May 6, 2015

VERTICAL DEVELOPMENT
20 Commercial St Branford, CT 06405

VIA EMAIL AND OVERNIGHT DELIVERY

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

RE: T-Mobile Northeast LLC – Notice of Exempt Modification
144 Chestnut Hill Road, Wilton, CT

Dear Ms. Bachman:

This letter and attachments are submitted on behalf of T-Mobile Northeast LLC ("T-Mobile"). T-Mobile is undertaking modifications to certain existing sites in its Connecticut network in order to implement updated technology. In order to do so, T-Mobile will modify antenna and equipment configurations at a number of existing sites. Please accept this letter and attachments as notification, pursuant to R.C.S.A. Section 16-50j-73, of construction which constitutes an exempt modification pursuant to R.C.S.A Section 16-50j-72(b)(2). In compliance with R.C.S.A. Section 16-50j-73, a copy of this letter and attachments is being sent to the First Selectman of the Town of Wilton, and the property owner, Eversource Energy. Please also see the letter of authorization from Eversource Energy attached hereto.

T-Mobile plans to modify the existing facility at 144 Chestnut Hill Road owned by Eversource Energy/Connecticut Light and Power (coordinates 41.18119, -73.39324). Attached are drawings depicting the planned changes, and documentation of the structural sufficiency of the tower to accommodate the revised antenna configuration. Also included is a power density calculation reflecting the modification to T-Mobile's operations at the site.

The changes to the facility do not constitute a modification as defined in Connecticut General Statutes ("C.G.S.") Section 16-50i(d) because the general physical characteristics of the facility will not be significantly changed. Rather, the planned changes to the facility fall squarely within those activities explicitly provided for in R.C.S.A. Section 16-50j-72(b)(2).

1. The height of the overall structure will be unaffected. T-Mobile proposes to replace three (3) existing antennas on a replacement mount (attached to a 19'–6" long pipe mast) at a centerline height of 97'–3" AGL.

2. The proposed changes will not extend the site boundaries. T-Mobile will replace four (4) existing GMA with six (6) GMA and replace an equipment cabinet

on an existing concrete pad. Thus, there will be no effect on the site compound or T-Mobile's leased area.

3. The proposed changes will not increase the noise level at the existing facility by six decibels or more. The incremental effect of the proposed changes will be negligible.

4. The changes to the facility will not increase the calculated "worst case" power density for the combined operations at the site to a level at or above the applicable standard for uncontrolled environments as calculated for a mixed frequency site. As indicated in the attached power density calculations, T-Mobile's operations at the site will result in a power density of 13.26%; the combined site operations will result in a total power density of 13.26%.

Please feel free to call me with any questions or concerns regarding this matter. Thank you for your consideration.

Respectfully submitted,

By: _____
Eric Dahl, Agent for T-Mobile
edahl@comcast.net
860-227-1975

Attachments

cc: First Selectman William F. Brennan, Town of Wilton
Hank O'Brien, Eversource/CL&P

EVERSOURCE ENERGY

107 Selden Street
Berlin, CT 06037

April 1, 2015

David Karpinski, General Manager
T-Mobile Northeast LLC
35 Griffin Road, South
Bloomfield, CT 06002

Re: Site Permitting Authorization

Dear Mr. Karpinski,

Authorization is hereby given to T-Mobile Northeast LLC, its employees and its duly authorized agents and independent contractors, to apply for any and all local municipal, state and federal licenses, permits and approvals, including but not limited to Connecticut Siting Council, building permits, zoning variances, zoning special exceptions, site plan and subdivision approvals, driveway, wetlands and terrain alteration permits, which are or may be necessary or required for T-Mobile Northeast LLC to construct, operate and maintain a wireless communications system (PCS System), and/or antenna site on the following property owned by The Connecticut Light & Power Company (CL&P):

144 Chestnut Hill Road
Wilton, CT
Pole 936
CT11296A

The foregoing authorization is given subject to the following conditions:

1. This authorization shall be nonexclusive. Nothing herein shall prevent or restrict CL&P from authorizing any other person or entity to apply for any similar licenses, permits or approvals to construct, operate and maintain any other communication system or facility of any type on the property at any time.

2. This authorization shall not obligate CL&P to pay for or reimburse any costs or expenses or to provide any assistance of any kind in connection with any applications, or bind or obligate CL&P to agree or be responsible for any on-site or off-site improvements, development restrictions, impact fees or assessments, capital improvement charges, bonds or other security, or any other fee, assessment, charge or expense imposed or required as a condition of any license, permit or approval. T-Mobile Northeast LLC shall be solely and fully responsible for all fees, charges costs and expenses of any kind in connection with any applications. CL&P agrees to reasonably cooperate with T-Mobile Northeast LLC in signing such applications or other similar documents as may be required in order for T-Mobile Northeast LLC to apply for any license, permit or approval.

EVERSOURCE ENERGY

107 Selden Street
Berlin, CT 06037

3. This authorization shall not be deemed or construed to grant or transfer to T-Mobile Northeast LLC any interest in the property, whatsoever, and shall not in any respect obligate or require CL&P to sell, lease or license the Property to T-Mobile Northeast LLC or otherwise allow T-Mobile Northeast LLC to use or occupy the property for any purpose, regardless of whether any licenses, permits and approvals applied for by T-Mobile Northeast LLC for the property are granted. T-Mobile Northeast LLC understands and acknowledges that any and all applications filed by T-Mobile Northeast LLC for the property at T-Mobile Northeast LLC sole risk and without any enforceable expectation that the property will be made available for T-Mobile Northeast LLC' use.

4. T-Mobile Northeast LLC shall be required to supply to CL&P, free of charge and contemporaneous with T-Mobile Northeast LLC filing of same, a complete copy of any and all applications, plans, reports and other public filings made by T-Mobile Northeast LLC with any local, municipal, state or federal governmental or regulatory officer, agency board, bureau, commission or other person or body for any licenses, permits or approvals for the property, and to keep CL&P fully informed on a regular basis of the status of T-Mobile Northeast LLC' applications.

5. This authorization shall automatically expire six (6) months after the date of this letter, unless extended in writing by mutual agreement of CL&P and T-Mobile Northeast LLC.

Very truly yours,

T & D ROW & Survey Engineering

AGREED TO ON BEHALF OF

T-MOBILE NORTHEAST LLC

By: _____
Duly Authorized

David Karpinski
CT Market Manager

Date: 3-31-2015

144 Chestnut Hill Road
Wilton, CT
Pole 936
CT11296A

T-Mobile

NORTHEAST LLC.

SITE NAME: WILTON/RT 33

SITE NUMBER: CT11296A

SITE ADDRESS: 144 CHESTNUT HILL ROAD (RTE-53),
WILTON, CONNECTICUT, 06897
CL&P TOWER #936

PROJECT SUMMARY

SITE NUMBER:	CT11296A
SITE NAME:	WILTON/RT 33
SITE ADDRESS:	144 CHESTNUT HILL ROAD (RTE-53), WILTON, CONNECTICUT, 06897
COUNTY:	FAIRFIELD
PROPERTY OWNER:	CONNECTICUT LIGHT & POWER
STRUCTURE #:	936
APPLICANT:	T-MOBILE NORTHEAST LLC. 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002 (860) 692-7100
ENGINEER:	TECTONIC ENGINEERING CONSULTANTS P.C. 1279 ROUTE 300 NEWBURGH, NY 12550
CONTACT: PHONE:	JAMES QUICKSELL (845) 567-6656 EXT. 2835
SITE ACQUISITION:	HPC WIRELESS 22 SHELTER ROCK LANE, BLDG C DANBURY, CT 06810
CONTACT: PHONE:	ALEX GIANNARAS (617) 281-0084
LATITUDE: (NAD 83)	41.18119° N
LONGITUDE: (NAD 83)	73.39324° W

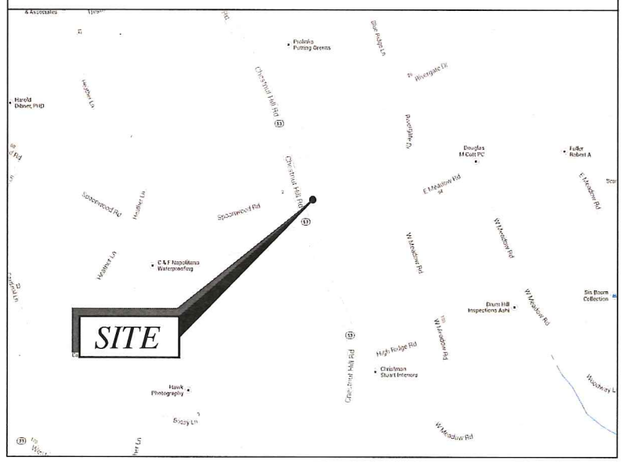
SITE DIRECTIONS

HEAD NORTHEAST ON GRIFFIN RD S TOWARD W NEWBERRY RD. TAKE THE 1ST RIGHT ONTO W NEWBERRY RD. TURN RIGHT ONTO WOODLAND AVE. TAKE THE 1ST RIGHT ONTO CT-187 S/BLUE HILLS AVE. TURN LEFT ONTO CT-178 E/E WINTONBURY AVE. CONTINUE TO FOLLOW CT-178 E. TURN RIGHT TO MERGE ONTO I-91 S TOWARD HARTFORD. TAKE EXIT 17 FOR CT-15 S/W CROSS PKWY. MERGE ONTO CT-15 S. TAKE EXIT 41 TOWARD CT-33 N/WILTON RD. TURN LEFT ONTO CT-33 N/WILTON RD. CONTINUE TO FOLLOW CT-33 N. TURN RIGHT ONTO CT-53 N/CHESTNUT HILL RD. DESTINATION WILL BE ON THE RIGHT.

N

LOCATION MAP

SCALE: NTS



SHEET INDEX

SHEET NO	DESCRIPTION	REV NO
T-1	TITLE SHEET	3
A-1	SITE PLAN & EQUIPMENT PLAN	3
A-2	ELEVATION	3
A-3	ANTENNA PLAN & DETAILS	3
A-4	UTILITY, GROUNDING & CONFIG. DIAGRAMS	3
A-5	NOTES	3
A-6	NOTES	3
A-7	NOTES	3
A-8	FOUNDATION MODIFICATION DESIGN (BY OTHERS)	0

THIS SET OF PLANS SHALL NOT BE UTILIZED AS CONSTRUCTION DOCUMENTS UNTIL ALL ITEMS HAVE BEEN ADDRESSED AND EACH OF THE DRAWINGS HAS BEEN REVISED AND ISSUED "FOR CONSTRUCTION".

CONFIGURATION
4B

0 1 2 3
ORIGINAL SIZE IN INCHES

TECTONIC
• PLANNING • SURVEYING
• ENGINEERING • CONSTRUCTION MANAGEMENT

TECTONIC Engineering & Surveying Consultants P.C.
1279 Route 300
Newburgh, NY 12550
Phone: (845) 567-6656
Fax: (845) 567-8703

T-Mobile
NORTHEAST LLC.

T-MOBILE NORTHEAST, LLC.
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

APPROVALS

T-MOBILE _____
LANDLORD _____
RF _____
CONSTRUCTION _____

PROJECT NUMBER	DESIGNED BY
6644.CT11296A	JQ

REV	DATE	REVISION	DRAWN BY
0	03/20/14	FOR COMMENT	JT
1	08/14/14	PER COMMENTS	DC
2	09/12/14	FOR CONSTRUCTION	MP
3	09/15/14	PER COMMENTS	MP

ISSUED BY	DATE
JMQ	9/15/14

STATE OF CONNECTICUT
JAMES M. QUICKSELL
No. 22033
LICENSED PROFESSIONAL ENGINEER

SITE INFORMATION

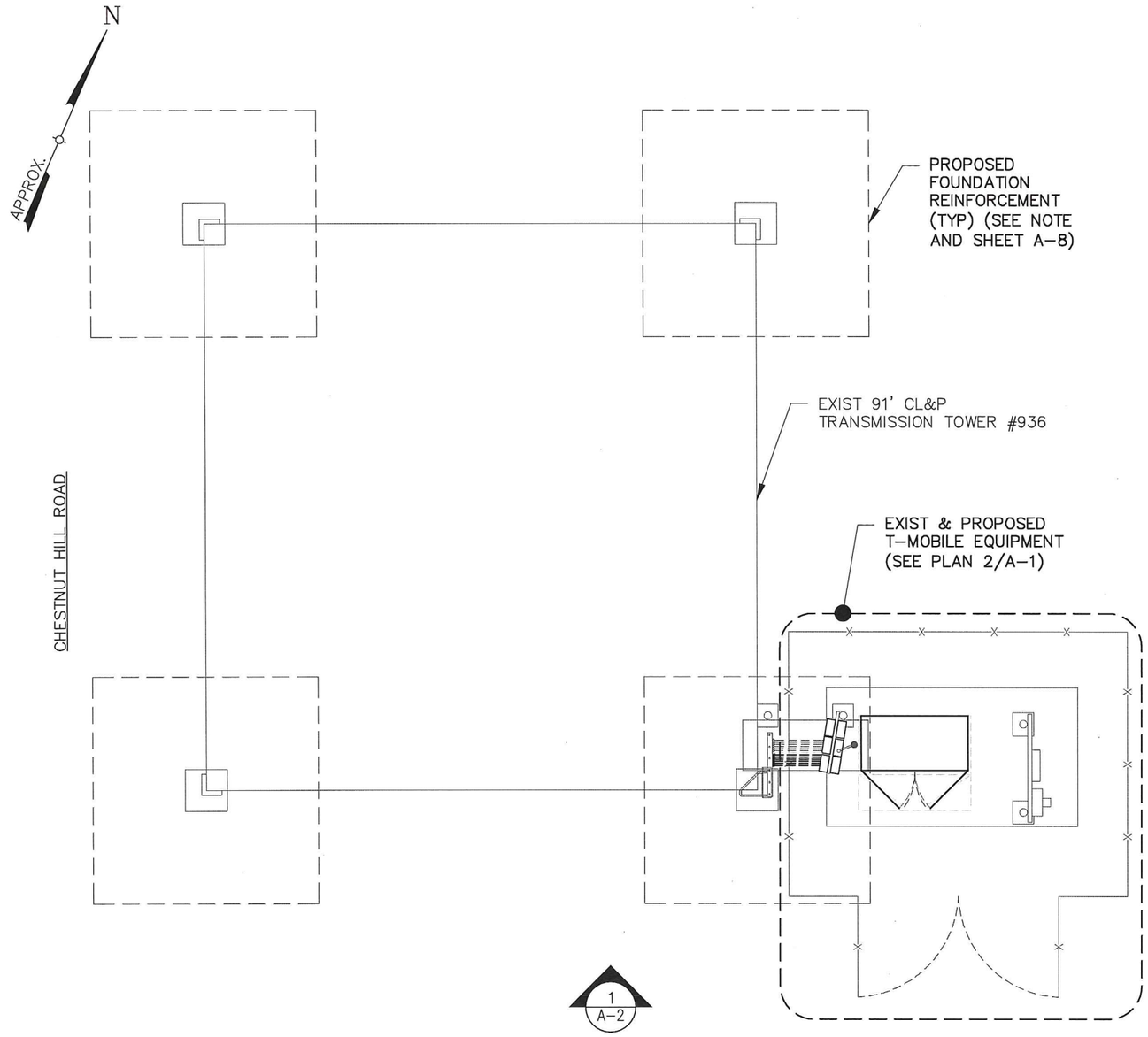
CT11296A
WILTON/RT 33
144 CHESTNUT HILL RD
(RTE-53)
WILTON, CT, 06897
CL&P TOWER #936

SHEET TITLE

TITLE SHEET

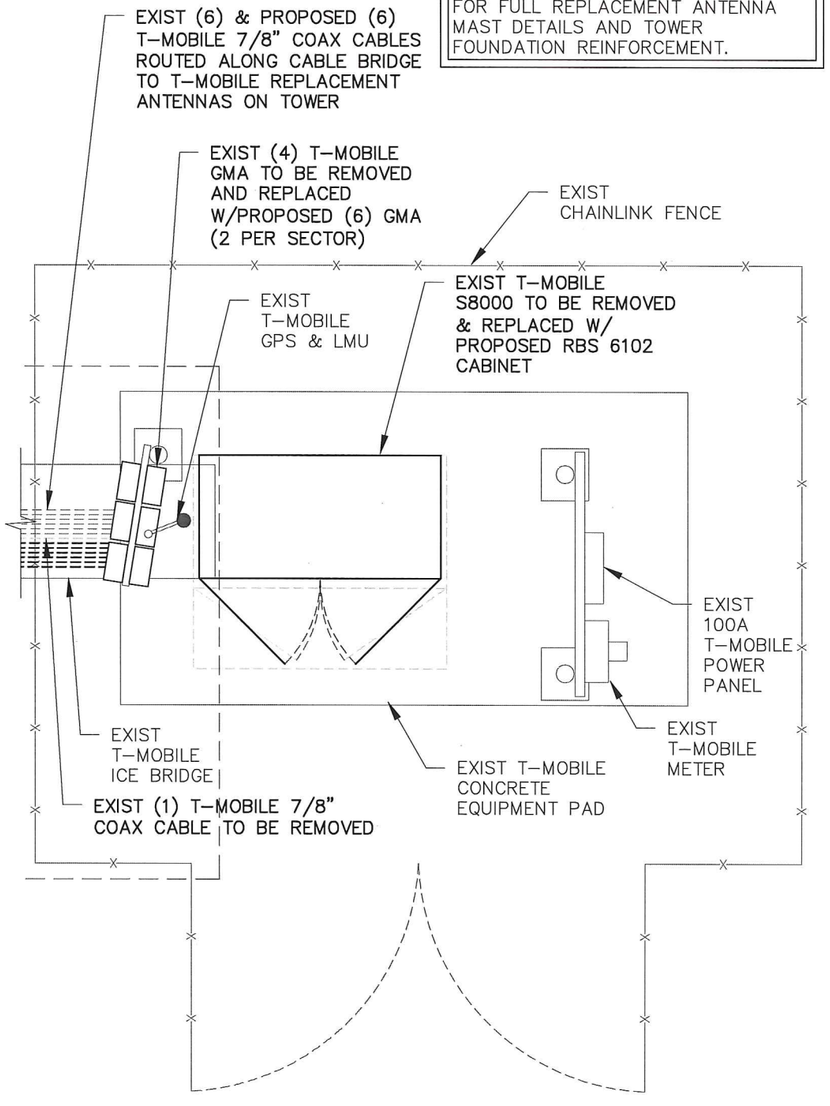
SHEET NUMBER

T-1



1 A-1 SITE PLAN

SCALE: 3/16" = 1'-0"



2 A-1 EQUIPMENT PLAN

SCALE: 3/8" = 1'-0"

NOTE:

REFER TO STRUCTURAL ANALYSIS BY CENTEK DATED 06/18/14, REV 1 FOR FULL REPLACEMENT ANTENNA MAST DETAILS AND TOWER FOUNDATION REINFORCEMENT.

NOTES:
1. CONTRACTOR TO MATCH ANTENNA AZIMUTHS AND DOWNTILTS TO EXISTING CONDITION AND NOTIFY RF ENGINEER FOR ANY DISCREPANCY.
2. CONTRACTOR TO RE-VERIFY CABLE LENGTHS PRIOR TO CONSTRUCTION.
3. CONTRACTOR SHALL FIELD VERIFY EXISTING ANTENNA MOUNT CONDITIONS, AND TIGHTEN ALL LOOSE ASSOCIATED HARDWARE IF REQUIRED.
4. LOCK & TAG BREAKERS FOR ALL EQUIPMENT BEING TURNED OFF (WHEN APPLICABLE).

CONFIGURATION

4B

0 1 2 3

ORIGINAL SIZE IN INCHES

TECTONIC
• PLANNING • ENGINEERING • SURVEYING • CONSTRUCTION MANAGEMENT
TECTONIC Engineering & Surveying Consultants P.C.
1279 Route 300
Newburgh, NY 12550
Phone: (845) 567-6656
Fax: (845) 567-8703

T-Mobile NORTHEAST LLC.

T-MOBILE NORTHEAST, LLC.
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

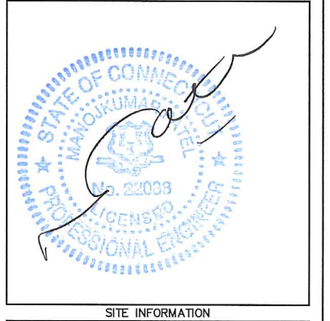
APPROVALS

T-MOBILE _____
LANDLORD _____
RF _____
CONSTRUCTION _____

PROJECT NUMBER	DESIGNED BY
6644.CT11296A	JQ

REV	DATE	REVISION	DRAWN BY
0	03/20/14	FOR COMMENT	JT
1	08/14/14	PER COMMENTS	DC
2	09/12/14	FOR CONSTRUCTION	MP
3	09/15/14	PER COMMENTS	MP

ISSUED BY	DATE
JMQ	9/15/14



SITE INFORMATION

CT11296A
WILTON/RT 33
144 CHESTNUT HILL RD
(RTE-53)
WILTON, CT, 06897
CL&P TOWER #936

SHEET TITLE

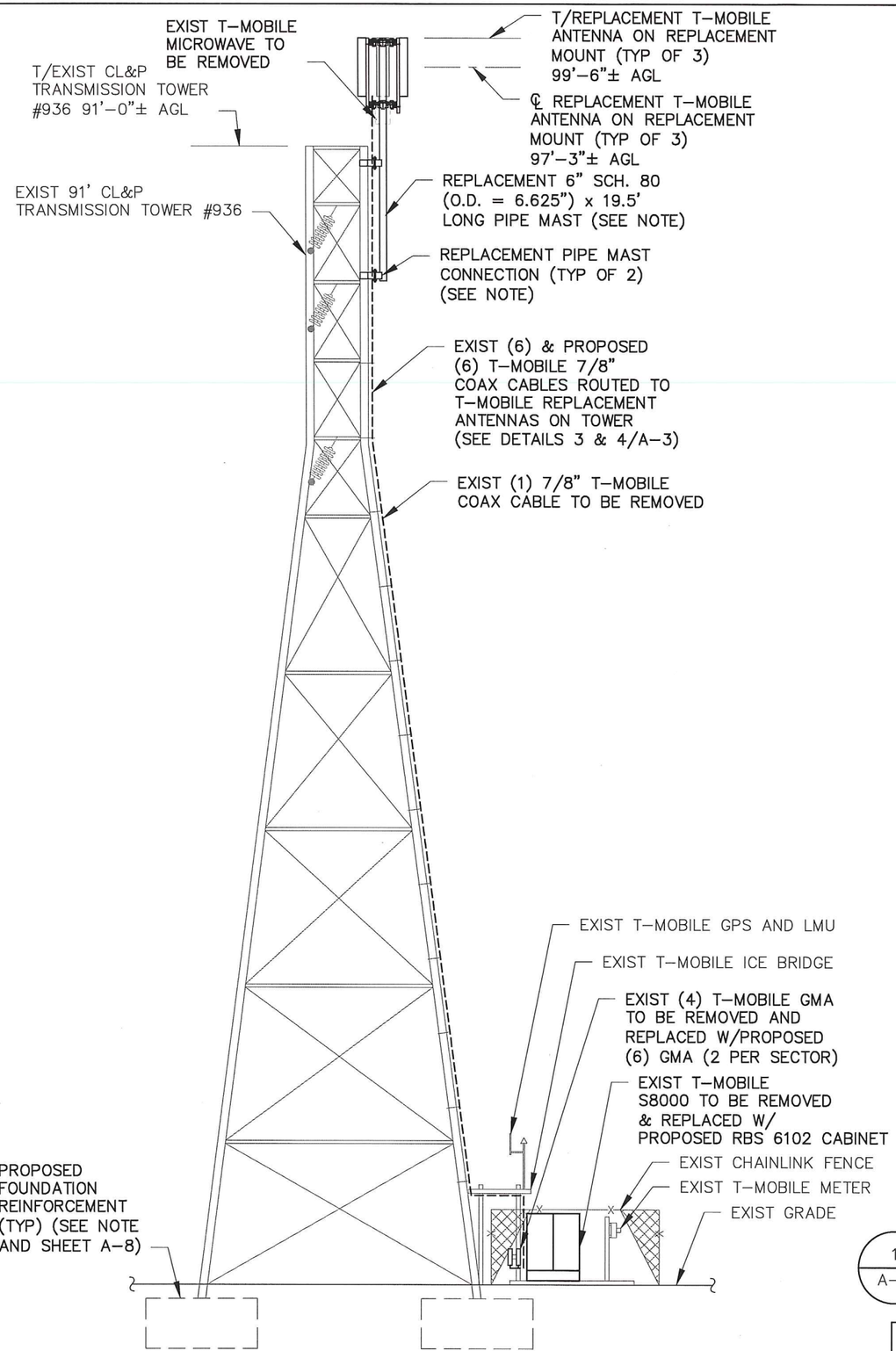
SITE PLAN &
EQUIPMENT PLAN

SHEET NUMBER

A-1

NOTE:

REFER TO STRUCTURAL ANALYSIS BY CENTEK DATED 06/18/14, REV 1 FOR FULL REPLACEMENT ANTENNA MAST DETAILS AND TOWER FOUNDATION REINFORCEMENT.



ELEVATION NOTE:

ELEVATION OF EXIST STEEL POLE HAS BEEN ARBITRARILY ASSIGNED AS EL 412'–0"±. THIS IS APPROXIMATELY 91'–0"± ABOVE GRADE WHICH WAS ESTIMATED AS EL 321'–0"± TAKEN FROM U.S.G.S. QUAD MAP, AND DOES NOT NECESSARILY CORRESPOND TO ACTUAL ELEVATION ABOVE SEA LEVEL. ALL OTHER ELEVATIONS INDICATED WERE DETERMINED ON THIS BASIS.

1/A–2 ELEVATION

SCALE: 3/32" = 1'–0"

CONFIGURATION 4B

0 1 2 3

ORIGINAL SIZE IN INCHES

TECTONIC

• PLANNING • ENGINEERING • SURVEYING • CONSTRUCTION MANAGEMENT

TECTONIC Engineering & Surveying Consultants P.C.

1279 Route 300
Newburgh, NY 12550
Phone: (845) 567–6656
Fax: (845) 567–8703

T–Mobile NORTHEAST LLC.

T–MOBILE NORTHEAST, LLC.
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

APPROVALS

T–MOBILE _____
LANDLORD _____
RF _____
CONSTRUCTION _____

PROJECT NUMBER	DESIGNED BY
6644.CT11296A	JQ

REV	DATE	REVISION	DRAWN BY
0	03/20/14	FOR COMMENT	JT
1	08/14/14	PER COMMENTS	DC
2	09/12/14	FOR CONSTRUCTION	MP
3	09/15/14	PER COMMENTS	MP

ISSUED BY	DATE
JMQ	9/15/14

STATE OF CONNECTICUT · MANOJKUMAR R. QUINTAL · No. 22038 · LICENSED PROFESSIONAL ENGINEER

SITE INFORMATION

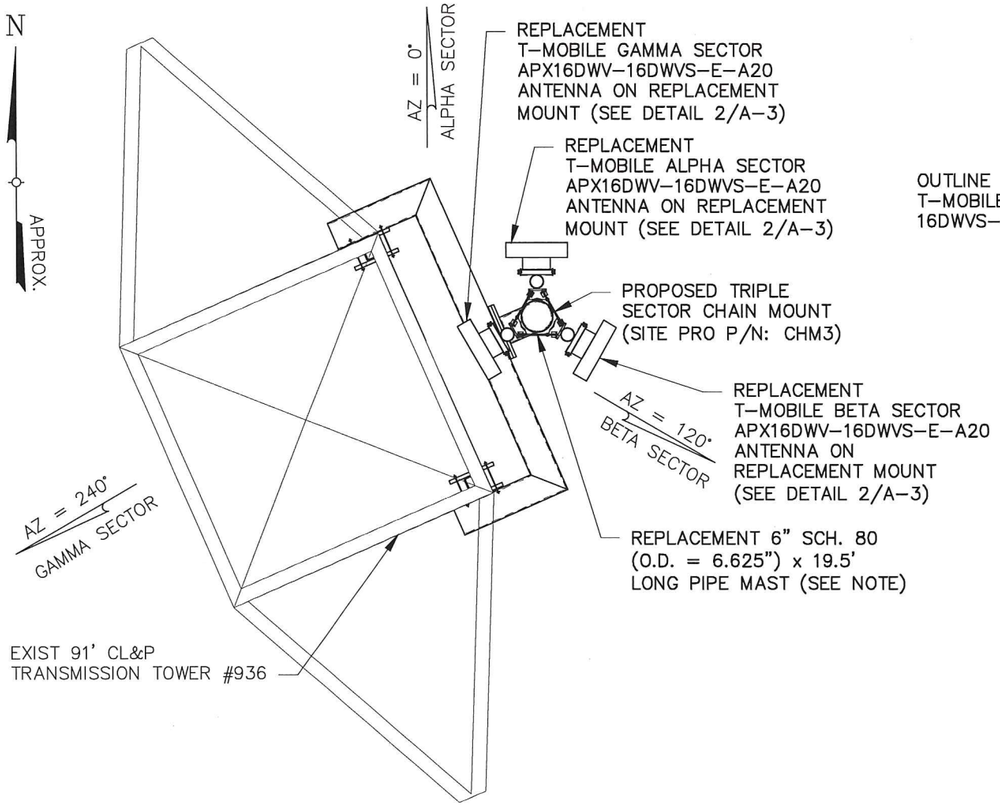
CT11296A
WILTON/RT 33
144 CHESTNUT HILL RD
(RTE–53)
WILTON, CT, 06897
CL&P TOWER #936

SHEET TITLE

ELEVATION

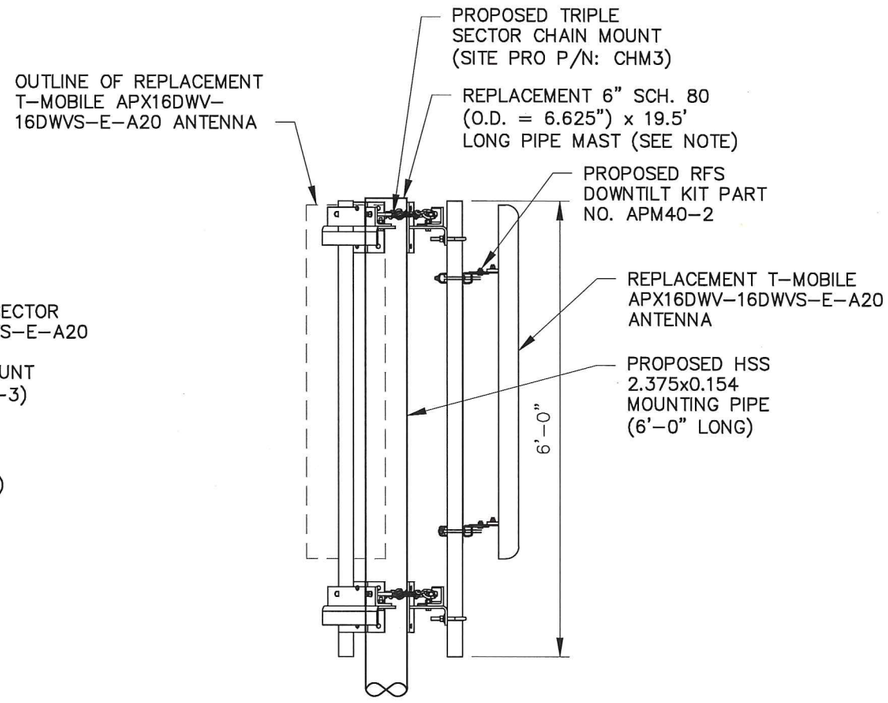
SHEET NUMBER

A–2



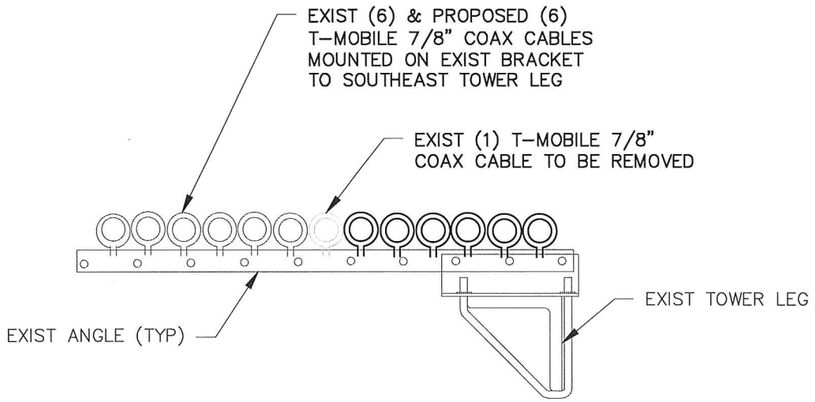
1 / A-3 ANTENNA PLAN

SCALE: 3/8" = 1'-0"



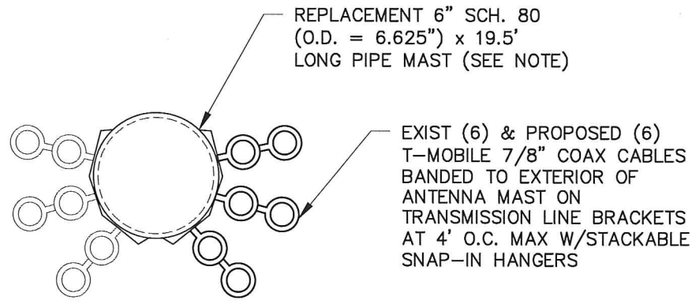
2 / A-3 DETAIL

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



3 / A-3 COAX CABLE PLAN (TOWER LEG)

SCALE: NTS



3 / A-3 COAX CABLE PLAN (STEEL POLE)

SCALE: NTS

NOTE:

REFER TO STRUCTURAL ANALYSIS BY CENTEK DATED 06/18/14, REV 1 FOR FULL REPLACEMENT ANTENNA MAST DETAILS AND TOWER FOUNDATION REINFORCEMENT.

CONFIGURATION

4B

0 1 2 3

ORIGINAL SIZE IN INCHES

TECTONIC

- PLANNING
- ENGINEERING
- SURVEYING
- CONSTRUCTION MANAGEMENT

TECTONIC Engineering & Surveying Consultants P.C.

1279 Route 300
Newburgh, NY 12550
Phone: (845) 567-6656
Fax: (845) 567-8703

T-Mobile NORTHEAST LLC.

T-MOBILE NORTHEAST, LLC.
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

APPROVALS

T-MOBILE _____
LANDLORD _____
RF _____
CONSTRUCTION _____

PROJECT NUMBER	DESIGNED BY
6644.CT11296A	JQ

REV	DATE	REVISION	DRAWN BY
0	03/20/14	FOR COMMENT	JT
1	08/14/14	PER COMMENTS	DC
2	09/12/14	FOR CONSTRUCTION	MP
3	09/15/14	PER COMMENTS	MP

ISSUED BY: JMQ
DATE: 9/15/14

STATE OF CONNECTICUT
MANOJKUMAR PATEL
No. 22038
LICENSED PROFESSIONAL ENGINEER

SITE INFORMATION

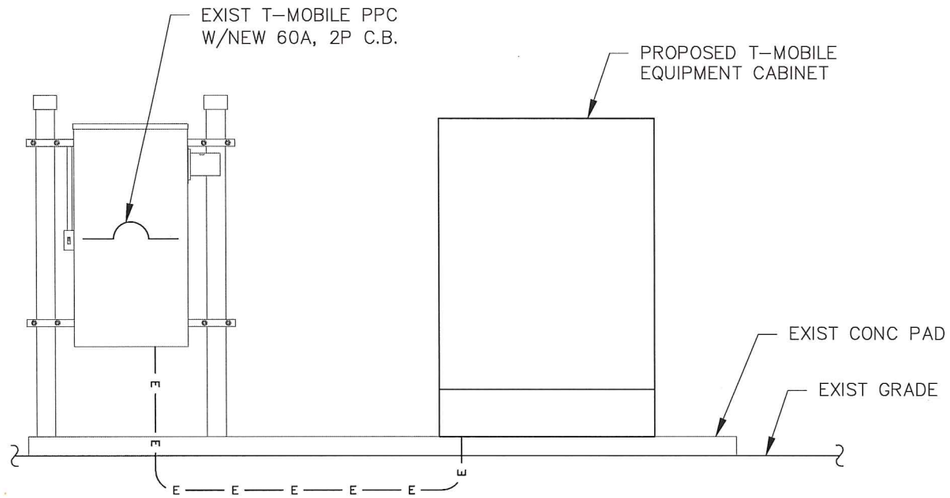
CT11296A
WILTON/RT 33
144 CHESTNUT HILL RD
(RTE-53)
WILTON, CT, 06897
CL&P TOWER #936

SHEET TITLE

ANTENNA PLAN
& DETAIL

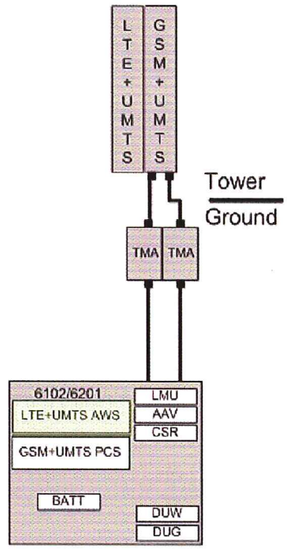
SHEET NUMBER

A-3



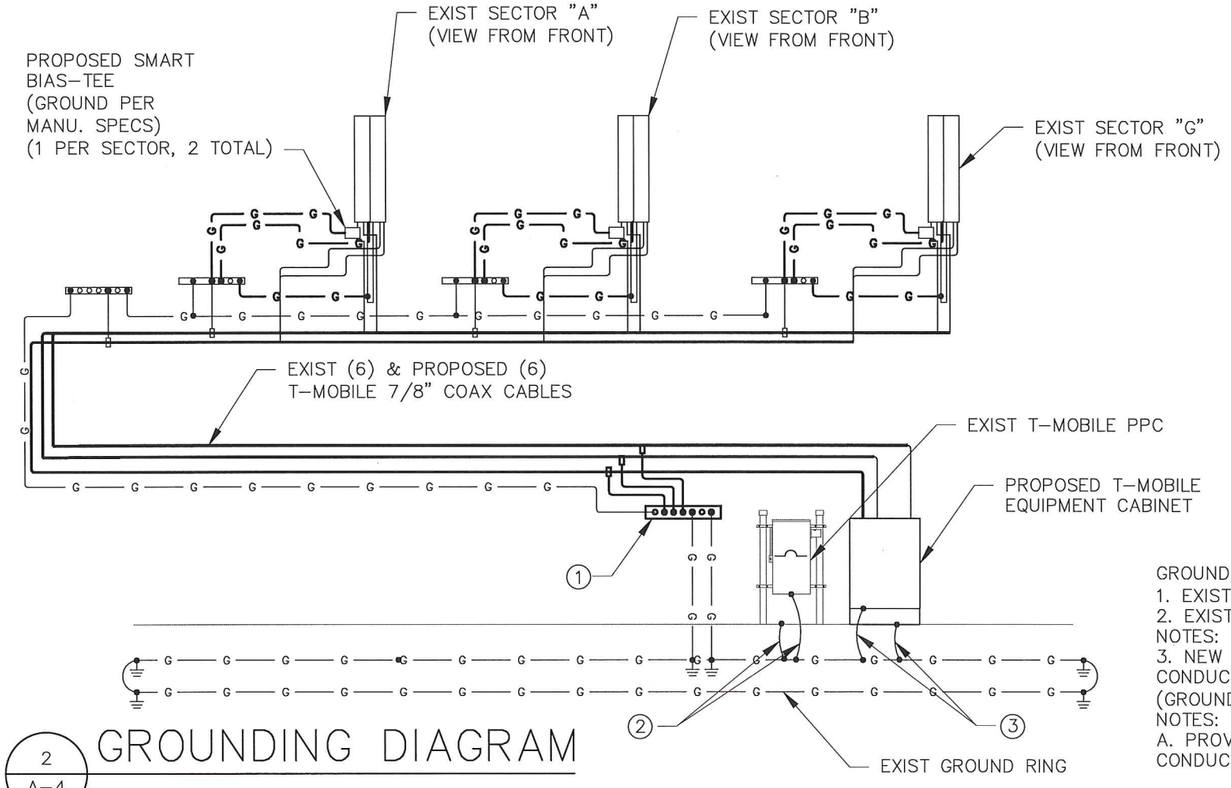
1 / A–4 UTILITY DIAGRAM

SCALE: NTS



3 / A–4 CONFIG. DIAGRAM

SCALE: NTS



2 / A–4 GROUNDING DIAGRAM

SCALE: NTS

GROUNDING SCHEDULE
1. EXIST MGB (BUSSBAR #1)
2. EXIST EQUIPMENT GROUNDING
NOTES:
3. NEW #2AWG BARE TINNED SOLID COPPER CONDUCTOR BONDED TO GROUND RING (GROUND CABINETS PER MANU. SPECS)
NOTES:
A. PROVIDE #2AWG GROUNDING CONDUCTOR, U.O.N.

CONFIGURATION
4B

0 1 2 3
ORIGINAL SIZE IN INCHES

TECTONIC
• PLANNING • ENGINEERING • SURVEYING • CONSTRUCTION MANAGEMENT
TECTONIC Engineering & Surveying Consultants P.C.
1279 Route 300
Newburgh, NY 12550
Phone: (845) 567–6656
Fax: (845) 567–8703

T-Mobile
NORTHEAST LLC.

T–MOBILE NORTHEAST, LLC.
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

APPROVALS
T–MOBILE
LANDLORD
RF
CONSTRUCTION

PROJECT NUMBER	DESIGNED BY
6644.CT11296A	JQ

REV	DATE	REVISION	DRAWN BY
0	03/20/14	FOR COMMENT	JT
1	08/14/14	PER COMMENTS	DC
2	09/12/14	FOR CONSTRUCTION	MP
3	09/15/14	PER COMMENTS	MP

ISSUED BY	DATE
JMQ	9/15/14

STATE OF CONNECTICUT
JANO KUMAR CUT
No. 22033
LICENSED PROFESSIONAL ENGINEER

SITE INFORMATION
CT11296A
WILTON/RT 33
144 CHESTNUT HILL RD
(RTE–53)
WILTON, CT, 06897
CL&P TOWER #936

SHEET TITLE
UTILITY, GROUNDING & CONFIG. DIAGRAMS

SHEET NUMBER
A–4

GENERAL NOTES

1. CONTRACTOR SHALL NOT COMMENCE ANY WORK UNTIL HE OBTAINS, AT HIS OWN EXPENSE, ALL INSURANCE REQUIRED BY T-MOBILE, THE PROPERTY OWNER AND/OR PROPERTY MANAGEMENT COMPANY.
2. THIS SET OF PLANS HAS BEEN PREPARED FOR THE PURPOSES OF MUNICIPAL AND AGENCY REVIEW AND APPROVAL. THIS SET OF PLANS SHALL NOT BE UTILIZED AS CONSTRUCTION DOCUMENTS UNTIL ALL CONDITIONS OF APPROVAL HAVE BEEN SATISFIED AND EACH OF THE DRAWINGS HAVE BEEN REVISED TO INDICATE "ISSUED FOR PERMIT"
3. THIS PLAN IS SUBJECT TO ALL EASEMENTS AND RESTRICTIONS OF RECORD.
4. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE CODES, ORDINANCES, LAWS AND REGULATIONS OF ALL MUNICIPALITIES, UTILITIES OR OTHER PUBLIC AUTHORITIES.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS THAT MAY BE REQUIRED BY ANY FEDERAL, STATE, COUNTY OR MUNICIPAL AUTHORITIES.
6. THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION MANAGER, IN WRITING, OF ANY CONFLICTS, ERRORS OR OMISSIONS PRIOR TO THE SUBMISSION OF BIDS OR PERFORMANCE OF WORK. MINOR OMISSIONS OR ERRORS IN THE BID DOCUMENTS SHALL NOT EXCUSE SAID CONTRACTOR FROM COMPLETING THIS PROJECT IN ACCORDANCE WITH THE OVERALL INTENT OF THESE DRAWINGS.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING SITE IMPROVEMENTS PRIOR TO COMMENCING CONSTRUCTION. THE CONTRACTOR SHALL REPAIR ANY DAMAGE CAUSED AS A RESULT OF CONSTRUCTION OF THIS FACILITY.
8. THE SCOPE OF WORK FOR THIS PROJECT SHALL INCLUDE PROVIDING ALL MATERIALS, EQUIPMENT AND LABOR REQUIRED TO COMPLETE THIS PROJECT. ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
9. THE CONTRACTOR SHALL VISIT THE PROJECT SITE PRIOR TO SUBMITTING A BID TO VERIFY THAT THE PROJECT CAN BE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
10. POWER TO THE FACILITY IS MONITORED BY AN EXISTING METER.
11. ALL STRUCTURAL ELEMENTS SHALL BE HOT DIPPED GALVANIZED STEEL.
12. CONTRACTOR SHALL MAKE A UTILITY "ONE CALL" TO LOCATE ALL UTILITIES PRIOR TO EXCAVATING.
13. IF ANY PIPING EXISTS BENEATH THE SITE AREA, CONTRACTOR MUST LOCATE IT AND CONTACT OWNER'S REPRESENTATIVE.
14. THE CONSTRUCTION CONTRACTOR IS SOLELY RESPONSIBLE FOR DETERMINING ALL CONSTRUCTION MEANS AND METHODS. THE CONSTRUCTION CONTRACTOR IS ALSO RESPONSIBLE FOR ALL JOB SITE SAFETY.
15. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES AND EXISTING CONDITIONS AT THE SITE PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA AND SUBMIT TO THE ENGINEER ANY DISCREPANCIES FROM THE DRAWINGS.
16. THE CONTRACTOR IS TO REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. THE CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUB-CONTRACTORS AND RELATED PARTIES. THE SUB-CONTRACTOR SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
17. DETAILS ARE INTENDED TO SHOW END RESULT OF DESIGN. MINOR MODIFICATIONS MAY BE REQUIRED TO SUIT JOB DIMENSIONS OR CONDITIONS, AND SUCH MODIFICATIONS SHALL BE INCLUDED AS PART OF THE WORK.
18. ALL MATERIAL PROVIDED BY T-MOBILE IS TO BE REVIEWED BY THE CONTRACTOR AND ALL APPLICABLE SUB-CONTRACTORS PRIOR TO INSTALLATION. ANY DEFICIENCIES TO PROVIDE MATERIALS SHALL BE BROUGHT TO THE CONSTRUCTION MANAGER'S ATTENTION IMMEDIATELY.
19. THE MATERIALS INSTALLED SHALL MEET REQUIREMENTS OF CONTRACTORS DOCUMENTS. NO SUBSTITUTIONS ARE ALLOWED.

GENERAL NOTES

20. THE CONTRACTOR SHALL RECEIVE CLARIFICATION AND AUTHORIZATION IN WRITING TO PROCEED BEFORE STARTING WORK ON ANY ITEMS NOT CLEARLY DEFINED OR IDENTIFIED BY THE CONSTRUCTION DOCUMENTS.
21. THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION MANAGER OF ALL PRODUCTS OR ITEMS NOTED AS "EXISTING" WHICH ARE NOT FOUND TO BE IN THE FIELD.
22. ERECTION SHALL BE DONE IN A WORKMANLIKE MANNER BY COMPETENT EXPERIENCED WORKMEN IN ACCORDANCE WITH APPLICABLE CODES AND THE BEST-ACCEPTED PRACTICE. ALL MEMBERS SHALL BE LAND PLUMB AND TRUE AS INDICATED ON THE DRAWINGS.
23. THE CONTRACTOR SHALL COORDINATE HIS WORK AND SCHEDULE HIS ACTIVITIES AND WORKING HOURS IN ACCORDANCE WITH THE REQUIREMENTS OF THE PROPERTY OWNER AND/OR PROPERTY MANAGEMENT COMPANY.
24. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING HIS WORK WITH THE WORK OF OTHERS AS IT MAY RELATE TO RADIO EQUIPMENT, ANTENNAS AND ANY OTHER PORTIONS OF THE WORK.
25. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY INDICATED OR WHERE LOCAL CODES OR REGULATIONS MAY TAKE PRECEDENCE.
26. THE CONTRACTOR SHALL REPAIR ALL EXISTING SURFACES DAMAGED DURING CONSTRUCTION SUCH THAT THEY MATCH AND BLEND WITH ADJACENT SURFACES.
27. THE CONTRACTOR SHALL KEEP CONTRACT AREA CLEAN, HAZARD FREE AND DISPOSE OF ALL DEBRIS AND RUBBISH. EQUIPMENT NOT SPECIFIED AS REMAINING ON THE PROPERTY OF THE OWNER SHALL BE REMOVED. LEAVE PREMISES IN CLEAN CONDITIONS AND FREE FROM PAINT SPOTS, DUST OR SMUDGES OF ANY NATURE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL ITEMS UNTIL COMPLETION OF CONSTRUCTION.
28. BEFORE FINAL ACCEPTANCE OF THE WORK, THE CONTRACTOR SHALL REMOVE ALL EQUIPMENT, TEMPORARY WORK, UNUSED AND USELESS MATERIALS, RUBBISH AND TEMPORARY STRUCTURES.
29. CONSTRUCTION SHALL BE IN ACCORDANCE WITH INTERNATIONAL BUILDING CODE & THE 2005 STATE OF CONNECTICUT BUILDING CODE INCLUDING SUBSEQUENT AMENDMENTS.

CONFIGURATION
4B

0 1 2 3
ORIGINAL SIZE IN INCHES

TECTONIC
• PLANNING • SURVEYING
• ENGINEERING • CONSTRUCTION MANAGEMENT
TECTONIC Engineering & Surveying Consultants P.C.
1279 Route 300
Newburgh, NY 12550
Phone: (845) 567-6656
Fax: (845) 567-8703

T-Mobile
NORTHEAST LLC.

T-MOBILE NORTHEAST, LLC.
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

APPROVALS
T-MOBILE _____
LANDLORD _____
RF _____
CONSTRUCTION _____

PROJECT NUMBER	DESIGNED BY
6644.CT11296A	JQ

REV	DATE	REVISION	DRAWN BY
0	03/20/14	FOR COMMENT	JT
1	08/14/14	PER COMMENTS	DC
2	09/12/14	FOR CONSTRUCTION	MP
3	09/15/14	PER COMMENTS	MP

ISSUED BY	DATE
JMQ	9/15/14

STATE OF CONNECTICUT
MANCHUSMAK
No. 22006
LICENSED
PROFESSIONAL ENGINEER

SITE INFORMATION
CT11296A
WILTON/RT 33
144 CHESTNUT HILL RD
(RTE-53)
WILTON, CT, 06897
CL&P TOWER #936

SHEET TITLE
NOTES

SHEET NUMBER
A-5

GROUNDING NOTES

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 INSTALLATION.
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 VALUE.
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.
14. TECTONIC TAKES NO RESPONSIBILITY OR LIABILITY FOR THE GROUNDING SYSTEM AS SHOWN ON THIS SITE. THIS IS A STANDARD GROUNDING SYSTEM.

CONFIGURATION

4B

0 1 2 3

ORIGINAL SIZE IN INCHES

TECTONIC

- PLANNING
- ENGINEERING
- SURVEYING
- CONSTRUCTION MANAGEMENT

TECTONIC Engineering & Surveying Consultants P.C.

1279 Route 300
Newburgh, NY 12550
Phone: (845) 567–6656
Fax: (845) 567–8703

T-Mobile NORTHEAST LLC.

T–MOBILE NORTHEAST, LLC.
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

APPROVALS

T–MOBILE _____
LANDLORD _____
RF _____
CONSTRUCTION _____

PROJECT NUMBER	DESIGNED BY
6644.CT11296A	JQ

REV	DATE	REVISION	DRAWN BY
0	03/20/14	FOR COMMENT	JT
1	08/14/14	PER COMMENTS	DC
2	09/12/14	FOR CONSTRUCTION	MP
3	09/15/14	PER COMMENTS	MP

ISSUED BY	DATE
JMQ	9/15/14

STATE OF CONNECTICUT MANJUKUMAR PATEL No. 22038 LICENSED PROFESSIONAL ENGINEER

SITE INFORMATION

CT11296A
WILTON/RT 33
144 CHESTNUT HILL RD
(RTE–53)
WILTON, CT, 06897
CL&P TOWER #936

SHEET TITLE

NOTES

SHEET NUMBER

A–6

STRUCTURAL STEEL NOTES

1. DESIGN AND CONSTRUCTION OF STRUCTURAL STEEL SHALL CONFORM TO THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS, ALLOWABLE STRESS DESIGN AND PLASTIC DESIGN".

2. STRUCTURAL STEEL WIDE FLANGE SHAPES SHALL CONFORM TO ASTM A992, "STEEL FOR STRUCTURAL SHAPES FOR USE IN BUILDING FRAMING", GRADE 50, UNLESS OTHERWISE INDICATED. IF THE MEMBER SIZES INDICATED ARE NOT AVAILABLE IN THIS GRADE, ASTM A572 "HIGH-STRENGTH LOW-ALLOY COLUMBIUM-VANADIUM STRUCTURAL STEEL", GRADE 50, MAY BE SUBSTITUTED.

3. HOLLOW STRUCTURAL SECTIONS (HSS) SHALL CONFORM TO ASTM A500 "COLD-FORMED WELDED & SEAMLESS CARBON STEEL STRUCTURAL TUBING IN ROUNDS AND SHAPES", GRADE B.

4. MISCELLANEOUS STEEL, INCLUDING CHANNELS, ANGLES, PLATES, AND BARS SHALL CONFORM TO ASTM A36 "CARBON STRUCTURAL STEEL", UNLESS OTHERWISE INDICATED.

5. ANCHOR BOLTS SHALL CONFORM TO ASTM F1554 "ANCHOR BOLTS, STEEL, 36, 55, AND 105-KSI YIELD STRENGTH", GRADE 36.

6. STRUCTURAL CONNECTION BOLTS SHALL BE HIGH STRENGTH BOLTS CONFORMING TO ASTM A325 "STRUCTURAL BOLTS, STEEL, HEAT TREATED, 120/105 KSI MINIMUM TENSILE STRENGTH". BOLTS SHALL BE 3/4 INCH DIAMETER, TYPE X, UNLESS OTHERWISE NOTED.

7. MATCHING NUTS SHALL BE HEAVY HEX TYPE, CONFORMING TO ASTM A563 "CARBON AND ALLOY STEEL NUTS".
WASHERS, WHERE REQUIRED, SHALL CONFORM TO ASTM F436 "HARDENED STEEL WASHERS".

FIELD CONNECTIONS SHALL BE BOLTED UNLESS OTHERWISE INDICATED. ALL BOLTED CONNECTIONS SHALL BE MADE WITH NOT LESS THAN TWO (2) HIGH STRENGTH BOLTS, OR EQUIVALENT WELD.

STRUCTURAL CONNECTIONS SHALL BE SNUG TIGHT IN ACCORDANCE WITH THE RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS", UNLESS OTHERWISE NOTED.

BOLTS IN SLIP-CRITICAL CONNECTIONS SHALL BE FULLY PRETENSIONED BY THE TURN-OF-NUT METHOD IN ACCORDANCE WITH THE RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS "SPECIFICATIONS FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS".

ANCHOR BOLTS SHALL BE TENSIONED BY THE TURN-OF-NUT METHOD AFTER GROUTING OF BASE PLATES.

CONTRACTOR SHALL COMPLY WITH AWS D1.1 "STRUCTURAL WELDING CODE - STEEL" FOR PROCEDURES, APPEARANCE AND QUALITY OF WELDS, AND FOR METHODS USED IN CORRECTING WELDING. ALL WELDERS AND WELDING PROCESSES SHALL BE QUALIFIED IN ACCORDANCE WITH AWS "STANDARD QUALIFICATION PROCEDURES".

GRATING SHALL BE TYPE "W/B" GALVANIZED WELDED STEEL BAR GRATING AS MANUFACTURED BY IKG BORDEN, OR APPROVED EQUAL. BEARING BARS SHALL BE AS FOLLOWS:

GRATING 1" x 3/16" SERRATED

BAND ALL EDGES, AND ATTACH TO SUPPORTING MEMBERS AT 18" ON CENTER WITH MODEL GG GALVANIZED G-CLIPS AS MANUFACTURED BY GRATING FASTENERS INC.

EXPANSION ANCHORS SHALL BE HILTI KWIK BOLT III OR APPROVED EQUAL. INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. MINIMUM EMBEDMENT SHALL BE 4-3/4" UNLESS OTHERWISE NOTED.

STRUCTURAL STEEL NOTES

15. EPOXY ANCHOR ASSEMBLIES SHALL BE AS MANUFACTURED BY HILTI OR ENGINEER APPROVED EQUAL, AS FOLLOWS:

BASE MATERIAL	ANCHOR SYSTEM
CONCRETE OR GROUTED CMU	HIT HY-200
HOLLOW CMU	HIT HY-70

INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS.

16. ALL INTERIOR STRUCTURAL STEEL SHALL BE SHOP PRIME COATED WITH A RUST-INHIBITIVE PRIMER EXCEPT AREAS TO BE FIREPROOFED NEED NOT BE PAINTED. SURFACE PREPARATION SHALL BE IN ACCORDANCE WITH THE PAINT MANUFACTURER'S RECOMMENDATIONS. AREAS WHICH MAY BE INACCESSIBLE AFTER INSTALLATION SHALL RECEIVE TWO (2) COATS OF PRIMER. SEE ARCHITECTURAL DRAWINGS FOR FINISH PAINT.

17. FIELD CONNECTIONS AND DAMAGED OR ABRADED AREAS OF SHOP PRIME COAT SHALL BE TOUCH-UP PAINTED WITH COMPATIBLE FIELD PRIMER.

18. ALL EXTERIOR STEEL SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT-DIP GALVANIZED) COATINGS ON IRON AND STEEL PRODUCTS", UNLESS OTHERWISE NOTED.

19. ALL EXTERIOR BOLTS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE", UNLESS OTHERWISE NOTED.

20. DAMAGED GALVANIZED SURFACES SHALL BE REPAIRED BY COLD GALVANIZING IN ACCORDANCE WITH ASTM A780 "REPAIR OF DAMAGED AND UNCOATED AREAS OF HOT-DIP GALVANIZED COATINGS".

21. ALL STEEL WORK SHALL BE SUBJECT TO SPECIAL INSPECTIONS DURING CONSTRUCTION.

22. THE NOTES CONTAINED HEREIN ARE NOT PROJECT SPECIFIC. THE CONTRACTOR SHALL UTILIZE ALL NOTES WHICH SOLELY PERTAIN TO THE WORK DEPICTED ON THESE DRAWINGS.

CONFIGURATION

4B

0 1 2 3

ORIGINAL SIZE IN INCHES

TECTONIC

- PLANNING
- ENGINEERING
- SURVEYING
- CONSTRUCTION MANAGEMENT

TECTONIC Engineering & Surveying Consultants P.C.

1279 Route 300
Newburgh, NY 12550
Phone: (845) 567-6656
Fax: (845) 567-8703

T-Mobile NORTHEAST LLC.

T-MOBILE NORTHEAST, LLC.
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

APPROVALS

T-MOBILE _____
LANDLORD _____
RF _____
CONSTRUCTION _____

PROJECT NUMBER	DESIGNED BY
6644.CT11296A	JQ

REV	DATE	REVISION	DRAWN BY
0	03/20/14	FOR COMMENT	JT
1	08/14/14	PER COMMENTS	DC
2	09/12/14	FOR CONSTRUCTION	MP
3	09/15/14	PER COMMENTS	MP

ISSUED BY	DATE
JMQ	9/15/14

STATE OF CONNECTICUT
MANOJKUMAR QUINTAL
No. 22003
LICENSED PROFESSIONAL ENGINEER

SITE INFORMATION

CT11296A
WILTON/RT 33
144 CHESTNUT HILL RD
(RTE-53)
WILTON, CT, 06897
CL&P TOWER #936

SHEET TITLE

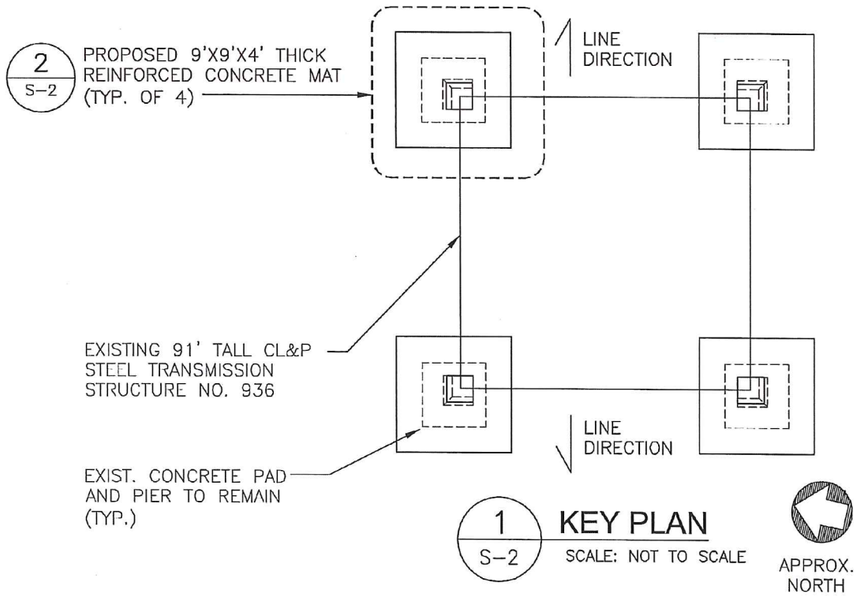
NOTES

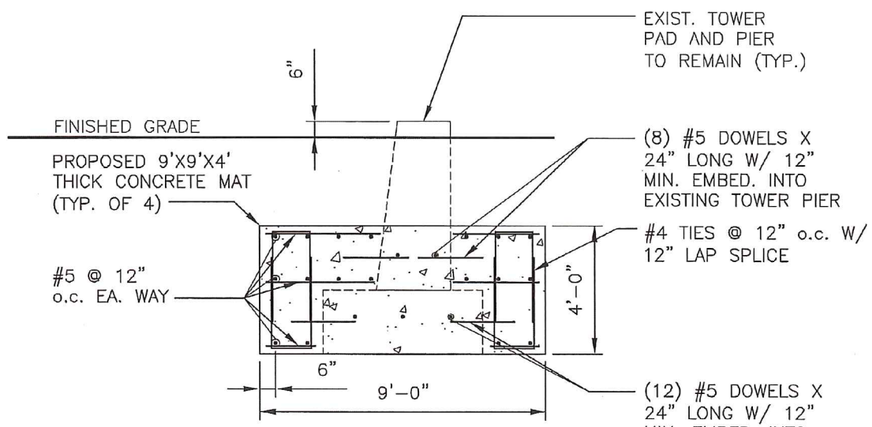
SHEET NUMBER

A-7

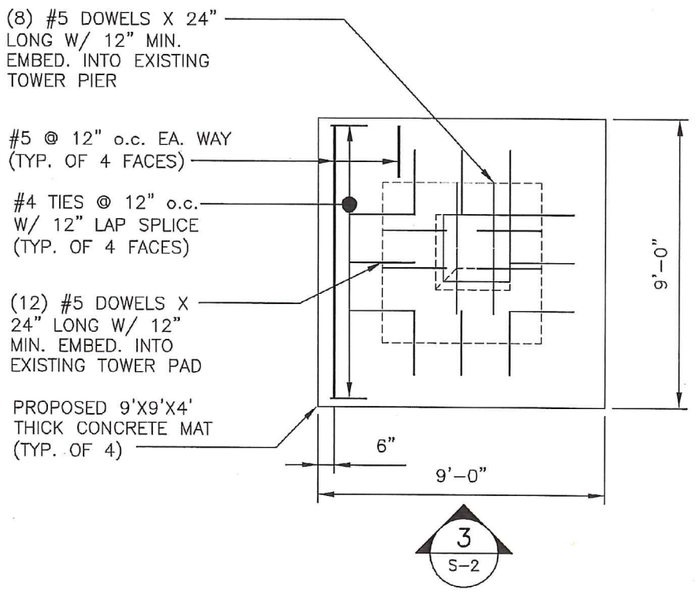
FOUNDATION PLAN NOTES:

1. TOWER FOUNDATION SHALL BE CHECKED AND/OR TEMPORARY SHORING SHALL BE PROVIDED TO ENSURE TOWER STABILITY DURING CONSTRUCTION. LIMIT CONSTRUCTION DURATION TO MINIMIZE RISK. CONSTRUCTION SHALL BE CONDUCTED IN WIND SPEEDS LESS THAN 15 MPH AND IN LOW ICE ACCUMULATION PERIODS.
2. CONTRACTOR SHALL USE EXTREME CAUTION DURING EXCAVATION OF EXISTING FOUNDATION STRUCTURE. IMPLEMENT HAND DIGGING WHERE PRACTICABLE.
3. PROTECT EXISTING TOWER GROUND WIRE(S) FROM DAMAGE DUE TO NEW CONSTRUCTION. CONTRACTOR SHALL NOTIFY NU IF GROUNDING SYSTEM BECOMES DAMAGED OR DISCONNECTED.
4. NOTIFY NU REPRESENTATIVE TO BE PRESENT UPON COMPLETION OF REBAR PLACEMENT.





3 S-2 **FOUNDATION REINFORCEMENT DETAIL**
SCALE: 1/4" = 1'-0"



2 S-2 **FOUNDATION REINFORCEMENT PLAN**
SCALE: 1/4" = 1'-0"

NOTE:

THESE DRAWINGS ARE FOR REFERENCE ONLY. TECTONIC ENGINEERING HAS NOT REVIEWED THESE MODIFICATION DRAWINGS. TECTONIC ENGINEERING TAKES NO RESPONSIBILITY AND/OR LIABILITY FOR THE REINFORCEMENT DESIGN INCLUDED. PLEASE REFER TO THE ENTIRE STRUCTURAL ANALYSIS BY CENTEK ENGINEERING, DATED 6/18/14, FOR FURTHER INFORMATION.

DESIGNED BY:	TJL
DRAWN BY:	TJL
CHK'D BY:	CFC

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	6/18/14	TJL	CFC	ISSUED FOR NU REVIEW

PROFESSIONAL ENGINEER SEAL

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

T-MOBILE
ANTENNA MAST DESIGN
CT111296A
CL&P STRUCTURE 936
144 CHESTNUT HILL ROAD
WILTON, CT 06897

DATE:	6/18/14
SCALE:	AS SHOWN
JOB NO.	14025.007

FOUNDATION REINFORCEMENT DETAILS

SHEET NO.
S-2
Sheet No. 8 of 9

CONFIGURATION
4B

0 1 2 3
ORIGINAL SIZE IN INCHES

TECTONIC
• PLANNING • ENGINEERING • SURVEYING • CONSTRUCTION MANAGEMENT
TECTONIC Engineering & Surveying Consultants P.C.
1279 Route 300
Newburgh, NY 12550
Phone: (845) 567-6656
Fax: (845) 567-8703

T-Mobile NORTHEAST LLC.

T-MOBILE NORTHEAST, LLC.
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

APPROVALS
T-MOBILE
LANDLORD
RF
CONSTRUCTION

PROJECT NUMBER	DESIGNED BY
6644.CT11296A	JQ

REV	DATE	REVISION	DRAWN BY
0	09/15/14	FOR COMMENT	MP

ISSUED BY	DATE

SITE INFORMATION
CT11296A
WILTON/RT 33
144 CHESTNUT HILL RD
(RTE-53)
WILTON, CT, 06897
CL&P TOWER #936

SHEET TITLE
FOUNDATION MODIFICATION DESIGN (BY OTHERS)

SHEET NUMBER
A-8

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: CT11296

Wilton / Rt 33
14 Chestnut Hill Road
Wilton, CT 06897

January 23, 2015

EBI Project Number: 62150281

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	13.26 %

21 B Street · Burlington, MA 01803 · Tel: (781) 273.2500 · Fax: (781) 273.3311

EBI Consulting
environmental | engineering | due diligence

January 23, 2015

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

Emissions Analysis for Site: **CT11296 – Wilton / Rt 33**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **14 Chestnut Hill Road, Wilton, 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 both the PCS and 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 **14 Chestnut Hill Road, Wilton, 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 (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

3) 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.

4) 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.

5) For the following calculations the sample point was the top of a six 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.

6) The antennas used in this modeling are the **RFS APX16DWV-16DWVS-E-A20** for 1900 MHz (PCS) and 2100 MHz (AWS) channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **RFS APX16DWV-16DWVS-E-A20** has a maximum gain of **16.3 dBd** at its main lobe. 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.

7) The antenna mounting height centerline of the proposed antennas is **97.25 feet** above ground level (AGL).

8) 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.

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 APX16DWV-16DWVS-E-A20	Make / Model:	RFS APX16DWV-16DWVS-E-A20	Make / Model:	RFS APX16DWV-16DWVS-E-A20
Gain:	16.3 dBd	Gain:	16.3 dBd	Gain:	16.3 dBd
Height (AGL):	97.25	Height (AGL):	97.25	Height (AGL):	97.25
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	6	Channel Count	6	# PCS Channels:	6
Total TX Power:	240	Total TX Power:	240	# AWS Channels:	240
ERP (W):	10,237.91	ERP (W):	10,237.91	ERP (W):	10,237.91
Antenna A1 MPE%	4.42	Antenna B1 MPE%	4.42	Antenna C1 MPE%	4.42

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile	**13.26**
Site Total MPE %:	**13.26 %**

T-Mobile Sector 1 Total:	4.42 %
T-Mobile Sector 2 Total:	4.42 %
T-Mobile Sector 3 Total:	4.42 %
Site Total:	13.26 %

EBI Consulting
environmental | engineering | due diligence

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 1:	4.42 %
Sector 2:	4.42 %
Sector 3 :	4.42 %
T-Mobile Total:	13.26 %
Site Total:	13.26 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **13.26%** 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.

Scott Heffernan
RF Engineering Director

EBI Consulting
21 B Street
Burlington, MA 01803`

CENTEK engineering

Centered on Solutions℠

Structural Analysis of PCS Mast and CL&P Tower

T-Mobile Site Ref: CT11296A

CL&P Structure No. 936
91' Electric Transmission Lattice Tower

144 Chestnut Hill Road
Wilton, CT

CENTEK Project No. 14025.007

~~Date: February 17, 2014~~
Date: June 18, 2014

Prepared for:
T-Mobile Towers
4 Sylvan Way
Parsippany, NJ 07054

63-2 North Branford Road, Branford, CT 06405 203.488.0580 Fax 203.488.8587 www.CentekEng.com

Table of Contents

Introduction

The purpose of this report is to analyze the existing antenna mast and 91' CL&P tower located at 144 Chestnut Hill Road in Wilton, CT for the proposed T-Mobile antenna upgrade.

The existing and proposed loads consist of the following:

- T-MOBILE (Existing to be Removed):
  Antennas: Three (3) EMS RR-90-17-02DP panel antennas and one (1) microwave dish flush mounted to the existing PCS mast with a RAD center elevation of 97.25-ft above grade.
  Coax Cables: One (1) 7/8" ∅ coax cable running on a leg of the existing tower as indicated in section 4 of this report.
  Mast: Pipe 4" Sch. 40 (O.D. = 4.5").
- T-MOBILE (Existing to Remain):
  Coax Cables: Six (6) 7/8" ∅ coax cables running on a leg of the existing tower as indicated in section 4 of this report.
- **T-MOBILE (Proposed):**
  Antennas: Three (3) RFS APX16DWV-16DWVS-E-A20 panel antennas flush mounted to the existing PCS mast with a RAD center elevation of 97.25-ft above grade.
  Coax Cables: Six (6) 7/8" ∅ coax cables running on a leg of the existing tower as indicated in section 4 of this report.
  Mast: Pipe 6" Sch. 80 (O.D. = 6.625") x 19.5-ft Long.

Primary assumptions used in the analysis

- Allowable steel stresses are defined by AISC-ASD 9th edition for design of the PCS Mast and antenna supporting elements.
- ASCE Manual No. 10-97, "Design of Latticed Steel Transmission Structures", defines allowable steel stresses for evaluation of the CL&P utility tower.
- All utility tower members are adequately protected to prevent corrosion of steel members.
- All proposed antenna mounts are modeled as listed above.
- All coaxial cable will be installed as indicated in Section 4 of this report.
- PCS Mast will be properly installed and maintained.
- No residual stresses exist due to incorrect tower erection.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds conform to the requirements of AWS D1.1.
- PCS Mast and utility tower will be in plumb condition.
- Utility tower 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.
- PCS mast was designed and installed per sketches prepared by ARCNET Architects Inc. project no; A99.506.834A dated April 21, 1999.

A n a l y s i s

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 antenna mast consisting of a 4" Sch. 40 pipe conforming to ASTM A53 Grade B (Fy = 35ksi) connected at four points to the existing tower was analyzed for its ability to resist loads prescribed by the TIA/EIA standard. Section 5 of this report details these gravity and lateral wind loads. NESC prescribed loads were also applied to the Antenna Mast in order to obtain reactions needed for analyzing the CL&P tower structure. These loads are developed in Section 7 of this report. Load cases and combinations used in RISA-3D for TIA/EIA loading and for NESC/NU loading are listed in report Sections 6 and 8, respectively.

An envelope solution was first made to determine maximum and minimum forces, stresses, and deflections to confirm the selected section as adequate. Additional analyses were then made to determine the NESC forces to be applied to the CL&P tower 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 CL&P tower using PLS-Tower. Maximum usage for the tower was calculated considering the additional forces from the mast and associated appurtenances.

D e s i g n B a s i s

Our analysis was performed in accordance with EIA-222-F-1996, ASCE Manual No. 10-97, "Design of Latticed Steel Transmission Structures", NESC C2-2007 and Northeast Utilities Design Criteria.

The CL&P tower structure, considering existing and future conductor and shield wire loading, with the proposed antenna mast was analyzed under two conditions:

- UTILITY TOWER ANALYSIS

  The purpose of this analysis is to determine the adequacy of the existing utility structure to support the proposed antenna loads. The loading and design requirements were analyzed in accordance with the NU Design Criteria Table, NESC C2-2007 ~ Construction Grade B, and ASCE Manual No. 10-97, "Design of Latticed Steel Transmission Structures".

  Load cases considered:

  Load Case 1: NESC Heavy
  Wind Pressure…….. 4.0 psf
  Radial Ice Thickness……. 0.5"
  Vertical Overload Capacity Factor……. 1.50
  Wind Overload Capacity Factor……. 2.50
  Wire Tension Overload Capacity Factor…… 1.65

  Load Case 2: NESC Extreme
  Wind Speed…… 110 mph (1)
  Radial Ice Thickness……. 0"

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

- PCS MAST ANALYSIS

PCS mast, appurtenances and connections to the utility tower were analyzed and designed in accordance with the NU Design Criteria Table, TIA/EIA-222-F, and AISC-ASD standards.

Load cases considered:

Load Case 1:
Wind Speed……... 85 mph (2)
Radial Ice Thickness…..……. 0”

Load Case 2:
Wind Pressure..……. 75% of 85 mph wind pressure
Radial Ice Thickness…..…….. 0.5”

Note 2: Per NU Mast Design Criteria Exception 1.

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 **6 SCH. 80 Pipe x 19.5-ft long (O.D. = 6.625”)**, conforming to ASTM A53, Grade B, F_y = 35 ksi specifications will be required.

Member	Stress Ratio (% of capacity)	Result
6” Sch. 80 Mast	31.0%	**PASS**
HSS6x6x1/4 Brace	15.3%	**PASS**
Mast Connection to CL&P Tower	9.1% (1)	**PASS**

Note 1 – 1/3 increase in allowable stress not used for connection to tower per OTRM 059.

- UTILITY TOWER

This analysis finds that the subject utility structure is adequate to support the existing PCS mast and related appurtenances. The tower stresses meet the requirements set forth by the ASCE Manual No. 10-97, “Design of Latticed Steel Transmission Structures”, for the applied NESC Heavy and Hi-Wind 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 **86.67%** occurs in the utility tower under the **NESC Extreme** loading condition.

TOWER SECTION:

The utility structure was found to be within allowable limits.

Tower Member	Stress Ratio (% of capacity)	Result
Angle g31Y	86.67%	**PASS**

- FOUNDATION AND ANCHORS

The existing foundation consists of four (4) 1.67-ft square tapering to 2.583-ft square x 6.25-ft long reinforced concrete piers on four (4) 5.5-ft square x 2.0-ft thick reinforced concrete pads. The base of the tower is connected to the foundation by one (1) anchor stub angle per leg embedded into the concrete foundation. Foundation information was obtained from NUSCO drawing # 01064-60003.

BASE REACTIONS:

From PLS-Tower analysis of CL&P tower based on NESC/NU prescribed loads.

Load Case	Shear	Uplift	Compression
NESC Heavy Wind	11.38 kips	32.51 kips	52.79 kips
NESC Extreme Wind	13.71 kips	50.84 kips	60.40 kips

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

FOUNDATION:

The foundation **with the proposed reinforcements detailed in Section 4 of this report** was found to be within allowable limits.

Foundation	Design Limit	Allowable Limit	Proposed Loading (2)	Result
Reinforced Conc. Pad and Pier	Uplift	1.0 FS (1)	1.73 FS (1)	**PASS**
	Overturning	1.0 FS (1)	1.58 FS (1)	**PASS**
	Bearing	9.0 ksf	2.05 ksf	**PASS**

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

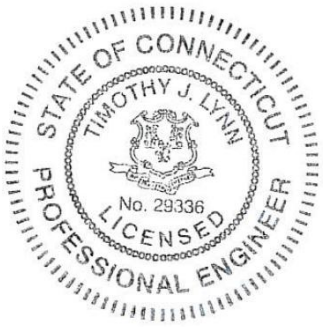
Conclusions and Recommendations

This analysis shows that the subject utility tower **with the replacement of the existing antenna mast and foundation reinforcement as detailed in section 4 of this report is adequate** to support the proposed T-Mobile equipment upgrade.

The analysis is based, in part on the information provided to this office by Northeast Utilities 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.

G E N E R A L D E S C R I P T I O N O F S T R U C T U R A L A N A L Y S I S P R O G R A M ~ P L S - T O W E R

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/EIA-222 (Rev. F) 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/EIA-222 (Rev. F) with two exceptions:

1. An 85 mph extreme wind speed shall be used for locations in all counties throughout the NU system.
2. The allowable stress increase of TIA Section 3.1.1.1 is allowed for the mast section, but is disallowed for the mast to structure connection design.

   The combined wind and ice condition shall consider ½" radial ice in combination with the wind load (0.75 Wi) as specified in TIA section 2.3.16.

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.

Northeast Utilities System

		Page	of
Job :	Spec. Number	Sheet	of
Description:	Computed by	Date	6/11/14
	Checked by	Date	

INPUT DATA

TOWER ID: 936

Structure Height (ft) : 91

Wind Zone : Central CT (green)

Wind Speed : 110 mph

Tower Type : (●) Suspension ( ) Strain

Extreme Wind Model : PCS Addition

Shield Wire Properties:

	BACK	AHEAD
NAME =	*11/32 CW*	*11/32 CW*
DESCRIPTION =	11/32	11/32
STRANDING =	7 #9 Cu Weld	7 #9 Cu Weld
DIAMETER =	0.343 in	0.343 in
WEIGHT =	0.257 lb/ft	0.257 lb/ft

Conductor Properties:

		BACK	AHEAD		
NAME =		*DOVE*	*DOVE*		
Number of Conductors per phase	1	556 26/7 ACSR	556 26/7 ACSR	1	Number of Conductors per phase
DIAMETER =		0.927 in	0.927 in		
WEIGHT =		0.765 lb/ft	0.765 lb/ft		

Insulator Weight = 200 lbs

Broken Wire Side = AHEAD SPAN

Horizontal Line Tensions:

	BACK		AHEAD	
	Shield	Conductor	Shield	Conductor
NESC HEAVY =	3,600	7,000	3,600	7,000
EXTREME WIND =	2,810	7,115	2,810	7,115
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 =	1,161	2,724	1,161	2,724

Line Geometry:

					SUM
LINE ANGLE (deg) =	BACK:	4	AHEAD:	4	**8**
WIND SPAN (ft) =	BACK:	367	AHEAD:	335	**702**
WEIGHT SPAN (ft) =	BACK:	456	AHEAD:	422	**879**

Northeast Utilities System

		Page	of
Job :	Spec. Number	Sheet	of
Description:	Computed by	Date	6/11/14
	Checked by	Date	

WIRE LOADING AT ATTACHMENTS

TOWER ID: 936

Wind Span =	702 ft	Broken Wire Span =	AHEAD SPAN
Weight Span =	879 ft	Type of Insulator Attachment =	SUSPENSION
Total Angle =	8 degrees		

1. NESC RULE 250B Heavy Loading:

	INTACT CONDITION			BROKEN WIRE CONDITION		
	Horizontal	Longitudinal	Vertical	Horizontal	Longitudinal	Vertical
Shield Wire =	1,614 lb	0 lb	1,030 lb	825 lb	5,926 lb	535 lb
Conductor =	2,739 lb	0 lb	2,778 lb	1,395 lb	11,522 lb	1,431 lb

2. NESC RULE 250C Transverse Extreme Wind Loading:

	Horizontal	Longitudinal	Vertical
Shield Wire =	969 lb	0 lb	226 lb
Conductor =	2,551 lb	0 lb	1,072 lb

3. NESC RULE 250C Longitudinal Extreme Wind Loading:

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	226 lb
Conductor =	#VALUE!	#VALUE!	1,072 lb

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

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	1,693 lb
Conductor =	#VALUE!	#VALUE!	3,178 lb

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

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	686 lb
Conductor =	#VALUE!	#VALUE!	1,852 lb

6. 60 Deg. F, No Wind

	Horizontal	Longitudinal	Vertical
Shield Wire =	162 lb	0 lb	226 lb
Conductor =	380 lb	0 lb	1,072 lb

7. Construction

	Horizontal	Longitudinal	Vertical
Shield Wire =	162 lb	0 lb	226 lb
Conductor =	380 lb	0 lb	1,072 lb

Northeast Utilities System

Job :		Spec. Number	Page of
Description:		Computed by	Sheet of
		Checked by	Date 6/11/14
			Date

INPUT DATA

TOWER ID: 936

Structure Height (ft) : 91

Wind Zone : Central CT (green)

Wind Speed : 110 mph

Tower Type : (●) Suspension ( ) Strain

Extreme Wind Model : PCS Addition

Shield Wire Properties:

	BACK	AHEAD
NAME =	*OPGW-120*	*OPGW-120*
DESCRIPTION =	6-Groove	6-Groove
STRANDING =	10/9 FOCAS	10/9 FOCAS
DIAMETER =	0.738 in	0.738 in
WEIGHT =	0.518 lb/ft	0.518 lb/ft

Conductor Properties:

	BACK	AHEAD		
NAME =	*DOVE*	*DOVE*		
Number of Conductors per phase: 1	556 26/7 ACSR	556 26/7 ACSR	1	Number of Conductors per phase
DIAMETER =	0.927 in	0.927 in		
WEIGHT =	0.765 lb/ft	0.765 lb/ft		

Insulator Weight = 200 lbs

Broken Wire Side = AHEAD SPAN

Horizontal Line Tensions:

	BACK		AHEAD	
	Shield	Conductor	Shield	Conductor
NESC HEAVY =	6,000	7,000	6,000	7,000
EXTREME WIND =	5,852	7,115	5,852	7,115
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 =	2,120	2,724	2,120	2,724

Line Geometry:

					SUM
LINE ANGLE (deg) =	BACK:	4	AHEAD:	4	**8**
WIND SPAN (ft) =	BACK:	367	AHEAD:	335	**702**
WEIGHT SPAN (ft) =	BACK:	456	AHEAD:	422	**879**

Northeast Utilities System

		Page	of
Job :	Spec. Number	Sheet	of
Description:	Computed by	Date	6/11/14
	Checked by	Date	

WIRE LOADING AT ATTACHMENTS

TOWER ID: 936

Wind Span =	702 ft	Broken Wire Span =	AHEAD SPAN
Weight Span =	879 ft	Type of Insulator Attachment =	SUSPENSION
Total Angle =	8 degrees		

1. NESC RULE 250B Heavy Loading:

	INTACT CONDITION			BROKEN WIRE CONDITION		
	Horizontal	Longitudinal	Vertical	Horizontal	Longitudinal	Vertical
Shield Wire =	2,398 lb	0 lb	1,698 lb	1,222 lb	9,876 lb	882 lb
Conductor =	2,739 lb	0 lb	2,778 lb	1,395 lb	11,522 lb	1,431 lb

2. NESC RULE 250C Transverse Extreme Wind Loading:

	Horizontal	Longitudinal	Vertical
Shield Wire =	2,057 lb	0 lb	455 lb
Conductor =	2,551 lb	0 lb	1,072 lb

3. NESC RULE 250C Longitudinal Extreme Wind Loading:

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	455 lb
Conductor =	#VALUE!	#VALUE!	1,072 lb

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

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	2,355 lb
Conductor =	#VALUE!	#VALUE!	3,178 lb

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

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	1,132 lb
Conductor =	#VALUE!	#VALUE!	1,852 lb

6. 60 Deg. F, No Wind

	Horizontal	Longitudinal	Vertical
Shield Wire =	296 lb	0 lb	455 lb
Conductor =	380 lb	0 lb	1,072 lb

7. Construction

	Horizontal	Longitudinal	Vertical
Shield Wire =	296 lb	0 lb	455 lb
Conductor =	380 lb	0 lb	1,072 lb

Connecticut Light & Power

ANTENNA MAST DESIGN

CL&P STRUCT. NO. 936
T-MOBILE CT11296A
144 CHESTNUT HILL ROAD
WILTON, CT 06897

VICINITY MAP

NORTH

PROJECT SUMMARY

SITE ADDRESS:	144 CHESTNUT HILL ROAD WILTON, CT 06897
PROJECT COORDINATES:	LAT: 41°–10'–52.30N LON: 73°–23'–36.00W ELEV:±321' AMSL
CL&P STRUCT NO:	936
CL&P CONTACT:	ROBERT GRAY 860.728.6125
T–MOBILE SITE REF.:	CT11296A
T–MOBILE CONTACT:	MARK RICHARD 860.692.7143
ANTENNA CL HEIGHT:	97'–3"
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

DESIGNED BY:	TJL
DRAWN BY:	TJL
CHK'D BY:	CFC

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	6/18/14	TJL	CFC	ISSUED FOR NU REVIEW

PROFESSIONAL ENGINEER SEAL

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

T-MOBILE
ANTENNA MAST DESIGN
CT11296A
CL&P STRUCTURE 936
144 CHESTNUT HILL ROAD
WILTON, CT 06897

DATE:	6/18/14
SCALE:	AS SHOWN
JOB NO.	14025.007

TITLE SHEET

SHEET NO.
T-1
Sheet No. 1 of 9

DESIGN BASIS

1. GOVERNING CODE: 2003 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2005 CT STATE BUILDING CODE AND 2009 AMENDMENTS.

2. TIA/EIA-222-F-1996, ASCE MANUAL NO. 72 – "DESIGN OF STEEL TRANSMISSION POLE STRUCTURES SECOND EDITION", NESC C2-2007 AND NORTHEAST UTILITIES DESIGN CRITERIA.

3. DESIGN CRITERIA

   WIND LOAD: (PCS MAST)
   BASIC WIND SPEED (V) =85 MPH (FASTEST MILE); BASED ON TIA/EIA-222F AND NU MAST DESIGN CRITERIA EXCEPTION 1.

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

GENERAL NOTES

1. REFER TO STRUCTURAL ANALYSIS AND REINFORCEMENT DESIGN PREPARED BY CENTEK ENGINEERING, INC., FOR T-MOBILE DATED 6/18/14.

2. TOWER GEOMETRY AND STRUCTURE MEMBER SIZES WERE OBTAINED FROM THE ORIGINAL TOWER DESIGN DRAWINGS PREPARED BY AMERICAN BRIDGE CO. DATED AUGUST 24, 1949.

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

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

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

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

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

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

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

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

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

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

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

DESIGNED BY:	TJL
DRAWN BY:	TJL
CHK'D BY:	CFC

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	6/18/14	TJL	CFC	ISSUED FOR NU REVIEW

PROFESSIONAL ENGINEER SEAL

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

T-MOBILE
ANTENNA MAST DESIGN

CT11296A
CL&P STRUCTURE 936

144 CHESTNUT HILL ROAD
WILTON, CT 06897

DATE:	6/18/14
SCALE:	AS SHOWN
JOB NO.	14025.007

DESIGN BASIS AND GENERAL NOTES

SHEET NO.
N-1
Sheet No. 2 of 9

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.

DESIGNED BY:	TJL
DRAWN BY:	TJL
CHK'D BY:	CFC

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	6/18/14	TJL	CFC	ISSUED FOR NU REVIEW

PROFESSIONAL ENGINEER SEAL

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

T-MOBILE
ANTENNA MAST DESIGN

CT11296A
CL&P STRUCTURE 936

144 CHESTNUT HILL ROAD
WILTON, CT 06897

DATE:	6/18/14
SCALE:	AS SHOWN
JOB NO.	14025.007

EARTHWORK & FOUNDATION CONSTRUCTION NOTES

SHEET NO.
N-2
Sheet No. 3 of 9

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.

DESIGNED BY:	TJL
DRAWN BY:	TJL
CHK'D BY:	CFC

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	6/18/14	TJL	CFC	ISSUED FOR NU REVIEW

PROFESSIONAL ENGINEER SEAL

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

T-MOBILE
ANTENNA MAST DESIGN

CT11296A
CL&P STRUCTURE 936

144 CHESTNUT HILL ROAD
WILTON, CT 06897

DATE:	6/18/14
SCALE:	AS SHOWN
JOB NO.	14025.007

CONCRETE CONSTRUCTION NOTES

SHEET NO.
N–3
Sheet No. 4 of 9

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 HSS (RECTANGULAR SHAPES)---ASTM A500 GRADE B, (FY = 46 KSI)
   D. STRUCTURAL HSS (ROUND SHAPES)---ASTM A500 GRADE B, (FY = 42 KSI)
   E. PIPE---ASTM A53 GRADE B (FY = 35 KSI)

3. FASTENER SPECIFICATIONS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

19. FABRICATE BEAMS WITH MILL CAMBER UP.

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

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

DESIGNED BY:	TJL
DRAWN BY:	TJL
CHK'D BY:	CFC

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	6/18/14	TJL	CFC	ISSUED FOR NU REVIEW

PROFESSIONAL ENGINEER SEAL

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

T-MOBILE
ANTENNA MAST DESIGN

CT11296A
CL&P STRUCTURE 936

144 CHESTNUT HILL ROAD
WILTON, CT 06897

DATE:	6/18/14
SCALE:	AS SHOWN
JOB NO.	14025.007

STRUCTURAL NOTES

SHEET NO.
N-4
Sheet No. 5 of 9

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

DESIGNED BY:	TJL
DRAWN BY:	TJL
CHK'D BY:	CFC

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	6/18/14	TJL	CFC	ISSUED FOR NU REVIEW

PROFESSIONAL ENGINEER SEAL
STATE OF CONNECTICUT
LICENSED PROFESSIONAL ENGINEER
No. 19694

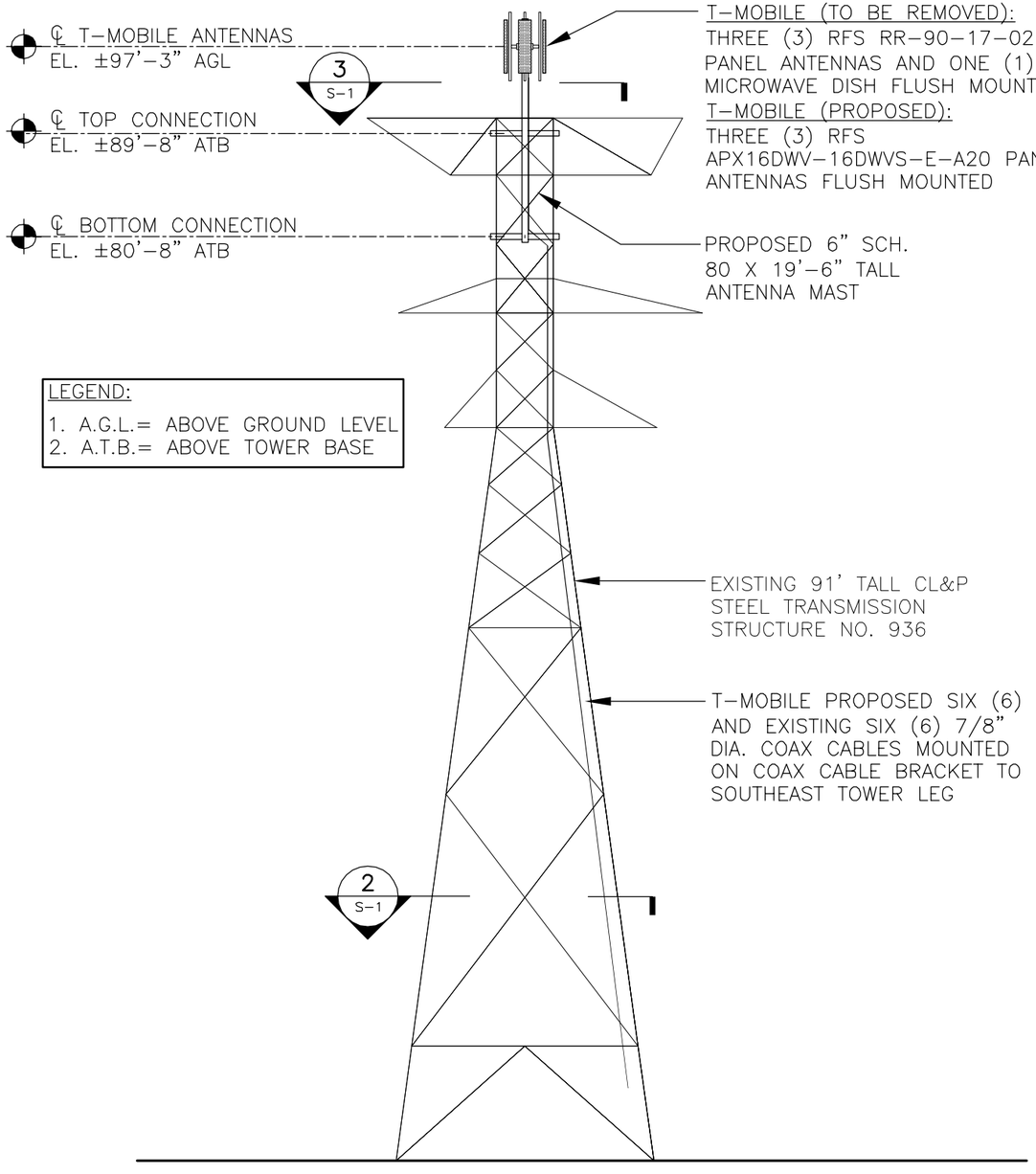
CENTEK engineering
Centered on Solutions
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

T-MOBILE
ANTENNA MAST DESIGN
CT11296A
CL&P STRUCTURE 936
144 CHESTNUT HILL ROAD
WILTON, CT 06897

DATE:	6/18/14
SCALE:	AS SHOWN
JOB NO.	14025.007

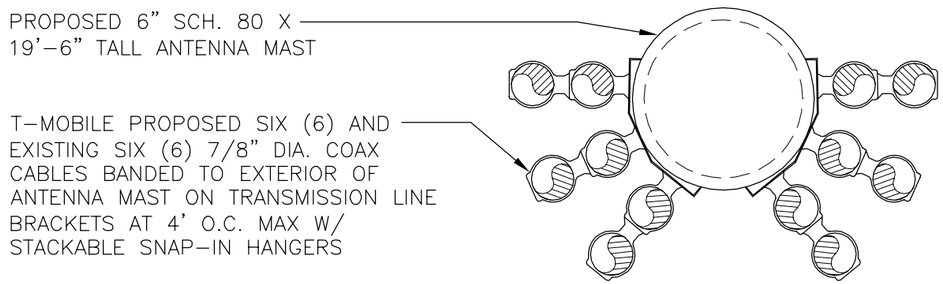
MODIFICATION INSPECTION REQUIREMENTS

SHEET NO.
MI-1
Sheet No. 6 of 9



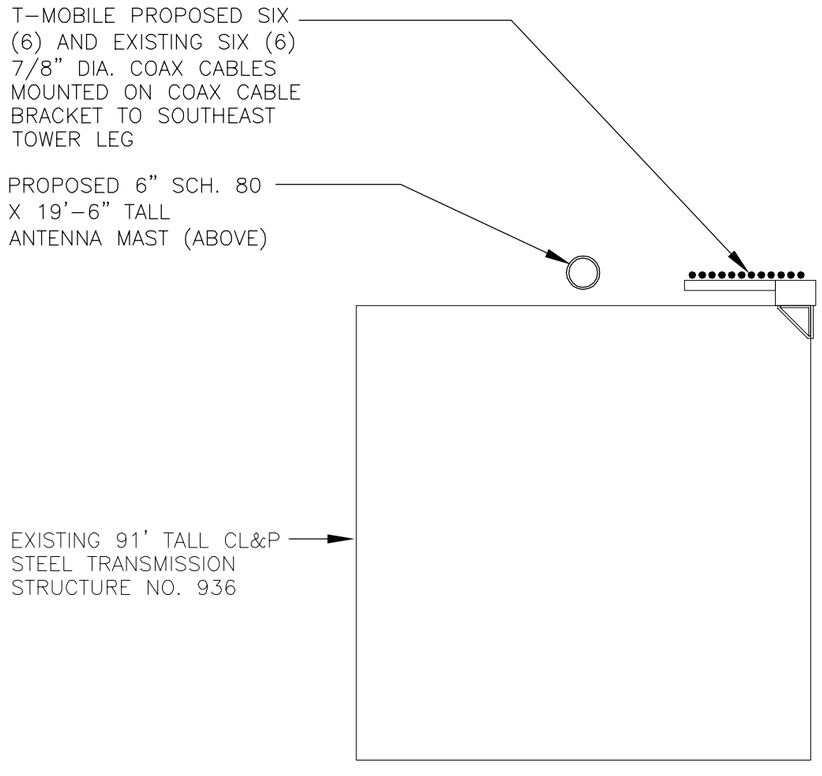
1 / S-1 TOWER & ANTENNA MASK ELEVATION

SCALE: NOT TO SCALE



3 / S-1 FEEDLINE PLAN - ANTENNA MAST

SCALE: NOT TO SCALE



2 / S-1 FEEDLINE PLAN - TOWER

SCALE: NOT TO SCALE

APPROX. NORTH

DESIGNED BY:	TJL
DRAWN BY:	TJL
CHK'D BY:	CFC

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	6/18/14	TJL	CFC	ISSUED FOR NU REVIEW

PROFESSIONAL ENGINEER SEAL

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

T-MOBILE
ANTENNA MAST DESIGN

CT11296A
CL&P STRUCTURE 936

144 CHESTNUT HILL ROAD
WILTON, CT 06897

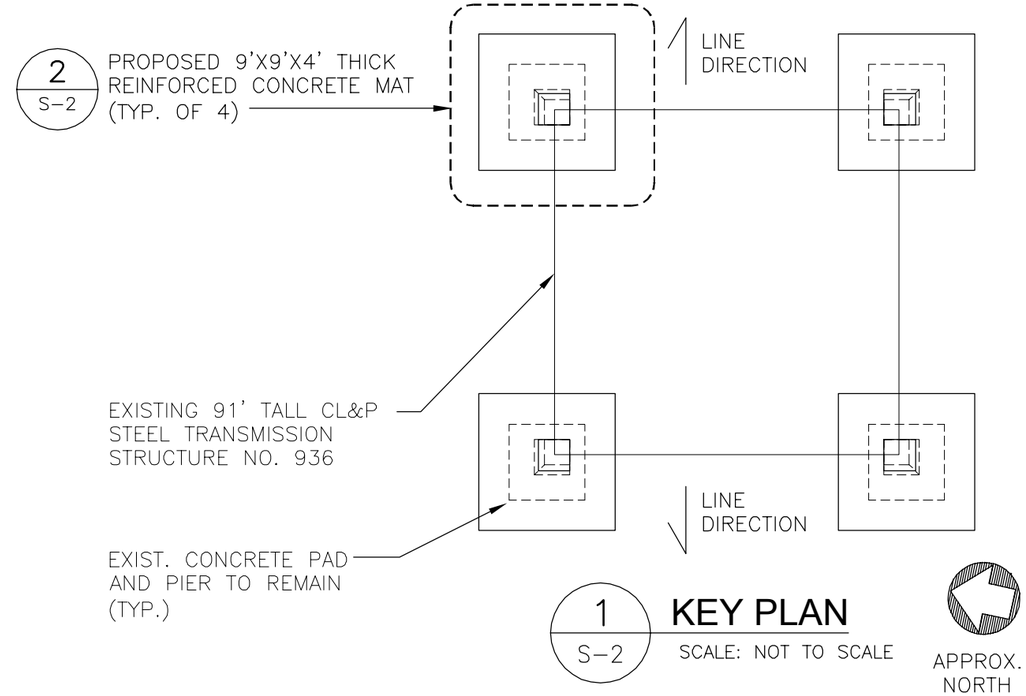
DATE:	6/18/14
SCALE:	AS SHOWN
JOB NO.	14025.007

TOWER ELEVATION AND FEEDLINE PLAN

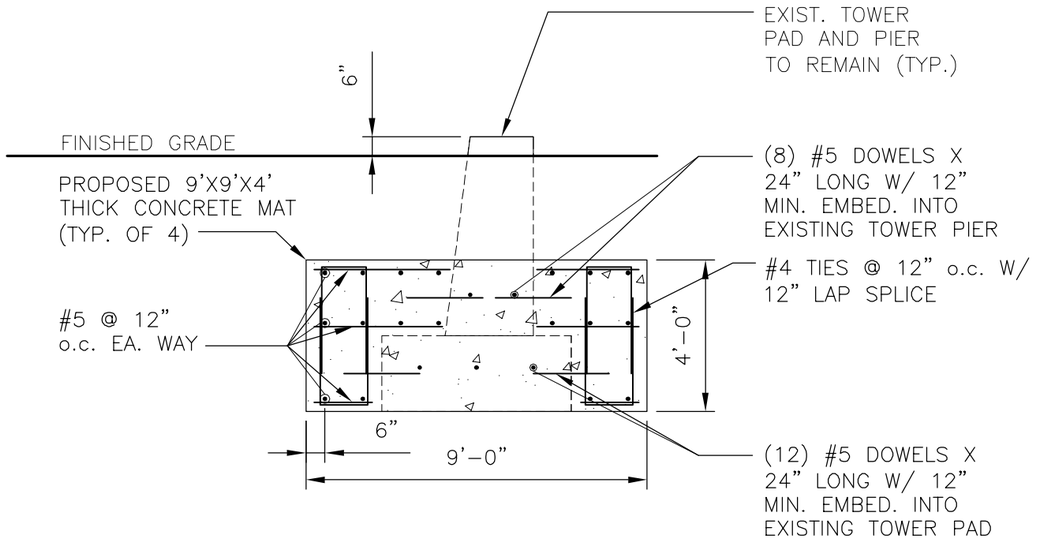
SHEET NO.
S-1
Sheet No. 7 of 9

FOUNDATION PLAN NOTES:

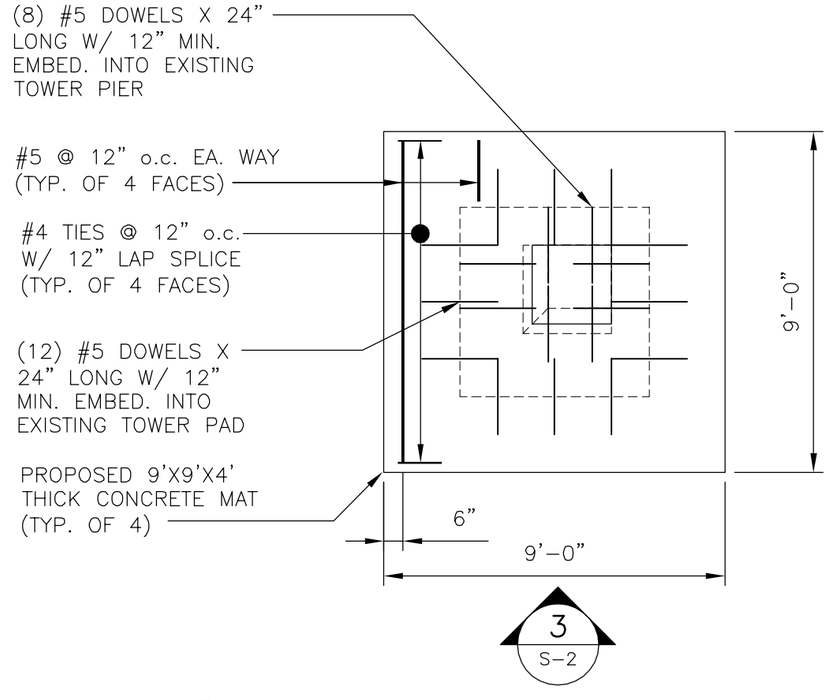
1. TOWER FOUNDATION SHALL BE CHECKED AND/OR TEMPORARY SHORING SHALL BE PROVIDED TO ENSURE TOWER STABILITY DURING CONSTRUCTION. LIMIT CONSTRUCTION DURATION TO MINIMIZE RISK. CONSTRUCTION SHALL BE CONDUCTED IN WIND SPEEDS LESS THAN 15 MPH AND IN LOW ICE ACCUMULATION PERIODS.
2. CONTRACTOR SHALL USE EXTREME CAUTION DURING EXCAVATION OF EXISTING FOUNDATION STRUCTURE. IMPLEMENT HAND DIGGING WHERE PRACTICABLE.
3. PROTECT EXISTING TOWER GROUND WIRE(S) FROM DAMAGE DUE TO NEW CONSTRUCTION. CONTRACTOR SHALL NOTIFY NU IF GROUNDING SYSTEM BECOMES DAMAGED OR DISCONNECTED.
4. NOTIFY NU REPRESENTATIVE TO BE PRESENT UPON COMPLETION OF REBAR PLACEMENT.



1 S-2 **KEY PLAN**
SCALE: NOT TO SCALE



3 S-2 **FOUNDATION REINFORCEMENT DETAIL**
SCALE: 1/4" = 1'-0"



2 S-2 **FOUNDATION REINFORCEMENT PLAN**
SCALE: 1/4" = 1'-0"

DESIGNED BY:	TJL
DRAWN BY:	TJL
CHK'D BY:	CFC

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	6/18/14	TJL	CFC	ISSUED FOR NU REVIEW

PROFESSIONAL ENGINEER SEAL

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

T-MOBILE
ANTENNA MAST DESIGN

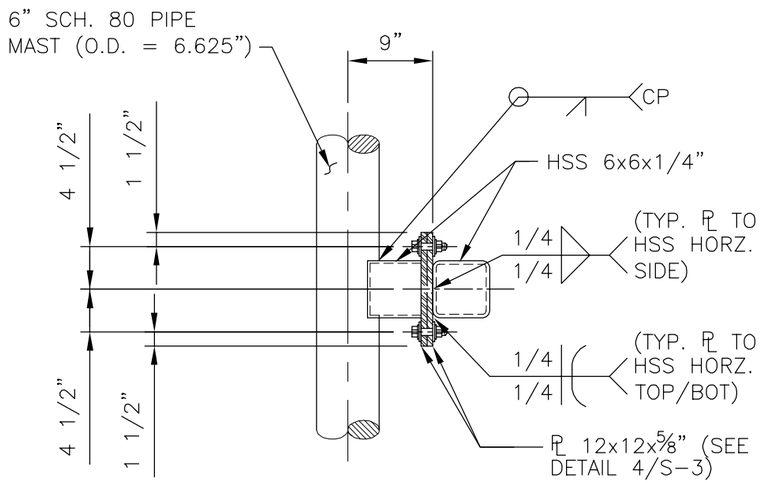
CT11296A
CL&P STRUCTURE 936

144 CHESTNUT HILL ROAD
WILTON, CT 06897

DATE:	6/18/14
SCALE:	AS SHOWN
JOB NO.	14025.007

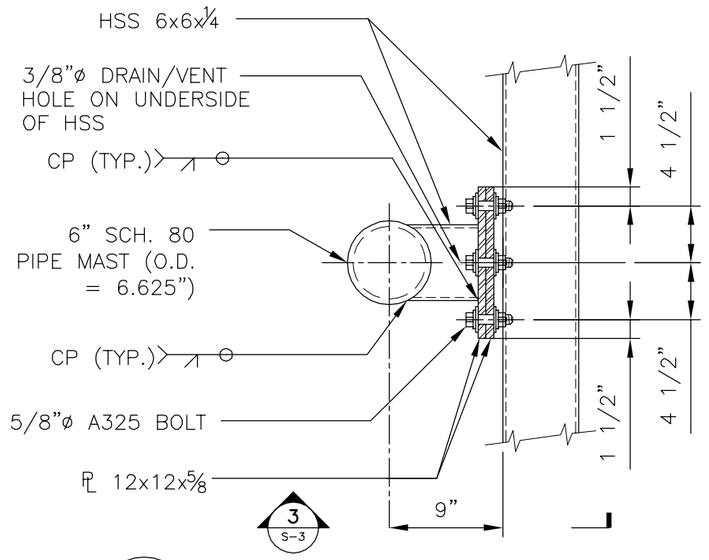
FOUNDATION REINFORCEMENT DETAILS

SHEET NO.
S-2
Sheet No. 8 of 9



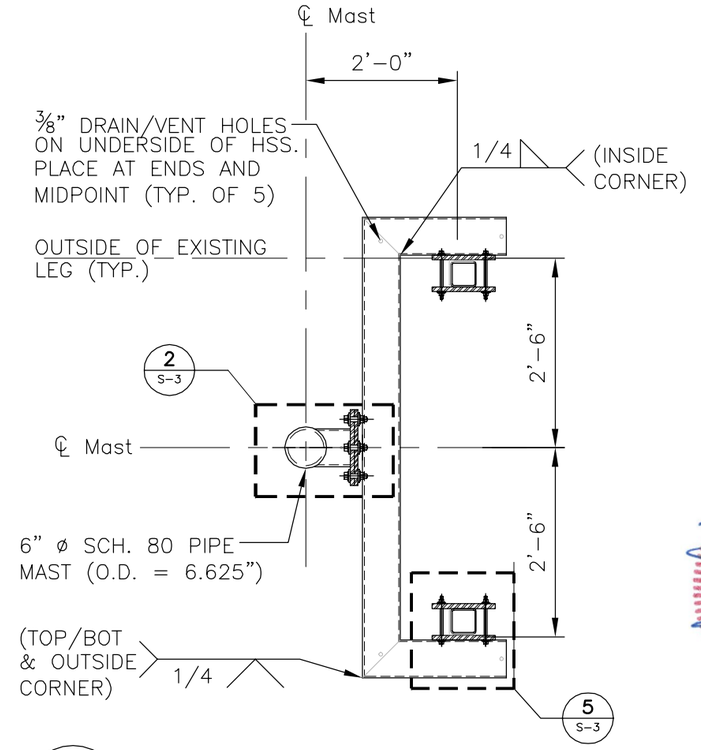
3 S-3 **MAST CONNECTION SECTION**

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



2 S-3 **MAST CONNECTION DETAIL**

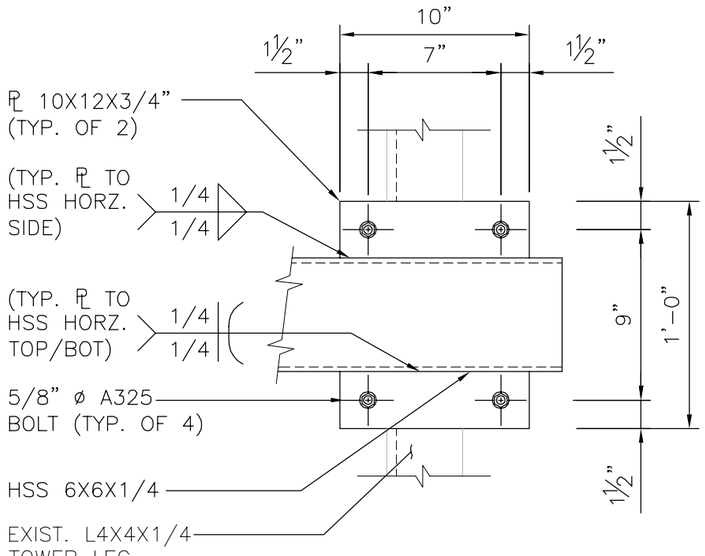
SCALE: 1" = 1'-0"



1 S-3 **MAST CONNECTION PLAN**

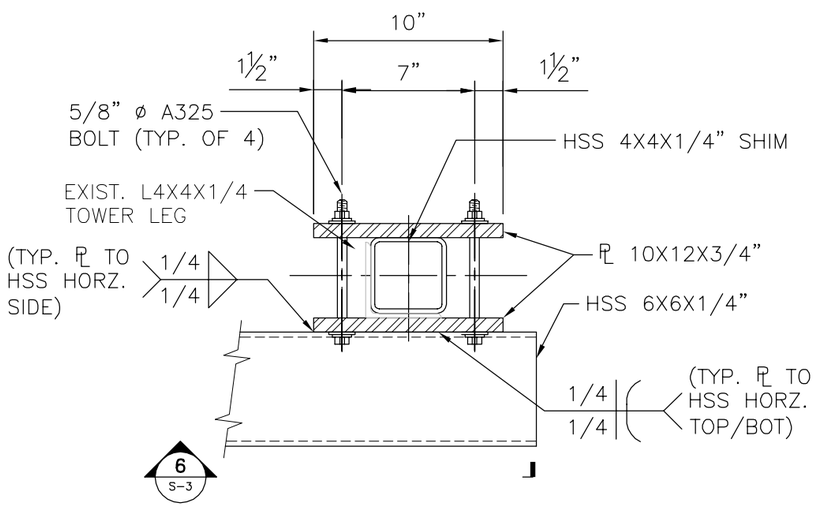
SCALE: 1/2" = 1'-0"

SLIP CRITICAL JOINT



6 S-3 **CONNECTION DETAIL**

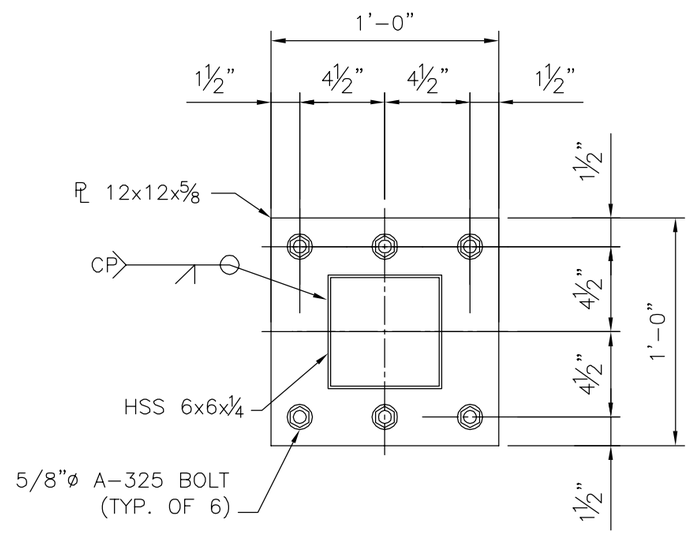
SCALE: 1-1/2" = 1'-0"



5 S-3 **CONNECTION DETAIL**

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

1. ALL SLIP CRITICAL CONNECTIONS TO BE INSTALLED W/ SQUIRTER A325 GALVANIZED LOAD INDICATING WASHERS OR ENGINEER APPROVED EQUAL.
2. SLIP-CRITICAL CONECTIONS SHALL BE TIGHTENED TO A BOLT TENSION NOT LESS THAN THAT GIVEN IN TABLE J3.1 OF AISC 14TH EDITION.
3. ROUGHEN SURFACES OF EXISTING AND PROPOSED STEEL AT LOCATION OF CONNECTION WITH WIRE BRUSH.



4 S-3 **PLATE DETAIL**

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

DESIGNED BY:	TJL
DRAWN BY:	TJL
CHK'D BY:	CFC

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	6/18/14	TJL	CFC	ISSUED FOR NU REVIEW

PROFESSIONAL ENGINEER SEAL

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

T-MOBILE
ANTENNA MAST DESIGN

CT11296A
CL&P STRUCTURE 936

144 CHESTNUT HILL ROAD
WILTON, CT 06897

DATE:	6/18/14
SCALE:	AS SHOWN
JOB NO.	14025.007

ANTENNA MAST DETAILS

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

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

Subject:	Load Analysis of PCS Mast and T-Mobile Equipment on CL&P Tower # 936
Location:	Wilton, CT
Rev. 1: 6/10/14	Prepared by: T.J.L. Checked by: C.F.C. Job No. 14025.007

Development of Design Heights, Exposure Coefficients, and Velocity Pressures Per TIA/EIA

Wind Speeds

Basic Wind Speed: $V := 85$ mph (User Input per NU Mast Design Criteria Exception 1)

Basic Wind Speed with Ice: $V_i := 74$ mph (User Input per TIA/EIA-222-F Section 2.3.16)

Heights above ground level, z

Mast: $z_{mast} := 89.92$ ft (User Input)

T-Mobile: $z_{TM} := 97.25$ ft (User Input)

Coax: $z_{coax} := 87$ ft (User Input)

Exposure Coefficients, kz

(per TIA/EIA-222-F Section 2.3.3)

Mast: $Kz_{mast} := \left(\frac{z_{mast}}{33}\right)^{\frac{2}{7}} = 1.332$

T-Mobile: $Kz_{TM} := \left(\frac{z_{TM}}{33}\right)^{\frac{2}{7}} = 1.362$

Coax: $Kz_{coax} := \left(\frac{z_{coax}}{33}\right)^{\frac{2}{7}} = 1.319$

Velocity Pressure without ice, qz

(per TIA/EIA-222-F Section 2.3.3)

Mast: $qz_{mast} := 0.00256 \cdot Kz_{mast} \cdot V^2 = 24.63$

T-Mobile: $qz_{TM} := 0.00256 \cdot Kz_{TM} \cdot V^2 = 25.188$

Coax: $qz_{coax} := 0.00256 \cdot Kz_{coax} \cdot V^2 = 24.399$

Velocity Pressure with ice, qzICE

(per TIA/EIA-222-F Section 2.3.3)

Mast: $qzICE_{mast} := 0.00256 \cdot Kz_{mast} \cdot V_i^2 = 18.668$

T-Mobile: $qzICE_{TM} := 0.00256 \cdot Kz_{TM} \cdot V_i^2 = 19.09$

Coax: $qzICE_{coax} := 0.00256 \cdot Kz_{coax} \cdot V_i^2 = 18.492$

TIA/EIA Common Factors:

Gust Response Factor = $G_H := 1.69$ (User Input per TIA/EIA-222-F Section 2.3.4)

Radial Ice Thickness = $Ir := 0.50$ in (User Input per TIA/EIA-222-F Section 2.3.1)

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

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

Subject: Load Analysis of PCS Mast and T-Mobile Equipment on CL&P Tower # 936

Location: Wilton, CT

Rev. 1: 6/10/14

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 14025.007

Development of Wind & Ice Load on PCS Mast (per TIA/EIA-222-F-1996 Criteria)

Mast Data: (Pipe 6.0" SCH. 80) (User Input)

Mast Shape = Round (User Input)

Mast Diameter = $D_{mast} := 6.63$ in (User Input)

Mast Length = $L_{mast} := 19.5$ ft (User Input)

Mast Thickness = $t_{mast} := 0.432$ in (User Input)

Mast Aspect Ratio = $Ar_{mast} := \frac{12 L_{mast}}{D_{mast}} = 35.3$

Mast Force Coefficient = $Ca_{mast} = 1.2$ (per TIA/EIA-222-F Table 3)

Wind Load (without ice) (per TIA/EIA-222-F-1996 Section 2.3.2)

Mast Projected Surface Area = $A_{mast} := \frac{D_{mast}}{12} = 0.553$ sf/ft

Total Mast Wind Force = $qz_{mast} \cdot G_H \cdot Ca_{mast} \cdot A_{mast} = 28$ plf **BLC 5,7**

Wind Load (with ice) (per TIA/EIA-222-F-1996 Section 2.3.2)

Mast Projected Surface Area w/ Ice = $AICE_{mast} := \frac{(D_{mast} + 2 \cdot Ir)}{12} = 0.636$ sf/ft

Total Mast Wind Force w/ Ice = $qzICE_{mast} \cdot G_H \cdot Ca_{mast} \cdot AICE_{mast} = 24$ plf **BLC 4,6**

Gravity Loads (without ice)

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

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{mast} := \frac{\pi}{4}\left[(D_{mast} + Ir \cdot 2)^2 - D_{mast}^2\right] = 11.2$ sq in

Weight of Ice on Mast = $W_{ICEmast} := Id \cdot \frac{Ai_{mast}}{144} = 4$ plf **BLC 3**

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

Subject: Load Analysis of PCS Mast and T-Mobile Equipment on CL&P Tower # 936

Location: Wilton, CT

Rev. 1: 6/10/14

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 14025.007

Development of Wind & Ice Load on Antennas (per TIA/EIA-222-F-1996 Criteria)

Antenna Data: (T-Mobile)

Antenna Model =	RFS APX 16DWV-16DWVS-E-A20				
Antenna Shape =	Flat		(User Input)		
Antenna Height =	$L_{ant} := 55.9$	in	(User Input)		
Antenna Width =	$W_{ant} := 13.0$	in	(User Input)		
Antenna Thickness =	$T_{ant} := 3.15$	in	(User Input)		
Antenna Weight =	$WT_{ant} := 45$	lbs	(User Input)		
Number of Antennas =	$N_{ant} := 3$		(User Input)		
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.3$				
Antenna Force Coefficient =	$Ca_{ant} = 1.4$		(per TIA/EIA-222-F-1996 Table 3)		

Wind Load (without ice) (per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 5$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 15.1$	sf	
Total Antenna Wind Force =	$F_{ant} := qz_{TM} \cdot G_H \cdot Ca_{ant} \cdot A_{ant} = 902$	lbs	**BLC 5,7**

Wind Load (with ice) (per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 5.5$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 16.6$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qzICE_{TM} \cdot G_H \cdot Ca_{ant} \cdot A_{ICEant} = 750$	lbs	**BLC 4,6**

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 135$	lbs	**BLC 2**

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2289$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 1)(W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 1017$	cu in	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 33$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 99$	lbs	**BLC 3**

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

Subject:	Load Analysis of PCS Mast and T-Mobile Equipment on CL&P Tower # 936
Location:	Wilton, CT
Rev. 1: 6/10/14	Prepared by: T.J.L. Checked by: C.F.C. Job No. 14025.007

Development of Wind & Ice Load on Antenna Mounts (per TIA/EIA-222-F-1996 Criteria)

Mount Data: (T-Mobile)

Mount Type: Universal Tri-Bracket Mount w/ 3 Pipes

Mount Shape = Round (User Input)

Pipe Mount Length = $L_{mnt} := 66$ 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)

Mount Weight = $W_{tsc.mnt} := 100$ lbs (User Input)

Mount Aspect Ratio = $Ar_{mnt} := \frac{L_{mnt}}{D_{mnt}} = 28$

Mount Force Coefficient = $Ca_{mnt} = 1.2$ (per TIA/EIA-222-F Table 3)

Wind Load (without ice) (per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Mount is Shielded by Antenna

Mount Projected Surface Area = $A_{mnt} := 0.0$ sf

Total Mount Wind Force = $F_{mnt} := qz_{TM} \cdot G_H \cdot Ca_{mnt} \cdot A_{mnt} = 0$ lbs **BLC 5,7**

Wind Load (with ice) (per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Mount is Shielded by Antenna

Mount Projected Surface Area w/ Ice = $A_{ICEmnt} := 0.0$ sf

Total Mount Wind Force = $Fi_{mnt} := qzICE_{TM} \cdot G_H \cdot Ca_{mnt} \cdot A_{ICEmnt} = 0$ lbs **BLC 4,6**

Gravity Loads (without ice) (per TIA/EIA-222-F-1996)

Weight Each Pipe Mount = $WT_{mnt} := W_{mnt} \cdot \frac{L_{mnt}}{12} = 20$ lbs

Weight of All Mounts = $WT_{mnt} \cdot N_{mnt} + W_{tsc.mnt} = 160$ lbs **BLC 2**

Gravity Loads (ice only) (per TIA/EIA-222-F-1996)

Volume of Each Pipe = $V_{mnt} := \frac{\pi}{4} \cdot D_{mnt}^2 \cdot L_{mnt} = 292$ cu in

Volume of Ice on Each Pipe = $V_{ice} := \left[\frac{\pi}{4} \cdot \left[(D_{mnt} + 1)^2\right] \cdot (L_{mnt} + 1)\right] - V_{mnt} = 307$ cu in

Weight of Ice each mount (incl, hardware) = $W_{ICEmnt} := \frac{V_{ice}}{1728} \cdot ld = 10$ lbs

Weight of Ice on All Mounts = $W_{ICEmnt} \cdot N_{mnt} + 5 = 35$ lbs **BLC 3**

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

Subject: Load Analysis of PCS Mast and T-Mobile Equipment on CL&P Tower # 936

Location: Wilton, CT

Rev. 1: 6/10/14

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 14025.007

Development of Wind & Ice Load on Coax Cables per TIA/EIA-222-F-96 Criteria

Coax Cable Data:

Coax Type = HELIAX 7/8"

Shape = Round (User Input)

Coax Outside Diameter = $D_{coax} := 1.11$ in (User Input)

Coax Cable Length = $L_{coax} := 14$ ft (User Input)

Weight of Coax per foot = $Wt_{coax} := 0.54$ 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, $Ar_{coax} := \frac{(L_{coax} \cdot 12)}{D_{coax}} = 151.4$

Coax Cable Force Factor Coefficient = $Ca_{coax} = 1.2$ TIA/EIA-222-F-96 Table 3

Wind Load (without ice) per TIA/EIA-222-F-96 Section 2.3.2

Coax projected surface area = $A_{coax} := \frac{NP_{coax} \cdot D_{coax}}{12} = 0.4$ sf/ft

Total Coax Wind Force = $F_{coax} := qz_{coax} \cdot G_H \cdot Ca_{coax} \cdot A_{coax} = 18$ plf **BLC 5,7**

Wind Load (with ice) per TIA/EIA-222-F-96 Section 2.3.2

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 = $Fi_{coax} := qzICE_{coax} \cdot G_H \cdot Ca_{coax} \cdot AICE_{coax} = 26$ plf **BLC 4,6**

Gravity Loads (without ice)

Weight of all cables w/o ice $WT_{coax} := Wt_{coax} \cdot N_{coax} = 6$ plf **BLC 2**

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{coax} := \frac{\pi}{4}\left[(D_{coax} + 2 \cdot Ir)^2 - D_{coax}^2\right] = 2.5$ sq in

Ice Weight All Coax per foot = $WTi_{coax} := Id \cdot \left(N_{coax} \cdot \frac{Ai_{coax}}{144}\right) = 12$ plf **BLC 3**

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

Subject:	Load Analysis of PCS Mast and T-Mobile Equipment on CL&P Tower # 936
Location:	Wilton, CT
Rev. 1: 6/10/14	Prepared by: T.J.L. Checked by: C.F.C. Job No. 14025.007

Development of Wind & Ice Load on Brace Member (per TIA/EIA-222-F-1996 Criteria)

Member Data: HSS6x6x1/4

Antenna Shape = Flat (User Input)

Height = $H_{mem} := 6$ in (User Input)

Width = $W_{mem} := 6$ in (User Input)

Length = $L_{mem} := 66$ in (User Input)

Member Aspect Ratio = $Ar_{mem} := \frac{L_{mem}}{H_{mem}} = 11.0$

Member Force Coefficient = $Ca_{mem} = 1.53$ (per TIA/EIA-222-F-1996 Table 3)

Wind Load (without ice) (per TIA/EIA-222-F-1996 Section 2.3.2)

Member Projected Surface Area = $A_{mem} := \frac{H_{mem}}{12} = 0.5$ plf

Total Member Wind Force = $F_{mem} := qz_{mast} \cdot G_H \cdot Ca_{mem} \cdot A_{mem} = 32$ lbs **BLC 5,7**

Wind Load (with ice) (per TIA/EIA-222-F-1996 Section 2.3.2)

Member Projected Surface Area w/ Ice = $A_{ICEmem} := \frac{(H_{mem} + 2 \cdot Ir)}{12} = 0.58$ plf

Total Member Wind Force w/ Ice = $Fi_{mem} := qzICE_{mast} \cdot G_H \cdot Ca_{mem} \cdot A_{ICEmem} = 28$ lbs **BLC 4,6**

Gravity Load (without ice)

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

Gravity Loads (ice only)

Ice Area per Linear foot = $Ai_{mem} := (W_{mem} + 2 \cdot Ir) \cdot (H_{mem} + 2 \cdot Ir) - W_{mem} \cdot H_{mem} = 13$ sq in

Weight of Ice on Member = $W_{ICE.mem} := Id \cdot \frac{Ai_{mem}}{144} = 5$ lbs **BLC 3**

CENTEK engineering, INC.	Subject:	**Analysis of TIA/EIA Wind and Ice Loads for Design of PCS Structure Only**
Consulting Engineers		**Tabulated Load Cases**
63-2 North Branford Road		
Branford, CT 06405	Location:	**Wilton, CT**
Ph. 203-488-0580 / Fax. 203-488-8587	Date: 2/14/14	Prepared by: T.J.L. Checked by: C.F.C. Job No. 14025.007

Load Case	Description
1	Self Weight (PCS Mast)
2	Weight of Appurtenances
3	Weight of Ice Only on PCS Structure
4	x-direction TIA/EIA Wind with Ice on PCS Structure
5	x-direction TIA/EIA Wind on PCS Structure
6	z-direction TIA/EIA Wind with Ice on PCS Structure
7	z-direction TIA/EIA Wind on PCS Structure

Footnotes:
(1) PCS Structure includes: PCS Mast and Appurtenances

CENTEK engineering, INC.
Consulting Engineers
63-2 North Branford Road
Branford, CT 06405
Ph. 203-488-0580 / Fax. 203-488-8587

Subject: **Analysis of TIA/EIA Wind and Ice Loads for Design of PCS Structure Only**
Load Combinations Table

Location: **Wilton, CT**

Date: 2/14/14 Prepared by: T.J.L. Checked by: C.F.C. Job No. 14025.007

Load Combination	Description	Envelope Soultion	Wind Factor	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	x-direction TIA/EIA Wind + Ice on PCS Structure		1		1	1	2	1	3	1	4	1		
2	x-direction TIA/EIA Wind on PCS Structure		1		1	1	2	1	5	1				
3	z-direction TIA/EIA Wind + Ice on PCS Structure		1		1	1	2	1	3	1	6	1		
4	z-direction TIA/EIA Wind on PCS Structure		1		1	1	2	1	7	1				

Footnotes:
(1) BLC = Basic Load Case
(2) PCS Structure includes: PCS Mast and Appurtenances

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): ASD
Adjust Stiffness?	Yes(Tau=1.0)
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	Mast	19.5	9	9	9	9	9				Lateral
2	M2	Brace	5									Lateral
3	M3	Brace	5									Lateral
4	M4	Brace	1.25									Lateral
5	M5	Brace	1.25									Lateral
6	M6	Brace	1.25									Lateral
7	M7	Brace	1.25									Lateral
8	M8	Brace	.75									Lateral
9	M9	Brace	.75									Lateral

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rul...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Mast	PIPE_6.0X	Column	Pipe	A53 Gr. B	Typical	7.83	38.3	38.3	76.6
2	Brace	HSS6x6x4	Beam	Tube	A500 Gr.46	Typical	5.24	28.6	28.6	45.6

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design R...
1	M1	N1	N4			Mast	Column	Pipe	A53 Gr. B	Typical
2	M2	N8	N7		90	Brace	Beam	Tube	A500 Gr.46	Typical
3	M3	N6	N5		90	Brace	Beam	Tube	A500 Gr.46	Typical
4	M4	N12	N8			Brace	Beam	Tube	A500 Gr.46	Typical
5	M5	N11	N7			Brace	Beam	Tube	A500 Gr.46	Typical
6	M6	N10	N6			Brace	Beam	Tube	A500 Gr.46	Typical
7	M7	N9	N5			Brace	Beam	Tube	A500 Gr.46	Typical
8	M8	N14	N3			Brace	Beam	Tube	A500 Gr.46	Typical
9	M9	N13	N2			Brace	Beam	Tube	A500 Gr.46	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Dia...
1	N1	0	0	0	0	
2	N2	0	.5	0	0	
3	N3	0	9.5	0	0	
4	N4	0	19.5	0	0	
5	N5	2.5	.5	.75	0	
6	N6	-2.5	.5	.75	0	
7	N7	2.5	9.5	.75	0	
8	N8	-2.5	9.5	.75	0	
9	N9	2.5	.5	2	0	
10	N10	-2.5	.5	2	0	
11	N11	2.5	9.5	2	0	
12	N12	-2.5	9.5	2	0	
13	N13	0	.5	.75	0	
14	N14	0	9.5	.75	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	N8							
2	N6							
3	N5							
4	N7							
5	N3							
6	N1							
7	N2							
8	N9	Reaction	Reaction	Reaction				
9	N10	Reaction	Reaction	Reaction				
10	N11	Reaction	Reaction	Reaction				
11	N12	Reaction	Reaction	Reaction				
12	N13							
13	N14							

Member Point Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Y	-.135	17.08
2	M1	Y	-.16	17.08

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Y	-.099	17.08
2	M1	Y	-.035	17.08

Member Point Loads (BLC 4 : x-dir TIA/EIA Wind with Ice on P)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	X	.75	17.08

Member Point Loads (BLC 5 : x-dir TIA/EIA Wind on Antenna St)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	X	.902	17.08

Member Point Loads (BLC 6 : z-dir TIA/EIA Wind with Ice on P)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Z	.75	17.08

Member Point Loads (BLC 7 : z-dir TIA/EIA Wind on Antenna St)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Z	.902	17.08

Joint Loads and Enforced Displacements

Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
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	-.006	-.006	0	14

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

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.004	-.004	0	0
2	M1	Y	-.012	-.012	0	14
3	M2	Y	-.005	-.005	0	0
4	M3	Y	-.005	-.005	0	0
5	M4	Y	-.005	-.005	0	0
6	M6	Y	-.005	-.005	0	0
7	M7	Y	-.005	-.005	0	0
8	M5	Y	-.005	-.005	0	0
9	M8	Y	-.005	-.005	0	0
10	M9	Y	-.005	-.005	0	0

Member Distributed Loads (BLC 4 : x-dir TIA/EIA Wind with Ice on P)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.024	.024	0	0
2	M1	X	.026	.026	0	14
3	M4	X	.028	.028	0	0
4	M8	X	.028	.028	0	0
5	M5	X	.028	.028	0	0
6	M6	X	.028	.028	0	0
7	M9	X	.028	.028	0	0
8	M7	X	.028	.028	0	0

Member Distributed Loads (BLC 5 : x-dir TIA/EIA Wind on Antenna St)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.028	.028	0	0
2	M1	X	.018	.018	0	14
3	M4	X	.032	.032	0	0
4	M8	X	.032	.032	0	0
5	M5	X	.032	.032	0	0
6	M6	X	.032	.032	0	0
7	M9	X	.032	.032	0	0
8	M7	X	.032	.032	0	0

Member Distributed Loads (BLC 6 : z-dir TIA/EIA Wind with Ice on P)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	Z	.024	.024	0	0
2	M1	Z	.026	.026	0	14
3	M2	Z	.028	.028	0	0
4	M3	Z	.028	.028	0	0

Member Distributed Loads (BLC 7 : z-dir TIA/EIA Wind on Antenna St)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	Z	.028	.028	0	0
2	M1	Z	.018	.018	0	14

Member Distributed Loads (BLC 7 : z-dir TIA/EIA Wind on Antenna St) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
3	M2	Z	.032	.032	0	0
4	M3	Z	.032	.032	0	0

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Grav...	Joint	Point	Distrib...	Area(...	Surfac...
1	Self Weight (Antenna Mast)	None		-1						
2	Weight of Appurtenances	None					2	1		
3	Weight of Ice Only on Antennna S	None					2	10		
4	x-dir TIA/EIA Wind with Ice on P	None					1	8		
5	x-dir TIA/EIA Wind on Antenna St	None					1	8		
6	z-dir TIA/EIA Wind with Ice on P	None					1	4		
7	z-dir TIA/EIA Wind on Antenna St	None					1	4		

Load Combinations

	Description	Solve	PDelta	SRSS	B...	Fa...	BLC	Fa...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	x-dir TIA/EIA Wind + Ice on P...	Yes	Y		1	1	2	1	3	1	4	1								
2	x-dir TIA/EIA Wind on PCS Str...	Yes	Y		1	1	2	1	5	1										
3	z-dir TIA/EIA Wind + Ice on P...	Yes	Y		1	1	2	1	3	1	6	1								
4	z-dir TIA/EIA Wind on PCS Str...	Yes	Y		1	1	2	1	7	1										
5	Self Weight		Y																	

Envelope Member Section Forces

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k...	LC	y-y Mom...	LC	z-z Mom...	LC
1	M1	1	max	0	1	0	1	0	4	0	1	0	1	0	1
2			min	0	1	0	3	0	1	0	1	0	1	0	1
3		2	max	.4	1	0	3	.697	4	.103	2	1.223	4	1.192	2
4			min	-.937	4	-.555	2	-.33	1	0	3	.026	2	0	3
5		3	max	.804	3	1.254	2	0	1	0	1	8.131	4	8.13	2
6			min	.58	2	0	3	-1.254	4	0	1	-.003	1	0	3
7		4	max	.578	3	1.041	2	0	1	0	1	2.56	4	2.56	2
8			min	.425	2	0	3	-1.041	4	0	1	-.001	1	0	3
9		5	max	0	1	.003	1	0	1	0	1	0	1	0	1
10			min	0	1	0	3	-.003	3	0	1	0	1	0	1
11	M2	1	max	.919	4	.927	2	.563	2	.689	2	0	1	1.428	2
12			min	-1.123	2	-1.167	4	-.896	3	-1.137	3	0	1	-1.148	4
13		2	max	.919	4	.927	2	.586	2	.689	2	.718	2	.285	4
14			min	-1.123	2	-1.127	4	-.868	4	-1.137	3	-1.102	3	.223	1
15		3	max	.919	4	.692	2	1.07	2	1.41	2	-2.168	3	1.669	4
16			min	-1.123	2	-1.087	4	-.845	4	-1.137	3	-2.731	2	-.891	2
17		4	max	.932	2	1.127	4	1.092	2	1.41	2	-1.098	4	.285	4
18			min	.763	3	.556	1	.867	3	1.124	4	-1.379	2	-.326	2
19		5	max	.932	2	1.167	4	1.115	2	1.41	2	0	1	-.953	3
20			min	.763	3	.556	1	.89	4	1.124	4	0	1	-1.19	2
21	M3	1	max	.248	2	.156	4	.337	4	.408	4	0	1	.184	4
22			min	-.148	4	-.222	1	-.511	1	-.657	1	0	1	-.286	2
23		2	max	.248	2	.196	4	.36	4	.408	4	.436	4	.005	1
24			min	-.148	4	-.222	1	-.483	1	-.657	1	-.621	1	-.036	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k...	LC	y-y Mom...	LC	z-z Mom...	LC
25		3	max	.248	2	.109	3	.182	3	.408	4	.899	4	.283	1
26			min	-.148	4	-.236	4	-.454	1	-.657	1	-1.206	1	-.307	4
27		4	max	.031	1	.108	1	.229	1	.34	1	.436	4	.078	2
28			min	-.148	4	-.196	4	-.36	4	-.408	4	-.304	1	-.036	4
29		5	max	.031	1	.108	1	.258	1	.34	1	0	1	.184	4
30			min	-.148	4	-.156	4	-.337	4	-.408	4	0	1	-.06	1
31	M4	1	max	1.166	4	.924	3	.919	4	0	1	0	1	0	1
32			min	-.928	2	-.54	2	-1.162	2	0	1	0	1	0	1
33		2	max	1.166	4	.917	3	.919	4	0	1	.287	4	.17	2
34			min	-.928	2	-.545	2	-1.152	2	0	1	-.362	2	-.288	3
35		3	max	1.166	4	.909	3	.919	4	0	1	.574	4	.341	2
36			min	-.928	2	-.551	2	-1.142	2	0	1	-.72	2	-.573	3
37		4	max	1.166	4	.902	3	.919	4	0	1	.861	4	.514	2
38			min	-.928	2	-.557	2	-1.132	2	0	1	-1.076	2	-.856	3
39		5	max	1.166	4	.895	3	.919	4	0	1	1.148	4	.689	2
40			min	-.928	2	-.562	2	-1.122	2	0	1	-1.428	2	-1.137	3
41	M5	1	max	1.166	4	1.139	2	-.763	3	0	1	0	1	0	1
42			min	.556	1	.911	4	-.972	2	0	1	0	1	0	1
43		2	max	1.166	4	1.134	2	-.763	3	0	1	-.238	3	-.284	4
44			min	.556	1	.905	4	-.962	2	0	1	-.302	2	-.355	2
45		3	max	1.166	4	1.128	2	-.763	3	0	1	-.477	3	-.566	4
46			min	.556	1	.899	4	-.952	2	0	1	-.601	2	-.708	2
47		4	max	1.166	4	1.122	2	-.763	3	0	1	-.715	3	-.846	4
48			min	.556	1	.894	4	-.942	2	0	1	-.897	2	-1.06	2
49		5	max	1.166	4	1.117	2	-.763	3	0	1	-.953	3	-1.124	4
50			min	.556	1	.888	4	-.932	2	0	1	-1.19	2	-1.41	2
51	M6	1	max	.222	1	.54	1	.208	2	0	1	0	1	0	1
52			min	-.156	4	-.315	4	-.148	4	0	1	0	1	0	1
53		2	max	.222	1	.533	1	.218	2	0	1	.067	2	.099	4
54			min	-.156	4	-.321	4	-.148	4	0	1	-.046	4	-.168	1
55		3	max	.222	1	.526	1	.228	2	0	1	.137	2	.2	4
56			min	-.156	4	-.326	4	-.148	4	0	1	-.092	4	-.333	1
57		4	max	.222	1	.519	1	.238	2	0	1	.209	2	.303	4
58			min	-.156	4	-.332	4	-.148	4	0	1	-.138	4	-.496	1
59		5	max	.222	1	.511	1	.248	2	0	1	.286	2	.408	4
60			min	-.156	4	-.337	4	-.148	4	0	1	-.184	4	-.657	1
61	M7	1	max	.108	1	.286	1	.148	4	0	1	0	1	0	1
62			min	-.156	4	-.315	4	-.066	1	0	1	0	1	0	1
63		2	max	.108	1	.279	1	.148	4	0	1	.046	4	.099	4
64			min	-.156	4	-.321	4	-.057	1	0	1	-.019	1	-.088	1
65		3	max	.108	1	.272	1	.148	4	0	1	.092	4	.2	4
66			min	-.156	4	-.326	4	-.048	1	0	1	-.035	1	-.175	1
67		4	max	.108	1	.265	1	.148	4	0	1	.138	4	.303	4
68			min	-.156	4	-.332	4	-.039	1	0	1	-.049	1	-.259	1
69		5	max	.108	1	.258	1	.148	4	0	1	.184	4	.408	4
70			min	-.156	4	-.337	4	-.031	1	0	1	-.06	1	-.34	1
71	M8	1	max	2.173	4	1.684	4	0	3	0	3	1.429	2	-.721	2
72			min	-.33	1	.463	2	-2.055	2	-4.195	2	0	3	-2.274	3
73		2	max	2.173	4	1.68	4	0	3	0	3	1.045	2	-.808	2
74			min	-.33	1	.46	2	-2.049	2	-4.195	2	0	3	-2.587	3
75		3	max	2.173	4	1.677	4	0	3	0	3	.661	2	-.894	2
76			min	-.33	1	.457	2	-2.043	2	-4.195	2	0	3	-2.899	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k...	LC	y-y Mom...	LC	z-z Mom...	LC
77		4	max	2.173	4	1.674	4	0	3	0	3	.279	2	-.979	2
78			min	-.33	1	.453	2	-2.037	2	-4.195	2	0	3	-3.211	3
79		5	max	2.173	4	1.67	4	0	3	0	3	0	3	-1.064	2
80			min	-.33	1	.45	2	-2.031	2	-4.195	2	-.103	2	-3.522	3
81	M9	1	max	.33	1	.655	1	.307	2	.801	2	0	3	.816	4
82			min	-.473	4	-.764	4	0	3	0	3	-.136	2	-.997	1
83		2	max	.33	1	.651	1	.313	2	.801	2	0	3	.959	4
84			min	-.473	4	-.768	4	0	3	0	3	-.078	2	-1.12	1
85		3	max	.33	1	.646	1	.319	2	.801	2	.005	1	1.104	4
86			min	-.473	4	-.771	4	0	3	0	3	-.019	2	-1.241	1
87		4	max	.33	1	.642	1	.325	2	.801	2	.046	1	1.248	4
88			min	-.473	4	-.774	4	0	3	0	3	0	3	-1.362	1
89		5	max	.33	1	.638	1	.331	2	.801	2	.103	2	1.394	4
90			min	-.473	4	-.778	4	0	3	0	3	0	3	-1.482	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	0	1	0	1	0	4	0	1	0	1	0	1	0	1
2			min	0	1	0	3	0	1	0	1	0	1	0	1	0	1
3		2	max	.051	1	0	3	.178	4	0	3	1.238	2	1.27	4	-.027	2
4			min	-.12	4	-.142	2	-.084	1	-1.238	2	0	3	.027	2	-1.27	4
5		3	max	.103	3	.32	2	0	1	0	3	8.445	2	8.446	4	.003	1
6			min	.074	2	0	3	-.32	4	-8.445	2	0	3	-.003	1	-8.446	4
7		4	max	.074	3	.266	2	0	1	0	3	2.659	2	2.659	4	.001	1
8			min	.054	2	0	3	-.266	4	-2.659	2	0	3	-.001	1	-2.659	4
9		5	max	0	1	0	1	0	1	0	1	0	1	0	1	0	1
10			min	0	1	0	3	0	3	0	1	0	1	0	1	0	1
11	M2	1	max	.175	4	.375	2	.228	2	1.446	4	1.797	2	0	1	0	1
12			min	-.214	2	-.472	4	-.363	3	-1.797	2	-1.446	4	0	1	0	1
13		2	max	.175	4	.375	2	.237	2	-.281	1	.359	4	.904	2	1.387	3
14			min	-.214	2	-.456	4	-.351	4	-.359	4	.281	1	-1.387	3	-.904	2
15		3	max	.175	4	.28	2	.433	2	1.121	2	2.1	4	-2.729	3	3.437	2
16			min	-.214	2	-.44	4	-.342	4	-2.1	4	-1.121	2	-3.437	2	2.729	3
17		4	max	.178	2	.456	4	.442	2	.41	2	.359	4	-1.383	4	1.736	2
18			min	.146	3	.225	1	.351	3	-.359	4	-.41	2	-1.736	2	1.383	4
19		5	max	.178	2	.472	4	.451	2	1.498	2	-1.2	3	0	1	0	1
20			min	.146	3	.225	1	.36	4	1.2	3	-1.498	2	0	1	0	1
21	M3	1	max	.047	2	.063	4	.137	4	.359	2	.232	4	0	1	0	1
22			min	-.028	4	-.09	1	-.207	1	-.232	4	-.359	2	0	1	0	1
23		2	max	.047	2	.08	4	.146	4	.045	4	.007	1	.549	4	.782	1
24			min	-.028	4	-.09	1	-.195	1	-.007	1	-.045	4	-.782	1	-.549	4
25		3	max	.047	2	.044	3	.074	3	.386	4	.357	1	1.132	4	1.519	1
26			min	-.028	4	-.096	4	-.184	1	-.357	1	-.386	4	-1.519	1	-1.132	4
27		4	max	.006	1	.044	1	.093	1	.045	4	.098	2	.549	4	.383	1
28			min	-.028	4	-.08	4	-.146	4	-.098	2	-.045	4	-.383	1	-.549	4
29		5	max	.006	1	.044	1	.104	1	.076	1	.232	4	0	1	0	1
30			min	-.028	4	-.063	4	-.137	4	-.232	4	-.076	1	0	1	0	1
31	M4	1	max	.223	4	.374	3	.372	4	0	1	0	1	0	1	0	1
32			min	-.177	2	-.219	2	-.471	2	0	1	0	1	0	1	0	1
33		2	max	.223	4	.371	3	.372	4	.362	3	.213	2	.361	4	.455	2

Envelope Member Section Stresses (Continued)

	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
34			min	-.177	2	-.221	2	-.466	2	-.213	2	-.362	3	-.455	2	-.361	4
35		3	max	.223	4	.368	3	.372	4	.721	3	.429	2	.723	4	.907	2
36			min	-.177	2	-.223	2	-.462	2	-.429	2	-.721	3	-.907	2	-.723	4
37		4	max	.223	4	.365	3	.372	4	1.077	3	.647	2	1.084	4	1.354	2
38			min	-.177	2	-.225	2	-.458	2	-.647	2	-1.077	3	-1.354	2	-1.084	4
39		5	max	.223	4	.362	3	.372	4	1.431	3	.867	2	1.446	4	1.797	2
40			min	-.177	2	-.228	2	-.454	2	-.867	2	-1.431	3	-1.797	2	-1.446	4
41	M5	1	max	.223	4	.461	2	-.309	3	0	1	0	1	0	1	0	1
42			min	.106	1	.369	4	-.394	2	0	1	0	1	0	1	0	1
43		2	max	.223	4	.459	2	-.309	3	.447	2	-.357	4	-.3	3	.38	2
44			min	.106	1	.366	4	-.39	2	.357	4	-.447	2	-.38	2	.3	3
45		3	max	.223	4	.457	2	-.309	3	.892	2	-.712	4	-.6	3	.757	2
46			min	.106	1	.364	4	-.385	2	.712	4	-.892	2	-.757	2	.6	3
47		4	max	.223	4	.454	2	-.309	3	1.334	2	-1.065	4	-.9	3	1.13	2
48			min	.106	1	.362	4	-.381	2	1.065	4	-1.334	2	-1.13	2	.9	3
49		5	max	.223	4	.452	2	-.309	3	1.775	2	-1.415	4	-1.2	3	1.498	2
50			min	.106	1	.36	4	-.377	2	1.415	4	-1.775	2	-1.498	2	1.2	3
51	M6	1	max	.042	1	.219	1	.084	2	0	1	0	1	0	1	0	1
52			min	-.03	4	-.128	4	-.06	4	0	1	0	1	0	1	0	1
53		2	max	.042	1	.216	1	.088	2	.211	1	.125	4	.084	2	.058	4
54			min	-.03	4	-.13	4	-.06	4	-.125	4	-.211	1	-.058	4	-.084	2
55		3	max	.042	1	.213	1	.092	2	.419	1	.252	4	.172	2	.116	4
56			min	-.03	4	-.132	4	-.06	4	-.252	4	-.419	1	-.116	4	-.172	2
57		4	max	.042	1	.21	1	.097	2	.625	1	.382	4	.264	2	.174	4
58			min	-.03	4	-.134	4	-.06	4	-.382	4	-.625	1	-.174	4	-.264	2
59		5	max	.042	1	.207	1	.101	2	.827	1	.513	4	.359	2	.232	4
60			min	-.03	4	-.137	4	-.06	4	-.513	4	-.827	1	-.232	4	-.359	2
61	M7	1	max	.021	1	.116	1	.06	4	0	1	0	1	0	1	0	1
62			min	-.03	4	-.128	4	-.027	1	0	1	0	1	0	1	0	1
63		2	max	.021	1	.113	1	.06	4	.111	1	.125	4	.058	4	.024	1
64			min	-.03	4	-.13	4	-.023	1	-.125	4	-.111	1	-.024	1	-.058	4
65		3	max	.021	1	.11	1	.06	4	.22	1	.252	4	.116	4	.045	1
66			min	-.03	4	-.132	4	-.019	1	-.252	4	-.22	1	-.045	1	-.116	4
67		4	max	.021	1	.107	1	.06	4	.325	1	.382	4	.174	4	.062	1
68			min	-.03	4	-.134	4	-.016	1	-.382	4	-.325	1	-.062	1	-.174	4
69		5	max	.021	1	.104	1	.06	4	.428	1	.513	4	.232	4	.076	1
70			min	-.03	4	-.137	4	-.012	1	-.513	4	-.428	1	-.076	1	-.232	4
71	M8	1	max	.415	4	.682	4	0	3	2.862	3	-.908	2	1.799	2	0	3
72			min	-.063	1	.188	2	-.832	2	.908	2	-2.862	3	0	3	-1.799	2
73		2	max	.415	4	.68	4	0	3	3.256	3	-1.017	2	1.315	2	0	3
74			min	-.063	1	.186	2	-.829	2	1.017	2	-3.256	3	0	3	-1.315	2
75		3	max	.415	4	.679	4	0	3	3.65	3	-1.125	2	.832	2	0	3
76			min	-.063	1	.185	2	-.827	2	1.125	2	-3.65	3	0	3	-.832	2
77		4	max	.415	4	.678	4	0	3	4.042	3	-1.232	2	.351	2	0	3
78			min	-.063	1	.184	2	-.824	2	1.232	2	-4.042	3	0	3	-.351	2
79		5	max	.415	4	.676	4	0	3	4.433	3	-1.339	2	0	3	.129	2
80			min	-.063	1	.182	2	-.822	2	1.339	2	-4.433	3	-.129	2	0	3
81	M9	1	max	.063	1	.265	1	.124	2	1.256	1	1.027	4	0	3	.172	2
82			min	-.09	4	-.309	4	0	3	-1.027	4	-1.256	1	-.172	2	0	3
83		2	max	.063	1	.263	1	.127	2	1.41	1	1.208	4	0	3	.099	2
84			min	-.09	4	-.311	4	0	3	-1.208	4	-1.41	1	-.099	2	0	3
85		3	max	.063	1	.262	1	.129	2	1.563	1	1.389	4	.007	1	.024	2

Envelope Member Section Stresses (Continued)

	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
86			min	-.09	4	-.312	4	0	3	-1.389	4	-1.563	1	-.024	2	-.007	1
87		4	max	.063	1	.26	1	.131	2	1.715	1	1.571	4	.058	1	0	3
88			min	-.09	4	-.313	4	0	3	-1.571	4	-1.715	1	0	3	-.058	1
89		5	max	.063	1	.258	1	.134	2	1.866	1	1.755	4	.129	2	0	3
90			min	-.09	4	-.315	4	0	3	-1.755	4	-1.866	1	0	3	-.129	2

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N9	max	.148	4	.286	1	.156	4	0	1	0	1	0	1
2		min	-.066	1	-.315	4	-.108	1	0	1	0	1	0	1
3	N10	max	.208	2	.54	1	.156	4	0	1	0	1	0	1
4		min	-.148	4	-.315	4	-.222	1	0	1	0	1	0	1
5	N11	max	-.763	3	1.137	2	-.556	1	0	1	0	1	0	1
6		min	-.972	2	.912	4	-1.166	4	0	1	0	1	0	1
7	N12	max	.919	4	.924	3	.928	2	0	1	0	1	0	1
8		min	-1.163	2	-.54	2	-1.166	4	0	1	0	1	0	1
9	Totals:	max	0	3	1.655	1	0	1						
10		min	-1.908	2	1.193	4	-2.02	4						

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation...	LC	Y Rotation...	LC	Z Rotation...	LC
1	N1	max	.001	2	.009	4	.003	1	-2.025e-4	4	4.086e-6	2	3.316e-4	2
2		min	0	4	-.025	1	0	4	-3.856e-4	1	-1.654e-6	1	0	3
3	N2	max	0	3	.009	4	.001	1	-2.023e-4	4	4.086e-6	2	3.314e-4	2
4		min	0	2	-.025	1	-.001	4	-3.856e-4	1	-1.654e-6	1	0	3
5	N3	max	.007	2	.01	4	.008	4	1.935e-3	4	0	4	0	3
6		min	0	4	-.025	1	-.001	1	-3.926e-4	1	-1.514e-4	2	-1.736e-3	2
7	N4	max	.669	2	.01	4	.693	4	6.957e-3	4	0	4	0	3
8		min	0	3	-.026	1	-.048	1	-3.947e-4	1	-1.514e-4	2	-6.757e-3	2
9	N5	max	0	4	.005	4	0	1	2.661e-4	4	4.332e-5	2	2.895e-4	1
10		min	0	2	-.013	1	0	4	-8.284e-4	1	-2.412e-5	4	-2.39e-4	4
11	N6	max	0	3	.005	4	0	1	2.661e-4	4	2.412e-5	4	2.39e-4	4
12		min	0	2	-.017	1	0	4	-1.053e-3	1	-3.521e-6	1	-2.062e-4	1
13	N7	max	.005	2	.008	4	0	4	6.706e-4	4	1.502e-4	4	5.946e-4	3
14		min	0	4	-.026	1	0	1	-1.574e-3	1	-2.205e-4	2	-9.913e-5	2
15	N8	max	.005	2	.008	4	0	4	6.706e-4	4	-1.247e-4	3	-4.529e-4	2
16		min	0	3	-.004	1	0	2	-3.269e-4	1	-1.894e-4	2	-5.946e-4	3
17	N9	max	0	1	0	4	0	1	3.208e-4	4	4.868e-5	2	2.895e-4	1
18		min	0	4	0	1	0	4	-8.754e-4	1	3.057e-7	3	-2.39e-4	4
19	N10	max	0	4	0	4	0	1	3.208e-4	4	4.985e-5	2	2.39e-4	4
20		min	0	2	0	1	0	4	-1.143e-3	1	-9.037e-7	4	-2.062e-4	1
21	N11	max	0	2	0	4	0	4	5.175e-4	4	-4.67e-6	3	5.946e-4	3
22		min	0	3	0	2	0	1	-1.762e-3	1	-3.831e-4	2	-9.913e-5	2
23	N12	max	0	2	0	2	0	4	5.175e-4	4	5.626e-6	4	-4.529e-4	2
24		min	0	4	0	3	0	2	-2.762e-4	1	-3.842e-4	2	-5.946e-4	3
25	N13	max	0	3	.01	4	.001	1	-2.261e-5	4	1.078e-6	2	1.614e-4	2
26		min	0	2	-.02	1	-.001	4	-5.876e-4	1	-6.581e-7	1	0	3
27	N14	max	.006	2	-.005	4	.007	4	1.466e-3	4	0	4	0	3
28		min	0	4	-.021	1	-.001	1	-5.955e-4	1	-4.369e-5	2	-8.45e-4	2

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

	Member	Shape	Code Check	Loc[ft]	LC	She...	Loc[ft]	...	LC	Pnc/o...	Pnt/...	Mny...	Mnz...	...	Eqn
1	M1	PIPE_...	.310	9.547	4	.026	9.547		4	145.248	164....	27.2...	27.2...	1	H1-...
2	M2	HSS6x...	.153	2.5	4	.093	5	z	2	138.071	144....	25.7...	25.7...	...	H1-...
3	M3	HSS6x...	.059	2.5	1	.043	0	z	1	138.071	144....	25.7...	25.7...	...	H1-...
4	M4	HSS6x...	.092	1.25	4	.028	0	z	2	143.936	144....	25.7...	25.7...	...	H1-...
5	M5	HSS6x...	.104	1.25	2	.028	0	y	2	143.936	144....	25.7...	25.7...	...	H1-...
6	M6	HSS6x...	.037	1.25	1	.013	0	y	1	143.936	144....	25.7...	25.7...	...	H1-...
7	M7	HSS6x...	.024	1.25	4	.008	1.25	y	4	143.936	144....	25.7...	25.7...	...	H1-...
8	M8	HSS6x...	.144	.75	4	.247	0	z	2	144.191	144....	25.7...	25.7...	...	H1-...
9	M9	HSS6x...	.062	.75	1	.049	0	y	2	144.191	144....	25.7...	25.7...	...	H1-...

Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	N9	-.066	.286	-.108	0	0	0
2	1	N10	.201	.54	-.222	0	0	0
3	1	N11	-.816	1.118	-.556	0	0	0
4	1	N12	-1.083	-.289	.886	0	0	0
5	1	Totals:	-1.764	1.655	0			
6	1	COG (ft):	X: 0	Y: 10.15	Z: .206			

Joint Reactions

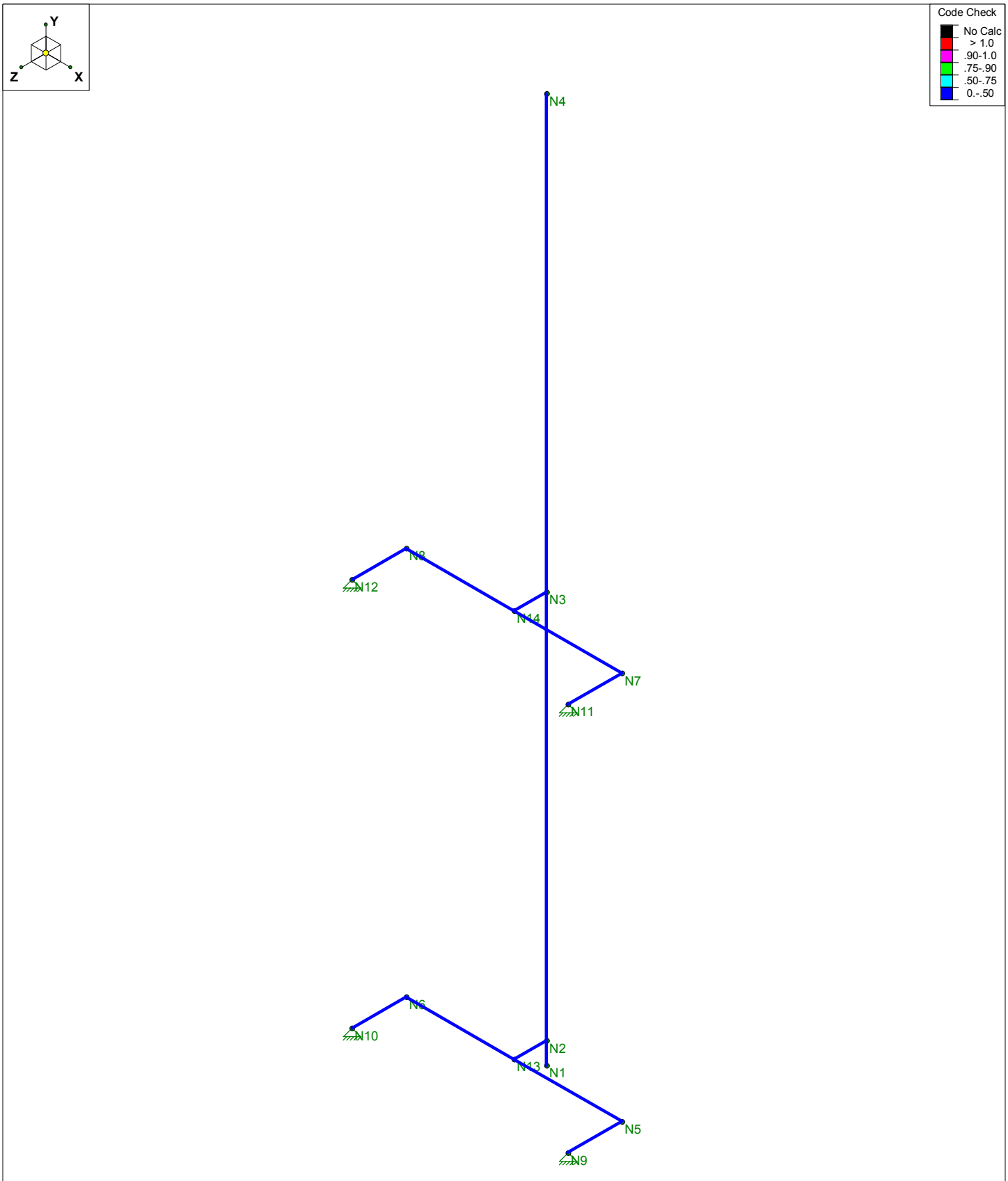
	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	N9	.018	.138	-.024	0	0	0
2	2	N10	.208	.458	-.212	0	0	0
3	2	N11	-.972	1.137	-.692	0	0	0
4	2	N12	-1.163	-.54	.928	0	0	0
5	2	Totals:	-1.908	1.193	0			
6	2	COG (ft):	X: 0	Y: 10.198	Z: .223			

Joint Reactions

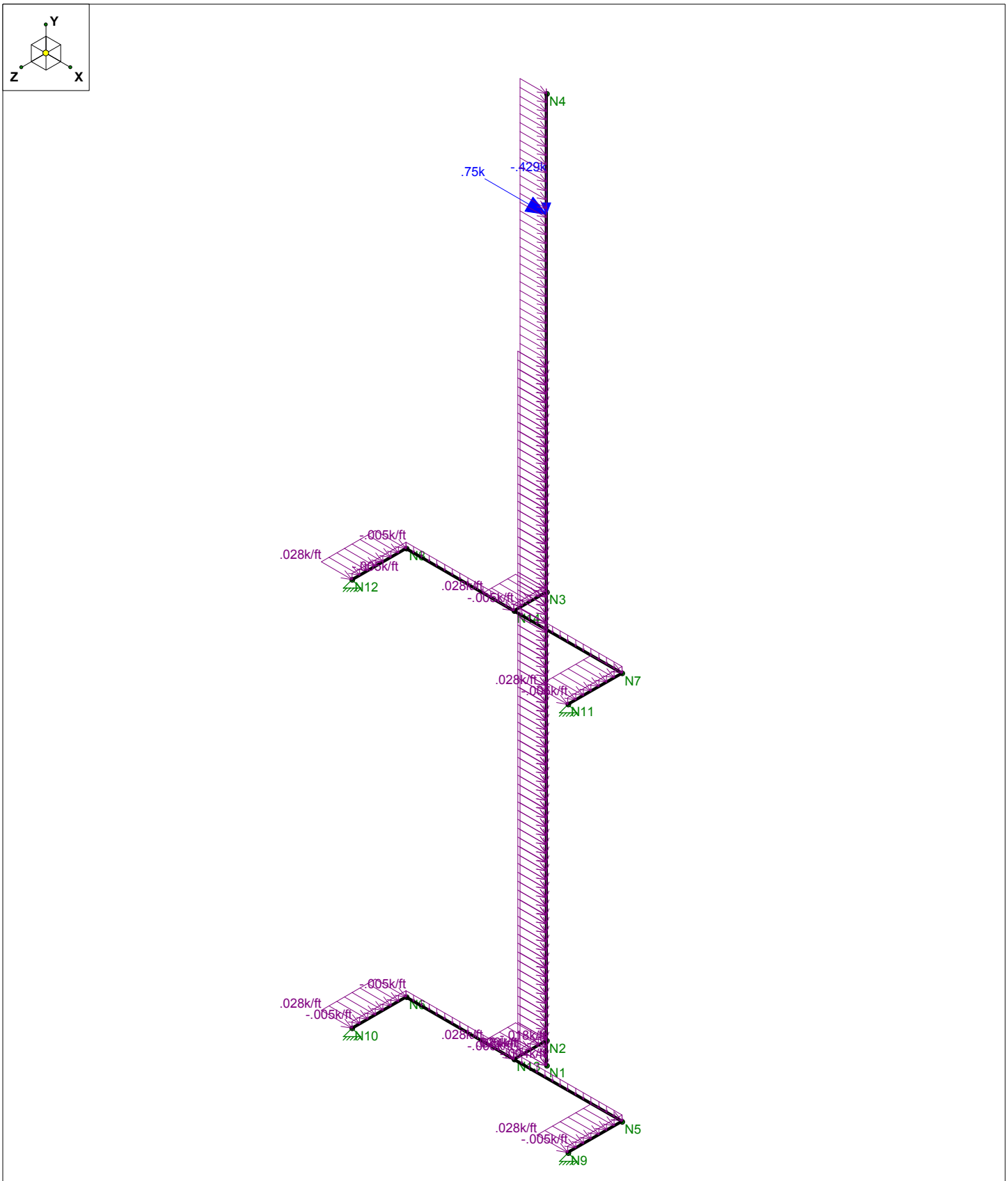
	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	3	N9	.05	-.096	.039	0	0	0
2	3	N10	-.05	-.096	.039	0	0	0
3	3	N11	-.763	.924	-.97	0	0	0
4	3	N12	.763	.924	-.97	0	0	0
5	3	Totals:	0	1.655	-1.862			
6	3	COG (ft):	X: 0	Y: 10.15	Z: .206			

Joint Reactions

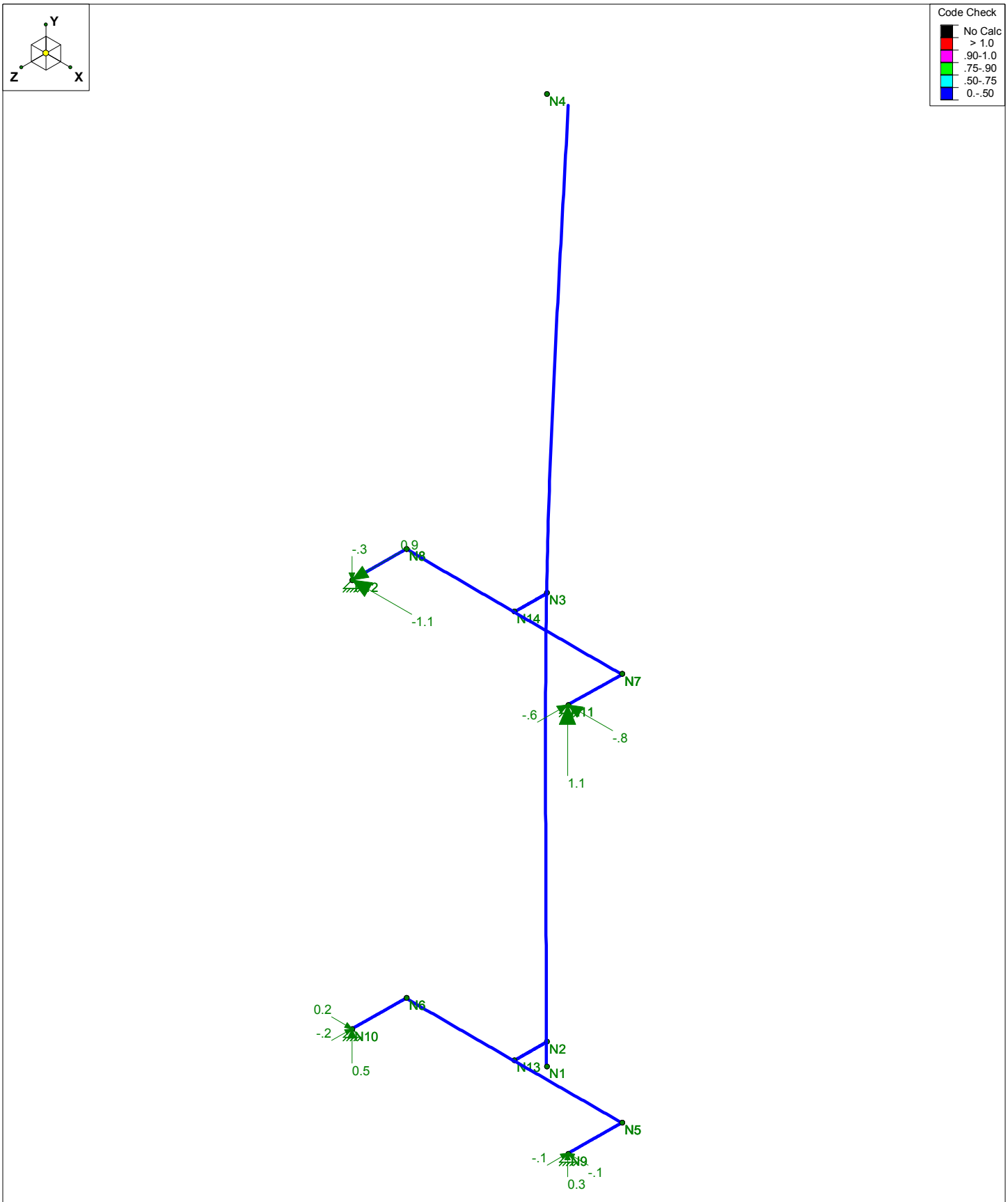
	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	4	N9	.148	-.315	.156	0	0	0
2	4	N10	-.148	-.315	.156	0	0	0
3	4	N11	-.919	.912	-1.166	0	0	0
4	4	N12	.919	.912	-1.166	0	0	0
5	4	Totals:	0	1.193	-2.02			
6	4	COG (ft):	X: 0	Y: 10.198	Z: .223			



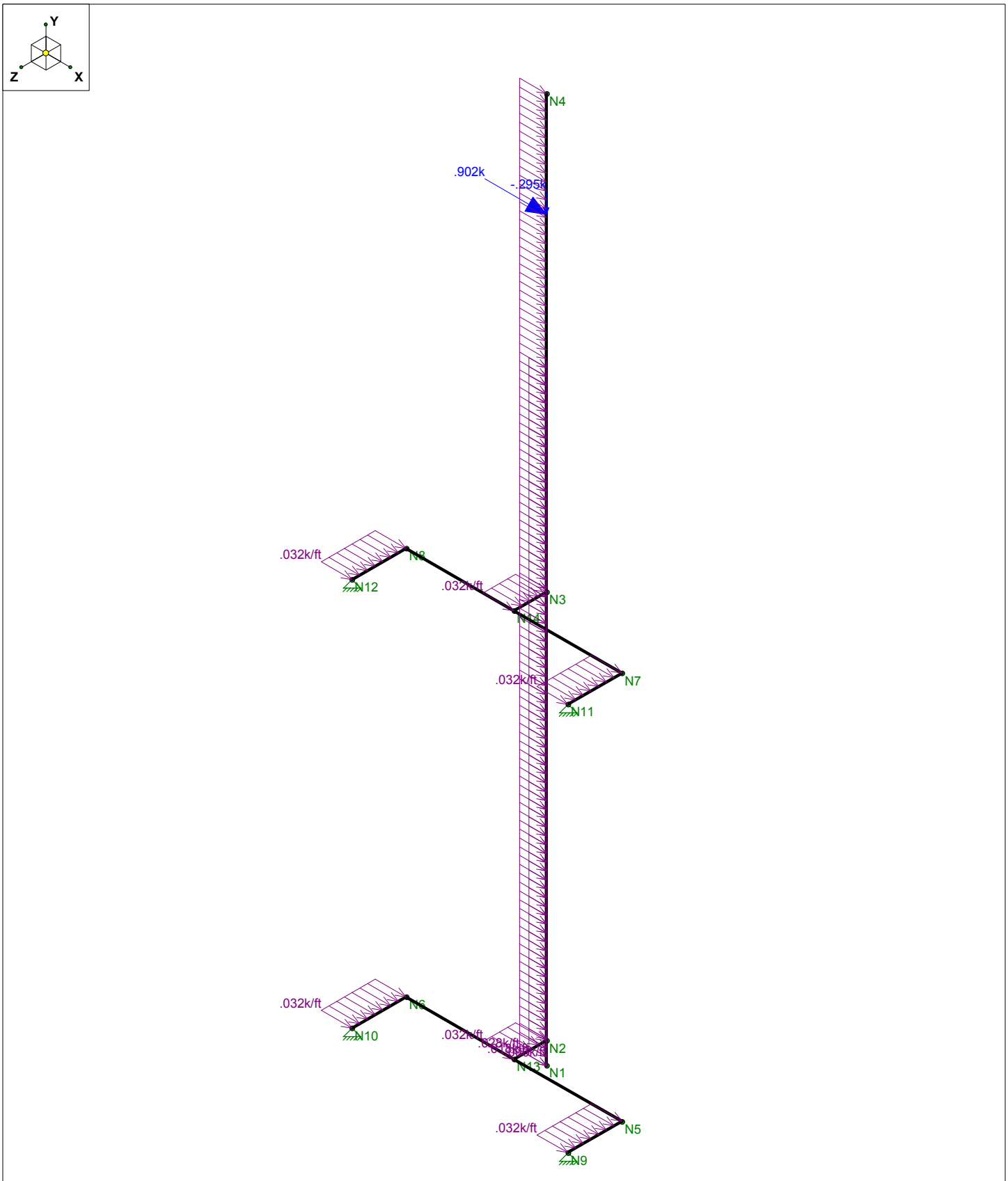
CENTEK Engineering, INC.		
tjl, cfc	CL&P # 936 - Mast	June 18, 2014 at 1:51 PM
14025.007 / T-Mobile CT11...	Unity Check	TIA-EIA.r3d



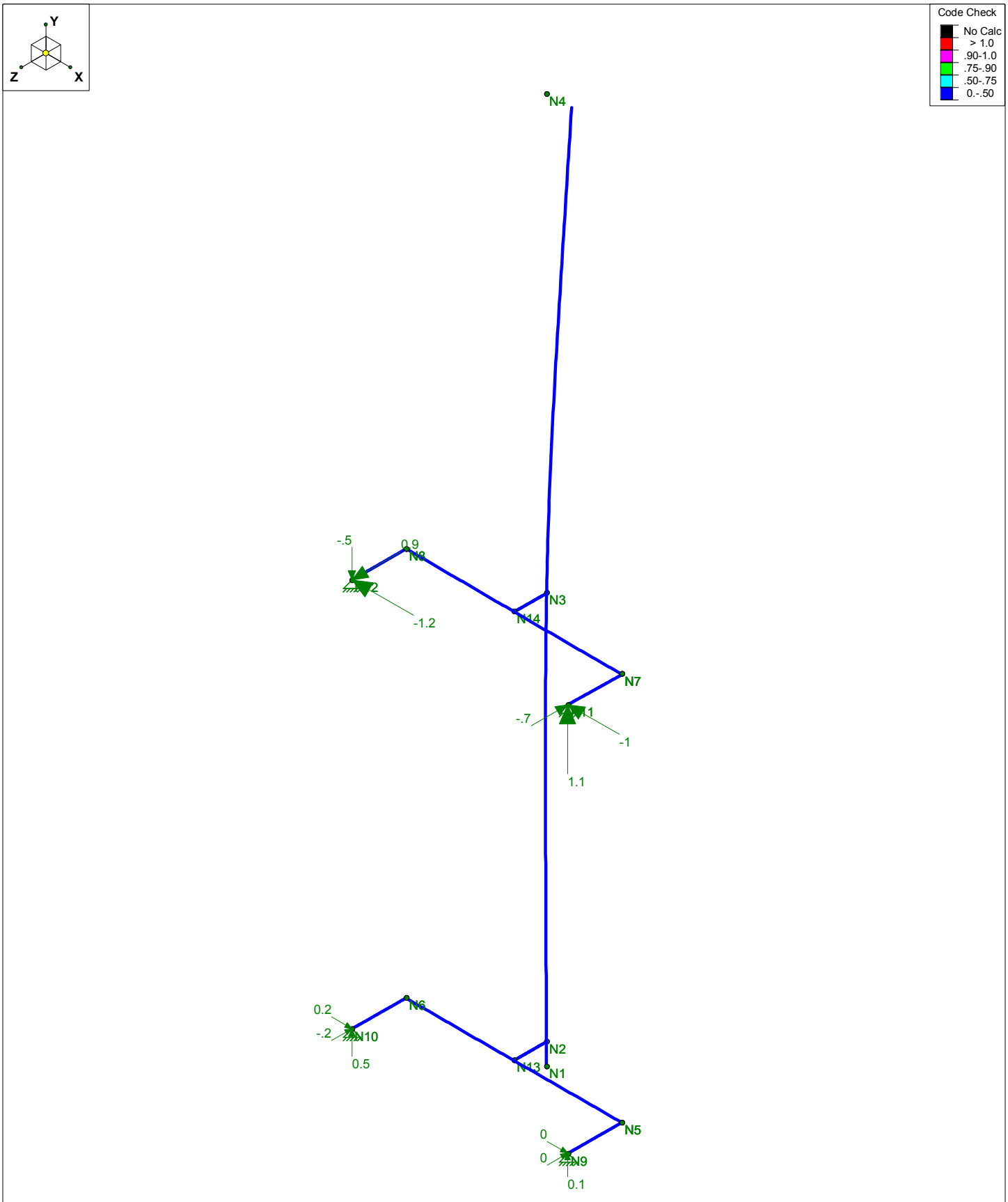
CENTEK Engineering, INC.		
tjl, cfc	CL&P # 936 - Mast	June 18, 2014 at 1:51 PM
14025.007 / T-Mobile CT11...	LC #1 Loads	TIA-EIA.r3d



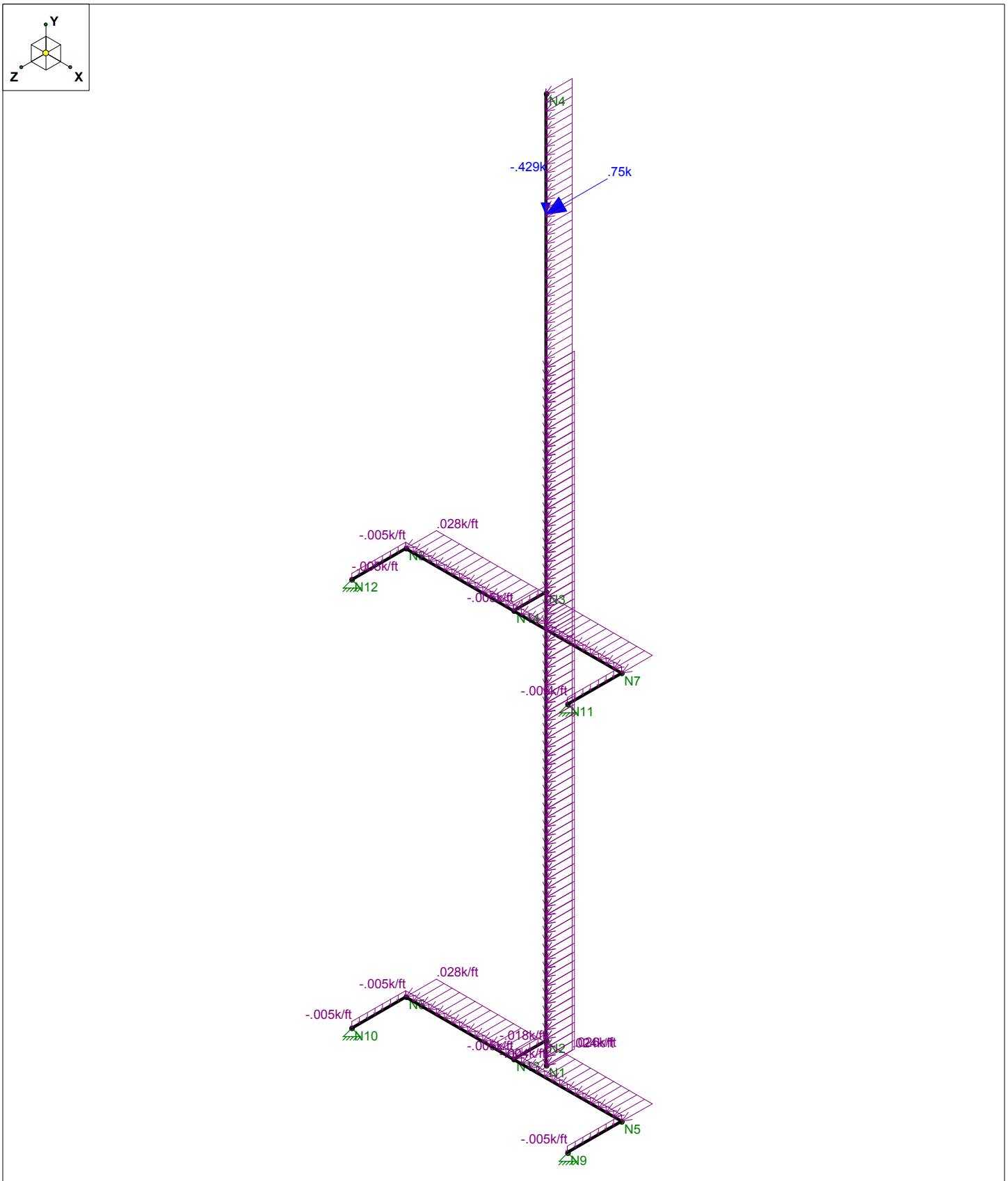
CENTEK Engineering, INC.		
tjl, cfc	CL&P # 936 - Mast	June 18, 2014 at 1:53 PM
14025.007 / T-Mobile CT11...	LC #1 Reactions and Deflected Shape	TIA-EIA.r3d



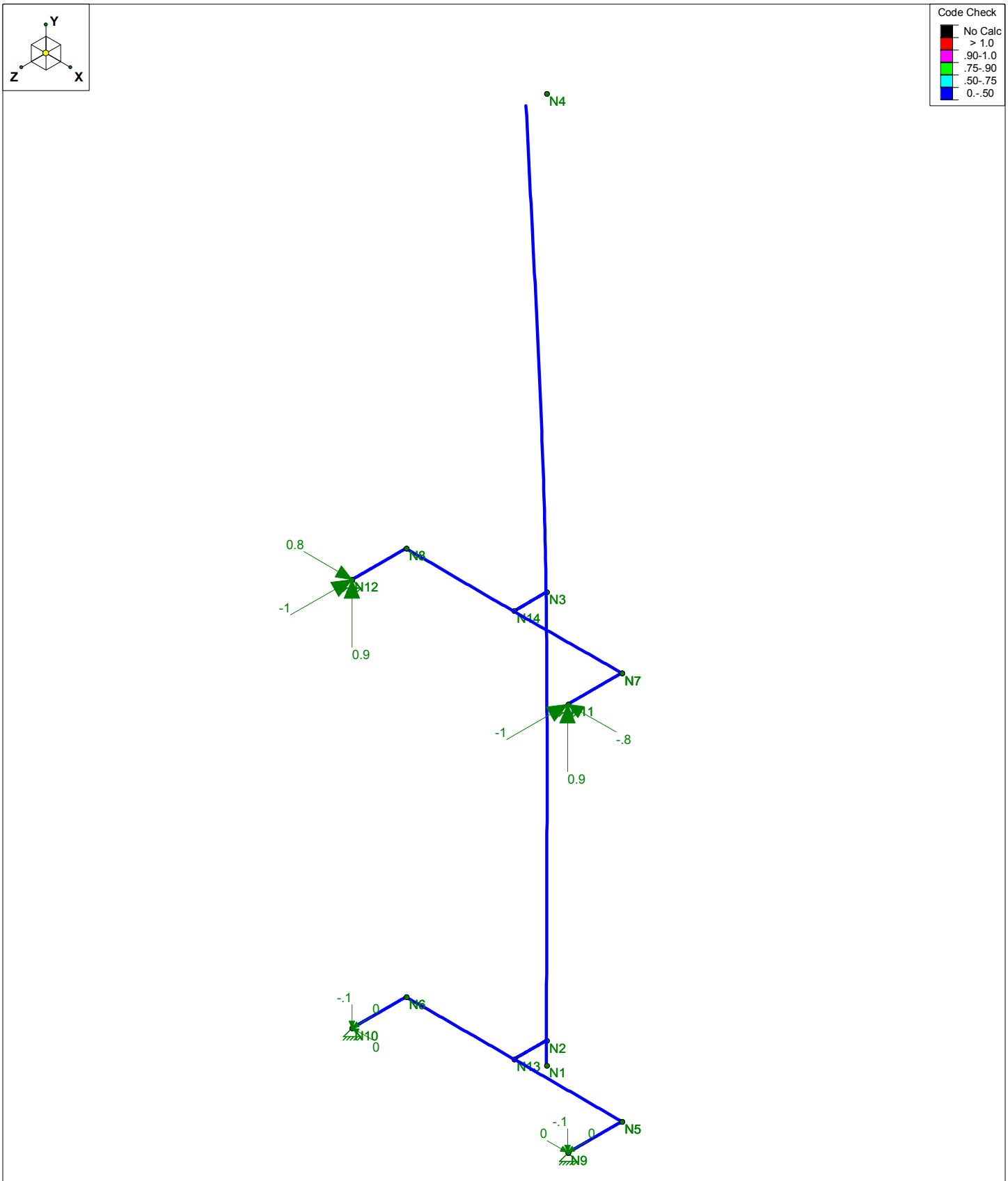
CENTEK Engineering, INC.		
tjl, cfc	CL&P # 936 - Mast	June 18, 2014 at 1:51 PM
14025.007 / T-Mobile CT11...	LC #2 Loads	TIA-EIA.r3d



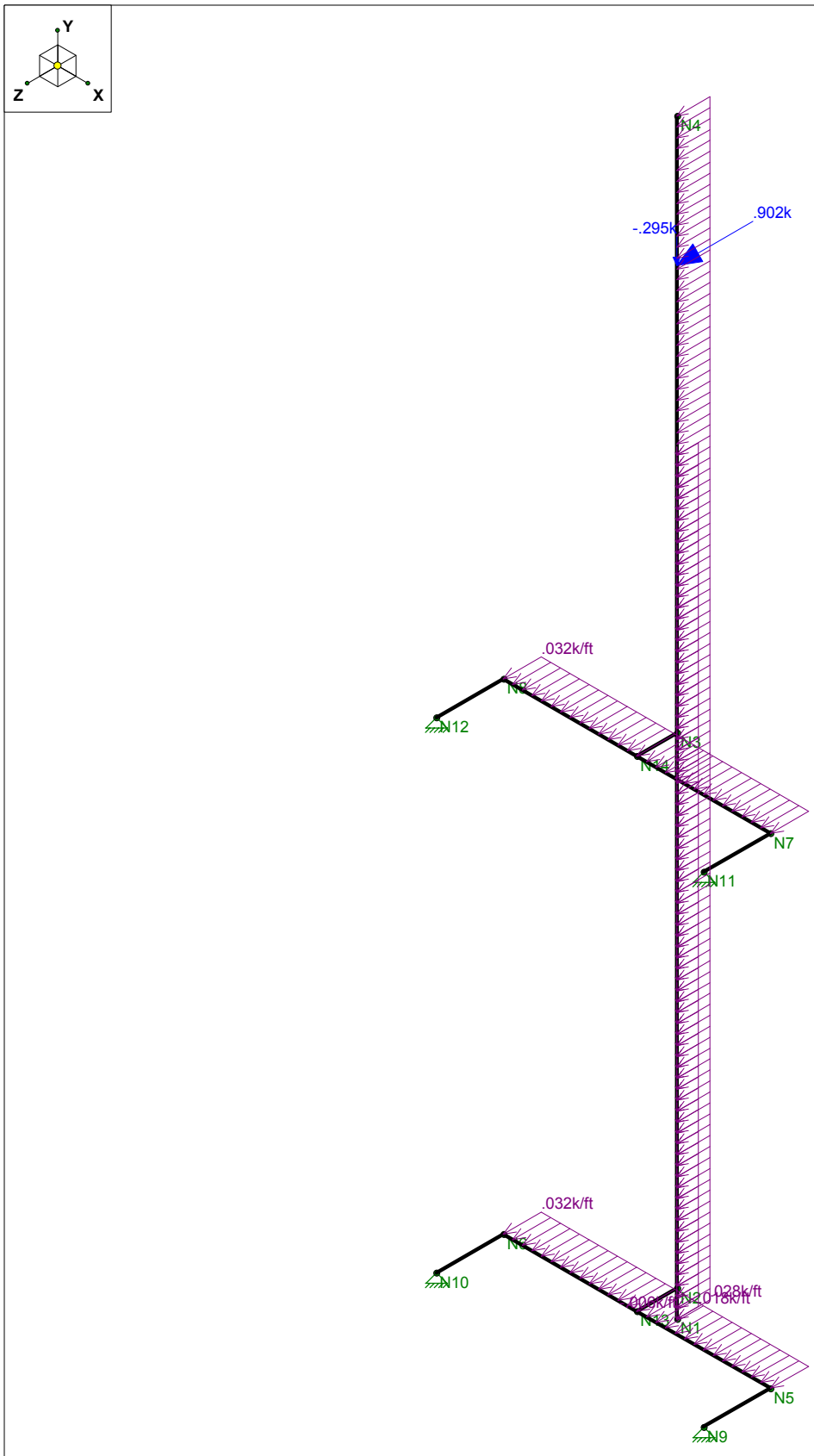
CENTEK Engineering, INC.		
tjl, cfc	CL&P # 936 - Mast	June 18, 2014 at 1:54 PM
14025.007 / T-Mobile CT11...	LC #2 Reactions and Deflected Shape	TIA-EIA.r3d



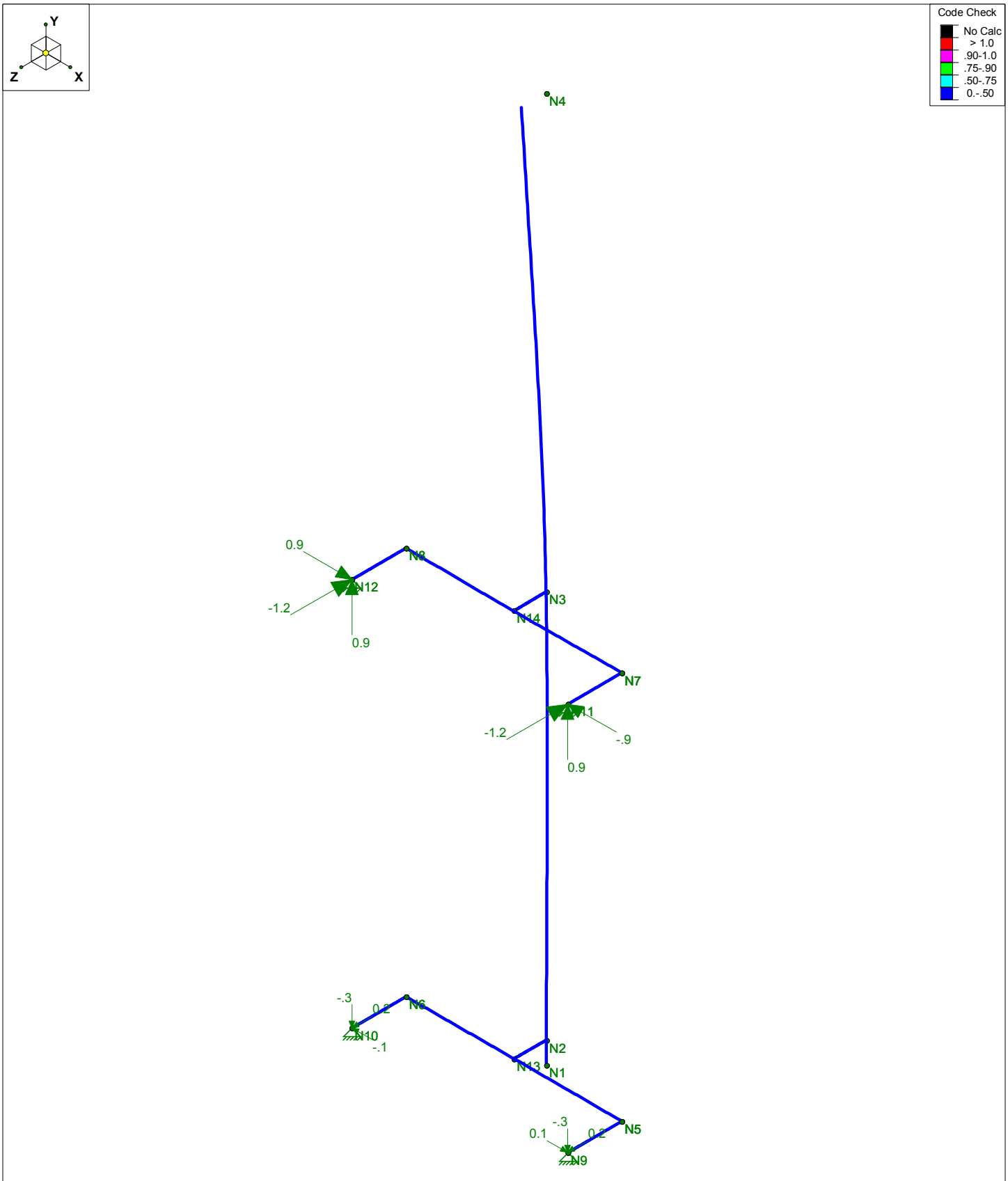
CENTEK Engineering, INC.		
tjl, cfc	CL&P # 936 - Mast	June 18, 2014 at 1:51 PM
14025.007 / T-Mobile CT11...	LC #3 Loads	TIA-EIA.r3d



CENTEK Engineering, INC.		
tjl, cfc	CL&P # 936 - Mast	June 18, 2014 at 1:54 PM
14025.007 / T-Mobile CT11...	LC #3 Reactions and Deflected Shape	TIA-EIA.r3d



CENTEK Engineering, INC.		
tjl, cfc	CL&P # 936 - Mast	June 18, 2014 at 1:52 PM
14025.007 / T-Mobile CT11...	LC #4 Loads	TIA-EIA.r3d

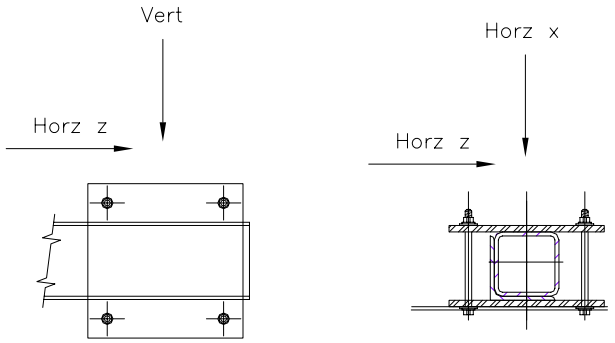


CENTEK Engineering, INC.		
tjl, cfc	CL&P # 936 - Mast	June 18, 2014 at 1:55 PM
14025.007 / T-Mobile CT11...	LC #4 Reactions and Deflected Shape	TIA-EIA.r3d

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

Subject:	Connection of Mast to CL&P Tower # 936
Location:	Wilton, CT
Rev. 1: 6/18/14	Prepared by: T.J.L. Checked by: C.F.C. Job No. 14025.007

Mast Connection to CL&P Tower:



Reactions:

Moment =	Moment := 0·kips	(Input From Risa-3D LC #2)
Vertical =	Vertical := 1.0·kips	(Input From Risa-3D LC #2)
Horizontal x-dir =	$Horizontal_x := 1.0 \cdot kips$	(Input From Risa-3D LC #2)
Horizontal z-dir =	$Horizontal_z := 1.2 \cdot kips$	(Input From Risa-3D LC #2)

Bolt Data:

Bolt Type =	ASTM A325	(User Input)
Bolt Diameter =	D := 0.625·in	(User Input)
Number of Bolts =	$N_b := 4$	(User Input)
Allowable Tensile Strength =	$F_t := 8.82 \cdot kips$	(User Input)
Allowable Shear Strength (Slip-Critical Bolt) =	$F_v := 4.29 \cdot kips$	(User Input)

Shear Force =

$$f_v := \frac{\sqrt{Horizontal_z^2 + Vertical^2}}{N_b} = 0.4 \cdot kips$$

Bolt Shear % of Capacity =

$$\frac{f_v}{F_v} = 9.1 \cdot \%$$

Check Bolt Shear =

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

Bolt_Shear = "OK"

Tension Force =

$$f_t := \frac{Horizontal_x}{N_b} = 0.3 \cdot kips$$

Bolt Tenison % of Capacity =

$$\frac{f_t}{F_t} = 2.83 \cdot \%$$

Check Bolt Tension =

$$Bolt\_Tension := if\left(\frac{f_t}{F_t} \le 1.00, "OK", "Overstressed"\right)$$

Bolt_Tension = "OK"

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

Subject: Load Analysis of PCS Mast and T-Mobile Equipment on CL&P Structure #936

Location: Wilton, CT

Rev. 1: 6/11/14

Prepared by: T.J.L Checked by: C.F.C.
Job No. 14025.007

Basic Components

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

Factors for Extreme Wind Calculation

Elevation of Top of PCS Mast Above Grade =	TME := 100	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 = $Kz := 2.01 \cdot \left(\frac{TME}{900}\right)^{\frac{2}{9.5}} = 1.266$ (NESC 2007 Table 250-2)

Exposure Factor = $Es := 0.346 \left[\frac{33}{(0.67 \cdot TME)}\right]^{\frac{1}{7}} = 0.313$ (NESC 2007 Table 250-3)

Response Term = $Bs := \frac{1}{\left(1 + 0.375 \cdot \frac{TME}{220}\right)} = 0.854$ (NESC 2007 Table 250-3)

Gust Response Factor = $Grf := \frac{\left[1 + \left(2.7 \cdot Es \cdot Bs^{\frac{1}{2}}\right)\right]}{kv^2} = 0.871$ (NESC 2007 Table 250-3)

Wind Pressure = $qz := 0.00256 \cdot Kz \cdot V^2 \cdot Grf \cdot I = 34.1$ 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

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

Subject: Load Analysis of PCS Mast and T-Mobile Equipment on CL&P Structure #936

Location: Wilton, CT

Rev. 1: 6/11/14

Prepared by: T.J.L Checked by: C.F.C.
Job No. 14025.007

Development of Wind & Ice Load on PCS Mast

PCS Mast Data: (Pipe 6.0" SCH. 80) (User Input)

Mast Shape =	Round		(User Input)
Mast Diameter =	$D_{mast} := 6.63$	in	(User Input)
Mast Length =	$L_{mast} := 19.5$	ft	(User Input)
Mast Thickness =	$t_{mast} := 0.432$	in	(User Input)

Wind Load (NESC Extreme)

Mast Projected Surface Area = $A_{mast} := \frac{D_{mast}}{12} = 0.553$ sf/ft

Total Mast Wind Force (Above NU Structure) = $qz \cdot Cd_R \cdot A_{mast} \cdot m = 31$ plf **BLC 5**

Total Mast Wind Force (Below NU Structure) = $qz \cdot Cd_R \cdot A_{mast} = 25$ plf **BLC 5**

Wind Load (NESE Heavy)

Mast Projected Surface Area w/ Ice = $AICE_{mast} := \frac{(D_{mast} + 2 \cdot Ir)}{12} = 0.636$ sf/ft

Total Mast Wind Force w/ Ice = $p \cdot Cd_R \cdot AICE_{mast} = 3$ 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 = $Ai_{mast} := \frac{\pi}{4}\left[(D_{mast} + Ir \cdot 2)^2 - D_{mast}^2\right] = 11.2$ sq in

Weight of Ice on Mast = $W_{ICEmast} := Id \cdot \frac{Ai_{mast}}{144} = 4$ plf **BLC 3**

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

Subject:	Load Analysis of PCS Mast and T-Mobile Equipment on CL&P Structure #936
Location:	Wilton, CT
Rev. 1: 6/11/14	Prepared by: T.J.L Checked by: C.F.C. Job No. 14025.007

Development of Wind & Ice Load on Antennas

Antenna Data: (T-Mobile)

Antenna Model =	RFS APX 16DWV-16DWVS-E-A20		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 55.9$	in	(User Input)
Antenna Width =	$W_{ant} := 13.0$	in	(User Input)
Antenna Thickness =	$T_{ant} := 3.15$	in	(User Input)
Antenna Weight =	$WT_{ant} := 45$	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 =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 5$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 15.1$	sf	
Total Antenna Wind Force =	$F_{ant1} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 1034$	lbs	**BLC 5**

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 5.5$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 16.6$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant1} := p \cdot Cd_F \cdot A_{ICEant} = 106$	lbs	**BLC 4**

Gravity Load (without ice)

Weight of All Antennas =	$Wt_{ant1} := (WT_{ant} \cdot N_{ant}) = 135$	lbs	**BLC 2**

Gravity Load (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2289$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 1)(W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 1017$	cu in	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 33$	lbs	
Weight of Ice on All Antennas =	$Wt_{ice.ant1} := W_{ICEant} \cdot N_{ant} = 99$	lbs	**BLC 3**

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

Subject:	Load Analysis of PCS Mast and T-Mobile Equipment on CL&P Structure #936
Location:	Wilton, CT
Rev. 1: 6/11/14	Prepared by: T.J.L Checked by: C.F.C. Job No. 14025.007

Development of Wind & Ice Load on Antenna Mounts

Mount Data: (T-Mobile)

Mount Type:	Universal Tri-Bracket Mount w/ 3 Pipes			
Mount Shape =	Round		(User Input)	
Pipe Mount Length =	$L_{mnt} := 66$	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 Chain Mount Weight =	$W_{tsc.mnt} := 100$	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 =	$F_{mnt1} := qz \cdot Cd_F \cdot A_{mnt} \cdot m = 0$	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 =	$Fi_{mnt1} := p \cdot Cd_F \cdot A_{ICEmnt} = 0$	lbs	**BLC 4**

Gravity Loads (without ice)

Weight Each Pipe Mount =	$WT_{mnt} := W_{mnt} \cdot \frac{L_{mnt}}{12} = 20$	lbs	
Weight of All Mounts =	$Wt_{mnt1} := \left(WT_{mnt} \cdot N_{mnt}\right) + W_{tsc.mnt} = 160$	lbs	**BLC 2**

Gravity Load (ice only)

Volume of Each Pipe =	$V_{mnt} := \frac{\pi}{4} \cdot D_{mnt}^{2} \cdot L_{mnt} = 292$	cu in	
Volume of Ice on Each Pipe =	$V_{ice} := \left[\frac{\pi}{4} \cdot \left[\left(D_{mnt} + 1\right)^2\right] \cdot \left(L_{mnt} + 1\right)\right] - V_{mnt} = 307$	cu in	
Weight of Ice each mount (incl, hardware) =	$W_{ICEmnt} := \frac{V_{ice}}{1728} \cdot Id = 10$	lbs	
Weight of Ice on All Mounts =	$Wt_{ice.mnt1} := W_{ICEmnt} \cdot N_{mnt} = 30$	lbs	**BLC 3**

Development of Wind & Ice Load on Coax Cables

Coax Cable Data:

Coax Type =	HELIAX 7/8"		
Shape =	Round		(User Input)
Coax Outside Diameter =	$D_{coax} := 1.11$	in	(User Input)
Coax Cable Length =	$L_{coax} := 18$	ft	(User Input)
Weight of Coax per foot =	$Wt_{coax} := 0.54$	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)

Gravity Loads (without ice)

Weight of all cables w/o ice = $WT_{coax} := Wt_{coax} \cdot N_{coax} = 6$ plf **BLC 2**

Gravity Load (ice only)

Ice Area per Linear Foot = $Ai_{coax} := \frac{\pi}{4}\left[\left(D_{coax} + 2 \cdot Ir\right)^2 - D_{coax}^2\right] = 2.5$ sq in

Ice Weight All Coax per foot = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 12$ plf **BLC 3**

Wind Load (NESC Heavy)

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

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

Wind Load (NESC Extreme)

Coax projected surface area = $A_{coax} := \frac{\left(NP_{coax} D_{coax}\right)}{12} = 0.4$ sf/ft

Total Coax Wind Force (Above NU Structure) = $F_{coax} := qz \cdot Cd_{coax} \cdot A_{coax} \cdot m = 23$ plf **BLC 5**

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

Subject:	Load Analysis of PCS Mast and T-Mobile Equipment on CL&P Structure #936
Location:	Wilton, CT
Rev. 1: 6/11/14	Prepared by: T.J.L Checked by: C.F.C. Job No. 14025.007

Development of Wind & Ice Load on Brace Member

Member Data: HSS6x6x1/4

Shape =	Flat		(User Input)
Width =	$H_{mem} := 6$	in	(User Input)
Length =	$W_{mem} := 6$	in	(User Input)
Height =	$L_{mem} := 66$	in	(User Input)

Wind Load (NESC Extreme)

Member Projected Surface Area = $A_{mem} := \frac{W_{mem}}{12} = 0.5$ sf/f

Total Member Wind Force = $qz \cdot Cd_F \cdot A_{mem} = 27$ plf **BLC 5**

Wind Load (NESE Heavy)

Member Projected Surface Area w/ Ice = $AICE_{mem} := \frac{(W_{mem} + 2 \cdot Ir)}{12} = 0.583$ sf/f

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

Gravity Loads (without ice)

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

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{mem} := (W_{mem} + 2 \cdot Ir) \cdot (H_{mem} + 2 \cdot Ir) - W_{mem} \cdot H_{mem} = 13$ sq in

Weight of Ice on Member = $W_{ICEmem} := Id \cdot \frac{Ai_{mem}}{144} = 5$ plf **BLC 3**

CENTEK engineering, INC.
Consulting Engineers
63-2 North Branford Road
Branford, CT 06405
Ph. 203-488-0580 / Fax. 203-488-8587

Subject: **Analysis of NESC Heavy Wind and NESC Extreme Wind for Obtaining PCS Structure Reactions Applied to CL&P Structure Tabulated Load Cases**

Location: **Wilton, CT**

Date:2/14/14 Prepared by: T.J.L. Checked by: C.F.C. Job No. 14025.007

Load Case	Description
1	Self Weight (PCS Mast)
2	Weight of Appurtenances
3	Weight of Ice Only on PCS Structure (1)
4	x-direction NESC Heavy Wind on PCS Structure(1)
5	x-direction NESC Extreme Wind on PCS Structure(1)

Footnotes:
(1) PCS Structure includes: PCS Mast and Appurtenances

CENTEK engineering, INC.
Consulting Engineers
63-2 North Branford Road
Branford, CT 06405
Ph. 203-488-0580 / Fax. 203-488-8587

Subject: **Analysis of NESC Heavy Wind and NESC Extreme Wind for Obtaining PCS Structure Reactions Applied to CL&P Structure Load Combinations Table**

Location: **Wilton, CT**

Date: 2/14/14 Prepared by: T.J.L. Checked by: C.F.C. Job No. 14025.007

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

Footnotes:
(1) BLC = Basic Load Case
(2) PCS Structure includes: PCS Mast and Appurtenances

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	Mast	19.5												Lateral
2	M2	Brace	5												Lateral
3	M3	Brace	5												Lateral
4	M4	Brace	1.25												Lateral
5	M5	Brace	1.25												Lateral
6	M6	Brace	1.25												Lateral
7	M7	Brace	1.25												Lateral
8	M8	Brace	.75												Lateral
9	M9	Brace	.75												Lateral

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rul...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Mast	PIPE_4.0	Beam	Pipe	A53 Gr. B	Typical	2.96	6.82	6.82	13.6
2	Brace	L3x3x6	Beam	Tube	A36 Gr.36	Typical	2.11	1.75	1.75	.101

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design R...
1	M1	N1	N4			Mast	Beam	Pipe	A53 Gr. B	Typical
2	M2	N8	N7			Brace	Beam	Tube	A36 Gr.36	Typical
3	M3	N6	N5			Brace	Beam	Tube	A36 Gr.36	Typical
4	M4	N8	N12			Brace	Beam	Tube	A36 Gr.36	Typical
5	M5	N7	N11			Brace	Beam	Tube	A36 Gr.36	Typical
6	M6	N6	N10			Brace	Beam	Tube	A36 Gr.36	Typical
7	M7	N5	N9			Brace	Beam	Tube	A36 Gr.36	Typical
8	M8	N3	N14			Brace	Beam	Tube	A36 Gr.36	Typical
9	M9	N2	N13			Brace	Beam	Tube	A36 Gr.36	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Dia...
1	N1	0	0	0	0	
2	N2	0	.5	0	0	
3	N3	0	9.5	0	0	
4	N4	0	19.5	0	0	
5	N5	2.5	.5	.75	0	
6	N6	-2.5	.5	.75	0	
7	N7	2.5	9.5	.75	0	
8	N8	-2.5	9.5	.75	0	
9	N9	2.5	.5	2	0	
10	N10	-2.5	.5	2	0	
11	N11	2.5	9.5	2	0	
12	N12	-2.5	9.5	2	0	
13	N13	0	.5	.75	0	
14	N14	0	9.5	.75	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	N8							
2	N7							
3	N5							
4	N6							
5	N1							
6	N2							
7	N3							
8	N9	Reaction	Reaction	Reaction				
9	N10	Reaction	Reaction	Reaction				
10	N11	Reaction	Reaction	Reaction				
11	N12	Reaction	Reaction	Reaction				
12	N13							
13	N14							

Member Point Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Y	-.135	17.08
2	M1	Y	-.16	17.08

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Y	-.099	17.08
2	M1	Y	-.03	17.08

Member Point Loads (BLC 4 : z-dir NESC Heavy Wind on Antenna)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	X	-.106	17.08

Member Point Loads (BLC 5 : z-dir NESC Extreme Wind on Anten)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	X	-1.034	17.08

Joint Loads and Enforced Displacements

Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
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	-.006	-.006	0	14

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

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.004	-.004	0	0
2	M1	Y	-.012	-.012	0	14

Member Distributed Loads (BLC 3 : Weight of Ice Only on Antenna St) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
3	M2	Y	-.005	-.005	0	0
4	M3	Y	-.005	-.005	0	0
5	M4	Y	-.005	-.005	0	0
6	M5	Y	-.005	-.005	0	0
7	M6	Y	-.005	-.005	0	0
8	M7	Y	-.005	-.005	0	0
9	M8	Y	-.005	-.005	0	0
10	M9	Y	-.005	-.005	0	0

Member Distributed Loads (BLC 4 : z-dir NESC Heavy Wind on Antenna)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	X	-.003	-.003	0	0
2	M1	X	-.004	-.004	0	14
3	M4	X	-.004	-.004	0	0
4	M8	X	-.004	-.004	0	0
5	M5	X	-.004	-.004	0	0
6	M6	X	-.004	-.004	0	0
7	M9	X	-.004	-.004	0	0
8	M7	X	-.004	-.004	0	0

Member Distributed Loads (BLC 5 : z-dir NESC Extreme Wind on Anten)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	X	-.031	-.031	0	11
2	M1	X	-.025	-.025	11	0
3	M1	X	-.023	-.023	0	14
4	M4	X	-.027	-.027	0	0
5	M8	X	-.027	-.027	0	0
6	M5	X	-.027	-.027	0	0
7	M6	X	-.027	-.027	0	0
8	M9	X	-.027	-.027	0	0
9	M7	X	-.027	-.027	0	0

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Grav...	Joint	Point	Distrib...	Area(...	Surfac...
1	Self Weight (Antenna Mast)	None		-1						
2	Weight of Appurtenances	None					2	1		
3	Weight of Ice Only on Antenna St	None					2	10		
4	z-dir NESC Heavy Wind on Ante...	None					1	8		
5	z-dir NESC Extreme Wind on An...	None					1	9		

Load Combinations

	Description	Solve	PDelta	SRSS	B...	Fa...	BLC	Fa...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	x-dir NESC Heavy Wind on P...	Yes			1	1.5	2	1.5	3	1.5	4	2.5								
2	x-dir NESC Extreme Wind on ...	Yes			1	1	2	1	5	1										
3	Self Weight				1	1														

Envelope Joint Reactions

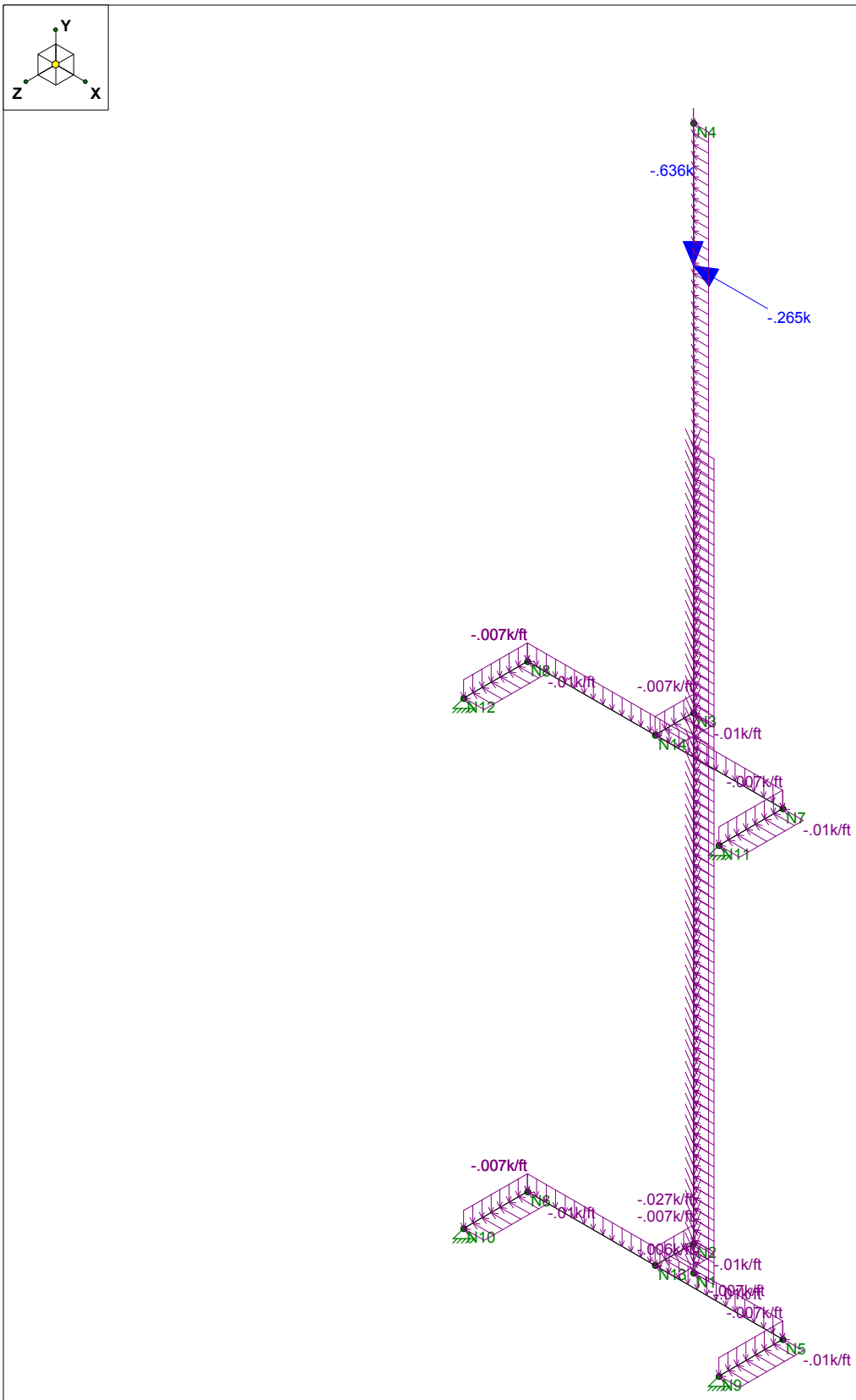
	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N9	max	-.027	1	.436	1	-.231	1	0	1	0	1	0	1
2		min	-.313	2	.183	2	-.306	2	0	1	0	1	0	1
3	N10	max	-.126	1	.43	1	.163	2	0	1	0	1	0	1
4		min	-.354	2	.163	2	-.122	1	0	1	0	1	0	1
5	N11	max	1.514	2	.423	1	1.1	2	0	1	0	1	0	1
6		min	.732	1	.144	2	.463	1	0	1	0	1	0	1
7	N12	max	1.238	2	.438	1	-.11	1	0	1	0	1	0	1
8		min	.037	1	.203	2	-.957	2	0	1	0	1	0	1
9	Totals:	max	2.085	2	1.727	1	0	1						
10		min	.616	1	.694	2	0	2						

Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	N9	-.027	.436	-.231	0	0	0
2	1	N10	-.126	.43	-.122	0	0	0
3	1	N11	.732	.423	.463	0	0	0
4	1	N12	.037	.438	-.11	0	0	0
5	1	Totals:	.616	1.727	0			
6	1	COG (ft):	X: 0	Y: 11.018	Z: .158			

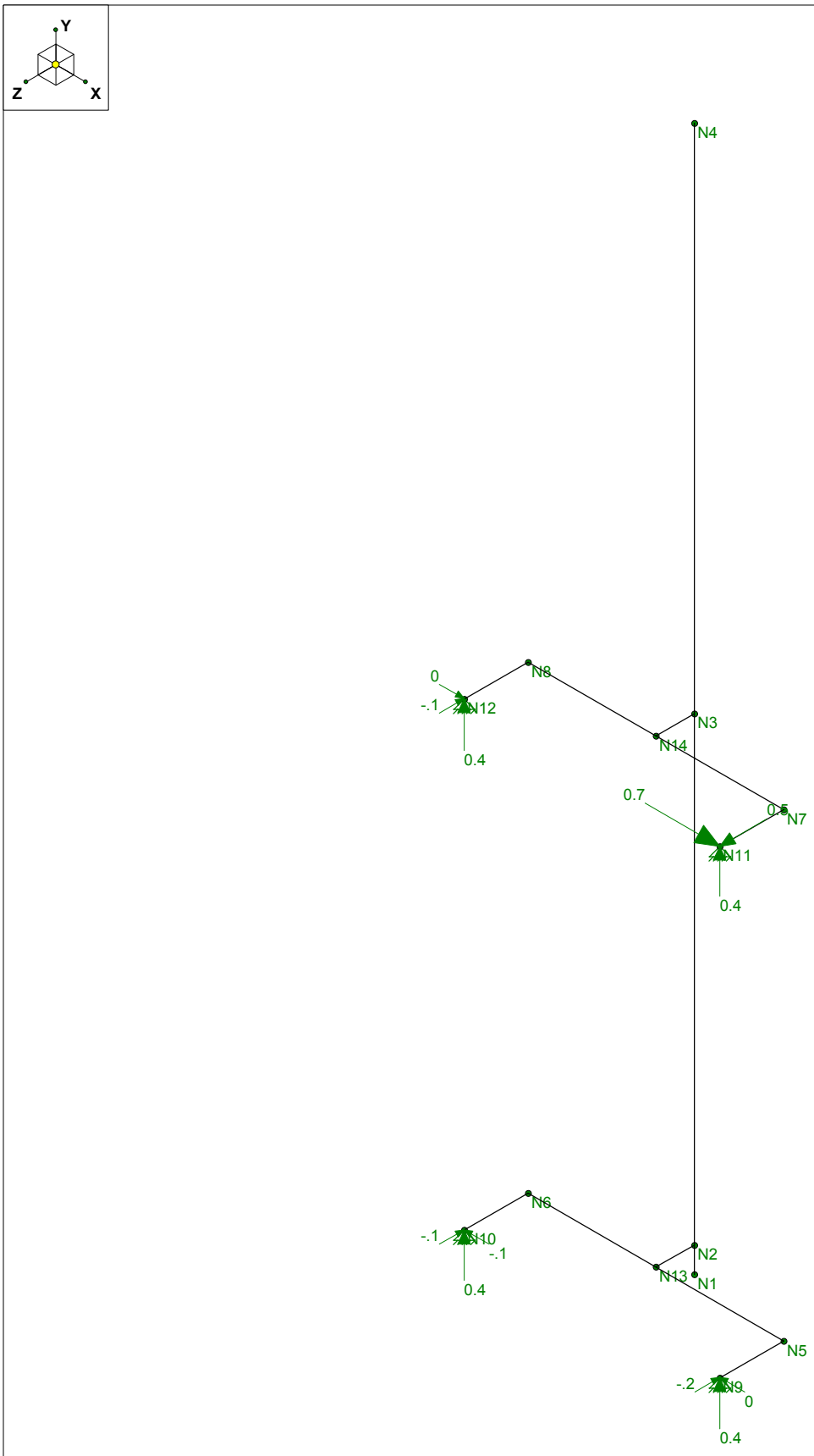
Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	N9	-.313	.183	-.306	0	0	0
2	2	N10	-.354	.163	.163	0	0	0
3	2	N11	1.514	.144	1.1	0	0	0
4	2	N12	1.238	.203	-.957	0	0	0
5	2	Totals:	2.085	.694	0			
6	2	COG (ft):	X: 0	Y: 11.722	Z: .155			

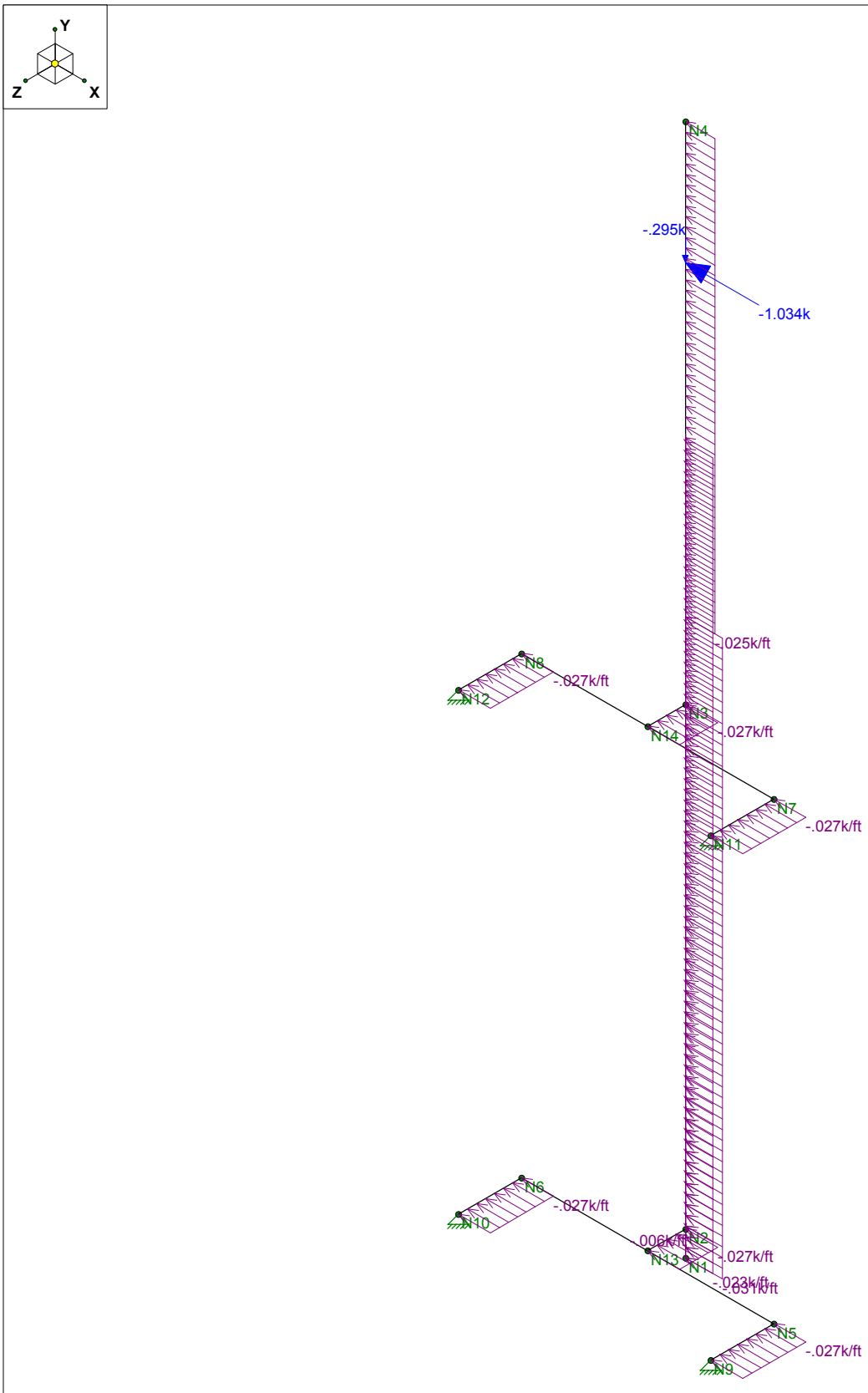


Loads: LC 1, x-dir NESC Heavy Wind on PCS Structure

CENTEK Engineering, Inc.		
tjl, cfc	CL&P # 936 - Mast	June 18, 2014 at 2:17 PM
14025.007 / T-Mobile CT11...	LC #1 Loads	NESC.r3d

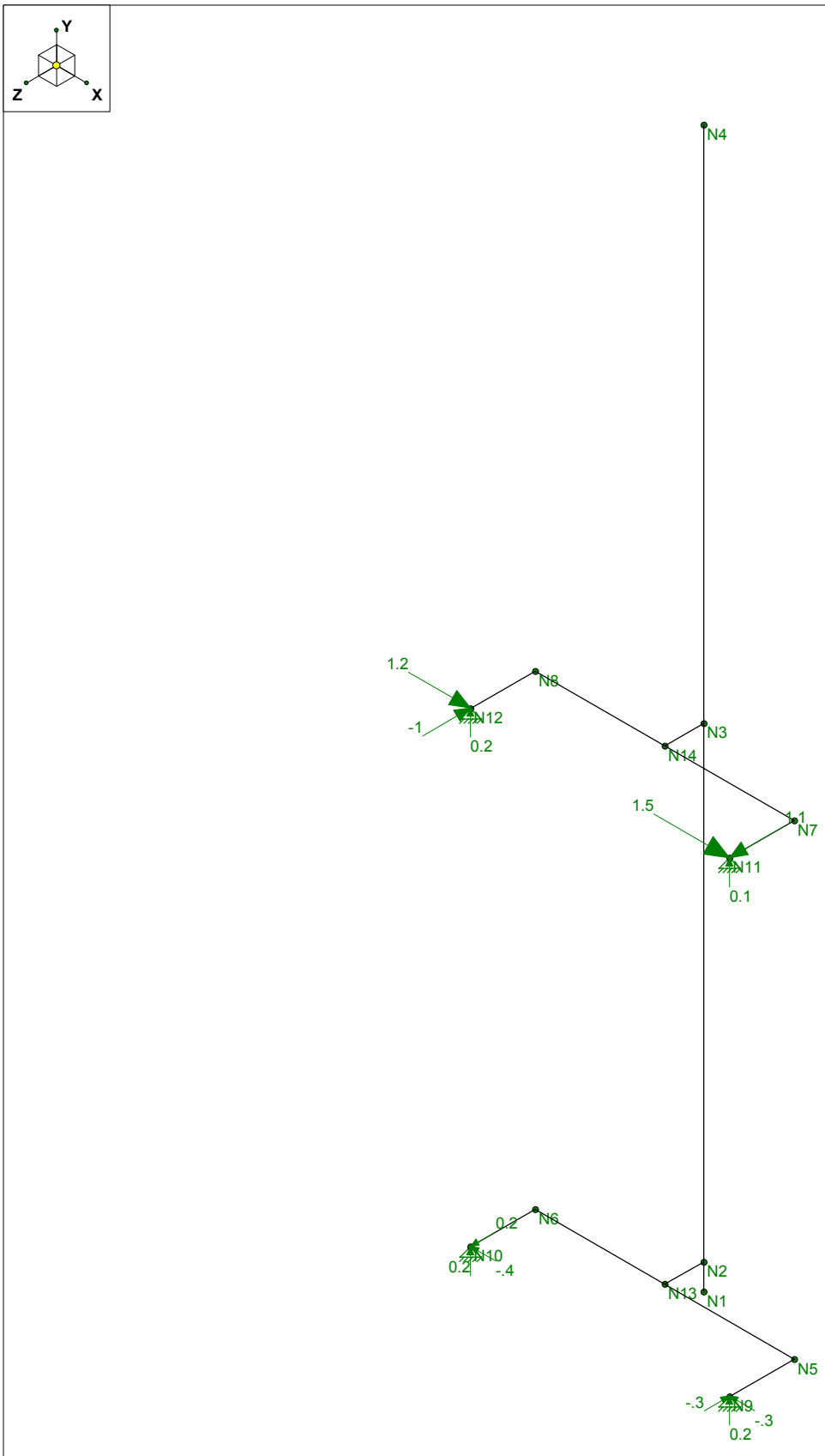


CENTEK Engineering, Inc.		
tjl, cfc	CL&P # 936 - Mast	June 18, 2014 at 2:18 PM
14025.007 / T-Mobile CT11...	LC #1 Reactions	NESC.r3d



Loads: LC 2, x-dir NESC Extreme Wind on PCS Structure

CENTEK Engineering, Inc.		
tjl, cfc	CL&P # 936 - Mast	June 18, 2014 at 2:17 PM
14025.007 / T-Mobile CT11...	LC #2 Loads	NESC.r3d



CENTEK Engineering, Inc.		
tjl, cfc	CL&P # 936 - Mast	June 18, 2014 at 2:19 PM
14025.007 / T-Mobile CT11...	LC #2 Reactions	NESC.r3d

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

Subject:	Coax Cable on CL&P Tower # 936
Location:	Wilton, CT
Rev. 0: 2/14/14	Prepared by: T.J.L Checked by: C.F.C. Job No. 14025.007

Coax Cable on CL&P Tower

Distance Between Coax Cable Attach Points =

Coax Cable Span = $Coax_{Span} := \begin{pmatrix} 5.5 \\ 10.5 \\ 11.25 \\ 13.5 \\ 18.25 \\ 21 \end{pmatrix} \cdot ft$ *(User Input)*

Diameter of Coax Cable = $D_{coax} := 1.11 \cdot in$ *(User Input)*

Weight of Coax Cable = $W_{coax} := 0.54 \cdot plf$ *(User Input)*

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

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

Extreme Wind Pressure = $qz := 34.1 \cdot psf$ *(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 Load = $OF_{HW} := 2.5$ *(User Input)*

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

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

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

Wind Area with Ice Transverse = $A_{Tice} := \left(NP_{Tcoax} \cdot D_{coax} + 2 \cdot Ir\right) = 3.22 \cdot in$

Wind Area without Ice Transverse = $A_T := \left(NP_{Tcoax} \cdot D_{coax}\right) = 2.22 \cdot in$

Ice Area per Liner Ft = $Ai_{coax} := \frac{\pi}{4} \cdot \left[\left(D_{coax} + 2 \cdot Ir\right)^2 - D_{coax}^2\right] = 0.018\,ft^2$

Weight of Ice on All Coax Cables = $W_{ice} := Ai_{coax} \cdot Id \cdot N_{coax} = 11.802 \cdot plf$

Heavy Vertical Load =

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

Heavy Transverse Load =

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

$$Heavy_{Vert} = \begin{pmatrix} 151 \\ 288 \\ 309 \\ 370 \\ 500 \\ 576 \end{pmatrix} lb \qquad Heavy_{Trans} = \begin{pmatrix} 24 \\ 45 \\ 48 \\ 58 \\ 78 \\ 90 \end{pmatrix} lb$$

Extreme Vertical Load =

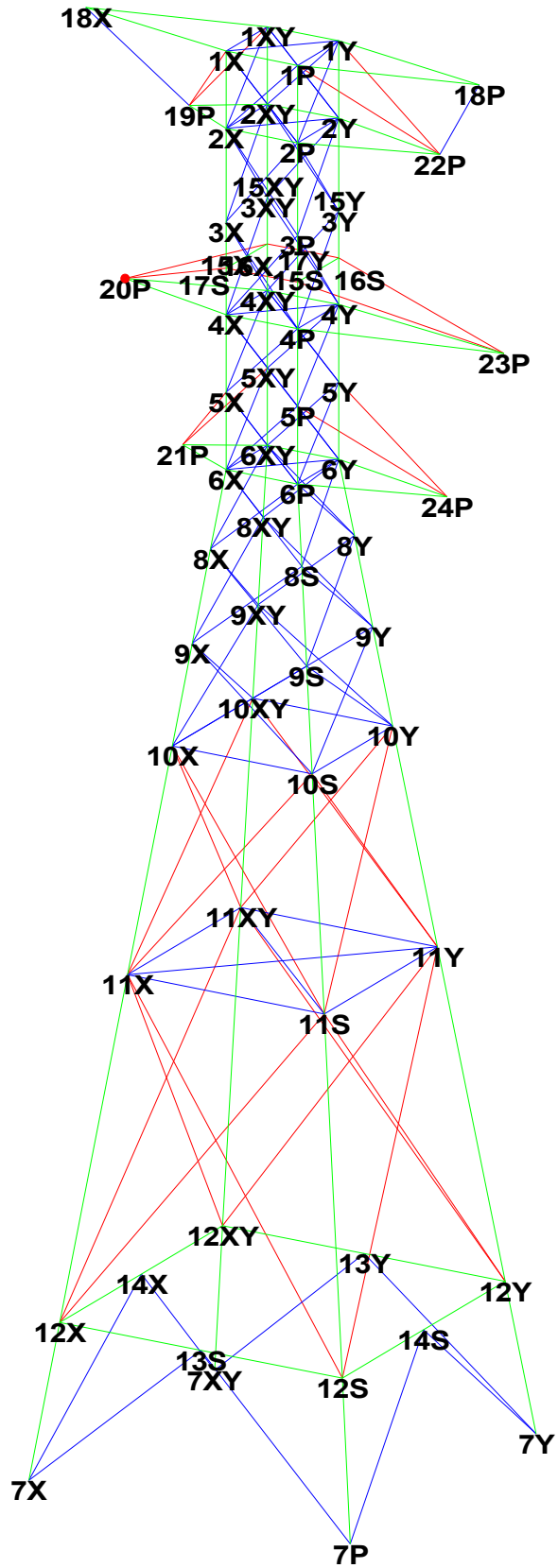
$$Extreme_{Vert} := \overrightarrow{\left[\left(N_{coax} \cdot W_{coax}\right) \cdot Coax_{Span} \cdot OF_{EV}\right]}$$

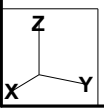
Extreme Transverse Load =

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

$$Extreme_{Vert} = \begin{pmatrix} 36 \\ 68 \\ 73 \\ 87 \\ 118 \\ 136 \end{pmatrix} lb \qquad Extreme_{Trans} = \begin{pmatrix} 56 \\ 106 \\ 114 \\ 136 \\ 184 \\ 212 \end{pmatrix} lb$$

Centek Engineering Inc, Project: "wilton - 936"
Tower Version 12.50, 4:27:18 PM Wednesday, June 11, 2014
Undeformed geometry displayed





Project Name : 14025.007 - Wilton, CT
Project Notes: CL&P Structure # 936/ T-Mobile CT11296A
Project File : J:\Jobs\1402500.WI\007 - CT11296A\Backup Documentation\Calcs\Rev (1)\PLS Tower\wilton - 936.tow
Date run : 5:36:58 PM Wednesday, June 11, 2014
by : Tower Version 12.50
Licensed to : Centek Engineering Inc

Successfully performed nonlinear analysis

Member "g4P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g4X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g4XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g4Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g6P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g6X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g6XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g6Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g9P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g9X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g9XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g9Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g10P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g10X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g10XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g10Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g11P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g11X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g11XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g11Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g12P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g12X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g12XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g12Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g15P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge

and spacing distances will be checked. ??
Member "g15X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g15XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g15Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g16P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g16X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g16XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g16Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g17P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g17X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g17XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g17Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g18P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g18X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g18XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g18Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g19P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g19X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g19XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g19Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g20P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g20X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g20XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g20Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g21P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g21X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g21XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g21Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g22P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g22X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge

and spacing distances will be checked. ??
Member "g22XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g22Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g23P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g23X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g23XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g23Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g24P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g24X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g24XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g24Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
KL/R value of 273.24 exceeds maximum of 200.00 for member "g53P" ??
KL/R value of 273.24 exceeds maximum of 200.00 for member "g53X" ??
The model has 66 warnings. ??

Member check option: ASCE 10
Connection rupture check: ASCE 10
Crossing diagonal check: ASCE 10 [Alternate Unsupported RLOUT = 1]
Included angle check: None
Climbing load check: None
Redundant members checked with: Actual Force

Loads from file: j:\jobs\1402500.wi\007 - ct11296a\backup documentation\calcs\rev (1)\pls tower\wilton - 936.lca

*** Analysis Results:

Maximum element usage is 86.67% for Angle "g31Y" in load case "NESC Heavy"
Maximum insulator usage is 8.02% for Clamp "7" in load case "NESC Heavy"

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	7P	3.85	4.72	30.35	6.09	0.06	-0.05	0.08	0.04	0.00
NESC Heavy	7X	-6.66	7.51	-48.74	10.04	0.14	0.12	0.18	-0.35	0.00
NESC Heavy	7XY	7.43	8.61	-52.79	11.38	0.16	-0.03	0.17	0.32	0.00
NESC Heavy	7Y	-4.62	5.57	32.51	7.24	0.04	0.03	0.05	-0.06	0.00
NESC Extreme	7P	6.40	8.13	47.83	10.35	0.17	-0.01	0.17	-0.49	0.00
NESC Extreme	7X	-7.81	9.50	-56.84	12.30	0.15	0.14	0.21	-0.44	0.00
NESC Extreme	7XY	8.46	10.80	-60.40	13.71	0.16	-0.04	0.17	0.39	0.00
NESC Extreme	7Y	-7.04	9.36	50.84	11.71	0.12	0.01	0.12	0.46	0.00

Summary of Joint Support Reactions For All Load Cases in Direction of Leg:

Load Case	Support Joint	Origin Joint	Member Leg	Force In Leg Dir.	Residual Shear Perpendicular	Residual Shear Horizontal	Residual Shear Horizontal	Residual Shear Horizontal	Total Long.	Total Tran.	Total Vert.

				(kips)	To Leg (kips)	To Leg - Res. (kips)	To Leg - Long. (kips)	To Leg - Tran. (kips)	Force (kips)	Force (kips)	Force (kips)
NESC Heavy	7P	12S	g12P	-30.944	0.639	0.640	0.298	-0.567	3.85	4.72	30.35
NESC Heavy	7X	12X	g12X	49.759	0.838	0.845	0.000	-0.845	-6.66	7.51	-48.74
NESC Heavy	7XY	12XY	g12XY	53.989	1.396	1.413	-0.215	-1.396	7.43	8.61	-52.79
NESC Heavy	7Y	12Y	g12Y	-33.285	1.126	1.139	0.175	-1.126	-4.62	5.57	32.51
NESC Extreme	7P	12S	g12P	-48.915	1.580	1.592	0.137	-1.586	6.40	8.13	47.83
NESC Extreme	7X	12X	g12X	58.127	1.716	1.733	0.043	-1.732	-7.81	9.50	-56.84
NESC Extreme	7XY	12XY	g12XY	61.888	2.520	2.547	-0.198	-2.539	8.46	10.80	-60.40
NESC Extreme	7Y	12Y	g12Y	-52.114	2.387	2.411	0.095	-2.409	-7.04	9.36	50.84

Overturning Moment Summary For All Load Cases:

Load Case	Transverse Moment (ft-k)	Longitudinal Moment (ft-k)	Resultant Moment (ft-k)
NESC Heavy	-1849.407	-21.266	1849.529
NESC Extreme	-2428.981	-6.351	2428.989

Sections Information:

Section Label	Top Z (ft)	Bottom Z (ft)	Joint Count	Member Count	Tran. Face Top Width (ft)	Tran. Face Bot Width (ft)	Tran. Face Gross Area (ft^2)	Long. Face Top Width (ft)	Long. Face Bot Width (ft)	Long. Face Gross Area (ft^2)
1	91.000	64.000	40	134	5.00	5.00	135.000	27.50	18.50	288.500
2	64.000	0.000	32	90	5.00	22.50	880.000	5.00	22.50	880.000

*** Overall summary for all load cases - Usage = Maximum Stress / Allowable Stress
Printed capacities do not include the strength factor entered for each load case.
The Group Summary reports on the member and load case that resulted in maximum usage
which may not necessarily be the same as that which produces maximum force.

Group Summary (Compression Portion):

Group Label	L/R	KL/R	Length (ft)	Group Desc.	Angle Curve	Angle No.	Angle Type	Steel Size	Steel Strength (ksi)	Max Usage %	Max Usage Cont-rol	Max Use In Comp. %	Comp. Control Member	Comp. Force (kips)	Comp. Control Load Case	L/R Capacity (kips)	Comp. Connect. Shear Capacity (kips)	Comp. Connect. Bearing Capacity (kips)	RLX	RLY	RLZ	Comp. Member No. Of Bolts
Leg1	Leg1	45.28	45.28	3.000	SAE	1	4X4X0.25	33.0	26.47	Comp	26.47	g4XY	-15.946	NESC Hea	60.236	91.000	140.625	1.000	1.000	1.000	10
Leg2	Leg2	79.92	79.92	6.620	SAE	1	5X5X0.3125	33.0	57.87	Comp	57.87	g9X	-47.214	NESC Ext	81.579	109.200	210.937	1.000	1.000	1.000	12
Leg3	Leg3	90.44	90.44	22.407	SAE	1	5X5X0.375	33.0	64.13	Comp	64.13	g11XY	-58.387	NESC Ext	91.040	127.400	295.312	0.333	0.333	0.333	14
XBrace1	XBrace1	123.69	122.85	7.071	SAE	5	1.75X1.75X0.1875	33.0	24.11	Comp	24.11	g13Y	-2.787	NESC Ext	11.559	18.200	21.094	0.750	0.500	0.500	2
XBrace2	XBrace2				SAU		3X2X0.25	33.0	28.88	Tens	28.09	g21Y	-6.961	NESC Ext	24.777	36.400	56.250	0.500	0.750	0.500	

																	110.87	113.15	7.071	2	4
XBrace3	XBrace3	SAE	2.5X2.5X0.1875	33.0	20.84	Comp	20.84	g29Y	-2.710	NESC Ext	13.003	18.200	21.094	0.775	0.550	0.550	147.38	140.91	11.054	5	2
XBrace4	XBrace4	SAE	2X2X0.25	33.0	86.67	Comp	86.67	g31Y	-3.111	NESC Hea	3.590	27.300	42.187	1.000	0.585	0.585	370.03	273.77	18.779	6	3
XBrace5	XBrace5	SAE	2.5X2.5X0.1875	33.0	85.08	Comp	85.08	g33P	-2.285	NESC Ext	2.685	27.300	31.641	1.000	0.410	0.410	429.08	310.08	27.819	6	3
XBrace6	XBrace6	SAU	3.5X2.5X0.25	33.0	38.01	Comp	38.01	g35XY	-3.459	NESC Ext	14.832	9.100	14.062	1.000	0.500	0.500	166.70	166.70	15.114	4	1
XBrace7	XBrace7	SAU	3X2X0.25	33.0	35.54	Comp	35.54	g17Y	-5.630	NESC Ext	15.844	27.300	42.187	1.000	2.000	1.000	163.28	146.62	3.905	6	3
Horz1	Horizontal 1	SAE	1.75X1.75X0.1875	33.0	28.96	Comp	28.96	g40X	-2.173	NESC Ext	7.504	18.200	21.094	1.000	1.000	1.000	174.93	153.78	5.000	6	2
Horz2	Horizontal 2	SAU	2.5X2X0.1875	33.0	31.78	Comp	31.78	g41P	-3.910	NESC Ext	12.304	18.200	21.094	1.000	0.500	0.500	148.07	137.26	9.785	6	2
Horz3	Horizontal 3	SAU	3X2.5X0.25	33.0	35.96	Comp	35.96	g43P	-5.717	NESC Ext	15.896	18.200	28.125	1.000	0.500	0.500	174.60	153.58	13.750	6	2
Horz4	**Horizontal 4**	**SAU**	**4X3X0.25**	**33.0**	**22.52**	**Comp**	**22.52**	**g46Y**	**-4.098**	**NESC Ext**	**18.857**	**18.200**	**28.125**	**2.000**	**1.000**	**1.000**	**185.30**	**160.16**	**9.883**	**6**	**2**

A potentially damaging moment exists in the following members (make sure your system is well triangulated to minimize moments): g45P g45Y ??

Horz5	Horizontal 5	Bar	1.75x1/4	33.0	66.27	Tens	0.00	g48Y	0.000		0.129	9.100	14.062	1.000	2.000	1.000	983.61	983.61	2.500	4	1
Horz6	Horizontal 6	SAE	1.75X1.75X0.1875	33.0	13.03	Comp	13.03	g47P	-1.186	NESC Hea	12.543	9.100	10.547	2.000	1.000	1.000	111.73	115.87	2.500	3	1
Inner1	Inner1	SAE	1.75X1.75X0.1875	33.0	4.15	Comp	4.15	g51X	-0.377	NESC Hea	11.437	9.100	10.547	0.500	0.500	0.500	123.69	123.69	7.071	4	1
Inner2	Inner2	SAU	2.5X2X0.1875	33.0	48.90	Comp	48.90	g53X	-1.518	NESC Ext	3.105	9.100	10.547	0.500	0.500	0.500	273.24	273.24	19.445	4	1
Arm1	Ground Wire Arm	SAU	3X2.5X0.25	33.0	19.76	Tens	2.87	g54XY	-0.523	NESC Hea	19.099	18.200	28.125	1.000	0.500	0.500	146.34	140.11	11.524	5	2
Arm2	Arm 2	SAE	2.5X2.5X0.1875	33.0	11.55	Comp	11.55	g56P	-2.078	NESC Hea	17.986	18.200	21.094	1.000	1.000	1.000	114.35	117.18	4.717	3	2
Arm3	Arm 3	SAU	3X2X0.1875	33.0	15.81	Comp	15.81	g58P	-2.711	NESC Hea	17.147	27.300	31.641	1.000	0.500	0.500	121.09	121.09	8.860	4	3
Arm4	Arm 4	SAU	4X3X0.25	33.0	42.56	Comp	42.56	g67Y	-7.745	NESC Hea	31.382	18.200	28.125	1.000	0.500	0.500	124.11	123.17	13.238	5	2
ArmBr1	ArmBr1	SAE	3X3X0.1875	33.0	34.52	Comp	34.52	g62P	-3.141	NESC Hea	9.922	9.100	10.547	1.000	1.000	1.000	177.32	177.32	8.807	4	1
ArmBr2	ArmBr2	SAE	2.5X2.5X0.1875	33.0	13.91	Comp	13.91	g69P	-1.266	NESC Hea	13.491	9.100	10.547	1.000	1.000	1.000	138.34	138.34	5.706	4	1
ArmBr3	ArmBr3	Bar	1.75x1/4	33.0	74.13	Tens	0.00	g72Y	0.000		0.029	9.100	14.062	1.000	1.000	1.000	2084.22	2084.22	10.595	4	1

Group Summary (Tension Portion):

Group Label	Group Desc.	Angle Type	Angle Size	Steel Strength (ksi)	Max Usage %	Usage Cont-rol	Max Tension Use In Tens. %	Tension Control Member	Tension Force (kips)	Tension Control Load Case	Net Section Capacity (kips)	Tension Connect. Shear Capacity (kips)	Tension Connect. Bearing Capacity (kips)	Tension Connect. Rupture Capacity (kips)	Length Tens. Member (ft)	No. Of Tens. Bolts	No. Of Holes	Hole Diameter (in)
Leg1	Leg1	SAE	4X4X0.25	33.0	26.47	Comp	25.72	g4P	12.000	NESC Ext	46.653	91.000	140.625	128.676	3.000	10	3.062	0.6875

Leg2	Leg2	SAE	5X5X0.3125	33.0	57.87	Comp	54.02	g9P	41.106NESC Ext	76.097	109.200	210.937	220.588	6.620	12	3.370	0.6875
Leg3	Leg3	SAE	5X5X0.375	33.0	64.13	Comp	55.52	g12Y	49.783NESC Ext	89.667	127.400	295.312	289.522	10.185	14	3.463	0.6875
XBrace1	XBrace1	SAE	1.75X1.75X0.1875	33.0	24.11	Comp	17.84	g13XY	2.602NESC Ext	14.585	18.200	21.094	16.189	7.071	2	1.000	0.6875
XBrace2	XBrace2	SAU	3X2X0.25	33.0	28.88	Tens	28.88	g21XY	7.729NESC Ext	26.767	36.400	56.250	50.000	7.071	4	1.680	0.6875
XBrace3	XBrace3	SAE	2.5X2.5X0.1875	33.0	20.84	Comp	15.80	g27XY	2.818NESC Ext	22.961	27.300	31.641	17.842	9.399	3	1.000	0.6875
XBrace4	XBrace4	SAE	2X2X0.25	33.0	86.67	Comp	25.59	g31XY	5.837NESC Ext	22.813	27.300	42.187	26.039	18.779	3	1.000	0.6875
XBrace5	XBrace5	SAE	2.5X2.5X0.1875	33.0	85.08	Comp	31.62	g33XY	6.441NESC Ext	22.961	27.300	31.641	20.373	27.819	3	1.000	0.6875
XBrace6	XBrace6	SAU	3.5X2.5X0.25	33.0	38.01	Comp	34.46	g35Y	3.136NESC Ext	30.238	9.100	14.062	12.500	15.114	1	1.000	0.6875
XBrace7	XBrace7	SAU	3X2X0.25	33.0	35.54	Comp	19.61	g17XY	5.354NESC Ext	30.238	27.300	42.187	37.500	3.905	3	1.000	0.6875
Horz1	Horizontal 1	SAE	1.75X1.75X0.1875	33.0	28.96	Comp	18.33	g40P	2.503NESC Hea	14.585	18.200	21.094	13.658	5.000	2	1.000	0.6875
Horz2	Horizontal 2	SAU	2.5X2X0.1875	33.0	31.78	Comp	5.95	g42Y	0.986NESC Hea	17.444	18.200	21.094	16.576	9.785	2	1.000	0.6875
Horz3	Horizontal 3	SAU	3X2.5X0.25	33.0	35.96	Comp	9.18	g44P	1.670NESC Hea	30.090	18.200	28.125	21.820	13.750	2	1.000	0.6875
Horz4	**Horizontal 4**	**SAU**	**4X3X0.25**	**33.0**	**22.52**	**Comp**	**8.76**	**g46X**	**1.594NESC Ext**	**37.663**	**18.200**	**28.125**	**21.820**	**9.883**	**2**	**1.000**	**0.6875 A potentially damaging moment exists in the following members (make sure your system is well triangulated to minimize moments): g45P g45Y ??**
Horz5	Horizontal 5	Bar	1.75x1/4	33.0	66.27	Tens	66.27	g48XY	5.809NESC Hea	8.766	9.100	14.062	12.500	2.500	1	1.000	0.6875
Horz6	Horizontal 6	SAE	1.75X1.75X0.1875	33.0	13.03	Comp	0.00	g47Y	0.000	14.585	9.100	10.547	7.330	2.500	1	1.000	0.6875
Inner1	Inner1	SAE	1.75X1.75X0.1875	33.0	4.15	Comp	3.32	g49X	0.244NESC Hea	14.585	9.100	10.547	7.330	7.071	1	1.000	0.6875
Inner2	Inner2	SAU	2.5X2X0.1875	33.0	48.90	Comp	0.00	g53X	0.000	17.444	9.100	10.547	7.717	19.445	1	1.000	0.6875
Arm1	Ground Wire Arm	SAU	3X2.5X0.25	33.0	19.76	Tens	19.76	g55P	3.597NESC Hea	33.802	18.200	28.125	28.125	5.000	2	1.000	0.6875
Arm2	Arm 2	SAE	2.5X2.5X0.1875	33.0	11.55	Comp	6.20	g60Y	1.129NESC Ext	22.961	18.200	21.094	18.750	5.148	2	1.000	0.6875
Arm3	Arm 3	SAU	3X2X0.1875	33.0	15.81	Comp	0.00	g58Y	0.000	17.333	27.300	31.641	22.061	8.860	3	1.000	0.6875
Arm4	Arm 4	SAU	4X3X0.25	33.0	42.56	Comp	0.00	g68Y	0.000	45.088	18.200	28.125	31.250	9.341	2	1.000	0.6875
ArmBr1	ArmBr1	SAE	3X3X0.1875	33.0	34.52	Comp	0.00	g62P	0.000	28.544	9.100	10.547	9.375	8.807	1	1.000	0.6875
ArmBr2	ArmBr2	SAE	2.5X2.5X0.1875	33.0	13.91	Comp	0.00	g69P	0.000	22.961	9.100	10.547	9.375	5.706	1	1.000	0.6875
ArmBr3	ArmBr3	Bar	1.75x1/4	33.0	74.13	Tens	74.13	g71Y	6.498NESC Hea	8.766	9.100	14.062	12.500	13.574	1	1.000	0.6875

*** Maximum Stress Summary for Each Load Case

Summary of Maximum Usages by Load Case:

Load Case	Maximum Usage %	Element Label	Element Type

NESC Heavy	86.67	g31Y	Angle
NESC Extreme	85.08	g33P	Angle

Summary of Insulator Usages:

Insulator Label	Insulator Type	Maximum Usage %	Load Case	Weight (lbs)
1	Clamp	3.94	NESC Heavy	0.0
2	Clamp	6.07	NESC Heavy	0.0
3	Clamp	7.99	NESC Heavy	0.0
4	Clamp	7.95	NESC Heavy	0.0
5	Clamp	7.92	NESC Heavy	0.0
6	Clamp	7.97	NESC Heavy	0.0
7	Clamp	8.02	NESC Heavy	0.0
8	Clamp	7.96	NESC Heavy	0.0
9	Clamp	1.49	NESC Heavy	0.0
10	Clamp	0.95	NESC Heavy	0.0
11	Clamp	1.10	NESC Extreme	0.0
12	Clamp	1.52	NESC Heavy	0.0
13	Clamp	2.46	NESC Heavy	0.0
14	Clamp	2.24	NESC Heavy	0.0
15	Clamp	3.39	NESC Extreme	0.0
16	Clamp	3.98	NESC Extreme	0.0
17	Clamp	1.13	NESC Heavy	0.0

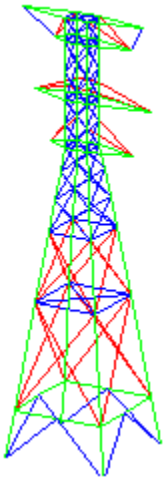
*** Weight of structure (lbs):
Weight of Angles*Section DLF: 10244.3
Total: 10244.3

*** End of Report

```
*****************************************************************************
*                                                                           *
* TOWER - Analysis and Design -  Copyright Power Line Systems, Inc. 1986-2011 *
*                                                                           *
*****************************************************************************

Project Name : 14025.007 - Wilton, CT
Project Notes: CL&P Structure # 936/ T-Mobile CT11296A
Project File : J:\Jobs\1402500.WI\007 - CT11296A\Backup Documentation\Calcs\Rev (1)\PLS Tower\wilton - 936.tow
Date run     : 5:36:57 PM Wednesday, June 11, 2014
by           : Tower Version 12.50
Licensed to  : Centek Engineering Inc

Successfully performed nonlinear analysis

Member "g4P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge
and spacing distances will be checked. ??
Member "g4X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge
and spacing distances will be checked. ??
Member "g4XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge
and spacing distances will be checked. ??
Member "g4Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge
and spacing distances will be checked. ??
Member "g6P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge
and spacing distances will be checked. ??
Member "g6X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge
and spacing distances will be checked. ??
Member "g6XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge
and spacing distances will be checked. ??
Member "g6Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge
and spacing distances will be checked. ??
Member "g9P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge
and spacing distances will be checked. ??
Member "g9X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge
and spacing distances will be checked. ??
Member "g9XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge
and spacing distances will be checked. ??
Member "g9Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge
and spacing distances will be checked. ??
Member "g10P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge
and spacing distances will be checked. ??
Member "g10X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge
and spacing distances will be checked. ??
Member "g10XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge
and spacing distances will be checked. ??
Member "g10Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge
and spacing distances will be checked. ??
Member "g11P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge
and spacing distances will be checked. ??
Member "g11X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge
and spacing distances will be checked. ??
Member "g11XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge
and spacing distances will be checked. ??
Member "g11Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge
and spacing distances will be checked. ??
Member "g12P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge
and spacing distances will be checked. ??
Member "g12X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge
```

and spacing distances will be checked. ??
Member "g12XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g12Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g15P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g15X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g15XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g15Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g16P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g16X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g16XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g16Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g17P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g17X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g17XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g17Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g18P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g18X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g18XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g18Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g19P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g19X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g19XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g19Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g20P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g20X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g20XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g20Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g21P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g21X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g21XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge

and spacing distances will be checked. ??
Member "g21Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g22P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g22X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g22XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g22Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g23P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g23X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g23XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g23Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g24P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g24X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g24XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
Member "g24Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??
KL/R value of 273.24 exceeds maximum of 200.00 for member "g53P" ??
KL/R value of 273.24 exceeds maximum of 200.00 for member "g53X" ??
The model has 66 warnings. ??



Nonlinear convergence parameters: Use Standard Parameters
Tension only member maximum compression load as a percent of compression capacity: 100%
Member check option: ASCE 10
Connection rupture check: ASCE 10
Crossing diagonal check: ASCE 10 [Alternate Unsupported RLOUT = 1]

Included angle check: None
Climbing load check: None
Redundant members checked with: Actual Force

Joints Geometry:

Joint Label	Symmetry Code	X Coord. (ft)	Y Coord. (ft)	Z Coord. (ft)	X Disp. Rest.	Y Disp. Rest.	Z Disp. Rest.	X Rot. Rest.	Y Rot. Rest.	Z Rot. Rest.
1P	XY-Symmetry	2.5	2.5	91	Free	Free	Free	Free	Free	Free
2P	XY-Symmetry	2.5	2.5	86	Free	Free	Free	Free	Free	Free
3P	XY-Symmetry	2.5	2.5	80	Free	Free	Free	Free	Free	Free
4P	XY-Symmetry	2.5	2.5	74	Free	Free	Free	Free	Free	Free
5P	XY-Symmetry	2.5	2.5	69	Free	Free	Free	Free	Free	Free
6P	XY-Symmetry	2.5	2.5	64	Free	Free	Free	Free	Free	Free
7P	XY-Symmetry	11.25	11.25	0	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
18P	X-Symmetry	0	13.75	91	Free	Free	Free	Free	Free	Free
19P	None	0	-6.5	86	Free	Free	Free	Free	Free	Free
20P	None	0	-11	74	Free	Free	Free	Free	Free	Free
21P	None	0	-7	64	Free	Free	Free	Free	Free	Free
22P	None	0	11	86	Free	Free	Free	Free	Free	Free
23P	None	0	15.5	74	Free	Free	Free	Free	Free	Free
24P	None	0	11.5	64	Free	Free	Free	Free	Free	Free
1X	X-GenXY	2.5	-2.5	91	Free	Free	Free	Free	Free	Free
1XY	XY-GenXY	-2.5	-2.5	91	Free	Free	Free	Free	Free	Free
1Y	Y-GenXY	-2.5	2.5	91	Free	Free	Free	Free	Free	Free
2X	X-GenXY	2.5	-2.5	86	Free	Free	Free	Free	Free	Free
2XY	XY-GenXY	-2.5	-2.5	86	Free	Free	Free	Free	Free	Free
2Y	Y-GenXY	-2.5	2.5	86	Free	Free	Free	Free	Free	Free
3X	X-GenXY	2.5	-2.5	80	Free	Free	Free	Free	Free	Free
3XY	XY-GenXY	-2.5	-2.5	80	Free	Free	Free	Free	Free	Free
3Y	Y-GenXY	-2.5	2.5	80	Free	Free	Free	Free	Free	Free
4X	X-GenXY	2.5	-2.5	74	Free	Free	Free	Free	Free	Free
4XY	XY-GenXY	-2.5	-2.5	74	Free	Free	Free	Free	Free	Free
4Y	Y-GenXY	-2.5	2.5	74	Free	Free	Free	Free	Free	Free
5X	X-GenXY	2.5	-2.5	69	Free	Free	Free	Free	Free	Free
5XY	XY-GenXY	-2.5	-2.5	69	Free	Free	Free	Free	Free	Free
5Y	Y-GenXY	-2.5	2.5	69	Free	Free	Free	Free	Free	Free
6X	X-GenXY	2.5	-2.5	64	Free	Free	Free	Free	Free	Free
6XY	XY-GenXY	-2.5	-2.5	64	Free	Free	Free	Free	Free	Free
6Y	Y-GenXY	-2.5	2.5	64	Free	Free	Free	Free	Free	Free
7X	X-GenXY	11.25	-11.25	0	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
7XY	XY-GenXY	-11.25	-11.25	0	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
7Y	Y-GenXY	-11.25	11.25	0	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
18X	X-Gen	0	-13.75	91	Free	Free	Free	Free	Free	Free

Secondary Joints:

Joint Label	Symmetry Code	Origin Joint	End Joint	Fraction	Elevation (ft)	X Disp. Rest.	Y Disp. Rest.	Z Disp. Rest.	X Rot. Rest.	Y Rot. Rest.	Z Rot. Rest.
8S	XY-Symmetry	6P	7P	0	59	Free	Free	Free	Free	Free	Free
9S	XY-Symmetry	6P	7P	0	53	Free	Free	Free	Free	Free	Free
10S	XY-Symmetry	6P	7P	0	46.5	Free	Free	Free	Free	Free	Free
11S	XY-Symmetry	6P	7P	0	32	Free	Free	Free	Free	Free	Free
12S	XY-Symmetry	6P	7P	0	10	Free	Free	Free	Free	Free	Free
13S	Y-Symmetry	12S	12X	0.5	0	Free	Free	Free	Free	Free	Free

14S	X-Symmetry	12S	12Y	0.5	0	Free	Free	Free	Free	Free	Free
15S	XY-Symmetry	3P	4P	0.5	0	Free	Free	Free	Free	Free	Free
16S	X-Symmetry	3P	4Y	0.5	0	Free	Free	Free	Free	Free	Free
17S	Y-Symmetry	3P	4X	0.5	0	Free	Free	Free	Free	Free	Free
8X	X-GenXY	6P	7P	0	59	Free	Free	Free	Free	Free	Free
8XY	XY-GenXY	6P	7P	0	59	Free	Free	Free	Free	Free	Free
8Y	Y-GenXY	6P	7P	0	59	Free	Free	Free	Free	Free	Free
9X	X-GenXY	6P	7P	0	53	Free	Free	Free	Free	Free	Free
9XY	XY-GenXY	6P	7P	0	53	Free	Free	Free	Free	Free	Free
9Y	Y-GenXY	6P	7P	0	53	Free	Free	Free	Free	Free	Free
10X	X-GenXY	6P	7P	0	46.5	Free	Free	Free	Free	Free	Free
10XY	XY-GenXY	6P	7P	0	46.5	Free	Free	Free	Free	Free	Free
10Y	Y-GenXY	6P	7P	0	46.5	Free	Free	Free	Free	Free	Free
11X	X-GenXY	6P	7P	0	32	Free	Free	Free	Free	Free	Free
11XY	XY-GenXY	6P	7P	0	32	Free	Free	Free	Free	Free	Free
11Y	Y-GenXY	6P	7P	0	32	Free	Free	Free	Free	Free	Free
12X	X-GenXY	6P	7P	0	10	Free	Free	Free	Free	Free	Free
12XY	XY-GenXY	6P	7P	0	10	Free	Free	Free	Free	Free	Free
12Y	Y-GenXY	6P	7P	0	10	Free	Free	Free	Free	Free	Free
13Y	Y-Gen	12S	12X	0.5	0	Free	Free	Free	Free	Free	Free
14X	X-Gen	12S	12Y	0.5	0	Free	Free	Free	Free	Free	Free
15X	X-GenXY	3P	4P	0.5	0	Free	Free	Free	Free	Free	Free
15XY	XY-GenXY	3P	4P	0.5	0	Free	Free	Free	Free	Free	Free
15Y	Y-GenXY	3P	4P	0.5	0	Free	Free	Free	Free	Free	Free
16X	X-Gen	3P	4Y	0.5	0	Free	Free	Free	Free	Free	Free
17Y	Y-Gen	3P	4X	0.5	0	Free	Free	Free	Free	Free	Free

The model contains 36 primary and 32 secondary joints for a total of 68 joints.

Steel Material Properties:

Steel Material Label	Modulus of Elasticity (ksi)	Yield Stress Fy (ksi)	Ultimate Stress Fu (ksi)	Member All. Stress Hyp. 1 (ksi)	Member All. Stress Hyp. 2 (ksi)	Member Rupture Hyp. 1 (ksi)	Member Rupture Hyp. 2 (ksi)	Member Bearing Hyp. 1 (ksi)	Member Bearing Hyp. 2 (ksi)
A7	2.9e+004	33	60	0	0	0	0	0	0

Bolt Properties:

Bolt Label	Bolt Diameter (in)	Hole Diameter (in)	Ultimate Shear Capacity (kips)	Default End Distance (in)	Default Bolt Spacing (in)	Shear Capacity Hyp. 1 (kips)	Shear Capacity Hyp. 2 (kips)
5/8 A394	0.625	0.6875	9.1	1.125	1.5	0	0

Number Bolts Used By Type:

Bolt Type	Number Bolts
5/8 A394	714

Angle Properties:

Angle Type	Angle Size	Long Leg	Short Leg	Thick.	Unit Weight	Gross Area	w/t Ratio	Radius of Gyration Rx	Radius of Gyration Ry	Radius of Gyration Rz	Number of Angles	Wind Width	Short Edge Dist.	Long Edge Dist.	Optimize Cost Factor	Section Modulus

		(in)	(in)	(in)	(lbs/ft)	(in^2)		(in)	(in)	(in)		(in)	(in)	(in)		(in^3)
SAE	5X5X0.375	5	5	0.375	12.3	3.61	11	1.56	1.56	0.99	1	5	2.5	0	1.0000	0
SAE	5X5X0.3125	5	5	0.3125	10.3	3.03	13.4	1.57	1.57	0.994	1	5	2.5	0	1.0000	0
SAE	4X4X0.25	4	4	0.25	6.6	1.94	13.5	1.25	1.25	0.795	1	4	2	0	1.0000	0
SAE	3X3X0.1875	3	3	0.1875	3.71	1.09	13.33	0.939	0.939	0.596	1	3	1.5	0	1.0000	0
SAE	2.5X2.5X0.1875	2.5	2.5	0.1875	3.07	0.902	10.67	0.778	0.778	0.495	1	2.5	1.25	0	1.0000	0
SAE	2X2X0.25	2	2	0.25	3.19	0.94	5	0.609	0.609	0.391	1	2	1	0	1.0000	0
SAE	1.75X1.75X0.1875	1.75	1.75	0.1875	2.12	0.62	6	0.537	0.537	0.343	1	1.75	0.875	0	1.0000	0
SAU	4X3X0.25	4	3	0.25	5.8	1.69	13.25	1.28	0.896	0.651	1	4	1.5	0	1.0000	0
SAU	3.5X2.5X0.25	3.5	2.5	0.25	4.9	1.44	11.25	1.12	0.735	0.544	1	3.5	1.25	0	1.0000	0
SAU	3X2.5X0.25	3	2.5	0.25	4.5	1.31	9.5	0.945	0.753	0.528	1	3	1.25	0	1.0000	0
SAU	3X2X0.25	3	2	0.25	4.1	1.19	9.75	0.957	0.574	0.435	1	3	1	0	1.0000	0
SAU	3X2X0.1875	3	2	0.1875	3.07	0.9	13.33	0.966	0.583	0.439	1	3	1	0	1.0000	0
SAU	2.5X2X0.1875	2.5	2	0.1875	2.75	0.81	10.67	0.793	0.6	0.427	1	2.5	1	0	1.0000	0
Bar	1.75x1/4	1.75	0	0.25	1.5	0.4375	7	0.305	0.061	0.305	1	1.75	0	0	0.0000	0

Angle Groups:

Group Label	Group Description	Angle Type	Angle Size	Material Type	Element Type	Group Type	Optimize Group	Allow. Add. Angle Width For Optimize (in)
Leg1	Leg1	SAE	4X4X0.25	A7	Beam	Leg	None	0.000
Leg2	Leg2	SAE	5X5X0.3125	A7	Beam	Leg	None	0.000
Leg3	Leg3	SAE	5X5X0.375	A7	Beam	Leg	None	0.000
XBrace1	XBrace1	SAE	1.75X1.75X0.1875	A7	Truss	Crossing Diagonal	None	0.000
XBrace2	XBrace2	SAU	3X2X0.25	A7	Truss	Crossing Diagonal	None	0.000
XBrace3	XBrace3	SAE	2.5X2.5X0.1875	A7	Truss	Crossing Diagonal	None	0.000
XBrace4	XBrace4	SAE	2X2X0.25	A7	T-Only	Other	None	0.000
XBrace5	XBrace5	SAE	2.5X2.5X0.1875	A7	T-Only	Other	None	0.000
XBrace6	XBrace6	SAU	3.5X2.5X0.25	A7	Truss	Other	None	0.000
XBrace7	XBrace7	SAU	3X2X0.25	A7	Truss	Other	None	0.000
Horz1	Horizontal 1	SAE	1.75X1.75X0.1875	A7	Truss	Other	None	0.000
Horz2	Horizontal 2	SAU	2.5X2X0.1875	A7	Truss	Other	None	0.000
Horz3	Horizontal 3	SAU	3X2.5X0.25	A7	Truss	Other	None	0.000
Horz4	Horizontal 4	SAU	4X3X0.25	A7	Beam	Other	None	0.000
Horz5	Horizontal 5	Bar	1.75x1/4	A7	T-Only Beam	Other	None	0.000
Horz6	Horizontal 6	SAE	1.75X1.75X0.1875	A7	Beam	Other	None	0.000
Inner1	Inner1	SAE	1.75X1.75X0.1875	A7	Truss	Other	None	0.000
Inner2	Inner2	SAU	2.5X2X0.1875	A7	Truss	Other	None	0.000
Arm1	Ground Wire Arm	SAU	3X2.5X0.25	A7	Beam	Other	None	0.000
Arm2	Arm 2	SAE	2.5X2.5X0.1875	A7	Beam	Other	None	0.000
Arm3	Arm 3	SAU	3X2X0.1875	A7	Beam	Other	None	0.000
Arm4	Arm 4	SAU	4X3X0.25	A7	Beam	Other	None	0.000
ArmBr1	ArmBr1	SAE	3X3X0.1875	A7	Truss	Other	None	0.000
ArmBr2	ArmBr2	SAE	2.5X2.5X0.1875	A7	Truss	Other	None	0.000
ArmBr3	ArmBr3	Bar	1.75x1/4	A7	T-Only	Other	None	0.000

Aggregate Angle Information:

Note: Estimate of surface area reported for painting purposes, not wind loading.

Angle Type	Angle Size	Material Type	Total Length (ft)	Total Surface Area (ft^2)	Total Weight (lbs)

SAE	4X4X0.25	A7	68.00	90.67	448.80
SAE	5X5X0.3125	A7	111.30	185.49	1146.35
SAE	5X5X0.375	A7	189.44	315.74	2330.17
SAE	1.75X1.75X0.1875	A7	163.14	95.16	345.85
SAU	3X2X0.25	A7	238.10	198.42	976.21
SAE	2.5X2.5X0.1875	A7	472.41	393.67	1450.30
SAE	2X2X0.25	A7	150.23	100.16	479.24
SAU	3.5X2.5X0.25	A7	120.91	120.91	592.47
SAU	2.5X2X0.1875	A7	78.03	58.52	214.59
SAU	3X2.5X0.25	A7	111.10	101.84	499.94
SAU	4X3X0.25	A7	171.94	200.60	997.25
Bar	1.75x1/4	A7	125.49	36.60	188.24
SAU	3X2X0.1875	A7	17.72	14.77	54.40
SAE	3X3X0.1875	A7	8.81	8.81	32.67

Sections:
The adjustment factors below only apply to dead load and wind areas that are calculated for members in the model.
They do not apply to equipment or to manually input dead load and drag areas.

Section Label	Joint Defining Section Bottom	Dead Load Adjust. Factor	Transverse Drag x Area Factor For Face	Longitudinal Drag x Area Factor For Face	Transverse Area Factor (CD From Code)	Longitudinal Area Factor (CD From Code)	Af Flat Factor For Face EIA Only	Ar Round Factor For Face EIA Only	Transverse Drag x Area Factor For All	Longitudinal Drag x Area Factor For All	SAPS Angle Drag x Area Factor	SAPS Round Drag x Area Factor	Force Solid Face
1	6P	1.050	3.300	3.300	1.100	1.100	0.000	0.000	1.000	1.000	0.000	0.000	None
2	7P	1.050	3.300	3.300	1.100	1.100	0.000	0.000	1.000	1.000	0.000	0.000	None

Angle Member Connectivity:

Member Label	Group Label	Section Label	Symmetry Code	Origin Joint	End Joint	Ecc. Code	Rest. Code	Ratio RLX	Ratio RLY	Ratio RLZ	Bolt Type	# Bolts	# Bolt Holes	# Shear Planes	Connect Leg	Short Edge Dist. (in)	Long Edge Dist. (in)	End Dist. (in)	Bolt Spacing (in)	Shear Path Length (in)	Tension Path Length (in)	Rest. Coef.
g1P	Leg1		XY-Symmetry	1P	2P	1	4	1	1	1	5/8 A394	0	4	1		0	0	0	0	0	0	0
g1X	Leg1		X-GenXY	1X	2X	1	4	1	1	1	5/8 A394	0	4	1		0	0	0	0	0	0	0
g1XY	Leg1		XY-GenXY	1XY	2XY	1	4	1	1	1	5/8 A394	0	4	1		0	0	0	0	0	0	0
g1Y	Leg1		Y-GenXY	1Y	2Y	1	4	1	1	1	5/8 A394	0	4	1		0	0	0	0	0	0	0
g2P	Leg1		XY-Symmetry	2P	3P	1	4	1	1	1	5/8 A394	0	2	1		0	0	0	0	0	0	0
g2X	Leg1		X-GenXY	2X	3X	1	4	1	1	1	5/8 A394	0	2	1		0	0	0	0	0	0	0
g2XY	Leg1		XY-GenXY	2XY	3XY	1	4	1	1	1	5/8 A394	0	2	1		0	0	0	0	0	0	0
g2Y	Leg1		Y-GenXY	2Y	3Y	1	4	1	1	1	5/8 A394	0	2	1		0	0	0	0	0	0	0
g3P	Leg1		XY-Symmetry	3P	15S	1	4	1	1	1	5/8 A394	0	2	1		0	0	0	0	0	0	0
g3X	Leg1		X-GenXY	3X	15X	1	4	1	1	1	5/8 A394	0	2	1		0	0	0	0	0	0	0

g3XY	Leg1	XY-GenXY	3XY	15XY	1	4	1	1	1	5/8	A394	0	2	1		0	0	0	0	0	0	0	0
g3Y	Leg1	Y-GenXY	3Y	15Y	1	4	1	1	1	5/8	A394	0	2	1		0	0	0	0	0	0	0	0
g4P	Leg1	XY-Symmetry	15S	4P	1	4	1	1	1	5/8	A394	10	3.062	1	Both	0.875	2.375	1.5	3.5	0	0	0	0
g4X	Leg1	X-GenXY	15X	4X	1	4	1	1	1	5/8	A394	10	3.062	1	Both	0.875	2.375	1.5	3.5	0	0	0	0
g4XY	Leg1	XY-GenXY	15XY	4XY	1	4	1	1	1	5/8	A394	10	3.062	1	Both	0.875	2.375	1.5	3.5	0	0	0	0
g4Y	Leg1	Y-GenXY	15Y	4Y	1	4	1	1	1	5/8	A394	10	3.062	1	Both	0.875	2.375	1.5	3.5	0	0	0	0
g5P	Leg2	XY-Symmetry	4P	5P	1	4	1	1	1	5/8	A394	0	4	1		0	0	0	0	0	0	0	0
g5X	Leg2	X-GenXY	4X	5X	1	4	1	1	1	5/8	A394	0	4	1		0	0	0	0	0	0	0	0
g5XY	Leg2	XY-GenXY	4XY	5XY	1	4	1	1	1	5/8	A394	0	4	1		0	0	0	0	0	0	0	0
g5Y	Leg2	Y-GenXY	4Y	5Y	1	4	1	1	1	5/8	A394	0	4	1		0	0	0	0	0	0	0	0
g6P	Leg2	XY-Symmetry	5P	6P	1	4	1	1	1	5/8	A394	14	4	1	Both	1.375	3	1.4375	4	0	0	0	0
g6X	Leg2	X-GenXY	5X	6X	1	4	1	1	1	5/8	A394	14	4	1	Both	1.375	3	1.4375	4	0	0	0	0
g6XY	Leg2	XY-GenXY	5XY	6XY	1	4	1	1	1	5/8	A394	14	4	1	Both	1.375	3	1.4375	4	0	0	0	0
g6Y	Leg2	Y-GenXY	5Y	6Y	1	4	1	1	1	5/8	A394	14	4	1	Both	1.375	3	1.4375	4	0	0	0	0
g7P	Leg2	XY-Symmetry	6P	8S	1	4	1	1	1	5/8	A394	0	4.79	1		0	0	0	0	0	0	0	0
g7X	Leg2	X-GenXY	6X	8X	1	4	1	1	1	5/8	A394	0	4.79	1		0	0	0	0	0	0	0	0
g7XY	Leg2	XY-GenXY	6XY	8XY	1	4	1	1	1	5/8	A394	0	4.79	1		0	0	0	0	0	0	0	0
g7Y	Leg2	Y-GenXY	6Y	8Y	1	4	1	1	1	5/8	A394	0	4.79	1		0	0	0	0	0	0	0	0
g8P	Leg2	XY-Symmetry	8S	9S	1	4	1	1	1	5/8	A394	0	3.5	1		0	0	0	0	0	0	0	0
g8X	Leg2	X-GenXY	8X	9X	1	4	1	1	1	5/8	A394	0	3.5	1		0	0	0	0	0	0	0	0
g8XY	Leg2	XY-GenXY	8XY	9XY	1	4	1	1	1	5/8	A394	0	3.5	1		0	0	0	0	0	0	0	0
g8Y	Leg2	Y-GenXY	8Y	9Y	1	4	1	1	1	5/8	A394	0	3.5	1		0	0	0	0	0	0	0	0
g9P	Leg2	XY-Symmetry	9S	10S	1	4	1	1	1	5/8	A394	12	3.37	1	Both	1	2.625	1.5	3	0	0	0	0
g9X	Leg2	X-GenXY	9X	10X	1	4	1	1	1	5/8	A394	12	3.37	1	Both	1	2.625	1.5	3	0	0	0	0
g9XY	Leg2	XY-GenXY	9XY	10XY	1	4	1	1	1	5/8	A394	12	3.37	1	Both	1	2.625	1.5	3	0	0	0	0
g9Y	Leg2	Y-GenXY	9Y	10Y	1	4	1	1	1	5/8	A394	12	3.37	1	Both	1	2.625	1.5	3	0	0	0	0
g10P	Leg3	XY-Symmetry	10S	11S	1	4	0.5	0.5	0.5	5/8	A394	14	3.36	1	Both	1.375	3	1.5	3.25	0	0	0	0
g10X	Leg3	X-GenXY	10X	11X	1	4	0.5	0.5	0.5	5/8	A394	14	3.36	1	Both	1.375	3	1.5	3.25	0	0	0	0
g10XY	Leg3	XY-GenXY	10XY	11XY	1	4	0.5	0.5	0.5	5/8	A394	14	3.36	1	Both	1.375	3	1.5	3.25	0	0	0	0
g10Y	Leg3	Y-GenXY	10Y	11Y	1	4	0.5	0.5	0.5	5/8	A394	14	3.36	1	Both	1.375	3	1.5	3.25				

0	0	0																					
	g11P	Leg3	XY-Symmetry	11S	12S	1	4	0.333	0.333	0.333	5/8	A394	14	3.463	1	Both	0.9375	2.5625	1.5	2.75			
0	0	0																					
	g11X	Leg3	X-GenXY	11X	12X	1	4	0.333	0.333	0.333	5/8	A394	14	3.463	1	Both	0.9375	2.5625	1.5	2.75			
0	0	0																					
	g11XY	Leg3	XY-GenXY	11XY	12XY	1	4	0.333	0.333	0.333	5/8	A394	14	3.463	1	Both	0.9375	2.5625	1.5	2.75			
0	0	0																					
	g11Y	Leg3	Y-GenXY	11Y	12Y	1	4	0.333	0.333	0.333	5/8	A394	14	3.463	1	Both	0.9375	2.5625	1.5	2.75			
0	0	0																					
	g12P	Leg3	XY-Symmetry	12S	7P	1	4	0.5	0.5	0.5	5/8	A394	14	3.463	1	Both	0.9375	2.5625	1.5625	2.75			
0	0	0																					
	g12X	Leg3	X-GenXY	12X	7X	1	4	0.5	0.5	0.5	5/8	A394	14	3.463	1	Both	0.9375	2.5625	1.5625	2.75			
0	0	0																					
	g12XY	Leg3	XY-GenXY	12XY	7XY	1	4	0.5	0.5	0.5	5/8	A394	14	3.463	1	Both	0.9375	2.5625	1.5625	2.75			
0	0	0																					
	g12Y	Leg3	Y-GenXY	12Y	7Y	1	4	0.5	0.5	0.5	5/8	A394	14	3.463	1	Both	0.9375	2.5625	1.5625	2.75			
0	0	0																					
	g13P	XBrace1	XY-Symmetry	1P	2X	2	5	0.75	0.5	0.5	5/8	A394	2	1	1	Short only	0.8125	0	1	2			
0	0	0																					
	g13X	XBrace1	X-GenXY	1X	2P	2	5	0.75	0.5	0.5	5/8	A394	2	1	1	Short only	0.8125	0	1	2			
0	0	0																					
	g13XY	XBrace1	XY-GenXY	1XY	2Y	2	5	0.75	0.5	0.5	5/8	A394	2	1	1	Short only	0.8125	0	1	2			
0	0	0																					
	g13Y	XBrace1	Y-GenXY	1Y	2XY	2	5	0.75	0.5	0.5	5/8	A394	2	1	1	Short only	0.8125	0	1	2			
0	0	0																					
	g14P	XBrace1	XY-Symmetry	1P	2Y	2	5	0.75	0.5	0.5	5/8	A394	2	1	1	Short only	0.8125	0	1	2			
0	0	0																					
	g14X	XBrace1	X-GenXY	1X	2XY	2	5	0.75	0.5	0.5	5/8	A394	2	1	1	Short only	0.8125	0	1	2			
0	0	0																					
	g14XY	XBrace1	XY-GenXY	1XY	2X	2	5	0.75	0.5	0.5	5/8	A394	2	1	1	Short only	0.8125	0	1	2			
0	0	0																					
	g14Y	XBrace1	Y-GenXY	1Y	2P	2	5	0.75	0.5	0.5	5/8	A394	2	1	1	Short only	0.8125	0	1	2			
0	0	0																					
	g15P	XBrace2	XY-Symmetry	2P	3X	2	5	0.5	0.75	0.5	5/8	A394	3	1	1	Long only	0.875	1.4375	1	3			
0	0	0																					
	g15X	XBrace2	X-GenXY	2X	3P	2	5	0.5	0.75	0.5	5/8	A394	3	1	1	Long only	0.875	1.4375	1	3			
0	0	0																					
	g15XY	XBrace2	XY-GenXY	2XY	3Y	2	5	0.5	0.75	0.5	5/8	A394	3	1	1	Long only	0.875	1.4375	1	3			
0	0	0																					
	g15Y	XBrace2	Y-GenXY	2Y	3XY	2	5	0.5	0.75	0.5	5/8	A394	3	1	1	Long only	0.875	1.4375	1	3			
0	0	0																					
	g16P	XBrace2	XY-Symmetry	2P	3Y	2	5	0.5	0.75	0.5	5/8	A394	3	1	1	Long only	0.875	1.4375	1	3			
0	0	0																					
	g16X	XBrace2	X-GenXY	2X	3XY	2	5	0.5	0.75	0.5	5/8	A394	3	1	1	Long only	0.875	1.4375	1	3			
0	0	0																					
	g16XY	XBrace2	XY-GenXY	2XY	3X	2	5	0.5	0.75	0.5	5/8	A394	3	1	1	Long only	0.875	1.4375	1	3			
0	0	0																					
	g16Y	XBrace2	Y-GenXY	2Y	3P	2	5	0.5	0.75	0.5	5/8	A394	3	1	1	Long only	0.875	1.4375	1	3			
0	0	0																					
	g17P	XBrace7	XY-Symmetry	3P	17S	3	6	1	2	1	5/8	A394	3	1	1	Long only	0.875	1.4375	1	3			
0	0	0																					
	g17X	XBrace7	X-GenXY	3X	17S	3	6	1	2	1	5/8	A394	3	1	1	Long only	0.875	1.4375	1	3			
0	0	0																					
	g17XY	XBrace7	XY-GenXY	3XY	17Y	3	6	1	2	1	5/8	A394	3	1	1	Long only	0.875	1.4375	1	3			
0	0	0																					
	g17Y	XBrace7	Y-GenXY	3Y	17Y	3	6	1	2	1	5/8	A394	3	1	1	Long only	0.875	1.4375	1	3			
0	0	0																					
	g18P	XBrace7	XY-Symmetry	17S	4P	3	6	1	2	1	5/8	A394	3	1	1	Long only	0.875	1.4375	1	3			
0	0	0																					

g18X	XBrace7	X-GenXY	17S	4X	3	6	1	2	1	5/8	A394	3	1	1	Long only	0.875	1.4375	1	3	0	0	0
g18XY	XBrace7	XY-GenXY	17Y	4XY	3	6	1	2	1	5/8	A394	3	1	1	Long only	0.875	1.4375	1	3	0	0	0
g18Y	XBrace7	Y-GenXY	17Y	4Y	3	6	1	2	1	5/8	A394	3	1	1	Long only	0.875	1.4375	1	3	0	0	0
g19P	XBrace7	XY-Symmetry	3P	16S	3	6	1	2	1	5/8	A394	3	1	1	Long only	0.875	1.4375	1	3	0	0	0
g19X	XBrace7	X-GenXY	3X	16X	3	6	1	2	1	5/8	A394	3	1	1	Long only	0.875	1.4375	1	3	0	0	0
g19XY	XBrace7	XY-GenXY	3XY	16X	3	6	1	2	1	5/8	A394	3	1	1	Long only	0.875	1.4375	1	3	0	0	0
g19Y	XBrace7	Y-GenXY	3Y	16S	3	6	1	2	1	5/8	A394	3	1	1	Long only	0.875	1.4375	1	3	0	0	0
g20P	XBrace7	XY-Symmetry	16S	4P	3	6	1	2	1	5/8	A394	3	1	1	Long only	0.875	1.4375	1	3	0	0	0
g20X	XBrace7	X-GenXY	16X	4X	3	6	1	2	1	5/8	A394	3	1	1	Long only	0.875	1.4375	1	3	0	0	0
g20XY	XBrace7	XY-GenXY	16X	4XY	3	6	1	2	1	5/8	A394	3	1	1	Long only	0.875	1.4375	1	3	0	0	0
g20Y	XBrace7	Y-GenXY	16S	4Y	3	6	1	2	1	5/8	A394	3	1	1	Long only	0.875	1.4375	1	3	0	0	0
g21P	XBrace2	XY-Symmetry	4P	5X	2	5	0.5	0.75	0.5	5/8	A394	4	1.68	1	Long only	0.875	2	1	2	0	0	0
g21X	XBrace2	X-GenXY	4X	5P	2	5	0.5	0.75	0.5	5/8	A394	4	1.68	1	Long only	0.875	2	1	2	0	0	0
g21XY	XBrace2	XY-GenXY	4XY	5Y	2	5	0.5	0.75	0.5	5/8	A394	4	1.68	1	Long only	0.875	2	1	2	0	0	0
g21Y	XBrace2	Y-GenXY	4Y	5XY	2	5	0.5	0.75	0.5	5/8	A394	4	1.68	1	Long only	0.875	2	1	2	0	0	0
g22P	XBrace2	XY-Symmetry	4P	5Y	2	5	0.5	0.75	0.5	5/8	A394	4	1.68	1	Long only	0.875	2	1	2	0	0	0
g22X	XBrace2	X-GenXY	4X	5XY	2	5	0.5	0.75	0.5	5/8	A394	4	1.68	1	Long only	0.875	2	1	2	0	0	0
g22XY	XBrace2	XY-GenXY	4XY	5X	2	5	0.5	0.75	0.5	5/8	A394	4	1.68	1	Long only	0.875	2	1	2	0	0	0
g22Y	XBrace2	Y-GenXY	4Y	5P	2	5	0.5	0.75	0.5	5/8	A394	4	1.68	1	Long only	0.875	2	1	2	0	0	0
g23P	XBrace2	XY-Symmetry	5P	6X	2	5	0.5	0.75	0.5	5/8	A394	4	1.68	1	Long only	0.875	2	1	2	0	0	0
g23X	XBrace2	X-GenXY	5X	6P	2	5	0.5	0.75	0.5	5/8	A394	4	1.68	1	Long only	0.875	2	1	2	0	0	0
g23XY	XBrace2	XY-GenXY	5XY	6Y	2	5	0.5	0.75	0.5	5/8	A394	4	1.68	1	Long only	0.875	2	1	2	0	0	0
g23Y	XBrace2	Y-GenXY	5Y	6XY	2	5	0.5	0.75	0.5	5/8	A394	4	1.68	1	Long only	0.875	2	1	2	0	0	0
g24P	XBrace2	XY-Symmetry	5P	6Y	2	5	0.5	0.75	0.5	5/8	A394	4	1.68	1	Long only	0.875	2	1	2	0	0	0
g24X	XBrace2	X-GenXY	5X	6XY	2	5	0.5	0.75	0.5	5/8	A394	4	1.68	1	Long only	0.875	2	1	2	0	0	0
g24XY	XBrace2	XY-GenXY	5XY	6X	2	5	0.5	0.75	0.5	5/8	A394	4	1.68	1	Long only	0.875	2	1	2	0	0	0
g24Y	XBrace2	Y-GenXY	5Y	6P	2	5	0.5	0.75	0.5	5/8	A394	4	1.68	1	Long only	0.875	2	1	2	0	0	0
g25P	XBrace3	XY-Symmetry	6P	8X	2	5	0.781	0.563	0.563	5/8	A394	3	1	1	Short only	0.875	0	1	1.5625	0	0	0
g25X	XBrace3	X-GenXY	6X	8S	2	5	0.781	0.563	0.563	5/8	A394	3	1	1	Short only	0.875	0	1	1.5625	0	0	0
g25XY	XBrace3	XY-GenXY	6XY	8Y	2	5	0.781	0.563	0.563	5/8	A394	3	1	1	Short only	0.875	0	1	1.5625			

0	0	0																			
	g25Y	XBrace3		Y-GenXY	6Y	8XY	2	5	0.781	0.563	0.563	5/8	A394	3	1	1	Short only	0.875	0	1	1.5625
0	0	0																			
	g26P	XBrace3		XY-Symmetry	6P	8Y	2	5	0.781	0.563	0.563	5/8	A394	3	1	1	Short only	0.875	0	1	1.5625
0	0	0																			
	g26X	XBrace3		X-GenXY	6X	8XY	2	5	0.781	0.563	0.563	5/8	A394	3	1	1	Short only	0.875	0	1	1.5625
0	0	0																			
	g26XY	XBrace3		XY-GenXY	6XY	8X	2	5	0.781	0.563	0.563	5/8	A394	3	1	1	Short only	0.875	0	1	1.5625
0	0	0																			
	g26Y	XBrace3		Y-GenXY	6Y	8S	2	5	0.781	0.563	0.563	5/8	A394	3	1	1	Short only	0.875	0	1	1.5625
0	0	0																			
	g27P	XBrace3		XY-Symmetry	8S	9X	2	5	0.779	0.557	0.557	5/8	A394	3	1	1	Short only	0.875	0	1	1.4375
0	0	0																			
	g27X	XBrace3		X-GenXY	8X	9S	2	5	0.779	0.557	0.557	5/8	A394	3	1	1	Short only	0.875	0	1	1.4375
0	0	0																			
	g27XY	XBrace3		XY-GenXY	8XY	9Y	2	5	0.779	0.557	0.557	5/8	A394	3	1	1	Short only	0.875	0	1	1.4375
0	0	0																			
	g27Y	XBrace3		Y-GenXY	8Y	9XY	2	5	0.779	0.557	0.557	5/8	A394	3	1	1	Short only	0.875	0	1	1.4375
0	0	0																			
	g28P	XBrace3		XY-Symmetry	8S	9Y	2	5	0.779	0.557	0.557	5/8	A394	3	1	1	Short only	0.875	0	1	1.4375
0	0	0																			
	g28X	XBrace3		X-GenXY	8X	9XY	2	5	0.779	0.557	0.557	5/8	A394	3	1	1	Short only	0.875	0	1	1.4375
0	0	0																			
	g28XY	XBrace3		XY-GenXY	8XY	9X	2	5	0.779	0.557	0.557	5/8	A394	3	1	1	Short only	0.875	0	1	1.4375
0	0	0																			
	g28Y	XBrace3		Y-GenXY	8Y	9S	2	5	0.779	0.557	0.557	5/8	A394	3	1	1	Short only	0.875	0	1	1.4375
0	0	0																			
	g29P	XBrace3		XY-Symmetry	9S	10X	2	5	0.775	0.55	0.55	5/8	A394	2	1	1	Short only	1.25	0	1	2.25
0	0	0																			
	g29X	XBrace3		X-GenXY	9X	10S	2	5	0.775	0.55	0.55	5/8	A394	2	1	1	Short only	1.25	0	1	2.25
0	0	0																			
	g29XY	XBrace3		XY-GenXY	9XY	10Y	2	5	0.775	0.55	0.55	5/8	A394	2	1	1	Short only	1.25	0	1	2.25
0	0	0																			
	g29Y	XBrace3		Y-GenXY	9Y	10XY	2	5	0.775	0.55	0.55	5/8	A394	2	1	1	Short only	1.25	0	1	2.25
0	0	0																			
	g30P	XBrace3		XY-Symmetry	9S	10Y	2	5	0.775	0.55	0.55	5/8	A394	2	1	1	Short only	1.25	0	1	2.25
0	0	0																			
	g30X	XBrace3		X-GenXY	9X	10XY	2	5	0.775	0.55	0.55	5/8	A394	2	1	1	Short only	1.25	0	1	2.25
0	0	0																			
	g30XY	XBrace3		XY-GenXY	9XY	10X	2	5	0.775	0.55	0.55	5/8	A394	2	1	1	Short only	1.25	0	1	2.25
0	0	0																			
	g30Y	XBrace3		Y-GenXY	9Y	10S	2	5	0.775	0.55	0.55	5/8	A394	2	1	1	Short only	1.25	0	1	2.25
0	0	0																			
	g31P	XBrace4		XY-Symmetry	10S	11X	3	6	1	0.585	0.585	5/8	A394	3	1	1	Short only	0.875	0	1	1.5625
0	0	0																			
	g31X	XBrace4		X-GenXY	10X	11S	3	6	1	0.585	0.585	5/8	A394	3	1	1	Short only	0.875	0	1	1.5625
0	0	0																			
	g31XY	XBrace4		XY-GenXY	10XY	11Y	3	6	1	0.585	0.585	5/8	A394	3	1	1	Short only	0.875	0	1	1.5625
0	0	0																			
	g31Y	XBrace4		Y-GenXY	10Y	11XY	3	6	1	0.585	0.585	5/8	A394	3	1	1	Short only	0.875	0	1	1.5625
0	0	0																			
	g32P	XBrace4		XY-Symmetry	10S	11Y	3	6	1	0.585	0.585	5/8	A394	3	1	1	Short only	0.875	0	1	1.5625
0	0	0																			
	g32X	XBrace4		X-GenXY	10X	11XY	3	6	1	0.585	0.585	5/8	A394	3	1	1	Short only	0.875	0	1	1.5625
0	0	0																			
	g32XY	XBrace4		XY-GenXY	10XY	11X	3	6	1	0.585	0.585	5/8	A394	3	1	1	Short only	0.875	0	1	1.5625
0	0	0																			
	g32Y	XBrace4		Y-GenXY	10Y	11S	3	6	1	0.585	0.585	5/8	A394	3	1	1	Short only	0.875	0	1	1.5625
0	0	0																			

g33P	XBrace5	XY-Symmetry	11S	12X	3	6	1	0.41	0.41	5/8	A394	3	1	1	Short only	0.875	0	1	1.625	0	0	0
g33X	XBrace5	X-GenXY	11X	12S	3	6	1	0.41	0.41	5/8	A394	3	1	1	Short only	0.875	0	1	1.625	0	0	0
g33XY	XBrace5	XY-GenXY	11XY	12Y	3	6	1	0.41	0.41	5/8	A394	3	1	1	Short only	0.875	0	1	1.625	0	0	0
g33Y	XBrace5	Y-GenXY	11Y	12XY	3	6	1	0.41	0.41	5/8	A394	3	1	1	Short only	0.875	0	1	1.625	0	0	0
g34P	XBrace5	XY-Symmetry	11S	12Y	3	6	1	0.41	0.41	5/8	A394	3	1	1	Short only	0.875	0	1	1.625	0	0	0
g34X	XBrace5	X-GenXY	11X	12XY	3	6	1	0.41	0.41	5/8	A394	3	1	1	Short only	0.875	0	1	1.625	0	0	0
g34XY	XBrace5	XY-GenXY	11XY	12X	3	6	1	0.41	0.41	5/8	A394	3	1	1	Short only	0.875	0	1	1.625	0	0	0
g34Y	XBrace5	Y-GenXY	11Y	12S	3	6	1	0.41	0.41	5/8	A394	3	1	1	Short only	0.875	0	1	1.625	0	0	0
g35P	XBrace6	XY-Symmetry	13S	7P	3	4	1	0.5	0.5	5/8	A394	1	1	1	Short only	1.25	0	1	0	0	0	0
g35X	XBrace6	X-GenXY	13S	7X	3	4	1	0.5	0.5	5/8	A394	1	1	1	Short only	1.25	0	1	0	0	0	0
g35XY	XBrace6	XY-GenXY	13Y	7XY	3	4	1	0.5	0.5	5/8	A394	1	1	1	Short only	1.25	0	1	0	0	0	0
g35Y	XBrace6	Y-GenXY	13Y	7Y	3	4	1	0.5	0.5	5/8	A394	1	1	1	Short only	1.25	0	1	0	0	0	0
g36P	XBrace6	XY-Symmetry	14S	7P	3	4	1	0.5	0.5	5/8	A394	1	1	1	Short only	1.25	0	1	0	0	0	0
g36X	XBrace6	X-GenXY	14X	7X	3	4	1	0.5	0.5	5/8	A394	1	1	1	Short only	1.25	0	1	0	0	0	0
g36XY	XBrace6	XY-GenXY	14X	7XY	3	4	1	0.5	0.5	5/8	A394	1	1	1	Short only	1.25	0	1	0	0	0	0
g36Y	XBrace6	Y-GenXY	14S	7Y	3	4	1	0.5	0.5	5/8	A394	1	1	1	Short only	1.25	0	1	0	0	0	0
g37P	Horz1	X-Symmetry	1P	1Y	3	6	1	1	1	5/8	A394	2	1	1	Short only	0.8125	0	1	1.5	0	0	0
g37X	Horz1	X-Gen	1X	1XY	3	6	1	1	1	5/8	A394	2	1	1	Short only	0.8125	0	1	1.5	0	0	0
g38P	Horz1	X-Symmetry	2P	2Y	3	6	1	1	1	5/8	A394	2	1	1	Short only	0.8125	0	1	1.5	0	0	0
g38X	Horz1	X-Gen	2X	2XY	3	6	1	1	1	5/8	A394	2	1	1	Short only	0.8125	0	1	1.5	0	0	0
g39P	Horz1	X-Symmetry	4P	4Y	3	6	1	1	1	5/8	A394	2	1	1	Short only	0.8125	0	1	1.5	0	0	0
g39X	Horz1	X-Gen	4X	4XY	3	6	1	1	1	5/8	A394	2	1	1	Short only	0.8125	0	1	1.5	0	0	0
g40P	Horz1	X-Symmetry	6P	6Y	3	6	1	1	1	5/8	A394	2	1	1	Short only	0.8125	0	1	1.625	0	0	0
g40X	Horz1	X-Gen	6X	6XY	3	6	1	1	1	5/8	A394	2	1	1	Short only	0.8125	0	1	1.625	0	0	0
g41P	Horz2	X-Symmetry	10S	10Y	3	6	1	0.5	0.5	5/8	A394	2	1	1	Short only	0.875	0	1	2	0	0	0
g41X	Horz2	X-Gen	10X	10XY	3	6	1	0.5	0.5	5/8	A394	2	1	1	Short only	0.875	0	1	2	0	0	0
g42P	Horz2	Y-Symmetry	10X	10S	3	6	1	0.5	0.5	5/8	A394	2	1	1	Short only	0.875	0	1	2	0	0	0
g42Y	Horz2	Y-Gen	10XY	10Y	3	6	1	0.5	0.5	5/8	A394	2	1	1	Short only	0.875	0	1	2	0	0	0
g43P	Horz3	X-Symmetry	11S	11Y	3	6	1	0.5	0.5	5/8	A394	2	1	1	Short only	1.25	0	1	1.625	0	0	0
g43X	Horz3	X-Gen	11X	11XY	3	6	1	0.5	0.5	5/8	A394	2	1	1	Short only	1.25	0	1	1.625			

0	0	0																			
	g44P	Horz3	Y-Symmetry	11X	11S	3	6	1	0.5	0.5	5/8	A394	2	1	1	Short only	1.25	0	1	1.625	
0	0	0																			
	g44Y	Horz3	Y-Gen	11XY	11Y	3	6	1	0.5	0.5	5/8	A394	2	1	1	Short only	1.25	0	1	1.625	
0	0	0																			
	g45P	Horz4	XY-Symmetry	12Y	14S	3	6	2	1	1	5/8	A394	2	1	1	Short only	1.25	0	1	1.625	
0	0	0																			
	g45X	Horz4	X-GenXY	12XY	14X	3	6	2	1	1	5/8	A394	2	1	1	Short only	1.25	0	1	1.625	
0	0	0																			
	g45XY	Horz4	XY-GenXY	12X	14X	3	6	2	1	1	5/8	A394	2	1	1	Short only	1.25	0	1	1.625	
0	0	0																			
	g45Y	Horz4	Y-GenXY	12S	14S	3	6	2	1	1	5/8	A394	2	1	1	Short only	1.25	0	1	1.625	
0	0	0																			
	g46P	Horz4	XY-Symmetry	12S	13S	3	6	2	1	1	5/8	A394	2	1	1	Short only	1.25	0	1	1.625	
0	0	0																			
	g46X	Horz4	X-GenXY	12X	13S	3	6	2	1	1	5/8	A394	2	1	1	Short only	1.25	0	1	1.625	
0	0	0																			
	g46XY	Horz4	XY-GenXY	12XY	13Y	3	6	2	1	1	5/8	A394	2	1	1	Short only	1.25	0	1	1.625	
0	0	0																			
	g46Y	Horz4	Y-GenXY	12Y	13Y	3	6	2	1	1	5/8	A394	2	1	1	Short only	1.25	0	1	1.625	
0	0	0																			
	g47P	Horz6	XY-Symmetry	15S	16S	3	4	2	1	1	5/8	A394	1	1	1	Short only	0.8125	0	1	0	
0	0	0																			
	g47X	Horz6	X-GenXY	15X	16X	3	4	2	1	1	5/8	A394	1	1	1	Short only	0.8125	0	1	0	
0	0	0																			
	g47XY	Horz6	XY-GenXY	15XY	16X	3	4	2	1	1	5/8	A394	1	1	1	Short only	0.8125	0	1	0	
0	0	0																			
	g47Y	Horz6	Y-GenXY	15Y	16S	3	4	2	1	1	5/8	A394	1	1	1	Short only	0.8125	0	1	0	
0	0	0																			
	g48P	Horz5	XY-Symmetry	15X	17S	1	4	1	2	1	5/8	A394	1	1	1	Both	0.875	0	1	0	
0	0	0																			
	g48X	Horz5	X-GenXY	15S	17S	1	4	1	2	1	5/8	A394	1	1	1	Both	0.875	0	1	0	
0	0	0																			
	g48XY	Horz5	XY-GenXY	15Y	17Y	1	4	1	2	1	5/8	A394	1	1	1	Both	0.875	0	1	0	
0	0	0																			
	g48Y	Horz5	Y-GenXY	15XY	17Y	1	4	1	2	1	5/8	A394	1	1	1	Both	0.875	0	1	0	
0	0	0																			
	g49P	Inner1	X-Symmetry	1P	1XY	2	4	0.5	0.5	0.5	5/8	A394	1	1	1	Short only	0.8125	0	1	0	
0	0	0																			
	g49X	Inner1	X-Gen	1X	1Y	2	4	0.5	0.5	0.5	5/8	A394	1	1	1	Short only	0.8125	0	1	0	
0	0	0																			
	g50P	Inner1	X-Symmetry	2P	2XY	2	4	0.5	0.5	0.5	5/8	A394	1	1	1	Short only	0.8125	0	1	0	
0	0	0																			
	g50X	Inner1	X-Gen	2X	2Y	2	4	0.5	0.5	0.5	5/8	A394	1	1	1	Short only	0.8125	0	1	0	
0	0	0																			
	g51P	Inner1	X-Symmetry	4P	4XY	2	4	0.5	0.5	0.5	5/8	A394	1	1	1	Short only	0.8125	0	1	0	
0	0	0																			
	g51X	Inner1	X-Gen	4X	4Y	2	4	0.5	0.5	0.5	5/8	A394	1	1	1	Short only	0.8125	0	1	0	
0	0	0																			
	g52P	Inner1	X-Symmetry	6P	6XY	2	4	0.5	0.5	0.5	5/8	A394	1	1	1	Short only	0.8125	0	1	0	
0	0	0																			
	g52X	Inner1	X-Gen	6X	6Y	2	4	0.5	0.5	0.5	5/8	A394	1	1	1	Short only	0.8125	0	1	0	
0	0	0																			
	g53P	Inner2	X-Symmetry	11X	11Y	2	4	0.5	0.5	0.5	5/8	A394	1	1	1	Short only	0.875	0	1	0	
0	0	0																			
	g53X	Inner2	X-Gen	11S	11XY	2	4	0.5	0.5	0.5	5/8	A394	1	1	1	Short only	0.875	0	1	0	
0	0	0																			
	g54P	Arm1	XY-Symmetry	18X	1X	3	5	1	0.5	0.5	5/8	A394	2	1	1	Long only	1.25	0	2.375	1.5	
0	0	0																			

g54X	Arm1	X-GenXY	18P	1P	3	5	1	0.5	0.5	5/8	A394	2	1	1	Long only	1.25	0	2.375	1.5	0	0	0
g54XY	Arm1	XY-GenXY	18P	1Y	3	5	1	0.5	0.5	5/8	A394	2	1	1	Long only	1.25	0	2.375	1.5	0	0	0
g54Y	Arm1	Y-GenXY	18X	1XY	3	5	1	0.5	0.5	5/8	A394	2	1	1	Long only	1.25	0	2.375	1.5	0	0	0
g55P	Arm1	Y-Symmetry	1X	1P	3	5	1	1	1	5/8	A394	2	1	1	Long only	1.25	0	2.375	1.5	0	0	0
g55Y	Arm1	Y-Gen	1XY	1Y	3	5	1	1	1	5/8	A394	2	1	1	Long only	1.25	0	2.375	1.5	0	0	0
g56P	Arm2	Y-Symmetry	19P	2X	3	4	1	1	1	5/8	A394	2	1	1	Short only	1.25	0	1	1.75	0	0	0
g56Y	Arm2	Y-Gen	19P	2XY	3	4	1	1	1	5/8	A394	2	1	1	Short only	1.25	0	1	1.75	0	0	0
g57P	Arm4	Y-Symmetry	2X	2P	3	6	1	1	1	5/8	A394	2	1	1	Long only	2	0	2.375	1.5	0	0	0
g57Y	Arm4	Y-Gen	2XY	2Y	3	6	1	1	1	5/8	A394	2	1	1	Long only	2	0	2.375	1.5	0	0	0
g58P	Arm3	Y-Symmetry	20P	4X	3	4	1	0.5	0.5	5/8	A394	3	1	1	Short only	0.875	0	1	1.75	0	0	0
g58Y	Arm3	Y-Gen	20P	4XY	3	4	1	0.5	0.5	5/8	A394	3	1	1	Short only	0.875	0	1	1.75	0	0	0
g59P	Arm4	Y-Symmetry	4X	4P	3	6	1	1	1	5/8	A394	2	1	1	Long only	2	0	2.75	1.5	0	0	0
g59Y	Arm4	Y-Gen	4XY	4Y	3	6	1	1	1	5/8	A394	2	1	1	Long only	2	0	2.75	1.5	0	0	0
g60P	Arm2	Y-Symmetry	21P	6X	3	4	1	1	1	5/8	A394	2	1	1	Short only	1.25	0	1	2	0	0	0
g60Y	Arm2	Y-Gen	21P	6XY	3	4	1	1	1	5/8	A394	2	1	1	Short only	1.25	0	1	2	0	0	0
g61P	Arm4	Y-Symmetry	6X	6P	3	6	1	1	1	5/8	A394	2	1	1	Long only	2	0	3.125	1.625	0	0	0
g61Y	Arm4	Y-Gen	6XY	6Y	3	6	1	1	1	5/8	A394	2	1	1	Long only	2	0	3.125	1.625	0	0	0
g62P	ArmBr1	None	18X	19P	3	4	1	1	1	5/8	A394	1	1	1	Short only	1.5	0	1	0	0	0	0
g63P	ArmBr3	Y-Symmetry	19P	1X	1	4	1	1	1	5/8	A394	1	1	1	Both	0.875	0	1	0	0	0	0
g63Y	ArmBr3	Y-Gen	19P	1XY	1	4	1	1	1	5/8	A394	1	1	1	Both	0.875	0	1	0	0	0	0
g64P	ArmBr3	Y-Symmetry	20P	15X	1	4	1	1	1	5/8	A394	1	1	1	Both	0.875	0	1	0	0	0	0
g64Y	ArmBr3	Y-Gen	20P	15XY	1	4	1	1	1	5/8	A394	1	1	1	Both	0.875	0	1	0	0	0	0
g65P	ArmBr3	Y-Symmetry	21P	5X	1	4	1	1	1	5/8	A394	1	1	1	Both	0.875	0	1	0	0	0	0
g65Y	ArmBr3	Y-Gen	21P	5XY	1	4	1	1	1	5/8	A394	1	1	1	Both	0.875	0	1	0	0	0	0
g66P	Arm4	Y-Symmetry	22P	2P	3	5	1	0.5	0.5	5/8	A394	2	1	1	Long only	2	0	2.375	1.5	0	0	0
g66Y	Arm4	Y-Gen	22P	2Y	3	5	1	0.5	0.5	5/8	A394	2	1	1	Long only	2	0	2.375	1.5	0	0	0
g67P	Arm4	Y-Symmetry	23P	4P	3	5	1	0.5	0.5	5/8	A394	2	1	1	Long only	2	0	2.75	1.5	0	0	0
g67Y	Arm4	Y-Gen	23P	4Y	3	5	1	0.5	0.5	5/8	A394	2	1	1	Long only	2	0	2.75	1.5	0	0	0
g68P	Arm4	Y-Symmetry	24P	6P	3	5	1	0.5	0.5	5/8	A394	2	1	1	Long only	2	0	3.125	1.625	0	0	0
g68Y	Arm4	Y-Gen	24P	6Y	3	5	1	0.5	0.5	5/8	A394	2	1	1	Long only	2	0	3.125	1.625			

0	0	0																			
	g69P	ArmBr2		None	22P	18P	3	4	1	1	1	5/8	A394	1	1	1	Short only	1.25	0	1	0
0	0	0																			
	g70P	ArmBr3		Y-Symmetry	22P	1P	1	4	1	1	1	5/8	A394	1	1	1	Both	0.875	0	1	0
0	0	0																			
	g70Y	ArmBr3		Y-Gen	22P	1Y	1	4	1	1	1	5/8	A394	1	1	1	Both	0.875	0	1	0
0	0	0																			
	g71P	ArmBr3		Y-Symmetry	23P	15S	1	4	1	1	1	5/8	A394	1	1	1	Both	0.875	0	1	0
0	0	0																			
	g71Y	ArmBr3		Y-Gen	23P	15Y	1	4	1	1	1	5/8	A394	1	1	1	Both	0.875	0	1	0
0	0	0																			
	g72P	ArmBr3		Y-Symmetry	24P	5P	1	4	1	1	1	5/8	A394	1	1	1	Both	0.875	0	1	0
0	0	0																			
	g72Y	ArmBr3		Y-Gen	24P	5Y	1	4	1	1	1	5/8	A394	1	1	1	Both	0.875	0	1	0
0	0	0																			

Member Capacities and Overrides:

Member Label	Group Label	Design Comp. Control	Design Tension Control	L/r Length		L/r	Comp. Capacity	Connection Shear Capacity	Connection Bearing Capacity	Net Section Tension Capacity	Rupture Tension Capacity	RTE End Dist. Capacity	RTE Edge Dist. Capacity	Override Comp. Capacity	Override Comp. Capacity Unsup.	Override Warnings or Errors
		Capacity (kips)	Criterion													
			Criterion	Capacity (kips)	Criterion	ship (ft)										
g1P	Leg1	53.509	L/r	41.332	Net Sect	75	5.00	53.509	0.000	0.000	41.332	0.000	0.000	0.000	0.000	0.000
		Automatic														
g1X	Leg1	53.509	L/r	41.332	Net Sect	75	5.00	53.509	0.000	0.000	41.332	0.000	0.000	0.000	0.000	0.000
		Automatic														
g1XY	Leg1	53.509	L/r	41.332	Net Sect	75	5.00	53.509	0.000	0.000	41.332	0.000	0.000	0.000	0.000	0.000
		Automatic														
g1Y	Leg1	53.509	L/r	41.332	Net Sect	75	5.00	53.509	0.000	0.000	41.332	0.000	0.000	0.000	0.000	0.000
		Automatic														
g2P	Leg1	48.884	L/r	52.676	Net Sect	91	6.00	48.884	0.000	0.000	52.676	0.000	0.000	0.000	0.000	0.000
		Automatic														
g2X	Leg1	48.884	L/r	52.676	Net Sect	91	6.00	48.884	0.000	0.000	52.676	0.000	0.000	0.000	0.000	0.000
		Automatic														
g2XY	Leg1	48.884	L/r	52.676	Net Sect	91	6.00	48.884	0.000	0.000	52.676	0.000	0.000	0.000	0.000	0.000
		Automatic														
g2Y	Leg1	48.884	L/r	52.676	Net Sect	91	6.00	48.884	0.000	0.000	52.676	0.000	0.000	0.000	0.000	0.000
		Automatic														
g3P	Leg1	60.236	L/r	52.676	Net Sect	45	3.00	60.236	0.000	0.000	52.676	0.000	0.000	0.000	0.000	0.000
		Automatic														
g3X	Leg1	60.236	L/r	52.676	Net Sect	45	3.00	60.236	0.000	0.000	52.676	0.000	0.000	0.000	0.000	0.000
		Automatic														
g3XY	Leg1	60.236	L/r	52.676	Net Sect	45	3.00	60.236	0.000	0.000	52.676	0.000	0.000	0.000	0.000	0.000
		Automatic														
g3Y	Leg1	60.236	L/r	52.676	Net Sect	45	3.00	60.236	0.000	0.000	52.676	0.000	0.000	0.000	0.000	0.000
		Automatic														
g4P	**Leg1**	**60.236**	**L/r**	**46.653**	**Net Sect**	**45**	**3.00**	**60.236**	**91.000**	**140.625**	**46.653**	**128.676**	**0.000**	**0.000**	**0.000**	**0.000**
		Automatic	**Member "g4P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than**													

zero); however, end, edge and spacing distances will be checked. ??
g4X Leg1 60.236 L/r 46.653 Net Sect 45 3.00 60.236 91.000 140.625 46.653 128.676 0.000 0.000 0.000 0.000
0.000 Automatic Member "g4X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g4XY Leg1 60.236 L/r 46.653 Net Sect 45 3.00 60.236 91.000 140.625 46.653 128.676 0.000 0.000 0.000 0.000
0.000 Automatic Member "g4XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g4Y Leg1 60.236 L/r 46.653 Net Sect 45 3.00 60.236 91.000 140.625 46.653 128.676 0.000 0.000 0.000 0.000
0.000 Automatic Member "g4Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g5P Leg2 89.489 L/r 71.631 Net Sect 60 5.00 89.489 0.000 0.000 71.631 0.000 0.000 0.000 0.000 0.000
0.000 Automatic
g5X Leg2 89.489 L/r 71.631 Net Sect 60 5.00 89.489 0.000 0.000 71.631 0.000 0.000 0.000 0.000 0.000
0.000 Automatic
g5XY Leg2 89.489 L/r 71.631 Net Sect 60 5.00 89.489 0.000 0.000 71.631 0.000 0.000 0.000 0.000 0.000
0.000 Automatic
g5Y Leg2 89.489 L/r 71.631 Net Sect 60 5.00 89.489 0.000 0.000 71.631 0.000 0.000 0.000 0.000 0.000
0.000 Automatic
g6P Leg2 89.489 L/r 71.631 Net Sect 60 5.00 89.489 127.400 246.093 71.631 314.453 0.000 0.000 0.000 0.000
0.000 Automatic Member "g6P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g6X Leg2 89.489 L/r 71.631 Net Sect 60 5.00 89.489 127.400 246.093 71.631 314.453 0.000 0.000 0.000 0.000
0.000 Automatic Member "g6X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g6XY Leg2 89.489 L/r 71.631 Net Sect 60 5.00 89.489 127.400 246.093 71.631 314.453 0.000 0.000 0.000 0.000
0.000 Automatic Member "g6XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g6Y Leg2 89.489 L/r 71.631 Net Sect 60 5.00 89.489 127.400 246.093 71.631 314.453 0.000 0.000 0.000 0.000
0.000 Automatic Member "g6Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g7P Leg2 89.096 L/r 66.030 Net Sect 61 5.09 89.096 0.000 0.000 66.030 0.000 0.000 0.000 0.000 0.000
0.000 Automatic
g7X Leg2 89.096 L/r 66.030 Net Sect 61 5.09 89.096 0.000 0.000 66.030 0.000 0.000 0.000 0.000 0.000
0.000 Automatic
g7XY Leg2 89.096 L/r 66.030 Net Sect 61 5.09 89.096 0.000 0.000 66.030 0.000 0.000 0.000 0.000 0.000
0.000 Automatic
g7Y Leg2 89.096 L/r 66.030 Net Sect 61 5.09 89.096 0.000 0.000 66.030 0.000 0.000 0.000 0.000 0.000
0.000 Automatic
g8P Leg2 84.303 L/r 75.175 Net Sect 74 6.11 84.303 0.000 0.000 75.175 0.000 0.000 0.000 0.000 0.000
0.000 Automatic
g8X Leg2 84.303 L/r 75.175 Net Sect 74 6.11 84.303 0.000 0.000 75.175 0.000 0.000 0.000 0.000 0.000
0.000 Automatic
g8XY Leg2 84.303 L/r 75.175 Net Sect 74 6.11 84.303 0.000 0.000 75.175 0.000 0.000 0.000 0.000 0.000
0.000 Automatic
g8Y Leg2 84.303 L/r 75.175 Net Sect 74 6.11 84.303 0.000 0.000 75.175 0.000 0.000 0.000 0.000 0.000
0.000 Automatic
g9P Leg2 81.579 L/r 76.097 Net Sect 80 6.62 81.579 109.200 210.937 76.097 220.588 0.000 0.000 0.000 0.000
0.000 Automatic Member "g9P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g9X Leg2 81.579 L/r 76.097 Net Sect 80 6.62 81.579 109.200 210.937 76.097 220.588 0.000 0.000 0.000 0.000
0.000 Automatic Member "g9X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g9XY Leg2 81.579 L/r 76.097 Net Sect 80 6.62 81.579 109.200 210.937 76.097 220.588 0.000 0.000 0.000 0.000
0.000 Automatic Member "g9XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g9Y Leg2 81.579 L/r 76.097 Net Sect 80 6.62 81.579 109.200 210.937 76.097 220.588 0.000 0.000 0.000 0.000
0.000 Automatic Member "g9Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??

g10P	Leg3	91.620	L/r	90.544	Net Sect	90	14.77	91.620	127.400	295.312	90.544	393.749	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g10P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??														
g10X	Leg3	91.620	L/r	90.544	Net Sect	90	14.77	91.620	127.400	295.312	90.544	393.749	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g10X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??														
g10XY	Leg3	91.620	L/r	90.544	Net Sect	90	14.77	91.620	127.400	295.312	90.544	393.749	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g10XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??														
g10Y	Leg3	91.620	L/r	90.544	Net Sect	90	14.77	91.620	127.400	295.312	90.544	393.749	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g10Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??														
g11P	Leg3	91.040	L/r	89.667	Net Sect	90	22.41	91.040	127.400	295.312	89.667	289.522	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g11P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??														
g11X	Leg3	91.040	L/r	89.667	Net Sect	90	22.41	91.040	127.400	295.312	89.667	289.522	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g11X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??														
g11XY	Leg3	91.040	L/r	89.667	Net Sect	90	22.41	91.040	127.400	295.312	89.667	289.522	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g11XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??														
g11Y	Leg3	91.040	L/r	89.667	Net Sect	90	22.41	91.040	127.400	295.312	89.667	289.522	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g11Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??														
g12P	Leg3	106.046	L/r	89.667	Net Sect	62	10.19	106.046	127.400	295.312	89.667	289.522	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g12P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??														
g12X	Leg3	106.046	L/r	89.667	Net Sect	62	10.19	106.046	127.400	295.312	89.667	289.522	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g12X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??														
g12XY	Leg3	106.046	L/r	89.667	Net Sect	62	10.19	106.046	127.400	295.312	89.667	289.522	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g12XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??														
g12Y	Leg3	106.046	L/r	89.667	Net Sect	62	10.19	106.046	127.400	295.312	89.667	289.522	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g12Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??														
g13P	XBrace1	11.559	L/r	14.585	Net Sect	124	7.07	11.559	18.200	21.094	14.585	16.189	0.000	0.000	0.000	0.000
0.000	Automatic															
g13X	XBrace1	11.559	L/r	14.585	Net Sect	124	7.07	11.559	18.200	21.094	14.585	16.189	0.000	0.000	0.000	0.000
0.000	Automatic															
g13XY	XBrace1	11.559	L/r	14.585	Net Sect	124	7.07	11.559	18.200	21.094	14.585	16.189	0.000	0.000	0.000	0.000
0.000	Automatic															
g13Y	XBrace1	11.559	L/r	14.585	Net Sect	124	7.07	11.559	18.200	21.094	14.585	16.189	0.000	0.000	0.000	0.000
0.000	Automatic															
g14P	XBrace1	11.559	L/r	14.585	Net Sect	124	7.07	11.559	18.200	21.094	14.585	16.189	0.000	0.000	0.000	0.000
0.000	Automatic															
g14X	XBrace1	11.559	L/r	14.585	Net Sect	124	7.07	11.559	18.200	21.094	14.585	16.189	0.000	0.000	0.000	0.000
0.000	Automatic															
g14XY	XBrace1	11.559	L/r	14.585	Net Sect	124	7.07	11.559	18.200	21.094	14.585	16.189	0.000	0.000	0.000	0.000
0.000	Automatic															
g14Y	XBrace1	11.559	L/r	14.585	Net Sect	124	7.07	11.559	18.200	21.094	14.585	16.189	0.000	0.000	0.000	0.000
0.000	Automatic															
g15P	XBrace2	22.446	L/r	27.300	Shear	122	7.81	22.446	27.300	42.187	30.238	37.500	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g15P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??														
g15X	XBrace2	22.446	L/r	27.300	Shear	122	7.81	22.446	27.300	42.187	30.238	37.500	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g15X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??														

g15XY XBrace2 22.446 L/r 27.300 Shear 122 7.81 22.446 27.300 42.187 30.238 37.500 0.000 0.000 0.000 0.000
0.000 Automatic Member "g15XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g15Y XBrace2 22.446 L/r 27.300 Shear 122 7.81 22.446 27.300 42.187 30.238 37.500 0.000 0.000 0.000 0.000
0.000 Automatic Member "g15Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g16P XBrace2 22.446 L/r 27.300 Shear 122 7.81 22.446 27.300 42.187 30.238 37.500 0.000 0.000 0.000 0.000
0.000 Automatic Member "g16P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g16X XBrace2 22.446 L/r 27.300 Shear 122 7.81 22.446 27.300 42.187 30.238 37.500 0.000 0.000 0.000 0.000
0.000 Automatic Member "g16X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g16XY XBrace2 22.446 L/r 27.300 Shear 122 7.81 22.446 27.300 42.187 30.238 37.500 0.000 0.000 0.000 0.000
0.000 Automatic Member "g16XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g16Y XBrace2 22.446 L/r 27.300 Shear 122 7.81 22.446 27.300 42.187 30.238 37.500 0.000 0.000 0.000 0.000
0.000 Automatic Member "g16Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g17P XBrace7 15.844 L/r 27.300 Shear 163 3.91 15.844 27.300 42.187 30.238 37.500 0.000 0.000 0.000 0.000
0.000 Automatic Member "g17P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g17X XBrace7 15.844 L/r 27.300 Shear 163 3.91 15.844 27.300 42.187 30.238 37.500 0.000 0.000 0.000 0.000
0.000 Automatic Member "g17X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g17XY XBrace7 15.844 L/r 27.300 Shear 163 3.91 15.844 27.300 42.187 30.238 37.500 0.000 0.000 0.000 0.000
0.000 Automatic Member "g17XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g17Y XBrace7 15.844 L/r 27.300 Shear 163 3.91 15.844 27.300 42.187 30.238 37.500 0.000 0.000 0.000 0.000
0.000 Automatic Member "g17Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g18P XBrace7 15.844 L/r 27.300 Shear 163 3.91 15.844 27.300 42.187 30.238 37.500 0.000 0.000 0.000 0.000
0.000 Automatic Member "g18P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g18X XBrace7 15.844 L/r 27.300 Shear 163 3.91 15.844 27.300 42.187 30.238 37.500 0.000 0.000 0.000 0.000
0.000 Automatic Member "g18X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g18XY XBrace7 15.844 L/r 27.300 Shear 163 3.91 15.844 27.300 42.187 30.238 37.500 0.000 0.000 0.000 0.000
0.000 Automatic Member "g18XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g18Y XBrace7 15.844 L/r 27.300 Shear 163 3.91 15.844 27.300 42.187 30.238 37.500 0.000 0.000 0.000 0.000
0.000 Automatic Member "g18Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g19P XBrace7 15.844 L/r 27.300 Shear 163 3.91 15.844 27.300 42.187 30.238 37.500 0.000 0.000 0.000 0.000
0.000 Automatic Member "g19P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g19X XBrace7 15.844 L/r 27.300 Shear 163 3.91 15.844 27.300 42.187 30.238 37.500 0.000 0.000 0.000 0.000
0.000 Automatic Member "g19X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g19XY XBrace7 15.844 L/r 27.300 Shear 163 3.91 15.844 27.300 42.187 30.238 37.500 0.000 0.000 0.000 0.000
0.000 Automatic Member "g19XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g19Y XBrace7 15.844 L/r 27.300 Shear 163 3.91 15.844 27.300 42.187 30.238 37.500 0.000 0.000 0.000 0.000
0.000 Automatic Member "g19Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g20P XBrace7 15.844 L/r 27.300 Shear 163 3.91 15.844 27.300 42.187 30.238 37.500 0.000 0.000 0.000 0.000
0.000 Automatic Member "g20P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than
zero); however, end, edge and spacing distances will be checked. ??
g20X XBrace7 15.844 L/r 27.300 Shear 163 3.91 15.844 27.300 42.187 30.238 37.500 0.000 0.000 0.000 0.000

0.000	Automatic	Member "g20X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??													
g20XY	XBrace7	15.844	L/r	27.300	Shear	163	3.91	15.844	27.300	42.187	30.238	37.500	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g20XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??													
g20Y	XBrace7	15.844	L/r	27.300	Shear	163	3.91	15.844	27.300	42.187	30.238	37.500	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g20Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??													
g21P	XBrace2	24.777	L/r	26.767	Net Sect	111	7.07	24.777	36.400	56.250	26.767	50.000	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g21P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??													
g21X	XBrace2	24.777	L/r	26.767	Net Sect	111	7.07	24.777	36.400	56.250	26.767	50.000	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g21X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??													
g21XY	XBrace2	24.777	L/r	26.767	Net Sect	111	7.07	24.777	36.400	56.250	26.767	50.000	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g21XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??													
g21Y	XBrace2	24.777	L/r	26.767	Net Sect	111	7.07	24.777	36.400	56.250	26.767	50.000	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g21Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??													
g22P	XBrace2	24.777	L/r	26.767	Net Sect	111	7.07	24.777	36.400	56.250	26.767	50.000	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g22P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??													
g22X	XBrace2	24.777	L/r	26.767	Net Sect	111	7.07	24.777	36.400	56.250	26.767	50.000	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g22X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??													
g22XY	XBrace2	24.777	L/r	26.767	Net Sect	111	7.07	24.777	36.400	56.250	26.767	50.000	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g22XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??													
g22Y	XBrace2	24.777	L/r	26.767	Net Sect	111	7.07	24.777	36.400	56.250	26.767	50.000	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g22Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??													
g23P	XBrace2	24.777	L/r	26.767	Net Sect	111	7.07	24.777	36.400	56.250	26.767	50.000	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g23P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??													
g23X	XBrace2	24.777	L/r	26.767	Net Sect	111	7.07	24.777	36.400	56.250	26.767	50.000	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g23X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??													
g23XY	XBrace2	24.777	L/r	26.767	Net Sect	111	7.07	24.777	36.400	56.250	26.767	50.000	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g23XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??													
g23Y	XBrace2	24.777	L/r	26.767	Net Sect	111	7.07	24.777	36.400	56.250	26.767	50.000	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g23Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??													
g24P	XBrace2	24.777	L/r	26.767	Net Sect	111	7.07	24.777	36.400	56.250	26.767	50.000	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g24P" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??													
g24X	XBrace2	24.777	L/r	26.767	Net Sect	111	7.07	24.777	36.400	56.250	26.767	50.000	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g24X" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??													
g24XY	XBrace2	24.777	L/r	26.767	Net Sect	111	7.07	24.777	36.400	56.250	26.767	50.000	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g24XY" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??													
g24Y	XBrace2	24.777	L/r	26.767	Net Sect	111	7.07	24.777	36.400	56.250	26.767	50.000	0.000	0.000	0.000	0.000
0.000	Automatic	Member "g24Y" will not be checked for block shear since more than one gage line exists (long edge distance (g) greater than zero); however, end, edge and spacing distances will be checked. ??													
g25P	XBrace3	19.795	L/r	19.529	Rupture	104	7.60	19.795	27.300	31.641	22.961	19.529	0.000	0.000	0.000	0.000
0.000	Automatic															

g25X	XBrace3	19.795	L/r	19.529	Rupture	104	7.60	19.795	27.300	31.641	22.961	19.529	0.000	0.000	0.000	0.000
0.000	Automatic															
g25XY	XBrace3	19.795	L/r	19.529	Rupture	104	7.60	19.795	27.300	31.641	22.961	19.529	0.000	0.000	0.000	0.000
0.000	Automatic															
g25Y	XBrace3	19.795	L/r	19.529	Rupture	104	7.60	19.795	27.300	31.641	22.961	19.529	0.000	0.000	0.000	0.000
0.000	Automatic															
g26P	XBrace3	19.795	L/r	19.529	Rupture	104	7.60	19.795	27.300	31.641	22.961	19.529	0.000	0.000	0.000	0.000
0.000	Automatic															
g26X	XBrace3	19.795	L/r	19.529	Rupture	104	7.60	19.795	27.300	31.641	22.961	19.529	0.000	0.000	0.000	0.000
0.000	Automatic															
g26XY	XBrace3	19.795	L/r	19.529	Rupture	104	7.60	19.795	27.300	31.641	22.961	19.529	0.000	0.000	0.000	0.000
0.000	Automatic															
g26Y	XBrace3	19.795	L/r	19.529	Rupture	104	7.60	19.795	27.300	31.641	22.961	19.529	0.000	0.000	0.000	0.000
0.000	Automatic															
g27P	XBrace3	16.295	L/r	17.842	Rupture	127	9.40	16.295	27.300	31.641	22.961	17.842	0.000	0.000	0.000	0.000
0.000	Automatic															
g27X	XBrace3	16.295	L/r	17.842	Rupture	127	9.40	16.295	27.300	31.641	22.961	17.842	0.000	0.000	0.000	0.000
0.000	Automatic															
g27XY	XBrace3	16.295	L/r	17.842	Rupture	127	9.40	16.295	27.300	31.641	22.961	17.842	0.000	0.000	0.000	0.000
0.000	Automatic															
g27Y	XBrace3	16.295	L/r	17.842	Rupture	127	9.40	16.295	27.300	31.641	22.961	17.842	0.000	0.000	0.000	0.000
0.000	Automatic															
g28P	XBrace3	16.295	L/r	17.842	Rupture	127	9.40	16.295	27.300	31.641	22.961	17.842	0.000	0.000	0.000	0.000
0.000	Automatic															
g28X	XBrace3	16.295	L/r	17.842	Rupture	127	9.40	16.295	27.300	31.641	22.961	17.842	0.000	0.000	0.000	0.000
0.000	Automatic															
g28XY	XBrace3	16.295	L/r	17.842	Rupture	127	9.40	16.295	27.300	31.641	22.961	17.842	0.000	0.000	0.000	0.000
0.000	Automatic															
g28Y	XBrace3	16.295	L/r	17.842	Rupture	127	9.40	16.295	27.300	31.641	22.961	17.842	0.000	0.000	0.000	0.000
0.000	Automatic															
g29P	XBrace3	13.003	L/r	18.200	Shear	147	11.05	13.003	18.200	21.094	22.961	18.750	0.000	0.000	0.000	0.000
0.000	Automatic															
g29X	XBrace3	13.003	L/r	18.200	Shear	147	11.05	13.003	18.200	21.094	22.961	18.750	0.000	0.000	0.000	0.000
0.000	Automatic															
g29XY	XBrace3	13.003	L/r	18.200	Shear	147	11.05	13.003	18.200	21.094	22.961	18.750	0.000	0.000	0.000	0.000
0.000	Automatic															
g29Y	XBrace3	13.003	L/r	18.200	Shear	147	11.05	13.003	18.200	21.094	22.961	18.750	0.000	0.000	0.000	0.000
0.000	Automatic															
g30P	XBrace3	13.003	L/r	18.200	Shear	147	11.05	13.003	18.200	21.094	22.961	18.750	0.000	0.000	0.000	0.000
0.000	Automatic															
g30X	XBrace3	13.003	L/r	18.200	Shear	147	11.05	13.003	18.200	21.094	22.961	18.750	0.000	0.000	0.000	0.000
0.000	Automatic															
g30XY	XBrace3	13.003	L/r	18.200	Shear	147	11.05	13.003	18.200	21.094	22.961	18.750	0.000	0.000	0.000	0.000
0.000	Automatic															
g30Y	XBrace3	13.003	L/r	18.200	Shear	147	11.05	13.003	18.200	21.094	22.961	18.750	0.000	0.000	0.000	0.000
0.000	Automatic															
g31P	XBrace4	3.590	L/r	22.813	Net Sect	370	18.78	3.590	27.300	42.187	22.813	26.039	0.000	0.000	0.000	0.000
0.000	Automatic															
g31X	XBrace4	3.590	L/r	22.813	Net Sect	370	18.78	3.590	27.300	42.187	22.813	26.039	0.000	0.000	0.000	0.000
0.000	Automatic															
g31XY	XBrace4	3.590	L/r	22.813	Net Sect	370	18.78	3.590	27.300	42.187	22.813	26.039	0.000	0.000	0.000	0.000
0.000	Automatic															
g31Y	XBrace4	3.590	L/r	22.813	Net Sect	370	18.78	3.590	27.300	42.187	22.813	26.039	0.000	0.000	0.000	0.000
0.000	Automatic															
g32P	XBrace4	3.590	L/r	22.813	Net Sect	370	18.78	3.590	27.300	42.187	22.813	26.039	0.000	0.000	0.000	0.000
0.000	Automatic															
g32X	XBrace4	3.590	L/r	22.813	Net Sect	370	18.78	3.590	27.300	42.187	22.813	26.039	0.000	0.000	0.000	0.000
0.000	Automatic															
g32XY	XBrace4	3.590	L/r	22.813	Net Sect	370	18.78	3.590	27.300	42.187	22.813	26.039	0.000	0.000	0.000	0.000

0.000	Automatic															
g32Y	XBrace4	3.590	L/r	22.813	Net Sect	370	18.78	3.590	27.300	42.187	22.813	26.039	0.000	0.000	0.000	0.000
0.000	Automatic															
g33P	XBrace5	2.685	L/r	20.373	Rupture	429	27.82	2.685	27.300	31.641	22.961	20.373	0.000	0.000	0.000	0.000
0.000	Automatic															
g33X	XBrace5	2.685	L/r	20.373	Rupture	429	27.82	2.685	27.300	31.641	22.961	20.373	0.000	0.000	0.000	0.000
0.000	Automatic															
g33XY	XBrace5	2.685	L/r	20.373	Rupture	429	27.82	2.685	27.300	31.641	22.961	20.373	0.000	0.000	0.000	0.000
0.000	Automatic															
g33Y	XBrace5	2.685	L/r	20.373	Rupture	429	27.82	2.685	27.300	31.641	22.961	20.373	0.000	0.000	0.000	0.000
0.000	Automatic															
g34P	XBrace5	2.685	L/r	20.373	Rupture	429	27.82	2.685	27.300	31.641	22.961	20.373	0.000	0.000	0.000	0.000
0.000	Automatic															
g34X	XBrace5	2.685	L/r	20.373	Rupture	429	27.82	2.685	27.300	31.641	22.961	20.373	0.000	0.000	0.000	0.000
0.000	Automatic															
g34XY	XBrace5	2.685	L/r	20.373	Rupture	429	27.82	2.685	27.300	31.641	22.961	20.373	0.000	0.000	0.000	0.000
0.000	Automatic															
g34Y	XBrace5	2.685	L/r	20.373	Rupture	429	27.82	2.685	27.300	31.641	22.961	20.373	0.000	0.000	0.000	0.000
0.000	Automatic															
g35P	XBrace6	9.100	Shear	9.100	Shear	167	15.11	14.832	9.100	14.062	30.238	12.500	0.000	0.000	0.000	0.000
0.000	Automatic															
g35X	XBrace6	9.100	Shear	9.100	Shear	167	15.11	14.832	9.100	14.062	30.238	12.500	0.000	0.000	0.000	0.000
0.000	Automatic															
g35XY	XBrace6	9.100	Shear	9.100	Shear	167	15.11	14.832	9.100	14.062	30.238	12.500	0.000	0.000	0.000	0.000
0.000	Automatic															
g35Y	XBrace6	9.100	Shear	9.100	Shear	167	15.11	14.832	9.100	14.062	30.238	12.500	0.000	0.000	0.000	0.000
0.000	Automatic															
g36P	XBrace6	9.100	Shear	9.100	Shear	167	15.11	14.832	9.100	14.062	30.238	12.500	0.000	0.000	0.000	0.000
0.000	Automatic															
g36X	XBrace6	9.100	Shear	9.100	Shear	167	15.11	14.832	9.100	14.062	30.238	12.500	0.000	0.000	0.000	0.000
0.000	Automatic															
g36XY	XBrace6	9.100	Shear	9.100	Shear	167	15.11	14.832	9.100	14.062	30.238	12.500	0.000	0.000	0.000	0.000
0.000	Automatic															
g36Y	XBrace6	9.100	Shear	9.100	Shear	167	15.11	14.832	9.100	14.062	30.238	12.500	0.000	0.000	0.000	0.000
0.000	Automatic															
g37P	Horz1	7.504	L/r	12.814	Rupture	175	5.00	7.504	18.200	21.094	14.585	12.814	0.000	0.000	0.000	0.000
0.000	Automatic															
g37X	Horz1	7.504	L/r	12.814	Rupture	175	5.00	7.504	18.200	21.094	14.585	12.814	0.000	0.000	0.000	0.000
0.000	Automatic															
g38P	Horz1	7.504	L/r	12.814	Rupture	175	5.00	7.504	18.200	21.094	14.585	12.814	0.000	0.000	0.000	0.000
0.000	Automatic															
g38X	Horz1	7.504	L/r	12.814	Rupture	175	5.00	7.504	18.200	21.094	14.585	12.814	0.000	0.000	0.000	0.000
0.000	Automatic															
g39P	Horz1	7.504	L/r	12.814	Rupture	175	5.00	7.504	18.200	21.094	14.585	12.814	0.000	0.000	0.000	0.000
0.000	Automatic															
g39X	Horz1	7.504	L/r	12.814	Rupture	175	5.00	7.504	18.200	21.094	14.585	12.814	0.000	0.000	0.000	0.000
0.000	Automatic															
g40P	Horz1	7.504	L/r	13.658	Rupture	175	5.00	7.504	18.200	21.094	14.585	13.658	0.000	0.000	0.000	0.000
0.000	Automatic															
g40X	Horz1	7.504	L/r	13.658	Rupture	175	5.00	7.504	18.200	21.094	14.585	13.658	0.000	0.000	0.000	0.000
0.000	Automatic															
g41P	Horz2	12.304	L/r	16.576	Rupture	148	9.79	12.304	18.200	21.094	17.444	16.576	0.000	0.000	0.000	0.000
0.000	Automatic															
g41X	Horz2	12.304	L/r	16.576	Rupture	148	9.79	12.304	18.200	21.094	17.444	16.576	0.000	0.000	0.000	0.000
0.000	Automatic															
g42P	Horz2	12.304	L/r	16.576	Rupture	148	9.79	12.304	18.200	21.094	17.444	16.576	0.000	0.000	0.000	0.000
0.000	Automatic															
g42Y	Horz2	12.304	L/r	16.576	Rupture	148	9.79	12.304	18.200	21.094	17.444	16.576	0.000	0.000	0.000	0.000
0.000	Automatic															

g43P	Horz3	15.896	L/r	18.200	Shear	175	13.75	15.896	18.200	28.125	30.090	21.820	0.000	0.000	0.000	0.000
0.000		Automatic														
g43X	Horz3	15.896	L/r	18.200	Shear	175	13.75	15.896	18.200	28.125	30.090	21.820	0.000	0.000	0.000	0.000
0.000		Automatic														
g44P	Horz3	15.896	L/r	18.200	Shear	175	13.75	15.896	18.200	28.125	30.090	21.820	0.000	0.000	0.000	0.000
0.000		Automatic														
g44Y	Horz3	15.896	L/r	18.200	Shear	175	13.75	15.896	18.200	28.125	30.090	21.820	0.000	0.000	0.000	0.000
0.000		Automatic														
g45P	Horz4	18.200	Shear	18.200	Shear	185	9.88	18.857	18.200	28.125	37.663	21.820	0.000	0.000	0.000	0.000
0.000		Automatic														
g45X	Horz4	18.200	Shear	18.200	Shear	185	9.88	18.857	18.200	28.125	37.663	21.820	0.000	0.000	0.000	0.000
0.000		Automatic														
g45XY	Horz4	18.200	Shear	18.200	Shear	185	9.88	18.857	18.200	28.125	37.663	21.820	0.000	0.000	0.000	0.000
0.000		Automatic														
g45Y	Horz4	18.200	Shear	18.200	Shear	185	9.88	18.857	18.200	28.125	37.663	21.820	0.000	0.000	0.000	0.000
0.000		Automatic														
g46P	Horz4	18.200	Shear	18.200	Shear	185	9.88	18.857	18.200	28.125	37.663	21.820	0.000	0.000	0.000	0.000
0.000		Automatic														
g46X	Horz4	18.200	Shear	18.200	Shear	185	9.88	18.857	18.200	28.125	37.663	21.820	0.000	0.000	0.000	0.000
0.000		Automatic														
g46XY	Horz4	18.200	Shear	18.200	Shear	185	9.88	18.857	18.200	28.125	37.663	21.820	0.000	0.000	0.000	0.000
0.000		Automatic														
g46Y	Horz4	18.200	Shear	18.200	Shear	185	9.88	18.857	18.200	28.125	37.663	21.820	0.000	0.000	0.000	0.000
0.000		Automatic														
g47P	Horz6	9.100	Shear	7.330	Rupture	112	2.50	12.543	9.100	10.547	14.585	7.330	0.000	0.000	0.000	0.000
0.000		Automatic														
g47X	Horz6	9.100	Shear	7.330	Rupture	112	2.50	12.543	9.100	10.547	14.585	7.330	0.000	0.000	0.000	0.000
0.000		Automatic														
g47XY	Horz6	9.100	Shear	7.330	Rupture	112	2.50	12.543	9.100	10.547	14.585	7.330	0.000	0.000	0.000	0.000
0.000		Automatic														
g47Y	Horz6	9.100	Shear	7.330	Rupture	112	2.50	12.543	9.100	10.547	14.585	7.330	0.000	0.000	0.000	0.000
0.000		Automatic														
g48P	Horz5	0.129	L/r	8.766	Net Sect	984	2.50	0.129	9.100	14.062	8.766	12.500	0.000	0.000	0.000	0.000
0.000		Automatic														
g48X	Horz5	0.129	L/r	8.766	Net Sect	984	2.50	0.129	9.100	14.062	8.766	12.500	0.000	0.000	0.000	0.000
0.000		Automatic														
g48XY	Horz5	0.129	L/r	8.766	Net Sect	984	2.50	0.129	9.100	14.062	8.766	12.500	0.000	0.000	0.000	0.000
0.000		Automatic														
g48Y	Horz5	0.129	L/r	8.766	Net Sect	984	2.50	0.129	9.100	14.062	8.766	12.500	0.000	0.000	0.000	0.000
0.000		Automatic														
g49P	Inner1	9.100	Shear	7.330	Rupture	124	7.07	11.437	9.100	10.547	14.585	7.330	0.000	0.000	0.000	0.000
0.000		Automatic														
g49X	Inner1	9.100	Shear	7.330	Rupture	124	7.07	11.437	9.100	10.547	14.585	7.330	0.000	0.000	0.000	0.000
0.000		Automatic														
g50P	Inner1	9.100	Shear	7.330	Rupture	124	7.07	11.437	9.100	10.547	14.585	7.330	0.000	0.000	0.000	0.000
0.000		Automatic														
g50X	Inner1	9.100	Shear	7.330	Rupture	124	7.07	11.437	9.100	10.547	14.585	7.330	0.000	0.000	0.000	0.000
0.000		Automatic														
g51P	Inner1	9.100	Shear	7.330	Rupture	124	7.07	11.437	9.100	10.547	14.585	7.330	0.000	0.000	0.000	0.000
0.000		Automatic														
g51X	Inner1	9.100	Shear	7.330	Rupture	124	7.07	11.437	9.100	10.547	14.585	7.330	0.000	0.000	0.000	0.000
0.000		Automatic														
g52P	Inner1	9.100	Shear	7.330	Rupture	124	7.07	11.437	9.100	10.547	14.585	7.330	0.000	0.000	0.000	0.000
0.000		Automatic														
g52X	Inner1	9.100	Shear	7.330	Rupture	124	7.07	11.437	9.100	10.547	14.585	7.330	0.000	0.000	0.000	0.000
0.000		Automatic														
g53P	**Inner2**	**3.105**	**L/r**	**7.717**	**Rupture**	**273**	**19.45**	**3.105**	**9.100**	**10.547**	**17.444**	**7.717**	**0.000**	**0.000**	**0.000**	**0.000**
0.000		**Automatic**														

KL/R value of 273.24 exceeds maximum of 200.00 for member "g53P" ??

g53X	**Inner2**	**3.105**	**L/r**	**7.717**	**Rupture**	**273**	**19.45**	**3.105**	**9.100**	**10.547**	**17.444**	**7.717**	**0.000**	**0.000**	**0.000**	**0.000**
0.000		**Automatic**														
KL/R value of 273.24 exceeds maximum of 200.00 for member "g53X" ??																
g54P	Arm1	18.200	Shear	18.200	Shear	146	11.52	19.099	18.200	28.125	33.802	28.125	0.000	0.000	0.000	0.000
0.000		Automatic														
g54X	Arm1	18.200	Shear	18.200	Shear	146	11.52	19.099	18.200	28.125	33.802	28.125	0.000	0.000	0.000	0.000
0.000		Automatic														
g54XY	Arm1	18.200	Shear	18.200	Shear	146	11.52	19.099	18.200	28.125	33.802	28.125	0.000	0.000	0.000	0.000
0.000		Automatic														
g54Y	Arm1	18.200	Shear	18.200	Shear	146	11.52	19.099	18.200	28.125	33.802	28.125	0.000	0.000	0.000	0.000
0.000		Automatic														
g55P	Arm1	18.200	Shear	18.200	Shear	114	5.00	26.226	18.200	28.125	33.802	28.125	0.000	0.000	0.000	0.000
0.000		Automatic														
g55Y	Arm1	18.200	Shear	18.200	Shear	114	5.00	26.226	18.200	28.125	33.802	28.125	0.000	0.000	0.000	0.000
0.000		Automatic														
g56P	Arm2	17.986	L/r	17.209	Rupture	114	4.72	17.986	18.200	21.094	22.961	17.209	0.000	0.000	0.000	0.000
0.000		Automatic														
g56Y	Arm2	17.986	L/r	17.209	Rupture	114	4.72	17.986	18.200	21.094	22.961	17.209	0.000	0.000	0.000	0.000
0.000		Automatic														
g57P	Arm4	18.200	Shear	18.200	Shear	92	5.00	37.680	18.200	28.125	45.088	28.125	0.000	0.000	0.000	0.000
0.000		Automatic														
g57Y	Arm4	18.200	Shear	18.200	Shear	92	5.00	37.680	18.200	28.125	45.088	28.125	0.000	0.000	0.000	0.000
0.000		Automatic														
g58P	Arm3	17.147	L/r	17.333	Net Sect	121	8.86	17.147	27.300	31.641	17.333	22.061	0.000	0.000	0.000	0.000
0.000		Automatic														
g58Y	Arm3	17.147	L/r	17.333	Net Sect	121	8.86	17.147	27.300	31.641	17.333	22.061	0.000	0.000	0.000	0.000
0.000		Automatic														
g59P	Arm4	18.200	Shear	18.200	Shear	92	5.00	37.680	18.200	28.125	45.088	28.125	0.000	0.000	0.000	0.000
0.000		Automatic														
g59Y	Arm4	18.200	Shear	18.200	Shear	92	5.00	37.680	18.200	28.125	45.088	28.125	0.000	0.000	0.000	0.000
0.000		Automatic														
g60P	Arm2	16.404	L/r	18.200	Shear	125	5.15	16.404	18.200	21.094	22.961	18.750	0.000	0.000	0.000	0.000
0.000		Automatic														
g60Y	Arm2	16.404	L/r	18.200	Shear	125	5.15	16.404	18.200	21.094	22.961	18.750	0.000	0.000	0.000	0.000
0.000		Automatic														
g61P	Arm4	18.200	Shear	18.200	Shear	92	5.00	37.680	18.200	28.125	45.088	31.250	0.000	0.000	0.000	0.000
0.000		Automatic														
g61Y	Arm4	18.200	Shear	18.200	Shear	92	5.00	37.680	18.200	28.125	45.088	31.250	0.000	0.000	0.000	0.000
0.000		Automatic														
g62P	ArmBr1	9.100	Shear	9.100	Shear	177	8.81	9.922	9.100	10.547	28.544	9.375	0.000	0.000	0.000	0.000
0.000		Automatic														
g63P	ArmBr3	0.068	L/r	8.766	Net Sect	1352	6.87	0.068	9.100	14.062	8.766	12.500	0.000	0.000	0.000	0.000
0.000		Automatic														
g63Y	ArmBr3	0.068	L/r	8.766	Net Sect	1352	6.87	0.068	9.100	14.062	8.766	12.500	0.000	0.000	0.000	0.000
0.000		Automatic														
g64P	ArmBr3	0.037	L/r	8.766	Net Sect	1840	9.35	0.037	9.100	14.062	8.766	12.500	0.000	0.000	0.000	0.000
0.000		Automatic														
g64Y	ArmBr3	0.037	L/r	8.766	Net Sect	1840	9.35	0.037	9.100	14.062	8.766	12.500	0.000	0.000	0.000	0.000
0.000		Automatic														
g65P	ArmBr3	0.063	L/r	8.766	Net Sect	1412	7.18	0.063	9.100	14.062	8.766	12.500	0.000	0.000	0.000	0.000
0.000		Automatic														
g65Y	ArmBr3	0.063	L/r	8.766	Net Sect	1412	7.18	0.063	9.100	14.062	8.766	12.500	0.000	0.000	0.000	0.000
0.000		Automatic														
g66P	Arm4	18.200	Shear	18.200	Shear	83	8.86	39.199	18.200	28.125	45.088	28.125	0.000	0.000	0.000	0.000
0.000		Automatic														
g66Y	Arm4	18.200	Shear	18.200	Shear	83	8.86	39.199	18.200	28.125	45.088	28.125	0.000	0.000	0.000	0.000
0.000		Automatic														
g67P	Arm4	18.200	Shear	18.200	Shear	124	13.24	31.382	18.200	28.125	45.088	28.125	0.000	0.000	0.000	0.000
0.000		Automatic														

g67Y	Arm4	18.200	Shear	18.200	Shear	124	13.24	31.382	18.200	28.125	45.088	28.125	0.000	0.000	0.000	0.000
0.000	Automatic															
g68P	Arm4	18.200	Shear	18.200	Shear	88	9.34	38.455	18.200	28.125	45.088	31.250	0.000	0.000	0.000	0.000
0.000	Automatic															
g68Y	Arm4	18.200	Shear	18.200	Shear	88	9.34	38.455	18.200	28.125	45.088	31.250	0.000	0.000	0.000	0.000
0.000	Automatic															
g69P	ArmBr2	9.100	Shear	9.100	Shear	138	5.71	13.491	9.100	10.547	22.961	9.375	0.000	0.000	0.000	0.000
0.000	Automatic															
g70P	ArmBr3	0.031	L/r	8.766	Net Sect	2001	10.17	0.031	9.100	14.062	8.766	12.500	0.000	0.000	0.000	0.000
0.000	Automatic															
g70Y	ArmBr3	0.031	L/r	8.766	Net Sect	2001	10.17	0.031	9.100	14.062	8.766	12.500	0.000	0.000	0.000	0.000
0.000	Automatic															
g71P	ArmBr3	0.018	L/r	8.766	Net Sect	2670	13.57	0.018	9.100	14.062	8.766	12.500	0.000	0.000	0.000	0.000
0.000	Automatic															
g71Y	ArmBr3	0.018	L/r	8.766	Net Sect	2670	13.57	0.018	9.100	14.062	8.766	12.500	0.000	0.000	0.000	0.000
0.000	Automatic															
g72P	ArmBr3	0.029	L/r	8.766	Net Sect	2084	10.59	0.029	9.100	14.062	8.766	12.500	0.000	0.000	0.000	0.000
0.000	Automatic															
g72Y	ArmBr3	0.029	L/r	8.766	Net Sect	2084	10.59	0.029	9.100	14.062	8.766	12.500	0.000	0.000	0.000	0.000
0.000	Automatic															

The model contains 224 angle members.

Sum of Unfactored Dead Load and Drag Areas From Equipment, Input and Calculated:

Joint Label	Dead Load (kips)	X-Drag Area (ft^2)	Y-Drag Area (ft^2)
1P	0.0891	4.828	3.163
2P	0.136	7.054	5.586
3P	0.0777	4.089	4.089
4P	0.146	7.278	5.060
5P	0.117	5.852	5.509
6P	0.159	7.614	6.062
7P	0.137	5.770	5.770
18P	0.0606	3.407	1.146
19P	0.0411	2.868	1.961
20P	0.0412	3.440	1.194
21P	0.0266	1.918	1.336
22P	0.0754	4.866	2.169
23P	0.0971	6.279	1.403
24P	0.0701	4.501	1.649
1X	0.0866	4.576	3.163
1XY	0.0866	4.576	3.163
1Y	0.0891	4.828	3.163
2X	0.118	6.054	5.429
2XY	0.118	6.054	5.429
2Y	0.136	7.054	5.586
3X	0.0777	4.089	4.089
3XY	0.0777	4.089	4.089
3Y	0.0777	4.089	4.089
4X	0.122	6.174	4.955
4XY	0.122	6.174	4.955
4Y	0.146	7.278	5.060
5X	0.115	5.592	5.509
5XY	0.115	5.592	5.509
5Y	0.117	5.852	5.509
6X	0.139	6.583	5.906

6XY	0.139	6.583	5.906
6Y	0.159	7.614	6.062
7X	0.137	5.770	5.770
7XY	0.137	5.770	5.770
7Y	0.137	5.770	5.770
18X	0.0682	3.913	1.250
8S	0.11	5.233	5.233
9S	0.128	6.066	6.066
10S	0.246	10.042	10.042
11S	0.463	18.795	18.795
12S	0.343	13.570	13.570
13S	0.131	7.684	2.944
14S	0.131	2.944	7.684
15S	0.0345	2.155	1.467
16S	0.0373	1.500	2.317
17S	0.0358	2.317	1.500
8X	0.11	5.233	5.233
8XY	0.11	5.233	5.233
8Y	0.11	5.233	5.233
9X	0.128	6.066	6.066
9XY	0.128	6.066	6.066
9Y	0.128	6.066	6.066
10X	0.246	10.042	10.042
10XY	0.246	10.042	10.042
10Y	0.246	10.042	10.042
11X	0.463	18.795	18.795
11XY	0.463	18.795	18.795
11Y	0.463	18.795	18.795
12X	0.343	13.570	13.570
12XY	0.343	13.570	13.570
12Y	0.343	13.570	13.570
13Y	0.131	7.684	2.944
14X	0.131	2.944	7.684
15X	0.0313	1.840	1.467
15XY	0.0313	1.840	1.467
15Y	0.0345	2.155	1.467
16X	0.0373	1.500	2.317
17Y	0.0358	2.317	1.500
Total	9.76	445.544	401.808

Unadjusted Dead Load and Drag Areas by Section:

Section Label	Unfactored Dead Load (kips)	X-Drag Area All (ft^2)	Y-Drag Area All (ft^2)	X-Drag Area Face (ft^2)	Y-Drag Area Face (ft^2)
1	3.327	176.924	133.187	74.782	47.573
2	6.429	268.621	268.621	104.068	104.068
Total	9.756	445.544	401.808	178.851	151.641

Angle Member Weights and Surface Areas by Section:

Section Label	Unfactored Weight (kips)	Factored Weight (kips)	Unfactored Surface Area (ft^2)	Factored Surface Area (ft^2)
1	3.327	3.494	692.067	726.671
2	6.429	6.751	1229.293	1290.758
Total	9.756	10.244	1921.360	2017.428

Section Joint Information:

Section Label	Joint Label	Joint Elevation (ft)
1	1P	91.000
1	2P	86.000
1	1X	91.000
1	2X	86.000
1	1XY	91.000
1	2XY	86.000
1	1Y	91.000
1	2Y	86.000
1	3P	80.000
1	3X	80.000
1	3XY	80.000
1	3Y	80.000
1	15S	77.000
1	15X	77.000
1	15XY	77.000
1	15Y	77.000
1	4P	74.000
1	4X	74.000
1	4XY	74.000
1	4Y	74.000
1	5P	69.000
1	5X	69.000
1	5XY	69.000
1	5Y	69.000
1	6P	64.000
1	6X	64.000
1	6XY	64.000
1	6Y	64.000
1	17S	77.000
1	17Y	77.000
1	16S	77.000
1	16X	77.000
1	18X	91.000
1	18P	91.000
1	19P	86.000
1	20P	74.000
1	21P	64.000
1	22P	86.000
1	23P	74.000
1	24P	64.000
2	6P	64.000
2	8S	59.000
2	6X	64.000
2	8X	59.000
2	6XY	64.000
2	8XY	59.000
2	6Y	64.000
2	8Y	59.000
2	9S	53.000
2	9X	53.000
2	9XY	53.000
2	9Y	53.000

2	10S	46.500
2	10X	46.500
2	10XY	46.500
2	10Y	46.500
2	11S	32.000
2	11X	32.000
2	11XY	32.000
2	11Y	32.000
2	12S	10.000
2	12X	10.000
2	12XY	10.000
2	12Y	10.000
2	7P	0.000
2	7X	0.000
2	7XY	0.000
2	7Y	0.000
2	13S	10.000
2	13Y	10.000
2	14S	10.000
2	14X	10.000

Sections Information:

Section Label	Top Z (ft)	Bottom Z (ft)	Joint Count	Member Count	Tran. Face Top Width (ft)	Tran. Face Bot Width (ft)	Tran. Face Gross Area (ft^2)	Long. Face Top Width (ft)	Long. Face Bot Width (ft)	Long. Face Gross Area (ft^2)
1	91.000	64.000	40	134	5.00	5.00	135.000	27.50	18.50	288.500
2	64.000	0.000	32	90	5.00	22.50	880.000	5.00	22.50	880.000

*** Insulator Data

Clamp Properties:

Label	Stock Number	Holding Capacity (lbs)
C-EX1		5e+004

Clamp Insulator Connectivity:

Clamp Label	Structure And Tip Attach	Property Set	Min. Required Vertical Load (uplift) (lbs)
1	18P	C-EX1	No Limit
2	18X	C-EX1	No Limit
3	19P	C-EX1	No Limit
4	20P	C-EX1	No Limit
5	21P	C-EX1	No Limit
6	22P	C-EX1	No Limit
7	23P	C-EX1	No Limit
8	24P	C-EX1	No Limit
9	3Y	C-EX1	No Limit
10	5Y	C-EX1	No Limit
11	8Y	C-EX1	No Limit
12	10Y	C-EX1	No Limit

13	11Y	C-EX1	No Limit
14	12Y	C-EX1	No Limit
15	1XY	C-EX1	No Limit
16	1Y	C-EX1	No Limit
17	3XY	C-EX1	No Limit

*** Loads Data

Loads from file: j:\jobs\1402500.wi\007 - ct11296a\backup documentation\calcs\rev (1)\pls tower\wilton - 936.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)	91.00 (ft)	
Structure height	91.00 (ft)	
Structure height above ground	91.00 (ft)	
Tower Shape	Rectangular	

Load distributed evenly among joints in section for section based load cases

Vector Load Cases:

Load Case Description	Dead Load Factor	Wind Area Factor	SF for Steel Poles Tubular Arms and Towers	SF for Guys and Cables	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)	Temperature (deg F)	Joint Displ.
NESC Heavy	1.5000	2.5000	1.00000	1.0000	1.0000	1.0000	18 loads	Wind on Face	-4	0	0.000	56.000	60.0	
NESC Extreme	1.0000	1.0000	1.00000	1.0000	1.0000	1.0000	18 loads	NESC 2012	-31	0	0.000	56.000	60.0	

Point Loads for Load Case "NESC Heavy":

Joint Label	Vertical Load (lbs)	Transverse Load (lbs)	Longitudinal Load (lbs)	Load Comment
18X	1698	-2398	0	Fiber Shield Wire
18P	1030	-1614	0	Shield Wire
19P	2778	-2739	0	Conductor
20P	2778	-2739	0	Conductor
21P	2778	-2739	0	Conductor
22P	2778	-2739	0	Conductor
23P	2778	-2739	0	Conductor
24P	2778	-2739	0	Conductor
3Y	151	-24	0	Coax Cables
5Y	288	-45	0	Coax Cables
8Y	309	-48	0	Coax Cables
10Y	370	-58	0	Coax Cables
11Y	500	-78	0	Coax Cables
12Y	576	-90	0	Coax Cables
1XY	438	-37	110	Top Connection
1Y	423	-732	-463	Top Connection
3XY	430	126	122	Bottom Connection
3Y	436	27	231	Bottom Connection

Section Load Case Information (Standard) for "NESC Heavy":

Section Label	Z of Top (ft)	Z of Bottom (ft)	Ave. Elev. Above Ground (ft)	Res. Adj. Wind Pres. (psf)	Tran Adj. Wind Pres. (psf)	Tran Drag Coef	Tran Wind Load (lbs)	Long Adj. Wind Pres. (psf)	Long Drag Coef	Long Wind Load (lbs)	Ice Weight (lbs)	Total Weight (lbs)
1	91.00	64.00	77.50	10.00	-10.00	3.300	-1569.9	0.00	3.300	0.0	0	5241
2	64.00	0.00	32.00	10.00	-10.00	3.300	-3434.3	0.00	3.300	0.0	0	10126

Point Loads for Load Case "NESC Extreme":

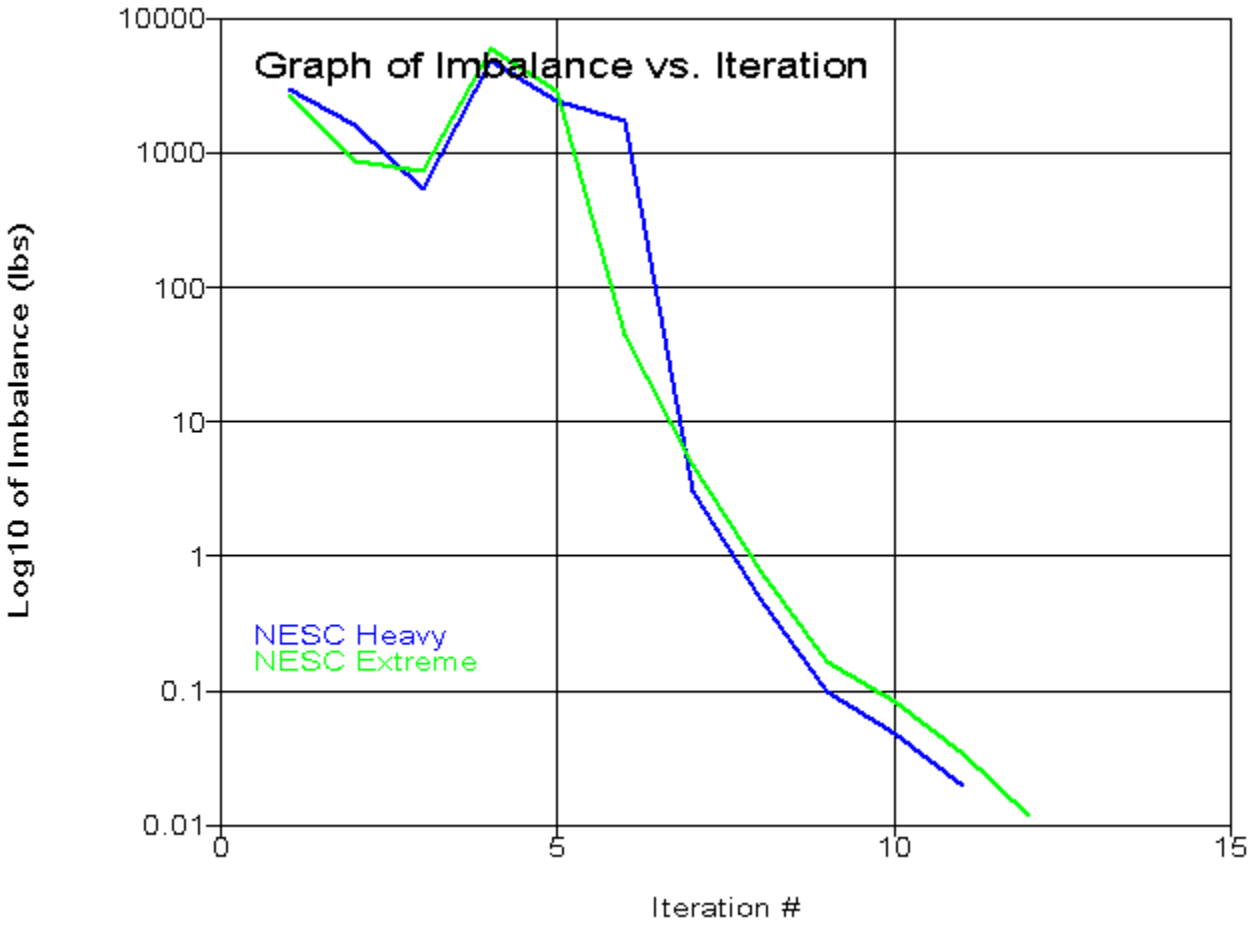
Joint Label	Vertical Load (lbs)	Transverse Load (lbs)	Longitudinal Load (lbs)	Load Comment
18X	455	-2057	0	Fiber Shield Wire
18P	226	-969	0	Shield Wire
19P	1072	-2551	0	Conductor
20P	1072	-2551	0	Conductor
21P	1072	-2551	0	Conductor
22P	1072	-2551	0	Conductor
23P	1072	-2551	0	Conductor
24P	1072	-2551	0	Conductor
3Y	36	-56	0	Coax Cables
5Y	68	-106	0	Coax Cables
8Y	73	-114	0	Coax Cables
10Y	87	-136	0	Coax Cables
11Y	118	-184	0	Coax Cables
12Y	136	-212	0	Coax Cables
1XY	203	-1238	957	Top Connection
1Y	144	-1514	-1100	Top Connection
3XY	163	354	-163	Bottom Connection
3Y	183	313	306	Bottom Connection

Section Load Case Information (Code) for "NESC Extreme":

Section Label	Z of Top (ft)	Z of Bottom (ft)	Ave. Elev. Above Ground (ft)	Res. Adj. Wind Pres. (psf)	Tran Adj. Wind Pres. (psf)	Tran Angle Face Area (ft^2)	Tran Gross Area (ft^2)	Tran Soli- dity Ratio	Tran Angle Drag Coef	Tran Wind Load (lbs)	Long Adj. Wind Pres. (psf)	Long Angle Face Area (ft^2)	Long Gross Area (ft^2)	Long Soli- dity Ratio	Long Angle Drag Coef	Long Wind Load (lbs)	Ice Weight (lbs)	Total Weight (lbs)
1	91.00	64.00	77.50	31.03	-31.03	52.33	135.00	0.388	3.200	-5195.4	0.00	82.26	288.50	0.285	3.200	0.0	0	3494
2	64.00	0.00	32.00	31.03	-31.03	114.48	880.00	0.130	3.200	-11365.3	0.00	114.48	880.00	0.130	3.200	0.0	0	6751

*** Analysis Results:

Maximum element usage is 86.67% for Angle "g31Y" in load case "NESC Heavy"
Maximum insulator usage is 8.02% for Clamp "7" in load case "NESC Heavy"



Angle Forces For All Load Cases:
Positive for tension - negative for compression

Group Label	Angle Label	Max. Usage For All LC %	Max. Tens. For All LC (kips)	Max. Comp. For All LC (kips)	LC 1 (kips)	LC 2 (kips)
Leg1	g1P	1.74	0.703	-0.934	-0.934	0.703
Leg1	g1X	5.22	0.000	-2.795	-2.795	-2.139
Leg1	g1XY	6.07	0.000	-3.246	-3.246	-1.932
Leg1	g1Y	2.86	0.193	-1.532	-1.532	0.193

Leg1	g2P	12.75	6.718	0.000	3.522	6.718
Leg1	g2X	17.38	0.000	-8.498	-8.351	-8.498
Leg1	g2XY	19.12	0.000	-9.346	-9.346	-8.787
Leg1	g2Y	11.73	6.182	0.000	2.450	6.182
Leg1	g3P	23.98	12.633	0.000	9.023	12.633
Leg1	g3X	23.50	0.000	-14.155	-13.012	-14.155
Leg1	g3XY	24.70	0.000	-14.878	-14.509	-14.878
Leg1	g3Y	22.82	12.022	0.000	7.276	12.022
Leg1	g4P	25.72	12.000	0.000	7.520	12.000
Leg1	g4X	24.64	0.000	-14.840	-14.478	-14.840
Leg1	g4XY	26.47	0.000	-15.946	-15.946	-15.492
Leg1	g4Y	24.33	11.352	0.000	5.764	11.352
Leg2	g5P	29.95	21.451	0.000	14.066	21.451
Leg2	g5X	28.32	0.000	-25.342	-23.386	-25.342
Leg2	g5XY	28.91	0.000	-25.873	-24.510	-25.873
Leg2	g5Y	28.64	20.516	0.000	11.712	20.516
Leg2	g6P	40.34	28.898	0.000	19.538	28.898
Leg2	g6X	37.77	0.000	-33.800	-31.365	-33.800
Leg2	g6XY	37.68	0.000	-33.720	-31.451	-33.720
Leg2	g6Y	38.11	27.295	0.000	15.979	27.295
Leg2	g7P	53.92	35.602	0.000	25.323	35.602
Leg2	g7X	45.32	0.000	-40.379	-36.325	-40.379
Leg2	g7XY	44.76	0.000	-39.881	-36.180	-39.881
Leg2	g7Y	51.39	33.933	0.000	21.729	33.933
Leg2	g8P	53.13	39.941	0.000	28.218	39.941
Leg2	g8X	54.81	0.000	-46.208	-41.512	-46.208
Leg2	g8XY	54.56	0.000	-45.994	-41.752	-45.994
Leg2	g8Y	50.58	38.027	0.000	25.268	38.027
Leg2	g9P	54.02	41.106	0.000	28.897	41.106
Leg2	g9X	57.87	0.000	-47.214	-41.878	-47.214
Leg2	g9XY	57.25	0.000	-46.702	-42.365	-46.702
Leg2	g9Y	52.13	39.670	0.000	26.776	39.670
Leg3	g10P	45.37	41.081	0.000	28.509	41.081
Leg3	g10X	55.96	0.000	-51.271	-44.335	-51.271
Leg3	g10XY	58.50	0.000	-53.599	-44.758	-53.599
Leg3	g10Y	40.85	36.991	0.000	27.214	36.991
Leg3	g11P	48.02	43.054	0.000	28.923	43.054
Leg3	g11X	59.40	0.000	-54.082	-46.363	-54.082
Leg3	g11XY	64.13	0.000	-58.387	-51.095	-58.387
Leg3	g11Y	44.95	40.308	0.000	26.422	40.308
Leg3	g12P	53.31	47.801	0.000	30.875	47.801
Leg3	g12X	52.86	0.000	-56.056	-48.565	-56.056
Leg3	g12XY	55.37	0.000	-58.719	-51.919	-58.719
Leg3	g12Y	55.52	49.783	0.000	32.018	49.783
XBrace1	g13P	13.55	0.000	-1.566	-1.362	-1.566
XBrace1	g13X	9.97	1.454	0.000	0.993	1.454
XBrace1	g13XY	17.84	2.602	0.000	1.228	2.602
XBrace1	g13Y	24.11	0.000	-2.787	-1.820	-2.787
XBrace1	g14P	2.58	0.000	-0.298	-0.227	-0.298
XBrace1	g14X	6.83	0.000	-0.590	-0.590	-0.170
XBrace1	g14XY	12.13	0.000	-1.047	-0.630	-1.047
XBrace1	g14Y	6.71	0.979	0.000	0.331	0.979
XBrace2	g15P	16.82	0.000	-3.774	-3.676	-3.774
XBrace2	g15X	15.51	4.234	0.000	4.234	3.994
XBrace2	g15XY	21.77	5.943	0.000	4.788	5.943
XBrace2	g15Y	25.60	0.000	-5.747	-4.166	-5.747
XBrace2	g16P	12.04	0.000	-1.908	-1.191	-1.908
XBrace2	g16X	6.35	1.733	0.000	0.900	1.733
XBrace2	g16XY	2.43	0.665	0.000	0.665	0.092

XBrace2	g16Y	2.38	0.000	-0.377	-0.377	-0.002
XBrace7	g17P	25.61	0.000	-4.058	-3.989	-4.058
XBrace7	g17X	14.44	3.942	0.000	3.826	3.942
XBrace7	g17XY	19.61	5.354	0.000	4.095	5.354
XBrace7	g17Y	35.54	0.000	-5.630	-4.578	-5.630
XBrace7	g18P	14.49	3.955	0.000	2.425	3.955
XBrace7	g18X	26.43	0.000	-4.188	-2.668	-4.188
XBrace7	g18XY	34.64	0.000	-5.489	-3.162	-5.489
XBrace7	g18Y	18.66	5.094	0.000	2.598	5.094
XBrace7	g19P	1.92	0.524	0.000	0.524	0.237
XBrace7	g19X	5.86	0.000	-0.928	-0.928	-0.373
XBrace7	g19XY	11.15	0.000	-1.767	-1.361	-1.767
XBrace7	g19Y	6.09	1.662	0.000	0.966	1.662
XBrace7	g20P	5.82	1.588	0.000	0.936	1.588
XBrace7	g20X	11.22	0.000	-1.778	-1.380	-1.778
XBrace7	g20XY	6.28	0.000	-0.995	-0.995	-0.486
XBrace7	g20Y	1.76	0.480	0.000	0.480	0.203
XBrace2	g21P	23.00	0.000	-5.699	-4.640	-5.699
XBrace2	g21X	25.73	6.888	0.000	6.888	6.559
XBrace2	g21XY	28.88	7.729	0.000	6.944	7.729
XBrace2	g21Y	28.09	0.000	-6.961	-4.792	-6.961
XBrace2	g22P	9.63	0.000	-1.745	-1.297	-1.745
XBrace2	g22X	6.16	1.650	0.000	1.031	1.650
XBrace2	g22XY	1.37	0.368	0.000	0.368	0.282
XBrace2	g22Y	3.34	0.000	-0.604	-0.604	-0.329
XBrace2	g23P	22.96	0.000	-5.690	-3.825	-5.690
XBrace2	g23X	24.83	6.647	0.000	6.411	6.647
XBrace2	g23XY	28.02	7.501	0.000	6.273	7.501
XBrace2	g23Y	26.71	0.000	-6.619	-3.880	-6.619
XBrace2	g24P	2.06	0.553	0.000	0.100	0.553
XBrace2	g24X	9.82	0.000	-1.779	-1.779	-1.263
XBrace2	g24XY	13.21	0.000	-2.392	-2.283	-2.392
XBrace2	g24Y	6.96	1.863	0.000	0.762	1.863
XBrace3	g25P	11.24	0.000	-2.225	-2.225	-1.806
XBrace3	g25X	7.31	1.428	0.000	1.393	1.428
XBrace3	g25XY	11.48	2.241	0.000	1.898	2.241
XBrace3	g25Y	16.41	0.000	-3.248	-2.914	-3.248
XBrace3	g26P	7.54	1.472	0.000	1.472	1.309
XBrace3	g26X	10.07	0.000	-1.782	-1.782	-1.718
XBrace3	g26XY	16.72	0.000	-2.959	-2.156	-2.959
XBrace3	g26Y	11.90	2.323	0.000	1.262	2.323
XBrace3	g27P	9.75	0.000	-1.588	-1.232	-1.588
XBrace3	g27X	9.44	1.684	0.000	1.684	1.645
XBrace3	g27XY	15.80	2.818	0.000	2.220	2.818
XBrace3	g27Y	14.13	0.000	-2.302	-1.753	-2.302
XBrace3	g28P	10.62	0.000	-1.496	-0.732	-1.496
XBrace3	g28X	11.31	2.018	0.000	1.445	2.018
XBrace3	g28XY	6.63	1.183	0.000	1.183	1.087
XBrace3	g28Y	6.77	0.000	-0.954	-0.954	-0.716
XBrace3	g29P	13.25	0.000	-1.722	-1.305	-1.722
XBrace3	g29X	8.61	1.566	0.000	1.098	1.566
XBrace3	g29XY	11.50	2.093	0.000	1.493	2.093
XBrace3	g29Y	20.84	0.000	-2.710	-1.695	-2.710
XBrace3	g30P	3.30	0.601	0.000	0.601	0.398
XBrace3	g30X	7.68	0.000	-0.869	-0.869	-0.777
XBrace3	g30XY	14.05	0.000	-1.590	-1.150	-1.590
XBrace3	g30Y	5.47	0.995	0.000	0.436	0.995
XBrace4	g31P	73.61	0.000	-2.642	-2.241	-2.642
XBrace4	g31X	6.83	1.559	0.000	0.485	1.559

XBrace4 g31XY	25.59	5.837	0.000	0.587	5.837
XBrace4 g31Y	86.67	0.000	-3.111	-3.111	0.000
XBrace4 g32P	19.06	4.349	0.000	3.399	4.349
XBrace4 g32X	3.50	0.797	0.000	0.262	0.797
XBrace4 g32XY	0.00	0.000	0.000	0.000	0.000
XBrace4 g32Y	21.60	4.927	0.000	3.161	4.927
XBrace5 g33P	85.08	0.000	-2.285	-2.128	-2.285
XBrace5 g33X	6.47	0.886	-0.174	-0.174	0.886
XBrace5 g33XY	31.62	6.441	0.000	4.153	6.441
XBrace5 g33Y	0.00	0.000	0.000	0.000	0.000
XBrace5 g34P	28.90	5.888	0.000	4.246	5.888
XBrace5 g34X	15.78	0.000	-0.424	-0.424	-0.252
XBrace5 g34XY	0.00	0.000	0.000	0.000	0.000
XBrace5 g34Y	26.51	5.401	0.000	3.322	5.401
XBrace6 g35P	20.78	1.891	0.000	0.852	1.891
XBrace6 g35X	24.26	0.000	-2.208	-1.165	-2.208
XBrace6 g35XY	38.01	0.000	-3.459	-2.027	-3.459
XBrace6 g35Y	34.46	3.136	0.000	1.707	3.136
XBrace6 g36P	5.31	0.000	-0.483	-0.483	-0.219
XBrace6 g36X	1.95	0.000	-0.177	-0.100	-0.177
XBrace6 g36XY	4.27	0.000	-0.388	-0.388	-0.368
XBrace6 g36Y	2.56	0.233	0.000	0.233	0.134
Horz1 g37P	11.18	0.000	-0.839	-0.839	-0.001
Horz1 g37X	20.12	0.000	-1.510	-1.510	-0.877
Horz1 g38P	14.32	1.835	0.000	1.835	1.077
Horz1 g38X	7.81	1.000	-0.256	1.000	-0.256
Horz1 g39P	12.61	1.616	0.000	1.616	0.732
Horz1 g39X	9.59	1.228	0.000	1.228	0.312
Horz1 g40P	18.33	2.503	0.000	2.503	2.500
Horz1 g40X	28.96	0.000	-2.173	-1.408	-2.173
Horz2 g41P	31.78	0.000	-3.910	-2.837	-3.910
Horz2 g41X	3.57	0.592	0.000	0.592	0.543
Horz2 g42P	4.61	0.764	0.000	0.764	0.380
Horz2 g42Y	16.37	0.986	-2.014	0.986	-2.014
Horz3 g43P	35.96	0.000	-5.717	-4.231	-5.717
Horz3 g43X	3.32	0.604	0.000	0.280	0.604
Horz3 g44P	9.18	1.670	0.000	1.670	1.444
Horz3 g44Y	20.35	0.000	-3.235	-0.479	-3.235
Horz4 g45P	16.63	0.000	-3.027	-2.285	-3.027
Horz4 g45X	0.91	0.166	0.000	0.166	0.160
Horz4 g45XY	0.27	0.018	-0.049	-0.049	0.018
Horz4 g45Y	15.19	0.000	-2.765	-1.752	-2.765
Horz4 g46P	6.05	0.000	-1.101	-0.050	-1.101
Horz4 g46X	8.76	1.594	0.000	1.451	1.594
Horz4 g46XY	2.50	0.455	0.000	0.400	0.455
Horz4 g46Y	22.52	0.000	-4.098	-2.379	-4.098
Horz6 g47P	13.03	0.000	-1.186	-1.186	-0.515
Horz6 g47X	11.01	0.000	-1.002	-1.002	-0.349
Horz6 g47XY	10.67	0.000	-0.971	-0.971	-0.284
Horz6 g47Y	12.93	0.000	-1.177	-1.177	-0.540
Horz5 g48P	45.68	4.004	0.000	4.004	1.897
Horz5 g48X	65.58	5.748	0.000	5.748	1.937
Horz5 g48XY	66.27	5.809	0.000	5.809	2.096
Horz5 g48Y	44.97	3.942	0.000	3.942	1.707
Inner1 g49P	3.11	0.228	0.000	0.228	0.090
Inner1 g49X	3.32	0.244	0.000	0.244	0.115
Inner1 g50P	1.77	0.130	0.000	0.130	0.083
Inner1 g50X	1.14	0.041	-0.104	0.041	-0.104
Inner1 g51P	1.02	0.000	-0.092	-0.092	-0.041

Inner1	g51X	4.15	0.000	-0.377	-0.377	-0.169
Inner1	g52P	3.71	0.000	-0.338	-0.338	-0.041
Inner1	g52X	2.23	0.000	-0.202	-0.174	-0.202
Inner2	g53P	19.85	0.000	-0.616	-0.095	-0.616
Inner2	g53X	48.90	0.000	-1.518	-0.759	-1.518
Arm1	g54P	14.22	2.588	0.000	2.588	1.523
Arm1	g54X	2.81	0.000	-0.512	-0.512	-0.473
Arm1	g54XY	2.87	0.000	-0.523	-0.523	-0.484
Arm1	g54Y	14.13	2.571	0.000	2.571	1.499
Arm1	g55P	19.76	3.597	0.000	3.597	1.395
Arm1	g55Y	18.44	3.357	0.000	3.357	1.322
Arm2	g56P	11.55	0.080	-2.078	-2.078	0.080
Arm2	g56Y	10.93	0.635	-1.966	-1.966	0.635
Arm4	g57P	18.71	0.000	-3.405	-3.405	-1.161
Arm4	g57Y	18.65	0.000	-3.395	-3.395	-1.195
Arm3	g58P	15.81	0.000	-2.711	-2.711	-0.362
Arm3	g58Y	15.41	0.000	-2.643	-2.643	-0.173
Arm4	g59P	28.72	0.000	-5.227	-5.227	-2.035
Arm4	g59Y	27.96	0.000	-5.089	-5.089	-1.953
Arm2	g60P	4.35	0.791	0.000	0.060	0.791
Arm2	g60Y	6.20	1.129	0.000	0.278	1.129
Arm4	g61P	15.75	0.000	-2.867	-2.867	-1.183
Arm4	g61Y	16.00	0.000	-2.911	-2.911	-1.033
ArmBr1	g62P	34.52	0.000	-3.141	-3.141	-0.922
ArmBr3	g63P	36.97	3.240	0.000	3.240	1.551
ArmBr3	g63Y	34.95	3.064	0.000	3.064	0.722
ArmBr3	g64P	50.31	4.410	0.000	4.410	1.873
ArmBr3	g64Y	49.30	4.322	0.000	4.322	1.651
ArmBr3	g65P	24.56	2.153	0.000	2.153	1.049
ArmBr3	g65Y	20.93	1.834	0.000	1.834	0.559
Arm4	g66P	28.31	0.000	-5.152	-5.152	-2.439
Arm4	g66Y	29.47	0.000	-5.364	-5.364	-3.075
Arm4	g67P	42.24	0.000	-7.688	-7.688	-3.754
Arm4	g67Y	42.56	0.000	-7.745	-7.745	-3.933
Arm4	g68P	22.33	0.000	-4.064	-4.064	-2.322
Arm4	g68Y	22.76	0.000	-4.143	-4.143	-2.628
ArmBr2	g69P	13.91	0.000	-1.266	-1.266	-0.346
ArmBr3	g70P	44.64	3.913	0.000	3.913	1.104
ArmBr3	g70Y	47.22	4.139	0.000	4.139	1.810
ArmBr3	g71P	73.71	6.461	0.000	6.461	2.460
ArmBr3	g71Y	74.13	6.498	0.000	6.498	2.615
ArmBr3	g72P	34.21	2.998	0.000	2.998	1.060
ArmBr3	g72Y	35.07	3.074	0.000	3.074	1.390

*** Analysis Results for Load Case No. 1 "NESC Heavy" - Number of iterations in SAPS 11

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)
1P	-0.01259	-0.248	0.007508	0.3286	-0.0354	0.0697	2.487	2.252	91.01
2P	-0.009894	-0.2191	0.007675	0.3242	-0.0227	0.0694	2.49	2.281	86.01
3P	-0.00842	-0.1833	0.007407	0.3548	-0.0283	0.0674	2.492	2.317	80.01
4P	-0.004878	-0.1516	0.00661	0.2793	-0.0097	0.0649	2.495	2.348	74.01
5P	-0.00446	-0.1248	0.005882	0.2913	-0.0248	0.0655	2.496	2.375	69.01
6P	-0.001169	-0.1029	0.004819	0.2275	-0.0202	0.0660	2.499	2.397	64
7P	0	0	0	0.0000	0.0000	0.0000	11.25	11.25	0
18P	-0.02647	-0.2514	0.06248	0.2655	-0.0263	0.0716	-0.02647	13.5	91.06
19P	0.0007209	-0.221	-0.04904	0.3997	-0.0242	0.0696	0.0007209	-6.721	85.95
20P	0.01037	-0.1526	-0.08	0.4597	-0.0206	0.0669	0.01037	-11.15	73.92
21P	0.008991	-0.1054	-0.04031	0.3341	-0.0220	0.0643	0.008991	-7.105	63.96
22P	-0.02048	-0.2232	0.04741	0.2505	-0.0248	0.0698	-0.02048	10.78	86.05
23P	-0.02002	-0.1566	0.0262	-0.0043	-0.0215	0.0664	-0.02002	15.34	74.03
24P	-0.01141	-0.1066	0.03697	0.2005	-0.0161	0.0640	-0.01141	11.39	64.04
1X	-0.006472	-0.2484	-0.02129	0.3431	-0.0253	0.0703	2.494	-2.748	90.98
1XY	-0.006047	-0.2546	-0.02349	0.3446	-0.0251	0.0703	-2.506	-2.755	90.98
1Y	-0.01235	-0.2542	0.005278	0.3296	-0.0192	0.0712	-2.512	2.246	91.01
2X	-0.003995	-0.2186	-0.02095	0.3356	-0.0386	0.0684	2.496	-2.719	85.98
2XY	-0.004269	-0.2247	-0.02311	0.3355	-0.0104	0.0692	-2.504	-2.725	85.98
2Y	-0.0104	-0.2251	0.005499	0.3259	-0.0298	0.0685	-2.51	2.275	86.01
3X	-0.0004252	-0.1844	-0.01996	0.3223	-0.0046	0.0776	2.5	-2.684	79.98
3XY	-0.00296	-0.1904	-0.02201	0.3256	-0.0419	0.0556	-2.503	-2.69	79.98
3Y	-0.006588	-0.189	0.005347	0.3550	-0.0220	0.0662	-2.507	2.311	80.01
4X	0.0007266	-0.151	-0.0184	0.2947	-0.0420	0.0695	2.501	-2.651	73.98
4XY	0.0003886	-0.1567	-0.02029	0.2943	0.0010	0.0589	-2.5	-2.657	73.98
4Y	-0.005323	-0.1573	0.004737	0.2810	-0.0342	0.0640	-2.505	2.343	74
5X	0.003683	-0.1265	-0.01701	0.2816	-0.0117	0.0677	2.504	-2.626	68.98
5XY	0.0008977	-0.1322	-0.01884	0.2830	-0.0283	0.0574	-2.499	-2.632	68.98
5Y	-0.001989	-0.1304	0.004144	0.2921	-0.0181	0.0599	-2.502	2.37	69
6X	0.003814	-0.1026	-0.01517	0.2432	-0.0199	0.0657	2.504	-2.603	63.98
6XY	0.004209	-0.108	-0.01699	0.2472	-0.0208	0.0560	-2.496	-2.608	63.98
6Y	-0.001862	-0.1084	0.003283	0.2311	-0.0150	0.0558	-2.502	2.392	64
7X	0	0	0	0.0000	0.0000	0.0000	11.25	-11.25	0
7XY	0	0	0	0.0000	0.0000	0.0000	-11.25	-11.25	0
7Y	0	0	0	0.0000	0.0000	0.0000	-11.25	11.25	0
18X	0.00766	-0.2521	-0.09595	0.3896	-0.0255	0.0710	0.00766	-14	90.9
8S	-0.002133	-0.08277	0.005984	0.2016	0.0024	0.0603	3.181	3.101	59.01
9S	-0.001068	-0.06338	0.006813	0.1563	-0.0168	0.0449	4.003	3.941	53.01
10S	-0.0005467	-0.04636	0.007016	0.1268	-0.0038	0.0357	4.892	4.846	46.51
11S	-9.395e-005	-0.01951	0.006677	0.0778	-0.0001	0.0162	6.875	6.855	32.01
12S	-0.00018	-0.0005075	0.002965	0.0141	-0.0021	-0.0130	9.883	9.882	10
13S	-0.01106	-0.0004904	-0.001604	0.0307	0.0156	-0.0334	9.872	-0.0004904	9.998
14S	0.0001741	-0.002813	-0.0004534	0.0208	-0.0008	0.0011	0.0001741	9.88	10
15S	-0.006416	-0.1656	0.006978	0.2960	-0.0415	0.0663	2.494	2.334	77.01
16S	-0.006249	-0.1686	0.005557	0.2958	-0.0217	0.0667	-0.006249	2.331	77.01
17S	-0.003028	-0.1667	-0.005732	0.2952	-0.0236	0.0585	2.497	-0.1667	76.99
8X	0.007998	-0.08338	-0.01504	0.1863	-0.0407	0.0732	3.192	-3.267	58.98
8XY	0.004963	-0.08978	-0.01742	0.1927	-0.0003	0.0367	-3.179	-3.273	58.98
8Y	0.0003258	-0.08903	0.004384	0.2094	-0.0292	0.0503	-3.183	3.095	59
9X	0.01101	-0.06365	-0.01435	0.1566	-0.0123	0.0804	4.015	-4.068	52.99

9XY	0.007888	-0.07081	-0.01743	0.1636	-0.0367	0.0167	-3.996	-4.075	52.98
9Y	0.0003115	-0.07048	0.005161	0.1632	-0.0053	0.0523	-4.004	3.933	53.01
10X	0.01275	-0.04665	-0.0132	0.1157	0.0009	0.0893	4.905	-4.939	46.49
10XY	0.01251	-0.05456	-0.01701	0.1185	-0.0249	-0.0100	-4.88	-4.947	46.48
10Y	0.0006384	-0.05418	0.00531	0.1293	-0.0145	0.0473	-4.892	4.838	46.51
11X	0.01024	-0.0201	-0.01078	0.0631	0.0355	0.1084	6.885	-6.895	31.99
11XY	0.01014	-0.02884	-0.01375	0.0791	0.0269	-0.0708	-6.865	-6.904	31.99
11Y	0.001441	-0.02902	0.004751	0.0930	-0.0089	0.0372	-6.874	6.846	32
12X	-0.000182	-0.0007765	-0.004731	-0.0030	0.0332	0.1467	9.883	-9.884	9.995
12XY	-1.937e-006	-0.0009805	-0.00501	0.0055	-0.0198	-0.1442	-9.883	-9.884	9.995
12Y	0.0006356	-0.001396	0.002895	0.0275	0.0043	0.0239	-9.882	9.881	10
13Y	0.01221	-0.0009079	-0.001764	0.0261	-0.0078	0.0273	-9.871	-0.0009079	9.998
14X	-7.005e-005	-0.04444	0.005841	-0.0001	-0.0045	0.0003	-7.005e-005	-9.927	10.01
15X	-0.0006644	-0.1675	-0.01922	0.3242	-0.0059	0.0822	2.499	-2.667	76.98
15XY	-0.0003849	-0.1733	-0.02119	0.3274	-0.0380	0.0489	-2.5	-2.673	76.98
15Y	-0.006083	-0.1714	0.005011	0.2955	-0.0050	0.0651	-2.506	2.329	77.01
16X	-0.0005206	-0.1722	-0.01972	0.3258	-0.0221	0.0669	-0.0005206	-2.672	76.98
17Y	-0.003753	-0.1725	-0.007644	0.2945	-0.0215	0.0656	-2.504	-0.1725	76.99

Joint Support Reactions for Load Case "NESC Heavy":

Joint Label	X Force (kips)	X Usage %	Y Force (kips)	Y Usage %	H-Shear Usage %	Z Force (kips)	Comp. Usage %	Uplift Usage %	Result. Force (kips)	Result. Usage %	X Moment (ft-k)	X-M. Usage %	Y Moment (ft-k)	Y-M. Usage %	H-Bend-M Usage %	Z Moment (ft-k)	Z-M. Usage %	Max. Usage %
7P	3.85	0.0	4.72	0.0	0.0	30.35	0.0	0.0	30.95	0.0	0.06	0.0	-0.1	0.0	0.0	0.04	0.0	0.0
7X	-6.66	0.0	7.51	0.0	0.0	-48.74	0.0	0.0	49.77	0.0	0.14	0.0	0.1	0.0	0.0	-0.35	0.0	0.0
7XY	7.43	0.0	8.61	0.0	0.0	-52.79	0.0	0.0	54.01	0.0	0.16	0.0	-0.0	0.0	0.0	0.32	0.0	0.0
7Y	-4.62	0.0	5.57	0.0	0.0	32.51	0.0	0.0	33.30	0.0	0.04	0.0	0.0	0.0	0.0	-0.06	0.0	0.0

Joint Displacements, Loads and Member Forces on Joints for Load Case "NESC Heavy":

Joint Label	X External Load (kips)	Y External Load (kips)	Z External Load (kips)	X Member Force (kips)	Y Member Force (kips)	Z Member Force (kips)	X Disp. (ft)	Y Disp. (ft)	Z Disp. (ft)
1P	0.0000	0.0000	-0.1403	0.0000	-0.0000	0.1403	-0.0126	-0.2480	0.0075
2P	0.0000	0.0000	-0.2147	0.0000	-0.0000	0.2147	-0.0099	-0.2191	0.0077
3P	0.0000	0.0000	-0.1224	0.0000	-0.0000	0.1224	-0.0084	-0.1833	0.0074
4P	0.0000	0.0000	-0.2305	0.0000	-0.0000	0.2305	-0.0049	-0.1516	0.0066
5P	0.0000	0.0000	-0.1850	0.0000	-0.0000	0.1850	-0.0045	-0.1248	0.0059
6P	0.0000	0.0000	-0.2499	0.0000	-0.0000	0.2499	-0.0012	-0.1029	0.0048
7P	0.0000	0.0000	-0.2153	-3.8506	-4.7154	30.5614	0.0000	0.0000	0.0000
18P	0.0000	-1.6140	-1.1255	-0.0000	1.6140	1.1255	-0.0265	-0.2514	0.0625
19P	0.0000	-2.8037	-2.8428	0.0000	2.8037	2.8428	0.0007	-0.2210	-0.0490
20P	0.0000	-2.7784	-2.8429	0.0000	2.7784	2.8429	0.0104	-0.1526	-0.0800
21P	0.0000	-2.7831	-2.8198	0.0000	2.7831	2.8198	0.0090	-0.1054	-0.0403
22P	0.0000	-2.7390	-2.8968	-0.0000	2.7390	2.8968	-0.0205	-0.2232	0.0474
23P	0.0000	-2.7390	-2.9310	-0.0000	2.7390	2.9310	-0.0200	-0.1566	0.0262
24P	0.0000	-2.7390	-2.8884	-0.0000	2.7390	2.8884	-0.0114	-0.1066	0.0370
1X	0.0000	-0.0683	-0.1364	0.0000	0.0683	0.1364	-0.0065	-0.2484	-0.0213
1XY	0.1100	-0.1053	-0.5744	-0.1100	0.1053	0.5744	-0.0060	-0.2546	-0.0235
1Y	-0.4630	-0.7320	-0.5633	0.4630	0.7320	0.5633	-0.0124	-0.2542	0.0053
2X	0.0000	-0.1183	-0.1856	0.0000	0.1183	0.1856	-0.0040	-0.2186	-0.0210
2XY	0.0000	-0.1183	-0.1856	0.0000	0.1183	0.1856	-0.0043	-0.2247	-0.0231
2Y	0.0000	0.0000	-0.2147	0.0000	-0.0000	0.2147	-0.0104	-0.2251	0.0055
3X	0.0000	-0.0978	-0.1224	0.0000	0.0978	0.1224	-0.0004	-0.1844	-0.0200
3XY	0.1220	0.0282	-0.5524	-0.1220	-0.0282	0.5524	-0.0030	-0.1904	-0.0220

3Y	0.2310	0.0030	-0.7094	-0.2310	-0.0030	0.7094	-0.0066	-0.1890	0.0053
4X	0.0000	-0.1065	-0.1914	0.0000	0.1065	0.1914	0.0007	-0.1510	-0.0184
4XY	0.0000	-0.1065	-0.1914	0.0000	0.1065	0.1914	0.0004	-0.1567	-0.0203
4Y	0.0000	0.0000	-0.2305	0.0000	-0.0000	0.2305	-0.0053	-0.1573	0.0047
5X	0.0000	-0.1405	-0.1809	0.0000	0.1405	0.1809	0.0037	-0.1265	-0.0170
5XY	0.0000	-0.1405	-0.1809	0.0000	0.1405	0.1809	0.0009	-0.1322	-0.0188
5Y	0.0000	-0.0450	-0.4730	0.0000	0.0450	0.4730	-0.0020	-0.1304	0.0041
6X	0.0000	-0.1329	-0.2197	0.0000	0.1329	0.2197	0.0038	-0.1026	-0.0152
6XY	0.0000	-0.1329	-0.2197	0.0000	0.1329	0.2197	0.0042	-0.1080	-0.0170
6Y	0.0000	0.0000	-0.2499	0.0000	-0.0000	0.2499	-0.0019	-0.1084	0.0033
7X	0.0000	-0.1418	-0.2153	6.6645	-7.3676	-48.5274	0.0000	0.0000	0.0000
7XY	0.0000	-0.1418	-0.2153	-7.4331	-8.4723	-52.5796	0.0000	0.0000	0.0000
7Y	0.0000	0.0000	-0.2153	4.6191	-5.5702	32.7233	0.0000	0.0000	0.0000
18X	0.0000	-2.4392	-1.8054	0.0000	2.4392	1.8054	0.0077	-0.2521	-0.0959
8S	0.0000	0.0000	-0.1731	0.0000	0.0000	0.1731	-0.0021	-0.0828	0.0060
9S	0.0000	0.0000	-0.2022	-0.0000	0.0000	0.2022	-0.0011	-0.0634	0.0068
10S	0.0000	0.0000	-0.3869	-0.0000	0.0000	0.3869	-0.0005	-0.0464	0.0070
11S	0.0000	0.0000	-0.7285	-0.0000	0.0000	0.7285	-0.0001	-0.0195	0.0067
12S	0.0000	0.0000	-0.5405	-0.0000	0.0000	0.5405	-0.0002	-0.0005	0.0030
13S	0.0000	0.0000	-0.2069	-0.0000	0.0000	0.2069	-0.0111	-0.0005	-0.0016
14S	0.0000	0.0000	-0.2069	-0.0000	0.0000	0.2069	0.0002	-0.0028	-0.0005
15S	0.0000	0.0000	-0.0543	-0.0000	0.0000	0.0543	-0.0064	-0.1656	0.0070
16S	0.0000	0.0000	-0.0588	-0.0000	-0.0000	0.0588	-0.0062	-0.1686	0.0056
17S	0.0000	0.0000	-0.0563	0.0000	0.0000	0.0563	-0.0030	-0.1667	-0.0057
8X	0.0000	-0.1345	-0.1731	0.0000	0.1345	0.1731	0.0080	-0.0834	-0.0150
8XY	0.0000	-0.1345	-0.1731	0.0000	0.1345	0.1731	0.0050	-0.0898	-0.0174
8Y	0.0000	-0.0480	-0.4821	0.0000	0.0480	0.4821	0.0003	-0.0890	0.0044
9X	0.0000	-0.1568	-0.2022	0.0000	0.1568	0.2022	0.0110	-0.0636	-0.0144
9XY	0.0000	-0.1568	-0.2022	0.0000	0.1568	0.2022	0.0079	-0.0708	-0.0174
9Y	0.0000	0.0000	-0.2022	0.0000	-0.0000	0.2022	0.0003	-0.0705	0.0052
10X	0.0000	-0.2686	-0.3869	0.0000	0.2686	0.3869	0.0127	-0.0466	-0.0132
10XY	0.0000	-0.2686	-0.3869	0.0000	0.2686	0.3869	0.0125	-0.0546	-0.0170
10Y	0.0000	-0.0580	-0.7569	-0.0000	0.0580	0.7569	0.0006	-0.0542	0.0053
11X	0.0000	-0.4564	-0.7285	0.0000	0.4564	0.7285	0.0102	-0.0201	-0.0108
11XY	0.0000	-0.4564	-0.7285	0.0000	0.4564	0.7285	0.0101	-0.0288	-0.0137
11Y	0.0000	-0.0780	-1.2285	-0.0000	0.0780	1.2285	0.0014	-0.0290	0.0048
12X	0.0000	-0.3715	-0.5405	0.0000	0.3715	0.5405	-0.0002	-0.0008	-0.0047
12XY	0.0000	-0.3715	-0.5405	0.0000	0.3715	0.5405	-0.0000	-0.0010	-0.0050
12Y	0.0000	-0.0900	-1.1165	-0.0000	0.0900	1.1165	0.0006	-0.0014	0.0029
13Y	0.0000	0.0000	-0.2069	0.0000	-0.0000	0.2069	0.0122	-0.0009	-0.0018
14X	0.0000	-0.2536	-0.2069	0.0000	0.2536	0.2069	-0.0001	-0.0444	0.0058
15X	0.0000	-0.0484	-0.0494	-0.0000	0.0484	0.0494	-0.0007	-0.1675	-0.0192
15XY	0.0000	-0.0484	-0.0494	-0.0000	0.0484	0.0494	-0.0004	-0.1733	-0.0212
15Y	0.0000	0.0000	-0.0543	-0.0000	0.0000	0.0543	-0.0061	-0.1714	0.0050
16X	0.0000	-0.0765	-0.0588	0.0000	0.0765	0.0588	-0.0005	-0.1722	-0.0197
17Y	0.0000	0.0000	-0.0563	0.0000	-0.0000	0.0563	-0.0038	-0.1725	-0.0076

Crossing Diagonal Check for Load Case "NESC Heavy" (RLOUT controls):

Comp. Member Label	Tens. Member Label	Connect Leg for Comp. Member	Force In Comp. Member (kips)	Force In Tens. Member (kips)	Original Supported L/R Cap. (kips)	RLX	RLY	RLZ	L/R	KL/R	Curve No.	Alternate Unsupported L/R Cap. (kips)	RLOUT	L/R	KL/R	Curve No.
g14X	g14XY	Short only	-0.59	-0.63	11.56	0.750	0.500	0.500	123.69	122.85	5	8.63	1.000	158.01	143.38	6
g14XY	g14X	Short only	-0.63	-0.59	11.56	0.750	0.500	0.500	123.69	122.85	5	8.63	1.000	158.01	143.38	6
g16P	g16Y	Long only	-1.19	-0.38	22.45	0.500	0.750	0.500	122.46	121.91	5	15.84	1.000	163.28	146.62	6
g16Y	g16P	Long only	-0.38	-1.19	22.45	0.500	0.750	0.500	122.46	121.91	5	15.84	1.000	163.28	146.62	6

g22P	g22Y	Long only	-1.30	-0.60	24.78	0.500	0.750	0.500	110.87	113.15	2	18.12	1.000	147.83	137.11	6
g22Y	g22P	Long only	-0.60	-1.30	24.78	0.500	0.750	0.500	110.87	113.15	2	18.12	1.000	147.83	137.11	6
g24X	g24XY	Long only	-1.78	-2.28	24.78	0.500	0.750	0.500	110.87	113.15	2	18.12	1.000	147.83	137.11	6
g24XY	g24X	Long only	-2.28	-1.78	24.78	0.500	0.750	0.500	110.87	113.15	2	18.12	1.000	147.83	137.11	6
g26X	g26XY	Short only	-1.78	-2.16	19.79	0.781	0.563	0.563	103.74	107.80	2	17.69	1.000	117.23	118.62	3
g26XY	g26X	Short only	-2.16	-1.78	19.79	0.781	0.563	0.563	103.74	107.80	2	17.69	1.000	117.23	118.62	3
g28P	g28Y	Short only	-0.73	-0.95	16.29	0.779	0.557	0.557	126.91	125.30	5	14.09	1.000	144.97	135.35	6
g28Y	g28P	Short only	-0.95	-0.73	16.29	0.779	0.557	0.557	126.91	125.30	5	14.09	1.000	144.97	135.35	6
g30X	g30XY	Short only	-0.87	-1.15	13.00	0.775	0.550	0.550	147.38	140.91	5	11.31	1.000	170.50	151.06	6
g30XY	g30X	Short only	-1.15	-0.87	13.00	0.775	0.550	0.550	147.38	140.91	5	11.31	1.000	170.50	151.06	6

Summary of Clamp Capacities and Usages for Load Case "NESC Heavy":

Clamp Label	Force (kips)	Input Holding Capacity (kips)	Factored Holding Capacity (kips)	Usage %
1	1.968	50.00	50.00	3.94
2	3.035	50.00	50.00	6.07
3	3.993	50.00	50.00	7.99
4	3.975	50.00	50.00	7.95
5	3.962	50.00	50.00	7.92
6	3.987	50.00	50.00	7.97
7	4.012	50.00	50.00	8.02
8	3.981	50.00	50.00	7.96
9	0.746	50.00	50.00	1.49
10	0.475	50.00	50.00	0.95
11	0.484	50.00	50.00	0.97
12	0.759	50.00	50.00	1.52
13	1.231	50.00	50.00	2.46
14	1.120	50.00	50.00	2.24
15	0.594	50.00	50.00	1.19
16	1.033	50.00	50.00	2.07
17	0.566	50.00	50.00	1.13

*** Analysis Results for Load Case No. 2 "NESC Extreme" - Number of iterations in SAPS 12

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)
1P	-0.01439	-0.3123	0.01388	0.4161	-0.0349	0.1273	2.486	2.188	91.01
2P	-0.01189	-0.2758	0.01395	0.4110	-0.0170	0.1243	2.488	2.224	86.01
3P	-0.01067	-0.2323	0.01339	0.4180	-0.0358	0.1343	2.489	2.268	80.01
4P	-0.006744	-0.1921	0.01221	0.3591	-0.0055	0.1170	2.493	2.308	74.01
5P	-0.006405	-0.1601	0.01109	0.3543	-0.0301	0.1147	2.494	2.34	69.01
6P	-0.002503	-0.1319	0.00953	0.2907	-0.0238	0.1125	2.497	2.368	64.01
7P	0	0	0	0.0000	0.0000	0.0000	11.25	11.25	0
18P	-0.03993	-0.3184	0.09188	0.3960	-0.0250	0.1310	-0.03993	13.43	91.09
19P	0.007359	-0.2809	-0.05336	0.4414	-0.0237	0.1248	0.007359	-6.781	85.95
20P	0.01915	-0.1962	-0.08171	0.4362	-0.0215	0.1120	0.01915	-11.2	73.92
21P	0.01412	-0.1365	-0.04389	0.3726	-0.0228	0.1051	0.01412	-7.136	63.96
22P	-0.03051	-0.282	0.07211	0.3907	-0.0232	0.1251	-0.03051	10.72	86.07
23P	-0.0319	-0.1982	0.07729	0.2547	-0.0226	0.1112	-0.0319	15.3	74.08
24P	-0.01899	-0.1371	0.05708	0.3168	-0.0202	0.1043	-0.01899	11.36	64.06
1X	-0.003155	-0.3123	-0.02202	0.4215	-0.0166	0.1279	2.497	-2.812	90.98
1XY	-0.002898	-0.3236	-0.02403	0.4260	-0.0254	0.1273	-2.503	-2.824	90.98
1Y	-0.01437	-0.3236	0.01177	0.4204	-0.0215	0.1283	-2.514	2.176	91.01
2X	-0.001375	-0.2755	-0.02169	0.4146	-0.0346	0.1242	2.499	-2.776	85.98
2XY	-0.001292	-0.2863	-0.02372	0.4182	-0.0074	0.1206	-2.501	-2.786	85.98
2Y	-0.01217	-0.2865	0.01189	0.4144	-0.0368	0.1211	-2.512	2.213	86.01
3X	0.002154	-0.2326	-0.02063	0.4051	-0.0031	0.1342	2.502	-2.733	79.98
3XY	-0.0007636	-0.2428	-0.02262	0.4126	-0.0381	0.0962	-2.501	-2.743	79.98
3Y	-0.008039	-0.2423	0.0114	0.4242	-0.0164	0.0969	-2.508	2.258	80.01
4X	0.002757	-0.1918	-0.01895	0.3650	-0.0440	0.1156	2.503	-2.692	73.98
4XY	0.00268	-0.2014	-0.02086	0.3673	0.0042	0.0999	-2.497	-2.701	73.98
4Y	-0.006938	-0.2017	0.01029	0.3618	-0.0428	0.0999	-2.507	2.298	74.01
5X	0.006047	-0.1606	-0.01741	0.3509	-0.0114	0.1112	2.506	-2.661	68.98
5XY	0.002669	-0.1699	-0.01929	0.3548	-0.0278	0.0947	-2.497	-2.67	68.98
5Y	-0.003203	-0.1693	0.009231	0.3590	-0.0176	0.0931	-2.503	2.331	69.01
6X	0.005716	-0.1317	-0.0154	0.2960	-0.0175	0.1067	2.506	-2.632	63.98
6XY	0.006329	-0.1407	-0.01728	0.3013	-0.0227	0.0896	-2.494	-2.641	63.98
6Y	-0.00319	-0.1408	0.007758	0.2926	-0.0207	0.0862	-2.503	2.359	64.01
7X	0	0	0	0.0000	0.0000	0.0000	11.25	-11.25	0
7XY	0	0	0	0.0000	0.0000	0.0000	-11.25	-11.25	0
7Y	0	0	0	0.0000	0.0000	0.0000	-11.25	11.25	0
18X	0.02248	-0.3181	-0.1083	0.4399	-0.0230	0.1308	0.02248	-14.07	90.89
8S	-0.003857	-0.1072	0.01068	0.2389	-0.0028	0.1233	3.18	3.076	59.01
9S	-0.002507	-0.08266	0.01145	0.1905	-0.0320	0.1305	4.001	3.921	53.01
10S	-0.001579	-0.06096	0.01142	0.1479	-0.0211	0.1456	4.891	4.832	46.51
11S	-0.0007113	-0.02624	0.01042	0.0786	-0.0189	0.1732	6.874	6.849	32.01
12S	-0.0007983	-0.00122	0.004461	-0.0026	-0.0445	0.2144	9.882	9.882	10
13S	-0.003345	-0.0009963	-0.0005447	0.0435	-0.0014	-0.0966	9.879	-0.0009963	9.999
14S	8.562e-005	-0.07997	-0.01128	0.0082	-0.0001	0.0014	8.562e-005	9.803	9.989
15S	-0.008158	-0.211	0.01279	0.3818	-0.0476	0.1391	2.492	2.289	77.01
16S	-0.008073	-0.2189	0.01122	0.3836	-0.0198	0.1120	-0.008073	2.281	77.01
17S	-0.001644	-0.2114	-0.003361	0.3668	-0.0233	0.0975	2.498	-0.2114	77
8X	0.01054	-0.1074	-0.01562	0.2351	-0.0428	0.1144	3.194	-3.291	58.98
8XY	0.007108	-0.118	-0.01809	0.2391	0.0033	0.0635	-3.176	-3.302	58.98
8Y	-0.0004616	-0.118	0.00856	0.2478	-0.0377	0.0556	-3.184	3.066	59.01
9X	0.01395	-0.08271	-0.01521	0.1939	-0.0104	0.1198	4.018	-4.087	52.98

9XY	0.01049	-0.09563	-0.01831	0.1964	-0.0409	0.0377	-3.993	-4.1	52.98
9Y	-0.0003758	-0.09493	0.00905	0.1915	-0.0031	0.0270	-4.004	3.909	53.01
10X	0.01602	-0.06106	-0.01423	0.1476	0.0045	0.1281	4.909	-4.954	46.49
10XY	0.0158	-0.07512	-0.01822	0.1639	-0.0261	-0.0005	-4.877	-4.968	46.48
10Y	6.2e-005	-0.07601	0.008559	0.1494	-0.0090	-0.0125	-4.893	4.817	46.51
11X	0.01253	-0.02674	-0.01199	0.0817	0.0466	0.1450	6.888	-6.902	31.99
11XY	0.01232	-0.03746	-0.01514	0.1170	0.0347	-0.0793	-6.863	-6.912	31.98
11Y	0.001364	-0.03865	0.008221	0.1194	0.0037	-0.0912	-6.874	6.836	32.01
12X	-0.000239	-0.001316	-0.005407	0.0001	0.0414	0.1824	9.883	-9.884	9.995
12XY	0.0001158	-0.001693	-0.005603	0.0101	-0.0243	-0.1735	-9.883	-9.885	9.994
12Y	0.001013	-0.002431	0.004462	0.0127	0.0448	-0.1990	-9.882	9.88	10
13Y	0.003943	-0.001603	-0.0006283	0.0380	0.0101	0.0891	-9.879	-0.001603	9.999
14X	-4.629e-005	-0.06213	0.008149	0.0027	-0.0051	-0.0006	-4.629e-005	-9.945	10.01
15X	0.001668	-0.2117	-0.01981	0.3925	0.0006	0.1391	2.502	-2.712	76.98
15XY	0.00177	-0.2214	-0.02175	0.3975	-0.0415	0.0840	-2.498	-2.721	76.98
15Y	-0.007998	-0.2208	0.01084	0.3857	-0.0021	0.0849	-2.508	2.279	77.01
16X	0.001729	-0.2196	-0.0202	0.3951	-0.0218	0.1122	0.001729	-2.72	76.98
17Y	-0.00504	-0.2212	-0.005296	0.3644	-0.0221	0.1233	-2.505	-0.2212	76.99

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 %
7P	6.40	0.0	8.13	0.0	0.0	47.83	0.0	0.0	48.94	0.0	0.17	0.0	-0.0	0.0	0.0	-0.49	0.0	0.0
7X	-7.81	0.0	9.50	0.0	0.0	-56.84	0.0	0.0	58.15	0.0	0.15	0.0	0.1	0.0	0.0	-0.44	0.0	0.0
7XY	8.46	0.0	10.80	0.0	0.0	-60.40	0.0	0.0	61.94	0.0	0.16	0.0	-0.0	0.0	0.0	0.39	0.0	0.0
7Y	-7.04	0.0	9.36	0.0	0.0	50.84	0.0	0.0	52.17	0.0	0.12	0.0	0.0	0.0	0.0	0.46	0.0	0.0

Joint Displacements, Loads and Member Forces on Joints for Load Case "NESC Extreme":

Joint Label	X External Load (kips)	Y External Load (kips)	Z External Load (kips)	X Member Force (kips)	Y Member Force (kips)	Z Member Force (kips)	X Disp. (ft)	Y Disp. (ft)	Z Disp. (ft)
1P	0.0000	-0.1299	-0.0873	0.0000	0.1299	0.0873	-0.0144	-0.3123	0.0139
2P	0.0000	-0.1299	-0.0873	0.0000	0.1299	0.0873	-0.0119	-0.2758	0.0139
3P	0.0000	-0.1299	-0.0873	0.0000	0.1299	0.0873	-0.0107	-0.2323	0.0134
4P	0.0000	-0.1299	-0.0873	0.0000	0.1299	0.0873	-0.0067	-0.1921	0.0122
5P	0.0000	-0.1299	-0.0873	0.0000	0.1299	0.0873	-0.0064	-0.1601	0.0111
6P	0.0000	-0.4851	-0.2983	0.0000	0.4851	0.2983	-0.0025	-0.1319	0.0095
7P	0.0000	-0.3552	-0.2110	-6.4030	-7.7710	48.0455	0.0000	0.0000	0.0000
18P	0.0000	-1.0989	-0.3133	-0.0000	1.0989	0.3133	-0.0399	-0.3184	0.0919
19P	0.0000	-2.6809	-1.1593	0.0000	2.6809	1.1593	0.0074	-0.2809	-0.0534
20P	0.0000	-2.6809	-1.1593	0.0000	2.6809	1.1593	0.0192	-0.1962	-0.0817
21P	0.0000	-2.6809	-1.1593	0.0000	2.6809	1.1593	0.0141	-0.1365	-0.0439
22P	0.0000	-2.6809	-1.1593	-0.0000	2.6809	1.1593	-0.0305	-0.2820	0.0721
23P	0.0000	-2.6809	-1.1593	-0.0000	2.6809	1.1593	-0.0319	-0.1982	0.0773
24P	0.0000	-2.6809	-1.1593	-0.0000	2.6809	1.1593	-0.0190	-0.1371	0.0571
1X	0.0000	-0.1299	-0.0873	0.0000	0.1299	0.0873	-0.0032	-0.3123	-0.0220
1XY	0.9570	-1.3679	-0.2903	-0.9570	1.3679	0.2903	-0.0029	-0.3236	-0.0240
1Y	-1.1000	-1.6439	-0.2313	1.1000	1.6439	0.2313	-0.0144	-0.3236	0.0118
2X	0.0000	-0.1299	-0.0873	0.0000	0.1299	0.0873	-0.0014	-0.2755	-0.0217
2XY	0.0000	-0.1299	-0.0873	0.0000	0.1299	0.0873	-0.0013	-0.2863	-0.0237
2Y	0.0000	-0.1299	-0.0873	0.0000	0.1299	0.0873	-0.0122	-0.2865	0.0119
3X	0.0000	-0.1299	-0.0873	0.0000	0.1299	0.0873	0.0022	-0.2326	-0.0206
3XY	-0.1630	0.2241	-0.2503	0.1630	-0.2241	0.2503	-0.0008	-0.2428	-0.0226

3Y	0.3060	0.1271	-0.3063	-0.3060	-0.1271	0.3063	-0.0080	-0.2423	0.0114
4X	0.0000	-0.1299	-0.0873	0.0000	0.1299	0.0873	0.0028	-0.1918	-0.0189
4XY	0.0000	-0.1299	-0.0873	0.0000	0.1299	0.0873	0.0027	-0.2014	-0.0209
4Y	0.0000	-0.1299	-0.0873	0.0000	0.1299	0.0873	-0.0069	-0.2017	0.0103
5X	0.0000	-0.1299	-0.0873	0.0000	0.1299	0.0873	0.0060	-0.1606	-0.0174
5XY	0.0000	-0.1299	-0.0873	0.0000	0.1299	0.0873	0.0027	-0.1699	-0.0193
5Y	0.0000	-0.2359	-0.1553	0.0000	0.2359	0.1553	-0.0032	-0.1693	0.0092
6X	0.0000	-0.4851	-0.2983	0.0000	0.4851	0.2983	0.0057	-0.1317	-0.0154
6XY	0.0000	-0.4851	-0.2983	0.0000	0.4851	0.2983	0.0063	-0.1407	-0.0173
6Y	0.0000	-0.4851	-0.2983	0.0000	0.4851	0.2983	-0.0032	-0.1408	0.0078
7X	0.0000	-0.3552	-0.2110	7.8139	-9.1477	-56.6255	0.0000	0.0000	0.0000
7XY	0.0000	-0.3552	-0.2110	-8.4558	-10.4421	-60.1915	0.0000	0.0000	0.0000
7Y	0.0000	-0.3552	-0.2110	7.0448	-9.0041	51.0469	0.0000	0.0000	0.0000
18X	0.0000	-2.1869	-0.5423	0.0000	2.1869	0.5423	0.0225	-0.3181	-0.1083
8S	0.0000	-0.3552	-0.2110	-0.0000	0.3552	0.2110	-0.0039	-0.1072	0.0107
9S	0.0000	-0.3552	-0.2110	-0.0000	0.3552	0.2110	-0.0025	-0.0827	0.0114
10S	0.0000	-0.3552	-0.2110	-0.0000	0.3552	0.2110	-0.0016	-0.0610	0.0114
11S	0.0000	-0.3552	-0.2110	-0.0000	0.3552	0.2110	-0.0007	-0.0262	0.0104
12S	0.0000	-0.3552	-0.2110	-0.0000	0.3552	0.2110	-0.0008	-0.0012	0.0045
13S	0.0000	-0.3552	-0.2110	-0.0000	0.3552	0.2110	-0.0033	-0.0010	-0.0005
14S	0.0000	-0.3552	-0.2110	-0.0000	0.3552	0.2110	0.0001	-0.0800	-0.0113
15S	0.0000	-0.1299	-0.0873	-0.0000	0.1299	0.0873	-0.0082	-0.2110	0.0128
16S	0.0000	-0.1299	-0.0873	-0.0000	0.1299	0.0873	-0.0081	-0.2189	0.0112
17S	0.0000	-0.1299	-0.0873	0.0000	0.1299	0.0873	-0.0016	-0.2114	-0.0034
8X	0.0000	-0.3552	-0.2110	0.0000	0.3552	0.2110	0.0105	-0.1074	-0.0156
8XY	0.0000	-0.3552	-0.2110	0.0000	0.3552	0.2110	0.0071	-0.1180	-0.0181
8Y	0.0000	-0.4692	-0.2840	-0.0000	0.4692	0.2840	-0.0005	-0.1180	0.0086
9X	0.0000	-0.3552	-0.2110	0.0000	0.3552	0.2110	0.0140	-0.0827	-0.0152
9XY	0.0000	-0.3552	-0.2110	0.0000	0.3552	0.2110	0.0105	-0.0956	-0.0183
9Y	0.0000	-0.3552	-0.2110	-0.0000	0.3552	0.2110	-0.0004	-0.0949	0.0090
10X	0.0000	-0.3552	-0.2110	0.0000	0.3552	0.2110	0.0160	-0.0611	-0.0142
10XY	0.0000	-0.3552	-0.2110	0.0000	0.3552	0.2110	0.0158	-0.0751	-0.0182
10Y	0.0000	-0.4912	-0.2980	-0.0000	0.4912	0.2980	0.0001	-0.0760	0.0086
11X	0.0000	-0.3552	-0.2110	0.0000	0.3552	0.2110	0.0125	-0.0267	-0.0120
11XY	0.0000	-0.3552	-0.2110	0.0000	0.3552	0.2110	0.0123	-0.0375	-0.0151
11Y	0.0000	-0.5392	-0.3290	-0.0000	0.5392	0.3290	0.0014	-0.0387	0.0082
12X	0.0000	-0.3552	-0.2110	0.0000	0.3552	0.2110	-0.0002	-0.0013	-0.0054
12XY	0.0000	-0.3552	-0.2110	-0.0000	0.3552	0.2110	0.0001	-0.0017	-0.0056
12Y	0.0000	-0.5672	-0.3470	-0.0000	0.5672	0.3470	0.0010	-0.0024	0.0045
13Y	0.0000	-0.3552	-0.2110	0.0000	0.3552	0.2110	0.0039	-0.0016	-0.0006
14X	0.0000	-0.3552	-0.2110	0.0000	0.3552	0.2110	-0.0000	-0.0621	0.0081
15X	0.0000	-0.1299	-0.0873	-0.0000	0.1299	0.0873	0.0017	-0.2117	-0.0198
15XY	0.0000	-0.1299	-0.0873	-0.0000	0.1299	0.0873	0.0018	-0.2214	-0.0218
15Y	0.0000	-0.1299	-0.0873	-0.0000	0.1299	0.0873	-0.0080	-0.2208	0.0108
16X	0.0000	-0.1299	-0.0873	0.0000	0.1299	0.0873	0.0017	-0.2196	-0.0202
17Y	0.0000	-0.1299	-0.0873	0.0000	0.1299	0.0873	-0.0050	-0.2212	-0.0053

Crossing Diagonal Check for Load Case "NESC Extreme" (RLOUT controls):

Comp. Member Label	Tens. Member Label	Connect Leg for Comp. Member	Force In Comp. Member (kips)	Force In Tens. Member (kips)	Original Supported L/R Cap. (kips)	RLX	RLY	RLZ	L/R	KL/R	Curve No.	Alternate Unsupported L/R Cap. (kips)	RLOUT	L/R	KL/R	Curve No.
g14X	g14XY	Short only	-0.17	-1.05	11.56	0.750	0.500	0.500	123.69	122.85	5	8.63	1.000	158.01	143.38	6
g14XY	g14X	Short only	-1.05	-0.17	11.56	0.750	0.500	0.500	123.69	122.85	5	8.63	1.000	158.01	143.38	6
g16P	g16Y	Long only	-1.91	-0.00	22.45	0.500	0.750	0.500	122.46	121.91	5	15.84	1.000	163.28	146.62	6
g16Y	g16P	Long only	-0.00	-1.91	22.45	0.500	0.750	0.500	122.46	121.91	5	15.84	1.000	163.28	146.62	6

g22P	g22Y	Long only	-1.75	-0.33	24.78	0.500	0.750	0.500	110.87	113.15	2	18.12	1.000	147.83	137.11	6
g22Y	g22P	Long only	-0.33	-1.75	24.78	0.500	0.750	0.500	110.87	113.15	2	18.12	1.000	147.83	137.11	6
g24X	g24XY	Long only	-1.26	-2.39	24.78	0.500	0.750	0.500	110.87	113.15	2	18.12	1.000	147.83	137.11	6
g24XY	g24X	Long only	-2.39	-1.26	24.78	0.500	0.750	0.500	110.87	113.15	2	18.12	1.000	147.83	137.11	6
g26X	g26XY	Short only	-1.72	-2.96	19.79	0.781	0.563	0.563	103.74	107.80	2	17.69	1.000	117.23	118.62	3
g26XY	g26X	Short only	-2.96	-1.72	19.79	0.781	0.563	0.563	103.74	107.80	2	17.69	1.000	117.23	118.62	3
g28P	g28Y	Short only	-1.50	-0.72	16.29	0.779	0.557	0.557	126.91	125.30	5	14.09	1.000	144.97	135.35	6
g28Y	g28P	Short only	-0.72	-1.50	16.29	0.779	0.557	0.557	126.91	125.30	5	14.09	1.000	144.97	135.35	6
g30X	g30XY	Short only	-0.78	-1.59	13.00	0.775	0.550	0.550	147.38	140.91	5	11.31	1.000	170.50	151.06	6
g30XY	g30X	Short only	-1.59	-0.78	13.00	0.775	0.550	0.550	147.38	140.91	5	11.31	1.000	170.50	151.06	6

Summary of Clamp Capacities and Usages for Load Case "NESC Extreme":

Clamp Label	Force (kips)	Input Holding Capacity (kips)	Factored Holding Capacity (kips)	Usage %
1	1.143	50.00	50.00	2.29
2	2.253	50.00	50.00	4.51
3	2.921	50.00	50.00	5.84
4	2.921	50.00	50.00	5.84
5	2.921	50.00	50.00	5.84
6	2.921	50.00	50.00	5.84
7	2.921	50.00	50.00	5.84
8	2.921	50.00	50.00	5.84
9	0.451	50.00	50.00	0.90
10	0.282	50.00	50.00	0.56
11	0.548	50.00	50.00	1.10
12	0.574	50.00	50.00	1.15
13	0.632	50.00	50.00	1.26
14	0.665	50.00	50.00	1.33
15	1.694	50.00	50.00	3.39
16	1.991	50.00	50.00	3.98
17	0.373	50.00	50.00	0.75

*** Overall summary for all load cases - Usage = Maximum Stress / Allowable Stress
Printed capacities do not include the strength factor entered for each load case.
The Group Summary reports on the member and load case that resulted in maximum usage
which may not necessarily be the same as that which produces maximum force.

Group Summary (Compression Portion):

Group Label	Group Desc.	Angle Curve	Angle No.	Angle Size	Steel Strength (ksi)	Max Usage %	Usage Control	Max Comp. Use In %	Comp. Control Member	Comp. Force (kips)	Comp. Load Case	L/R Capacity (kips)	Comp. Connect. Shear Capacity (kips)	Comp. Connect. Bearing Capacity (kips)	RLX	RLY	RLZ	L/R	KL/R Comp.	Length Comp.	No. Of Bolts	Group Member
Leg1	Leg1	SAE		4X4X0.25	33.0	26.47	Comp	26.47	g4XY	-15.946	NESC Hea	60.236	91.000	140.625	1.000	1.000	1.000	45.28	45.28	3.000	1	10
Leg2	Leg2	SAE		5X5X0.3125	33.0	57.87	Comp	57.87	g9X	-47.214	NESC Ext	81.579	109.200	210.937	1.000	1.000	1.000	79.92	79.92	6.620	1	12
Leg3	Leg3	SAE		5X5X0.375	33.0	64.13	Comp	64.13	g11XY	-58.387	NESC Ext	91.040	127.400	295.312	0.333	0.333	0.333	90.44	90.44	22.407	1	14
XBrace1	XBrace1	SAE		1.75X1.75X0.1875	33.0	24.11	Comp	24.11	g13Y	-2.787	NESC Ext	11.559	18.200	21.094	0.750	0.500	0.500	123.69	122.85	7.071	5	2
XBrace2	XBrace2	SAU		3X2X0.25	33.0	28.88	Tens	28.09	g21Y	-6.961	NESC Ext	24.777	36.400	56.250	0.500	0.750	0.500	110.87	113.15	7.071	2	4
XBrace3	XBrace3	SAE		2.5X2.5X0.1875	33.0	20.84	Comp	20.84	g29Y	-2.710	NESC Ext	13.003	18.200	21.094	0.775	0.550	0.550	147.38	140.91	11.054	5	2
XBrace4	XBrace4	SAE		2X2X0.25	33.0	86.67	Comp	86.67	g31Y	-3.111	NESC Hea	3.590	27.300	42.187	1.000	0.585	0.585	370.03	273.77	18.779	6	3
XBrace5	XBrace5	SAE		2.5X2.5X0.1875	33.0	85.08	Comp	85.08	g33P	-2.285	NESC Ext	2.685	27.300	31.641	1.000	0.410	0.410	429.08	310.08	27.819	6	3
XBrace6	XBrace6	SAU		3.5X2.5X0.25	33.0	38.01	Comp	38.01	g35XY	-3.459	NESC Ext	14.832	9.100	14.062	1.000	0.500	0.500	166.70	166.70	15.114	4	1
XBrace7	XBrace7	SAU		3X2X0.25	33.0	35.54	Comp	35.54	g17Y	-5.630	NESC Ext	15.844	27.300	42.187	1.000	2.000	1.000	163.28	146.62	3.905	6	3
Horz1	Horizontal 1	SAE		1.75X1.75X0.1875	33.0	28.96	Comp	28.96	g40X	-2.173	NESC Ext	7.504	18.200	21.094	1.000	1.000	1.000	174.93	153.78	5.000	6	2
Horz2	Horizontal 2	SAU		2.5X2X0.1875	33.0	31.78	Comp	31.78	g41P	-3.910	NESC Ext	12.304	18.200	21.094	1.000	0.500	0.500	148.07	137.26	9.785	6	2
Horz3	Horizontal 3	SAU		3X2.5X0.25	33.0	35.96	Comp	35.96	g43P	-5.717	NESC Ext	15.896	18.200	28.125	1.000	0.500	0.500	174.60	153.58	13.750	6	2
Horz4	**Horizontal 4**	**SAU**		**4X3X0.25**	**33.0**	**22.52**	**Comp**	**22.52**	**g46Y**	**-4.098**	**NESC Ext**	**18.857**	**18.200**	**28.125**	**2.000**	**1.000**	**1.000**	**185.30**	**160.16**	**9.883**	**6**	**2 A potentially damaging moment exists in the following members (make sure your system is well triangulated to minimize moments): g45P g45Y ??**
Horz5	Horizontal 5	Bar		1.75x1/4	33.0	66.27	Tens	0.00	g48Y	0.000		0.129	9.100	14.062	1.000	2.000	1.000	983.61	983.61	2.500	4	1
Horz6	Horizontal 6	SAE		1.75X1.75X0.1875	33.0	13.03	Comp	13.03	g47P	-1.186	NESC Hea	12.543	9.100	10.547	2.000	1.000	1.000	111.73	115.87	2.500	3	1
Inner1	Inner1	SAE		1.75X1.75X0.1875	33.0	4.15	Comp	4.15	g51X	-0.377	NESC Hea	11.437	9.100	10.547	0.500	0.500	0.500	123.69	123.69	7.071	4	1
Inner2	Inner2	SAU		2.5X2X0.1875	33.0	48.90	Comp	48.90	g53X	-1.518	NESC Ext	3.105	9.100	10.547	0.500	0.500	0.500	273.24	273.24	19.445	4	1

Arm1	Ground Wire Arm	SAU	3X2.5X0.25	33.0	19.76	Tens	2.87	g54XY	-0.523	NESC Hea	19.099	18.200	28.125	1.000	0.500	0.500	146.34	140.11	11.524	5	2
Arm2	Arm 2	SAE	2.5X2.5X0.1875	33.0	11.55	Comp	11.55	g56P	-2.078	NESC Hea	17.986	18.200	21.094	1.000	1.000	1.000	114.35	117.18	4.717	3	2
Arm3	Arm 3	SAU	3X2X0.1875	33.0	15.81	Comp	15.81	g58P	-2.711	NESC Hea	17.147	27.300	31.641	1.000	0.500	0.500	121.09	121.09	8.860	4	3
Arm4	Arm 4	SAU	4X3X0.25	33.0	42.56	Comp	42.56	g67Y	-7.745	NESC Hea	31.382	18.200	28.125	1.000	0.500	0.500	124.11	123.17	13.238	5	2
ArmBr1	ArmBr1	SAE	3X3X0.1875	33.0	34.52	Comp	34.52	g62P	-3.141	NESC Hea	9.922	9.100	10.547	1.000	1.000	1.000	177.32	177.32	8.807	4	1
ArmBr2	ArmBr2	SAE	2.5X2.5X0.1875	33.0	13.91	Comp	13.91	g69P	-1.266	NESC Hea	13.491	9.100	10.547	1.000	1.000	1.000	138.34	138.34	5.706	4	1
ArmBr3	ArmBr3	Bar	1.75x1/4	33.0	74.13	Tens	0.00	g72Y	0.000		0.029	9.100	14.062	1.000	1.000	1.000	2084.22	2084.22	10.595	4	1

Group Summary (Tension Portion):

Group Label	**Group Desc.**	**Angle Type**	**Angle Size**	**Steel Strength (ksi)**	**Max Usage %**	**Usage Cont-rol**	**Max Tension Use In Tens. %**	**Tension Control Member**	**Tension Force (kips)**	**Tension Control Load Case**	**Net Section Capacity (kips)**	**Tension Connect. Shear Capacity (kips)**	**Tension Connect. Bearing Capacity (kips)**	**Tension Connect. Rupture Capacity (kips)**	**Length Tens. Member (ft)**	**No. Of Bolts Tens.**	**No. Of Holes**	**Hole Diameter (in)**
Leg1	Leg1	SAE	4X4X0.25	33.0	26.47	Comp	25.72	g4P	12.000	NESC Ext	46.653	91.000	140.625	128.676	3.000	10	3.062	0.6875
Leg2	Leg2	SAE	5X5X0.3125	33.0	57.87	Comp	54.02	g9P	41.106	NESC Ext	76.097	109.200	210.937	220.588	6.620	12	3.370	0.6875
Leg3	Leg3	SAE	5X5X0.375	33.0	64.13	Comp	55.52	g12Y	49.783	NESC Ext	89.667	127.400	295.312	289.522	10.185	14	3.463	0.6875
XBrace1	XBrace1	SAE	1.75X1.75X0.1875	33.0	24.11	Comp	17.84	g13XY	2.602	NESC Ext	14.585	18.200	21.094	16.189	7.071	2	1.000	0.6875
XBrace2	XBrace2	SAU	3X2X0.25	33.0	28.88	Tens	28.88	g21XY	7.729	NESC Ext	26.767	36.400	56.250	50.000	7.071	4	1.680	0.6875
XBrace3	XBrace3	SAE	2.5X2.5X0.1875	33.0	20.84	Comp	15.80	g27XY	2.818	NESC Ext	22.961	27.300	31.641	17.842	9.399	3	1.000	0.6875
XBrace4	XBrace4	SAE	2X2X0.25	33.0	86.67	Comp	25.59	g31XY	5.837	NESC Ext	22.813	27.300	42.187	26.039	18.779	3	1.000	0.6875
XBrace5	XBrace5	SAE	2.5X2.5X0.1875	33.0	85.08	Comp	31.62	g33XY	6.441	NESC Ext	22.961	27.300	31.641	20.373	27.819	3	1.000	0.6875
XBrace6	XBrace6	SAU	3.5X2.5X0.25	33.0	38.01	Comp	34.46	g35Y	3.136	NESC Ext	30.238	9.100	14.062	12.500	15.114	1	1.000	0.6875
XBrace7	XBrace7	SAU	3X2X0.25	33.0	35.54	Comp	19.61	g17XY	5.354	NESC Ext	30.238	27.300	42.187	37.500	3.905	3	1.000	0.6875
Horz1	Horizontal 1	SAE	1.75X1.75X0.1875	33.0	28.96	Comp	18.33	g40P	2.503	NESC Hea	14.585	18.200	21.094	13.658	5.000	2	1.000	0.6875
Horz2	Horizontal 2	SAU	2.5X2X0.1875	33.0	31.78	Comp	5.95	g42Y	0.986	NESC Hea	17.444	18.200	21.094	16.576	9.785	2	1.000	0.6875
Horz3	Horizontal 3	SAU	3X2.5X0.25	33.0	35.96	Comp	9.18	g44P	1.670	NESC Hea	30.090	18.200	28.125	21.820	13.750	2	1.000	0.6875
Horz4	**Horizontal 4**	**SAU**	**4X3X0.25**	**33.0**	**22.52**	**Comp**	**8.76**	**g46X**	**1.594**	**NESC Ext**	**37.663**	**18.200**	**28.125**	**21.820**	**9.883**	**2**	**1.000**	**0.6875 A potentially damaging moment exists in the following members (make sure your system is well triangulated to minimize moments): g45P g45Y ??**
Horz5	Horizontal 5	Bar	1.75x1/4	33.0	66.27	Tens	66.27	g48XY	5.809	NESC Hea	8.766	9.100	14.062	12.500	2.500	1		

1.000	0.6875																
Horz6	Horizontal 6	SAE	1.75X1.75X0.1875	33.0	13.03	Comp	0.00	g47Y	0.000	14.585	9.100	10.547	7.330	2.500	1		
1.000	0.6875																
Inner1	Inner1	SAE	1.75X1.75X0.1875	33.0	4.15	Comp	3.32	g49X	0.244NESC Hea	14.585	9.100	10.547	7.330	7.071	1		
1.000	0.6875																
Inner2	Inner2	SAU	2.5X2X0.1875	33.0	48.90	Comp	0.00	g53X	0.000	17.444	9.100	10.547	7.717	19.445	1		
1.000	0.6875																
Arm1	Ground Wire Arm	SAU	3X2.5X0.25	33.0	19.76	Tens	19.76	g55P	3.597NESC Hea	33.802	18.200	28.125	28.125	5.000	2		
1.000	0.6875																
Arm2	Arm 2	SAE	2.5X2.5X0.1875	33.0	11.55	Comp	6.20	g60Y	1.129NESC Ext	22.961	18.200	21.094	18.750	5.148	2		
1.000	0.6875																
Arm3	Arm 3	SAU	3X2X0.1875	33.0	15.81	Comp	0.00	g58Y	0.000	17.333	27.300	31.641	22.061	8.860	3		
1.000	0.6875																
Arm4	Arm 4	SAU	4X3X0.25	33.0	42.56	Comp	0.00	g68Y	0.000	45.088	18.200	28.125	31.250	9.341	2		
1.000	0.6875																
ArmBr1	ArmBr1	SAE	3X3X0.1875	33.0	34.52	Comp	0.00	g62P	0.000	28.544	9.100	10.547	9.375	8.807	1		
1.000	0.6875																
ArmBr2	ArmBr2	SAE	2.5X2.5X0.1875	33.0	13.91	Comp	0.00	g69P	0.000	22.961	9.100	10.547	9.375	5.706	1		
1.000	0.6875																
ArmBr3	ArmBr3	Bar	1.75x1/4	33.0	74.13	Tens	74.13	g71Y	6.498NESC Hea	8.766	9.100	14.062	12.500	13.574	1		
1.000	0.6875																

*** Maximum Stress Summary for Each Load Case

Summary of Maximum Usages by Load Case:

Load Case	Maximum Usage %	Element Label	Element Type
NESC Heavy	86.67	g31Y	Angle
NESC Extreme	85.08	g33P	Angle

Summary of Insulator Usages:

Insulator Label	Insulator Type	Maximum Usage %	Load Case	Weight (lbs)
1	Clamp	3.94	NESC Heavy	0.0
2	Clamp	6.07	NESC Heavy	0.0
3	Clamp	7.99	NESC Heavy	0.0
4	Clamp	7.95	NESC Heavy	0.0
5	Clamp	7.92	NESC Heavy	0.0
6	Clamp	7.97	NESC Heavy	0.0
7	Clamp	8.02	NESC Heavy	0.0
8	Clamp	7.96	NESC Heavy	0.0
9	Clamp	1.49	NESC Heavy	0.0
10	Clamp	0.95	NESC Heavy	0.0
11	Clamp	1.10	NESC Extreme	0.0
12	Clamp	1.52	NESC Heavy	0.0
13	Clamp	2.46	NESC Heavy	0.0
14	Clamp	2.24	NESC Heavy	0.0
15	Clamp	3.39	NESC Extreme	0.0
16	Clamp	3.98	NESC Extreme	0.0
17	Clamp	1.13	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	1	Clamp	18P	0.000	-1.614	1.125	1.968
NESC Heavy	2	Clamp	18X	0.000	-2.439	1.805	3.035
NESC Heavy	3	Clamp	19P	0.000	-2.804	2.843	3.993
NESC Heavy	4	Clamp	20P	0.000	-2.778	2.843	3.975
NESC Heavy	5	Clamp	21P	0.000	-2.783	2.820	3.962
NESC Heavy	6	Clamp	22P	0.000	-2.739	2.897	3.987
NESC Heavy	7	Clamp	23P	0.000	-2.739	2.931	4.012
NESC Heavy	8	Clamp	24P	0.000	-2.739	2.888	3.981
NESC Heavy	9	Clamp	3Y	0.231	0.003	0.709	0.746
NESC Heavy	10	Clamp	5Y	0.000	-0.045	0.473	0.475
NESC Heavy	11	Clamp	8Y	0.000	-0.048	0.482	0.484
NESC Heavy	12	Clamp	10Y	0.000	-0.058	0.757	0.759
NESC Heavy	13	Clamp	11Y	0.000	-0.078	1.229	1.231
NESC Heavy	14	Clamp	12Y	0.000	-0.090	1.116	1.120
NESC Heavy	15	Clamp	1XY	0.110	-0.105	0.574	0.594
NESC Heavy	16	Clamp	1Y	-0.463	-0.732	0.563	1.033
NESC Heavy	17	Clamp	3XY	0.122	0.028	0.552	0.566
NESC Extreme	1	Clamp	18P	0.000	-1.099	0.313	1.143
NESC Extreme	2	Clamp	18X	0.000	-2.187	0.542	2.253
NESC Extreme	3	Clamp	19P	0.000	-2.681	1.159	2.921
NESC Extreme	4	Clamp	20P	0.000	-2.681	1.159	2.921
NESC Extreme	5	Clamp	21P	0.000	-2.681	1.159	2.921
NESC Extreme	6	Clamp	22P	0.000	-2.681	1.159	2.921
NESC Extreme	7	Clamp	23P	0.000	-2.681	1.159	2.921
NESC Extreme	8	Clamp	24P	0.000	-2.681	1.159	2.921
NESC Extreme	9	Clamp	3Y	0.306	0.127	0.306	0.451
NESC Extreme	10	Clamp	5Y	0.000	-0.236	0.155	0.282
NESC Extreme	11	Clamp	8Y	0.000	-0.469	0.284	0.548
NESC Extreme	12	Clamp	10Y	0.000	-0.491	0.298	0.574
NESC Extreme	13	Clamp	11Y	0.000	-0.539	0.329	0.632
NESC Extreme	14	Clamp	12Y	0.000	-0.567	0.347	0.665
NESC Extreme	15	Clamp	1XY	0.957	-1.368	0.290	1.694
NESC Extreme	16	Clamp	1Y	-1.100	-1.644	0.231	1.991
NESC Extreme	17	Clamp	3XY	-0.163	0.224	0.250	0.373

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	-21.405	0.000	23.317	-1622.536	-21.222	4.735
NESC Extreme	-21.225	0.000	8.324	-1633.839	-6.379	13.976

*** Weight of structure (lbs):
Weight of Angles*Section DLF: 10244.3
Total: 10244.3

*** End of Report

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

Subject:	Foundation Analysis CL&P Tower # 936
Location:	Wilton, CT
Rev. 1: 6/11/14	Prepared by: T.J.L. Checked by: C.F.C. Job No. 14025.007

Foundation Analysis

Input Data:

Max. Reactions at Tower Leg:

Shear (Compression Leg) = $Shear_{comp} := 13.71 \cdot 1.1 \cdot kips = 15.1 \cdot kips$ (User Input from PLS Tower)

Shear (Uplift Leg) = $Shear_{up} := 11.71 \cdot 1.1 \cdot kips = 12.9 \cdot kips$ (User Input from PLS Tower)

Compression = $Comp := 60.40 \cdot 1.1 \cdot kips = 66.4 \cdot kips$ (User Input from PLS Tower)

Uplift = $Uplift := 50.84 \cdot 1.1 \cdot kips = 55.9 \cdot kips$ (User Input from PLS Tower)

Tower Properties:

Tower Height = $H_t := 91 \cdot ft$ (User Input)

Foundation Properties:

Pier Height = $P_H := 4.25 \cdot ft$ (User Input)

Pier Width Top = $P_{w1} := 1.67 \cdot ft$ (User Input)

Pier Width Botttom = $P_{w2} := 2.29 \cdot ft$ (User Input)

Pier Projection Above Grade = $P_P := 0.5 \cdot ft$ (User Input)

Pad Width = $Pd_w := 9 \cdot ft$ (User Input)

Pad Thickness = $Pd_t := 4 \cdot ft$ (User Input)

Subgrade Properties:

Concrete Unit Weight = $\gamma c := 150 \cdot pcf$ (User Input)

Water Unit Weight = $\gamma w := 62.4 \cdot pcf$ (User Input)

Soil Unit Weight = $\gamma s := 100 \cdot pcf$ (User Input)

Uplift Angle = $\phi := 30.0 \cdot deg$ (User Input)

Soil Bearing Capacity = $BC_{soil} := 9000 \cdot psf$ (User Input)

Coefficient of Friction = $\mu := 0.45$ (User Input)

Coefficient of Lateral Soil Pressure = $K_p := \frac{1 + \sin(\phi)}{1 - \sin(\phi)} = 3$

Calculated Data:

Volume of the Concrete Pad = $V_{pad} := Pd_w^2 \cdot Pd_t = 324 \cdot ft^3$

Volume of the Concrete Pier = $V_{pier} := \frac{(P_H)}{3} \cdot \left(P_{w1}^2 + P_{w2}^2 + \sqrt{P_{w1}^2 \cdot P_{w2}^2}\right) = 16.8 \cdot ft^3$

Resisting Pyramid Base 1 = $B_1 := Pd_w^2 = 81 ft^2$

Resisting Pyramid Base 2 = $B_2 := \left[2 \cdot \tan(\phi) \cdot (P_H - P_P) + Pd_w\right]^2 = 178 ft^2$

Volume of Soil = $V_{soil} := \left[\frac{(P_H - P_P)}{3} \cdot \left(B_1 + B_2 + \sqrt{B_1 \cdot B_2}\right)\right] - V_{pier} = 457 \cdot ft^3$

Total Volume of Concrete = $V_{Conc} := V_{pad} + V_{pier} = 341 \cdot ft^3$

Mass of Concrete = $Mass_{Conc} := V_{Conc} \cdot \gamma c = 51.1 \cdot kips$

Mass of Soil = $Mass_{Soil} := V_{soil} \cdot \gamma s = 46 \cdot kips$

Total Mass = $Mass_{tot} := Mass_{Conc} + Mass_{Soil} = 97 \cdot kips$

Check Uplift:

Required Factor of Safety = $F_S := 1.0$

$ActualFS := \frac{Mass_{tot}}{Uplift} = 1.73$

$Uplift\_Check := if\left(\frac{Mass_{tot}}{Uplift} \geq F_S, "OK", "Overstressed"\right)$

Uplift_Check = "OK"

Check Bearing:

Cross Sectional Area of Pad = $A_{pad} := Pd_w^2 = 81 ft^2$

Section Modulus of Pad = $S_{pad} := \frac{(Pd_w)^3}{6} = 122 \cdot ft^3$

Residual Mass of Concrete = $Mass_{Concr} := V_{Conc} \cdot (\gamma c - \gamma s) = 17 \cdot kips$

$Bearing := \frac{Comp + Mass_{Concr}}{A_{pad}} + \frac{\left[Shear_{comp} \cdot (P_H + Pd_t)\right]}{S_{pad}} = 2.05 \cdot ksf$

$Bearing\_Check := if\left(Bearing \leq BC_{soil}, "OK", "No Good"\right)$

Bearing_Check = "OK"

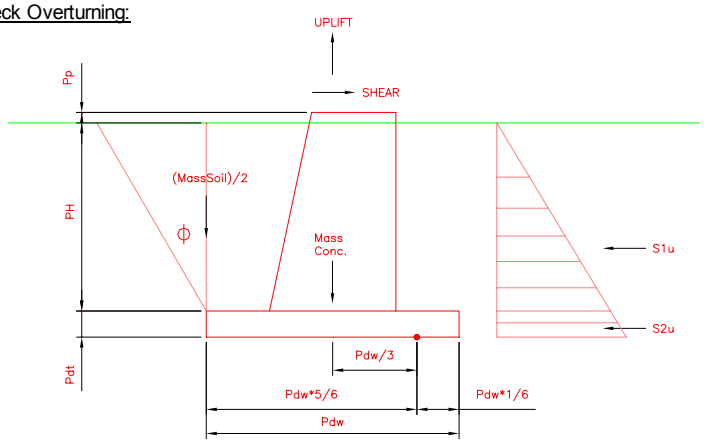
Check Sliding:

Sliding Resistance = $S_R := \mu \cdot (Mass_{Conc} + Comp) = 52.902 \cdot kips$

$Sliding\_Check := if\left(Shear_{comp} \leq S_R, "OK", "No Good"\right)$

Sliding_Check = "OK"

Check Overturning:



Passive Pressure (on pier) =

$P1_{top} := K_p \cdot \gamma s \cdot 0 = 0 \cdot ksf$

$P1_{bot} := K_p \cdot \gamma s \cdot (P_H - P_P) = 1.125 \cdot ksf$

$P1_{ave} := \frac{P1_{top} + P1_{bot}}{2} = 0.563 \cdot ksf$

$A_1 := P_H \cdot \left[\frac{(P_{w1} + P_{w2})}{2} \right] = 8.415\,ft^2$

Ultimate Shear =

$S1_u := P1_{ave} \cdot A_1 = 4.733 \cdot kip$

Passive Pressure (on pad) =

$P2_{top} := K_p \cdot \gamma s \cdot (P_H - P_P) = 1.125 \cdot ksf$

$P2_{bot} := K_p \cdot \gamma s \cdot (P_H + Pd_t - P_P) = 2.325 \cdot ksf$

$P2_{ave} := \frac{P2_{top} + P2_{bot}}{2} = 1.725 \cdot ksf$

$A_2 := Pd_t \cdot Pd_w = 36\,ft^2$

Ultimate Shear =

$S2_u := P2_{ave} \cdot A_2 = 62.1 \cdot kip$

Overturning Moment =

$OM := Uplift \cdot \frac{Pd_w}{3} + Shear_{up} \cdot (P_H + Pd_t) = 274 \cdot k \cdot ft$

Resisting Moment =

$RM := Mass_{Conc} \cdot \left(\frac{Pd_w}{3} \right) + \frac{Mass_{Soil}}{2} \cdot \left(\frac{5 \cdot Pd_w}{6} \right) + S1_u \cdot \left[Pd_t + \frac{1}{3} \cdot (P_H - P_P) \right] + S2_u \cdot \left(\frac{1}{3} \cdot Pd_t \right) = 432.2 \cdot k \cdot ft$

$ActualFS := \frac{RM}{OM} = 1.58$

$Overturning\_Check := if\left(\frac{RM}{OM} \geq F_S, \text{"OK"}, \text{"No Good"} \right)$

Overturning_Check = "OK"

Network Modernization RFDS v3.0

T-Mobile

Site ID	**CT11296A**	**Latitude**	41.18119
		Longitude	-73.39324
Site Name	Wilton/Rt 33	**Site Type**	Structure (Non-Building)
Address	144 Chestnut Hill Road (Rte-53), Wilton, CONNECTICUT, 06897	**Site Class**	Utility Lattice Tower
Market	CONNECTICUT	**Landlord**	CL&P

Configuration

4B

Approvals	
Market RF	
Market Development	

RFDS Revision		**Date**	01/21/2014
RFDS Final			
Work Order #		**NOC#**	(888) 218-6664

Site Information

Existing Configuration					Proposed Configuration			
1	2	3	4	Cabinet #	1	2	3	4
GSM				Technology	GSM/UMTS/LTE			
S8000				Cabinet type	6102			
				CBU				
				DUW30	2			
				DUL20	1			
				DUG20	1			
				DUS41				
				RBS6601				
6				dTRU/TRX				
				RU22 B4				
				RUS01 B2	6			
				RUS01 B4	6			

	Relocate cabinet
	Add cabinet
X	Swap cabinet
	Remove cabinet
	Make cabinet dark

Scope of Work

Replace existing S8000 GSM cabinet with 6102 cabinet. Add 2 DUW30, DUL20, DUG20, 6 RUS01 B2 and 6 RUS01 B4 radios to 6102 cabinet. Install 6 E/// GMAs, remove existing GMAs. Install 6 coax lines. Install 1 home run for RET control.

ALPHA - Scope of Work

	Add new mount		Add RRU
	Relocate antenna		Swap existing RRU
	Add antenna		Remove RRU
X	Swap antenna		Consolidate coax cables
	Remove antenna	X	Add coax cables
X	Add TMA		Add fiber cables
X	Swap TMA		Add hybrid combiner
	Remove TMA		Add filter combiner

Install APX16DWV_16DWVS quad pole antenna at position 1. Use 2 existing coax lines at position 1/left for PCS GSM/UMTS. Add 2 new coax lines at position 1/right for AWS UMTS/LTE. Connect PCS GSM/UMTS and AWS UMTS/LTE in cabinet radio units to passive antenna at position 1/left and /right respectively via coax lines. Add 2 E/// GMAs, remove existing GMAs. Install 2 coax lines.

BETA - Scope of Work

	Add new mount		Add RRU
	Relocate antenna		Swap existing RRU
	Add antenna		Remove RRU
X	Swap antenna		Consolidate coax cables
	Remove antenna	X	Add coax cables
X	Add TMA		Add fiber cables
X	Swap TMA		Add hybrid combiner
	Remove TMA		Add filter combiner

Install APX16DWV_16DWVS quad pole antenna at position 1. Use 2 existing coax lines at position 1/left for PCS GSM/UMTS. Add 2 new coax lines at position 1/right for AWS UMTS/LTE. Connect PCS GSM/UMTS and AWS UMTS/LTE in cabinet radio units to passive antenna at position 1/left and /right respectively via coax lines. Add 2 E/// GMAs, remove existing GMAs. Install 2 coax lines.

GAMMA - Scope of Work

	Add new mount		Add RRU
	Relocate antenna		Swap existing RRU
	Add antenna		Remove RRU
X	Swap antenna		Consolidate coax cables
	Remove antenna	X	Add coax cables
X	Add TMA		Add fiber cables
X	Swap TMA		Add hybrid combiner
	Remove TMA		Add filter combiner

Install APX16DWV_16DWVS quad pole antenna at position 1. Use 2 existing coax lines at position 1/left for PCS GSM/UMTS. Add 2 new coax lines at position 1/right for AWS UMTS/LTE. Connect PCS GSM/UMTS and AWS UMTS/LTE in cabinet radio units to passive antenna at position 1/left and /right respectively via coax lines. Add 2 E/// GMAs, remove existing GMAs. Install 2 coax lines.

DELTA - Scope of Work

	Add new mount		Add RRU
	Relocate antenna		Swap existing RRU
	Add antenna		Remove RRU
	Swap antenna		Consolidate coax cables
	Remove antenna		Add coax cables
	Add TMA		Add fiber cables
	Swap TMA		Add hybrid combiner
	Remove TMA		Add filter combiner

Network Modernization RFDS v3.0

Site ID	**CT11296A**	**Latitude**	41.18119
		Longitude	-73.39324
Site Name	Wilton/Rt 33	**Site Type**	Structure (Non-Building)
Address	144 Chestnut Hill Road (Rte-53), Wilton, CONNECTICUT, 06897	**Site Class**	Utility Lattice Tower
Market	CONNECTICUT	**Landlord**	CL&P

Configuration

4B

Approvals	
Market RF	
Market Development	

RFDS Revision	
RFDS Final	

Date 01/21/2014

ALPHA (view from behind)

Existing Configuration				Mount	Proposed Configuration			
X					X			
GSM				Technology	GSM/UMTS	UMTS/LTE		
B2				Band	B2	B4		
P				Active/Passive	P	P		
Dual pole				Ant. Type	Quad pole			
RR90_17_02DP				Ant. Model	APX16DWV_16DWVS			
EMS				Ant. Vendor	RFS			
97.3				Ant. Height	97.3			
0				Azimuth	0			
No				RET deployed	No	No		
2				E-Tilt	2	2		
				M-Tilt				
1				TMA #	1	1		
dd B2				TMA Type	dd B2	dd B4		
				RRU #				
				RRU Type				
2				Used Coax #	2	2		
7/8"				Coax Type	7/8"	7/8"		
99				Coax Length (ft)	99			
				Fiber (CPRI) #				
				Splitter #				
				Combiner #				
				Combiner Type				

	Add new mount		Add RRU
	Relocate antenna		Swap existing RRU
	Add antenna		Remove RRU
X	Swap antenna		Consolidate coax cables
	Remove antenna	X	Add coax cables
X	Add TMA		Add fiber cables
X	Swap TMA		Add hybrid combiner
	Remove TMA		Add filter combiner

Scope of work

Install APX16DWV_16DWVS quad pole antenna at position 1. Use 2 existing coax lines at position 1/left for PCS GSM/UMTS. Add 2 new coax lines at position 1/right for AWS UMTS/LTE. Connect PCS GSM/UMTS and AWS UMTS/LTE in cabinet radio units to passive antenna at position 1/left and /right respectively via coax lines. Add 2 E/// GMAs, remove existing GMAs. Install 2 coax lines.

BETA (view from behind)

Existing Configuration				Mount	Proposed Configuration			
X					X			
GSM				Technology	GSM/UMTS	UMTS/LTE		
B2				Band	B2	B4		
P				Active/Passive	P	P		
Dual pole				Ant. Type	Quad pole			
RR90_17_02DP				Ant. Model	APX16DWV_16DWVS			
EMS				Ant. Vendor	RFS			
97.3				Ant. Height	97.3			
120				Azimuth	120			
No				RET deployed	No	No		
2				E-Tilt	4	4		
				M-Tilt				
1				TMA #	1	1		
dd B2				TMA Type	dd B2	dd B4		
				RRU #				
				RRU Type				
2				Used Coax #	2	2		
7/8"				Coax Type	7/8"	7/8"		
99				Coax Length (ft)	99			
				Fiber (CPRI) #				
				Splitter #				
				Combiner #				
				Combiner Type				

	Add new mount		Add RRU
	Relocate antenna		Swap existing RRU
	Add antenna		Remove RRU
X	Swap antenna		Consolidate coax cables
	Remove antenna	X	Add coax cables
X	Add TMA		Add fiber cables
X	Swap TMA		Add hybrid combiner
	Remove TMA		Add filter combiner

Scope of work

Install APX16DWV_16DWVS quad pole antenna at position 1. Use 2 existing coax lines at position 1/left for PCS GSM/UMTS. Add 2 new coax lines at position 1/right for AWS UMTS/LTE. Connect PCS GSM/UMTS and AWS UMTS/LTE in cabinet radio units to passive antenna at position 1/left and /right respectively via coax lines. Add 2 E/// GMAs, remove existing GMAs. Install 2 coax lines.

Network Modernization RFDS v3.0

T-Mobile

Site ID	**CT11296A**	**Latitude**	41.18119
		Longitude	-73.39324
Site Name	Wilton/Rt 33	**Site Type**	Structure (Non-Building)
Address	144 Chestnut Hill Road (Rte-53), Wilton, CONNECTICUT, 06897	**Site Class**	Utility Lattice Tower
Market	CONNECTICUT	**Landlord**	CL&P

Configuration

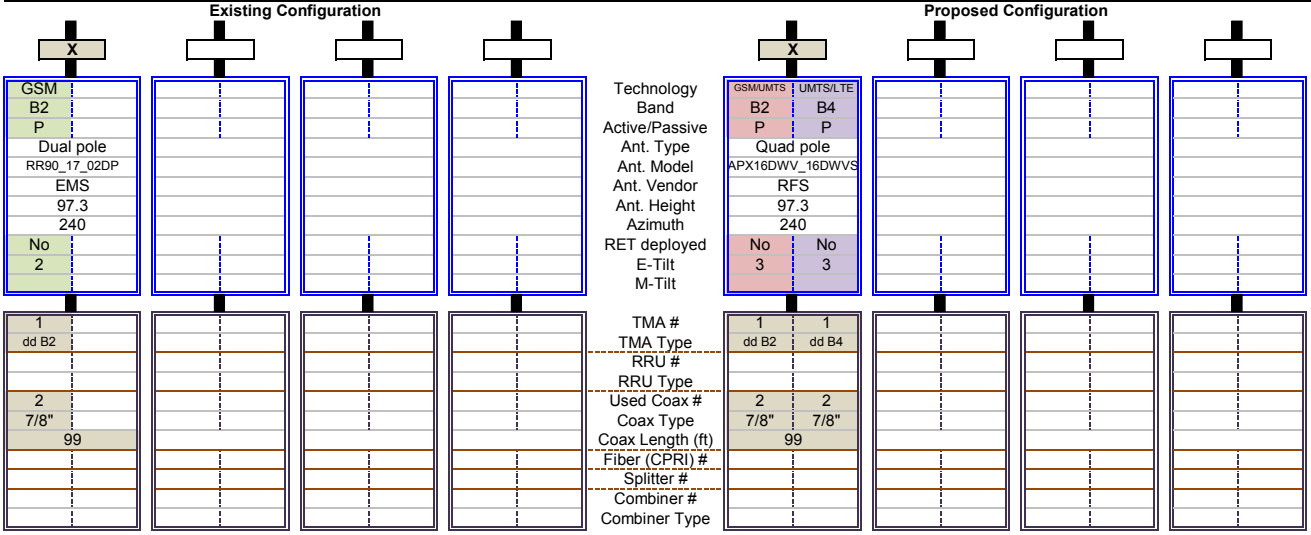
4B

Approvals	
Market RF	
Market Development	

RFDS Revision	
RFDS Final	

Date 01/21/2014

GAMMA (view from behind)

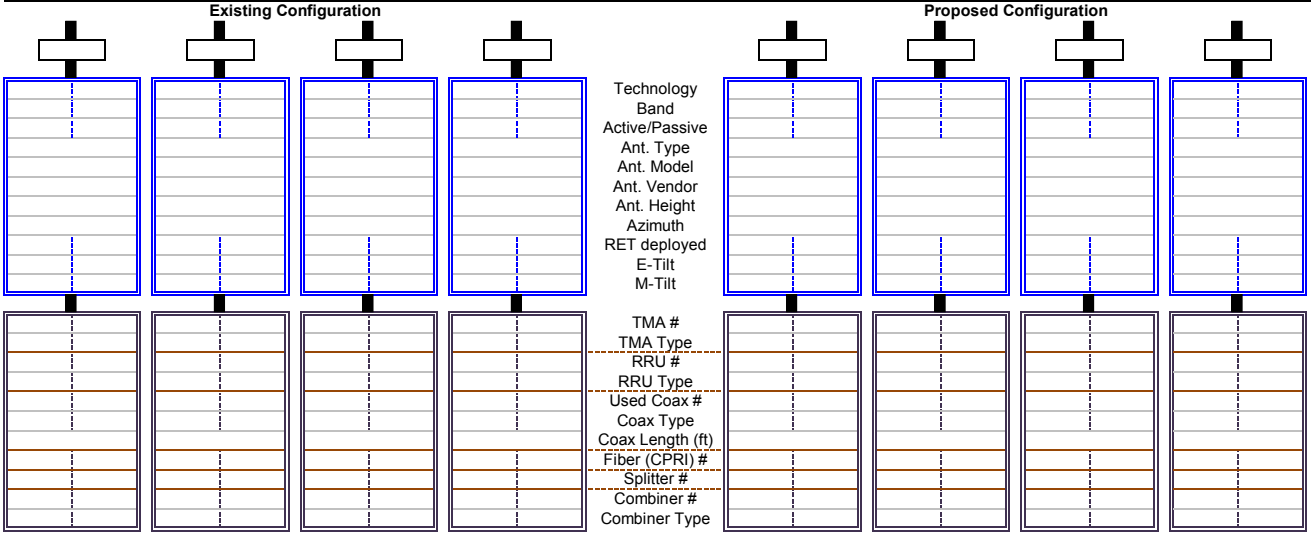


	Add new mount		Add RRU
	Relocate antenna		Swap existing RRU
	Add antenna		Remove RRU
X	Swap antenna		Consolidate coax cables
	Remove antenna	X	Add coax cables
X	Add TMA		Add fiber cables
X	Swap TMA		Add hybrid combiner
	Remove TMA		Add filter combiner

Scope of work

Install APX16DWV_16DWVS quad pole antenna at position 1. Use 2 existing coax lines at position 1/left for PCS GSM/UMTS. Add 2 new coax lines at position 1/right for AWS UMTS/LTE. Connect PCS GSM/UMTS and AWS UMTS/LTE in cabinet radio units to passive antenna at position 1/left and /right respectively via coax lines. Add 2 E/// GMAs, remove existing GMAs. Install 2 coax lines.

DELTA (view from behind)



	Add new mount		Add RRU
	Relocate antenna		Swap existing RRU
	Add antenna		Remove RRU
	Swap antenna		Consolidate coax cables
	Remove antenna		Add coax cables
	Add TMA		Add fiber cables
	Swap TMA		Add hybrid combiner
	Remove TMA		Add filter combiner

Scope of work

Product Data Sheet **APX16DWV-16DWVS-E-A20**

Optimizer® Side-by-Side Dual Polarized Antenna, 1710-2200, 65deg, 18.4dBi, 1.4m, VET, 0-10deg RET

Product Description

A combination of two X-Polarized antennas in a single radome, this pair of variable tilt antennas 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 (1710-2200 MHz). The antenna comes pre-connected with two antenna control units (ACU).

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).**
- **Gain tracking – difference between AWS UL (1710-1755 MHz) and DL (2110-2155 MHz) <1dB.**
- **Two X-Polarised panels in a single radome.**
- **Azimuth horizontal beamwidth difference <4deg between AWS UL (1710-1755 MHz) and DL (2110-2155 MHz).**
- **Low profile for low visual impact.**
- **Dual polarization; Broadband design.**
- **Includes (2) AISG 2.0 Compatible ACU-A20-N antenna control units.**

Technical Specifications

Electrical Specifications

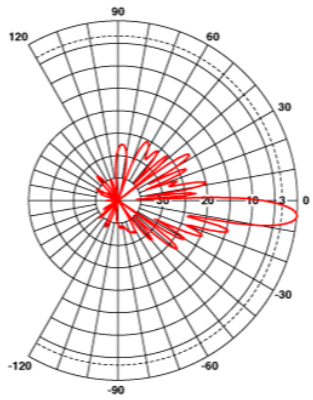
Frequency Range, MHz	1710-2200
Horizontal Beamwidth, deg	65
Vertical Beamwidth, deg	5.9 to 7.7
Electrical Downtilt, deg	0-10
Gain, dBi (dBd)	18.4 (16.3)
1st Upper Sidelobe Suppression, dB	> 18 (typically > 20)
Upper Sidelobe Suppression, dB	> 18 all (typically > 20)
Front-To-Back Ratio, dB	>26 (typically 28)
Polarization	Dual pol +/-45°
VSWR	< 1.5:1
Isolation between Ports, dB	> 30
3rd Order IMP @ 2 x 43 dBm, dBc	> 150 (155 Typical)
Impedance, Ohms	50
Maximum Power Input, W	300
Lightning Protection	Direct Ground
Connector Type	(4) 7-16 Long Neck Female

Mechanical Specifications

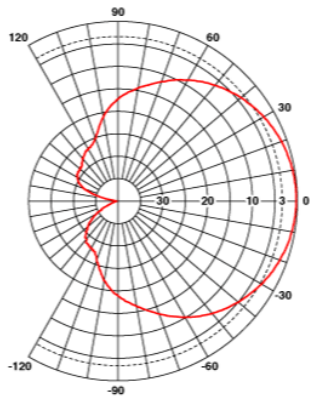
Dimensions - HxWxD, mm (in)	1420 x 331 x 80 (55.9 x 13 x 3.15)
Weight w/o Mtg Hardware, kg (lb)	18.5 (40.7)
Survival Wind Speed, km/h (mph)	200 (125)
Rated Wind Speed, km/h (mph)	160 (100)
Max Wind Loading Area, m² (ft²)	0.47 (5.03)
Front Thrust @ Rated Wind, N (lbf)	756 (170)
Maximum Thrust @ Rated Wind, N (lbf)	756 (170)
Wind Load - Side @ Rated Wind, N (lbf)	231 (52)
Wind Load - Rear @ Rated Wind, N (lbf)	408 (92)
Radome Material	Fiberglass
Radome Color	Light Grey RAL7035
Mounting Hardware Material	Diecasted Aluminum
Shipping Weight, kg (lb)	24.5 (53.9)
Packing Dimensions, HxWxD, mm (in)	1520 x 408 x 198 (59.8 x 16 x 7.8)

Ordering Information

Mounting Hardware	APM40-2 + APM40-E2



Vertical Pattern



Horizontal Pattern