NORTHEAST
SITE SOLUTIONS
Turnkey Wireless Development

Northeast Site Solutions
Denise Sabo
4 Angela's Way Burlington CT 06013
860-209-4690
denise@northeastsitesolutions.com

December 12, 2018

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

RE: Notice of Exempt Modification

440 Old Turnpike Road, Southington CT 06489
Latitude: 41.582824
Longitude: -72.883174
T-Mobile Site#: CTHA220_L700 4x2 – NHP18

Dear Ms. Bachman:

T-Mobile currently maintains six (6) antennas at the 147-foot and 155-foot level of the existing 254-foot lattice tower at 440 Old Turnpike Road, Southington CT. The 254-foot lattice tower is owned by Landmark Dividend LLC. The property is owned by DGS Holdings LLC. T-Mobile now intends to replace three (3) of its existing antennas with three (3) new 600/700 MHz antenna. The new antennas would be installed at the 147-foot level of the tower. Proposed tower modifications on baseplate and legs from 4'-6" through 84'-6".

Planned Modifications:

Tower:
Remove: (6) TMA

Remove and Replace:
(3) LNX 6515-A1M Antenna (REMOVE) - (3) RFS-APXVAARR24_43U-NA20 Antenna 600/700 MHz **(REPLACE)**
Install New:
(6) 1-5/8" Coax
(2) Hybrid Lines
(6) Diplexer
Existing to Remain:
(18) 1-5/8" Coax
(3)APX16 DWV Antenna 1900/2100 MHz

Ground:
Install New: (3) RRU on new H-Frame
This facility was approved by the CT Siting Council TS-T-Mobile-131-060411–on May 23, 2006 T-Mobile tower share was approved on the existing tower. Please see attached.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies§ 16- SOj-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.SA. § 16-SOj-73, a copy of this letter is being sent to Town Manager -Mark J. Sciota, Elected Official and Matthew A. Reimondo, Zoning Official for the City of Southington, as well as the property owner and the tower owner.

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

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

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

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

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

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

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

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

Sincerely,

Denise Sabo
Mobile: 860-209-4690
Fax: 413-521-0558
Office: 4 Angela's Way, Burlington CT 06013
Email: denise@northeastsitesolutions.com

Attachments
cc: Mark J. Sciota- Southington Town Manager
Matthew A. Reimondo– Southington Zoning Enforcement Officer
Landmark Dividend LLC - as tower owner
DGS Holdings LLC - as property owner

Exhibit A

CHA-336

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@po.state.ct.us
www.ct.gov/csc

May 23, 2006

Karina Fournier
Zoning Department
T-Mobile
100 Filley Street
Bloomfield, CT 06002

RE: **TS-T-MOBILE-131-060411** - Omnipoint Communications, Inc. (T-Mobile) request for an order to approve tower sharing at an existing telecommunications facility located at 440 Old Turnpike Road, Southington, Connecticut.

Dear Ms. Fournier:

At a public meeting held May 17, 2006, the Connecticut Siting Council (Council) ruled that the shared use of this existing tower site is technically, legally, environmentally, and economically feasible and meets public safety concerns, and therefore, in compliance with General Statutes § 16-50aa, the Council has ordered the shared use of this facility to avoid the unnecessary proliferation of tower structures. 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 with the condition that the inside of the compound is cleared of all vegetation for safety purposes, aesthetics, and to allow worker access.

This decision is under the exclusive jurisdiction of the Council. Any additional change to this facility may require an explicit request to this agency pursuant to General Statutes § 16-50aa or notice pursuant to Regulations of Connecticut State Agencies Section 16-50j-73, as applicable. Such request or 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. Any deviation from this format may result in the Council implementing enforcement proceedings pursuant to General Statutes § 16-50u including, without limitation, imposition of expenses resulting from such failure and of civil penalties in an amount not less than one thousand dollars per day for each day of construction or operation in material violation.

This decision applies only to this request for tower sharing and is not applicable to any other request or construction. Please be advised that the validity of this action shall expire one year from the date of this letter.

The proposed shared use is to be implemented as specified in your letter dated April 11, 2006, including the placement of all necessary equipment and shelters within the tower compound.

Thank you for your attention and cooperation.

Very truly yours,

Pamela B. Katz fsc

Pamela B. Katz, P.E.
Chairman

PBK/laf

c: The Honorable John Barry, Chairman Town Council, Town of Southington
Mary Hughes, Town Planner, Town of Southington
Davidson Media Group

G:\EM\T-MOBILE\SOUTHGTN\dc051706.DOC

CONNECTICUT SITING COUNCIL

Exhibit B

440 OLD TURNPIKE RD

Location	440 OLD TURNPIKE RD	**Mblu**	064/ / 047/ /
Acct#	13536	**Owner**	DGS HOLDINGS LLC ET AL
Assessment	$340,080	**Appraisal**	$485,830
PID	4801	**Building Count**	1

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2016	$335,680	$150,150	$485,830
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2016	$234,970	$105,110	$340,080

Owner of Record

Owner	DGS HOLDINGS LLC ET AL	**Sale Price**	$0
Co-Owner	C/O FULL POWER RADIO	**Certificate**	
Address	131 NEW LONDON TNPK STE# 101 GLASTONBURY, CT 06033	**Book & Page**	1363/1075
		Sale Date	02/22/2016
		Instrument	29

Ownership History

Ownership History					
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Instrument**	**Sale Date**
DGS HOLDINGS LLC ET AL	$0		1363/1075	29	02/22/2016
DGS HOLDINGS LLC ET AL	$0		1350/ 646	29	08/18/2015
DGS HOLDINGS LLC ET AL	$0		1275/ 902	29	03/11/2013
NES REALTY LLC & DGS HOLDINGS LLC	$0		1256/1065	29	09/21/2012
WINTEE REALTY LLC & DGS HOLDINGS LL	$100		1167/ 941	29	08/28/2009

Building Information

Building 1 : Section 1

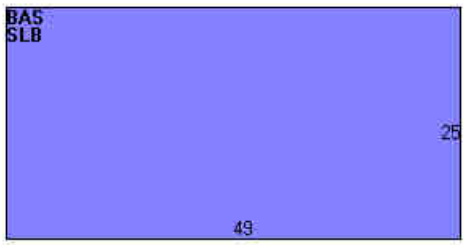
Year Built:	1975
Living Area:	1,225
Building Percent Good:	72

Building Attributes	
Field	**Description**
STYLE	Radio/TV Station
MODEL	Ind/Comm
Grade	C
Stories:	1
Occupancy	0
Exterior Wall 1	Concr/Cinder
Exterior Wall 2	
Roof Structure	Flat
Roof Cover	Tar & Gravel
Interior Wall 1	Average
Interior Wall 2	
Interior Floor 1	Average
Interior Floor 2	
Heating Fuel	Typical
Heating Type	Forced Hot Air
AC Type	Central
Bldg Use	Radio, Television Trans
Total Bedrooms	
Total Baths	
Wet Sprinkler	0
Dry Sprinkler	0
1st Floor Use:	
Heat/AC	Heat/AC Split
Frame Type	Masonry
Baths/Plumbing	Average
Ceiling/Wall	Typical
Rooms/Prtns	Average
Wall Height	9

Building Photo

(http://images.vgsi.com/photos2/SouthingtonCTPhotos//\00\05\

Building Layout



(http://images.vgsi.com/photos2/SouthingtonCTPhotos//Sketche

Building Sub-Areas (sq ft)			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	1,225	1,225
SLB	Slab	1,225	0
		2,450	1,225

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code 433
Description Radio, Television Trans

Land Line Valuation

Size (Acres) 3.1
Depth

Zone	I-1
Alt Land Appr	No
Category	

Outbuildings

Outbuildings					Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Bldg #**
FN1	Fence - Chain			160 L.F.	1
PAV1	Paving	AS	Asphalt	4000 S.F.	1
ANTS	Self Sup Tower			254 L.F.	1
FN1	Fence - Chain			40 L.F.	1
ANTS	Self Sup Tower			254 L.F.	1

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2017	$335,680	$150,150	$485,830
2016	$335,680	$150,150	$485,830
2015	$335,680	$150,150	$485,830
2014	$342,040	$157,950	$499,990
2013	$403,720	$157,950	$561,670

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2017	$234,970	$105,110	$340,080
2016	$234,970	$105,110	$340,080
2015	$234,970	$105,110	$340,080
2014	$239,430	$110,570	$350,000
2013	$282,600	$110,570	$393,170

Property Boundaries

- Historic Parcel Boundary
- Easement
- Town Boundary
- Parcels

Structures and Buildings

- Stone Wall
- Fence or Gate
- Wall or Barrier
- Pools
- Building or Structure
- Decks, Wharf or Pier

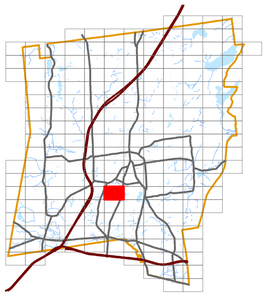
Natural Features

- Path or Trail
- Streams
- Lake or Pond
- River
- Swamp
- Recreational / Sportfield

Roads and Transportation

- Bridges
- Paved
- DriveWays and Parking Lots

074	075	076
063	064	065
052	053	054



Disclaimer:
This map is for informational purposes only. All information is subject to verification by any user. The Town of Southington and its mapping contractors assume no legal responsibility for the information contained herein.

Map: 064

NEGEO
New England Geosystems
www.negeosystems.com
282 Main Street Extension - C2
Middletown, CT 06457 • (203) 404 - 7129

1 inch equals 100 feet

100 0 100 200 300 400 500 600 Feet

Town of Southington, Connecticut 2018 Assessment Parcel Map

Map Coordinates based on NAD 83 Connecticut State Plane Feet.
Original planimetric features based on aerial photography dated April 1997. Planimetric features updated using aerial photography dated June 2016.

Map Produced October 2018

Map: 064

Exhibit C

ANTENNA UPGRADES BY

T-Mobile

T-MOBILE NORTHEAST LLC

PROJECT: L700 4X2

SITE NUMBER: CTHA220A

SITE NAME: HA220/WNTY TOWER_SST

SITE ADDRESS: 440 OLD TURNPIKE ROAD
SOUTHINGTON, CT 06489

(RF CONFIGURATION 67D94B)

PROJECT SCOPE:

UPGRADE OF EXISTING WIRELESS FACILITY AS FOLLOWS:
REPLACE (3) EXISTING ANTENNAS,
REMOVE (3) REMOTE RADIO UNITS (RRU) AT ANTENNAS,
ADD (3) REMOTE RADIO UNITS (RRU) AT GRADE,
REMOVE (6) EXISTING TOWER MOUNTED AMPLIFIER UNITS (TMA)
ADD (6) AWS/PCS DIPLEXER,
ADD (6) 1-5/8" COAX CABLES.

PROJECT NOTES:

1. THIS IS AN UNMANNED TELECOMMUNICATION FACILITY AND NOT FOR HUMAN HABITATION:
   HANDICAPPED ACCESS IS NOT REQUIRED.
   POTABLE WATER OR SANITARY SERVICE IS NOT REQUIRED.
   NO OUTDOOR STORAGE OR ANY
   SOLID WASTE RECEPTACLES REQUIRED.
2. CONTRACTOR SHALL VERIFY ALL PLANS, EXISTING DIMENSIONS, AND CONDITIONS ON THE JOB SITE. CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ARCHITECT/ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK. FAILURE TO NOTIFY THE ARCHITECT/ENGINEER PLACES THE RESPONSIBILITY ON THE CONTRACTOR TO CORRECT THE DISCREPANCIES AT THE CONTRACTOR'S EXPENSE.
3. DEVELOPMENT AND USE OF THE SITE WILL CONFORM TO ALL APPLICABLE CODES, ORDINANCES AND SPECIFICATIONS.
4. REFER TO STRUCTURAL ANALYSIS REPORT TITLED "STRUCTURAL ANALYSIS REPORT - UPGRADE, SELF-SUPPORT" SITE ID: CTHA220A, PREPARED BY DESTEK ENGINEERING.

APPLICABLE STATE ADOPTION CODES:

2018 CONNECTICUT STATE BUILDING CODE (CSBC).

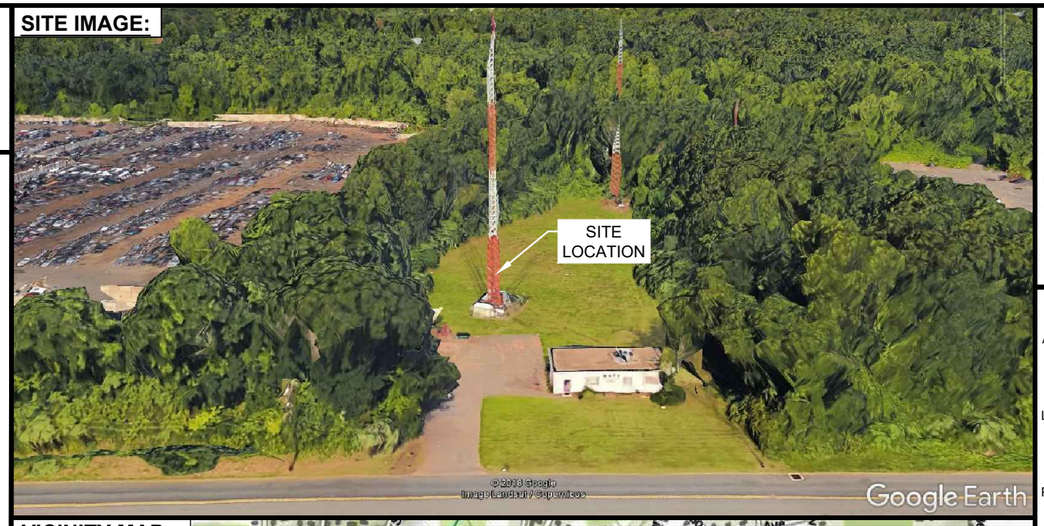
ANSI/TIA-222-G-2005 STRUCTURAL STANDARD FOR ANTENNA SUPPORTING STRUCTURES AND ANTENNAS.

2017 NATIONAL ELECTRICAL CODE (NFPA 70) FOR POWER AND GROUNDING REQUIREMENTS.

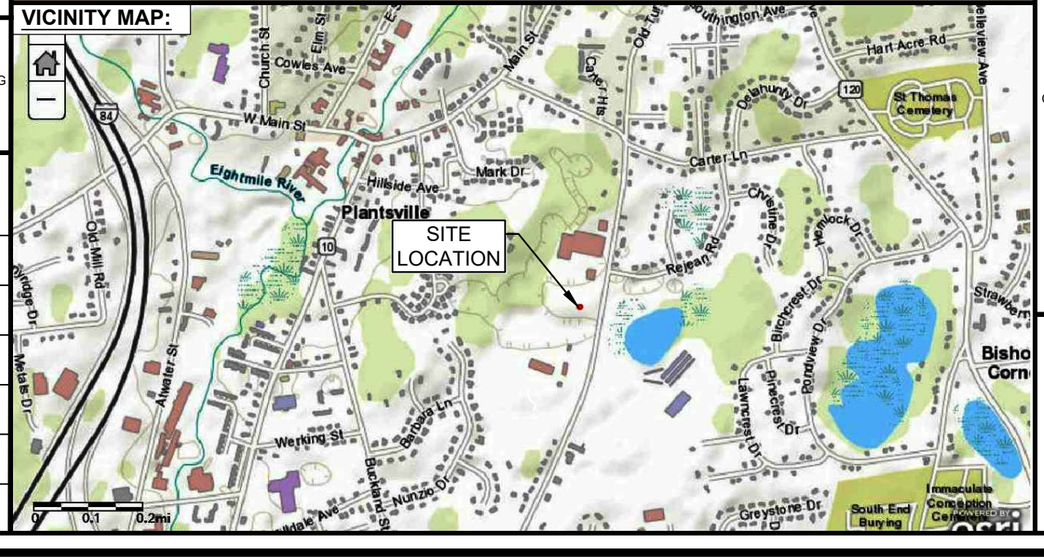
APPROVALS:

FSA CM	DATE
RF ENGINEER	DATE
FOPS	DATE
T-MOBILE ENGINEERING AND DEVELOPMENT	DATE
	DATE
	DATE

SITE IMAGE:



VICINITY MAP:



PROJECT INFORMATION:

ADDRESS:	440 OLD TURNPIKE ROAD SOUTHINGTON, CT 06489
STRUCTURE TYPE:	LATTICE TOWER
COORDINATES:	41.582824 N -72.883174 W
PARCEL:	MAP: 64 LOT: 47
CURRENT ZONING:	I-1

PROJECT TEAM:

APPLICANT:	T-MOBILE NORTHEAST, LLC. 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002 860-692-7100
LANDLORD:	DAVIDSON MEDIA GROUP 670 BROADWAY, SUITE 305 NEW YORK, NY 10012
PROJECT MANAGER:	NORTHEAST SITE SOLUTIONS 420 MAIN STREET, BLDG 4 STURBRIDGE, MA 01566 SHELDON FREINCLE SHELDON@NORTHEASTSITE SOLUTIONS.COM 201-776-8521
CONSULTANTS:	FORESITE LLC 462 WALNUT ST NEWTON, MA 02460 SAEED MOSSAVAT SMOSSAVAT@FORESITELLC.COM 617-212-3123

SHEET INDEX:

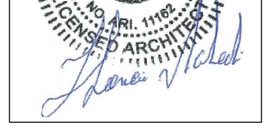
T-1:	TITLE SHEET
N-1:	GENERAL NOTES
A-1:	PLAN
A-2:	ELEVATION
A-3:	ANTENNA PLAN
A-4:	ANTENNA DETAILS
E-1:	GROUNDING DETAILS
S-1 ~ S-5:	STRUCTURAL MODIFICATION DESIGN

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

PROJECT MANAGER
NSS NORTHEAST SITE SOLUTIONS
Turnkey Wireless Development
420 MAIN STREET, BLDG 4
STURBRIDGE, MA 01566
203-275-6669

CONSULTANT:
FORESITE LLC
Architects . Engineers . Surveyors
462 WALNUT STREET
NEWTON, MA 02460
617-212-3123

PROFESSIONAL SEAL



REV	DESCRIPTION	DATE
A	PRELIMINARY	08/28/18
B	REVISED CABLES	08/29/18
0	SIGNED AND SEALED	09/22/18
1	REVISED CABLE COUNT	10/26/18

SITE NUMBER: CTHA220A
SITE NAME: HA220/WNTY TOWER_SST
SITE ADDRESS: 440 OLD TURNPIKE ROAD
SOUTHINGTON, CT 06489

SHEET TITLE:

T-1: TITLE SHEET

GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

11. BOLTING:

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

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

C. ALL CONNECTIONS SHALL BE 2 BOLTS MINIMUM.

12. FABRICATION:

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

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

13. ERECTION OF STEEL:

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

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

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

14. ANTENNA INSTALLATION:

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

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

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

15. ANTENNA AND COAXIAL / FIBER CABLE GROUNDING:

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

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

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

A. FLASHING OF OPENING INTO OUTSIDE WALLS

B. SEALING AND CAULKING ALL OPENINGS

C. PAINTING

D. CUTTING AND PATCHING

17. REQUIREMENTS OF REGULATORY AGENCIES:

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

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

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

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

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

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

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

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

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

J. 2009 LIFE SAFETY CODE NFPA – 101.

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

PROJECT MANAGER
NSS NORTHEAST SITE SOLUTIONS
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420 MAIN STREET, BLDG 4
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NEWTON, MA 02460
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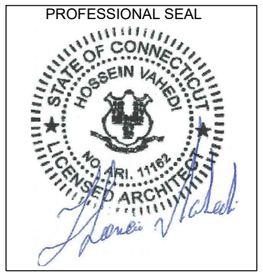
PROFESSIONAL SEAL



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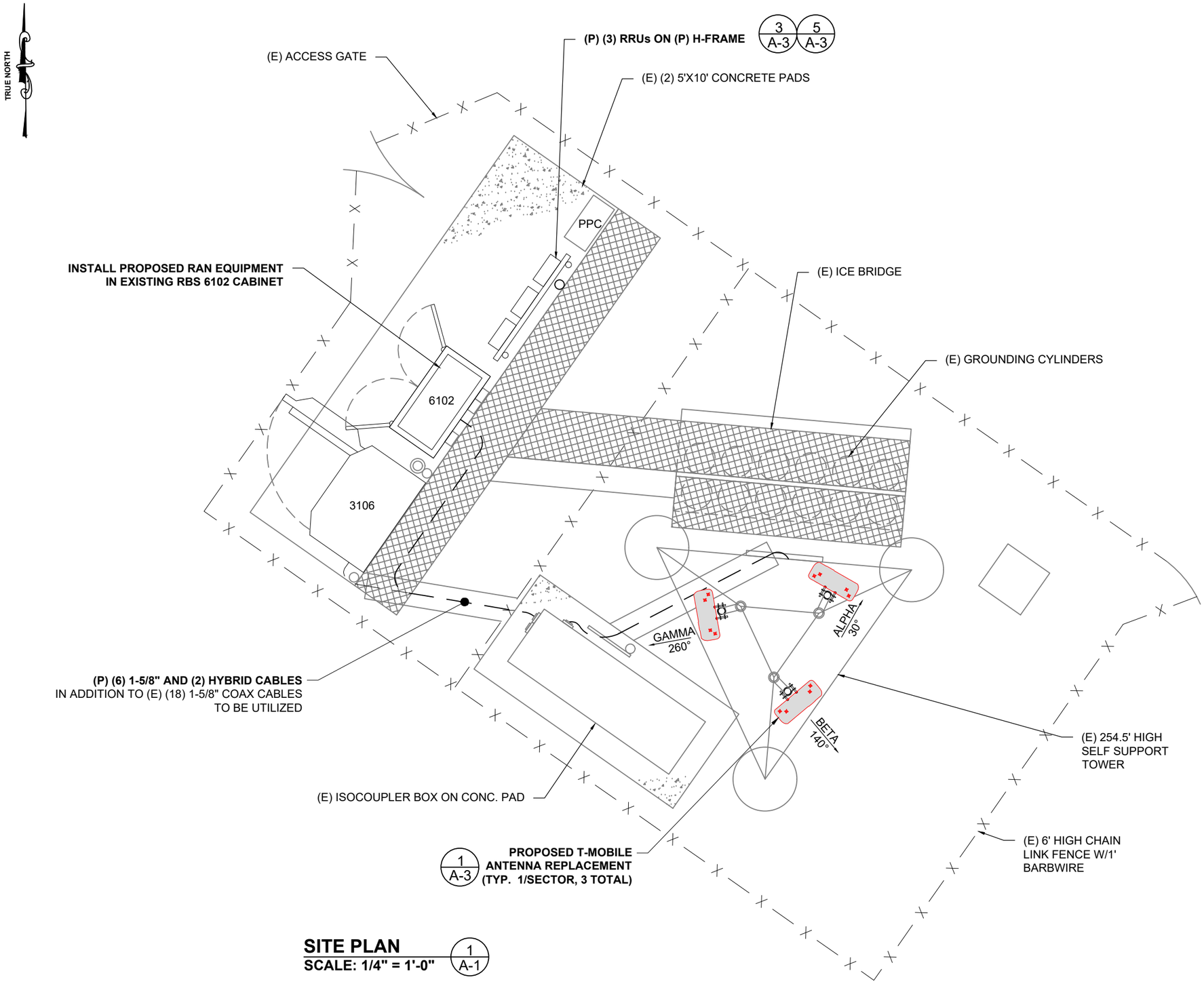
SOUTHINGTON, CT 06489

SHEET TITLE:
N-1: NOTES AND DISCLAIMERS



SITE PLAN

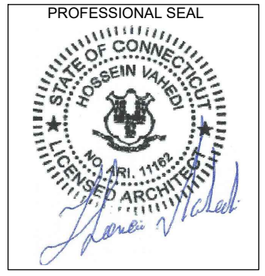
SCALE: 1/4" = 1'-0" (1 / A-1)

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

PROJECT MANAGER
NSS NORTHEAST SITE SOLUTIONS
Turnkey Wireless Development
420 MAIN STREET, BLDG 4
STURBRIDGE, MA 01566
203-275-6669

CONSULTANT:
FORESITE LLC
Architects . Engineers . Surveyors
462 WALNUT STREET
NEWTON, MA 02460
617-212-3123

PROFESSIONAL SEAL

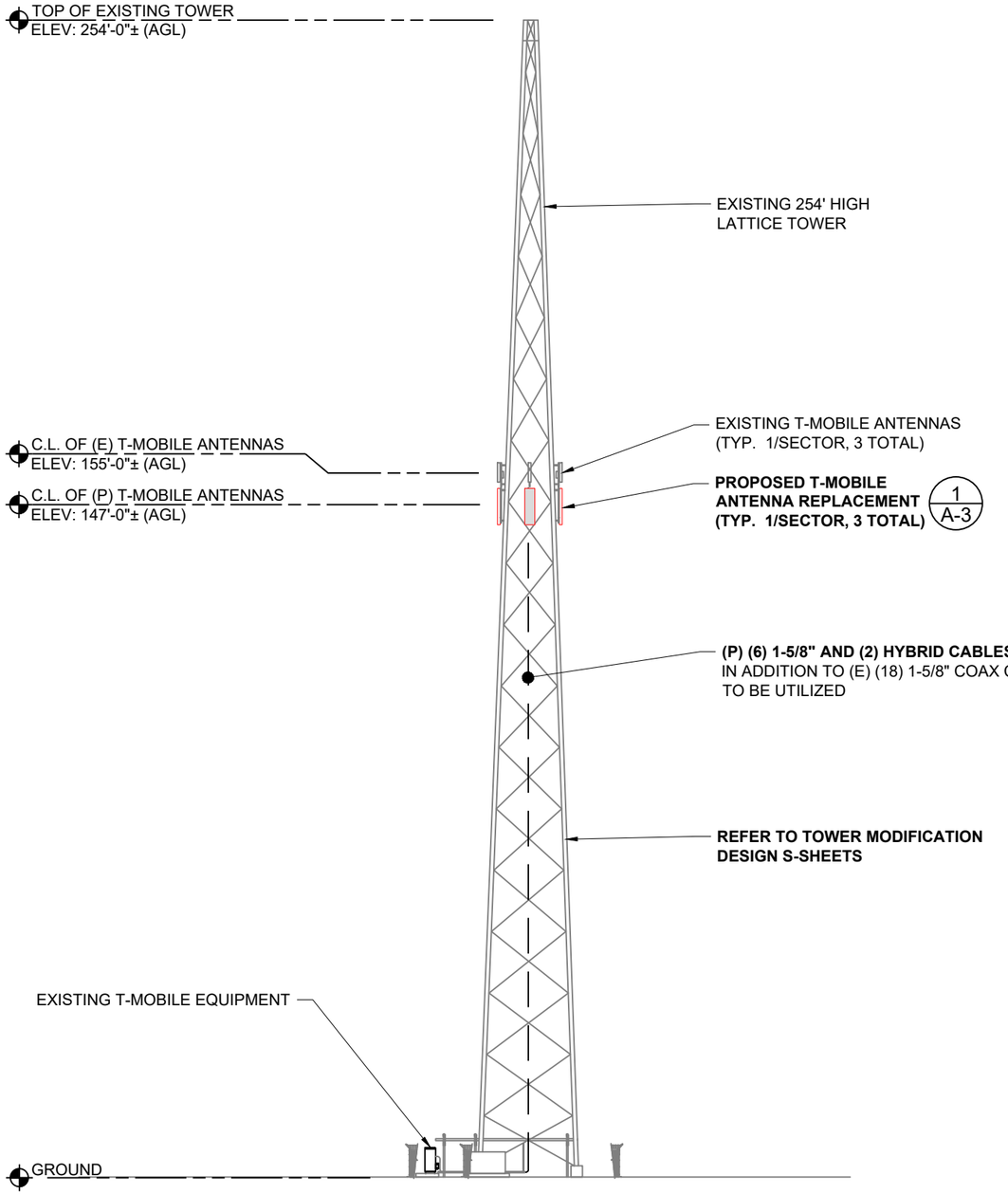


REV	DESCRIPTION	DATE
A	PRELIMINARY	08/28/18
B	REVISED CABLES	08/29/18
0	SIGNED AND SEALED	09/22/18
1	REVISED CABLE COUNT	10/26/18

SITE NUMBER: CTHA220A
SITE NAME: HA220/WNTY TOWER_SST
SITE ADDRESS: 440 OLD TURNPIKE ROAD
SOUTHINGTON, CT 06489

SHEET TITLE:
A-1: PLAN

NOTE: REFER TO STRUCTURAL MODIFICATION DESIGN OF TOWER - S SHEETS.



ELEVATION 1 / A-2
SCALE: 1" = 30'-0"

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

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NSS NORTHEAST SITE SOLUTIONS
Turnkey Wireless Development
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STURBRIDGE, MA 01566
203-275-6669

CONSULTANT:
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Architects . Engineers . Surveyors
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NEWTON, MA 02460
617-212-3123

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

REV	DESCRIPTION	DATE
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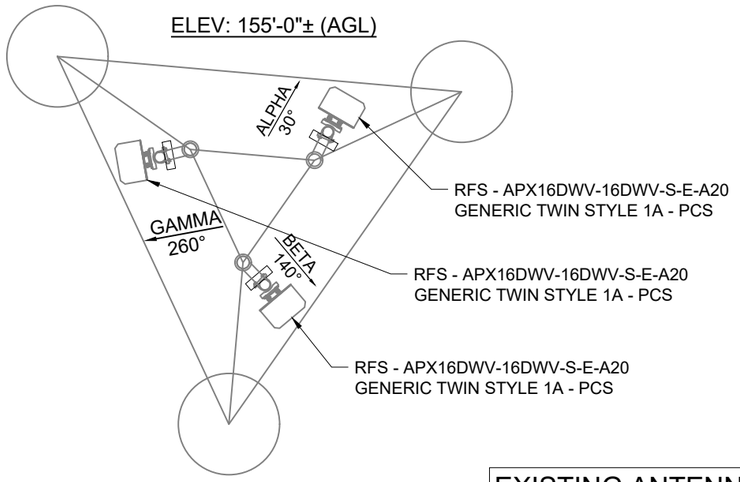
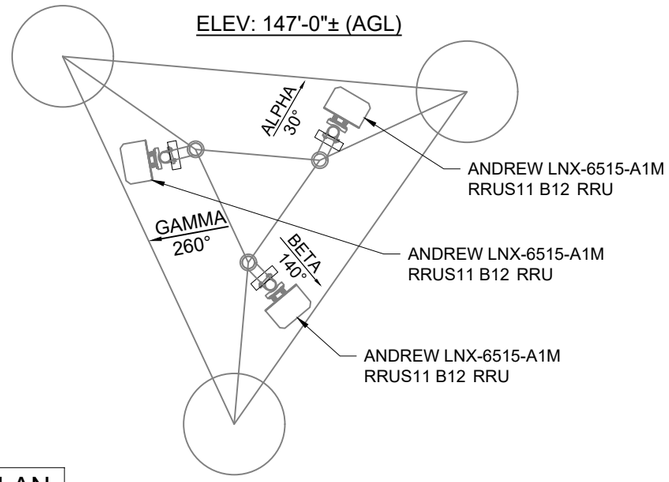
SHEET TITLE:
A-2: ELEVATION

TRUE NORTH

ELEV: 155'-0"± (AGL)

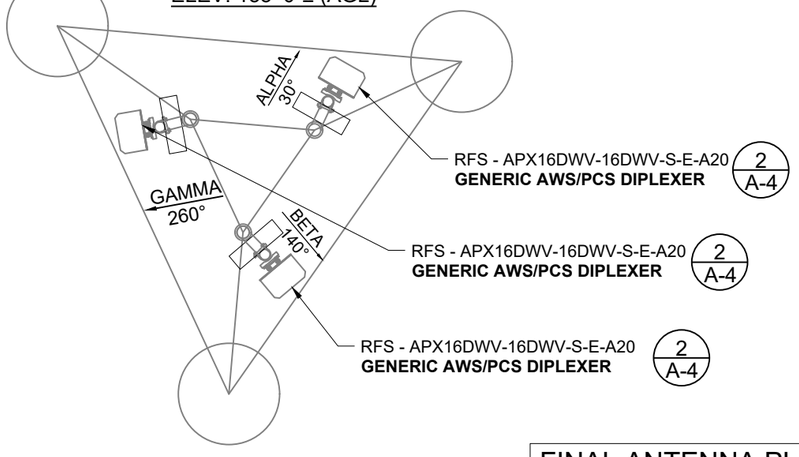


ELEV: 147'-0"± (AGL)

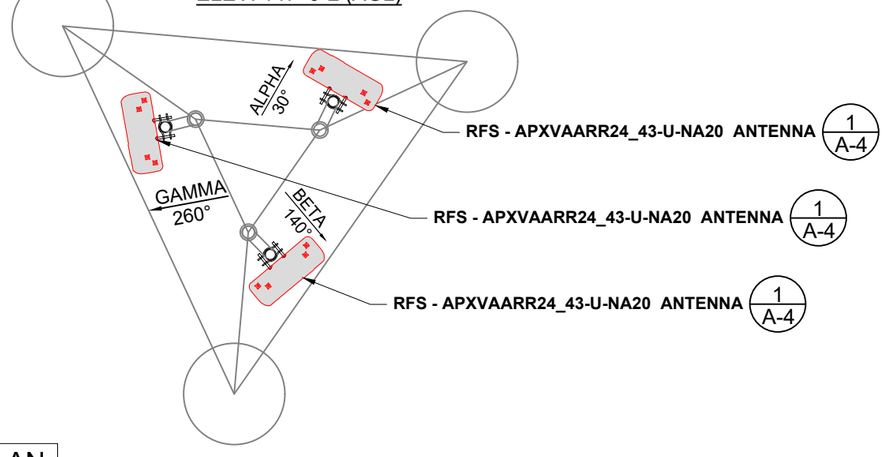


EXISTING ANTENNA PLAN

ELEV: 155'-0"± (AGL)



ELEV: 147'-0"± (AGL)



FINAL ANTENNA PLAN

ANTENNA PLAN (1 / A-3)
SCALE: NTS

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

PROJECT MANAGER
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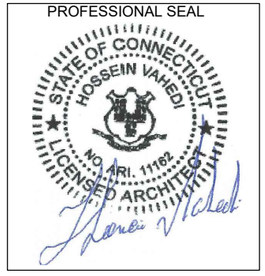
PROFESSIONAL SEAL



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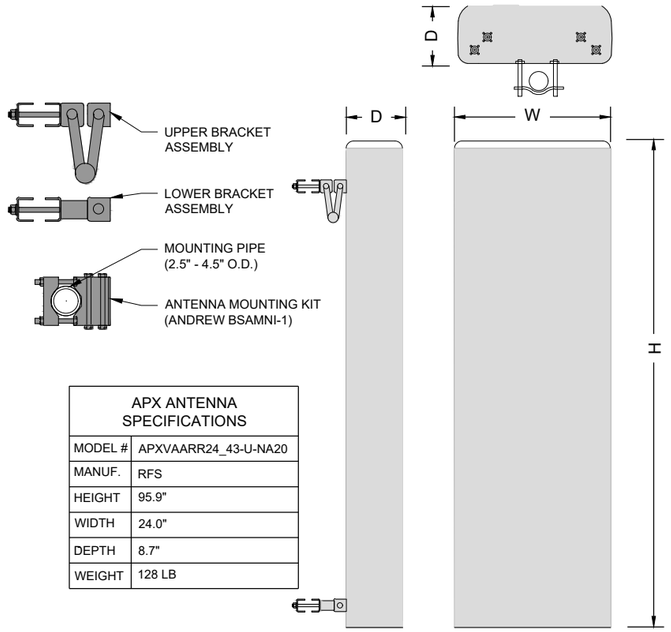
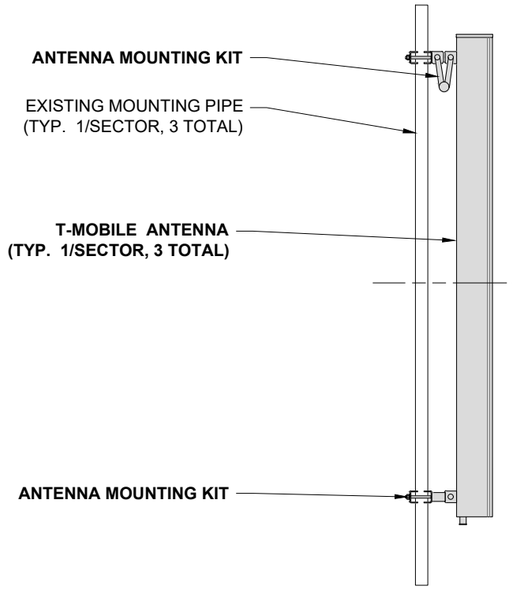
SITE ADDRESS: 440 OLD TURNPIKE ROAD
SOUTHINGTON, CT 06489

SHEET TITLE:
A-3: ANTENNA PLAN



APX ANTENNA SPECIFICATIONS	
MODEL #	APXVAARR24_43-U-NA20
MANUF.	RFS
HEIGHT	95.9"
WIDTH	24.0"
DEPTH	8.7"
WEIGHT	128 LB

RFS ANTENNA
N.T.S
1 / A-4

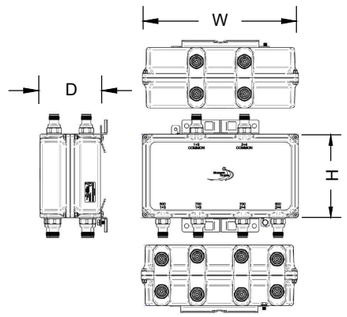


STRUCTURAL NOTES:

PRIOR TO COMMENCING CONSTRUCTION, GC SHALL REFER TO TOWER STRUCTURAL ANALYSIS REPORT AND MOUNT ASSESSMENT TO DETERMINE IF THERE IS ANY SUPPLEMENTAL OF SPECIAL INSTALLATION REQUIRED FOR ROOFTOP EQUIPMENT AND FOR CABLE BUNDLING, SHIELDING, MOUNTING, OR RELOCATION ARRANGEMENTS.

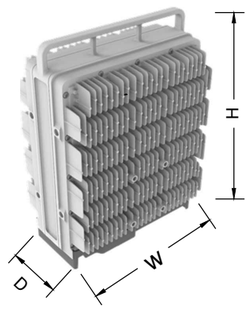
ANTENNA INSTALLATION SPECIAL WORK NOTE:
ANTENNA INSTALLATION WORKING POINT IS THE STRUCTURAL FACE FRAME VERTICAL CENTERLINE OF THE EXISTING ANTENNA SUPPORT ASSEMBLY. UNLESS NOTED OTHERWISE, VERTICALLY CENTERED PROPOSED PIPE MASTS AND ANTENNAS ON THIS WORKING POINT.

ANTENNA MOUNTING DETAIL
N.T.S
4 / A-4



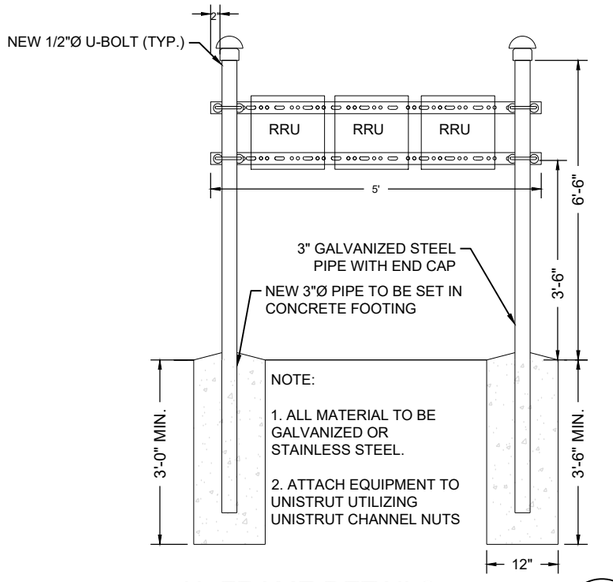
DIPLEXER SPECIFICATIONS	
MODEL #	MI-554nn
MANUF.	MICRODATA TELECOM
HEIGHT	6.34"
WIDTH	11.85"
DEPTH	5.71"
WEIGHT	15.87 LB

DIPLEXER
N.T.S
2 / A-4



REMOTE RADIO UNIT SPECIFICATIONS	
MODEL #	RADIO 4449 B71+B12
MANUF.	ERICSSON
HEIGHT	14.9"
WIDTH	13.2"
DEPTH	10.4"
WEIGHT	74 LB

REMOTE RADIO UNIT
N.T.S
3 / A-4



H- FRAME DETAILS
N.T.S
5 / A-4

APPLICANT:
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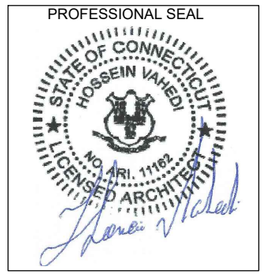
PROFESSIONAL SEAL



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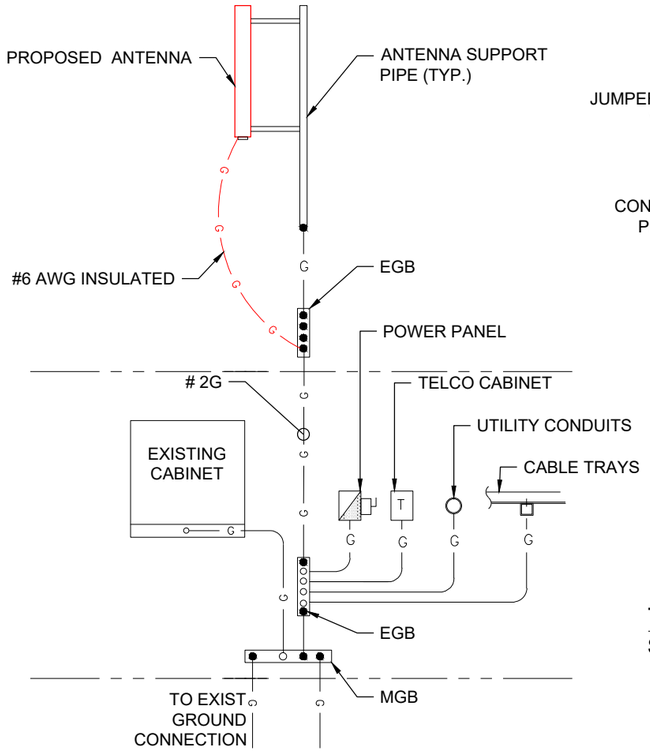
SOUTHINGTON, CT 06489

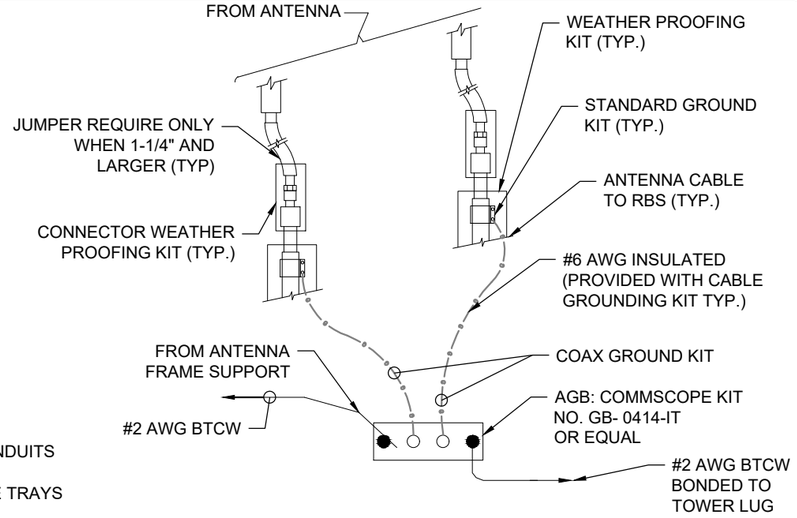
SHEET TITLE:
A-4: ANTENNA DETAILS

ELECTRICAL & GROUNDING NOTES

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

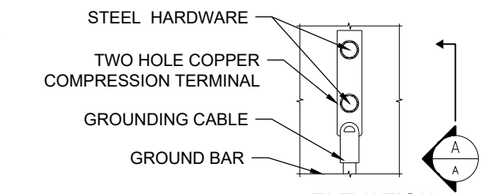


GROUNDING RISER DIAGRAM (1 / E–1)
SCALE: N.T.S

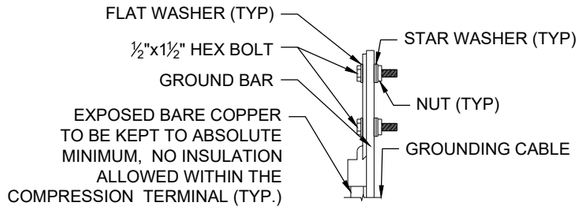


NOTES:
INSTALL CABLE GROUND KIT ABOVE HORIZONTAL BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO AGB/EGB

TOWER TOP CABLE GROUNDING DETAIL (2 / E–1)
SCALE: N.T.S



ELEVATION



SECTION A-A

NOTES:
1. "DOUBLING UP" OR "STACKING " OF CONNECTION IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.

TYPICAL GROUND BAR CONNECTIONS DETAIL (3 / E–1)
SCALE: N.T.S

APPLICANT:
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35 GRIFFIN ROAD SOUTH
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PROFESSIONAL SEAL
STATE OF CONNECTICUT · HOSSEIN VAHEDI · NO. ARI. 11162 · LICENSED ARCHITECT

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SITE NAME: HA220/WNTY TOWER_SST
SITE ADDRESS: 440 OLD TURNPIKE ROAD
SOUTHINGTON, CT 06489

SHEET TITLE:
E-1: GROUNDING AND ELECTRICAL DETAILS

NOTES:

1. UPGRADE DESIGN VALID FOR APPURTENANCES LISTED IN DESTEK ANALYSIS REPORT DATED 8/20/2018. CONTRACTOR TO REVIEW AND SHOULD ADHERE TO THE REPORT.

2. CONTRACTOR TO REMOVE AND REATTACH EXISTING APPURTENANCES AS NEEDED.

3. ALL DIMENSIONS ARE BASED ON A PREVIOUS STRUCTURAL ANALYSIS REPORT – POST MODIFICATION PREPARED BY EBI CONSULTING, DATED 8/22/2014.

4. CONTRACTOR TO FIELD VERIFY EXISTING TOWER MEMBER SIZES AND TOWER DIMENSIONS IN THE VICINITY OF THE UPGRADE, BEFORE FABRICATION OF STEEL AND COMMENCEMENT OF WORK. ANY DISCREPANCY SHOULD BE REPORTED TO DESTEK IMMEDIATELY FOR FURTHER EVALUATION.

5. DO NOT PERFORM THE WORK ON THE TOWER WHEN WINDS GUST MORE THAN 15 MPH AT THE GROUND LEVEL.

6. NEW TOWER REACTIONS:

BASE MOMENT:	2019 KIP–FT
LEG UPLIFT:	224 KIPS
LEG COMPRESSION:	242 KIPS
LEG SHEAR:	15 KIPS

7. CONTRACTOR TO HAVE THE SAFETY CLIMB INTACT AND FUNCTIONAL AFTER WORK IS COMPLETE.

8. TOWER WILL BECOME UNSTABLE WHEN MEMBERS ARE DISCONNECTED OR BEING REPLACED. CONTRACTOR IS FULLY RESPONSIBLE TO MAINTAIN STABILITY OF THE TOWER DURING WORK AND SHOULD CONSULT WITH AN ENGINEER.

9. DESTEK DISCLAIMS ANY LIABILITY ARISING FROM THE ORIGINAL MATERIAL, FABRICATION OR ERECTION OF THE TOWER.

10. ALL CONSTRUCTION MEANS AND METHODS; INCLUDING BUT NOT LIMITED TO, ERECTION PLANS, RIGGING PLANS, CLIMBING PLANS, AND RESCUE PLANS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR RESPONSIBLE FOR THE EXECUTION OF THE WORK CONTAINED HEREIN AND SHALL MEET ANSI/ASSE A10.48 (LATEST EDITION), OSHA, AND GENERAL INDUSTRY STANDARDS. ALL RIGGING PLANS SHALL ADHERE TO ANSI/ASSE A10.48 (LATEST EDITION) INCLUDING THE REQUIRED INVOLVEMENT OF A QUALIFIED ENGINEER FOR CLASS IV CONSTRUCTION.

1. DESIGN INFORMATION AND GENERAL REQUIREMENTS

1.1 CODES
a. 2016 CONNECTICUT STATE BUILDING CODE, INTERNATIONAL CODE COUNCIL AND CONNECTICUT DEPARTMENT OF ADMINISTRATIVE SERVICES
b. MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES, ASCE/SEI 7–10, AMERICAN SOCIETY OF CIVIL ENGINEERS
c. STEEL CONSTRUCTION MANUAL, 14TH EDITION, AMERICAN INSTITUTE OF STEEL CONSTRUCTION
d. STRUCTURAL STANDARD FOR ANTENNA SUPPORTING STRUCTURES AND ANTENNAS, ANSI/TIA–222–G, TELECOMMUNICATIONS INDUSTRY ASSOCIATION
e. BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE, ACI 318–11

1.2 GENERAL
a. PRIOR TO PURCHASE OR FABRICATION OF MATERIAL, THE CONTRACTOR SHALL PERFORM AN INSPECTION VERIFYING MEMBER DIMENSIONS AND BOLT SIZES. SHOULD THE CONTRACTOR DISCOVER ANY DAMAGED OR MISSING MEMBERS OR THE MEMBER OR BOLT SIZES DO NOT MATCH THOSE LISTED, DESTEK SHALL BE NOTIFIED IMMEDIATELY.
b. CONTRACTOR TO REPLACE ALL BOLTS REMOVED WITH NEW BOLTS OF SAME TYPE, UNLESS NOTED OTHERWISE.

1.3 LOADS & DESIGN CRITERIA
a. WIND LOADING: V=97MPH, EXPOSURE CATEGORY C, STRUCTURE CLASS II

2. STRUCTURAL STEEL

2.1 MATERIALS
a. STRUCTURAL STEEL . . . . . ASTM A992
ANGLE & PLATE . . . . . ASTM A36 U.N.O.
PIPE . . . . . ASTM A53 GRADE B (OR Fy>35KSI)
HSS ROUND . . . . . ASTM A500 GRADE B (OR Fy>42KSI)
BARS (SOLID RODS) . . . . . ASTM A572 GRADE 50
b. BOLTS . . . . . ASTM A325N U.N.O.
c. WELDING ELECTRODES . . . . . AWS A5.1 (E70XX)
d. STEEL CONSTRUCTION SHALL CONFORM TO "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS, ANSI/AISC 360–10"
e. WELDING SHALL CONFORM TO AWS D1.1/D1.3/D1.7 AS APPLICABLE.
f. THE FABRICATOR SHALL FURNISH CHECKED SHOP AND ERECTION DRAWINGS TO THE ENGINEER, AND OBTAIN APPROVAL PRIOR TO FABRICATING ANY STRUCTURAL STEEL. SHOP DRAWINGS SHALL CONFORM TO "DETAILING FOR STEEL CONSTRUCTION, 2ND EDITION"
g. POOR MATCHING OF HOLES SHALL BE CORRECTED BY DRILLING TO THE NEXT LARGER SIZE. WELDING FOR RE–DRILLING WILL NOT BE PERMITTED.

2.2 CONNECTIONS
a. SHOP CONNECTIONS MAY BE BOLTED OR WELDED
b. FIELD CONNECTIONS BOLTED WITH A325–N BOLTS, (INSTALLED SNUG TIGHT) UNLESS OTHERWISE SPECIFIED OR IF WELDED CONNECTIONS ARE NOTED ON DRAWINGS
c. FIELD CONNECTIONS SHALL BE MADE WITH A325–N BOLTS AND HARDENED WASHERS EXCEPT AS INDICATED ON THE DESIGN DRAWINGS
d. CONNECTIONS NOT SHOWN ON DRAWINGS SHALL BE DESIGNED BY THE STEEL FABRICATOR. CONNECTIONS SHALL BE DESIGNED IN ACCORDANCE WITH AISC "SPECIFICATIONS FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS" AND "AISC CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES"
e. DO NOT FIELD CUT OR ALTER STRUCTURAL MEMBERS WITHOUT PRIOR WRITTEN APPROVAL OF ENGINEER.
f. BOLT HOLES SHALL BE CUT, DRILLED OR PUNCHED AT RIGHT ANGLES TO THE SURFACE OF THE METAL AND SHALL NOT BE MADE OR ENLARGED BY BURNING. HOLES SHALL BE CLEAN CUT WITHOUT TORN OR RAGGED EDGES. OUTSIDE BURRS RESULTING FROM DRILLING OR REAMING OPERATION SHALL BE REMOVED WITH A TOOL MAKING A 1/16 INCH BEVEL. BOLT HOLES SHALL BE 1/16 INCH OVERSIZE.

2.3 FINISHES
a. STRUCTURAL STEEL SHALL BE HOT DIP GALVANIZED AFTER FABRICATION PER ASTM A123
b. BOLTS AND NUTS SHALL BE HOT DIP GALVANIZED PER ASTM A153.
c. ALL SURFACES DAMAGED DURING THE WORK SHALL BE PAINTED WITH COLD GALVANIZING COMPOUND TWICE. THE PAINT SHOULD BE AT LEAST 93% PURE ZINC. RUST–OLEUM PROFESSIONAL, (MODEL# 7585838) OR SIMILAR.

2.4 WELDING
a. CONTRACTOR TO TAKE ALL NECESSARY PRECAUTIONS FOR FIRE PREVENTION DURING WELDING, SUCH AS; INSTALLING 3000 (NFPA 701) FIRE BLANKET AROUND COAX. MORE SPLATTER AND SPARKS SHOULD BE ANTICIPATED WHILE WELDING ON GALVANIZED SURFACE. COAX IS FLAMMABLE AND SHALL CATCH FIRE IF NOT PROTECTED. WATER SHALL BE ON SITE OF ADEQUATE AMOUNT AND AVAILABLE AT SHORT NOTICE AT ALL TIMES DURING WELDING ACTIVITY. CONTRACTOR SHOULD BE ABLE TO TRANSPORT THE WATER TO THE HEIGHT WELDING BEING PERFORMED.
b. WELDING ON GALVANIZED SURFACE SHOULD BE DONE WITH EXTREME CAUTION. IF THE WELD MATERIAL IS CONTAMINATED WITH ZINC, IT DOES NOT PROVIDE A STRUCTURAL WELD. GRIND GALVANIZING BEFORE WELDING.
c. WELDING CERTIFICATE MUST BE PROVIDED PRIOR TO WELDING. ALL WELDING SHALL BE PERFORMED BY AWS QUALIFIED WELDER WHO HAS EXPERIENCE WITH GALVANIZED SURFACES.

EPOXY GROUTED REINFORCING ANCHOR ROD NOTES:

1. IF EXISTING ANCHOR/REBAR MATERIAL IS ENCOUNTERED DURING DRILLING, RELOCATE HOLE AND GROUT FILL IMPEDED HOLE WITH 5000 PSI NON SHRINK GROUT.

2. THE CORE–DRILLED HOLES IN THE CONCRETE FOR THE ANCHOR RODS SHALL BE CLEAN AND DRY, AND OTHERWISE PROPERLY PREPARED ACCORDING TO THE ANCHOR ROD AND EPOXY MANUFACTURERS' INSTRUCTIONS, PRIOR TO PLACEMENT OF ANCHOR RODS AND EPOXY. CONTRACTOR SHALL FOLLOW ALL ANCHOR ROD AND EPOXY MANUFACTURER RECOMMENDATIONS REGARDING HANDLING OF RODS, EPOXY, ACCEPTABLE AMBIENT TEMPERATURE RANGE DURING INSTALLATION AND POST–INSTALLATION CURING, THE EFFECT OF TEMPERATURE ON EPOXY CURING TIME, PREPARATION OF HOLE, ETC.

3. ONCE THE REINFORCING ANCHOR RODS HAVE BEEN INSTALLED AND ALL EPOXY AND GROUT HAVE CURED, ALL REINFORCING ANCHOR RODS SHALL BE LOAD TESTED PER ASTM E488–96. FORCE MEASUREMENT SYSTEMS SHALL BE CALIBRATED IN ACCORDANCE WITH ASTM E4–16, STANDARD PRACTICES FOR FORCE VERIFICATION OF TESTING MACHINES. NEW ANCHOR SHALL BE PROOF LOADED TO 87 KIPS.
a. THE CONTRACTOR SHALL ENSURE THAT THE CONSTRUCTION DOES NOT GO BEYOND THE POINT WHERE THE ANCHOR RODS CAN BE EFFECTIVELY TESTED PRIOR TO THOSE TESTS BEING CONDUCTED. COORDINATION WITH THE TEST FIRM MAY BE NECESSARY TO ESTABLISH THIS POINT. CONSTRUCTION MAY PROCEED AFTER THE TESTING IS COMPLETED.
b. SUITABLE EQUIPMENT SHALL BE USED TO PERFORM TESTS REQUIRED TO VERIFY CORRECT INSTALLATION AND PROVIDE PROOF LOADS AND DISPLACEMENT TEST ON POST–INSTALLED ANCHOR RODS. THE EQUIPMENT SHALL BE CAPABLE OF MEASURING THE FORCES TO WITHIN +/– 2% OF THE APPLIED LOAD.
c. THE TEST SYSTEM SUPPORT SHALL BE OF SUFFICIENT SIZE AND DESIGN TO PREVENT DAMAGE TO THE SURROUNDING STRUCTURAL ELEMENTS, EQUIPMENT, AND FOUNDATION. SPECIFICALLY, THE PARTIES RESPONSIBLE FOR TESTING THE ANCHOR SHALL ENSURE WHEN THE LOAD TEST TRANSFERS THROUGH THE CONCRETE AN ADEQUATE SIZE BEARING PLATE BE USED.
d. TEST SYSTEM USED SHALL HAVE TWO PRESSURE GAUGES IN SERIES TO ENSURE PROPER GAUGE FUNCTION.
e. FORCES SHALL BE APPLIED THROUGH THE CENTER OF AND IN ALIGNMENT WITH THE ANCHOR ROD.
f. INCREASE APPLIED LOADS TO THE MAXIMUM SPECIFIED TARGET TENSION WITHOUT DISPLACEMENT FAILURE.
g. PERFORM A PRE–TEST BY CYCLING THE ANCHOR ROD ONCE UP TO AND DOWN FROM THE TARGET TENSION LOAD TO INITIATE STRAIN CRACKING OF EPOXY/GROUT AND ESTABLISH THE BASE LINE FOR DEFLECTION MEASUREMENTS.
- LOAD THE ANCHOR ROD TO 33% OF TARGET TENSION AND HOLD FOR 1 MINUTE, RECORD DISPLACEMENT.
- LOAD THE ANCHOR ROD TO 66% OF TARGET TENSION AND HOLD FOR 1 MINUTE, RECORD DISPLACEMENT.
- LOAD THE ANCHOR ROD TO 100% OF TARGET TENSION AND HOLD FOR 2 MINUTES, RECORD DISPLACEMENT.
- RELEASE THE LOAD FROM THE ANCHOR ROD AND STOP AT 66%. HOLD FOR 1 MINUTE, RECORD DISPLACEMENT.
- RELEASE THE LOAD FROM THE ANCHOR ROD AND STOP AT 33%. HOLD FOR 1 MINUTE, RECORD DISPLACEMENT.
- FULLY RELEASE THE LOAD FROM THE ANCHOR ROD. AFTER THE LOAD HAS BEEN RELEASED FOR TWO MINUTES RECORD THE BASELINE DEFLECTION.
- IF THE ANCHOR ROD IS UNABLE TO MAINTAIN THE TARGET TENSION DURING ANY OF THE STAGES OF THE PRE–TEST, RECORD THE VALUES THAT THE ROD SETTLED AT AND CONTINUE ON WITH THE PRE–TEST CYCLE PROCEDURE UNTIL COMPLETED.
- UPON COMPLETION OF THE PRE–TEST RESET THE DISPLACEMENT GAUGE TO ZERO.

h. TEST CYCLE SEQUENCE IS AS FOLLOWS:
- INCREMENTALLY LOAD ANCHOR ROD TO TARGET TENSION. MEASURE AND RECORD DISPLACEMENT VALUES WHEN THE ROD IS AT 33% OF TARGET TENSION, 66% OF TARGET TENSION, AND 100% OF TARGET TENSION. EACH INCREMENT SHALL BE LOADED AT A MINIMUM TIME SPAN OF 20 SECONDS PER INCREMENT.
- UPON RECORDING THE 100% TARGET TENSION DISPLACEMENT VALUE FROM THE ANCHOR ROD, ALLOW THE ROD TO HOLD THE TARGET TENSION FOR AN ADDITIONAL TWO MINUTES. WHEN THE TWO MINUTES ARE COMPLETED, RELEASE THE LOAD OFF THE ANCHOR ROD IN A CONTROLLED MANNER. LET THE ANCHOR ROD SETTLE FOR AN ADDITIONAL TWO MINUTES AND RECORD THE FINAL DISPLACEMENT OF THE ANCHOR ROD.
- IF A DECREASE OF PRESSURE IS OBSERVED DURING THE PULL TEST, THE FOLLOWING ACTION ITEMS SHALL BE USED:
  - IF THE FORCE IN THE ANCHOR ROD REMAINS WITHIN 98% OF ITS TARGET TENSION FOR TWO MINUTES, NO ACTION IS NEEDED.
  - IF THE FORCE IN THE ANCHOR ROD FALLS UNDER 98% BUT NO LESS THAN 95% OF THE TARGET TENSION, THE TESTER SHALL APPLY ADDITIONAL PRESSURE TO BRING THE ANCHOR ROD BACK TO THE TARGET TENSION WITHOUT STOPPING THE TEST.
  - IF THE FORCE IN THE ANCHOR ROD FALLS UNDER 95% OF THE TARGET TENSION, THE TESTER SHALL APPLY ADDITIONAL PRESSURE TO BRING THE ANCHOR ROD BACK TO THE TARGET TENSION AND RESTART 2 MINUTE INCREMENT.
- MAINTAIN COMPLETE LOAD–DISPLACEMENT RECORDS THROUGHOUT THE TEST. THE DATA RECORDS SHALL INCLUDE A TIME RECORD OF THE BEGINNING AND END OF EACH INCREMENT OF LOADING.
- IF A DISPLACEMENT GREATER THAN 0.01 INCHES MEASURED FROM THE BASE LINE REMAINS AFTER THE FIRST TEST CYCLE, FURTHER TESTS SHALL BE PERFORMED. A MAXIMUM OF 2 ADDITIONAL TEST CYCLES ARE PERMITTED TO DETERMINE IF ANCHOR ROD MOVEMENT CONTINUES TO ACCUMULATE. THESE TESTS SHALL NOT INCLUDE ANY FURTHER PRE–TESTING OF THE ROD. TOTAL RESIDUAL MOVEMENT SHALL NOT EXCEED 0.05 INCHES. INCREMENTAL RESIDUAL MOVEMENTS RECORDED FROM EACH TEST CYCLE MUST BE DECREASING IN VALUE AND STABILIZE TO A VALUE NO MORE THAN 0.01 INCHES. ANCHORS NOT MEETING THE TOTAL RESIDUAL MOVEMENT AND/OR THE INCREMENTAL RESIDUAL MOVEMENT LIMITATIONS SHALL BE CONSIDERED TO HAVE FAILED THE TEST.

i. IF ANY ANCHOR ROD FAILS THE PULL TEST, THE PULL TEST VENDOR SHALL NOTIFY THE ENGINEER OF RECORD AND GENERAL CONTRACTOR.

4. ONCE THE REINFORCING ANCHOR RODS HAVE BEEN SUCCESSFULLY LOAD TESTED AND APPROVED, CONTRACTOR SHALL RELEASE ALL OF THE PROOF LOAD AND TIGHTEN ALL ANCHOR NUTS TO SNUG TIGHT PLUS ⅛ TURN OF THE NUT.

5. CONTRACTOR SHALL VERIFY THAT EXISTING BASE PLATE GROUT IS IN GOOD CONDITION.

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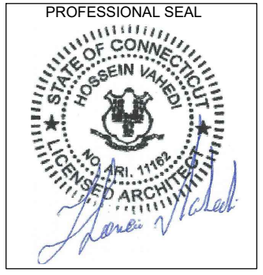
PROFESSIONAL SEAL



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1	REVISED CABLE COUNT	10/26/18

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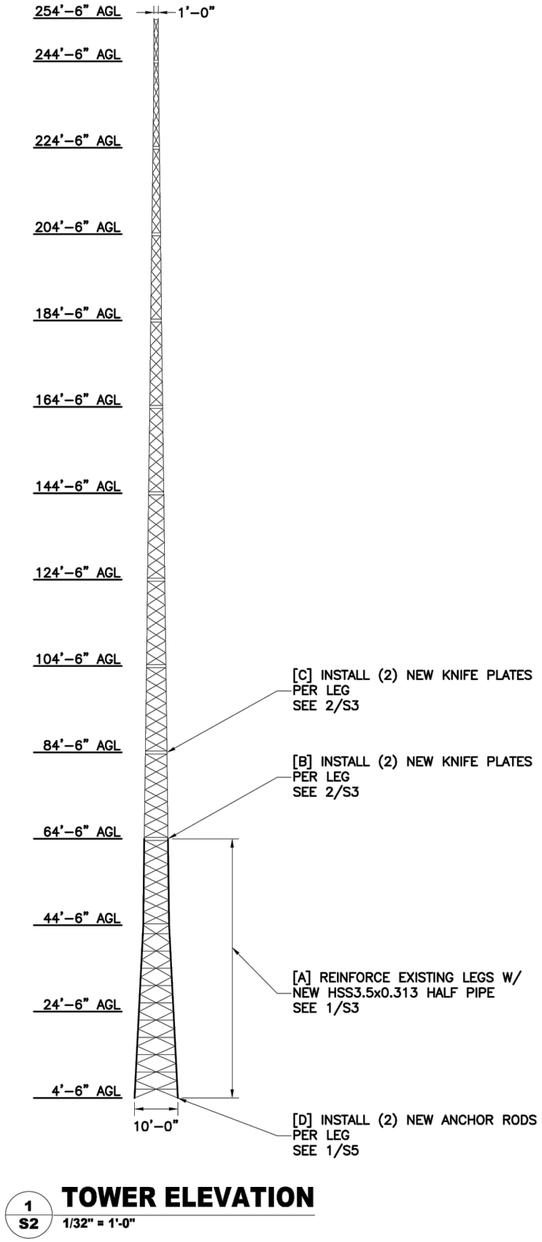
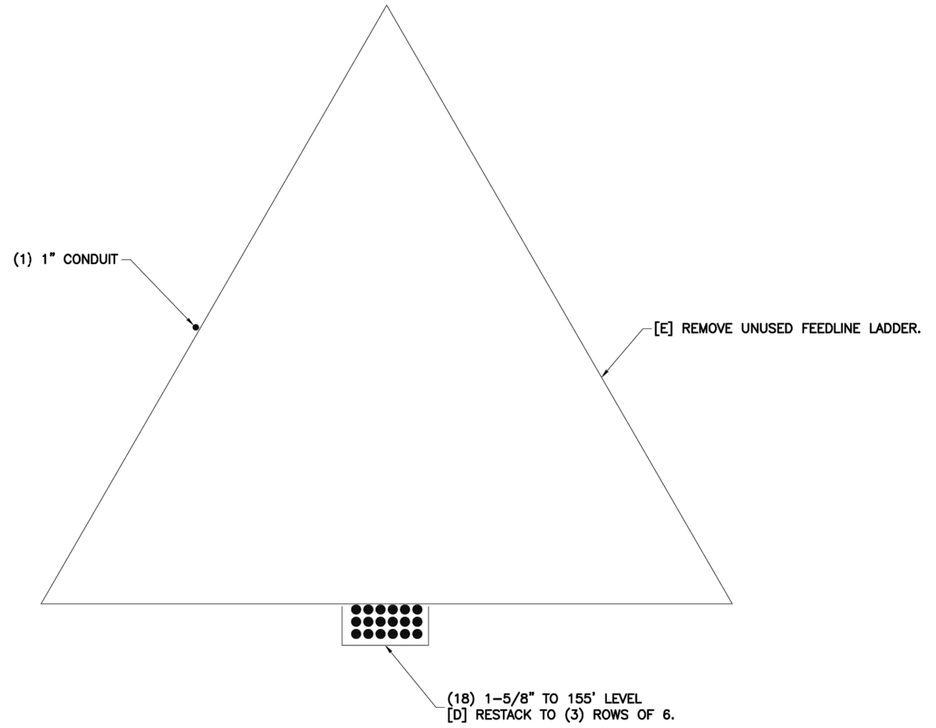
SITE NAME: HA220/WNTY TOWER_SST
SITE ADDRESS: 440 OLD TURNPIKE ROAD
SOUTHINGTON, CT 06489

SHEET TITLE:
S-1: STRUCTURAL UPGRADE DETAILS

SELF-SUPPORT TOWER EXISTING MEMBER SIZES														
SECTION	T13	T12	T11	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1	
LEGS	SR 2¾"				SR 2½"		SR 2¼"	SR 2"		SR 1¾"	SR 1½"	SR 1¼"		
DIAGONALS	L2½x2½x3/16	L2x2x3/16	SR 1"	SR 7/8"			SR ¾"		SR ⅝"		SR ½"			N/A
TOP GIRTS	N/A		SR 1"	SR 7/8"	SR 1"		SR ¾"		SR ⅝"		SR ½"			
BOTTOM GIRTS	N/A		SR 1"	SR 7/8"			SR ¾"		SR ⅝"		SR ½"			
SEC. HORIZ.	L2½x2½x¼	L2x2x¼												



1/S2 TOWER ELEVATION
1/32" = 1'-0"



2/S2 BASE LEVEL PLAN
N.T.S.

TOWER MODIFICATION SCHEDULE				
	FROM (FT)	TO (FT)	MODIFICATION	REFERENCE SHEET
A	4'-6"	64'-6"	REINFORCE EXISTING LEGS W/ NEW HSS3.5x0.313 HALF PIPE	S3
B	64'-6"	64'-6"	INSTALL (2) NEW KNIFE PLATES PER LEG	S3
C	84'-6"	84'-6"	INSTALL (2) NEW KNIFE PLATES PER LEG	S3
D	4'-6"	4'-6"	INSTALL (2) NEW ANCHOR RODS PER LEG	S5
E	4'-6"	155'-0"	STACK COAX IN (3) ROWS OF 6	S2
F	4'-6"	155'-0"	REMOVE UNUSED FEEDLINE LADDER	S2
NOTE: APPLY MODIFICATIONS A, B, C, & D TO ALL 3 TOWER FACES				

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617-212-3123

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

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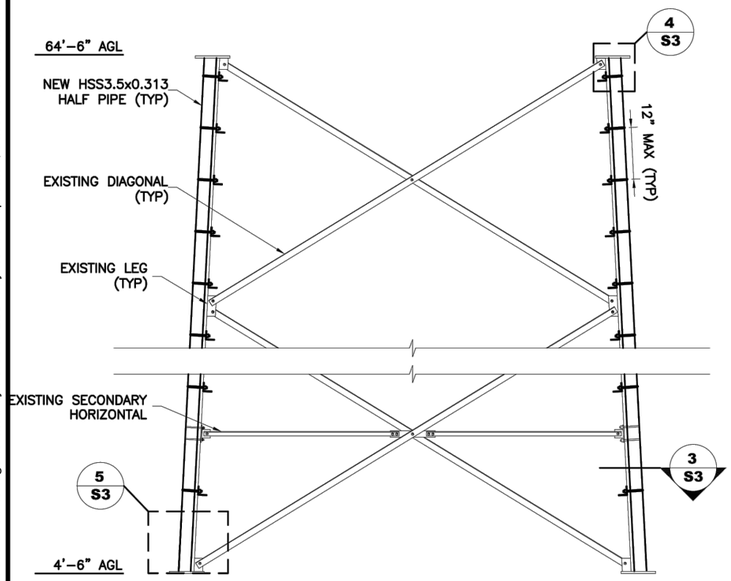
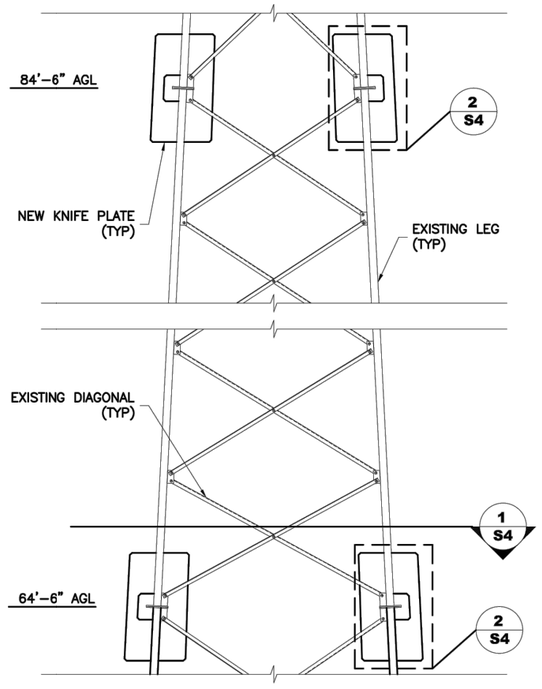
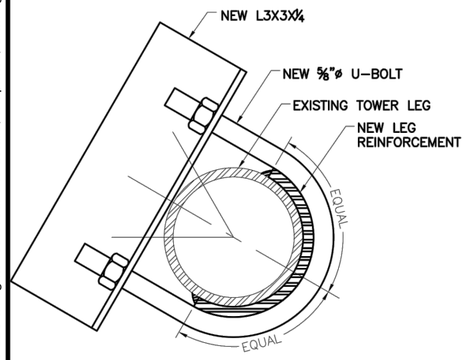
SHEET TITLE:
S-2: STRUCTURAL UPGRADE DETAILS



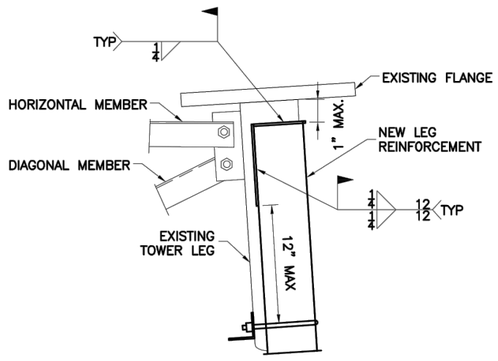
1 S3 **ELEVATION VIEW**
N.T.S.



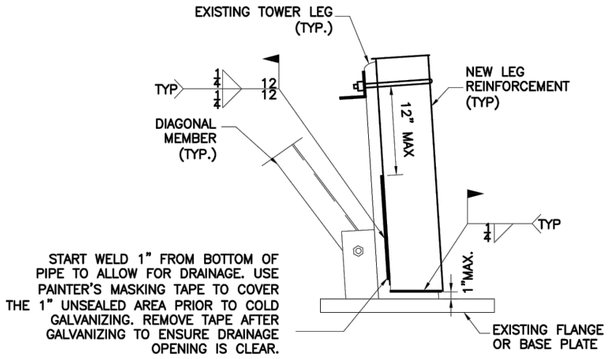
2 S3 **ELEVATION VIEW**
N.T.S.



3 S3 **LEG REINFORCEMENT**
N.T.S.



4 S3 **TOP OF LEG CONNECTION**
N.T.S.



START WELD 1" FROM BOTTOM OF PIPE TO ALLOW FOR DRAINAGE. USE PAINTER'S MASKING TAPE TO COVER THE 1" UNSEALED AREA PRIOR TO COLD GALVANIZING. REMOVE TAPE AFTER GALVANIZING TO ENSURE DRAINAGE OPENING IS CLEAR.

5 S3 **BASE OF LEG CONNECTION**
N.T.S.

NOTE: FLANGE BOLTS NOT SHOWN FOR CLARITY

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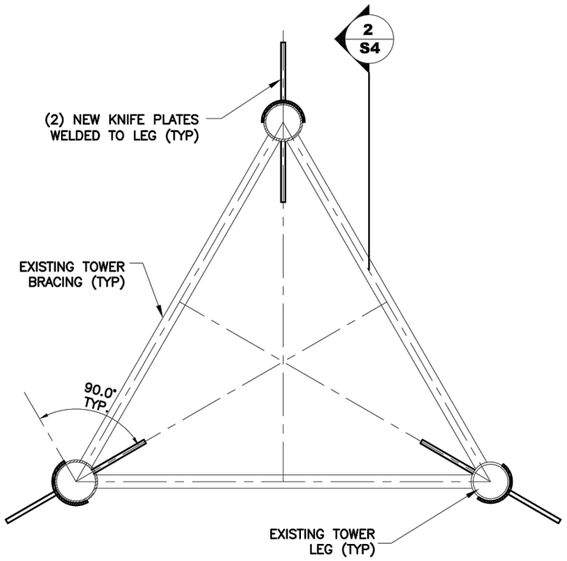
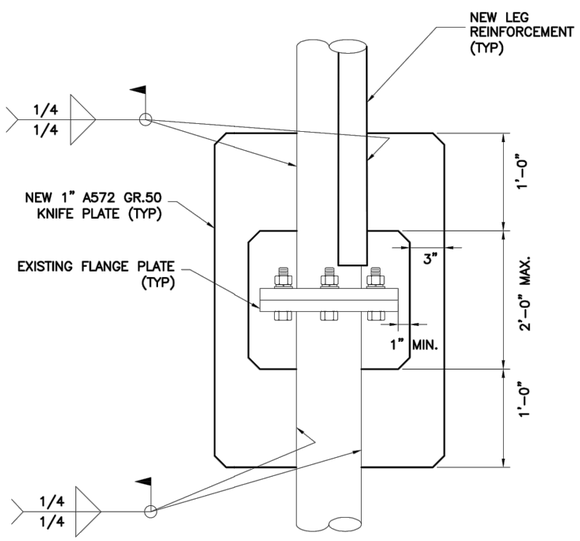
SHEET TITLE:
S-3: STRUCTURAL UPGRADE DETAILS



1 S4 KNIFE PLATE PLAN TYP.

N.T.S.

NOTE: KNIFE PLATE CONFIGURATION MAY BE ROTATED 90 DEGREES AS NECESSARY TO AVOID FIELD OBSTRUCTIONS



2 S4 KNIFE PLATE DETAIL

N.T.S.

NOTE: DIAGONAL MEMBERS NOT SHOWN FOR CLARITY

APPLICANT:
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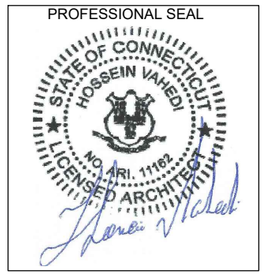

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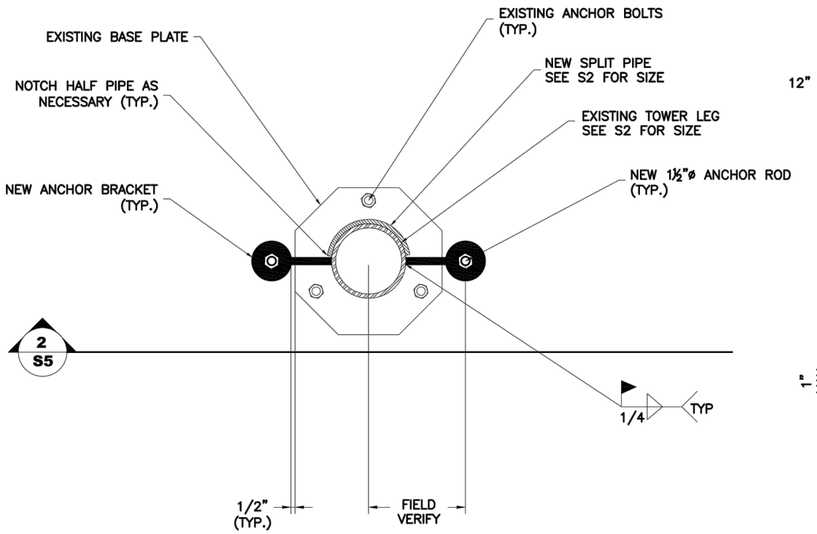
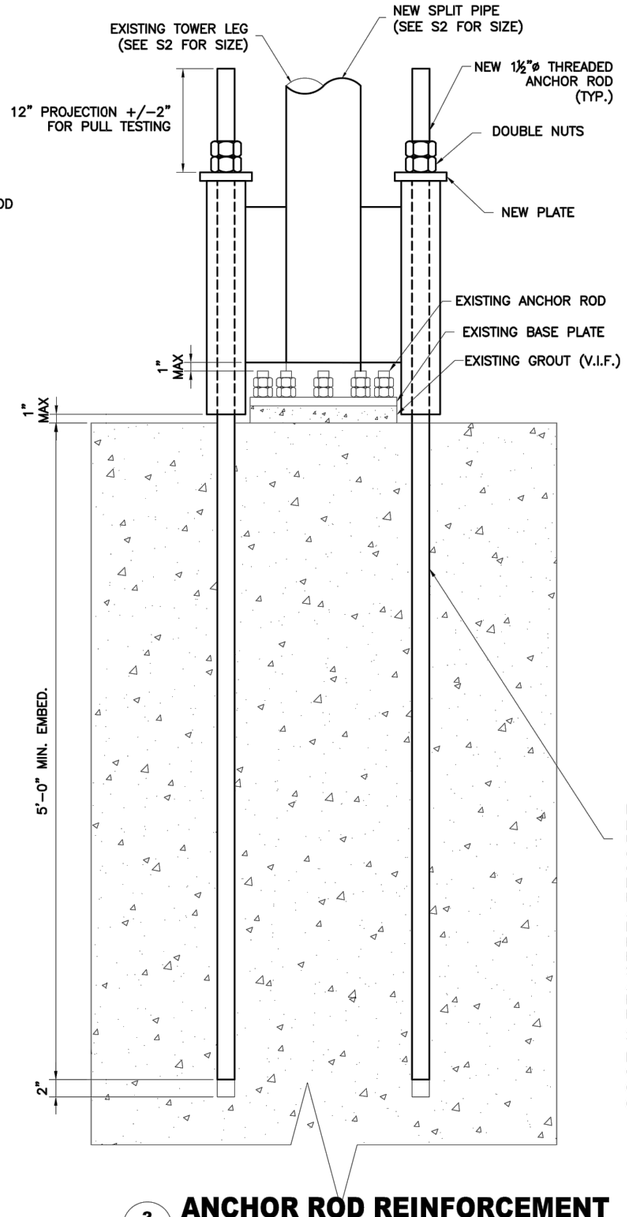
SHEET TITLE:
S-4: STRUCTURAL UPGRADE DETAILS



1 S4 ANCHOR ROD REINFORCEMENT

N.T.S.



2 S5 ANCHOR ROD REINFORCEMENT

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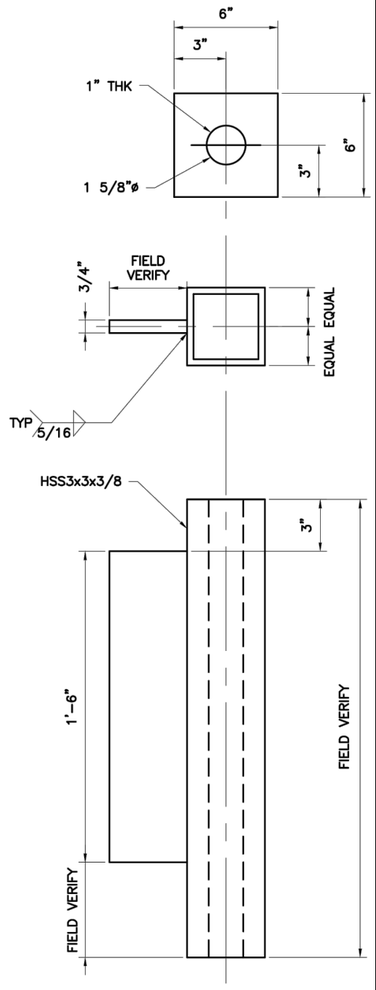

3 S5 ANCHOR BRACKET

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

MATERIAL NOTES:

1. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL QUANTITIES. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE PROPER FIT AND CLEARANCE OF THE REINFORCING MATERIAL IN THE FIELD. THE CONTRACTOR IS EXPECTED TO PERFORM A SITE VISIT BEFORE FABRICATING ANY MATERIAL.

2. ALL NEW STEEL, (EXCEPT HSS), SHALL CONFORM TO THE REQUIREMENTS OF ASTM A572 (50 KSI YIELD POINT MATERIAL).

3. NEW HSS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A500 GRADE B (42 KSI YIELD POINT MATERIAL).

4. ALL NEW STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123.

5. DRILLED IN ANCHOR RODS SHALL CONFORM TO THE REQUIREMENTS OF ASTM F1554 GR105. ANCHOR RODS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153.

6. SHOP WELDED CONNECTIONS SHALL CONFORM TO THE LATEST REVISED CODE OF THE AMERICAN WELDING SOCIETY AWS D1.1.

APPLICANT:
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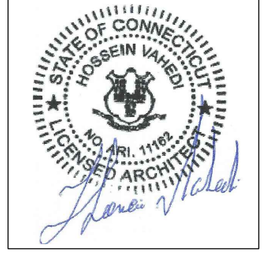

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SHEET TITLE:
S-5: STRUCTURAL UPGRADE DETAILS

Exhibit D

STRUCTURAL ANALYSIS REPORT – UPGRADE – REV2
SELF-SUPPORT

Prepared For:

T-Mobile Northeast, LLC
35 Griffin Road South
Bloomfield, CT 06002

Structure Rating:

Self-Support Tower: **Pass**

Sincerely,
Destek Engineering, LLC
Firm License No: PEC0001429

11-16-2018

STATE OF CONNECTICUT
AHMET COLAKOGLU
PEN. 27057
LICENSED
PROFESSIONAL ENGINEER

Ahmet Colakoglu, PE
Connecticut Professional Engineer
License No: 27057

Site ID: CTHA220A
Site Name: HA220/WNTY TOWER_SST
440 Old Turnpike Road
Southington, CT 06489

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

CONTENTS

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

1.0 SUBJECT AND REFERENCES

The purpose of this analysis is to evaluate the structural capacity of the 250' tall self-support tower located at 440 Old Turnpike Road, Southington, CT 06489 for the additions and alterations proposed by T-Mobile.

The structural analysis is based on the following documentation provided to Destek Engineering, LLC (Destek):

- RFDS provided by T-Mobile, dated 5/15/2018.
- Loading E-mail prepared by Foresite, LLC, dated 7/18/2018.
- Structural Analysis Report - Post Modification prepared by EBI Consulting, dated 8/22/2014.
- Construction Drawings prepared by EBI Consulting, dated 9/3/2014.
- Photographs provided by Foresite, LLC.
- Loading Email from Foresite, dated 11/12/2018

1.1 STRUCTURE

The subject structure is a three-sided, 250' tall self-support lattice tower formed by (12) 20' sections and (1) 10' section. The base of the tower is 4'-6" above grade level (AGL). Solid round legs are X-braced from 4'-6" AGL to 44'-6" AGL with single angle diagonals and from 44'-6" AGL to the top of the tower with solid round diagonals. The tower is 10'-0" wide at the base and 1'-0" wide at the top. Please refer to the software output in Appendix A for tower geometry, member sizes, and other details.

2.0 EXISTING AND PROPOSED APPURTENANCES

Existing Configuration of T-Mobile Appurtenances:

Rad Center (ft.)	Antennas & Equipment	Coax	Mounts
155	(3) RFS APX16DWV-16DWV-S-E-A20 (6) TMA - Generic Twin Style 1A - PCS	(18) 1-5/8"	(3) Stand-Off Mounts
147	(3) Andrew LNX-6515DS-A1M		(3) Stand-Off Mounts

Proposed and Final Configuration of T-Mobile Appurtenances:

Rad Center (ft.)	Antennas & Equipment	Coax	Mounts
155	(3) RFS APX16DWV-16DWV-S-E-A20 (6) Diplexer - Generic AWS/PCS	(24) 1-5/8" & 2 Hybrid Cables	(3) Stand-Off Mounts
147	(3) RFS APXVAARR24_43-U-NA20		(3) Stand-Off Mounts

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

3.0 CODES AND LOADING

The tower was analyzed per *TIA/EIA-222-G* as referenced by the *2018 Connecticut State Building Code* with all of the adopted Addendums and Supplements. The following wind loading was used in compliance with the standard for Southington, CT:

- Basic wind speed 97 mph without ice (V)
- Basic wind speed 50 mph with 1" escalating ice (V_i)
- Exposure Category: C
- Topographic Category: 1
- Structure Class: II

The following load combinations were used with wind blowing at 0°, 30°, 60°, and 90°, measured from a line normal to the face of the tower:

- 1.2 D + 1.6 W_0
- 0.9 D + 1.6 W_0
- 1.2 D + 1.0 D_i + 1.0 W_i + 1.0 T_i

D: Dead load of structures and appurtenances
D_i: Weight of ice due to factored ice thickness (based upon t_i)
T_i: Load effects due to temperature
W_0: Wind load without ice (based upon V)
W_i: Wind load with ice (based upon V_i)

4.0 STANDARD CONDITIONS FOR ENGINEERING SERVICES ON EXISTING STRUCTURES

The analysis is based on the information provided to Destek and is assumed to be current and correct. Unless otherwise noted, the structure and the foundation system are assumed to be in good condition, free of defects and can achieve theoretical strength.

It is assumed that the structure has been maintained and shall be maintained during its service. The superstructure and the foundation system are assumed to be designed with proper engineering practice and fabricated, constructed and erected in accordance with the design documents. Destek will accept no liability which may arise due to any existing deficiency in design, material, fabrication, erection, construction, etc. or lack of maintenance.

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The analysis does not include a qualification of the mounts attached on the structure or their connections. The analysis is performed to verify the capacity of the main structural members, which is the current practice in the tower industry.

The analysis results presented in this report are only applicable for the previously mentioned existing and proposed additions and alterations. Any deviation of the proposed equipment and placement, etc., will require Destek to generate an additional structural analysis.

5.0 ANALYSIS AND ASSUMPTIONS

The tower was analyzed by utilizing tnxTower, a non-linear, three-dimensional, finite element-analysis software package, a product of Tower Numerics, Inc. Software output for this analysis is provided in Appendix A of this report.

The tower and foundation were constructed in accordance with their original design and maintained per the manufacturer's specifications. Tower is plumb and free of twist.

6.0 RESULTS AND CONCLUSION

Based on a structural analysis per *ANSI/TIA-222-G*, the existing self-support tower **will have adequate** structural capacity for the proposed changes by T-Mobile once the tower is upgraded according to the attached Destek drawings dated 11/16/2018. For the code specified load combinations and as a maximum, the tower legs from 84'-6" to 104'-6" are stressed to **97.1%** of their structural capacity. The diagonals, girts, and anchor bolts are stressed to **72.4%**, **41.4%**, and **63.1%** of capacity, respectively.

Information regarding the tower base foundation was not available at the time of this analysis, thus a qualification of the foundation could not be completed.

Therefore, the proposed additions and alterations by T-Mobile **can** be implemented as intended and with the conditions outlined in this report.

Should you have any questions about this report, please contact us at (770) 693-0835.

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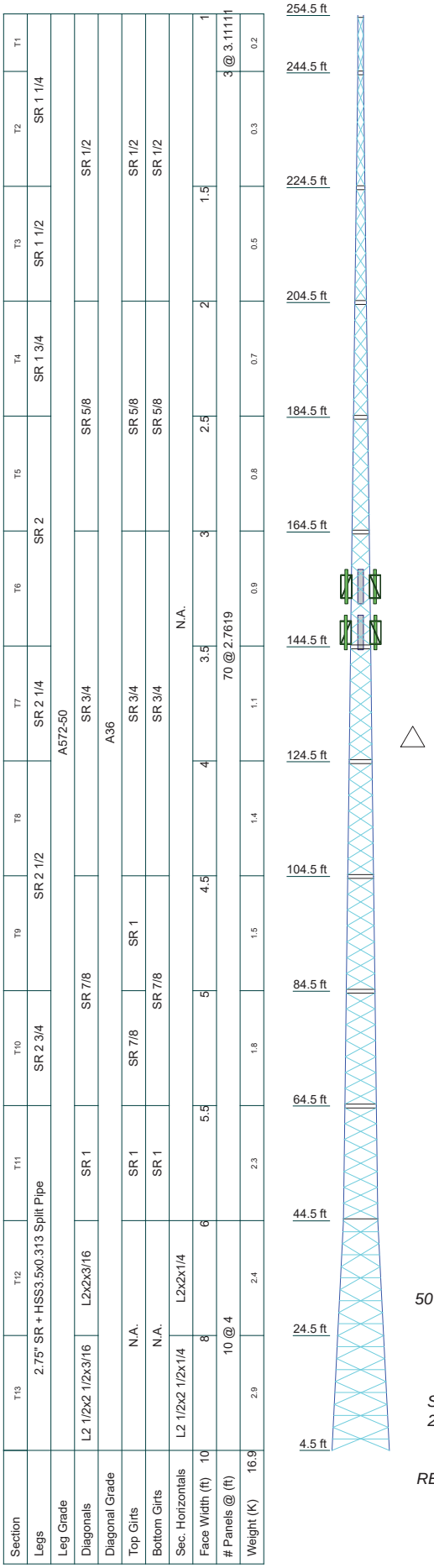
APPENDIX A
SOFTWARE OUTPUT



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Flash Beacon Lighting	254.5	Side Arm Mount [SO 201-1]	155
Generic Lightning Rod 4' Copper	254.5	APXVAARR24_43-U-NA20 w/ Mount Pipe	147
APX16DWV-16DWVS-E-A20 w/ Mount Pipe	155	APXVAARR24_43-U-NA20 w/ Mount Pipe	147
APX16DWV-16DWVS-E-A20 w/ Mount Pipe	155	APXVAARR24_43-U-NA20 w/ Mount Pipe	147
APX16DWV-16DWVS-E-A20 w/ Mount Pipe	155	Side Arm Mount [SO 201-1]	147
(2) 6.7"x2.4"x5.9" Diplexer	155	Side Arm Mount [SO 201-1]	147
(2) 6.7"x2.4"x5.9" Diplexer	155	Side Arm Mount [SO 201-1]	147
(2) 6.7"x2.4"x5.9" Diplexer	155	Obstruction Light	124
Side Arm Mount [SO 201-1]	155	Obstruction Light	124
Side Arm Mount [SO 201-1]	155		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

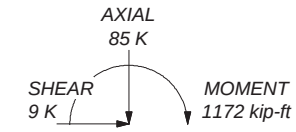
TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.000 ft
8. TOWER RATING: 97.1%

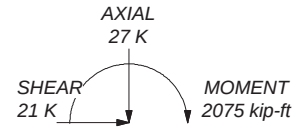
ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 248 K
SHEAR: 15 K

UPLIFT: -231 K
SHEAR: 14 K



TORQUE 3 kip-ft
50 mph WIND - 1.0000 in ICE



TORQUE 10 kip-ft
REACTIONS - 97 mph WIND

DESTEK ENGINEERING
Destek Engineering, LLC
1281 Kennestone Circle, Ste 100
Marietta, GA
Phone: (770) 693-0835
FAX:

Job: ***CTHA220A - HA220/WNTY TOWER_SST***			
Project: ***1875059***			
Client: T-Mobile	Drawn by: Ahmet Colakoglu	App'd:	
Code: TIA-222-G	Date: 11/16/18	Scale: NTS	
Path: S:\Projects\2018\75 - ForeSite LLC\1875059 - CTHA220A\tnxtower\Upgrade - Add 6 Coax\CTHA220A - Upgrade - Add 6 Coax_TES1.eri		Dwg No. E-1	

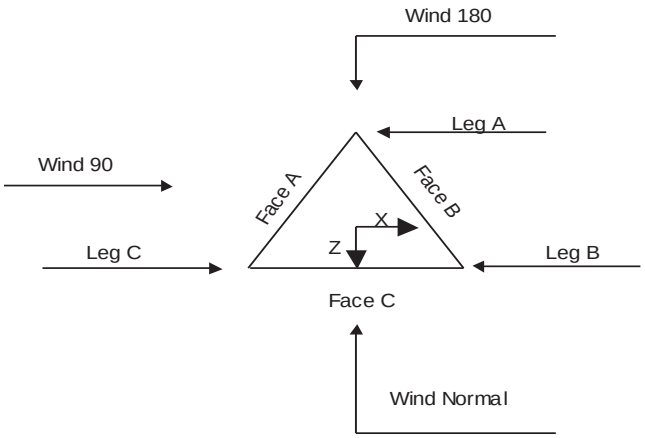
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 254.500 ft above the ground line.
The base of the tower is set at an elevation of 4.500 ft above the ground line.
The face width of the tower is 1.00 ft at the top and 10.00 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

1. Tower is located in Hartford County, Connecticut.
2. Basic wind speed of 97 mph.
3. Structure Class II.
4. Exposure Category C.
5. Topographic Category 1.
6. Crest Height 0.000 ft.
7. Nominal ice thickness of 1.0000 in.
8. Ice thickness is considered to increase with height.
9. Ice density of 56 pcf.
10. A wind speed of 50 mph is used in combination with ice.
11. Temperature drop of 50 °F.
12. Deflections calculated using a wind speed of 60 mph.
13. A non-linear (P-delta) analysis was used.
14. Pressures are calculated at each section.
15. Stress ratio used in tower member design is 1.
16. Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned	√	Calculate Redundant Bracing Forces
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification	√	Use Clear Spans For Wind Area	√	SR Leg Bolts Resist Compression
√	Use Code Stress Ratios	√	Use Clear Spans For KL/r		All Leg Panels Have Same Allowable
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice	√	Bypass Mast Stability Checks	√	Consider Feed Line Torque
	Always Use Max Kz	√	Use Azimuth Dish Coefficients	√	Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-G Bracing Resist. Exemption
√	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-G Tension Splice Exemption
	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
√	Secondary Horizontal Braces Leg	√	Sort Capacity Reports By Component		Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric		Ignore KL/ry For 60 Deg. Angle Legs		Pole Without Linear Attachments
					Pole With Shroud Or No Appurtenances
					Outside and Inside Corner Radii Are Known



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	254.500-244.500			1.00	1	10.000
T2	244.500-224.500			1.00	1	20.000
T3	224.500-204.500			1.50	1	20.000
T4	204.500-184.500			2.00	1	20.000
T5	184.500-164.500			2.50	1	20.000
T6	164.500-144.500			3.00	1	20.000
T7	144.500-124.500			3.50	1	20.000
T8	124.500-104.500			4.00	1	20.000
T9	104.500-84.500			4.50	1	20.000
T10	84.500-64.500			5.00	1	20.000
T11	64.500-44.500			5.50	1	20.000
T12	44.500-24.500			6.00	1	20.000
T13	24.500-4.500			8.00	1	20.000

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	254.500-244.500	3.11	X Brace	No	Steps	4.0000	4.0000
T2	244.500-224.500	2.76	X Brace	No	Steps	4.0000	4.0000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T3	224.500-204.500	2.76	X Brace	No	Steps	4.0000	4.0000
T4	204.500-184.500	2.76	X Brace	No	Steps	4.0000	4.0000
T5	184.500-164.500	2.76	X Brace	No	Steps	4.0000	4.0000
T6	164.500-144.500	2.76	X Brace	No	Steps	4.0000	4.0000
T7	144.500-124.500	2.76	X Brace	No	Steps	4.0000	4.0000
T8	124.500-104.500	2.76	X Brace	No	Steps	4.0000	4.0000
T9	104.500-84.500	2.76	X Brace	No	Steps	4.0000	4.0000
T10	84.500-64.500	2.76	X Brace	No	Steps	4.0000	4.0000
T11	64.500-44.500	2.76	X Brace	No	Steps	4.0000	4.0000
T12	44.500-24.500	4.00	X Brace	No	Yes	0.0000	0.0000
T13	24.500-4.500	4.00	X Brace	No	Yes	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 254.500-244.500	Solid Round	1 1/4	A572-50 (50 ksi)	Solid Round	1/2	A36 (36 ksi)
T2 244.500-224.500	Solid Round	1 1/4	A572-50 (50 ksi)	Solid Round	1/2	A36 (36 ksi)
T3 224.500-204.500	Solid Round	1 1/2	A572-50 (50 ksi)	Solid Round	1/2	A36 (36 ksi)
T4 204.500-184.500	Solid Round	1 3/4	A572-50 (50 ksi)	Solid Round	5/8	A36 (36 ksi)
T5 184.500-164.500	Solid Round	2	A572-50 (50 ksi)	Solid Round	5/8	A36 (36 ksi)
T6 164.500-144.500	Solid Round	2	A572-50 (50 ksi)	Solid Round	3/4	A36 (36 ksi)
T7 144.500-124.500	Solid Round	2 1/4	A572-50 (50 ksi)	Solid Round	3/4	A36 (36 ksi)
T8 124.500-104.500	Solid Round	2 1/2	A572-50 (50 ksi)	Solid Round	3/4	A36 (36 ksi)
T9 104.500-84.500	Solid Round	2 1/2	A572-50 (50 ksi)	Solid Round	7/8	A36 (36 ksi)
T10 84.500-64.500	Solid Round	2 3/4	A572-50 (50 ksi)	Solid Round	7/8	A36 (36 ksi)
T11 64.500-44.500	Arbitrary Shape	2.75" SR + HSS3.5x0.313 Split Pipe	A572-50 (50 ksi)	Solid Round	1	A36 (36 ksi)
T12 44.500-24.500	Arbitrary Shape	2.75" SR + HSS3.5x0.313 Split Pipe	A572-50 (50 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T13 24.500-4.500	Arbitrary Shape	2.75" SR + HSS3.5x0.313 Split Pipe	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 254.500-244.500	Solid Round	1/2	A36 (36 ksi)	Solid Round	1/2	A36 (36 ksi)
T2	Solid Round	1/2	A36	Solid Round	1/2	A36

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
244.500-224.500			(36 ksi)			(36 ksi)
T3	Solid Round	1/2	A36	Solid Round	1/2	A36
224.500-204.500			(36 ksi)			(36 ksi)
T4	Solid Round	5/8	A36	Solid Round	5/8	A36
204.500-184.500			(36 ksi)			(36 ksi)
T5	Solid Round	5/8	A36	Solid Round	5/8	A36
184.500-164.500			(36 ksi)			(36 ksi)
T6	Solid Round	3/4	A36	Solid Round	3/4	A36
164.500-144.500			(36 ksi)			(36 ksi)
T7	Solid Round	3/4	A36	Solid Round	3/4	A36
144.500-124.500			(36 ksi)			(36 ksi)
T8	Solid Round	3/4	A36	Solid Round	3/4	A36
124.500-104.500			(36 ksi)			(36 ksi)
T9	Solid Round	1	A36	Solid Round	7/8	A36
104.500-84.500			(36 ksi)			(36 ksi)
T10	Solid Round	7/8	A36	Solid Round	7/8	A36
84.500-64.500			(36 ksi)			(36 ksi)
T11	Solid Round	1	A36	Solid Round	1	A36
64.500-44.500			(36 ksi)			(36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T12	Equal Angle	L2x2x1/4	A36	Solid Round		A572-50
44.500-24.500			(36 ksi)			(50 ksi)
T13 24.500-4.500	Equal Angle	L2 1/2x2 1/2x1/4	A36	Solid Round		A572-50
			(36 ksi)			(50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1	0.000	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
254.500-244.500			(36 ksi)						
T2	0.000	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
244.500-224.500			(36 ksi)						
T3	0.000	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
224.500-204.500			(36 ksi)						
T4	0.000	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
204.500-184.500			(36 ksi)						
T5	0.000	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
184.500-164.5			(36 ksi)						

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
00									
T6 164.500-144.500	0.000	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T7 144.500-124.500	0.000	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T8 124.500-104.500	0.000	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T9 104.500-84.500	0.000	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T10 84.500-64.500	0.000	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T11 64.500-44.500	0.000	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T12 44.500-24.500	0.000	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T13 24.500-4.500	0.000	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 254.500-244.500	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 244.500-224.500	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 224.500-204.500	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 204.500-184.500	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 184.500-164.500	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T6 164.500-144.500	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T7 144.500-124.500	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T8 124.500-104.500	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T9	Yes	Yes	1	1	1	1	1	1	1	1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
104.500-84.500				1	1	1	1	1	1	1
T10	Yes	Yes	1	1	1	1	1	1	1	1
84.500-64.500				1	1	1	1	1	1	1
T11	Yes	Yes	1.13901	1	1	1	1	1	1	1
64.500-44.500				1	1	1	1	1	1	1
T12	Yes	Yes	1.2371	1	1	1	1	1	1	1
44.500-24.500				1	1	1	1	1	1	1
T13	Yes	Yes	1.24045	1	1	1	1	1	1	1
24.500-4.500				1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
254.500-244.500														
T2	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
244.500-224.500														
T3	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
224.500-204.500														
T4	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
204.500-184.500														
T5	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
184.500-164.500														
T6	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
164.500-144.500														
T7	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
144.500-124.500														
T8	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
124.500-104.500														
T9	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
104.500-84.500														
T10	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
84.500-64.500														
T11	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
64.500-44.500														
T12	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
44.500-24.500														

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T13 24.500-4.500	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 254.500-244.500	Flange	0.6250 A325N	3	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 244.500-224.500	Flange	0.6250 A325N	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 224.500-204.500	Flange	0.6250 A325N	4	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 204.500-184.500	Flange	0.6250 A325N	4	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 184.500-164.500	Flange	0.7500 A325N	4	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 164.500-144.500	Flange	0.7500 A325N	4	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 144.500-124.500	Flange	0.8750 A325N	4	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 124.500-104.500	Flange	0.8750 A325N	4	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 104.500-84.500	Flange	0.8750 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T10 84.500-64.500	Flange	1.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T11 64.500-44.500	Flange	1.1250 A325N	4	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T12 44.500-24.500	Flange	1.1250 A325N	4	0.6250 A325N	1	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	2
T13 24.500-4.500	Flange	1.2500 A325N	0	0.8750 A325N	1	0.8750 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	2

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1" Conduit	C	No	No	Ar (CaAa)	254.500 - 9.000	0.0000	0	1	1	0.5000	1.0000		1.00
LDF7-50A(1-5/8")	A	No	No	Ar (CaAa)	155.000 - 6.500	0.0000	0	24	6	0.5000	1.9800		0.82
Feedline Ladder (Rail)	A	No	No	Af (CaAa)	155.000 - 6.500	0.0000	0	2	2	24.0000 0.0000	1.7500		3.00
MLE Hybrid 3Power/6Fiber RL 2 10AWG(1-1/4'')	A	No	No	Ar (CaAa)	155.000 - 6.500	0.0000	0.1	2	2	0.5000	1.2500		0.46

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	254.500-244.500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	1.000	0.000	0.01
T2	244.500-224.500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	2.000	0.000	0.02
T3	224.500-204.500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	2.000	0.000	0.02
T4	204.500-184.500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	2.000	0.000	0.02
T5	184.500-164.500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	2.000	0.000	0.02
T6	164.500-144.500	A	0.000	0.000	58.646	0.000	0.28
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	2.000	0.000	0.02
T7	144.500-124.500	A	0.000	0.000	111.707	0.000	0.53
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	2.000	0.000	0.02
T8	124.500-104.500	A	0.000	0.000	111.707	0.000	0.53
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	2.000	0.000	0.02
T9	104.500-84.500	A	0.000	0.000	111.707	0.000	0.53
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	2.000	0.000	0.02
T10	84.500-64.500	A	0.000	0.000	111.707	0.000	0.53
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	2.000	0.000	0.02
T11	64.500-44.500	A	0.000	0.000	111.707	0.000	0.53
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	2.000	0.000	0.02
T12	44.500-24.500	A	0.000	0.000	111.707	0.000	0.53
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	2.000	0.000	0.02
T13	24.500-4.500	A	0.000	0.000	100.536	0.000	0.48
		B	0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		C	0.000	0.000	1.550	0.000	0.02

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	254.500-244.500	A	2.448	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	5.897	0.000	0.11
T2	244.500-224.500	A	2.433	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	11.733	0.000	0.22
T3	224.500-204.500	A	2.412	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	11.647	0.000	0.22
T4	204.500-184.500	A	2.388	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	11.553	0.000	0.22
T5	184.500-164.500	A	2.362	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	11.450	0.000	0.21
T6	164.500-144.500	A	2.334	0.000	0.000	59.734	0.000	1.48
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	11.335	0.000	0.21
T7	144.500-124.500	A	2.302	0.000	0.000	113.073	0.000	2.79
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	11.207	0.000	0.21
T8	124.500-104.500	A	2.265	0.000	0.000	112.264	0.000	2.75
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	11.060	0.000	0.20
T9	104.500-84.500	A	2.222	0.000	0.000	111.316	0.000	2.71
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	10.888	0.000	0.19
T10	84.500-64.500	A	2.170	0.000	0.000	110.168	0.000	2.66
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	10.679	0.000	0.19
T11	64.500-44.500	A	2.103	0.000	0.000	108.699	0.000	2.59
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	10.412	0.000	0.18
T12	44.500-24.500	A	2.009	0.000	0.000	106.632	0.000	2.50
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	10.036	0.000	0.17
T13	24.500-4.500	A	1.842	0.000	0.000	92.669	0.000	2.11
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	7.261	0.000	0.11

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	254.500-244.500	0.0000	0.5079	0.0000	0.0000
T2	244.500-224.500	0.0000	0.5895	0.0000	0.0000

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T3	224.500-204.500	0.0000	0.6749	0.0000	0.0882
T4	204.500-184.500	0.0000	0.7033	0.0000	0.2600
T5	184.500-164.500	0.0000	0.7490	0.0000	0.4426
T6	164.500-144.500	-5.4696	-3.2633	-1.9885	-0.9206
T7	144.500-124.500	-7.7980	-4.8263	-3.8152	-2.1701
T8	124.500-104.500	-8.2552	-5.1249	-4.3638	-2.4800
T9	104.500-84.500	-8.6531	-5.3883	-4.8175	-2.7390
T10	84.500-64.500	-9.0290	-5.6379	-5.2941	-3.0129
T11	64.500-44.500	-8.8085	-5.5386	-5.4720	-3.1249
T12	44.500-24.500	-6.5276	-4.5480	-5.2737	-3.1374
T13	24.500-4.500	-5.8269	-4.2393	-5.3297	-3.3647

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	1	1" Conduit	244.50 - 254.50	0.6000	0.0000
T2	1	1" Conduit	224.50 - 244.50	0.6000	0.0000
T3	1	1" Conduit	204.50 - 224.50	0.6000	0.0913
T4	1	1" Conduit	184.50 - 204.50	0.6000	0.2009
T5	1	1" Conduit	164.50 - 184.50	0.6000	0.2814
T6	1	1" Conduit	144.50 - 164.50	0.6000	0.3353
T6	2	LDF7-50A(1-5/8")	144.50 - 155.00	0.6000	0.3353
T6	4	Feedline Ladder (Rail)	144.50 - 155.00	0.6000	0.3353
T6	6	MLE Hybrid 3Power/6Fiber RL 2 10AWG(1-1/4")	144.50 - 155.00	0.6000	0.3353
T7	1	1" Conduit	124.50 - 144.50	0.6000	0.3791
T7	2	LDF7-50A(1-5/8")	124.50 - 144.50	0.6000	0.3791
T7	4	Feedline Ladder (Rail)	124.50 - 144.50	0.6000	0.3791
T7	6	MLE Hybrid 3Power/6Fiber RL 2 10AWG(1-1/4")	124.50 - 144.50	0.6000	0.3791
T8	1	1" Conduit	104.50 - 124.50	0.6000	0.4139
T8	2	LDF7-50A(1-5/8")	104.50 - 124.50	0.6000	0.4139
T8	4	Feedline Ladder (Rail)	104.50 - 124.50	0.6000	0.4139
T8	6	MLE Hybrid 3Power/6Fiber RL 2 10AWG(1-1/4")	104.50 - 124.50	0.6000	0.4139
T9	1	1" Conduit	84.50 - 104.50	0.6000	0.4387
T9	2	LDF7-50A(1-5/8")	84.50 - 104.50	0.6000	0.4387
T9	4	Feedline Ladder (Rail)	84.50 - 104.50	0.6000	0.4387
T9	6	MLE Hybrid 3Power/6Fiber RL 2 10AWG(1-1/4")	84.50 - 104.50	0.6000	0.4387

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T10	1	1" Conduit	64.50 - 84.50	0.6000	0.4649
T10	2	LDF7-50A(1-5/8")	64.50 - 84.50	0.6000	0.4649
T10	4	Feedline Ladder (Rail)	64.50 - 84.50	0.6000	0.4649
T10	6	MLE Hybrid 3Power/6Fiber RL 2 10AWG(1-1/4")	64.50 - 84.50	0.6000	0.4649
T11	1	1" Conduit	44.50 - 64.50	0.6000	0.4713
T11	2	LDF7-50A(1-5/8")	44.50 - 64.50	0.6000	0.4713
T11	4	Feedline Ladder (Rail)	44.50 - 64.50	0.6000	0.4713
T11	6	MLE Hybrid 3Power/6Fiber RL 2 10AWG(1-1/4")	44.50 - 64.50	0.6000	0.4713
T12	1	1" Conduit	24.50 - 44.50	0.6000	0.4686
T12	2	LDF7-50A(1-5/8")	24.50 - 44.50	0.6000	0.4686
T12	4	Feedline Ladder (Rail)	24.50 - 44.50	0.6000	0.4686
T12	6	MLE Hybrid 3Power/6Fiber RL 2 10AWG(1-1/4")	24.50 - 44.50	0.6000	0.4686
T13	1	1" Conduit	9.00 - 24.50	0.6000	0.5005
T13	2	LDF7-50A(1-5/8")	6.50 - 24.50	0.6000	0.5005
T13	4	Feedline Ladder (Rail)	6.50 - 24.50	0.6000	0.5005
T13	6	MLE Hybrid 3Power/6Fiber RL 2 10AWG(1-1/4")	6.50 - 24.50	0.6000	0.5005

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Flash Beacon Lighting	C	None		0.0000	254.500	No Ice	2.700	2.700	0.05
						1/2" Ice	3.100	3.100	0.07
						1" Ice	3.500	3.500	0.09
Generic Lightning Rod 4' Copper	A	None		0.0000	254.500	No Ice	0.500	0.500	0.00
						1/2" Ice	1.000	1.000	0.00
						1" Ice	1.500	1.500	0.00
Obstruction Light	A	None		0.0000	124.000	No Ice	0.180	0.180	0.01
						1/2" Ice	0.250	0.250	0.01
						1" Ice	0.320	0.320	0.01
Obstruction Light	B	None		0.0000	124.000	No Ice	0.180	0.180	0.01
						1/2" Ice	0.250	0.250	0.01
						1" Ice	0.320	0.320	0.01
******									
APX16DWV-16DWVS-E-A20 w/ Mount Pipe	A	From Leg	1.000 0.00 0.00	0.0000	155.000	No Ice	7.233	3.782	0.06
						1/2" Ice	7.712	4.643	0.11
						1" Ice	8.176	5.382	0.17
APX16DWV-16DWVS-E-A20 w/ Mount Pipe	B	From Leg	1.000 0.00 0.00	0.0000	155.000	No Ice	7.233	3.782	0.06
						1/2" Ice	7.712	4.643	0.11
						1" Ice	8.176	5.382	0.17
APX16DWV-16DWVS-E-A20 w/ Mount Pipe	C	From Leg	1.000 0.00 0.00	0.0000	155.000	No Ice	7.233	3.782	0.06
						1/2" Ice	7.712	4.643	0.11
						1" Ice	8.176	5.382	0.17
(2) 6.7"x2.4"x5.9" Diplexer	A	From Leg	1.000 0.00 0.00	0.0000	155.000	No Ice	0.135	0.329	0.01
						1/2" Ice	0.188	0.403	0.01
						1" Ice	0.250	0.484	0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral / Vert (ft / ft / ft)	Azimuth Adjustment (°)	Placement (ft)		C_AA_A Front (ft^2)	C_AA_A Side (ft^2)	Weight (K)
(2) 6.7"x2.4"x5.9" Diplexer	B	From Leg	1.000 0.00 0.00	0.0000	155.000	No Ice 1/2" Ice 1" Ice	0.135 0.188 0.250	0.329 0.403 0.484	0.01 0.01 0.01
(2) 6.7"x2.4"x5.9" Diplexer	C	From Leg	1.000 0.00 0.00	0.0000	155.000	No Ice 1/2" Ice 1" Ice	0.135 0.188 0.250	0.329 0.403 0.484	0.01 0.01 0.01
APXVAARR24_43-U-NA20 w/ Mount Pipe	A	From Leg	1.000 0.00 0.00	0.0000	147.000	No Ice 1/2" Ice 1" Ice	20.480 21.231 21.990	11.024 12.550 14.099	0.16 0.30 0.44
APXVAARR24_43-U-NA20 w/ Mount Pipe	B	From Leg	1.000 0.00 0.00	0.0000	147.000	No Ice 1/2" Ice 1" Ice	20.480 21.231 21.990	11.024 12.550 14.099	0.16 0.30 0.44
APXVAARR24_43-U-NA20 w/ Mount Pipe	C	From Leg	1.000 0.00 0.00	0.0000	147.000	No Ice 1/2" Ice 1" Ice	20.480 21.231 21.990	11.024 12.550 14.099	0.16 0.30 0.44
Side Arm Mount [SO 201-1]	A	From Leg	1.000 0.00 0.00	0.0000	155.000	No Ice 1/2" Ice 1" Ice	2.960 4.100 5.240	2.110 2.930 3.750	0.10 0.12 0.14
Side Arm Mount [SO 201-1]	B	From Leg	1.000 0.00 0.00	0.0000	155.000	No Ice 1/2" Ice 1" Ice	2.960 4.100 5.240	2.110 2.930 3.750	0.10 0.12 0.14
Side Arm Mount [SO 201-1]	C	From Leg	1.000 0.00 0.00	0.0000	155.000	No Ice 1/2" Ice 1" Ice	2.960 4.100 5.240	2.110 2.930 3.750	0.10 0.12 0.14
Side Arm Mount [SO 201-1]	A	From Leg	1.000 0.00 0.00	0.0000	147.000	No Ice 1/2" Ice 1" Ice	2.960 4.100 5.240	2.110 2.930 3.750	0.10 0.12 0.14
Side Arm Mount [SO 201-1]	B	From Leg	1.000 0.00 0.00	0.0000	147.000	No Ice 1/2" Ice 1" Ice	2.960 4.100 5.240	2.110 2.930 3.750	0.10 0.12 0.14
Side Arm Mount [SO 201-1]	C	From Leg	1.000 0.00 0.00	0.0000	147.000	No Ice 1/2" Ice 1" Ice	2.960 4.100 5.240	2.110 2.930 3.750	0.10 0.12 0.14

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	1.2D+1.6W (pattern 1) 0 deg - No Ice
4	1.2D+1.6W (pattern 2) 0 deg - No Ice
5	0.9 Dead+1.6 Wind 0 deg - No Ice
6	1.2 Dead+1.6 Wind 30 deg - No Ice
7	1.2D+1.6W (pattern 1) 30 deg - No Ice
8	1.2D+1.6W (pattern 2) 30 deg - No Ice
9	0.9 Dead+1.6 Wind 30 deg - No Ice
10	1.2 Dead+1.6 Wind 60 deg - No Ice
11	1.2D+1.6W (pattern 1) 60 deg - No Ice
12	1.2D+1.6W (pattern 2) 60 deg - No Ice
13	0.9 Dead+1.6 Wind 60 deg - No Ice

Comb. No.	Description
14	1.2 Dead+1.6 Wind 90 deg - No Ice
15	1.2D+1.6W (pattern 1) 90 deg - No Ice
16	1.2D+1.6W (pattern 2) 90 deg - No Ice
17	0.9 Dead+1.6 Wind 90 deg - No Ice
18	1.2 Dead+1.6 Wind 120 deg - No Ice
19	1.2D+1.6W (pattern 1) 120 deg - No Ice
20	1.2D+1.6W (pattern 2) 120 deg - No Ice
21	0.9 Dead+1.6 Wind 120 deg - No Ice
22	1.2 Dead+1.6 Wind 150 deg - No Ice
23	1.2D+1.6W (pattern 1) 150 deg - No Ice
24	1.2D+1.6W (pattern 2) 150 deg - No Ice
25	0.9 Dead+1.6 Wind 150 deg - No Ice
26	1.2 Dead+1.6 Wind 180 deg - No Ice
27	1.2D+1.6W (pattern 1) 180 deg - No Ice
28	1.2D+1.6W (pattern 2) 180 deg - No Ice
29	0.9 Dead+1.6 Wind 180 deg - No Ice
30	1.2 Dead+1.6 Wind 210 deg - No Ice
31	1.2D+1.6W (pattern 1) 210 deg - No Ice
32	1.2D+1.6W (pattern 2) 210 deg - No Ice
33	0.9 Dead+1.6 Wind 210 deg - No Ice
34	1.2 Dead+1.6 Wind 240 deg - No Ice
35	1.2D+1.6W (pattern 1) 240 deg - No Ice
36	1.2D+1.6W (pattern 2) 240 deg - No Ice
37	0.9 Dead+1.6 Wind 240 deg - No Ice
38	1.2 Dead+1.6 Wind 270 deg - No Ice
39	1.2D+1.6W (pattern 1) 270 deg - No Ice
40	1.2D+1.6W (pattern 2) 270 deg - No Ice
41	0.9 Dead+1.6 Wind 270 deg - No Ice
42	1.2 Dead+1.6 Wind 300 deg - No Ice
43	1.2D+1.6W (pattern 1) 300 deg - No Ice
44	1.2D+1.6W (pattern 2) 300 deg - No Ice
45	0.9 Dead+1.6 Wind 300 deg - No Ice
46	1.2 Dead+1.6 Wind 330 deg - No Ice
47	1.2D+1.6W (pattern 1) 330 deg - No Ice
48	1.2D+1.6W (pattern 2) 330 deg - No Ice
49	0.9 Dead+1.6 Wind 330 deg - No Ice
50	1.2 Dead+1.0 Ice+1.0 Temp
51	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
52	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
53	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
54	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
55	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
56	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
57	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
58	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
59	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
60	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
61	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
62	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
63	Dead+Wind 0 deg - Service
64	Dead+Wind 30 deg - Service
65	Dead+Wind 60 deg - Service
66	Dead+Wind 90 deg - Service
67	Dead+Wind 120 deg - Service
68	Dead+Wind 150 deg - Service
69	Dead+Wind 180 deg - Service
70	Dead+Wind 210 deg - Service
71	Dead+Wind 240 deg - Service
72	Dead+Wind 270 deg - Service
73	Dead+Wind 300 deg - Service
74	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	254.5 - 244.5	Leg	Max Tension	26	2.75	0.00	0.03
			Max. Compression	59	-2.94	0.01	-0.01
			Max. Mx	60	1.67	-0.03	0.00
			Max. My	57	2.05	0.00	0.03
			Max. Vy	60	-0.13	0.01	-0.01
			Max. Vx	51	-0.14	-0.00	0.01
		Diagonal	Max Tension	38	0.41	0.00	0.00
			Max. Compression	60	-0.42	0.00	0.00
			Max. Mx	61	-0.03	-0.00	0.00
			Max. My	61	-0.09	-0.00	-0.00
			Max. Vy	60	-0.00	-0.00	-0.00
			Max. Vx	61	-0.00	0.00	0.00
		Top Girt	Max Tension	2	0.03	0.00	0.00
			Max. Compression	26	-0.03	0.00	0.00
			Max. Mx	50	-0.00	0.00	0.00
			Max. My	51	-0.01	0.00	0.00
			Max. Vy	50	-0.00	0.00	0.00
			Max. Vx	51	-0.00	0.00	0.00
		Bottom Girt	Max Tension	61	0.08	0.00	0.00
			Max. Compression	2	-0.08	0.00	0.00
			Max. Mx	50	0.01	0.00	0.00
			Max. My	51	0.05	0.00	0.00
			Max. Vy	50	-0.00	0.00	0.00
			Max. Vx	51	-0.00	0.00	0.00
T2	244.5 - 224.5	Leg	Max Tension	57	11.12	0.05	0.00
			Max. Compression	59	-13.63	0.05	0.00
			Max. Mx	59	-2.95	0.05	0.00
			Max. My	62	-1.36	0.00	-0.06
			Max. Vy	51	-0.28	0.05	-0.00
			Max. Vx	62	-0.24	0.00	0.02
		Diagonal	Max Tension	61	0.58	0.00	0.00
			Max. Compression	60	-0.63	0.00	0.00
			Max. Mx	60	0.20	-0.00	-0.00
			Max. My	59	-0.05	-0.00	-0.00
			Max. Vy	61	-0.01	-0.00	0.00
			Max. Vx	59	-0.00	0.00	0.00
		Top Girt	Max Tension	51	0.07	0.00	0.00
			Max. Compression	61	-0.06	0.00	0.00
			Max. Mx	50	0.00	0.00	0.00
			Max. My	51	-0.03	0.00	0.00
			Max. Vy	50	-0.00	0.00	0.00
			Max. Vx	51	-0.00	0.00	0.00
		Bottom Girt	Max Tension	61	0.21	0.00	0.00
			Max. Compression	59	-0.21	0.00	0.00
			Max. Mx	50	0.01	0.00	0.00
			Max. My	57	-0.08	0.00	-0.00
			Max. Vy	50	0.01	0.00	0.00
			Max. Vx	57	-0.00	0.00	0.00
T3	224.5 - 204.5	Leg	Max Tension	57	22.76	0.07	0.00
			Max. Compression	59	-27.09	0.08	0.00
			Max. Mx	51	-13.47	0.14	-0.00
			Max. My	62	-1.38	0.00	0.10
			Max. Vy	51	-0.44	0.08	0.00
			Max. Vx	62	-0.34	0.00	0.03
		Diagonal	Max Tension	61	0.72	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	60	-0.79	0.00	0.00
			Max. Mx	60	0.24	-0.00	-0.00
			Max. My	59	-0.07	-0.00	-0.00
			Max. Vy	61	-0.01	-0.00	0.00
			Max. Vx	59	-0.00	0.00	0.00
		Top Girt	Max Tension	51	0.10	0.00	0.00
			Max. Compression	61	-0.08	0.00	0.00
			Max. Mx	50	0.01	0.00	0.00
			Max. My	51	-0.05	0.00	0.00
			Max. Vy	50	-0.01	0.00	0.00
			Max. Vx	51	-0.00	0.00	0.00
		Bottom Girt	Max Tension	61	0.31	0.00	0.00
			Max. Compression	59	-0.30	0.00	0.00
			Max. Mx	50	0.02	0.00	0.00
			Max. My	57	-0.12	0.00	-0.00
			Max. Vy	50	0.01	0.00	0.00
			Max. Vx	57	-0.00	0.00	0.00
T4	204.5 - 184.5	Leg	Max Tension	57	35.03	0.09	0.00
			Max. Compression	59	-41.49	0.11	0.00
			Max. Mx	51	-26.84	0.22	-0.00
			Max. My	62	-2.36	0.00	0.14
			Max. Vy	51	-0.58	0.11	0.00
			Max. Vx	62	-0.42	0.01	0.02
		Diagonal	Max Tension	61	0.83	0.00	0.00
			Max. Compression	59	-0.93	0.00	0.00
			Max. Mx	60	0.23	-0.01	-0.00
			Max. My	59	-0.11	-0.00	-0.00
			Max. Vy	60	-0.01	-0.01	-0.00
			Max. Vx	59	-0.00	0.00	0.00
		Top Girt	Max Tension	51	0.07	0.00	0.00
			Max. Compression	62	-0.04	0.00	0.00
			Max. Mx	50	0.01	0.01	0.00
			Max. My	51	-0.04	0.00	0.00
			Max. Vy	50	-0.01	0.00	0.00
			Max. Vx	51	-0.00	0.00	0.00
		Bottom Girt	Max Tension	61	0.43	0.00	0.00
			Max. Compression	59	-0.40	0.00	0.00
			Max. Mx	50	0.03	0.01	0.00
			Max. My	57	-0.16	0.00	-0.00
			Max. Vy	50	0.01	0.00	0.00
			Max. Vx	57	-0.00	0.00	0.00
T5	184.5 - 164.5	Leg	Max Tension	61	47.22	0.15	-0.00
			Max. Compression	59	-56.05	0.09	0.00
			Max. Mx	51	-41.17	0.30	-0.00
			Max. My	62	-4.72	0.01	-0.17
			Max. Vy	51	-0.70	0.09	0.00
			Max. Vx	62	-0.49	0.01	-0.00
		Diagonal	Max Tension	61	0.91	0.00	0.00
			Max. Compression	59	-1.01	0.00	0.00
			Max. Mx	60	0.28	-0.01	-0.00
			Max. My	59	-0.09	-0.01	-0.00
			Max. Vy	61	-0.01	-0.00	0.00
			Max. Vx	59	-0.00	0.00	0.00
		Top Girt	Max Tension	51	0.06	0.00	0.00
			Max. Compression	45	-0.04	0.00	0.00
			Max. Mx	50	0.02	0.01	0.00
			Max. My	51	-0.03	0.00	0.00
			Max. Vy	50	0.01	0.00	0.00
			Max. Vx	51	0.00	0.00	0.00
		Bottom Girt	Max Tension	61	0.49	0.00	0.00
			Max. Compression	59	-0.44	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	50	0.04	0.01	0.00
			Max. My	57	-0.18	0.00	-0.00
			Max. Vy	50	-0.01	0.00	0.00
			Max. Vx	57	0.00	0.00	0.00
T6	164.5 - 144.5	Leg	Max Tension	42	60.91	0.42	-0.01
			Max. Compression	59	-75.06	0.19	-0.00
			Max. Mx	18	-64.46	-0.45	0.01
			Max. My	22	-2.32	0.01	0.33
			Max. Vy	18	-2.15	0.27	-0.00
			Max. Vx	22	1.42	0.00	-0.14
		Diagonal	Max Tension	26	2.37	0.00	0.00
			Max. Compression	2	-2.41	0.00	0.00
			Max. Mx	60	0.68	-0.01	-0.00
			Max. My	61	-0.71	-0.00	-0.00
			Max. Vy	59	0.01	-0.01	-0.00
			Max. Vx	58	-0.00	0.00	0.00
		Top Girt	Max Tension	57	0.06	0.00	0.00
			Max. Compression	17	-0.03	0.00	0.00
			Max. Mx	50	0.03	0.01	0.00
			Max. My	51	0.02	0.00	0.00
			Max. Vy	50	-0.02	0.00	0.00
			Max. Vx	51	-0.00	0.00	0.00
		Bottom Girt	Max Tension	42	1.04	0.00	0.00
			Max. Compression	18	-1.06	0.00	0.00
			Max. Mx	50	0.07	0.02	0.00
			Max. My	57	-0.26	0.00	-0.00
			Max. Vy	50	-0.02	0.00	0.00
			Max. Vx	57	0.00	0.00	0.00
T7	144.5 - 124.5	Leg	Max Tension	42	95.89	0.57	-0.01
			Max. Compression	18	-100.27	0.30	-0.00
			Max. Mx	18	-64.46	0.98	-0.01
			Max. My	22	-2.34	-0.00	-0.62
			Max. Vy	18	-2.75	0.30	-0.00
			Max. Vx	22	1.75	0.00	-0.10
		Diagonal	Max Tension	26	2.86	0.00	0.00
			Max. Compression	2	-2.92	0.00	0.00
			Max. Mx	59	1.00	-0.01	-0.00
			Max. My	30	-2.63	0.00	0.00
			Max. Vy	59	0.01	-0.01	-0.00
			Max. Vx	62	-0.00	0.00	0.00
		Top Girt	Max Tension	18	0.43	0.00	0.00
			Max. Compression	42	-0.40	0.00	0.00
			Max. Mx	50	0.05	0.02	0.00
			Max. My	51	-0.05	0.00	0.00
			Max. Vy	50	-0.02	0.00	0.00
			Max. Vx	51	-0.00	0.00	0.00
		Bottom Girt	Max Tension	42	1.01	0.00	0.00
			Max. Compression	18	-1.03	0.00	0.00
			Max. Mx	50	0.07	0.02	0.00
			Max. My	57	-0.24	0.00	-0.00
			Max. Vy	50	0.02	0.00	0.00
			Max. Vx	57	-0.00	0.00	0.00
T8	124.5 - 104.5	Leg	Max Tension	42	133.06	0.80	-0.01
			Max. Compression	18	-138.54	0.22	-0.00
			Max. Mx	18	-100.28	1.21	-0.01
			Max. My	22	-3.23	-0.00	-0.68
			Max. Vy	18	-3.32	0.22	-0.00
			Max. Vx	22	2.07	0.01	-0.04
		Diagonal	Max Tension	26	3.37	0.00	0.00
			Max. Compression	2	-3.43	0.00	0.00
			Max. Mx	59	1.31	-0.01	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. My	30	-3.05	0.00	0.00
			Max. Vy	61	-0.01	-0.01	0.00
			Max. Vx	30	-0.00	0.00	0.00
		Top Girt	Max Tension	18	0.33	0.00	0.00
			Max. Compression	45	-0.31	0.00	0.00
			Max. Mx	50	0.05	0.02	0.00
			Max. My	51	-0.00	0.00	0.00
			Max. Vy	50	-0.02	0.00	0.00
			Max. Vx	51	-0.00	0.00	0.00
		Bottom Girt	Max Tension	42	1.11	0.00	0.00
			Max. Compression	18	-1.12	0.00	0.00
			Max. Mx	50	0.07	0.03	0.00
			Max. My	57	-0.23	0.00	-0.00
			Max. Vy	50	-0.02	0.00	0.00
			Max. Vx	57	0.00	0.00	0.00
T9	104.5 - 84.5	Leg	Max Tension	42	171.39	0.75	-0.00
			Max. Compression	18	-178.18	0.45	-0.00
			Max. Mx	18	-138.54	1.32	-0.01
			Max. My	22	-4.15	-0.01	-0.73
			Max. Vy	18	-3.87	0.45	-0.00
			Max. Vx	22	2.36	0.01	-0.12
		Diagonal	Max Tension	26	3.77	0.00	0.00
			Max. Compression	2	-3.89	0.00	0.00
			Max. Mx	59	1.32	-0.01	0.00
			Max. My	30	-3.43	0.00	0.00
			Max. Vy	59	0.02	-0.01	0.00
			Max. Vx	30	-0.00	0.00	0.00
		Top Girt	Max Tension	18	0.25	0.00	0.00
			Max. Compression	25	-0.23	0.00	0.00
			Max. Mx	50	0.08	0.03	0.00
			Max. My	2	-0.19	0.00	0.00
			Max. Vy	50	-0.03	0.00	0.00
			Max. Vx	2	-0.00	0.00	0.00
		Bottom Girt	Max Tension	42	1.31	0.00	0.00
			Max. Compression	18	-1.33	0.00	0.00
			Max. Mx	50	0.10	0.03	0.00
			Max. My	26	-0.54	0.00	-0.00
			Max. Vy	50	0.03	0.00	0.00
			Max. Vx	26	0.00	0.00	0.00
T10	84.5 - 64.5	Leg	Max Tension	42	210.45	0.77	-0.00
			Max. Compression	18	-218.80	0.60	-0.00
			Max. Mx	18	-178.18	1.72	-0.01
			Max. My	22	-5.09	-0.01	-0.91
			Max. Vy	18	-4.42	0.60	-0.00
			Max. Vx	22	2.55	0.01	-0.24
		Diagonal	Max Tension	26	4.06	0.00	0.00
			Max. Compression	2	-4.19	0.00	0.00
			Max. Mx	59	1.41	-0.01	-0.00
			Max. My	2	-4.06	0.00	-0.00
			Max. Vy	59	0.02	-0.01	-0.00
			Max. Vx	2	0.00	0.00	-0.00
		Top Girt	Max Tension	19	0.24	0.00	0.00
			Max. Compression	21	-0.21	0.00	0.00
			Max. Mx	50	0.07	0.03	0.00
			Max. My	2	-0.18	0.00	0.00
			Max. Vy	50	-0.03	0.00	0.00
			Max. Vx	2	-0.00	0.00	0.00
		Bottom Girt	Max Tension	42	1.24	0.00	0.00
			Max. Compression	18	-1.23	0.00	0.00
			Max. Mx	50	0.09	0.04	0.00
			Max. My	26	-0.52	0.00	-0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	50	0.03	0.00	0.00
			Max. Vx	26	0.00	0.00	0.00
T11	64.5 - 44.5	Leg	Max Tension	42	249.64	0.40	-0.00
			Max. Compression	18	-260.04	1.84	-0.00
			Max. Mx	18	-218.81	2.06	-0.01
			Max. My	22	-6.06	-0.01	-1.10
			Max. Vy	18	-7.11	1.84	-0.00
			Max. Vx	22	2.56	-0.01	-1.10
		Diagonal	Max Tension	26	4.35	0.00	0.00
			Max. Compression	2	-4.60	0.00	0.00
			Max. Mx	60	0.46	-0.02	-0.00
			Max. My	26	-3.88	-0.00	0.00
			Max. Vy	60	0.02	-0.02	-0.00
			Max. Vx	2	0.00	-0.00	-0.00
		Top Girt	Max Tension	61	0.22	0.00	0.00
			Max. Compression	21	-0.12	0.00	0.00
			Max. Mx	50	0.09	0.04	0.00
			Max. My	2	-0.09	0.00	0.00
			Max. Vy	50	-0.03	0.00	0.00
			Max. Vx	2	-0.00	0.00	0.00
		Bottom Girt	Max Tension	21	0.47	0.00	0.00
			Max. Compression	42	-0.77	0.00	0.00
			Max. Mx	50	-0.20	0.05	0.00
			Max. My	2	-0.43	0.00	0.00
			Max. Vy	50	-0.03	0.00	0.00
			Max. Vx	2	-0.00	0.00	0.00
T12	44.5 - 24.5	Leg	Max Tension	42	247.10	-1.61	0.00
			Max. Compression	18	-257.52	-0.92	0.00
			Max. Mx	18	-257.43	1.84	-0.00
			Max. My	38	-7.25	-0.09	-1.14
			Max. Vy	18	-1.16	1.32	0.00
			Max. Vx	46	0.71	-0.09	1.14
		Diagonal	Max Tension	28	3.50	0.00	0.00
			Max. Compression	4	-3.81	0.03	0.00
			Max. Mx	60	-0.88	0.05	0.01
			Max. My	2	0.02	-0.04	0.02
			Max. Vy	61	0.04	0.05	0.00
			Max. Vx	2	0.00	0.00	0.00
		Secondary Horizontal	Max Tension	18	4.47	0.01	-0.00
			Max. Compression	18	-4.47	0.00	0.00
			Max. Mx	62	-2.70	0.03	0.00
			Max. My	18	-0.38	0.02	0.01
			Max. Vy	62	-0.04	0.03	0.00
			Max. Vx	59	-0.00	0.00	0.00
T13	24.5 - 4.5	Leg	Max Tension	45	234.21	0.50	0.00
			Max. Compression	18	-247.78	0.99	0.00
			Max. Mx	18	-247.78	0.99	0.00
			Max. My	46	-9.19	-0.05	0.62
			Max. Vy	18	-0.84	0.99	0.00
			Max. Vx	46	-0.36	-0.05	0.62
		Diagonal	Max Tension	62	2.69	0.00	0.00
			Max. Compression	62	-2.26	0.00	0.00
			Max. Mx	61	-1.92	0.09	0.00
			Max. My	59	-0.22	0.03	-0.01
			Max. Vy	61	0.06	0.09	0.00
			Max. Vx	59	0.00	0.00	0.00
		Secondary Horizontal	Max Tension	18	4.30	0.02	-0.00
			Max. Compression	18	-4.30	0.00	0.00
			Max. Mx	60	-0.54	0.08	0.01

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. My	60	-0.60	0.08	0.01
			Max. Vy	60	-0.06	0.08	0.01
			Max. Vx	62	-0.00	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	34	235.17	12.25	-7.69
	Max. H_x	34	235.17	12.25	-7.69
	Max. H_z	13	-215.95	-10.91	6.93
	Min. Vert	13	-215.95	-10.91	6.93
	Min. H_x	13	-215.95	-10.91	6.93
	Min. H_z	34	235.17	12.25	-7.69
Leg B	Max. Vert	18	247.75	-13.34	-7.69
	Max. H_x	45	-231.21	12.04	6.94
	Max. H_z	45	-231.21	12.04	6.94
	Min. Vert	45	-231.21	12.04	6.94
	Min. H_x	18	247.75	-13.34	-7.69
	Min. H_z	18	247.75	-13.34	-7.69
Leg A	Max. Vert	2	235.12	-0.54	14.46
	Max. H_x	24	-183.79	0.76	-10.41
	Max. H_z	2	235.12	-0.54	14.46
	Min. Vert	29	-215.98	0.56	-12.91
	Min. H_x	60	30.47	-0.80	0.12
	Min. H_z	29	-215.98	0.56	-12.91

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	22.40	0.00	0.00	-3.48	6.38	-0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	26.88	0.00	-20.02	-1958.61	7.90	-9.52
1.2D+1.6W (pattern 1) 0 deg - No Ice	26.88	0.00	-17.36	-1530.11	7.90	-9.48
1.2D+1.6W (pattern 2) 0 deg - No Ice	26.88	0.00	-17.41	-1856.86	7.91	-9.52
0.9 Dead+1.6 Wind 0 deg - No Ice	20.16	0.00	-20.02	-1946.44	5.91	-9.49
1.2 Dead+1.6 Wind 30 deg - No Ice	26.88	8.94	-15.49	-1568.36	-895.16	-8.08
1.2D+1.6W (pattern 1) 30 deg - No Ice	26.88	7.61	-13.19	-1197.21	-680.85	-8.04
1.2D+1.6W (pattern 2) 30 deg - No Ice	26.88	7.73	-13.39	-1483.26	-845.95	-8.08
0.9 Dead+1.6 Wind 30 deg - No Ice	20.16	8.94	-15.49	-1558.18	-891.88	-8.04
1.2 Dead+1.6 Wind 60 deg - No Ice	26.88	16.80	-9.70	-975.88	-1674.89	-9.33
1.2D+1.6W (pattern 1) 60 deg -	26.88	14.50	-8.37	-761.51	-1303.58	-9.29

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
No Ice						
1.2D+1.6W (pattern 2) 60 deg - No Ice	26.88	14.75	-8.52	-927.31	-1590.73	-9.32
0.9 Dead+1.6 Wind 60 deg - No Ice	20.16	16.80	-9.70	-969.15	-1667.11	-9.29
1.2 Dead+1.6 Wind 90 deg - No Ice	26.88	20.57	0.00	-4.43	-2022.83	-6.28
1.2D+1.6W (pattern 1) 90 deg - No Ice	26.88	17.91	0.00	-4.37	-1594.30	-6.26
1.2D+1.6W (pattern 2) 90 deg - No Ice	26.88	18.14	0.00	-4.36	-1924.51	-6.28
0.9 Dead+1.6 Wind 90 deg - No Ice	20.16	20.57	0.00	-3.32	-2013.35	-6.26
1.2 Dead+1.6 Wind 120 deg - No Ice	26.88	18.60	10.74	1034.21	-1790.84	0.14
1.2D+1.6W (pattern 1) 120 deg - No Ice	26.88	16.30	9.41	819.98	-1419.78	0.14
1.2D+1.6W (pattern 2) 120 deg - No Ice	26.88	16.34	9.44	983.33	-1702.72	0.14
0.9 Dead+1.6 Wind 120 deg - No Ice	20.16	18.60	10.74	1029.49	-1782.78	0.14
1.2 Dead+1.6 Wind 150 deg - No Ice	26.88	10.29	17.81	1754.42	-1007.35	6.52
1.2D+1.6W (pattern 1) 150 deg - No Ice	26.88	8.96	15.51	1383.28	-793.13	6.49
1.2D+1.6W (pattern 2) 150 deg - No Ice	26.88	9.07	15.71	1669.25	-958.25	6.52
0.9 Dead+1.6 Wind 150 deg - No Ice	20.16	10.29	17.81	1745.57	-1003.63	6.50
1.2 Dead+1.6 Wind 180 deg - No Ice	26.88	0.00	19.40	1938.82	7.92	9.52
1.2D+1.6W (pattern 1) 180 deg - No Ice	26.88	0.00	16.75	1510.08	7.93	9.49
1.2D+1.6W (pattern 2) 180 deg - No Ice	26.88	0.00	17.04	1841.65	7.94	9.52
0.9 Dead+1.6 Wind 180 deg - No Ice	20.16	0.00	19.40	1928.62	5.93	9.49
1.2 Dead+1.6 Wind 210 deg - No Ice	26.88	-8.94	15.49	1559.80	910.89	8.08
1.2D+1.6W (pattern 1) 210 deg - No Ice	26.88	-7.61	13.19	1188.62	696.61	8.04
1.2D+1.6W (pattern 2) 210 deg - No Ice	26.88	-7.73	13.39	1474.63	861.79	8.08
0.9 Dead+1.6 Wind 210 deg - No Ice	20.16	-8.94	15.49	1551.77	903.65	8.04
1.2 Dead+1.6 Wind 240 deg - No Ice	26.88	-17.33	10.01	972.86	1700.38	9.33
1.2D+1.6W (pattern 1) 240 deg - No Ice	26.88	-15.03	8.68	758.60	1329.28	9.29
1.2D+1.6W (pattern 2) 240 deg - No Ice	26.88	-15.07	8.70	921.97	1612.26	9.32
0.9 Dead+1.6 Wind 240 deg - No Ice	20.16	-17.33	10.01	968.39	1688.78	9.29
1.2 Dead+1.6 Wind 270 deg - No Ice	26.88	-20.57	0.00	-4.40	2038.50	6.28
1.2D+1.6W (pattern 1) 270 deg - No Ice	26.88	-17.91	0.00	-4.35	1609.98	6.26
1.2D+1.6W (pattern 2) 270 deg - No Ice	26.88	-18.14	0.00	-4.34	1940.19	6.28
0.9 Dead+1.6 Wind 270 deg - No Ice	20.16	-20.57	0.00	-3.30	2025.05	6.26

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
1.2 Dead+1.6 Wind 300 deg - No Ice	26.88	-18.07	-10.43	-1037.13	1796.81	-0.14
1.2D+1.6W (pattern 1) 300 deg - No Ice	26.88	-15.77	-9.11	-822.76	1425.51	-0.14
1.2D+1.6W (pattern 2) 300 deg - No Ice	26.88	-16.02	-9.25	-988.55	1712.67	-0.14
0.9 Dead+1.6 Wind 300 deg - No Ice	20.16	-18.07	-10.43	-1030.14	1784.59	-0.14
1.2 Dead+1.6 Wind 330 deg - No Ice	26.88	-10.28	-17.81	-1762.80	1023.25	-6.52
1.2D+1.6W (pattern 1) 330 deg - No Ice	26.88	-8.96	-15.51	-1391.72	808.99	-6.49
1.2D+1.6W (pattern 2) 330 deg - No Ice	26.88	-9.07	-15.71	-1677.70	974.08	-6.52
0.9 Dead+1.6 Wind 330 deg - No Ice	20.16	-10.28	-17.81	-1751.80	1015.56	-6.50
1.2 Dead+1.0 Ice+1.0 Temp	85.10	0.00	0.00	-18.11	34.69	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	85.10	0.00	-8.43	-1133.80	34.81	-2.52
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	85.10	4.03	-6.98	-960.59	-509.36	-2.26
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	85.10	7.23	-4.18	-575.38	-930.26	-2.33
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	85.10	8.52	0.00	-18.26	-1092.01	-1.40
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	85.10	7.49	4.32	548.78	-947.17	0.16
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	85.10	4.26	7.38	957.74	-528.52	1.69
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	85.10	0.00	8.35	1096.21	34.83	2.52
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	85.10	-4.03	6.98	924.31	578.88	2.26
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	85.10	-7.30	4.21	539.65	1000.96	2.33
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	85.10	-8.52	0.00	-18.23	1161.62	1.40
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	85.10	-7.42	-4.29	-584.48	1015.69	-0.16
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	85.10	-4.26	-7.38	-993.99	598.27	-1.69
Dead+Wind 0 deg - Service	22.40	0.00	-4.79	-469.27	6.52	-2.27
Dead+Wind 30 deg - Service	22.40	2.14	-3.70	-376.22	-208.64	-1.93
Dead+Wind 60 deg - Service	22.40	4.02	-2.32	-235.06	-394.45	-2.23
Dead+Wind 90 deg - Service	22.40	4.92	0.00	-3.55	-477.40	-1.50
Dead+Wind 120 deg - Service	22.40	4.45	2.57	243.94	-422.15	0.03
Dead+Wind 150 deg - Service	22.40	2.46	4.26	415.54	-235.43	1.55
Dead+Wind 180 deg - Service	22.40	0.00	4.64	459.45	6.53	2.27
Dead+Wind 210 deg - Service	22.40	-2.14	3.70	369.12	221.68	1.93
Dead+Wind 240 deg - Service	22.40	-4.14	2.39	229.31	409.85	2.23
Dead+Wind 270 deg - Service	22.40	-4.92	0.00	-3.55	490.42	1.50
Dead+Wind 300 deg - Service	22.40	-4.32	-2.50	-249.68	432.82	-0.03
Dead+Wind 330 deg - Service	22.40	-2.46	-4.26	-422.62	248.47	-1.55

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-22.40	0.00	-0.00	22.40	-0.00	0.002%
2	0.00	-26.88	-20.03	-0.00	26.88	20.02	0.048%
3	0.00	-26.88	-17.37	-0.00	26.88	17.36	0.037%
4	0.00	-26.88	-17.42	-0.00	26.88	17.41	0.050%
5	0.00	-20.16	-20.03	-0.00	20.16	20.02	0.056%
6	8.95	-26.88	-15.50	-8.94	26.88	15.49	0.048%
7	7.62	-26.88	-13.20	-7.61	26.88	13.19	0.036%
8	7.74	-26.88	-13.40	-7.73	26.88	13.39	0.050%
9	8.95	-20.16	-15.50	-8.94	20.16	15.49	0.057%
10	16.82	-26.88	-9.71	-16.80	26.88	9.70	0.048%
11	14.51	-26.88	-8.38	-14.50	26.88	8.37	0.038%
12	14.77	-26.88	-8.53	-14.75	26.88	8.52	0.049%
13	16.82	-20.16	-9.71	-16.80	20.16	9.70	0.059%
14	20.59	-26.88	0.00	-20.57	26.88	-0.00	0.050%
15	17.93	-26.88	0.00	-17.91	26.88	-0.00	0.038%
16	18.16	-26.88	0.00	-18.14	26.88	-0.00	0.051%
17	20.59	-20.16	0.00	-20.57	20.16	-0.00	0.057%
18	18.62	-26.88	10.75	-18.60	26.88	-10.74	0.048%
19	16.31	-26.88	9.42	-16.30	26.88	-9.41	0.038%
20	16.36	-26.88	9.44	-16.34	26.88	-9.44	0.050%
21	18.62	-20.16	10.75	-18.60	20.16	-10.74	0.056%
22	10.29	-26.88	17.83	-10.29	26.88	-17.81	0.050%
23	8.96	-26.88	15.52	-8.96	26.88	-15.51	0.038%
24	9.08	-26.88	15.73	-9.07	26.88	-15.71	0.051%
25	10.29	-20.16	17.83	-10.29	20.16	-17.81	0.057%
26	0.00	-26.88	19.42	-0.00	26.88	-19.40	0.048%
27	0.00	-26.88	16.76	-0.00	26.88	-16.75	0.038%
28	0.00	-26.88	17.05	-0.00	26.88	-17.04	0.049%
29	0.00	-20.16	19.42	-0.00	20.16	-19.40	0.059%
30	-8.95	-26.88	15.50	8.94	26.88	-15.49	0.048%
31	-7.62	-26.88	13.20	7.61	26.88	-13.19	0.036%
32	-7.74	-26.88	13.40	7.73	26.88	-13.39	0.050%
33	-8.95	-20.16	15.50	8.94	20.16	-15.49	0.057%
34	-17.35	-26.88	10.02	17.33	26.88	-10.01	0.048%
35	-15.04	-26.88	8.69	15.03	26.88	-8.68	0.037%
36	-15.09	-26.88	8.71	15.07	26.88	-8.70	0.050%
37	-17.35	-20.16	10.02	17.33	20.16	-10.01	0.056%
38	-20.59	-26.88	0.00	20.57	26.88	-0.00	0.050%
39	-17.93	-26.88	0.00	17.91	26.88	-0.00	0.038%
40	-18.16	-26.88	0.00	18.14	26.88	-0.00	0.051%
41	-20.59	-20.16	0.00	20.57	20.16	-0.00	0.058%
42	-18.09	-26.88	-10.44	18.07	26.88	10.43	0.049%
43	-15.78	-26.88	-9.11	15.77	26.88	9.11	0.039%
44	-16.04	-26.88	-9.26	16.02	26.88	9.25	0.050%
45	-18.09	-20.16	-10.44	18.07	20.16	10.43	0.059%
46	-10.29	-26.88	-17.83	10.28	26.88	17.81	0.050%
47	-8.96	-26.88	-15.52	8.96	26.88	15.51	0.038%
48	-9.08	-26.88	-15.73	9.07	26.88	15.71	0.051%
49	-10.29	-20.16	-17.83	10.28	20.16	17.81	0.058%
50	0.00	-85.10	0.00	-0.00	85.10	-0.00	0.001%
51	0.00	-85.10	-8.44	-0.00	85.10	8.43	0.014%
52	4.04	-85.10	-6.99	-4.03	85.10	6.98	0.014%
53	7.24	-85.10	-4.18	-7.23	85.10	4.18	0.014%
54	8.53	-85.10	0.00	-8.52	85.10	-0.00	0.014%
55	7.50	-85.10	4.33	-7.49	85.10	-4.32	0.014%
56	4.27	-85.10	7.39	-4.26	85.10	-7.38	0.014%
57	0.00	-85.10	8.37	-0.00	85.10	-8.35	0.014%
58	-4.04	-85.10	6.99	4.03	85.10	-6.98	0.014%
59	-7.31	-85.10	4.22	7.30	85.10	-4.21	0.014%
60	-8.53	-85.10	0.00	8.52	85.10	-0.00	0.015%
61	-7.43	-85.10	-4.29	7.42	85.10	4.29	0.015%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
62	-4.27	-85.10	-7.39	4.26	85.10	7.38	0.015%
63	0.00	-22.40	-4.79	-0.00	22.40	4.79	0.017%
64	2.14	-22.40	-3.71	-2.14	22.40	3.70	0.016%
65	4.02	-22.40	-2.32	-4.02	22.40	2.32	0.016%
66	4.92	-22.40	0.00	-4.92	22.40	-0.00	0.017%
67	4.45	-22.40	2.57	-4.45	22.40	-2.57	0.018%
68	2.46	-22.40	4.26	-2.46	22.40	-4.26	0.017%
69	0.00	-22.40	4.64	-0.00	22.40	-4.64	0.016%
70	-2.14	-22.40	3.71	2.14	22.40	-3.70	0.016%
71	-4.15	-22.40	2.40	4.14	22.40	-2.39	0.017%
72	-4.92	-22.40	0.00	4.92	22.40	-0.00	0.018%
73	-4.32	-22.40	-2.50	4.32	22.40	2.50	0.017%
74	-2.46	-22.40	-4.26	2.46	22.40	4.26	0.018%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00007441
2	Yes	62	0.00014569	0.00012631
3	Yes	62	0.00014690	0.00012450
4	Yes	62	0.00014585	0.00012744
5	Yes	56	0.00014407	0.00012481
6	Yes	62	0.00014808	0.00012984
7	Yes	62	0.00014835	0.00012763
8	Yes	62	0.00014822	0.00013104
9	Yes	56	0.00014696	0.00012877
10	Yes	63	0.00014315	0.00012412
11	Yes	62	0.00014970	0.00012695
12	Yes	63	0.00014327	0.00012519
13	Yes	56	0.00014975	0.00012972
14	Yes	62	0.00014798	0.00012754
15	Yes	62	0.00014822	0.00012473
16	Yes	62	0.00014812	0.00012863
17	Yes	56	0.00014688	0.00012647
18	Yes	62	0.00014549	0.00012507
19	Yes	62	0.00014668	0.00012300
20	Yes	62	0.00014564	0.00012616
21	Yes	56	0.00014385	0.00012354
22	Yes	62	0.00014799	0.00012756
23	Yes	62	0.00014824	0.00012475
24	Yes	62	0.00014813	0.00012864
25	Yes	56	0.00014689	0.00012649
26	Yes	63	0.00014315	0.00012413
27	Yes	62	0.00014970	0.00012697
28	Yes	63	0.00014327	0.00012520
29	Yes	56	0.00014975	0.00012974
30	Yes	62	0.00014808	0.00012985
31	Yes	62	0.00014835	0.00012765
32	Yes	62	0.00014822	0.00013105
33	Yes	56	0.00014696	0.00012878
34	Yes	62	0.00014568	0.00012631
35	Yes	62	0.00014689	0.00012451
36	Yes	62	0.00014584	0.00012745
37	Yes	56	0.00014406	0.00012481
38	Yes	62	0.00014799	0.00012747

39	Yes	62	0.00014824	0.00012466
40	Yes	62	0.00014812	0.00012854
41	Yes	56	0.00014688	0.00012641
42	Yes	63	0.00014313	0.00012292
43	Yes	62	0.00014964	0.00012540
44	Yes	63	0.00014324	0.00012392
45	Yes	56	0.00014975	0.00012849
46	Yes	62	0.00014800	0.00012747
47	Yes	62	0.00014825	0.00012466
48	Yes	62	0.00014813	0.00012855
49	Yes	56	0.00014689	0.00012642
50	Yes	77	0.00000001	0.00004739
51	Yes	101	0.00014572	0.00015000
52	Yes	101	0.00014688	0.00015000
53	Yes	101	0.00014799	0.00015000
54	Yes	101	0.00014690	0.00015000
55	Yes	101	0.00014576	0.00015000
56	Yes	101	0.00014692	0.00015000
57	Yes	101	0.00014800	0.00015000
58	Yes	101	0.00014688	0.00015000
59	Yes	101	0.00014571	0.00015000
60	Yes	101	0.00014679	0.00015000
61	Yes	101	0.00014786	0.00015000
62	Yes	101	0.00014681	0.00015000
63	Yes	58	0.00014924	0.00012791
64	Yes	58	0.00014974	0.00012973
65	Yes	59	0.00014291	0.00012267
66	Yes	58	0.00014962	0.00012774
67	Yes	58	0.00014909	0.00012697
68	Yes	58	0.00014962	0.00012777
69	Yes	59	0.00014292	0.00012272
70	Yes	58	0.00014974	0.00012978
71	Yes	58	0.00014923	0.00012794
72	Yes	58	0.00014966	0.00012756
73	Yes	59	0.00014287	0.00012146
74	Yes	58	0.00014967	0.00012754

Maximum Tower Deflections - Service Wind

Section No.	*Elevation*	*Horz. Deflection*	*Gov. Load Comb.*	*Tilt*	*Twist*
	ft	*in*		°	°
T1	254.5 - 244.5	28.107	73	1.0036	0.0907
T2	244.5 - 224.5	26.004	73	0.9956	0.0911
T3	224.5 - 204.5	21.942	73	0.9289	0.0907
T4	204.5 - 184.5	18.194	73	0.8503	0.0907
T5	184.5 - 164.5	14.774	73	0.7751	0.0907
T6	164.5 - 144.5	11.657	73	0.7065	0.0907
T7	144.5 - 124.5	8.846	73	0.6256	0.0875
T8	124.5 - 104.5	6.370	73	0.5384	0.0777
T9	104.5 - 84.5	4.268	73	0.4472	0.0622
T10	84.5 - 64.5	2.589	73	0.3382	0.0476
T11	64.5 - 44.5	1.351	73	0.2358	0.0312
T12	44.5 - 24.5	0.528	73	0.1434	0.0177
T13	24.5 - 4.5	0.119	73	0.0613	0.0068

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
254.500	Flash Beacon Lighting	73	28.107	1.0036	0.0907	54904
155.000	APX16DWV-16DWVS-E-A20 w/ Mount Pipe	73	10.282	0.6697	0.0898	15072
147.000	APXVAARR24_43-U-NA20 w/ Mount Pipe	73	9.179	0.6363	0.0882	14448
124.000	Obstruction Light	73	6.313	0.5363	0.0774	12998

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	254.5 - 244.5	117.230	42	4.2008	0.3819
T2	244.5 - 224.5	108.433	42	4.1673	0.3835
T3	224.5 - 204.5	91.448	42	3.8856	0.3819
T4	204.5 - 184.5	75.786	42	3.5536	0.3817
T5	184.5 - 164.5	61.511	42	3.2358	0.3816
T6	164.5 - 144.5	48.509	42	2.9460	0.3816
T7	144.5 - 124.5	36.798	42	2.6053	0.3681
T8	124.5 - 104.5	26.496	42	2.2408	0.3269
T9	104.5 - 84.5	17.747	42	1.8604	0.2614
T10	84.5 - 64.5	10.765	42	1.4062	0.2001
T11	64.5 - 44.5	5.619	42	0.9802	0.1312
T12	44.5 - 24.5	2.198	42	0.5958	0.0745
T13	24.5 - 4.5	0.499	18	0.2544	0.0284

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
254.500	Flash Beacon Lighting	42	117.230	4.2008	0.3819	13212
155.000	APX16DWV-16DWVS-E-A20 w/ Mount Pipe	42	42.779	2.7908	0.3779	3050
147.000	APXVAARR24_43-U-NA20 w/ Mount Pipe	42	38.188	2.6503	0.3711	3035
124.000	Obstruction Light	42	26.257	2.2317	0.3255	3124

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	254.5	Leg	A325N	0.6250	3	0.92	20.71	0.044	1	Bolt Tension

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T2	244.5	Leg	A325N	0.6250	2	5.56	20.71	0.269	1	Bolt Tension
T3	224.5	Leg	A325N	0.6250	4	5.69	20.71	0.275	1	Bolt Tension
T4	204.5	Leg	A325N	0.6250	4	8.76	20.71	0.423	1	Bolt Tension
T5	184.5	Leg	A325N	0.7500	4	11.81	29.82	0.396	1	Bolt Tension
T6	164.5	Leg	A325N	0.7500	4	15.23	29.82	0.511	1	Bolt Tension
T7	144.5	Leg	A325N	0.8750	4	23.97	40.59	0.591	1	Bolt Tension
T8	124.5	Leg	A325N	0.8750	4	33.27	40.59	0.820	1	Bolt Tension
T11	64.5	Leg	A325N	1.1250	4	62.41	67.10	0.930	1	Bolt Tension
T12	44.5	Leg	A325N	1.1250	4	58.93	67.10	0.878	1	Bolt Tension
		Diagonal	A325N	0.6250	1	3.50	6.83	0.512	1	Member Block Shear
		Secondary Horizontal	A325N	0.6250	2	2.23	8.22	0.272	1	Member Block Shear
T13	24.5	Diagonal	A325N	0.8750	1	2.69	9.07	0.297	1	Member Block Shear
		Secondary Horizontal	A325N	0.6250	2	2.15	9.58	0.224	1	Member Block Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	254.5 - 244.5	1 1/4	10.000	3.111	119.5 K=1.00	1.2272	-2.18	19.42	0.112 [1]
T2	244.5 - 224.5	1 1/4	20.002	2.762	106.1 K=1.00	1.2272	-12.49	24.26	0.515 [1]
T3	224.5 - 204.5	1 1/2	20.002	2.762	88.4 K=1.00	1.7672	-25.77	44.92	0.574 [1]
T4	204.5 - 184.5	1 3/4	20.002	2.762	75.8 K=1.00	2.4053	-40.07	71.14	0.563 [1]
T5	184.5 - 164.5	2	20.002	2.762	66.3 K=1.00	3.1416	-54.64	102.52	0.533 [1]
T6	164.5 - 144.5	2	20.002	2.762	66.3 K=1.00	3.1416	-73.04	102.52	0.712 [1]
T7	144.5 - 124.5	2 1/4	20.002	2.762	58.9 K=1.00	3.9761	-97.09	138.81	0.699 [1]
T8	124.5 - 104.5	2 1/2	20.002	2.762	53.0 K=1.00	4.9087	-135.17	179.83	0.752 [1]
T9	104.5 - 84.5	2 1/2	20.002	2.762	53.0 K=1.00	4.9087	-174.66	179.83	0.971 [1]
T10	84.5 - 64.5	2 3/4	20.002	2.762	48.2 K=1.00	5.9396	-215.30	225.51	0.955 [1]
T11	64.5 - 44.5	2.75" SR + HSS3.5x0.313 Split Pipe	20.002	2.762	49.9 K=1.14	7.2558	-256.39	272.21	0.942 [1]
T12	44.5 - 24.5	2.75" SR + HSS3.5x0.313 Split Pipe	20.033	2.068	40.6 K=1.24	7.2558	-257.52	289.52	0.889 [1]
T13	24.5 - 4.5	2.75" SR + HSS3.5x0.313 Split Pipe	20.033	2.052	40.4 K=1.24	7.2558	-247.76	289.86	0.855 [1]

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	254.5 - 244.5	1/2	3.268	1.464	126.5 K=0.90	0.1963	-0.42	2.74	0.155 [1]
T2	244.5 - 224.5	1/2	3.123	1.487	128.5 K=0.90	0.1963	-0.63	2.67	0.238 [1]
T3	224.5 - 204.5	1/2	3.385	1.614	139.5 K=0.90	0.1963	-0.79	2.28	0.348 [1]
T4	204.5 - 184.5	5/8	3.697	1.765	122.0 K=0.90	0.3068	-0.93	4.54	0.205 [1]
T5	184.5 - 164.5	5/8	4.046	1.933	133.6 K=0.90	0.3068	-1.01	3.88	0.260 [1]
T6	164.5 - 144.5	3/4	4.425	2.128	122.6 K=0.90	0.4418	-2.41	6.49	0.371 [1]
T7	144.5 - 124.5	3/4	4.826	2.320	133.6 K=0.90	0.4418	-2.92	5.59	0.522 [1]
T8	124.5 - 104.5	3/4	5.244	2.520	145.1 K=0.90	0.4418	-3.43	4.74	0.724 [1]
T9	104.5 - 84.5	7/8	5.675	2.738	135.2 K=0.90	0.6013	-3.89	7.43	0.523 [1]
T10	84.5 - 64.5	7/8	6.116	2.949	145.6 K=0.90	0.6013	-4.19	6.41	0.654 [1]
T11	64.5 - 44.5	1	6.566	3.141	135.7 K=0.90	0.7854	-4.60	9.63	0.477 [1]
T12	44.5 - 24.5	L2x2x3/16	7.379	3.525	110.5 K=1.03	0.7150	-3.81	12.18	0.313 [1]
T13	24.5 - 4.5	L2 1/2x2 1/2x3/16	10.216	4.908	119.2 K=1.00	0.9020	-2.26	13.83	0.163 [1]

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T12	44.5 - 24.5	L2x2x1/4	7.795	7.107	132.3 K=0.94	0.9380	-4.47	12.09	0.369 [1]
T13	24.5 - 4.5	L2 1/2x2 1/2x1/4	9.796	9.108	133.6 K=0.94	1.1900	-4.30	15.06	0.285 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	254.5 - 244.5	1/2	1.000	0.896	89.4 K=1.04	0.1963	-0.03	4.18	0.008 [1]
T2	244.5 - 224.5	1/2	1.008	0.904	89.6 K=1.03	0.1963	-0.06	4.17	0.015 [1]
T3	224.5 - 204.5	1/2	1.508	1.383	93.0 K=0.70	0.1963	-0.08	4.04	0.020 [1]
T4	204.5 - 184.5	5/8	2.008	1.863	100.1 K=0.70	0.3068	-0.04	5.86	0.007 [1]
T5	184.5 - 164.5	5/8	2.508	2.342	125.9 K=0.70	0.3068	-0.04	4.32	0.009 [1]
T6	164.5 - 144.5	3/4	3.008	2.842	127.3 K=0.70	0.4418	-0.03	6.10	0.004 [1]
T7	144.5 - 124.5	3/4	3.508	3.321	148.8 K=0.70	0.4418	-0.40	4.51	0.088 [1]
T8	124.5 - 104.5	3/4	4.008	3.800	170.2 K=0.70	0.4418	-0.31	3.44	0.091 [1]
T9	104.5 - 84.5	1	4.508	4.300	144.5 K=0.70	0.7854	-0.23	8.50	0.027 [1]
T10	84.5 - 64.5	7/8	5.008	4.779	183.5 K=0.70	0.6013	-0.21	4.03	0.053 [1]
T11	64.5 - 44.5	1	5.508	5.217	175.3 K=0.70	0.7854	-0.12	5.78	0.021 [1]

[1] $P_u / \phi P_n$ controls

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	254.5 - 244.5	1/2	1.000	0.896	89.4 K=1.04	0.1963	-0.08	4.18	0.018 [1]
T2	244.5 - 224.5	1/2	1.492	1.387	93.2 K=0.70	0.1963	-0.21	4.03	0.051 [1]
T3	224.5 - 204.5	1/2	1.992	1.867	125.4 K=0.70	0.1963	-0.30	2.78	0.108 [1]
T4	204.5 - 184.5	5/8	2.492	2.346	126.1 K=0.70	0.3068	-0.40	4.30	0.094 [1]
T5	184.5 - 164.5	5/8	2.992	2.825	151.9 K=0.70	0.3068	-0.44	3.00	0.148 [1]
T6	164.5 - 144.5	3/4	3.492	3.325	149.0 K=0.70	0.4418	-1.06	4.50	0.235 [1]
T7	144.5 - 124.5	3/4	3.992	3.804	170.4 K=0.70	0.4418	-1.03	3.44	0.300 [1]
T8	124.5 - 104.5	3/4	4.492	4.283	191.9 K=0.70	0.4418	-1.12	2.71	0.414 [1]
T9	104.5 - 84.5	7/8	4.992	4.783	183.7 K=0.70	0.6013	-1.33	4.03	0.331 [1]
T10	84.5 - 64.5	7/8	5.492	5.263	202.1 K=0.70	0.6013	-1.23	3.33	0.368 [1]
T11	64.5 - 44.5	KL/R > 200 (C) - 444 1	5.992	5.700	191.5 K=0.70	0.7854	-0.77	4.84	0.159 [1]

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	254.5 - 244.5	1 1/4	10.000	0.333	12.8	1.2272	2.75	55.22	0.050 [1]
T2	244.5 - 224.5	1 1/4	20.002	0.333	12.8	1.2272	11.12	55.22	0.201 [1]
T3	224.5 - 204.5	1 1/2	20.002	0.333	10.7	1.7672	22.76	79.52	0.286 [1]
T4	204.5 - 184.5	1 3/4	20.002	0.333	9.1	2.4053	35.03	108.24	0.324 [1]
T5	184.5 - 164.5	2	20.002	0.333	8.0	3.1416	47.22	141.37	0.334 [1]
T6	164.5 - 144.5	2	20.002	0.333	8.0	3.1416	60.91	141.37	0.431 [1]
T7	144.5 - 124.5	2 1/4	20.002	0.333	7.1	3.9761	95.89	178.92	0.536 [1]
T8	124.5 - 104.5	2 1/2	20.002	0.333	6.4	4.9087	133.06	220.89	0.602 [1]
T9	104.5 - 84.5	2 1/2	20.002	0.333	6.4	4.9087	171.39	220.89	0.776 [1]
T10	84.5 - 64.5	2 3/4	20.002	0.333	5.8	5.9396	210.45	267.28	0.787 [1]
T11	64.5 - 44.5	2.75" SR + HSS3.5x0.313 Split Pipe	20.002	0.333	5.3	7.2558	249.64	326.51	0.765 [1]
T12	44.5 - 24.5	2.75" SR + HSS3.5x0.313 Split Pipe	20.033	1.939	30.7	7.2558	247.10	326.51	0.757 [1]
T13	24.5 - 4.5	2.75" SR + HSS3.5x0.313 Split Pipe	20.033	1.954	31.0	7.2558	234.21	326.51	0.717 [1]

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	254.5 - 244.5	1/2	3.268	1.464	140.5	0.1963	0.41	6.36	0.064 [1]
T2	244.5 - 224.5	1/2	3.123	1.487	142.7	0.1963	0.58	6.36	0.091 [1]
T3	224.5 - 204.5	1/2	3.385	1.614	155.0	0.1963	0.72	6.36	0.113 [1]
T4	204.5 - 184.5	5/8	3.697	1.765	135.5	0.3068	0.83	9.94	0.084 [1]
T5	184.5 - 164.5	5/8	4.046	1.933	148.4	0.3068	0.91	9.94	0.092 [1]
T6	164.5 - 144.5	3/4	4.425	2.128	136.2	0.4418	2.37	14.31	0.166 [1]
T7	144.5 - 124.5	3/4	4.826	2.320	148.5	0.4418	2.86	14.31	0.200 [1]
T8	124.5 - 104.5	3/4	5.244	2.520	161.3	0.4418	3.37	14.31	0.235 [1]
T9	104.5 - 84.5	7/8	5.675	2.738	150.2	0.6013	3.77	19.48	0.193 [1]
T10	84.5 - 64.5	7/8	6.116	2.949	161.8	0.6013	4.06	19.48	0.208 [1]
T11	64.5 - 44.5	1	6.566	3.141	150.8	0.7854	4.35	25.45	0.171 [1]
T12	44.5 - 24.5	L2x2x3/16	7.379	3.525	70.9	0.4308	3.50	18.74	0.187 [1]
T13	24.5 - 4.5	L2 1/2x2 1/2x3/16	10.586	5.092	80.9	0.5359	2.69	23.31	0.116 [1]

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T12	44.5 - 24.5	L2x2x1/4	7.795	7.107	147.8	0.5629	4.47	24.49	0.182 [1]
T13	24.5 - 4.5	L2 1/2x2 1/2x1/4	9.796	9.108	148.3	0.7519	4.30	32.71	0.131 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	254.5 - 244.5	1/2	1.000	0.896	86.0	0.1963	0.03	6.36	0.005 [1]
T2	244.5 - 224.5	1/2	1.008	0.904	86.8	0.1963	0.07	6.36	0.010 [1]
T3	224.5 - 204.5	1/2	1.508	1.383	132.8	0.1963	0.10	6.36	0.016 [1]
T4	204.5 - 184.5	5/8	2.008	1.863	143.0	0.3068	0.07	9.94	0.007 [1]
T5	184.5 - 164.5	5/8	2.508	2.342	179.8	0.3068	0.06	9.94	0.006 [1]
T6	164.5 - 144.5	3/4	3.008	2.842	181.9	0.4418	0.06	14.31	0.004 [1]
T7	144.5 - 124.5	3/4	3.508	3.321	212.5	0.4418	0.43	14.31	0.030 [1]
T8	124.5 - 104.5	3/4	4.008	3.800	243.2	0.4418	0.33	14.31	0.023 [1]
T9	104.5 - 84.5	1	4.508	4.300	206.4	0.7854	0.25	25.45	0.010 [1]
T10	84.5 - 64.5	7/8	5.008	4.779	262.2	0.6013	0.24	19.48	0.012 [1]
T11	64.5 - 44.5	1	5.508	5.217	250.4	0.7854	0.22	25.45	0.009 [1]

[1] P_u / ϕP_n controls

Bottom Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	254.5 - 244.5	1/2	1.000	0.896	86.0	0.1963	0.08	6.36	0.013 [1]
T2	244.5 - 224.5	1/2	1.492	1.387	133.2	0.1963	0.21	6.36	0.033 [1]
T3	224.5 - 204.5	1/2	1.992	1.867	179.2	0.1963	0.31	6.36	0.049 [1]
T4	204.5 - 184.5	5/8	2.492	2.346	180.2	0.3068	0.43	9.94	0.044 [1]
T5	184.5 - 164.5	5/8	2.992	2.825	217.0	0.3068	0.49	9.94	0.049 [1]
T6	164.5 - 144.5	3/4	3.492	3.325	212.8	0.4418	1.04	14.31	0.073 [1]
T7	144.5 - 124.5	3/4	3.992	3.804	243.5	0.4418	1.01	14.31	0.071 [1]
T8	124.5 - 104.5	3/4	4.492	4.283	274.1	0.4418	1.11	14.31	0.078 [1]
T9	104.5 - 84.5	7/8	4.992	4.783	262.4	0.6013	1.31	19.48	0.067 [1]
T10	84.5 - 64.5	7/8	5.492	5.263	288.7	0.6013	1.24	19.48	0.064 [1]
T11	64.5 - 44.5	1	5.992	5.700	273.6	0.7854	0.47	25.45	0.019 [1]

[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	254.5 - 244.5	Leg	1 1/4	2	-2.18	19.42	11.2	Pass
T2	244.5 - 224.5	Leg	1 1/4	28	-12.49	24.26	51.5	Pass
T3	224.5 - 204.5	Leg	1 1/2	79	-25.77	44.92	57.4	Pass
T4	204.5 - 184.5	Leg	1 3/4	130	-40.07	71.14	56.3	Pass
T5	184.5 - 164.5	Leg	2	181	-54.64	102.52	53.3	Pass
T6	164.5 - 144.5	Leg	2	232	-73.04	102.52	71.2	Pass
T7	144.5 - 124.5	Leg	2 1/4	284	-97.09	138.81	69.9	Pass
T8	124.5 - 104.5	Leg	2 1/2	335	-135.17	179.83	75.2 82.0 (b)	Pass
T9	104.5 - 84.5	Leg	2 1/2	386	-174.66	179.83	97.1	Pass
T10	84.5 - 64.5	Leg	2 3/4	437	-215.30	225.51	95.5	Pass
T11	64.5 - 44.5	Leg	2.75" SR + HSS3.5x0.313 Split Pipe	488	-256.39	272.21	94.2	Pass
T12	44.5 - 24.5	Leg	2.75" SR + HSS3.5x0.313 Split Pipe	539	-257.52	289.52	88.9	Pass
T13	24.5 - 4.5	Leg	2.75" SR + HSS3.5x0.313 Split Pipe	587	-247.76	289.86	85.5	Pass
T1	254.5 - 244.5	Diagonal	1/2	10	-0.42	2.74	15.5	Pass
T2	244.5 - 224.5	Diagonal	1/2	37	-0.63	2.67	23.8	Pass
T3	224.5 - 204.5	Diagonal	1/2	88	-0.79	2.28	34.8	Pass
T4	204.5 - 184.5	Diagonal	5/8	139	-0.93	4.54	20.5	Pass
T5	184.5 - 164.5	Diagonal	5/8	190	-1.01	3.88	26.0	Pass
T6	164.5 - 144.5	Diagonal	3/4	245	-2.41	6.49	37.1	Pass
T7	144.5 - 124.5	Diagonal	3/4	296	-2.92	5.59	52.2	Pass
T8	124.5 - 104.5	Diagonal	3/4	347	-3.43	4.74	72.4	Pass
T9	104.5 - 84.5	Diagonal	7/8	398	-3.89	7.43	52.3	Pass
T10	84.5 - 64.5	Diagonal	7/8	449	-4.19	6.41	65.4	Pass
T11	64.5 - 44.5	Diagonal	1	500	-4.60	9.63	47.7	Pass
T12	44.5 - 24.5	Diagonal	L2x2x3/16	579	-3.81	12.18	31.3 51.2 (b)	Pass
T13	24.5 - 4.5	Diagonal	L2 1/2x2 1/2x3/16	600	-2.26	13.83	16.3 29.7 (b)	Pass
T12	44.5 - 24.5	Secondary Horizontal	L2x2x1/4	547	-4.47	12.09	36.9	Pass
T13	24.5 - 4.5	Secondary Horizontal	L2 1/2x2 1/2x1/4	596	-4.30	15.06	28.5	Pass
T1	254.5 - 244.5	Top Girt	1/2	4	-0.03	4.18	0.8	Pass
T2	244.5 - 224.5	Top Girt	1/2	33	-0.06	4.17	1.5	Pass
T3	224.5 - 204.5	Top Girt	1/2	84	-0.08	4.04	2.0	Pass
T4	204.5 - 184.5	Top Girt	5/8	133	0.07	9.94	0.7	Pass
T5	184.5 - 164.5	Top Girt	5/8	186	-0.04	4.32	0.9	Pass
T6	164.5 - 144.5	Top Girt	3/4	235	0.06	14.31	0.4	Pass
T7	144.5 - 124.5	Top Girt	3/4	288	-0.40	4.51	8.8	Pass
T8	124.5 - 104.5	Top Girt	3/4	339	-0.31	3.44	9.1	Pass
T9	104.5 - 84.5	Top Girt	1	388	-0.23	8.50	2.7	Pass
T10	84.5 - 64.5	Top Girt	7/8	439	-0.21	4.03	5.3	Pass
T11	64.5 - 44.5	Top Girt	1	490	-0.12	5.78	2.1	Pass
T1	254.5 - 244.5	Bottom Girt	1/2	7	-0.08	4.18	1.8	Pass
T2	244.5 - 224.5	Bottom Girt	1/2	35	-0.21	4.03	5.1	Pass
T3	224.5 - 204.5	Bottom Girt	1/2	86	-0.30	2.78	10.8	Pass
T4	204.5 - 184.5	Bottom Girt	5/8	137	-0.40	4.30	9.4	Pass
T5	184.5 - 164.5	Bottom Girt	5/8	188	-0.44	3.00	14.8	Pass
T6	164.5 - 144.5	Bottom Girt	3/4	240	-1.06	4.50	23.5	Pass
T7	144.5 - 124.5	Bottom Girt	3/4	291	-1.03	3.44	30.0	Pass
T8	124.5 - 104.5	Bottom Girt	3/4	342	-1.12	2.71	41.4	Pass
T9	104.5 - 84.5	Bottom Girt	7/8	393	-1.33	4.03	33.1	Pass
T10	84.5 - 64.5	Bottom Girt	7/8	444	-1.23	3.33	36.8	Pass
T11	64.5 - 44.5	Bottom Girt	1	495	-0.77	4.84	15.9	Pass
							Summary	
						Leg (T9)	97.1	Pass
						Diagonal (T8)	72.4	Pass
						Secondary	36.9	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
						Horizontal (T12)		
						Top Girt (T8)	9.1	Pass
						Bottom Girt (T8)	41.4	Pass
						Bolt Checks	93.0	Pass
						RATING =	**97.1**	**Pass**

Jump Plate Reinforcement Check - Rev. G

Elevation: 64.5ft

Jump Plate

Number of jump plates $N := 2$

Yield strength of plate $F_y := 50ksi$

Ultimate strength of plate $F_u := 65ksi$

Thickness of plate $t_{plate} := 1in$

Effective width of plate $w_{effective} := 3.0in$

Applied Compression (Tnx) $P_{tnx} := 218.8 \cdot kip$

Applied Tension (Tnx) $T_{tnx} := 210.45kip$

Determine the force distribution

EXISTING SOLID ROD LEG INPUTS

Outside Diameter: $D_L := 2.75in$

$$t_{leg} := \frac{D_L}{2}$$

Area: $$A_L := \frac{\pi}{4} \cdot \left(D_L^{\,2}\right) = 5.94 \cdot in^2$$

$$A_{mod} := 0 \cdot in^2$$

gross area of the plate cross section $$A_g := t_{plate} \cdot w_{effective} = 3 \cdot in^2$$

Total Area: $$A_{tot} := A_L + A_{mod} + N A_g$$

Tensile load carried through the tower leg $$P_{TLeg} := \frac{A_L + A_{mod}}{A_{tot}} \cdot T_{tnx} = 104.692 \cdot kip$$

Tensile load carried through the Knife Plates $$P_{TPl} := \frac{N \cdot A_g}{A_{tot}} \cdot T_{tnx} = 105.758 \cdot kip$$

Compressive load carried through the tower leg $$P_{CLeg} := \frac{A_L + A_{mod}}{A_{tot}} \cdot P_{tnx} = 108.846 \cdot kip$$

Compressive load carried through the Knife Plates $$P_{CPl} := \frac{N \cdot A_g}{A_{tot}} \cdot P_{tnx} = 109.954 \cdot kip$$

Tensile Strength of the Jump Plate

AISC 14th Edition Chapter D
Equation (D2-1)

Safety Factor $\phi_t := 0.9$

Tensile strength in the gross cross section $P_{n.plate} := F_y \cdot A_g = 150 \cdot kip$

Design Tensile Strength of one Jump Plate $\phi P_{n.tension} := \phi_t \cdot P_{n.plate} = 135 \cdot kip$

Tensile force needed to be resisted by each jump plate $P_t := \frac{P_{TPl}}{N} = 52.879 \cdot kip$

Tension Check

Gross Section Yield

$$Check_{ten\_yieldHSS} := \begin{cases} \text{"OK"} & \text{if } \phi P_{n.tension} \geq \frac{P_{TPl}}{N} \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

$Check_{ten\_yieldHSS} = \text{"OK"}$

$$Check_{tension} := \frac{P_t}{\phi P_{n.tension}} = 39.169 \cdot \%$$

Tensile check of the Flange Bolts

$\phi P_{nb} := 53.01 \cdot kip$ Bolt Capacity as reported by TNX

$n_b := 4$ Number of flange bolts

$$P_{tb} := \frac{P_{TLeg}}{n_b} = 26.173 \cdot kip$$

$$Check_{Bolt\_tension} := \frac{P_{tb}}{\phi P_{nb}} = 49.374 \cdot \%$$

Compression Check of the Jump Plate

AISC 14th Edition Chapter E Equation (E3-1 to E3-4)

Unbraced Length $l_u := 24in$

K Factor $K := 0.8$

Radius of gyration (calculated from AutoCAD) $r_x := \frac{t_{plate}}{\sqrt{12}} = 0.289 \cdot in$

Modulus of elasticity $E := 29000ksi$

compression force needed to be resisted by each jump plate $P_c := \frac{P_{CPl}}{N} = 54.977 \cdot kip$

Compression Strength of Jump Plate

Safety Factor $\phi_c := 0.9$

$\phi P_{n\_comp} = \phi_c \cdot F_{cr} \cdot A_g$

$F_e := \frac{\pi^2 \cdot 29000ksi}{\left(\frac{K \cdot l_u}{r_x}\right)^2} = 64.701 \cdot ksi$

$\frac{K \cdot l_u}{r_x} = 66.511 \quad < \quad 4.71 \cdot \sqrt{\frac{29000 \cdot ksi}{F_y}} = 113.432$

$\therefore \quad F_{cr} := 0.658^{\frac{F_y}{F_e}} \cdot F_y = 36.183 \cdot ksi$

AISC 14th Edition Chapter J Equation (J4-6)

$$\phi P_{n\_comp} := \begin{cases} \phi_c \cdot F_y \cdot A_g & \text{if } \frac{K \cdot l_u}{r_x} \le 25 \\ \phi_c \cdot F_{cr} \cdot A_g & \text{otherwise} \end{cases}$$

$\phi P_{n\_comp} = 97.693 \cdot kip$

$$Check_{comp} := \begin{cases} \text{"OK"} & \text{if } \phi P_{n\_comp} \ge P_c \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

$Check_{comp} = \text{"OK"}$

$Check_{compression} := \frac{P_c}{\phi P_{n\_comp}} = 56.275 \cdot \%$

CALCULATION SHEET

WELD CONNECTION

Weld Sizing

Length of vertical weld

$l_{weld} := 12 \cdot in$

Electrode Strength

$F_{EXX} := 70 \cdot ksi$

Vertical fillet weld size - jump plate to leg (in sixteenths of an inch):

$D_{vplate} := 5$

$Weldsize := \frac{D_{vplate}}{16} = 0.313$

Horizontal component of eccentricity with respect to centroid of the weld group

$e_x := 5.5 \cdot in$

Load Not in Plane with Weld Group

$k := 0$

$a := \frac{e_x}{l_{weld}} = 0.458$

Electrode Strength Coefficient

$C_1 = 1$

Coefficient for eccentrically Loaded Weld Groups

$C := 2.4512$

(Linearly interpolated from AISC, 14th Edition, Table 8-4)

Weld Capacity

Design Strength

$\phi_w := 0.75$

$D_{min} := ceil\left(\frac{\max(P_t, P_c) \cdot in}{\phi_w \cdot C C_1 \cdot l_{weld} \cdot kip}\right) = 3$

$minweldsize := \frac{D_{min}}{16} = \frac{3}{16}$

$Check_{weld} := \begin{cases} \text{"OK"} & \text{if } D_{vplate} \geq D_{min} \wedge D_{vplate} \geq Min_{weldsize} \wedge D_{vplate} \leq Max_{weldsize} \\ \text{"N/G"} & \text{otherwise} \end{cases}$

$Check_{weld} = \text{"OK"}$

$\phi Rn_{weld2} := \phi_w \cdot C ksi \cdot in \cdot C_1 \cdot D_{vplate} \cdot l_{weld} = 110.304 \cdot kip$

$Check_{weld3} := \begin{cases} \text{"OK"} & \text{if } \phi Rn_{weld2} \geq P_t \\ \text{"N/G"} & \text{otherwise} \end{cases}$

$Check_{weld3} = \text{"OK"}$

$\frac{\max(P_t, P_c)}{\phi Rn_{weld2}} = 49.841 \cdot \%$

Jump Plate Reinforcement Check - Rev. G

Elevation: 84.5ft

Jump Plate

Number of jump plates $N := 2$

Yield strength of plate $F_y := 50ksi$

Ultimate strength of plate $F_u := 65ksi$

Thickness of plate $t_{plate} := 1in$

Effective width of plate $w_{effective} := 3.0in$

Applied Compression (Tnx) $P_{tnx} := 178.18 \cdot kip$

Applied Tension (Tnx) $T_{tnx} := 171.39kip$

Determine the force distribution

EXISTING SOLID ROD LEG INPUTS

Outside Diameter: $D_L := 2.5in$

$$t_{leg} := \frac{D_L}{2}$$

Area: $$A_L := \frac{\pi}{4} \cdot \left(D_L^{\,2}\right) = 4.909 \cdot in^2$$

$$A_{mod} := 0 \cdot in^2$$

gross area of the plate cross section $$A_g := t_{plate} \cdot w_{effective} = 3 \cdot in^2$$

Total Area: $$A_{tot} := A_L + A_{mod} + N A_g$$

Tensile load carried through the tower leg $$P_{TLeg} := \frac{A_L + A_{mod}}{A_{tot}} \cdot T_{tnx} = 77.122 \cdot kip$$

Tensile load carried through the Knife Plates $$P_{TPl} := \frac{N \cdot A_g}{A_{tot}} \cdot T_{tnx} = 94.268 \cdot kip$$

Compressive load carried through the tower leg $$P_{CLeg} := \frac{A_L + A_{mod}}{A_{tot}} \cdot P_{tnx} = 80.178 \cdot kip$$

Compressive load carried through the Knife Plates $$P_{CPl} := \frac{N \cdot A_g}{A_{tot}} \cdot P_{tnx} = 98.002 \cdot kip$$

Tensile Strength of the Jump Plate

AISC 14th Edition Chapter D
Equation (D2-1)

Safety Factor $\phi_t := 0.9$

Tensile strength in the gross cross section $P_{n.plate} := F_y \cdot A_g = 150 \cdot kip$

Design Tensile Strength of one Jump Plate $\phi P_{n.tension} := \phi_t \cdot P_{n.plate} = 135 \cdot kip$

Tensile force needed to be resisted by each jump plate $P_t := \frac{P_{TPl}}{N} = 47.134 \cdot kip$

Tension Check

Gross Section Yield

$$Check_{ten\_yieldHSS} := \begin{cases} \text{"OK"} & \text{if } \phi P_{n.tension} \geq \frac{P_{TPl}}{N} \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

$Check_{ten\_yieldHSS} = \text{"OK"}$

$$Check_{tension} := \frac{P_t}{\phi P_{n.tension}} = 34.914 \cdot \%$$

Tensile check of the Flange Bolts

$\phi P_{nb} := 40.59 \cdot kip$ Bolt Capacity as reported by TNX

$n_b := 4$ Number of flange bolts

$$P_{tb} := \frac{P_{TLeg}}{n_b} = 19.281 \cdot kip$$

$$Check_{Bolt\_tension} := \frac{P_{tb}}{\phi P_{nb}} = 47.501 \cdot \%$$

Compression Check of the Jump Plate

AISC 14th Edition Chapter E Equation (E3-1 to E3-4)

Unbraced Length $l_u := 24in$

K Factor $K := 0.8$

Radius of gyration (calculated from AutoCAD) $r_x := \frac{t_{plate}}{\sqrt{12}} = 0.289 \cdot in$

Modulus of elasticity $E := 29000ksi$

compression force needed to be resisted by each jump plate $P_c := \frac{P_{CPl}}{N} = 49.001 \cdot kip$

Compression Strength of Jump Plate

Safety Factor $\phi_c := 0.9$

$\phi P_{n\_comp} = \phi_c \cdot F_{cr} \cdot A_g$

$F_e := \frac{\pi^2 \cdot 29000ksi}{\left(\frac{K \cdot l_u}{r_x}\right)^2} = 64.701 \cdot ksi$

$\frac{K \cdot l_u}{r_x} = 66.511 \quad < \quad 4.71 \cdot \sqrt{\frac{29000 \cdot ksi}{F_y}} = 113.432$

$\therefore \quad F_{cr} := 0.658^{\frac{F_y}{F_e}} \cdot F_y = 36.183 \cdot ksi$

AISC 14th Edition Chapter J Equation (J4-6)

$$\phi P_{n\_comp} := \begin{cases} \phi_c \cdot F_y \cdot A_g & \text{if } \frac{K \cdot l_u}{r_x} \le 25 \\ \phi_c \cdot F_{cr} \cdot A_g & \text{otherwise} \end{cases}$$

$\phi P_{n\_comp} = 97.693 \cdot kip$

$$Check_{comp} := \begin{cases} \text{"OK"} & \text{if } \phi P_{n\_comp} \ge P_c \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

$Check_{comp} = \text{"OK"}$

$Check_{compression} := \frac{P_c}{\phi P_{n\_comp}} = 50.158 \cdot \%$

CALCULATION SHEET

WELD CONNECTION

Weld Sizing

Length of vertical weld

$l_{weld} := 12 \cdot in$

Electrode Strength

$F_{EXX} := 70 \cdot ksi$

Vertical fillet weld size - jump plate to leg (in sixteenths of an inch):

$D_{vplate} := 5$

$Weldsize := \frac{D_{vplate}}{16} = 0.313$

Horizontal component of eccentricity with respect to centroid of the weld group

$e_x := 5.5 \cdot in$

Load Not in Plane with Weld Group

$k := 0$

$a := \frac{e_x}{l_{weld}} = 0.458$

Electrode Strength Coefficient

$C_1 = 1$

Coefficient for eccentrically Loaded Weld Groups

$C := 2.4512$

(Linearly interpolated from AISC, 14th Edition, Table 8-4)

Weld Capacity

Design Strength

$\phi_w := 0.75$

$D_{min} := ceil\left(\frac{\max(P_t, P_c) \cdot in}{\phi_w \cdot C C_1 \cdot l_{weld} \cdot kip}\right) = 3$

$minweldsize := \frac{D_{min}}{16} = \frac{3}{16}$

$Check_{weld} := \begin{cases} \text{"OK"} & \text{if } D_{vplate} \geq D_{min} \wedge D_{vplate} \geq Min_{weldsize} \wedge D_{vplate} \leq Max_{weldsize} \\ \text{"N/G"} & \text{otherwise} \end{cases}$

$Check_{weld} = \text{"OK"}$

$\phi Rn_{weld2} := \phi_w \cdot C ksi \cdot in \cdot C_1 \cdot D_{vplate} \cdot l_{weld} = 110.304 \cdot kip$

$Check_{weld3} := \begin{cases} \text{"OK"} & \text{if } \phi Rn_{weld2} \geq P_t \\ \text{"N/G"} & \text{otherwise} \end{cases}$

$Check_{weld3} = \text{"OK"}$

$\frac{\max(P_t, P_c)}{\phi Rn_{weld2}} = 44.424 \cdot \%$

Project Information

BU #	
Site Name	CTHA220A - Existing Anchors-Rev2
Order #	

Tower Information

Tower Type	Self Support
TIA-222 Rev	G

Applied Loads

	Comp.	Uplift
Axial (k)	124.00	115.50
Shear (k)	15.00	13.00

Anchor Rod Data

Quantity:	3
Diameter (in):	1.25
Material Grade:	A325
Grout Considered:	No
l_{ar} (in):	0
Eta Factor, η:	0.5
Thread Type:	N-Included
Configuration:	Symmetrical

Anchor Rod Results

Axial, Pu (kips)	41.33	
Shear, Vu (kips)	5.00	
Moment, Mu (kip-ft)	-	
Axial Cap., ϕPn (kips)	81.40	
Shear Cap., ϕVn (kips)	-	
Moment Cap., ϕMn (kip-ft)	-	
Stress Rating	63.1%	**Pass**

Analysis Date: 11/16/2018

Project Information

BU #	
Site Name	CTHA220A - Modification Anchors-Rev2
Order #	

Tower Information

Tower Type	Self Support
TIA-222 Rev	G

Applied Loads

	Comp.	Uplift
Axial (k)	124.00	115.50
Shear (k)	0.00	0.00

Anchor Rod Data

Quantity:	2
Diameter (in):	1.5
Material Grade:	F1554-105
Grout Considered:	No
l_{ar} (in):	0
Eta Factor, η:	0.5
Thread Type:	N-Included
Configuration:	Symmetrical

Anchor Rod Results

Axial, Pu (kips)	62.00	
Shear, Vu (kips)	0.00	
Moment, Mu (kip-ft)	-	
Axial Cap., ϕPn (kips)	141.00	
Shear Cap., ϕVn (kips)	-	
Moment Cap., ϕMn (kip-ft)	-	
Stress Rating	44.0%	**Pass**

Analysis Date: 11/16/2018

NOTES:

1. UPGRADE DESIGN VALID FOR APPURTENANCES LISTED IN DESTEK ANALYSIS REPORT DATED 11/16/2018. CONTRACTOR TO REVIEW AND SHOULD ADHERE TO THE REPORT.

2. CONTRACTOR TO REMOVE AND REATTACH EXISTING APPURTENANCES AS NEEDED.

3. ALL DIMENSIONS ARE BASED ON A PREVIOUS STRUCTURAL ANALYSIS REPORT – POST MODIFICATION PREPARED BY EBI CONSULTING, DATED 8/22/2014.

4. CONTRACTOR TO FIELD VERIFY EXISTING TOWER MEMBER SIZES AND TOWER DIMENSIONS IN THE VICINITY OF THE UPGRADE, BEFORE FABRICATION OF STEEL AND COMMENCEMENT OF WORK. ANY DISCREPANCY SHOULD BE REPORTED TO DESTEK IMMEDIATELY FOR FURTHER EVALUATION.

5. DO NOT PERFORM THE WORK ON THE TOWER WHEN WINDS GUST MORE THAN 15 MPH AT THE GROUND LEVEL.

6. NEW TOWER REACTIONS:

BASE MOMENT:	2075 KIP–FT
LEG UPLIFT:	231 KIPS
LEG COMPRESSION:	248 KIPS
LEG SHEAR:	15 KIPS

7. CONTRACTOR TO HAVE THE SAFETY CLIMB INTACT AND FUNCTIONAL AFTER WORK IS COMPLETE.

8. TOWER WILL BECOME UNSTABLE WHEN MEMBERS ARE DISCONNECTED OR BEING REPLACED. CONTRACTOR IS FULLY RESPONSIBLE TO MAINTAIN STABILITY OF THE TOWER DURING WORK AND SHOULD CONSULT WITH AN ENGINEER.

9. DESTEK DISCLAIMS ANY LIABILITY ARISING FROM THE ORIGINAL MATERIAL, FABRICATION OR ERECTION OF THE TOWER.

10. ALL CONSTRUCTION MEANS AND METHODS; INCLUDING BUT NOT LIMITED TO, ERECTION PLANS, RIGGING PLANS, CLIMBING PLANS, AND RESCUE PLANS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR RESPONSIBLE FOR THE EXECUTION OF THE WORK CONTAINED HEREIN AND SHALL MEET ANSI/ASSE A10.48 (LATEST EDITION), OSHA, AND GENERAL INDUSTRY STANDARDS. ALL RIGGING PLANS SHALL ADHERE TO ANSI/ASSE A10.48 (LATEST EDITION) INCLUDING THE REQUIRED INVOLVEMENT OF A QUALIFIED ENGINEER FOR CLASS IV CONSTRUCTION.

1. DESIGN INFORMATION AND GENERAL REQUIREMENTS

1.1 CODES
a. 2018 CONNECTICUT STATE BUILDING CODE, INTERNATIONAL CODE COUNCIL AND CONNECTICUT DEPARTMENT OF ADMINISTRATIVE SERVICES
b. MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES, ASCE/SEI 7–10, AMERICAN SOCIETY OF CIVIL ENGINEERS
c. STEEL CONSTRUCTION MANUAL, 14TH EDITION, AMERICAN INSTITUTE OF STEEL CONSTRUCTION
d. STRUCTURAL STANDARD FOR ANTENNA SUPPORTING STRUCTURES AND ANTENNAS, ANSI/TIA–222–G, TELECOMMUNICATIONS INDUSTRY ASSOCIATION
e. BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE, ACI 318–11

1.2 GENERAL
a. PRIOR TO PURCHASE OR FABRICATION OF MATERIAL, THE CONTRACTOR SHALL PERFORM AN INSPECTION VERIFYING MEMBER DIMENSIONS AND BOLT SIZES. SHOULD THE CONTRACTOR DISCOVER ANY DAMAGED OR MISSING MEMBERS OR THE MEMBER OR BOLT SIZES DO NOT MATCH THOSE LISTED, DESTEK SHALL BE NOTIFIED IMMEDIATELY.
b. CONTRACTOR TO REPLACE ALL BOLTS REMOVED WITH NEW BOLTS OF SAME TYPE, UNLESS NOTED OTHERWISE.

1.3 LOADS & DESIGN CRITERIA
a. WIND LOADING: V=97MPH, EXPOSURE CATEGORY C, STRUCTURE CLASS II

2. STRUCTURAL STEEL

2.1 MATERIALS
a. STRUCTURAL STEEL . . . . . ASTM A992
ANGLE & PLATE . . . . . ASTM A36 U.N.O.
PIPE . . . . . ASTM A53 GRADE B (OR Fy>35KSI)
HSS ROUND . . . . . ASTM A500 GRADE B (OR Fy>42KSI)
BARS (SOLID RODS) . . . . . ASTM A572 GRADE 50
b. BOLTS . . . . . ASTM A325N U.N.O.
c. WELDING ELECTRODES . . . . . AWS A5.1 (E70XX)
d. STEEL CONSTRUCTION SHALL CONFORM TO "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS, ANSI/AISC 360–10"
e. WELDING SHALL CONFORM TO AWS D1.1/D1.3/D1.7 AS APPLICABLE.
f. THE FABRICATOR SHALL FURNISH CHECKED SHOP AND ERECTION DRAWINGS TO THE ENGINEER, AND OBTAIN APPROVAL PRIOR TO FABRICATING ANY STRUCTURAL STEEL. SHOP DRAWINGS SHALL CONFORM TO "DETAILING FOR STEEL CONSTRUCTION, 2ND EDITION"
g. POOR MATCHING OF HOLES SHALL BE CORRECTED BY DRILLING TO THE NEXT LARGER SIZE. WELDING FOR RE–DRILLING WILL NOT BE PERMITTED.

2.2 CONNECTIONS
a. SHOP CONNECTIONS MAY BE BOLTED OR WELDED
b. FIELD CONNECTIONS BOLTED WITH A325–N BOLTS, (INSTALLED SNUG TIGHT) UNLESS OTHERWISE SPECIFIED OR IF WELDED CONNECTIONS ARE NOTED ON DRAWINGS
c. FIELD CONNECTIONS SHALL BE MADE WITH A325–N BOLTS AND HARDENED WASHERS EXCEPT AS INDICATED ON THE DESIGN DRAWINGS
d. CONNECTIONS NOT SHOWN ON DRAWINGS SHALL BE DESIGNED BY THE STEEL FABRICATOR. CONNECTIONS SHALL BE DESIGNED IN ACCORDANCE WITH AISC "SPECIFICATIONS FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS" AND "AISC CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES"
e. DO NOT FIELD CUT OR ALTER STRUCTURAL MEMBERS WITHOUT PRIOR WRITTEN APPROVAL OF ENGINEER.
f. BOLT HOLES SHALL BE CUT, DRILLED OR PUNCHED AT RIGHT ANGLES TO THE SURFACE OF THE METAL AND SHALL NOT BE MADE OR ENLARGED BY BURNING. HOLES SHALL BE CLEAN CUT WITHOUT TORN OR RAGGED EDGES. OUTSIDE BURRS RESULTING FROM DRILLING OR REAMING OPERATION SHALL BE REMOVED WITH A TOOL MAKING A 1/16 INCH BEVEL. BOLT HOLES SHALL BE 1/16 INCH OVERSIZE.

2.3 FINISHES
a. STRUCTURAL STEEL SHALL BE HOT DIP GALVANIZED AFTER FABRICATION PER ASTM A123
b. BOLTS AND NUTS SHALL BE HOT DIP GALVANIZED PER ASTM A153.
c. ALL SURFACES DAMAGED DURING THE WORK SHALL BE PAINTED WITH COLD GALVANIZING COMPOUND TWICE. THE PAINT SHOULD BE AT LEAST 93% PURE ZINC. RUST–OLEUM PROFESSIONAL, (MODEL# 7585838) OR SIMILAR.

2.4 WELDING
a. CONTRACTOR TO TAKE ALL NECESSARY PRECAUTIONS FOR FIRE PREVENTION DURING WELDING, SUCH AS; INSTALLING 3000 (NFPA 701) FIRE BLANKET AROUND COAX. MORE SPLATTER AND SPARKS SHOULD BE ANTICIPATED WHILE WELDING ON GALVANIZED SURFACE. COAX IS FLAMMABLE AND SHALL CATCH FIRE IF NOT PROTECTED. WATER SHALL BE ON SITE OF ADEQUATE AMOUNT AND AVAILABLE AT SHORT NOTICE AT ALL TIMES DURING WELDING ACTIVITY. CONTRACTOR SHOULD BE ABLE TO TRANSPORT THE WATER TO THE HEIGHT WELDING BEING PERFORMED.
b. WELDING ON GALVANIZED SURFACE SHOULD BE DONE WITH EXTREME CAUTION. IF THE WELD MATERIAL IS CONTAMINATED WITH ZINC, IT DOES NOT PROVIDE A STRUCTURAL WELD. GRIND GALVANIZING BEFORE WELDING.
c. WELDING CERTIFICATE MUST BE PROVIDED PRIOR TO WELDING. ALL WELDING SHALL BE PERFORMED BY AWS QUALIFIED WELDER WHO HAS EXPERIENCE WITH GALVANIZED SURFACES.

EPOXY GROUTED REINFORCING ANCHOR ROD NOTES:

1. IF EXISTING ANCHOR/REBAR MATERIAL IS ENCOUNTERED DURING DRILLING, RELOCATE HOLE AND GROUT FILL IMPEDED HOLE WITH 5000 PSI NON SHRINK GROUT.

2. THE CORE–DRILLED HOLES IN THE CONCRETE FOR THE ANCHOR RODS SHALL BE CLEAN AND DRY, AND OTHERWISE PROPERLY PREPARED ACCORDING TO THE ANCHOR ROD AND EPOXY MANUFACTURERS' INSTRUCTIONS, PRIOR TO PLACEMENT OF ANCHOR RODS AND EPOXY. CONTRACTOR SHALL FOLLOW ALL ANCHOR ROD AND EPOXY MANUFACTURER RECOMMENDATIONS REGARDING HANDLING OF RODS, EPOXY, ACCEPTABLE AMBIENT TEMPERATURE RANGE DURING INSTALLATION AND POST–INSTALLATION CURING, THE EFFECT OF TEMPERATURE ON EPOXY CURING TIME, PREPARATION OF HOLE, ETC.

3. ONCE THE REINFORCING ANCHOR RODS HAVE BEEN INSTALLED AND ALL EPOXY AND GROUT HAVE CURED, ALL REINFORCING ANCHOR RODS SHALL BE LOAD TESTED PER ASTM E488–96. FORCE MEASUREMENT SYSTEMS SHALL BE CALIBRATED IN ACCORDANCE WITH ASTM E4–16, STANDARD PRACTICES FOR FORCE VERIFICATION OF TESTING MACHINES. NEW ANCHOR SHALL BE PROOF LOADED TO 87 KIPS.
a. THE CONTRACTOR SHALL ENSURE THAT THE CONSTRUCTION DOES NOT GO BEYOND THE POINT WHERE THE ANCHOR RODS CAN BE EFFECTIVELY TESTED PRIOR TO THOSE TESTS BEING CONDUCTED. COORDINATION WITH THE TEST FIRM MAY BE NECESSARY TO ESTABLISH THIS POINT. CONSTRUCTION MAY PROCEED AFTER THE TESTING IS COMPLETED.
b. SUITABLE EQUIPMENT SHALL BE USED TO PERFORM TESTS REQUIRED TO VERIFY CORRECT INSTALLATION AND PROVIDE PROOF LOADS AND DISPLACEMENT TEST ON POST–INSTALLED ANCHOR RODS. THE EQUIPMENT SHALL BE CAPABLE OF MEASURING THE FORCES TO WITHIN +/– 2% OF THE APPLIED LOAD.
c. THE TEST SYSTEM SUPPORT SHALL BE OF SUFFICIENT SIZE AND DESIGN TO PREVENT DAMAGE TO THE SURROUNDING STRUCTURAL ELEMENTS, EQUIPMENT, AND FOUNDATION. SPECIFICALLY, THE PARTIES RESPONSIBLE FOR TESTING THE ANCHOR SHALL ENSURE WHEN THE LOAD TEST TRANSFERS THROUGH THE CONCRETE AN ADEQUATE SIZE BEARING PLATE BE USED.
d. TEST SYSTEM USED SHALL HAVE TWO PRESSURE GAUGES IN SERIES TO ENSURE PROPER GAUGE FUNCTION.
e. FORCES SHALL BE APPLIED THROUGH THE CENTER OF AND IN ALIGNMENT WITH THE ANCHOR ROD.
f. INCREASE APPLIED LOADS TO THE MAXIMUM SPECIFIED TARGET TENSION WITHOUT DISPLACEMENT FAILURE.
g. PERFORM A PRE–TEST BY CYCLING THE ANCHOR ROD ONCE UP TO AND DOWN FROM THE TARGET TENSION LOAD TO INITIATE STRAIN CRACKING OF EPOXY/GROUT AND ESTABLISH THE BASE LINE FOR DEFLECTION MEASUREMENTS.
- LOAD THE ANCHOR ROD TO 33% OF TARGET TENSION AND HOLD FOR 1 MINUTE, RECORD DISPLACEMENT.
- LOAD THE ANCHOR ROD TO 66% OF TARGET TENSION AND HOLD FOR 1 MINUTE, RECORD DISPLACEMENT.
- LOAD THE ANCHOR ROD TO 100% OF TARGET TENSION AND HOLD FOR 2 MINUTES, RECORD DISPLACEMENT.
- RELEASE THE LOAD FROM THE ANCHOR ROD AND STOP AT 66%. HOLD FOR 1 MINUTE, RECORD DISPLACEMENT.
- RELEASE THE LOAD FROM THE ANCHOR ROD AND STOP AT 33%. HOLD FOR 1 MINUTE, RECORD DISPLACEMENT.
- FULLY RELEASE THE LOAD FROM THE ANCHOR ROD. AFTER THE LOAD HAS BEEN RELEASED FOR TWO MINUTES RECORD THE BASELINE DEFLECTION.
- IF THE ANCHOR ROD IS UNABLE TO MAINTAIN THE TARGET TENSION DURING ANY OF THE STAGES OF THE PRE–TEST, RECORD THE VALUES THAT THE ROD SETTLED AT AND CONTINUE ON WITH THE PRE–TEST CYCLE PROCEDURE UNTIL COMPLETED.
- UPON COMPLETION OF THE PRE–TEST RESET THE DISPLACEMENT GAUGE TO ZERO.

h. TEST CYCLE SEQUENCE IS AS FOLLOWS:
- INCREMENTALLY LOAD ANCHOR ROD TO TARGET TENSION. MEASURE AND RECORD DISPLACEMENT VALUES WHEN THE ROD IS AT 33% OF TARGET TENSION, 66% OF TARGET TENSION, AND 100% OF TARGET TENSION. EACH INCREMENT SHALL BE LOADED AT A MINIMUM TIME SPAN OF 20 SECONDS PER INCREMENT.
- UPON RECORDING THE 100% TARGET TENSION DISPLACEMENT VALUE FROM THE ANCHOR ROD, ALLOW THE ROD TO HOLD THE TARGET TENSION FOR AN ADDITIONAL TWO MINUTES. WHEN THE TWO MINUTES ARE COMPLETED, RELEASE THE LOAD OFF THE ANCHOR ROD IN A CONTROLLED MANNER. LET THE ANCHOR ROD SETTLE FOR AN ADDITIONAL TWO MINUTES AND RECORD THE FINAL DISPLACEMENT OF THE ANCHOR ROD.
- IF A DECREASE OF PRESSURE IS OBSERVED DURING THE PULL TEST, THE FOLLOWING ACTION ITEMS SHALL BE USED:
  - IF THE FORCE IN THE ANCHOR ROD REMAINS WITHIN 98% OF ITS TARGET TENSION FOR TWO MINUTES, NO ACTION IS NEEDED.
  - IF THE FORCE IN THE ANCHOR ROD FALLS UNDER 98% BUT NO LESS THAN 95% OF THE TARGET TENSION, THE TESTER SHALL APPLY ADDITIONAL PRESSURE TO BRING THE ANCHOR ROD BACK TO THE TARGET TENSION WITHOUT STOPPING THE TEST.
  - IF THE FORCE IN THE ANCHOR ROD FALLS UNDER 95% OF THE TARGET TENSION, THE TESTER SHALL APPLY ADDITIONAL PRESSURE TO BRING THE ANCHOR ROD BACK TO THE TARGET TENSION AND RESTART 2 MINUTE INCREMENT.
- MAINTAIN COMPLETE LOAD–DISPLACEMENT RECORDS THROUGHOUT THE TEST. THE DATA RECORDS SHALL INCLUDE A TIME RECORD OF THE BEGINNING AND END OF EACH INCREMENT OF LOADING.
- IF A DISPLACEMENT GREATER THAN 0.01 INCHES MEASURED FROM THE BASE LINE REMAINS AFTER THE FIRST TEST CYCLE, FURTHER TESTS SHALL BE PERFORMED. A MAXIMUM OF 2 ADDITIONAL TEST CYCLES ARE PERMITTED TO DETERMINE IF ANCHOR ROD MOVEMENT CONTINUES TO ACCUMULATE. THESE TESTS SHALL NOT INCLUDE ANY FURTHER PRE–TESTING OF THE ROD. TOTAL RESIDUAL MOVEMENT SHALL NOT EXCEED 0.05 INCHES. INCREMENTAL RESIDUAL MOVEMENTS RECORDED FROM EACH TEST CYCLE MUST BE DECREASING IN VALUE AND STABILIZE TO A VALUE NO MORE THAN 0.01 INCHES. ANCHORS NOT MEETING THE TOTAL RESIDUAL MOVEMENT AND/OR THE INCREMENTAL RESIDUAL MOVEMENT LIMITATIONS SHALL BE CONSIDERED TO HAVE FAILED THE TEST.

i. IF ANY ANCHOR ROD FAILS THE PULL TEST, THE PULL TEST VENDOR SHALL NOTIFY THE ENGINEER OF RECORD AND GENERAL CONTRACTOR.

4. ONCE THE REINFORCING ANCHOR RODS HAVE BEEN SUCCESSFULLY LOAD TESTED AND APPROVED, CONTRACTOR SHALL RELEASE ALL OF THE PROOF LOAD AND TIGHTEN ALL ANCHOR NUTS TO SNUG TIGHT PLUS ⅛ TURN OF THE NUT.

5. CONTRACTOR SHALL VERIFY THAT EXISTING BASE PLATE GROUT IS IN GOOD CONDITION.

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PREPARED FOR:
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Bloomfield, CT 06002

NUM	DATE	DESCRIPTION:
A	11/16/18	ISSUED FOR CONSTRUCTION

CTHA220A

ADDRESS:
440 OLD TURNPIKE ROAD
SOUTHINGTON, CT 06489

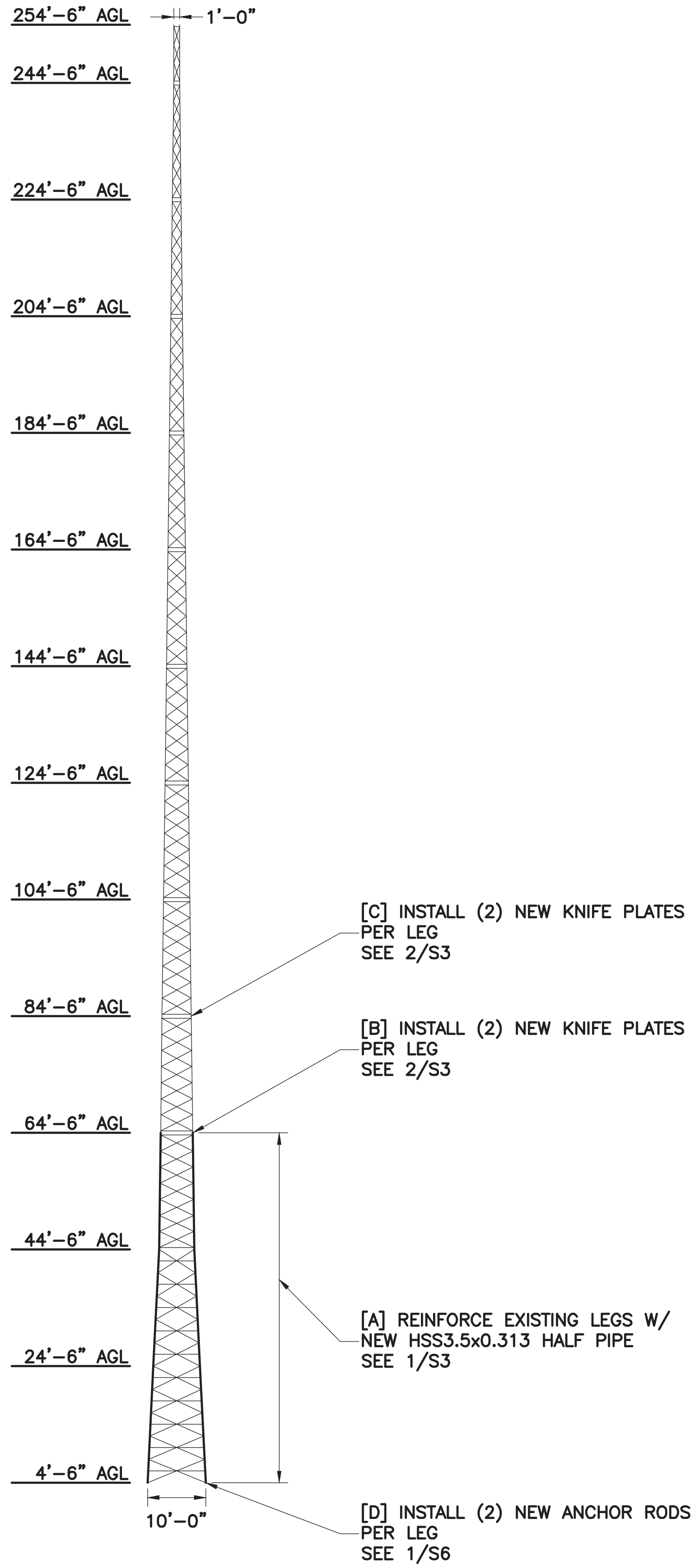
DESIGNED: SS
DRAWN: SS
CHECKED: AC

JOB #: 1875059

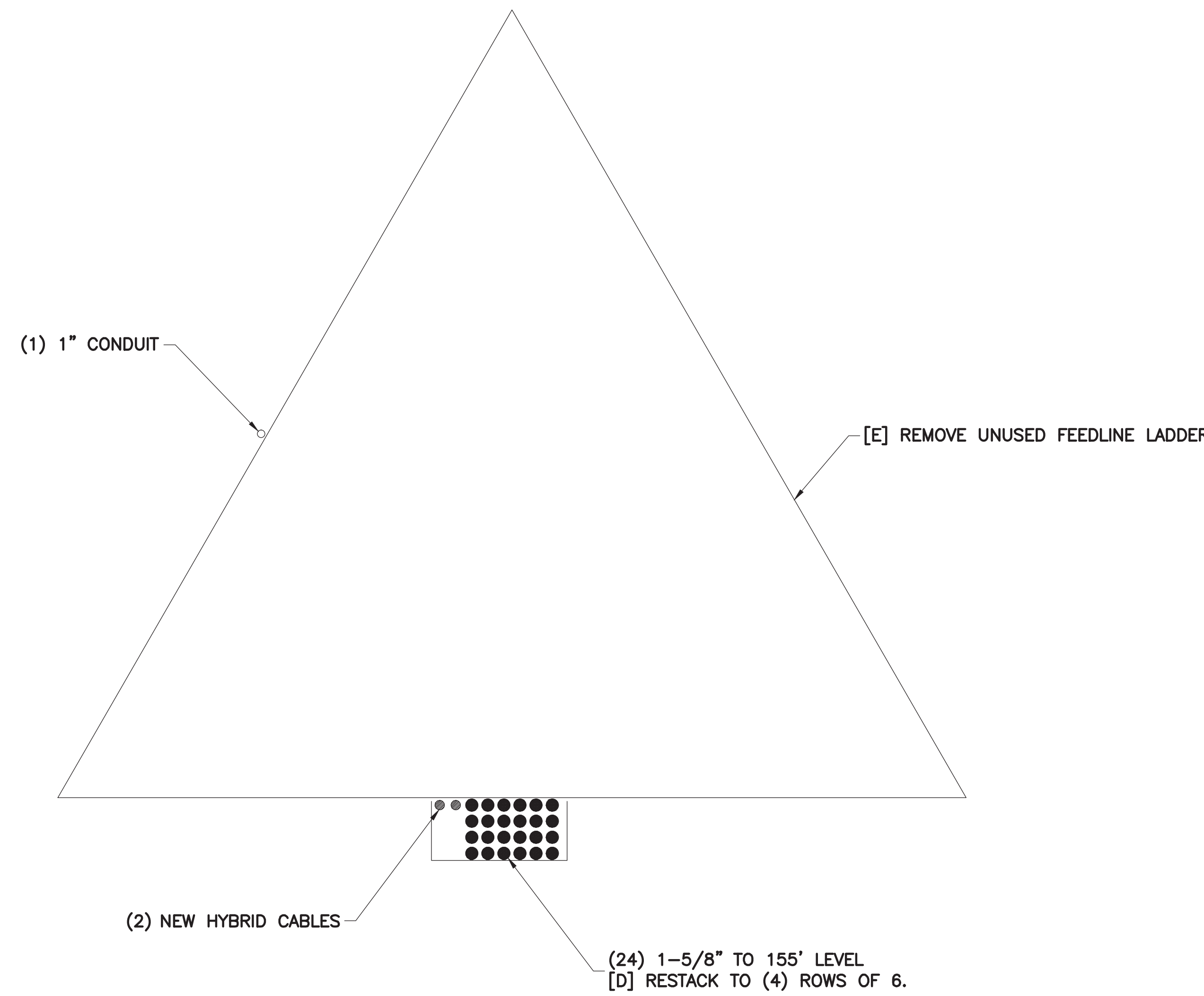
S1
NOTES

SELF-SUPPORT TOWER EXISTING MEMBER SIZES

SECTION	LEGS	DIAGONALS	TOP GIRTS	BOTTOM GIRTS	SEC. HORIZ.
T1	SR 1¼"	SR ½"	SR ½"	SR ½"	N/A
T2	SR 1¼"	SR ½"	SR ½"	SR ½"	N/A
T3	SR 1½"	SR ½"	SR ½"	SR ½"	N/A
T4	SR 1¾"	SR ⅝"	SR ⅝"	SR ⅝"	N/A
T5	SR 2"	SR ⅝"	SR ⅝"	SR ⅝"	N/A
T6	SR 2"	SR ¾"	SR ¾"	SR ¾"	N/A
T7	SR 2¼"	SR ¾"	SR ¾"	SR ¾"	N/A
T8	SR 2½"	SR ¾"	SR ¾"	SR ¾"	N/A
T9	SR 2½"	SR ⅞"	SR 1"	SR ⅞"	N/A
T10	SR 2¾"	SR ⅞"	SR ⅞"	SR ⅞"	N/A
T11	SR 2¾"	SR 1"	SR 1"	SR 1"	N/A
T12	SR 2¾"	L2x2x3/16	N/A	N/A	L2x2x¼
T13	SR 2¾"	L2½x2½x3/16	N/A	N/A	L2½x2½x¼



1 / S2 **TOWER ELEVATION**
1/32" = 1'-0"



2 / S2 **BASE LEVEL PLAN**
N.T.S.

TOWER MODIFICATION SCHEDULE

	FROM (FT)	TO (FT)	MODIFICATION	REFERENCE SHEET
A	4'-6"	64'-6"	REINFORCE EXISTING LEGS W/ NEW HSS3.5x0.313 HALF PIPE	S3
B	64'-6"	64'-6"	INSTALL (2) NEW KNIFE PLATES PER LEG	S3
C	84'-6"	84'-6"	INSTALL (2) NEW KNIFE PLATES PER LEG	S3
D	4'-6"	4'-6"	INSTALL (2) NEW ANCHOR RODS PER LEG	S6
E	4'-6"	155'-0"	STACK COAX IN (4) ROWS OF 6	S2
F	4'-6"	155'-0"	REMOVE UNUSED FEEDLINE LADDER	S2

NOTE: APPLY MODIFICATIONS A, B, C, & D TO ALL 3 TOWER FACES

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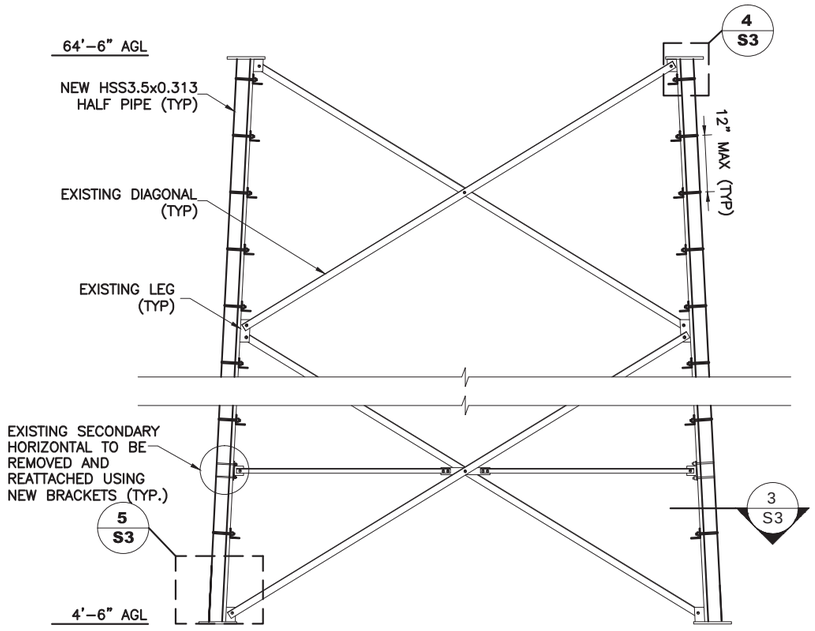
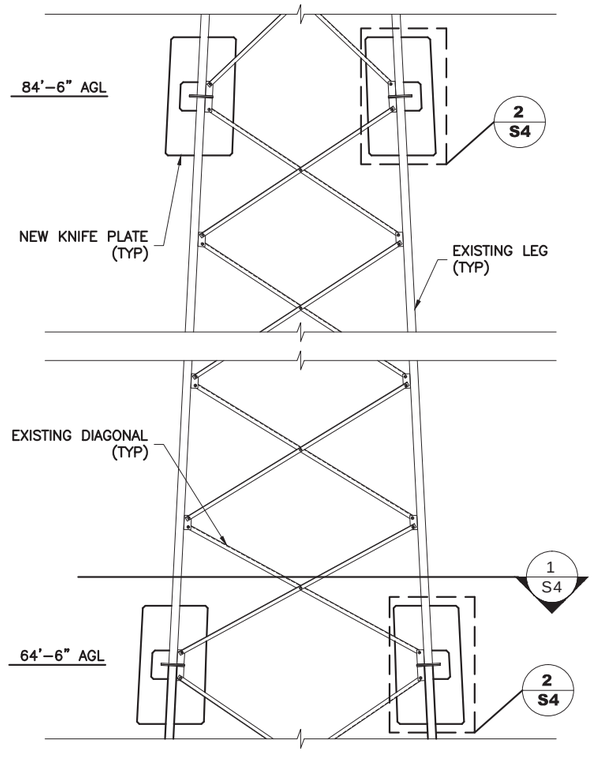
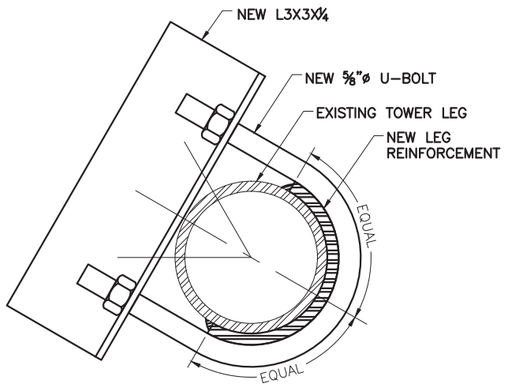
S2
SCOPE OF MODIFICATION



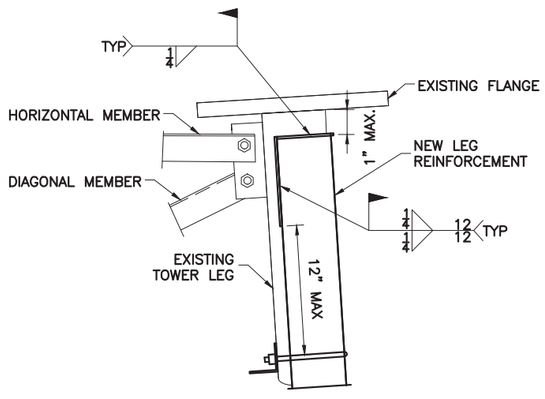
1 S3 **ELEVATION VIEW**
N.T.S.



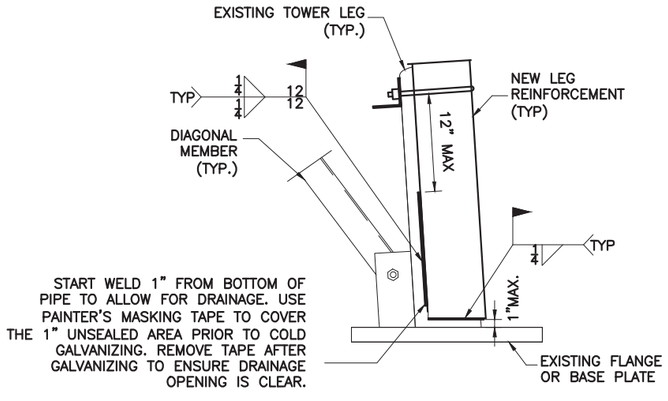
2 S3 **ELEVATION VIEW**
N.T.S.



3 S3 **LEG REINFORCEMENT**
N.T.S.



4 S3 **TOP OF LEG CONNECTION**
N.T.S.



START WELD 1" FROM BOTTOM OF PIPE TO ALLOW FOR DRAINAGE. USE PAINTER'S MASKING TAPE TO COVER THE 1" UNSEALED AREA PRIOR TO COLD GALVANIZING. REMOVE TAPE AFTER GALVANIZING TO ENSURE DRAINAGE OPENING IS CLEAR.

5 S3 **BASE OF LEG CONNECTION**
N.T.S.

NOTE: FLANGE BOLTS NOT SHOWN FOR CLARITY

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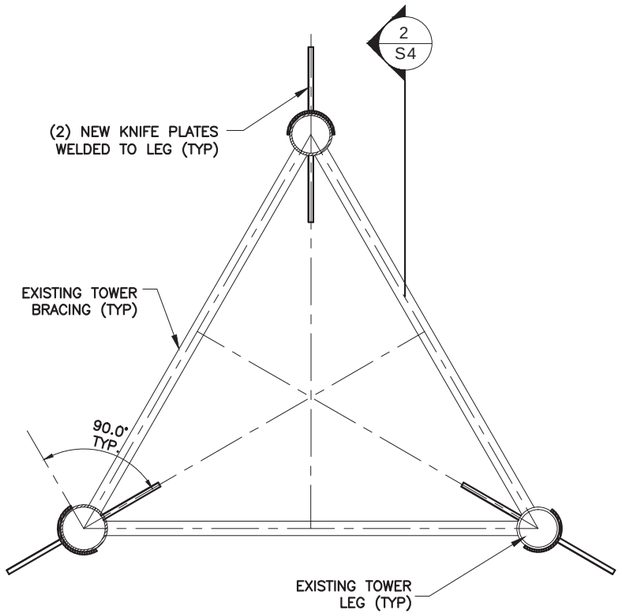
JOB #: 1875059

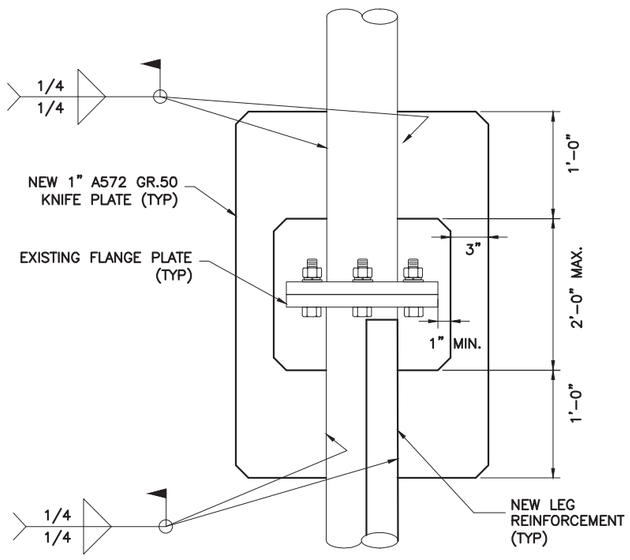
S3
STRUCTURAL
DETAILS



1 S4 KNIFE PLATE PLAN TYP.

N.T.S.

NOTE: KNIFE PLATE CONFIGURATION MAY BE ROTATED 90 DEGREES AS NECESSARY TO AVOID FIELD OBSTRUCTIONS



2 S4 KNIFE PLATE DETAIL

N.T.S.

NOTE: DIAGONAL MEMBERS NOT SHOWN FOR CLARITY

11-16-2018

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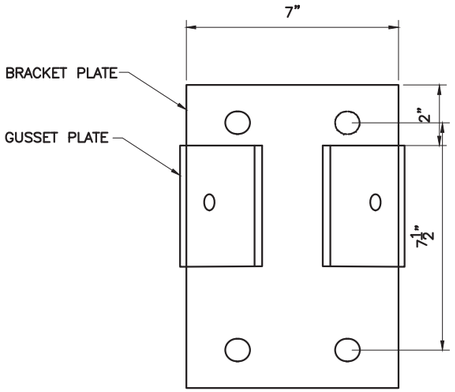
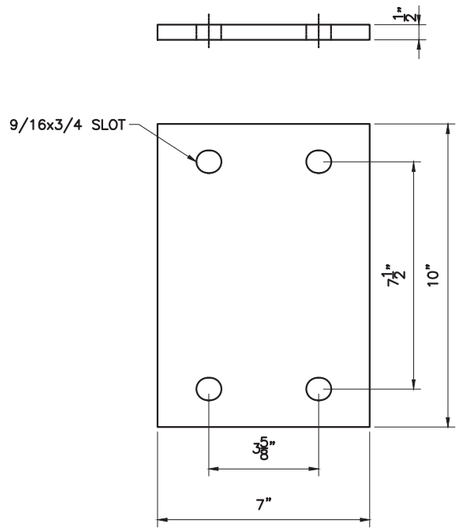
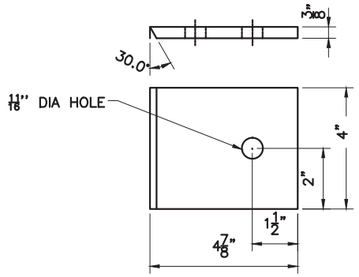
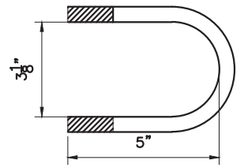




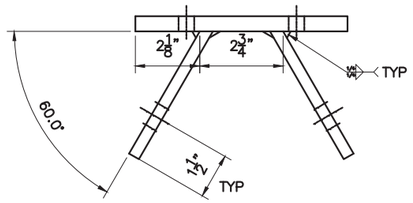


3 / S5 **GUSSET PLATE**
1" = 5"



4 / S5 **U-BOLT**
1" = 5"

2 / S5 **BRACKET PLATE**
1" = 5"



1 / S5 **SECONDARY HORIZONTAL BRACKET ASSEMBLY**
1" = 5"

MATERIAL NOTES:

1. ALL HOLES TO BE SHOP FABRICATED, UNLESS NOTED OTHERWISE.
2. TOLERANCES UNLESS NOTED OTHERWISE: FRACTIONS +/- 1/16".
3. STANDARD 1/2" U-BOLTS SHALL BE USED.
4. U-BOLTS SHALL MEET REQUIREMENTS OF ASME B18.31.5-2011 BENT BOLTS.
5. U-BOLTS TO BE ASTM A36/A307, SAE 429 GR2.
6. U-BOLT ASSEMBLY, COMPLETE WITH NUTS (ASTM A563), WASHERS (ASTM F436), AND LOCK WASHERS.
7. FULL ASSEMBLY TO BE HOT-DIP GALVANIZED PER ASTM A153/A153M OR A123, AS APPLICABLE.
8. NO FIELD FABRICATION PERMITTED ON THIS PART.

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S5
STRUCTURAL
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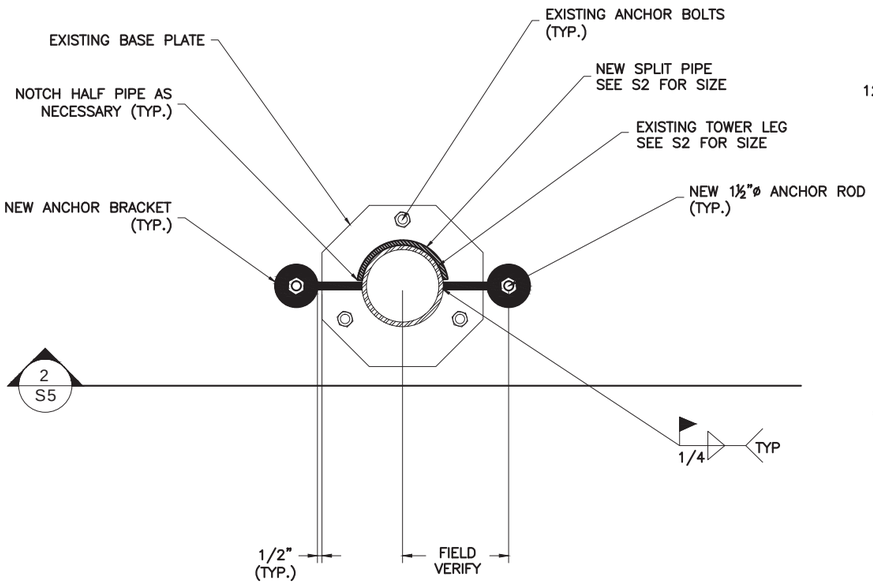


1/S6 ANCHOR ROD REINFORCEMENT

N.T.S.

MATERIAL NOTES:

1. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL QUANTITIES. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE PROPER FIT AND CLEARANCE OF THE REINFORCING MATERIAL IN THE FIELD. THE CONTRACTOR IS EXPECTED TO PERFORM A SITE VISIT BEFORE FABRICATING ANY MATERIAL.

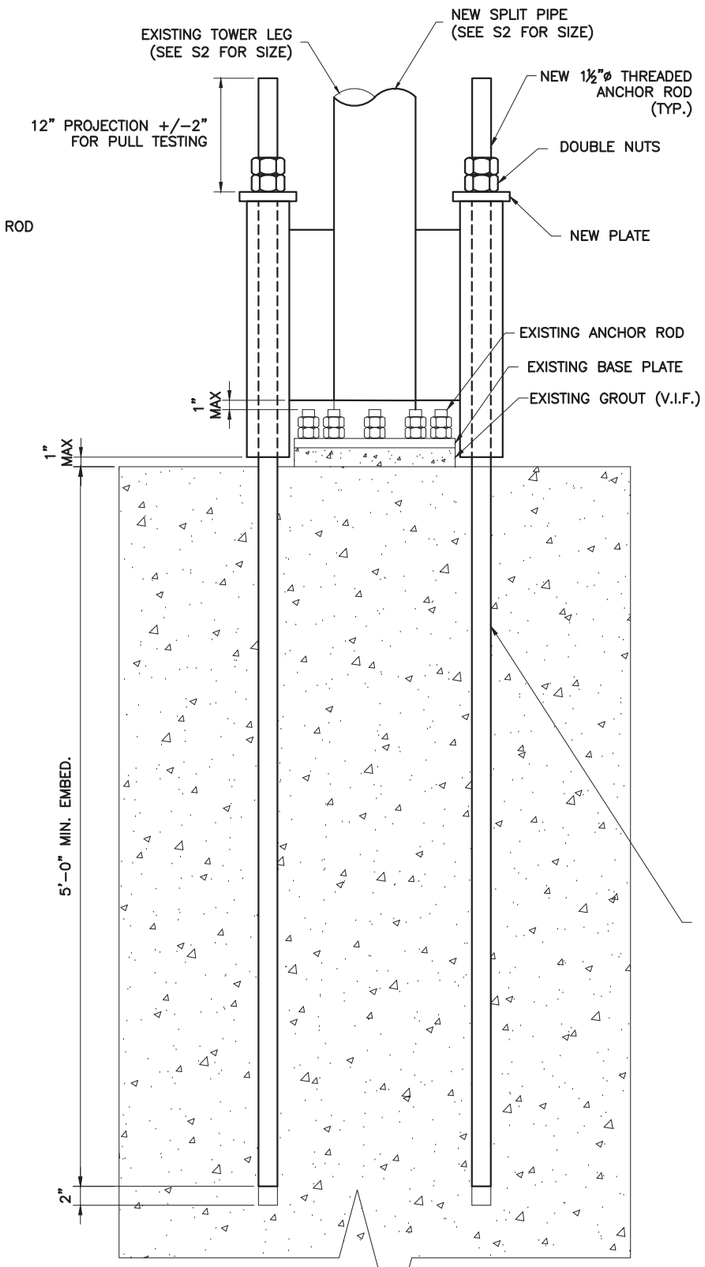
2. ALL NEW STEEL, (EXCEPT HSS), SHALL CONFORM TO THE REQUIREMENTS OF ASTM A572 (50 KSI YIELD POINT MATERIAL).

3. NEW HSS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A500 GRADE B (42 KSI YIELD POINT MATERIAL).

4. ALL NEW STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123.

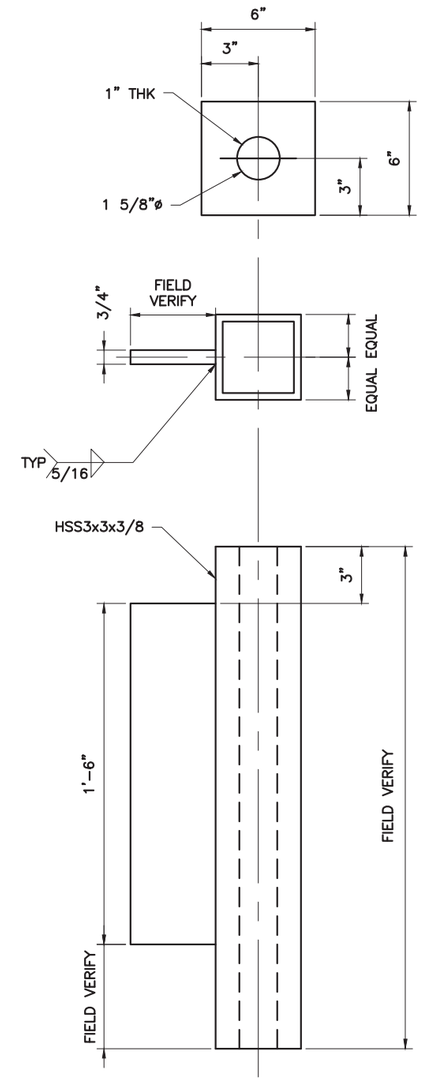
5. DRILLED IN ANCHOR RODS SHALL CONFORM TO THE REQUIREMENTS OF ASTM F1554 GR105. ANCHOR RODS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153.

6. SHOP WELDED CONNECTIONS SHALL CONFORM TO THE LATEST REVISED CODE OF THE AMERICAN WELDING SOCIETY AWS D1.1.



2/S6 ANCHOR ROD REINFORCEMENT

N.T.S.



3/S6 ANCHOR BRACKET

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

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TEL NO: 770-693-0835
ADMIN@DESTEKENGINEERING.COM
LICENSE NO: PEC0001429

PREPARED FOR:
T-Mobile Northeast, LLC
35 Griffin Road South
Bloomfield, CT 06002

NUM	DATE	DESCRIPTION:
A	11/16/18	ISSUED FOR CONSTRUCTION

CTHA220A

ADDRESS:
440 OLD TURNPIKE ROAD
SOUTHINGTON, CT 06489

DESIGNED: SS
DRAWN: SS
CHECKED: AC

JOB #: 1875059

S6
STRUCTURAL DETAILS

Exhibit E

July 31, 2018

To: T-Mobile Northeast, LLC
35 Griffin Road South
Bloomfield, CT 06002

Subject: Mount Assessment – CTHA220C (Destek Job #: 1875059)

Per your request, Destek Engineering, LLC (Destek) has performed a structural assessment of the antenna mounting system which supports the T-Mobile Equipment at the referenced site. We have evaluated the subject mount for the additions and alterations specified in the RFDS, which is referenced in Table 1. This assessment is based on the documents and information listed in Table 1 and is in accordance with the mount loading and evaluation criteria stated in Table 2.

Based on our experience with similar mount structures and with respect to the changes in applied loads, Destek opines that the mount **WILL BE ADEQUATE.**

This assessment is only valid for the loading scenario described herein. Variations between this document and actual field conditions will void this assessment. It is assumed that all structural members and connections of the subject mount are in good condition and the mount has been properly designed, constructed and assembled. Discrepancies between this document and field conditions should be immediately brought to our attention. It is assumed that the tower and other components of the site have been analyzed and qualified by others.

We at *Destek Engineering, LLC* appreciate the opportunity of providing our continuing professional services to you. If you have any questions or need further assistance on this or any other project, please do not hesitate to contact us.

Sincerely,
Destek Engineering, LLC
License No: PEC00001429

07-31-2018

Ahmet Colakoglu, PE
Connecticut Professional Engineer
License No: 27057

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

References and Loading

Table 1: Documents and Information Provided

DOCUMENT	PREPARED BY	DATE
Structural Analysis Report	EBI Consulting	08/22/2014
RFDS	T-Mobile	05/15/2018
Site Photos	ForeSite LLC	04/14/2018

Table 2: Mount Loading and Evaluation Criteria

LOCATION	Southington, Hartford County, CT
BUILDING CODE AND TOWER STANDARD	2016 Connecticut State Building Code and TIA-222-G
RAD CENTER	147 & 155 ft
STRUCTURE TYPE	Self-Support Tower
EXPOSURE CATEGORY	C
WIND LOADING	125 mph ultimate basic wind (97 mph nominal wind speed)
ICE LOADING	1.00 inch ice with 50 mph basic wind. Ice is considered to increase in thickness with height
CLASS	II
TOPOGRAPHIC CATEGORY	1

Table 2.1 –Existing Appurtenance Configuration

QTY	MODEL
3	APX16DWV-16DWV-S-E-A20 – Antennas
3	LNX-6515DS-A1M - Antennas
3	RRUS11 B12 - RRUs
6	Generic Twin Style 1B – AWS - TMAs

Table 2.2 – Proposed and Final Appurtenance Configuration

QTY	MODEL
3	APX16DWV-16DWV-S-E-A20 – Antennas
3	APXVAARR24-43-U-NA20 – Antennas
6	Generic AWS/PCS - Diplexers
3	Radio 4449 B71 + B12 – RRUs*

***To be mounted in H-frame at grade level**

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

Mount Photos

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

Exhibit F

EBI Consulting
environmental | engineering | due diligence

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

T-Mobile Existing Facility

Site ID: CTHA220A

HA220/WNTY Tower_SST
440 Old Turnpike Road
Southington, CT 06489

August 27, 2018

EBI Project Number: 6218005866

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general population allowable limit:	2.88 %

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

EBI Consulting
environmental | engineering | due diligence

August 27, 2018

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

Emissions Analysis for Site: **CTHA220A – HA220/WNTY Tower_SST**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **440 Old Turnpike Road, Southington, CT**, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

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

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

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

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at **440 Old Turnpike Road, Southington, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panel antennas, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

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

1) 1 GSM channels (PCS Band - 1900 MHz) was considered for each sector of the proposed installation. These Channels have a transmit power of 15 Watts per Channel.

2) 1 UMTS channel (AWS Band – 2100 MHz) was considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

3) 2 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

4) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

5) 2 LTE channels (600 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

6) 2 LTE channels (700 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 20 Watts per Channel.

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

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

9) The antennas used in this modeling are the **RFS APX16DWV-16DWVS-E-A20** for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the **RFS APXVAARR24_43-U-NA20** for 600 MHz and 700 MHz channels. This is based on feedback from the carrier with regard to anticipated antenna selection. All Antenna gain values and associated transmit power levels are shown in the Site Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panel antennas, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

10) The antenna mounting height centerlines of the proposed antennas are **155 feet & 147 feet** above ground level (AGL).

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

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

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	RFS APX16DWV-16DWVS-E-A20	Make / Model:	RFS APX16DWV-16DWVS-E-A20	Make / Model:	RFS APX16DWV-16DWVS-E-A20
Gain:	16.3 dBd	Gain:	16.3 dBd	Gain:	16.3 dBd
Height (AGL):	155 feet	Height (AGL):	155 feet	Height (AGL):	155 feet
Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)
Channel Count	6	Channel Count	6	Channel Count	6
Total TX Power(W):	255	Total TX Power(W):	255	Total TX Power(W):	255
ERP (W):	10,877.78	ERP (W):	10,877.78	ERP (W):	10,877.78
Antenna A1 MPE%	**1.76**	Antenna B1 MPE%	**1.76**	Antenna C1 MPE%	**1.76**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20
Gain:	12.95 / 13.35 dBd	Gain:	12.95 / 13.35 dBd	Gain:	12.95 / 13.35 dBd
Height (AGL):	147 feet	Height (AGL):	147 feet	Height (AGL):	147 feet
Frequency Bands	600 MHz / 700 MHz	Frequency Bands	600 MHz / 700 MHz	Frequency Bands	600 MHz / 700 MHz
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	120	Total TX Power(W):	120	Total TX Power(W):	120
ERP (W):	2,443.03	ERP (W):	2,443.03	ERP (W):	2,443.03
Antenna A2 MPE%	**1.05**	Antenna B2 MPE%	**1.05**	Antenna C2 MPE%	**1.05**

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile (Per Sector Max)	**2.81 %**
WXCT AM	**0.07** %
Site Total MPE %:	**2.88 %**

T-Mobile Sector A Total:	2.81 %
T-Mobile Sector B Total:	2.81 %
T-Mobile Sector C Total:	2.81 %
Site Total:	2.88 %

T-Mobile Maximum MPE Power Values (Per Sector)

T-Mobile _Frequency Band / Technology (Per Sector)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
T-Mobile AWS - 2100 MHz UMTS	1	1,706.32	155	2.76	AWS - 2100 MHz	1000.00	0.28%
T-Mobile PCS - 1900 MHz GSM	1	639.87	155	1.04	PCS - 1900 MHz	1000.00	0.10%
T-Mobile PCS - 1900 MHz LTE	2	1,706.32	155	5.53	PCS - 1900 MHz	1000.00	0.55%
T-Mobile AWS - 2100 MHz LTE	2	2,559.48	155	8.29	AWS - 2100 MHz	1000.00	0.83%
T-Mobile 600 MHz LTE	2	788.97	147	2.85	600 MHz	400.00	0.71%
T-Mobile 700 MHz LTE	2	432.54	147	1.56	700 MHz	467.00	0.34%
						Total:	**2.81%**

Summary

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

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

T-Mobile Sector	Power Density Value (%)
Sector A:	2.81 %
Sector B:	2.81 %
Sector C:	2.81 %
T-Mobile Maximum MPE % (Per Sector):	2.81 %
Site Total:	2.88 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **2.88%** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

Exhibit G

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BLOOMFIELD CT 06002-1351

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Ref#: HA220 ZAP

0024

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C019

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SOUTHINGTON TOWN MANAGER
75 MAIN ST
SOUTHINGTON CT 06489-2504

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Priority Mail® Postage:	**$6.70**
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T-MOBILE USA- NSS
35 GRIFFIN RD S
BLOOMFIELD CT 06002-1351

Ref#: HA220 ZAP

To: MARK J SCIOTA
SOUTHINGTON TOWN MANAGER
75 MAIN ST
SOUTHINGTON CT 06489-2504

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DEBORAH CHASE
T-MOBILE/NSS
35 GRIFFIN RD S
BLOOMFIELD CT 06002-1351

Expected Delivery Date: 12/13/18
Ref#: HA220 ZAP

0024

Carrier -- Leave if No Response

C020

SHIP TO: MATTHEW A REIMONDO
SOUTHINGTON ZONING ENFORCEMENT OFFICER
196 N MAIN ST
200
SOUTHINGTON CT 06489-2514

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Ref#: HA220 ZAP

To: MATTHEW A REIMONDO
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200
SOUTHINGTON CT 06489-2514

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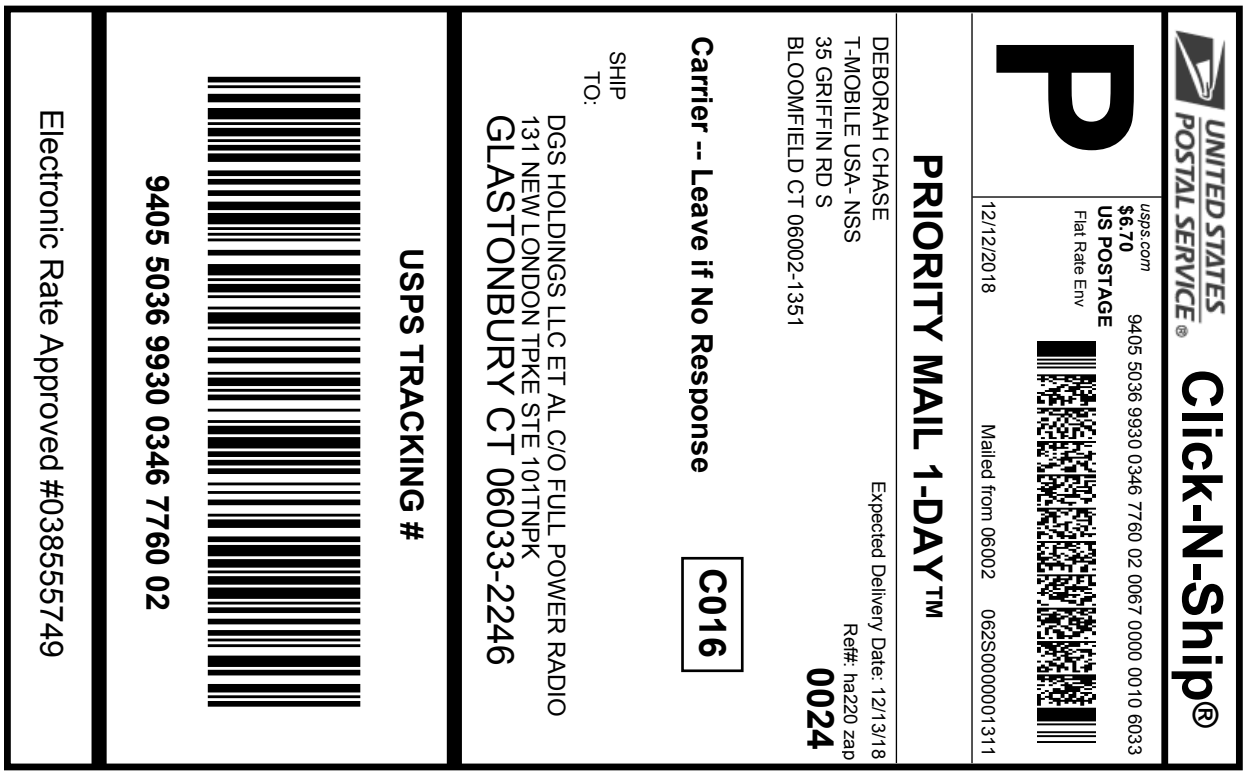

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T-MOBILE USA- NSS
35 GRIFFIN RD S
BLOOMFIELD CT 06002-1351

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131 NEW LONDON TPKE STE 101TNPK
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BLOOMFIELD CT 06002-1351

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Ref#: HA220 ZAP

0004

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B023

SHIP TO: GEORGIA BROWN
LANDMARK DIVIDEND LLC
PO BOX 3429
EL SEGUNDO CA 90245-8590

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Ship Date:	12/11/2018
Expected Delivery Date:	12/14/2018

Priority Mail® Postage:	**$6.70**
Total	**$6.70**

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35 GRIFFIN RD S
BLOOMFIELD CT 06002-1351

Ref#: HA220 ZAP

To: GEORGIA BROWN
LANDMARK DIVIDEND LLC
PO BOX 3429
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