STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

Phone: (860) 827-2935 Fax: (860) 827-2950

E-Mail: siting.council@ct.gov

Internet: ct.gov/csc

Daniel F. Caruso

Chairman

March 15, 2011

Thomas J. Regan, Esq.
Brown Rudnick LLP
CityPlace I, 185 Asylum Street
Hartford, CT 06103

RE: **EM-T-MOBILE-027-110210** – T-Mobile USA, Inc. notice of intent to modify an existing telecommunications facility located at 21 East Main Street, Clinton, Connecticut.

Dear Attorney Regan:

The Connecticut Siting Council (Council) hereby acknowledges your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies with the following conditions:

- Any deviation from the proposed modification as specified in this notice and supporting materials with Council shall render this acknowledgement invalid;
- Any material changes to this modification as proposed shall require the filing of a new notice with the Council;
- Not less than 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;
- The validity of this action shall expire one year from the date of this letter; and
- The applicant may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration;

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated February 10, 2011. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Please be advised that the validity of this action shall expire one year from the date of this letter. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Thank you for your attention and cooperation.

Very truly yours,

LRoberts

Linda Roberts
Executive Director

LR/CDM/laf

c: The Honorable William W. Fritz, Jr., First Selectman, Town of Clinton
Thomas Lane, Zoning Enforcement Officer, Town of Clinton
Comcast

G:\EM\T-MOBILE\Clinton\dc031511EMainSt.DOC

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

Phone: (860) 827-2935 Fax: (860) 827-2950

E-Mail: siting.council@ct.gov

Internet: ct.gov/csc

Daniel F. Caruso
Chairman

February 22, 2011

The Honorable William W. Fritz, Jr.
First Selectman
Town of Clinton
54 East Main Street
Clinton, CT 06413

RE: **EM-T-MOBILE-027-110210** – T-Mobile USA, Inc. notice of intent to modify an existing telecommunications facility located at 21 East Main Street, Clinton, Connecticut.

Dear First Selectman Fritz:

The Connecticut Siting Council (Council) received this request to modify an existing telecommunications facility, pursuant to Regulations of Connecticut State Agencies Section 16-50j-72.

If you have any questions or comments regarding this proposal, please call me or inform the Council by March 8, 2011.

Thank you for your cooperation and consideration.

Very truly yours,

Linda Roberts

Linda Roberts
Executive Director

LR/jbw

Enclosure: Notice of Intent

c: Thomas Lane, Zoning Enforcement Officer, Town of Clinton

CSC
CONNECTICUT SITING COUNCIL
Affirmative Action / Equal Opportunity Employer

CONNECTICUT

EM-T-MOBILE-027-110210

In re:
T-Mobile USA, Inc. Notice to Make an Exempt Modification to an Existing Facility at 21 East Main Street, Clinton, Connecticut.

NO. ________

February 10, 2011

RECEIVED FEB 10 2011 CONNECTICUT SITING COUNCIL

ORIGINAL

NOTICE OF EXEMPT MODIFICATION

Pursuant to Conn. Agencies Regs. §§ 16-50j-73 and 16-50j-72(b), T-Mobile USA, Inc. ("T-Mobile") hereby gives notice to the Connecticut Siting Council ("Council") and the Town of Clinton of T-Mobile's intent to make an exempt modification to the existing lattice tower (the "Tower") located at 21 East Main Street in Clinton, Connecticut. Furthermore, pursuant to Conn. Gen. Stat. §§ 16-50x(a) and 16-50i(a)(6) and Conn. Agencies Regs. § 16-50j-2a *et seq*. the Tower is a Facility and therefore under the Council's exclusive jurisdiction.

T-Mobile plans to upgrade its wireless system in Connecticut by implementing its Universal Mobile Telecommunications System ("UMTS"). UMTS is a third-generation ("3G") technology that utilizes a code division multiple access ("CDMA") base to allow for fast and large data transfers. To accomplish this upgrade, T-Mobile must modify its antenna and equipment configurations at many of its existing sites.

Once the UMTS upgrade is complete, T-Mobile will operate on a more unified communication system, allowing international wireless telephones to function world-wide. Furthermore, UMTS will enhance global positioning system ("GPS") navigation capabilities and provide emergency responders with more advanced tracking capabilities. The proposed UMTS technology is compatible with the existing second-generation ("2G") Global System for Mobile Communication ("GSM") currently on the Tower and the proposed upgrade is expected to enhance the existing 2G system. In order to accomplish the upgrade at this site, T-Mobile plans to add UMTS technology and install associated equipment adjacent to the Tower.

BROWN RUDNICK LLP
CITYPLACE I
185 ASYLUM STREET
HARTFORD, CT 06103
(860) 509-6500

Under the Council's regulations (Conn. Agencies Regs. § 16-50j-72(b)), T-Mobile's plans do not constitute a modification subject to the Council's review because T-Mobile will not change the height of the Tower, will not extend the boundaries of the site, will not increase the noise levels at the site, and will not increase the total radio frequency electromagnetic radiation power density at the site to levels above applicable standards.

The Tower is a 67-foot, 8-inch lattice tower located at 21 East Main Street in Clinton, Connecticut (latitude N 41.28, longitude W -72.53). The Tower is owned by Comcast. Currently, T-Mobile has 3 GSM panel antennas located on the Tower with a centerline of 60 feet. A site plan with Tower specifications is attached.

Specifically, T-Mobile plans to install remove and replace 3 of its existing antennas with upgraded antennas that also include UMTS technology. Additionally, T-Mobile plans install 6 TMAs. The 6 TMAs will include 3 PCS TMA and 3 AWS TMA. The centerline of the new antennas and TMAs will remain at 60 feet. T-Mobile will continue to utilize its 6 existing coax cables and will install 6 additional 7/8 inch coax cables.

To confirm the Tower can support these changes, T-Mobile commissioned Centek Engineering to perform a structural analysis of the Tower (attached). According to the Structural Analysis Report, dated January 10, 2011: "Calculated stresses were found to be within allowable limits" (Section 1-4, Structural Analysis Report).

In addition, T-Mobile proposes to install 1 new UMTS equipment cabinet and 3 RRU units on the exterior of the existing stairwell. Since T-Mobile's equipment will be located on the exterior of the existing stairwell no increase in the boundaries of the site will be necessary.

BROWN RUDNICK LLP
CITYPLACE I
185 ASYLUM STREET
HARTFORD, CT 06103
(860) 509-6500

Excluding brief, minor, construction-related noise during the addition of the antennas and the installation of the equipment cabinet, T-Mobile's changes to the Tower will not increase noise levels at the site.

The proposed antennas will not adversely impact the health and safety of the surrounding community or the people working on the Tower. The total radio frequency exposure measured around the Tower will be well below the National Council on Radiation Protection and Measurements' ("NCRP") standard adopted by the Federal Communications Commission ("FCC"). A cumulative power density analysis indicates that together, all of the antennas on the Tower will emit 40.84% of the NCRP's standard for maximum permissible exposure. Therefore, the power density levels will be below the FCC mandated radio frequency exposure limits in all locations around the Tower, even with extremely conservative assumptions. The power density analysis is attached.

In conclusion, T-Mobile's proposed plan to remove and replace antennas, install TMAs and install equipment at this site does not constitute a modification subject to the Council's jurisdiction because T-Mobile will not increase the height of the Tower, will not extend the boundaries of the site, will not increase the noise levels at the site, and the total radio frequency electromagnetic radiation power density will stay within all applicable standards. *See* Conn. Agencies Regs. § 16-50j-72.

T-Mobile USA, Inc.

By: ______________________

Thomas J. Regan
Brown Rudnick LLP
185 Asylum Street, CityPlace I
Hartford, CT 06103-3402
Email - tregan@brownrudnick.com
Phone - 860.509.6522 /Fax - 860.509.6501

Certificate of Service

This is to certify that on this 10th day of February, 2011, the foregoing Notice of Exempt Modification was sent, via first class mail, to the following:

Town of Clinton
First Selectman William W. Fritz
54 East Main Street
Clinton, CT 06413

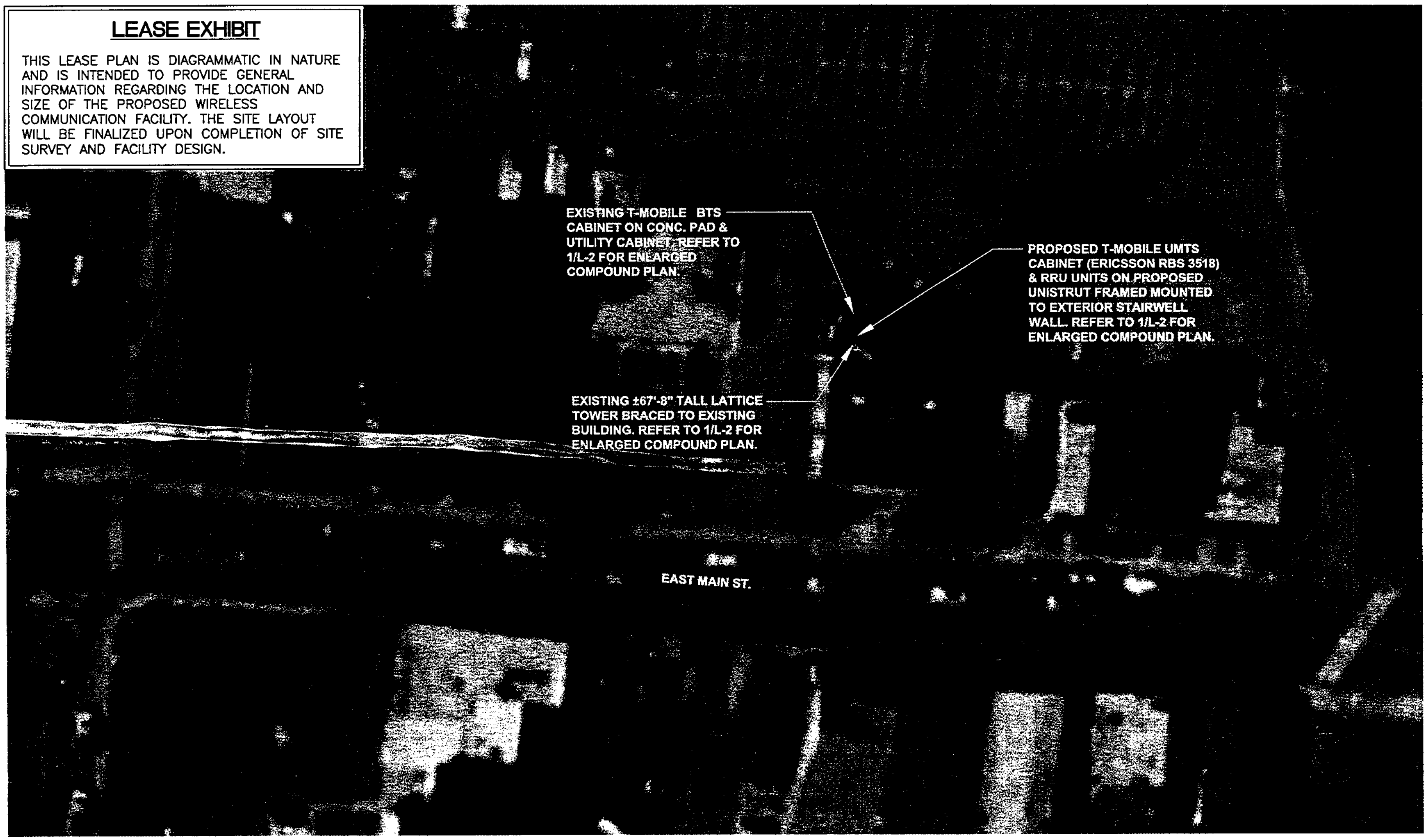
By: ______________________
Thomas J. Regan

40281212 v1 - 025064/0016

BROWN RUDNICK LLP
CITYPLACE I
185 ASYLUM STREET
HARTFORD, CT 06103
(860) 509-6500

LEASE EXHIBIT

THIS LEASE PLAN IS DIAGRAMMATIC IN NATURE AND IS INTENDED TO PROVIDE GENERAL INFORMATION REGARDING THE LOCATION AND SIZE OF THE PROPOSED WIRELESS COMMUNICATION FACILITY. THE SITE LAYOUT WILL BE FINALIZED UPON COMPLETION OF SITE SURVEY AND FACILITY DESIGN.



1 / L-1 **SITE PLAN**
SCALE: 1" = 40'

APPROXIMATE NORTH

40 0 20 40 80 160
(IN FEET)
1 inch = 40 ft.

DESIGNED BY:	CFC			
DRAWN BY:	DEB			
CHK'D BY:	CFC			
REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
00	10/7/10	DEB	CFC	FINAL LEASE EXHIBIT
A	10/4/10	DEB	CFC	LEASE EXHIBIT – CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

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

T-Mobile

T-MOBILE
CT11031B
21 EAST MAIN STREET
CLINTON, CT

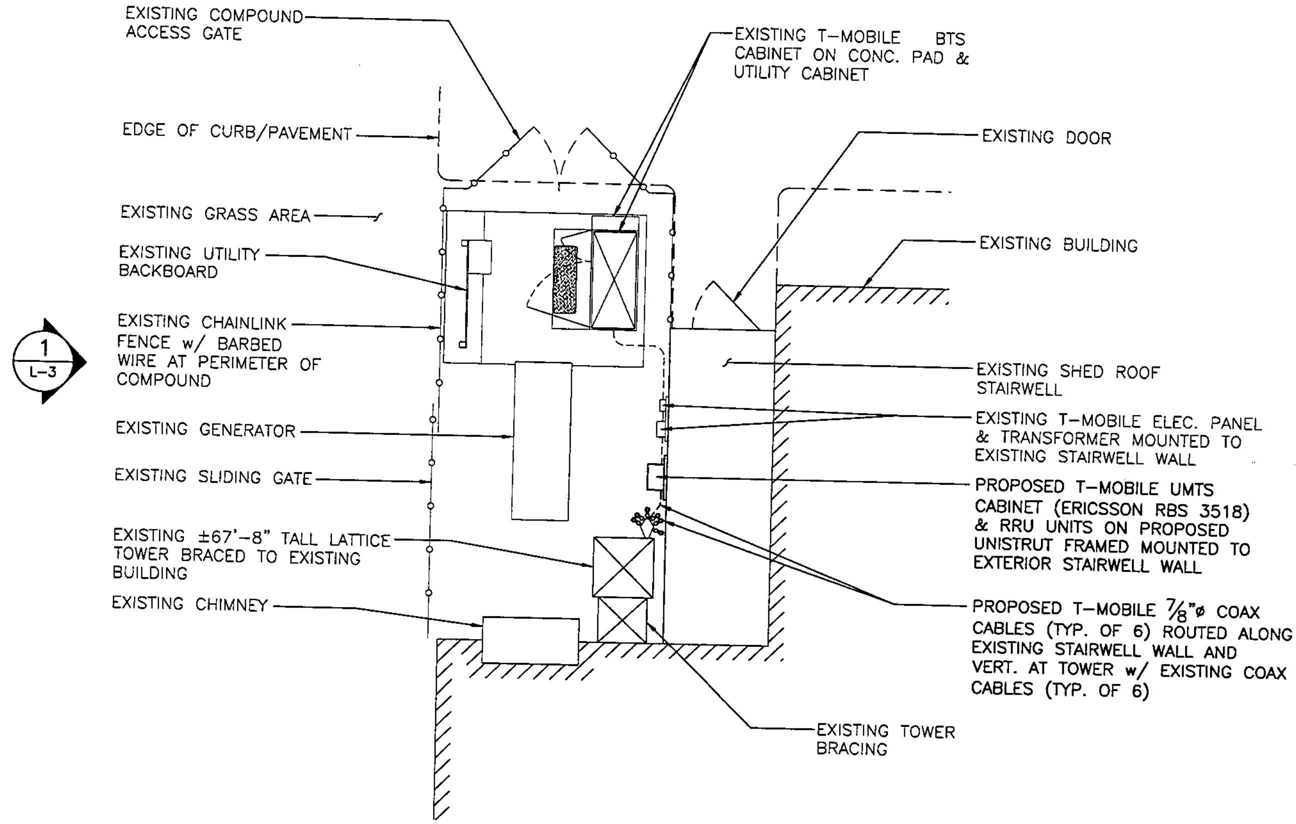
DATE: 10/1/10
SCALE: AS SHOWN
JOB NO. 10118.C06

LEASE EXHIBIT

SHEET NO. L-1
Sheet No. 1 of 3

LEASE EXHIBIT

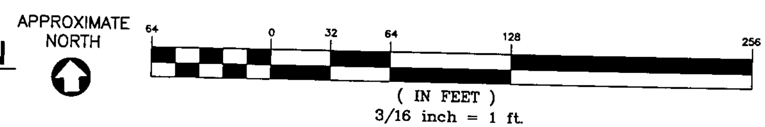
THIS LEASE PLAN IS DIAGRAMMATIC IN NATURE AND IS INTENDED TO PROVIDE GENERAL INFORMATION REGARDING THE LOCATION AND SIZE OF THE PROPOSED WIRELESS COMMUNICATION FACILITY. THE SITE LAYOUT WILL BE FINALIZED UPON COMPLETION OF SITE SURVEY AND FACILITY DESIGN.



1
L-2

COMPOUND PLAN

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



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

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
00	10/7/10	DEB	CFC	FINAL LEASE EXHIBIT
A	10/4/10	DEB	CFC	LEASE EXHIBIT - CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

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

T-Mobile

T-MOBILE
CT11031B
21 EAST MAIN STREET
CLINTON, CT

DATE:	10/1/10
SCALE:	AS SHOWN
JOB NO.	10116.C06

LEASE EXHIBIT

SHEET NO. L-2

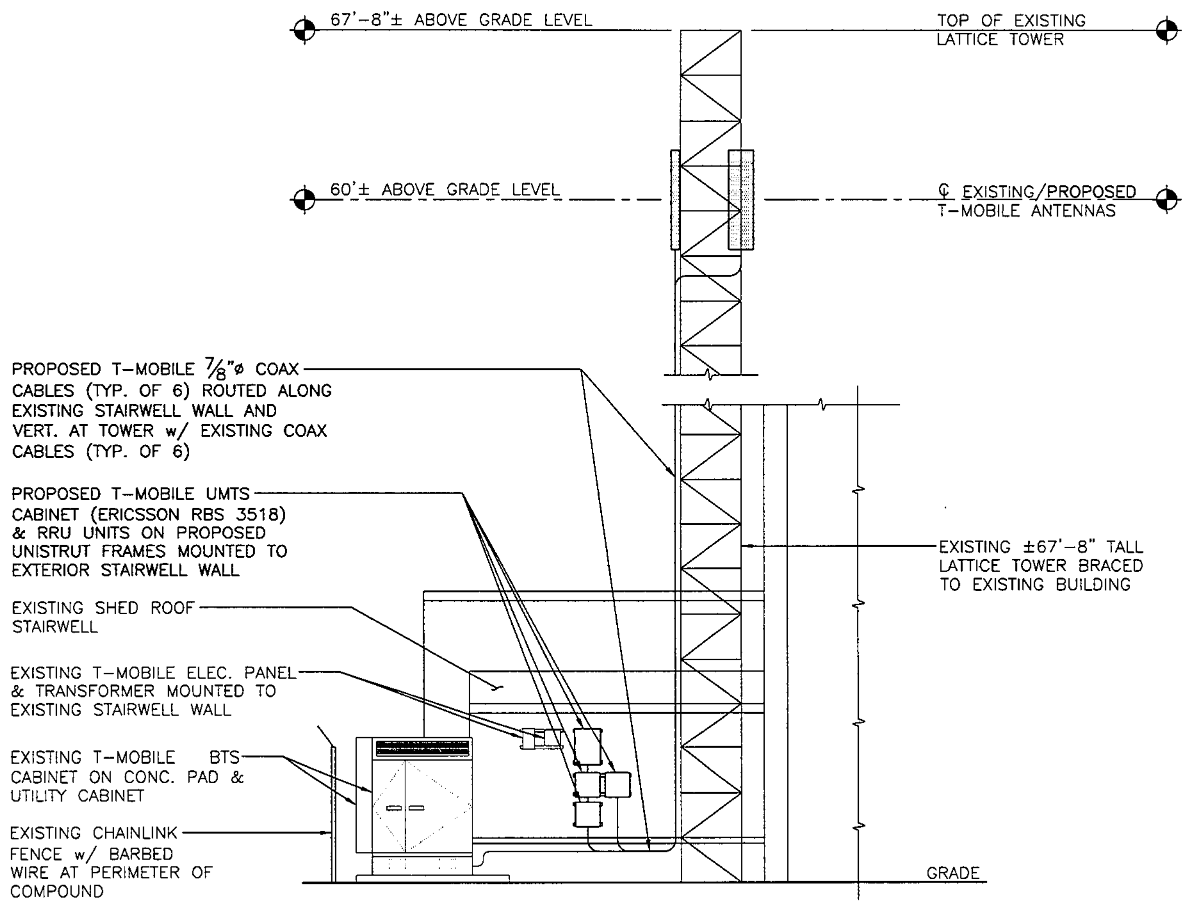
Sheet No. 2 of 3

LEASE EXHIBIT

THIS LEASE PLAN IS DIAGRAMMATIC IN NATURE AND IS INTENDED TO PROVIDE GENERAL INFORMATION REGARDING THE LOCATION AND SIZE OF THE PROPOSED WIRELESS COMMUNICATION FACILITY. THE SITE LAYOUT WILL BE FINALIZED UPON COMPLETION OF SITE SURVEY AND FACILITY DESIGN.

EQUIP. UPGRADE PROJECT SCOPE

EQUIPMENT TYPE	PROPOSED CHANGES
RADIO CABINET	• (1) EXISTING BTS CABINET ON EXISTING CONC. PAD TO REMAIN. • INSTALL (1) ERICSSON RBS 3518 CABINET AND RRU UNITS (TYP. OF 3) ON PROPOSED UNISTRUT FRAMES MOUNTED TO EXISTING EXTERIOR STAIRWELL WALL AS SHOWN HEREIN.
ANTENNAS/ TMAs	• EXISTING (3) EMS RR90-17-02DP PANEL ANTENNAS TO BE REMOVED. • (3) RFS APX16DWV-16DWV-S PANEL ANTENNAS ARE PROPOSED TO BE INSTALLED ON EXISTING STANDOFF MOUNTS ON EXISTING LATTICE TOWER. • (6) TWIN AWS/PCS TMAs ARE PROPOSED TO BE INSTALLED WITH THE PROPOSED ANTENNAS. • PROPOSED TMAs TO BE INSTALLED ON ANTENNA MOUNT PIPES BEHIND ANTENNAS.
COAX CABLES	• NO CHANGE IS PROPOSED FOR THE (6) EXISTING 7/8"ø COAX CABLES ROUTED ALONG EXISTING STAIRWELL WALL AND VERT. AT TOWER. • (6) ADDITIONAL 7/8"ø COAX CABLES ARE PROPOSED TO BE ROUTED ALONG EXISTING STAIRWELL WALL AND VERT. AT TOWER (SIMILAR TO EXISTING) TO BE COORDINATED WITH STRUCTURAL ANALYSIS.
COMPOUND LIMITS	• NO CHANGE TO THE LIMITS OF THE EXISTING FENCED COMPOUND IS PROPOSED.



NOTE:
EXISTING GENERATOR AND UTILITY BACKBOARD NOT SHOWN FOR CLARITY.

1 / L-3 **WEST ELEVATION**
SCALE: 3/16" = 1'-0"

64 0 32 64 128 256
(IN FEET)
3/16 inch = 1 ft.

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

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
00	10/7/10	DEB	CFC	FINAL LEASE EXHIBIT
A	10/4/10	DEB	CFC	LEASE EXHIBIT – CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

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

T-Mobile

T-MOBILE
CT11031B
21 EAST MAIN STREET
CLINTON, CT

DATE: 10/1/10
SCALE: AS SHOWN
JOB NO. 10118.C06

LEASE EXHIBIT

SHEET NO. L-3
Sheet No. 3 of 3

CENTEK

Centered on Solutions

Structural Analysis Report w/ Reinforcement Design

67.5-ft Existing Lattice Tower

Proposed T-Mobile Antenna Upgrade

T-Mobile Site Ref:
CT11031B

21 East Main Street
Clinton, CT

Centek Project No. 10116.CO6

Date: January 10, 2011

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

www.CentekEng.com

CENTEK
Structural Analysis – 67.5-ft Lattice Tower
T-Mobile Antenna Upgrade – CT11031B
Clinton, CT
January 10, 2011

Table of Contents

Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna upgrade proposed by T-Mobile on the existing lattice tower located in Clinton, Connecticut.

The host tower is a four sided 67.5-ft AGL steel lattice structure. At the time of preparing this report the tower manufacturer was unknown and is thought to be custom built. The approximate construction date of the tower was estimated circa 1970's, predicated on the size of tower steel angle members available at the time. The tower geometry and structure member sizes were obtained from a tower mapping report conducted by JWB Tower Services on behalf of Centek Engineering, dated December 01, 2010.

The existing tower is constructed of a fully welded continuous steel angle K-Brace left lattice frame work with subsequent horizontal steel angle reinforcements bolted to the face of the tower from 0-ft to 33'-7in AGL. The tower face width measured 2.5-ft and is consistent throughout its height. The tower is connected to the masonry wall of the host building via bolted steel angle bracket assemblies located at respective heights of 5-ft, 15-ft and 25-ft AGL.

Antenna and Appurtenance information were taken from the aforementioned tower mapping report, a T-Mobile RF data sheet and visual verification of the structure conducted from grade by Centek Engineering personnel on September 29, 2010.

T-Mobile proposes the removal of three (3) existing panel antennas and the installation of three (3) panel antennas, six (6) TMAs and six (6) additional transmission lines. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna configuration.

Antenna and Appurtenance Summary

The existing tower was designed to support several communication antennas. The existing and proposed loads considered in this analysis consist of the following:

- NONE (Existing):
  Antennas: One (1) 4in dia. x 5-ft long dia. vacant pipe mounted to the North face of the existing tower with an elevation of 65-ft 6in above grade level.
  Coax Cables: None
- T-MOBILE (Existing to Remain):
  Coax Cables: Six (6) 7/8" Ø coaxial cables running on the NE leg of the existing tower.
- **T-MOBILE (Existing to Remove):**
  Antennas: Three (3) RR90-17-02DP panel antennas mounted to the legs of the existing tower with a RAD center elevation of 60-ft above grade level.

- **T-MOBILE (Proposed):**
  <u>Antennas</u>: Three (3) RFS APX16DWV-16DWVS-E-A20 panel antennas, three (3) Twin PCS and three (3) Twin AWS TMA's mounted to the legs of the NE, SE and SW legs of the existing tower with a RAD center elevation of 60-ft above grade level.
  <u>Coax Cables</u>: Six (6) 7/8" Ø coax cables running on the NW leg of the existing tower with brackets to match existing.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents or reinforcement drawings.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- **All existing coax cables to be installed on the legs of the existing tower, as noted above.**

Tower Capacity

Tower stresses were calculated utilizing the structural analysis software RISA 3D. Allowable stresses were determined based on Table 5 of the TIA/EIA code with a 1/3 increase per Section 3.1.1.1 of the same code.

Calculated stresses were found to be within allowable limits. In Load Combination #7, per RISA 3D "Design Results", the tower was found to be at **94.4%** of its total capacity.

Tower Member	Elevation	Stress Ratio (percentage of capacity)	Result
Leg Member #115 (L2 1/2x2 1/2x1/4)	25.2'	94.4%	PASS

Foundation and Anchors

The existing foundation consists of a 3-ft square reinforced concrete pad with an assumed depth of 3ft-6in to meet the minimum frost depth requirements. The base of the tower is connected to the foundation by means of four (4) 5/8"∅, ASTM A36 (min steel grade assumed) anchor bolts with an unknown embedment depth into the concrete foundation.

Review of the foundation and anchor design consisted of verification of applied loads obtained from the tower design calculations and code checks of allowable stresses:

- The tower base reactions developed from the governing Load Combinations #7 were used in the verification of the foundation and its anchors:

Base Reactions	Vector	Proposed Load (kips)
Base	Resultant Shear	**9.71**
	Axial	**6.40**

- The foundation was found to be within allowable limits.

Foundation	Design Limit	Proposed Loading	Stress Ratio (percentage of capacity)	Result
Reinforced Concrete Pad	Bearing Pressure	1.24ksf	31.0%	**PASS**

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM ~ RISA-3D

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

Modeling Features:

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

Analysis Features:

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

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

Graphics Features:

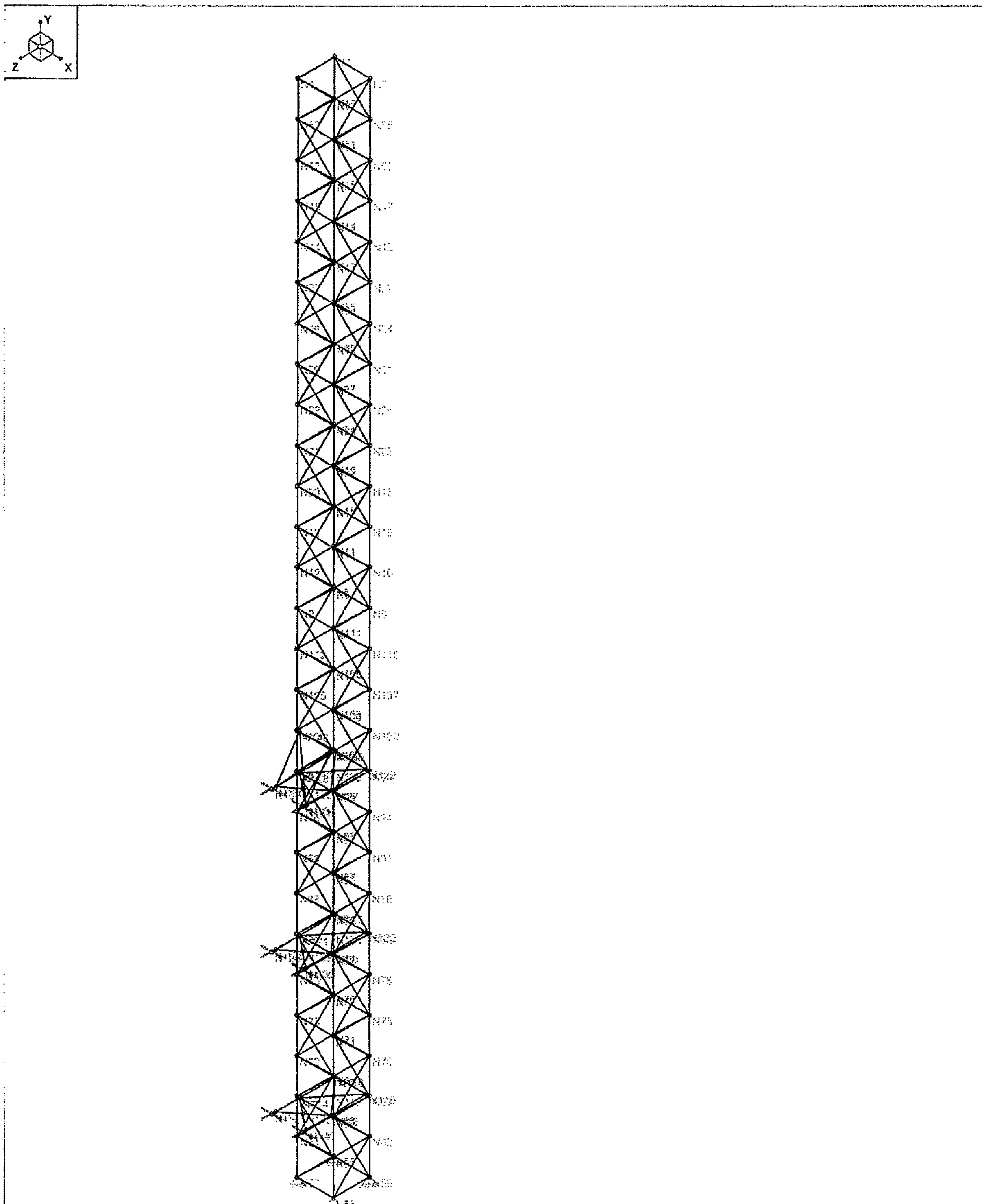
- Unlimited simultaneous model view windows
- Extraordinary "true to scale" rendering, even when drawing
- High-speed redraw algorithm for instant refreshing
- Dynamic scrolling stops right where you want
- Plot & print virtually everything with color coding & labeling
- Rotate, zoom, pan, scroll and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

Design Features:

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

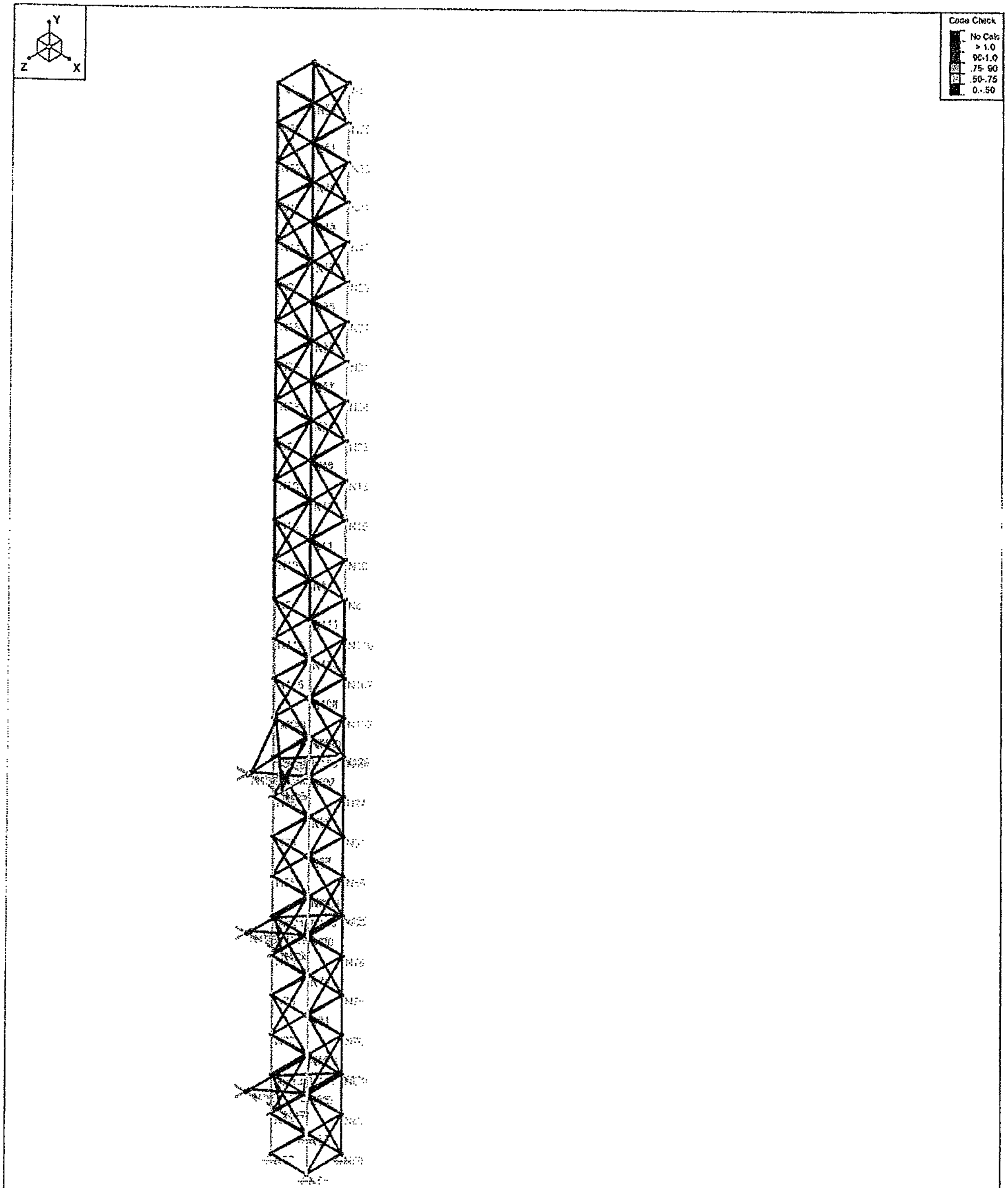
Results Features:

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



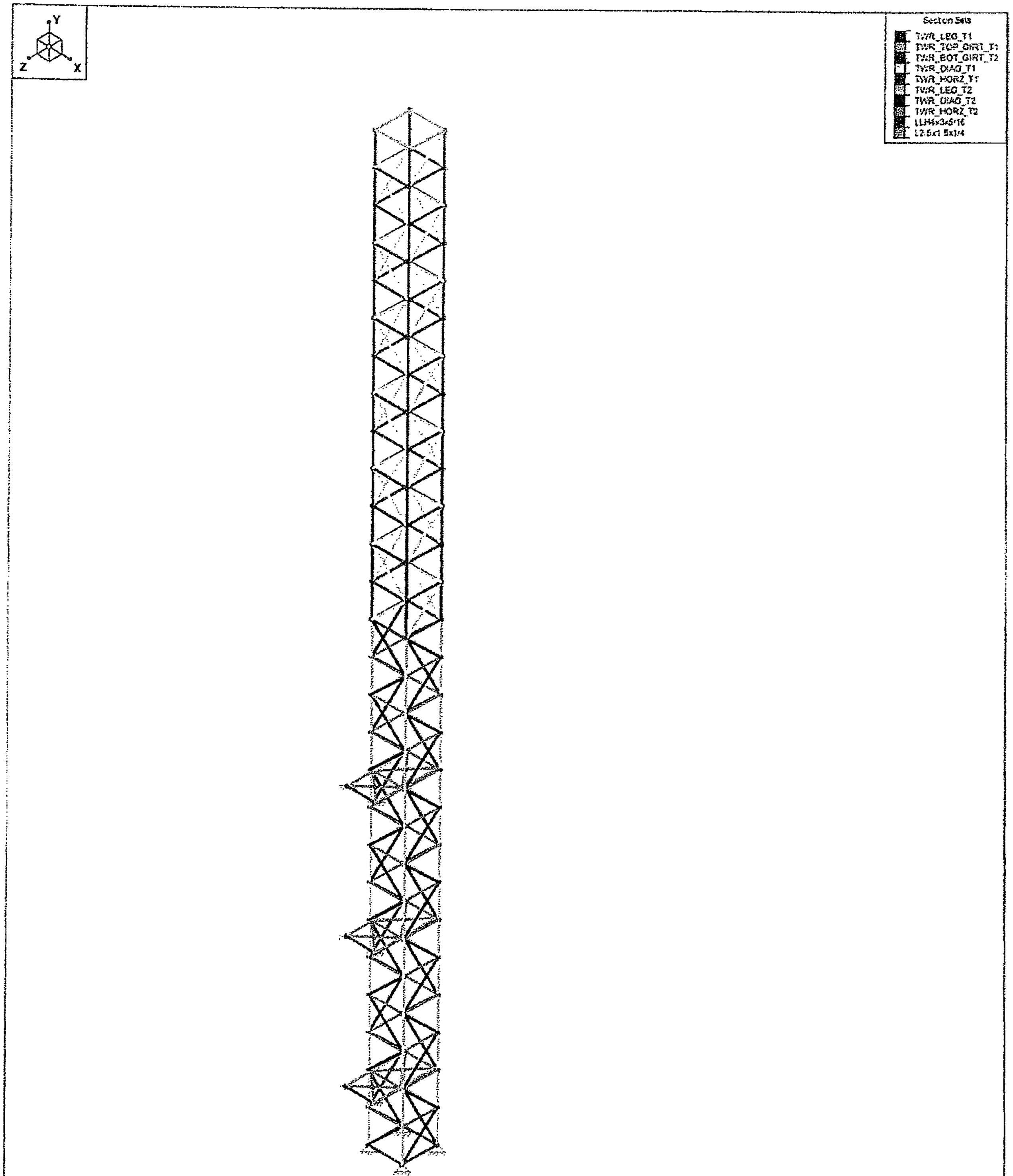
Results for LC 7, Dead+Wind 45 deg+Ice+Temp

CENTEK Engineering, Inc.		SK - 1
JRM	T- Mobile - 68ft Lattice Tower, Clinton, CT	Jan 9, 2011 at 2:52 PM
10116.CO6	Tower Geometry	68-ft Square_Lattice_Clinton_CT.rt3



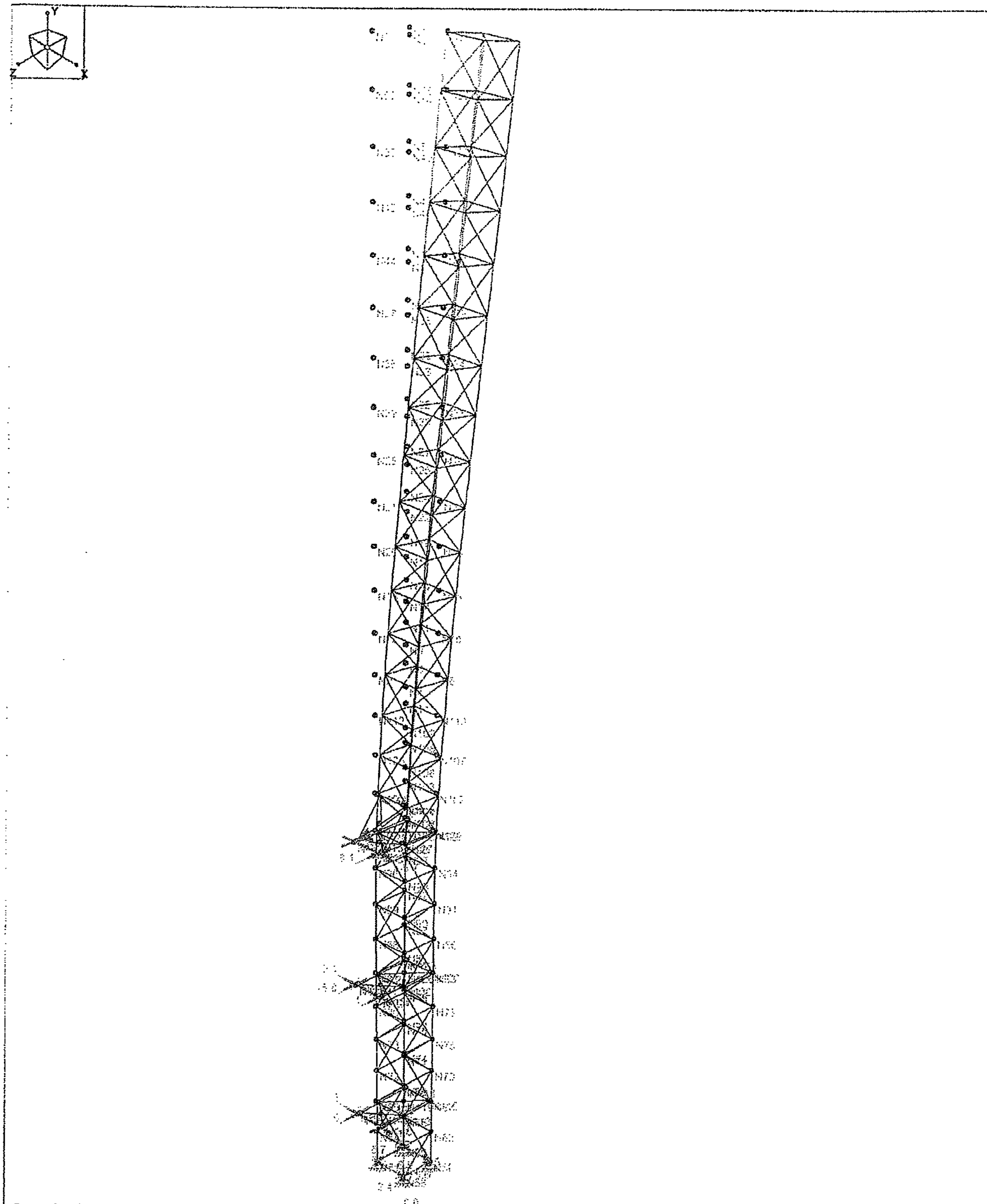
Solution: Envelope

CENTEK Engineering, Inc.		SK - 2
JRM	T- Mobile - 68ft Lattice Tower, Clinton, CT	Jan 9, 2011 at 12:37 PM
10116.CO6	Unity Bending Check	68-ft Square_Lattice_Clinton_CT.r3



Results for LC 8, Dead+Wind 90 deg+Ice+Temp

CENTEK Engineering, Inc.		SK - 6
Jrm	T- Mobile - 68ft Lattice Tower, Clinton, CT	Dec 29, 2010 at 10:12 AM
10116.CO6	Section Sets	68-ft Square_Lattice_Clinton_CT.r3



Results for LC 7, Dead+Wind 45 deg+Ice+Temp
Z-moment Reaction units are k and k-ft

CENTEK Engineering, Inc.		SK - 3
JRM	T- Mobile - 68ft Lattice Tower, Clinton, CT	Jan 9, 2011 at 1:03 PM
10116.CO6	LC #7 Reactions and Deflected Shape	68-ft Square_Lattice_Clinton_CT.r3

Global

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation	Yes
Include Warping	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Vertical Axis	Y

Hot Rolled Steel Code	AISC 9th: ASD
Cold Formed Steel Code	None
Wood Code	None
Wood Temperature	< 100F
Concrete Code	None
Masonry Code	ACI 530-05: ASD
Aluminum Code	AA ADM1-05: ASD

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	PCA Load Contour
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections	Yes
Bad Framing Warnings	No
Unused Force Warnings	Yes

Seismic Code	UBC 1997
Seismic Base Elevation (ft)	Not Entered
Ct X	.035
Ct Z	.035
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	8.5
R Z	8.5
Ct Exp. X	.75
Ct Exp. Z	.75
Ca	.36
Cv	.54
Nv	1
SD1	1
SDS	1
S1	1
Occupancy Code	4
Seismic Zone	3
Use Group	I
Use Gravity Self Wt in Diaphragm Mass	Yes
Use Deck Self Wt in Diaphragm Mass	Yes
Use Lateral Self Wt in Diaphragm Mass	Yes
Seismic Detailing Code	None
Om X	1
Om Z	1
Rho X	1
Rho Z	1

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E5 F)	Density[k/ft^3]	Yield[ksi]
1	A36	29000	11200	.295	.65	.49	36

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design R...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	TWR LEG T1	L2 1/2x2 1/2x1/4	Column	Single An...	A36	Typical	1.19	.703	.703	.025
2	TWR TOP GIRT T1	L1 1/2x1 1/2x1/4	Beam	Single An...	A36	Typical	.688	.139	.139	.014
3	TWR BOT GIRT T2	L1 1/2x1 1/2x1/4	Beam	Single An...	A36	Typical	.688	.139	.139	.014
4	TWR DIAG T1	L1 1/2x1 1/2x1/4	Column	Single An...	A36	Typical	.688	.139	.139	.014
5	TWR HORZ T1	L1 1/2x1 1/2x1/4	Beam	Single An...	A36	Typical	.688	.139	.139	.014
6	TWR LEG T2	L2 1/2x2 1/2x1/4	Column	Single An...	A36	Typical	1.19	.703	.703	.025
7	TWR DIAG T2	L1 1/2x1 1/2x1/4	Column	Single An...	A36	Typical	.688	.139	.139	.014
8	TWR HORZ T2	L1 1/2x1 1/2x1/4	Beam	Single An...	A36	Typical	.688	.139	.139	.014
9	LLH4x3x5/16	L4X3X5	Beam	Single An...	A36	Typical	2.09	1.65	3.38	.073
10	L2.5x1.5x1/4	L2.5X1.5x4	Beam	Single An...	A36	Typical	.938	.161	.591	.018

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M1	N2	N1		180	TWR_LEG_T1	Column	Single Angle	A36	Typical
2	M2	N4	N3		270	TWR_LEG_T1	Column	Single Angle	A36	Typical
3	M3	N6	N5			TWR_LEG_T1	Column	Single Angle	A36	Typical
4	M4	N8	N7		90	TWR_LEG_T1	Column	Single Angle	A36	Typical
5	M5	N1	N3		90	TWR_TOP_GI...	Beam	Single Angle	A36	Typical
6	M6	N3	N5		90	TWR_TOP_GI...	Beam	Single Angle	A36	Typical
7	M7	N5	N7		90	TWR_TOP_GI...	Beam	Single Angle	A36	Typical
8	M8	N7	N1		90	TWR_TOP_GI...	Beam	Single Angle	A36	Typical
9	M9	N2	N4		90	TWR_BOT_GI...	Beam	Single Angle	A36	Typical
10	M10	N4	N6		90	TWR_BOT_GI...	Beam	Single Angle	A36	Typical
11	M11	N6	N8		90	TWR_BOT_GI...	Beam	Single Angle	A36	Typical
12	M12	N8	N2		90	TWR_BOT_GI...	Beam	Single Angle	A36	Typical
13	M13	N2	N9		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
14	M14	N4	N10		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
15	M15	N6	N11		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
16	M16	N8	N12		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
17	M17	N12	N9		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
18	M18	N9	N10		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
19	M19	N10	N11		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
20	M20	N11	N12		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
21	M21	N9	N13		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
22	M22	N10	N14		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
23	M23	N11	N15		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
24	M24	N12	N16		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
25	M25	N13	N14		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
26	M26	N14	N15		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
27	M27	N15	N16		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
28	M28	N16	N13		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
29	M29	N13	N17		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
30	M30	N14	N18		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
31	M31	N15	N19		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
32	M32	N16	N20		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
33	M33	N20	N17		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
34	M34	N17	N18		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
35	M35	N18	N19		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
36	M36	N19	N20		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
37	M37	N17	N21		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
38	M38	N18	N22		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
39	M39	N19	N23		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
40	M40	N20	N24		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
41	M41	N21	N22		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
42	M42	N22	N23		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
43	M43	N23	N24		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
44	M44	N24	N21		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
45	M45	N21	N25		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
46	M46	N22	N26		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
47	M47	N23	N27		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
48	M48	N24	N28		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
49	M49	N28	N25		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
50	M50	N25	N26		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
51	M51	N26	N27		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
52	M52	N27	N28		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
53	M53	N25	N29		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
54	M54	N26	N30		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
55	M55	N27	N31		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
56	M56	N28	N32		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
57	M57	N29	N30		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
58	M58	N30	N31		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
59	M59	N31	N32		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
60	M60	N32	N29		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
61	M61	N29	N33		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
62	M62	N30	N34		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
63	M63	N31	N35		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
64	M64	N32	N36		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
65	M65	N36	N33		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
66	M66	N33	N34		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
67	M67	N34	N35		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
68	M68	N35	N36		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
69	M69	N33	N37		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
70	M70	N34	N38		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
71	M71	N35	N39		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
72	M72	N36	N40		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
73	M73	N37	N38		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
74	M74	N38	N39		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
75	M75	N39	N40		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
76	M76	N40	N37		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
77	M77	N37	N41		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
78	M78	N38	N42		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
79	M79	N39	N43		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
80	M80	N40	N44		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
81	M81	N44	N41		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
82	M82	N41	N42		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
83	M83	N42	N43		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
84	M84	N43	N44		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
85	M85	N41	N45		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
86	M86	N42	N46		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
87	M87	N43	N47		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
88	M88	N44	N48		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
89	M89	N45	N46		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
90	M90	N46	N47		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
91	M91	N47	N48		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
92	M92	N48	N45		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
93	M93	N45	N49		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
94	M94	N46	N50		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
95	M95	N47	N51		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
96	M96	N48	N52		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
97	M97	N52	N49		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
98	M98	N49	N50		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
99	M99	N50	N51		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
100	M100	N51	N52		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
101	M101	N49	N53		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
102	M102	N50	N54		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
103	M103	N51	N55		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
104	M104	N52	N56		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
105	M105	N53	N54		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
106	M106	N54	N55		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
107	M107	N55	N56		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
108	M108	N56	N53		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
109	M109	N53	N3		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
110	M110	N54	N5		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
111	M111	N55	N7		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
112	M112	N56	N1		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
113	M113	N57	N2		180	TWR_LEG_T2	Column	Single Angle	A36	Typical
114	M114	N58	N4		270	TWR_LEG_T2	Column	Single Angle	A36	Typical
115	M115	N59	N6			TWR_LEG_T2	Column	Single Angle	A36	Typical
116	M116	N60	N8		90	TWR_LEG_T2	Column	Single Angle	A36	Typical
117	M117	N57	N58		90	TWR_BOT_GI...	Beam	Single Angle	A36	Typical
118	M118	N58	N59		90	TWR_BOT_GI...	Beam	Single Angle	A36	Typical
119	M119	N59	N60		90	TWR_BOT_GI...	Beam	Single Angle	A36	Typical
120	M120	N60	N57		90	TWR_BOT_GI...	Beam	Single Angle	A36	Typical
121	M121	N57	N61		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
122	M122	N58	N62		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
123	M123	N59	N63		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
124	M124	N60	N64		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
125	M125	N64	N61		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
126	M126	N61	N62		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
127	M127	N62	N63		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
128	M128	N63	N64		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
129	M129	N61	N65		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
130	M130	N62	N66		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
131	M131	N63	N67		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
132	M132	N64	N68		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
133	M133	N65	N66		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
134	M134	N66	N67		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
135	M135	N67	N68		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
136	M136	N68	N65		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
137	M137	N65	N69		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
138	M138	N66	N70		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
139	M139	N67	N71		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
140	M140	N68	N72		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
141	M141	N72	N69		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
142	M142	N69	N70		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
143	M143	N70	N71		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
144	M144	N71	N72		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
145	M145	N69	N73		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
146	M146	N70	N74		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
147	M147	N71	N75		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
148	M148	N72	N76		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
149	M149	N73	N74		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
150	M150	N74	N75		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
151	M151	N75	N76		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
152	M152	N76	N73		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
153	M153	N73	N77		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
154	M154	N74	N78		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
155	M155	N75	N79		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
156	M156	N76	N80		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
157	M157	N80	N77		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
158	M158	N77	N78		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
159	M159	N78	N79		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
160	M160	N79	N80		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
161	M161	N77	N81		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
162	M162	N78	N82		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
163	M163	N79	N83		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
164	M164	N80	N84		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
165	M165	N81	N82		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
166	M166	N82	N83		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
167	M167	N83	N84		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
168	M168	N84	N81		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
169	M169	N81	N85		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
170	M170	N82	N86		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
171	M171	N83	N87		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
172	M172	N84	N88		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
173	M173	N88	N85		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
174	M174	N85	N86		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
175	M175	N86	N87		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
176	M176	N87	N88		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
177	M177	N85	N89		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
178	M178	N86	N90		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
179	M179	N87	N91		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
180	M180	N88	N92		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
181	M181	N89	N90		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
182	M182	N90	N91		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
183	M183	N91	N92		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
184	M184	N92	N89		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
185	M185	N89	N93		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
186	M186	N90	N94		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
187	M187	N91	N95		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
188	M188	N92	N96		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
189	M189	N96	N93		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
190	M190	N93	N94		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
191	M191	N94	N95		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
192	M192	N95	N96		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
193	M193	N93	N97		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
194	M194	N94	N98		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
195	M195	N95	N99		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
196	M196	N96	N100		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
197	M197	N97	N98		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
198	M198	N98	N99		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
199	M199	N99	N100		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
200	M200	N100	N97		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
201	M201	N97	N101		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
202	M202	N98	N102		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
203	M203	N99	N103		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
204	M204	N100	N104		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
205	M205	N104	N101		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
206	M206	N101	N102		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
207	M207	N102	N103		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
208	M208	N103	N104		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
209	M209	N101	N105		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
210	M210	N102	N106		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
211	M211	N103	N107		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
212	M212	N104	N108		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
213	M213	N105	N106		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
214	M214	N106	N107		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
215	M215	N107	N108		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
216	M216	N108	N105		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
217	M217	N105	N109		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
218	M218	N106	N110		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
219	M219	N107	N111		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
220	M220	N108	N112		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
221	M221	N112	N109		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
222	M222	N109	N110		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
223	M223	N110	N111		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
224	M224	N111	N112		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
225	M225	N109	N2		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
226	M226	N110	N4		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
227	M227	N111	N6		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
228	M228	N112	N8		90	TWR_DIAG_T2	Column	Single Angle	A36	Typical
229	M229	N116	N118		270	L2.5x1.5x1/4	Beam	Single Angle	A36	Typical
230	M230	N117	N115		270	L2.5x1.5x1/4	Beam	Single Angle	A36	Typical
231	M231	N115	N114		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
232	M232	N113	N116			TWR_HORZ_...	Beam	Single Angle	A36	Typical
233	M233	N140	N114			TWR_HORZ_...	Beam	Single Angle	A36	Typical
234	M234	N141	N113			TWR_HORZ_...	Beam	Single Angle	A36	Typical
235	M235	N118	N117		270	LLH4x3x5/16	Beam	Single Angle	A36	Typical
236	M236	N123	N125		270	L2.5x1.5x1/4	Beam	Single Angle	A36	Typical
237	M237	N124	N122		270	L2.5x1.5x1/4	Beam	Single Angle	A36	Typical
238	M238	N122	N121		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
239	M239	N120	N123			TWR_HORZ_...	Beam	Single Angle	A36	Typical
240	M240	N137	N121			TWR_HORZ_...	Beam	Single Angle	A36	Typical
241	M241	N138	N120			TWR_HORZ_...	Beam	Single Angle	A36	Typical
242	M242	N125	N124		270	LLH4x3x5/16	Beam	Single Angle	A36	Typical
243	M243	N130	N132		270	L2.5x1.5x1/4	Beam	Single Angle	A36	Typical
244	M244	N131	N129		270	L2.5x1.5x1/4	Beam	Single Angle	A36	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
245	M245	N129	N128		90	TWR_HORZ_...	Beam	Single Angle	A36	Typical
246	M246	N127	N130			TWR_HORZ_...	Beam	Single Angle	A36	Typical
247	M247	N134	N128			TWR_HORZ_...	Beam	Single Angle	A36	Typical
248	M248	N135	N127			TWR_HORZ_...	Beam	Single Angle	A36	Typical
249	M249	N135	N134		270	LLH4x3x5/16	Beam	Single Angle	A36	Typical
250	M250	N135	N143		90	TWR_DIAG_T1	Column	Single Angle	A36	Typical
251	M251	N134	N144		180	TWR_DIAG_T1	Column	Single Angle	A36	Typical
252	M252	N144	N145		45	TWR_DIAG_T1	Column	Single Angle	A36	Typical
253	M253	N143	N134		135	TWR_DIAG_T1	Column	Single Angle	A36	Typical
254	M254	N145	N135		45	TWR_DIAG_T1	Column	Single Angle	A36	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	-1.3125	67.5	1.3125	0	
2	N2	-1.3125	35	1.3125	0	
3	N3	1.3125	67.5	1.3125	0	
4	N4	1.3125	35	1.3125	0	
5	N5	1.3125	67.5	-1.3125	0	
6	N6	1.3125	35	-1.3125	0	
7	N7	-1.3125	67.5	-1.3125	0	
8	N8	-1.3125	35	-1.3125	0	
9	N9	1.3125	37.5	1.3125	0	
10	N10	1.3125	37.5	-1.3125	0	
11	N11	-1.3125	37.5	-1.3125	0	
12	N12	-1.3125	37.5	1.3125	0	
13	N13	-1.3125	40	1.3125	0	
14	N14	1.3125	40	1.3125	0	
15	N15	1.3125	40	-1.3125	0	
16	N16	-1.3125	40	-1.3125	0	
17	N17	1.3125	42.5	1.3125	0	
18	N18	1.3125	42.5	-1.3125	0	
19	N19	-1.3125	42.5	-1.3125	0	
20	N20	-1.3125	42.5	1.3125	0	
21	N21	-1.3125	45	1.3125	0	
22	N22	1.3125	45	1.3125	0	
23	N23	1.3125	45	-1.3125	0	
24	N24	-1.3125	45	-1.3125	0	
25	N25	1.3125	47.5	1.3125	0	
26	N26	1.3125	47.5	-1.3125	0	
27	N27	-1.3125	47.5	-1.3125	0	
28	N28	-1.3125	47.5	1.3125	0	
29	N29	-1.3125	50	1.3125	0	
30	N30	1.3125	50	1.3125	0	
31	N31	1.3125	50	-1.3125	0	
32	N32	-1.3125	50	-1.3125	0	
33	N33	1.3125	52.5	1.3125	0	
34	N34	1.3125	52.5	-1.3125	0	
35	N35	-1.3125	52.5	-1.3125	0	
36	N36	-1.3125	52.5	1.3125	0	
37	N37	-1.3125	55	1.3125	0	
38	N38	1.3125	55	1.3125	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
39	N39	1.3125	55	-1.3125	0	
40	N40	-1.3125	55	-1.3125	0	
41	N41	1.3125	57.5	1.3125	0	
42	N42	1.3125	57.5	-1.3125	0	
43	N43	-1.3125	57.5	-1.3125	0	
44	N44	-1.3125	57.5	1.3125	0	
45	N45	-1.3125	60	1.3125	0	
46	N46	1.3125	60	1.3125	0	
47	N47	1.3125	60	-1.3125	0	
48	N48	-1.3125	60	-1.3125	0	
49	N49	1.3125	62.5	1.3125	0	
50	N50	1.3125	62.5	-1.3125	0	
51	N51	-1.3125	62.5	-1.3125	0	
52	N52	-1.3125	62.5	1.3125	0	
53	N53	-1.3125	65	1.3125	0	
54	N54	1.3125	65	1.3125	0	
55	N55	1.3125	65	-1.3125	0	
56	N56	-1.3125	65	-1.3125	0	
57	N57	-1.3125	0	1.3125	0	
58	N58	1.3125	0	1.3125	0	
59	N59	1.3125	0	-1.3125	0	
60	N60	-1.3125	0	-1.3125	0	
61	N61	1.3125	2.5	1.3125	0	
62	N62	1.3125	2.5	-1.3125	0	
63	N63	-1.3125	2.5	-1.3125	0	
64	N64	-1.3125	2.5	1.3125	0	
65	N65	-1.3125	5	1.3125	0	
66	N66	1.3125	5	1.3125	0	
67	N67	1.3125	5	-1.3125	0	
68	N68	-1.3125	5	-1.3125	0	
69	N69	1.3125	7.5	1.3125	0	
70	N70	1.3125	7.5	-1.3125	0	
71	N71	-1.3125	7.5	-1.3125	0	
72	N72	-1.3125	7.5	1.3125	0	
73	N73	-1.3125	10	1.3125	0	
74	N74	1.3125	10	1.3125	0	
75	N75	1.3125	10	-1.3125	0	
76	N76	-1.3125	10	-1.3125	0	
77	N77	1.3125	12.5	1.3125	0	
78	N78	1.3125	12.5	-1.3125	0	
79	N79	-1.3125	12.5	-1.3125	0	
80	N80	-1.3125	12.5	1.3125	0	
81	N81	-1.3125	15	1.3125	0	
82	N82	1.3125	15	1.3125	0	
83	N83	1.3125	15	-1.3125	0	
84	N84	-1.3125	15	-1.3125	0	
85	N85	1.3125	17.5	1.3125	0	
86	N86	1.3125	17.5	-1.3125	0	
87	N87	-1.3125	17.5	-1.3125	0	
88	N88	-1.3125	17.5	1.3125	0	
89	N89	-1.3125	20	1.3125	0	
90	N90	1.3125	20	1.3125	0	
91	N91	1.3125	20	-1.3125	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
92	N92	-1.3125	20	-1.3125	0	
93	N93	1.3125	22.5	1.3125	0	
94	N94	1.3125	22.5	-1.3125	0	
95	N95	-1.3125	22.5	-1.3125	0	
96	N96	-1.3125	22.5	1.3125	0	
97	N97	-1.3125	25	1.3125	0	
98	N98	1.3125	25	1.3125	0	
99	N99	1.3125	25	-1.3125	0	
100	N100	-1.3125	25	-1.3125	0	
101	N101	1.3125	27.5	1.3125	0	
102	N102	1.3125	27.5	-1.3125	0	
103	N103	-1.3125	27.5	-1.3125	0	
104	N104	-1.3125	27.5	1.3125	0	
105	N105	-1.3125	30	1.3125	0	
106	N106	1.3125	30	1.3125	0	
107	N107	1.3125	30	-1.3125	0	
108	N108	-1.3125	30	-1.3125	0	
109	N109	1.3125	32.5	1.3125	0	
110	N110	1.3125	32.5	-1.3125	0	
111	N111	-1.3125	32.5	-1.3125	0	
112	N112	-1.3125	32.5	1.3125	0	
113	N113	1.1025	5	1.3125	0	
114	N114	-1.1025	5	1.3125	0	
115	N115	1.1025	5	-1.3125	0	
116	N116	-1.1025	5	-1.3125	0	
117	N117	1.103	5	3.313	0	
118	N118	-1.103	5	3.313	0	
119	N119	0	5	0	0	
120	N120	1.1025	15	1.3125	0	
121	N121	-1.1025	15	1.3125	0	
122	N122	1.1025	15	-1.3125	0	
123	N123	-1.1025	15	-1.3125	0	
124	N124	1.103	15	3.313	0	
125	N125	-1.103	15	3.313	0	
126	N126	0	15	0	0	
127	N127	1.103	25	1.313095	0	
128	N128	-1.1025	25	1.3125	0	
129	N129	1.103	25	-1.3125	0	
130	N130	-1.1025	25	-1.3125	0	
131	N131	1.103	25	3.313	0	
132	N132	-1.103	25	3.313	0	
133	N133	0	25	0	0	
134	N134	1.103	25	3.063	0	
135	N135	-1.1025	25	3.062603	0	
136	N136	-0.00025	25	2.18775	0	
137	N137	1.1025	15	3.062603	0	
138	N138	-1.1025	15	3.062603	0	
139	N139	-0.00025	15	2.18775	0	
140	N140	1.1025	5	3.0625	0	
141	N141	-1.1025	5	3.0625	0	
142	N142	0	5	2.1875	0	
143	N143	-1.1025	27.5	1.3125	0	
144	N144	1.1025	27.5	1.3125	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
145	N145	0	26.25	2.187552	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	N57	Reaction	Reaction	Reaction				
2	N58	Reaction	Reaction	Reaction				
3	N59	Reaction	Reaction	Reaction				
4	N60	Reaction	Reaction	Reaction				
5	N132	Reaction		Reaction				
6	N131	Reaction		Reaction				
7	N125	Reaction		Reaction				
8	N124	Reaction		Reaction				
9	N118	Reaction		Reaction				
10	N117	Reaction		Reaction				
11	N61							
12	N134							
13	N135							
14	N137							
15	N138							
16	N140							
17	N141							

Basic Load Cases

	BLC Description	Category	X Gr...	Y Gr...	Z Gr...	Joint	Point	Distrib...	Area...	Surf...
1	Dead	None		-1		146	38	8		
2	No Ice Wind 0 deg	None				146	76	8		
3	No Ice Wind 45 deg	None				292	80	32		
4	No Ice Wind 90 deg	None				146	80	24		
5	Ice	None				146	38	236		
6	Temperature Drop	None						228		
7	Ice Wind 0 deg	None				146	76	8		
8	Ice Wind 45 deg	None				292	80	32		
9	Ice Wind 90 deg	None				146	80	24		
10	Service Wind 0 deg	None				146	76	8		
11	Service Wind 45 deg	None				292	80	32		
12	Service Wind 90 deg	None				146	80	24		

Load Combinations

	Description	Solve	P...	S...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...
1	Dead Only	Yes	Y		1	1	13	1	14	1	0		0		0		0		0	
2	Dead+Wind 0 deg - No Ice	Yes	Y		1	1	2	1	13	1	14	1	0		0		0		0	
3	Dead+Wind 45 deg - No Ice	Yes	Y		1	1	3	1	13	1	14	1	0		0		0		0	
4	Dead+Wind 90 deg - No Ice	Yes	Y		1	1	4	1	13	1	14	1	0		0		0		0	
5	Dead+Ice+Temp	Yes	Y		1	1	5	1	6	1	13	1	14	1	0		0		0	
6	Dead+Wind 0 deg+Ice+Temp	Yes	Y		1	1	7	1	5	1	6	1	13	1	14	1	0		0	
7	Dead+Wind 45 deg+Ice+Temp	Yes	Y		1	1	8	1	5	1	6	1	13	1	14	1	0		0	
8	Dead+Wind 90 deg+Ice+Temp	Yes	Y		1	1	9	1	5	1	6	1	13	1	14	1	0		0	
9	Dead+Wind 0 deg - Service	Yes	Y		1	1	10	1	13	1	14	1	0		0		0		0	

Load Combinations (Continued)

	Description	Solve	P...	S...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...
10	Dead+Wind 45 deg - Service	Yes	Y		1	1	11	1	13	1	14	1	0		0		0		0	
11	Dead+Wind 90 deg - Service	Yes	Y		1	1	12	1	13	1	14	1	0		0		0		0	

Load Combination Design

	Description	ASIF	CD	ABIF	Serv...	Hot Ro...	Cold F...	Wood	Concr...	Masonry	Footings	Alumin...
1	Dead Only					Yes				Yes		Yes
2	Dead+Wind 0 deg - No Ice	1.333				Yes				Yes		Yes
3	Dead+Wind 45 deg - No Ice	1.333				Yes				Yes		Yes
4	Dead+Wind 90 deg - No Ice	1.333				Yes				Yes		Yes
5	Dead+Ice+Temp					Yes				Yes		Yes
6	Dead+Wind 0 deg+Ice+Temp	1.333				Yes				Yes		Yes
7	Dead+Wind 45 deg+Ice+Temp	1.333				Yes				Yes		Yes
8	Dead+Wind 90 deg+Ice+Temp	1.333				Yes				Yes		Yes
9	Dead+Wind 0 deg - Service	1.333				Yes				Yes		Yes
10	Dead+Wind 45 deg - Service	1.333				Yes				Yes		Yes
11	Dead+Wind 90 deg - Service	1.333				Yes				Yes		Yes

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N57	max	.249	4	2.506	8	6.523	6	0	1	0	1	0	1
2		min	-6.867	6	.899	1	-.007	4	0	1	0	1	0	1
3	N58	max	6.494	5	1.826	6	6.987	7	0	1	0	1	0	1
4		min	-.028	4	-.221	4	-.009	1	0	1	0	1	0	1
5	N59	max	7.211	8	1.671	5	.032	2	0	1	0	1	0	1
6		min	-.02	2	-.341	4	-6.498	8	0	1	0	1	0	1
7	N60	max	.005	1	2.843	8	.135	2	0	1	0	1	0	1
8		min	-6.521	8	.657	2	-6.863	8	0	1	0	1	0	1
9	N132	max	.517	5	0	1	19.82	7	0	1	0	1	0	1
10		min	-6.334	4	0	1	.018	1	0	1	0	1	0	1
11	N131	max	.653	2	0	1	8.126	6	0	1	0	1	0	1
12		min	-7.733	8	0	1	-18.645	8	0	1	0	1	0	1
13	N125	max	2.314	8	0	1	.061	5	0	1	0	1	0	1
14		min	.012	1	0	1	-5.756	3	0	1	0	1	0	1
15	N124	max	2.26	4	0	1	4.07	4	0	1	0	1	0	1
16		min	-.813	6	0	1	-4.079	6	0	1	0	1	0	1
17	N118	max	.902	8	0	1	.409	5	0	1	0	1	0	1
18		min	0	2	0	1	-1.327	4	0	1	0	1	0	1
19	N117	max	.511	4	0	1	1.355	4	0	1	0	1	0	1
20		min	-.37	6	0	1	-.552	6	0	1	0	1	0	1
21	Totals:	max	.094	2	6.404	5	8.005	6						
22		min	-8.005	8	3.573	4	-.094	4						

Envelope AISC ASD Steel Code Checks

	Me...	Shape	Code Check	Loc[ft]	LC	Shear Ch...	Loc[ft]	...	LC	Fa ...	Ft [...	Fb ...	Fb ...	...	...	...	AS...
1	M115	L2 1/2x...	.944	25.156	7	.029	25.156	z	3	26...	28...	- C..					H1-1
2	M113	L2 1/2x...	.831	27.344	3	.035	26.979	y	6	26...	28...	- C..					H2-1
3	M243	L2.5X1...	.733	4.385	7	.614	4.385	y	4	28...	28...	- C..					H2-1
4	M114	L2 1/2x...	.726	22.604	8	.034	25.156	y	7	26...	28...	- C..					H1-1

Envelope AISC ASD Steel Code Checks (Continued)

	Me...	Shape	Code Check	Loc[ft]	LC	Shear Ch...	Loc[ft]	...	LC	Fa ...	Ft [...	Fb ...	Fb ...	...	AS...
5	M244	L2.5X1...	.704	0	8	.790	0	y	8	28...	28...	- C..			H1-1
6	M247	L1 1/2x...	.681	0	8	.083	.176	z	8	23...	28...	- C..			H1-1
7	M197	L1 1/2x...	.662	0	8	1.106	2.434	y	6	15...	28...	- C..			H1-1
8	M3	L2 1/2x...	.658	0	7	.012	0	z	7	23...	28...	- C..			H1-1
9	M116	L2 1/2x...	.631	25.156	6	.026	24.792	z	8	26...	28...	- C..			H1-1
10	M1	L2 1/2x...	.497	2.37	3	.011	0	z	3	23...	28...	- C..			H2-1
11	M185	L1 1/2x...	.495	0	8	.004	0	z	8	21...	28...	- C..			H1-1
12	M2	L2 1/2x...	.476	0	8	.009	2.37	y	8	23...	28...	- C..			H1-1
13	M186	L1 1/2x...	.473	0	6	.004	0	z	7	21...	28...	- C..			H1-1
14	M196	L1 1/2x...	.473	0	6	.014	3.625	z	8	21...	28...	- C..			H1-1
15	M169	L1 1/2x...	.463	0	8	.008	0	z	8	21...	28...	- C..			H1-1
16	M180	L1 1/2x...	.461	0	6	.004	3.625	z	8	21...	28...	- C..			H1-1
17	M248	L1 1/2x...	.450	0	4	.043	.88	z	4	23...	28...	- C..			H2-1
18	M15	L1 1/2x...	.440	0	8	.004	0	z	6	8.97	28...	- C..			H1-1
19	M170	L1 1/2x...	.440	0	6	.009	.264	y	3	21...	28...	- C..			H1-1
20	M117	L1 1/2x...	.436	0	5	.003	0	z	5	11...	21.6	- C..			H2-1
21	M118	L1 1/2x...	.436	0	5	.003	0	z	5	11...	21.6	- C..			H2-1
22	M119	L1 1/2x...	.436	0	5	.003	0	z	5	11...	21.6	- C..			H2-1
23	M120	L1 1/2x...	.436	0	5	.003	0	z	5	11...	21.6	- C..			H2-1
24	M4	L2 1/2x...	.432	0	6	.010	2.031	z	6	23...	28...	- C..			H1-1
25	M246	L1 1/2x...	.419	0	8	.028	0	z	6	21...	28...	- C..			H1-1
26	M16	L1 1/2x...	.398	0	6	.004	3.625	z	8	8.97	28...	- C..			H1-1
27	M22	L1 1/2x...	.385	0	6	.004	0	z	8	8.97	28...	- C..			H1-1
28	M31	L1 1/2x...	.385	0	8	.003	0	z	6	8.97	28...	- C..			H1-1
29	M193	L1 1/2x...	.363	3.625	8	.011	.038	y	6	21...	28...	- C..			H2-1
30	M177	L1 1/2x...	.355	3.625	8	.003	3.625	z	3	21...	28...	- C..			H2-1
31	M194	L1 1/2x...	.350	3.625	6	.019	1.473	y	6	21...	28...	- C..			H2-1
32	M188	L1 1/2x...	.346	3.625	6	.004	3.625	z	7	21...	28...	- C..			H2-1
33	M21	L1 1/2x...	.343	0	8	.003	3.625	z	6	8.97	28...	- C..			H1-1
34	M32	L1 1/2x...	.342	0	6	.003	3.625	z	8	8.97	28...	- C..			H1-1
35	M178	L1 1/2x...	.340	3.625	6	.003	3.625	z	6	21...	28...	- C..			H2-1
36	M38	L1 1/2x...	.333	0	6	.003	0	z	7	8.97	28...	- C..			H1-1
37	M172	L1 1/2x...	.322	3.625	6	.012	0	y	6	21...	28...	- C..			H2-1
38	M47	L1 1/2x...	.321	0	8	.003	0	z	6	8.97	28...	- C..			H1-1
39	M37	L1 1/2x...	.291	0	8	.003	3.625	z	6	8.97	28...	- C..			H1-1
40	M195	L1 1/2x...	.288	0	8	.008	0	z	5	21...	28...	- C..			H1-1
41	M48	L1 1/2x...	.286	0	6	.002	3.625	z	8	8.97	28...	- C..			H1-1
42	M179	L1 1/2x...	.276	0	8	.004	0	z	7	21...	28...	- C..			H1-1
43	M54	L1 1/2x...	.273	0	6	.002	0	z	7	8.97	28...	- C..			H1-1
44	M199	L1 1/2x...	.269	0	8	.670	2.434	y	2	15...	28...	- C..			H2-1
45	M63	L1 1/2x...	.263	0	8	.002	0	z	6	8.97	28...	- C..			H1-1
46	M53	L1 1/2x...	.240	0	4	.002	3.625	z	6	8.97	28...	- C..			H1-1
47	M64	L1 1/2x...	.231	0	2	.002	3.625	z	8	8.97	28...	- C..			H1-1
48	M200	L1 1/2x...	.223	0	6	.020	.027	y	2	15...	28...	- C..			H2-1
49	M70	L1 1/2x...	.223	0	2	.002	0	z	7	8.97	28...	- C..			H1-1
50	M203	L1 1/2x...	.219	0	8	.007	0	z	5	21...	28...	- C..			H1-1
51	M236	L2.5X1...	.218	4.385	3	.236	4.626	y	8	28...	28...	- C..			H1-1
52	M241	L1 1/2x...	.214	0	8	.047	0	z	8	23...	28...	- C..			H1-1
53	M187	L1 1/2x...	.212	3.625	8	.004	0	z	6	21...	28...	- C..			H2-1
54	M210	L1 1/2x...	.212	0	6	.005	0	z	8	21...	28...	- C..			H1-1
55	M245	L1 1/2x...	.209	0	4	.022	1.714	y	6	21...	28...	- C..			H2-1
56	M219	L1 1/2x...	.208	0	8	.005	0	z	6	21...	28...	- C..			H1-1
57	M198	L1 1/2x...	.206	0	2	.020	.109	y	6	15...	28...	- C..			H1-1

Envelope AISC ASD Steel Code Checks (Continued)

	Me...	Shape	Code Check	Loc[ft]	LC	Shear Ch...	Loc[ft]	...	LC	Fa ...	Ft [...	Fb ...	Fb	...	AS...
58	M79	L1 1/2x...	.203	0	4	.001	0	z	7	8.97	28...	- C..			H1-1
59	M171	L1 1/2x...	.193	3.625	8	.009	.34	y	6	21...	28...	- C..			H2-1
60	M69	L1 1/2x...	.192	0	4	.001	3.625	z	6	8.97	28...	- C..			H1-1
61	M220	L1 1/2x...	.191	0	6	.005	3.625	z	8	21...	28...	- C..			H1-1
62	M209	L1 1/2x...	.191	0	8	.004	3.625	z	2	21...	28...	- C..			H1-1
63	M226	L1 1/2x...	.185	0	6	.005	0	z	8	21...	28...	- C..			H1-1
64	M232	L1 1/2x...	.184	1.714	5	.021	1.75	z	5	16...	21.6	- C..			H1-1
65	M80	L1 1/2x...	.178	0	2	.001	3.625	z	8	8.97	28...	- C..			H1-1
66	M240	L1 1/2x...	.175	0	4	.057	0	z	4	23...	28...	- C..			H2-1
67	M165	L1 1/2x...	.174	0	4	.444	2.434	y	2	15...	28...	- C..			H2-1
68	M239	L1 1/2x...	.174	1.714	5	.028	1.714	z	6	16...	21.6	- C..			H1-1
69	M238	L1 1/2x...	.173	0	5	.025	1.714	y	5	16...	21.6	- C..			H1-1
70	M168	L1 1/2x...	.173	0	2	.013	.273	y	6	15...	28...	- C..			H1-1
71	M202	L1 1/2x...	.172	3.625	6	.018	0	y	6	21...	28...	- C..			H2-1
72	M237	L2.5X1....	.171	.289	2	.227	.241	y	4	22...	28...	- C..			H1-1
73	M225	L1 1/2x...	.168	0	8	.004	3.625	z	6	21...	28...	- C..			H1-1
74	M86	L1 1/2x...	.165	0	2	.001	0	z	7	8.97	28...	- C..			H1-1
75	M163	L1 1/2x...	.164	0	8	.009	.038	y	6	21...	28...	- C..			H1-1
76	M211	L1 1/2x...	.161	3.625	8	.006	0	z	6	21...	28...	- C..			H2-1
77	M204	L1 1/2x...	.159	0	6	.013	3.625	z	8	21...	28...	- C..			H1-1
78	M231	L1 1/2x...	.158	0	5	.026	1.714	y	5	16...	21.6	- C..			H1-1
79	M212	L1 1/2x...	.149	3.625	6	.006	3.625	z	8	21...	28...	- C..			H2-1
80	M227	L1 1/2x...	.144	3.625	8	.005	0	z	6	21...	28...	- C..			H2-1
81	M201	L1 1/2x...	.144	3.625	7	.010	0	y	7	21...	28...	- C..			H2-1
82	M218	L1 1/2x...	.142	3.625	6	.005	0	z	8	21...	28...	- C..			H2-1
83	M85	L1 1/2x...	.142	0	4	.001	0	z	5	8.97	28...	- C..			H1-1
84	M147	L1 1/2x...	.138	0	8	.002	0	z	8	21...	28...	- C..			H1-1
85	M217	L1 1/2x...	.130	3.625	8	.005	3.625	z	6	21...	28...	- C..			H2-1
86	M228	L1 1/2x...	.130	3.625	6	.004	3.625	z	8	21...	28...	- C..			H2-1
87	M166	L1 1/2x...	.128	0	7	.012	.355	y	6	15...	28...	- C..			H2-1
88	M153	L1 1/2x...	.128	0	4	.002	3.625	z	5	21...	28...	- C..			H1-1
89	M23	L1 1/2x...	.127	3.625	8	.004	0	z	6	8.97	28...	- C..			H2-1
90	M14	L1 1/2x...	.127	3.625	6	.004	0	z	8	8.97	28...	- C..			H2-1
91	M133	L1 1/2x...	.120	.219	5	.436	0	y	5	11...	21.6	- C..			H2-1
92	M13	L1 1/2x...	.113	3.625	8	.004	3.625	z	6	8.97	28...	- C..			H2-1
93	M24	L1 1/2x...	.113	3.625	6	.003	3.625	z	8	8.97	28...	- C..			H2-1
94	M253	L1 1/2x...	.113	3.765	8	.070	1.883	z	8	8.3..	28...	- C..			H1-1
95	M30	L1 1/2x...	.111	3.625	6	.003	0	z	8	8.97	28...	- C..			H2-1
96	M39	L1 1/2x...	.110	3.625	8	.003	0	z	6	8.97	28...	- C..			H2-1
97	M137	L1 1/2x...	.109	0	4	.007	0	y	5	21...	28...	- C..			H1-1
98	M155	L1 1/2x...	.108	3.625	8	.002	3.625	z	5	21...	28...	- C..			H2-1
99	M161	L1 1/2x...	.105	3.625	8	.007	0	z	5	21...	28...	- C..			H2-1
100	M29	L1 1/2x...	.097	3.625	8	.003	3.625	z	6	8.97	28...	- C..			H2-1
101	M167	L1 1/2x...	.096	.219	6	.668	2.434	y	6	15...	28...	- C..			H2-1
102	M40	L1 1/2x...	.096	3.625	6	.003	3.625	z	7	8.97	28...	- C..			H2-1
103	M135	L1 1/2x...	.094	.219	5	.343	2.434	y	5	11...	21.6	- C..			H2-1
104	M46	L1 1/2x...	.093	3.625	2	.002	0	z	8	8.97	28...	- C..			H2-1
105	M139	L1 1/2x...	.091	3.625	8	.007	0	z	5	21...	28...	- C..			H2-1
106	M55	L1 1/2x...	.090	3.625	4	.002	0	z	6	8.97	28...	- C..			H2-1
107	M136	L1 1/2x...	.088	0	5	.002	2.625	z	5	11...	21.6	- C..			H2-1
108	M134	L1 1/2x...	.087	0	5	.002	0	y	7	11...	21.6	- C..			H2-1
109	M145	L1 1/2x...	.087	3.625	4	.002	3.625	z	5	21...	28...	- C..			H2-1
110	M95	L1 1/2x...	.084	0	8	.001	0	z	5	8.97	28...	- C..			H1-1

Envelope AISC ASD Steel Code Checks (Continued)

	Me...	Shape	Code Check	Loc[ft]	LC	Shear Ch...	Loc[ft]	...	LC	Fa ...	Ft [...	Fb ...	Fb ...	...	...	AS...
111	M234	L1 1/2x...	.083	0	8	.018	1.408	z	8	23...	28...	- C..				H1-1
112	M131	L1 1/2x...	.083	0	8	.008	0	z	5	21...	28...	- C..				H1-1
113	M45	L1 1/2x...	.081	3.625	4	.002	3.625	z	6	8.97	28...	- C..				H2-1
114	M164	L1 1/2x...	.079	0	6	.011	3.361	y	6	21...	28...	- C..				H1-1
115	M56	L1 1/2x...	.079	3.625	2	.002	3.625	z	7	8.97	28...	- C..				H2-1
116	M62	L1 1/2x...	.077	3.625	2	.002	0	z	8	8.97	28...	- C..				H2-1
117	M96	L1 1/2x...	.076	0	6	.001	0	z	5	8.97	28...	- C..				H1-1
118	M71	L1 1/2x...	.073	3.625	4	.002	0	z	6	8.97	28...	- C..				H2-1
119	M205	L1 1/2x...	.072	2.434	6	.148	0	z	6	15...	28...	- C..				H1-1
120	M254	L1 1/2x...	.070	1.882	6	.060	1.882	z	4	20...	28...	- C..				H1-1
121	M252	L1 1/2x...	.067	1.882	6	.014	0	z	8	20...	28...	- C..				H1-1
122	M61	L1 1/2x...	.066	3.625	4	.002	3.625	z	6	8.97	28...	- C..				H2-1
123	M72	L1 1/2x...	.063	3.625	2	.002	3.625	z	7	8.97	28...	- C..				H2-1
124	M78	L1 1/2x...	.059	3.625	2	.001	0	z	8	8.97	28...	- C..				H2-1
125	M87	L1 1/2x...	.054	3.625	4	.001	0	z	5	8.97	28...	- C..				H2-1
126	M123	L1 1/2x...	.054	3.625	8	.002	0	z	5	21...	28...	- C..				H2-1
127	M154	L1 1/2x...	.053	0	2	.002	0	z	5	21...	28...	- C..				H1-1
128	M148	L1 1/2x...	.052	0	6	.002	0	z	5	21...	28...	- C..				H1-1
129	M77	L1 1/2x...	.052	3.625	4	.001	3.625	z	7	8.97	28...	- C..				H2-1
130	M230	L2.5X1....	.050	0	4	.054	.241	y	4	28...	28...	- C..				H2-1
131	M229	L2.5X1....	.050	4.385	4	.094	4.626	y	8	28...	28...	- C..				H1-1
132	M250	L1 1/2x...	.049	3.052	6	.028	0	y	4	12...	28...	- C..				H2-1
133	M162	L1 1/2x...	.049	3.625	2	.007	0	y	2	21...	28...	- C..				H2-1
134	M102	L1 1/2x...	.047	0	6	.001	0	z	5	8.97	28...	- C..				H1-1
135	M88	L1 1/2x...	.047	3.625	2	.001	0	z	5	8.97	28...	- C..				H2-1
136	M156	L1 1/2x...	.043	3.625	6	.002	0	z	6	21...	28...	- C..				H2-1
137	M233	L1 1/2x...	.043	0	4	.015	0	z	4	23...	28...	- C..				H2-1
138	M129	L1 1/2x...	.043	0	5	.008	0	z	5	15...	21.6	- C..				H1-1
139	M101	L1 1/2x...	.042	0	8	.001	0	z	5	8.97	28...	- C..				H1-1
140	M130	L1 1/2x...	.039	0	5	.006	3.625	z	5	15...	21.6	- C..				H1-1
141	M206	L1 1/2x...	.037	0	6	.005	2.625	z	7	15...	28...	- C..				H1-1
142	M121	L1 1/2x...	.036	3.625	5	.002	0	z	5	15...	21.6	- C..				H2-1
143	M132	L1 1/2x...	.036	0	8	.007	3.625	z	5	21...	28...	- C..				H1-1
144	M122	L1 1/2x...	.035	3.625	7	.002	0	z	5	21...	28...	- C..				H2-1
145	M138	L1 1/2x...	.032	0	2	.005	3.625	z	5	21...	28...	- C..				H1-1
146	M251	L1 1/2x...	.032	3.052	8	.027	3.052	z	8	12...	28...	- C..				H2-1
147	M146	L1 1/2x...	.030	3.625	2	.002	0	z	5	21...	28...	- C..				H2-1
148	M216	L1 1/2x...	.029	0	7	.003	0	z	6	15...	28...	- C..				H1-1
149	M124	L1 1/2x...	.028	3.625	5	.002	0	z	5	15...	21.6	- C..				H2-1
150	M140	L1 1/2x...	.028	3.625	6	.006	0	y	5	21...	28...	- C..				H2-1
151	M189	L1 1/2x...	.025	0	7	.009	0	z	8	15...	28...	- C..				H1-1
152	M221	L1 1/2x...	.025	0	3	.002	2.625	z	8	15...	28...	- C..				H1-1
153	M208	L1 1/2x...	.023	0	4	.006	0	z	6	15...	28...	- C..				H1-1
154	M94	L1 1/2x...	.023	3.625	6	.001	0	z	5	8.97	28...	- C..				H2-1
155	M192	L1 1/2x...	.022	0	4	.006	2.625	z	6	15...	28...	- C..				H1-1
156	M12	L1 1/2x...	.022	0	3	.003	0	z	6	15...	28...	- C..				H1-1
157	M184	L1 1/2x...	.021	0	7	.005	2.625	z	6	15...	28...	- C..				H1-1
158	M93	L1 1/2x...	.021	3.625	8	.001	0	z	5	8.97	28...	- C..				H2-1
159	M17	L1 1/2x...	.019	0	3	.002	2.625	z	8	15...	28...	- C..				H1-1
160	M91	L1 1/2x...	.019	0	4	.001	0	z	8	15...	28...	- C..				H1-1
161	M224	L1 1/2x...	.017	0	4	.003	0	z	7	15...	28...	- C..				H1-1
162	M173	L1 1/2x...	.017	0	7	.008	0	z	8	15...	28...	- C..				H1-1
163	M28	L1 1/2x...	.017	0	3	.002	0	z	6	15...	28...	- C..				H1-1

Envelope AISC ASD Steel Code Checks (Continued)

	Me...	Shape	Code Check	Loc[ft]	LC	Shear Ch...	Loc[ft]	...	LC	Fa ...	Ft [...	Fb ..	Fb	...	...	AS...
164	M103	L1 1/2x...	.016	3.625	8	.001	0	z	5	8.97	28...	- C..				H2-1
165	M213	L1 1/2x...	.016	0	2	.003	2.625	z	7	15...	28...	- C..				H1-1
166	M215	L1 1/2x...	.016	0	4	.004	0	z	8	15...	28...	- C..				H1-1
167	M92	L1 1/2x...	.016	0	2	.001	2.625	z	5	15...	28...	- C..				H1-1
168	M111	L1 1/2x...	.015	0	8	.001	0	z	5	8.97	28...	- C..				H1-1
169	M33	L1 1/2x...	.015	0	3	.002	2.625	z	8	15...	28...	- C..				H1-1
170	M104	L1 1/2x...	.015	3.625	6	.001	0	z	5	8.97	28...	- C..				H2-1
171	M207	L1 1/2x...	.014	0	3	.006	0	z	8	15...	28...	- C..				H2-1
172	M9	L1 1/2x...	.014	0	2	.003	2.625	z	7	15...	28...	- C..				H1-1
173	M190	L1 1/2x...	.014	0	8	.007	0	z	7	15...	28...	- C..				H2-1
174	M183	L1 1/2x...	.014	0	8	.004	2.625	z	7	15...	28...	- C..				H1-1
175	M222	L1 1/2x...	.014	0	2	.003	2.625	z	7	15...	28...	- C..				H1-1
176	M112	L1 1/2x...	.014	0	6	.001	0	z	5	8.97	28...	- C..				H1-1
177	M214	L1 1/2x...	.013	0	7	.003	2.625	z	6	15...	28...	- C..				H2-1
178	M174	L1 1/2x...	.013	0	2	.008	0	z	7	15...	28...	- C..				H1-1
179	M223	L1 1/2x...	.013	0	7	.004	0	z	8	15...	28...	- C..				H2-1
180	M11	L1 1/2x...	.013	0	4	.004	0	z	8	15...	28...	- C..				H1-1
181	M20	L1 1/2x...	.013	0	4	.003	0	z	7	15...	28...	- C..				H1-1
182	M44	L1 1/2x...	.012	0	3	.002	0	z	6	15...	28...	- C..				H1-1
183	M18	L1 1/2x...	.012	0	2	.003	2.625	z	6	15...	28...	- C..				H1-1
184	M191	L1 1/2x...	.012	0	7	.004	2.625	z	8	15...	28...	- C..				H2-1
185	M181	L1 1/2x...	.012	0	2	.006	0	z	8	15...	28...	- C..				H1-1
186	M10	L1 1/2x...	.011	0	7	.003	2.625	z	6	15...	28...	- C..				H2-1
187	M19	L1 1/2x...	.011	0	7	.003	0	z	8	15...	28...	- C..				H2-1
188	M49	L1 1/2x...	.011	0	3	.002	2.625	z	8	15...	28...	- C..				H1-1
189	M27	L1 1/2x...	.011	0	4	.003	0	z	8	15...	28...	- C..				H1-1
190	M182	L1 1/2x...	.011	0	7	.005	0	z	7	15...	28...	- C..				H2-1
191	M90	L1 1/2x...	.011	0	2	.002	2.625	z	6	15...	28...	- C..				H2-1
192	M25	L1 1/2x...	.011	0	2	.003	2.625	z	7	15...	28...	- C..				H1-1
193	M176	L1 1/2x...	.010	0	4	.006	2.625	z	6	15...	28...	- C..				H1-1
194	M34	L1 1/2x...	.010	0	2	.002	2.625	z	6	15...	28...	- C..				H1-1
195	M60	L1 1/2x...	.009	0	3	.002	0	z	6	15...	28...	- C..				H1-1
196	M26	L1 1/2x...	.009	0	7	.003	2.625	z	6	15...	28...	- C..				H2-1
197	M89	L1 1/2x...	.009	0	4	.001	2.625	z	8	15...	28...	- C..				H2-1
198	M43	L1 1/2x...	.009	0	4	.003	0	z	8	15...	28...	- C..				H1-1
199	M36	L1 1/2x...	.009	0	4	.002	0	z	7	15...	28...	- C..				H1-1
200	M35	L1 1/2x...	.009	0	7	.003	0	z	8	15...	28...	- C..				H2-1
201	M42	L1 1/2x...	.008	0	7	.003	2.625	z	6	15...	28...	- C..				H2-1
202	M50	L1 1/2x...	.008	0	2	.002	2.625	z	6	15...	28...	- C..				H1-1
203	M157	L1 1/2x...	.008	0	8	.002	0	z	8	15...	28...	- C..				H1-1
204	M175	L1 1/2x...	.008	0	3	.004	2.625	z	8	15...	28...	- C..				H2-1
205	M65	L1 1/2x...	.008	0	3	.002	2.625	z	8	15...	28...	- C..				H1-1
206	M107	L1 1/2x...	.008	0	8	.001	2.625	z	5	15...	28...	- C..				H1-1
207	M59	L1 1/2x...	.007	0	4	.002	0	z	8	15...	28...	- C..				H1-1
208	M41	L1 1/2x...	.007	0	2	.002	2.625	z	7	15...	28...	- C..				H1-1
209	M141	L1 1/2x...	.007	0	8	.002	0	z	8	15...	28...	- C..				H1-1
210	M158	L1 1/2x...	.007	0	6	.002	0	z	8	15...	28...	- C..				H1-1
211	M76	L1 1/2x...	.007	0	3	.002	0	z	6	15...	28...	- C..				H1-1
212	M51	L1 1/2x...	.007	0	7	.002	0	z	8	15...	28...	- C..				H2-1
213	M66	L1 1/2x...	.007	0	2	.002	2.625	z	6	15...	28...	- C..				H1-1
214	M108	L1 1/2x...	.007	0	6	.001	2.625	z	5	15...	28...	- C..				H1-1
215	M126	L1 1/2x...	.006	0	6	.001	2.625	z	5	15...	28...	- C..				H1-1
216	M75	L1 1/2x...	.006	0	4	.002	0	z	8	15...	28...	- C..				H1-1

Envelope AISC ASD Steel Code Checks (Continued)

	Me...	Shape	Code Check	Loc[ft]	LC	Shear Ch...	Loc[ft]	...	LC	Fa ...	Ft [...	Fb ...	Fb ...	...	...	AS...
217	M159	L1 1/2x...	.006	0	8	.003	2.625	z	8	15...	28...	- C..				H2-1
218	M82	L1 1/2x...	.006	0	6	.002	2.625	z	6	15...	28...	- C..				H1-1
219	M125	L1 1/2x...	.006	0	8	.002	2.625	z	5	15...	28...	- C..				H1-1
220	M52	L1 1/2x...	.006	0	4	.002	0	z	7	15...	28...	- C..				H1-1
221	M81	L1 1/2x...	.006	0	8	.001	2.625	z	8	15...	28...	- C..				H1-1
222	M98	L1 1/2x...	.005	0	6	.001	0	z	5	15...	28...	- C..				H1-1
223	M160	L1 1/2x...	.005	0	6	.001	2.625	z	6	15...	28...	- C..				H2-1
224	M151	L1 1/2x...	.005	0	8	.003	2.625	z	8	15...	28...	- C..				H1-1
225	M74	L1 1/2x...	.005	0	6	.002	2.625	z	6	15...	28...	- C..				H2-1
226	M58	L1 1/2x...	.005	0	7	.002	2.625	z	6	15...	28...	- C..				H2-1
227	M152	L1 1/2x...	.005	0	7	.002	2.625	z	6	15...	28...	- C..				H1-1
228	M97	L1 1/2x...	.005	0	8	.001	0	z	5	15...	28...	- C..				H1-1
229	M67	L1 1/2x...	.005	0	7	.002	0	z	8	15...	28...	- C..				H2-1
230	M144	L1 1/2x...	.005	0	6	.002	0	z	5	15...	28...	- C..				H2-1
231	M68	L1 1/2x...	.005	0	6	.002	0	z	7	15...	28...	- C..				H2-1
232	M143	L1 1/2x...	.004	0	4	.002	2.625	z	8	15...	28...	- C..				H2-1
233	M57	L1 1/2x...	.004	0	8	.002	2.625	z	7	15...	28...	- C..				H2-1
234	M110	L1 1/2x...	.004	3.625	6	.001	0	z	5	8.97	28...	- C..				H2-1
235	M142	L1 1/2x...	.004	0	2	.002	0	z	7	15...	28...	- C..				H1-1
236	M150	L1 1/2x...	.004	0	7	.001	2.625	z	5	15...	28...	- C..				H2-1
237	M83	L1 1/2x...	.004	0	8	.002	0	z	8	15...	28...	- C..				H2-1
238	M109	L1 1/2x...	.004	3.625	8	.001	0	z	5	8.97	28...	- C..				H2-1
239	M84	L1 1/2x...	.004	0	6	.002	0	z	7	15...	28...	- C..				H2-1
240	M106	L1 1/2x...	.004	0	6	.001	2.625	z	5	15...	28...	- C..				H2-1
241	M127	L1 1/2x...	.004	0	4	.001	2.625	z	5	15...	28...	- C..				H2-1
242	M73	L1 1/2x...	.004	0	8	.002	2.625	z	7	15...	28...	- C..				H2-1
243	M149	L1 1/2x...	.004	0	8	.002	0	z	7	15...	28...	- C..				H2-1
244	M99	L1 1/2x...	.004	0	8	.001	0	z	5	15...	28...	- C..				H2-1
245	M128	L1 1/2x...	.003	0	2	.001	0	z	5	15...	28...	- C..				H2-1
246	M100	L1 1/2x...	.003	0	6	.001	0	z	5	15...	28...	- C..				H2-1
247	M105	L1 1/2x...	.003	0	8	.001	2.625	z	5	15...	28...	- C..				H2-1
248	M6	L1 1/2x...	.003	0	6	.001	0	z	5	15...	28...	- C..				H1-1
249	M5	L1 1/2x...	.003	0	8	.001	0	z	5	15...	28...	- C..				H1-1
250	M7	L1 1/2x...	.001	0	8	.001	0	z	5	15...	28...	- C..				H2-1
251	M8	L1 1/2x...	.001	0	6	.001	0	z	5	15...	28...	- C..				H2-1

Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	N57	-.002	1.101	.021	0	0	0
2	2	N58	-.006	1.097	.11	0	0	0
3	2	N59	-.02	.718	.032	0	0	0
4	2	N60	.004	.657	.135	0	0	0
5	2	N132	-.318	0	6.963	0	0	0
6	2	N131	.653	0	8.069	0	0	0
7	2	N125	.233	0	-3.582	0	0	0
8	2	N124	-.408	0	-4.013	0	0	0
9	2	N118	0	0	-.073	0	0	0
10	2	N117	-.041	0	-.146	0	0	0
11	2	Totals:	.094	3.573	7.516			
12	2	COG (ft):	X: .053	Y: 34.147	Z: -.008			

Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	3	N57	.185	1.874	.014	0	0	0
2	3	N58	-.024	.177	.164	0	0	0
3	3	N59	.364	-.207	.024	0	0	0
4	3	N60	-.016	1.728	.035	0	0	0
5	3	N132	-5.203	0	19.464	0	0	0
6	3	N131	-5.038	0	-7.966	0	0	0
7	3	N125	1.693	0	-5.756	0	0	0
8	3	N124	1.447	0	.038	0	0	0
9	3	N118	.352	0	-1.089	0	0	0
10	3	N117	.37	0	.942	0	0	0
11	3	Totals:	-5.87	3.573	5.87			
12	3	COG (ft):	X: .053	Y: 34.147	Z: -.008			

Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	4	N57	.249	1.942	-.007	0	0	0
2	4	N58	-.028	-.221	.091	0	0	0
3	4	N59	.482	-.341	.002	0	0	0
4	4	N60	-.02	2.193	-.083	0	0	0
5	4	N132	-6.334	0	17.803	0	0	0
6	4	N131	-7.028	0	-18.226	0	0	0
7	4	N125	1.936	0	-3.772	0	0	0
8	4	N124	2.26	0	4.07	0	0	0
9	4	N118	.456	0	-1.327	0	0	0
10	4	N117	.511	0	1.355	0	0	0
11	4	Totals:	-7.516	3.573	-.094			
12	4	COG (ft):	X: .053	Y: 34.147	Z: -.008			

Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	6	N57	-6.867	1.703	6.523	0	0	0
2	6	N58	6.493	1.826	6.944	0	0	0
3	6	N59	6.745	1.499	-6.464	0	0	0
4	6	N60	-6.495	1.375	-6.64	0	0	0
5	6	N132	.169	0	7.297	0	0	0
6	6	N131	.078	0	8.126	0	0	0
7	6	N125	.66	0	-3.521	0	0	0
8	6	N124	-.813	0	-4.079	0	0	0
9	6	N118	.472	0	.371	0	0	0
10	6	N117	-.37	0	-.552	0	0	0
11	6	Totals:	.073	6.404	8.005			
12	6	COG (ft):	X: .047	Y: 695.061	Z: -.101			

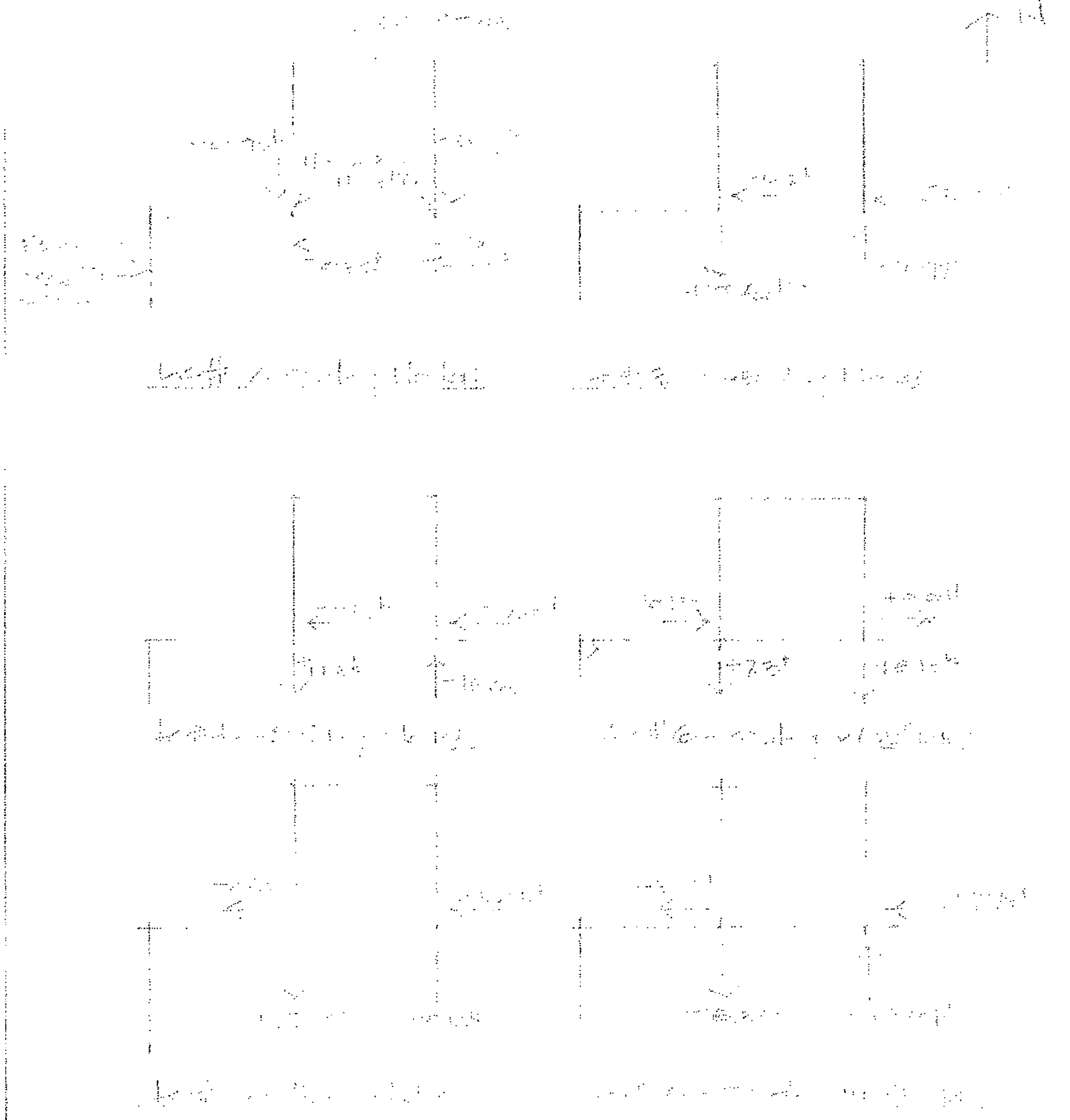
Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	7	N57	-6.695	2.437	6.516	0	0	0
2	7	N58	6.474	.949	6.987	0	0	0
3	7	N59	7.1	.619	-6.474	0	0	0
4	7	N60	-6.516	2.398	-6.739	0	0	0
5	7	N132	-4.746	0	19.82	0	0	0
6	7	N131	-5.653	0	-8.12	0	0	0
7	7	N125	2.074	0	-5.555	0	0	0
8	7	N124	.991	0	-.147	0	0	0
9	7	N118	.802	0	-.606	0	0	0
10	7	N117	.017	0	.471	0	0	0
11	7	Totals:	-6.152	6.404	6.152			
12	7	COG (ft):	X: .047	Y: 695.061	Z: -.101			

Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	8	N57	-6.636	2.506	6.493	0	0	0
2	8	N58	6.47	.57	6.906	0	0	0
3	8	N59	7.211	.484	-6.498	0	0	0
4	8	N60	-6.521	2.843	-6.863	0	0	0
5	8	N132	-5.962	0	18.363	0	0	0
6	8	N131	-7.733	0	-18.645	0	0	0
7	8	N125	2.314	0	-3.609	0	0	0
8	8	N124	1.8	0	3.804	0	0	0
9	8	N118	.902	0	-.867	0	0	0
10	8	N117	.15	0	.842	0	0	0
11	8	Totals:	-8.005	6.404	-.073			
12	8	COG (ft):	X: .047	Y: 695.061	Z: -.101			

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



CENTEK	Subject:	Tower Connection to Existing Building - Bolt Stress Analysis
	Location:	Clinton, CT
	Rev. 0: 01/09/11	Prepared by: J.R.M.

Thru Bolt Capacity at Top Connection (25-ft AGL):

Maximum Design Reactions at Connection: **Load Combination #6 (Wind w/ice 0 deg to Tower):**

Max Horizontal Shear = $Horz_x := 0.17 \cdot kips$ (User Input)

Max Vertical Shear = $Vert_y := 0.01 \cdot kips$ (User Input)

Max Longitudinal Tension = $Horz_z := 8.13 \cdot kips$ (User Input)

Thru Bolt Data: Consists of four 5/8" dia. threaded thru-bolts at wall plate connection.

Bolt Grade = A36 (Assumed Conservative Value - Actual Grade Unknown)

Number of Bolts Per Connection = $n_b := 4$ (User Input)

Bolt Diameter = $d_b := 0.625in$ (User Input)

Allowable Tensile Stress = $F_{t.all} := 19.1 \cdot ksi$ (User Input) Table 1-B, AISC ASD 9th Ed

Allowable Shear Stress = $F_{v.all} := 10.0 \cdot ksi$ (User Input)

Vetical Spacing Between Top and Bottom Bolts = $S_{vert} := 5.0 \cdot in$ (User Input)

Horizontal Spacing Between Bolts = $S_{horz} := 5.0 \cdot in$ (User Input)

Bolt Area = $a_b := \frac{1}{4} \cdot \pi \cdot d_b^{\,2} = 0.307 \cdot in^2$

Check Bolt Stresses:

Bolt Shear Stress:

Shear Force per Bolt =

$$f_{vconn} := \left(\frac{\sqrt{Vert_y^{\,2} + Horz_x^{\,2}}}{n_b} \right) = 0.04 \cdot kips$$

Shear Stress per Bolt = $f_v := \frac{f_{vconn}}{a_b} = 0.14 \cdot ksi$

$Stress_{Ratio1} := \frac{f_v}{F_{v.all}} = 0.01$

Condition1 := if($f_v < F_{v.all}$, "OK", "Overstressed")

Condition1 = "OK"

CENTEK	Subject:	Tower Connection to Existing Building - Bolt Stress Analysis
	Location:	Clinton, CT
	Rev. 0: 01/09/11	Prepared by: J.R.M.

Bolt Tension Stress:

Allowable Tensile Stress Adjusted for Shear = $F_{t.adj} := 1.333 \cdot 26ksi - 1.8 \cdot f_v = 34.41 \cdot ksi$

AISC ASD 9th Ed. Table J3.3

Note: Allowable stress increased by 1/3rd for transient loading per A5.2

Total Tension Force at Connection = $F_{tension} := Horz_z = 8.13 \cdot kips$

Tension Force Each Bolt = $F_{tension.bolt} := \frac{F_{tension}}{n_b} = 2.03 \cdot kips$

Tension Stress Each Bolt = $F_{t.act} := \frac{F_{tension.bolt}}{a_b} = 6.6 \cdot ksi$

Factor of Safety Required = $FS := 2.0$

$$Stress_{Ratio2} := \frac{F_{t.act} \cdot FS}{F_{t.adj}} = 0.39$$

$$Condition2 := if\left(\frac{F_{t.act} \cdot FS}{F_{t.adj}} < 1.0, \text{"OK"}, \text{"Overstressed"}\right)$$

Condition2 = "OK"

Thru Bolt Capacity at Top Connection (25-ft AGL):

Maximum Design Reactions at Connection: — **Load Combination #7 (Wind w/ice 45 deg to Tower):**

Max Horizontal Shear = $Horz_x := 5.65 \cdot kips$ (User Input)

Max Vertical Shear = $Vert_y := 0.01 \cdot kips$ (User Input)

Max Longitudinal Tension = $Horz_z := 19.82 \cdot kips$ (User Input)

Thru Bolt Data: Consists of four 5/8" dia. threaded thru-bolts at wall plate connection.

Bolt Grade = A36 (Assumed Conservative Value - Actual Grade Unknown)

Number of Bolts Per Connection = $n_b := 4$ (User Input)

Bolt Diameter = $d_b := 0.625in$ (User Input)

Allowable Tensile Stress = $F_{t.all} := 19.1 \cdot ksi$ (User Input) Table 1-B, AISC ASD 9th Ed

Allowable Shear Stress = $F_{v.all} := 10.0 \cdot ksi$ (User Input)

Velical Spacing Between Top and Bottom Bolts = $S_{vert} := 5.0 \cdot in$ (User Input)

Horizontal Spacing Between Bolts = $S_{horz} := 5.0 \cdot in$ (User Input)

Bolt Area = $a_b := \frac{1}{4} \cdot \pi \cdot d_b^2 = 0.307 \cdot in^2$

Check Bolt Stresses:

Bolt Shear Stress:

Shear Force per Bolt = $$f_{vconn} := \left(\frac{\sqrt{Vert_y^2 + Horz_x^2}}{n_b} \right) = 1.41 \cdot kips$$

Shear Stress per Bolt = $$f_v := \frac{f_{vconn}}{a_b} = 4.6 \cdot ksi$$

$$Stress_{Ratio1} := \frac{f_v}{F_{v.all}} = 0.46$$

Condition1 := if($f_v < F_{v.all}$, "OK", "Overstressed")

Condition1 = "OK"

Bolt Tension Stress:

Allowable Tensile Stress Adjusted for Shear = $F_{t.adj} := 1.333 \cdot 26ksi - 1.8 \cdot f_v = 26.37 \cdot ksi$

AISC ASD 9th Ed. Table J3.3

Note: Allowable stress increased by 1/3rd for transient loading per A5.2

Total Tension Force at Connection = $F_{tension} := Horz_z = 19.82 \cdot kips$

Tension Force Each Bolt = $F_{tension.bolt} := \frac{F_{tension}}{n_b} = 4.96 \cdot kips$

Tension Stress Each Bolt = $F_{t.act} := \frac{F_{tension.bolt}}{a_b} = 16.2 \cdot ksi$

Factor of Safety Required = $FS := 2.0$

$Stress_{Ratio2} := \frac{F_{t.act} \cdot FS}{F_{t.adj}} = 1.22$

$Condition2 := if\left(\frac{F_{t.act} \cdot FS}{F_{t.adj}} < 1.0, \text{"OK"}, \text{"Overstressed"}\right)$

Condition2 = "Overstressed"

Note: Replace with 5/8"in dia. A449 grade threaded rods

CENTEK	Subject:	Tower Connection to Existing Building - Bolt Stress Analysis
	Location:	Clinton, CT
	Rev. 0: 01/09/11	Prepared by: J.R.M.

Thru Bolt Capacity at Top Connection (25-ft AGL):

Maximum Design Reactions at Connection: — **Load Combination #8 (Wind w/Ice 90 deg to Tower):**

Max Horizontal Shear = $Horz_x := 7.73 \cdot kips$ (User Input)

Max Vertical Shear = $Vert_y := 0.01 \cdot kips$ (User Input)

Max Longitudinal Tension = $Horz_z := 18.64 \cdot kips$ (User Input)

Thru Bolt Data: Consists of four 5/8" dia. threaded thru-bolts at wall plate connection.

Bolt Grade = A36 (Assumed Conservative Value - Actual Grade Unknown)

Number of Bolts Per Connection = $n_b := 4$ (User Input)

Bolt Diameter = $d_b := 0.625in$ (User Input)

Allowable Tensile Stress = $F_{t.all} := 19.1 \cdot ksi$ (User Input) Table 1-B, AISC ASD 9th Ed

Allowable Shear Stress = $F_{v.all} := 10.0 \cdot ksi$ (User Input)

Vetical Spacing Between Top and Bottom Bolts = $S_{vert} := 5.0 \cdot in$ (User Input)

Horizontal Spacing Between Bolts = $S_{horz} := 5.0 \cdot in$ (User Input)

Bolt Area = $a_b := \frac{1}{4} \cdot \pi \cdot d_b^{\,2} = 0.307 \cdot in^2$

Check Bolt Stresses:

Bolt Shear Stress:

Shear Force per Bolt =

$$f_{vconn} := \left(\frac{\sqrt{Vert_y^{\,2} + Horz_x^{\,2}}}{n_b} \right) = 1.93 \cdot kips$$

Shear Stress per Bolt = $f_v := \frac{f_{vconn}}{a_b} = 6.3 \cdot ksi$

$$Stress_{Ratio1} := \frac{f_v}{F_{v.all}} = 0.63$$

Condition1 := if($f_v < F_{v.all}$, "OK", "Overstressed")

Condition1 = "OK"

Bolt Tension Stress:

Allowable Tensile Stress Adjusted for Shear = $F_{t.adj} := 1.333 \cdot 26ksi - 1.8 \cdot f_v = 23.32 \cdot ksi$

AISC ASD 9th Ed. Table J3.3

Note: Allowable stress increased by 1/3rd for transient loading per A5.2

Total Tension Force at Connection = $F_{tension} := Horz_z = 18.64 \cdot kips$

Tension Force Each Bolt = $F_{tension.bolt} := \dfrac{F_{tension}}{n_b} = 4.66 \cdot kips$

Tension Stress Each Bolt = $F_{t.act} := \dfrac{F_{tension.bolt}}{a_b} = 15.2 \cdot ksi$

Factor of Safety Required = $FS := 2.0$

$$Stress_{Ratio2} := \frac{F_{t.act} \cdot FS}{F_{t.adj}} = 1.3$$

$$Condition2 := if\left(\frac{F_{t.act} \cdot FS}{F_{t.adj}} < 1.0, \text{"OK"}, \text{"Overstressed"}\right)$$

Condition2 = "Overstressed"

Note: Replace with 5/8"in dia. A449 grade threaded rods.

CENTEK	Subject:	Tower Top Connection Single Anchor Bolt Analysis
	Location:	Clinton, CT
	Rev. 0: 01/09/11	Prepared by: J.R.M. Checked by: C.F.C.

Tower Top Connection Single Anchor Bolt Analysis

Max Reactions: — **Load Combination #7 (Wind w/Ice 45 deg to Tower):**

Max Tension Y - Direction = $Vert_y := 0.01 \cdot kips$ (User Input)

Max Horizontal Shear X - Direction = $Horizontal_x := 4.75 \cdot kips$ (User Input) Node #132

Max Horizontal Shear Z-Direction = $Horizontal_z := 19.82 \cdot kips$ (User Input)

Resultant Shear Force = $Resultant_{Shear} := \sqrt{Horizontal_x^2 + Horizontal_z^2} = 20.4 \cdot kips$

Bolt Data:

Use ASTM A325-N (Grade as Indentified in tower Mapping Report by JWB Tower Services, LLC dated 12.01.2010)

Number of Anchor Bolts = $N := 1$ (User Input)

Bolt Ultimate Strength = $F_u := 120ksi$ (User Input)

Bolt Yield Strength = $F_y := 85ksi$ (User Input)

Diameter of Bolts = $D := 0.750in$ (User Input)

Threads per Inch = $n := 10$ (User Input)

Anchor Bolt Area:

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

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 = 0.334 \cdot in^2$ (AISC 9th Ed. pg. 4-147)

CENTEK	Subject:	Tower Top Connection Single Anchor Bolt Analysis
	Location:	Clinton, CT
	Rev. 0: 01/09/11	Prepared by: J.R.M. Checked by: C.F.C.

Check Anchor Bolt Tension Force:

Maximum Tensile Force (Gross Area) = $Ft_{gross} := 1.333 \cdot (0.33 \cdot A_g \cdot F_u) = 23.3 \cdot kips$

Note: Allowable stress increased by 1/3rd for transient loading per A5.2

Maximum Tensile Force (Net Area) = $Ft_{net} := 1.333 \cdot (0.60 \cdot A_n \cdot F_y) = 22.7 \cdot kips$

Allowable Tension = $F_t := \begin{cases} Ft_{gross} & \text{if } Ft_{gross} < Ft_{net} \\ Ft_{net} & \text{if } Ft_{net} < Ft_{gross} \end{cases}$

$F_t = 22.7 \cdot kips$

Applied Tension = $MaxTension := \frac{Vert_y}{N} = 0.01 \cdot kips$

$\frac{MaxTension}{F_t} = 0.0 \cdot \%$

$Condition1 := if\left(\frac{MaxTension}{F_t} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

Condition1 = "OK"

Check Shear Force:

Maximum Allowable Shear Force (Gross Area) = $Fv_{gross} := 1.333 \cdot (0.17 \cdot A_g \cdot F_u) = 12 \cdot kips$

Note: Allowable stress increased by 1/3rd for transient loading per A5.2

Applied Tension = $MaxShear := \frac{Resultant_{Shear}}{N} = 20.38 \cdot kips$

$\frac{MaxShear}{Fv_{gross}} = 169.7 \cdot \%$

$Condition1 := if\left(\frac{MaxShear}{Fv_{gross}} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

Condition1 = "Overstressed"

Note: Provide a total of 9 linear inches of 1/4" fillet weld (both sides +r eturn) at L2.5x1.5x1/4 to L4x3x1/4 top connection intersection. Fv capacity = 9in x 3.71kips/in x1.33 = 44.4kips > 2 x fv =40.8kips - Okay.

CENTEK	Subject:	Tower Top Connection Single Anchor Bolt Analysis
	Location:	Clinton, CT
	Rev. 0: 01/09/11	Prepared by: J.R.M. Checked by: C.F.C.

Tower Top Connection Single Anchor Bolt Analysis

Max Reactions:

Load Combination #8 (Wind w/ice 45 deg to Tower):

Max Tension Y - Direction = $Vert_y := 0.01 \cdot kips$ (User Input)

Max Horizontal Shear X - Direction = $Horizontal_x := 7.73 \cdot kips$ (User Input) Node #132

Max Horizontal Shear Z-Direction = $Horizontal_z := 18.64 \cdot kips$ (User Input)

Resultant Shear Force = $Resultant_{Shear} := \sqrt{Horizontal_x^2 + Horizontal_z^2} = 20.2 \cdot kips$

Bolt Data:

Use ASTM A325-N (Grade as Indentified In lower Mapping Report by JWB Tower Services, LLC dated 12.01.2010)

Number of Anchor Bolts = $N := 1$ (User Input)

Bolt Ultimate Strength = $F_u := 120ksi$ (User Input)

Bolt Yield Strength = $F_y := 85ksi$ (User Input)

Diameter of Bolts = $D := 0.750in$ (User Input)

Threads per Inch = $n := 10$ (User Input)

Anchor Bolt Area:

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

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 = 0.334 \cdot in^2$ (AISC 9th Ed. pg. 4-147)

Check Anchor Bolt Tension Force:

Maximum Tensile Force (Gross Area) = $Ft_{gross} := 1.333 \cdot (0.33 \cdot A_g \cdot F_u) = 23.3 \cdot kips$

Note: Allowable stress increased by 1/3rd for transient loading per A5.2

Maximum Tensile Force (Net Area) = $Ft_{net} := 1.333 \cdot (0.60 \cdot A_n \cdot F_y) = 22.7 \cdot kips$

Allowable Tension = $F_t := \begin{cases} Ft_{gross} & \text{if } Ft_{gross} < Ft_{net} \\ Ft_{net} & \text{if } Ft_{net} < Ft_{gross} \end{cases}$

$F_t = 22.7 \cdot kips$

Applied Tension = $MaxTension := \frac{Vert_y}{N} = 0.01 \cdot kips$

$\frac{MaxTension}{F_t} = 0.0 \cdot \%$

$Condition1 := if\left(\frac{MaxTension}{F_t} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

Condition1 = "OK"

Check Shear Force:

Maximum Allowable Shear Force (Gross Area) = $Fv_{gross} := 1.333 \cdot (0.17 \cdot A_g \cdot F_u) = 12 \cdot kips$

Note: Allowable stress increased by 1/3rd for transient loading per A5.2

Applied Tension = $MaxShear := \frac{Resultant_{Shear}}{N} = 20.18 \cdot kips$

$\frac{MaxShear}{Fv_{gross}} = 168.0 \cdot \%$

$Condition1 := if\left(\frac{MaxShear}{Fv_{gross}} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

Condition1 = "Overstressed"

Note: Provide a total of 9 linear inches of 1/4" fillet weld (both sides +r eturn) at L2.5x1.5x1/4 to L4x3x1/4 top connection intersection. Fv capacity = 9in x 3.71kips/in x1.33 = 44.4kips > 2 x fv =40.4kips - Okay.

CENTEK	Subject:	Tower Anchor Bolt Analysis
	Location:	Clinton, CT
	Rev. 0: 01/09/11	Prepared by: J.R.M. Checked by: C.F.C.

Tower Anchor Bolt Analysis

Max Leg Reactions: **Load Combination #7 (Wind w/Ice 45 deg to Tower):**

Max Tension Y - Direction = $Vert_y := 0.0 \cdot kips$ (User Input)

Max Horizontal Shear X - Direction = $Horizontal_x := 7.10 \cdot kips$ (User Input)

Max Horizontal Shear Z-Direction = $Horizontal_z := 6.47 \cdot kips$ (User Input)

Resultant Shear Force = $Resultant_{Shear} := \sqrt{Horizontal_x^2 + Horizontal_z^2} = 9.6 \cdot kips$

Bolt Data:

Use ASTM A325-N (Minimum Grade Assumed - Unknown)

Number of Anchor Bolts = $N := 1$ (User Input)

Bolt Ultimate Strength = $F_u := 58ksi$ (User Input)

Bolt Yield Strength = $F_y := 36ksi$ (User Input)

Diameter of Bolts = $D := 0.625in$ (User Input)

Threads per Inch = $n := 11$ (User Input)

Anchor Bolt Area:

Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 0.307 \cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 = 0.226 \cdot in^2$ (AISC 9th Ed. pg 4-147)

CENTEK	Subject:	EXISTING PAD FOUNDATION ANALYSIS
	Location:	68-ft Lattice Tower, Clinton, CT
	Rev. 0: 01/10/11	Prepared by: J.R.M. Checked by: C.F.C.

Pad & Pier Foundation

Input Data:

Max. Loads at Tower Leg:	Load Combination #7 (Wind w/ice 45 deg to Tower):	
Compression =	$Comp := 6.404 \cdot kips$	(User Input from RISATower)
Pad Properties:		
Pad Thickness =	$PD_t := 3.5 \cdot ft$	(User Input)
Pad Projection Above Grade =	$PD_p := 0.1 \cdot ft$	(User Input)
Pad Depth Below Grade =	$PD_d := PD_t - PD_p = 3.4 \cdot ft$	(User Input)
Pad Width =	$PD_w := 3.0 \cdot ft$	(User Input)
Subgrade Properties:		
Concrete Unit Weight =	$\gamma c := 150 \cdot pcf$	(User Input)
Water Unit Weight =	$\gamma w := 62.4 \cdot pcf$	(User Input)
Soil Unit Weight =	$\gamma s := 100 \cdot pcf$	(User Input/Assumed Minimum)
Uplift Angle =	$\psi := 30 \cdot deg$	(User Input/Assumed Minimum)
Soil Bearing Capacity =	$q_s := 4 \cdot ksf$	(User Input/Assumed Minimum)
Distance to Water Table =	$D_{wt} := 10 \cdot ft$	(User Input/Assumed)
Concrete Compressive Strength =	$f_c := 3 \cdot ksi$	(User Input)

Calculated Data:

Area of the Mat =	$A_{pad} := PD_w^{\ 2} = 9 ft^2$
Volume of Concrete =	$V_{Conc} := PD_t \cdot (A_{pad}) = 31.5 \cdot ft^3$
Weight of Concrete =	$Wt_{Conc} := V_{Conc} \cdot \gamma c = 4.7 \cdot kips$

Bearing Pressure Caused by Footing:

Section Modulus of Mat = $S := \frac{PD_w^3}{6} = 4.5 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{Wt_{Conc} + Comp}{A_{pad}} = 1.24 \cdot ksf$

$\frac{P_{max}}{q_s} = 30.9 \cdot \%$

Condition1 := $if\left(\frac{P_{max}}{q_s} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

Condition1 = "OK"

Centek Engineering, Inc.	Subject:	Masonry Allowable Stress Analysis for:
Consulting Engineers		Unreinforced Solid Brick Masonry Walls
63-2 North Branford Road		Based on ACI 530-02 ASCE 5-02/TMS 602-02 Code
Branford, CT 06405	Project:	Brick Masonry Wall/Parapet Analysis
	Designed:	JRM Date [illegible]

Sht 1 of 3
Job No. 10116.CO6
Checked: CFC Date

Brick or CMU Masonry Walls and Parapets

f'm	f_t	Em	Wall "t" [4]	A_n/L.F.	I/L.F.	S_n/L.F.	r	h (in.)	h/r	e (in.)
1,500.00	30.00	1,050,000	12.000	144	1,728.0	288.0	3.46	144.00	41.57	1.2

Brick or CMU Masonry Columns (DNA = does not apply for this project)

f'm	f_t	Em	Column Dim	Area (in^2)	I (in^4)	S (in^3)	r (in)	h (in.)	h/r	e (in.)
1,500.00	30.00	1,050,000	12.000	144	1,728.0	288.0	3.46	144.00	41.57	1.2

Brick or CMU Masonry Walls and Parapets

$F_a=(1/4)f'_m[1-h/140r)^2$	341.9	for (h/r)≤99
$F_a=(1/4)f'_m[70r/h)^2$	use other Fa	for h/r>99
F_a(allow)	341.94	psi
P_{allow}/L/F.	49,239	lbs/L.F.
$F_b=(1/3)f'_m$ (compression)	500.00	psi
M_{allow}/L.F.	144,000	in-lbs/L.F.
	12,000	ft-lbs/L.F.
$F_b=$ (tension)	30.00	psi
M_{allow}/L.F.	8,640	in-lbs/L.F.
	720	ft-lbs/L.F.

Brick or CMU Masonry Columns (DNA)

$F_a=(1/4)f'_m[1-h/140r)^2$	341.9	for (h/r)≤99
$F_a=(1/4)f'_m[70r/h)^2$	use other Fa	for h/r>99
F_a(allow)	341.94	psi
P_{allow}	49,239	lbs

Wall Axial Load Controlled by Eccentricity

$P_e=[\pi^2E_mI](1-.577e/r)^3]/h^2$	442,359	lbs/L.F.
$P\leq(1/4)P_e$	110,590	lbs/L.F.

Column Axial Load Controlled by Eccentricity (DNA)

$P_e=[\pi^2E_mI](1-.577e/r)^3]/h^2$ *	442,359	lbs
$P\leq(1/4)P_e$ *	110,590	lbs

Allowable Shear Stress

$F_v=1.5(f_m)^{1/2}$	58.1	psi
F_v=120	120	psi
$F_v=v+0.45N_v/A_n$	(see Tables below)	
$F_{v(allow)}$	(see Tables below)	

LOAD COMBINATION # 6 REACTONS OBTAINED FROM RISA 3D OUTPUT

Shear Stress for Lateral Forces Parallel to Wall

Node No.	V (kips)[3]	P=N_v (kips)	F_v (psi)	$F_{v(allow)}$ (psi)	L_{eff} (ft.)	No. of courses in shear plane	f_v (psi)	Status
N131 (x)	0.06	0	38.7	38.7	2.0	2.0	0.3	Okay, Fv>fv
N132 (x)	0.17	0	38.7	38.7	2.0	2.0	0.6	Okay, Fv>fv

Shear Stress for Lateral Forces Perpendicular to Wall

Node No.	V (kips)[3]	P=N_v (kips)	F_v (psi)	$F_{v(allow)}$ (psi)	L_{eff} (ft.)	No. of courses in shear plane	f_v (psi)	Status
N131 (z)	8.13	0	38.7	38.7	2.0	2.0	28.2	Okay, Fv>fv
N132 (z)	7.3	0	38.7	38.7	2.0	2.0	25.3	Okay, Fv>fv
Net Force	15.43	0	38.7	38.7	4.0	2.0	20.1	Okay, Fv>fv

Footnotes:
In the equation Fv = v+0.45Nv/An, v = (fm).5 for allowable stress in multi-wythe brick masonry using header brick.
Above shear forces assumed to be distributed over two grout courses top and bottom of 8"x8" plate connection.

Flexural Stress for Lateral Forces Perpendicular to Wall

Node No.	H (ft)	M (in-lbs)	f_b (psi)	f_a=P/A (psi)	$f_t=(f_b-f_a)$ (psi)	Check f_t	$f_c=(f_b+f_a)$ (psi)	Check f_c	Comment
Net Force	0.3	55,548	48.2	0.0	48.2	ft>30 N.G.	48.2	Okay	See Notes below

Footnotes:
H = moment arm from applied lateral load down to mortar joint in question.
Note 1: If ft and/or fc exceed allowable stresses, develop forces thru roof diaphragm or increase Leff.
Note 2: If neither f_t nor f_c exceed allowable stresses, forces do not have to be developed thru roof diaphragm.
Note 3: V is the sum of the bolt forces.

Summary: Increase effective length of wall engaged by connection.

Centek Engineering, Inc.	Subject:	Masonry Allowable Stress Analysis for		Sht 2 of 3
Consulting Engineers		Unreinforced Solid Brick Masonry Walls		Job No. 10116.CO6
63-2 North Branford Road		Based on ACI 530-02/ASCE 5-02/TMS 602-02 Code		
Branford, CT 06405	Project:	Brick Masonry Wall/Parapet Analysis		
	Designed:	JRM	Date: [illegible]	
			Checked: CFC Date	

Brick or CMU Masonry Walls and Parapets

f'm	f_t	Em	Wall "t" [4]	A_n/L.F.	I/L.F.	S_n/L.F.	r	h (in.)	h/r	e (in.)
1,500.00	30.00	1,050,000	12.000	144	1,728.0	288.0	3.46	144.00	41.57	1.2

Brick or CMU Masonry Columns (DNA = does not apply for this project)

f'm	f_t	Em	Column Dim	Area (in²)	I (in⁴)	S (in³)	r (in)	h (in.)	h/r	e (in.)
1,500.00	30.00	1,050,000	12.000	144	1,728.0	288.0	3.46	144.00	41.57	1.2

Brick or CMU Masonry Walls and Parapets

$F_a=(1/4)f'_m[1-h/140r]^2$	341.9	for (h/r)≤99
$F_a=(1/4)f'_m[70r/h]^2$	use other Fa	for h/r>99
$F_{a(allow)}$	341.94	psi
P_{allow}/L/F.	49,239	lbs/L.F.
$F_b=(1/3)f'_{m\ (compression)}$	500.00	psi
M_{allow}/L.F.	144,000	in-lbs/L.F.
	12,000	ft-lbs/L.F.
$F_{b\ (tension)}$=	30.00	psi
M_{allow}/L.F.	8,640	in-lbs/L.F.
	720	ft-lbs/L.F.

Brick or CMU Masonry Columns (DNA)

$F_a=(1/4)f'_m[1-h/140r]^2$	341.9	for (h/r)≤99
$F_a=(1/4)f'_m[70r/h]^2$	use other Fa	for h/r>99
$F_{a(allow)}$	341.94	psi
P_{allow}	49,239	lbs

Wall Axial Load Controlled by Eccentricity

$P_e=[\pi^2E_mI(1-.577e/r)^3]/h^2$	442,359	lbs/L.F.
$P\leq(1/4)P_e$	110,590	lbs/L.F.

Column Axial Load Controlled by Eccentricity (DNA)

$P_e=[\pi^2E_mI(1-.577e/r)^3]/h^2$ *	442,359	lbs
$P\leq(1/4)P_e$ *	110,590	lbs

Allowable Shear Stress

$F_v=1.5(f'_m)^{1/2}$	58.1	psi
$F_v=120$	120	psi
$F_v=v+0.45N_v/A_n$	(see Tables below)	
$F_{v(allow)}$	(see Tables below)	

LOAD COMBINATION # 7 REACTONS OBTAINED FROM RISA 3D OUTPUT

Shear Stress for Lateral Forces Parallel to Wall

Node No.	V (kips)[3]	P=N_v (kips)	F_v (psi)	$F_{v(allow)}$ (psi)	L_{eff} (ft.)	No. of courses in shear plane	f_v (psi)	Status
N131 (x)	-5.65	0	38.7	38.7	2.0	2.0	19.6	Okay, Fv>fv
N132 (x)	-4.75	0	38.7	38.7	2.0	2.0	16.5	Okay, Fv>fv

Shear Stress for Lateral Forces Perpendicular to Wall

Node No.	V (kips)[3]	P=N_v (kips)	F_v (psi)	$F_{v(allow)}$ (psi)	L_{eff} (ft.)	No. of courses in shear plane	f_v (psi)	Status
N131 (z)	-8.12	0	38.7	38.7				
N132 (z)	19.82	0	38.7	38.7				
Net Force	11.7	0	38.7	38.7	4.0	2.0	15.2	Okay, Fv>fv

Footnotes:
In the equation Fv = v+0.45Nv/An, v = (fm).5 for allowable stress in multi-wythe brick masonry using header brick.
Above shear forces assumed to be distributed over two grout courses top and bottom of 8"x8" plate connection.

Flexural Stress for Lateral Forces Perpendicular to Wall

Node No.	H (ft)	M (in-lbs)	f_b (psi)	f_a=P/A (psi)	$f_t=(f_b-f_a)_{(psi)}$	Check f_t	$f_c=(f_b+f_a)_{(psi)}$	Check f_c	Comment
Net Force	0.3	42,120	36.6	0.0	36.6	ft>30 N.G.	36.6	Okay	See Notes below

Footnotes:
H = moment arm from applied lateral load down to mortar joint in question.
Note 1: If f_t and/or f_c exceed allowable stresses, develop forces thru roof diaphragm or increase Leff.
Note 2: If neither f_t nor f_c exceed allowable stresses, forces do not have to be developed thru roof diaphragm.
Note 3: V is the sum of the bolt forces.

Summary: Increase effective length of wall engaged by connection.

Centek Engineering, Inc.	Subject:	Masonry Allowable Stress Analysis for:	Sht 3 of 3
Consulting Engineers		Unreinforced Solid Brick Masonry Walls	Job No. 10116.CO6
63-2 North Branford Road		Based on ACI 530-02 ASCE 5-02 TMS 602-02 Code	
Branford, CT 06405	Project:	Brick Masonry Wall/Parapet Analysis	
	Designed:	JRM Date [illegible]	Checked: CFC Date

Brick or CMU Masonry Walls and Parapets

f'm	f_t	Em	Wall "t" [4]	A_n/L.F.	I/L.F.	S_n/L.F.	r	h (in.)	h/r	e (in.)
1,500.00	30.00	1,050,000	12.000	144	1,728.0	288.0	3.46	144.00	41.57	1.2

Brick or CMU Masonry Columns (DNA = does not apply for this project)

f'm	f_t	Em	Column Dim	Area (in^2)	I (in^4)	S (in^3)	r (in)	h (in.)	h/r	e (in.)
1,500.00	30.00	1,050,000	12.000	144	1,728.0	288.0	3.46	144.00	41.57	1.2

Brick or CMU Masonry Walls and Parapets

$F_a=(1/4)f'_m[1-h/140r]^2$	341.9	for (h/r)≤99
$F_a=(1/4)f'_m[70r/h]^2$	use other Fa	for h/r>99
F_a(allow)	341.94	psi
P_{allow}/L.F.	49,239	lbs/L.F.
$F_b=(1/3)f'_{m\ (compression)}$	500.00	psi
M_{allow}/L.F.	144,000	in-lbs/L.F.
	12,000	ft-lbs/L.F.
$F_t=$ (tension)	30.00	psi
M_{allow}/L.F.	8,640	in-lbs/L.F.
	720	ft-lbs/L.F.

Brick or CMU Masonry Columns (DNA)

$F_a=(1/4)f'_m[1-h/140r]^2$	341.9	for (h/r)≤99
$F_a=(1/4)f'_m[70r/h]^2$	use other Fa	for h/r>99
F_a(allow)	341.94	psi
P_{allow}	49,239	lbs

Wall Axial Load Controlled by Eccentricity

$P_e=[\pi^2E_mI(1-.577e/r)^3]/h^2$	442,359	lbs/L.F.
$P\le(1/4)P_e$	110,590	lbs/L.F.

Column Axial Load Controlled by Eccentricity (DNA)

$P_e=[\pi^2E_mI(1-.577e/r)^3]/h^2$ *	442,359	lbs
$P\le(1/4)P_e$ =	110,590	lbs

Allowable Shear Stress

[illegible]	58.1	psi
[illegible]	120	psi
F_v=[illegible]0.45N_v/A_n	(see Tables below)	
[illegible]	(see Tables below)	

LOAD COMBINATION # 8 REACTONS OBTAINED FROM RISA 3D OUTPUT

Shear Stress for Lateral Forces Parallel to Wall

Node No.	V (kips)[3]	P=N_v (kips)	F_v (psi)	$F_{v(allow)}$ (psi)	L_{eff} (ft.)	No. of courses in shear plane	f_v (psi)	Status
[illegible]	-7.73	0	38.7	38.7	2.0	2.0	26.8	Okay, Fv>fv
[illegible]	-5.96	0	38.7	38.7	2.0	2.0	20.7	Okay, Fv>fv

Shear Stress for Lateral Forces Perpendicular to Wall

Node No.	V (kips)[3]	P=N_v (kips)	F_v (psi)	$F_{v(allow)}$ (psi)	L_{eff} (ft.)	No. of courses in shear plane	f_v (psi)	Status
[illegible]	-18.64	0	38.7	38.7				
[illegible]	18.36	0	38.7	38.7				
Net Force	-0.28	0	38.7	38.7	4.0	2.0	0.4	Okay, Fv>fv

Footnotes:
[illegible] equation Fv=[illegible]0.45Nv/An ; v = (f'm).5 for allowable stress in multi-wythe brick masonry using header brick
Above shear forces assumed to be distributed over two grout courses top and bottom of 8"x8" plate connection.

Flexural Stress for Lateral Forces Perpendicular to Wall

Node No.	H (ft)	M (in-lbs)	f_b (psi)	f_a=P/A (psi)	$f_t=(f_b-f_a)_{(psi)}$	Check f_t	$f_c=(f_b+f_a)_{(psi)}$	Check f_c	Comment
Net Force	0.3	1,008	0.9	0.0	0.9	Okay	0.9	Okay	See Notes below

Footnotes:
H = moment arm from applied lateral load down to mortar joint in question.
Note 1: If ft and/or fc exceed allowable stresses, develop forces thru roof diaphragm or increase Leff.
Note 2: If neither f_t nor f_c exceed allowable stresses, forces do not have to be developed thru roof diaphragm.
Note 3: V is the sum of the bolt forces.

Summary: Increase effective length of wall engaged by connection.

Check Anchor Bolt Tension Force:

Maximum Tensile Force (Gross Area) = $Ft_{gross} := 1.333 \cdot (0.33 \cdot A_g \cdot F_u) = 7.8 \cdot kips$

Note: Allowable stress increased by 1/3rd for transient loading per A5.2

Maximum Tensile Force (Net Area) = $Ft_{net} := 1.333 \cdot (0.60 \cdot A_n \cdot F_y) = 6.5 \cdot kips$

Allowable Tension = $F_t := \begin{vmatrix} Ft_{gross} \text{ if } Ft_{gross} < Ft_{net} \\ Ft_{net} \text{ if } Ft_{net} < Ft_{gross} \end{vmatrix}$

$F_t = 6.5 \cdot kips$

Applied Tension = $MaxTension := \dfrac{Vert_y}{N} = 0 \cdot kips$

$\dfrac{MaxTension}{F_t} = 0.0 \cdot \%$

$Condition1 := if\left(\dfrac{MaxTension}{F_t} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

Condition1 = "OK"

Check Shear Force:

Maximum Allowable Shear Force (Gross Area) = $Fv_{gross} := 1.333 \cdot (0.17 \cdot A_g \cdot F_u) = 4 \cdot kips$

Note: Allowable stress increased by 1/3rd for transient loading per A5.2

Applied Tension = $MaxShear := \dfrac{Resultant_{Shear}}{N} = 9.61 \cdot kips$

$\dfrac{MaxShear}{Fv_{gross}} = 238.2 \cdot \%$

$Condition1 := if\left(\dfrac{MaxShear}{Fv_{gross}} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

Condition1 = "Overstressed"

Note: Provide additional anchorage to existing reinforced concrete foundation. Provide one (1) 3/4" dia. Hilti HY-150/HIT-ICE anchor rod system at interior of existing tower legs for a total of four (4). Refer to Appendix for Hilti anchor system capacity. Provide 3/4" thick steel (ASTM A36) connection plate located diagonally across inside corners. Refer to sketches within Section 3 of this report.

Pad & Pier Foundation

Input Data:

Max. Loads at Tower Leg: Load Combination #7 (Wind w/Ice 45 deg to Tower):

Compression = $Comp := 6.404 \cdot kips$ (User Input from RISATower)

Pad Properties:

Pad Thickness = $PD_t := 3.5 \cdot ft$ (User Input)

Pad Projection Above Grade = $PD_p := 0.1 \cdot ft$ (User Input)

Pad Depth Below Grade = $PD_d := PD_t - PD_p = 3.4 \cdot ft$ (User Input)

Pad Width = $PD_w := 3.0 \cdot ft$ (User Input)

Subgrade Properties:

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

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

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

Uplift Angle = $\psi := 30 \cdot deg$ (User Input/Assumed Minimum)

Soil Bearing Capacity = $q_s := 4 \cdot ksf$ (User Input/Assumed Minimum)

Distance to Water Table = $D_{wt} := 10 \cdot ft$ (User Input/Assumed)

Concrete Compressive Strength = $f_c := 3 \cdot ksi$ (User Input)

Calculated Data:

Area of the Mat = $A_{pad} := PD_w^{\,2} = 9ft^2$

Volume of Concrete = $V_{Conc} := PD_t \cdot (A_{pad}) = 31.5 \cdot ft^3$

Weight of Concrete = $Wt_{Conc} := V_{Conc} \cdot \gamma c = 4.7 \cdot kips$

Bearing Pressure Caused by Footing:

Section Modulus of Mat = $S := \frac{PD_w^3}{6} = 4.6\cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{Wt_{Conc} + Comp}{A_{pad}} = 1.24\cdot ksf$

$\frac{P_{max}}{q_s} = 30.9\cdot\%$

Condition1 := $if\left(\frac{P_{max}}{q_s} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

Condition1 = "OK"

UMTS RFDS v2.0

Site ID	CT11031B	Site Type	Self Support Tower
Address	21 East Main Street, Clinton, CT	Latitude	41.2789488
		Longitude	-72.52597583

TMO UMTS Engineer	M Lucey

GSM Impacted?

Alpha	X
Beta	X
Gamma	X
Delta	

History (approvals)	Date
RFDS	08/23/10
GSM RF Acceptance	

RFDS Revision	2

Site Leasing/Zoning	Preliminary Leasing	Preliminary Zoning
* # of Sectors	Information not available	---
* # of Antennas	Information not available	Information not available
Antenna Model	Information not available	---
Antenna Size	---	Information not available
* # of TMA	Information not available	---
* # of Feeders	Information not available	Information not available
Feeder Diameter	Information not available	Information not available
Leased area (sq ft)	Information not available	Information not available
* # of Cabinets	Information not available	Information not available
Cabinet Model	Information not available	---
Site Comments	Antenna swap out and share. Add new TMA for both technologies and tie in RET. RRUs to be located at tower base with 3518.	

* Legend: Config under threshold; Config meets threshold; Config above threshold; Test / Not checked

GSM Information

	Existing Alpha	Existing Beta	Existing Gamma	Existing Delta	Proposed Alpha	Proposed Beta	Proposed Gamma	Proposed Delta
Ant. Height (ft)	60	60	60		60	60	60	
RET deployed	NO	NO	NO		YES	YES	YES	
Feeder Type	7/8"	7/8"	7/8"		7/8"	7/8"	7/8"	
Feeder Length (ft)	80	80	80		80	80	80	
# Current TRX	2	2	2		2	2	2	
# Forec. TRX								
# of Nortel HePA								

	Existing	Proposed
Cabinet Type	S8000 outdoor	S8000 outdoor
Cabinet #	1	1

UMTS Information

	Existing Alpha	Existing Beta	Existing Gamma	Existing Delta	Proposed Alpha	Proposed Beta	Proposed Gamma	Proposed Delta
Ant. Height (ft)				---	60	60	60	
RET deployed				---	YES	YES	YES	
Feeder Type				---	7/8"	7/8"	7/8"	
Feeder Length (ft)				---	80	80	80	

	Existing	Proposed
Cabinet Type	---	RBS 3518
Cabinet #	---	1

UMTS RFDS v2.0

Site ID	CT11031B	Site Type	Self Support Tower
Address	21 East Main Street, Clinton, CT	Latitude	41.2789488
		Longitude	-72.52597583

TMO UMTS Engineer	M Lucey

GSM Impacted?	
Alpha	X
Beta	X
Gamma	X
Delta	

History (approvals)	Date
RFDS	08/23/10
GSM RF Acceptance	

RFDS Revision	2

ALPHA

	Existing Configuration				Proposed Configuration			
Mount	X				X			
Antenna Deployed	GSM				GSM/UMTS			
Ant. Type	Dual pole				Quad pole			
Ant. Model	RR90-17-00DP				APX16DWV-16DWV-			
Ant. Vendor	EMS				RFS			
Azimuth	0				0			
E-Tilt (sw)	0				2/2			
M-Tilt	0				0			
TMA #					2			
TMA Type					Twin PCS / Twin AWS			
Used Feeders	2				4			

[ ] GSM Lost Spatial Diversity

Req	OK	
		Add new Mount
		Relocate GSM antenna
X		Swap GSM antenna
		Consolidate GSM feeders
X		Add Twin TMA
		Swap single TMA with twin TMA
		Add Booster
X		Add two new feeders for UMTS
		Reuse GSM feeders for UMTS

Comments

Antenna swap and share. Add new TMA for both technologies. Tie in RET system.

BETA

	Existing Configuration				Proposed Configuration			
Mount	X				X			
Antenna Deployed	GSM				GSM/UMTS			
Ant. Type	Dual pole				Quad pole			
Ant. Model	RR90-17-00DP				APX16DWV-16DWV-			
Ant. Vendor	EMS				RFS			
Azimuth	120				120			
E-Tilt (sw)	0				2/2			
M-Tilt	0				0			
TMA #					2			
TMA Type					Twin PCS / Twin AWS			
Used Feeders	2				4			

[ ] GSM Lost Spatial Diversity

Req	OK	
		Add new Mount
		Relocate GSM antenna
X		Swap GSM antenna
		Consolidate GSM feeders
X		Add Twin TMA
		Swap single TMA with twin TMA
		Add Booster
X		Add two new feeders for UMTS
		Reuse GSM feeders for UMTS

Comments

UMTS RFDS v2.0

Site ID	CT11031B	Site Type	Self Support Tower
Address	21 East Main Street, Clinton, CT	Latitude	41.2789488
		Longitude	-72.52597583

TMO UMTS Engineer	M Lucey

GSM Impacted?	
Alpha	X
Beta	X
Gamma	X
Delta	

History (approvals)	Date
RFDS	08/23/10
GSM RF Acceptance	

RFDS Revision	2

GAMMA

	Existing Configuration				Proposed Configuration			
Mount	X				X			
Antenna Deployed	GSM				GSM/UMTS			
Ant. Type	Dual pole				Quad pole			
Ant. Model	RR90-17-00DP				APX16DWV-16DWV			
Ant. Vendor	EMS				RFS			
Azimuth	220				220			
E-Tilt (sw)	0				2/2			
M-Tilt	0				0			
TMA #					2			
TMA Type					Twin PCS / Twin AWS			
Used Feeders	2				4			

☐ GSM Lost Spatial Diversity

Req	OK	
		Add new Mount
		Relocate GSM antenna
X		Swap GSM antenna
		Consolidate GSM feeders
X		Add Twin TMA
		Swap single TMA with twin TMA
		Add Booster
X		Add two new feeders for UMTS
		Reuse GSM feeders for UMTS

Comments

DELTA

	Existing Configuration				Proposed Configuration			
Mount								
Antenna Deployed								
Ant. Type								
Ant. Model								
Ant. Vendor								
Azimuth								
E-Tilt (sw)								
M-Tilt								
TMA #								
TMA Type								
Used Feeders								

☐ GSM Lost Spatial Diversity

Req	OK	
		Add new Mount
		Relocate GSM antenna
		Swap GSM antenna
		Consolidate GSM feeders
		Add Twin TMA
		Swap single TMA with twin TMA
		Add Booster
		Add two new feeders for UMTS
		Reuse GSM feeders for UMTS

Comments

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

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

Product Description

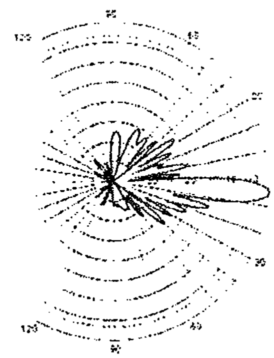
A combination of two X-Polarized antennas in a single radome, this pair of variable tilt antennas provides exceptional suppression of all upper sidelobes at all downtilt angles. It also features a wide downtilt range. This antenna is optimized for performance across the entire frequency band (1710-2200 MHz). The antenna comes pre-connected with two antenna control units (ACU).

Features/Benefits

- **Variable electrical downtilt - provides enhanced precision in controlling intercell interference. The tilt is infield adjustable 0-10 deg.**
- **High Suppression of all Upper Sidelobes (Typically <-20dB).**
- **Gain tracking – difference between AWS UL (1710-1755 MHz) and DL (2110-2155 MHz) <1dB.**
- **Two X-Polarised panels in a single radome.**
- **Azimuth horizontal beamwidth difference <4deg between AWS UL (1710-1755 MHz) and DL (2110-2155 MHz).**
- **Low profile for low visual impact.**
- **Dual polarization; Broadband design.**
- **Includes (2) AISG 2.0 Compatible ACU-A20-N antenna control units.**

Technical Specifications

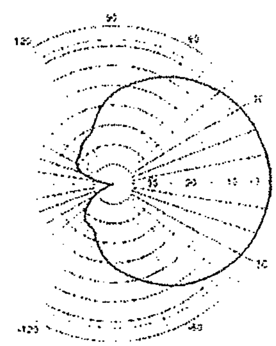
Electrical Specifications	
Frequency Range, MHz	1710-2200
Horizontal Beamwidth, deg	65
Vertical Beamwidth, deg	5.9 to 7.7
Electrical Downtilt, deg	0-10
Gain, dBi (dBd)	18.4 (16.3)
1st Upper Sidelobe Suppression, dB	> 18 (typically > 20)
Upper Sidelobe Suppression, dB	> 18 all (typically > 20)
Front-To-Back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



Vertical Pattern

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

Ordering Information	
Mounting Hardware	APM40-2 + APM40-E2



Horizontal Pattern

All information contained in the present datasheet is subject to confirmation at time of ordering

EMS
Wireless

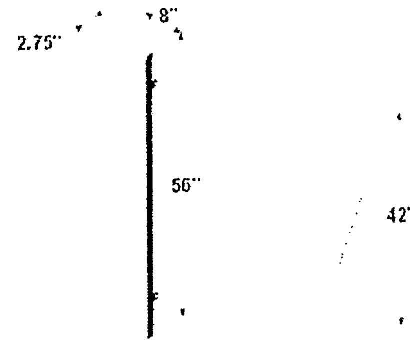
RR90-17-XXDP

DualPol® Polarization
1850 MHz - 1990 MHz

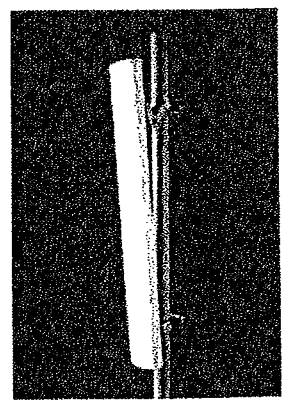
OptiRange™

Electrical Specifications

Azimuth Beamwidth	90°
Elevation Beamwidth	6.8°
Gain	16.5 dBi (14.4 dBd)
Polarization	Dual Linear Slant (± 45°)
Port-to-Port Isolation	≥ 30 dB
Front-to-Back Ratio	> 34 dB
Electrical Downtilt Options	0°, 2°, 4°, 6°
VSWR	1.35:1 Max
Connectors	2; 7-16 DIN (female)
Power Handling	250 Watts CW
Passive Intermodulation	≤ -150 dBc [2 x 20 W (+ 43 dBm)]
Lightning Protection	Chassis Ground



RF CONNECTORS



Mechanical Specifications

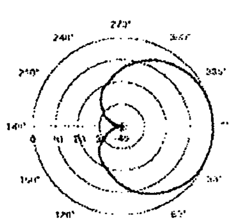
Dimensions (L x W x D)	56 in x 8 in x 2.75 in (142 cm x 20.3 cm x 7.0 cm)
Rated Wind Velocity	150 mph (241 km/hr)
Equivalent Flat Plate Area	3.1ft² (.29 m²)
Front Wind Load @ 100 mph (161 kph)	92 lbs (409 N)
Side Wind Load @ 100 mph (161 kph)	31lbs (139 N)
Weight (Without Mounting Kit)	13.5 lbs (6.2 kg)

Mounting Options

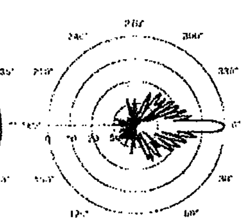
MTG-P00-10, MTG-S02-10, MTG-DXX-20*, MTG-CXX-10*, MTG-C02-10, MTG-TXX-10*

*Note: *Model number shown represents a series of products. See Mounting Options section for specific model number.*

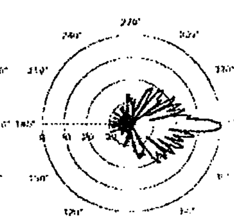
Patterns



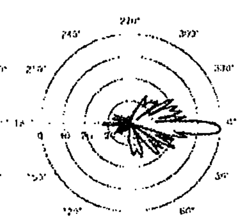
Azimuth



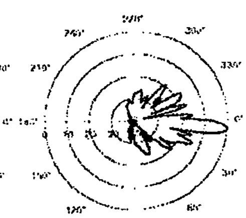
Elevation
0° Downtilt



Elevation
2° Downtilt



Elevation
4° Downtilt



Elevation
6° Downtilt

EMS' antennas are protected by one or more of the following U.S. patents: 5,844,529; 6,067,053; 6,462,710; 6,392,600; 6,069,590; 5,966,102; 5,757,246. EMS antenna designs may also be covered by pending U.S. patent applications and by pending & awarded international patents.

Revised 04/21/04

Product Data Sheet ATMAA1412D-1A20

AWS Twin Wideband Dual Duplex Tower Mounted Amplifier

Product Description

Designed for use in AWS projects, these units improve base station receiver sensitivity and enhance coverage. Use of these TMAs can increase data rates without a reduction in capacity. These TMAs are wideband and cover the entire 45 MHz in the AWS frequency band. The unit is extremely lightweight, weighing just 13 lbs (5.9 kg) for a twin unit. It is easy to install and meets IP66 requirements for ingress protection. The TMA has a metallic base and the radome cap is light grey allowing them to blend with antenna radomes. Its dual-duplex configuration enables the use of a single feeder for both Downlink and Uplink.

Features/Benefits

- **AISG 2.0 compliant**
- **Two TMAs in a single enclosure – Reduces tower load and installation time.**
- **Low noise figure overcomes feeder losses and enhances site coverage**
- **Filtering improves Tx-Rx isolation by reducing noise and interference**
- **Dual-duplex configuration enables use of a single feeder for both Downlink and Uplink**
- **Low insertion loss of Tx filter provides increased downlink coverage**
- **Extremely light weight – Reduces tower loading and facilitates installation.**
- **Equipped with breather valve – Guards against internal condensation.**
- **Option: AISG connector location at bottom or top**

Technical Specifications

Product Type	Tower Mounted Amplifier
Frequency Band, MHz	1710-1755, 2110-2155
Noise Figure, Typical, dB	1.3 @ midband, 1.5 @ band edge
Gain, dB	12 ± 1
Configuration	Twin, Dual Duplexed
Mounting	Wall, pole
Uplink Frequency, MHz	1710-1755
Downlink Frequency, MHz	2110-2155
Bandwidth Tx & Rx, MHz	45
Input IP3, Min, dBm	+13
Tx Loss, Max, dB	0.4
Return Loss All Ports, Min, dB	18
Tx Rejection in Rx Branch, Min, dB	80
Rx Rejection in Tx Branch, Min, dB	60
Tx Power Handling, Max, W	250 cw, 5000 peak
IMP Level at the ANT Port, Min, dBm	-117 @ 2 * 43
Nominal Current (ATMAA1412D-1A20), mA	AISG Mode: AWS 1 Port = 120-200 (AISG RS485 port), AWS 2 Port = 100 ± 20 ; Non-AISG Mode: Each port = 100 ± 20
Alarm Current (ATMAA1412D-1A20), mA	AISG Mode: AWS 1 port = AISG alarm, AWS 2 port = 190 ± 10 ; Non-AISG Mode: Each port = 190 ± 10
Impedance, Ohms	50
Temperature Range, °C (°F)	-40 to +65 (-40 to +149)
Ingress Protection	IP66
Connectors	7-16-Female Long-neck
Weight, kg (lb)	5.9 (13)
Application	AWS
Dimensions, H x W x D, mm (in)	305 x 254 x 101 (12 x 10 x 4), includes connector length
Supporting Power Distribution Unit	CNI-P1A20 and CNI-P2A20 with bias-T BITA2S-AL20

Notes

All information contained in the present datasheet is subject to confirmation at time of ordering

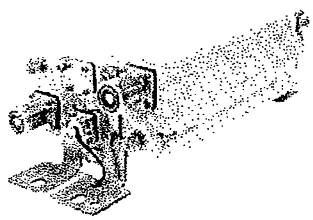
Product Specifications

ANDREW

ETW190VS12UB

Material ID. E15S09P94

Tower Mounted Amplifier, Twin PCS with AISG



CHARACTERISTICS

Electrical Specifications Rx (Uplink)

Bandwidth	60.00 MHz
License Band	PCS
Frequency Band	1850 – 1910 MHz
Gain	12 dB
Gain Tolerance	±1
Noise Figure, Mid Band, typical	1.20 dB @ 12 dB
Noise Figure, Full Band, typical	1.80 dB @ 12 dB
Output IP3, minimum	26 dBm @ 12 dB
Return Loss, minimum	18 dB
Group Delay Variation, maximum	50 ns @ 5 MHz
Total Group Delay, maximum	150 ns

Electrical Specifications Tx (Downlink)

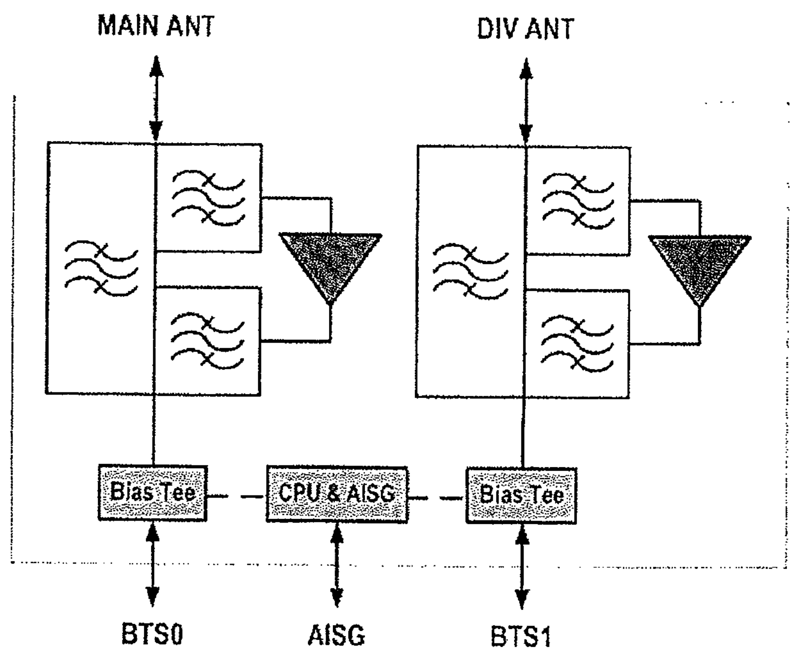
Bandwidth	60.00 MHz
Insertion Loss, maximum	0.70 dB
License Band	PCS
Frequency Band	1930 – 1990 MHz
Return Loss, minimum	18 dB
3rd Order IMD	-107 dBm
3rd Order IMD Test Method	Two +43 dBm carriers
Input Power, RMS, maximum	500 W
Input Power, PEP, maximum	5000 W
Group Delay Variation, maximum	15 ns @ 5 MHz
Total Group Delay, maximum	50 ns

©2010 CommScope, Inc. All rights reserved.
All trademarks identified by ® or ™ are registered trademarks or trademarks, respectively, of CommScope. All specifications are subject to change. See www.commscope.com/andrew for the most current information.

Product Specifications

ETW190VS12UB · Material ID: E15S09P94

Block Diagram



Mechanical Specifications

Connector Interface	7-16 DIN Female
Connector Interface Style	Long neck
Ground Screw Diameter	6.00 mm
AISG Connector Standard	IEC 60130-9
Finish	Painted
Color	Gray
Mounting Pipe Hardware	Band clamps
Mounting Pipe Diameter	40–160 mm

Environmental Specifications

Operating Temperature	-40 °C to +65 °C (-40 °F to +149 °F)
Relative Humidity	Up to 100%
Ingress Protection Test Method	IEC 60529:2001, IP67

Dimensions

Height	260.0 mm | 10.2 in

©2010 CommScope, Inc. All rights reserved.
All trademarks identified by ® or ™ are registered trademarks or trademarks, respectively, of CommScope All specifications are subject to change.
See www.commscope.com/andrew for the most current information.

Product Specifications

ETW190VS12UB · Material ID: E15S09P94

Width	170.0 mm | 6.7 in
Depth	94.0 mm | 3.7 in
Weight	6.6 kg | 14.6 lb

www.commscope.com/andrew

©2010 CommScope, Inc. All rights reserved.
All trademarks identified by ® or ™ are registered trademarks or trademarks, respectively, of CommScope. All specifications are subject to change.
See www.commscope.com/andrew for the most current information.

4.2.5 HIT-ICE/HIT-HY 150 Adhesive Anchoring System

HIT-ICE/HIT-HY 150 Allowable and Ultimate Bond/Concrete Capacity for HAS Rods in Normal-Weight Concrete[1,2,3]

Anchor Diameter in (mm)	Embedment Depth in (mm)	HIT-ICE/HIT-HY 150 Allowable Bond/Concrete Capacity				HIT-ICE/HIT-HY 150 Ultimate Bond/Concrete Capacity			
		Tensile		Shear		Tensile		Shear	
		f'_c = 2000 psi (13.8 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)	f'_c = 2000 psi (13.8 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)	f'_c = 2000 psi (13.8 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)	f'_c = 2000 psi (13.8 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)
3/8 (9.5)	1-3/4 (44)	720 (3.2)	1265 (5.6)	1395 (6.2)	1970 (8.8)	2710 (12.1)	4750 (21.1)	4175 (18.6)	5900 (26.2)
	3-1/2 (89)	1895 (8.4)	2705 (12.0)	3335 (14.8)	4715 (21.0)	7120 (31.7)	10160 (45.2)	10000 (44.5)	14140 (62.9)
	5-1/4 (133)	2635 (11.7)	2800 (12.5)	6120 (27.2)	8655 (38.5)	9880 (44.0)	10510 (46.8)	18360 (81.7)	25960 (115.5)
1/2 (12.7)	2-1/8 (54)	1220 (5.4)	1575 (7.0)	1980 (8.8)	2800 (12.5)	4580 (20.4)	5910 (26.3)	5940 (26.4)	8400 (37.4)
	4-1/4 (108)	2725 (12.1)	3935 (17.5)	5150 (22.9)	7280 (32.4)	10220 (44.5)	14760 (65.7)	15440 (68.7)	21840 (97.1)
	6-3/8 (162)	4300 (19.1)	5295 (23.6)	9455 (42.1)	13375 (59.5)	16140 (71.8)	19860 (88.3)	28360 (126.2)	40120 (178.5)
5/8 (15.9)	2-1/2 (64)	1620 (7.2)	1985 (8.8)	2460 (10.9)	3480 (15.5)	6090 (27.1)	7460 (33.2)	7380 (32.8)	10440 (46.4)
	5 (127)	4395 (19.6)	5250 (23.4)	7350 (32.7)	10390 (46.2)	16480 (73.3)	19690 (87.6)	22040 (98.0)	31160 (138.6)
	7-1/2 (191)	6025 (26.8)	8225 (36.6)	13495 (60.0)	19080 (84.9)	22595 (100.5)	30850 (137.2)	40480 (180.0)	57240 (254.6)
3/4 (19.1)	3-3/8 (86)	2365 (10.5)	3925 (17.5)	5435 (24.2)	7680 (34.2)	8870 (39.5)	14720 (65.5)	16295 (72.5)	23040 (102.5)
	6-5/8 (168)	4655 (20.7)	8885 (39.5)	12270 (54.6)	17355 (77.2)	17460 (77.7)	33330 (148.3)	36800 (163.7)	52060 (231.6)
	10 (254)	9515 (42.3)	12140 (54.0)	22755 (101.2)	32180 (143.1)	35695 (158.8)	45530 (202.5)	68260 (303.6)	96540 (429.4)
7/8 (22.2)	3-3/4 (95)	3080 (13.7)	4800 (21.4)	6705 (29.8)	9480 (42.4)	11555 (51.4)	18000 (80.1)	20105 (89.4)	28430 (126.5)
	7-1/2 (191)	7845 (34.9)	11020 (49.0)	15960 (71.0)	22575 (100.4)	29430 (130.9)	41000 (182.3)	47880 (213.0)	67720 (301.2)
	11-1/4 (286)	13330 (59.3)	16645 (74.0)	29330 (130.5)	41475 (184.5)	49990 (222.4)	62425 (277.7)	87980 (391.4)	124420 (553.4)
1 (25.4)	4-1/8 (105)	3445 (15.3)	4865 (21.6)	8265 (36.8)	11685 (52.0)	12920 (57.5)	18250 (81.2)	24790 (110.3)	35050 (155.9)
	8-1/4 (210)	8330 (37.1)	11635 (51.8)	19690 (87.6)	27840 (123.8)	31250 (139.0)	43640 (194.1)	59060 (262.7)	83520 (371.5)
	12-3/8 (314)	15540 (69.1)	19525 (86.85)	36170 (160.9)	51150 (227.5)	58280 (259.3)	73220 (325.7)	108500 (482.6)	153440 (682.5)
1-1/4 (31.8)	6 (152)	4645 (20.7)	7000 (31.1)	14760 (65.7)	20870 (92.8)	17430 (77.5)	26265 (116.8)	44280 (197.0)	62610 (278.5)
	12 (305)	15490 (68.9)	20770 (92.4)	38615 (171.8)	54610 (242.9)	58085 (258.4)	77900 (346.5)	115840 (515.3)	163820 (728.7)
	15 (381)	19210 (85.5)	26815 (119.3)	53960 (240.0)	76315 (339.5)	72040 (320.5)	100560 (447.3)	161880 (720.1)	228940 (1018.4)

1 Influence factors for spacing and/or edge distance are applied to concrete/bond values above, and then compared to the steel value. The lesser of the values is to be used for the design.

2 For $h_{ef} \geq h_{cr}$ average ultimate concrete shear capacity based on Concrete Capacity Design (CCD) method. For $h_{ef} < h_{cr}$ average ultimate concrete shear values based on testing.

3 All values based on holes drilled with carbide bit and cleaned with compressed air and a wire brush per manufacturer's instructions.

HIT-ICE/HIT-HY 150 Adhesive Anchoring System 4.2.5

Allowable Steel Strength for HAS Rods[1]

Rod Diameter in. (mm)	HAS-E Standard ISO 898 Class 5.8		HAS Super ASTM A 193 B7		HAS SS AISI 304/316 SS	
	Tensile lb (kN)	Shear lb (kN)	Tensile lb (kN)	Shear lb (kN)	Tensile lb (kN)	Shear lb (kN)
3/8 (9.5)	2640 (11.7)	1360 (6.0)	4555 (20.3)	2345 (10.4)	3645 (16.2)	1875 (8.3)
1/2 (12.7)	4700 (20.9)	2420 (10.8)	8100 (36.0)	4170 (18.5)	6480 (28.8)	3335 (14.8)
5/8 (15.9)	7340 (32.7)	3780 (16.8)	12655 (56.3)	6520 (29.0)	10125 (45.0)	5215 (23.2)
3/4 (19.1)	10570 (47.0)	5445 (24.2)	18225 (81.1)	9390 (41.8)	12390 (55.1)	6385 (28.4)
7/8 (22.2)	14385 (64.0)	7410 (33.0)	24805 (110.3)	12780 (56.9)	16865 (75.0)	8690 (38.6)
1 (25.4)	18790 (83.6)	9680 (43.0)	32400 (144.1)	16690 (74.2)	22030 (98.0)	11350 (50.5)
1-1/4 (31.8)	29360 (130.6)	15125 (67.3)	50620 (225.2)	26080 (116.0)	34425 (153.1)	17735 (78.9)

1 Steel strength as defined in AISC Manual of Steel Construction (ASD):

Tensile = 0.33 x F_u x Nominal Area
Shear = 0.17 x F_u x Nominal Area

Ultimate Steel Strength for HAS Rods[1]

Rod Diameter in. (mm)	HAS-E Standard ISO 898 Class 5.8			HAS Super ASTM A 193 B7			HAS SS AISI 304/316 SS		
	Yield lb (kN)	Tensile lb (kN)	Shear lb (kN)	Yield lb (kN)	Tensile lb (kN)	Shear lb (kN)	Yield lb (kN)	Tensile lb (kN)	Shear lb (kN)
3/8 (9.5)	4495 (20.0)	6005 (26.7)	3605 (16.0)	8135 (36.2)	10350 (43.4)	6210 (27.6)	5035 (22.4)	8280 (36.8)	4970 (22.1)
1/2 (12.7)	8230 (36.6)	10675 (47.5)	6405 (28.5)	14900 (66.3)	18405 (79.0)	11040 (49.1)	9225 (41.0)	14720 (65.5)	8835 (39.3)
5/8 (15.9)	13110 (58.3)	16680 (74.2)	10010 (44.5)	23730 (105.6)	28760 (125.7)	17260 (76.8)	14690 (65.3)	23010 (102.4)	13805 (61.4)
3/4 (19.1)	19400 (86.3)	24020 (106.9)	14415 (64.1)	35120 (156.2)	41420 (185.7)	24850 (110.5)	15050 (66.9)	28165 (125.3)	16800 (75.2)
7/8 (22.2)	26780 (119.1)	32695 (145.4)	19620 (87.3)	48480 (215.7)	56370 (256.9)	33825 (150.5)	20775 (92.4)	38335 (170.5)	23000 (102.3)
1 (25.4)	35130 (156.3)	42705 (190.0)	25625 (114.0)	63600 (282.9)	73630 (337.0)	44180 (196.5)	27255 (121.2)	50070 (222.7)	30040 (133.6)
1-1/4 (31.8)	56210 (250.0)	66730 (296.8)	40035 (178.1)	101755 (452.6)	115050 (511.8)	69030 (307.1)	43610 (194.0)	78235 (348.0)	46940 (208.8)

1 Steel strength as defined in AISC Manual of Steel Construction 2nd Ed. (LRFD):

Yield = F_y x Tensile Stress Area
Tensile = 0.75 x F_u x Nominal Area
Shear = 0.45 x F_u x Nominal Area

JWB Tower Services, LLC
148 Governor Street
New Britain, CT 06053
(800) 819-3084
(860) 256-8175 fax

Lattice Tower Mapping and Inventory
General Information

Site Name:		Comcast
Site Number:		CT11031B
FCC Number:		
Manufacturer ID #		
Street Address:		21 East Main Street
City/State/Zip Code:		Clinton, CT
County:		
Lat:	N/S	41° 16' 43"
Long:	E/W	72° 31' 33"
Performed By:		JWB
Date:		12/1/2010

Manufacture: (Circle One)

Rohn Summit EEI Pirod Sabre Fort Worth Valmont Nudd **[Other]**

Foundation:

Reveal: 0" (Level With Ground)
Grout: 1/2" (No Grout)
Size/Circumference: 36"x36"

Anchor Bolts:

Base Plate Grouted: Yes **[No]**

Number of Anchor Bolts: 1/Leg
Anchor Bolt Spacing: 29" Square
Diameter of Anchor Bolts: 5/8"

Diameter of Anchor Bolt Placement: N/A

Safety Climb:

Start Elevation (AGL) 0
End Elevation (AGL) 67'-8"

Location West Face

Climbing Components:

Step Bolts **[Climbing Ladder]** Sub Horz Internal External

West Face
Start Elevation: (AGL) 1'-4"
End Elevation: (AGL) 67'-6"

N, E, S Face Leg
Start Elevation: (AGL) 55'
End Elevation: (AGL) 67'-6"

______ Leg
Start Elevation: (AGL) ______
End Elevation: (AGL) ______

______ Leg
Start Elevation: (AGL) ______
End Elevation: (AGL) ______

Lighting System Information:

1st OB: ______
2nd OB: ______
3rd OB: ______
4th OB: ______

1st Beacon: ______
2nd Beacon: ______
3rd Beacon: ______
4th Beacon: ______

Top of Tower Steel (Top of Concrete) 67'-6"

Waveguide Ladders:

North Face near NE Leg Size:
Starts at: 0 Ends at: 58'-6"
Coax: 1/2" 7/8" 6 1 1/4" 1 5/8"
Other: T-Mobile

South Face near SE Leg Size:
Starts at: 0 Ends at: 67'-6"
Coax: 1/2" 7/8" 1 1/4" 1 5/8"
Other: (1) 3/4" Ridgid

Face near Leg Size:
Starts at: Ends at:
Coax: 1/2" 7/8" 1 1/4" 1 5/8"
Other:

Face near Leg Size:
Starts at: Ends at:
Coax: 1/2" 7/8" 1 1/4" 1 5/8"
Other:

Face near Leg Size:
Starts at: Ends at:
Coax: 1/2" 7/8" 1 1/4" 1 5/8"
Other:

Face near Leg Size:
Starts at: Ends at:
Coax: 1/2" 7/8" 1 1/4" 1 5/8"
Other:

Antenna Information:

CARRIER: Empty Mount — **PIC #**

MOUNT

Type:	Pipe Mount	Manf.:	Custom				
Elev. C/L:		Bottom:	62'-6"'	Top:	67'-6"'	Leg:	N Face
Face Width:	4"	Height:	5'	Projection:	N/A	Azimuth/s:	

ANTENNA

Type:		Manf.:		Model:			
Elev. C/L:		Bottom:		Top:		Leg:	
Quantity:		Dim: (HxWxD)				Azimuth/s:	

TMA'S

Quantity:		Manf.:		Model:	

COAX

Quantity:		Size:		Jumper:		Color:	

CARRIER: T-Mobile — **PIC #**

MOUNT

Type:	Angle Leg	Manf.:	Valmont	Antenna Mount Pipe:			2.5" x 4'
Elev. C/L:		Bottom:	58'-4"	Top:	62'-4"	Leg:	NE, SE, SW
Face Width:	2.5'	Height:	4'	Projection:	1'	Azimuth/s:	

ANTENNA

Type:	Panel	Manf.:	EMS	Model:			RR90-17-02DP
Elev. C/L:	60'	Bottom:		Top:		Leg:	
Quantity:	3	Dim: (HxWxD)				Azimuth/s:	0,120,240

TMA'S

Quantity:		Manf.:		Model:	

COAX

Quantity:	6	Size:	7/8"	Jumper:	1/2"	Color:	N/A

CARRIER: — **PIC #**

MOUNT

Type:		Manf.:		Antenna Mount Pipe:			
Elev. C/L:		Bottom:		Top:		Leg:	
Face Width:		Height:		Projection:		Azimuth/s:	

ANTENNA

Type:		Manf.:		Model:			
Elev. C/L:		Bottom:		Top:		Leg:	
Quantity:		Dim: (HxWxD)				Azimuth/s:	

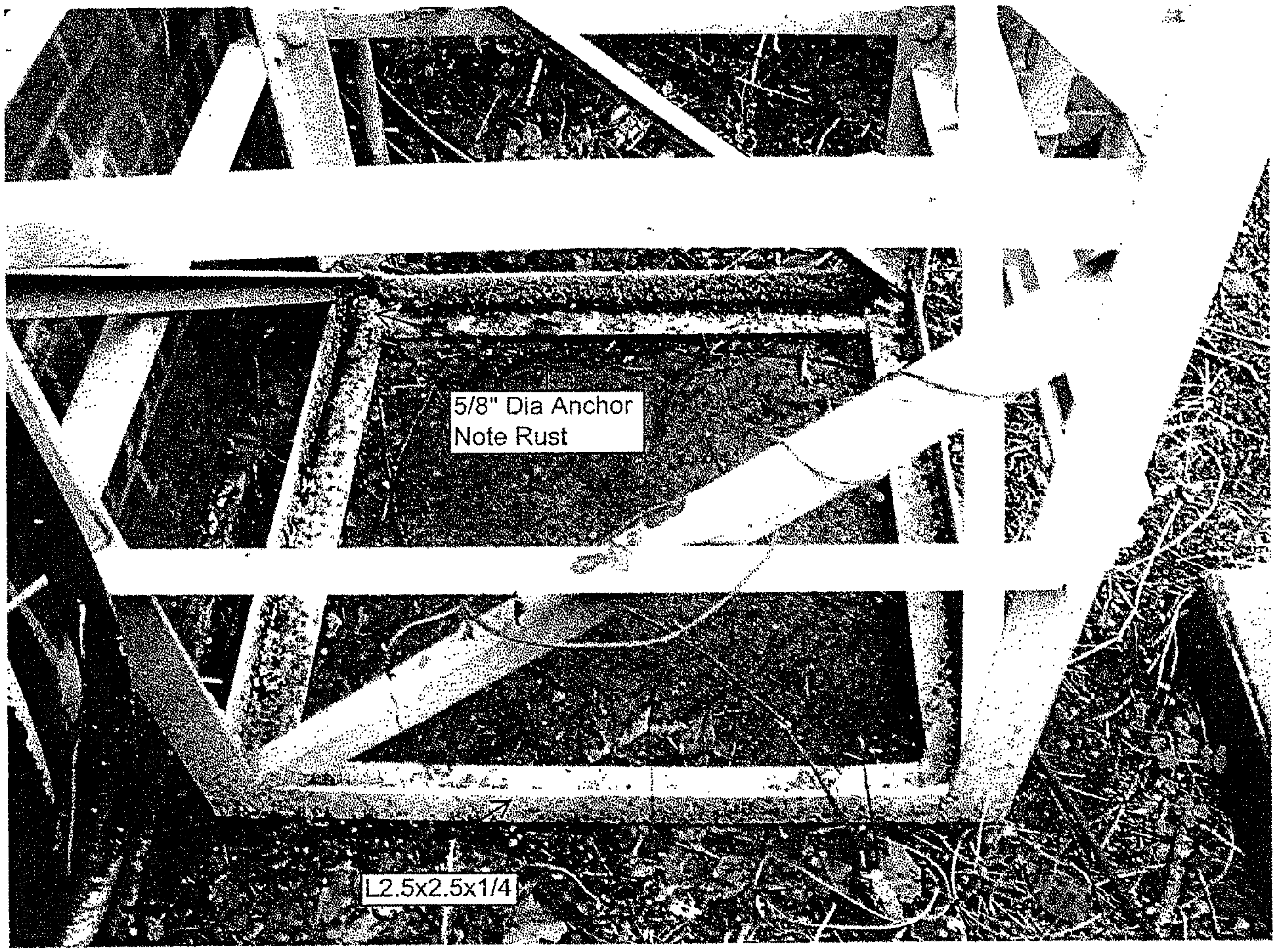
TMA'S

Quantity:		Manf.:		Model:	

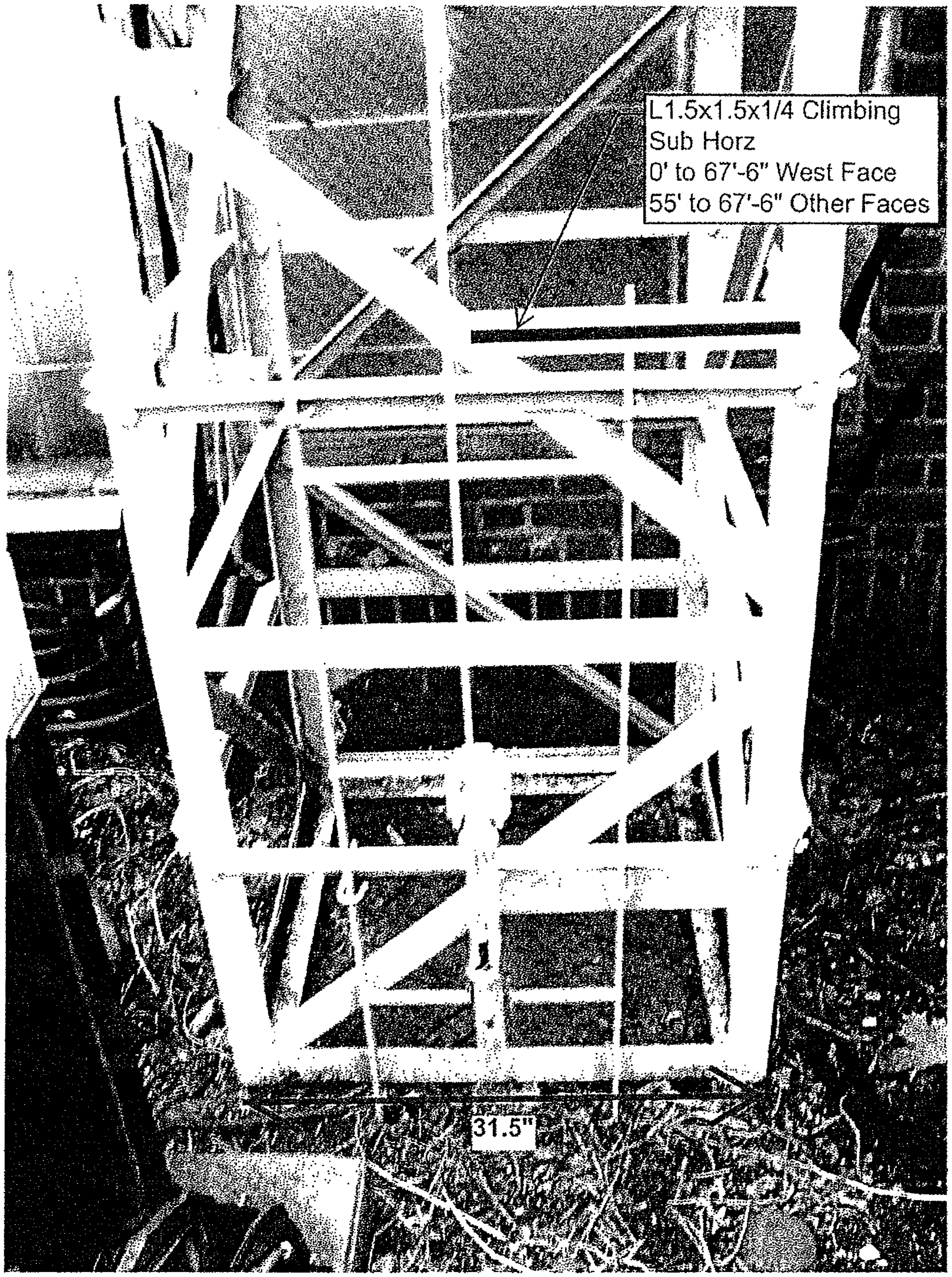
COAX

Quantity:		Size:		Jumper:		Color:	

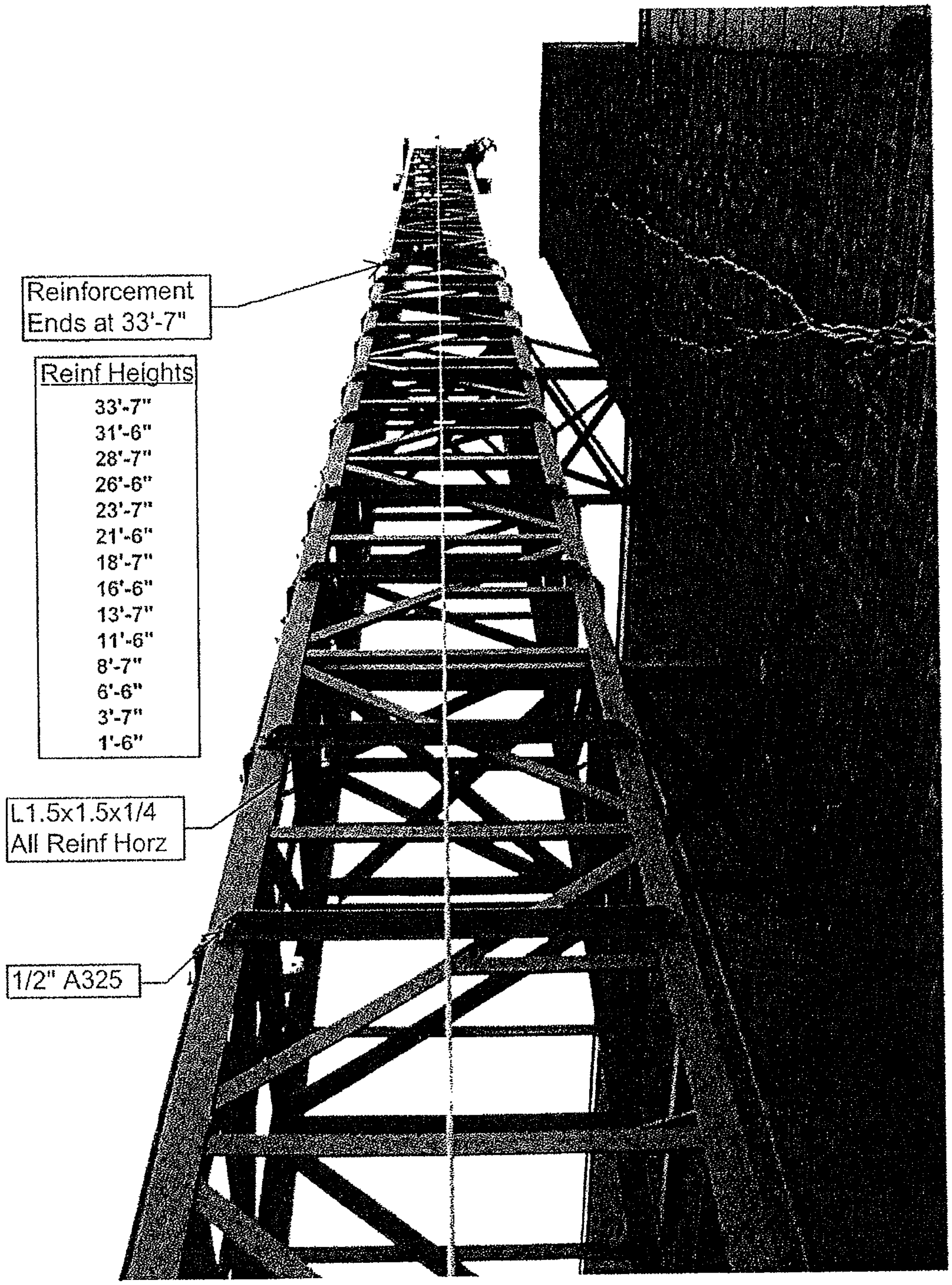
1.0 Elevation



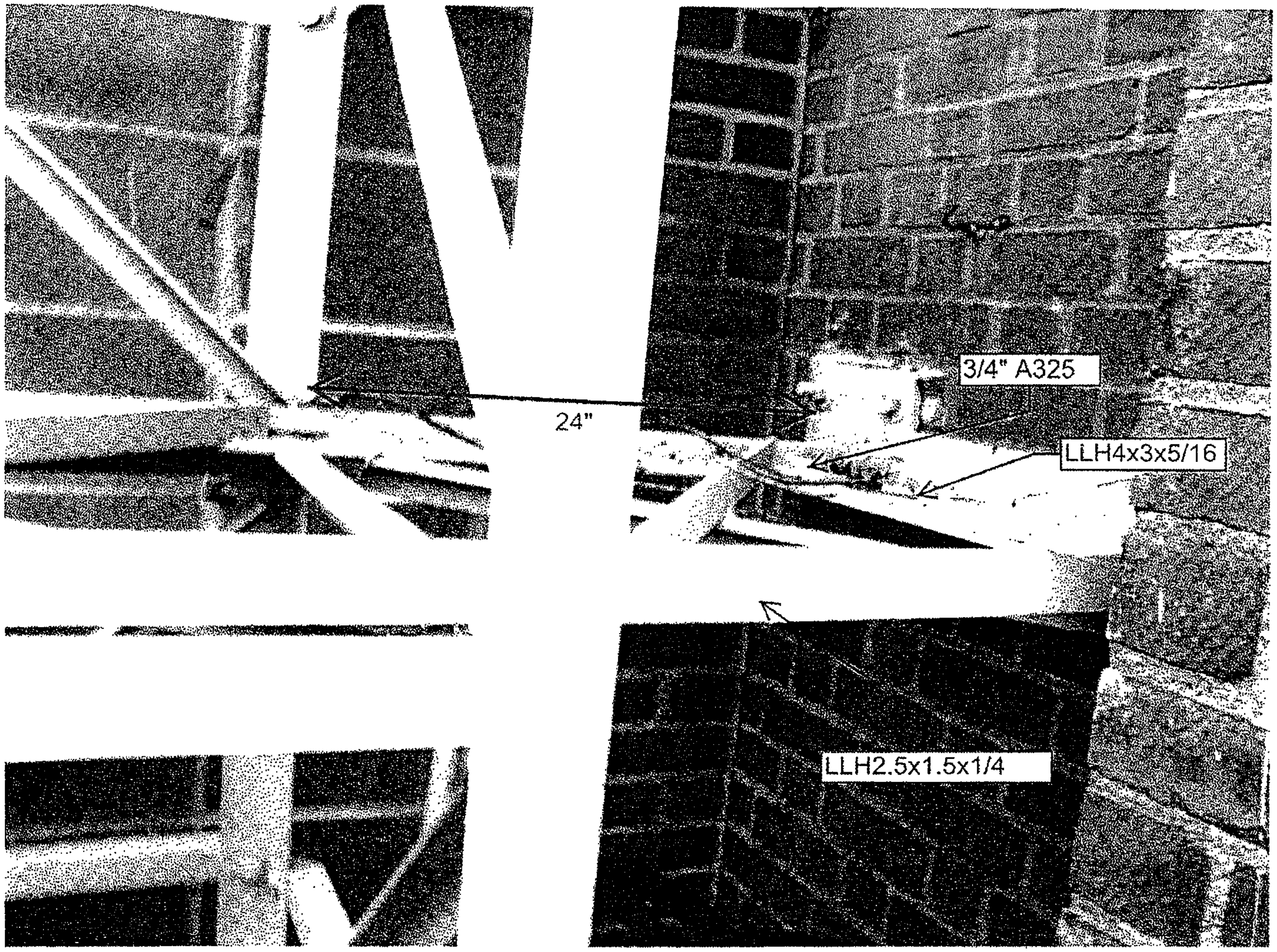
2.0 Base



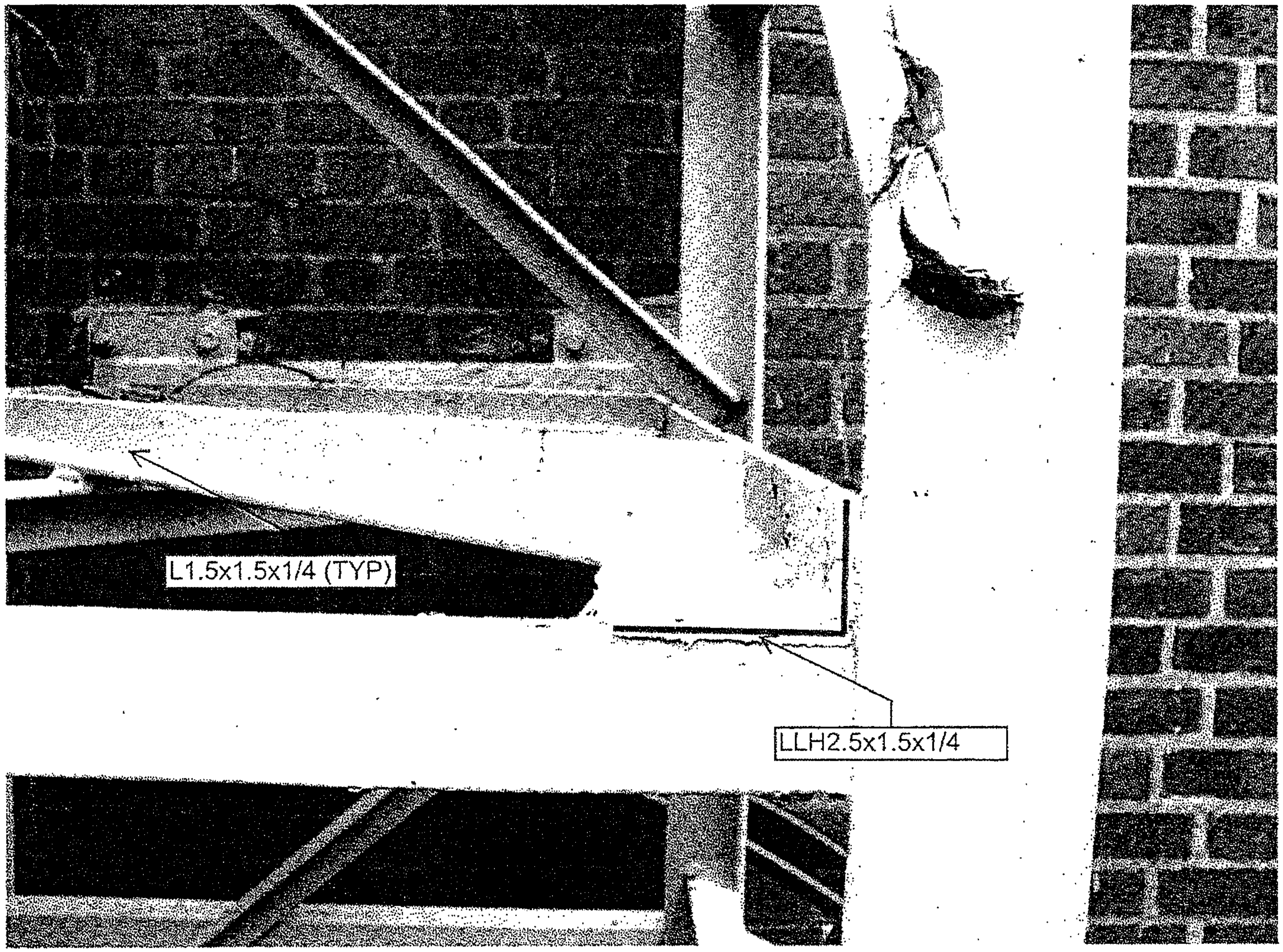
3.0 Safety Climb



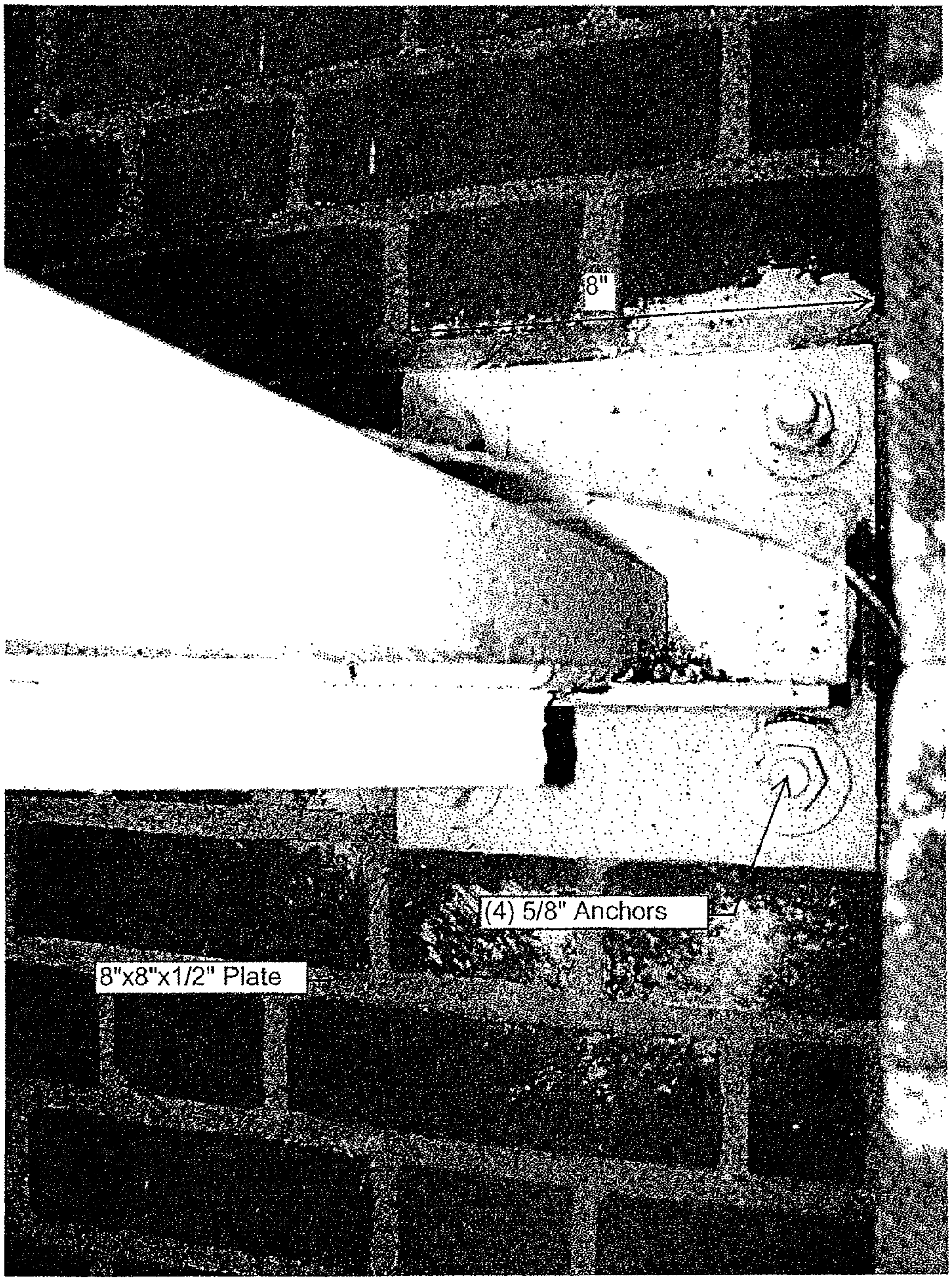
3.1 Safety Climb



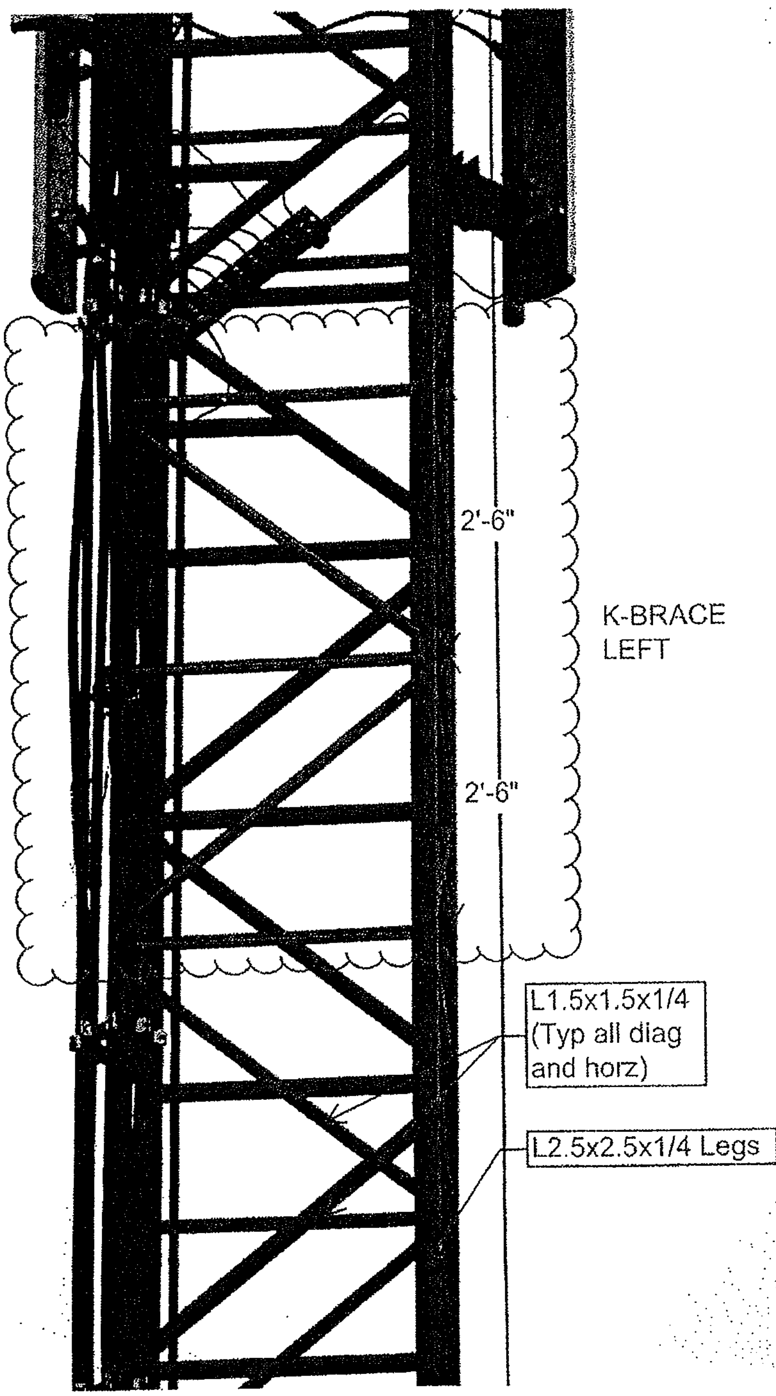
4.0 Building Attachment
(Typical at 5', 15', and 25')



4.1 Building Attachment
(Typical at 5', 15', and 25')

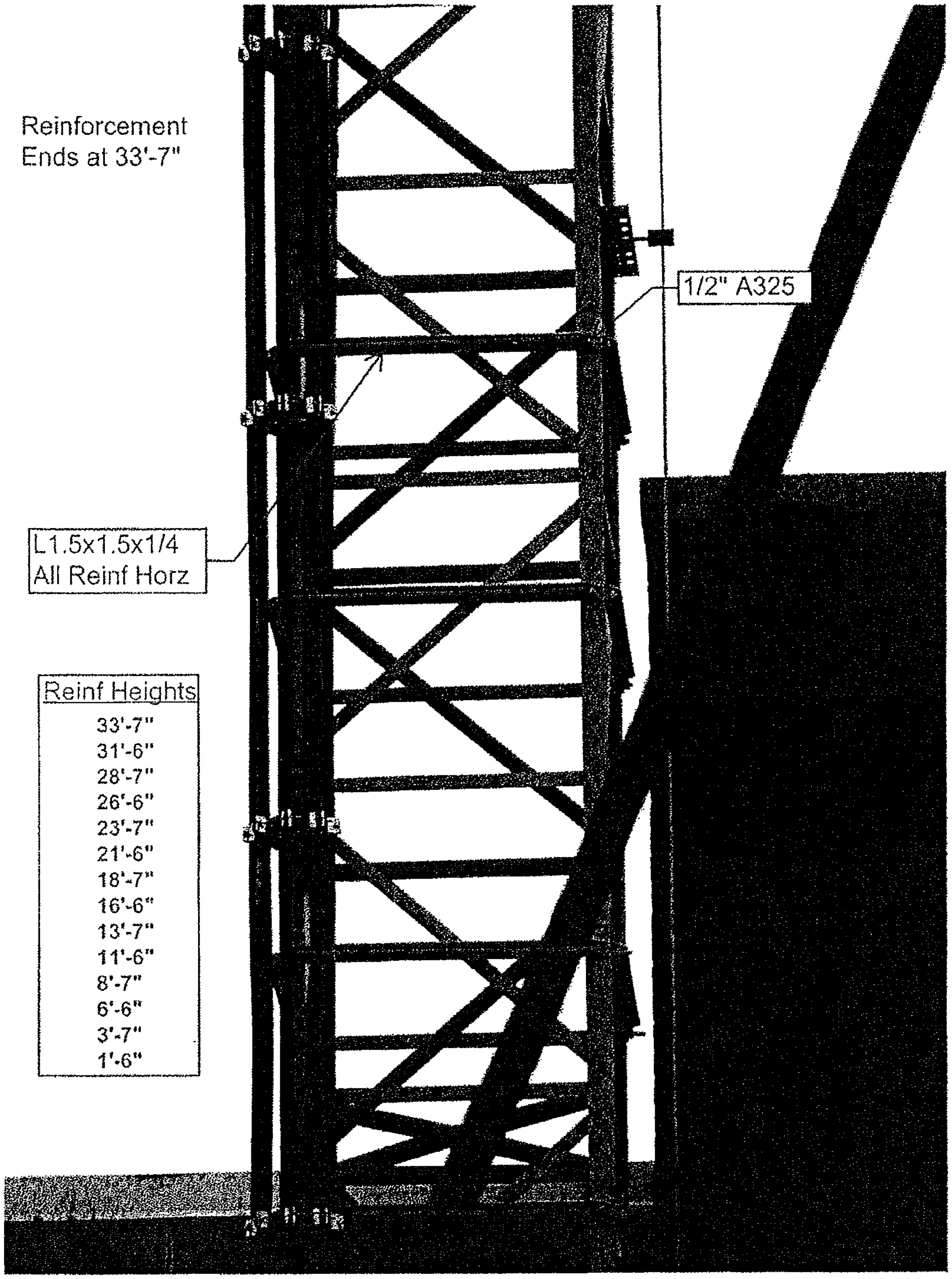


4.2 Building Attachment

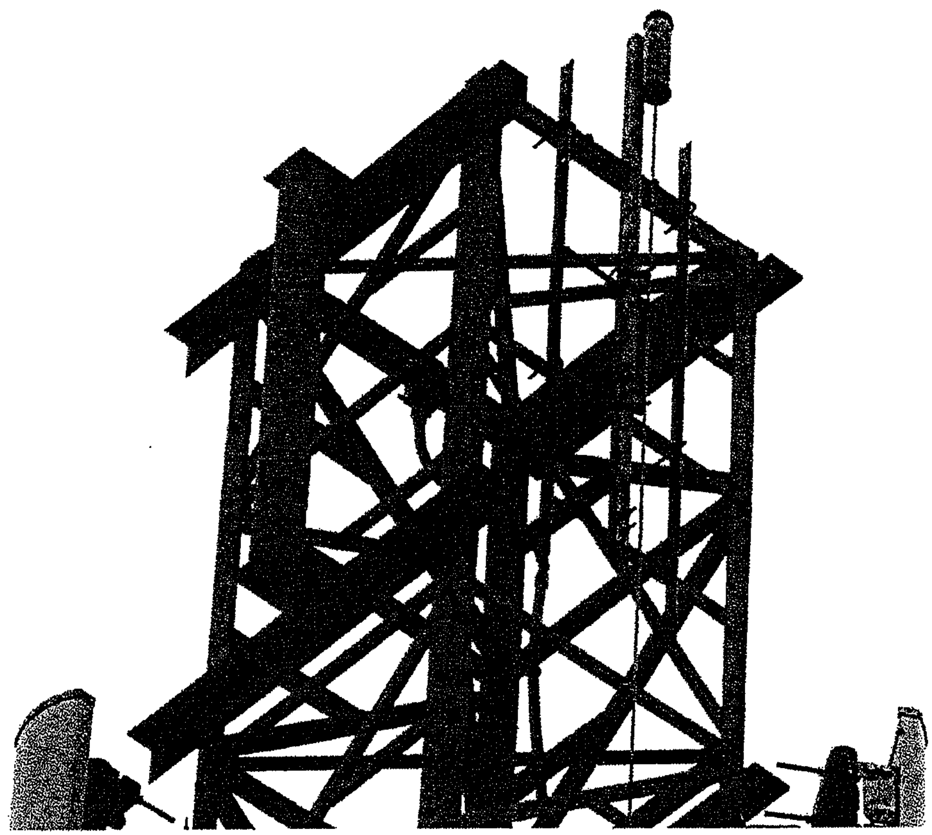


2'-6"
2'-6"
K-BRACE
LEFT
L1.5x1.5x1/4
(Typ all diag
and horz)
L2.5x2.5x1/4 Legs

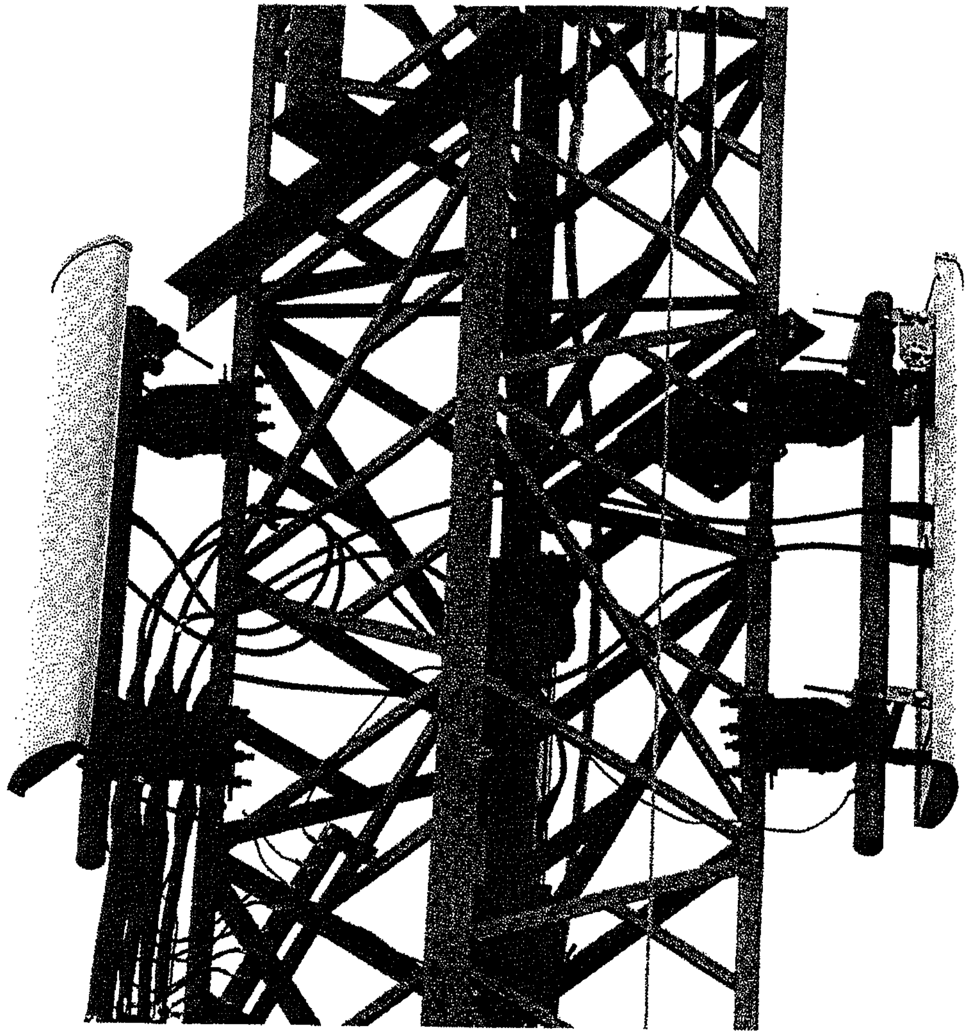
5.0 Geometry



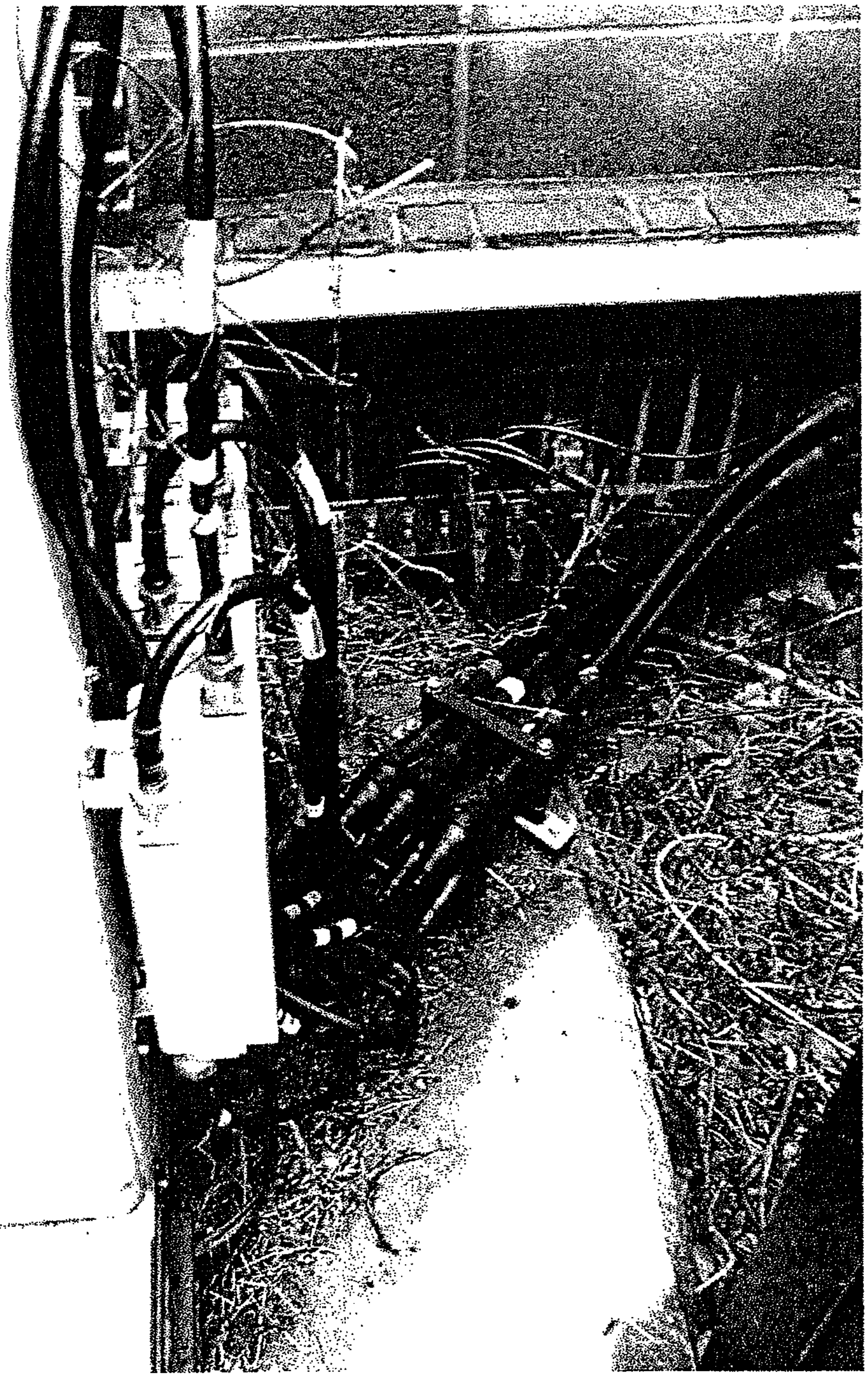
6.0 Reinforecements



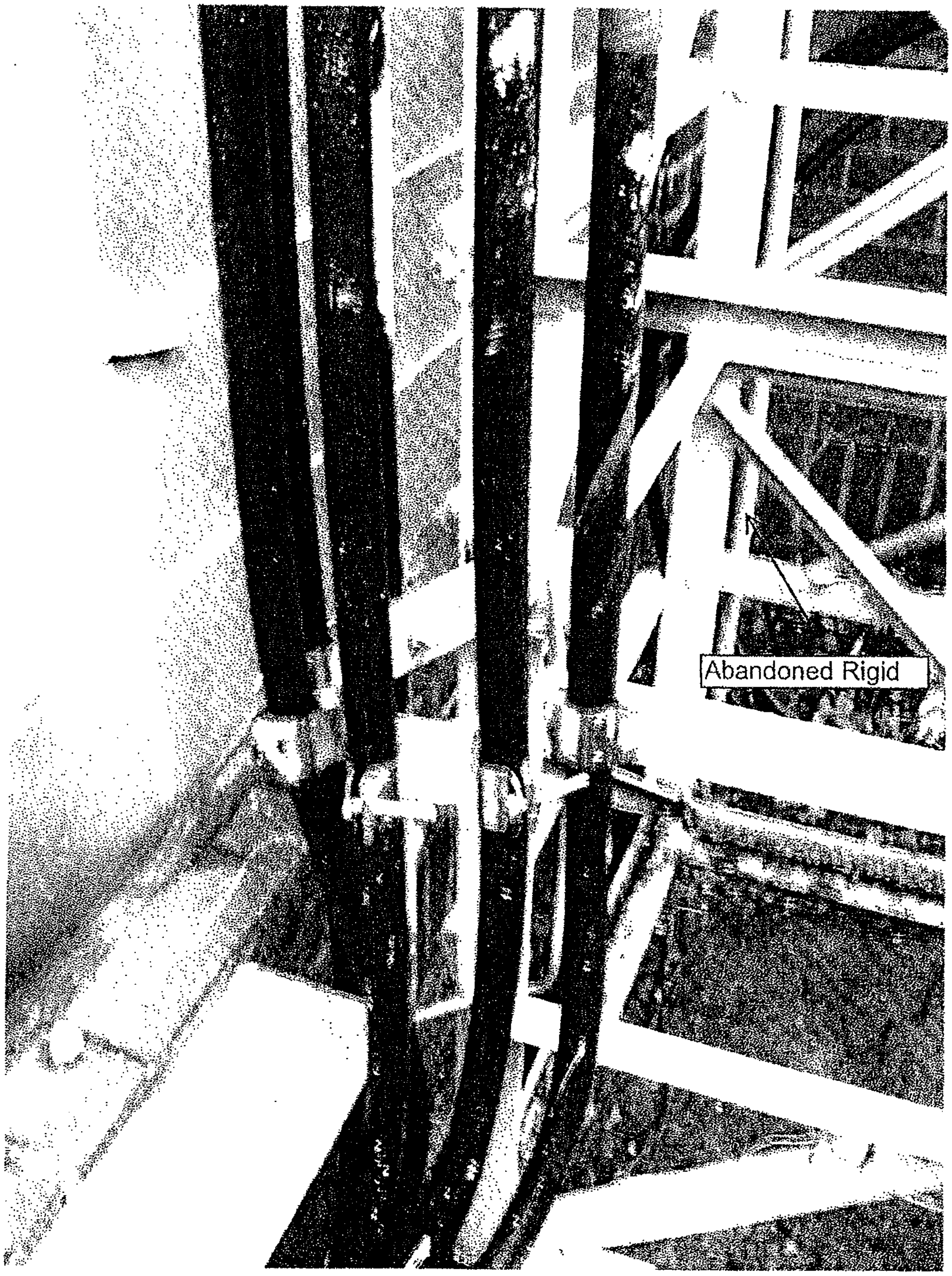
7.0 Empty Mount



8.0 T-Mobile



9.0 Coax



9.1 Coax

T · ·Mobile·

T-Mobile USA Inc.
35 Griffin Rd South, Bloomfield, CT 06002-1853
Phone: (860) 692-7100
Fax: (860) 692-7159

Technical Memo

To: Transcend
From: Amir Uzzaman - Radio Frequency Engineer
cc: Jason Overbey
Subject: Power Density Report for CT11031B
Date: February 2, 2011

1. Introduction:

This report is the result of an Electromagnetic Field Intensities (EMF - Power Densities) study for the T-Mobile antenna installation on a Self Support Tower at Comcast Tower/21 East Main Street, Clinton, CT. This study incorporates the most conservative consideration for determining the practical combined worst case power density levels that would be theoretically encountered from locations surrounding the transmitting location.

2. Discussion:

The following assumptions were used in the calculations:

1) The emissions from T-Mobile transmitters are in the (1935-1944.8), (2140-2145), (2110-2120)MHz frequency Band.
2) The antenna array consists of three sectors, with 1 antenna per sector.
3) The model number for GSM antenna is APX16DWV-16DWV.
3) The model number for UMTS antenna is APX16DWV-16DWV.
4) GSM antenna center line height is 60 ft.
4) UMTS antenna center line height is 60 ft.
5) The maximum transmit power from any GSM sector is 2542.85 Watts Effective Radiated Power (EiRP) assuming 8 channels per sector.
5) The maximum transmit power from any UMTS sector is 2885.96 Watts Effective Radiated Power (EiRP) assuming 2 channels per sector.
6) All the antennas are simultaneously transmitting and receiving, 24 hours a day.
7) Power levels emitting from the antennas are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.
8) The average ground level of the studied area does not change significantly with respect to the transmitting location.

Equations given in "FCC OET Bulletin 65, Edition 97-01" were then used with the above information to perform the calculations.

3. Conclusion:

Based on the above worst case assumptions, the power density calculation from the T-Mobile antenna installation on a Self Support Tower at Comcast Tower/21 East Main Street, Clinton, CT, is 0.40845 mW/cm^2. This value represents 40.845% of the Maximum Permissible Exposure (MPE) standard of 1 milliwatt per square centimeter (mW/cm^2) set forth in the FCC/ANSI/IEEE C95.1-1991. Furthermore, the proposed antenna location for T-Mobile will not interfere with existing public safety communications, AM or FM radio broadcasts, TV, Police Communications, HAM Radio communications or any other signals in the area.

Connecticut Market

Worst Case Power Density

Site:	**CT11031B**
Site Address:	**Comcast Tower/21 East Main Street**
Town:	**Clinton**
Tower Height:	**67 ft.**
Tower Style:	**Self Support Tower**

GSM Data		**UMTS Data**	
Base Station TX output	20 W	**Base Station TX output**	40 W
Number of channels	8	**Number of channels**	2
Antenna Model	APX16DWV-16DWV	**Antenna Model**	APX16DWV-16DWV
Cable Size	7/8 in	**Cable Size**	7/8 in
Cable Length	80 ft.	**Cable Length**	80 ft.
Antenna Height	60.0 ft.	**Antenna Height**	60.0 ft.
Ground Reflection	1.6	**Ground Reflection**	1.6
Frequency	1945.0 MHz	**Frequency**	2.1 GHz
Jumper & Connector loss	4.50 dB	**Jumper & Connector loss**	1.50 dB
Antenna Gain	18.0 dBi	**Antenna Gain**	18.0 dBi
Cable Loss per foot	0.0186 dB	**Cable Loss per foot**	0.0116 dB
Total Cable Loss	1.4880 dB	**Total Cable Loss**	0.9280 dB
Total Attenuation	5.9880 dB	**Total Attenuation**	2.4280 dB
Total EIRP per Channel	55.02 dBm	**Total EIRP per Channel**	61.59 dBm
(In Watts)	317.86 W	**(In Watts)**	1442.98 W
Total EIRP per Sector	64.05 dBm	**Total EIRP per Sector**	64.60 dBm
(In Watts)	2542.85 W	**(In Watts)**	2885.96 W
nsg	12.0120	**nsg**	15.5720
Power Density (S) =	**0.191317 mW/cm^2**	**Power Density (S) =**	**0.217132 mW/cm^2**

T-Mobile Worst Case % MPE = 40.8448%

Equation Used :

$$S = \frac{(1000)(grf)^2 (Power) * 10^{(nsg/10)}}{4\pi (R)^2}$$

Office of Engineering and Technology (OET) Bulletin 65, Edition 97-01, August 1997

Co-Location Total

Carrier	% of Standard
Verizon	
Cingular	
Sprint	
AT&T Wireless	
Pocket	
MetroPCS	
Nextel	
Other Antenna Systems	
Total Excluding T-Mobile	**0.0000 %**
T-Mobile	40.8448
Total % MPE for Site	**40.8448%**

EM-T-Mobile-027-110210

BROWNRUDNICK

THOMAS J. REGAN
Direct Dial: (860) 509-6522
tregan@brownrudnick.com

CityPlace I
185 Asylum
Street
Hartford
Connecticut
06103
tel 860.509.6500
fax 860.509.6501

Via Hand Delivery

February 10, 2011

RECEIVED
FEB 10 2011
CONNECTICUT
SITING COUNCIL

Daniel F. Caruso, Chairman
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

RE: Notice of Exempt Modification / Clinton @ 21 East Main Street

Dear Mr. Caruso:

On behalf of T-Mobile USA Inc. ("T-Mobile"), enclosed for filing are an original and five (5) copies of T-Mobile's Notice of Exempt Modification for the Facility located at the above-referenced site. A complete copy of the Structural Analysis Report is enclosed within the original filing. Included within each copy of the filing is the Report Section (Section 1) of the Structural Analysis Report for this Facility. Additional copies of the Structural Analysis Report will be submitted upon request.

I also enclose herewith a check in the amount of $625.00 representing the filing fee.

I would appreciate it if you would date-stamp the enclosed copy of this transmittal letter and return it to the courier delivering this package.

If you have any questions, please feel free to contact me.

Very truly yours,

BROWN RUDNICK LLP

By: ______________________
Thomas J. Regan

Enclosures
cc w/ encl. via 1st Class Mail – First Selectman William W. Fritz