini

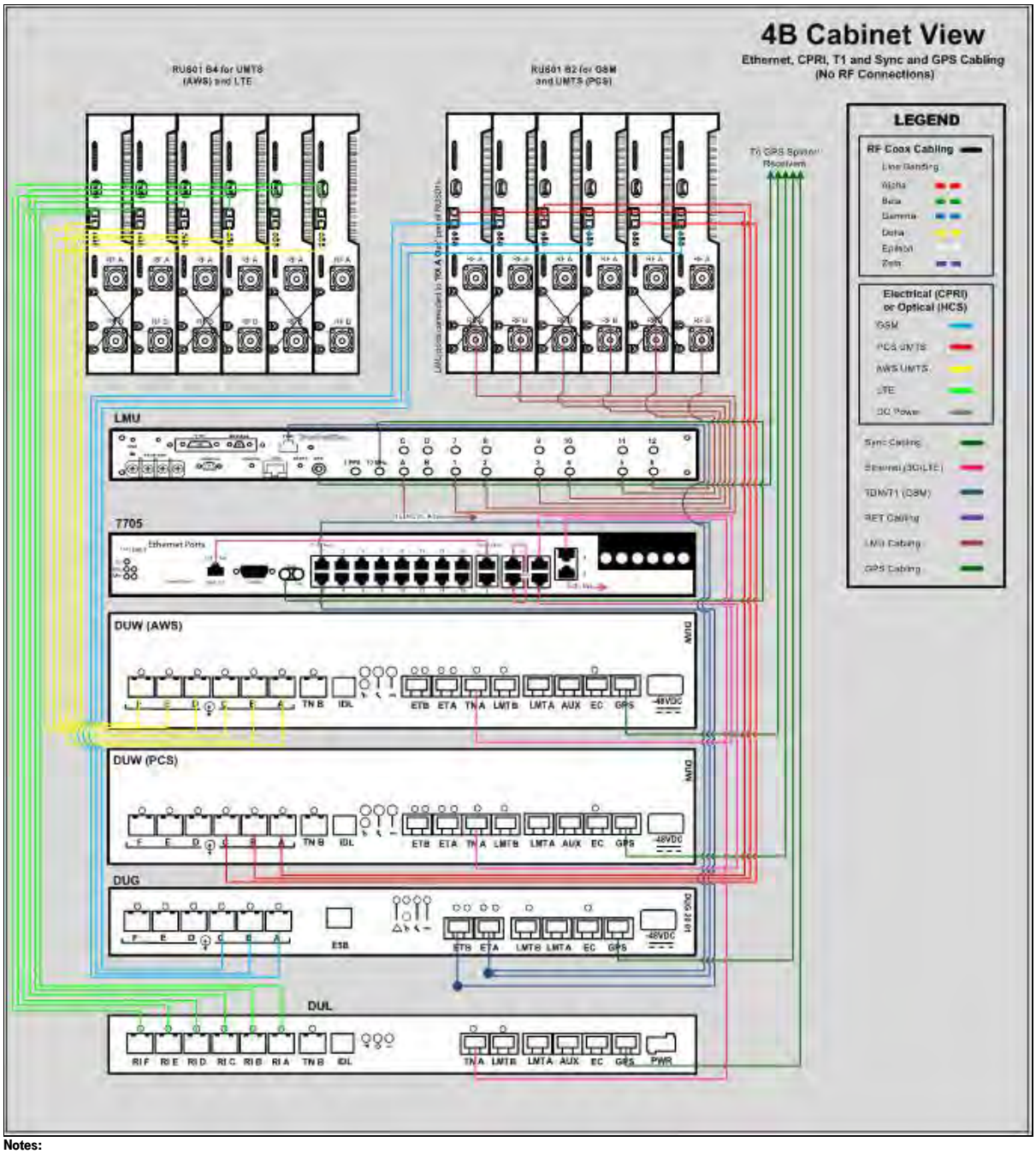
Site Name: Danbury/I-84/X8
Site Class: Utility Lattice Tower
Site Type: Structure Non Building
Solution Type: 704Bu
Plan Year: 2016
Market: CONNECTICUT
Vendor: Ericsson
Landlord: CL&P

Latitude: 41.41080000
Longitude: -73.40020000
Address: 8 Chimney Drive CL&P P# 321 L#1770
City, State: Bethel, CT
Region: NORTHEAST

RAN Template: 704Bu Outdoor			AL Template: 704Bu	
Sector Count: 3	Antenna Count: 6	Coax Line Count: 12	TMA Count: 6	RRU Count: 3

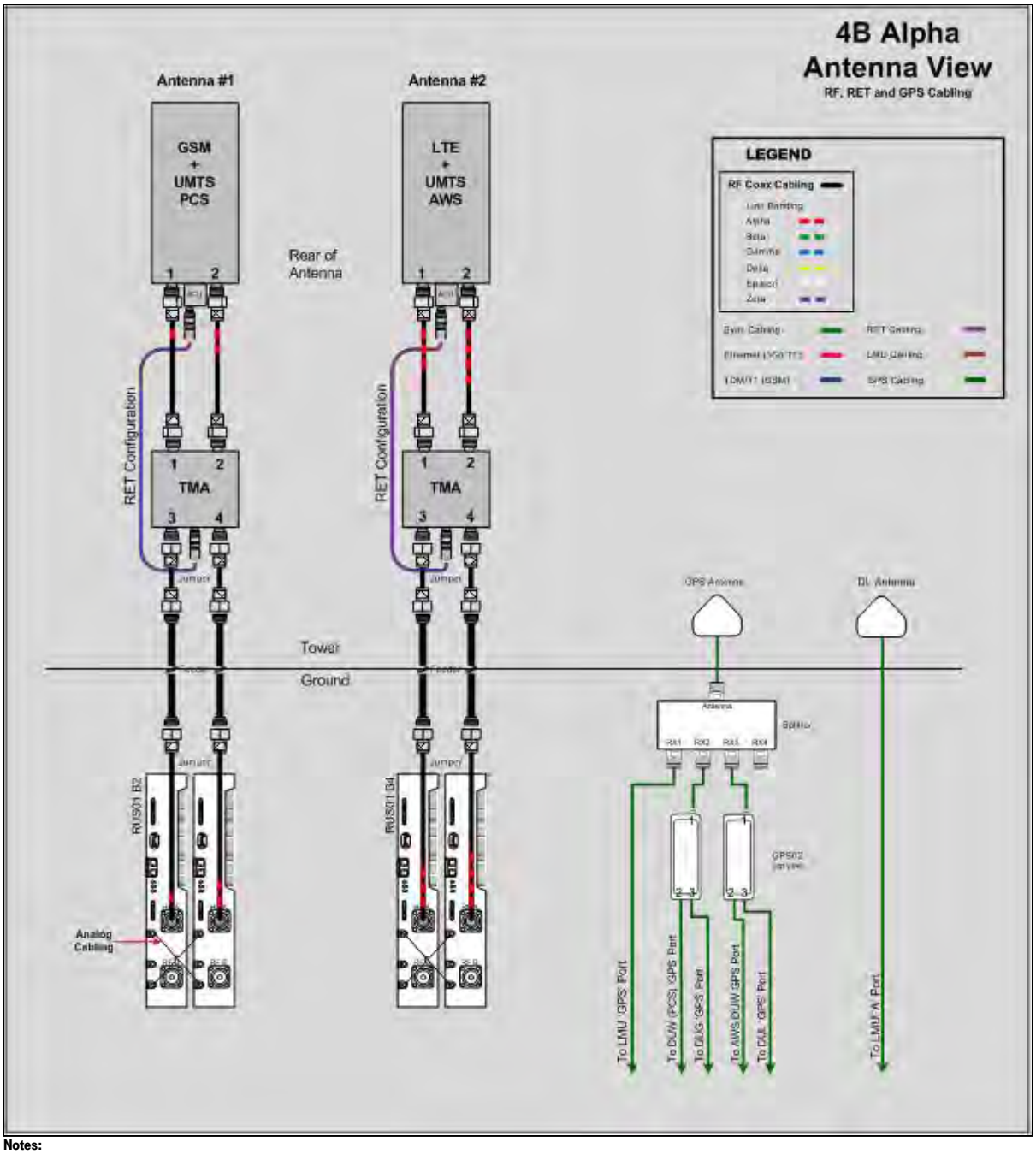
Section 2 - Existing Template Images

RAN_4B.jpg



Notes:

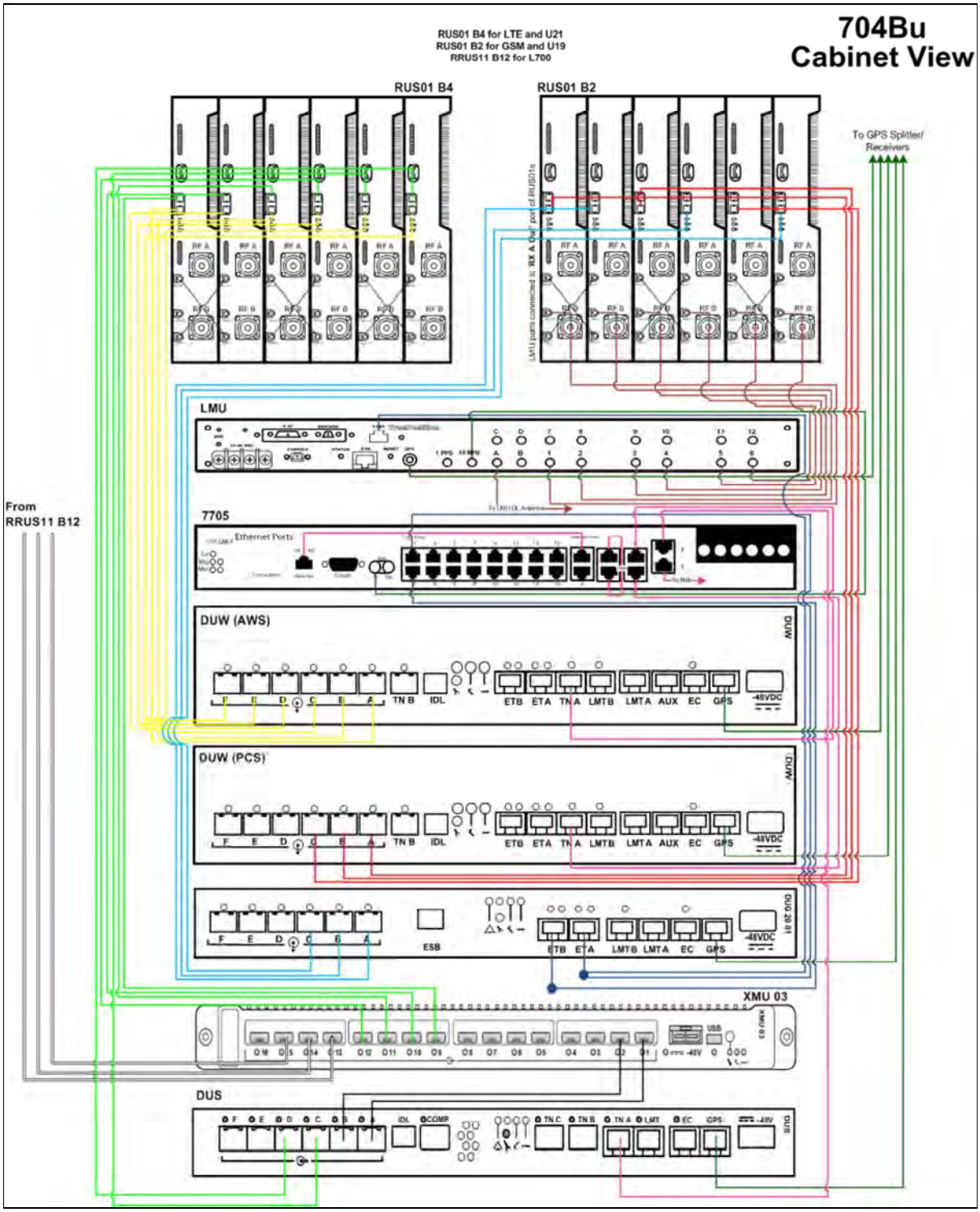
AL_4B.jpg


4B Alpha
Antenna View
RF, RET and GPS Cabling
Antenna #1
Antenna #2
GSM
+
UMTS
PCS
LTE
+
UMTS
AWS
Rear of
Antenna
LEGEND
RF Coax Cabling
RET Configuration
TMA
Tower
Ground
Analog
Cabling
GPS Antenna
DL Antenna
To LMU GPS Port
To DUW (PCS) GPS Port
To DUG GPS Port
To AWS DUW GPS Port
To DUL GPS Port
To LMU A Port

Notes:

Section 3 - Proposed Template Images

704Bu.png



Notes:

Section 4 - Siteplan Images

— This section is intentionally blank. —

RAN Template: 704Bu Outdoor	A&L Template: 704Bu

CT11110C_1.2_L700

Section 5 - RAN Equipment

Existing RAN Equipment	
Template: 4B Outdoor	
Enclosure	1
Enclosure Type	RBS 6102
Baseband	DUL20 (L2100), DUW30 (U1900), DUW30 (U2100), DUG20 (G1900)
Radio	RUS01 B4 (x6) (U2100, L2100), RUS01 B2 (x3) (G1900), RUS01 B2 (x3) (U1900)

Proposed RAN Equipment	
Template: 704Bu Outdoor	
Enclosure	1
Enclosure Type	RBS 6102
Baseband	DUG20 (G1900), DUW30 (U1900), DUW30 (U2100), DUS41 (L2100, L700)
Multiplexer	XMU (L2100, L700)
Radio	RUS01 B2 (x3) (G1900), RUS01 B2 (x3) (U1900), RUS01 B4 (x6) (U2100, L2100)

RAN Scope of Work:

Swap DUL with DUS41. Swap EMS antennas with APX dualpoles.

RAN Template: 704Bu Outdoor	A&L Template: 704Bu

CT11110C_1.2_L700

Section 6 - A&L Equipment

Existing Template: 4B_2DP
Proposed Template: 704Bu

Sector 1 (Existing) view from behind		
Coverage Type	A - Outdoor Macro	
Antenna	1	2
Antenna Model	RR90-17-02DP (Dual)	RR90-17-02DP (Dual)
Azimuth	60	60
M. Tilt	0	0
Height	154	154
Ports	P1	P2
Active Tech.	U1900 G1900	U2100 L2100
Dark Tech.		
Restricted Tech.		
Decomm. Tech.		
E. Tilt		
Cables	Coax Feeder - 185 ft. Coax Feeder - 185 ft.	Coax Feeder - 185 ft. Coax Feeder - 185 ft.
TMAs	Generic Style 1A - Twin PCS	Generic Style 1B - Twin AWS
Diplexers / Combiners		
Radio		
Sector Equipment		

Unconnected Equipment:

Scope of Work:

RAN Template: 704Bu Outdoor	A&L Template: 704Bu

CT11110C_1.2_L700

Sector 1 (Proposed) view from behind		
Coverage Type	A - Outdoor Macro	
Antenna	1	2
Antenna Model	APXV18-209014-C (Dual)	LNX-6512DS-A1M (Dual)
Azimuth	60	60
M. Tilt	0	0
Height	154	162
Ports	P1	P2
Active Tech.	U2100 U1900 L2100 G1900	L700
Dark Tech.		
Restricted Tech.		
Decomm. Tech.		
E. Tilt	2	2
Cables	7/8" Coax - 185 ft. 7/8" Coax - 185 ft.	7/8" Coax - 185 ft. 7/8" Coax - 185 ft.
TMAs	Generic Style 3B - Single Diplexed PCS/AWS Generic Style 3B - Single Diplexed PCS/AWS	
Diplexers / Combiners	Filter Filter	
Radio		RRUS11 B12
Sector Equipment		Andrew Smart Bias T

ALL CABLES 1-5/8"

Unconnected Equipment:

Scope of Work:

RRU's on the ground for L700.

TMAs on the ground

RAN Template: 704Bu Outdoor	A&L Template: 704Bu

CT11110C_1.2_L700

Sector 2 (Existing) view from behind		
Coverage Type	A - Outdoor Macro	
Antenna	1	2
Antenna Model	RR90-17-02DP (Dual)	RR90-17-02DP (Dual)
Azimuth	180	180
M. Tilt	0	0
Height	154	154
Ports	P1	P2
Active Tech.	U1900 G1900	U2100 L2100
Dark Tech.		
Restricted Tech.		
Decomm. Tech.		
E. Tilt		
Cables	Coax Feeder - 185 ft. Coax Feeder - 185 ft.	Coax Feeder - 185 ft. Coax Feeder - 185 ft.
TMAs	Generic Style 1A - Twin PCS	Generic Style 1B - Twin AWS
Diplexers / Combiners		
Radio		
Sector Equipment		

Unconnected Equipment:

Scope of Work:

RAN Template: 704Bu Outdoor	A&L Template: 704Bu

CT11110C_1.2_L700

Sector 2 (Proposed) view from behind		
Coverage Type	A - Outdoor Macro	
Antenna	1	2
Antenna Model	APXV18-209014-C (Dual)	LNX-6512DS-A1M (Dual)
Azimuth	180	180
M. Tilt		0
Height	154	162
Ports	P1	P2
Active Tech.	U2100 U1900 L2100 G1900	L700
Dark Tech.		
Restricted Tech.		
Decomm. Tech.		
E. Tilt	2	2
Cables	7/8" Coax - 185 ft. 7/8" Coax - 185 ft.	7/8" Coax - 185 ft. 7/8" Coax - 185 ft.
TMAs	Generic Style 3B - Single Diplexed PCS/AWS Generic Style 3B - Single Diplexed PCS/AWS	
Diplexers / Combiners	Filter Filter	
Radio		RRUS11 B12
Sector Equipment		Andrew Smart Bias T

ALL CABLES 1-5/8"

Unconnected Equipment:

Scope of Work:

RRUS on the ground for L700.

TMAs on the ground

RAN Template: 704Bu Outdoor	A&L Template: 704Bu

CT11110C_1.2_L700

Sector 3 (Existing) view from behind		
Coverage Type	A - Outdoor Macro	
Antenna	1	2
Antenna Model	RR90-17-02DP (Dual)	RR90-17-02DP (Dual)
Azimuth	300	300
M. Tilt	0	0
Height	154	154
Ports	P1	P2
Active Tech.	U1900 G1900	U2100 L2100
Dark Tech.		
Restricted Tech.		
Decomm. Tech.		
E. Tilt		
Cables	Coax Feeder - 185 ft. Coax Feeder - 185 ft.	Coax Feeder - 185 ft. Coax Feeder - 185 ft.
TMAs	Generic Style 1A - Twin PCS	Generic Style 1B - Twin AWS
Diplexers / Combiners		
Radio		
Sector Equipment		

Unconnected Equipment:

Scope of Work:

RAN Template: 704Bu Outdoor	A&L Template: 704Bu

CT11110C_1.2_L700

Sector 3 (Proposed) view from behind		
Coverage Type	A - Outdoor Macro	
Antenna	1	2
Antenna Model	APXV18-209014-C (Dual)	LNX-6512DS-A1M (Dual)
Azimuth	300	300
M. Tilt	0	0
Height	154	162
Ports	P1	P2
Active Tech.	U2100 U1900 L2100 G1900	L700
Dark Tech.		
Restricted Tech.		
Decomm. Tech.		
E. Tilt	2	2
Cables	7/8" Coax - 185 ft. 7/8" Coax - 185 ft.	7/8" Coax - 185 ft. 7/8" Coax - 185 ft.
TMAs	Generic Style 3B - Single Diplexed PCS/AWS Generic Style 3B - Single Diplexed PCS/AWS	
Diplexers / Combiners	Filter Filter	
Radio		RRUS11 B12
Sector Equipment		Andrew Smart Bias T

ALL CABLES 1-5/8"

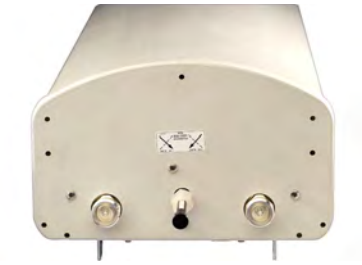
Unconnected Equipment:

Scope of Work:

RRUS on the ground for L700.

TMAs on the ground

Product Specifications



LNX-6512DS-VTM | LNX-6512DS-A1M

Single Band Antenna, 698–896 MHz, 65° horizontal beamwidth, RET compatible

- Excellent choice to maximize both coverage and capacity in suburban and rural applications
- Ideal choice for site collocations and tough zoning restrictions
- Extended elevation tilt for maximum flexibility in urban core areas
- Remote beam tilt management is an optional feature using Andrew's Teletilt® system
- The RF connectors are designed for IP67 rating and the radome for IP56 rating

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**
Gain, dBi	14.1	15.0
Beamwidth, Horizontal, degrees	65	65
Beamwidth, Vertical, degrees	19.0	17.0
Beam Tilt, degrees	0–15	0–15
USLS, typical, dB	17	18
Front-to-Back Ratio at 180°, dB	28	28
CPR at Boresight, dB	12	12
CPR at Sector, dB	10	10
Isolation, dB	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	400	400
Polarization	±45°	±45°
Impedance	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	**698–806**	**806–896**
Beamwidth, Horizontal Tolerance, degrees	±3	±3

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

General Specifications

Operating Frequency Band	698 – 896 MHz
Antenna Type	Sector
Band	Single band
Performance Note	Outdoor usage

Mechanical Specifications

RF Connector Quantity, total	2
RF Connector Quantity, low band	2
RF Connector Interface	7-16 DIN Female
Color	Light gray
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Radiator Material	Aluminum
Radome Material	Fiberglass, UV resistant

Product Specifications

LNX-6512DS-VTM | LNX-6512DS-A1M

RF Connector Location	Bottom
Wind Loading, frontal	380.0 N @ 150 km/h 85.4 lbf @ 150 km/h
Wind Loading, lateral	122.0 N @ 150 km/h 27.4 lbf @ 150 km/h
Wind Loading, rear	446.0 N @ 150 km/h 100.3 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Length	1232.0 mm | 48.5 in
Width	301.0 mm | 11.9 in
Depth	181.0 mm | 7.1 in
Net Weight, without mounting kit	13.0 kg | 28.7 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 2.0 Actuator	LNX-6512DS-A1M

Packed Dimensions

Length	1548.0 mm | 60.9 in
Width	411.0 mm | 16.2 in
Depth	284.0 mm | 11.2 in
Shipping Weight	29.5 kg | 65.0 lb

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system

Included Products

DB380 — Pipe Mounting Kit for 2.4"-4.5" (60-115mm) OD round members on wide panel antennas. Includes 2 clamp sets and double nuts.

DB5083 — Downtilt Mounting Kit for 2.4"-4.5" (60 - 115 mm) OD round members. Includes a heavy-duty, galvanized steel downtilt mounting bracket assembly and associated hardware. This kit is compatible with the DB380 pipe mount kit for panel antennas that are equipped with two mounting brackets.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

Product Data Sheet **APXV18-209014-C**

Optimizer® Dual Polarized Antenna, 1710-2170, 90deg, 16.5dBi, 1.3m, VET, 0-10deg

Product Description

This X-Polarized variable tilt antenna provides exceptional suppression of all upper sidelobes at all downtilt angles. It also features a wide downtilt range. This antenna is optimized for performance across the entire frequency band (1710-2170 MHz).

Features/Benefits

- **Variable electrical downtilt - provides enhanced precision in controlling intercell interference. The tilt is infield adjustable 0-10 deg.**
- **High Suppression of all Upper Sidelobes (Typically <-20dB).**
- **Optional remote tilt - can be retrofitted.**
- **Two X-Polarized panels in a single radome.**
- **Dual polarization.**
- **Low profile for low visual impact.**
- **Broadband design.**

Technical Specifications

Electrical Specifications

Frequency Range, MHz	1710-1900		1900-2170
Horizontal Beamwidth, deg		88	
Vertical Beamwidth, deg	7.0		6.4
Electrical Downtilt Range, deg		0-10	
Gain, dBi (dBd)		16.5 (14.4)	
1st Upper Sidelobe Suppression, dB		>19 first (typically >22)	
Upper Sidelobe Suppression, dB		>17 all other (typically >20)	
Front-To-Back Ratio, dB		>26	
Polarization		Dual pol +/-45°	
VSWR		< 1.5:1	
Isolation between Ports, dB		>30	
3rd Order IMP @ 2 x 43 dBm, dBc		≥153	
7th Order IMP @ 2 x 46 dBm, dBc		N/A, >170	
Impedance, Ohms		50	
Maximum Power Input, W		300	
Lightning Protection		Direct Ground	
Connector Type/Location		(2) 7-16 Long Neck Female/Bottom	

Mechanical Specifications

Dimensions - HxWxD, mm (in)	1349 x 169 x 80 (53.0 x 6.65 x 3.15)
Weight w/o Mtg Hardware, kg (lb)	8.5 (18.7)
Survival/Rated Wind Speed, km/h (mph)	200 (125) / 160 (100)
Wind Load @ Rated Wind, Front, N (lbf)	406 (91)
Wind Load @ Rated Wind, Max., N (lbf)	406 (91)
Wind Load @ Rated Wind, Side, N (lbf)	236 (53)
Wind Load @ Rated Wind, Rear, N (lbf)	196 (44)
Operation temperature, °C (°F)	-40 to +60 (-40 to +140)
Radome Material/Color	Fiberglass/Light Grey RAL7035
Mounting Hardware Material	Diecasted Aluminum
Radiating Element Material	Brass
Reflector Material	Aluminum
Shipping Weight, kg (lb)	15.5 (34.1)
Packing Dimensions, HxWxD, mm (in)	1520 x 260 x 200 (59.8 x 10.2 x 7.8)

Ordering Information

Mounting Hardware	APM40-2
Mounting Pipe Diameter, mm (in)	60-120 (2.36-4.72)
Mounting Hardware Weight, kg (lb)	3.4 (7.5)

Product Specifications

ATSBT-TOP-FM-4G

Teletilt® Top Smart Bias Tee

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

General Specifications

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

Electrical Specifications

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

Mechanical Specifications

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

Product Specifications

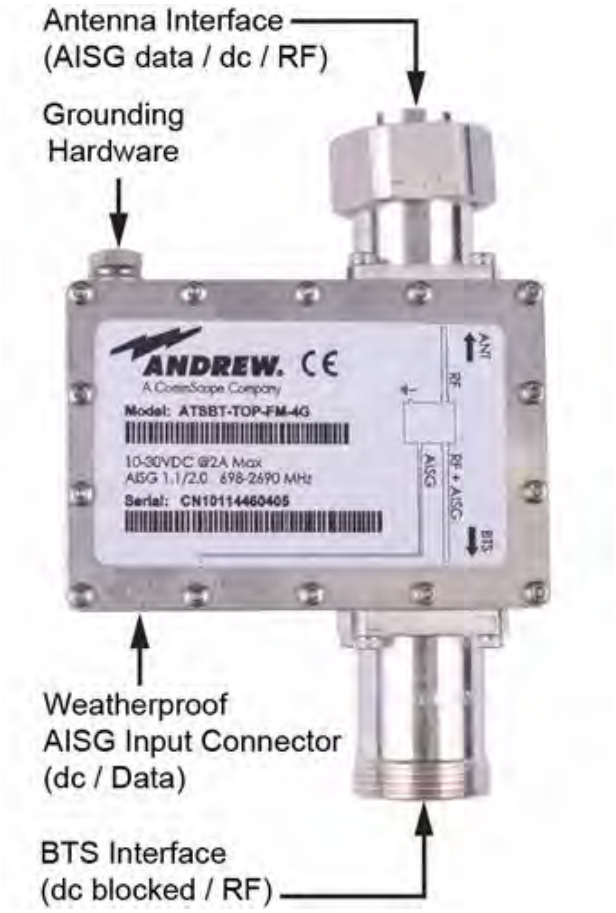
ATSBT-TOP-FM-4G

Lightning Surge Capability Test Method	IEC 61000-4-5, Level X
Lightning Surge Capability Waveform	1.2/50 voltage and 8/20 current combination waveform

Environmental Specifications

Ingress Protection Test Method	IEC 60529:2001, IP66
Operating Temperature	-40 °C to +70 °C (-40 °F to +158 °F)

Interface Port Drawing



Dimensions

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

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption

Exhibit E

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: CT11110C

Danbury/I-84/X8
8 Chimney Drive
Bethel, CT 06801

April 6, 2017

EBI Project Number: 6217000476

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	0.75 %

21 B Street · Burlington, MA 01803 · Tel: (781) 273.2500 · Fax: (781) 273.3311

EBI Consulting
environmental | engineering | due diligence

April 6, 2017

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

Emissions Analysis for Site: **CT11110C – Danbury/I-84/X8**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **8 Chimney Drive, Bethel, CT**, 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 (μW/cm2). 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 public 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 public 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 limit for the 700 MHz Band is approximately 467 $\mu W/cm^2$, and the general population exposure limit for the 1900 MHz (PCS) and 2100 MHz (AWS) 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 **8 Chimney Drive, Bethel, CT**, 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 manufactures supplied specifications, minus 10 dB, 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 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.

2) 2 UMTS 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.

3) 2 UMTS channels (AWS Band – 2100 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 (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel

5) 1 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 30 Watts.

6) Since all radios are ground mounted there are additional cabling losses accounted for. For each ground mounted RF path the following losses were calculated. 1.76 dB of additional cable loss for all ground mounted 700 MHz Channels, 3.11 dB of additional cable loss for all ground mounted 1900 MHz channels and 3.20 dB of additional cable loss for all ground mounted 2100 MHz channels were factored into the calculations used for this analysis. This is based on manufacturers Specifications for 185 feet of 7/8" coax cable on each path.

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

8) For the following calculations the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications minus 10 dB was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

9) The antennas used in this modeling are the **RFS APX18D-209014-C** for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the **Commscope LNX-6512DS-A1M** for 700 MHz channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **RFS APX18D-209014-C** has a maximum gain of **14.4 dBd** at its main lobe at 1900 MHz and 2100 MHz. The **Commscope LNX-6512DS-A1M** has a maximum gain of **12 dBd** at its main lobe at 700 MHz. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

10) The antenna mounting height centerlines of the proposed antennas are **154 & 162 feet** above ground level (AGL).

11) 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.

12) All calculations were done with respect to uncontrolled / general public threshold limits.

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	RFS APX18D-209014-C	Make / Model:	RFS APX18D-209014-C	Make / Model:	RFS APX18D-209014-C
Gain:	14.4 dBd	Gain:	14.4 dBd	Gain:	14.4 dBd
Height (AGL):	154	Height (AGL):	154	Height (AGL):	154
Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)
Channel Count	8	Channel Count	8	Channel Count	8
Total TX Power(W):	300	Total TX Power(W):	300	Total TX Power(W):	300
ERP (W):	3,987.89	ERP (W):	3,987.89	ERP (W):	3,987.89
Antenna A1 MPE%	0.65	Antenna B1 MPE%	0.65	Antenna C1 MPE%	0.65
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Commscope LNX-6512DS-A1M	Make / Model:	Commscope LNX-6512DS-A1M	Make / Model:	Commscope LNX-6512DS-A1M
Gain:	12 dBd	Gain:	12 dBd	Gain:	12 dBd
Height (AGL):	162	Height (AGL):	162	Height (AGL):	162
Frequency Bands	700 MHz	Frequency Bands	700 MHz	Frequency Bands	700 MHz
Channel Count	1	Channel Count	1	Channel Count	1
Total TX Power(W):	30	Total TX Power(W):	30	Total TX Power(W):	30
ERP (W):	317.05	ERP (W):	317.05	ERP (W):	317.05
Antenna A2 MPE%	0.10	Antenna B2 MPE%	0.10	Antenna C2 MPE%	0.10

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile (Per Sector Max)	**0.75 %**
No Additional Carriers Per CSC Active MPE Database	NA
Site Total MPE %:	**0.75 %**

T-Mobile Sector A Total:	0.75 %
T-Mobile Sector B Total:	0.75 %
T-Mobile Sector C Total:	0.75 %
Site Total:	0.75 %

T-Mobile _Max Values per sector	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
T-Mobile AWS - 2100 MHz LTE	2	790.95	154	2.60	AWS - 2100 MHz	1000	0.26%
T-Mobile AWS - 2100 MHz UMTS	2	395.48	154	1.30	AWS - 2100 MHz	1000	0.13%
T-Mobile PCS - 1950 MHz UMTS	2	403.76	154	1.33	PCS - 1950 MHz	1000	0.13%
T-Mobile PCS - 1950 MHz GSM	2	403.76	154	1.33	PCS - 1950 MHz	1000	0.13%
T-Mobile 700 MHz LTE	1	317.05	162	0.47	700 MHz	467	0.10%
						Total:	**0.75%**

Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general public 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 public exposure to RF Emissions are shown here:

T-Mobile Sector	Power Density Value (%)
Sector A:	0.75 %
Sector B:	0.75 %
Sector C:	0.75 %
T-Mobile Per Sector Maximum:	0.75 %
Site Total:	0.75 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **0.75%** of the allowable FCC established general public 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 F

EVERSOURCE ENERGY

56 Prospect Street,
Hartford, CT 06103

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

March 27, 2017

Mr. Mark Richard
T-Mobile
35 Griffin Rd.
Bloomfield, CT 06002

RE: T-Mobile Antenna Site, CT11110C, 8 Chimney Dr., Bethel CT, structure 10256.

Dear Mr. Richard:

Based on our reviews of the site drawings, the structural analysis provided by Centek Engineering and, and the foundation analyses performed by Centek Engineering, we have reviewed for acceptance this modification

Since there are no outstanding structural or site related issues to resolve at this time, please contact Hank O'Brien (860-665-6987) to complete the lease amendment issues

Sincerely,

Robert Gray
Transmission Line Engineering

ref: CT11110C-L700-CD-S&S V2.pdf
16162.07 - CT11110C Structural Analysis Rev1 17.02.08.pdf