Crown Castle
12 Gill Street, Suite 5800
Woburn, MA 01801

September 29, 2016

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

RE: **Notice of Exempt Modification for T-Mobile / L700 Crown Site BU: 876376**
T-Mobile Site ID: CT11367A
Located at: 123 Campville Hill Road, Harwinton, CT 06791
Latitude: 41° 44' 12.4" / Longitude: -73°5'49.4"

Dear Ms. Bachman,

T-Mobile currently maintains three (3) antennas at the 169-foot level of the existing 177-foot monopole tower located at 123 Campville Hill Road, Harwinton, CT. The tower is owned by Crown Castle. The property is owned by Harwinton Rod & Gun Club. T-Mobile now proposes to replace three (3) antennas, add three (3) new antennas, and add six (6) lines of coaxial cable. The antennas would be installed at the same 169-foot level of the tower.

This facility was approved by the Town of Harwinton Zoning Commission on June 26, 2000, Application No. 3830. This approval included the condition(s) that:

1. Tower Manager: That a Tower Management firm be designated by name, address, contract person and telephone number as the person and firm responsible for the construction and operation of the tower, and be kept current and on file with the Commission at all times.
2. Tower Removal Bond: That the applicant file, prior to construction, a tower removal bond, in sufficient amount, and with sufficient surety, to guarantee the cost of removal of the tower, fence, and accessory structures, when the tower is no longer in service (other than for routine maintenance and testing), or its lease (and renewal options) expire, whichever occurs first. The bond shall protect both the Town of Harwinton and the landowner, and their heirs, successors

and assigns, as per C.G.S. §8-3(g) and Zoning Regulations §7.4, and shall be subject to review and approval every five (5) years hereafter as to sufficiency and amount.

3. Landscaping and Fencing: That the tower site be fenced with a secure chain link fence with green webbing, and such fence be maintained in a safe condition at all times. The applicant shall plant a mature (16' tall) evergreen buffer around the tower compound, which shall be maintained and replanted as necessary, during the life of the tower. As much of the mature tree line around the tower as is possible shall be preserved as determined by the Commission or its agent at a pre-construction on-site meeting.
4. Security Alarm: That the tower be protected by a security alarm which shall be regularly tested and operational at all times.
5. EMF Certification: That each carrier shall certify that the EMF output of any antenna, combined with that of any previously installed antenna(s), is within FCC standards for public health and safety, and that the Tower Manager provide annual certification during the service life of the tower.
6. Tower Construction: That the monopole tower satisfy all structural requirements of the State Building Code, as certified by a Connecticut licensed structural engineer, that the applicant comply with the threshold structural notification requirements of C.G.S §29-276b and the Connecticut Supplement to the State Building Code; and that the monopole be of a matte gray finish with no lights or striping.
7. Fall Zone: That the property lines be maintained at all times while the tower is standing at a distance from the case of the tower not less than its total height.
8. Municipal VFD and EMS Use: As offered by the applicant at the public hearing, that the Town of Harwinton, the Westside Volunteer Fire Department, the Harwinton Volunteer Fire Department and the Harwinton Ambulance Association be allowed to place their antenna(S0 on the tower at no cost, provided that there is no proven signal interference and subject to such reasonable terms and conditions as the applicant or Tower Manager may impose.
9. Future structures and modification: That any future structural additions or modifications, including accessory structures, be submitted to the Zoning Commission in accordance with the Zoning Regulations of the Commission then in effect, i.e., Regulations §A.8.10.12, as amended, and any other land use regulations and ordinances as may then be in effect.

10. Recording and filing: That this special permit and the mylar site plans, be recorded in the Harwinton Land Records within fifteen (15) days, and shall run with the land described in the Harwinton Land Records in Volume 152 at Pages53-54, Assessors Map A4-05-0002.
11. Subdivision approval: A five (5) acre read lot shall be created solely for the tower and its accessory structure with its own 50' wide access way, on which no other principal uses or structures shall be permitted, in conformity with Regulations §§5, 6.1 and 8.6, and pursuant to subdivision approval, if required, (i.e., if "free split" privilege has been exhausted since September 30, 1961), as shown on the preliminary subdivision plan dates 4/24/00.
12. General requirements: The utility service to the property, including the tower, shall be buried underground, and the carriers' utility lockers or cabinets shall be enclosed within a wood, colonial style carriage shed type building to comply with Regulations §8.1.1(a).

This modification complies with the aforementioned condition(s).

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. §16-50j-72(b)(2). In accordance with R.S.C.A. § 16-50j-73, a copy of this letter is being sent to Mr. Michael R. Criss, First Selectman for the Town of Harwinton, as well as the property owner and the tower owner.

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

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

3. The proposed modification 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 Communication 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 constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2). Please send approval/rejection letter to Attn: Amanda Goodall.

Sincerely,

Amanda Goodall
Real Estate Specialist
12 Gill Street, Suite 5800, Woburn, MA 01801
339-205-7017
Amanda.Goodall@crowncastle.com

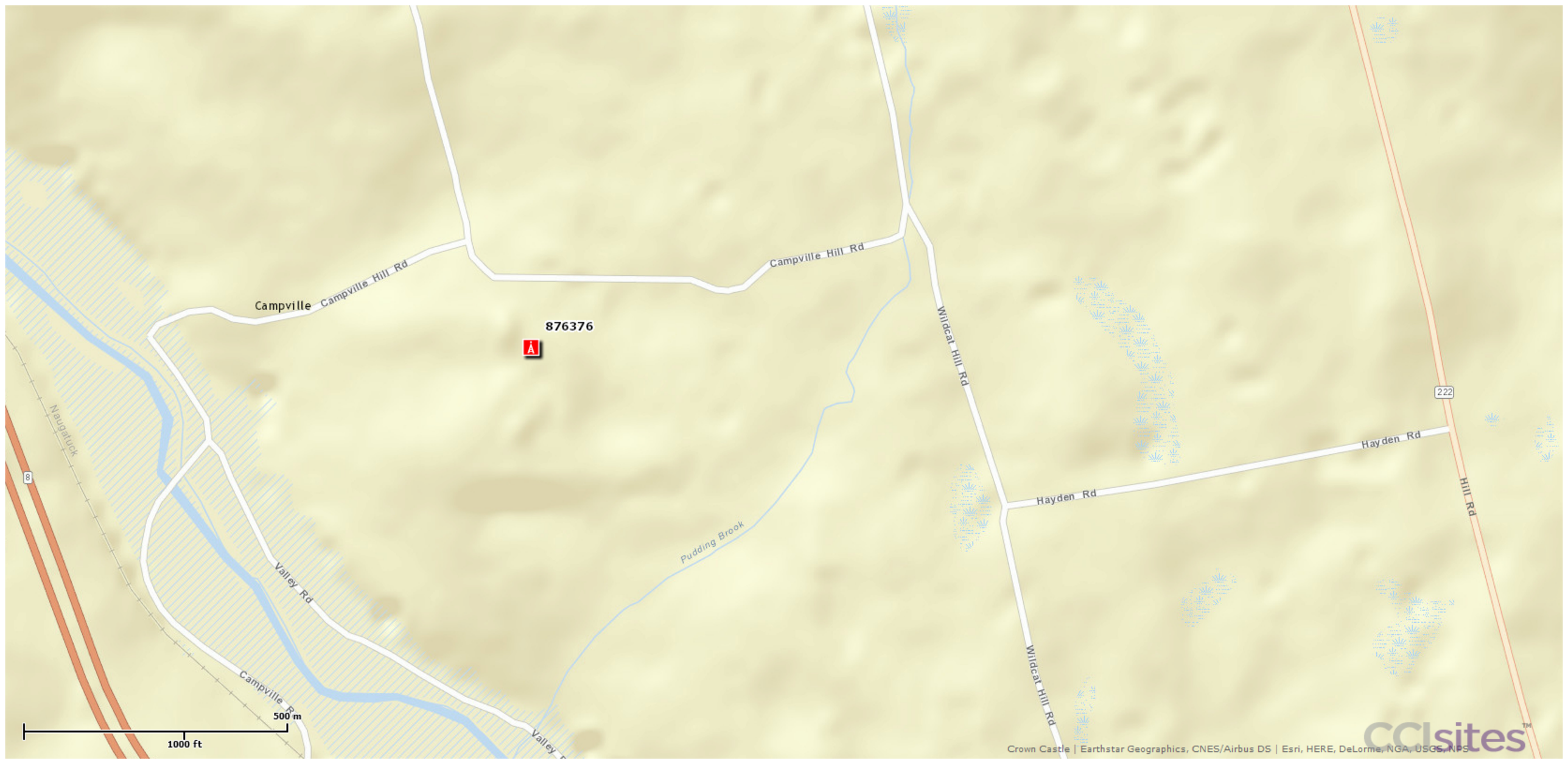
Attachments:

Tab 1: Exhibit-1: Compound plan and elevation depicting the planned changes
Tab 2: Exhibit-2: Structural Modification Report
Tab 4: Exhibit-3: General Power Density Table report (RF Emissions Analysis Report)

cc: First Selectman Michael Criss
Town of Harwinton
100 Bentley Drive
PO Box 66
Harwinton, CT 06791

Crown Castle (Tower Owner)
12 Gill Street, Suite 5800
Woburn, Ma 01801

Harwinton Rod & Gun Club
123 Campville Hill Road
PO Box 181
Harwinton, CT 06791


Campville Campville Hill Rd
Campville Hill Rd
876376
Wildcat Hill Rd
222
Hayden Rd
Hayden Rd
Hill Rd
Naugatuck
8
Valley Rd
Pudding Brook
Campville R
Wildcat Hill Rd
500 m
1000 ft
Crown Castle | Earthstar Geographics, CNES/Airbus DS | Esri, HERE, DeLorme, NGA, USGS, NPS
CCIsites™

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Owner and Parcel Information			
Owner Name	HARWINTON ROD & GUN CLUB	**Today's Date**	September 26, 2016
Mailing Address	PO BOX 181	**Parcel ID**	1225 (Account #: 2581)
	HARWINTON, CT 06791		
Location Address	123 CAMPVILLE HILL	**Census Tract**	298400000000
Map / Block / Lot	A4 / 05 / 0002	**Acreage**	49.00
Use Class / Description	1-1 RES LAND		
Assessing Neighborhood	0001A	**Utilities**	

Current Appraised Value Information							
Building Value	**XF Value**	**OB Value**	**Land Value**	**Special Land Value**	**Total Appraised Value**	**Net Appraised Value**	**Current Assessment**
$ 205,400	$ 0	$ 0	$ 391,460		$ 596,860	$ 596,860	$ 220,070

Assessment History				
Year	**Building**	**OB/Misc**	**Land**	**Total Assessment**
Current	$ 143,780	0	$ 76,290	$ 220,070
2015	$ 143,780	0	$ 76,290	$ 220,070
2013	$ 143,780	0	$ 73,250	$ 217,030

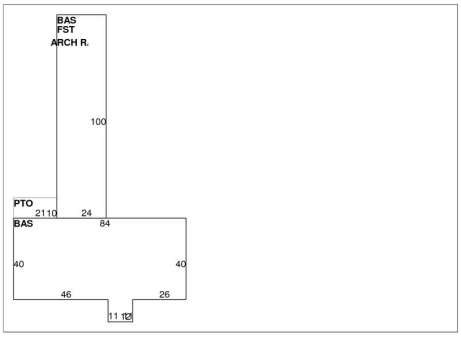
Land Information				
Use	**Class**	**Zoning**	**Area**	**Value**
RES LAND	R	CR2	2 AC	$ 100,060
FOREST LD	R		47 AC	$ 291,400

Residential Building Information								
Style	**Year Built**	**Eff Year Built**	**Living Area**	**Stories**	**Grade**	**Exterior Wall**	**Interior Wall**	**Fireplaces**
Camp	1977	1980	5,892	1	Average	Wood on Sheath	Wall Brd/Wood	
Roof Cover	**Roof Structure**	**Floor Type**	**Heat Type**	**Heat Fuel**	**AC**	**Bedrooms/Full Baths/Half Baths/Total Rooms**	**Basement**	**Basement Garages**
Asph/F Gls/Cmp	Gable/Hip	Average	Oil	Forced Air-Duc	None	0 / 1 / 0 / 2		

Building Sub Areas

Code	Description	Living Area	Gross Area	Effective Area
BAS	First Floor	5,892	5,892	
FST	Utility Storage	0	2,400	
PTO	Patio	0	210	
	Totals	**5,892**	**8,502**	**7,113**

Building Sketch Enlarge



Building Photo Enlarge

Out Buildings / Extra Features				
Description	**Sub Description**	**Area**	**Year Built**	**Value**
No Out Building/Misc Information available for this parcel.				

Sale Information						
Sale Date	**Sale Price**	**Deed Book/Page**	**Sale Qualification**	**Reason**	**Vacant or Improved**	**Owner**
12/30/1997	$ 50,000	0152/0053				HARWINTON ROD & GUN CLUB
07/08/1957		0049/0488	Unqualified		Improved	SLATE ALICE

Permit Information								
Permit ID	**Issue Date**	**Type**	**Description**	**Amount**	**Inspection Date**	**% Complete**	**Date Complete**	**Comments**
1647E	03/08/2016	EL	Electric	$ 2,500		0		
9416	10/24/2014		MODIFICATIONS	$ 20,000		0		
8760	01/17/2013		FACILITY MODIFICATIO	$ 25,000		0		
8757	01/02/2013		ANTENNA SWAP	$ 10,000		0		
8704	11/21/2012		ANTENNAS	$ 12,000		0		
8339	01/13/2012			$ 92		0		REPLACING 6 ANTENNAS WITH NEWER MODELS

7560	09/28/2009	DE	Demolish	$ 1,500		0		
0000	09/10/2009	CO	CO ISSUED			0		
7495	07/14/2009	EL	Electric	$ 3,000		0		
7486	07/01/2009	AD	Addition	$ 31,395		0		CEL TOWER
	03/17/2009	EL	Electric			0		INSTALLING ANTENNAS & RADIO
7201	07/09/2008			$ 28,000		0		NEW VINYL SIDING
6437	06/21/2008	EL	Electric	$ 8,000		0		

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DECISION

The Zoning Commission, having reviewed the application and documentation, having heard the testimony at public hearing sessions held March 20, April 24, and May 1, and having viewed the premises and its surroundings in light of the proposed application, hereby finds as follows:

1. The applicant has proven that a tower is necessary to serve the Route 8 corridor south of Route 118 (Exit 42) to Campville Road (Exit 41). The applicant has also proven that its 180' tower at 123 Campville Road would serve this area, albeit to a greater degree of coverage and signal level than the Commission believes is required by the Telecommunications Act of 1996. Therefore, the applicant has satisfied the public interest, convenience or necessity requirement of §8.10.2.

2. On balance, the applicant has proven that the proposed location is necessary, and to a lesser degree, that alternate locations where similar special permit uses are located (or proposed to be located) are not available as required by §8.10.3.

3. The applicant has not demonstrated that the visual inconvenience of the proposed tower at this location is clearly less than the public necessity which requires the tower at this location, as required under §8.10.4; however, the visual impact of the tower will be lessened by landscaping, mature true planting, and mature tree line preservation imposed as a condition of approval under §8.10.3 and §8.1.1(a).

4. The tower and its support facilities would constitute a principal use or structure to be located on the same lot with an exiting principal building or use, in violation of §6.1; however, the applicant and the property owner have proposed a subdivision feasibility plan and agreed to subdivide (if necessary), as a condition of approval, so as to satisfy §6.1 in conjunction with the rear lot requirements of §5 and §8.6.

5. Subject to reasonable conditions of approval and site plan modifications imposed by the Commission, the application will more closely comply with the general requirements of §8.1.1(a).

THEREFORE, based on the foregoing regulations, findings of fact and reasons for decision, Application No. 3830 for a special permit to construct a 180' telecommunications tower at 123 Campville Hill Road, as shown on 4 sheets constituting the site plan and erosion control plan, dated 12/10/99, revised 12/21/99, as modified by the preliminary subdivision plan dated 4/24/00 is hereby APPROVED, subject to the following conditions and modifications:

1. Tower Manager: That a Tower Management firm be designated by name, address, contact person and telephone number as the person and firm responsible for the construction and operation of the tower, and be kept current and on file with the Commission at all times.

2. Tower Removal Bond: That the applicant file, prior to construction, a tower removal bond, in sufficient amount, and with sufficient surety, to guarantee the cost of removal of the tower, fence, and accessory structures, when the tower is no longer in service (other than for routine maintenance and testing), or its lease (and renewal options) expire, whichever occurs first. The bond shall protect both the Town of Harwinton and the landowner, and their heirs, successors and assigns, as per C.G.S. §8-3(g) and Zoning Regulation §7.4, and shall be subject to review and approval every five (5) years hereafter as to sufficiency and amount.

3. Landscaping and Fencing: That the tower site be fenced with a secure chain link fence with green webbing, and such fence be maintained in a safe condition at all times. The applicant shall plant a mature (16' tall) evergreen buffer around the tower compound, which shall be maintained and replanted as necessary, during the life of the tower. As much of the mature tree line around the tower as is possible shall be preserved as determined by the Commission or its agent at a pre-construction on-site meeting.

4. Security Alarm: That the tower be protected by a security alarm which shall be regularly tested and operational at all times.

5. EMF Certification: That each carrier shall certify that the EMF output of any antenna, combined with that of any previously installed antenna(s), is within FCC standards for public health and safety, and that the Tower Manager provide annual certification during the service life of the tower.

6. Tower Construction: That the monopole tower satisfy all structural requirements of the State Building Code, as certified by a Connecticut licensed

structural engineer; that the applicant comply with the threshold structural notification requirements of C.G.S. §29-276b and the Connecticut Supplement to the State Building Code; and that the monopole be of a matte gray finish with no lights or striping.

7. Fall Zone: That the property lines be maintained at all times while the tower is standing at a distance from the base of the tower not less than its total height.

8. Municipal, VFD and EMS Use: As offered by the applicant at the public hearing, that the Town of Harwinton, the Westside Volunteer Fire Department, the Harwinton Volunteer Fire Department and the Harwinton Ambulance Association be allowed to place their antenna(s) on the tower at no cost, provided that there is no proven signal interference and subject to such reasonable terms and conditions as the applicant or Tower Manager may impose.

9. Future structures and modifications: That any future structural additions or modifications, including accessory structures, be submitted to the Zoning Commission in accordance with the Zoning Regulations of the Commission then in effect, i.e., Regulations §A.8.10.1 - A.8.10.12, as amended, and any other land use regulations and ordinances as may then be in effect.

10. Recording and filing: That this special permit and the mylar site plans, be recorded in the Harwinton Land Records within fifteen (15) days, and shall run with the land described in the Harwinton Land Records in Volume 152 at Pages 53-54, Assessors Map A4-05-0002.

11. Subdivision approval: A five (5) acre rear lot shall be created solely for the tower and its accessory structure with its own 50' wide access way, on which no other principal uses or structures shall be permitted, in conformity with Regulations §§5, 6.1 and 8.6, and pursuant to subdivision approval, if required, (i.e., if "free split" privilege has been exhausted since September 30, 1961), as shown on the preliminary subdivision plan dated 4/24/00.

12. General requirements: The utility service to the property, including the tower, shall be buried underground, and the carriers' utility lockers or cabinets shall be enclosed within a wood, colonial style carriage shed type building to comply with Regulations §8.1.1(a).

Dated at Harwinton, Connecticut this 26 day of June, 2000.

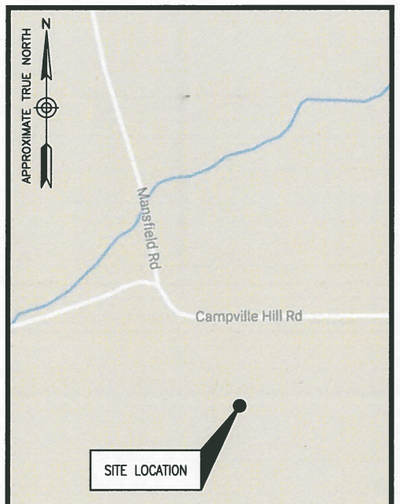
HARWINTON ZONING COMMISSION

By: _____
John Byrnes
Its Chairman

A:\MDR.harwinton.2\HPC. notice of decison - 123 Campville Hill Road.wpd

T-MOBILE NORTHEAST LLC

T-MOBILE SITE #: CT11367A
CROWN CASTLE BU #: 876376
SITE NAME: SCOVILLE HILL / HARWINTON ROD
123 CAMPVILLE HILL ROAD
HARWINTON, CT 06791
LITCHFIELD COUNTY



VICINITY MAP

FROM BLOOMFIELD, CT:

HEAD NORTHEAST ON GRIFFIN RD S TOWARD W NEWBERRY RD. TURN LEFT ONTO CT-187 N. TAKE THE CT-189 N RAMP TO TARIFFVILLE/GRANBY. CONTINUE ONTO CT-189 N. TURN RIGHT ONTO SALMON BROOK ST. SLIGHT LEFT ONTO N GRANBY RD. SLIGHT LEFT ONTO CT-20 W/W GRANBY RD. TURN LEFT ONTO CT-219 S. TURN LEFT ONTO CT-179 S/CT-219 S. TURN RIGHT ONTO CT-318 W. TURN LEFT ONTO CT-181 S/CT-318 W. TURN RIGHT ONTO US-44 W/NEW HARTFORD RD. TURN LEFT ONTO CT-8 S (SIGNS FOR TORRINGTON/WATERBURY). TAKE EXIT 41 TOWARD CAMPVILLE/NORTHFIELD. TURN LEFT ONTO MARSH RD. TURN LEFT AT THE 1ST CROSS STREET ONTO CAMPVILLE RD. CONTINUE ONTO NORTHFIELD RD. TURN LEFT ONTO VALLEY RD. TURN RIGHT ONTO CAMPVILLE HILL RD. SITE WILL BE ON THE RIGHT.

ENGINEER
DEWBERRY ENGINEERS INC.
600 PARSIPPANY ROAD
SUITE 301
PARSIPPANY, NJ 07054

CONTACT: BRYAN HUFF
PHONE #: (973) 576-0147

CONSTRUCTION
CROWN CASTLE
3 CORPORATE PARK DRIVE, SUITE 101
CLIFTON PARK, NY 12065

CONTACT: PATRICIA PELON
PHONE #: (518) 373-3507

CONSULTANT TEAM

SITE NAME:
SCOVILLE HILL / HARWINTON ROD

SITE NUMBER:
CT11367A

TOWER OWNER:
CROWN CASTLE
3 CORPORATE PARK DRIVE, SUITE 101
CLIFTON PARK, NY 12065

APPLICANT/DEVELOPER:
T-MOBILE NORTHEAST LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

COORDINATES:
LATITUDE: 41°-44'-12.4" N (NAD83)
LONGITUDE: 73°-05'-49.4" W (NADB3)
(PER CROWN CASTLE)

CONFIGURATION
704G

PROJECT SUMMARY

SITE ADDRESS:
123 CAMPVILLE HILL ROAD
HARWINTON, CT 06791
LITCHFIELD COUNTY

PROJECT DIRECTORY

- REMOVE AND REPLACE (3) EXISTING ANTENNAS WITH (6) NEW ANTENNAS.
- INSTALL (6) NEW LINES OF COAX.
- INSTALL (1) NEW BBU CABINET AT GRADE.
- REMOVE EXISTING iDEN ANTENNAS, MOUNTS AND COAX AT A CENTERLINE ELEVATION OF 139'-0"± A.G.L.

SCOPE OF WORK

THIS DOCUMENT WAS DEVELOPED TO REFLECT A SPECIFIC SITE AND ITS SITE CONDITIONS AND IS NOT TO BE USED FOR ANOTHER SITE OR WHEN OTHER CONDITIONS PERTAIN. REUSE OF THIS DOCUMENT IS AT THE SOLE RISK OF THE USER.

A.D.A. COMPLIANCE:
FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION.

SHT. NO.	DESCRIPTION
T-1	TITLE SHEET
G-1	GENERAL NOTES
C-1	COMPOUND PLAN & EQUIPMENT PLANS
C-2	ANTENNA LAYOUTS & ELEVATIONS
C-3	CONSTRUCTION DETAILS
E-1	GROUNDING NOTES & DETAILS

SHEET INDEX

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

CROWN CASTLE
3 CORPORATE PARK DRIVE, SUITE 101
CLIFTON PARK, NY 12065

CT11367A
SCOVILLE HILL / HARWINTON ROD

CONSTRUCTION DRAWINGS

0	09/21/16	ISSUED AS FINAL
A	09/14/16	ISSUED FOR REVIEW

Dewberry
Dewberry Engineers Inc.
600 PARSIPPANY ROAD
SUITE 301
PARSIPPANY, NJ 07054
PHONE: 973.739.9400
FAX: 973.739.9710

STATE OF CONNECTICUT
JIANG YU
No. 23222
LICENSED PROFESSIONAL ENGINEER
JIANG YU, P.E.
CONNECTICUT LICENSE NO. 0023222

DRAWN BY:	JC
REVIEWED BY:	BSH
CHECKED BY:	GHN
PROJECT NUMBER:	50066258
JOB NUMBER:	50078133
SITE ADDRESS:	

123 CAMPVILLE HILL RD.
HARWINTON, CT 06791
LITCHFIELD COUNTY

SHEET TITLE

TITLE SHEET

SHEET NUMBER

T-1

GENERAL NOTES:

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:
   PROJECT MANAGEMENT – CROWN CASTLE
   CONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
   OWNER – T–MOBILE
   OEM – ORIGINAL EQUIPMENT MANUFACTURER
2. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING CONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF PROJECT MANAGEMENT.
3. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK.
4. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
5. DRAWINGS PROVIDED HERE ARE NOT TO SCALE UNLESS OTHERWISE NOTED AND ARE INTENDED TO SHOW OUTLINE ONLY.
6. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
7. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
8. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY PROJECT MANAGEMENT.
9. CONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND T1 CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. CONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. CONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH PROJECT MANAGEMENT.
10. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE OWNER.
11. CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
12. CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.
13. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE PROJECT DESCRIBED HEREIN. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES AND FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.
14. CONTRACTOR SHALL NOTIFY DEWBERRY 48 HOURS IN ADVANCE OF POURING CONCRETE, OR BACKFILLING TRENCHES, SEALING ROOF AND WALL PENETRATIONS & POST DOWNS, FINISHING NEW WALLS OR FINAL ELECTRICAL CONNECTIONS FOR ENGINEER REVIEW.
15. CONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS MUST BE VERIFIED. CONTRACTOR SHALL NOTIFY PROJECT MANAGEMENT OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.
16. THE EXISTING CELL SITE IS IN FULL COMMERCIAL OPERATION. ANY CONSTRUCTION WORK BY CONTRACTOR SHALL NOT DISRUPT THE EXISTING NORMAL OPERATION. ANY WORK ON EXISTING EQUIPMENT MUST BE COORDINATED WITH CONTRACTOR. ALSO, WORK SHOULD BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.
17. SINCE THE CELL SITE IS ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUTDOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE ADVISED TO BE WORN TO ALERT OF ANY DANGEROUS EXPOSURE LEVELS.

SITE WORK GENERAL NOTES:

1. THE CONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION.
2. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES, AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY CONTRACTOR. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT BE LIMITED TO:
   A) FALL PROTECTION
   B) CONFINED SPACE
   C) ELECTRICAL SAFETY
   D) TRENCHING & EXCAVATION.
3. ALL SITE WORK SHALL BE AS INDICATED ON THE DRAWINGS AND PROJECT SPECIFICATIONS.
4. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES, TOP SOIL AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.
5. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF CONTRACTOR, OWNER AND/OR LOCAL UTILITIES.
6. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION.
7. THE CONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE T–MOBILE SPECIFICATION FOR SITE SIGNAGE.
8. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE TRANSMISSION EQUIPMENT AND TOWER AREAS.
9. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.
10. THE SUB GRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION, SEE SOIL COMPACTION NOTES.
11. THE AREAS OF THE OWNER'S PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE, AND STABILIZED TO PREVENT EROSION.
12. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL JURISDICTION'S GUIDELINES FOR EROSION AND SEDIMENT CONTROL.

ELECTRICAL INSTALLATION NOTES:

1. ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE LOCAL CODES.
2. CONTRACTOR SHALL MODIFY EXISTING CABLE TRAY SYSTEM AS REQUIRED TO SUPPORT RF AND TRANSPORT CABLING TO THE NEW BTS EQUIPMENT. CONTRACTOR SHALL SUBMIT MODIFICATIONS TO PROJECT MANAGEMENT FOR APPROVAL.
3. CONDUIT ROUTINGS ARE SCHEMATIC. CONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT BLOCKED.
4. WIRING, RACEWAY AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC AND TELCORDIA.
5. ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC AND TELCORDIA.
6. CABLES SHALL NOT BE ROUTED THROUGH LADDER–STYLE CABLE TRAY RUNGS.
7. EACH END OF EVERY POWER, POWER PHASE CONDUCTOR (I.E., HOTS), GROUNDING, AND T1 CONDUCTOR AND CABLE SHALL BE LABELED WITH COLOR–CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2 INCH PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC & OSHA, AND MATCH EXISTING INSTALLATION REQUIREMENTS.
8. ALL ELECTRICAL COMPONENTS SHALL BE CLEARLY LABELED WITH ENGRAVED LAMACOID PLASTIC LABELS. ALL EQUIPMENT SHALL BE LABELED WITH THEIR VOLTAGE RATING, PHASE CONFIGURATION, WIRE CONFIGURATION, POWER OR AMPACITY RATING, AND BRANCH CIRCUIT ID NUMBERS (I.E., PANELBOARD AND CIRCUIT ID'S).
9. PANELBOARDS (ID NUMBERS) AND INTERNAL CIRCUIT BREAKERS (CIRCUIT ID NUMBERS) SHALL BE CLEARLY LABELED WITH ENGRAVED LAMACOID PLASTIC LABELS.
10. ALL TIE WRAPS SHALL BE CUT FLUSH WITH APPROVED CUTTING TOOL TO REMOVE SHARP EDGES.
11. POWER, CONTROL, AND EQUIPMENT GROUND WIRING IN TUBING OR CONDUIT SHALL BE SINGLE CONDUCTOR (SIZE 14 AWG OR LARGER), 600V, OIL RESISTANT THHN OR THWN–2, CLASS B STRANDED COPPER CABLE RATED FOR 90 °C (WET AND DRY) OPERATION; LISTED OR LABELED FOR THE LOCATION AND RACEWAY SYSTEM USED, UNLESS OTHERWISE SPECIFIED.
12. POWER PHASE CONDUCTORS (I.E., HOTS) SHALL BE LABELED WITH COLOR–CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2 INCH PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL.) PHASE CONDUCTOR COLOR CODES SHALL CONFORM WITH THE NEC & OSHA AND MATCH EXISTING INSTALLATION REQUIREMENTS.
13. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED INDOORS SHALL BE SINGLE CONDUCTOR (SIZE 6 AWG OR LARGER), 600V, OIL RESISTANT THHN OR THWN–2 GREEN INSULATION, CLASS B STRANDED COPPER CABLE RATED FOR 90°C (WET AND DRY) OPERATION; LISTED OR LABELED FOR THE LOCATION AND RACEWAY SYSTEM USED, UNLESS OTHERWISE SPECIFIED.
14. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED OUTDOORS, OR BELOW GRADE, SHALL BE SINGLE CONDUCTOR #2 AWG SOLID TINNED COPPER CABLE, UNLESS OTHERWISE SPECIFIED.
15. POWER AND CONTROL WIRING, NOT IN TUBING OR CONDUIT, SHALL BE MULTI–CONDUCTOR, TYPE TC CABLE (SIZE 14 AWG OR LARGER), 600V, OIL RESISTANT THHN OR THWN–2, CLASS B STRANDED COPPER CABLE RATED FOR 90°C (WET AND DRY) OPERATION; WITH OUTER JACKET; LISTED OR LABELED FOR THE LOCATION USED, UNLESS OTHERWISE SPECIFIED.
16. ALL POWER AND POWER GROUNDING CONNECTIONS SHALL BE CRIMP–STYLE, COMPRESSION WIRE LUGS AND WIRENUTS BY THOMAS AND BETTS (OR EQUAL). LUGS AND WIRENUTS SHALL BE RATED FOR OPERATION AT NO LESS THAN 75°C (90°C IF AVAILABLE).
17. RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE, AND NEC.
18. NEW RACEWAY OR CABLE TRAY WILL MATCH THE EXISTING INSTALLATION WHERE POSSIBLE.
19. ELECTRICAL METALLIC TUBING (EMT) OR RIGID NONMETALLIC CONDUIT (I.E., RIGID PVC SCHEDULE 40, OR RIGID PVC SCHEDULE 80 FOR LOCATIONS SUBJECT TO PHYSICAL DAMAGE) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.
20. ELECTRICAL METALLIC TUBING (EMT), ELECTRICAL NONMETALLIC TUBING (ENT), OR RIGID NONMETALLIC CONDUIT (RIGID PVC, SCHEDULE 40) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.
21. GALVANIZED STEEL INTERMEDIATE METALLIC CONDUIT (IMC) SHALL BE USED FOR OUTDOOR LOCATIONS ABOVE GRADE.
22. RIGID NONMETALLIC CONDUIT (I.E., RIGID PVC SCHEDULE 40 OR RIGID PVC SCHEDULE 80) SHALL BE USED UNDERGROUND; DIRECT BURIED, IN AREAS OF OCCASIONAL LIGHT VEHICLE TRAFFIC OR ENCASED IN REINFORCED CONCRETE IN AREAS OF HEAVY VEHICLE TRAFFIC.
23. LIQUID–TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID–TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.
24. CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION–TYPE AND APPROVED FOR THE LOCATION USED. SETSCREW FITTINGS ARE NOT ACCEPTABLE.
25. CABINETS, BOXES, AND WIREWAYS SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE, AND NEC.
26. CABINETS, BOXES, AND WIREWAYS TO MATCH THE EXISTING INSTALLATION WHERE POSSIBLE.
27. WIREWAYS SHALL BE EPOXY–COATED (GRAY) AND INCLUDE A HINGED COVER, DESIGNED TO SWING OPEN DOWNWARD; SHALL BE PANDUIT TYPE E (OR EQUAL); AND RATED NEMA 1 (OR BETTER) INDOORS, OR NEMA 3R (OR BETTER) OUTDOORS.
28. EQUIPMENT CABINETS, TERMINAL BOXES, JUNCTION BOXES, AND PULL BOXES SHALL BE GALVANIZED OR EPOXY–COATED SHEET STEEL, SHALL MEET OR EXCEED UL 50, AND RATED NEMA 1 (OR BETTER) INDOORS, OR NEMA 3R (OR BETTER) OUTDOORS.
29. METAL RECEPTACLE, SWITCH, AND DEVICE BOXES SHALL BE GALVANIZED, EPOXY–COATED, OR NON–CORRODING; SHALL MEET OR EXCEED UL 514A AND NEMA OS 1; AND RATED NEMA 1 (OR BETTER) INDOORS, OR WEATHER PROTECTED (WP OR BETTER) OUTDOORS.
30. NONMETALLIC RECEPTACLE, SWITCH, AND DEVICE BOXES SHALL MEET OR EXCEED NEMA OS 2; AND RATED NEMA 1 (OR BETTER) INDOORS, OR WEATHER PROTECTED (WP OR BETTER) OUTDOORS.
31. THE CONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM PROJECT MANAGEMENT BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.
32. THE CONTRACTOR SHALL PROVIDE NECESSARY TAGGING ON THE BREAKERS, CABLES AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD AGAINST LIFE AND PROPERTY.

CONCRETE AND REINFORCING STEEL NOTES:

1. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 301, ACI 318, ACI 336, ASTM A184, ASTM A185 AND THE DESIGN AND CONSTRUCTION SPECIFICATION FOR CAST–IN–PLACE CONCRETE.
2. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS, UNLESS NOTED OTHERWISE. A HIGHER STRENGTH (4000 PSI) MAY BE USED. ALL CONCRETING WORK SHALL BE DONE IN ACCORDANCE WITH ACI 318 CODE REQUIREMENTS.
3. REINFORCING STEEL SHALL CONFORM TO ASTM A 615, GRADE 60, DEFORMED UNLESS NOTED OTHERWISE. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A 185 WELDED STEEL WIRE FABRIC UNLESS NOTED OTHERWISE (UNO). SPLICES SHALL BE CLASS "B" AND ALL HOOKS SHALL BE STANDARD, UNO.
4. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCING STEEL UNLESS SHOWN OTHERWISE ON DRAWINGS:

   CONCRETE CAST AGAINST EARTH.....3 IN.
   CONCRETE EXPOSED TO EARTH OR WEATHER:
   #6 AND LARGER .....2 IN.
   #5 AND SMALLER & WWF.....1 1/2 IN.
   CONCRETE NOT EXPOSED TO EARTH OR WEATHER OR NOT CAST AGAINST THE GROUND:
   SLAB AND WALL .....3/4 IN.
   BEAMS AND COLUMNS.....1 1/2 IN.

5. A CHAMFER 3/4" SHALL BE PROVIDED AT ALL EXPOSED EDGES OF CONCRETE, UNO, IN ACCORDANCE WITH ACI 301 SECTION 4.2.4.
6. INSTALLATION OF CONCRETE EXPANSION/WEDGE ANCHOR, SHALL BE PER MANUFACTURER'S WRITTEN RECOMMENDED PROCEDURE. THE ANCHOR BOLT, DOWEL OR ROD SHALL CONFORM TO MANUFACTURER'S RECOMMENDATION FOR EMBEDMENT DEPTH OR AS SHOWN ON THE DRAWINGS. NO REBAR SHALL BE CUT WITHOUT PRIOR CONTRACTOR APPROVAL WHEN DRILLING HOLES IN CONCRETE. SPECIAL INSPECTIONS, REQUIRED BY GOVERNING CODES, SHALL BE PERFORMED IN ORDER TO MAINTAIN MANUFACTURER'S MAXIMUM ALLOWABLE LOADS. ALL EXPANSION/WEDGE ANCHORS SHALL BE STAINLESS STEEL OR HOT DIPPED GALVANIZED. EXPANSION BOLTS SHALL BE PROVIDED BY RAMSET/REDHEAD OR APPROVED EQUAL.
7. CONCRETE CYLINDER TEST IS NOT REQUIRED FOR SLAB ON GRADE WHEN CONCRETE IS LESS THAN 50 CUBIC YARDS (IBC 1905.6.2.3) IN THAT EVENT THE FOLLOWING RECORDS SHALL BE PROVIDED BY THE CONCRETE SUPPLIER;
   (A) RESULTS OF CONCRETE CYLINDER TESTS PERFORMED AT THE SUPPLIER'S PLANT,
   (B) CERTIFICATION OF MINIMUM COMPRESSIVE STRENGTH FOR THE CONCRETE GRADE SUPPLIED.
   FOR GREATER THAN 50 CUBIC YARDS THE GC SHALL PERFORM THE CONCRETE CYLINDER TEST.
8. AS AN ALTERNATIVE TO ITEM 7, TEST CYLINDERS SHALL BE TAKEN INITIALLY AND THEREAFTER FOR EVERY 50 YARDS OF CONCRETE FROM EACH DIFFERENT BATCH PLANT.
9. EQUIPMENT SHALL NOT BE PLACED ON NEW PADS FOR SEVEN DAYS AFTER PAD IS POURED, UNLESS IT IS VERIFIED BY CYLINDER TESTS THAT COMPRESSIVE STRENGTH HAS BEEN ATTAINED.

STRUCTURAL STEEL NOTES:

1. ALL STEEL WORK SHALL BE PAINTED OR GALVANIZED IN ACCORDANCE WITH THE DRAWINGS UNLESS NOTED OTHERWISE. STRUCTURAL STEEL SHALL BE ASTM–A–36 UNLESS OTHERWISE NOTED ON THE SITE SPECIFIC DRAWINGS. STEEL DESIGN, INSTALLATION AND BOLTING SHALL BE PERFORMED IN ACCORDANCE WITH THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) "MANUAL OF STEEL CONSTRUCTION".
2. ALL WELDING SHALL BE PERFORMED USING E70XX ELECTRODES AND WELDING SHALL CONFORM TO AISC. WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLE J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION". PAINTED SURFACES SHALL BE TOUCHED UP.
3. BOLTED CONNECTIONS SHALL BE ASTM A325 BEARING TYPE (3/4"Ø) CONNECTIONS AND SHALL HAVE MINIMUM OF TWO BOLTS UNLESS NOTED OTHERWISE.
4. NON–STRUCTURAL CONNECTIONS FOR STEEL GRATING MAY USE 5/8" DIA. ASTM A 307 BOLTS UNLESS NOTED OTHERWISE.
5. INSTALLATION OF CONCRETE EXPANSION/WEDGE ANCHOR, SHALL BE PER MANUFACTURER'S WRITTEN RECOMMENDED PROCEDURE. THE ANCHOR BOLT, DOWEL OR ROD SHALL CONFORM TO MANUFACTURER'S RECOMMENDATION FOR EMBEDMENT DEPTH OR AS SHOWN ON THE DRAWINGS. NO REBAR SHALL BE CUT WITHOUT PRIOR CONTRACTOR APPROVAL WHEN DRILLING HOLES IN CONCRETE. SPECIAL INSPECTIONS, REQUIRED BY GOVERNING CODES, SHALL BE PERFORMED IN ORDER TO MAINTAIN MANUFACTURER'S MAXIMUM ALLOWABLE LOADS. ALL EXPANSION/WEDGE ANCHORS SHALL BE STAINLESS STEEL OR HOT DIPPED GALVANIZED. EXPANSION BOLTS SHALL BE PROVIDED BY RAMSET/REDHEAD OR APPROVED EQUAL.
6. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR ENGINEER REVIEW & APPROVAL ON PROJECTS REQUIRING STRUCTURAL STEEL.
7. ALL STRUCTURAL STEEL WORK SHALL BE DONE IN ACCORDANCE WITH AISC SPECIFICATIONS.

CONSTRUCTION NOTES:

1. FIELD VERIFICATION:
   CONTRACTOR SHALL FIELD VERIFY SCOPE OF WORK, T–MOBILE ANTENNA PLATFORM LOCATION AND ANTENNAS TO BE REPLACED.
2. COORDINATION OF WORK:
   CONTRACTOR SHALL COORDINATE RF WORK AND PROCEDURES WITH PROJECT MANAGEMENT.
3. CABLE LADDER RACK:
   CONTRACTOR SHALL FURNISH AND INSTALL CABLE LADDER RACK, CABLE TRAY, AND CONDUIT AS REQUIRED TO SUPPORT CABLES TO THE NEW BTS LOCATION.
4. GROUNDING OF ALL EQUIPMENT AND ANTENNAS IS NOT CONSIDERED PART OF THE SCOPE OF THIS PROJECT AND IS THE RESPONSIBILITY OF THE OWNER AND CONTRACTOR AT THE TIME OF CONSTRUCTION. ALL EQUIPMENT AND ANTENNAS TO BE INSTALLED AND GROUNDED IN ACCORDANCE WITH GOVERNING BUILDING CODE, MANUFACTURER RECOMMENDATIONS AND OWNER SPECIFICATIONS.

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CLIFTON PARK, NY 12065

CT11367A
SCOVILLE HILL / HARWINTON ROD

CONSTRUCTION DRAWINGS		
0	09/21/16	ISSUED AS FINAL
A	09/14/16	ISSUED FOR REVIEW

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STATE OF CONNECTICUT
JIANG YU
23222
LICENSED
PROFESSIONAL ENGINEER

CONNECTICUT LICENSE NO. 0023222

DRAWN BY:	JC
REVIEWED BY:	BSH
CHECKED BY:	GHN
PROJECT NUMBER:	50066258
JOB NUMBER:	50078133
SITE ADDRESS:	

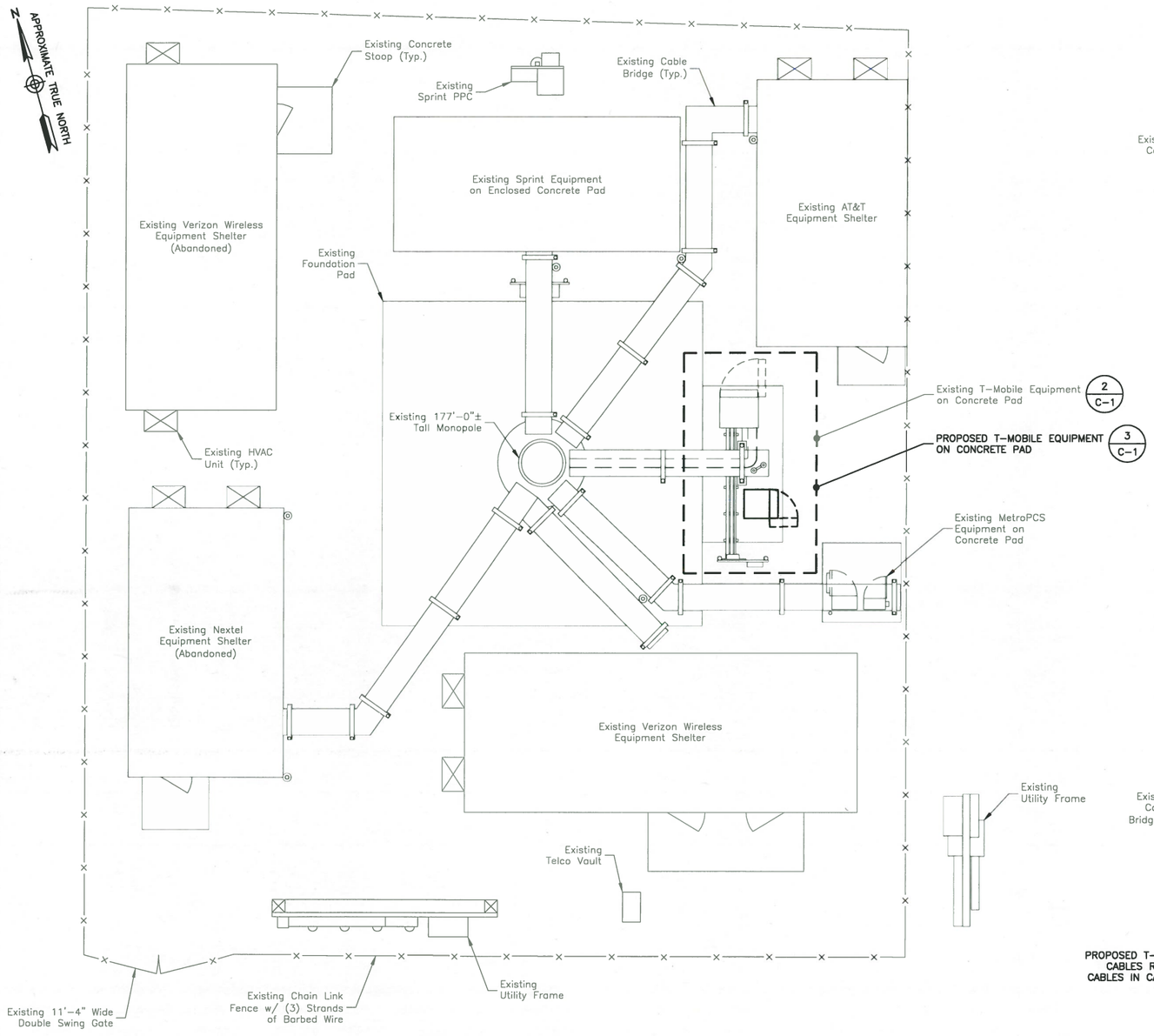
123 CAMPVILLE HILL RD.
HARWINTON, CT 06791
LITCHFIELD COUNTY

SHEET TITLE

GENERAL NOTES

SHEET NUMBER

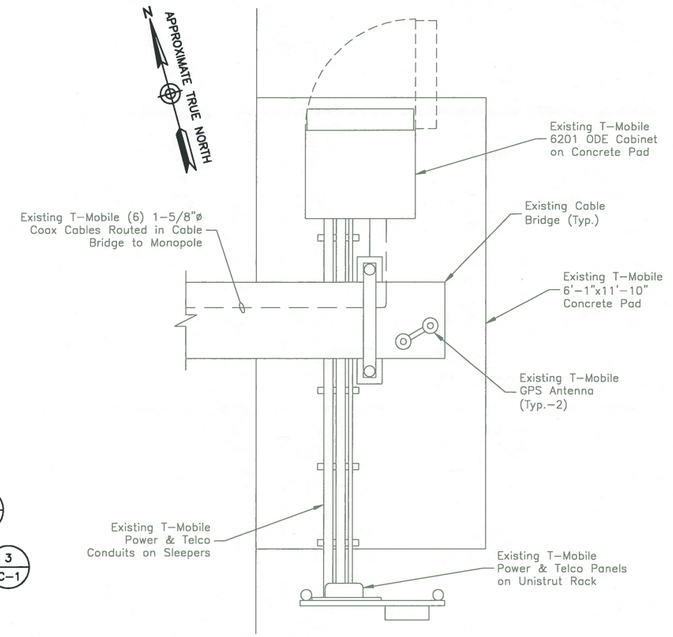
G–1



COMPOUND PLAN 1

SCALE: 1"=10' FOR 11"x17"
1"=5' FOR 22"x34"

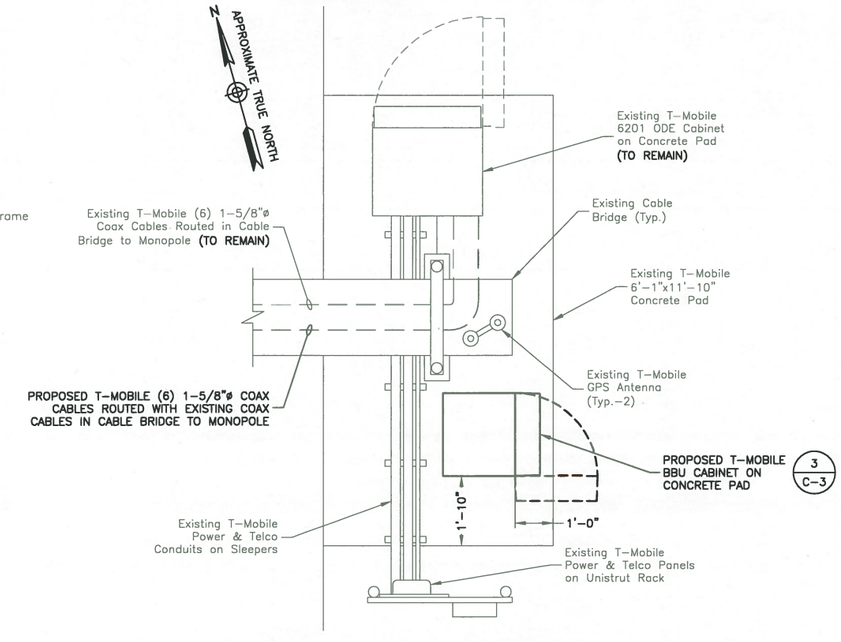
0' 5' 10'



EXISTING EQUIPMENT PLAN 2

SCALE: 1/4"=1' FOR 11"x17"
1/2"=1' FOR 22"x34"

0' 1' 2' 4'



PROPOSED EQUIPMENT PLAN 3

SCALE: 1/4"=1' FOR 11"x17"
1/2"=1' FOR 22"x34"

0' 1' 2' 4'

NOTES:

1. NORTH ARROW SHOWN AS APPROXIMATE.
2. NOT ALL INFORMATION IS SHOWN FOR CLARITY.
3. ALL PROPOSED EQUIPMENT, INCLUDING ANTENNAS, COAX, TMA'S, ETC., SHALL BE MOUNTED IN ACCORDANCE WITH THE TOWER STRUCTURAL ANALYSIS BY B+T GROUP DATED SEPTEMBER 2, 2016.

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CT11367A
SCOVILLE HILL / HARWINTON ROD

CONSTRUCTION DRAWINGS

0	09/21/16	ISSUED AS FINAL
A	09/14/16	ISSUED FOR REVIEW

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STATE OF CONNECTICUT
JIANG YU
23222
LICENSED PROFESSIONAL ENGINEER

JIANG YU, P.E.
CONNECTICUT LICENSE NO. 0023222

DRAWN BY:	JC
REVIEWED BY:	BSH
CHECKED BY:	GHN
PROJECT NUMBER:	50066258
JOB NUMBER:	50078133
SITE ADDRESS:	

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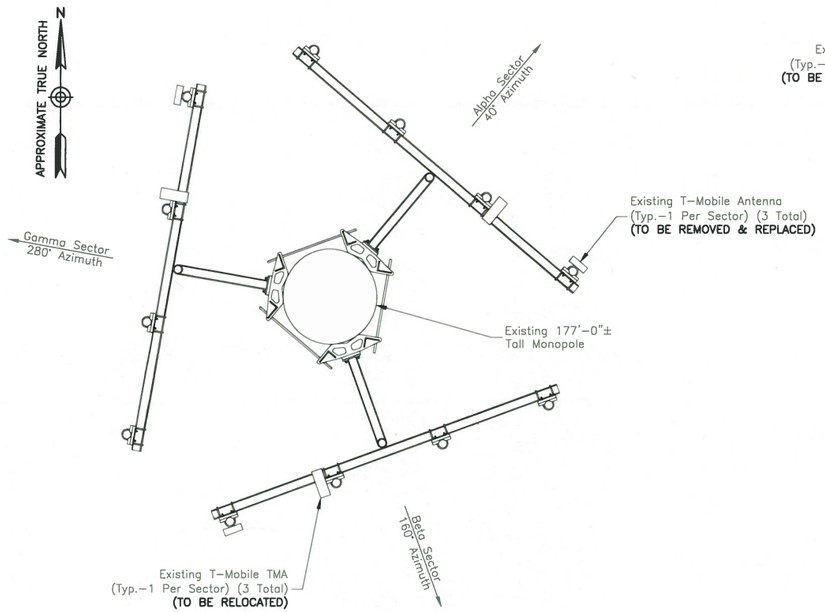
LITCHFIELD COUNTY

SHEET TITLE

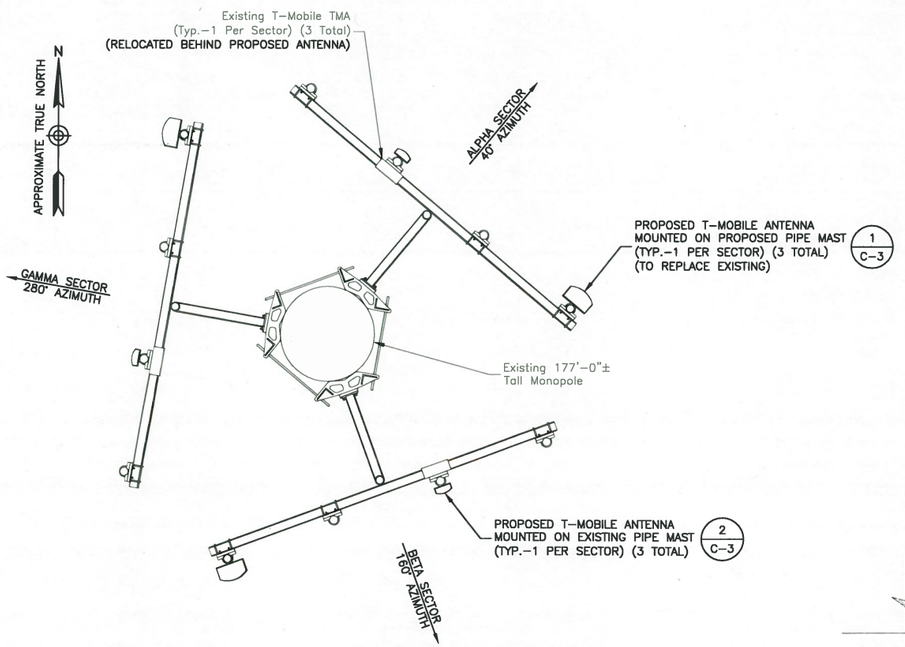
COMPOUND PLAN & EQUIPMENT PLANS

SHEET NUMBER

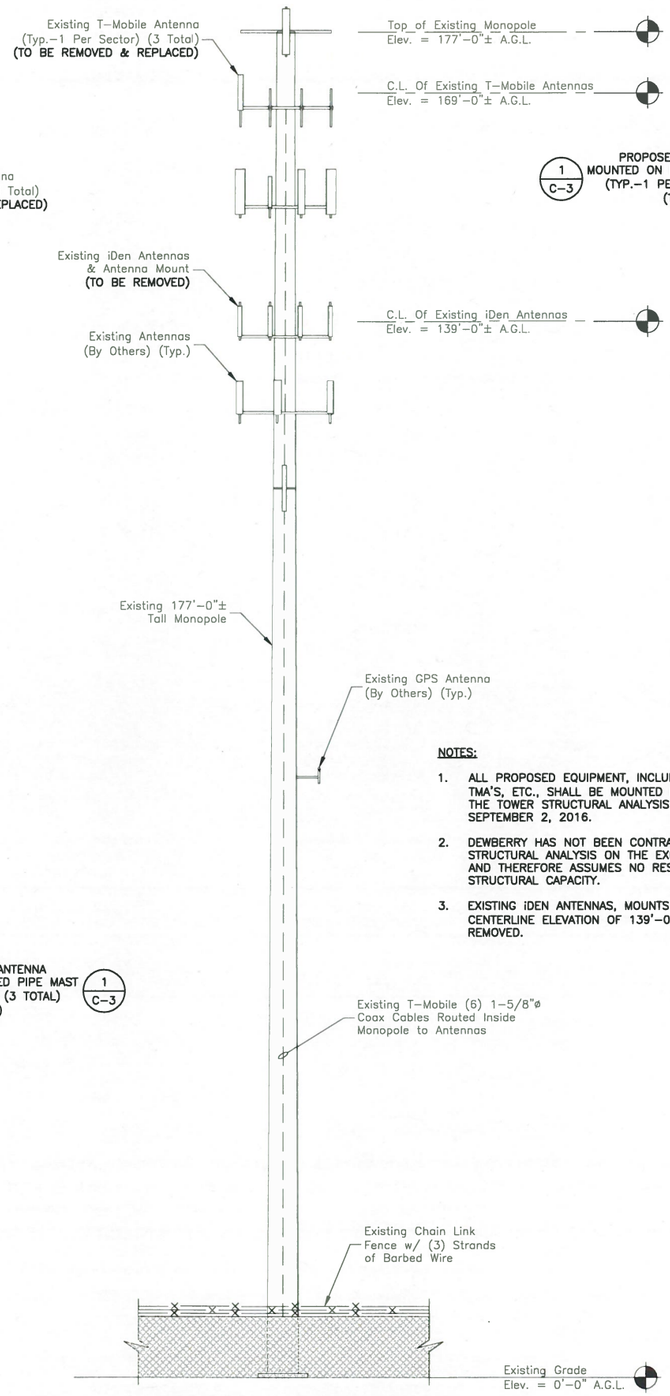
C-1



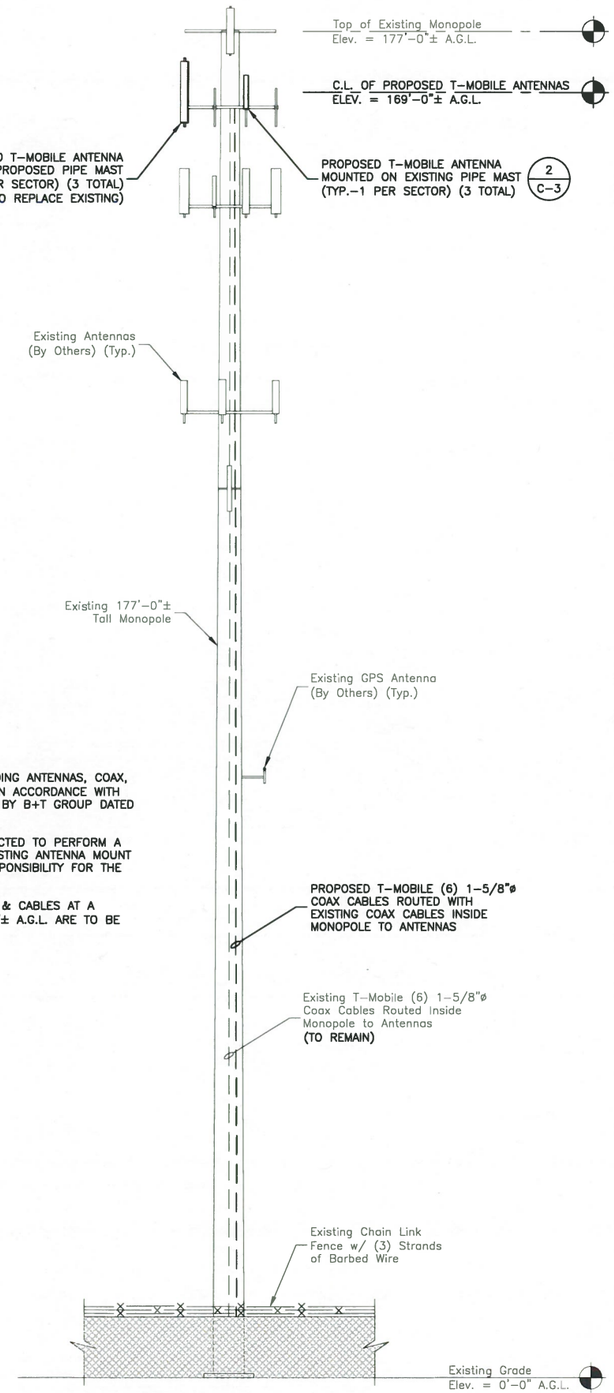
EXISTING ANTENNA LAYOUT (1)
SCALE: N.T.S.



PROPOSED ANTENNA LAYOUT (2)
SCALE: N.T.S.



EXISTING ELEVATION (3)
SCALE: 1"=20' FOR 11"x17"
1"=10' FOR 22"x34"
0' 10' 20'



PROPOSED ELEVATION (4)
SCALE: 1"=20' FOR 11"x17"
1"=10' FOR 22"x34"
0' 10' 20'

NOTES:

1. ALL PROPOSED EQUIPMENT, INCLUDING ANTENNAS, COAX, TMA'S, ETC., SHALL BE MOUNTED IN ACCORDANCE WITH THE TOWER STRUCTURAL ANALYSIS BY B+T GROUP DATED SEPTEMBER 2, 2016.
2. DEWBERRY HAS NOT BEEN CONTRACTED TO PERFORM A STRUCTURAL ANALYSIS ON THE EXISTING ANTENNA MOUNT AND THEREFORE ASSUMES NO RESPONSIBILITY FOR THE STRUCTURAL CAPACITY.
3. EXISTING iDEN ANTENNAS, MOUNTS & CABLES AT A CENTERLINE ELEVATION OF 139'-0"± A.G.L. ARE TO BE REMOVED.

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STATE OF CONNECTICUT
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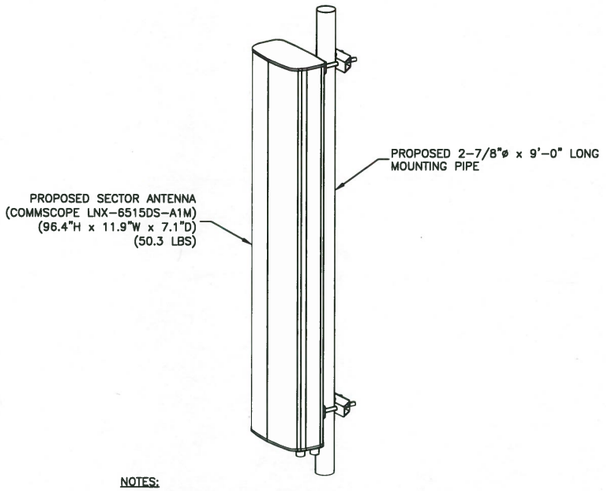
123 CAMPVILLE HILL RD.
HARWINTON, CT 06791
LITCHFIELD COUNTY

SHEET TITLE

ANTENNA LAYOUTS & ELEVATIONS

SHEET NUMBER

C-2

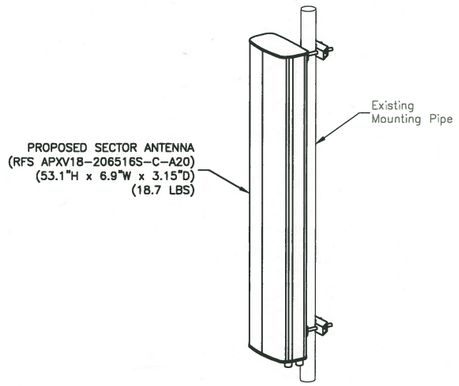


NOTES:

1. MOUNT ANTENNAS PER MANUFACTURER'S RECOMMENDATIONS.
2. GROUND ANTENNAS AND MOUNTS PER MANUFACTURER'S RECOMMENDATIONS AND T-MOBILE STANDARDS.
3. CONFIRM REQUIRED ANTENNAS WITH THE LATEST RFDS.

ISOMETRIC ANTENNA DETAIL 1

SCALE: N.T.S.

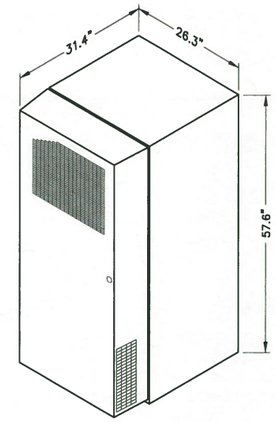


NOTES:

1. MOUNT ANTENNAS PER MANUFACTURER'S RECOMMENDATIONS.
2. GROUND ANTENNAS AND MOUNTS PER MANUFACTURER'S RECOMMENDATIONS AND T-MOBILE STANDARDS.
3. CONFIRM REQUIRED ANTENNAS WITH THE LATEST RFDS.

ISOMETRIC ANTENNA DETAIL 2

SCALE: N.T.S.



ERICSSON BBS 6101 BBU CABINET

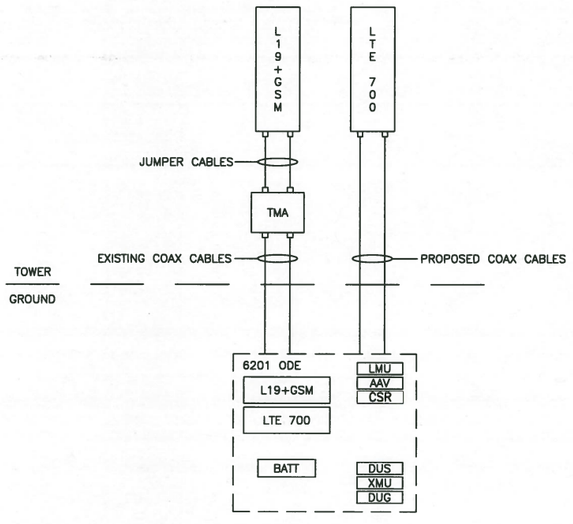
MATERIAL:	ANCHOR:
CONCRETE	3/8"ø HILTI KWIK BOLT 3 W/2-1/2" MIN. EMBED.
STRUCTURAL STEEL	1/2"ø STRUCTURAL BOLTS

NOTE:

1. CONTRACTOR SHALL ANCHOR CABINET IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.

BBU CABINET DETAIL 3

SCALE: N.T.S.



SITE CONFIGURATION 704G 4

SCALE: N.T.S.

DESIGN CONFIGURATION

	ANTENNAS		COAX		COAX LENGTH	TMA	RRU
	EXISTING	PROPOSED	EXISTING	PROPOSED		EXISTING	EXISTING/PROPOSED
ALPHA	–	RFS APXV18-206516S-C-A20	(2) 1-5/8"ø	(2) 1-5/8"ø	219'-0"	ERICSSON KRY 112 75/1	–
	EMS RR90-17-02DP	COMMSCOPE LNX-6515DS-A1M				–	–
BETA	–	RFS APXV18-206516S-C-A20	(2) 1-5/8"ø	(2) 1-5/8"ø	219'-0"	ERICSSON KRY 112 75/1	–
	EMS RR90-17-02DP	COMMSCOPE LNX-6515DS-A1M				–	–
GAMMA	–	RFS APXV18-206516S-C-A20	(2) 1-5/8"ø	(2) 1-5/8"ø	219'-0"	ERICSSON KRY 112 75/1	–
	EMS RR90-17-02DP	COMMSCOPE LNX-6515DS-A1M				–	–

T-Mobile

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

CROWN CASTLE

CROWN CASTLE
3 CORPORATE PARK DRIVE, SUITE 101
CLIFTON PARK, NY 12065

CT11367A
SCOVILLE HILL / HARWINTON ROD

CONSTRUCTION DRAWINGS

0	09/21/16	ISSUED AS FINAL
A	09/14/16	ISSUED FOR REVIEW

Dewberry

Dewberry Engineers Inc.
600 PARSIPPANY ROAD
SUITE 301
PARSIPPANY, NJ 07054
PHONE: 973.739.9400
FAX: 973.739.9710

STATE OF CONNECTICUT
JIANG YU
NO. 23222
LICENSED
PROFESSIONAL ENGINEER

JIANG YU, P.E.
CONNECTICUT LICENSE NO. 0023222

DRAWN BY:	JC
REVIEWED BY:	BSH
CHECKED BY:	GHN
PROJECT NUMBER:	50066258
JOB NUMBER:	50078133
SITE ADDRESS:	

123 CAMPVILLE HILL RD.
HARWINTON, CT 06791
LITCHFIELD COUNTY

SHEET TITLE

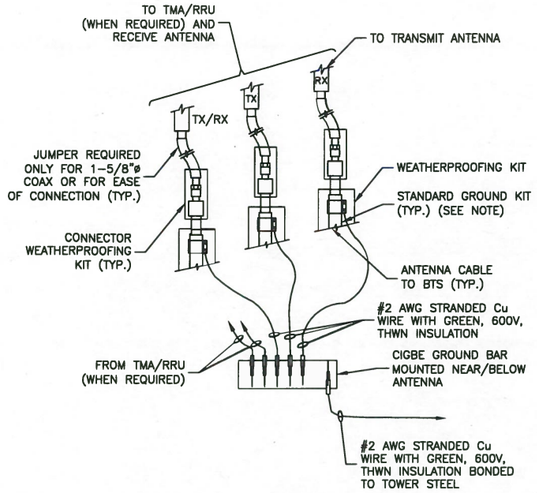
CONSTRUCTION DETAILS

SHEET NUMBER

C-3

GROUNDING NOTES:

1. THE CONTRACTOR SHALL REVIEW AND INSPECT THE EXISTING FACILITY GROUNDING SYSTEM AND LIGHTNING PROTECTION SYSTEM (AS DESIGNED AND INSTALLED) FOR STRICT COMPLIANCE WITH THE NEC (AS ADOPTED BY THE AHJ). THE SITE-SPECIFIC (UL, LPI, OR NFPA) LIGHTING PROTECTION CODE, AND GENERAL COMPLIANCE WITH TELCORDIA AND TIA GROUNDING STANDARDS. THE CONTRACTOR SHALL REPORT ANY VIOLATIONS OR ADVERSE FINDINGS TO THE ENGINEER FOR RESOLUTION.
2. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION, AND AC POWER GES'S) SHALL BE BONDED TOGETHER, AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS. ALL AVAILABLE GROUNDING ELECTRODES SHALL BE CONNECTED TOGETHER IN ACCORDANCE WITH THE NEC.
3. THE CONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR GROUND ELECTRODE SYSTEMS. USE OF OTHER METHODS MUST BE PRE-APPROVED BY THE ENGINEER IN WRITING.
4. THE CONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS ON TOWER SITES AND 10 OHMS OR LESS ON ROOFTOP SITES. WHEN ADDING ELECTRODES, CONTRACTOR SHALL MAINTAIN A MINIMUM DISTANCE BETWEEN THE ADDED ELECTRODE AND ANY OTHER EXISTING ELECTRODE EQUAL TO THE BURIED LENGTH OF THE ROD. IDEALLY, CONTRACTOR SHALL STRIVE TO KEEP THE SEPARATION DISTANCE EQUAL TO TWICE THE BURIED LENGTH OF THE RODS.
5. THE CONTRACTOR IS RESPONSIBLE FOR PROPERLY SEQUENCING GROUNDING AND UNDERGROUND CONDUIT INSTALLATION AS TO PREVENT ANY LOSS OF CONTINUITY IN THE GROUNDING SYSTEM OR DAMAGE TO THE CONDUIT.
6. METAL CONDUIT AND TRAY SHALL BE GROUNDED AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH 6 AWG COPPER WIRE AND UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.
7. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO TRANSMISSION EQUIPMENT.
8. CONNECTIONS TO THE GROUND BUS SHALL NOT BE DOUBLED UP OR STACKED. BACK-TO-BACK CONNECTIONS ON OPPOSITE SIDES OF THE GROUND BUS ARE PERMITTED.
9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.
10. USE OF 90° BENDS IN THE PROTECTION GROUNDING CONDUCTORS SHALL BE AVOIDED WHEN 45° BENDS CAN BE ADEQUATELY SUPPORTED. IN ALL CASES, BENDS SHALL BE MADE WITH A MINIMUM BEND RADIUS OF 8 INCHES.
11. EACH INTERIOR TRANSMISSION CABINET FRAME/PLINTH SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH 6 AWG STRANDED, GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRE UNLESS NOTED OTHERWISE' IN THE DETAILS. EACH OUTDOOR CABINET FRAME/PLINTH SHALL BE DIRECTLY CONNECTED TO THE BURIED GROUND RING WITH 2 AWG SOLID TIN-PLATED COPPER WIRE UNLESS NOTED OTHERWISE IN THE DETAILS.
12. ALL EXTERIOR GROUND CONDUCTORS BETWEEN EQUIPMENT/GROUND BARS AND THE GROUND RING, SHALL BE 2 AWG SOLID TIN-PLATED COPPER UNLESS OTHERWISE INDICATED.
13. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE. CONNECTIONS TO ABOVE GRADE UNITS SHALL BE MADE WITH EXOTHERMIC WELDS WHERE PRACTICAL OR WITH 2 HOLE MECHANICAL TYPE BRASS CONNECTORS WITH STAINLESS STEEL HARDWARE, INCLUDING SET SCREWS. HIGH PRESSURE CRIMP CONNECTORS MAY ONLY BE USED WITH WRITTEN PERMISSION FROM T-MOBILE MARKET REPRESENTATIVE.
14. EXOTHERMIC WELDS SHALL BE PERMITTED ON TOWERS ONLY WITH THE EXPRESS APPROVAL OF THE TOWER MANUFACTURER OR THE CONTRACTORS STRUCTURAL ENGINEER.
15. ALL WIRE TO WIRE GROUND CONNECTIONS TO THE INTERIOR GROUND RING SHALL BE FORMED USING HIGH PRESS CRIMPS OR SPLIT BOLT CONNECTORS WHERE INDICATED IN THE DETAILS.
16. ON ROOFTOP SITES WHERE EXOTHERMIC WELDS ARE A FIRE HAZARD COPPER COMPRESSION CAP CONNECTORS MAY BE USED FOR WIRE TO WIRE CONNECTORS. 2 HOLE MECHANICAL TYPE BRASS CONNECTORS WITH STAINLESS STEEL HARDWARE, INCLUDING SET SCREWS SHALL BE USED FOR CONNECTION TO ALL ROOFTOP TRANSMISSION EQUIPMENT AND STRUCTURAL STEEL.
17. COAX BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED TO THE BRIDGE AND THE TOWER GROUND BAR USING TWO-HOLE MECHANICAL TYPE BRASS CONNECTORS AND STAINLESS STEEL HARDWARE.
18. APPROVED ANTIOXIDANT COATINGS (I.E., CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.
19. ALL EXTERIOR GROUND CONNECTIONS SHALL BE COATED WITH A CORROSION RESISTANT MATERIAL.
20. MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.
21. BOND ALL METALLIC OBJECTS WITHIN 6 FT OF THE BURIED GROUND RING WITH 2 AWG SOLID TIN-PLATED COPPER GROUND CONDUCTOR. DURING EXCAVATION FOR NEW GROUND CONDUCTORS, IF EXISTING GROUND CONDUCTORS ARE ENCOUNTERED, BOND EXISTING GROUND CONDUCTORS TO NEW CONDUCTORS.
22. GROUND CONDUCTORS USED IN THE FACILITY GROUND AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS. WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON-METALLIC MATERIAL SUCH AS PVC PLASTIC CONDUIT SHALL BE USED. WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (E.G., NON-METALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT WITH LISTED BONDING FITTINGS.

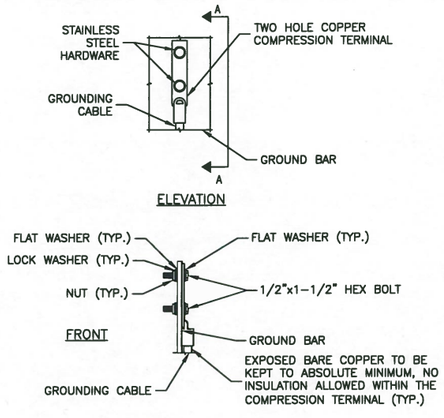


NOTE:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE.

CONNECTION OF GROUND WIRES TO GROUNDING BAR (CIGBE) — 1

SCALE: N.T.S.

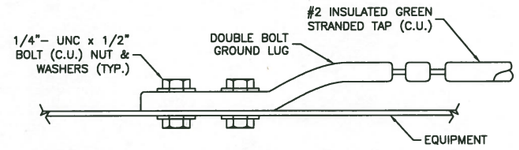


NOTES:

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

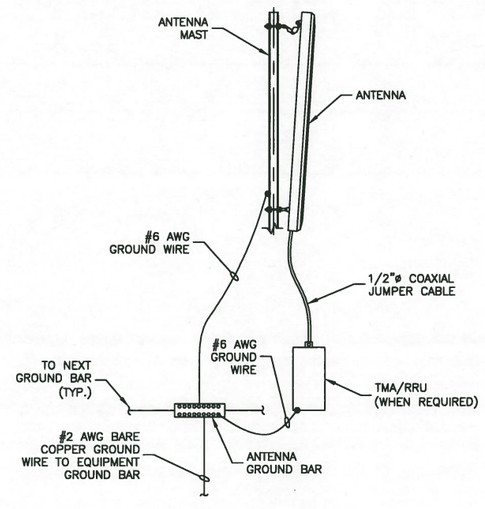
TYPICAL GROUND BAR MECHANICAL CONNECTION DETAIL — 2

SCALE: N.T.S.



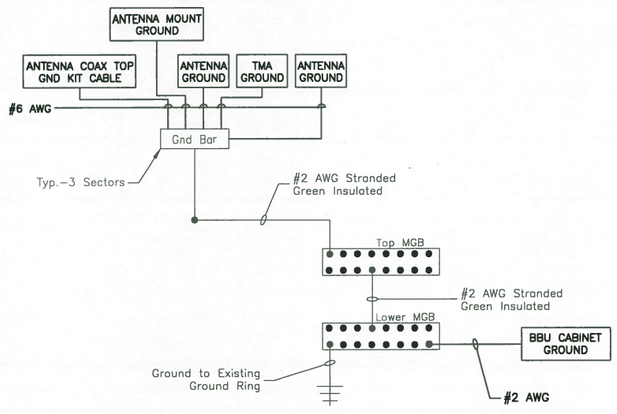
CONNECTION TO EQUIPMENT DETAIL — 3

SCALE: N.T.S.



TYPICAL ANTENNA GROUNDING DETAIL — 4

SCALE: N.T.S



NOTES:

1. BOND ANTENNA GROUNDING KIT CABLE TO TOP CIGBE
2. BOND ANTENNA GROUNDING KIT CABLE TO BOTTOM CIGBE.
3. SCHEMATIC GROUNDING DIAGRAM IS TYPICAL FOR EACH SECTOR.
4. VERIFY EXISTING GROUND SYSTEM IS INSTALLED PER T-MOBILE STANDARDS.

SCHEMATIC GROUNDING DIAGRAM — 5

SCALE: N.T.S.

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CT11367A
SCOVILLE HILL / HARWINTON ROD

CONSTRUCTION DRAWINGS

0	09/21/16	ISSUED AS FINAL
A	09/14/16	ISSUED FOR REVIEW

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STATE OF CONNECTICUT
JIANG YU
No. 23222
LICENSED PROFESSIONAL ENGINEER

CONNECTICUT LICENSE NO. 0023222

DRAWN BY:	JC
REVIEWED BY:	BSH
CHECKED BY:	GHN
PROJECT NUMBER:	50066258
JOB NUMBER:	50078133
SITE ADDRESS:	

123 CAMPVILLE HILL RD.
HARWINTON, CT 06791
LITCHFIELD COUNTY

SHEET TITLE

GROUNDING NOTES & DETAILS

SHEET NUMBER

E-1

September 2, 2016

Charles McGuirt
Crown Castle
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Charlotte, NC 28277
(704) 405- 6607

B+T Group
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Tulsa, OK 74119
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Subject:	**Structural Analysis Report**	
Carrier Designation:	***T-Mobile* Co-Locate**	
	Carrier Site Number:	CT11367A
	Carrier Site Name:	LITCHFIELD1/RT 8
Crown Castle Designation:	**Crown Castle BU Number:**	876376
	Crown Castle Site Name:	Scoville Hill / Harwinton Rod
	Crown Castle JDE Job Number:	392502
	Crown Castle Work Order Number:	1290345
	Crown Castle Application Number:	358301 Rev. 0
Engineering Firm Designation:	**B+T Group Project Number:**	83609.005.01
Site Data:	**123 Campville Hill Rd., Harwinton, Litchfield County, CT** **Latitude *41° 44' 12.4"*, Longitude *-73° 5' 49.4"*** **177 Foot - Monopole Tower**	

Dear Charles McGuirt,

B+T Group is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 941058, in accordance with application 358301, revision 0.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC5: Existing + Proposed Equipment ***Sufficient Capacity**

Note: See Table 1 and Table 2 for the proposed and existing loading, respectively.

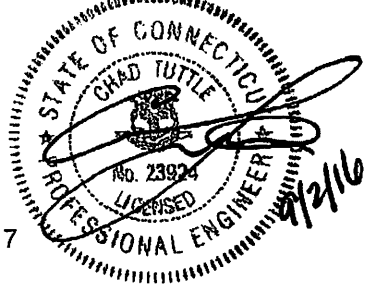
***The structure has sufficient capacity once the loading changes described in the Recommendations section of this report are completed.**

This analysis has been performed in accordance with the TIA/EIA-222-F standard and 2005 CT State Building Code with 2009 amendment based upon a wind speed of 80 mph fastest mile.

All equipment proposed in this report shall be installed in accordance with the attached drawings for the determined available structural capacity to be effective.

We at *B+T Group* appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully submitted by:
B+T Engineering, Inc.



Brandon Sevier, E.I.
Project Engineer

Chad E. Tuttle, P.E.
Engineer of Record
COA: PEC.0001564 Expires: 2/10/2017

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 177 ft. Monopole tower designed by Summit in August of 2000. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F.The tower has been modified by several times, those modification were incorporated in this analysis.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
167.0	169.0	3	Commscope	LNX-6515DS-A1M	6	1-5/8	--
		3	RFS Celwave	APXV18-206516S-C-A20			

Table 2 – Existing Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
177.0	177.0	3	Alcatel Lucent	1900MHz RRH (65MHz)	3	1-1/4	1
		3	Alcatel Lucent	800 External Notch Filter			
		3	Alcatel Lucent	800MHZ RRH			
		9	RFS Celwave	ACU-A20-N			
		3	RFS Celwave	APXVSPP18-C-A20			
		1	--	Platform Mount [LP 712-1]			
167.0	**169.0**	**3**	**EMS Wireless**	**RR90-17-02DP**	**--**	**--**	**3**
		3	**Ericsson**	**KRY 112 75/1**			
		3	Ericsson	KRY 112 75/1	6	1-5/8	1
	167.0	1	--	T-Arm Mount [TA 602-3]			
154.0	156.0	1	Antel	BXA-171063-8BF-EDIN-2	12	1-5/8	1
		2	Antel	BXA-171085-8BF-EDIN-2			
		3	Antel	BXA-70063-6CF-2			
		2	Antel	LPA-80063/6CF			
		4	Antel	LPA-80080/6CF			
	154.0	6	RFS Celwave	FD9R6004/2C-3L			
		1	--	Platform Mount [LP 303-1]			
137.0	**139.0**	**12**	**Decibel**	**DB844H90**	**12**	**1-1/4**	**2**
	137.0	**1**	**--**	**Platform Mount [LP 712-1]**			
127.0	129.0	3	Ericsson	RRUS 11 B12	12 2 1	1-5/8 5/8 3/8	1
		1	Kathrein	800 10764			
		6	Kathrein	AP14/17-880/1940/065D/ADT/XXP			
		1	KMW Comm.	AM-X-CD-14-65-00T-RET			
		1	KMW Comm.	AM-X-CD-16-65-00T-RET			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
		6	Powerwave	LGP 17201			
		1	Raycap	DC6-48-60-18-8F			
	127.0	1	--	Platform Mount [LP 303-1]			
117.0	117.0	3	RFS Celwave	APXV18-206517S-C	6	1-5/8	1
79.0	80.0	1	Spectracom	8225	1	1/2	1
	79.0	1	--	Side Arm Mount [SO 701-1]			

Notes:
1) Existing Equipment
2) Abandoned Equipment To Be Removed; Not Considered in This Analysis
3) Equipment To Be Removed; Not Considered in This Analysis

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
177	177	1	--	14' Low Profile Platform	--	--
		12	DAPA	48000		
167	167	1	--	14' Clamp On Low Profile Platform	--	--
		12	DAPA	48000		
157	157	1	--	14' Clamp On Low Profile Platform	--	--
		12	DAPA	48000		
75	75	1	--	GPS Antenna W/ Mount	--	--

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Online Application	T-Mobile Co-locate Rev # 0	358301	CCI Sites
Tower Manufacturing Drawings	Summit Manufacturing LLC, Job No: 10633	1613568	CCI Sites
Tower Modification Drawing	Semaan Engineering Solutions, Inc, Site ID CT33XC111	1595751	CCI Sites
Tower Modification Drawing	Global Signal Legacy No: CT33XC111	1623517	CCI Sites
Tower Modification Drawing	Hutter Trankina Engineering, Project No:04073	1634507	CCI Sites
Post Modification Inspection	GLOBAL SIGNAL SITE No: 3017696	2176310	CCI Sites
Tower Modification Drawing	B&T Engineering, Inc Project No: 80185	2461486	CCI Sites
Post Modification Inspection	B&T Engineering, Inc Project No: 80185	2461484	CCI Sites
Tower Modification Drawing	TEP Project No: 131001.876376	3384748	CCI Sites
Post Modification Inspection	TEP Project No: 131001.876376	3841069	CCI Sites
Foundation Drawings	Summit Manufacturing LLC, Job No: 10633	1613623	CCI Sites
Geotech Report	Criscuolo Shepard Associates File No.99900.24	1531965	CCI Sites
Antenna Configuration	Crown CAD Package	Date:08/25/2016	CCI Sites

3.1) Analysis Method

tnxTower (version 7.0.5.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.
5) Mount areas and weights are assumed based on photographs provided.

This analysis may be affected if any assumptions are not valid or have been made in error. B+T Group should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	177 - 129.75	Pole	TP30.268x22x0.219	1	-7.554	1060.949	64.8	Pass
L2	129.75 - 118.583	Pole	TP31.785x29.174x0.25	2	-11.540	1300.853	78.9	Pass
L3	118.583 - 108	Pole	TP33.636x31.785x0.382	3	-13.552	1769.851	72.3	Pass
L4	108 - 106.417	Pole	TP33.913x33.636x0.38	4	-13.838	1779.142	73.9	Pass
L5	106.417 - 84	Pole	TP37.836x33.913x0.716	5	-18.520	2102.301	83.0	Pass
L6	84 - 80	Pole	TP38.036x36.505x0.766	6	-22.203	2318.180	85.1	Pass
L7	80 - 60	Pole	TP41.536x38.036x0.767	7	-28.715	2652.043	91.0	Pass
L8	60 - 39.25	Pole	TP45.167x41.536x0.73	8	-33.780	3278.367	83.2	Pass
L9	39.25 - 20	Pole	TP47.91x43.536x0.752	9	-44.885	3707.846	88.7	Pass
L10	20 - 0	Pole	TP51.41x47.91x0.762	10	-53.166	4097.242	89.8	Pass
							Summary	
						Pole (L7)	91.0	Pass
						Rating =	91.0	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	Base	84.7	Pass
1	Base Plate	Base	83.8	Pass
1	Base Foundation (Structural)	Base	70.2	Pass
1	Base Foundation (Soil Interaction)	Base	90.2	Pass

Structure Rating (max from all components) =	91.0%

Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
2) Capacities up to 100% are considered acceptable based on analysis methods used.
3) The percent capacities shown above (excluding foundations) include the 1/3 increase in allowable stresses as allowed by TIA/EIA-222-F.

4.1) Recommendations

The tower and foundation have sufficient capacity to carry the existing and proposed loading. In order for the results of this analysis to be considered valid the loading modification listed below must be completed.

Loading Changes:

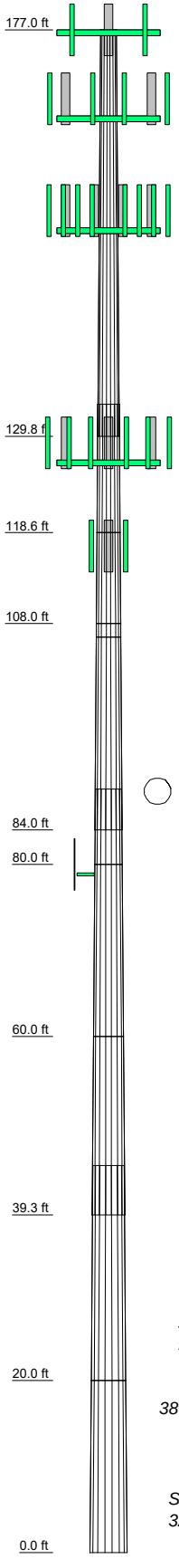
1.) Removal of the abandoned antennas, feed lines and mounts at the 137 ft level

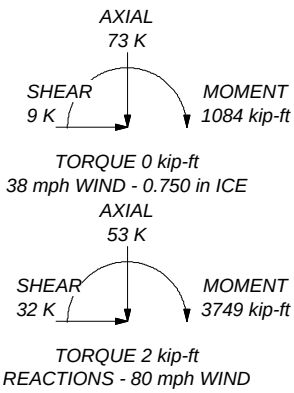
No structural modifications are required at this time, provided that the above listed changes are implemented.

APPENDIX A

TNXTOWER OUTPUT

Section	1	2	3	4	5	6	7	8	9	10
Length (ft)	47.250	14.917	10.583	1.583	22.417	8.750	20.000	20.750	25.000	20.000
Number of Sides	18	18	18	18	18	18	18	18	18	18
Thickness (in)	0.219	0.250	0.382	0.380	0.716	0.766	0.767	0.730	0.752	0.762
Socket Length (ft)	3.750				4.750			5.750		
Top Dia (in)	22.000	29.174	31.785	33.686	33.913	36.505	38.036	41.536	43.536	47.910
Bot Dia (in)	30.268	31.785	33.636	33.913	37.836	38.036	41.536	45.167	47.910	51.410
Grade	A607-65			54.938894ksi	54.948782ksi	31.861329ksi	32.001205ksi	33.414851ksi	40.722257ksi	41.836348ksi
Weight (K)	2.9	1.2	1.4	0.2	4.9	2.2	5.4	6.0	8.0	7.1





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
APXVSPP18-C-A20 w/ Mount Pipe (E)	177	BXA-70063-6CF-2 w/ Mount Pipe (E)	154
APXVSPP18-C-A20 w/ Mount Pipe (E)	177	BXA-70063-6CF-2 w/ Mount Pipe (E)	154
APXVSPP18-C-A20 w/ Mount Pipe (E)	177	BXA-171063-8BF-EDIN-2 w/ Mount Pipe (E)	154
(3) ACU-A20-N (E)	177	BXA-171085-8BF-EDIN-2 w/ Mount Pipe (E)	154
(3) ACU-A20-N (E)	177	BXA-171085-8BF-EDIN-2 w/ Mount Pipe (E)	154
(3) ACU-A20-N (E)	177	(2) FD9R6004/2C-3L (E)	154
1900MHz RRH (65MHz) (E)	177	(2) FD9R6004/2C-3L (E)	154
1900MHz RRH (65MHz) (E)	177	(2) FD9R6004/2C-3L (E)	154
1900MHz RRH (65MHz) (E)	177	Platform Mount [LP 303-1] (E)	154
800MHZ RRH (E)	177	(2) AP14/17-880/1940/065D/ADT/XXP w/ Mount Pipe (E)	127
800MHZ RRH (E)	177	(2) AP14/17-880/1940/065D/ADT/XXP w/ Mount Pipe (E)	127
800MHZ RRH (E)	177	(2) AP14/17-880/1940/065D/ADT/XXP w/ Mount Pipe (E)	127
800 EXTERNAL NOTCH FILTER (E)	177	AM-X-CD-14-65-00T-RET w/ Mount Pipe (E)	127
800 EXTERNAL NOTCH FILTER (E)	177	AM-X-CD-16-65-00T-RET w/ Mount Pipe (E)	127
800 EXTERNAL NOTCH FILTER (E)	177	800 10764 w/ Mount Pipe (E)	127
6' x 2' Mount Pipe (E)	177	(2) LGP 17201 (E)	127
6' x 2' Mount Pipe (E)	177	(2) LGP 17201 (E)	127
6' x 2' Mount Pipe (E)	177	(2) LGP 17201 (E)	127
Platform Mount [LP 712-1] (E)	177	RRUS 11 B12 (E)	127
APXV18-206516S-C-A20 w/ Mount Pipe (P)	167	RRUS 11 B12 (E)	127
APXV18-206516S-C-A20 w/ Mount Pipe (P)	167	RRUS 11 B12 (E)	127
APXV18-206516S-C-A20 w/ Mount Pipe (P)	167	DC6-48-60-18-8F (E)	127
LNX-6515DS-A1M w/ Mount Pipe (P)	167	Platform Mount [LP 303-1] (E)	127
LNX-6515DS-A1M w/ Mount Pipe (P)	167	APXV18-206517S-C w/ Mount Pipe (E)	117
LNX-6515DS-A1M w/ Mount Pipe (P)	167	APXV18-206517S-C w/ Mount Pipe (E)	117
KRY 112 75/1 (E)	167	APXV18-206517S-C w/ Mount Pipe (E)	117
KRY 112 75/1 (E)	167	8225 (E)	79
KRY 112 75/1 (E)	167	Side Arm Mount [SO 701-1] (E)	79
(2) 6' x 2" Mount Pipe (E)	167		
(2) 6' x 2" Mount Pipe (E)	167		
(2) 6' x 2" Mount Pipe (E)	167		
T-Arm Mount [TA 602-3] (E)	167		
(2) LPA-80063/6CF w/ Mount Pipe (E)	154		
(2) LPA-80080/6CF w/ Mount Pipe (E)	154		
(2) LPA-80080/6CF w/ Mount Pipe (E)	154		
BXA-70063-6CF-2 w/ Mount Pipe (E)	154		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-65	65 ksi	80 ksi	33.414851ksi	33 ksi	48 ksi
54.938894ksi	55 ksi	70 ksi	40.722257ksi	41 ksi	56 ksi
54.948782ksi	55 ksi	70 ksi	41.16284ksi	41 ksi	56 ksi
31.861329ksi	32 ksi	47 ksi	41.836348ksi	42 ksi	57 ksi
32.001205ksi	32 ksi	47 ksi			

TOWER DESIGN NOTES

1. Tower is located in Litchfield County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 91%

B+T Group
1717 S Boulder Ave, Suite 300
Tulsa, OK 74119
Phone: (918) 587-4630
FAX: (918) 295-0265

Job: 83609.005.01 - Scoville Hill/Harwinton Rod, CT (BU# 87637			
Project:			
Client: Crown Castle	Drawn by: bsevier	App'd:	
Code: TIA/EIA-222-F	Date: 09/02/16	Scale: NTS	
Path: S:\Projects\Crown Castle\83000\83609_876376_Scoville\Engineering\RISA\83609_005_01_Scoville Hill Harwinton Rod_CT_ASeri		Dwg No. E-1	

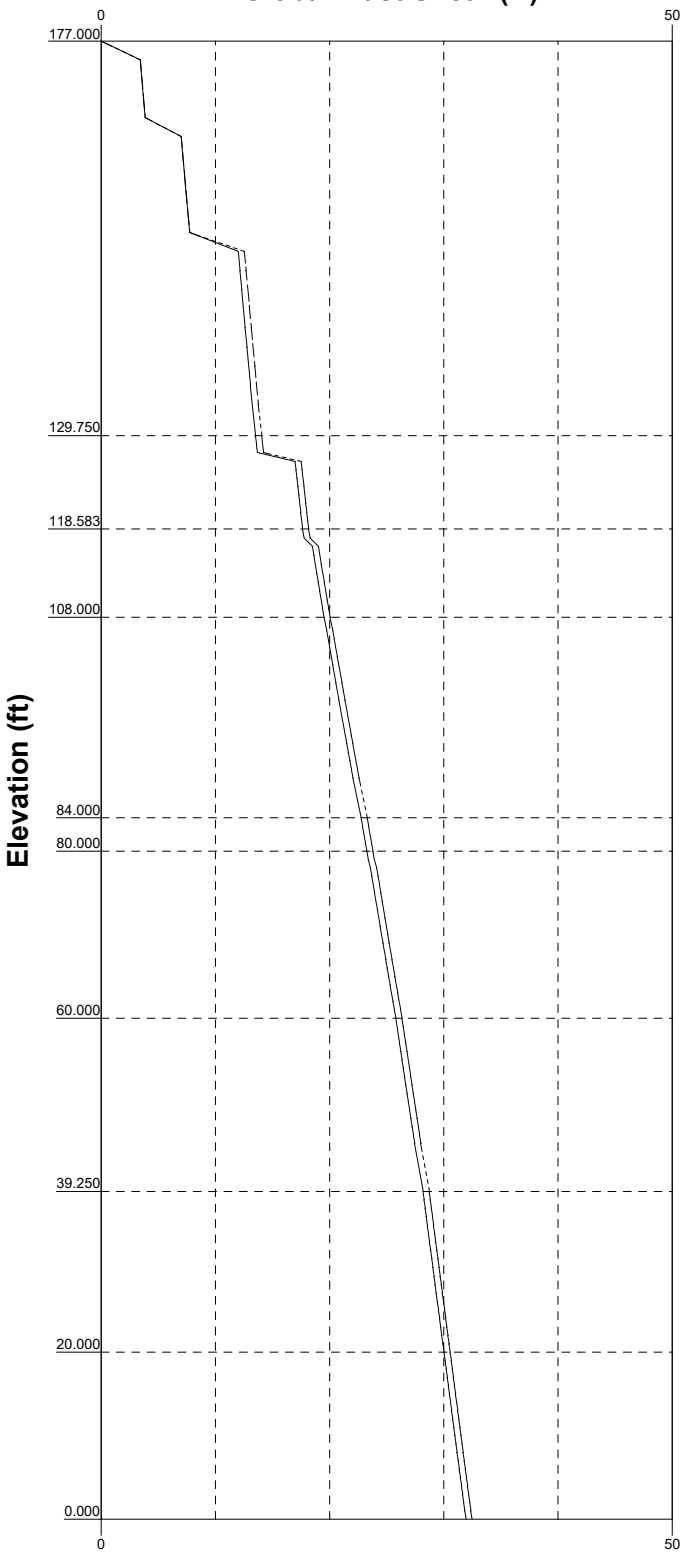
TIA/EIA-222-F - 80 mph/38 mph 0.750 in Ice

Vx Vz

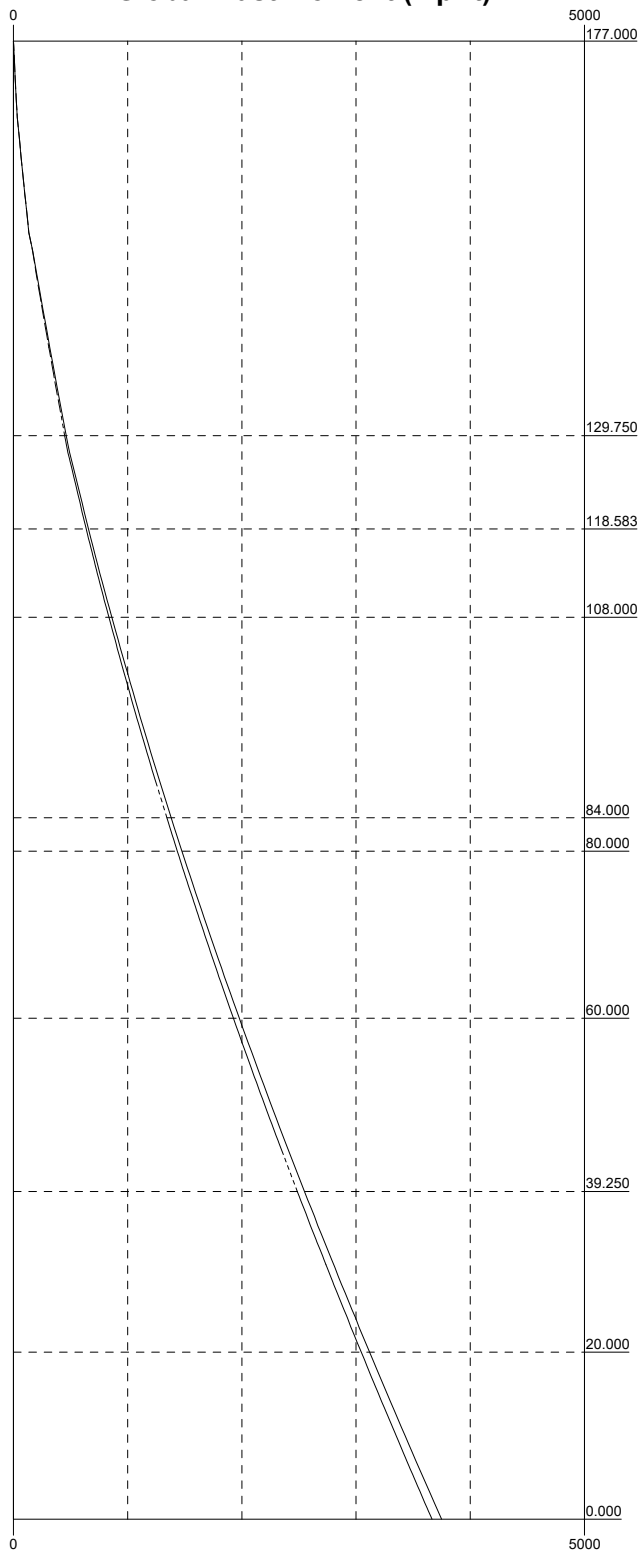
Maximum Values

Mx Mz

Global Mast Shear (K)



Global Mast Moment (kip-ft)



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Project:		
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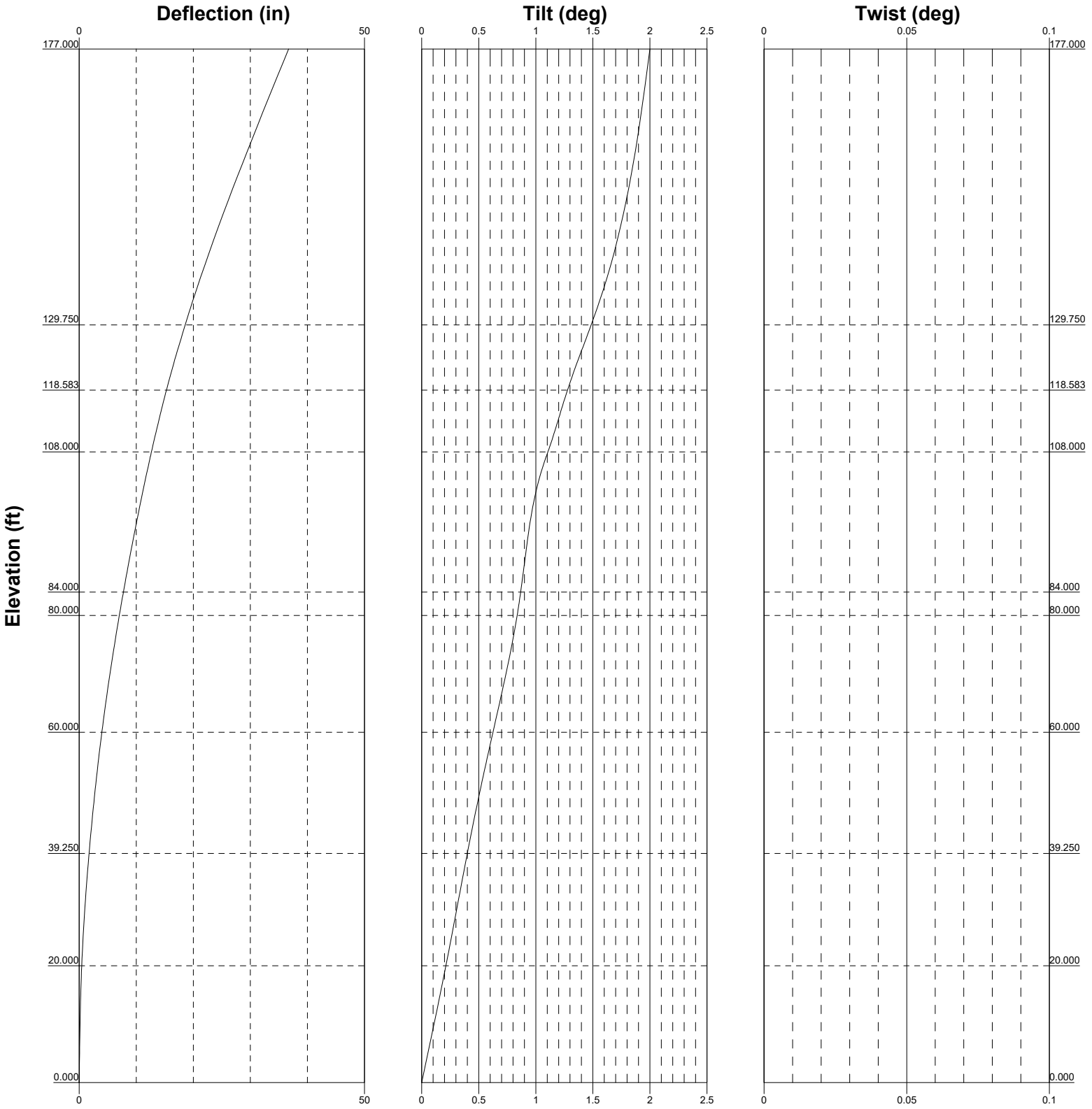
Code: TIA/EIA-222-F	Date: 09/02/16	Scale: NTS
Path: S:\Projects\Crown Castle\83000\83609_876376_Scoville\Engineering\RISA\83609_005_01_Scoville Hill Harwinton Rod_CT_ASeri		Dwg No. E-4

TIA/EIA-222-F - Service - 50 mph

Maximum Values



B+T GRP

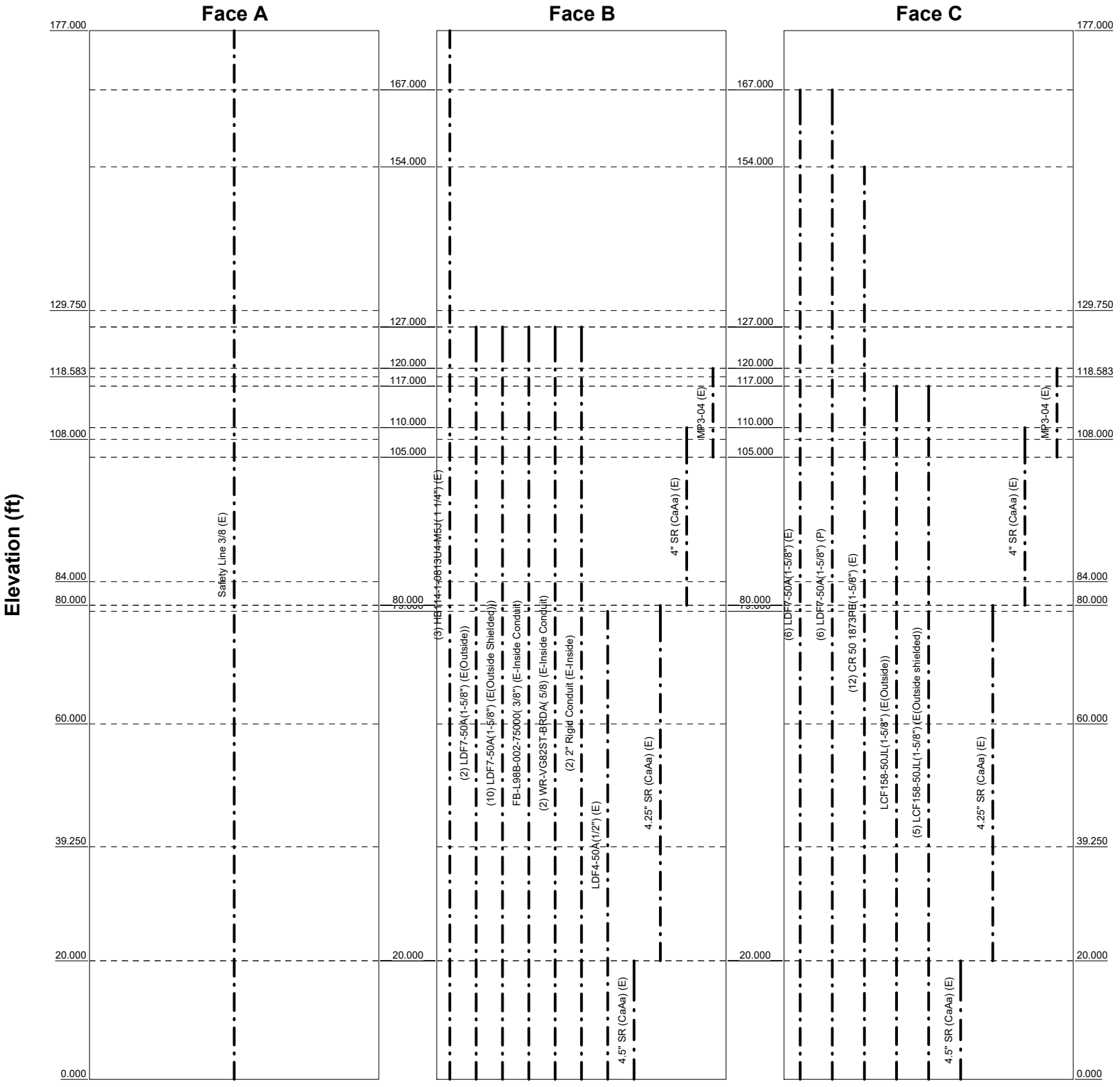
B+T Group
1717 S Boulder Ave, Suite 300
Tulsa, OK 74119
Phone: (918) 587-4630
FAX: (918) 295-0265

Job: ***83609.005.01 - Scoville Hill/Harwinton Rod, CT (BU# 87637***		
Project:		
Client: Crown Castle	Drawn by: bsevier	App'd:
Code: TIA/EIA-222-F	Date: 09/02/16	Scale: NTS
Path: S:\Projects\Crown Castle\83000\83609_876376_Scoville\Engineering\RISA\83609_005_01_Scoville Hill Harwinton Rod_CT_ASeri		Dwg No. E-5

Feed Line Distribution Chart

0' - 177'

Round — Flat — App In Face — App Out Face — Truss Leg



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FAX: (918) 295-0265

Job: **83609.005.01 - Scoville Hill/Harwinton Rod, CT (BU# 87637**		
Project:		
Client: Crown Castle	Drawn by: bsevier	App'd:
Code: TIA/EIA-222-F	Date: 09/02/16	Scale: NTS
Path: S:\Projects\Crown Castle\83000\83609_876376_Scoville\Engineering\RISA\83609_005_01_Scoville Hill Harwinton Rod_CT_ASeri		Dwg No. E-7

Tower Input Data

There is a pole section.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Tower is located in Litchfield County, Connecticut.
Basic wind speed of 80 mph.
Nominal ice thickness of 0.750 in.
Ice thickness is considered to increase with height.
Ice density of 56.000 pcf.
A wind speed of 38 mph is used in combination with ice.
Temperature drop of 50.000 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
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				

Tapered Pole Section Geometry

Section	*Elevation* *ft*	*Section Length* *ft*	*Splice Length* *ft*	*Number of Sides*	*Top Diameter* *in*	*Bottom Diameter* *in*	*Wall Thickness* *in*	*Bend Radius* *in*	*Pole Grade*
L1	177.000-129.750	47.250	3.750	18	22.000	30.268	0.219	0.875	A607-65 (65 ksi)
L2	129.750-118.583	14.917	0.000	18	29.174	31.785	0.250	1.000	A607-65 (65 ksi)
L3	118.583-108.000	10.583	0.000	18	31.785	33.636	0.382	1.526	54.938894ksi (55 ksi)
L4	108.000-106.417	1.583	0.000	18	33.636	33.913	0.380	1.521	54.948782ksi (55 ksi)
L5	106.417-84.000	22.417	4.750	18	33.913	37.836	0.716	2.865	31.861329ksi (32 ksi)

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L6	84.000-80.000	8.750	0.000	18	36.505	38.036	0.766	3.063	32.001205ksi (32 ksi)
L7	80.000-60.000	20.000	0.000	18	38.036	41.536	0.767	3.067	33.414851ksi (33 ksi)
L8	60.000-39.250	20.750	5.750	18	41.536	45.167	0.730	2.921	40.722257ksi (41 ksi)
L9	39.250-20.000	25.000	0.000	18	43.536	47.910	0.752	3.010	41.16284ksi (41 ksi)
L10	20.000-0.000	20.000		18	47.910	51.410	0.762	3.047	41.836348ksi (42 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	22.339	15.123	906.444	7.732	11.176	81.106	1814.080	7.563	3.487	15.941
	30.735	20.864	2380.090	10.667	15.376	154.791	4763.311	10.434	4.942	22.593
L2	30.291	22.951	2425.903	10.268	14.821	163.685	4854.998	11.478	4.695	18.779
	32.275	25.023	3143.720	11.195	16.147	194.699	6291.578	12.514	5.154	20.616
L3	32.275	38.036	4738.797	11.148	16.147	293.487	9483.829	19.021	4.922	12.899
	34.155	40.279	5627.557	11.805	17.087	329.342	11262.518	20.143	5.248	13.753
L4	34.155	40.148	5609.784	11.806	17.087	328.302	11226.949	20.078	5.251	13.804
	34.437	40.483	5751.131	11.904	17.228	333.825	11509.830	20.245	5.299	13.933
L5	34.437	75.471	10507.961	11.785	17.228	609.935	21029.749	37.743	4.708	6.573
	38.420	84.389	14690.330	13.178	19.221	764.298	29399.991	42.202	5.399	7.537
L6	37.912	86.852	14015.475	12.687	18.544	755.777	28049.391	43.434	5.077	6.631
	38.623	90.573	15895.172	13.231	19.322	822.634	31811.260	45.295	5.347	6.983
L7	38.623	90.715	15919.015	13.231	19.322	823.868	31858.976	45.366	5.345	6.969
	42.177	99.234	20838.116	14.473	21.100	987.578	41703.651	49.626	5.961	7.773
L8	42.177	94.574	19895.225	14.486	21.100	942.891	39816.628	47.296	6.025	8.251
	45.864	102.989	25693.017	15.775	22.945	1119.773	51419.841	51.504	6.664	9.127
L9	45.229	102.177	23628.828	15.188	22.116	1068.396	47288.748	51.098	6.338	8.423
	48.649	112.625	31643.284	16.741	24.338	1300.135	63328.204	56.323	7.108	9.446
L10	48.649	113.989	32013.798	16.738	24.338	1315.359	64069.721	57.005	7.092	9.31
	52.203	122.449	39684.785	17.980	26.116	1519.542	79421.789	61.236	7.708	10.119

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
L1 177.000-129.750				1	1	1			
L2 129.750-118.583				1	1	1			
L3 118.583-108.000				1	1	0.966072			
L4 108.000-106.417				1	1	0.966635			
L5 106.417-84.00				1	1	0.811272			

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
0									
L6 84.000-80.000				1	1	0.830059			
L7 80.000-60.000				1	1	0.841674			
L8 60.000-39.250				1	1	0.855671			
L9 39.250-20.000				1	1	0.880976			
L10 20.000-0.000				1	1	0.886497			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight klf
*******										

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
HB114-1-0813U4-M5J(1 1/4") (E)	B	No	Inside Pole	177.000 - 0.000	3	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.000 0.000 0.000 0.000 0.000	0.001 0.001 0.001 0.001 0.001
*******								
LDF7-50A(1-5/8") (E)	C	No	Inside Pole	167.000 - 0.000	6	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.000 0.000 0.000 0.000 0.000	0.001 0.001 0.001 0.001 0.001
LDF7-50A(1-5/8") (P)	C	No	Inside Pole	167.000 - 0.000	6	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.000 0.000 0.000 0.000 0.000	0.001 0.001 0.001 0.001 0.001
*******								
CR 50 1873PE(1-5/8") (E)	C	No	Inside Pole	154.000 - 0.000	12	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.000 0.000 0.000 0.000 0.000	0.001 0.001 0.001 0.001 0.001
*******								
*******								
LDF7-50A(1-5/8") (E(Outside))	B	No	CaAa (Out Of Face)	127.000 - 0.000	2	No Ice 1/2" Ice 1" Ice 2" Ice	0.198 0.298 0.398 0.598	0.001 0.002 0.004 0.011

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
						4" Ice	0.998	0.030
LDF7-50A(1-5/8") (E(Outside Shielded)))	B	No	CaAa (Out Of Face)	127.000 - 0.000	10	No Ice	0.000	0.001
						1/2" Ice	0.000	0.002
						1" Ice	0.000	0.004
						2" Ice	0.000	0.011
						4" Ice	0.000	0.030
FB-L98B-002-75000(3/8") (E-Inside Conduit)	B	No	Inside Pole	127.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
						2" Ice	0.000	0.000
						4" Ice	0.000	0.000
WR-VG82ST-BRDA(5/8) (E-Inside Conduit)	B	No	Inside Pole	127.000 - 0.000	2	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
						2" Ice	0.000	0.000
						4" Ice	0.000	0.000
2" Rigid Conduit (E-Inside)	B	No	Inside Pole	127.000 - 0.000	2	No Ice	0.000	0.003
						1/2" Ice	0.000	0.003
						1" Ice	0.000	0.003
						2" Ice	0.000	0.003
						4" Ice	0.000	0.003
*******								
LCF158-50JL(1-5/8") (E(Outside))	C	No	CaAa (Out Of Face)	117.000 - 0.000	1	No Ice	0.198	0.001
						1/2" Ice	0.298	0.002
						1" Ice	0.398	0.004
						2" Ice	0.598	0.010
						4" Ice	0.998	0.030
LCF158-50JL(1-5/8") (E(Outside shielded))	C	No	CaAa (Out Of Face)	117.000 - 0.000	5	No Ice	0.000	0.001
						1/2" Ice	0.000	0.002
						1" Ice	0.000	0.004
						2" Ice	0.000	0.010
						4" Ice	0.000	0.030
*******								
LDF4-50A(1/2") (E)	B	No	Inside Pole	79.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
						2" Ice	0.000	0.000
						4" Ice	0.000	0.000
*******								
Safety Line 3/8 (E)	A	No	CaAa (Out Of Face)	177.000 - 0.000	1	No Ice	0.037	0.000
						1/2" Ice	0.137	0.001
						1" Ice	0.238	0.001
						2" Ice	0.437	0.002
						4" Ice	0.838	0.004
*******								
4.5" SR (CaAa) (E)	C	No	CaAa (Out Of Face)	20.000 - 0.000	1	No Ice	0.450	0.000
						1/2" Ice	0.550	0.000
						1" Ice	0.650	0.000
						2" Ice	0.850	0.000
						4" Ice	1.250	0.000
4.5" SR (CaAa) (E)	B	No	CaAa (Out Of Face)	20.000 - 0.000	1	No Ice	0.450	0.000
						1/2" Ice	0.550	0.000
						1" Ice	0.650	0.000
						2" Ice	0.850	0.000
						4" Ice	1.250	0.000
4.25" SR (CaAa) (E)	C	No	CaAa (Out Of Face)	80.000 - 20.000	1	No Ice	0.425	0.000
						1/2" Ice	0.525	0.000
						1" Ice	0.625	0.000
						2" Ice	0.825	0.000
						4" Ice	1.225	0.000
4.25" SR (CaAa)	B	No	CaAa (Out Of	80.000 - 20.000	1	No Ice	0.425	0.000

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
(E)			Face)			1/2" Ice	0.525	0.000
						1" Ice	0.625	0.000
						2" Ice	0.825	0.000
						4" Ice	1.225	0.000
4" SR (CaAa)	C	No	CaAa (Out Of	110.000 - 80.000	1	No Ice	0.400	0.000
(E)			Face)			1/2" Ice	0.500	0.000
						1" Ice	0.600	0.000
						2" Ice	0.800	0.000
						4" Ice	1.200	0.000
4" SR (CaAa)	B	No	CaAa (Out Of	110.000 - 80.000	1	No Ice	0.400	0.000
(E)			Face)			1/2" Ice	0.500	0.000
						1" Ice	0.600	0.000
						2" Ice	0.800	0.000
						4" Ice	1.200	0.000
MP3-04	B	No	CaAa (Out Of	120.000 - 105.000	1	No Ice	0.268	0.000
(E)			Face)			1/2" Ice	0.352	0.000
						1" Ice	0.435	0.000
						2" Ice	0.602	0.000
						4" Ice	0.935	0.000
MP3-04	C	No	CaAa (Out Of	120.000 - 105.000	1	No Ice	0.268	0.000
(E)			Face)			1/2" Ice	0.352	0.000
						1" Ice	0.435	0.000
						2" Ice	0.602	0.000
						4" Ice	0.935	0.000
*******								

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
L1	177.000-129.750	A	0.000	0.000	0.000	1.772	0.010
		B	0.000	0.000	0.000	0.000	0.170
		C	0.000	0.000	0.000	0.000	0.608
L2	129.750-118.583	A	0.000	0.000	0.000	0.419	0.002
		B	0.000	0.000	0.000	3.713	0.176
		C	0.000	0.000	0.000	0.380	0.221
L3	118.583-108.000	A	0.000	0.000	0.000	0.397	0.002
		B	0.000	0.000	0.000	7.831	0.209
		C	0.000	0.000	0.000	5.422	0.238
L4	108.000-106.417	A	0.000	0.000	0.000	0.059	0.000
		B	0.000	0.000	0.000	1.685	0.031
		C	0.000	0.000	0.000	1.371	0.036
L5	106.417-84.000	A	0.000	0.000	0.000	0.841	0.005
		B	0.000	0.000	0.000	18.224	0.442
		C	0.000	0.000	0.000	13.786	0.514
L6	84.000-80.000	A	0.000	0.000	0.000	0.150	0.001
		B	0.000	0.000	0.000	3.184	0.079
		C	0.000	0.000	0.000	2.392	0.092
L7	80.000-60.000	A	0.000	0.000	0.000	0.750	0.004
		B	0.000	0.000	0.000	16.420	0.397
		C	0.000	0.000	0.000	12.460	0.458
L8	60.000-39.250	A	0.000	0.000	0.000	0.778	0.005
		B	0.000	0.000	0.000	17.036	0.412
		C	0.000	0.000	0.000	12.927	0.476
L9	39.250-20.000	A	0.000	0.000	0.000	0.722	0.004
		B	0.000	0.000	0.000	15.804	0.382
		C	0.000	0.000	0.000	11.993	0.441

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
L10	20.000-0.000	A	0.000	0.000	0.000	0.750	0.004
		B	0.000	0.000	0.000	16.920	0.397
		C	0.000	0.000	0.000	12.960	0.458

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
L1	177.000-129.750	A	0.901	0.000	0.000	0.000	10.288	0.056
		B		0.000	0.000	0.000	0.000	0.170
		C		0.000	0.000	0.000	0.000	0.608
L2	129.750-118.583	A	0.879	0.000	0.000	0.000	2.431	0.013
		B		0.000	0.000	0.000	6.960	0.501
		C		0.000	0.000	0.000	0.593	0.221
L3	118.583-108.000	A	0.870	0.000	0.000	0.000	2.237	0.012
		B		0.000	0.000	0.000	13.394	0.601
		C		0.000	0.000	0.000	8.869	0.404
L4	108.000-106.417	A	0.864	0.000	0.000	0.000	0.333	0.002
		B		0.000	0.000	0.000	2.733	0.089
		C		0.000	0.000	0.000	2.146	0.065
L5	106.417-84.000	A	0.851	0.000	0.000	0.000	4.658	0.025
		B		0.000	0.000	0.000	29.878	1.251
		C		0.000	0.000	0.000	21.622	0.919
L6	84.000-80.000	A	0.837	0.000	0.000	0.000	0.831	0.004
		B		0.000	0.000	0.000	5.228	0.223
		C		0.000	0.000	0.000	3.754	0.164
L7	80.000-60.000	A	0.821	0.000	0.000	0.000	4.032	0.022
		B		0.000	0.000	0.000	26.267	1.088
		C		0.000	0.000	0.000	19.025	0.804
L8	60.000-39.250	A	0.787	0.000	0.000	0.000	4.046	0.022
		B		0.000	0.000	0.000	26.838	1.094
		C		0.000	0.000	0.000	19.462	0.816
L9	39.250-20.000	A	0.750	0.000	0.000	0.000	3.753	0.020
		B		0.000	0.000	0.000	24.898	1.015
		C		0.000	0.000	0.000	18.055	0.757
L10	20.000-0.000	A	0.750	0.000	0.000	0.000	3.750	0.020
		B		0.000	0.000	0.000	25.920	1.016
		C		0.000	0.000	0.000	18.960	0.768

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	177.000-129.750	0.000	-0.055	0.000	-0.279
L2	129.750-118.583	0.338	0.192	0.531	0.132
L3	118.583-108.000	0.200	0.601	0.291	0.665
L4	108.000-106.417	0.151	0.819	0.217	0.899
L5	106.417-84.000	0.173	0.680	0.254	0.747
L6	84.000-80.000	0.177	0.680	0.262	0.751
L7	80.000-60.000	0.178	0.710	0.264	0.782
L8	60.000-39.250	0.182	0.728	0.270	0.809
L9	39.250-20.000	0.186	0.742	0.278	0.830
L10	20.000-0.000	0.188	0.777	0.279	0.866

Discrete Tower Loads

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
APXVSPP18-C-A20 w/ Mount Pipe (E)	A	From Leg	4.000 0.000 0.000	0.000	177.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.498 9.149 9.767 11.031 13.679	6.946 8.127 9.021 10.844 14.851	0.083 0.151 0.227 0.406 0.909
APXVSPP18-C-A20 w/ Mount Pipe (E)	B	From Leg	4.000 0.000 0.000	0.000	177.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.498 9.149 9.767 11.031 13.679	6.946 8.127 9.021 10.844 14.851	0.083 0.151 0.227 0.406 0.909
APXVSPP18-C-A20 w/ Mount Pipe (E)	C	From Leg	4.000 0.000 0.000	0.000	177.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.498 9.149 9.767 11.031 13.679	6.946 8.127 9.021 10.844 14.851	0.083 0.151 0.227 0.406 0.909
(3) ACU-A20-N (E)	A	From Leg	2.000 0.000 0.000	0.000	177.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.078 0.121 0.173 0.302 0.665	0.136 0.189 0.251 0.400 0.802	0.001 0.002 0.004 0.012 0.045
(3) ACU-A20-N (E)	B	From Leg	2.000 0.000 0.000	0.000	177.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.078 0.121 0.173 0.302 0.665	0.136 0.189 0.251 0.400 0.802	0.001 0.002 0.004 0.012 0.045
(3) ACU-A20-N (E)	C	From Leg	2.000 0.000 0.000	0.000	177.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.078 0.121 0.173 0.302 0.665	0.136 0.189 0.251 0.400 0.802	0.001 0.002 0.004 0.012 0.045
1900MHz RRH (65MHz) (E)	A	From Leg	2.000 0.000 0.000	0.000	177.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.698 2.936 3.183 3.703 4.846	2.771 3.011 3.260 3.784 4.935	0.060 0.084 0.111 0.176 0.354
1900MHz RRH (65MHz) (E)	B	From Leg	2.000 0.000 0.000	0.000	177.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.698 2.936 3.183 3.703 4.846	2.771 3.011 3.260 3.784 4.935	0.060 0.084 0.111 0.176 0.354
1900MHz RRH (65MHz) (E)	C	From Leg	2.000 0.000 0.000	0.000	177.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.698 2.936 3.183 3.703 4.846	2.771 3.011 3.260 3.784 4.935	0.060 0.084 0.111 0.176 0.354
800MHZ RRH (E)	A	From Leg	2.000 0.000 0.000	0.000	177.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.490 2.706 2.931 3.407 4.462	2.068 2.271 2.481 2.928 3.927	0.053 0.074 0.098 0.157 0.318

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
800MHZ RRH	B	From Leg	2.000	0.000	0.000	177.000	No Ice	2.490	2.068	0.053
(E)			0.000				1/2" Ice	2.706	2.271	0.074
			0.000				1" Ice	2.931	2.481	0.098
							2" Ice	3.407	2.928	0.157
							4" Ice	4.462	3.927	0.318
800MHZ RRH	C	From Leg	2.000	0.000	0.000	177.000	No Ice	2.490	2.068	0.053
(E)			0.000				1/2" Ice	2.706	2.271	0.074
			0.000				1" Ice	2.931	2.481	0.098
							2" Ice	3.407	2.928	0.157
							4" Ice	4.462	3.927	0.318
800 EXTERNAL NOTCH FILTER	A	From Leg	2.000	0.000	0.000	177.000	No Ice	0.770	0.375	0.011
(E)			0.000				1/2" Ice	0.890	0.465	0.017
			0.000				1" Ice	1.018	0.563	0.024
							2" Ice	1.301	0.787	0.045
							4" Ice	1.970	1.337	0.114
800 EXTERNAL NOTCH FILTER	B	From Leg	2.000	0.000	0.000	177.000	No Ice	0.770	0.375	0.011
(E)			0.000				1/2" Ice	0.890	0.465	0.017
			0.000				1" Ice	1.018	0.563	0.024
							2" Ice	1.301	0.787	0.045
							4" Ice	1.970	1.337	0.114
800 EXTERNAL NOTCH FILTER	C	From Leg	2.000	0.000	0.000	177.000	No Ice	0.770	0.375	0.011
(E)			0.000				1/2" Ice	0.890	0.465	0.017
			0.000				1" Ice	1.018	0.563	0.024
							2" Ice	1.301	0.787	0.045
							4" Ice	1.970	1.337	0.114
6' x 2' Mount Pipe	A	From Leg	2.000	0.000	0.000	177.000	No Ice	1.425	1.425	0.022
(E)			0.000				1/2" Ice	1.925	1.925	0.033
			0.000				1" Ice	2.294	2.294	0.048
							2" Ice	3.060	3.060	0.090
							4" Ice	4.702	4.702	0.231
6' x 2' Mount Pipe	B	From Leg	2.000	0.000	0.000	177.000	No Ice	1.425	1.425	0.022
(E)			0.000				1/2" Ice	1.925	1.925	0.033
			0.000				1" Ice	2.294	2.294	0.048
							2" Ice	3.060	3.060	0.090
							4" Ice	4.702	4.702	0.231
6' x 2' Mount Pipe	C	From Leg	2.000	0.000	0.000	177.000	No Ice	1.425	1.425	0.022
(E)			0.000				1/2" Ice	1.925	1.925	0.033
			0.000				1" Ice	2.294	2.294	0.048
							2" Ice	3.060	3.060	0.090
							4" Ice	4.702	4.702	0.231
Platform Mount [LP 712-1]	C	None			0.000	177.000	No Ice	24.530	24.530	1.335
(E)							1/2" Ice	29.940	29.940	1.646
							1" Ice	35.350	35.350	1.956
							2" Ice	46.170	46.170	2.577
							4" Ice	67.810	67.810	3.820
*******										
APXV18-206516S-C-A20 w/ Mount Pipe	A	From Leg	4.000	0.000	0.000	167.000	No Ice	3.859	3.296	0.039
(P)			0.000				1/2" Ice	4.274	4.004	0.073
			2.000				1" Ice	4.727	4.672	0.113
							2" Ice	5.686	6.056	0.215
							4" Ice	7.727	9.038	0.528
APXV18-206516S-C-A20 w/ Mount Pipe	B	From Leg	4.000	0.000	0.000	167.000	No Ice	3.859	3.296	0.039
(P)			0.000				1/2" Ice	4.274	4.004	0.073
			2.000				1" Ice	4.727	4.672	0.113
							2" Ice	5.686	6.056	0.215
							4" Ice	7.727	9.038	0.528
APXV18-206516S-C-A20 w/	C	From Leg	4.000	0.000	0.000	167.000	No Ice	3.859	3.296	0.039

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Mount Pipe			0.000				1/2" Ice	4.274	4.004	0.073
(P)			2.000				1" Ice	4.727	4.672	0.113
							2" Ice	5.686	6.056	0.215
							4" Ice	7.727	9.038	0.528
LNX-6515DS-A1M w/	A	From Leg	4.000		0.000	167.000	No Ice	11.683	9.842	0.083
Mount Pipe			0.000				1/2" Ice	12.404	11.366	0.173
(P)			2.000				1" Ice	13.135	12.914	0.273
							2" Ice	14.601	15.267	0.506
							4" Ice	17.875	20.139	1.151
LNX-6515DS-A1M w/	B	From Leg	4.000		0.000	167.000	No Ice	11.683	9.842	0.083
Mount Pipe			0.000				1/2" Ice	12.404	11.366	0.173
(P)			2.000				1" Ice	13.135	12.914	0.273
							2" Ice	14.601	15.267	0.506
							4" Ice	17.875	20.139	1.151
LNX-6515DS-A1M w/	C	From Leg	4.000		0.000	167.000	No Ice	11.683	9.842	0.083
Mount Pipe			0.000				1/2" Ice	12.404	11.366	0.173
(P)			2.000				1" Ice	13.135	12.914	0.273
							2" Ice	14.601	15.267	0.506
							4" Ice	17.875	20.139	1.151
KRY 112 75/1	A	From Leg	4.000		0.000	167.000	No Ice	1.288	0.494	0.025
(E)			0.000				1/2" Ice	1.441	0.601	0.034
			2.000				1" Ice	1.603	0.716	0.044
							2" Ice	1.953	0.972	0.072
							4" Ice	2.758	1.589	0.160
KRY 112 75/1	B	From Leg	4.000		0.000	167.000	No Ice	1.288	0.494	0.025
(E)			0.000				1/2" Ice	1.441	0.601	0.034
			2.000				1" Ice	1.603	0.716	0.044
							2" Ice	1.953	0.972	0.072
							4" Ice	2.758	1.589	0.160
KRY 112 75/1	C	From Leg	4.000		0.000	167.000	No Ice	1.288	0.494	0.025
(E)			0.000				1/2" Ice	1.441	0.601	0.034
			2.000				1" Ice	1.603	0.716	0.044
							2" Ice	1.953	0.972	0.072
							4" Ice	2.758	1.589	0.160
(2) 6' x 2" Mount Pipe	A	From Leg	4.000		0.000	167.000	No Ice	1.425	1.425	0.022
(E)			0.000				1/2" Ice	1.925	1.925	0.033
			0.000				1" Ice	2.294	2.294	0.048
							2" Ice	3.060	3.060	0.090
							4" Ice	4.702	4.702	0.231
(2) 6' x 2" Mount Pipe	B	From Leg	4.000		0.000	167.000	No Ice	1.425	1.425	0.022
(E)			0.000				1/2" Ice	1.925	1.925	0.033
			0.000				1" Ice	2.294	2.294	0.048
							2" Ice	3.060	3.060	0.090
							4" Ice	4.702	4.702	0.231
(2) 6' x 2" Mount Pipe	C	From Leg	4.000		0.000	167.000	No Ice	1.425	1.425	0.022
(E)			0.000				1/2" Ice	1.925	1.925	0.033
			0.000				1" Ice	2.294	2.294	0.048
							2" Ice	3.060	3.060	0.090
							4" Ice	4.702	4.702	0.231
T-Arm Mount [TA 602-3]	C	None			0.000	167.000	No Ice	11.590	11.590	0.774
(E)							1/2" Ice	15.440	15.440	0.990
							1" Ice	19.290	19.290	1.206
							2" Ice	26.990	26.990	1.639
							4" Ice	42.390	42.390	2.503
*******										
(2) LPA-80063/6CF w/	A	From Leg	4.000		0.000	154.000	No Ice	10.577	10.671	0.052
Mount Pipe			0.000				1/2" Ice	11.241	11.932	0.145

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(E)			2.000				1" Ice	11.872	12.911	0.246
							2" Ice	13.163	14.921	0.476
							4" Ice	15.866	19.158	1.088
(2) LPA-80080/6CF w/ Mount Pipe	B	From Leg	4.000	0.000	0.000	154.000	No Ice	4.564	10.728	0.046
			0.000				1/2" Ice	5.105	11.990	0.113
(E)			2.000				1" Ice	5.612	12.968	0.187
							2" Ice	6.651	14.980	0.363
							4" Ice	8.834	19.217	0.857
(2) LPA-80080/6CF w/ Mount Pipe	C	From Leg	4.000	0.000	0.000	154.000	No Ice	4.564	10.728	0.046
			0.000				1/2" Ice	5.105	11.990	0.113
(E)			2.000				1" Ice	5.612	12.968	0.187
							2" Ice	6.651	14.980	0.363
							4" Ice	8.834	19.217	0.857
BXA-70063-6CF-2 w/ Mount Pipe	A	From Leg	4.000	0.000	0.000	154.000	No Ice	7.969	5.801	0.042
			0.000				1/2" Ice	8.609	6.953	0.103
(E)			2.000				1" Ice	9.216	7.819	0.171
							2" Ice	10.459	9.601	0.335
							4" Ice	13.066	13.366	0.804
BXA-70063-6CF-2 w/ Mount Pipe	B	From Leg	4.000	0.000	0.000	154.000	No Ice	7.969	5.801	0.042
			0.000				1/2" Ice	8.609	6.953	0.103
(E)			2.000				1" Ice	9.216	7.819	0.171
							2" Ice	10.459	9.601	0.335
							4" Ice	13.066	13.366	0.804
BXA-70063-6CF-2 w/ Mount Pipe	C	From Leg	4.000	0.000	0.000	154.000	No Ice	7.969	5.801	0.042
			0.000				1/2" Ice	8.609	6.953	0.103
(E)			2.000				1" Ice	9.216	7.819	0.171
							2" Ice	10.459	9.601	0.335
							4" Ice	13.066	13.366	0.804
BXA-171063-8BF-EDIN-2 w/ Mount Pipe	A	From Leg	4.000	0.000	0.000	154.000	No Ice	3.179	3.353	0.029
			0.000				1/2" Ice	3.555	3.971	0.061
(E)			2.000				1" Ice	3.964	4.595	0.099
							2" Ice	4.853	5.893	0.193
							4" Ice	6.767	8.885	0.488
BXA-171085-8BF-EDIN-2 w/ Mount Pipe	B	From Leg	4.000	0.000	0.000	154.000	No Ice	3.179	3.353	0.029
			0.000				1/2" Ice	3.555	3.971	0.061
(E)			2.000				1" Ice	3.964	4.595	0.099
							2" Ice	4.853	5.893	0.193
							4" Ice	6.767	8.885	0.488
BXA-171085-8BF-EDIN-2 w/ Mount Pipe	C	From Leg	4.000	0.000	0.000	154.000	No Ice	3.179	3.353	0.029
			0.000				1/2" Ice	3.555	3.971	0.061
(E)			2.000				1" Ice	3.964	4.595	0.099
							2" Ice	4.853	5.893	0.193
							4" Ice	6.767	8.885	0.488
(2) FD9R6004/2C-3L	A	From Leg	4.000	0.000	0.000	154.000	No Ice	0.367	0.085	0.003
(E)			0.000				1/2" Ice	0.451	0.136	0.005
			0.000				1" Ice	0.543	0.196	0.009
							2" Ice	0.755	0.343	0.020
							4" Ice	1.281	0.740	0.063
(2) FD9R6004/2C-3L	B	From Leg	4.000	0.000	0.000	154.000	No Ice	0.367	0.085	0.003
(E)			0.000				1/2" Ice	0.451	0.136	0.005
			0.000				1" Ice	0.543	0.196	0.009
							2" Ice	0.755	0.343	0.020
							4" Ice	1.281	0.740	0.063
(2) FD9R6004/2C-3L	C	From Leg	4.000	0.000	0.000	154.000	No Ice	0.367	0.085	0.003
(E)			0.000				1/2" Ice	0.451	0.136	0.005
			0.000				1" Ice	0.543	0.196	0.009
							2" Ice	0.755	0.343	0.020

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
							4" Ice	1.281	0.740	0.063
Platform Mount [LP 303-1]	C	None			0.000	154.000	No Ice	14.660	14.660	1.250
(E)							1/2" Ice	18.870	18.870	1.481
							1" Ice	23.080	23.080	1.713
							2" Ice	31.500	31.500	2.175
							4" Ice	48.340	48.340	3.101
*******										
*******										
(2)	A	From Leg	4.000		0.000	127.000	No Ice	5.394	3.750	0.056
AP14/17-880/1940/065D/AD			0.000				1/2" Ice	5.863	4.421	0.098
T/XXP w/ Mount Pipe			2.000				1" Ice	6.336	5.074	0.146
(E)							2" Ice	7.314	6.430	0.264
							4" Ice	9.396	9.533	0.612
(2)	B	From Leg	4.000		0.000	127.000	No Ice	5.394	3.750	0.056
AP14/17-880/1940/065D/AD			0.000				1/2" Ice	5.863	4.421	0.098
T/XXP w/ Mount Pipe			2.000				1" Ice	6.336	5.074	0.146
(E)							2" Ice	7.314	6.430	0.264
							4" Ice	9.396	9.533	0.612
(2)	C	From Leg	4.000		0.000	127.000	No Ice	5.394	3.750	0.056
AP14/17-880/1940/065D/AD			0.000				1/2" Ice	5.863	4.421	0.098
T/XXP w/ Mount Pipe			2.000				1" Ice	6.336	5.074	0.146
(E)							2" Ice	7.314	6.430	0.264
							4" Ice	9.396	9.533	0.612
AM-X-CD-14-65-00T-RET	A	From Leg	4.000		0.000	127.000	No Ice	5.744	4.015	0.035
w/ Mount Pipe			0.000				1/2" Ice	6.198	4.633	0.080
(E)			2.000				1" Ice	6.661	5.276	0.131
							2" Ice	7.618	6.678	0.254
							4" Ice	9.668	9.744	0.610
AM-X-CD-16-65-00T-RET	B	From Leg	4.000		0.000	127.000	No Ice	8.498	6.304	0.074
w/ Mount Pipe			0.000				1/2" Ice	9.149	7.479	0.139
(E)			2.000				1" Ice	9.767	8.368	0.212
							2" Ice	11.031	10.179	0.385
							4" Ice	13.679	14.024	0.874
800 10764 w/ Mount Pipe	C	From Leg	4.000		0.000	127.000	No Ice	6.203	4.294	0.064
(E)			0.000				1/2" Ice	6.690	4.992	0.112
			2.000				1" Ice	7.178	5.662	0.166
							2" Ice	8.186	7.100	0.296
							4" Ice	10.328	10.300	0.673
(2) LGP 17201	A	From Leg	4.000		0.000	127.000	No Ice	1.946	0.518	0.031
(E)			0.000				1/2" Ice	2.134	0.640	0.042
			2.000				1" Ice	2.330	0.770	0.055
							2" Ice	2.749	1.056	0.089
							4" Ice	3.690	1.733	0.193
(2) LGP 17201	B	From Leg	4.000		0.000	127.000	No Ice	1.946	0.518	0.031
(E)			0.000				1/2" Ice	2.134	0.640	0.042
			2.000				1" Ice	2.330	0.770	0.055
							2" Ice	2.749	1.056	0.089
							4" Ice	3.690	1.733	0.193
(2) LGP 17201	C	From Leg	4.000		0.000	127.000	No Ice	1.946	0.518	0.031
(E)			0.000				1/2" Ice	2.134	0.640	0.042
			2.000				1" Ice	2.330	0.770	0.055
							2" Ice	2.749	1.056	0.089
							4" Ice	3.690	1.733	0.193
RRUS 11 B12	A	From Leg	4.000		0.000	127.000	No Ice	3.306	1.361	0.051
(E)			0.000				1/2" Ice	3.550	1.540	0.072
			2.000				1" Ice	3.802	1.728	0.095
							2" Ice	4.334	2.130	0.153

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice	5.501	3.038	0.314
RRUS 11 B12	B	From Leg	4.000	0.000	127.000	No Ice	3.306	1.361	0.051
(E)			0.000			1/2" Ice	3.550	1.540	0.072
			2.000			1" Ice	3.802	1.728	0.095
						2" Ice	4.334	2.130	0.153
						4" Ice	5.501	3.038	0.314
RRUS 11 B12	C	From Leg	4.000	0.000	127.000	No Ice	3.306	1.361	0.051
(E)			0.000			1/2" Ice	3.550	1.540	0.072
			2.000			1" Ice	3.802	1.728	0.095
						2" Ice	4.334	2.130	0.153
						4" Ice	5.501	3.038	0.314
DC6-48-60-18-8F	B	From Leg	4.000	0.000	127.000	No Ice	1.467	1.467	0.019
(E)			0.000			1/2" Ice	1.667	1.667	0.037
			2.000			1" Ice	1.878	1.878	0.057
						2" Ice	2.333	2.333	0.105
						4" Ice	3.378	3.378	0.239
Platform Mount [LP 303-1]	C	None		0.000	127.000	No Ice	14.660	14.660	1.250
(E)						1/2" Ice	18.870	18.870	1.481
						1" Ice	23.080	23.080	1.713
						2" Ice	31.500	31.500	2.175
						4" Ice	48.340	48.340	3.101
*******									
APXV18-206517S-C w/ Mount Pipe	A	From Leg	1.000	0.000	117.000	No Ice	5.404	4.700	0.052
(E)			0.000			1/2" Ice	5.960	5.860	0.097
			0.000			1" Ice	6.481	6.734	0.150
						2" Ice	7.547	8.515	0.280
						4" Ice	9.919	12.277	0.679
APXV18-206517S-C w/ Mount Pipe	B	From Leg	1.000	0.000	117.000	No Ice	5.404	4.700	0.052
(E)			0.000			1/2" Ice	5.960	5.860	0.097
			0.000			1" Ice	6.481	6.734	0.150
						2" Ice	7.547	8.515	0.280
						4" Ice	9.919	12.277	0.679
APXV18-206517S-C w/ Mount Pipe	C	From Leg	1.000	0.000	117.000	No Ice	5.404	4.700	0.052
(E)			0.000			1/2" Ice	5.960	5.860	0.097
			0.000			1" Ice	6.481	6.734	0.150
						2" Ice	7.547	8.515	0.280
						4" Ice	9.919	12.277	0.679
********									
8225	C	From Leg	3.000	0.000	79.000	No Ice	0.894	0.894	0.001
(E)			0.000			1/2" Ice	1.080	1.080	0.009
			1.000			1" Ice	1.284	1.284	0.018
						2" Ice	1.719	1.719	0.046
						4" Ice	2.691	2.691	0.137
Side Arm Mount [SO 701-1]	C	From Leg	1.500	0.000	79.000	No Ice	0.850	1.670	0.065
(E)			0.000			1/2" Ice	1.140	2.340	0.079
			0.000			1" Ice	1.430	3.010	0.093
						2" Ice	2.010	4.350	0.121
						4" Ice	3.170	7.030	0.177
********									

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	177 - 129.75	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-14.352	-0.022	0.583
			Max. Mx	5	-7.616	-398.733	0.045
			Max. My	2	-7.554	-0.017	410.998
			Max. Vy	5	13.231	-398.733	0.045
			Max. Vx	8	13.769	-0.025	-410.865
			Max. Torque	6			-0.036
L2	129.75 - 118.583	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-20.828	-0.928	-0.105
			Max. Mx	5	-11.596	-637.083	-0.273
			Max. My	8	-11.539	-0.272	-657.180

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	5	17.640	-637.083	-0.273
			Max. Vx	8	18.168	-0.272	-657.180
			Max. Torque	9			0.830
L3	118.583 - 108	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-23.998	-1.300	-0.578
			Max. Mx	5	-13.603	-835.990	-0.420
			Max. My	8	-13.552	-0.422	-861.667
			Max. Vy	5	19.523	-835.990	-0.420
			Max. Vx	8	20.051	-0.422	-861.667
			Max. Torque	9			0.880
L4	108 - 106.417	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-24.422	-1.349	-0.651
			Max. Mx	5	-13.888	-867.081	-0.443
			Max. My	8	-13.838	-0.443	-893.594
			Max. Vy	5	19.756	-867.081	-0.443
			Max. Vx	8	20.283	-0.443	-893.594
			Max. Torque	9			0.890
L5	106.417 - 84	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-30.687	-1.916	-1.508
			Max. Mx	5	-18.563	-1236.261	-0.710
			Max. My	8	-18.520	-0.697	-1272.120
			Max. Vy	5	22.054	-1236.261	-0.710
			Max. Vx	8	22.583	-0.697	-1272.120
			Max. Torque	9			0.980
L6	84 - 80	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-35.362	-2.203	-1.942
			Max. Mx	5	-22.243	-1434.782	-0.845
			Max. My	8	-22.203	-0.825	-1475.288
			Max. Vy	5	23.266	-1434.782	-0.845
			Max. Vx	8	23.797	-0.825	-1475.288
			Max. Torque	9			1.026
L7	80 - 60	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-43.641	-2.595	-3.151
			Max. Mx	5	-28.747	-1925.826	-1.505
			Max. My	8	-28.715	-1.204	-1977.520
			Max. Vy	5	25.801	-1925.826	-1.505
			Max. Vx	8	26.346	-1.204	-1977.520
			Max. Torque	10			1.164
L8	60 - 39.25	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-49.945	-3.138	-3.966
			Max. Mx	5	-33.804	-2325.248	-1.950
			Max. My	8	-33.780	-1.635	-2385.103
			Max. Vy	5	27.457	-2325.248	-1.950
			Max. Vx	8	27.999	-1.635	-2385.103
			Max. Torque	10			1.270
L9	39.25 - 20	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-63.360	-4.089	-5.392
			Max. Mx	5	-44.897	-3045.486	-2.701
			Max. My	8	-44.885	-2.364	-3118.850
			Max. Vy	5	30.027	-3045.486	-2.701
			Max. Vx	8	30.562	-2.364	-3118.850
			Max. Torque	10			1.442
L10	20 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-73.230	-4.884	-6.578
			Max. Mx	5	-53.167	-3665.175	-3.313
			Max. My	8	-53.167	-2.961	-3749.169
			Max. Vy	5	31.946	-3665.175	-3.313
			Max. Vx	8	32.472	-2.961	-3749.169
			Max. Torque	10			1.591

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	73.230	-0.000	-0.000
	Max. H_x	11	53.174	31.934	0.018
	Max. H_z	2	53.174	0.018	32.459
	Max. M_x	2	3745.902	0.018	32.459
	Max. M_z	5	3665.175	-31.934	-0.018
	Max. Torsion	10	1.591	27.647	-16.214
	Min. Vert	33	53.174	-0.007	-12.679
	Min. H_x	5	53.174	-31.934	-0.018
	Min. H_z	8	53.174	-0.018	-32.459
	Min. M_x	8	-3749.169	-0.018	-32.459
	Min. M_z	11	-3662.615	31.934	0.018
	Min. Torsion	4	-1.543	-27.647	16.214

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	53.174	0.000	0.000	1.593	-1.249	0.000
Dead+Wind 0 deg - No Ice	53.174	-0.018	-32.459	-3745.902	0.402	0.593
Dead+Wind 30 deg - No Ice	53.174	15.952	-28.102	-3243.028	-1831.713	1.223
Dead+Wind 60 deg - No Ice	53.174	27.647	-16.214	-1870.744	-3173.435	1.543
Dead+Wind 90 deg - No Ice	53.174	31.934	0.018	3.313	-3665.175	1.467
Dead+Wind 120 deg - No Ice	53.174	27.664	16.245	1876.920	-3175.115	0.998
Dead+Wind 150 deg - No Ice	53.174	15.982	28.119	3247.973	-1834.625	0.245
Dead+Wind 180 deg - No Ice	53.174	0.018	32.459	3749.169	-2.961	-0.592
Dead+Wind 210 deg - No Ice	53.174	-15.952	28.102	3246.294	1829.155	-1.271
Dead+Wind 240 deg - No Ice	53.174	-27.647	16.214	1874.009	3170.876	-1.591
Dead+Wind 270 deg - No Ice	53.174	-31.934	-0.018	-0.049	3662.615	-1.467
Dead+Wind 300 deg - No Ice	53.174	-27.664	-16.245	-1873.654	3172.553	-0.950
Dead+Wind 330 deg - No Ice	53.174	-15.982	-28.119	-3244.706	1832.064	-0.196
Dead+Ice+Temp	73.230	0.000	0.000	6.578	-4.884	0.000
Dead+Wind 0 deg+Ice+Temp	73.230	-0.005	-9.158	-1070.414	-4.694	0.186
Dead+Wind 30 deg+Ice+Temp	73.230	4.512	-7.929	-925.924	-533.292	0.374
Dead+Wind 60 deg+Ice+Temp	73.230	7.820	-4.575	-531.520	-920.349	0.463
Dead+Wind 90 deg+Ice+Temp	73.230	9.033	0.005	7.120	-1062.150	0.429
Dead+Wind 120 deg+Ice+Temp	73.230	7.825	4.583	545.665	-920.700	0.280
Dead+Wind 150 deg+Ice+Temp	73.230	4.520	7.933	939.812	-533.900	0.055
Dead+Wind 180 deg+Ice+Temp	73.230	0.005	9.158	1083.951	-5.396	-0.186
Dead+Wind 210 deg+Ice+Temp	73.230	-4.512	7.929	939.461	523.203	-0.377
Dead+Wind 240 deg+Ice+Temp	73.230	-7.820	4.575	545.057	910.259	-0.466
Dead+Wind 270 deg+Ice+Temp	73.230	-9.033	-0.005	6.418	1052.061	-0.429
Dead+Wind 300 deg+Ice+Temp	73.230	-7.825	-4.583	-532.128	910.610	-0.277
Dead+Wind 330 deg+Ice+Temp	73.230	-4.520	-7.933	-926.275	523.811	-0.052
Dead+Wind 0 deg - Service	53.174	-0.007	-12.679	-1463.312	-0.626	0.233
Dead+Wind 30 deg - Service	53.174	6.231	-10.977	-1266.721	-716.809	0.485
Dead+Wind 60 deg - Service	53.174	10.800	-6.334	-730.273	-1241.271	0.610
Dead+Wind 90 deg - Service	53.174	12.474	0.007	2.293	-1433.478	0.575
Dead+Wind 120 deg - Service	53.174	10.806	6.346	734.684	-1241.928	0.385
Dead+Wind 150 deg - Service	53.174	6.243	10.984	1270.651	-717.947	0.090
Dead+Wind 180 deg - Service	53.174	0.007	12.679	1466.585	-1.940	-0.233

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 210 deg - Service	53.174	-6.231	10.977	1269.995	714.243	-0.493
Dead+Wind 240 deg - Service	53.174	-10.800	6.334	733.547	1238.706	-0.618
Dead+Wind 270 deg - Service	53.174	-12.474	-0.007	0.980	1430.912	-0.575
Dead+Wind 300 deg - Service	53.174	-10.806	-6.346	-731.411	1239.362	-0.378
Dead+Wind 330 deg - Service	53.174	-6.243	-10.984	-1267.378	715.381	-0.082

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	0.000	-53.174	0.000	0.000	53.174	0.000	0.000%
2	-0.018	-53.174	-32.459	0.018	53.174	32.459	0.000%
3	15.952	-53.174	-28.102	-15.952	53.174	28.102	0.000%
4	27.647	-53.174	-16.214	-27.647	53.174	16.214	0.000%
5	31.934	-53.174	0.018	-31.934	53.174	-0.018	0.000%
6	27.664	-53.174	16.245	-27.664	53.174	-16.245	0.000%
7	15.982	-53.174	28.119	-15.982	53.174	-28.119	0.000%
8	0.018	-53.174	32.459	-0.018	53.174	-32.459	0.000%
9	-15.952	-53.174	28.102	15.952	53.174	-28.102	0.000%
10	-27.647	-53.174	16.214	27.647	53.174	-16.214	0.000%
11	-31.934	-53.174	-0.018	31.934	53.174	0.018	0.000%
12	-27.664	-53.174	-16.245	27.664	53.174	16.245	0.000%
13	-15.982	-53.174	-28.119	15.982	53.174	28.119	0.000%
14	0.000	-73.230	0.000	-0.000	73.230	-0.000	0.000%
15	-0.005	-73.230	-9.158	0.005	73.230	9.158	0.000%
16	4.512	-73.230	-7.929	-4.512	73.230	7.929	0.000%
17	7.820	-73.230	-4.575	-7.820	73.230	4.575	0.000%
18	9.033	-73.230	0.005	-9.033	73.230	-0.005	0.000%
19	7.825	-73.230	4.583	-7.825	73.230	-4.583	0.000%
20	4.520	-73.230	7.933	-4.520	73.230	-7.933	0.000%
21	0.005	-73.230	9.158	-0.005	73.230	-9.158	0.000%
22	-4.512	-73.230	7.929	4.512	73.230	-7.929	0.000%
23	-7.820	-73.230	4.575	7.820	73.230	-4.575	0.000%
24	-9.033	-73.230	-0.005	9.033	73.230	0.005	0.000%
25	-7.825	-73.230	-4.583	7.825	73.230	4.583	0.000%
26	-4.520	-73.230	-7.933	4.520	73.230	7.933	0.000%
27	-0.007	-53.174	-12.679	0.007	53.174	12.679	0.000%
28	6.231	-53.174	-10.977	-6.231	53.174	10.977	0.000%
29	10.800	-53.174	-6.334	-10.800	53.174	6.334	0.000%
30	12.474	-53.174	0.007	-12.474	53.174	-0.007	0.000%
31	10.806	-53.174	6.346	-10.806	53.174	-6.346	0.000%
32	6.243	-53.174	10.984	-6.243	53.174	-10.984	0.000%
33	0.007	-53.174	12.679	-0.007	53.174	-12.679	0.000%
34	-6.231	-53.174	10.977	6.231	53.174	-10.977	0.000%
35	-10.800	-53.174	6.334	10.800	53.174	-6.334	0.000%
36	-12.474	-53.174	-0.007	12.474	53.174	0.007	0.000%
37	-10.806	-53.174	-6.346	10.806	53.174	6.346	0.000%
38	-6.243	-53.174	-10.984	6.243	53.174	10.984	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00041096
3	Yes	5	0.00000001	0.00054391
4	Yes	5	0.00000001	0.00051883
5	Yes	4	0.00000001	0.00064757
6	Yes	5	0.00000001	0.00053720
7	Yes	5	0.00000001	0.00053462
8	Yes	4	0.00000001	0.00043447
9	Yes	5	0.00000001	0.00052274
10	Yes	5	0.00000001	0.00054173
11	Yes	4	0.00000001	0.00062762
12	Yes	5	0.00000001	0.00052439
13	Yes	5	0.00000001	0.00053312
14	Yes	4	0.00000001	0.00002218
15	Yes	5	0.00000001	0.00037086
16	Yes	5	0.00000001	0.00041223
17	Yes	5	0.00000001	0.00040822
18	Yes	5	0.00000001	0.00036641
19	Yes	5	0.00000001	0.00041205
20	Yes	5	0.00000001	0.00041523
21	Yes	5	0.00000001	0.00037393
22	Yes	5	0.00000001	0.00041169
23	Yes	5	0.00000001	0.00040875
24	Yes	5	0.00000001	0.00036312
25	Yes	5	0.00000001	0.00040512
26	Yes	5	0.00000001	0.00040888
27	Yes	4	0.00000001	0.00014816
28	Yes	5	0.00000001	0.00005245
29	Yes	5	0.00000001	0.00004775
30	Yes	4	0.00000001	0.00017454
31	Yes	5	0.00000001	0.00005118
32	Yes	5	0.00000001	0.00005058
33	Yes	4	0.00000001	0.00014950
34	Yes	5	0.00000001	0.00004837
35	Yes	5	0.00000001	0.00005213
36	Yes	4	0.00000001	0.00017280
37	Yes	5	0.00000001	0.00004863
38	Yes	5	0.00000001	0.00005017

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	177 - 129.75	36.695	33	1.999	0.001
L2	133.5 - 118.583	19.777	33	1.555	0.001
L3	118.583 - 108	15.297	33	1.276	0.001
L4	108 - 106.417	12.658	33	1.103	0.001
L5	106.417 - 84	12.296	33	1.076	0.001
L6	88.75 - 80	8.635	33	0.901	0.001
L7	80 - 60	7.034	33	0.835	0.001
L8	60 - 39.25	3.974	33	0.625	0.000
L9	45 - 20	2.270	33	0.459	0.000
L10	20 - 0	0.445	33	0.214	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
177.000	APXVSPP18-C-A20 w/ Mount Pipe	33	36.695	1.999	0.001	25992
167.000	APXV18-206516S-C-A20 w/ Mount Pipe	33	32.530	1.932	0.001	12996
154.000	(2) LPA-80063/6CF w/ Mount Pipe	33	27.267	1.825	0.002	5649
127.000	(2) AP14/17-880/1940/065D/ADT/XXP w/ Mount Pipe	33	17.713	1.434	0.001	2949
117.000	APXV18-206517S-C w/ Mount Pipe	33	14.875	1.249	0.001	3013
79.000	8225	33	6.861	0.826	0.001	5901

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	177 - 129.75	93.689	8	5.106	0.003
L2	133.5 - 118.583	50.521	8	3.972	0.004
L3	118.583 - 108	39.083	8	3.259	0.003
L4	108 - 106.417	32.342	8	2.819	0.002
L5	106.417 - 84	31.419	8	2.750	0.002
L6	88.75 - 80	22.065	8	2.301	0.002
L7	80 - 60	17.976	8	2.134	0.001
L8	60 - 39.25	10.156	8	1.599	0.001
L9	45 - 20	5.802	8	1.174	0.001
L10	20 - 0	1.138	8	0.546	0.000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
177.000	APXVSPP18-C-A20 w/ Mount Pipe	8	93.689	5.106	0.004	10313
167.000	APXV18-206516S-C-A20 w/ Mount Pipe	8	83.062	4.934	0.004	5156
154.000	(2) LPA-80063/6CF w/ Mount Pipe	8	69.634	4.662	0.004	2239
127.000	(2) AP14/17-880/1940/065D/ADT/XXP w/ Mount Pipe	8	45.252	3.662	0.003	1164
117.000	APXV18-206517S-C w/ Mount Pipe	8	38.005	3.190	0.003	1187
79.000	8225	8	17.533	2.112	0.001	2315

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	177 - 129.75 (1)	TP30.268x22x0.219	47.250	0.000	0.0	39.000	20.408	-7.554	795.911	0.009
L2	129.75 - 118.583 (2)	TP31.785x29.174x0.25	14.917	0.000	0.0	39.000	25.023	-11.540	975.884	0.012
L3	118.583 - 108 (3)	TP33.636x31.785x0.382	10.583	0.000	0.0	32.963	40.279	-13.552	1327.720	0.010
L4	108 - 106.417 (4)	TP33.913x33.636x0.38	1.583	0.000	0.0	32.969	40.483	-13.838	1334.690	0.010
L5	106.417 - 84 (5)	TP37.836x33.913x0.716	22.417	0.000	0.0	19.117	82.499	-18.520	1577.120	0.012
L6	84 - 80 (6)	TP38.036x36.505x0.766	8.750	0.000	0.0	19.201	90.573	-22.203	1739.070	0.013
L7	80 - 60 (7)	TP41.536x38.036x0.767	20.000	0.000	0.0	20.049	99.234	-28.715	1989.530	0.014
L8	60 - 39.25 (8)	TP45.167x41.536x0.73	20.750	0.000	0.0	24.433	100.657	-33.780	2459.390	0.014
L9	39.25 - 20 (9)	TP47.91x43.536x0.752	25.000	0.000	0.0	24.698	112.625	-44.885	2781.580	0.016
L10	20 - 0 (10)	TP51.41x47.91x0.762	20.000	0.000	0.0	25.102	122.449	-53.166	3073.700	0.017

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	177 - 129.75 (1)	TP30.268x22x0.219	410.998	33.306	39.000	0.854	0.000	0.000	39.000	0.000
L2	129.75 - 118.583 (2)	TP31.785x29.174x0.25	657.180	40.504	39.000	1.039	0.000	0.000	39.000	0.000
L3	118.583 - 108 (3)	TP33.636x31.785x0.382	861.667	31.396	32.963	0.952	0.000	0.000	32.963	0.000
L4	108 - 106.417 (4)	TP33.913x33.636x0.38	893.592	32.122	32.969	0.974	0.000	0.000	32.969	0.000
L5	106.417 - 84 (5)	TP37.836x33.913x0.716	1272.117	20.908	19.117	1.094	0.000	0.000	19.117	0.000
L6	84 - 80 (6)	TP38.036x36.505x0.766	1475.292	21.520	19.201	1.121	0.000	0.000	19.201	0.000
L7	80 - 60 (7)	TP41.536x38.036x0.767	1977.517	24.029	20.049	1.199	0.000	0.000	20.049	0.000
L8	60 - 39.25 (8)	TP45.167x41.536x0.73	2385.100	26.768	24.433	1.096	0.000	0.000	24.433	0.000
L9	39.25 - 20 (9)	TP47.91x43.536x0.752	3118.850	28.786	24.698	1.166	0.000	0.000	24.698	0.000
L10	20 - 0 (10)	TP51.41x47.91x0.762	3749.167	29.608	25.102	1.179	0.000	0.000	25.102	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	177 - 129.75 (1)	TP30.268x22x0.219	13.768	0.675	26.000	0.052	0.000	0.000	26.000	0.000
L2	129.75 - 118.583 (2)	TP31.785x29.174x0.25	18.168	0.726	26.000	0.056	0.670	0.020	26.000	0.001
L3	118.583 - 108 (3)	TP33.636x31.785x0.382	20.051	0.498	21.976	0.045	0.690	0.012	21.976	0.001
L4	108 - 106.417 (4)	TP33.913x33.636x0.38	20.284	0.501	21.980	0.046	0.693	0.012	21.980	0.001
L5	106.417 - 84 (5)	TP37.836x33.913x0.716	22.583	0.274	12.745	0.043	0.725	0.006	12.745	0.000
L6	84 - 80 (6)	TP38.036x36.505x0.766	23.797	0.263	12.801	0.041	0.741	0.005	12.801	0.000
L7	80 - 60 (7)	TP41.536x38.036x0.767	26.346	0.265	13.366	0.040	0.486	0.003	13.366	0.000
L8	60 - 39.25 (8)	TP45.167x41.536x0.73	27.999	0.278	16.289	0.034	0.512	0.003	16.289	0.000
L9	39.25 - 20 (9)	TP47.91x43.536x0.752	30.563	0.271	16.465	0.033	0.556	0.002	16.465	0.000
L10	20 - 0 (10)	TP51.41x47.91x0.762	32.472	0.265	16.735	0.032	0.592	0.002	16.735	0.000

Pole Interaction Design Data

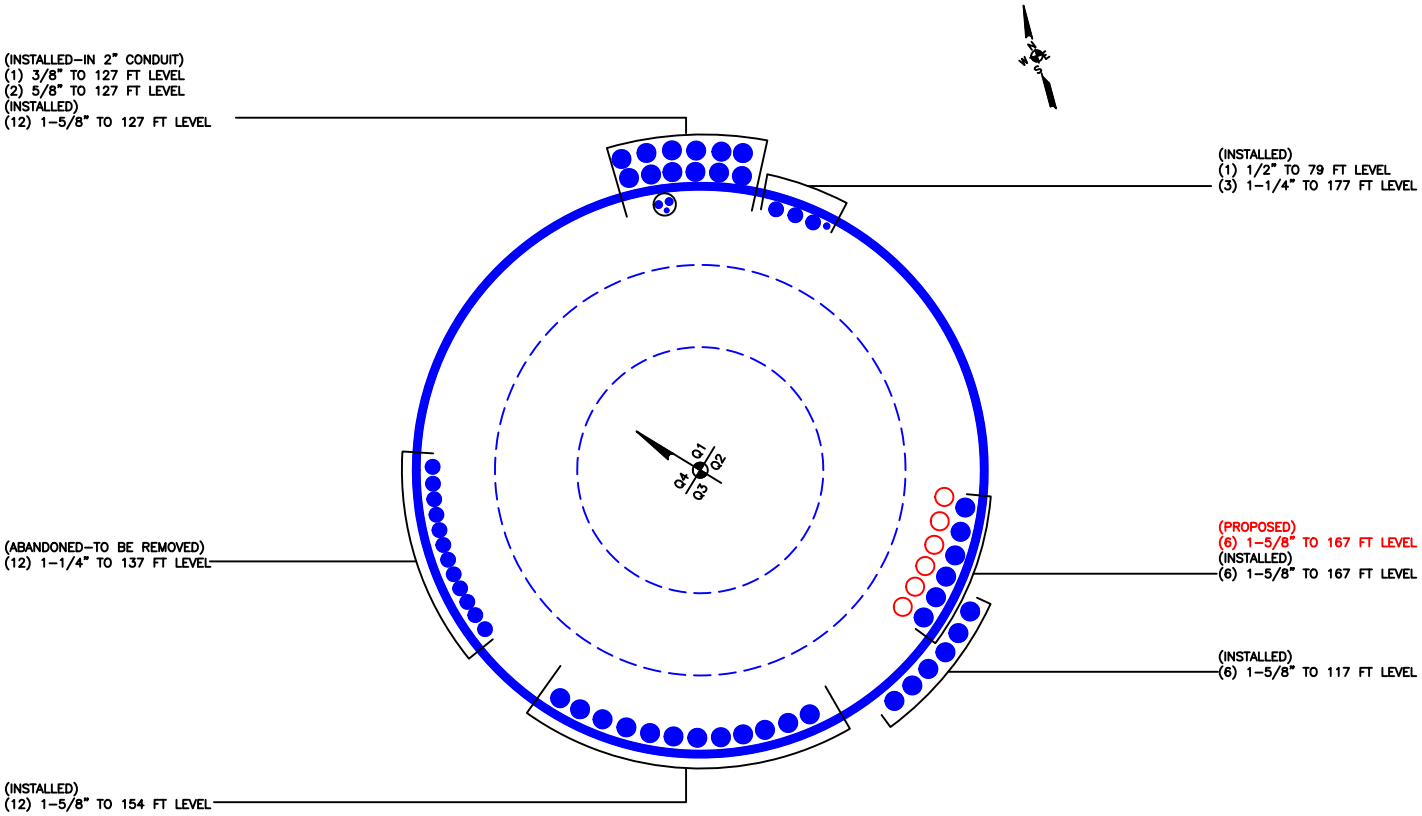
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	177 - 129.75 (1)	0.009	0.854	0.000	0.052	0.000	0.864 ✔	1.333	H1-3+VT ✔
L2	129.75 - 118.583 (2)	0.012	1.039	0.000	0.056	0.001	1.051 ✔	1.333	H1-3+VT ✔
L3	118.583 - 108 (3)	0.010	0.952	0.000	0.045	0.001	0.963 ✔	1.333	H1-3+VT ✔
L4	108 - 106.417 (4)	0.010	0.974	0.000	0.046	0.001	0.985 ✔	1.333	H1-3+VT ✔
L5	106.417 - 84 (5)	0.012	1.094	0.000	0.043	0.000	1.106 ✔	1.333	H1-3+VT ✔
L6	84 - 80 (6)	0.013	1.121	0.000	0.041	0.000	1.134 ✔	1.333	H1-3+VT ✔
L7	80 - 60 (7)	0.014	1.199	0.000	0.040	0.000	1.213 ✔	1.333	H1-3+VT ✔
L8	60 - 39.25 (8)	0.014	1.096	0.000	0.034	0.000	1.110 ✔	1.333	H1-3+VT ✔
L9	39.25 - 20 (9)	0.016	1.166	0.000	0.033	0.000	1.182 ✔	1.333	H1-3+VT ✔
L10	20 - 0 (10)	0.017	1.179	0.000	0.032	0.000	1.197 ✔	1.333	H1-3+VT ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	177 - 129.75	Pole	TP30.268x22x0.219	1	-7.554	1060.949	64.8	Pass
L2	129.75 - 118.583	Pole	TP31.785x29.174x0.25	2	-11.540	1300.853	78.9	Pass
L3	118.583 - 108	Pole	TP33.636x31.785x0.382	3	-13.552	1769.851	72.3	Pass
L4	108 - 106.417	Pole	TP33.913x33.636x0.38	4	-13.838	1779.142	73.9	Pass
L5	106.417 - 84	Pole	TP37.836x33.913x0.716	5	-18.520	2102.301	83.0	Pass
L6	84 - 80	Pole	TP38.036x36.505x0.766	6	-22.203	2318.180	85.1	Pass
L7	80 - 60	Pole	TP41.536x38.036x0.767	7	-28.715	2652.043	91.0	Pass
L8	60 - 39.25	Pole	TP45.167x41.536x0.73	8	-33.780	3278.367	83.2	Pass
L9	39.25 - 20	Pole	TP47.91x43.536x0.752	9	-44.885	3707.846	88.7	Pass
L10	20 - 0	Pole	TP51.41x47.91x0.762	10	-53.166	4097.242	89.8	Pass
							Summary	
						Pole (L7)	91.0	Pass
						RATING =	**91.0**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT:876376

APPENDIX C

ADDITIONAL CALCULATIONS

Reinforcement 1

Bottom	Top	QTY	Type	Position	Gap	Ten/Comp
0	20	3	4-1/2" SR	F	0	T&C
20	60	3	1/4" SR Lu=3	F	0	T&C
60	80	3	1/4" SR Lu=6	F	0	T&C
80	108	3	4" SR	F	0	T&C
106.417	118.583	3	MP304	F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C

Reinforcement 2

Bottom	Top	QTY	Type	Position	Gap	Ten/Comp
0				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C

Reinforcement 3

Bottom	Top	QTY	Type	Position	Gap	Ten/Comp
0				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C
				F	0	T&C

Bottom Elevation	Top Elevation	Original Thickness	Original Yield Stress	Original Ultimate Stress	Reinforced Shaft Capacity	Reinf. 1 QTY	Reinf. 1 Type	Rein. 1 Capacity	Reinf. 2 QTY	Reinf. 2 Type	Rein. 2 Capacity	Reinf. 3 QTY	Reinf. 3 Type	Rein. 3 Capacity	Control Stress Ratio	Top Height	Section Length	Lap Splice	# of Sides	Top Diameter	Bottom Diameter	Equivalent Shaft Thickness	Equivalent Shaft Fy	Equivalent Weight Mult.		Bottom Elevation Failure	Top Elevation Failure	Section Failure %
129.7500	177.0000	0.2188	65	80	64.7%										**64.7%**	177.0000	47.2500	3.7500	18	22.0000	30.2680	0.2188	65.0	1.00	1			
118.5830	133.5000	0.2500	65	80	78.7%										**78.7%**	133.5000	14.9170	0.0000	18	29.1743	31.7845	0.2500	65.0	1.00	2			
108.0000	118.5830	0.2500	65	80	60.4%	3	MP304	72.3%							**72.3%**	118.5830	10.5830	0.0000	18	31.7845	33.6364	0.3816	53.5	0.97	3			
106.4170	108.0000	0.2500	65	80	61.8%	3	MP304	73.9%							**73.9%**	108.0000	1.5830	0.0000	18	33.6364	33.9134	0.3804	53.5	0.97	4			
84.0000	106.4170	0.2500	65	80	40.8%	3	4" SR	83.0%							**83.0%**	106.4170	22.4170	4.7500	18	33.9134	37.8360	0.7163	31.1	0.81	5			
80.0000	88.7500	0.3125	65	80	41.9%	3	4" SR	85.1%							**85.1%**	88.7500	8.7500	0.0000	18	36.5048	38.0360	0.7656	31.2	0.83	6			
60.0000	80.0000	0.3125	65	80	46.8%	3	1/4" SR Lu=6	91.0%							**91.0%**	80.0000	20.0000	0.0000	18	38.0360	41.5359	0.7669	32.6	0.84	7			
39.2500	60.0000	0.3125	65	80	52.2%	3	1/4" SR Lu=3	83.2%							**83.2%**	60.0000	20.7500	5.7500	18	41.5359	45.1670	0.7302	39.6	0.86	8			
20.0000	45.0000	0.3750	65	80	56.0%	3	1/4" SR Lu=3	88.7%							**88.7%**	45.0000	25.0000	0.0000	18	43.5358	47.9104	0.7524	40.0	0.88	9			
0.0000	20.0000	0.3750	65	80	57.7%	3	4-1/2" SR	89.8%							**89.8%**	20.0000	20.0000	0.0000	18	47.9104	51.4100	0.7617	40.6	0.89	10			
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Reinforced Pole Stress and Effective Thickness Check

AeroSolutions LLC
Optimizing Your Tower Infrastructure
5500 Flatirons Parkway, Suite 100
Boulder, CO 80301
720-304-6882

Section		Loads				Pole																Unreinforced Pole - Rev. F					Reinforced Pole						Rev. F	Reinforcement 1									Composite						
Section	Elevation (ft)	Moment (ft-kip)	Compressi on (kip)	Shear (kip)	Torsion (kip-ft)	Number of Sides	OD (in)	Thickness (in)	Yield Strength (ksi)	Flat Width (in)	Area (in^2)	Moment of Inertia (in^4)	Percent of Composite Moment of Inertia	Angle Offset to Pole Flat	Distance to Extreme Fiber (in)	Section Modulus (in^3)	Torsion Constant (in^4)	Polygonal Compact Criterion	Allowable Bending Stress (ksi)	Allowable Bending Moment Strength (ft-kip)	Allowable Axial Stress (ksi)	Allowable Shear Stress (ksi)	Bending Stress (ksi)	Axial Stress (ksi)	Shear Stress (ksi)	Torsion Shear Stress (ksi)	**Stress Ratio**	Moment in Pole when Reinforced	Bending Stress (ksi)	Axial Stress (ksi)	Shear Stress (ksi)	Torsion Shear Stress (ksi)	**Reinforced Pole Stress Ratio**	**Rev. F Reinforced Pole Stress Ratio**	Qty	**Model**	Position (F-Flat, C Corner)	Gap Between Pole and Back of Rein. (in)	Tension only or Tension & Comp.	Total Moment of Inertia (in^4)	Axial Force (kip)	**Stress Ratio**	Centroid Offset (in)	Area (in^2)	Moment of Inertia (in^4)	**Controlling Stress Ratio**	**Thickness (in)**	**Weight Multiplier**	**Derated Yield Stress (ksi)**	**% Error in Derated Yield Stress**
Section	*Elevation*	*Moment*	*Compressior*	*Shear*	*Torsion*	*PoleSides*	*PoleOD*	*PoleT*	*PoleFy*	*PoleW*	*PoleA*	*PoleI*	*PoleIPer*	*PoleCPoint*	*PoleC*	*PoleS*	*PoleJ*	*PoleWTf*	*PoleFb*	*PoleMall*	*PoleFa*	*PoleFv*	*PoleFbAct*	*PoleFaAct*	*PoleFvAct*	*PoleFvtAct*	***PoleSR***	*PoleMomeR*	*RPoleFbAct*	*RPoleFaAct*	*RPoleFvAct*	*RPoleFvtAct*	***RPoleSR***		*Rein1Qty*	***Rein1Model***	*Rein1Pos*	*Rein1Gap*	*Rein1TC*	*Rein1ITotal*	*Rein1P*	***Rein1SR***	*CompYBar*	*CompA*	*CompI*	***CompSR***	***EPoleT***	***EPoleWM***	***EDPoleFy***	***EDPoleSRCheck***
1	177	0.0	2.0	3.1	0.0	18	22.0000	0.2188	65	3.49	15.1	905	100%	TRUE	11.15	81	1795	129	52.0	351.6	52.0	34.7	0.0	0.13	0.00	0.00	**0.003**	0.0	0.0	0.13	0.00	0.00	**0.003**										0.000	15.1	905	**0.003**	**0.2188**	**1.00**	**65.0**	**441.2%**
2	133.5	411.0	7.6	13.8	0.0	18	29.6118	0.2188	65	4.84	20.4	2225	100%	TRUE	15.02	148	4410	178	52.0	641.9	52.0	34.7	33.3	0.37	0.00	0.00	**0.647**	411.0	33.3	0.37	0.00	0.00	**0.647**										0.000	20.4	2225	**0.647**	**0.2188**	**1.00**	**65.0**	**0.3%**
3	129.75	463.1	8.2	14.0	0.0	18	30.2680	0.4688	65	4.51	44.3	4965	100%	TRUE	15.33	324	9852	78	52.0	1403.0	52.0	34.7	17.2	0.19	0.00	0.00	**0.334**	463.1	17.2	0.19	0.00	0.00	**0.334**										0.000	44.3	4965	**0.334**	**0.4688**	**1.00**	**65.0**	**0.3%**
4	118.583	657.1	11.5	18.2	0.7	18	31.7845	0.2500	65	5.16	25.0	3140	100%	TRUE	16.12	195	6224	167	52.0	844.0	52.0	34.7	40.5	0.46	0.00	0.02	**0.787**	657.1	40.5	0.46	0.00	0.00	**0.787**										0.000	25.0	3140	**0.787**	**0.2500**	**1.00**	**65.0**	**0.3%**
5	108	861.7	13.6	20.1	0.7	18	33.6364	0.2500	65	5.49	26.5	3727	66%	0	16.82	222	7386	177	52.0	960.0	52.0	34.7	46.7	0.51	0.00	0.02	**0.907**	570.6	30.9	0.51	0.00	0.00	**0.604**	**3**	**MP304**	**F**	0	T&C	1901	132.3	**0.723**	0.000	38.9	5628	**0.723**	**0.3816**	**0.97**	**53.5**	**2.8%**
6	106.417	893.7	13.8	20.3	0.7	18	33.9134	0.2500	65	5.54	26.7	3820	66%	0	16.96	225	7572	179	52.0	976.0	52.0	34.7	47.6	0.52	0.00	0.02	**0.926**	593.6	31.6	0.52	0.00	0.00	**0.618**	**3**	**MP304**	**F**	0	T&C	1931	135.4	**0.739**	0.000	39.1	5751	**0.739**	**0.3804**	**0.97**	**53.5**	**2.8%**
7	88.75	1272.1	18.5	22.6	0.7	18	37.0048	0.2500	65	6.08	29.1	4973	36%	0	18.50	269	9855	196	52.0	1164.3	52.0	34.7	56.8	0.64	0.00	0.02	**1.105**	460.9	20.6	0.64	0.00	0.00	**0.408**	**3**	**4" SR**	**F**	0	T&C	8753	301.2	**0.830**	0.000	66.8	13726	**0.830**	**0.7163**	**0.81**	**31.1**	**2.6%**
8	84	1381.1	21.0	23.3	0.7	18	37.8360	0.5625	65	5.68	66.5	11660	56%	0	18.92	616	23136	81	52.0	2670.2	52.0	34.7	26.9	0.32	0.00	0.01	**0.523**	776.0	15.1	0.32	0.00	0.00	**0.297**	**3**	**4" SR**	**F**	0	T&C	9093	220.4	**0.607**	0.000	104.2	20753	**0.607**	**1.0387**	**0.86**	**31.2**	**2.6%**
9	80	1475.3	22.2	23.8	0.7	18	38.0360	0.3125	65	6.16	37.4	6719	42%	0	19.02	353	13320	159	52.0	1530.7	52.0	34.7	50.1	0.59	0.00	0.01	**0.975**	623.7	21.2	0.59	0.00	0.00	**0.419**	**3**	**4" SR**	**F**	0	T&C	9176	308.8	**0.851**	0.000	75.1	15895	**0.851**	**0.7656**	**0.83**	**31.2**	**2.6%**
10	60	1977.5	28.7	26.3	0.5	18	41.5359	0.3125	65	6.77	40.9	8769	42%	0	20.77	422	17381	175	52.0	1829.3	52.0	34.7	56.2	0.70	0.00	0.01	**1.095**	832.2	23.7	0.70	0.00	0.00	**0.468**	**3**	**4-1/4" SR Lu=66"**	**F**	0	T&C	12069	384.7	**0.910**	0.000	83.4	20838	**0.910**	**0.7669**	**0.84**	**32.6**	**2.7%**
11	45	2385.1	33.8	28.0	0.5	18	44.1608	0.3125	65	7.24	43.5	10554	44%	0	22.08	478	20916	187	52.0	2070.7	52.0	34.7	59.9	0.78	0.00	0.01	**1.167**	1049.4	26.3	0.78	0.00	0.00	**0.522**	**3**	**4-1/4" SR Lu=33"**	**F**	0	T&C	13433	425.3	**0.832**	0.000	86.0	23987	**0.832**	**0.7302**	**0.86**	**39.6**	**2.8%**
12	39.25	2548.2	37.6	28.7	0.5	18	45.1670	0.6875	65	6.75	96.9	24217	63%	0	22.58	1072	48054	79	52.0	4645.6	52.0	34.7	28.5	0.39	0.00	0.00	**0.556**	1615.7	18.1	0.39	0.00	0.00	**0.355**	**3**	**4-1/4" SR Lu=33"**	**F**	0	T&C	13976	291.1	**0.570**	0.000	139.5	38193	**0.570**	**1.1141**	**0.90**	**39.8**	**2.8%**
13	20	3118.9	44.9	30.6	0.6	18	47.9104	0.3750	65	7.79	56.5	16134	51%	0	23.96	674	31980	167	52.0	2917.8	52.0	34.7	55.6	0.79	0.00	0.00	**1.094**	1590.2	28.3	0.79	0.00	0.00	**0.560**	**3**	**4-1/4" SR Lu=33"**	**F**	0	T&C	15509	453.0	**0.887**	0.000	99.1	31643	**0.887**	**0.7524**	**0.88**	**40.0**	**2.9%**
14	0	3749.2	53.2	32.5	0.6	18	51.4100	0.3750	65	8.40	60.7	19967	50%	0	25.71	777	39575	181	52.0	3365.2	52.0	34.7	57.9	0.88	0.00	0.00	**1.131**	1886.4	29.1	0.88	0.00	0.00	**0.577**	**3**	**4-1/2" SR**	**F**	0	T&C	19718	518.4	**0.898**	0.000	108.4	39685	**0.898**	**0.7617**	**0.89**	**40.6**	**3.0%**
																										1.167						**0.787**								**0.910**				**0.910**				

Rein1

Bottom	Top	Qty	Model	Position	T or T&C
0	20	3	4-1/2" SR	F	T&C
20	60	3	SR Lu=33"	F	T&C
60	80	3	SR Lu=66"	F	T&C
80	108	3	4" SR	F	T&C
106.417	118.583	3	MP304	F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

Flats (Used for relative orientation only. Actual flat numbers may vary.)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
			1						1						1		
			1						1						1		
			1						1						1		
			1						1						1		
1						1						1					

Rein2

Bottom	Top	Qty	Model	Position	T or T&C
0				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

Rein3

Bottom	Top	Qty	Model	Position	T or T&C
	0			F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

Reinforcement Capacity

AeroSolutions LLC
Optimizing Your Tower Infrastructure

5500 Flatirons Parkway, Suite 100
Boulder, CO 80301
720-304-6882

Dimensions and Properties														Compression				Axial				
																		ASD-9			LRFD	
Model	Weight (lb/ft)	Area (in^2)	Moment of Inertia (in^4)	Moment of Inertia (in^4)	Centroid from Mating Edge (in)	Centroid from Bolt Hole Center (in)	Web Thickness (in)	Width (in)	Flange Width (in)	Flange Thickness (in)	Hole Diameter (in)	Yield Stress (ksi)	Ultimate Stress (ksi)	Slender. Ratio Coefficient	Unbraced Length (in)	Slender. Ratio Coefficient	Unbraced Length (in)	Allowable Axial (kip)	Allowable Axial w/ increase (kip)	Governing Axial	Design Axial Strength (kip)	Governing Axial
Model	*Wt*	*A*	*Ix*	*Iy*	*Y*	*X*	*Tw*	*W*	*Wf*	*Tf*	*Dh*	*Fy*	*Fu*	*Kx*	*Lx*	*Ky*	*Ly*	*PAll*	*Pall.inc*	*Ptype.ASD*	*phiPn*	*Ptype.LRFD*
MP304	14.1	4.13	0.91	11.86	0.61	0	0.43	4.78	1.61	0.84	1.21875	65	80	0.80	18	1.00	18	137.3	183.1	Rupture	**206.0**	Rupture
4-1/2" SR	54.1	15.90	20.13	20.13	3	0	0	4.5				50	65	0.80	33	1.00	33	433.2	577.5	Compress.	672.1	Compress.
4-1/4" SR Lu=33"	48.3	14.19	16.0	16.0	3.0	0	0	4.25				50	65	0.80	33	1.00	33	383.3	511.1	Compress.	594.9	Compress.
4-1/4" SR Lu=66"	48.3	14.19	16.0	16.0	3.0	0	0	4.25				50	65	0.80	66	1.00	66	317.1	422.8	Compress.	481.5	Compress.
4" SR	42.8	12.57	12.6	12.6	3	0	0	4				50	65	0.80	66	1.00	66	272.3	363.0	Compress.	411.2	Compress.

Anchor Rod Information for TIA/EIA-222-F and TIA-222-G-2

Site Information	
ID:	876376
Name:	SCOVILLE HILL - HARWINTON ROD
App. #:	358301 Revision # 0

AeroSolutions LLC
Optimizing Your Tower Infrastructure

Base Reactions		
Moment:	3749	ft-kip
Axial:	53	kip
Shear:	32	kip
Base Plate Type:	Square	

Design Information	
TIA Code:	F
ASIF:	1.333
Failure:	100%
eta Factor:	0.50

Original Anchor Rod Data

Quantity:	16	
Diameter:	2.25	in
Material:	A615 GR 75	
Bolt Circle:	58.0	in
Bolt Spacing:	6	in
Bolt Group Area:	63.62	in^2
Bolt Group MOIx:	26751	in^4

Reactions Seen by Original AR Group

Moment:	3257.5	kip-ft
Axial:	53.2	kip
Shear:	32.5	kip

Original AR Capacity Check

Tension Load:	165.2	kip
Allowable load:	194.8	kip
AR Capacity:	84.8%	**Pass**

First Added Anchor Rod Data

Quantity:	3	
Diameter:	1.75	in
Material:	A772	
Bolt Circle:	66.9	in
Bolt Group Area:	7.22	in^2
Bolt Group MOIx:	4038	in^4

Reactions Seen by First Added AR Group

Moment:	491.7	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

First Added AR Capacity Check

Tension Load:	116.9	kip
Allowable load:	158.7	kip
AR Capacity:	73.7%	**Pass**

Second Added Anchor Rod Data

Quantity:		
Diameter:		in
Material:		
Bolt Circle:		in
Bolt Group Area:	0.00	in^2
Bolt Group MOIx:	0	in^4

Reactions Seen by Second Added AR Group

Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

Second Added AR Capacity Check

Tension Load:	0.0	kip
Allowable load:	0.0	kip
AR Capacity:	0.0%	

Third Added Anchor Rod Data

Quantity:		
Diameter:		in
Material:		
Bolt Circle:		in
Bolt Group Area:	0.00	in^2
Bolt Group MOIx:	0	in^4

Reactions Seen by Second Added AR Group

Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

Second Added AR Capacity Check

Tension Load:	0.0	kip
Allowable load:	0.0	kip
AR Capacity:	0.0%	

Rev.4.1

Rev.4.1

Square, Stiffened / Unstiffened Base Plate, Any Rod Material - Rev. F /C

Assumptions: 1) Rod groups at corners. Total # rods divisible by 4. Maximum total # of rods = 48 (12 per Corner).
2) Rod Spacing = Straight Center-to-Center distance between any (2) adjacent rods (same corner)
3) Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#: *876376*
Site Name: *SCOVILLE HILL - HARWIN*
App #: *358301 Revision # 0*

Anchor Rod Data		
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	58	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	57	in
Thick:	2.75	in
Grade:	55	ksi
Clip Distance:	12	in

Stiffener Data (Welding at both sides)		
Configuration:	Unstiffened	
Weld Type:		**
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data		
Diam:	51.41	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round

Stress Increase Factor		
ASD ASIF:	1.333	

Base Reactions		
TIA Revision:	F	
Unfactored Moment, M:	3257.45174	ft-kips
Unfactored Axial, P:	53.1665	kips
Unfactored Shear, V:	32.471905	kips

Anchor Rod Results

TIA F --> Maximum Rod Tension	165.2 Kips
Allowable Tension:	195.0 Kips
Anchor Rod Stress Ratio:	84.7% **Pass**

Base Plate Results Flexural Check

Base Plate Stress:	46.1 ksi
Allowable PL Bending Stress:	55.0 ksi
Base Plate Stress Ratio:	83.8% **Pass**

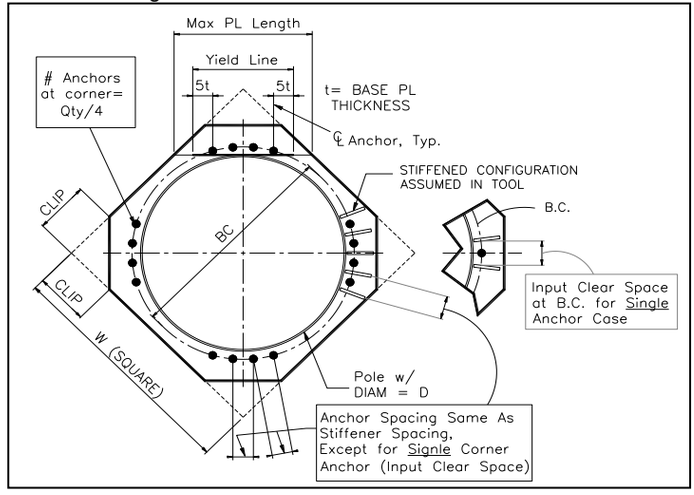
N/A - Unstiffened

Stiffener Results

Horizontal Weld :	N/A
Vertical Weld:	N/A
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	N/A
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	N/A
Plate Comp. (AISC Bracket):	N/A

Pole Results

Pole Punching Shear Check: N/A



** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Proj. Number	83609.005.01
Proj. Name	SCOVILLE HILL / HARWINTON ROI
Code	Rev. G

Proposed Anchor Rods

Diameter	1.75	in
Grade	50 (Williams)	
Quantity	3	
Bolt Circle	66.9	in
AR Capacity	190.608	kips

Existing Anchor Rods

Diameter	2.25	in
Quantity	16	
Bolt Circle	58	in

Tower Properties

Fy_{pole} =	65	ksi
Fu_{pole} =	80	ksi
Fy_{base} =	55	ksi
Fu_{base} =	60	ksi

Foundation Properties

Type	Pad	
Pad Thickness	7.5	ft
f'_c	3000	psi
Clear Cover	3	inch
Pad Width	24.5	ft
	10	
	18	
	3	
	60	
Seismic controlled?	☐	

Summary Output

- Anchor Rod Checks

Specified Embedment Depth:	**7**	**ft**
Min. Pull Test Value:	**133**	**kips**
6 inch Tape Length	**Good**	

- Anchor Rod Bracket Checks

Tube Stress:	**77.5%**
Bracket Plate Check:	**OK**
Max. Weld Stress:	**73.3%**

Anchor Rod Bracket Properties

Gusset Properties

Thickness	1.25	inch
Pole to Tube CL	7.75	inch
Height	30	inch
Width at Tube	6	inch
Fy_{plate} =	65	ksi
Fu_{plate} =	80	ksi
Gap =	0	inch
Notch =	0.75	inch

Pipe /Tube Properties

Size	3 XXS Pipe	
L_{pipe} =	10.5	inch
F_{ypipe} =	50	ksi
D_{pipe} =	3.5	inch
t_{pipe} =	0.6	inch
A_{pipe} =	5.466371217	$inch^2$
I_{pipe} =	5.992509447	$inch^4$
r_{pipe} =	1.04701958	inch

Weld Properties

F_{EXX} =	70	ksi	Weld Material Grade
- Bracket to Tube Weld			
D_{vpipe} =	6		Vertical fillet weld size *in sixteenths*
$l_{vweldpipe}$ =	10.5	inch	Length of Vertical Weld to Pipe
- Bracket to Pole Weld			
D_{vpole} =	6		Vertical fillet weld size *in sixteenths*
H =	30	inch	Height of vertical weld from base plate
- Base Plate Welds			
D_{Hbp} =	0.5625	inch	Gusset Bevel Size
D_{Hp} =	8		Pipe to Baseplate weld in sixteenths

Additional Variables

C_1 =	1.00		Electrode Strength Coefficient
k_{rt} =	0		Transverse Reinforcement Index :
ψ_t =	1		Rebar Location Factor :
ψ_e =	1		Rebar Coatig Factor :
ψ_s =	1		Rebar Size Factor :
λ =	1	$\sqrt{psi}$	Concrete Weight Factor :
S_b =	1575	psi	Epoxy Bond Strength:

PROJECT	83609.005.01 - Scoville Hill
SUBJECT	Foundation Overturning Analysis
DATE	9/2/16
PAGE	1 OF 1

B+T GRP
1717 S. BOULDER SUITE 300
TULSA, OK 74119
PH: (918) 587-4630
www.btgrp.com

$M = 3,749$ k·ft

$V = 32$ k

$A = 53$ k

$$M_o = 3749 + 32 \times 4 = 3,877 \text{ k·ft}$$

$$M_R = [4 \times 24.5 \times 24.5 \times 0.150] \times \frac{24.5}{2} + [3.5 \times 7 \times 7 \times 0.150] \times \frac{24.5}{2}$$

$$+ 53 \times \frac{24.5}{2} + [1 \times 24.5 \times 24.5 - \frac{\pi}{4} \times 4.6^2 \times 1] \times 0.150 \times \frac{24.5}{2}$$

$$= 4411.8 + 315.1 + 649.3 + 1072.4 = 6448.6 \text{ k·ft}$$

S.F. = 1.5

$$\frac{M_R}{M_o} = \frac{6448.6}{3877} = 1.66 > 1.5 \Rightarrow \boxed{90.2\%}$$

PROJECT	**876376 - SCOVILLE HILL / HARWINTON ROD, CT**			
SUBJECT	**Foundation Analysis**			
DATE	**09/02/16**	PAGE 1	OF 1	

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Tulsa, OK 74119
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Monopole Pad & Pier Foundation Analysis

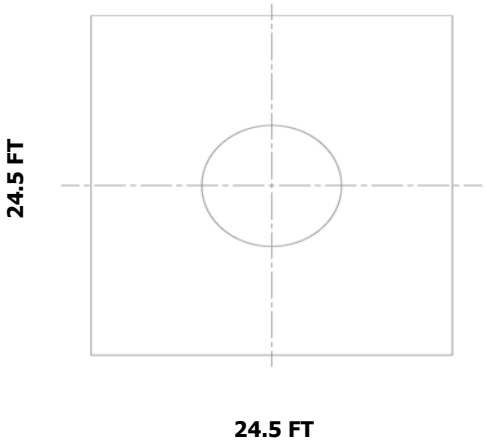
Rev. Type: F

Design Loads:

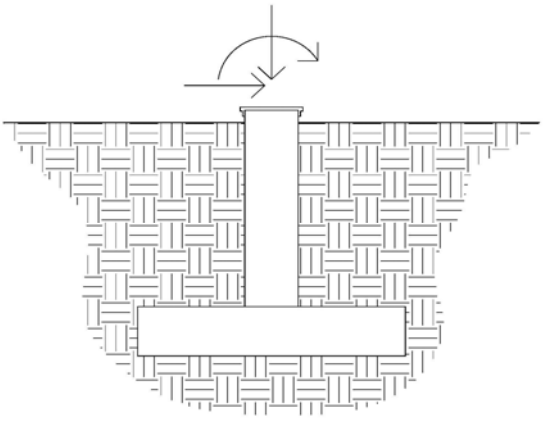
	Input unfactored loads	
Shear:	32.0	kips
Moment:	3,749.0	ft-kips
Tower Height:	177.0	ft
Tower Weight:	53.0	kips

Pad & Pier Dimensions / Properties:

Pole Diameter at Base:	51.36	in
Bearing Depth:	3.5	ft
Pad Width:	24.5	ft
Neglected Depth:	3.3	ft
Thickness:	4.0	ft
Pier Diameter:	0.0	ft
Pier Height Above Grade:	0.0	ft
BP Dist. Above Pier:	0.0	in
Clear Cover:	3.0	in
Pad Rebar Size:	9	
Pad Rebar Quanity:	27	
Rebar Yield Strength:	60000	psi
Concrete Strength:	3000	psi
Concrete Unit Weight:	0.15	kcf



Elevation Overview



Soil Data:

	Allowable Values	
Soil Unit Weight:	0.120	kcf
Ult. Bearing Capacity:	40.000	ksf
Angle of Friction:	35.000	deg
Cohesion:	0.000	ksf
Passive Pressure:	0.000	ksf
Base Friction:	0.300	

** Notes:

Summary of Results

Shear Capacity	56.4%
Bearing	36.7%
Pad Shear - 1-way	45.8%
Pad Shear - 2-way	6.8%
Pad Moment Capacity	70.7%

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

T-Mobile Existing Facility

Site ID: CT11367C

Litchfield1/RT8
123 Campville Hill Road
Harwinton, CT 06791

September 9, 2016

EBI Project Number: 6216004065

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	5.99 %

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

EBI Consulting
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September 9, 2016

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

Emissions Analysis for Site: **CT11367C – Litchfield1/RT8**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **123 Campville Hill Road, Harwinton, CT**, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

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

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

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

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

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at **123 Campville Hill Road, Harwinton, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

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

1) 2 GSM channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

2) 2 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

3) 1 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 30 Watts.

4) Since all radios are ground mounted there are additional cabling losses accounted for. For all 1900 MHz channels an additional 1.92 dB of cable loss was factored into the calculations. This is based on manufacturers Specifications for 160 feet of 1-1/4" coax cable on each path. For all 700 MHz channels an additional 0.90 dB of cable loss was factored into the calculations. This is based on manufacturers Specifications for 160 feet of 1-5/8" coax cable on each path.

5) 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.

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

7) The antennas used in this modeling are the **RFS APXV18-206516S-C-A20** for 1900 MHz (PCS) channels and the **Commscope LNX-6515DS-VTM** for 700 MHz channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **RFS APXV18-206516S-C-A20** has a maximum gain of **16.3 dBd** at its main lobe at 1900 MHz. The **Commscope LNX-6515DS-VTM** has a maximum gain of **14.6 dBd** at its main lobe at 700 MHz. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

8) The antenna mounting height centerline of the proposed antennas is **169 feet** above ground level (AGL).

9) 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.

10) All calculations were done with respect to uncontrolled / general public threshold limits.

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	RFS APXV18-206516S-C-A20	Make / Model:	RFS APXV18-206516S-C-A20	Make / Model:	RFS APXV18-206516S-C-A20
Gain:	16.3 dBd	Gain:	16.3 dBd	Gain:	16.3 dBd
Height (AGL):	169	Height (AGL):	169	Height (AGL):	169
Frequency Bands	1900 MHz(PCS)	Frequency Bands	1900 MHz(PCS)	Frequency Bands	1900 MHz(PCS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	180	Total TX Power(W):	180	Total TX Power(W):	180
ERP (W):	4,934.83	ERP (W):	4,934.83	ERP (W):	4,934.83
Antenna A1 MPE%	0.67	Antenna B1 MPE%	0.67	Antenna C1 MPE%	0.67
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Commscope LNX-6515DS-VTM	Make / Model:	Commscope LNX-6515DS-VTM	Make / Model:	Commscope LNX-6515DS-VTM
Gain:	14.6 dBd	Gain:	14.6 dBd	Gain:	14.6 dBd
Height (AGL):	169	Height (AGL):	169	Height (AGL):	169
Frequency Bands	700 MHz	Frequency Bands	700 MHz	Frequency Bands	700 MHz
Channel Count	1	Channel Count	1	Channel Count	1
Total TX Power(W):	30	Total TX Power(W):	30	Total TX Power(W):	30
ERP (W):	703.27	ERP (W):	703.27	ERP (W):	703.27
Antenna A2 MPE%	0.20	Antenna B2 MPE%	0.20	Antenna C2 MPE%	0.20

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile (Per Sector Max)	**0.87 %**
Sprint	0.43 %
MetroPCS	0.55 %
Verizon Wireless	1.57 %
Nextel	0.44 %
AT&T	2.13 %
Site Total MPE %:	**5.99 %**

T-Mobile Sector A Total:	0.87 %
T-Mobile Sector B Total:	0.87 %
T-Mobile Sector C Total:	0.87 %
Site Total:	5.99 %

T-Mobile _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 PCS - 1950 MHz LTE	2	1,644.94	169	4.45	PCS - 1950 MHz	1000	0.45%
T-Mobile PCS - 1950 MHz GSM	2	822.47	169	2.23	PCS - 1950 MHz	1000	0.22%
T-Mobile 700 MHz LTE	1	703.27	169	0.95	700 MHz	467	0.20%
						Total:	**0.87%**

Summary

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

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

T-Mobile Sector	Power Density Value (%)
Sector A:	0.87 %
Sector B:	0.87 %
Sector C:	0.87 %
T-Mobile Per Sector Maximum:	0.87 %
Site Total:	5.99 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **5.99%** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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