EM-SPRINT-155-130828

HPC Wireless Services
22 Shelter Rock Lane.
Building C
Danbury, CT, 06810
P.: 203.797.1112

HPC
WIRELESS SERVICES

August 26, 2013

RECEIVED
AUG 2 8 2013
CONNECTICUT
SITING COUNCIL

VIA OVERNIGHT COURIER

Connecticut Siting Council
10 Franklin Square
New Britain, Connecticut 06051
Attn: Ms. Melanie Bachman, Acting Executive Director

Re: Sprint Spectrum, L.P. – Exempt Modification
345 North Main Street, a/k/a 333 North Main Street, West Hartford, Connecticut

Dear Ms. Bachman:

This letter and attachments are submitted on behalf of Sprint Spectrum, L.P. ("Sprint"). Sprint is undertaking modifications to certain existing sites in its Connecticut system in order to implement updated technology. Please accept this letter and attachments as notification, pursuant to R.C.S.A. Section 16-50j-73, of construction that 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 Mayor of the Town of West Hartford.

Sprint plans to modify the existing wireless communications facility owned and managed by Edens & Avant Investments LP, and located at 345 North Main Street, a/k/a/ 333 North Main Street, West Hartford, (coordinates 41°-47'-06.1" N, 72°-44'-54.55" W). Attached are plan and elevation drawings depicting the planned changes, and documentation of the structural sufficiency of the structure to accommodate the revised antenna configuration. Also included is a power density report reflecting the modification to Sprint'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. Sprint will remove the six (6) existing CMDA antennas, and add three (3) dual-band panel antennas, and six (6) RRHs (remote radio heads), at a centerline height of approximately 100', AGL, or approximately 50' above the rooflevel. During an interim period of up to one year, the existing CDMA antennas will remain. Sprint will also install three (3) hybriflex cables along the existing coaxial cable run, and will remove the coaxial cable at the end of the interim period. The proposed modifications will not

extend the height of the approximately 50' rooftop tower.

2. Sprint will replace the three (3) existing cabinets with three (3) new cabinets on the existing steel equipment platform, and will add a proposed fiber junction box mounted on new posts attached to the existing steel platform beam. In order to accommodate the new cabinets, the platform will be reinforced as detailed in the attached structural analysis. The existing GPS antenna will be replaced by another GPS antenna on the tower leg. These changes will have no effect on the site boundaries.

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 on the attached report prepared by EBI Consulting, Sprint's operations at the site will result in a power density of approximately 33.788%; the combined site operations will result in a total power density of approximately 50.248%.

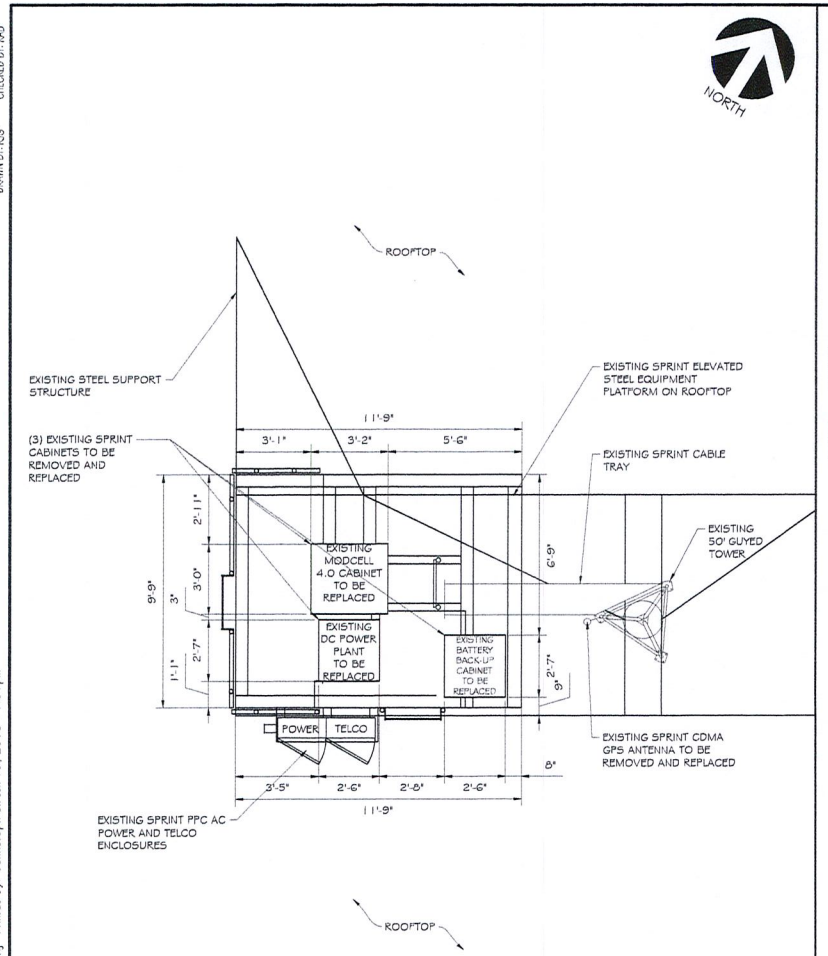
Please contact me by phone at (203) 610-1071 or by e-mail at mjhowlett@optonline.net with questions concerning this matter. Thank you for your consideration.

Respectfully yours,

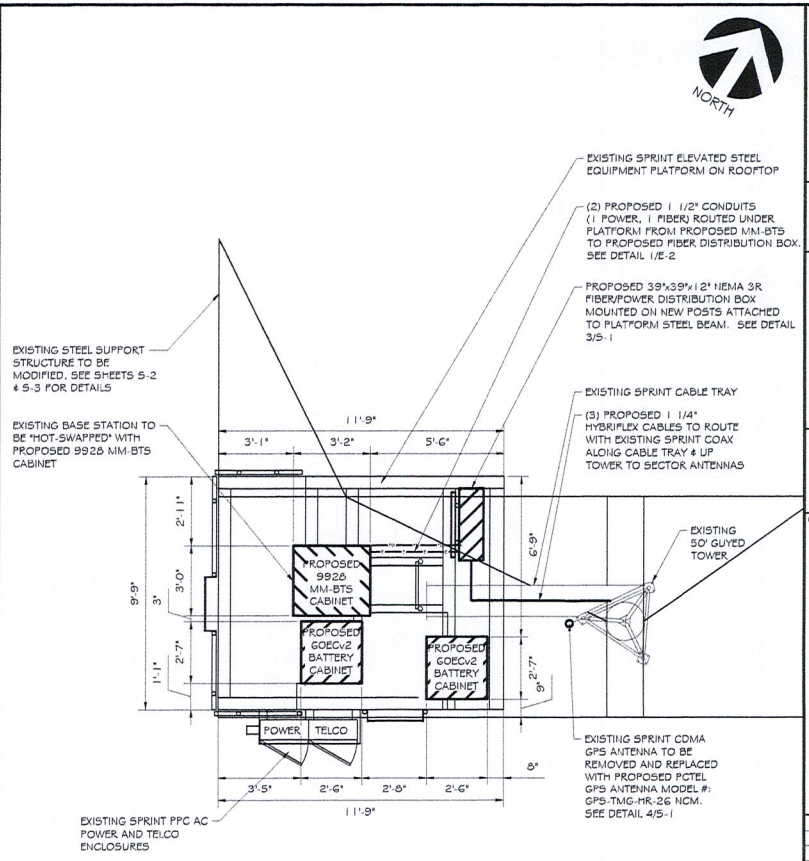
Melanie J. Howlett

Attachments

cc: Honorable Scott Slifka, Mayor, Town of West Hartford
Ena Northeast LP, c/o Edens & Avant Investments LP (underlying property owner)



EXISTING EQUIPMENT PLAN
SCALE: 1" = 5'-0"



PROPOSED EQUIPMENT PLAN
SCALE: 1" = 5'-0"

Sprint
6391 Sprint Parkway
Overland Park, KS 66251

Alcatel·Lucent

RAMAKER & ASSOCIATES, INC.
1120 Dallas Street, Sauk City, WI 53583
Phone: 608-643-4100 Fax: 608-643-7999
www.Ramaker.com

NETWORK VISION MMBTS LAUNCH NORTHERN CT MARKET

Certification & Seal:

MARK	DATE	DESCRIPTION
D	6/13/13	AAV PAGES ADDED, FINAL PRELIM CDS
C	1/15/13	STRUCTURAL DETAILS ADDED, FINAL PRELIM CDS
B	10/25/12	FINAL PRELIMINARY CDS
A	10/01/12	90% CD REVIEW

ISSUE PHASE: FINAL PRELIMINARY DATE ISSUED: 01/15/2013

PROJECT TITLE:
WEST HARTFORD
BISHOPS
SITE#: CT03XC074

PROJECT INFORMATION:
345 N. MAIN STREET
HARTFORD, CT 06117
HARTFORD COUNTY

SHEET TITLE:
EQUIPMENT PLAN

0 2.5' 5' 10'
11" x 17" - 1" = 5'
22" x 34" - 1" = 2.5'

PROJECT NUMBER: 22995
SHEET NUMBER: A-1

DRAWN BY: KJG CHECKED BY: DJS

I:\22900\22995\CADT\elecom\22995 Vision Project-CT.dwg Printed by: achristoph on Jun 19, 2013 - 1:51 pm

NOTES:

I. SCOPE

A. THIS SECTION COVERS THE SPECIFICATIONS FOR ANTENNA AND COAXIAL CABLE INSTALLATION OF: ANTENNAS, COAXIAL, CONNECTIONS, AND ICE BRIDGE.

B. REFERENCE SPRINT STANDARD CONSTRUCTION SPECIFICATIONS FOR WIRELESS SITES FOR GENERAL REQUIREMENTS.

II. ANTENNAS:

A. ANTENNAS SHALL BE PLUMB AND INSTALLED SO THAT THE ENTIRE WHIP EXTENDS ABOVE VERTICAL PIPE MOUNT. DIRECTIONAL ANTENNAS SHALL BE ORIENTED TO PROPER AZIMUTH, PROVIDED ON THE RF SPECIFICATION SHEET. NOTE: THE ANTENNA MAY BE ORIENTED USING THE REFLECTOR AS THE REFERENCE, ADJUSTING ITS AZIMUTH 180 DEGREES FROM MAXIMUM ANTENNA RADIATION.

B. MICROWAVE ANTENNAS (DISHES) SHALL BE ASSEMBLED PER MANUFACTURER'S DRAWINGS. STIFF ARMS AND RADOMES SHALL BE INSTALLED WITH POLARIZATION PROVIDED BY RF SPECIFICATION SHEET. IF PATH IS NOT READY TO ALIGN, DISH SHOULD BE POINTED TOWARD CALCULATED AZIMUTH, OR DIRECTION OF FIELD STAKE DENOTING OPPOSITE END. 2 STIFF ARMS SHALL BE PROVIDED FOR MICROWAVE DISHES 6'-0" IN DIAMETER OR GREATER.

C. A TRANSIT SHALL BE USED TO PROPERLY ALIGN CELLULAR AND MICROWAVE ANTENNAS.

III. COAXIAL CABLE:

A. COAXIAL CABLE SHALL BE SUPPORTED WITH SNAP-IN HANGERS. SNAP-IN HANGERS SHOULD BE USED EVERY 3 FEET THE ENTIRE HEIGHT OF THE TOWER. ANGLE ADAPTERS OR ROUND MEMBER ADAPTERS WITH BUTTERFLY CLAMPS SHALL BE USED ELSEWHERE. I.E. SIDEARMS, PLATFORMS, AND MICROWAVE MOUNTS.

B. COAXIAL CABLE SHALL ALSO BE SUPPORTED WITH HOISTING GRIPS, INSTALLED AT MAXIMUM INTERVALS OF 200 FEET. HOISTING GRIPS SHALL BE ATTACHED WITH SHACKLES, BOLTED IN THE 5/8" HOLE OF WAVEGUIDE LADDER.

C. ALL JUMPERS USED BETWEEN COAXIAL CABLE AND ANTENNA SHALL BE SUPPORTED WITHIN 18 INCHES OF ANTENNA, USING BUTTERFLY CLAMPS WITH ANGLE ADAPTERS OR ROUND MEMBER ADAPTERS AROUND PIPES. CELLULAR ANTENNAS TYPICALLY USE 6' JUMPERS; MICROWAVE DISHES USE 3' JUMPERS.

D. COAXIAL CABLE SHALL BE NEATLY BENT WHEN REQUIRED, USING A MINIMUM BENDING RADIUS OF 10 TIMES THE DIAMETER OF THE COAXIAL CABLE. DRIP LOOPS SHOULD BEGIN AT THE ICE BRIDGE. THE END IN THE COAXIAL CABLE SHOULD BE AT A LOWER HEIGHT THAN THE ENTRY PORT.

E. COAXIAL CABLE SHALL BE SUPPORTED WITH SNAP-IN HANGERS ON THE WAVEGUIDE LADDER UNDER ICE BRIDGE. COAXIAL CABLE SHOULD BE NEATLY CUT 16" INSIDE BUILDING AND TERMINATED AT THE QUARTER WAVE SHORTS.

F. CONNECTORS WILL NORMALLY BE PROVIDED FIRST OFF REEL FROM FACTORY. CONNECTORS TERMINATED IN BUILDING SHALL BE NEATLY INSTALLED PER MANUFACTURER'S SPECIFICATIONS.

G. COAXIAL CABLES SHOULD BE LABELED WITH TAGS INSIDE THE BUILDING.

H. USE 2" WIDE COLORED TAPE TO INDICATE SECTORS. CONTRACTOR TO USE SECTOR COLOR CODING AS INDICATED IN THESE DRAWINGS OR AS PROVIDED BY SPRINT.

I. ALL EXCEPTIONS NEED TO BE VERIFIED WITH THE PROJECT MANAGER.

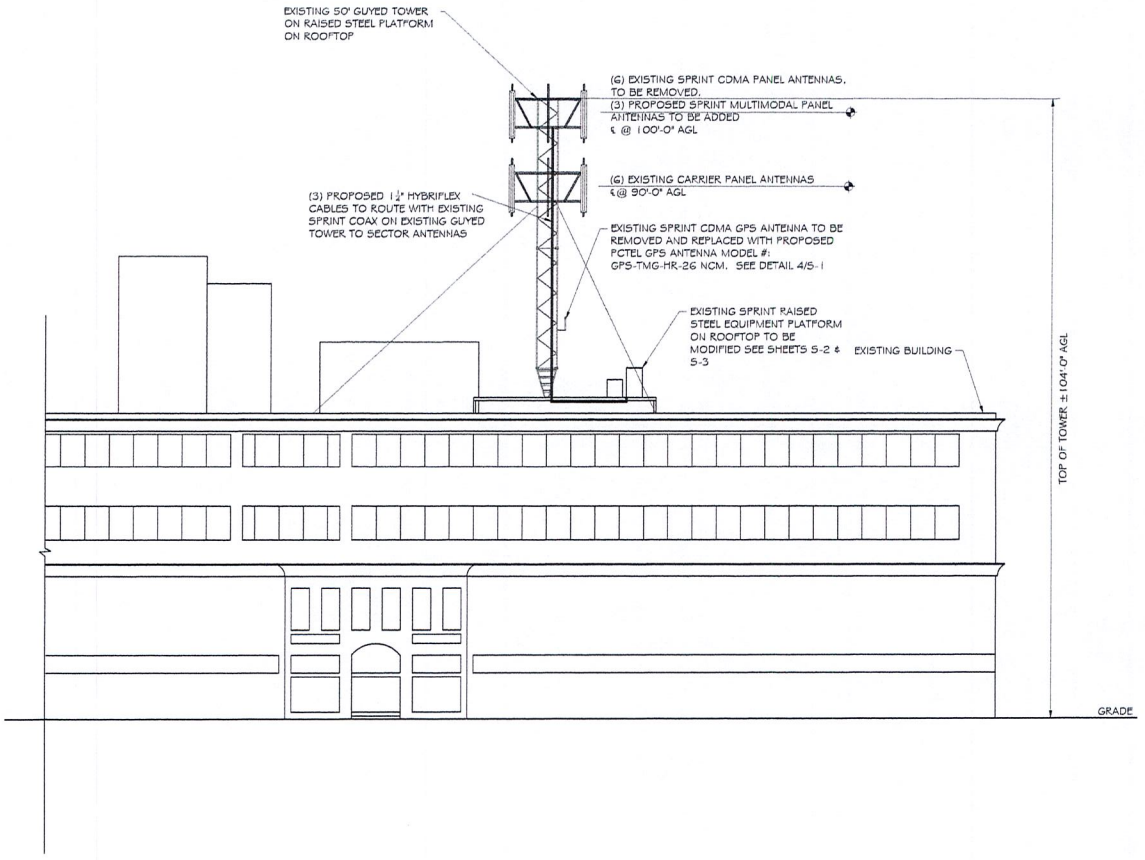
IV. CONNECTORS:

A. ALL CONNECTIONS AND GROUNDING KITS SHALL BE WEATHERPROOFED USING COLD SHRINK OR ANDREW APPROVED WEATHER STRIPPING. NOTE: NO PORTION OF CONNECTOR SHALL BE EXPOSED TO THE ELEMENTS.

B. COAXIAL CABLE SHALL BE GROUNDED USING GROUNDING KITS AT THE TOP (BELOW THE BEND), BOTTOM (ABOVE THE BEND ON TOWER GROUND BAR), AND ON BUILDING GROUND BAR BEFORE ENTRY INTO WAVEGUIDE PORTS. 4" CABLE BOOTS SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.

C. GROUNDING KITS SHALL BE NEATLY INSTALLED SO THAT THE JUMPER RUNS IN THE SAME DIRECTION AS THE COAXIAL AND GROUND BAR. JUMPER WIRE SHOULD RUN IN A DIRECT PATH TO THE GROUND BAR/ TOWER LADDER, BUT HAVE ADEQUATE SLACK FOR EXPANSION, CONTRACTION, AND REPAIR. NON-OXIDE GREASE SHOULD BE APPLIED BETWEEN LUG AND BAR/TOWER.

D. TOWER GROUND BAR SHALL BE INSTALLED ON THE ANGLE BEHIND THE FIRST DIAGONAL WAVEGUIDE LADDER RUNG, ABOVE 5'-6". GROUND BAR SHALL BE ISOLATED FROM ANGLE USING NEWTON BUSHINGS PROVIDED.



ELEVATION
SCALE: 1"= 20'-0"

Sprint
6391 Sprint Parkway
Overland Park, KS 66251

Alcatel·Lucent

RAMAKER & ASSOCIATES, INC.
1120 Dallas Street, Sauk City, WI 53583
Phone: 608-643-4100 Fax: 608-643-7999
www.Ramaker.com

NETWORK VISION
MMBTS LAUNCH
NORTHERN CT MARKET

Certification # Seal:

MARK	DATE	DESCRIPTION
D	6/19/13	AAV PAGES ADDED, FINAL PRELIM CDS
C	1/15/13	STRUCTURAL DETAILS ADDED, FINAL PRELIM CDS
B	10/25/12	FINAL PRELIMINARY CDS
A	10/03/12	80% CD REVIEW

ISSUE PHASE: FINAL PRELIMINARY DATE ISSUED: 01/15/2013

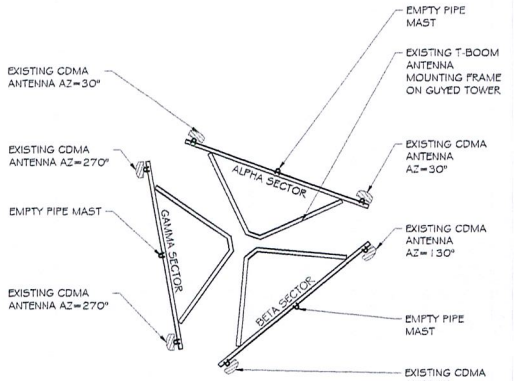
PROJECT TITLE:
WEST HARTFORD
BISHOPS
SITE#: CT03XC074

PROJECT INFORMATION:
345 N. MAIN STREET
HARTFORD, CT 06117
HARTFORD COUNTY

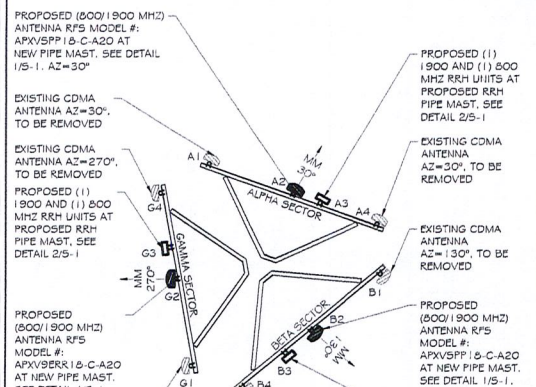
SHEET TITLE:
SITE ELEVATION
& NOTES

0 10' 20' 40'
11" x 17" - 1" = 20'
22" x 34" - 1" = 10'

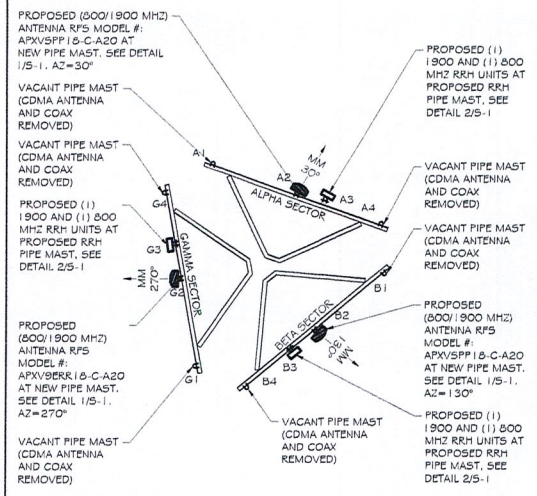
PROJECT NUMBER: 22995
SHEET NUMBER: A-2



EXISTING ANTENNA LAYOUT (1)
SCALE: NTS



INTERIM ANTENNA LAYOUT (2)
SCALE: NTS



FINAL ANTENNA LAYOUT (3)
SCALE: NTS

ANTENNA AND COAXIAL CABLE SCHEDULE

SECTOR	POS.	AZIMUTH	ANTENNA CENTERLINE	ANTENNA STATUS	TECH.	ANTENNA MAKE/ MODEL	MECH. DOWNTILT (°)	ELEC. DOWNTILT (°)	RRHs	CABLE SIZE	CABLE LENGTH
ALPHA	A-1	30°	100'-0"	EX. TO BE REMOVED	CDMA	-	-	-	-	EX. TO BE REMOVED	-
	A-2	30°	100'-0"	PROPOSED	MULTIMODAL	RFS/APXVSPP18-C-A20	1900(0), 800(0)	1900(-1), 800(-4)	-	(1) 1 5/8" HYBRIFLEX HYBRID CABLE RFS #HB114-1-08U4-M5J	±75'-0"
	A-3	-	100'-0"	PROPOSED	RRH	-	-	-	(1) 1900, (1) 800	-	-
	A-4	30°	100'-0"	EX. TO BE REMOVED	CDMA	-	-	-	-	EX. TO BE REMOVED	-
BETA	B-1	130°	100'-0"	EX. TO BE REMOVED	CDMA	-	-	-	-	EX. TO BE REMOVED	-
	B-2	130°	100'-0"	PROPOSED	MULTIMODAL	RFS/APXVSPP18-C-A20	1900(0), 800(0)	1900 (-1), 800 (-1)	-	(1) 1 5/8" HYBRIFLEX HYBRID CABLE RFS #HB114-1-08U4-M5J	± 75'-0"
	B-3	-	100'-0"	PROPOSED	RRH	-	-	-	(1) 1900, (1) 800	-	-
	B-4	130°	100'-0"	EX. TO BE REMOVED	CDMA	-	-	-	-	EX. TO BE REMOVED	-
GAMMA	G-1	270°	100'-0"	EX. TO BE REMOVED	CDMA	-	-	-	-	EX. TO BE REMOVED	-
	G-2	270°	100'-0"	PROPOSED	MULTIMODAL	RFS/APXV9ERR18-C-A20	1900(0), 800(0)	1900(0), 800(0)	-	(1) 1 5/8" HYBRIFLEX HYBRID CABLE RFS #HB114-1-08U4-M5J	±75'-0"
	G-3	-	100'-0"	PROPOSED	RRH	-	-	-	(1) 1900, (1) 800	-	-
	G-4	270°	100'-0"	EX. TO BE REMOVED	CDMA	-	-	-	-	EX. TO BE REMOVED	-

Sprint
6391 Sprint Parkway
Overland Park, KS 66251

Alcatel·Lucent

RAMAKER & ASSOCIATES, INC.
1120 Dallas Street, Sauk City, WI 53583
Phone: 608-643-4100 Fax: 608-643-7999
www.Ramaker.com

NETWORK VISION
MMBTS LAUNCH
NORTHERN CT MARKET

Certification & Seal:

MARK	DATE	DESCRIPTION
D	6/19/13	AAV PAGES ADDED, FINAL PRELIM CDS
C	1/15/13	STRUCTURAL DETAILS ADDED, FINAL PRELIM CDS
B	10/25/12	FINAL PRELIMINARY CDS
A	10/03/12	90% CD REVIEW

ISSUE PHASE: FINAL PRELIMINARY DATE ISSUED: 01/15/2013

PROJECT TITLE:
WEST HARTFORD
BISHOPS
SITE#: CT03XC074

PROJECT INFORMATION
345 N. MAIN STREET
HARTFORD, CT 06117
HARTFORD COUNTY

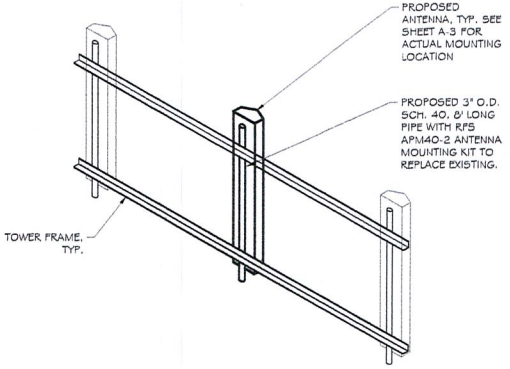
SHEET TITLE:
ANTENNA DETAILS
& COAX SCHEDULE

SCALE: NONE

PROJECT NUMBER: 22995
SHEET NUMBER: A-3

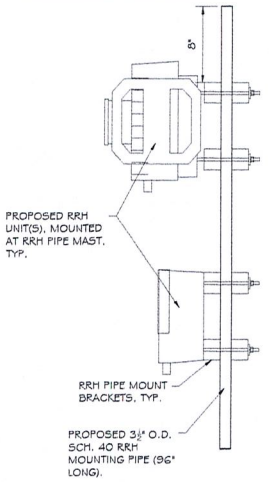
STRUCTURAL NOTES

1. DESIGN REQUIREMENTS PER INTERNATIONAL BUILDING CODE 2009 AND THE TIA-222-G STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES.
2. INFORMATION SHOWN ON THESE DRAWINGS WAS OBTAINED BY FIELD MEASUREMENTS AND FROM THE EXISTING STRUCTURAL DRAWINGS. THE GENERAL CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS AND NOTIFY THE ARCHITECT/ENGINEER OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIALS OR PROCEEDING WITH CONSTRUCTION.
3. THE GENERAL CONTRACTOR AND HIS SUB-CONSULTANTS SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS WHICH MAY BE REQUIRED FOR THE WORK.
4. STRUCTURAL STEEL SHALL CONFORM TO THE LATEST EDITION OF THE AISC SPECIFICATIONS FOR STRUCTURAL STEEL BUILDINGS- ALLOWABLE STRESS DESIGN AND PLASTIC DESIGN INCLUDING THE COMMENTARY AND THE AISC CODE FOR STANDARD PRACTICE.
5. STRUCTURAL STEEL PLATES AND SHAPES SHALL CONFORM TO ASTM A992. ALL STRUCTURAL STEEL PIPES SHALL CONFORM TO ASTM A53 GRADE B. ALL STRUCTURAL STEEL COMPONENTS AND FABRICATED ASSEMBLIES SHALL BE HOT DIP GALVANIZED AFTER FABRICATION.
6. WELDING SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF AMERICAN WELDING SOCIETY (AWS) STRUCTURAL WELDING CODE- STEEL WELD ELECTRODES SHALL BE E70XX.
7. ALL COAXIAL CABLE CONNECTORS AND TRANSMITTER EQUIPMENT SHALL BE AS SPECIFIED BY THE OWNER AND IS NOT INCLUDED IN THESE CONSTRUCTION DOCUMENTS. THE CONTRACTOR SHALL FURNISH ALL CONNECTION HARDWARE REQUIRED TO SECURE THE CABLES. CONNECTION HARDWARE SHALL BE STAINLESS STEEL.
8. ALL THREADED STRUCTURAL FASTENERS FOR ANTENNA SUPPORT ASSEMBLIES SHALL CONFORM TO ASTM A307 OR ASTM A36. ALL STRUCTURAL FASTENERS FOR STRUCTURAL STEEL FRAMING SHALL CONFORM TO ASTM A325. FASTENERS SHALL BE ⅝" MIN. DIAMETER BEARING TYPE CONNECTIONS WITH THREADS INCLUDED IN THE SHEAR PLANE. ALL EXPOSED FASTENERS, NUTS, AND WASHERS SHALL BE GALVANIZED UNLESS OTHERWISE NOTES. CONCRETE EXPANSION ANCHORS SHALL BE HILTI KWIK BOLTS UNLESS OTHERWISE NOTED.
9. LUMBER (IF APPLICABLE) SHALL COMPLY WITH THE REQUIREMENTS OF AMERICAN INSTITUTE OF TIMBER CONSTRUCTION AND THE NATIONAL FOREST PRODUCTS ASSOCIATION'S NATIONAL DESIGN SPECIFICATION FOR WOOD CONSTRUCTION. ALL LUMBER SHALL BE PRESSURE TREATED AND SHALL BE STRUCTURAL GRADE NO. 2 OR BETTER.
10. IF APPLICABLE, ROOF PROTECTION PADS UNDER THE CONCRETE PAVERS AND WAVEGUIDE SUPPORTS SHALL BE 0.30" THICK RUBBER FIRESTONE PROTECTION PADS. THE ROOF PROTECTION PADS SHALL EXTEND A MINIMUM OF TWO INCHES BEYOND THE PERIMETER OF THE PAVERS AND THE WOOD SLEEPERS AND SHALL BE PLACED WITH A MINIMUM ½" SPACE BETWEEN ADJACENT PADS TO FACILITATE DRAINAGE. PROVIDE A 28 LB. INORGANIC PAD DIRECTLY ON THE ROOF. REMOVE ALL LOOSE STONES PRIOR TO PLACING THE SEPARATOR SHEET.
11. NORTH ARROW SHOWN ON PLANS REFERS TO TRUE NORTH. CONTRACTOR SHALL VERIFY TRUE NORTH AND INFORM CONSTRUCTION MANAGER OF ANY DISCREPANCY BEFORE STARTING CONSTRUCTION.

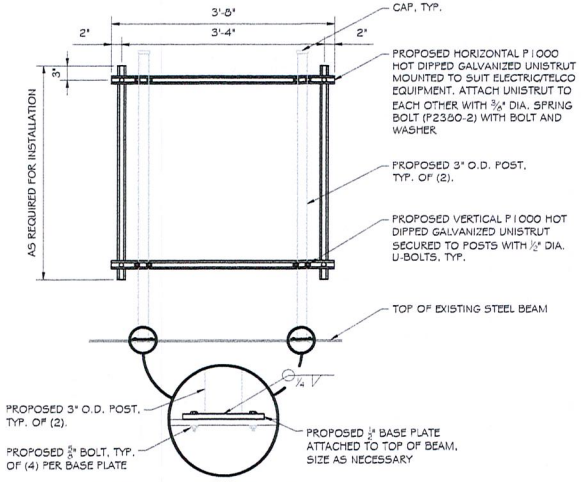


ANTENNA MOUNTING DETAIL (1)
SCALE: NTS

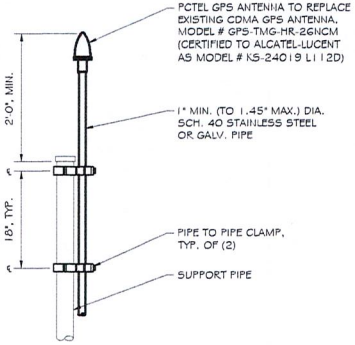
NOTE:
FINAL ANTENNA MOUNT DESIGN AND/OR MODIFICATIONS PENDING STRUCTURAL ANALYSIS.



RRH MOUNTING DETAIL (2)
SCALE: NTS



FIBER BOX MOUNTING FRAME (3)
SCALE: NTS



GPS MOUNTING DETAIL (4)
SCALE: NTS

Sprint
6391 Sprint Parkway
Overland Park, KS 66251

Alcatel·Lucent

RAMAKER & ASSOCIATES, INC.
1120 Dallas Street, Sauk City, WI 53583
Phone: 608-643-4100 Fax: 608-643-7999
www.Ramaker.com

NETWORK VISION
MMBTS LAUNCH
NORTHERN CT MARKET

Certification # Seal:

MARK	DATE	DESCRIPTION
D	6/19/13	AAV PAGES ADDED, FINAL PRELIM CDS
C	1/15/13	STRUCTURAL DETAILS ADDED, FINAL PRELIM CDS
B	10/25/12	FINAL PRELIMINARY CDS
A	10/03/12	90% CD REVIEW

ISSUE PHASE: FINAL PRELIMINARY DATE ISSUED: 01/15/2013

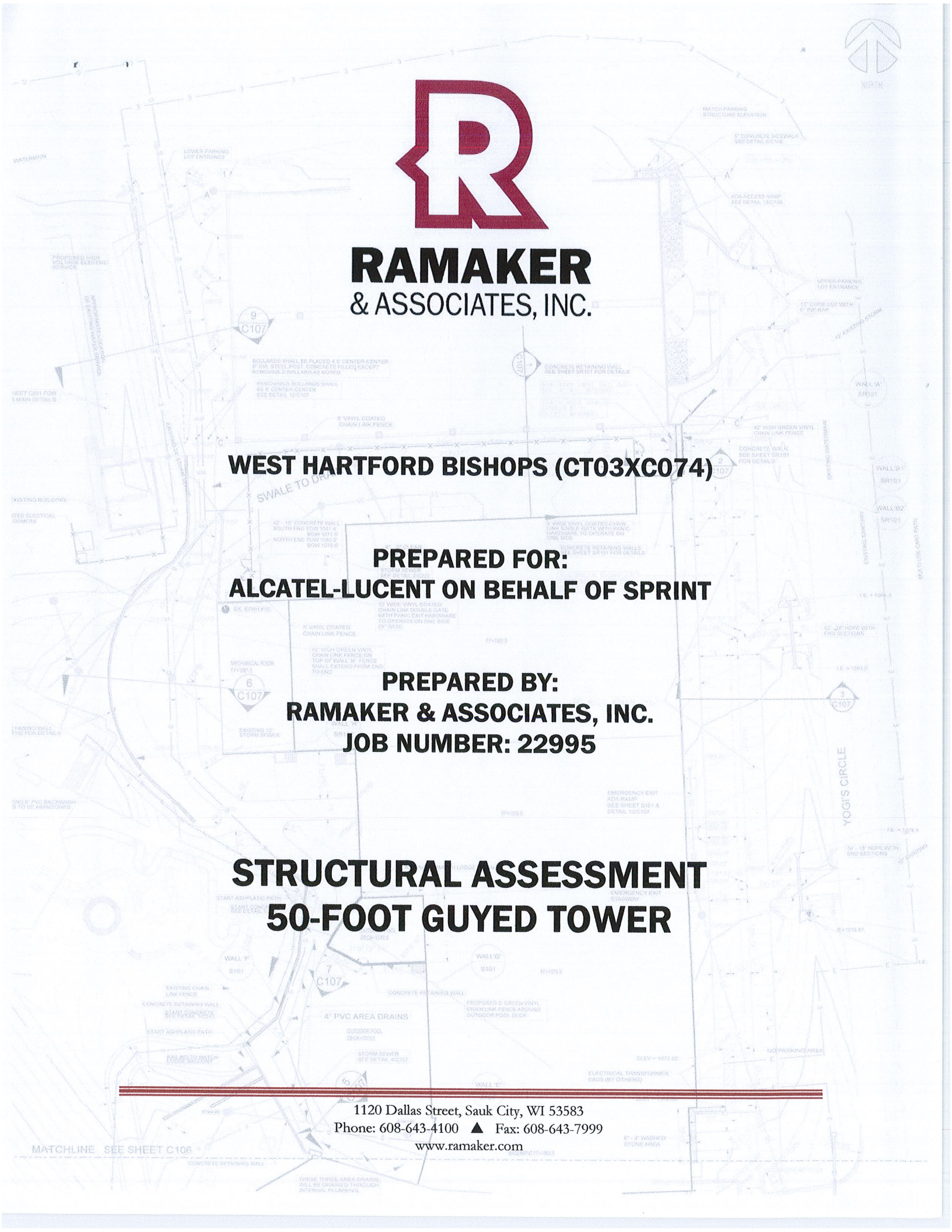
PROJECT TITLE:
WEST HARTFORD
BISHOPS
SITE#: CT03XC074

PROJECT INFORMATION:
345 N. MAIN STREET
HARTFORD, CT 06117
HARTFORD COUNTY

SHEET TITLE:
STRUCTURAL DETAILS

SCALE: NONE

PROJECT NUMBER: 22995
SHEET NUMBER: S-1



RAMAKER
& ASSOCIATES, INC.

WEST HARTFORD BISHOPS (CT03XC074)

PREPARED FOR:
ALCATEL-LUCENT ON BEHALF OF SPRINT

PREPARED BY:
RAMAKER & ASSOCIATES, INC.
JOB NUMBER: 22995

STRUCTURAL ASSESSMENT
50-FOOT GUYED TOWER

1120 Dallas Street, Sauk City, WI 53583
Phone: 608-643-4100 ▲ Fax: 608-643-7999
www.ramaker.com

WEST HARTFORD BISHOPS (CT03XC074)

SITE:

West Hartford Bishops (CT03XC074)
345 N. Main Street
West Hartford, Hartford County, Connecticut 06117

CONTACT PERSON:

John Szilezy
Alcatel-Lucent
Site Acquisition Manager
600 Mountain Avenue, Murray Hill, NJ 07974
Email: john.szilezy@alcatel-lucent.com

PREPARED BY:

Ramaker & Associates, Inc.
1120 Dallas Street
Sauk City, Wisconsin 53583
Telephone: (608) 643-4100
Facsimile: (608) 643-7999

RAMAKER JOB NUMBER: 22995

DATE OF REPORT ISSUANCE: January 14, 2013

Thomas E. Moore
Structural Engineer

1/14/13
Date

James R. Skowronski, P.E.
Supervising Engineer

1/14/13
Date

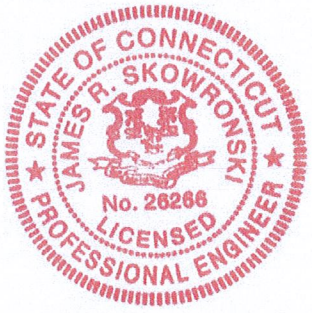


TABLE OF CONTENTS

LIST OF APPENDICES

SECTION 1
EXECUTIVE SUMMARY

This report summarizes the structural analysis conducted by Ramaker & Associates, Inc. (Ramaker & Associates) for Alcatel-Lucent on behalf of Sprint, who intends to install additional equipment on an existing 50-foot guyed tower.

Alcatel-Lucent is proposing to install two (2) RFS APXVSPP18-C-A20 panel antennas, one (1) RFS APXV9ERR18-C-A20 panel antenna, three (3) Alcatel-Lucent 1900 MHz RRHs, and three (3) Alcatel-Lucent 800 MHz RRHs at a centerline elevation of 100 feet AGL. The proposed antennas shall be mounted to the existing T-Frames and fed with three (3) 1-1/4-inch fiber/power hybrid cables. The proposed cables were assumed to be routed up the tower next to the existing Sprint coax. The six (6) existing Sprint panel antennas and their corresponding coax at 100-feet AGL shall remain during the interim phase, and then shall be removed for the final antenna layout.

Results of our analysis show that the tower will be stressed to a maximum of 93.5 percent of capacity under proposed loading conditions. All proposed model reactions, except for anchor uplift, were found to be greater than the modified original design reactions.

The tower is supported by a custom steel platform, which requires modifications. This platform shall be modified by welding two new beams under the two existing 30-foot long beams. The platform shall also be modified by connecting on additional lateral bracing members. The modified platform will be at 90.2 percent of capacity under proposed loading conditions. Details are contained within Appendix C.

The building was analyzed with the SEA Consultants previous analysis and the building was determined to provide adequate strength under the modified proposed loading conditions.

In summary, the modified platform will pass the TIA-222-G code requirements under proposed loading conditions.

SECTION 2
INTRODUCTION

2.1 PROJECT INFORMATION

This report summarizes the structural analysis conducted by Ramaker & Associates, Inc. (Ramaker & Associates) for Alcatel-Lucent on behalf of Sprint, who intends to install additional equipment on an existing tower.

2.2 PURPOSE OF REPORT

The analysis activities of this report were conducted for the purposes of creating and analyzing a model of the subject structure under the required loading conditions. Base reactions from the resulting model were also determined for tower foundation and support development. Recommendations regarding the analysis results, loading configuration, and structural modifications are also provided.

2.3 SCOPE OF SERVICES

Ramaker & Associates developed a finite element model (FEM) of the tower, using tnxTower, for member force, joint deflection, and structure reaction determinations. Subsequently, this report was drafted to provide our engineering recommendations. All information contained herein is valid only for the described structure configuration and loading conditions. Ramaker & Associates reserves the right to modify our recommendations should alterations to the tower loading occur.

SECTION 3
MODEL DEVELOPMENT

3.1 INTRODUCTION

Ramaker & Associates developed a FEM of the tower superstructure using the tower drawings and site photos. Required static loads consisting of the antenna configuration, wind forces, ice loads, and linear appurtenances (including cable loads) were then applied to the FEM. As a result, all member forces, allowable capacities, and base reactions were computed.

3.2 EXISTING STRUCTURE INFORMATION

Tower information was gathered from the original tower drawings by Rohn, engineering file number 34599SW, drawing number D970975, and dated 7/28/97.

3.3 EXISTING TOWER LOADS

Ramaker & Associates understands that the existing antenna, cable, and appurtenance configurations are as shown in the following chart:

Elevation	Appurtenance	Mount	Coax
104	6' Lightning Rod	Top Mount	---
100	** (6) Decibel DB980H90E-M **	(3) T-Frames	** (6) 1-5/8 **
89	(6) Powerwave 7770.00	(3) T-Frames	(12) 1-5/8
	(6) Powerwave LGP219nn		
	(6) Powerwave LGP214nn		
	[Reserved] (2) KMW AM-X-CD-16-65-00T-RET (2) Powerwave P65-17-XLH-RR (6) Ericsson RRUS-11 (1) Raycap DC6-48-60-18-8F		(1) Fiber (2) Power In 3" Conduit
67	GPS	Leg Mounted	1/2

The six (6) Decibel DB980H90E-M panel antennas and their corresponding coax at 100 feet AGL shall remain during the interim phase, and then shall be removed for the final antenna layout.

3.4 PROPOSED TOWER LOADS

Ramaker & Associates understands that the total antenna loading for the tower will consist of the aforementioned existing antennas and the following proposed antennas:

Elevation	Appurtenance	Mount	Coax
247	(2) RFS APXVSPP18-C-A20	Existing (3) T-Frames	(3) 1-1/4 Hybrid Cables
	(1) RFS APXV9ERR18-C-A20		
	(3) ALU 1900MHz 4x40W RRH		
	(3) ALU 800MHz 2x50W RRH		

Proposed hybrid cables were assumed to be routed up the tower adjacent to the existing Sprint coax.

3.5 PROPOSED PLATFORM MODIFICATIONS

The tower is supported by a custom steel platform, which requires modifications. This platform shall be modified by welding two new beams under the two existing 30-foot long beams. The platform shall also be modified by connecting on additional lateral bracing members. The modified platform will be at 90.2 percent of capacity under proposed loading conditions. Details are contained within Appendix C.

3.6 WIND AND ICE LOAD

Wind forces used in model development are in compliance with the TIA-222-G Standard. These guidelines, in accordance with the ATC website, call for an analysis to be performed, which assumes a basic wind speed (3-second gust) of 98 miles-per-hour (mph) without ice in Hartford County. The tower is also designed for a 50 mph basic wind speed with 1.0-inch of radial ice. The tower was analyzed using the following parameters: Structure Class II, Topographic Category 1, and Exposure Category B.

SECTION 4
ANALYSIS RESULTS

4.1 ANALYSIS RESULTS

The tower superstructure was analyzed with the combined existing and proposed antenna loading with and without radial ice. The computed maximum tower member stress capacities are as follows:

Component Type	Percent Capacity
Legs	21.0
Diagonals	44.2
Horizontals	13.8
Bolts	50.0
Guys	93.5
RATING =	93.5

4.2 BASE REACTIONS

The computed maximum factored reactions correlated to maximum moment are as follows:

Load Type	Original Design	Original Design * 1.35	Proposed Model
Total Axial (k)	23.0	31.1	49.83
Total Shear (k)	–	–	0.35
Anchor Uplift (k)	10.7	14.4	13.47
Anchor Lateral (k)	8.6	11.6	10.55

The TIA-222-G code in Section 15.5.1 specifies to multiply original ASD reactions by 1.35 when comparing them with reactions determined using the TIA-222-G code. All proposed model reactions, except for anchor uplift, were found to be greater than the modified original design reactions.

The supporting platform and building were analyzed under proposed loading conditions. The platform shall be modified per Section 3.5 of this report. The modified platform will be at 90.2 percent of capacity under proposed loading conditions. Details are contained within Appendix C. The modified platform and existing building will provide adequate strength under proposed loading conditions.

SECTION 5
LIMITATIONS

The recommendations contained within this report were developed using general project information provided by the owner, tower manufacturer, general field observations, reference information and laboratory testing data, as applicable. All recommendations pertain only to the proposed tower construction, location, and loading as described in this report. Ramaker & Associates assumes no responsibility for failures caused by factors beyond our control. These include but are not limited to the following:

1. Missing, corroding, and/or deteriorating members
2. Improper manufacturing and/or construction
3. Improper maintenance

Ramaker & Associates assumes no responsibility for modifications completed prior to or hereafter in which Ramaker & Associates was not directly involved. These modifications include but are not limited to the following:

1. Replacing or strengthening bracing members
2. Reinforcing or extending vertical members
3. Installing or removing antenna mounting gates or side arms
4. Changing loading configurations

Furthermore, Ramaker & Associates hereby states that this document represents the entire report and that it assumes no liability for any factual changes that may occur after the date of this report. All representations, recommendations and conclusions are based on the information contained and set forth herein. If you are aware of any information contrary to that contained herein, or if you are aware of any defects arising from the original design, material, fabrication and erection deficiencies, you should disregard this report and immediately contact Ramaker & Associates. Ramaker & Associates isn't liable for any representation, recommendation or conclusion not expressly stated herein.

The tower owner is responsible for verifying that the existing loading on the tower is consistent with the loading applied to the tower within this report.

SECTION 6
REFERENCES

1. 2009 International Building Code.

2. Telecommunications Industries Association, Structural Standard for Antenna Supporting Structures and Antennas, TIA Standard ANSI/TIA-222-G 2005, Washington, D.C.

APPENDIX A

TOWER FIGURES

WINDSPEED BY LOCATION

Applied Technology Council

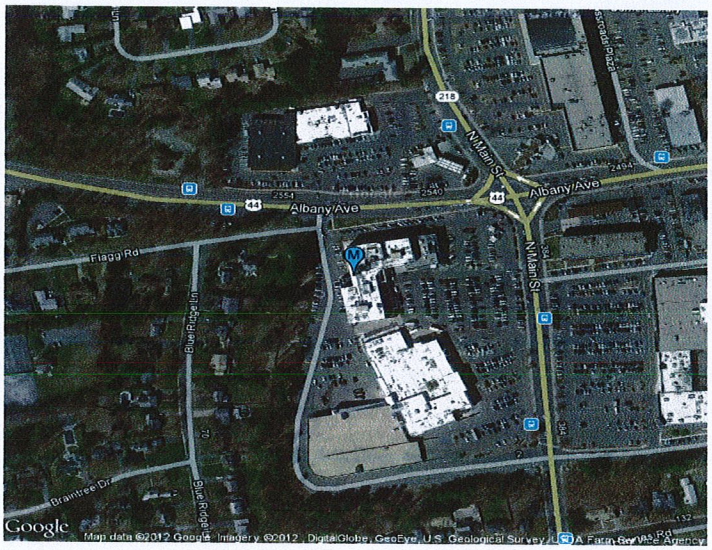
Search Results

Latitude: 41.7850
Longitude: -72.7486

ASCE 7-10 Wind Speeds (3-sec peak gust MPH*):

Risk Category I: 111
Risk Category II: 121
Risk Category III-IV: 131
MRI 10 Year:** 76
MRI 25 Year:** 86
MRI 50 Year:** 92
MRI 100 Year:** 99

ASCE 7-05: 98
ASCE 7-93: 79

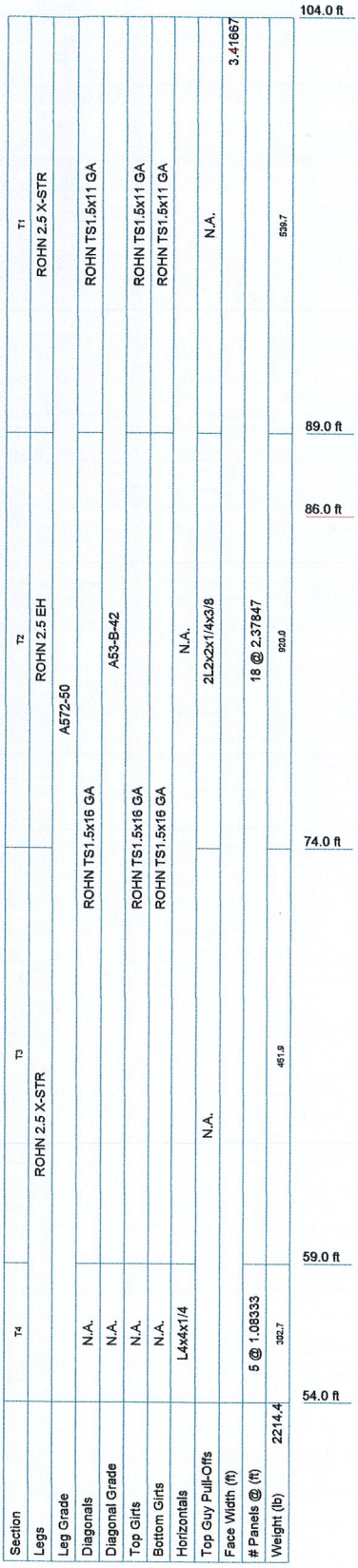


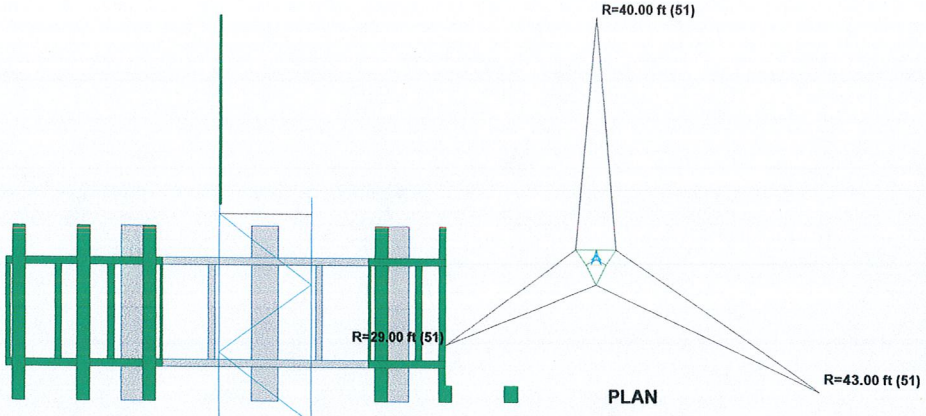
*MPH(Miles per hour)

**MRI Mean Recurrence Interval (years)

Users should consult with local building officials to determine if there are community-specific wind speed requirements that govern.

Sponsored by the ATC Endowment Fund Applied Technology Council 201 Redwood Shores Parkway, Suite 240 Redwood City, California 94065 (650) 595-1542





DESIGNED APPURTENANCE LOADING

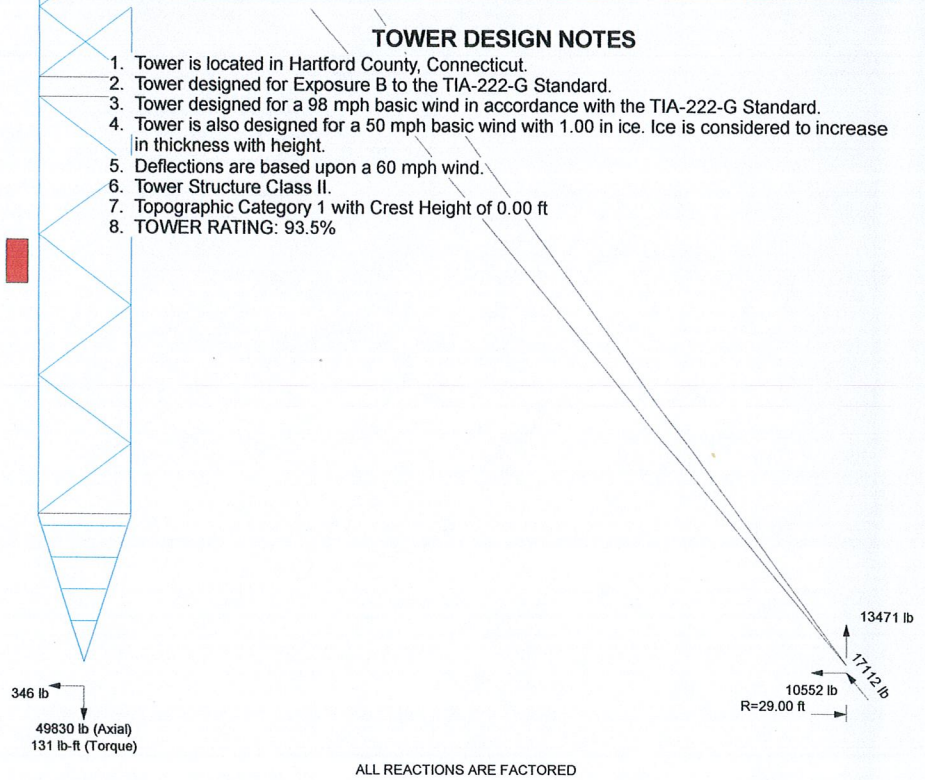
TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod 1"x6.5'	104	(2) LGP219nn	89
(2) DB980F90E-M w/Mount Pipe	100	(2) LGP219nn	89
(2) DB980F90E-M w/Mount Pipe	100	(2) LGP219nn	89
(2) DB980F90E-M w/Mount Pipe	100	(2) LGP214nn	89
APXVSPP18-C w/Mount Pipe	100	(2) LGP214nn	89
APXVSPP18-C w/Mount Pipe	100	(2) LGP214nn	89
APXV9ERR18-C w/Mount Pipe	100	Rohn 12' Boom Gate (3)	89
1900MHz 4x40W RRH	100	AM-X-CD-16-65-00T-RET w/Mount Pipe	89
1900MHz 4x40W RRH	100		
1900MHz 4x40W RRH	100	P65-17-XLH-RR w/Mount Pipe	89
800MHz 2x50W RRH	100	P65-17-XLH-RR w/Mount Pipe	89
800MHz 2x50W RRH	100	(2) RRUS-11	89
800MHz 2x50W RRH	100	(2) RRUS-11	89
Rohn 12' Boom Gate (3)	100	(2) RRUS-11	89
(2) 7770.00 w/Mount Pipe	89	DC6-48-60-18-8F	89
(2) 7770.00 w/Mount Pipe	89	GPS	67
(2) 7770.00 w/Mount Pipe	89		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A53-B-42	42 ksi	63 ksi

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 98 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 93.5%



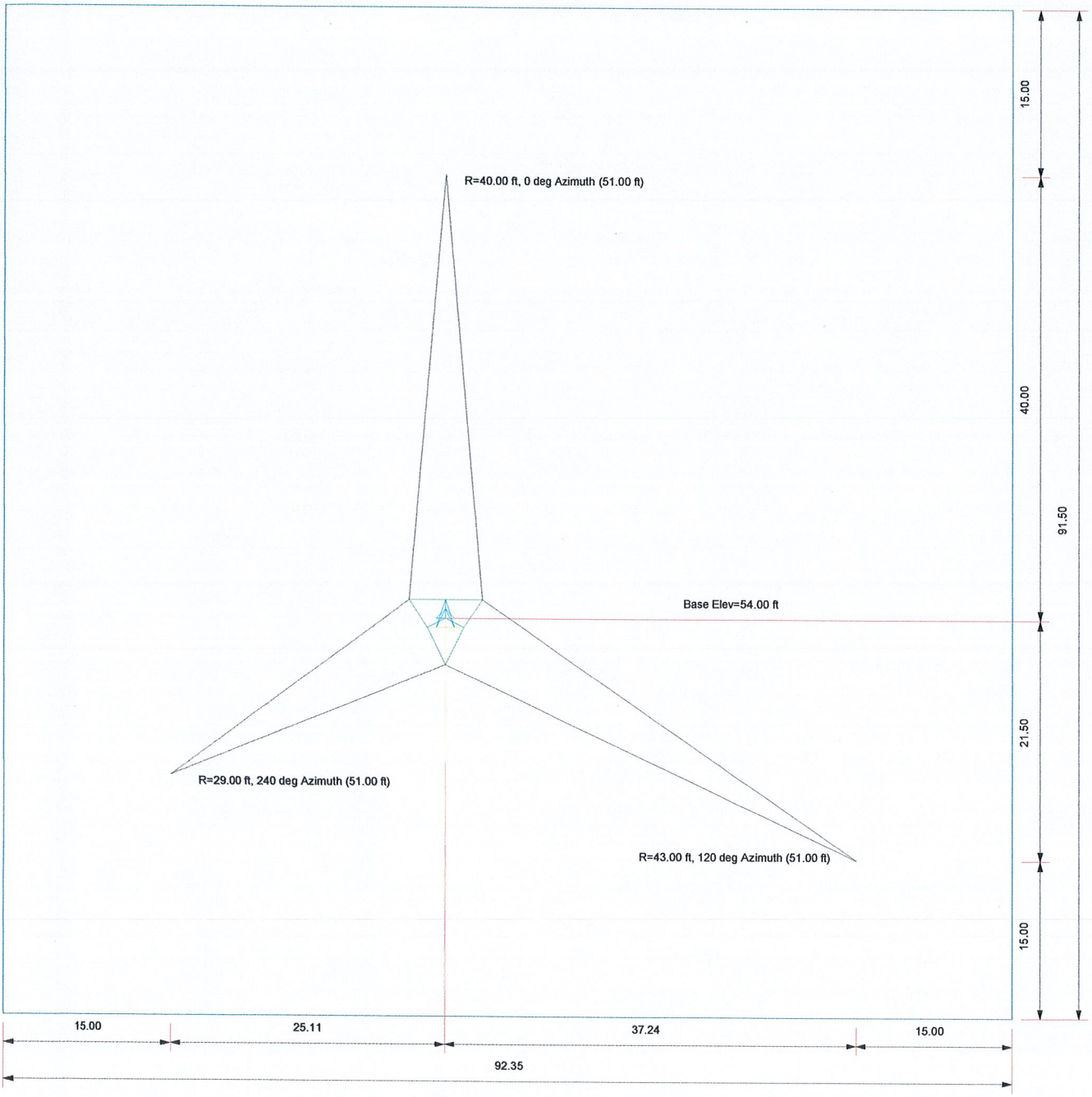
ALL REACTIONS ARE FACTORED

RAMAKER & ASSOCIATES, INC.
Consulting Engineers

Ramaker & Associates, Inc.
1120 Dallas Street
Sauk City, WI 53583
Phone: (608) 643-4100
FAX: (608) 643-7999

Job: *West Hartford Bishops (CT03XC074)*			
Project: *22995*			
Client: Sprint / Alcatel-Lucent	Drawn by: tmoore	App'd:	
Code: TIA-222-G	Date: 10/26/12	Scale: NTS	
Path: I:\22900\22995\Structural\Risa\22995.eri		Dwg No. E-1	

Plot Plan
Total Area - 0.19 Acres



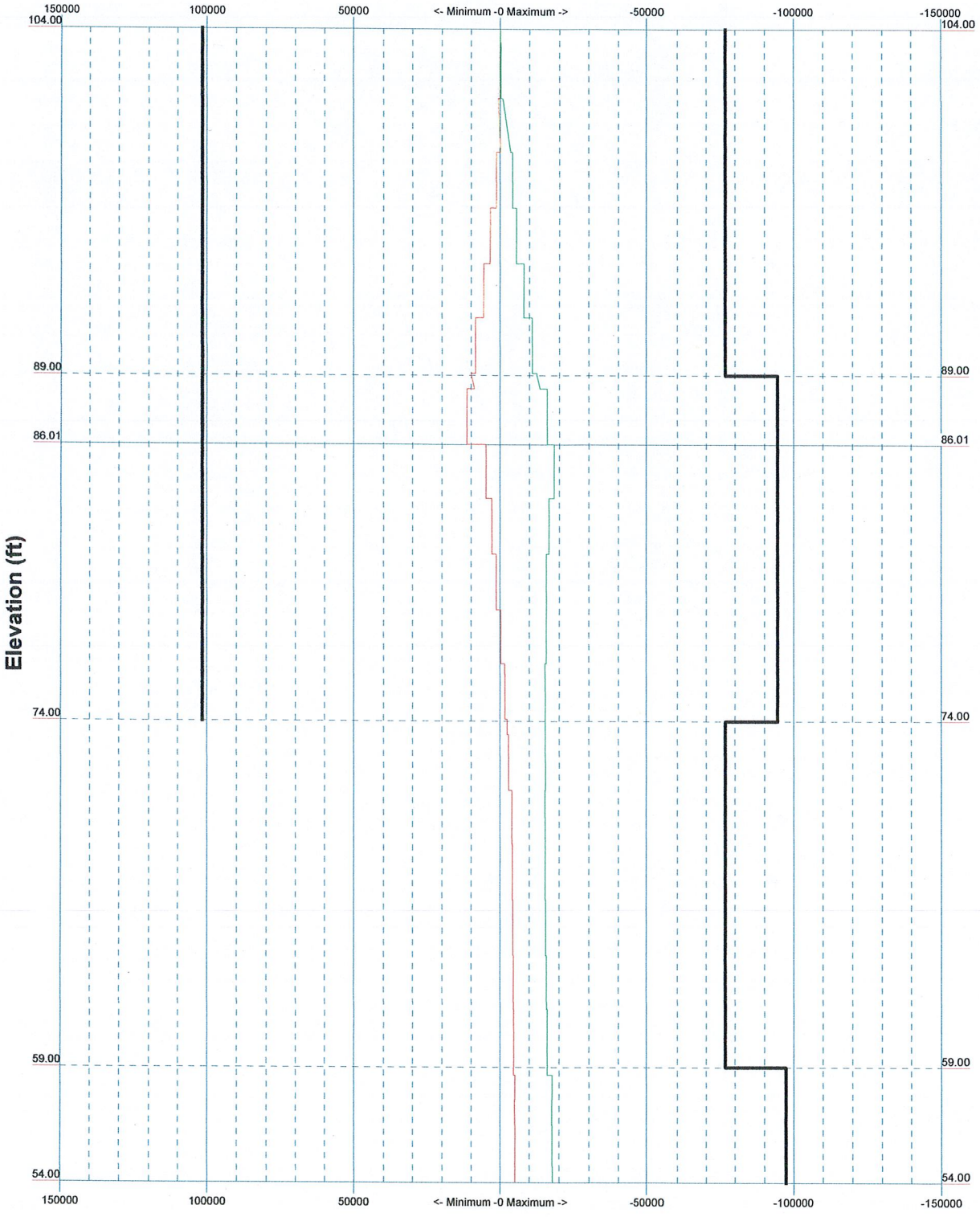
RAMAKER & ASSOCIATES, INC.
Consulting Engineers

Ramaker & Associates, Inc.
1120 Dallas Street
Sauk City, WI 53583
Phone: (608) 643-4100
FAX: (608) 643-7999

Job: ***West Hartford Bishops (CT03XC074)***			
Project: ***22995***			
Client: Sprint / Alcatel-Lucent	Drawn by: tmoore	App'd:	
Code: TIA-222-G	Date: 10/26/12	Scale: NTS	
Path: I:\22900\22995\Structural\Risa\22995.eri		Dwg No. E-2	

TIA-222-G - 98 mph/50 mph 1.0000 in Ice Exposure B

Leg Capacity ——— Leg Compression (lb)



RAMAKER & ASSOCIATES, INC.
Consulting Engineers

Ramaker & Associates, Inc.
1120 Dallas Street
Sauk City, WI 53583
Phone: (608) 643-4100
FAX: (608) 643-7999

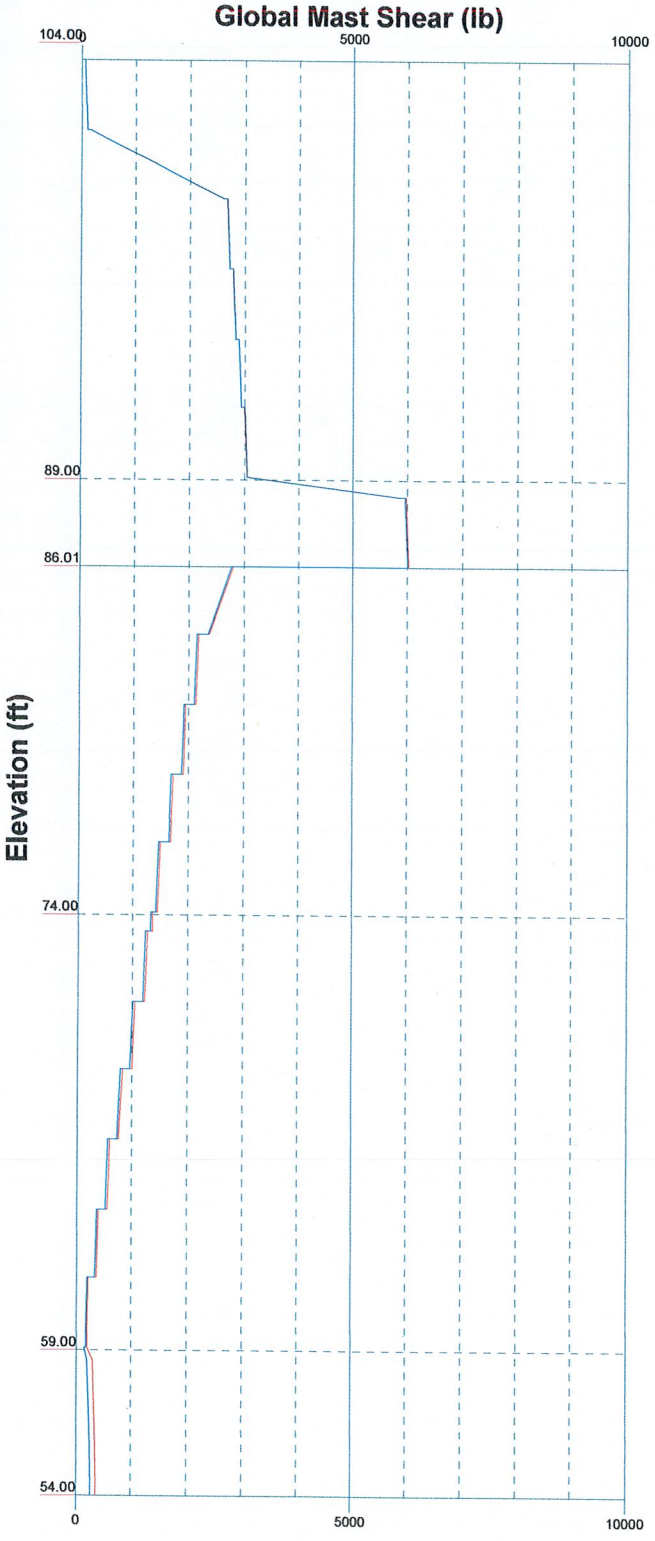
Job: ***West Hartford Bishops (CT03XC074)***			
Project: ***22995***			
Client: Sprint / Alcatel-Lucent	Drawn by: tmoore	App'd:	
Code: TIA-222-G	Date: 10/26/12	Scale: NTS	
Path: I:\22900\22995\Structural\Risa\22995.eri		Dwg No. E-3	

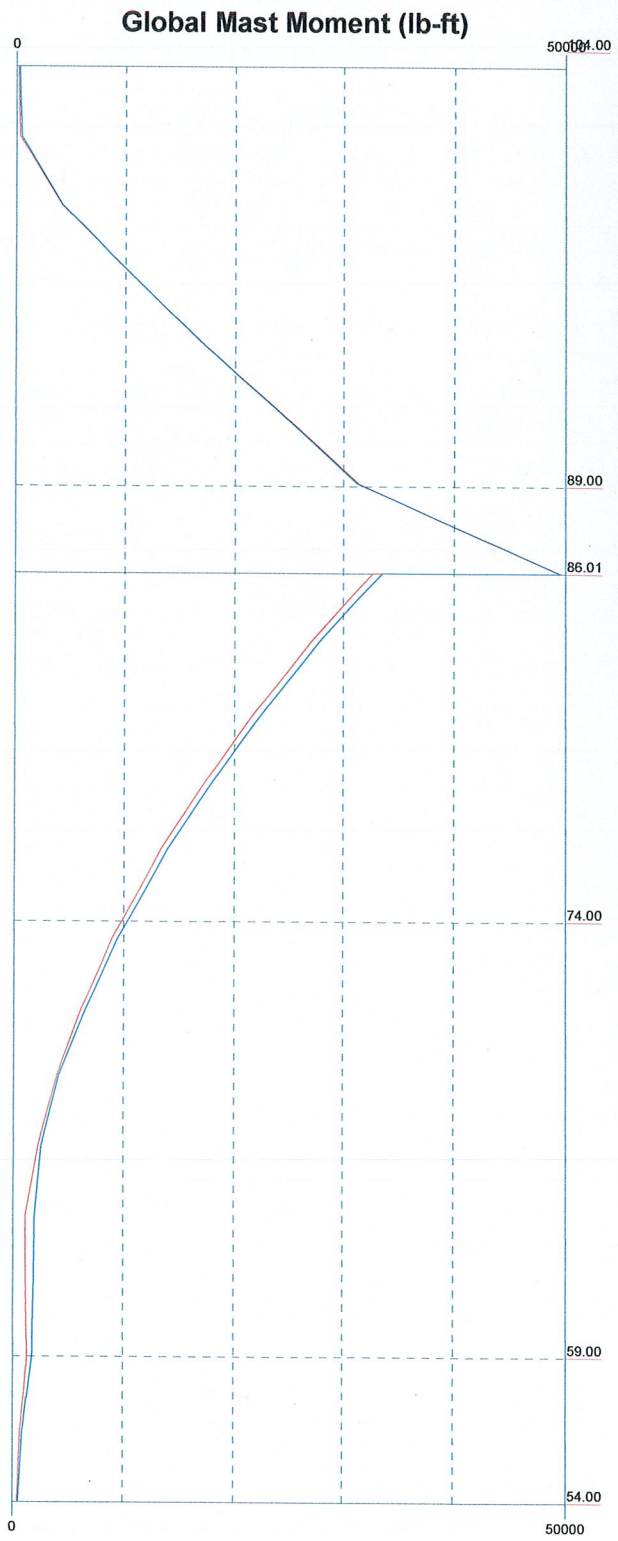
TIA-222-G - 98 mph/50 mph 1.0000 in Ice Exposure B

Vx Vz

Maximum Values

Mx Mz





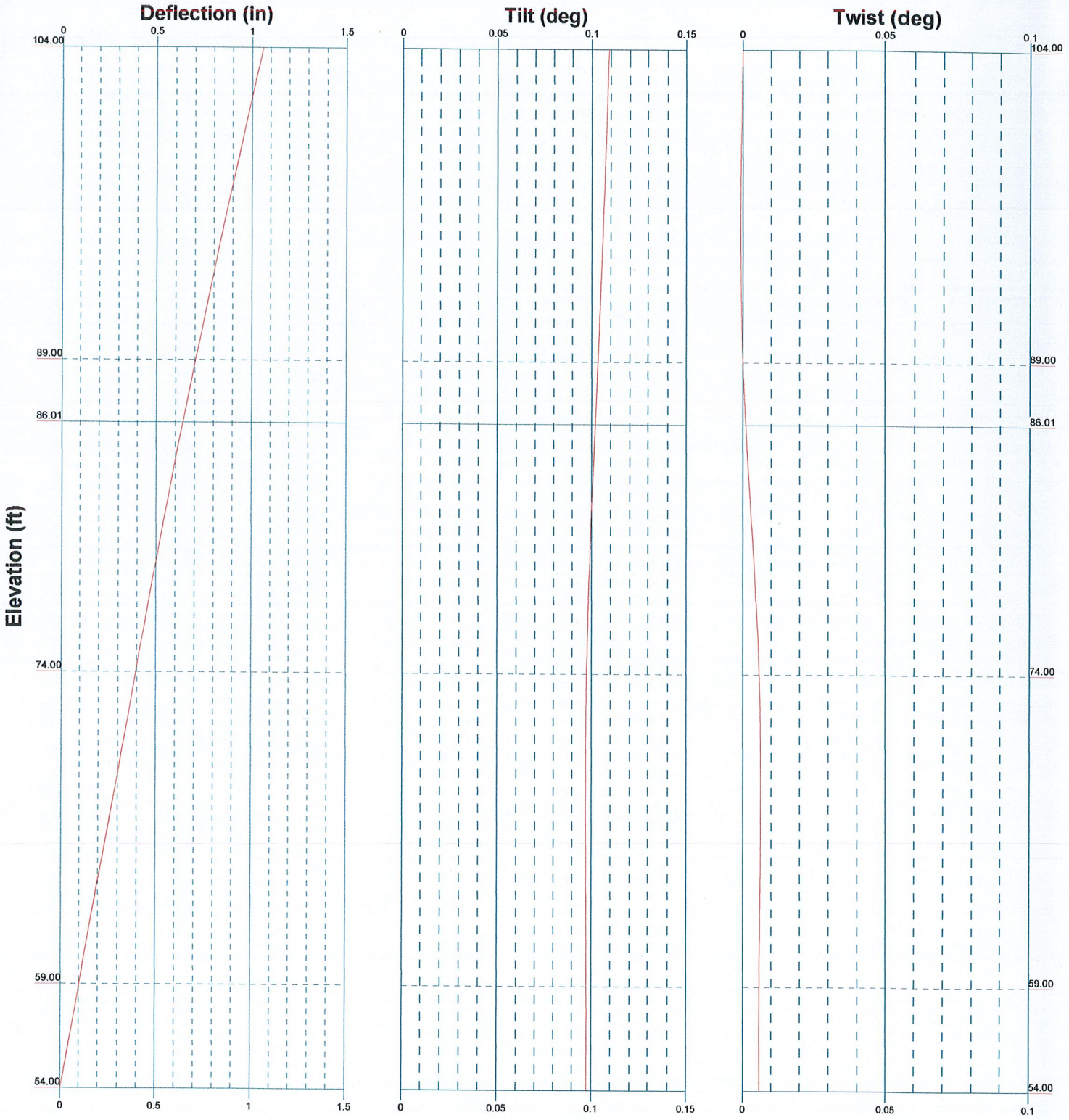
RAMAKER & ASSOCIATES, INC.
Consulting Engineers

Ramaker & Associates, Inc.
1120 Dallas Street
Sauk City, WI 53583
Phone: (608) 643-4100
FAX: (608) 643-7999

Job: **West Hartford Bishops (CT03XC074)**			
Project: ***22995***			
Client: Sprint / Alcatel-Lucent	Drawn by: tmoore	App'd:	
Code: TIA-222-G	Date: 10/26/12	Scale: NTS	
Path: I:\22900\22995\Structural\Risa\22995.eri		Dwg No. E-4	

TIA-222-G - Service - 60 mph

Maximum Values



RAMAKER & ASSOCIATES, INC.
Consulting Engineers

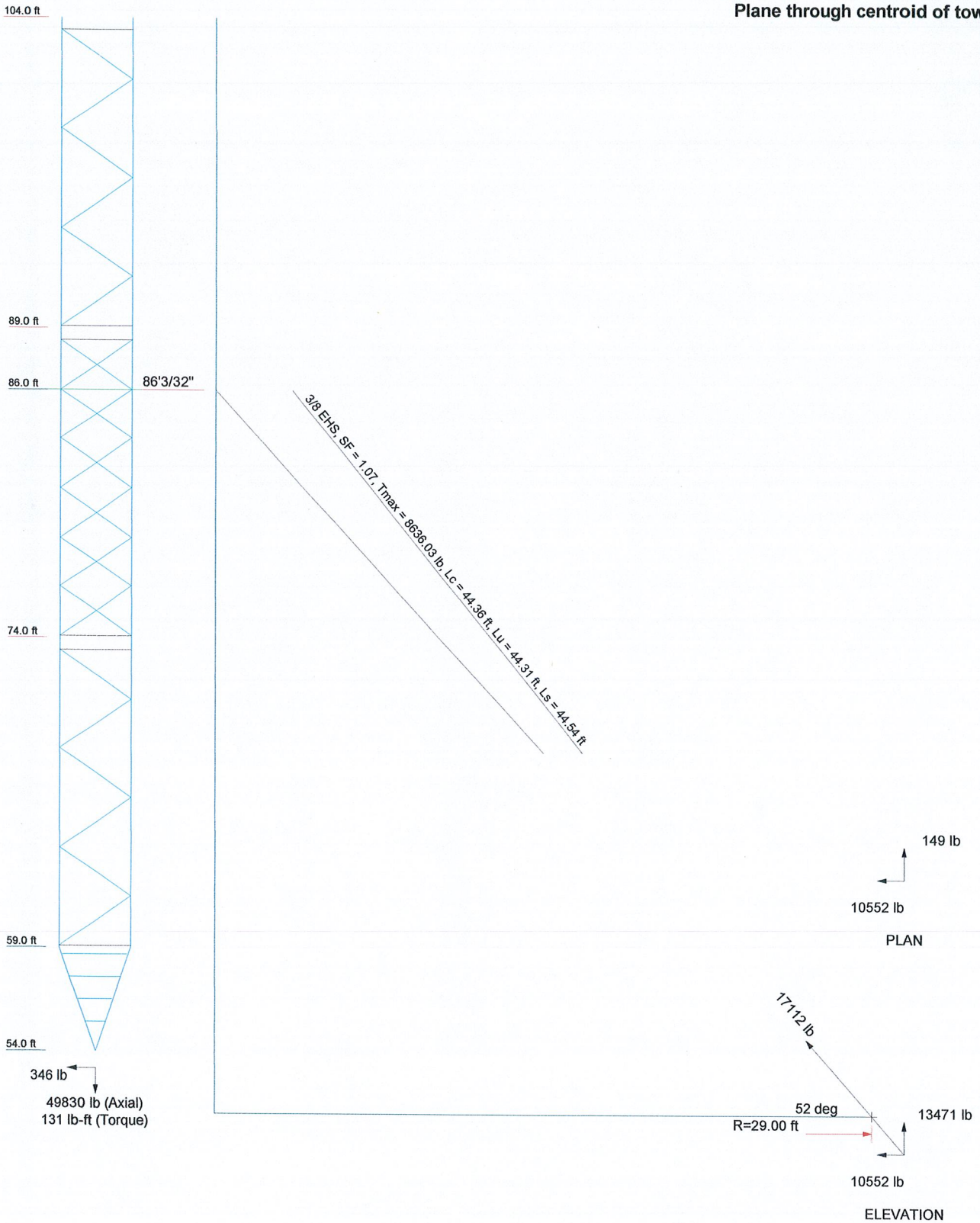
Ramaker & Associates, Inc.
1120 Dallas Street
Sauk City, WI 53583
Phone: (608) 643-4100
FAX: (608) 643-7999

Job: ***West Hartford Bishops (CT03XC074)***			
Project: ***22995***			
Client: Sprint / Alcatel-Lucent	Drawn by: tmoore	App'd:	
Code: TIA-222-G	Date: 10/26/12	Scale: NTS	
Path: I:\22900\22995\Structural\Risa\22995.eri		Dwg No. E-5	

Guy Tensions and Tower Reactions

TIA-222-G - 98 mph/50 mph 1.0000 in Ice Exposure B

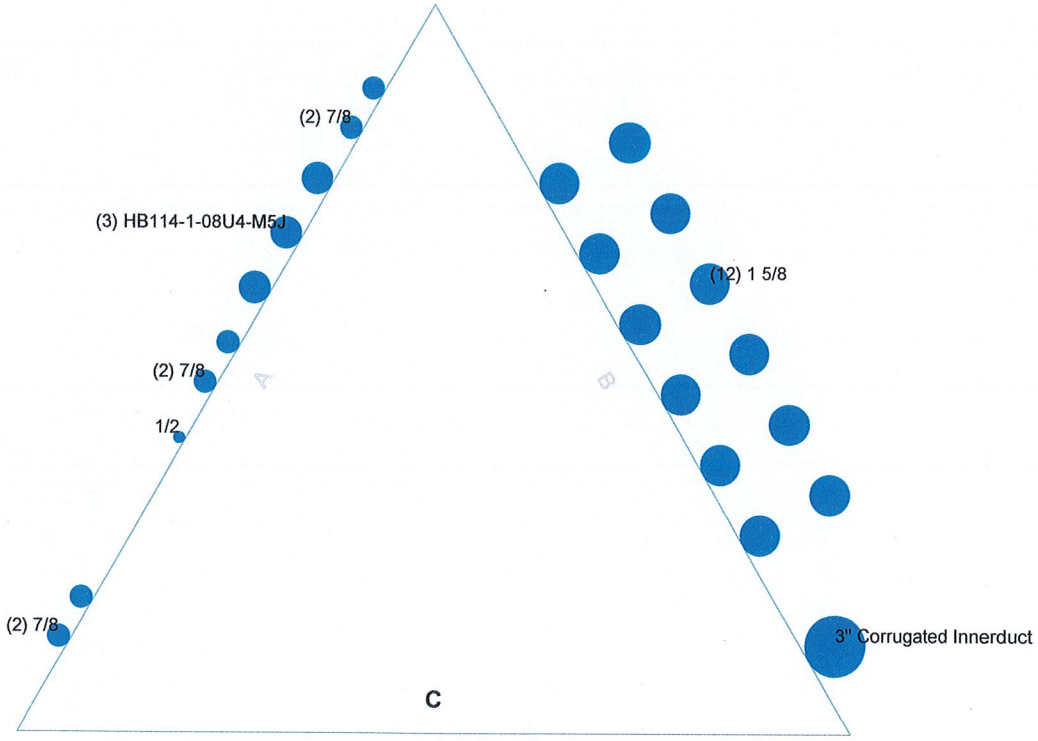
Maximum Values
Anchor 'C'@29 ft Azimuth 240 deg Elev 51 ft
Plane through centroid of tower



RAMAKER & ASSOCIATES, INC. Consulting Engineers	*Ramaker & Associates, Inc.* 1120 Dallas Street Sauk City, WI 53583 Phone: (608) 643-4100 FAX: (608) 643-7999	Job: ***West Hartford Bishops (CT03XC074)***	
		Project: ***22995***	
		Client: Sprint / Alcatel-Lucent	Drawn by: tmoore / App'd:
		Code: TIA-222-G	Date: 10/26/12 / Scale: NTS
		Path: I:\22900\22995\Structural\Risa\22995.eri	Dwg No. E-6

Feedline Plan

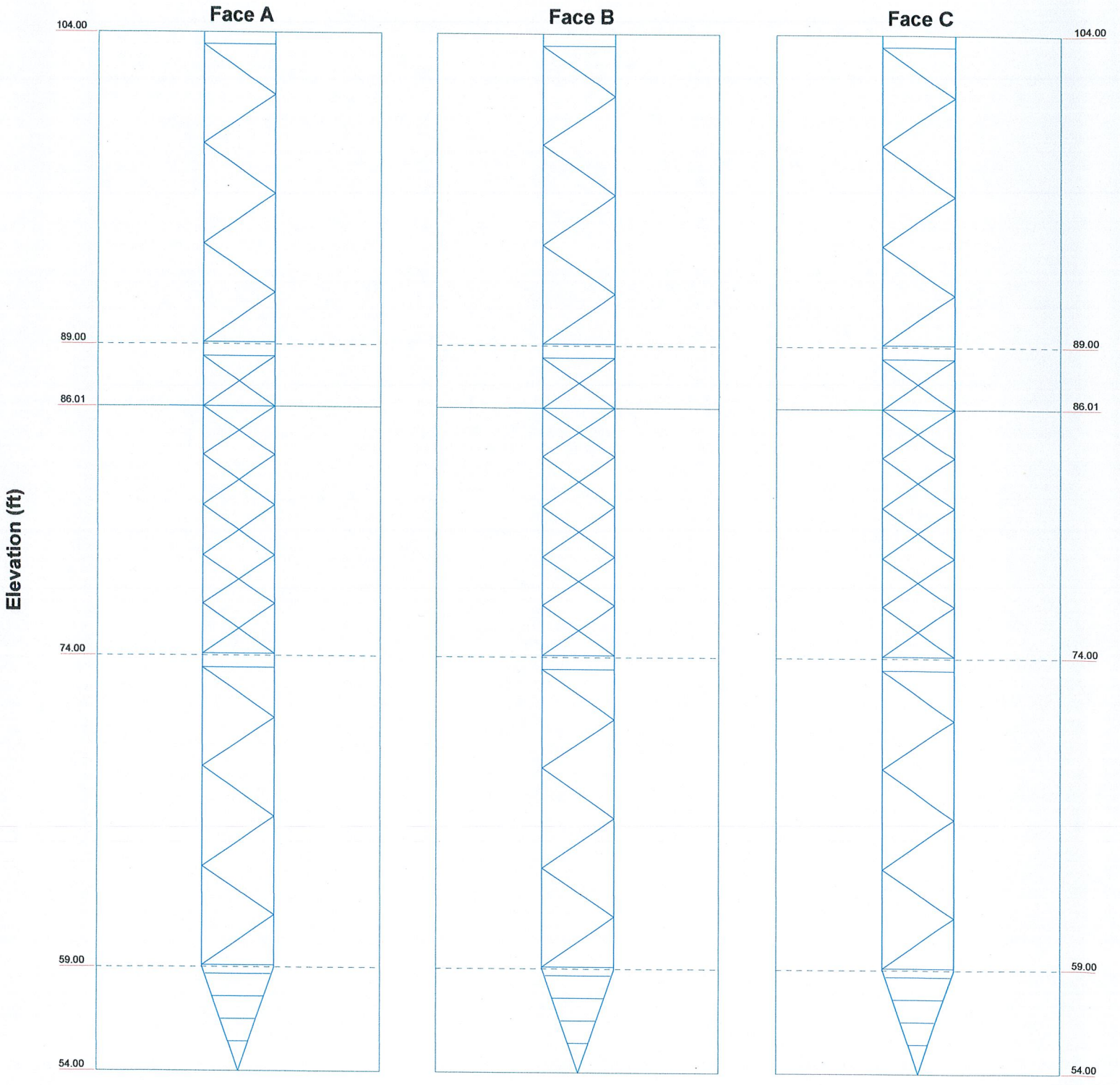
Round Flat App In Face App Out Face



RAMAKER & ASSOCIATES, INC. Consulting Engineers	*Ramaker & Associates, Inc.* 1120 Dallas Street Sauk City, WI 53583 Phone: (608) 643-4100 FAX: (608) 643-7999	Job: ***West Hartford Bishops (CT03XC074)***	
		Project: ***22995***	
		Client: Sprint / Alcatel-Lucent	Drawn by: tmoore / App'd:
		Code: TIA-222-G	Date: 10/26/12 / Scale: NTS
		Path: I:\22900\22995\Structural\Risa\22995.eri	Dwg No. E-7

Stress Distribution Chart
54' - 104'

> 100% | 90%-100% | 75%-90% | 50%-75% | < 50% Overstress



RAMAKER & ASSOCIATES, INC.
Consulting Engineers

Ramaker & Associates, Inc.
1120 Dallas Street
Sauk City, WI 53583
Phone: (608) 643-4100
FAX: (608) 643-7999

Job: ***West Hartford Bishops (CT03XC074)***			
Project: ***22995***			
Client: Sprint / Alcatel-Lucent	Drawn by: tmoore	App'd:	
Code: TIA-222-G	Date: 10/26/12	Scale: NTS	
Path: I:\22900\22995\Structural\Risa\22995.eri		Dwg No. E-8	

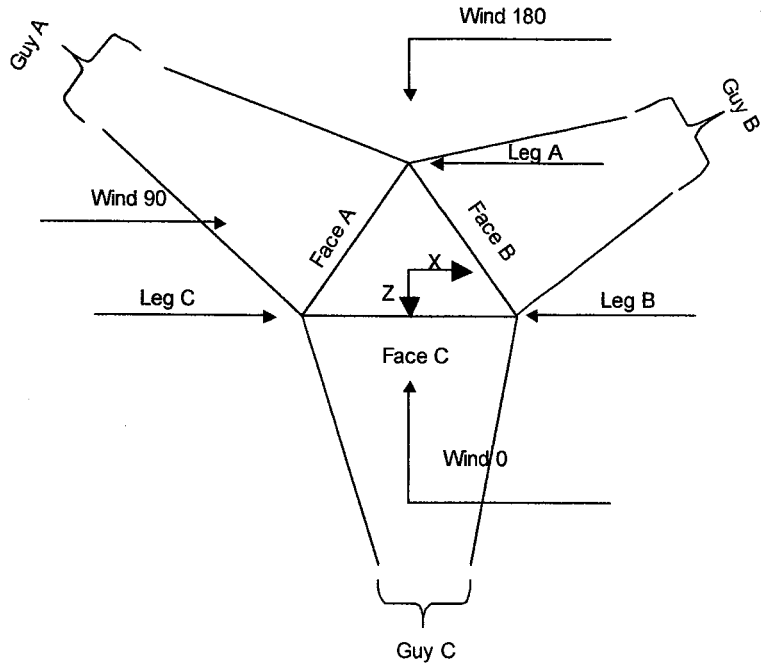
APPENDIX B

TOWER CALCULATIONS

Tower Input Data

The main tower is a 3x guyed tower with an overall height of 104.00 ft above the ground line.
The base of the tower is set at an elevation of 54.00 ft above the ground line.
The face width of the tower is 3.42 ft at the top and tapered at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

- Tower is located in Hartford County, Connecticut.
- Basic wind speed of 98 mph.
- Structure Class II.
- Exposure Category B.
- Topographic Category 1.
- Crest Height 0.00 ft.
- Nominal ice thickness of 1.0000 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 50 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60 mph.
- Pressures are calculated at each section.
- Safety factor used in guy design is 1.
- Stress ratio used in tower member design is 1.
- Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.



Face Guyed

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	104.00-89.00			3.42	1	15.00
T2	89.00-74.00			3.42	1	15.00
T3	74.00-59.00			3.42	1	15.00
T4	59.00-54.00			3.42	1	5.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	104.00-89.00	2.38	K Brace Left	No	No	7.3750	1.3750

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T2	89.00-74.00	2.38	CX Brace	No	No	7.3750	1.3750
T3	74.00-59.00	2.38	K Brace Left	No	No	7.3750	1.3750
T4	59.00-54.00	1.08	CX Brace	No	Yes	4.0000	4.0000

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 104.00-89.00	Pipe	ROHN 2.5 X-STR	A572-50 (50 ksi)	Pipe	ROHN TS1.5x11 GA	A53-B-42 (42 ksi)
T2 89.00-74.00	Pipe	ROHN 2.5 EH	A572-50 (50 ksi)	Pipe	ROHN TS1.5x16 GA	A53-B-42 (42 ksi)
T3 74.00-59.00	Pipe	ROHN 2.5 X-STR	A572-50 (50 ksi)	Pipe	ROHN TS1.5x16 GA	A53-B-42 (42 ksi)
T4 59.00-54.00	Pipe	ROHN 2.5 X-STR	A572-50 (50 ksi)	Pipe		A53-B-42 (42 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 104.00-89.00	Pipe	ROHN TS1.5x11 GA	A53-B-42 (42 ksi)	Pipe	ROHN TS1.5x11 GA	A53-B-42 (42 ksi)
T2 89.00-74.00	Pipe	ROHN TS1.5x16 GA	A53-B-42 (42 ksi)	Pipe	ROHN TS1.5x16 GA	A53-B-42 (42 ksi)
T3 74.00-59.00	Pipe	ROHN TS1.5x16 GA	A53-B-42 (42 ksi)	Pipe	ROHN TS1.5x16 GA	A53-B-42 (42 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T4 59.00-54.00	None	Flat Bar		A36 (36 ksi)	Equal Angle	L4x4x1/4	A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Gusset Area (per face) ft²	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
T1 104.00-89.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T2 89.00-74.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T3 74.00-59.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T4 59.00-54.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 104.00-89.00	No	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T2 89.00-74.00	No	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T3 74.00-59.00	No	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T4 59.00-54.00	No	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1

[1]*Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.*

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	U	Diagonal Net Width Deduct in	U	Top Girt Net Width Deduct in	U	Bottom Girt Net Width Deduct in	U	Mid Girt Net Width Deduct in	U	Long Horizontal Net Width Deduct in	U	Short Horizontal Net Width Deduct in	U
T1 104.00-89.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 89.00-74.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 74.00-59.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 59.00-54.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg Bolt Size in	Leg No.	Diagonal Bolt Size in	Diagonal No.	Top Girt Bolt Size in	Top Girt No.	Bottom Girt Bolt Size in	Bottom Girt No.	Mid Girt Bolt Size in	Mid Girt No.	Long Horizontal Bolt Size in	Long Horizontal No.	Short Horizontal Bolt Size in	Short Horizontal No.
T1 104.00-89.00	Flange	0.7500 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T2 89.00-74.00	Flange	0.7500 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T3 74.00-59.00	Flange	0.7500 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T4 59.00-54.00	Flange	0.7500 A325N	4	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0

Guy Data

Guy Elevation ft	Guy Grade		Guy Size	Initial Tension lb	%	Guy Modulus ksi	Guy Weight plf	L_u ft	Anchor Radius ft	Anchor Azimuth Adj. °	Anchor Elevation ft	End Fitting Efficiency %
86.0069	EHS	A	3/8	1540.00	10%	21000	0.273	51.75	40.00	0.0000	51.00	100%
		B	3/8	1540.00	10%	21000	0.273	53.99	43.00	0.0000	51.00	100%
		C	3/8	1540.00	10%	21000	0.273	44.32	29.00	0.0000	51.00	100%

Guy Data *(cont'd)*

Guy Elevation ft	Mount Type	Torque-Arm Spread ft	Torque-Arm Leg Angle °	Torque-Arm Style	Torque-Arm Grade	Torque-Arm Type	Torque-Arm Size
86.0069	Torque Arm	6.83	0.0000	Channel	A36 (36 ksi)	Channel	C10x15.3

Guy Data *(cont'd)*

Guy Elevation ft	Diagonal Grade	Diagonal Type	Upper Diagonal Size	Lower Diagonal Size	Is Strap.	Pull-Off Grade	Pull-Off Type	Pull-Off Size
86.01	A572-50 (50 ksi)	Solid Round			No	A36 (36 ksi)	Double Equal Angle	2L2x2x1/4x3/8

Guy Data *(cont'd)*

Guy Elevation ft	Cable Weight A lb	Cable Weight B lb	Cable Weight C lb	Cable Weight D lb	Tower Intercept A ft	Tower Intercept B ft	Tower Intercept C ft	Tower Intercept D ft
86.0069	14.13	14.74	12.10		0.24 0.8 sec/pulse	0.26 0.9 sec/pulse	0.17 0.7 sec/pulse	

Guy Data *(cont'd)*

Guy Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Torque Arm K_x	Torque Arm K_y	Pull Off K_x	Pull Off K_y	Diagonal K_x	Diagonal K_y
86.0069	No	No	1	1	1	1	1	1

Guy Data *(cont'd)*

Guy Elevation ft	Torque-Arm Bolt Size in	Torque-Arm Number	Torque-Arm Net Width Deduct in	Torque-Arm U	Pull Off Bolt Size in	Pull Off Number	Pull Off Net Width Deduct in	Pull Off U	Diagonal Bolt Size in	Diagonal Number	Diagonal Net Width Deduct in	Diagonal U
86.0069	0.0000 A325N	0	0.0000	1	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75

Guy Pressures

Guy Elevation ft	Guy Location	z ft	q_z psf	q_z Ice psf	Ice Thickness in
86.0069	A	68.50	19	5	2.1515
	B	68.50	19	5	2.1515
	C	68.50	19	5	2.1515

Guy-Tensioning Information

Guy Elevation ft		H ft	V ft	Temperature At Time Of Tensioning: 0 F Initial Tension lb	0 F Intercept ft	20 F Initial Tension lb	20 F Intercept ft	40 F Initial Tension lb	40 F Intercept ft	60 F Initial Tension lb	60 F Intercept ft	80 F Initial Tension lb	80 F Intercept ft	100 F Initial Tension lb	100 F Intercept ft	120 F Initial Tension lb	120 F Intercept ft
86.0069	A	38.18	35.01	1892	0.19	1774	0.21	1657	0.22	1540	0.24	1423	0.26	1306	0.28	1190	0.31
	B	41.17	35.01	1916	0.21	1790	0.22	1665	0.24	1540	0.26	1415	0.28	1290	0.31	1166	0.34
	C	27.24	35.01	1785	0.15	1703	0.16	1621	0.16	1540	0.17	1459	0.18	1377	0.19	1296	0.21

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
7/8	A	No	Ar (CaAa)	100.00 - 54.00	0.0000	-0.35	2	2	1.1100	1.1100		0.54
7/8	A	No	Ar (CaAa)	100.00 - 54.00	0.0000	0	2	2	1.1100	1.1100		0.54
7/8	A	No	Ar (CaAa)	100.00 - 54.00	0.0000	0.35	2	2	1.1100	1.1100		0.54
HB114-1-08U4-M5J **********	A	No	Ar (CaAa)	100.00 - 54.00	0.0000	0.175	3	3	1.5400	1.5400		1.08
1 5/8	B	No	Ar (CaAa)	89.00 - 54.00	0.0000	0	12	6	1.9800	1.9800		1.04
3" Corrugated Innerduct **********	B	No	Ar (CaAa)	89.00 - 54.00	0.0000	0.4	1	1	3.0000	3.0000		0.30
1/2	A	No	Ar (CaAa)	66.00 - 54.00	0.0000	-0.1	1	1	0.5800	0.5800		0.25

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T1	104.00-89.00	A	0.000	0.000	12.408	0.000	71.28
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T2	89.00-74.00	A	0.000	0.000	16.920	0.000	97.20
		B	0.000	0.000	40.140	0.000	191.70
		C	0.000	0.000	0.000	0.000	0.00
T3	74.00-59.00	A	0.000	0.000	17.326	0.000	98.95
		B	0.000	0.000	40.140	0.000	191.70
		C	0.000	0.000	0.000	0.000	0.00
T4	59.00-54.00	A	0.000	0.000	5.930	0.000	33.65
		B	0.000	0.000	13.380	0.000	63.90
		C	0.000	0.000	0.000	0.000	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T1	104.00-89.00	A	2.227	0.000	0.000	58.095	0.000	771.56
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T2	89.00-74.00	A	2.189	0.000	0.000	78.448	0.000	1031.15
		B		0.000	0.000	63.793	0.000	1708.26
		C		0.000	0.000	0.000	0.000	0.00
T3	74.00-59.00	A	2.145	0.000	0.000	80.945	0.000	1058.36
		B		0.000	0.000	63.446	0.000	1685.01
		C		0.000	0.000	0.000	0.000	0.00
T4	59.00-54.00	A	2.110	0.000	0.000	28.007	0.000	365.11
		B		0.000	0.000	21.058	0.000	555.61
		C		0.000	0.000	0.000	0.000	0.00

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	104.00-89.00	-1.1134	-1.0475	-0.3879	-0.3937
T2	89.00-74.00	1.2936	-1.2626	0.4525	-0.3904
T3	74.00-59.00	1.3464	-1.3352	0.6071	-0.5911
T4	59.00-54.00	1.0690	-1.2100	0.0671	-0.0993

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	1	7/8	89.00 - 100.00	0.6000	0.4538
T1	2	7/8	89.00 - 100.00	0.6000	0.4538
T1	3	7/8	89.00 - 100.00	0.6000	0.4538
T1	4	HB114-1-08U4-M5J	89.00 - 100.00	0.6000	0.4538
T2	1	7/8	74.00 - 89.00	0.6000	0.2425
T2	2	7/8	74.00 - 89.00	0.6000	0.2425
T2	3	7/8	74.00 - 89.00	0.6000	0.2425
T2	4	HB114-1-08U4-M5J	74.00 - 89.00	0.6000	0.2425
T2	6	1 5/8	74.00 - 89.00	0.6000	0.2425
T2	7	3" Corrugated Innerduct	74.00 - 89.00	0.6000	0.2425
T3	1	7/8	59.00 - 74.00	0.6000	0.4654
T3	2	7/8	59.00 - 74.00	0.6000	0.4654
T3	3	7/8	59.00 - 74.00	0.6000	0.4654
T3	4	HB114-1-08U4-M5J	59.00 - 74.00	0.6000	0.4654
T3	6	1 5/8	59.00 - 74.00	0.6000	0.4654
T3	7	3" Corrugated Innerduct	59.00 - 74.00	0.6000	0.4654
T3	9	1/2	59.00 - 66.00	0.6000	0.4654
T4	1	7/8	54.00 - 59.00	0.4874	0.0232
T4	2	7/8	54.00 - 59.00	0.4874	0.0232
T4	3	7/8	54.00 - 59.00	0.4874	0.0232
T4	4	HB114-1-08U4-M5J	54.00 - 59.00	0.4874	0.0232
T4	6	1 5/8	54.00 - 59.00	0.4874	0.0232
T4	7	3" Corrugated Innerduct	54.00 - 59.00	0.4874	0.0232
T4	9	1/2	54.00 - 59.00	0.4874	0.0232

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
Lightning Rod 1"x6.5'	C	From Leg	0.00	0.0000	104.00	No Ice	0.65	0.65	50.00
			0.00			1/2" Ice	1.32	1.32	56.06
			3.00			1" Ice	2.00	2.00	66.34
**********									
(2) DB980F90E-M w/Mount Pipe	A	From Leg	4.00	0.0000	100.00	No Ice	4.37	3.95	34.05

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
			0.00			1/2" Ice	4.96	5.04	70.69
			0.00			1" Ice	5.47	5.85	117.91
(2) DB980F90E-M w/Mount Pipe	B	From Leg	4.00	0.0000	100.00	No Ice	4.37	3.95	34.05
			0.00			1/2" Ice	4.96	5.04	70.69
			0.00			1" Ice	5.47	5.85	117.91
(2) DB980F90E-M w/Mount Pipe	C	From Leg	4.00	0.0000	100.00	No Ice	4.37	3.95	34.05
			0.00			1/2" Ice	4.96	5.04	70.69
			0.00			1" Ice	5.47	5.85	117.91
APXVSPP18-C w/Mount Pipe	A	From Leg	4.00	0.0000	100.00	No Ice	8.56	6.95	82.55
			0.00			1/2" Ice	9.21	8.13	147.99
			0.00			1" Ice	9.83	9.03	225.42
APXVSPP18-C w/Mount Pipe	B	From Leg	4.00	0.0000	100.00	No Ice	8.56	6.95	82.55
			0.00			1/2" Ice	9.21	8.13	147.99
			0.00			1" Ice	9.83	9.03	225.42
APXV9ERR18-C w/Mount Pipe	C	From Leg	4.00	0.0000	100.00	No Ice	8.56	6.95	33.05
			0.00			1/2" Ice	9.21	8.13	98.49
			0.00			1" Ice	9.83	9.03	175.92
1900MHz 4x40W RRH	A	From Leg	4.00	0.0000	100.00	No Ice	2.71	2.61	59.50
			0.00			1/2" Ice	2.95	2.84	82.62
			0.00			1" Ice	3.20	3.09	108.98
1900MHz 4x40W RRH	B	From Leg	4.00	0.0000	100.00	No Ice	2.71	2.61	59.50
			0.00			1/2" Ice	2.95	2.84	82.62
			0.00			1" Ice	3.20	3.09	108.98
1900MHz 4x40W RRH	C	From Leg	4.00	0.0000	100.00	No Ice	2.71	2.61	59.50
			0.00			1/2" Ice	2.95	2.84	82.62
			0.00			1" Ice	3.20	3.09	108.98
800MHz 2x50W RRH	A	From Leg	4.00	0.0000	100.00	No Ice	2.40	2.25	64.00
			0.00			1/2" Ice	2.61	2.46	86.12
			0.00			1" Ice	2.83	2.68	111.30
800MHz 2x50W RRH	B	From Leg	4.00	0.0000	100.00	No Ice	2.40	2.25	64.00
			0.00			1/2" Ice	2.61	2.46	86.12
			0.00			1" Ice	2.83	2.68	111.30
800MHz 2x50W RRH	C	From Leg	4.00	0.0000	100.00	No Ice	2.40	2.25	64.00
			0.00			1/2" Ice	2.61	2.46	86.12
			0.00			1" Ice	2.83	2.68	111.30
Rohn 12' Boom Gate (3)	C	None		0.0000	100.00	No Ice	33.02	33.02	1670.00
						1/2" Ice	47.36	47.36	2220.00
						1" Ice	61.70	61.70	2770.00
**********									
(2) 7770.00 w/Mount Pipe	A	From Leg	0.00	0.0000	89.00	No Ice	6.98	5.06	59.85
			0.00			1/2" Ice	7.87	6.33	112.68
			0.00			1" Ice	8.77	7.63	177.76
(2) 7770.00 w/Mount Pipe	B	From Leg	0.00	0.0000	89.00	No Ice	6.98	5.06	59.85
			0.00			1/2" Ice	7.87	6.33	112.68
			0.00			1" Ice	8.77	7.63	177.76
(2) 7770.00 w/Mount Pipe	C	From Leg	0.00	0.0000	89.00	No Ice	6.98	5.06	59.85
			0.00			1/2" Ice	7.87	6.33	112.68
			0.00			1" Ice	8.77	7.63	177.76
(2) LGP219nn	A	From Leg	0.00	0.0000	89.00	No Ice	0.27	0.18	11.00
			0.00			1/2" Ice	0.34	0.25	13.41
			0.00			1" Ice	0.43	0.32	16.91
(2) LGP219nn	B	From Leg	0.00	0.0000	89.00	No Ice	0.27	0.18	11.00
			0.00			1/2" Ice	0.34	0.25	13.41
			0.00			1" Ice	0.43	0.32	16.91
(2) LGP219nn	C	From Leg	0.00	0.0000	89.00	No Ice	0.27	0.18	11.00
			0.00			1/2" Ice	0.34	0.25	13.41
			0.00			1" Ice	0.43	0.32	16.91

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
(2) LGP214nn	A	From Leg	0.00	0.0000	89.00	No Ice	1.30	0.23	14.10
			0.00			1/2" Ice	1.45	0.31	21.30
			0.00			1" Ice	1.62	0.40	30.39
(2) LGP214nn	B	From Leg	0.00	0.0000	89.00	No Ice	1.30	0.23	14.10
			0.00			1/2" Ice	1.45	0.31	21.30
			0.00			1" Ice	1.62	0.40	30.39
(2) LGP214nn	C	From Leg	0.00	0.0000	89.00	No Ice	1.30	0.23	14.10
			0.00			1/2" Ice	1.45	0.31	21.30
			0.00			1" Ice	1.62	0.40	30.39
Rohn 12' Boom Gate (3)	C	None		0.0000	89.00	No Ice	33.02	33.02	1670.00
						1/2" Ice	47.36	47.36	2220.00
						1" Ice	61.70	61.70	2770.00
**********									
AM-X-CD-16-65-00T-RET w/Mount Pipe	A	From Leg	0.00	0.0000	89.00	No Ice	6.97	5.56	54.90
			0.00			1/2" Ice	7.53	6.46	109.84
			0.00			1" Ice	8.07	7.24	174.93
P65-17-XLH-RR w/Mount Pipe	B	From Leg	0.00	0.0000	89.00	No Ice	11.70	8.94	102.85
			0.00			1/2" Ice	12.42	10.45	184.99
			0.00			1" Ice	13.15	11.99	282.15
P65-17-XLH-RR w/Mount Pipe	C	From Leg	0.00	0.0000	89.00	No Ice	11.70	8.94	102.85
			0.00			1/2" Ice	12.42	10.45	184.99
			0.00			1" Ice	13.15	11.99	282.15
(2) RRUS-11	A	From Leg	0.00	0.0000	89.00	No Ice	3.25	1.37	50.71
			0.00			1/2" Ice	3.49	1.55	71.49
			0.00			1" Ice	3.74	1.74	95.32
(2) RRUS-11	B	From Leg	0.00	0.0000	89.00	No Ice	3.25	1.37	50.71
			0.00			1/2" Ice	3.49	1.55	71.49
			0.00			1" Ice	3.74	1.74	95.32
(2) RRUS-11	C	From Leg	0.00	0.0000	89.00	No Ice	3.25	1.37	50.71
			0.00			1/2" Ice	3.49	1.55	71.49
			0.00			1" Ice	3.74	1.74	95.32
DC6-48-60-18-8F	C	None		0.0000	89.00	No Ice	1.47	1.47	32.80
						1/2" Ice	1.67	1.67	50.52
						1" Ice	1.88	1.88	70.72
**********									
GPS	C	From Leg	1.00	0.0000	67.00	No Ice	1.00	1.00	10.00
			0.00			1/2" Ice	1.50	1.50	15.00
			0.00			1" Ice	2.00	2.00	20.00

Force Totals (Does not include forces on guys)

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Torques lb-ft
Leg Weight	1216.82			
Bracing Weight	997.53			
Total Member Self-Weight	2214.35			
Guy Weight	81.93			
Total Weight	8324.97			
Wind 0 deg - No Ice		0.00	-5388.45	68.98

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Torques lb-ft
Wind 30 deg - No Ice		2769.75	-4781.44	34.82
Wind 60 deg - No Ice		4988.26	-2870.79	-44.77
Wind 90 deg - No Ice		5768.31	0.00	-114.21
Wind 120 deg - No Ice		4727.71	2720.36	-106.04
Wind 150 deg - No Ice		2642.12	4560.38	-77.24
Wind 180 deg - No Ice		0.00	5370.46	-67.30
Wind 210 deg - No Ice		-2769.75	4781.44	-34.82
Wind 240 deg - No Ice		-5003.84	2879.78	45.52
Wind 270 deg - No Ice		-5768.31	0.00	114.21
Wind 300 deg - No Ice		-4712.13	-2711.37	103.61
Wind 330 deg - No Ice		-2642.12	-4560.38	77.24
Member Ice	6959.68			
Guy Ice	1993.18			
Total Weight Ice	36482.85			
Wind 0 deg - Ice		0.00	-2911.00	-33.86
Wind 30 deg - Ice		1462.26	-2532.82	-11.84
Wind 60 deg - Ice		2574.06	-1486.19	10.92
Wind 90 deg - Ice		3005.17	0.00	29.26
Wind 120 deg - Ice		2590.74	1495.82	42.17
Wind 150 deg - Ice		1469.53	2545.40	45.37
Wind 180 deg - Ice		0.00	2906.27	33.91
Wind 210 deg - Ice		-1462.26	2532.82	11.84
Wind 240 deg - Ice		-2578.15	1488.55	-10.90
Wind 270 deg - Ice		-3005.17	0.00	-29.26
Wind 300 deg - Ice		-2586.64	-1493.46	-42.24
Wind 330 deg - Ice		-1469.53	-2545.40	-45.37
Total Weight	8324.97			
Wind 0 deg - Service		0.00	-2019.83	25.86
Wind 30 deg - Service		1038.22	-1792.29	13.05
Wind 60 deg - Service		1869.82	-1076.10	-16.78
Wind 90 deg - Service		2162.21	0.00	-42.81
Wind 120 deg - Service		1772.15	1019.71	-39.75
Wind 150 deg - Service		990.38	1709.43	-28.95
Wind 180 deg - Service		0.00	2013.08	-25.23
Wind 210 deg - Service		-1038.22	1792.29	-13.05
Wind 240 deg - Service		-1875.66	1079.47	17.06
Wind 270 deg - Service		-2162.21	0.00	42.81
Wind 300 deg - Service		-1766.31	-1016.34	38.84
Wind 330 deg - Service		-990.38	-1709.43	28.95

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy
3	1.2 Dead+1.6 Wind 30 deg - No Ice+1.0 Guy
4	1.2 Dead+1.6 Wind 60 deg - No Ice+1.0 Guy
5	1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy
6	1.2 Dead+1.6 Wind 120 deg - No Ice+1.0 Guy
7	1.2 Dead+1.6 Wind 150 deg - No Ice+1.0 Guy
8	1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy
9	1.2 Dead+1.6 Wind 210 deg - No Ice+1.0 Guy
10	1.2 Dead+1.6 Wind 240 deg - No Ice+1.0 Guy

Comb. No.	Description
11	1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy
12	1.2 Dead+1.6 Wind 300 deg - No Ice+1.0 Guy
13	1.2 Dead+1.6 Wind 330 deg - No Ice+1.0 Guy
14	1.2 Dead+1.0 Ice+1.0 Temp+Guy
15	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy
16	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy
17	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy
18	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy
19	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy
20	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy
21	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy
22	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy
23	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy
24	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy
25	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy
26	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy
27	Dead+Wind 0 deg - Service+Guy
28	Dead+Wind 30 deg - Service+Guy
29	Dead+Wind 60 deg - Service+Guy
30	Dead+Wind 90 deg - Service+Guy
31	Dead+Wind 120 deg - Service+Guy
32	Dead+Wind 150 deg - Service+Guy
33	Dead+Wind 180 deg - Service+Guy
34	Dead+Wind 210 deg - Service+Guy
35	Dead+Wind 240 deg - Service+Guy
36	Dead+Wind 270 deg - Service+Guy
37	Dead+Wind 300 deg - Service+Guy
38	Dead+Wind 330 deg - Service+Guy

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
T1	104 - 89	Leg	Max Tension	4	9996.13	624.91	-461.79
			Max. Compression	2	-12504.87	-67.37	-579.96
			Max. Mx	5	-10071.65	789.63	28.99
			Max. My	8	8326.10	88.63	764.69
			Max. Vy	4	1347.03	470.59	-370.73
			Max. Vx	8	1536.55	90.65	588.67
		Diagonal	Max Tension	9	3078.23	0.00	0.00
			Max. Compression	3	-3100.78	0.00	0.00
			Max. Mx	18	882.90	22.06	0.00
			Max. My	15	105.85	0.00	0.05
			Max. Vy	18	-21.20	0.00	0.00
			Max. Vx	15	-0.05	0.00	0.00
		Top Girt	Max Tension	8	115.02	0.00	0.00
			Max. Compression	2	-116.91	0.00	0.00
			Max. Mx	23	19.57	18.05	0.00
			Max. My	2	50.34	0.00	0.00
			Max. Vy	23	-21.13	0.00	0.00
			Max. Vx	2	-0.00	0.00	0.00
		Bottom Girt	Max Tension	3	1447.84	0.00	0.00
			Max. Compression	9	-1344.21	0.00	0.00
			Max. Mx	23	29.65	18.05	0.00
			Max. My	15	545.46	0.00	0.00
			Max. Vy	23	-21.13	0.00	0.00
			Max. Vx	15	-0.00	0.00	0.00
T2	89 - 74	Leg	Max Tension	4	11345.37	-859.45	388.68

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Compression	6	-18313.07	-14.78	9.03
			Max. Mx	5	-2277.15	-1091.20	4.64
			Max. My	3	-2254.89	-579.94	926.08
			Max. Vy	5	2267.73	-893.16	171.94
			Max. Vx	8	2456.98	101.35	-920.18
		Diagonal	Max Tension	11	2519.18	0.00	0.00
			Max. Compression	11	-2635.90	0.00	0.00
			Max. Mx	18	674.29	19.61	0.00
			Max. My	19	-139.08	0.00	-0.04
			Max. Vy	18	-18.84	0.00	0.00
			Max. Vx	19	0.04	0.00	0.00
		Top Girt	Max Tension	10	272.75	0.00	0.00
			Max. Compression	7	-228.39	0.00	0.00
			Max. Mx	23	216.35	16.04	0.00
			Max. My	15	55.64	0.00	0.00
			Max. Vy	23	-18.78	0.00	0.00
			Max. Vx	15	-0.00	0.00	0.00
		Bottom Girt	Max Tension	13	205.33	0.00	0.00
			Max. Compression	11	-64.45	0.00	0.00
			Max. Mx	23	135.94	16.04	0.00
			Max. My	15	125.12	0.00	0.00
			Max. Vy	23	-18.78	0.00	0.00
			Max. Vx	15	-0.00	0.00	0.00
		Guy A	Bottom Tension	9	7254.49		
			Top Tension	9	7263.86		
			Top Cable Vert	9	4908.36		
			Top Cable Norm	9	5354.54		
			Top Cable Tan	9	23.62		
			Bot Cable Vert	9	-4878.33		
			Bot Cable Norm	9	5369.12		
			Bot Cable Tan	9	46.09		
		Guy B	Bottom Tension	11	7062.92		
			Top Tension	11	7072.29		
			Top Cable Vert	11	4582.60		
			Top Cable Norm	11	5386.71		
			Top Cable Tan	11	21.03		
			Bot Cable Vert	11	-4551.73		
			Bot Cable Norm	11	5400.43		
			Bot Cable Tan	11	43.72		
		Guy C	Bottom Tension	5	8626.76		
			Top Tension	5	8636.03		
			Top Cable Vert	5	6802.93		
			Top Cable Norm	5	5319.67		
			Top Cable Tan	5	48.40		
			Bot Cable Vert	5	-6776.73		
			Bot Cable Norm	5	5337.79		
			Bot Cable Tan	5	70.49		
		Top Guy Pull-Off	Max Tension	12	5215.64	0.00	0.00
			Max. Compression	10	-4964.99	0.00	0.00
			Max. Mx	23	-1383.11	37.38	0.00
			Max. My	2	2674.62	0.00	-0.00
			Max. Vy	23	43.76	0.00	0.00
			Max. Vx	2	0.00	0.00	0.00
		Torque Arm Top	Max Tension	13	6094.42	0.00	0.00
			Max. Compression	5	-3599.30	0.00	0.00
			Max. Mx	3	-574.49	-22287.22	0.00
			Max. My	2	-2977.47	-12789.74	-0.00
			Max. Vy	3	6555.98	-22287.22	0.00
			Max. Vx	2	-0.00	-12789.74	-0.00
T3	74 - 59	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	19	-16126.01	-212.06	172.84

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Mx	19	-15856.13	496.07	231.46
			Max. My	15	-15774.93	-53.37	-549.17
			Max. Vy	15	2226.25	-449.30	311.92
			Max. Vx	18	2593.51	-56.07	-239.95
		Diagonal	Max Tension	13	1082.47	0.00	0.00
			Max. Compression	7	-1104.66	0.00	0.00
			Max. Mx	18	97.94	19.05	0.00
			Max. My	19	82.98	0.00	-0.04
			Max. Vy	18	-18.30	0.00	0.00
			Max. Vx	19	0.03	0.00	0.00
		Top Girt	Max Tension	7	426.82	0.00	0.00
			Max. Compression	13	-411.00	0.00	0.00
			Max. Mx	23	-9.49	15.58	0.00
			Max. My	15	199.62	0.00	0.00
			Max. Vy	23	-18.24	0.00	0.00
			Max. Vx	15	-0.00	0.00	0.00
		Bottom Girt	Max Tension	19	1370.67	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	26	1339.82	15.58	0.00
			Max. My	19	1364.49	0.00	0.00
			Max. Vy	26	-18.24	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
T4	59 - 54	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	19	-17776.72	-121.15	28.17
			Max. Mx	18	-16040.96	-727.50	-37.66
			Max. My	11	-8782.01	-50.08	59.27
			Max. Vy	19	3601.60	562.20	-40.94
			Max. Vx	6	65.02	-464.14	-52.44
		Horizontal	Max Tension	15	2469.61	229.19	-65.69
			Max. Compression	18	-325.48	9.47	-1.74
			Max. Mx	15	2469.61	229.19	-65.69
			Max. My	6	-130.52	85.21	-114.50
			Max. Vy	11	109.07	82.21	-54.06
			Max. Vx	6	168.89	18.06	48.33

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Mast	Max. Vert	19	49829.75	146.24	-6.78
	Max. H_x	12	18884.28	176.92	72.14
	Max. H_z	4	22573.56	-301.39	169.69
	Max. M_x	1	0.00	-28.35	1.82
	Max. M_z	1	0.00	-28.35	1.82
	Max. Torsion	8	34.45	21.80	-234.65
	Min. Vert	35	14606.39	49.39	-46.14
	Min. H_x	4	22573.56	-301.39	169.69
	Min. H_z	15	49432.26	0.34	-237.70
	Min. M_x	1	0.00	-28.35	1.82
	Min. M_z	1	0.00	-28.35	1.82
	Min. Torsion	11	-130.63	92.96	22.75
Guy C @ 29 ft Elev 51 ft Azimuth 240 deg	Max. Vert	10	-92.18	-40.76	23.51
	Max. H_x	10	-92.18	-40.76	23.51
	Max. H_z	3	-13448.91	-9066.02	5366.72

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
	Min. Vert	5	-13470.97	-9196.28	5176.01
	Min. H_x	5	-13470.97	-9196.28	5176.01
	Min. H_z	9	-130.55	-77.60	22.99
Guy B @ 43 ft Elev 51 ft Azimuth 120 deg	Max. Vert	6	-38.82	25.95	15.03
	Max. H_x	11	-9034.35	9298.70	5284.69
	Max. H_z	13	-9031.87	9217.40	5420.09
	Min. Vert	11	-9034.35	9298.70	5284.69
	Min. H_x	6	-38.82	25.95	15.03
	Min. H_z	6	-38.82	25.95	15.03
Guy A @ 40 ft Elev 51 ft Azimuth 0 deg	Max. Vert	2	-47.51	-0.06	-34.06
	Max. H_x	10	-8412.43	112.13	-9222.26
	Max. H_z	2	-47.51	-0.06	-34.06
	Min. Vert	7	-9697.01	-92.30	-10644.60
	Min. H_x	6	-8408.02	-133.65	-9217.91
	Min. H_z	7	-9697.01	-92.30	-10644.60

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	14856.25	28.35	-1.82	0.00	0.00	17.86
1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy	29501.56	154.54	-39.32	0.00	0.00	29.63
1.2 Dead+1.6 Wind 30 deg - No Ice+1.0 Guy	28098.55	264.86	-58.52	0.00	0.00	-0.35
1.2 Dead+1.6 Wind 60 deg - No Ice+1.0 Guy	22573.56	301.39	-169.69	0.00	0.00	-17.84
1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy	28468.00	181.81	-169.52	0.00	0.00	-8.11
1.2 Dead+1.6 Wind 120 deg - No Ice+1.0 Guy	30093.68	105.98	-73.05	0.00	0.00	-3.85
1.2 Dead+1.6 Wind 150 deg - No Ice+1.0 Guy	26604.51	36.43	69.31	0.00	0.00	1.83
1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy	19465.42	-21.80	234.65	0.00	0.00	-34.45
1.2 Dead+1.6 Wind 210 deg - No Ice+1.0 Guy	24373.91	0.93	151.56	0.00	0.00	8.27
1.2 Dead+1.6 Wind 240 deg - No Ice+1.0 Guy	26335.67	-38.34	64.76	0.00	0.00	77.81
1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy	24060.71	-92.96	-22.75	0.00	0.00	130.63
1.2 Dead+1.6 Wind 300 deg - No Ice+1.0 Guy	18884.28	-176.92	-72.14	0.00	0.00	105.26
1.2 Dead+1.6 Wind 330 deg - No Ice+1.0 Guy	25921.77	-0.80	-46.08	0.00	0.00	46.96
1.2 Dead+1.0 Ice+1.0 Temp+Guy	47661.26	-37.47	103.98	0.00	0.00	49.52
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy	49432.26	-0.34	237.70	0.00	0.00	26.45
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy	49426.68	-38.12	194.73	0.00	0.00	30.63
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy	49295.18	-94.17	130.03	0.00	0.00	50.59
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy	49682.95	-126.65	54.84	0.00	0.00	67.98
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy	49829.75	-146.24	6.78	0.00	0.00	70.16
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy	49015.00	-115.17	1.09	0.00	0.00	66.78
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy	47957.38	-70.55	5.00	0.00	0.00	58.92
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy	47406.42	-24.17	42.67	0.00	0.00	50.23
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy	47277.28	19.54	77.30	0.00	0.00	52.01
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy	47230.91	31.51	128.28	0.00	0.00	51.89
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy	47624.20	42.68	181.84	0.00	0.00	39.74
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy	48598.25	23.12	217.33	0.00	0.00	29.85
Dead+Wind 0 deg - Service+Guy	14943.03	41.33	-74.57	0.00	0.00	29.70
Dead+Wind 30 deg - Service+Guy	15060.00	77.49	-66.49	0.00	0.00	23.69
Dead+Wind 60 deg - Service+Guy	15125.97	100.96	-46.76	0.00	0.00	10.18
Dead+Wind 90 deg - Service+Guy	15118.82	104.44	-14.74	0.00	0.00	-1.70
Dead+Wind 120 deg - Service+Guy	15046.05	92.71	23.09	0.00	0.00	-0.51
Dead+Wind 150 deg - Service+Guy	14922.92	55.51	49.72	0.00	0.00	4.68

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Dead+Wind 180 deg - Service+Guy	14787.86	15.57	65.86	0.00	0.00	6.58
Dead+Wind 210 deg - Service+Guy	14671.87	-21.16	63.19	0.00	0.00	12.30
Dead+Wind 240 deg - Service+Guy	14606.39	-49.39	46.14	0.00	0.00	25.61
Dead+Wind 270 deg - Service+Guy	14614.20	-48.32	11.31	0.00	0.00	37.12
Dead+Wind 300 deg - Service+Guy	14687.84	-31.73	-24.45	0.00	0.00	35.66
Dead+Wind 330 deg - Service+Guy	14806.91	1.48	-53.66	0.00	0.00	31.09

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
1	-0.00	-8324.98	0.00	-0.44	8324.97	-0.02	0.005%
2	10.76	-9982.79	-9420.11	-10.73	9982.77	9419.80	0.002%
3	4718.88	-9970.81	-8135.43	-4718.85	9970.80	8135.20	0.002%
4	8172.64	-9960.01	-4706.48	-8172.38	9960.01	4706.93	0.004%
5	9421.39	-9970.50	-7.81	-9421.16	9970.49	7.91	0.002%
6	8183.74	-9982.43	4700.47	-8183.44	9982.41	-4700.32	0.002%
7	4699.10	-9973.30	8116.78	-4698.91	9973.29	-8116.69	0.002%
8	-10.76	-9964.42	9391.32	11.30	9964.42	-9391.29	0.004%
9	-4718.88	-9976.41	8135.43	4718.58	9976.40	-8135.24	0.003%
10	-8197.58	-9987.20	4720.87	8197.15	9987.17	-4720.62	0.004%
11	-9421.39	-9976.72	7.81	9421.09	9976.70	-7.64	0.003%
12	-8158.81	-9964.79	-4686.07	8159.23	9964.78	4685.27	0.007%
13	-4699.10	-9973.92	-8116.78	4699.11	9973.91	8116.59	0.001%
14	-0.00	-38131.38	0.00	0.38	38131.38	-0.02	0.001%
15	21.83	-38150.00	-3375.71	-21.83	38149.99	3375.28	0.001%
16	1714.14	-38125.69	-2943.79	-1714.32	38125.67	2942.73	0.003%
17	2947.82	-38103.80	-1707.45	-2946.71	38103.79	1707.96	0.003%
18	3395.06	-38125.06	-15.85	-3394.10	38125.04	16.58	0.003%
19	2923.84	-38149.26	1668.40	-2923.44	38149.25	-1668.17	0.001%
20	1673.98	-38130.75	2905.94	-1673.08	38130.73	-2905.51	0.003%
21	-21.83	-38112.76	3370.99	22.81	38112.75	-3370.68	0.003%
22	-1714.14	-38137.07	2943.79	1713.36	38137.06	-2943.41	0.002%
23	-2951.92	-38158.96	1709.82	2951.26	38158.95	-1709.46	0.002%
24	-3395.06	-38137.70	15.85	3394.17	38137.69	-15.22	0.003%
25	-2919.74	-38113.50	-1666.04	2919.92	38113.49	1665.24	0.002%
26	-1673.98	-38132.01	-2905.94	1674.05	38131.99	2905.04	0.002%
27	2.52	-8327.13	-2206.92	-2.50	8327.13	2206.85	0.001%
28	1105.53	-8324.33	-1905.95	-1105.48	8324.32	1905.88	0.001%
29	1914.67	-8321.80	-1102.62	-1914.59	8321.80	1102.58	0.001%
30	2207.22	-8324.25	-1.83	-2207.13	8324.25	1.83	0.001%
31	1917.27	-8327.05	1101.21	-1917.18	8327.05	-1101.19	0.001%
32	1100.89	-8324.91	1901.58	-1100.60	8324.91	-1901.41	0.004%
33	-2.52	-8322.83	2200.17	2.59	8322.83	-2199.98	0.002%
34	-1105.53	-8325.64	1905.95	1105.40	8325.64	-1905.79	0.002%
35	-1920.51	-8328.17	1105.99	1920.31	8328.16	-1105.88	0.003%
36	-2207.22	-8325.71	1.83	2207.03	8325.71	-1.79	0.002%
37	-1911.42	-8322.92	-1097.84	1911.30	8322.92	1097.71	0.002%
38	-1100.89	-8325.05	-1901.58	1100.90	8325.05	1901.29	0.003%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00011152
2	Yes	14	0.00000001	0.00007471
3	Yes	14	0.00000001	0.00006285
4	Yes	16	0.00000001	0.00002837
5	Yes	14	0.00000001	0.00006723
6	Yes	14	0.00000001	0.00008073
7	Yes	14	0.00000001	0.00005644
8	Yes	15	0.00000001	0.00005525
9	Yes	13	0.00000001	0.00010036
10	Yes	13	0.00000001	0.00012762
11	Yes	13	0.00000001	0.00009946
12	Yes	14	0.00000001	0.00008514
13	Yes	14	0.00000001	0.00005253
14	Yes	9	0.00000001	0.00005708
15	Yes	12	0.00000001	0.00005972
16	Yes	11	0.00000001	0.00012806
17	Yes	9	0.00000001	0.00013628
18	Yes	11	0.00000001	0.00014855
19	Yes	12	0.00000001	0.00006483
20	Yes	11	0.00000001	0.00013632
21	Yes	10	0.00000001	0.00013334
22	Yes	9	0.00000001	0.00010283
23	Yes	10	0.00000001	0.00009673
24	Yes	9	0.00000001	0.00012744
25	Yes	10	0.00000001	0.00010685
26	Yes	11	0.00000001	0.00012080
27	Yes	8	0.00000001	0.00004315
28	Yes	8	0.00000001	0.00004485
29	Yes	8	0.00000001	0.00004587
30	Yes	8	0.00000001	0.00005043
31	Yes	8	0.00000001	0.00005245
32	Yes	7	0.00000001	0.00014855
33	Yes	7	0.00000001	0.00009383
34	Yes	7	0.00000001	0.00008394
35	Yes	7	0.00000001	0.00009118
36	Yes	7	0.00000001	0.00008116
37	Yes	7	0.00000001	0.00008228
38	Yes	7	0.00000001	0.00012742

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	104 - 89	1.058	29	0.1108	0.0013
T2	89 - 74	0.704	29	0.1045	0.0017
T3	74 - 59	0.394	29	0.0951	0.0038
T4	59 - 54	0.101	29	0.0955	0.0042

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
104.00	Lightning Rod 1"x6.5'	29	1.058	0.1108	0.0013	128261
100.00	(2) DB980F90E-M w/Mount Pipe	29	0.961	0.1095	0.0010	128261
89.00	(2) 7770.00 w/Mount Pipe	29	0.704	0.1045	0.0017	46272
86.01	Guy	29	0.639	0.1024	0.0022	46394
67.00	GPS	29	0.257	0.0946	0.0029	385620

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	104 - 89	8.638	6	0.8724	0.0189
T2	89 - 74	5.872	6	0.8463	0.0160
T3	74 - 59	3.301	6	0.7981	0.0131
T4	59 - 54	0.834	6	0.7950	0.0164

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
104.00	Lightning Rod 1"x6.5'	6	8.638	0.8724	0.0189	30169
100.00	(2) DB980F90E-M w/Mount Pipe	6	7.890	0.8677	0.0182	30169
89.00	(2) 7770.00 w/Mount Pipe	6	5.872	0.8463	0.0160	10913
86.01	Guy	6	5.343	0.8365	0.0154	11020
67.00	GPS	6	2.150	0.7930	0.0148	118682

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	104	Leg	A325N	0.7500	4	13.16	29820.60	0.000 ✓	1	Bolt Tension
		Diagonal	A325N	0.5000	1	3100.78	7952.16	0.390 ✓	1	Bolt Shear
		Top Girt	A325N	0.5000	1	116.92	7952.16	0.015 ✓	1	Bolt Shear
		Bottom Girt	A325N	0.5000	1	1447.84	7952.16	0.182 ✓	1	Bolt Shear
T2	89	Leg	A325N	0.7500	4	2498.81	29820.60	0.084 ✓	1	Bolt Tension
		Diagonal	A325N	0.5000	1	2519.18	5042.52	0.500 ✓	1	Member Bearing
		Top Girt	A325N	0.5000	1	272.75	5042.52	0.054 ✓	1	Member Bearing
		Bottom Girt	A325N	0.5000	1	205.33	5042.52	0.041 ✓	1	Member Bearing
T3	74	Leg	A325N	0.7500	4	1282.22	29820.60	0.043 ✓	1	Bolt Tension
		Diagonal	A325N	0.5000	1	1082.47	5042.52	0.215 ✓	1	Member Bearing

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load / Allowable	Allowable Ratio	Criteria
		Top Girt	A325N	0.5000	1	426.82	5042.52	0.085 ✓	1	Member Bearing
		Bottom Girt	A325N	0.5000	1	1370.67	5042.52	0.272 ✓	1	Member Bearing
T4	59	Leg	A325N	0.7500	4	1340.12	29820.60	0.045 ✓	1	Bolt Tension

Guy Design Data

Section No.	Elevation ft	Size	Initial Tension lb	Breaking Load lb	Actual T_u lb	Allowable ϕT_n lb	Required S.F.	Actual S.F.
T2	86.01 (A) (126)	3/8 EHS	1540.00	15399.96	7263.86	9240.00	1.000	1.272 ✓
	86.01 (A) (127)	3/8 EHS	1540.00	15399.96	7239.65	9240.00	1.000	1.276 ✓
	86.01 (B) (122)	3/8 EHS	1540.00	15399.96	7045.89	9240.00	1.000	1.311 ✓
	86.01 (B) (123)	3/8 EHS	1540.00	15399.96	7072.29	9240.00	1.000	1.307 ✓
	86.01 (C) (115)	3/8 EHS	1540.00	15399.96	8636.03	9240.00	1.000	1.070 ✓
	86.01 (C) (116)	3/8 EHS	1540.00	15399.96	8614.59	9240.00	1.000	1.073 ✓

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	Mast Stability Index	P_u lb	ϕP_n lb	Ratio $P_u / \phi P_n$
T1	104 - 89	ROHN 2.5 X-STR	15.00	2.38	61.8 K=2.00	2.2535	1.00	-12504.90	76718.10	0.163 [1] ✓
T2	89 - 74	ROHN 2.5 EH	15.00	2.38	30.9 K=1.00	2.2535	1.00	-18313.10	94576.40	0.194 [1] ✓
T3	74 - 59	ROHN 2.5 X-STR	15.00	2.38	61.8 K=2.00	2.2535	1.00	-16126.00	76718.10	0.210 [1] ✓
T4	59 - 54	ROHN 2.5 X-STR	5.38	1.52	19.8 K=1.00	2.2535	0.99	-17776.70	97441.20	0.182 [1] ✓

[1] $P_u / \phi P_n$ controls

Diagonal Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	lb	lb	
T1	104 - 89	ROHN TS1.5x11 GA	4.16	3.87	94.9 K=1.00	0.5202	-3100.78	11316.70	0.274 [1] ✔
T2	89 - 74	ROHN TS1.5x16 GA	4.16	3.87	91.0 K=1.00	0.2627	-2635.90	5969.57	0.442 [1] ✔
T3	74 - 59	ROHN TS1.5x16 GA	4.16	3.87	91.0 K=1.00	0.2627	-1104.66	5969.57	0.185 [1] ✔

[1] $P_u / \phi P_n$ controls

Horizontal Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	lb	lb	
T4	59 - 54	L4x4x1/4	2.45	2.21	33.3 K=1.00	1.9400	-325.48	57389.50	0.006 [1] ✔

[1] $P_u / \phi P_n$ controls

Top Girt Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	lb	lb	
T1	104 - 89	ROHN TS1.5x11 GA	3.42	3.18	77.8 K=1.00	0.5202	-116.92	13553.60	0.009 [1] ✔
T2	89 - 74	ROHN TS1.5x16 GA	3.42	3.18	74.7 K=1.00	0.2627	-228.39	7048.75	0.032 [1] ✔
T3	74 - 59	ROHN TS1.5x16 GA	3.42	3.18	74.7 K=1.00	0.2627	-411.00	7048.75	0.058 [1] ✔

[1] $P_u / \phi P_n$ controls

Bottom Girt Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	lb	lb	
T1	104 - 89	ROHN TS1.5x11 GA	3.42	3.18	77.8 K=1.00	0.5202	-1344.21	13553.60	0.099 [1] ✔
T2	89 - 74	ROHN TS1.5x16 GA	3.42	3.18	74.7 K=1.00	0.2627	-64.45	7048.75	0.009 [1] ✔

[1] P_u / ϕP_n controls

Top Guy Pull-Off Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	89 - 74	2L2x2x1/4x3/8	3.42	3.18	99.8 K=1.00	1.8800	-4964.99	36050.60	0.138 [1]
		2L 'a' > 18.3582 in - 120							

[1] P_u / ϕP_n controls

Top Guy Pull-Off Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T2	89 - 74	2L2x2x1/4x3/8	0.00	2000.70	0.000	0.00	3391.69	0.000

Top Guy Pull-Off Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T2	89 - 74	2L2x2x1/4x3/8	0.138	0.000	0.000	0.138 [1] ✔	1.000	4.9-4 ✔

[1] P_u / ϕP_n controls

Torque-Arm Top Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	89 - 74 (117)	C10x15.3	3.42	3.30	55.5 K=1.00	4.4900	-603.48	123708.00	0.005
T2	89 - 74 (118)	C10x15.3	3.42	3.30	55.5 K=1.00	4.4900	-456.89	123708.00	0.004
T2	89 - 74 (124)	C10x15.3	3.42	3.30	55.5 K=1.00	4.4900	-455.26	123708.00	0.004
T2	89 - 74 (125)	C10x15.3	3.42	3.30	55.5 K=1.00	4.4900	-574.49	123708.00	0.005
T2	89 - 74 (128)	C10x15.3	3.42	3.30	55.5 K=1.00	4.4900	-428.06	123708.00	0.003
T2	89 - 74 (129)	C10x15.3	3.42	3.30	55.5 K=1.00	4.4900	-424.50	123708.00	0.003

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	lb	lb	

Torque-Arm Top Bending Design Data

Section No.	Elevation	Size	M_{ux}	ϕM_{nx}	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy}	ϕM_{ny}	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
	ft		lb-ft	lb-ft		lb-ft	lb-ft	
T2	89 - 74 (117)	C10x15.3	-22276.17	36450.00	0.611	-0.00	6345.00	0.000
T2	89 - 74 (118)	C10x15.3	-16641.75	36450.00	0.457	0.00	6345.00	0.000
T2	89 - 74 (124)	C10x15.3	-15525.67	36450.00	0.426	0.00	6345.00	0.000
T2	89 - 74 (125)	C10x15.3	-22287.25	36450.00	0.611	0.00	6345.00	0.000
T2	89 - 74 (128)	C10x15.3	-15349.08	36450.00	0.421	-0.00	6345.00	0.000
T2	89 - 74 (129)	C10x15.3	-16261.92	36450.00	0.446	-0.00	6345.00	0.000

Torque-Arm Top Interaction Design Data

Section No.	Elevation	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	ft							
T2	89 - 74 (117)	C10x15.3	0.005	0.611	0.000	0.614 ✓	1.000	4.9-4 ✓
T2	89 - 74 (118)	C10x15.3	0.004	0.457	0.000	0.458 ✓	1.000	4.9-4 ✓
T2	89 - 74 (124)	C10x15.3	0.004	0.426	0.000	0.428 ✓	1.000	4.9-4 ✓
T2	89 - 74 (125)	C10x15.3	0.005	0.611	0.000	0.614 ✓	1.000	4.9-4 ✓
T2	89 - 74 (128)	C10x15.3	0.003	0.421	0.000	0.423 ✓	1.000	4.9-4 ✓
T2	89 - 74 (129)	C10x15.3	0.003	0.446	0.000	0.448 ✓	1.000	4.9-4 ✓

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	lb	lb	
T1	104 - 89	ROHN 2.5 X-STR	15.00	2.38	30.9	2.2535	9996.13	101409.00	0.099 [1] ✓
T2	89 - 74	ROHN 2.5 EH	15.00	2.38	30.9	2.2535	11345.40	101409.00	0.112 [1] ✓

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	lb	lb	
T1	104 - 89	ROHN TS1.5x11 GA	4.16	3.87	94.9	0.5202	3078.23	19665.40	0.157 [1] ✔
T2	89 - 74	ROHN TS1.5x16 GA	4.16	3.87	91.0	0.2627	2519.18	9931.96	0.254 [1] ✔
T3	74 - 59	ROHN TS1.5x16 GA	4.16	3.87	91.0	0.2627	1082.47	9931.96	0.109 [1] ✔

[1] $P_u / \phi P_n$ controls

Horizontal Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	lb	lb	
T4	59 - 54	L4x4x1/4	3.19	2.95	28.3	1.9400	2469.61	62856.00	0.039 [1] ✔

[1] $P_u / \phi P_n$ controls

Top Girt Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	lb	lb	
T1	104 - 89	ROHN TS1.5x11 GA	3.42	3.18	77.8	0.5202	115.02	19665.40	0.006 [1] ✔
T2	89 - 74	ROHN TS1.5x16 GA	3.42	3.18	74.7	0.2627	272.75	9931.96	0.027 [1] ✔
T3	74 - 59	ROHN TS1.5x16 GA	3.42	3.18	74.7	0.2627	426.82	9931.96	0.043 [1] ✔

[1] $P_u / \phi P_n$ controls

Bottom Girt Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	lb	lb	
T1	104 - 89	ROHN TS1.5x11 GA	3.42	3.18	77.8	0.5202	1447.84	19665.40	0.074 [1] ✔
T2	89 - 74	ROHN TS1.5x16 GA	3.42	3.18	74.7	0.2627	205.33	9931.96	0.021 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T3	74 - 59	ROHN TS1.5x16 GA	3.42	3.18	74.7	0.2627	1370.67	9931.96	0.138 [1] ✔

[1] $P_u / \phi P_n$ controls

Top Guy Pull-Off Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	89 - 74	2L2x2x1/4x3/8 2L 'a' > 18.3582 in - 121	3.42	3.18	62.6	1.8800	5215.64	60912.00	0.086 [1]

[1] $P_u / \phi P_n$ controls

Top Guy Pull-Off Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T2	89 - 74	2L2x2x1/4x3/8	0.00	2000.70	0.000	0.00	3391.69	0.000

Top Guy Pull-Off Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T2	89 - 74	2L2x2x1/4x3/8	0.086	0.000	0.000	0.086 [1] ✔	1.000	4.9-4 ✔

[1] $P_u / \phi P_n$ controls

Torque-Arm Top Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	89 - 74 (117)	C10x15.3	3.42	3.30	55.5	4.4900	2089.89	145476.00	0.014
T2	89 - 74 (118)	C10x15.3	3.42	3.30	55.5	4.4900	2195.20	145476.00	0.015
T2	89 - 74 (124)	C10x15.3	3.42	3.30	55.5	4.4900	2193.06	145476.00	0.015
T2	89 - 74 (125)	C10x15.3	3.42	3.30	55.5	4.4900	2130.29	145476.00	0.015

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	89 - 74 (128)	C10x15.3	3.42	3.30	55.5	4.4900	2253.94	145476.00	0.015
T2	89 - 74 (129)	C10x15.3	3.42	3.30	55.5	4.4900	2273.54	145476.00	0.016

Torque-Arm Top Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T2	89 - 74 (117)	C10x15.3	-19820.83	36450.00	0.544	-0.00	6345.00	0.000
T2	89 - 74 (118)	C10x15.3	-15187.92	36450.00	0.417	-0.00	6345.00	0.000
T2	89 - 74 (124)	C10x15.3	-14189.75	36450.00	0.389	0.00	6345.00	0.000
T2	89 - 74 (125)	C10x15.3	-19815.08	36450.00	0.544	0.00	6345.00	0.000
T2	89 - 74 (128)	C10x15.3	-13896.50	36450.00	0.381	-0.00	6345.00	0.000
T2	89 - 74 (129)	C10x15.3	-14645.00	36450.00	0.402	-0.00	6345.00	0.000

Torque-Arm Top Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T2	89 - 74 (117)	C10x15.3	0.014	0.544	0.000	0.551 ✔	1.000	4.9-4 ✔
T2	89 - 74 (118)	C10x15.3	0.015	0.417	0.000	0.424 ✔	1.000	4.9-4 ✔
T2	89 - 74 (124)	C10x15.3	0.015	0.389	0.000	0.397 ✔	1.000	4.9-4 ✔
T2	89 - 74 (125)	C10x15.3	0.015	0.544	0.000	0.551 ✔	1.000	4.9-4 ✔
T2	89 - 74 (128)	C10x15.3	0.015	0.381	0.000	0.389 ✔	1.000	4.9-4 ✔
T2	89 - 74 (129)	C10x15.3	0.016	0.402	0.000	0.410 ✔	1.000	4.9-4 ✔

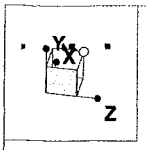
Section Capacity Table

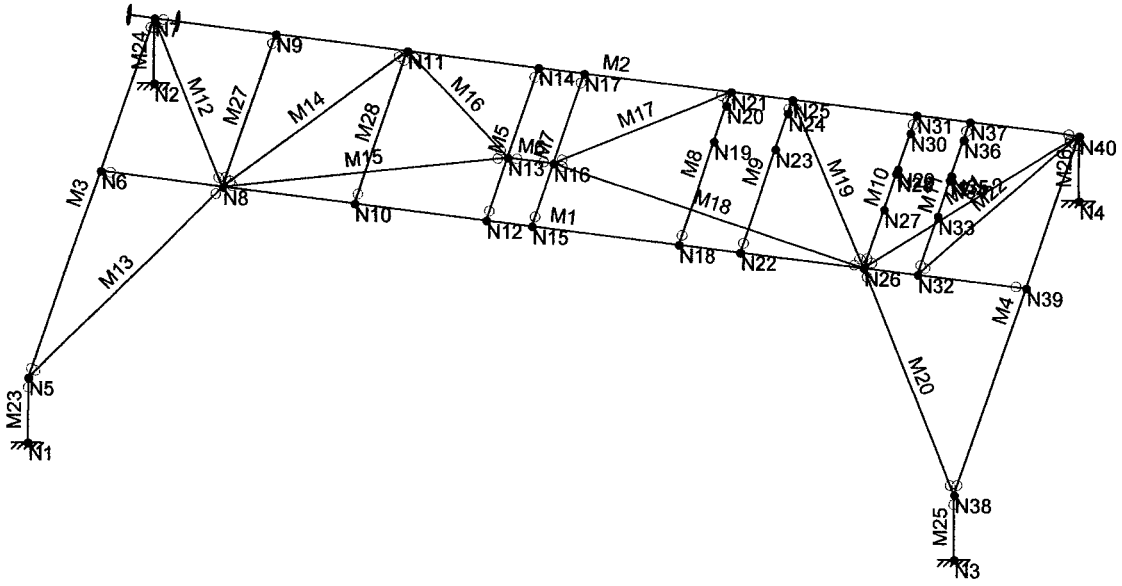
Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T1	104 - 89	Leg	ROHN 2.5 X-STR	3	-12504.90	76718.10	16.3	Pass
		Diagonal	ROHN TS1.5x11 GA	12	-3100.78	11316.70	27.4	Pass
		Top Girt	ROHN TS1.5x11 GA	5	-116.92	13553.60	0.9	Pass
		Bottom Girt	ROHN TS1.5x11 GA	9	-1344.21	13553.60	9.9	Pass
T2	89 - 74	Leg	ROHN 2.5 EH	29	-18313.10	94576.40	19.4	Pass
		Diagonal	ROHN TS1.5x16 GA	67	-2635.90	5969.57	44.2	Pass
		Top Girt	ROHN TS1.5x16 GA	31	-228.39	7048.75	3.2	Pass
		Bottom Girt	ROHN TS1.5x16 GA	34	205.33	9931.96	2.1	Pass
		Guy A@86.0069	3/8	126	7263.86	9240.00	78.6	Pass
		Guy B@86.0069	3/8	123	7072.29	9240.00	76.5	Pass
		Guy C@86.0069	3/8	115	8636.03	9240.00	93.5	Pass
		Top Guy Pull-Off@86.0069	2L2x2x1/4x3/8	120	-4964.99	36050.60	13.8	Pass
		Torque Arm Top@86.0069	C10x15.3	125	2130.29	145476.00	61.4	Pass
T3	74 - 59	Leg	ROHN 2.5 X-STR	73	-16126.00	76718.10	21.0	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Diagonal	ROHN TS1.5x16 GA	98	-1104.66	5969.57	18.5	Pass
		Top Girt	ROHN TS1.5x16 GA	77	-411.00	7048.75	5.8	Pass
		Bottom Girt	ROHN TS1.5x16 GA	81	1370.67	9931.96	13.8	Pass
T4	59 - 54	Leg	ROHN 2.5 X-STR	102	-17776.70	97441.20	18.2	Pass
		Horizontal	L4x4x1/4	104	2469.61	62856.00	3.9	Pass
							Summary	
						Leg (T3)	21.0	Pass
						Diagonal (T2)	44.2	Pass
						Horizontal (T4)	3.9	Pass
						Top Girt (T3)	5.8	Pass
						Bottom Girt (T3)	13.8	Pass
						Guy A (T2)	78.6	Pass
						Guy B (T2)	76.5	Pass
						Guy C (T2)	93.5	Pass
						Top Guy Pull-Off (T2)	13.8	Pass
						Torque Arm Top (T2)	61.4	Pass
						Bolt Checks	50.0	Pass
						RATING =	**93.5**	**Pass**

APPENDIX C

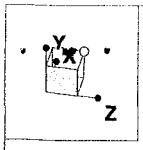
MODIFIED PLATFORM ANALYSIS

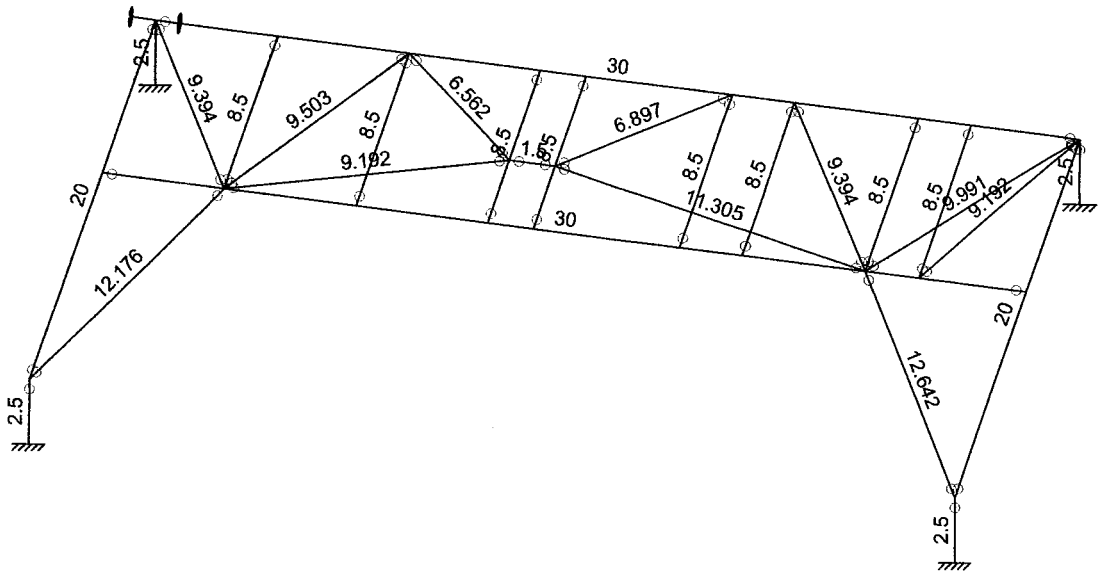




Solution: Envelope

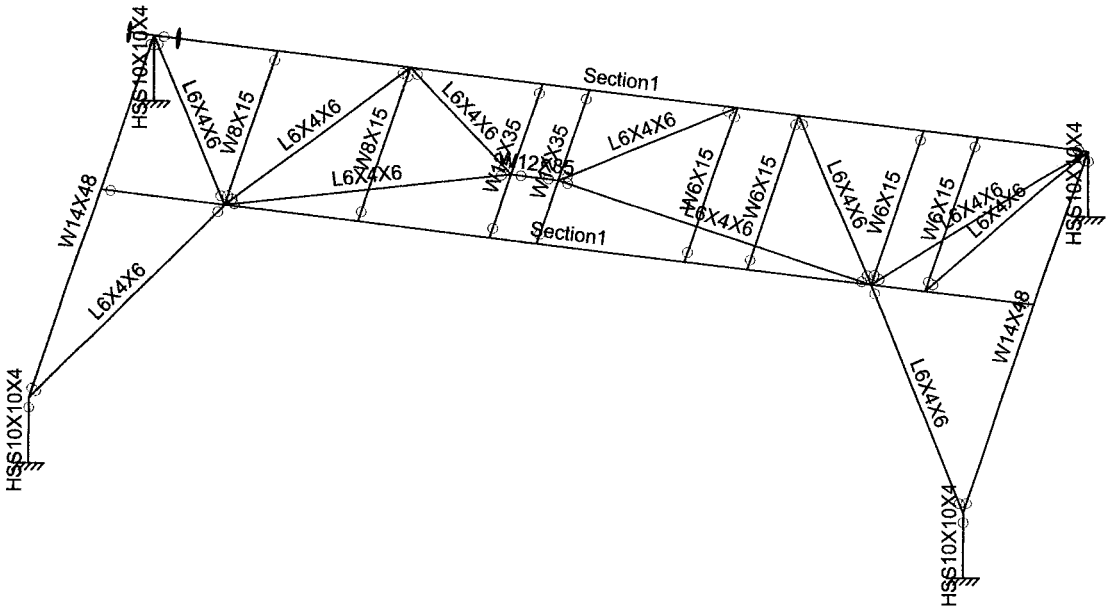
Ramaker & Associates, Inc.	West Hartford Bishops (CT03XC074)	SK - 1
TEM		Jan 14, 2013 at 10:22 AM
22995		22995 Modified.r3d





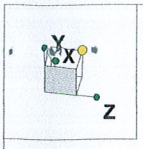
Member Length (ft) Displayed
Solution: Envelope

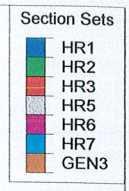
Ramaker & Associates, Inc.	West Hartford Bishops (CT03XC074)	SK - 2
TEM		Jan 14, 2013 at 10:23 AM
22995		22995 Modified.r3d

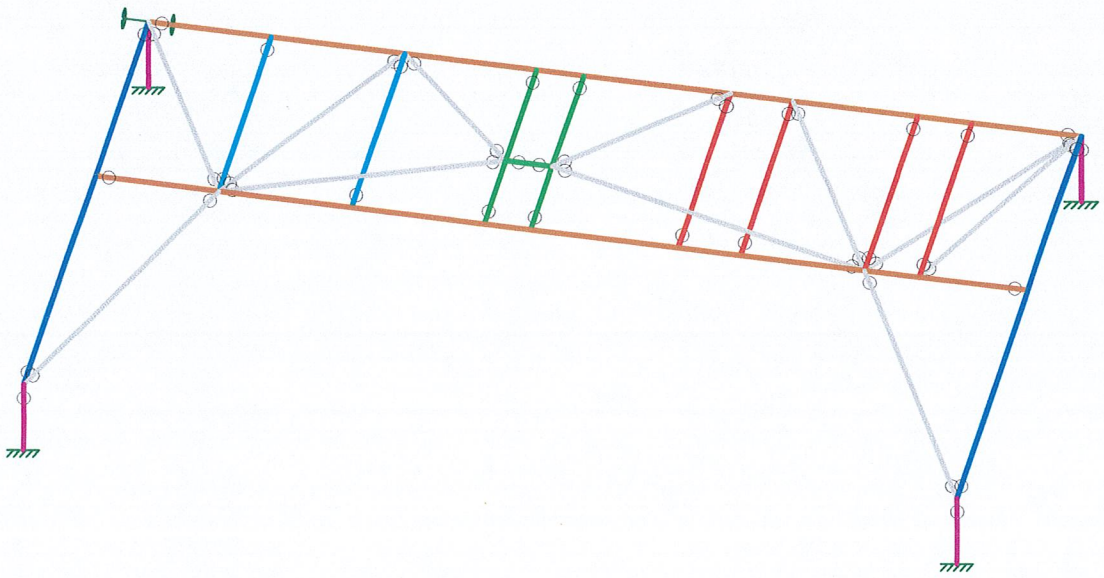


Solution: Envelope

Ramaker & Associates, Inc.	West Hartford Bishops (CT03XC074)	SK - 3
TEM		Jan 14, 2013 at 10:24 AM
22995		22995 Modified.r3d

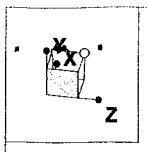


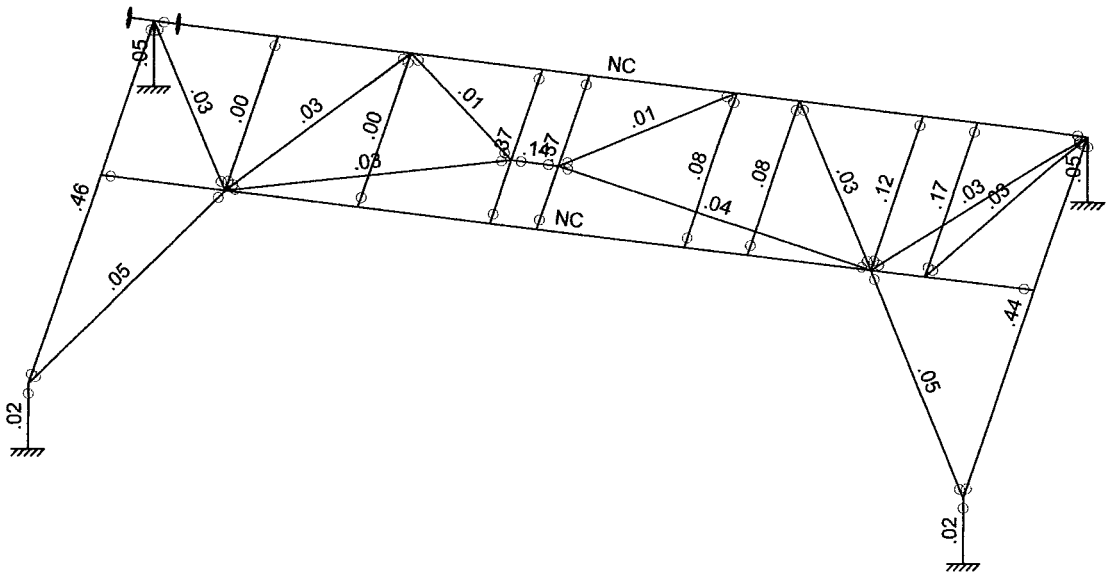




Solution: Envelope

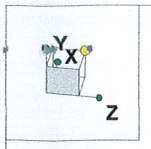
Ramaker & Associates, Inc.	West Hartford Bishops (CT03XC074)	SK - 4
TEM		Jan 14, 2013 at 10:25 AM
22995		22995 Modified.r3d

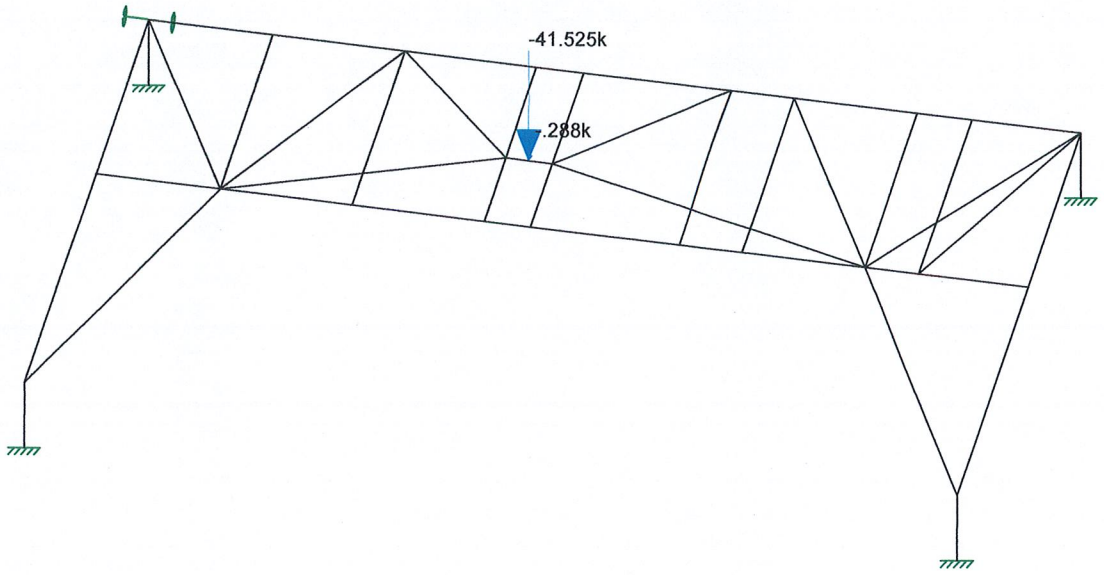




Member Code Checks Displayed
Solution: Envelope

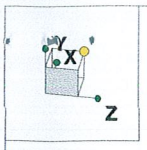
Ramaker & Associates, Inc.	West Hartford Bishops (CT03XC074)	SK - 5
TEM		Jan 14, 2013 at 10:25 AM
22995		22995 Modified.r3d

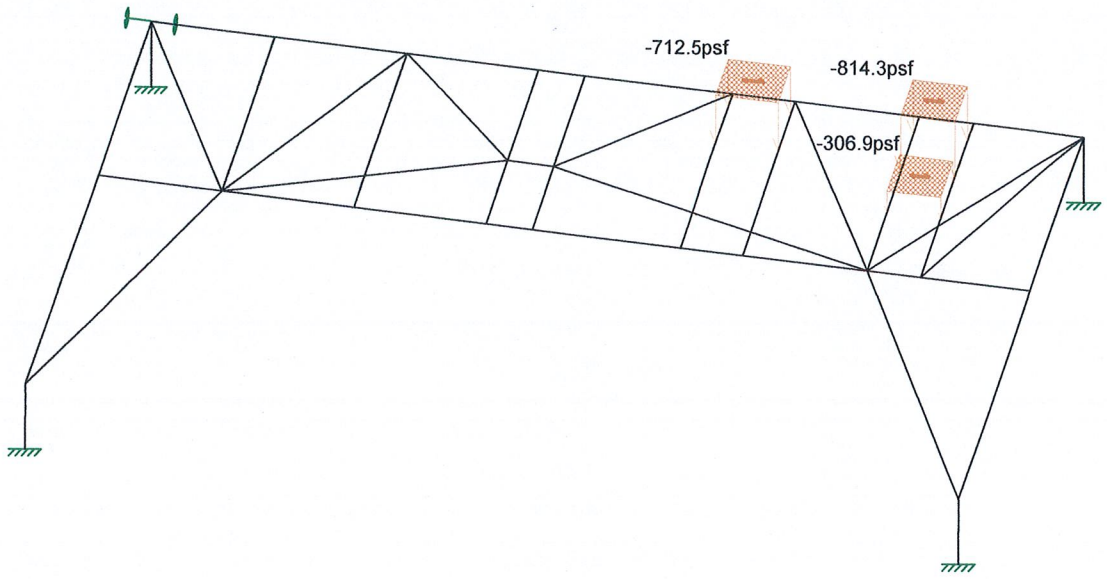




Loads: BLC 1, Tower
Solution: Envelope

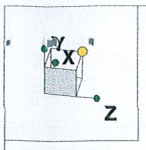
Ramaker & Associates, Inc.	West Hartford Bishops (CT03XC074)	SK - 6
TEM		Jan 14, 2013 at 10:26 AM
22995		22995 Modified.r3d

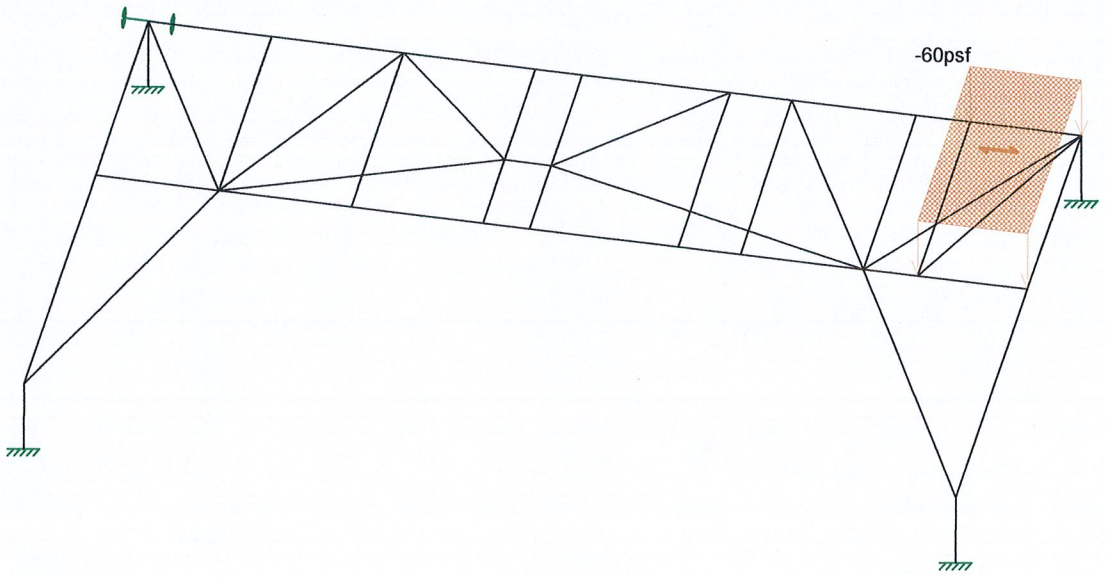




Loads: BLC 2, Equipment
Solution: Envelope

Ramaker & Associates, Inc.	West Hartford Bishops (CT03XC074)	SK - 7
TEM		Jan 14, 2013 at 10:26 AM
22995		22995 Modified.r3d





Loads: BLC 4, Live
Solution: Envelope

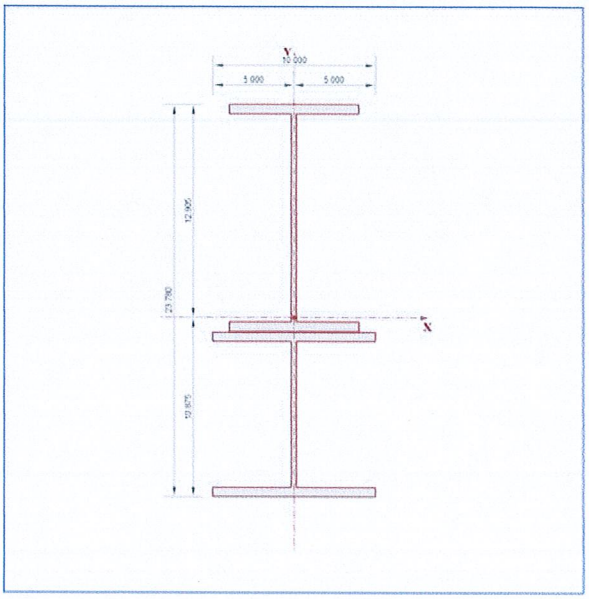
Ramaker & Associates, Inc.	West Hartford Bishops (CT03XC074)	SK - 8
TEM		Jan 14, 2013 at 10:26 AM
22995		22995 Modified.r3d

Section Properties: Section1

Number of Shapes	=	2	
Total Width	=	10.000	in
Total Height	=	23.780	in
Center, Xo	=	0.000	in
Center, Yo	=	-0.000	in
X-bar(Right)	=	5.000	in
X-bar(Left)	=	5.000	in
Y-bar(Top)	=	12.905	in
Y-bar(Bot)	=	10.875	in

Equivalent Properties:

Area, Ax	=	28.500	in^2
Inertia, Ixx	=	1765.01	in^4
Inertia, Iyy	=	144.80	in^4
Inertia, Ixy	=	0.000	in^4
Modulus, Sx(Top)	=	136.77	in^3
Modulus, Sx(Bot)	=	162.30	in^3
Modulus, Sy(Left)	=	28.960	in^3
Modulus, Sy(Right)	=	28.960	in^3
Radius, rx	=	7.870	in
Radius, ry	=	2.254	in
Plastic Modulus, Zx	=	167.34	in^3
Plastic Modulus, Zy	=	47.801	in^3
Torsional, J	=	2.850	in^4



Section Diagram

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?	Yes
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 13th(360-05): LRFD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	AISC 13th(360-05): LRFD
Cold Formed Steel Code	AISI S100-07: LRFD
Wood Code	AF&PA NDS-05/08: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-11
Masonry Code	ACI 530-08: ASD
Aluminum Code	AA ADM1-05: ASD - Building

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	Exact Integration
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
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	ASCE 7-10
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	Yes
Ct Z	.02
Ct X	.02
T Z (sec)	Not Entered
T X (sec)	Not Entered
R Z	3
R X	3
Ct Exp. Z	.75
Ct Exp. X	.75
SD1	1
SDS	1
S1	1
TL (sec)	5
Risk Cat	I or II
Seismic Detailing Code	ASCE 7-05
Om Z	1
Om X	1
Rho Z	1
Rho X	1

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E..	Density[lb/f...	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A36 Gr.36	29000	11154	.3	.65	490	36	1.5	58	1.2
2	A572 Gr.50	29000	11154	.3	.65	490	50	1.1	65	1.1
3	A992	29000	11154	.3	.65	490	50	1.1	65	1.1
4	A500 Gr.42	29000	11154	.3	.65	490	42	1.4	58	1.3
5	A500 Gr.46	29000	11154	.3	.65	490	46	1.4	58	1.3

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	HR1	W14X48	Beam	Wide Flange	A36 Gr.36	Typical	14.1	51.4	485	1.46
2	HR2	W12X35	Beam	Wide Flange	A36 Gr.36	Typical	10.3	24.5	285	.74
3	HR3	W6X15	Beam	Wide Flange	A36 Gr.36	Typical	4.43	9.32	29.1	.1
4	HR4	L3X3X6	VBrace	Single Angle	A36 Gr.36	Typical	2.11	1.76	1.76	.103
5	HR5	L6X4X6	HBrace	Single Angle	A36 Gr.36	Typical	3.61	4.9	13.5	.183
6	HR6	HSS10X10X4	Column	SquareTube	A36 Gr.36	Typical	8.945	141.101	141.101	219.548
7	HR7	W8X15	Column	SquareTube	A36 Gr.36	Typical	4.44	3.41	48	.14
8	HR8	W8X15	Column	SquareTube	A36 Gr.36	Typical	4.44	3.41	48	.14

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Di...
1	N1	0	-2.5	0	0	
2	N2	20	-2.5	0	0	
3	N3	0	-2.5	30	0	
4	N4	20	-2.5	30	0	
5	N5	0	0	0	0	
6	N6	11.5	0	0	0	
7	N7	20	0	0	0	
8	N8	11.5	0	4	0	
9	N9	20	0	4	0	
10	N10	11.5	0	8.25	0	
11	N11	20	0	8.25	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Di...
12	N12	11.5	0	12.5	0	
13	N13	15	0	12.5	0	
14	N14	20	0	12.5	0	
15	N15	11.5	0	14	0	
16	N16	15	0	14	0	
17	N17	20	0	14	0	
18	N18	11.5	0	18.75	0	
19	N19	17.25	0	18.75	0	
20	N20	19.25	0	18.75	0	
21	N21	20	0	18.75	0	
22	N22	11.5	0	20.75	0	
23	N23	17.25	0	20.75	0	
24	N24	19.25	0	20.75	0	
25	N25	20	0	20.75	0	
26	N26	11.5	0	24.75	0	
27	N27	14.75	0	24.75	0	
28	N28	16.75	0	24.75	0	
29	N29	17	0	24.75	0	
30	N30	19	0	24.75	0	
31	N31	20	0	24.75	0	
32	N32	11.5	0	26.5	0	
33	N33	14.75	0	26.5	0	
34	N34	16.75	0	26.5	0	
35	N35	17	0	26.5	0	
36	N36	19	0	26.5	0	
37	N37	20	0	26.5	0	
38	N38	0	0	30	0	
39	N39	11.5	0	30	0	
40	N40	20	0	30	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	N38							
2	N40							
3	N7						Reaction	
4	N5							
5	N1	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction	
6	N2	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction	
7	N4	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction	
8	N3	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction	

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M1	N6	N39			GEN3	Beam	None	gen_Steel	Default
2	M2	N7	N40			GEN3	Beam	None	gen_Steel	Default
3	M3	N5	N7			HR1	Beam	Wide Flange	A36 Gr.36	Typical
4	M4	N40	N38			HR1	Beam	Wide Flange	A36 Gr.36	Typical
5	M5	N12	N14			HR2	Beam	Wide Flange	A36 Gr.36	Typical
6	M6	N13	N16			HR2	Beam	Wide Flange	A36 Gr.36	Typical
7	M7	N15	N17			HR2	Beam	Wide Flange	A36 Gr.36	Typical
8	M8	N21	N18			HR3	Beam	Wide Flange	A36 Gr.36	Typical
9	M9	N22	N25			HR3	Beam	Wide Flange	A36 Gr.36	Typical
10	M10	N31	N26			HR3	Beam	Wide Flange	A36 Gr.36	Typical
11	M11	N37	N32			HR3	Beam	Wide Flange	A36 Gr.36	Typical
12	M12	N8	N7			HR5	HBrace	Single Angle	A36 Gr.36	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
13	M13	N5	N8			HR5	HBrace	Single Angle	A36 Gr.36	Typical
14	M14	N8	N11			HR5	HBrace	Single Angle	A36 Gr.36	Typical
15	M15	N8	N13			HR5	HBrace	Single Angle	A36 Gr.36	Typical
16	M16	N11	N13			HR5	HBrace	Single Angle	A36 Gr.36	Typical
17	M17	N16	N21			HR5	HBrace	Single Angle	A36 Gr.36	Typical
18	M18	N16	N26			HR5	HBrace	Single Angle	A36 Gr.36	Typical
19	M19	N25	N26			HR5	HBrace	Single Angle	A36 Gr.36	Typical
20	M20	N26	N38			HR5	HBrace	Single Angle	A36 Gr.36	Typical
21	M21	N26	N40			HR5	HBrace	Single Angle	A36 Gr.36	Typical
22	M22	N32	N40			HR5	HBrace	Single Angle	A36 Gr.36	Typical
23	M23	N1	N5			HR6	Column	SquareTube	A36 Gr.36	Typical
24	M24	N2	N7			HR6	Column	SquareTube	A36 Gr.36	Typical
25	M25	N3	N38			HR6	Column	SquareTube	A36 Gr.36	Typical
26	M26	N4	N40			HR6	Column	SquareTube	A36 Gr.36	Typical
27	M27	N8	N9			HR7	Column	SquareTube	A36 Gr.36	Typical
28	M28	N10	N11			HR7	Column	SquareTube	A36 Gr.36	Typical

Hot Rolled Steel Design Parameters

	Label	Shape	Length...	Lbyy[ft]	Lbzz[ft]	Lcomp to...	Lcomp bo...	L-torque...	Kyy	Kzz	Cb	Function
1	M3	HR1	20			Segment						Lateral
2	M4	HR1	20			Segment						Lateral
3	M5	HR2	8.5			Segment						Lateral
4	M6	HR2	1.5			Segment						Lateral
5	M7	HR2	8.5			Segment						Lateral
6	M8	HR3	8.5			Segment						Lateral
7	M9	HR3	8.5			Segment						Lateral
8	M10	HR3	8.5			Segment						Lateral
9	M11	HR3	8.5			Segment						Lateral
10	M12	HR5	9.394			Segment						Lateral
11	M13	HR5	12.176			Segment						Lateral
12	M14	HR5	9.503									Lateral
13	M15	HR5	9.192			Segment						Lateral
14	M16	HR5	6.562									Lateral
15	M17	HR5	6.897									Lateral
16	M18	HR5	11.305			Segment						Lateral
17	M19	HR5	9.394									Lateral
18	M20	HR5	12.642			Segment						Lateral
19	M21	HR5	9.991			Segment						Lateral
20	M22	HR5	9.192									Lateral
21	M23	HR6	2.5									Lateral
22	M24	HR6	2.5									Lateral
23	M25	HR6	2.5									Lateral
24	M26	HR6	2.5									Lateral
25	M27	HR7	8.5									Lateral
26	M28	HR7	8.5									Lateral

Joint Loads and Enforced Displacements

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

Member Point Loads (BLC 1 : Tower)

	Member Label	Direction	Magnitude[k,lb-ft]	Location[ft,%]
1	M6	Y	-41.525	%50

Member Point Loads (BLC 1 : Tower) (Continued)

	Member Label	Direction	Magnitude[k,lb-ft]	Location[ft,%]
2	M6	X	-.288	%50

Member Distributed Loads (BLC 5 : BLC 2 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft...	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M8	Y	-712.5	-712.5	.75	2.75
2	M9	Y	-712.5	-712.5	5.75	7.75
3	M10	Y	-712.513	-712.513	1	3
4	M11	Y	-712.513	-712.513	1	3
5	M10	Y	-268.538	-268.538	3.25	5.25
6	M11	Y	-268.537	-268.537	3.25	5.25

Member Distributed Loads (BLC 6 : BLC 4 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft...	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M4	Y	-105	-105	4.022e-14	8.5
2	M11	Y	-105	-105	3.558e-14	8.5

Member Area Loads (BLC 2 : Equipment)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N20	N24	N23	N19	Y	A-B	-712.5
2	N30	N36	N35	N29	Y	A-B	-814.3
3	N28	N34	N33	N27	Y	A-B	-306.9

Member Area Loads (BLC 4 : Live)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N37	N40	N39	N32	Y	A-B	-60

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(...
1	Tower	DL					2			
2	Equipment	DL							3	
3	Self Weight	DL		-1						
4	Live	LL							1	
5	BLC 2 Transient Area Lo...	None						6		
6	BLC 4 Transient Area Lo...	None						2		

Load Combinations

	Description	Sol...	PD...	SR...	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	1	Yes	Y		DL	1.2	LL	1.6														
2	2	Yes	Y		DL	1	LL	1														

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	N7	max	0	1	0	1	0	1	0	1	0	1	-12.823	2
2		min	0	1	0	1	0	1	0	1	0	1	-15.4736	1
3	N1	max	.0982	1	9.0292	1	.0333	1	83.4322	1	0	1	-204.6484	2
4		min	.0818	2	7.5171	2	.0278	2	69.5153	2	0	2	-245.6589	1
5	N2	max	.0986	1	27.2149	1	-.0084	2	-20.9388	2	0	1	-205.878	2
6		min	.0821	2	22.6516	2	-.01	1	-25.129	1	0	1	-247.1412	1
7	N4	max	.0758	1	28.8231	1	.0044	1	11.0088	1	0	1	-158.2682	2

Envelope Joint Reactions (Continued)

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
8		min	.0631	2	23.5779	2	.0037	2	9.1753	2	0	1	-189.9983	1
9	N3	max	.0731	1	8.6661	1	-.0231	2	-57.7684	2	0	1	-152.4552	2
10		min	.0609	2	7.1028	2	-.0277	1	-69.3363	1	0	1	-183.0169	1
11	Totals:	max	.3456	1	73.7333	1	0	2						
12		min	.288	2	60.8494	2	0	1						

Envelope AISC 13th(360-05): LRFD Steel Code Checks

	Member	Shape	Code Ch...	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	phi*Pn...	phi*Pn...	phi*Mn ...	phi*Mn...	Cb	Eqn
1	M3	W14X48	.461	11.4...	1	.116	20	y	1	198.84..	456.84	52920	211680	1.66..	H1-1b
2	M4	W14X48	.441	8.54...	1	.118	0	y	1	198.84..	456.84	52920	211680	1.62..	H1-1b
3	M5	W12X35	.373	3.54...	1	.185	0	y	1	265.08..	333.72	31050	138240	1.66..	H1-1b
4	M6	W12X35	.139	.75	1	.308	0	y	1	331.33..	333.72	31050	138240	1.31..	H1-1b
5	M7	W12X35	.373	3.54...	1	.185	0	y	1	265.08..	333.72	31050	138240	1.66..	H1-1b
6	M8	W6X15	.078	2.39...	1	.049	0	y	1	110.633	143.532	12535.3..	28709....	1.09..	H1-1b
7	M9	W6X15	.078	6.10...	1	.049	8.5	y	1	110.633	143.532	12535.3..	28709....	1.08..	H1-1b
8	M10	W6X15	.116	2.92...	1	.058	0	y	1	110.633	143.532	12535.3..	28709....	1.129	H1-1b
9	M11	W6X15	.166	3.45...	1	.083	0	y	1	110.633	143.532	12535.3..	28709....	1.03..	H1-1b
10	M12	L6X4X6	.027	4.69...	1	.002	9.39...	y	1	48.249	116.964	5070.47..	11526....	1.13..	H2-1
11	M13	L6X4X6	.049	6.08...	1	.002	0	y	1	29.3825	116.964	5070.47..	10674....	1.13..	H2-1
12	M14	L6X4X6	.030	4.75...	1	.005	9.50...	y	1	47.3631	116.964	5070.47..	11491....	1.13..	H2-1
13	M15	L6X4X6	.027	4.59...	1	.006	9.19...	y	1	49.9023	116.964	5070.47..	11591....	1.13..	H2-1
14	M16	L6X4X6	.014	3.28...	1	.011	6.56...	y	1	72.4118	116.964	5070.47..	12470....	1.13..	H2-1
15	M17	L6X4X6	.015	3.44...	1	.011	6.89...	y	1	69.5425	116.964	5070.47..	12354....	1.13..	H2-1
16	M18	L6X4X6	.042	5.65...	1	.005	11.3...	y	1	34.0808	116.964	5070.47..	10933....	1.13..	H2-1
17	M19	L6X4X6	.029	4.69...	1	.005	0	y	1	48.249	116.964	5070.47..	11526....	1.13..	H2-1
18	M20	L6X4X6	.052	6.32...	1	.002	0	y	1	27.2567	116.964	5070.47..	10538....	1.13..	H2-1
19	M21	L6X4X6	.030	4.99...	1	.002	0	y	1	43.4882	116.964	5070.47..	11337....	1.13..	H2-1
20	M22	L6X4X6	.025	4.59...	1	.002	0	y	1	49.9023	116.964	5070.47..	11591....	1.13..	H2-1
21	M23	HSS10X10X4	.020	0	1	.001	0	y	1	287.49..	289.804	75958.5..	75958....	1.66..	H1-1b
22	M24	HSS10X10X4	.051	0	1	.001	0	y	1	287.49..	289.804	75958.5..	75958....	1.66..	H1-1b
23	M25	HSS10X10X4	.018	0	1	.001	0	y	1	287.49..	289.804	75958.5..	75958....	1.66..	H1-1b
24	M26	HSS10X10X4	.053	0	1	.001	0	y	1	287.49..	289.804	75958.5..	75958....	1.66..	H1-1b
25	M27	W8X15	.005	4.25	1	.003	0	y	1	70.5035	143.856	7209	33177....	1.13..	H1-1b
26	M28	W8X15	.005	4.25	1	.003	0	y	1	70.5035	143.856	7209	33177....	1.13..	H1-1b

STEEL MEMBER REINFORCEMENT ANALYSIS

Existing Member Reinforced with New I-shaped Member at Bottom

Per AISC 13th Edition Manual (LRFD)

Project Name:	West Hartford Bishops (CT03XC074)	Client:	Alcatel-Lucent		
Project No.:	22995	Prep. By:	TEM	Date:	1/14/2013

Input Data:

Member and I-Beam Reinf. Sizes:

Exist. Member =	W14x48
I-Beam Reinf. =	W10x49

Member Loadings:

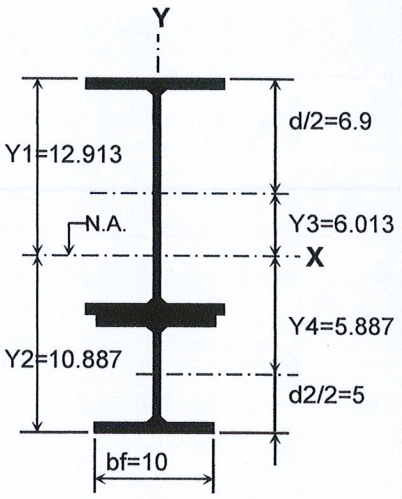
P(axial) =	0.00	kips
Mx(total) =	227.30	ft-kips
Mx(cutoff) =	211.68	ft-kips
Mx(residual) =	170.35	ft-kips
My =	0.04	ft-kips
Rv(shear) =	18.58	kips

Design Parameters:

Fy (mem./I-bm.) =	36.00	ksi
Kx =	1.00	
Ky =	1.00	
Kz =	1.00	
Lx =	4.750	ft.
Ly =	4.750	ft.
Lb =	4.750	ft.
Cb =	1.00	
Full Lgth. Reinf.?	Yes	

Exist. W14x48 Properties:

A =	14.10	in.^2
d =	13.800	in.
tw =	0.340	in.
bf =	8.030	in.
tf =	0.595	in.
k =	1.190	in.
Ix =	484.0	in.^4
Sx =	70.2	in.^3
rx =	5.85	in.
Zx =	78.4	in.^3
Iy =	51.40	in.^4
Sy =	12.80	in.^3
ry =	1.910	in.
Zy =	19.6	in.^3
J =	1.450	in.^4
Cw =	2240.0	in.^6



New W10x49 Properties:

A2 =	14.40	in.^2
d2 =	10.000	in.
tw2 =	0.340	in.
bf2 =	10.000	in.
tf2 =	0.560	in.
k2 =	1.060	in.
Ix2 =	272.00	in.^4

W10x49 Properties (Cont'd):

Iy2 =	93.40	in.^4
Zy2 =	28.30	in.^3
J2 =	1.39	in.^4

Section Ratios & Parameters:

bf/(2*tf) =	6.75
h/tw =	63.38

Results:

Combined Section Properties:

Y1 =	12.913	in.	Y1 = d+d2-Y2
Y2 =	10.887	in.	Y2 = (A*(d2+d/2)+(A2*d2/2))/(A+A2)
Y3 =	6.013	in.	Y3 = Y1-d/2
Y4 =	5.887	in.	Y4 = Y2-d2/2
Ac =	28.50	in.^2	Ac = A+A2
rtc =	2.040	in.	rtc = SQRT((tf*bf^3/12+(Y1-tf)/3*tw^3/12)/(bf*tf+(Y1-tf)/3*tw))
Ixc =	1764.86	in.^4	Ixc = Ix1+Ix2+A1*Y3^2+A2*Y4^2
Sxc(top/mem) =	136.68	in.^3	Sxc(top/mem) = Ixc/Y1 (ref. to top/upper flange of exist. member)
Sxc(bot/mem) =	1988.87	in^3	Sxc(bot/mem) = Ixc/ABS(Y2-d2) (ref. to bot/lower flg. of exist. member)
Sxc(bot/pl) =	162.10	in.^3	Sxc(bot/bm) = Ixc/Y2 (referenced to bottom of reinforcing beam)
rxc =	7.869	in.	rxc = SQRT(Ixc/Ac)

(continued)

Combined Section Properties (continued):

Zxc =	309.50	in.^3	P.N.A. is Below Bottom Flange of Existing Beam
Iyc =	144.80	in.^4	Iyc = Iy+Iy2
Syc(top/mem) =	36.06	in.^3	Syc(top/mem) = Iyc/(bf/2) (referenced to tip of top flange of member)
Syc(bot/mem) =	36.06	in.^3	Syc(bot/mem) = Iyc/(bf/2) (referenced to tip of bot. flange of member)
Syc(bot/bm) =	28.96	in.^3	Syc(bot/bm) = Iyc/(bfwt/2) (referenced to tip of flange of reinf. bm)
ryc =	2.254	in.	ryc = SQRT(Iyc/Ac)
Zyc =	47.9	in.^3	Zyc = Zy (I-shape) + Zy (bm)
J =	2.840	in.^4	J = ∑ of J for Each Shape (conservative)
Cwc =	8931.6	in.^6	Cwc ≈ h'^2*Ic*It/(Ic+It)

Check Stresses:

For Axial Compression: (for combined section)

KL/rx =	7.24		KL/rx = Kx*Lx*12/rxc (use rxc for combined section)
KL/ry =	25.29		KL/ry = Ky*Ly*12/ryc (use ryc for combined section)
KL/r =	25.29		KL/r = Max. of: Kx*Lx*12/rxc or Ky*Ly*12/ryc
Fe =	N.A.		
fa =	0.00	ksi	fa = P/Ac (use Ac for combined section)
Fa =	29.89	ksi	Governing Equation is (Eqn. E7-2)
Pa =	851.90	kips	Pa = Fa*Ac (use Ac for combined section)
S.R. =	0.000		S.R = fa/Fa

For X-axis Bending: (for combined section)

Lp =	5.31	ft.	(Eqn. F2-5, max. value of Lb for Fbx = 0.6*SF*Fy)
Lr =	21.99	ft.	(Eqn. F4-8, max. value of Lb for inelastic LTB)
rtc =	7.87		rxc = SQRT(Ixc/Ac)
fbx(residual) =	29.12	ksi	fbx = Mx(residual)*12/Sx
fbx(add. top) =	5.00	ksi	fbx = {Mx(total) - Mx(residual)}*12/Sxc(top/mem)
fbx(add. bot) =	0.34	ksi	fbx = {Mx(total) - Mx(residual)}*12/Sxc(bot/mem)
fbx(top/mem) =	34.12	ksi	fbx(top/mem) = fbx(residual)+fbx(added, top/mem)
fbx(bot/mem) =	29.46	ksi	fbx(bot/mem) = fbx(residual)+fbx(added, bot/mem)
fbx(bot/bm) =	4.22	ksi	fbx = {Mx(total) - Mx(residual)}*12/Sxc(bot/bm)
Fbx(residual) =	36.18	ksi	Governing Equation is (Eqn. F2-1)
Fbx(top/mem) =	51.84	ksi	Governing Equation is (Eqn. F4-1)
Fbx(bot/mem) =	51.84	ksi	Governing Equation is (Eqn. F4-1)
Fbx(bot/bm) =	51.84	ksi	Governing Equation is (Eqn. F4-1)
Mrx =	590.44	ft-kips	Mrx=Min. of: Sxc(top/mem)*Fbx(top)/12, Sxc(top)*Fbx(bot/mem)/12, Sxc(bot/WT)*Fbx(bot/bm)/12
S.R. (top/mem) =	0.901		S.R = fbx(residual)/Fbx(residual) + fbx(added,top)/Fbx(top)
S.R. (bot/mem) =	0.811		S.R = fbx(residual)/Fbx(residual) + fbx(added,bot)/Fbx(bot)
S.R. (bot/bm) =	0.081		S.R = fbx(bot/bm)/Fbx(bot/bm)

For Y-axis Bending: (for combined section)

fby(top/mem) =	0.01	ksi	fby(top/mem) = My*12/Syc(top/mem)
fby(bot/mem) =	0.01	ksi	fby(bot/mem) = My*12/Syc(bot/mem)
fby(bot/bm) =	0.02	ksi	fby(bot/bm) = My*12/Syc(bot/bm)
Fby =	43.03	ksi	Governing Equation is (Eqn. F6-1)
Mry =	103.85	ft-kips	Mry=Min. of: Syc(top/mem)*Fby/12, Syc(bot/mem)*Fby/12, Syc(bot/bm)*Fby/12
S.R. (top/mem) =	0.000		S.R = fby(top/mem)/Fby
S.R. (bot/mem) =	0.000		S.R = fby(bot/mem)/Fby
S.R. (bot/bm) =	0.000		S.R = fby(bot/bm)/Fby

(continued)

Combined Stress Ratios:

S.R.(top/mem) =	0.902	Eqn. H1-1b	S.R. = 0.5*fa/Fa + (fbx/Fbx+fby/Fby)	S.R.(top/mem) <= 1.0, O.K.
S.R.(bot/mem) =	0.812	Eqn. H1-1b	S.R. = 0.5*fa/Fa + (fbx/Fbx+fby/Fby)	S.R.(top/mem) <= 1.0, O.K.
S.R.(bot/WT) =	0.082	Eqn. H1-1b	S.R. = 0.5*fa/Fa + (fbx/Fbx+fby/Fby)	S.R.(top/mem) <= 1.0, O.K.

Weld Design:

Interior Welds of I-Beam Reinf. to Exist. Member:

Fw =	0.446	kips/in.	Fw = Rv*A2*Y4/(2*Ixc) (weld force per inch)
ω(min) =	1/4	in.	ω(min) = Min. fillet weld size from AISC Table J2.4, page 16.1-96
ω(max,eff) =	0.3620	in.	ω(max eff) = Min. of: (tf1 or tf2)*(0.40*Fy/((SQRT(2)/2)*0.60*0.75*70))
ω(use) =	1/4	in.	ω(use) = ω(min) <= 5/16"
Lw(min) =	1.500	in./ft.	Lw(min) = Max. of: 1.5" or 4*ω(min)
Lw(use) =	1.500	in./ft.	Lw(use) = Max. of: (Fw*12)/(ω*SQRT(2)/2*0.60*0.75*70) or Lw(min)

Note: ω = ω (use)

Use: 1/4" Fillet Weld, 1.5" @ 12" Each Side of Beam Reinf.

End Welds of I-Beam Reinf. to Exist. Member:

For Case #1: Weld Across End of Beam Reinf.

Fw(total) =	122.02	kips	Fw(total) = M(cutoff)*12*A2*Y4/Ixc
Lw(end) =	8.030	in.	Lw(end) = Min. of: bf1 or bf2
a'(min) =	15.000	in.	a'(min) = 1.5*bf2, for weld size < 0.75*tf2
a'(req'd) =	6.941	in.	a'(req'd) = (Fw(total)/(ω*SQRT(2)/2*0.60*0.75*70)-Lw(end))/2
a'(use) =	15.000	in.	a'(use) = Max. of: a'(min) or a'(req'd)
Lw(total) =	38.030	in.	Lw(total) = 2*a'(use)+Lw(end) (@ each end of beam reinf.)

Note: ω = ω (use)

Use: 1/4" Fillet Weld, 15" Continuous Each Side of Beam Reinf. and Across End

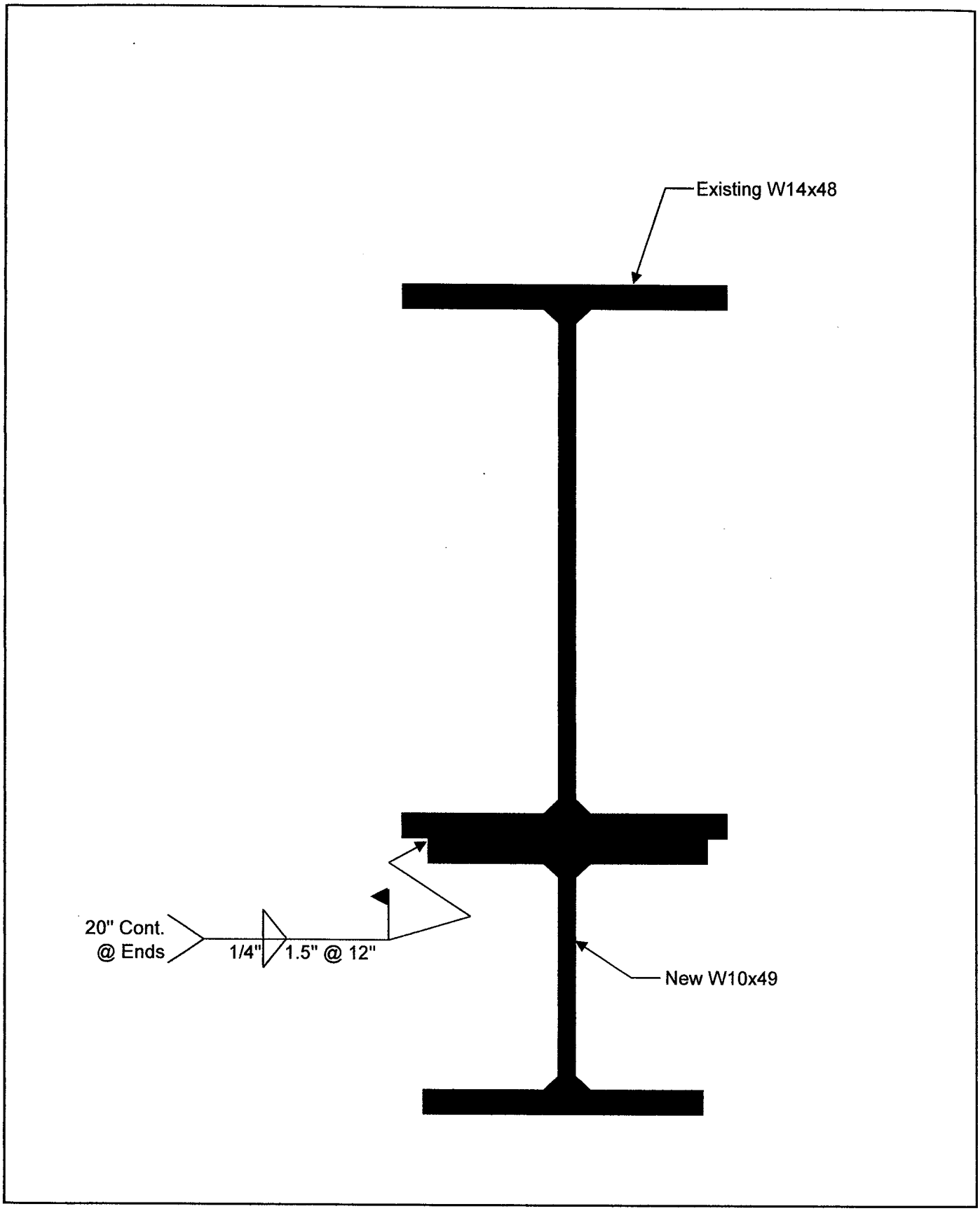
For Case #2: No Weld Across End of Beam Reinf.

Fw(total) =	122.02	kips	Fw(total) = M(cutoff)*12*A2*Y4/Ixc
Lw(end) =	0.000	in.	Lw(end) = 0 (assumed)
a'(min) =	20.000	in.	a'(min) = 2*bf2, for no weld across end of beam reinf.
a'(req'd) =	10.956	in.	a'(req'd) = (Fw(total)/(ω*SQRT(2)/2*0.60*0.75*70))/2
a'(use) =	20.000	in.	a'(use) = Max. of: a'(min) or a'(req'd)
Lw(total) =	40.000	in.	Lw(total) = 2*a'(use) (@ each end of beam reinf.)

Note: ω = ω (use)

Use: 1/4" Fillet Weld, 20" Continuous Each Side of Beam Reinf.

Comments:


Existing W14x48
20" Cont.
@ Ends
1/4"
1.5" @ 12"
New W10x49

Info. From SEA Consultants

DL Factor	1.2	
LL Factor	1.6	

Roof

1.5" Metal Deck	2	psf
2" Insulation	3	psf
3 Ply Roof & Gravel	6	psf
Steel Framing	4	psf
Misc	5	psf
Total	20	psf
Snow Load	30	psf
Use Live	30	psf
DL + LL (Roof)	72	psf (non-reduced)

Floor

Steel Framing	7	psf
4" Conc. Slab	50	psf
Misc.	5	psf
Total	62	psf
Floor Live	50	psf
Partitions	20	psf
Total	70	psf

LL Reduction

KLL - assumed	4	
Lo	70	psf
AT	600	sq ft
L	38.93304	psf
Lmin	35	psf
L use	38.93304	psf
DL + LL (Floor)	186.4	psf (non-reduced)
DL + LL (Floor)	136.6929	psf (reduced)

300 Ton Chiller Weight	25	kip
Factored Platform Reaction	28.8	kip

Shape	HSS5-1/2x5-1/2x1/4				
K	1.0	t	0.25	in	
L	11 ft	tdes	0.233	in	
Fy	33 ksi	B	5.5	in	
E	29000 ksi	H	5.5	in	
f'c	3 ksi	As	4.77	in^2	OK
wc	145 pcf	Is	21.7	in^4	
Ec	3024.215 ksi	rs	2.13	in	
		h/t	20.6		OK, Composite
		b/t	20.6		Compact, Non-Composite
		C2	0.85		0.85 Rectangular
					0.95 Circular

Analysis per AISC 13th

Non-Composite		Composite				Non-Composite	
Ωc	1.67	Ωc	2.00	ϕc	0.75	Ωc	1.67
ϕc	0.90	r	0.3495 in	Po	222.0002 kip	ϕc	0.90
KL/r	61.97183	b	4.801 in	C3	0.916949	KL/r	77.61194
Fe	74.52622 ksi	h	4.801 in	C3	0.9	Fe	47.51609 ksi
Fy/Fe	0.442797	r-t	0.1165 in	Eleff	774759.2 kip-in^2	Fy/Fe	0.694502
Fcr1	27.41731 ksi	Ac	25.32951 in^2			Fcr1	24.67582 ksi
Fcr2	65.35949 ksi			Pe	438.8526 kip	Fcr2	41.67161 ksi
Fcr	27.41731 ksi	h1	5.034 in	Po/Pe	0.505865	Fcr	24.67582 ksi
Pn	130.7806 kip	b1	4.801 in	Pn1	179.6388 kip	Pn	225.2902 kip
ϕPn	117.7025 kip	h2	4.801 in	Pn2	384.8737 kip	ϕPn	202.7612 kip
Pn/Ω	78.31172 kip	b2	0.1165 in	Pn	179.6388 kip	Pn/Ω	134.9043 kip
		r-t	0.1165 in	ϕPn	134.7291 kip		
		Ic	53.44243 in^4	Pn/Ω	89.81942 kip		

Column 77 - Roof to 4th Floor

Width	20	ft
Length	30	ft
Area	600	sq ft

24" Girder

Width	20	ft
Length	30	ft
Grider Wt	0.1	klf
DL + LL (Roof) - Fctr	72	psf
Grider Load - Fctr	1.56	klf
Chiller - Fctr	7.5	k
Reaction	30.9	k

16" Girder

Width	20	ft
Length	30	ft
Grider Wt	0.05	klf
DL + LL (Roof) - Fctr	72	psf
Grider Load - Fctr	1.5	klf
Chiller - Fctr	0	k
Reaction	22.5	k

Column 77 - Roof to 4th Floor

Column Load	53.4	k
Proposed Load	28.80	k
Total Load	82.20	k
Capacity	69.8%	

Column 76 - Analysis - Roof

Column Load	53.4	k
Platform Reaction	28.80	k
Total	82.20	k
Capacity	69.8%	

Shape	8H31		
A	9.13	in^2	
Iy	37	in^4	
ry	2.01	in	
K	1		
L	13	ft	
Fy	33	ksi	
E	29000	ksi	

Column 76 & 77 - 4th Floor to 3rd Floor

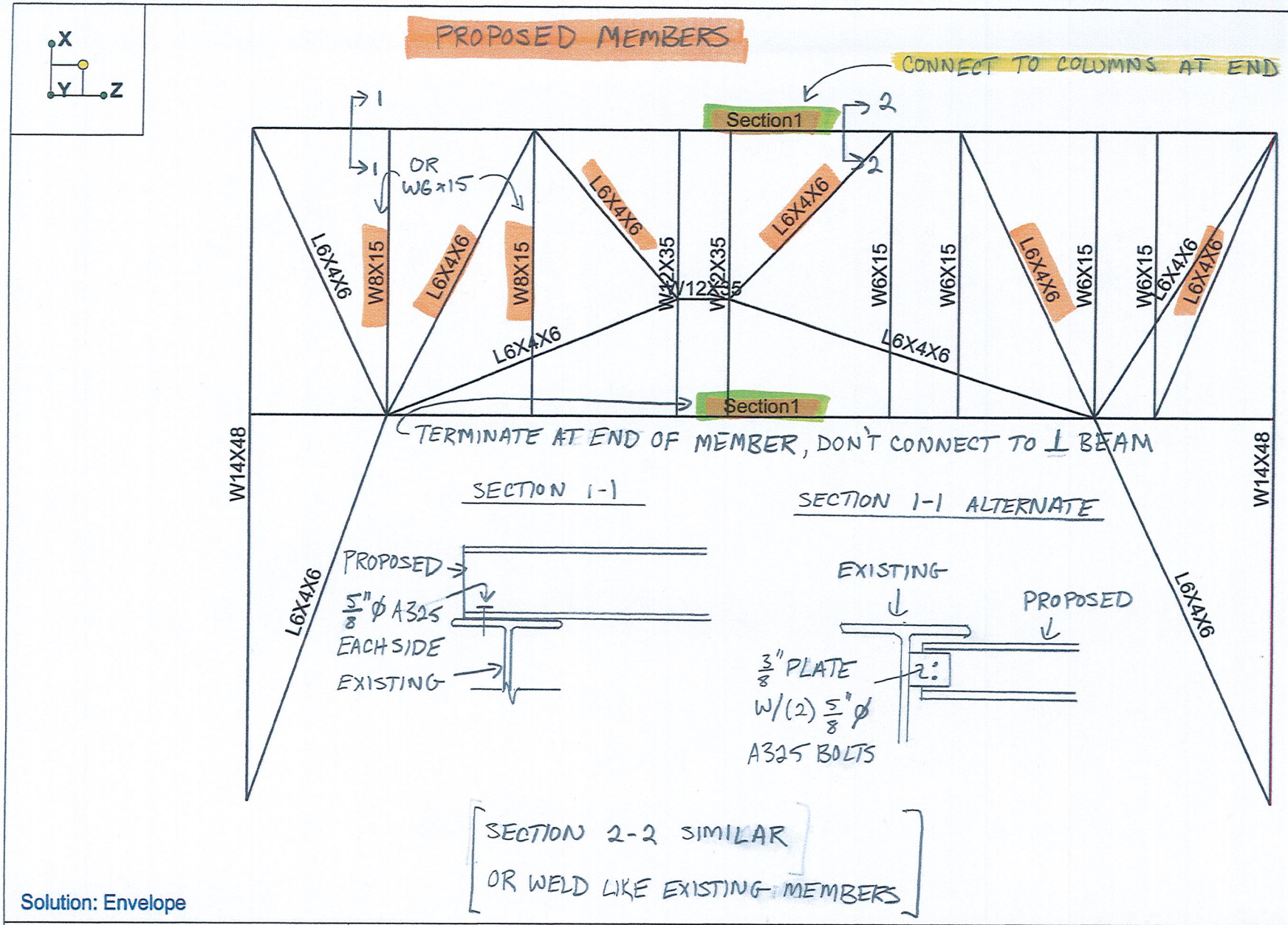
Width	20	ft
Length	30	ft
Area	600	sq ft
DL + LL (Floor) - Fctr	136.6929	psf
Total	82.01571	k
Roof	82.20	k
Existing Load	164.22	k
Capacity	81.0%	

Guy Anchor Analysis

Roof - Conservative

1.5" Metal Deck	1.5	psf
2" Insulation	2	psf
3 Ply Roof & Gravel	3	psf
Steel Framing	3	psf
Misc	2	psf
Total	11.5	psf
0.9*Total	10.35	psf
Tributary Area	600	sq ft
Resisting Weight	6.21	kip
Guy Anchor Uplift	13.471	kip
Difference	7.261	kip
Needed Capacity	8.067778	kip

Assume Base Plate from Roof Supporting Column has a connection capacity of at least 9 kips



Solution: Envelope

Ramaker & Associates, Inc.	West Hartford Bishops (CT03XC074)	SK - 9
TEM		Jan 14, 2013 at 10:37 AM
22995		22995 Modified.r3d

RAMAKER
& ASSOCIATES, INC.

1120 Dallas Street Sauk City, WI 53583
(608) 643-4100
FAX (608) 643-7999
e-mail: ramaker@ramaker.com

JOB 22995

SHEET NO _____ OF _____

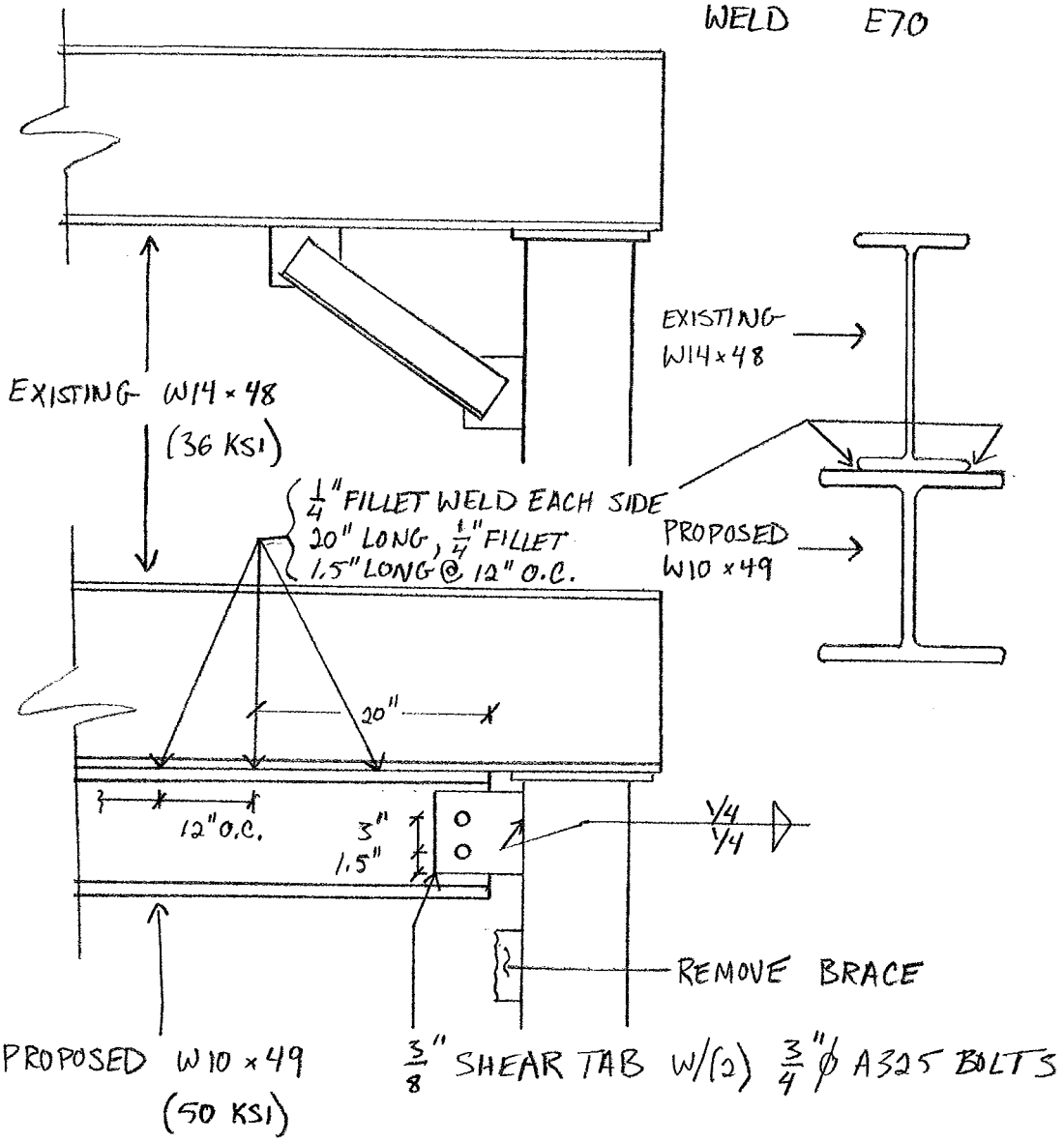
CALCULATED BY TEM DATE 1/14/13

CHECKED BY _____ DATE _____

SCALE _____

SECTION 1 REINFORCEMENT

BEAMS	A992
ANGLES	A36
BOLTS	A325
WELD	E70



RAMAKER
& ASSOCIATES, INC.

1120 Dallas Street Sauk City, WI 53583
(608) 643-4100
FAX (608) 643-7999
e-mail: ramaker@ramaker.com

JOB 22995

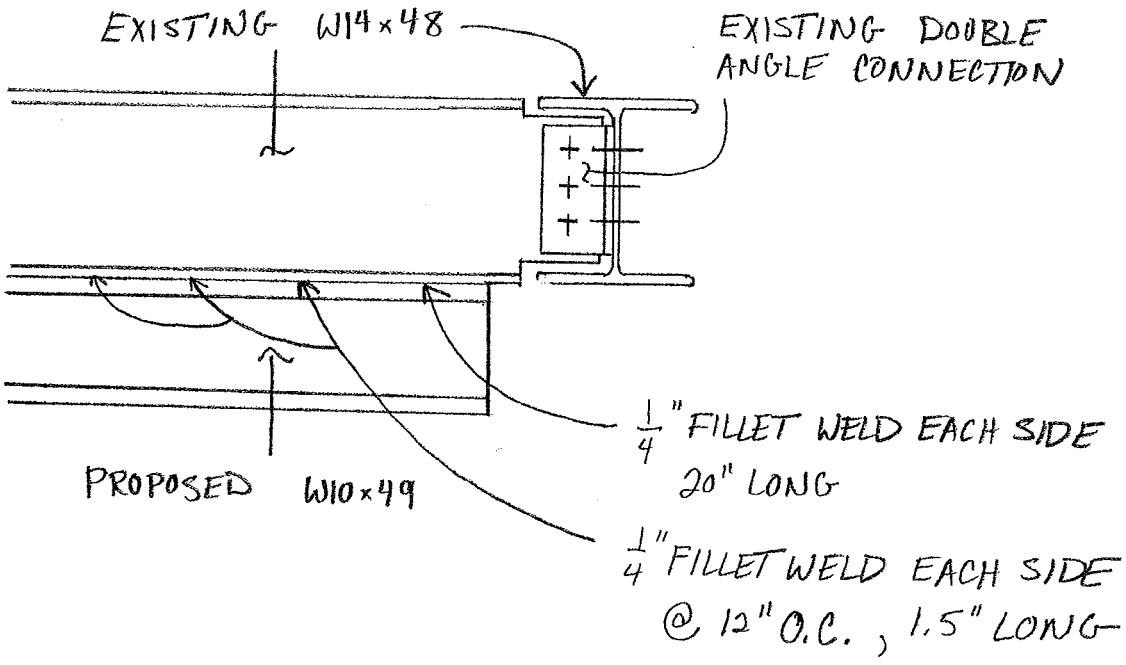
SHEET NO. _____ OF _____

CALCULATED BY TEM DATE 1/14/13

CHECKED BY _____ DATE _____

SCALE _____

SECTION 1 REINFORCEMENT CONTINUED



EBI Consulting
environmental | engineering | due diligence

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

Sprint Existing Facility

Site ID: CT03XC074

West Hartford Bishops
345 N. Main Street
West Hartford, CT 06117

October 17, 2012

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

EBI Consulting
environmental | engineering | due diligence

October 17, 2012

Sprint
Attn: RF Engineering Manager
1 International Boulevard, Suite 800
Mahwah, NJ 07495

Re: Emissions Values for Site: **CT03XC074 – West Hartford Bishops**

EBI Consulting was directed to analyze the proposed upgrades to the existing Sprint facility located at 345 N. Main Street, West Hartford, CT, for the purpose of determining whether the emissions from the proposed Sprint equipment upgrades 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 μW/cm2 calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

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

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

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limit for the cellular band is approximately 567 $\mu W/cm^2$, and the general population exposure limit for the PCS band 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 upgrades to the existing Sprint Wireless antenna facility located at 345 N. Main Street, West Hartford, CT, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. All calculations were performed assuming the main lobe of the antenna was focused at the base of the tower to present a worst case scenario. Actual values seen from this site will be dramatically less than those shown in this report. 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 emissions were calculated using the following assumptions:

1) 3 CDMA Carriers (1900 MHz) were considered for each sector of the proposed installation.
2) 1 CDMA Carrier (850 MHz) was considered for each sector of the proposed installation
3) 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.
4) For the following calculations the sample point was the top of a six foot person standing at the base of the tower. The actual gain in this direction was used per the manufactures supplied specifications.
5) The antenna used in this modeling is the APXVSPP18-C-A20. This is based on feedback from the carrier with regards to anticipated antenna selection. This antenna has a 15.9 dBd gain value at its main lobe at 1900 MHz and 13.4 dBd at its main lobe for 850 MHz. All calculations were performed assuming the main lobe of the antenna was focused at the base of the tower to present a worst case scenario.

6) The antenna mounting height centerline of the proposed antennas is **100 feet** above ground level (AGL)
7) 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 calculation were done with respect to uncontrolled / general public threshold limits

Site ID	CT03XC074 - West Hartford Bishops
Site Addresss	345 N. Main Street, West Hartford, CT, 06117
Site Type	Rooftop Guyed Tower

Sector 1

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	3	60	15.9	100	94	1/2 "	0.5	0	2080.4211	84.64504	8.46450%
1a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	13.4	100	94	1/2 "	0.5	0	389.96892	15.86647	2.79832%
														Sector total Power Density Value:		11.263%	

Sector 2

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
2a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	3	60	15.9	100	94	1/2 "	0.5	0	2080.4211	84.64504	8.46450%
2a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	13.4	100	94	1/2 "	0.5	0	389.96892	15.86647	2.79832%
														Sector total Power Density Value:		11.263%	

Sector 3

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
3a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	3	60	15.9	100	94	1/2 "	0.5	0	2080.4211	84.64504	8.46450%
3a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	13.4	100	94	1/2 "	0.5	0	389.96892	15.86647	2.79832%
														Sector total Power Density Value:		11.263%	

Site Composite MPE %	
Carrier	MPE %
Sprint	33.788%
Clearwire	16.460%
Total Site MPE %	50.248%

EBI Consulting
environmental | engineering | due diligence

Summary

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

The anticipated Maximum Composite contributions from the Sprint facility are **33.788469229725528% (11.263% from each sector)** of the allowable FCC established general public limit considering all three sectors simultaneously sampled at the ground level.

The anticipated composite MPE value for this site assuming all carriers present is **50.248%** 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