June 25, 2020

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

DRW NX
Tower Share Application
115 Birch Mountain Road, Glastonbury, CT 06033
Latitude- 41.708956
Longitude- -72.473447

Dear Ms. Bachman,

This letter and the attachments are submitted on behalf of DRW NX ("DRW"). DRW plans to install microwave dishes and related equipment at the tower site located at 115 Birch Mountain Road in Glastonbury, Connecticut. The tower was originally approved by the Town of Glastonbury Zoning Board of Appeals on August 7, 1998. The approval was made without conditions. Documentation from the Town of Glastonbury on this is enclosed.

DRW will install three (3) microwave dishes, six (6) SAF radios, and related equipment at the 190' level of the existing 200' self-support tower. DRW will also install an equipment cabinet and related ground equipment in the existing building within the existing ground facility. Included are plans by GPD Engineering and Architecture, dated June 15, 2020, depicting the proposed site and attached as **Exhibit A**. Also included is a structural analysis prepared by Crown Castle, dated June 5, 2020, confirming that the existing tower will be structurally capable of supporting the proposed equipment after tower modifications are made. This is attached and detailed in **Exhibit B**. Additionally, an analysis of the proposed mounts is attached and incorporated as **Exhibit C**.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies 16-50aa, of DRW's intent to share a telecommunications facility pursuant to R.C.S.A. 16-50j-88. In accordance with R.C.S.A., a copy of this letter is being sent to Thomas P. Gullotta, Chairman of the Town of Glastonbury Town Council, Khara Dodds, Director of Planning and Land Use Services for the Town of Glastonbury, the tower owner, Crown Castle, and the property owner, Scarrone Park LLC. Please see the attached letter from Crown Castle authorizing the proposed shared use of this facility attached as **Exhibit D**.

The planned modifications of the facility fall squarely within those activities explicitly provided for in R.C.S.A. 16-50j-89.

1. The proposed modification will not result in an increase in the height of the existing structure. The top of the self-support tower is 200'; DRW's proposed equipment will be located at a center line height of 190'.

2. The proposed modifications will not result in the increase of the site boundary, as depicted on the attached site plan.

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

4. The operation of the proposed equipment will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard. As indicated in the attached RF exposure assessment, the site operations will have no measurable effect on RF exposure levels near this facility, as evidenced by **Exhibit E**.

Connecticut General Statutes 16-50aa indicates that the Council must approve the shared use of a telecommunications facility provided it finds the shared use is technically, legally, environmentally, and economically feasible and meets public safety concerns. As demonstrated in this letter, DRW respectfully submits that the shared use of this facility satisfies these criteria.

A. Technical Feasibility. The existing self-support tower has been deemed structurally capable of supporting DRW's proposed loading after tower modifications are made. The structural analysis and tower modification drawings are included as **Exhibit B**.
B. Legal Feasibility. As referenced above, C.G.S. 16-50aa has been authorized to issue orders approving the shared use of an existing tower such as this self-support tower in Glastonbury. Under the authority granted to the Council, an order of the Council approving the requested shared use would permit DRW to obtain a building permit for the proposed installation. Further, a Letter of Authorization is included as **Exhibit D**, authorizing DRW to file this application for shared use.
C. Environmental Feasibility. The proposed shared use of this facility would have minimal environmental impact. The installation of DRW equipment at the 190' level of the existing 200' tower would have an insignificant visual impact on the area around the tower. DRW's ground equipment would be installed in the existing building within the existing facility compound. DRW's shared use would therefore not cause any significant alteration in the physical or environmental characteristics of the existing site. Additionally, as evidenced by **Exhibit E**, the proposed equipment would not increase radio frequency emissions to a level at or above the Federal Communications Commission safety standard.
D. Economic Feasibility. DRW will be entering into an agreement with the owner of this facility to mutually agreeable terms. As previously mentioned, the Letter of Authorization has been provided by the owner to assist DRW with this tower sharing application.
E. Public Safety Concerns. As discussed above, the self-support tower will be structurally capable of supporting DRW's proposed loading after completion of tower modifications. DRW is not aware of any public safety concerns relative to the proposed sharing of the existing tower.

Sincerely,

Danielle Petti (o/b/o DRW NX)
201-926-7619
Dpetti111@gmail.com

CC:
Thomas P. Gullotta- Town Council Chairman, Town of Glastonbury
Khara Dodds- Director of Planning and Land Use Services, Town of Glastonbury
Crown Castle- Tower Owner
Scarrone Park LLC- Property Owner

After printing this label:
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115 BIRCH MOUNTAIN RD

Location	115 BIRCH MOUNTAIN RD	**Mblu**	N6/ 2920/ E0001C/ /
Acct#	29203387	**Owner**	SCARRONE PARK LLC
Assessment	$566,600	**Appraisal**	$809,400
PID	13487	**Building Count**	1

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2019	$800	$808,600	$809,400
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2019	$600	$566,000	$566,600

Owner of Record

Owner	SCARRONE PARK LLC	**Sale Price**	$0
Co-Owner	C/O TOCZYSKA MARIA A	**Certificate**	
Address	3385 HEBRON AVE GLASTONBURY, CT 06033-2806	**Book & Page**	3525/0218
		Sale Date	11/15/2018
		Instrument	79

Ownership History

Ownership History					
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Instrument**	**Sale Date**
TOCZYSKA MARIA A	$0		3525/0216	81	11/15/2018
SCARRONE CAROLYN R REVOCABLE TRUST	$0		3468/0328	25	01/22/2018
SCARRONE CAROLYN R REVOCABLE TRUST	$0		1829/0101	79	06/03/2003
SCARRONE CAROLYN R	$0		1261/0312		07/29/1999

Building Information

Building 1 : Section 1

Year Built:
Living Area: 0
Replacement Cost: $0

Replacement Cost
Less Depreciation: $0

Building Attributes	
Field	**Description**
Style	Vacant Land
Model	
Occupancy	
Exterior Wall 1	
Roof Structure:	
Roof Cover	
Interior Wall 1	
Floor/Cover 1	
Floor/Cover 2	
Heat Fuel	
Heat Type:	
AC Type:	
Total Bedrooms:	
Total Bthrms:	
Total Half Baths:	
Total Rooms:	
Extra Kitchens	
Style Sub Class	
Bsmt Garages	
Fireplaces	

Building Photo

(http://images.vgsi.com/photos/GlastonburyCTPhotos//\02\02\02/02.jpg)

Building Layout

(http://images.vgsi.com/photos/GlastonburyCTPhotos//Sketches/13487_13

Building Sub-Areas (sq ft)
No Data for Building Sub-Areas

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code 350V
Description Cell Tower 00 MDL
Zone RR
Category

Land Line Valuation

Size (Acres) 11.54
Assessed Value $566,000
Appraised Value $808,600

Outbuildings

Outbuildings						Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**

SHD2	Shed-Metal-Storage			168 S.F.	$800	1

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2018	$800	$808,600	$809,400
2017	$800	$808,600	$809,400

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2018	$600	$566,000	$566,600
2017	$600	$566,000	$566,600

Town of Glastonbury GIS

1,016 0 508 1,016 Feet

NAD_1983_StatePlane_Connecticut_FIPS_0600_Feet

This map is a user generated static output from an Internet mapping site and is for reference only.
Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

0425-01

TOWN OF GLASTONBURY
APPLICATION FOR BUILDING PERMIT
CONNECTICUT STATE BUILDING CODE (SBC111.0)

DEPARTMENT DECISION

..... Approved ..... Disapproved

....
Date Inspector

ESTIMATED COSTS

Structural	180,870
Plumbing	
Electrical	10,000
Heating/AC	
Fire Protection	
Total	190,870

FEES

C.O. & Use	
Structural	
Plumbing	
Electrical	
Heating/AC	
Fire Protection	
Total	

ACTUAL COST AFFIDAVIT MAY BE REQUESTED

(Please Print or Type All Entries)

115 BIRCH MOUNTAIN ROAD — Job Location Street Address — N92 — Lot#

CAROLYN R. SCARRONE C/O DAVID SHERWOOD ALTEC, SHERWOOD & JANEDA, LLC — Owner's Name

701 HEBRON AVE — Street Address — GLASTONBURY — Town — CT — State — 06033 — Zip

Home Phone# — 860-652-4070 — Work Phone# — 860-652-4022 — Fax# — Mobile Phone#

DOTRAD NORDAMERICAN ANTENNA SITES - PAUL GENNER PROJECT MANAGER — Applicant's Name (If other than Owner)

6349 FORGE TWSP — Street Address — BENSALEM — Town — PA — State — 19020 — Zip

Home Phone# — 215-757-4955 — Work Phone# — 215-757-6152 — Fax# — Mobile Phone#

C.E.R. TOWERS, L.L.C. — Contractor/General Contractor — 16-148-944G — Registration #

7693 WEST STATE ST — Street Address — LOWVILLE — Town — NY — State — 13367 — Zip — 315-376-0056 — Telephone#

Home Phone# — Work Phone# — 315-376-8139 — Fax# — Mobile Phone#

ZONING INFORMATION:

Distance From:

Zone..RURAL RESIDENCE..

Street Line.....73'..... Rear Line.....220'.....

Right Line.....750'..... Left Line.....175'.....

Zoning Board of Appeals Approval....VOL 205 PAGE 93.....TPZ Special Permit.....

Project Type:

a) ☒ New Construction
b) ☐ Addition
c) ☐ Alteration
d) ☒ Repair/Replacement
e) ☐ Demolition
f) ☐ Relocation
g) ☐ Change of Use
h) ☐ Article 32
i) ☐ Designated Historic Structure

Construction Type: ☐ 1A ☐ 1B ☐ 2A ☐ 2B ☐ 2C ☐ 3A ☐ 3B ☐ 4 ☐ 5A ☐ 5B

Use Group(s):

☐ A-1 ☐ A-2 ☐ A-3 ☐ A-4 ☐ A-5
☐ B
☐ F-1 ☐ F-2
☐ H-1 ☐ H-2 ☐ H-3 ☐ H-4
☐ I-1 ☐ I-2 ☐ I-3
☐ M
☐ R-1 ☐ R-2 ☐ R-3
☐ S-1 ☐ S-2
☐ U

Mixed Use: ☐ Yes ☐ No ☐ Separated ☐ Nonseparated

(Over)

Exhibit A

Construction Drawings

DRAWING INDEX

SHEET NUMBER:	PAGE NAME:	REVISION NUMBER:
TP-1	TITLE PAGE	0
N-1	GENERAL NOTES	0
N-2	GENERAL NOTES	0
N-3	ELECTRICAL NOTES	0
C-1	OVERALL SITE PLAN	0
C-2	ENLARGED SITE PLAN	0
T-1	TOWER ELEVATION & ANTENNA SCHEDULE	0
T-2	DISH MOUNT DETAILS	0
T-3	DISH PLAN @ 190'-0"	0
T-4	DISH ELEVATIONS	0
T-5	COAX MOUNTING DETAILS	0
T-6	CABINET DETAILS	0
E-1	UTILITY PLAN	0
E-2	GROUNDING PLAN	0
E-3	ONE-LINE DIAGRAM & UTILITY DETAILS	0
E-4	PANEL SCHEDULE	0
E-5	GROUNDING RISER DIAGRAM	0
E-6	GROUNDING DETAILS	0

DRW NX

SITE NAME:

US.CT.CCI.871584

SITE ADDRESS:

115 BIRCH MTN. ROAD
GLASTONBURY, CT 06033

SPECIAL NOTES

CONTRACTOR SHALL VERIFY ALL (EX.) CONDITIONS IN FIELD. IF SIGNIFICANT DEVIATIONS OR DETERIORATION ARE ENCOUNTERED AT THE TIME OF CONSTRUCTION, A REPAIR PERMIT WILL BE OBTAINED AND CONTRACTOR SHALL NOTIFY STRUCTURAL ENGINEER IMMEDIATELY.

CONTRACTOR SHALL VERIFY ALL PLANS AND (EX.) DIMENSIONS AND CONDITIONS ON THE JOB SITE & SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

THESE DRAWINGS ARE PLOTTED AT 22"X34" AND SCALABLE TO 11"X17". PLOT WILL BE FULL SCALE UNLESS OTHERWISE NOTED.

811 Know what's below. Call before you dig.

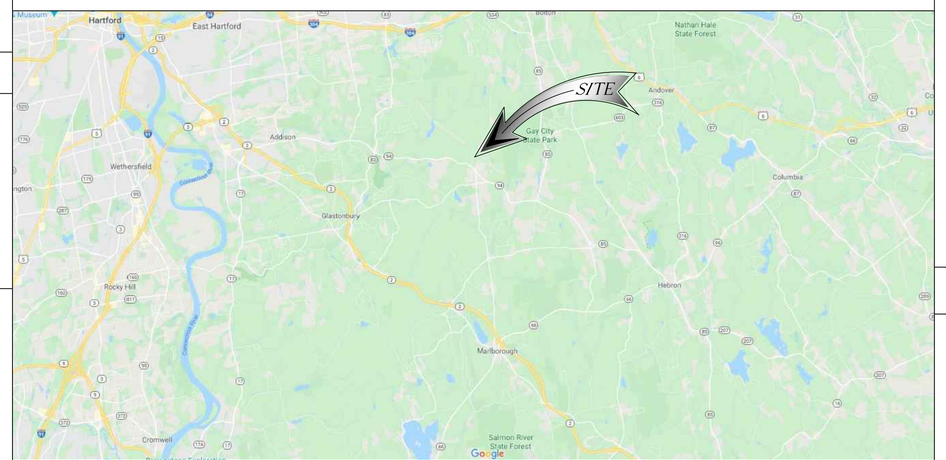
TO OBTAIN LOCATION OF PARTICIPANTS UNDERGROUND FACILITIES BEFORE YOU DIG IN CONNECTICUT, CONTACT CALL BEFORE YOU DIG
TOLL FREE: 1-800-922-4455 OR
www.cbyd.com
CONNECTICUT STATUTE REQUIRES MIN OF 2 WORKING DAYS NOTICE BEFORE YOU EXCAVATE

DIRECTIONS

(FROM: BRADLEY INTERNATIONAL AIRPORT)

CONTINUE TO BRADLEY INTERNATIONAL AIRPORT CON. HEAD NORTH TOWARD BRADLEY INTERNATIONAL AIRPORT. SLIGHT LEFT ONTO BRADLEY INTERNATIONAL AIRPORT. SLIGHT LEFT. TAKE CT-20 E, I-91 S AND CT-2 E TO NEIPSIC RD IN GLASTONBURY. TAKE EXIT 9 FROM CT-2 E. CONTINUE ONTO BRADLEY INTERNATIONAL AIRPORT CON. CONTINUE ONTO CT-20E/BRADLEY INTERNATIONAL AIRPORT CON. USE THE RIGHT 2 LANES TO MERGE ONTO I-91 S TOWARD HARTFORD. USE THE LEFT LANE TO TAKE EXIT 30 FOR INTERSTATE 84 E TOWARD CT-2/EAST HARTFORD/NEW LONDON. MERGE ONTO I-84 E. TAKE EXIT 55 FOR CT-2 TOWARD NORWICH/NEW LONDON/I-84 E. CONTINUE ONTO CT-2 E. TAKE EXIT 9 FOR NEIPSIC RD. CONTINUE ON NEIPSIC RD. TAKE CT-94 E TO BICH MTN RD. TURN LEFT ONTO NEIPSIC RD. CONTINUE ONTO BROOK ST. TURN LEFT ONTO CT-83 N. TURN RIGHT ONTO CT-94 E. TURN LEFT ONTO BIRCH MOUNTAIN ROAD. DESTINATION WILL BE ON THE RIGHT.

LOCAL MAP



PROJECT SUMMARY

SCOPE OF WORK:	DRW NX PROPOSES TO: GROUND SCOPE: INSTALL EQUIPMENT CABINET WITHIN 4'x8' LEASE AREA IN BUILDING, AND NEW 100A ELECTRICAL SERVICE. TOWER SCOPE: INSTALL (3) 6'-0" MW DISHES, (6) SAF RADIO, ASSOCIATED CABLING AND ASSOCIATED MOUNTING EQUIPMENT.
SITE NAME:	US.CT.CCI.871584
SITE ADDRESS:	115 BIRCH MTN. ROAD GLASTONBURY, CT 06033 HARTFORD COUNTY
PROPERTY OWNER:	SCARRONE PARK LLC 3385 HEBRON AVE GLASTONBURY, CT 06033
TOWER OWNER:	CROWN CASTLE 2000 CORPORATE DR. CANNONSBURG, PA 15317 PHONE: (877) 486-9377
COUNTY:	HARTFORD
JURISDICTION:	GLASTONBURY
PARCEL NUMBER:	04200115
LATITUDE (NAD 83):	41° 42' 32.24" N (41.708956°) (PER PER CCI SITES)
LONGITUDE (NAD 83):	72° 28' 24.41" W (-72.473447°) (PER PER CCI SITES)
GROUND ELEVATION:	880' AMSL (PER GOOGLE EARTH)
APPLICANT:	DRW NX

BUILDING CODES:		
	STRUCTURAL	2018 CONNECTICUT BUILDING CODE, W/ AMENDMENTS FROM 2015 IBC
	MECHANICAL	2018 CONNECTICUT BUILDING CODE, W/ AMENDMENTS FROM 2015 IMC
	ELECTRICAL	2017 NEC, AS ADOPTED BY THE STATE OF CONNECTICUT
	FIRE LIFE SAFETY	2018 CONNECTICUT BUILDING CODE, W/ AMENDMENTS FROM 2015 IFC

CONSULTING TEAM

ENGINEER:

GPD ENGINEERING AND ARCHITECTURE
PROFESSIONAL CORPORATION
520 SOUTH MAIN STREET, SUITE 2531
AKRON, OHIO 44311
CONTACT: JUSTIN BUTTERFIELD
PHONE #: 330-572-2205
EMAIL: jbutterfield@gpdgroup.com

STRUCTURAL ENGINEER:

CROWN CASTLE
2000 CORPORATE DR.
CANONSBURG, PA
CONTACT: MAHAM BARIMANI
PHONE #: 724-416-2000

DRW NX

GPD Engineering and Architecture Professional Corporation

520 South Main Street
Akron, OH 44311
330.572.2100 Fax 330.572.2102

SEAL:

STATE OF CONNECTICUT · EDWARD G. STIER · 31512 · LICENSED PROFESSIONAL ENGINEER

06/15/2020

PROJECT LOCATION:

US.CT.CCI.871584
115 BIRCH MTN. ROAD
GLASTONBURY, CT 06033
HARTFORD COUNTY

SCHEDULE OF REVISIONS

REV.	DESCRIPTION OF CHANGE	DRAWN BY:	AUTH BY:	ISSUE DATE
0	ISSUED FOR PERMITTING	ZDT	JWB	06/15/2020
A	90% REVIEW	ZDT	JWB	06/10/2020

SCALE:AS SHOWN | DESIGNED BY: ZDT | DRAWN BY: ZDT

GPD#:2020796.01.US.CT.CCI.871584.01

PROJECT NAME:
US.CT.CCI.871584

DRAWING TITLE:
TITLE PAGE

DRAWING NUMBER:
TP-1

GENERAL NOTES

1. THE CONTRACTOR'S SCOPE OF WORK SHALL INCLUDE ALL ITEMS DEFINED IN THE CONTRACT DOCUMENTS. THE CONTRACT DOCUMENTS INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING: THE CONTRACT, SPECIFICATIONS AND CONSTRUCTION DRAWINGS.
2. ALL EQUIPMENT SUPPLIED BY THE OWNER SHALL BE PICKED UP BY THE CONTRACTOR AT THE APPROPRIATE WAREHOUSE.
3. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING ALL WORK.
4. THE CONTRACTOR SHALL PROVIDE ON-SITE SUPERVISION AT ALL TIMES WHILE THE WORK IS BEING PERFORMED AND SHALL DIRECT ALL WORK, USING HIS BEST SKILL AND ATTENTION. HE SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, PROCEDURES AND SEQUENCES FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.
5. THE CONTRACTOR SHALL VISIT THE JOB SITE TO REVIEW THE SCOPE OF WORK AND EXISTING JOB SITE CONDITIONS INCLUDING, BUT NOT LIMITED TO, MECHANICAL, ELECTRICAL SERVICE AND OVERALL COORDINATION. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS PRIOR TO SUBMITTING HIS BID. ANY DISCREPANCIES, CONFLICTS OR OMISSIONS, ETC., SHALL BE REPORTED TO DRW NX CONSTRUCTION SUPERVISOR BEFORE PROCEEDING WITH THE WORK.
6. THE CONTRACTOR SHALL PROTECT ALL AREAS FROM DAMAGE WHICH MAY OCCUR DURING CONSTRUCTION. ANY DAMAGE TO NEW AND EXISTING CONSTRUCTION, STRUCTURE, LANDSCAPING OR EQUIPMENT SHALL BE IMMEDIATELY REPAIRED OR REPLACED TO THE SATISFACTION OF THE TENANT, BUILDING OWNER OR OWNER'S REPRESENTATIVE AT THE EXPENSE OF THE CONTRACTOR.
7. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE ALL EXISTING UTILITIES, WHETHER SHOWN HEREON OR NOT, AND TO PROTECT THEM FROM DAMAGE. THE CONTRACTOR SHALL BEAR ALL EXPENSES FOR REPAIR OR REPLACEMENT OF UTILITIES OR OTHER PROPERTY DAMAGED IN CONJUNCTION WITH THE EXECUTION OF WORK.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COMPLETE SECURITY OF THE SITE WHILE THE JOB IS IN PROGRESS AND UNTIL THE JOB IS COMPLETED.
9. THE CONTRACTOR SHALL PROVIDE TEMPORARY WATER, POWER AND TOILET FACILITIES AS REQUIRED BY THE CITY OR GOVERNING AGENCY.
10. THE CONTRACTOR AND ALL SUBORDINATE CONTRACTORS SHALL COMPLY WITH ALL LOCAL AND STATE REGULATIONS.
11. THE CONTRACTOR SHALL OBTAIN AND PAY FOR PERMITS, LICENSES AND INSPECTIONS NECESSARY FOR PERFORMANCE OF THE WORK AND INCLUDE THOSE IN THE COST OF THE WORK TO DRW NX.
12. FIGURED DIMENSIONS HAVE PRECEDENCE OVER DRAWING SCALE, AND DETAIL DRAWINGS HAVE PRECEDENCE OVER SMALL DRAWINGS. CHECK ACCURACY OF ALL DIMENSIONS IN THE FIELD. UNLESS SPECIFICALLY NOTED, DO NOT FABRICATE ANY MATERIALS OFF SITE, NOR DO ANY CONSTRUCTION UNTIL THE ACCURACY OF DRAWING DIMENSIONS HAVE BEEN VERIFIED AGAINST ACTUAL FIELD DIMENSIONS.
13. THE CONTRACTOR SHALL NOTIFY THE DRW NX CONSTRUCTION SUPERVISOR OF ANY CONFLICTS OR DISCREPANCIES IN THE CONTRACT DOCUMENTS OR FIELD CONDITIONS PRIOR TO EXECUTING THE WORK IN QUESTION.
14. THE CONTRACTOR SHALL NOTIFY THE DRW NX CONSTRUCTION SUPERVISOR IF DETAILS ARE CONSIDERED UNSOUND, UNSAFE, NOT WATERPROOF, OR NOT WITHIN CUSTOMARY TRADE PRACTICE. IF WORK IS PERFORMED, IT WILL BE ASSUMED THAT THERE IS NO OBJECTION TO THE DETAIL. DETAILS ARE INTENDED TO SHOW THE END RESULT OF THE DESIGN. MINOR MODIFICATIONS MAY BE REQUIRED TO SUIT JOB CONDITIONS, AND SHALL BE INCLUDED AS PART OF THE WORK.
15. EXISTING ELEVATIONS AND LOCATIONS TO BE JOINED SHALL BE VERIFIED BY THE CONTRACTOR BEFORE CONSTRUCTION. IF THEY DIFFER FROM THOSE SHOWN ON THE PLANS, THE CONTRACTOR SHALL NOTIFY THE DRW NX CONSTRUCTION SUPERVISOR SO THAT MODIFICATIONS CAN BE MADE BEFORE PROCEEDING WITH THE WORK.
16. ALL SYMBOLS AND ABBREVIATIONS USED ON THE DRAWINGS ARE CONSIDERED CONSTRUCTION STANDARDS. IF THE CONTRACTOR HAS QUESTIONS REGARDING THEIR EXACT MEANING, THE DRW NX CONSTRUCTION SUPERVISOR SHALL BE NOTIFIED FOR CLARIFICATION BEFORE PROCEEDING WITH THE WORK.
17. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY BLOCKING, BACKING, FRAMING, HANGERS OR OTHER SUPPORT FOR ALL OTHER ITEMS REQUIRING THE SAME.
18. APPROVED PLANS SHALL BE KEPT IN A PLAN BOX AND SHALL NOT BE USED BY WORKMEN. ALL CONSTRUCTION SETS SHALL REFLECT SAME INFORMATION. AT ALL TIMES THESE ARE TO BE UNDER THE CARE OF THE JOB SUPERINTENDENT.
19. DESIGN DRAWINGS ARE DIAGRAMMATIC ONLY AND SHALL BE FOLLOWED AS CLOSELY AS ACTUAL CONSTRUCTION CONDITIONS WILL PERMIT. ANY ERROR, OMISSION, OR DESIGN DISCREPANCY SHALL BE BROUGHT TO THE ATTENTION OF THE DRW NX CONSTRUCTION SUPERVISOR FOR CLARIFICATION OR CORRECTION BEFORE CONSTRUCTION.
20. AS-BUILTS REQUIREMENTS: DO NOT USE RECORD DOCUMENTS FOR CONSTRUCTION PURPOSES. PROTECT RECORD DOCUMENTS FROM DETERIORATION AND LOSS IN A SECURE, FIRE-RESISTANT LOCATION. PROVIDE ACCESS TO RECORD DOCUMENTS FOR THE DRW NX CONSTRUCTION SUPERVISOR'S REFERENCE DURING NORMAL WORKING HOURS. MAINTAIN A CLEAN, UNDAMAGED SET OF BLUE OR BLACK LINE PRINTS OF CONTRACT DRAWINGS AND SHOP DRAWINGS. MARK THE SET TO SHOW THE ACTUAL INSTALLATION WHERE THE INSTALLATION VARIES SUBSTANTIALLY FROM THE WORK AS ORIGINALLY SHOWN. MARK WHICH DRAWINGS IS MOST CAPABLE OF SHOWING CONDITIONS FULLY AND ACCURATELY. WHERE SHOP DRAWINGS ARE USED, RECORD A CROSS-REFERENCE AT THE CORRESPONDING LOCATION ON THE CONTRACT DRAWINGS. GIVE PARTICULAR ATTENTION TO CONCEALED ELEMENTS THAT WOULD BE DIFFICULT TO MEASURE AND RECORD AT A LATER DATE. MARK RECORD SETS WITH RED ERASABLE PENCIL. USE OTHER COLORS TO DISTINGUISH BETWEEN VARIATIONS IN SEPARATE CATEGORIES OF THE WORK. MARK NEW INFORMATION THAT IS IMPORTANT TO THE OWNER BUT WAS NOT SHOWN ON THE CONTRACT DRAWINGS, DETAILS OR SHOP DRAWINGS. NOTE RELATED CHANGE ORDER NUMBERS WHERE APPLICABLE. NOTE RELATED RECORD DRAWING INFORMATION AND PRODUCT DATA. UPON COMPLETION OF THE WORK, SUBMIT ONE (1) COMPLETE SET OF RECORD DOCUMENTS TO THE DRW NX CONSTRUCTION SUPERVISOR FOR THE OWNER'S RECORDS.

PART I: GENERAL

1.1 SCOPE: CLEARING, GRUBBING, STRIPPING, EROSION CONTROL, SURVEY, LAYOUT, SUB GRADE PREPARATION, FINISH GRADING AND SECURITY FENCE, AS REQUIRED BY CONSTRUCTION DRAWINGS AND DETAIL DRAWINGS.

1.2 REFERENCES
A. DEPARTMENT OF TRANSPORTATION CONSTRUCTION AND MATERIAL SPECIFICATIONS FOR THE STATE IN WHICH THE PROJECT IS LOCATED.
B. ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS)
C. OSHA (OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION)
D. AASHTO (AMERICAN ASSOCIATION OF STATE AND HIGHWAY TRANSPORTATION OFFICIALS)

1.3 INSPECTION AND TESTING
A. FIELD TESTING OF EARTHWORK, AGGREGATE BASE COURSE, COMPACTION, AND CONCRETE TESTING SHALL BE PERFORMED BY THE CONTRACTOR'S INDEPENDENT TESTING LAB.
B. ALL WORK SHALL BE INSPECTED AND RELEASED BY THE DRW NX CONSTRUCTION SUPERVISOR WHO SHALL CARRY OUT THE GENERAL INSPECTION OF THE WORK WITH SPECIFIC CONCERN TO PROPER PERFORMANCE OF THE WORK AS SPECIFIED AND/OR CALLED FOR ON THE DRAWINGS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO REQUEST TIMELY INSPECTIONS PRIOR TO PROCEEDING WITH FURTHER WORK THAT WOULD MAKE PARTS OF THE WORK INACCESSIBLE OR DIFFICULT TO INSPECT.

1.4 SITE MAINTENANCE AND PROTECTION
A. PROVIDE ALL NECESSARY JOB SITE MAINTENANCE FROM COMMENCEMENT OF THE WORK UNTIL COMPLETION OF THE CONTRACT.
B. CONTACT THE ONE-CALL UTILITY LOCATION SERVICE PRIOR TO ANY EXCAVATING ACTIVITIES TO HAVE LOCATIONS OF UNDERGROUND UTILITIES VERIFIED.
C. AVOID DAMAGE TO THE SITE INCLUDING EXISTING FACILITIES, STRUCTURES, TREES AND SHRUBS DESIGNATED TO REMAIN. TAKE PROTECTIVE MEASURES TO PREVENT EXISTING FACILITIES THAT ARE NOT DESIGNATED FOR REMOVAL FROM BEING DAMAGED BY THE WORK.
D. KEEP SITE FREE OF ALL PONDING WATER.
E. PROVIDE EROSION CONTROL MEASURES IN ACCORDANCE WITH THE DEPARTMENT OF TRANSPORTATION CONSTRUCTION AND MATERIAL SPECIFICATIONS FOR THE STATE IN WHICH THE PROJECT IS LOCATED.
F. PROVIDE AND MAINTAIN ALL TEMPORARY FENCING, BARRICADES, WARNING SIGNALS AND SIMILAR DEVICES NECESSARY TO PROTECT LIFE AND PROPERTY DURING THE ENTIRE PERIOD OF CONSTRUCTION. REMOVE ALL SUCH DEVICES UPON COMPLETION OF THE WORK.

PART II: PRODUCTS

2.1 SUITABLE BACK FILL: EXCAVATED INORGANIC MATERIAL, COHESIVE AND NON-COHESIVE MATERIALS, INCLUDING GRAVEL, SAND, INORGANIC LEAN CLAY, GRAVEL SILT, GRAVEL CLAY, SAND CLAY, SAND SILT OR SILT CLAY MATERIAL FREE FROM FROZEN LUMPS, REFUSE, STONES OR ROCKS LARGER THAN 3-INCHES IN ANY DIMENSION OR OTHER MATERIAL THAT MAY MAKE THE INORGANIC MATERIAL UNSUITABLE FOR BACKFILL OR FILL MATERIAL AS DETERMINED BY THE DRW NX CONSTRUCTION SUPERVISOR AND GEOTECHNICAL ENGINEER.

2.2 POROUS AND NON POROUS EMBANKMENT AND BACK FILL:
A. CONNECTICUT: PER CONNECTICUT DEPARTMENT OF TRANSPORTATION SECTION 2.13-19

2.3 SELECT STRUCTURAL FILL: GRANULAR FILL MATERIAL FOR USE AROUND AND UNDER STRUCTURES WHERE STRUCTURAL FILL MATERIALS ARE REQUIRED:
A. CONNECTICUT: PER CONNECTICUT DEPARTMENT OF TRANSPORTATION SECTION 2.13-19

2.4 GRANULAR BEDDING AND TRENCH BACK FILL: WELL-GRADED SAND (SW OR SW-SM) AND THE FOLLOWING:
A. CONNECTICUT: PER CONNECTICUT DEPARTMENT OF TRANSPORTATION SECTION 2.13-19

2.5 CRUSHED STONE SURFACE COURSE FOR ACCESS ROAD:
A. CONNECTICUT: PER CONNECTICUT DEPARTMENT OF TRANSPORTATION SECTION 2.13-19L

2.6 CRUSHED STONE SUBBASE FOR ACCESS ROAD:
A. AASHTO #57 CRUSHED LIMESTONE OR APPROVED EQUAL

2.7 CRUSHED STONE GRANULAR BASE FOR COMPOUND:
A. AASHTO #57 CRUSHED LIMESTONE OR APPROVED EQUAL

2.8 UNSUITABLE MATERIALS: TOP SOIL, HIGH AND MODERATELY PLASTIC SILTS AND CLAY, MATERIAL CONTAINING REFUSE, FROZEN LUMPS, DEMOLISHED BITUMINOUS MATERIAL, VEGETATIVE MATTER, WOOD, STONES IN EXCESS OF 3-INCHES IN ANY DIMENSION AND DEBRIS AS DETERMINED BY THE CONSTRUCTION SUPERVISOR AND DRW NX GEOTECHNICAL ENGINEER. TYPICALLY, THESE WILL BE SOILS CLASSIFIED AS PT, MH, CH, OH, ML OR OL.

2.9 GEOTEXTILE FABRIC: MIRAFI 500X OR APPROVED EQUIVALENT

2.10 PLASTIC MARKING TAPE: SHALL BE ACID AND ALKALI RESISTANT POLYETHYLENE FILM, SPECIFICALLY MANUFACTURED FOR MARKING AND LOCATING UNDERGROUND UTILITIES, 6-INCHES WIDE WITH A MINIMUM THICKNESS OF 0.004-INCH. TAPE SHALL HAVE MINIMUM STRENGTH OF 1500 PSI IN BOTH DIRECTIONS AND MANUFACTURED WITH INTEGRAL WIRES, FOIL BACKING OR OTHER MEANS TO ENABLE DETECTION BY A METAL DETECTOR WHEN BURIED UP TO 3 FEET DEEP. THE METALLIC CORE OF THE TAPE SHALL BE ENCASED IN A PROTECTIVE JACKET OR PROVIDED WITH OTHER MEANS TO PROTECT IT FROM CORROSION. TAPE COLOR SHALL BE RED FOR ELECTRIC UTILITIES AND ORANGE FOR TELECOMMUNICATION UTILITIES.

2.11 SECURITY FENCE
A. PROVIDE AND INSTALL THE GALVANIZED FENCE WITH ASSOCIATED POSTS, RAILS, BRACES, FABRIC, TERMINAL POST, GATES, DROP BAR AND BARBED WIRE. USE APPLICABLE PROVISIONS OF ASTM FOR MATERIALS.
B. FABRIC SHALL BE HEAVY GALVANIZED CHAIN LINK FENCE, CONFORMING TO ASTM A392 2-INCH MESH 9 GAUGE WIRE (0.148 INCHES IN DIAMETER) WITH THE TOP AND BOTTOM SELVAGES TWISTED AND BARBED.
C. POSTS
   1. LINE POST FOR FABRIC UP TO 8 FEET HIGH SHALL BE 2 3/8 INCH O.D.
   2. END CORNER, PULL POST AND GATE POST SHALL BE 2 7/8 INCH O.D. ALL POSTS SHALL BE SCHEDULE 40 GALVANIZED STEEL PIPE IN ACCORDANCE WITH ASTM A120, A570 AND A525. FOR FENCE OVER 8 FEET HIGH, SIZE POST ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
D. TOP RAILS SHALL CONFORM TO 1 1/4 INCH (1.660" O.D.), SCHEDULE 40 GALVANIZED STEEL PIPE IN ACCORDANCE WITH ASTM A120.
E. TENSION WIRE SHALL BE 7 GAUGE U.S. STEEL WIRE GALVANIZED IN ACCORDANCE WITH ASTM A116, COATING CLASS III.
F. BRACE BANDS, TENSION BANDS AND TENSION BARS SHALL BE FABRICATED OF 1/8 INCH BY 7/8 INCH GALVANIZED STEEL WITH GALVANIZED STEEL CARRIAGE BOLTS AND NUTS IN ACCORDANCE WITH ASTM A123. TENSION BARS SHALL BE 1/4 INCH BY 3/4 INCH GALVANIZED STEEL BAR IN ACCORDANCE WITH ASTM A153.
G. FABRIC TIES SHALL BE CLASS I GALVANIZED STEEL WIRE NO LESS THAN 9 GAUGE.
H. POST TOPS SHALL BE PRESSED STEEL OR MALLEABLE IRON AND SHALL BE GALVANIZED PER ASTM A153.
I. BARBED WIRE SHALL CONSIST OF DOUBLE STRANDED 12 1/2 GAUGE WIRE ASTM A121, CLASS 3 WITH 4-POINT BARBS SPACED 5 INCHES APART. THE TOP 1 FOOT OF THE FENCE SHALL CONSIST OF 3 STRANDS OF BARBED WIRE ATTACHED TO 45 DEGREE ANGLE, HEAVY-PRESSED ARMS CAPABLE OF WITHSTANDING WITHOUT FAILURE 250 POUNDS DOWNWARD PULL AT THE OUTERMOST END OF THE ARM.
J. GATE MATERIALS, SUCH AS FABRIC, BOLTS, NUTS, TENSION BARS AND BARBED WIRE SHALL BE CONSISTENT WITH FENCE MATERIALS.

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SCHEDULE OF REVISIONS

REV.	DESCRIPTION OF CHANGE	DRAWN BY:	AUTH BY:	ISSUE DATE
0	ISSUED FOR PERMITTING	ZDT	JWB	06/15/2020
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GENERAL NOTES

DRAWING NUMBER:
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PART III: EXECUTION

3.1 GENERAL

A. BEFORE STARTING GENERAL SITE PREPARATION ACTIVITIES, INSTALL EROSION AND SEDIMENT CONTROL MEASURES. THE WORK AREA SHALL BE CONSTRUCTED AND MAINTAINED IN SUCH CONDITION THAT IN THE EVENT OF RAIN THE SITE WILL BE WELL DRAINED AT ALL TIMES.

B. PERFORM ALL SURVEY, LAYOUT, STAKING AND MARKING TO ESTABLISH AND MAINTAIN ALL LINES, GRADES, ELEVATIONS AND BENCHMARKS NEEDED FOR EXECUTION OF THE WORK.

C. CLEAR AND GRUB THE AREA WITHIN THE LIMITS OF THE SITE AND ONLY THE IMMEDIATE SURROUNDINGS NECESSARY TO COMPLETE THE WORK. REMOVE TREES, BRUSH, STUMPS, RUBBISH AND OTHER DEBRIS AND VEGETATION RESTING ON OR PROTRUDING THROUGH THE SURFACE OF THE SITE AREA TO BE CLEARED AND GRUBBED.

1. REMOVE THE FOLLOWING MATERIALS TO A DEPTH OF NO LESS THAN 12-INCHES BELOW THE ORIGINAL GROUND SURFACE: ROOTS, STUMPS AND OTHER DEBRIS, BRUSH AND REFUSE EMBEDDED IN OR PROTRUDING THROUGH THE GROUND SURFACE. RAKE, DISK OR PLOW THE AREA TO A DEPTH OF NO LESS THAN 6-INCHES, AND REMOVE UP TO A DEPTH OF 12-INCHES ALL ROOTS AND OTHER DEBRIS THEREBY EXPOSED.
2. REMOVE TOPSOIL MATERIALS COMPLETELY FROM THE SURFACE UNTIL THE SOIL NO LONGER MEETS THE DEFINITION OF TOPSOIL. AVOID MIXING TOPSOIL WITH SUBSOIL OR OTHER EXCAVATED MATERIALS. TOPSOIL SHALL BE STOCKPILED SEPARATELY FOR REUSE, AS DIRECTED BY THE CONSTRUCTION SUPERVISOR.
3. EXCEPT WHERE EXCAVATION TO GREATER DEPTH IS INDICATED, FILL DEPRESSIONS RESULTING FROM CLEARING, GRUBBING AND DEMOLITION COMPLETELY WITH SUITABLE FILL.

D. REMOVE FROM THE SITE AND DISPOSE IN AN AUTHORIZED LANDFILL ALL DEBRIS RESULTING FROM CLEARING AND GRUBBING OPERATIONS. BURNING IS NOT PERMITTED.

E. PRIOR TO EXCAVATING, THOROUGHLY EXAMINE THE AREA TO BE EXCAVATED AND/OR TRENCHED TO VERIFY THE LOCATIONS OF FEATURES INDICATED ON THE DRAWINGS, AND ASCERTAIN THE EXISTENCE AND LOCATION OF ANY STRUCTURE, UNDERGROUND STRUCTURE, CULVERT, STREAM CROSSING OR OTHER ITEM NOT SHOWN THAT MIGHT AFFECT OR INTERFERE WITH THE NEW CONSTRUCTION. NOTIFY THE DRW NX CONSTRUCTION SUPERVISOR OF ANY OBSTRUCTIONS THAT WILL PREVENT ACCOMPLISHMENT OF THE WORK AS INDICATED ON THE DRAWINGS.

F. SEPARATE AND STOCKPILE ALL EXCAVATED MATERIALS SUITABLE FOR BACK FILL. ALL EXCESS EXCAVATED AND UNSUITABLE MATERIALS SHALL BE DISPOSED OF IN AN AREA DESIGNATED BY THE DRW NX CONSTRUCTION SUPERVISOR. (UNSUITABLE MATERIAL MAY BE REQUIRED TO BE REMOVED FROM THE SITE.)

3.2 BACK FILL AS SOON AS PRACTICAL AFTER COMPLETING CONSTRUCTION OF THE RELATED STRUCTURE, INCLUDING EXPIRATION OF THE SPECIFIED MINIMUM CURING PERIOD FOR CAST-IN-PLACE CONCRETE, BACKFILL THE EXCAVATION WITH APPROVED MATERIAL TO RESTORE THE REQUIRED FINISH GRADE.

A. PRIOR TO PLACING BACKFILL AROUND STRUCTURES, ALL FORMS SHALL HAVE BEEN REMOVED AND THE EXCAVATION CLEANED OF ALL TRASH, DEBRIS AND UNSUITABLE MATERIALS.

B. BACK FILL BY PLACING AND COMPACTING SUITABLE BACKFILL MATERIAL OR SELECT GRANULAR BACKFILL MATERIAL, WHEN REQUIRED, IN UNIFORM HORIZONTAL LAYERS OF NO GREATER THAN 8-INCH LOOSE THICKNESS. WHERE HAND-OPERATED COMPACTORS ARE USED, THE FILL MATERIALS SHALL BE PLACED IN LIFTS NOT TO EXCEED FOUR INCHES IN LOOSE DEPTH.

C. WHENEVER THE DENSITY TESTS INDICATE THAT THE CONTRACTOR HAS NOT OBTAINED THE SPECIFIED DENSITY, THE SUCCEEDING LAYER SHALL NOT BE PLACED UNTIL THE SPECIFICATION REQUIREMENTS ARE MET UNLESS OTHERWISE AUTHORIZED BY THE GEOTECHNICAL ENGINEER. THE CONTRACTOR SHALL TAKE WHATEVER APPROPRIATE ACTION IS NECESSARY, SUCH AS DISKING AND DRYING, ADDING WATER OR INCREASING THE COMPACTIVE EFFORT.

D. THOROUGHLY COMPACT EACH LAYER OF BACKFILL TO A MINIMUM OF 90% OF THE MAXIMUM DRY DENSITY AS PROVIDED BY THE MODIFIED PROCTOR TEST C. DO NOT PLACE BACKFILL AROUND NEW CAST-IN-PLACE CONCRETE STRUCTURES UNTIL THE CONCRETE HAS CURED FOR AT LEAST 7 DAYS OR COMPRESSIVE STRENGTH TESTS INDICATE THAT THE CONCRETE HAS ACHIEVED MORE THAN 80% OF ITS SPECIFIED 28 DAY COMPRESSIVE STRENGTH.

3.3 TRENCH EXCAVATION

A. UTILITY TRENCHES SHALL BE EXCAVATED TO THE LINES AND GRADES SHOWN ON THE DRAWINGS OR AS DIRECTED BY THE DRW NX CONSTRUCTION SUPERVISOR. PROVIDE SHORING, SHEETING AND BRACING AS REQUIRED TO PREVENT CAVING OR SLOUGHING OF THE TRENCH WALLS.

B. THE TRENCH WIDTH EXTENDS A MINIMUM OF 6 INCHES BEYOND EACH OUTSIDE EDGE OF THE CONDUIT OR OUTERMOST CONDUIT, WHICHEVER IS APPLICABLE.

C. WHEN SOFT, YIELDING OR OTHERWISE UNSTABLE SOIL CONDITIONS ARE ENCOUNTERED AT THE REQUIRED TRENCH BOTTOM ELEVATION, OVER-EXCAVATE THE TRENCH TO A DEPTH OF NO LESS THAN 12 INCHES BELOW THE REQUIRED ELEVATION AND BACKFILL WITH GRANULAR BEDDING MATERIAL.

3.4 TRENCH BACK FILL

A. PROVIDE GRANULAR BEDDING MATERIAL IN ACCORDANCE WITH THE SPECIFICATIONS, DRAWINGS AND THE UTILITY REQUIREMENTS.

B. NOTIFY THE DRW NX CONSTRUCTION SUPERVISOR 24 HOURS IN ADVANCE OF BACK FILLING

C. CONDUCT UTILITY CHECK TESTS BEFORE BACK FILLING BACK FILL AND COMPACT TRENCH BEFORE ACCEPTANCE TESTING.

D. PLACE GRANULAR TRENCH BACKFILL UNIFORMLY ON BOTH SIDES OF THE CONDUITS IN 6-INCH UNCOMPACTED LIFTS UNTIL 12 INCHES OVER THE CONDUITS. SOLIDLY RAM AND TAMP BACKFILL INTO SPACES AROUND THE CONDUITS.

E. PROTECT CONDUIT FROM LATERAL MOVEMENT, DAMAGE FROM IMPACT OR UNBALANCED LOADING.

F. ABOVE THE CONDUIT EMBEDMENT ZONE, PLACE AND COMPACT SATISFACTORY BACKFILL MATERIAL IN 9-INCH MAXIMUM LOOSE THICKNESS LIFTS TO RESTORE THE REQUIRED FINISHED SURFACE GRADE.

G. COMPACT FINAL TRENCH BACKFILL TO A DENSITY EQUAL TO OR GREATER THAN THAT OF THE EXISTING UNDISTURBED MATERIAL IMMEDIATELY ADJACENT TO THE TRENCH BUT NO LESS THAN A MINIMUM OF 95%OF THE MAXIMUM DRY DENSITY AS PROVIDED BY THE MODIFIED PROCTOR TEST, ASTM D1557

3.5 AGGREGATE ACCESS ROAD AND SITE

A. CLEAR, GRUB, STRIP AND EXCAVATE FOR THE ACCESS ROAD AND TOWER COMPOUND TO THE LINES AND GRADES INDICATED ON THE DRAWINGS. SCARIFY TO A DEPTH OF 6 INCHES AND PROOF-ROLL. ALL HOLES, RUTS, SOFT PLACES AND OTHER DEFECTS SHALL BE CORRECTED.

B. THE ENTIRE SUB GRADE SHALL BE COMPACTED TO NOT LESS THAN 95% OF THE MAXIMUM DRY DENSITY AS PROVIDED BY THE MODIFIED PROCTOR TEST, ASTM D 1557.

C. AFTER PREPARATION OF THE SUB GRADE IS COMPLETED, THE GEOTEXTILE FABRIC SHALL BE INSTALLED TO THE LIMITS INDICATED ON THE DRAWINGS BY ROLLING THE FABRIC OUT LONGITUDINALLY ALONG THE ROADWAY OR SITE. THE FABRIC SHALL NOT BE DRAGGED ACROSS THE SUB GRADE PLACE THE ENTIRE ROLL IN A SINGLE OPERATION, ROLLING THE MATERIAL AS SMOOTHLY AS POSSIBLE.

1. OVERLAPS PARALLEL TO THE ROADWAY AND SITE WILL BE PERMITTED AT THE CENTERLINE AND AT LOCATIONS BEYOND THE ROADWAY OR SITE SURFACE WIDTH (I.E., WITHIN THE SHOULDER WIDTH) ONLY. NO LONGITUDINAL OVERLAPS SHALL BE LOCATED BETWEEN THE CENTERLINE AND THE SHOULDER. PARALLEL OVERLAPS SHALL BE A MINIMUM OF 3 FEET WIDE.
2. TRANSVERSE (PERPENDICULAR TO THE ROADWAY) OVERLAPS AT THE END OF A ROLL SHALL OVERLAP IN THE DIRECTION OF THE AGGREGATE PLACEMENT (PREVIOUS ROLL ON TOP) AND SHALL HAVE A MINIMUM LENGTH OF 3 FEET.
3. ALL OVERLAPS SHALL BE PINNED WITH STAPLES OR NAILS BETWEEN 10 AND 12 INCHES LONG TO INSURE STABLE POSITIONING DURING PLACEMENT OF AGGREGATE. PIN LONGITUDINAL SEAMS AT 25-FOOT CENTERS AND TRANSVERSE SEAMS EVERY 5 FEET ON CENTER.

D. THE AGGREGATE SUB BASE, BASE AND SURFACE COURSES SHALL BE CONSTRUCTED IN LAYERS NOT MORE THAN 4 INCHES (COMPACTED) THICKNESS. AGGREGATE TO BE PLACED ON GEOTEXTILE FABRIC SHALL BE END-DUMPED ON THE FABRIC FROM THE FREE END OF THE FABRIC OR OVER PREVIOUSLY PLACED AGGREGATE. AT NO TIME SHALL EQUIPMENT, EITHER DUMPING THE AGGREGATE OR GRADING THE AGGREGATE, BE PERMITTED ON THE ROADWAY OR COMPOUND WITH LESS THAN 8 INCHES OF MATERIAL COVERING THE FABRIC.

E. THE AGGREGATE SUB BASE AND BASE SHALL BE IMMEDIATELY COMPACTED TO NOT LESS THAN 95% OF THE MAXIMUM DRY DENSITY AS PROVIDED BY THE MODIFIED PROCTOR TEST, ASTM D 1557.

3.6 FINISH GRADING

A. PERFORM ALL FINISHED GRADING TO PROVIDE SMOOTH, EVEN SURFACE AND SUBSURFACE DRAINAGE OF THE ENTIRE AREA WITHIN THE LIMITS OF CONSTRUCTION. GRADING SHALL BE COMPATIBLE WITH ALL SURROUNDING TOPOGRAPHY AND STRUCTURES.

B. UTILIZE SATISFACTORY FILL MATERIALS RESULTING FROM THE EXCAVATION WORK IN THE CONSTRUCTION OF FILLS, EMBANKMENTS AND FOR THE REPLACEMENT OF REMOVED UNSUITABLE MATERIALS.

C. REPAIR ALL ACCESS ROADS AND SURROUNDING AREAS USED DURING THE COURSE OF THIS WORK TO THEIR ORIGINAL CONDITION.

3.7 SECURITY FENCE

A. THE BOTTOM OF THE FENCE SHALL BE 2 INCHES BELOW THE TOP OF THE COMPOUND GRAVEL. IF THE SITE CROSSES FEATURES SUCH AS DRAINAGE DITCHES, ETC., THE FENCE SHALL SPAN THE DEPRESSION. CLOSE THE SPACE BELOW THE BOTTOM OF THE FENCE WITH EXTRA FENCE FABRIC OR BARBED WIRE AS DIRECTED BY THE DRW NX CONSTRUCTION SUPERVISOR. PRIOR TO PLACING COMPONENTS SUCH AS FABRIC, RAILS, TENSION WIRE AND GATES, ENSURE THAT THE CONCRETE POST FOUNDATION HAS REACHED AT LEAST 75% OF ITS DESIGN STRENGTH OR HAS CURED A MINIMUM OF 7 DAYS AFTER SETTING THE POST.

B. FURNISH GATES WITH NECESSARY FITTINGS AND HARDWARE. HINGES SHALL ALLOW SWING GATES TO SWING 180 DEGREES. PLUNGER BARS SHALL HAVE TOP, BOTTOM AND MIDDLE LOCKING POINTS WITH THE MIDDLE POINT ARRANGED FOR PADLOCKING. GATES SHALL HAVE KEEPERS ON EACH LEAF THAT ENGAGE AUTOMATICALLY WHEN THE GATE IS SWUNG OPEN. REPAIR GALVANIZED COATING DAMAGED IN THE FIELD WITH METHODS AND TECHNIQUES AS RECOMMENDED BY THE MANUFACTURER.

END OF SPECIFICATION

SAFETY ENFORCEMENT

SAFETY IS OF PARAMOUNT CONCERN TO BOTH SITE WORKERS AND THE PUBLIC.

1. CONSTRUCTION WORK PRESENTS UNIQUE THREATS TO HEALTH AND SAFETY. THE CONTRACTOR IS RESPONSIBLE TO EDUCATE THEIR WORK FORCE OF THESE DANGERS AND LIMIT THEIR EXPOSURE TO HAZARDS. THIS EDUCATION SHALL INCLUDE BUT NOT BE LIMITED TO APPLICABLE TRAINING COURSES AND CERTIFICATIONS, PROPER PERSONAL PROTECTIVE EQUIPMENT USAGE, DAILY TAILGATE MEETINGS AND ANY OTHER PREVENTATIVE MEASURES WHICH MAY BE REASONABLY EXPECTED. THE CONTRACTOR AND ALL SUB-CONTRACTORS SHALL BE RESPONSIBLE FOR THE SAFETY OF THE WORK AREA, ADJACENT AREAS AND ANY PROPERTY OCCUPANTS WHO MAY BE AFFECTED BY THE WORK UNDER CONTRACT. THE CONTRACTOR SHALL REVIEW ALL LANDOWNER, PRIME CONTRACTOR, CARRIER, OSHA, AND LOCAL SAFETY GUIDELINES AND AT ALL TIMES SHALL CONFORM TO THE MOST RESTRICTIVE OF THESE STANDARDS TO ENSURE A SAFE WORKPLACE.

2. ALL SAFETY EQUIPMENT SHALL BE INSPECTED ACCORDING TO ALL OSHA AND INDUSTRY SCHEDULED INTERVALS AND ALL INSPECTIONS SHALL BE DOCUMENTED PER APPLICABLE CODES AND STANDARDS.

3. TOWER WORK PRESENTS ADDITIONAL THREATS TO HEALTH AND SAFETY. ALL TOWER WORKERS WORKING ON A TOWER MUST BE ADEQUATELY TRAINED AND MONITORED TO ENSURE THAT SAFE WORK PRACTICES ARE LEARNED AND FOLLOWED. AS REQUIRED BY OSHA, WHEN WORKING ON EXISTING COMMUNICATION TOWERS, EMPLOYEES MUST BE PROVIDED WITH APPROPRIATE FALL PROTECTION, TRAINED TO USE THIS FALL PROTECTION PROPERLY, AND THE USE OF FALL PROTECTION MUST BE CONSISTENTLY SUPERVISED AND ENFORCED BY THE CONTRACTOR.

4. ELECTRICAL WORK PRESENTS SPECIFIC THREATS TO THE HEALTH AND SAFETY OF WORKERS ON SITE. SPECIFICALLY ELECTROCUTIONS ARE THE FOURTH LEADING CAUSE OF DEATH ON CONSTRUCTION SITES. ALL ELECTRICAL WORKERS SHALL HAVE CURRENT CERTIFICATIONS WHICH SATISFY ALL TRAINING REQUIREMENTS FOR THE ELECTRICAL WORK THEY ARE PERFORMING PER OSHA STANDARDS. ALL ELECTRICAL WORKERS SHALL ADHERE TO ALL SAFETY RULES AND REGULATIONS FOR WORKER AND PUBLIC SAFETY. ALL WORK SHALL BE PERFORMED BY QUALIFIED ELECTRICIANS TRAINED FOR THE TYPE OF WORK AND THE VOLTAGES PRESENT FOR EACH TASK. THE CONTRACTOR SHALL REVIEW ALL LANDOWNER, PRIME CONTRACTOR, CARRIER, OSHA, NFPA 70, AND LOCAL SAFETY GUIDELINES AND AT ALL TIMES SHALL CONFORM TO THE MOST RESTRICTIVE OF THESE STANDARDS TO ENSURE A SAFE WORKPLACE.

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SCHEDULE OF REVISIONS

REV.	DESCRIPTION OF CHANGE	DRAWN BY:	AUTH BY:	ISSUE DATE
0	ISSUED FOR PERMITTING	ZDT	JWB	06/15/2020
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DRAWING NUMBER:
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PROJECT SPECIFICATION 16000 (ELECTRICAL)

NOT ALL SECTIONS MAY APPLY TO THIS PROJECT, COORDINATE WITH CONSTRUCTION MANAGER.

PART I: GENERAL

1.1 SCOPE: THIS SPECIFICATION DESCRIBES THE MINIMUM REQUIREMENT FOR INSTALLATION OF ALL ELECTRICAL SYSTEMS.

1.2 REFERENCES: THE PUBLICATIONS LISTED BELOW FORM PART OF THIS SPECIFICATION. EACH PUBLICATION SHALL BE THE LATEST REVISION AND ADDENDUM IN EFFECT ON THE DATE THIS SPECIFICATION IS ISSUED FOR CONSTRUCTION, UNLESS NOTED OTHERWISE. EXCEPT AS MODIFIED BY THE REQUIREMENTS SPECIFIED HEREIN, OR THE DETAILS OF THE DRAWINGS, WORK INCLUDED IN THIS SPECIFICATION SHALL CONFORM TO THE APPLICABLE PROVISIONS OF THESE PUBLICATIONS.
- A. ANSI (AMERICAN NATIONAL STANDARDS INSTITUTE)
- B. NESC (NATIONAL ELECTRICAL SAFETY CODE), LATEST EDITION
- C. NEC (NATIONAL ELECTRICAL CODE), LATEST EDITION
- D. NFPA 70 (NATIONAL FIRE PROTECTION ASSOCIATION)
- E. OSHA (OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION), INCLUDING ALL APPLICABLE AMENDMENTS
- F. U.L. (UNDERWRITERS LABORATORIES)

1.3 SYSTEM DESCRIPTION
- A. DESIGN REQUIREMENTS: THE CONTRACTOR SHALL INSTALL UNDERGROUND ELECTRICAL AND TELEPHONE CONDUITS AND CABLE AS SPECIFIED HEREIN AND AS SHOWN ON THE DRAWINGS.
- B. PERFORMANCE REQUIREMENTS: WHEN FINISHED, WORK SHALL BE IN A COMPLETE AND UNDAMAGED STATE, AS REQUIRED IN THE CONTRACT DOCUMENTS.

PART II: PRODUCTS

2.1 GENERAL
- A. ITEMS SHALL BE NEW AND SHALL BE INSTALLED ONLY IF IN FIRST-CLASS CONDITION.
- B. SUBSTITUTIONS FOR MATERIAL WILL BE PERMITTED ONLY BY WRITTEN APPROVAL OF THE DRW NX CONSTRUCTION SUPERVISOR.

2.2 MATERIALS: THE CONTRACTOR SHALL PROVIDE ALL MATERIAL EXCEPT AS SPECIFIED IN THE CONTRACT DOCUMENTS. ALL MATERIAL SHALL BE APPROVED AND LISTED BY OR BEAR THE U.L. LABEL, AND WILL COMPLY WITH ANSI, IEEE AND NEMA STANDARDS WHERE APPLICABLE.
- A. CONDUITS:
  1. ALL UNDERGROUND CONDUIT SHALL BE SCHEDULE 40 PVC, SIZED AS SHOWN ON THE CONSTRUCTION DRAWINGS.
  2. ALL EXTERIOR ABOVEGROUND CONDUIT SHALL BE PER LOCAL CODE REQUIREMENTS, MIN. SCH. 80 PVC.
  3. ALL INTERIOR CONDUIT SHALL BE EMT WITH COMPRESSION-TYPE FITTINGS.
  4. LIQUID-TIGHT FLEXIBLE METALLIC CONDUIT SHALL BE USED FOR OUTDOOR LOCATIONS WHERE FLEXIBLE CONNECTION IS REQUIRED.
- B. CABLES:
  CONDUCTORS FOR GENERAL WIRING SHALL BE NEC STANDARD ANNEALED COPPER WIRE WITH NEC 600 VOLT INSULATION.
  1. #8 AND LARGER-STRANDED TYPE, THHN/THWN
  2. #10 AND SMALLER-SOLID TYPE THHN/THWN
  3. CONDUCTORS IN CONDUIT IN OR ADJACENT TO HIGH HEAT SOURCE SHALL BE TYPE XHHW
  4. CONDUCTORS IN CONDUITS ABOVE ROOF, ON TOP OF ROOF OR INSIDE BUILT-UP ROOFING MATERIAL SHALL BE TYPE XHHW
- C. CONVENIENCE OUTLET: UNLESS NOTED OTHERWISE, SURFACE-MOUNTED OUTLETS FOR EXTERIOR LOCATIONS SHALL BE FERALOY, CAD/ZINC ELECTROPLATED WITH THREADED HUBS OR CONDUIT ENTRANCES DRILLED AND TAPPED. ALL COVERS SHALL BE SELF-CLOSING AND GASKETED. SURFACE MOUNTED OUTLETS FOR INTERIOR LOCATIONS SHALL BE GALVANIZED, PRESSED STEEL WITH COVER PLATE, SIERRA PLASTIC STYLE, IVORY COLOR.
- D. COAXIAL CABLE SUPPORTS
  1. ALL WAVE GUIDE SUPPORTS SHALL BE MANUFACTURED TO MEET ALL COAX MINIMUM BENDING REQUIREMENTS WAVE GUIDES, AND B1587 FOR 6 WAVE GUIDES. SUPPORTS SHALL BE PROVIDED 3'-0" ON CENTERS.

PART III: EXECUTION

3.1 PREPARATION
- A. BEFORE LAYING OUT WORK, EXERCISE PROPER PRECAUTION TO VERIFY EACH MEASUREMENT.
- B. USE EXTREME CAUTION BEFORE EXCAVATING IN EXISTING AREAS TO LOCATE EXISTING UNDERGROUND SERVICES.

3.2 INSPECTION
- A. A VISUAL CHECK OF ELECTRICAL AND TELEPHONE CABLES, CONDUITS AND OTHER ITEMS SHALL BE MADE BY AN DRW NX CONSTRUCTION SUPERVISOR BEFORE THESE ITEMS ARE PERMANENTLY INSTALLED.
- B. THE CONTRACTOR SHALL NOTIFY THE DRW NX CONSTRUCTION SUPERVISOR 24 HOURS PRIOR TO TRENCH BACK FILL

3.3 INSTALLATION
- A. TRENCHING, BACK FILLING, BEDDING AND COMPACTING SHALL COMPLY WITH SITE WORK SPECIFICATIONS.
- B. DIG TRENCHES TO THE REQUIRED DEPTH AS SHOWN ON THE DRAWINGS WITHOUT POCKETS OR DIPS. REMOVE LARGE STONES FROM THE BOTTOM OF THE TRENCH AND FIRMLY TAMP LOOSE FILL IN THE BOTTOM BEFORE CONDUIT IS LAID.
- C. INSTALL UNDERGROUND CONDUIT WITH A MINIMUM 3-INCH TO 100-FOOT SLOPE OR TO A SLOPE SHOWN ON THE DRAWINGS.
- D. UNLESS SHOWN OTHERWISE ON THE DRAWINGS, TERMINATE AND CAP ALL STUB-UPS 12 INCHES ABOVE FINISHED GRADE ELEVATION.
- E. WHEREVER CONDUITS CROSS UNDER ROADWAYS, USE GALVANIZED RIGID STEEL CONDUITS IN ALL CASES, EXTENDING 5 FEET BEYOND THE EDGE OF THE ROAD BED. MINIMUM DEPTH FOR CONDUIT SHALL BE 4 FEET BELOW ROADWAY GRADE.
- F. MARK UNDERGROUND CONDUITS WITH A 6-INCH WIDE RED POLYETHYLENE TAPE BURIED 6 INCHES UNDER THE SURFACE DIRECTLY OVER THE CONDUITS. MARK THE TAPE THUS: CAUTION-BURIED ELECTRICAL CABLE.
- G. FOR SEALING CONDUITS, USE ONLY NONTHERMOPLASTIC COMPOUNDS SUCH AS J.M. DUXSEAL, OR AN APPROVED SUBSTITUTE. THE COMPOUND SHALL HAVE NO EFFECT ON RUBBER OR RUBBER-LIKE INSULATIONS, LEAD, ALUMINUM OR FERROUS ALLOYS; IT SHALL BE INSOLUBLE IN WATER AND WITHSTAND MAXIMUM TEMPERATURE RANGES OF THE LOCALITY.
- H. COAXIAL - REFER TO NOKIA ANTENNA AND COAXIAL CABLE INSULATION PROCEDURES.
- I. ANTENNA - REFER TO NOKIA ANTENNA AND COAXIAL CABLE INSULATION PROCEDURES.
- J. LNA/MHA - REFER TO NOKIA ANTENNA AND COAXIAL CABLE INSULATION PROCEDURES.

END OF ELECTRICAL SPECIFICATIONS

PROJECT SPECIFICATION 16670 (GROUNDING)

NOT ALL SECTIONS MAY APPLY TO THIS PROJECT, COORDINATE WITH CONSTRUCTION MANAGER.

PART I: GENERAL

1.1 SCOPE
- A. THIS SPECIFICATION PRESCRIBES THE REQUIREMENTS FOR FURNISHING, INSTALLATION AND TESTING OF THE GROUNDING CABLE, CONNECTORS AND ASSOCIATED COMPONENTS AS INDICATED ON THE DRAWINGS.
- B. APPLICATIONS OF ELECTRICAL GROUNDING AND BONDING WORK SPECIFIED IN THIS SPECIFICATION INCLUDE THE FOLLOWING:
  1. FENCE AND GATE POSTS
  2. ELECTRICAL POWER SYSTEMS
  3. GROUNDING ELECTRODES
  4. GROUND BUS BAR
  5. SERVICE EQUIPMENT
  6. ENCLOSURES
  7. MONOPOLE/LATTICE TOWER
  8. ICE BRIDGE

1.2 REFERENCES: THE PUBLICATIONS LISTED BELOW FORM PART OF THIS SPECIFICATION. EACH PUBLICATION SHALL BE THE LATEST REVISION AND ADDENDUM IN EFFECT ON THE DATE THIS SPECIFICATION IS ISSUED FOR CONSTRUCTION, UNLESS NOTED OTHERWISE. EXCEPT AS MODIFIED BY THE REQUIREMENTS SPECIFIED HEREIN, OR THE DETAILS OF THE DRAWINGS, WORK INCLUDED IN THIS SPECIFICATION SHALL CONFORM TO THE APPLICABLE PROVISIONS OF THESE PUBLICATIONS.
- A. ANSI (AMERICAN NATIONAL STANDARDS INSTITUTE)
- B. IEEE (INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS)
- C. NEC (NATIONAL ELECTRICAL CODE), LATEST EDITION
- D. NEMA (NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION)
- E. NESC (NATIONAL ELECTRICAL SAFETY CODE), LATEST EDITION
- F. OSHA (OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION)
- G. U.L. (UNDERWRITERS LABORATORIES)
- H. APPLICABLE LOCAL CODES AND ORDINANCES

PART II: PRODUCTS

2.1 MATERIALS: EXCEPT AS OTHERWISE INDICATED, PROVIDE ELECTRICAL GROUNDING AND BONDING SYSTEMS INDICATED; WITH ASSEMBLY OF MATERIAL, INCLUDING, BUT NOT LIMITED TO, GROUNDING ELECTRODES, BONDING JUMPER AND ADDITIONAL ACCESSORIES NEEDED FOR A COMPLETE INSTALLATION. WHERE MORE THAN ONE TYPE COMPONENT PRODUCT MEETS INDICATED REQUIREMENTS, SELECTION IS INSTALLER'S OPTION. WHERE MATERIALS OR COMPONENTS ARE NOT INDICATED, PROVIDE PRODUCTS WHICH COMPLY WITH NEC, U.L. AND IEEE REQUIREMENTS AND WITH ESTABLISHED INDUSTRY STANDARDS FOR THOSE APPLICATIONS INDICATED.
- A. GROUNDING
  1. THE EQUIPMENT SHALL BE GROUNDED AS FOLLOWS, AS SHOWN ON THE DRAWINGS AND IN COMPLIANCE WITH NEC ARTICLE 250 AND STATE AND LOCAL CODES.
  2. GROUND RODS AND QUANTITY SHOWN ON THE DRAWINGS ARE DIAGRAMMATIC. THE CONTRACTOR SHALL PERFORM A GROUND-RESISTANCE-TO-EARTH TEST. SHOULD THE INSTALLATION HAVE A RESISTANCE OF 5 OHMS OR MORE, CONTRACTOR SHALL INSTALL MORE GROUND RODS AS NECESSARY SO THAT THE OVERALL GROUND-TO-EARTH RESISTANCE IS LESS THAN 5 OHMS.
  3. INSTALL ELECTRICAL GROUNDING AND BONDING SYSTEMS AS INDICATED, IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, NEC'S "STANDARD OF INSTALLATION," AND IN ACCORDANCE WITH RECOGNIZED INDUSTRY PRACTICES TO ENSURE THAT PRODUCTS COMPLY WITH REQUIREMENTS.
  4. COORDINATE WITH OTHER ELECTRICAL WORK AS NECESSARY TO INTERFACE INSTALLATION OF ELECTRICAL GROUNDING AND BONDING SYSTEMS.
  5. INSTALL GROUND CONDUCTORS A MINIMUM OF 36 INCHES BELOW FINISHED GRADE WHICH ENCIRCLES THE TOWER AND EQUIPMENT AND ARE CONNECTED TO EACH DRIVEN GROUND ROD. GROUND TRENCH SHALL BE AT LEAST 24 INCHES AWAY FROM FOUNDATIONS.
  6. TIGHTEN GROUNDING AND BONDING CONNECTORS, INCLUDING SCREWS AND BOLTS, IN ACCORDANCE WITH MANUFACTURER'S PUBLISHED TORQUE TIGHTENING VALUE FOR CONNECTORS AND BOLTS. WHERE MANUFACTURER'S TORQUING REQUIREMENTS ARE NOT INDICATED, TIGHTEN CONNECTIONS TO COMPLY WITH TIGHTENING TORQUE VALUE SPECIFIED IN U.L. 486A TO ASSURE PERMANENT AND EFFECTIVE GROUNDING.
  7. APPLY CORROSION-RESISTANT FINISH (NO-OX) TO FIELD-CONNECTIONS, AT COPPER GROUND BARS AND PLACES WHERE FACTORY APPLIED PROTECTIVE COATING HAVE BEEN DESTROYED, WHICH ARE SUBJECTED TO CORROSIVE AND/OR OXIDATION PROCESS.
  8. ON EXISTING LATTICE TOWERS, WATER TOWERS AND ROOF TOPS WHEN A NEW GROUNDING SYSTEM IS INSTALLED, THE CONTRACTOR SHALL TIE THE NEW GROUND SYSTEM TO THE EXISTING WATER TOWER, LATTICE TOWER STRUCTURAL STEEL OR BUILDING STRUCTURAL STEEL AS THE CASE MAY BE AT LEAST AT ONE LOCATION SO THAT THEY ARE AT THE SAME POTENTIAL.
- B. GROUND RODS
  1. GROUND RODS SHALL BE 3/4" DIAMETER 10'-0" LONG, COPPER CLAD DRIVEN ROD(S).
  2. GROUND ROD(S) SHALL BE LOCATED AT THE PERIMETER OF EQUIPMENT AS TO CREATE A GROUND RING AS SHOWN ON THE DRAWINGS.
  3. GROUND ROD(S) SHALL BE SPACED AT A MINIMUM SPACING OF 8'-0" AND A MAXIMUM SPACING OF 10'-0".
  4. GROUND RODS SHALL BE BURIED BELOW THE FROSTLINE. AT NO TIME SHALL THIS DEPTH BE LESS THAN 18" BELOW FINISHED GRADE.
  5. GROUND RODS WHICH CANNOT BE DRIVEN STRAIGHT DOWN THE ENTIRE (10) FEET, SHALL BE DRIVEN AT AN ANGLE NOT GRATER THAN 45 DEGREES (NEC 250-83 AND 250-84).
  6. GROUND ROD LOCATIONS SHALL BE NOTED ON THE AS-BUILT DRAWING COMPLETE WITH DIMENSIONS.
  7. PROVIDE GROUND TEST WELLS AS SHOWN ON THE CONSTRUCTION DRAWINGS.
- C. GROUND CONDUCTOR
  1. ALL DIRECT BURIED GROUND CONDUCTORS SHALL BE TINNED SOLID (#2 AWG CU) WIRE. BURIED GROUND CONDUCTOR SHALL BE INSTALLED AT MINIMUM DEPTH OF 36" BELOW GRADE.
  2. ALL SUB GRADE GROUND CONNECTIONS SHALL BE MADE THROUGH THE USE OF EXOTHERMIC WELD PROCESS. CONNECTIONS SHALL INCLUDE ALL CABLE TO CABLE SPLICES, TEES AND ALL GROUND ROD CONNECTIONS. MOLD, WELD KITS, ETC., SHALL BE MANUFACTURED BY CADWELD AND SHALL BE INSTALLED AS PER THE MANUFACTURER'S INSTRUCTIONS.
  3. GROUND CONDUCTORS SHALL BE ROUTED IN THE SHORTEST AND STRAIGHTEST DISTANCES POSSIBLE TO MINIMIZE TRANSIENT VOLTAGE RISES. CONDUCTORS SHALL BE INSTALLED AS FOLLOWS:
     A. ALL GROUND CONDUCTORS SHALL FOLLOW A CONTINUOUS DOWNWARD PATTERN TO THE GROUND SOURCE. (NEVER RUN GROUND CONDUCTOR IN AN UPWARD DIRECTION.)
     B. CONDUCTORS SHALL BE INSTALLED WITH A MINIMUM OF 12 INCH MINIMUM BENDING RADIUS.
     C. WHEN THE MINIMUM BENDING RADIUS CANNOT BE ACHIEVED, GROUND CABLES SHALL BE ROUTED AT 90 DEGREE BENDS WITH THE USE OF EXOTHERMIC CONNECTIONS AT 90 DEGREES. THE INTENT IS TO ELIMINATE THE CABLE BEND RADIUS AND REPLACE THE RADIUS WITH AN EXOTHERMIC CONNECTION.

PART III: EXECUTION

3.1 PREPARATION
- A. ALL SURFACES TO WHICH GROUND CONNECTIONS WILL BE MADE SHALL BE FREE OF PAINT, GALVANIZING DIRECT CORROSION ETC..
- B. ALL METAL SURFACES EXPOSED ON GROUNDING SHALL BE EITHER COLD GALVANIZE, OR PAINTED TO MATCH ORIGINAL SURFACE.

3.2 EXAMINATION.
- A. EXAMINE AREAS AND CONDITIONS UNDER WHICH ELECTRICAL GROUNDING AND BONDING CONNECTIONS ARE TO BE MADE AND NOTIFY DRW NX CONSTRUCTION SUPERVISOR IN WRITING OF CONDITIONS DETRIMENTAL TO PROPER COMPLETION OF WORK. DO NOT PROCEED WITH WORK UNTIL UNSATISFACTORY CONDITIONS HAVE BEEN REMEDIED.
- B. THE CONTRACTOR SHALL NOTIFY THE DRW NX CONSTRUCTION SUPERVISOR 24 HOURS PRIOR TO TRENCH BACK FILL ALL WORK DONE BELOW FINISHED GRADE SHALL BE INSPECTED BY THE AERIAL CONSTRUCTION SUPERVISOR DURING THAT PERIOD OR THE CONTRACTOR SHALL PROCEED.

3.3 GROUND TESTING
- A. THE CONTRACTOR SHALL TEST THE GROUND ELECTRODE ROD RESISTANCE IN ACCORDANCE WITH THE METHODS OF MEASUREMENT SHOWN IN THE FALL OF POTENTIAL METHOD.
- B. TEST INSTRUMENTS SHALL OPERATE AT A FREQUENCY OTHER THAN 60 HERTZ AND SHALL CONTAIN STRAY CURRENT AND DC FILTERS, FAULT CURRENT PROTECTION AND HAVE SENSITIVITY TO OPERATE A LOW SIGNAL STRENGTH.
- C. PRIOR TO TESTING, THE CONTRACTOR SHALL DE-ENERGIZE ALL POWER SOURCES, DISCONNECT THE ELECTRODE CONDUCTOR FROM THE GROUND ROD, WEAR HIGH VOLTAGE RUBBER SAFETY GLOVES AND WILL NOT HANDLE TEST INSTRUMENTS IF AT ALL POSSIBLE.
- D. GROUND TESTS ARE TO BE PERFORMED BY QUALIFIED PERSONS FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THE EQUIPMENT AND THE HAZARDS INVOLVED.
- E. AN INDEPENDENT, APPROVED OUTSIDE FIRM SHALL PERFORM THE GROUND TEST AS OUTLINED. ALL TEST RESULTS SHALL BE FORWARDED TO THE DRW NX CONSTRUCTION SUPERVISOR FOR APPROVAL.

END OF GROUNDING SPECIFICATIONS

CLOSE OUT DOCUMENTATION

CLOSEOUT BOOK CONTAINING THE FOLLOWING:
- A. AS BUILT DESIGN DRAWINGS
- B. SWEEP TEST RESULTS
- C. GROUND RESISTIVITY TEST
- D. PHOTO DOCUMENTATION OF:
  1. UNDERGROUND CONDUITS AND GROUND RING
  2. ANTENNA, COAXIAL, JUMPER ATTACHMENTS AND GROUND KIT ATTACHMENTS
  3. ANTENNA DOWN TILT MEASUREMENT USING AN INCLINOMETER ON THE BACK PLANE OF THE ANTENNA
  4. GROUND BAR ATTACHMENTS
- E. SIGNED OFF PERMIT CARDS
- F. CERTIFICATE OF OCCUPANCY
- G. RETURN OF KEYS AND/OR ACCESS AUTHORIZATION
- H. ORIGINAL BUILDING PERMIT

DRW NX

GPD Engineering and Architecture
Professional Corporation

520 South Main Street
Akron, OH 44311
330.572.2100 Fax 330.572.2102

SEAL:

STATE OF CONNECTICUT · STEVEN F SCHAUF · 25034 · LICENSED PROFESSIONAL ENGINEER

06/15/2020

PROJECT LOCATION:

US.CT.CCI.871584
115 BIRCH MTN. ROAD
GLASTONBURY, CT 06033
HARTFORD COUNTY

SCHEDULE OF REVISIONS

REV.	DESCRIPTION OF CHANGE	DRAWN BY:	AUTH BY:	ISSUE DATE
0	ISSUED FOR PERMITTING	ZDT	JWB	06/15/2020
A	90% REVIEW	ZDT	JWB	06/10/2020

SCALE:AS SHOWN | DESIGNED BY: ZDT | DRAWN BY: ZDT

GPD#:2020796.01.US.CT.CCI.871584.01

PROJECT NAME:
US.CT.CCI.871584

DRAWING TITLE:
ELECTRICAL NOTES

DRAWING NUMBER:
N-3

THIS IS NOT A SITE SURVEY:
ALL PROPERTY BOUNDARIES, ORIENTATION OF TRUE NORTH AND STREET HALF-WIDTHS ACCORDING TO ONLINE GIS DATA.

PARCEL ID: 04200001A

PARCEL ID: 04200001B

PARCEL ID: 04200001E

PARCEL ID: 79000070

EXISTING WOODED AREA

PARCEL ID: 31200062

EXISTING BUILDING (TYP.)

EXISTING TREE LINE (TYP.)

PROPOSED TOWER COMPOUND PLAN SEE SHEET C-2 FOR DETAILS

EXISTING 200'-0" TALL SELF SUPPORT TOWER

BIRCH MOUNTAIN RD.

PARCEL ID: 79000060

PARCEL ID: 79000073

ZENITH LANE

PARCEL ID: 31200050

PARCEL ID: 31200038

EXISTING WOODED AREA

PARCEL ID: 04200115

PARCEL ID: 79000067

PARCEL ID: 29203271

PARCEL ID: 04200001W

EXISTING WOODED AREA

PARCEL ID: 79000057

PARCEL ID: 29203285

PARCEL ID: 29203299

PARCEL ID: 79000021

PARCEL ID: 22600057

SYMBOL LEGEND

- FENCE
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- TREE LINE

OVERALL SITE PLAN

50' 25' 0 50' 100'
1"=50'

1

DRAWNX

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SEAL:

STATE OF CONNECTICUT LEONARDO A. STEFFA 31512 LICENSED PROFESSIONAL ENGINEER

06/15/2020

PROJECT LOCATION:

US.CT.CCI.871584
115 BIRCH MTN. ROAD
GLASTONBURY, CT 06033
HARTFORD COUNTY

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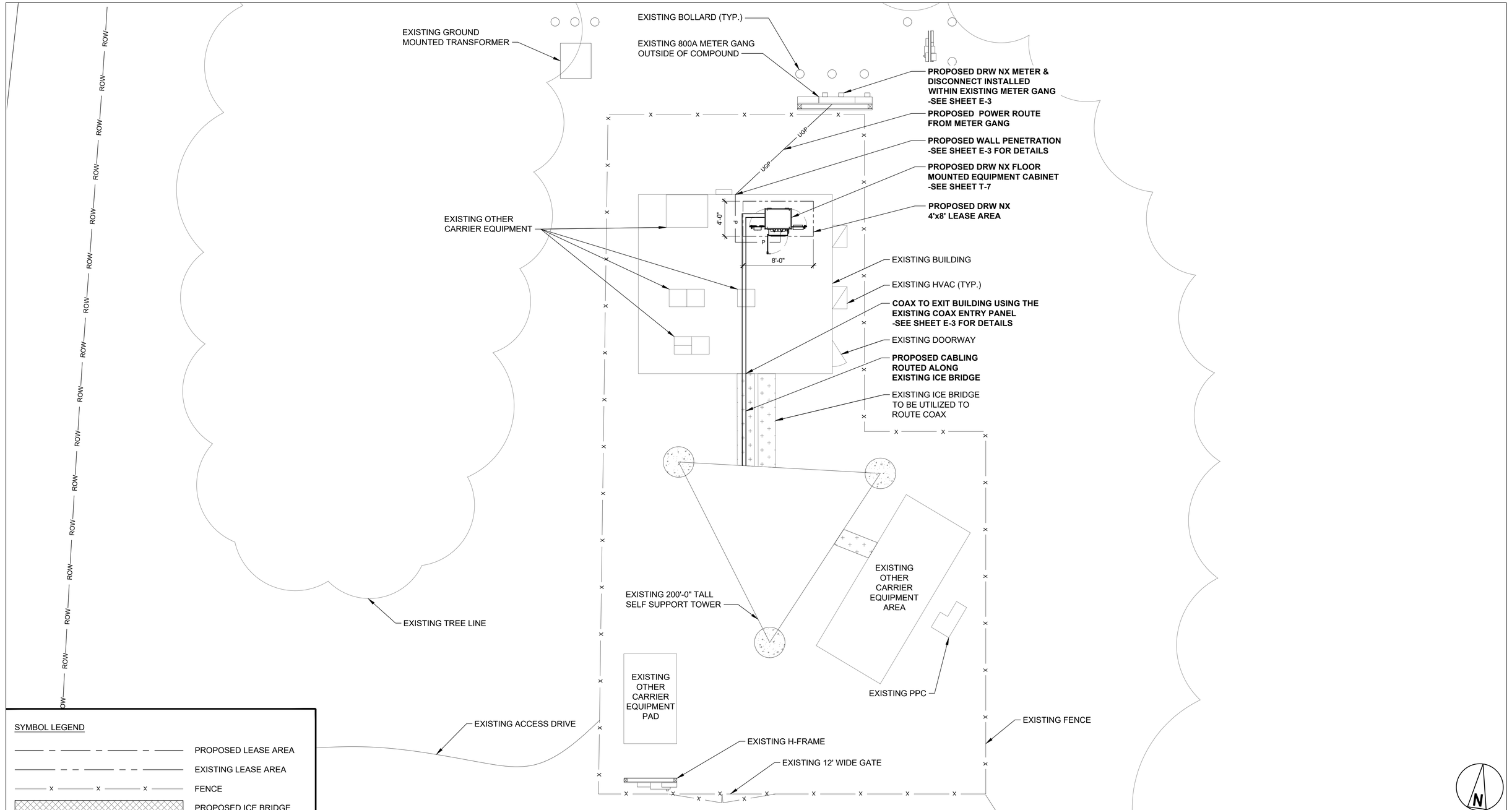
SCALE:AS SHOWN | DESIGNED BY: ZDT | DRAWN BY: ZDT

GPD#:2020796.01.US.CT.CCI.871584.01

PROJECT NAME:
US.CT.CCI.871584

DRAWING TITLE:
OVERALL SITE PLAN

DRAWING NUMBER:
C-1



ENLARGED SITE PLAN

3/16"=1'-0"

1

DRW NX

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SEAL:

STATE OF CONNECTICUT LEONARDO A. BRERA 31572 LICENSED PROFESSIONAL ENGINEER

06/15/2020

PROJECT LOCATION:

US.CT.CCI.871584
115 BIRCH MTN. ROAD
GLASTONBURY, CT 06033
HARTFORD COUNTY

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A	90% REVIEW	ZDT	JWB	06/10/2020

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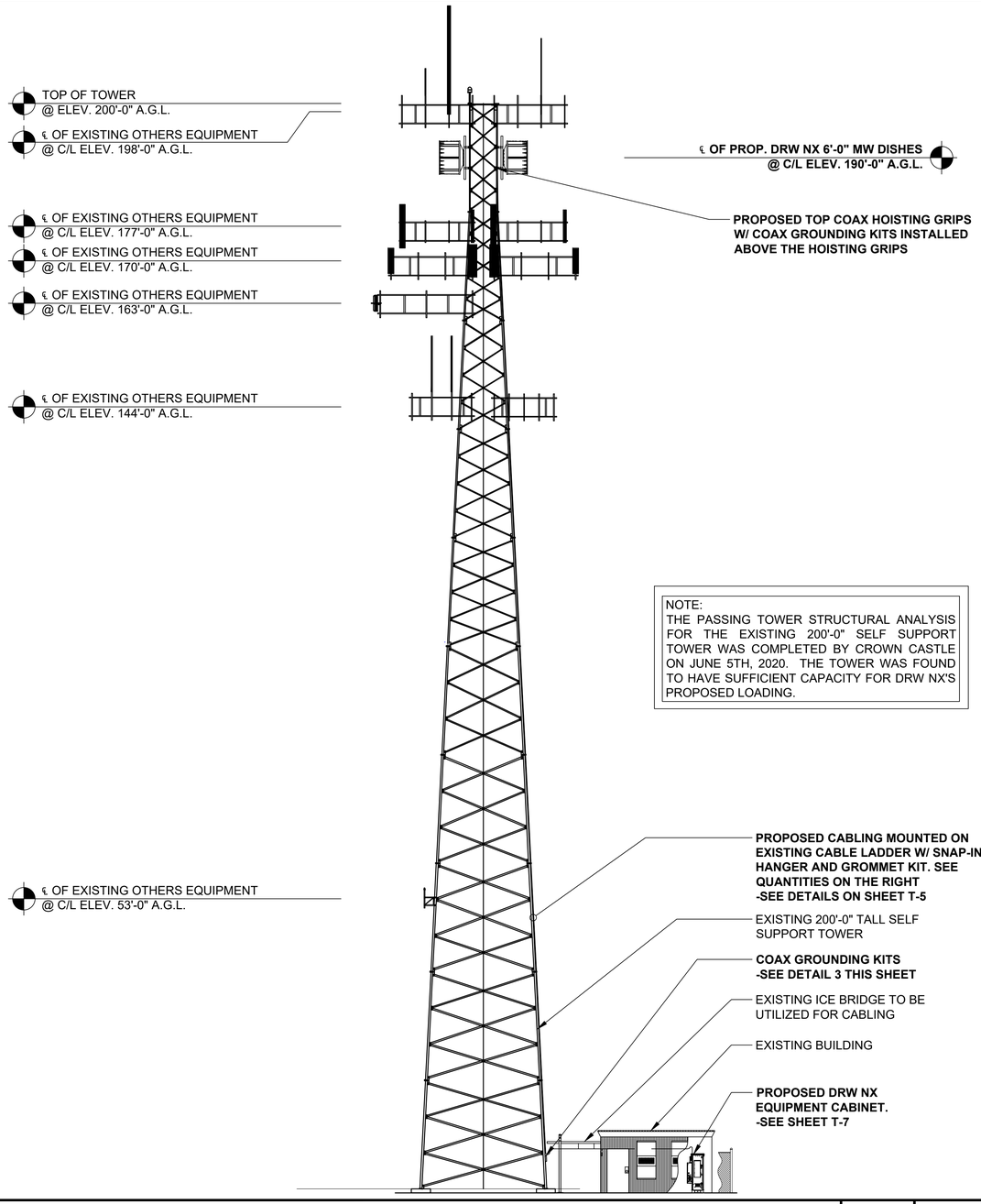
GPD#:2020796.01.US.CT.CCI.871584.01

PROJECT NAME:
US.CT.CCI.871584

DRAWING TITLE:
ENLARGED SITE PLAN

DRAWING NUMBER:
C-2



NOTE:
THE PASSING TOWER STRUCTURAL ANALYSIS FOR THE EXISTING 200'-0" SELF SUPPORT TOWER WAS COMPLETED BY CROWN CASTLE ON JUNE 5TH, 2020. THE TOWER WAS FOUND TO HAVE SUFFICIENT CAPACITY FOR DRW NX'S PROPOSED LOADING.

TOWER ELEVATION

SCALE: N.T.S. | 1

MICROWAVE DISH CONFIGURATION

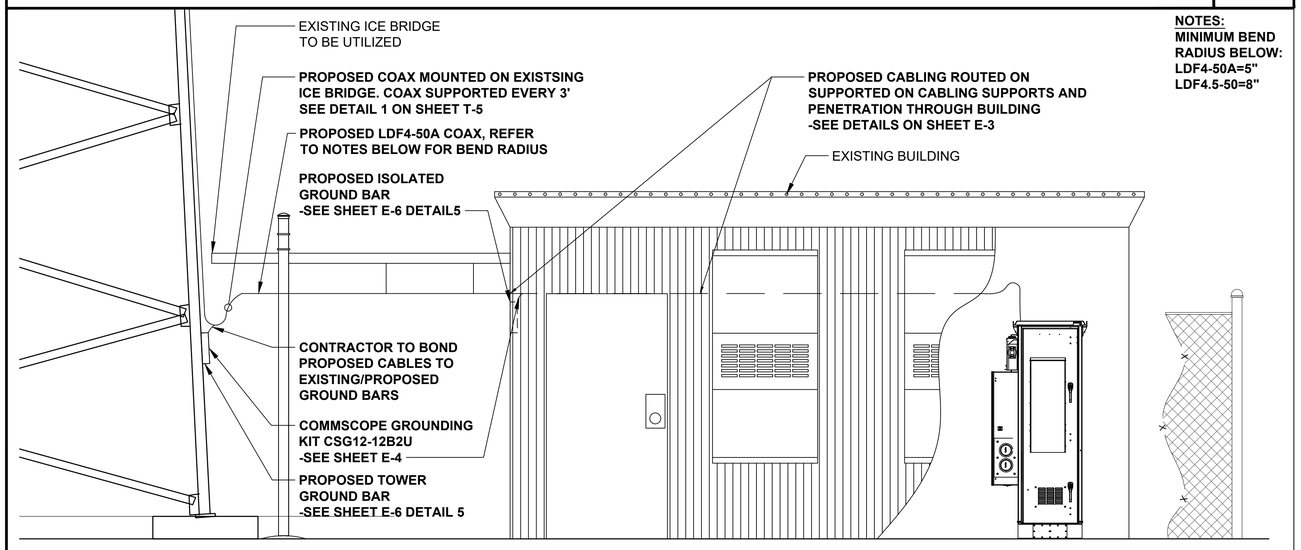
DISH #	AZIMUTH	MODEL #	DIAMETER (FT)	WEIGHT (LBS)	RADIO MODEL #	RAD CENTER (FT)	MECH. DOWNTILT	ODU QUANTITY	CABLING TABLE # OF CABLES	CABLING TABLE MODEL #	CABLING TABLE DIA. (IN)
1	232	USX6-6W-6GR	6	198	SAF MXM MK2 ODU	190	-	2	3/3/3	LDF4-50A/CAT6/COPPER POWER	1/2, 1/4, 1/4
2	53	USX6-6W-6GR	6	198	SAF MXM MK2 ODU	190	-	2	3/3/3	LDF4-50A/CAT6/COPPER POWER	1/2, 1/4, 1/4
3	250	USX6-6W-6GR	6	198	SAF MXM MK2 ODU	190	-	2	3/3/3	LDF4-50A/CAT6/COPPER POWER	1/2, 1/4, 1/4
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-

EQUIPMENT QUANTITIES

ITEM	MODEL #	QUANTITY	UNIT*
TOWER MOUNTED GROUND BAR	-	2	
TOWER COAX QTY	LDF4-50A	2079	LF
TOWER FIBER CABLE QTY	CAT6	2079	LF
TOWER POWER CABLE QTY	COPPER POWER CABLE	2079	LF
HANGER ADAPTER GROMMET QTY	VALMONT BC124	201	
HANGER ADAPTER GROMMET QTY	VALMONT BC1410	134	
SNAP-IN QTY	COMMSCOPE SSH-158-3	335	
GROUNDING KIT QTY	COMMSCOPE CSG12-12B2U	81	
MID-GROUNDING KIT QTY	COMMSCOPE CSG12-12B2U	0	
TOP HOISTING GRIP QTY	COMMSCOPE L4SGRIP	27	
MID-HOISTING GRIP QTY	COMMSCOPE 43094	0	

ANTENNA SCHEDULE

2



NOTES:
MINIMUM BEND RADIUS BELOW:
LDF4-50A=5"
LDF4.5-50=8"

ENLARGED ELEVATION

SCALE: N.T.S. | 3

DRW NX

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520 South Main Street
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330.572.2100 Fax 330.572.2102

SEAL:

PROJECT LOCATION:

US.CT.CCI.871584
115 BIRCH MTN. ROAD
GLASTONBURY, CT 06033
HARTFORD COUNTY

SCHEDULE OF REVISIONS

REV.	DESCRIPTION OF CHANGE	DRAWN BY:	AUTH BY:	ISSUE DATE
0	ISSUED FOR PERMITTING	ZDT	JWB	06/15/2020
A	90% REVIEW	ZDT	JWB	06/10/2020

SCALE:AS SHOWN | DESIGNED BY: ZDT | DRAWN BY: ZDT

GPD#:2020796.01.US.CT.CCI.871584.01

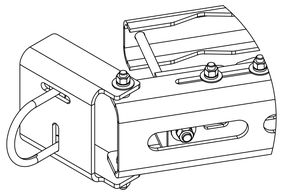
PROJECT NAME:
US.CT.CCI.871584

DRAWING TITLE:
TOWER ELEVATION & ANTENNA SCHEDULE

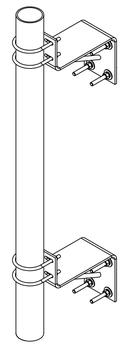
DRAWING NUMBER:
T-1

COMMSCOPE # TF-ML3-8 (FOR REFERENCE ONLY)			
ITEM	PART NO.	DESCRIPTION	QTY
1	MT-653-63	PLAIN END PIPE	2*
2	TFMHK3	FACE MOUNT KIT	1
3	MT54796	PLAIN END PIPE	2
4	TF-ST	MOUNT STAND-OFF	2*

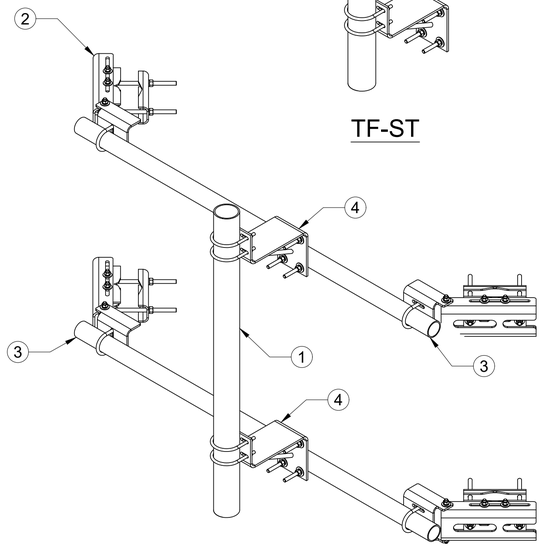
*QTY'S MARKED WITH AN ASTERISK ONLY COME WITH 1 IN THE TF-ML3-8 MOUNTING CONFIGURATION. EXTRA PARTS ARE NEEDED FOR PROPOSED MOUNTING CONFIGURATION.



TFMHK3



TF-ST



TF-ML3-8

TORQUING NOTES:

PER EIA/TIA-222 STANDARDS. FOR CONNECTIONS SUBJECT TO TENSION AND SLIP CRITICAL AREAS, A325 BOLTS SHALL BE USED. FASTENERS SHALL BE TIGHTENED TO THE STANDARD OF "SNUG TIGHTENED". GOVERNED BY THE SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS, STANDARD PER RCSC.

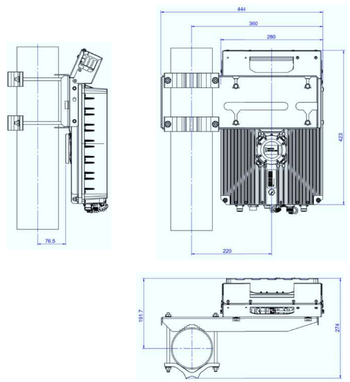
THE CONTRACTOR SHALL ENSURE THAT CONNECTED ELEMENTS ARE NOT DAMAGED DUE TO TORQUING REQUIREMENTS OR BE RESPONSIBLE FOR THE SAME.

COMMSCOPE TF-ML3-8 MOUNTING ASSEMBLY

SCALE: N.T.S.

1

Dual ODU mounting bracket

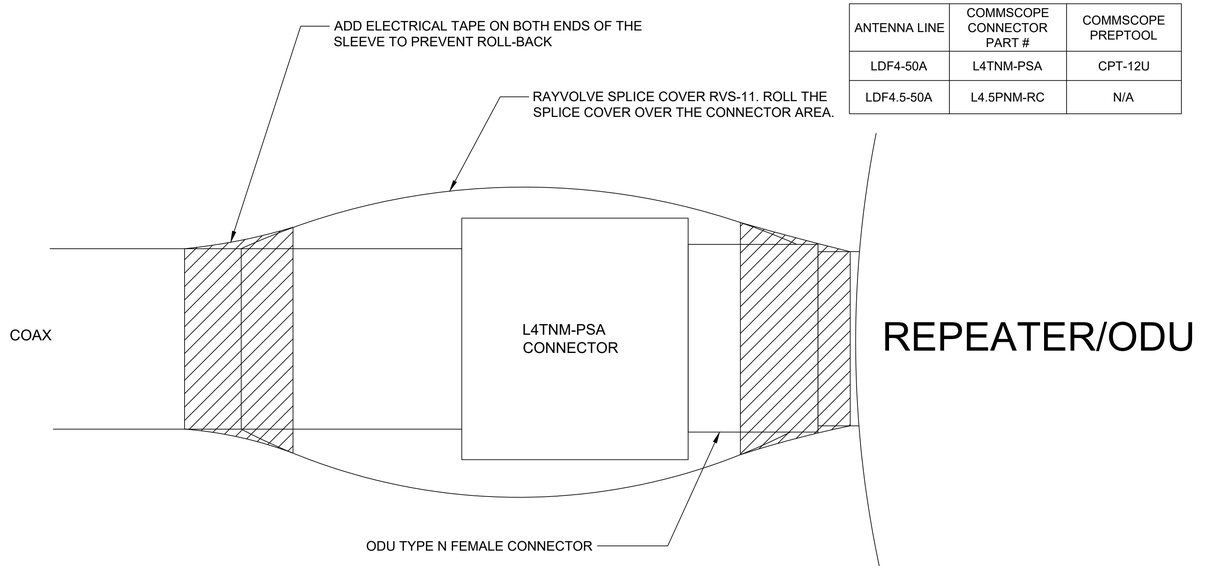


ODU MOUNT

SCALE: N.T.S.

2

ANTENNA LINE	COMMSCOPE CONNECTOR PART #	COMMSCOPE PREPTOOL
LDF4-50A	L4TNM-PSA	CPT-12U
LDF4.5-50A	L4.5PNM-RC	N/A

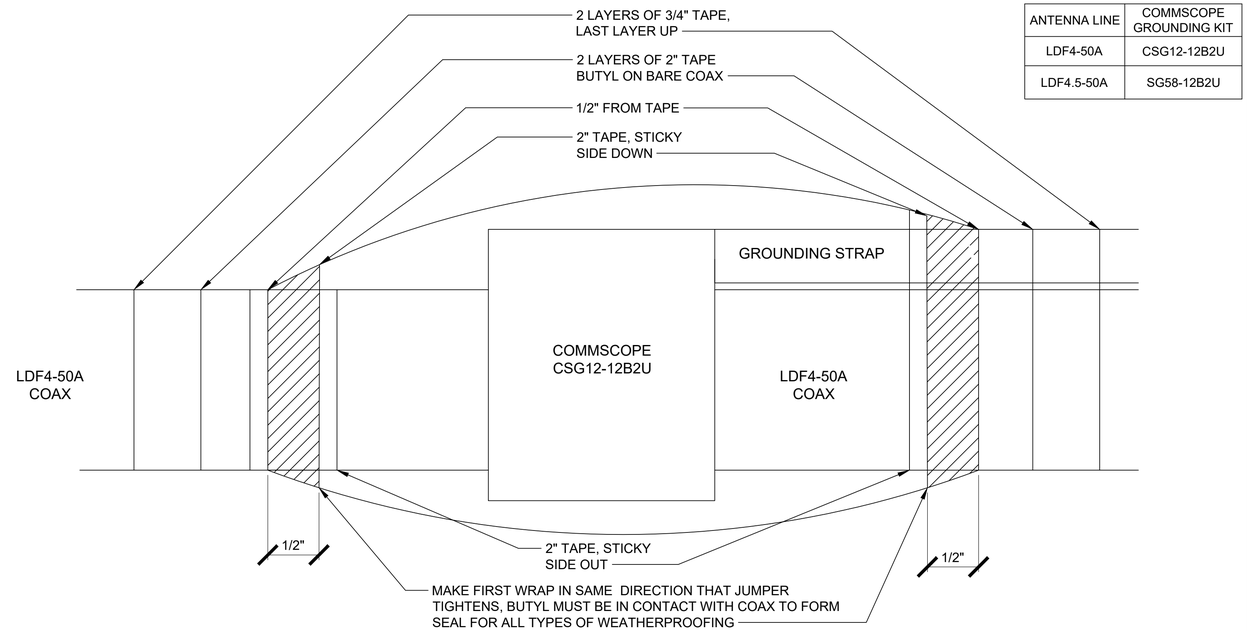


COAX TO REPEATER/ODU WEATHERPROOFING DETAIL

SCALE: N.T.S.

3

ANTENNA LINE	COMMSCOPE GROUNDING KIT
LDF4-50A	CSG12-12B2U
LDF4.5-50A	SG58-12B2U



GROUNDING KIT WEATHERPROOFING DETAIL

SCALE: N.T.S.

4

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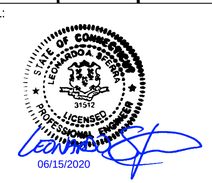
SEAL:



PROJECT LOCATION:

US.CT.CCI.871584
115 BIRCH MTN. ROAD
GLASTONBURY, CT 06033
HARTFORD COUNTY

SCHEDULE OF REVISIONS

REV.	DESCRIPTION OF CHANGE	DRAWN BY:	AUTH BY:	ISSUE DATE
0	ISSUED FOR PERMITTING	ZDT	JWB	06/15/2020
A	90% REVIEW	ZDT	JWB	06/10/2020

SCALE:AS SHOWN | DESIGNED BY: ZDT | DRAWN BY: ZDT

GPD#:2020796.01.US.CT.CCI.871584.01

PROJECT NAME:

US.CT.CCI.871584

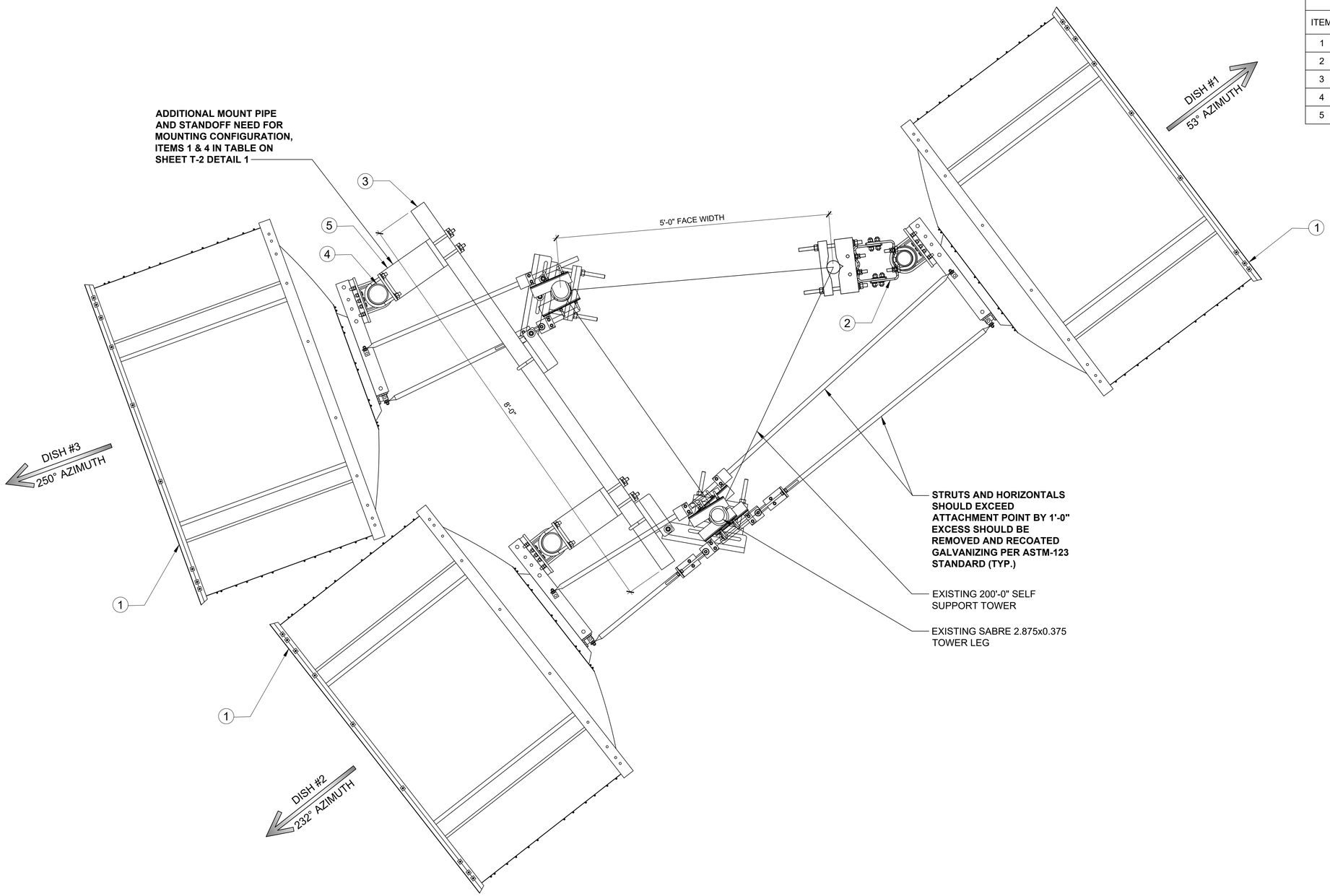
DRAWING TITLE:

DISH MOUNT DETAILS

DRAWING NUMBER:

T-2

COMMSCOPE BILL OF MATERIAL FOR DISH & MOUNTING COMPONENTS			
ITEM	PART NO.	DESCRIPTION	QTY
1	USX6-6W-6GR	6'-0" MW DISH	2
2	PM-SC4-96	UNIVERSAL OPEN FACE PIPE MOUNT	1
3	TF-ML3-8	TOWER FACE MOUNT W/ 14" STANDOFF	1
4	MT-653-63	PLAIN END PIPE	1
5	TF-ST	MOUNT STAND-OFF	1



NOTE:
1. THE SIDE STRUTS MUST BE ATTACHED POINTING DIRECTLY BEHIND THE ANTENNA WITHIN THE FOLLOWING ANGULAR LIMITS:
   SIDE STRUT (WITH AZIMUTH ADJUSTMENT):
   25° HORIZONTALLY
   5° VERTICALLY
   SIDE STRUT (WITHOUT AZIMUTH ADJUSTMENT):
   25° HORIZONTALLY
   25° VERTICALLY

2. REFER TO SOW DOCUMENT FOR ODU CABLING DETAILS

3. ANTENNAS MUST BE INSTALLED PER MANUFACTURER SPECIFICATIONS

N

DISH PLAN @ 190'-0" A.G.L.

0 0.75 1.5 3
1" = 1'-0"

1

DRAWNX

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SEAL:

STATE OF CONNECTICUT LEONARDO A. SPERA 31572 LICENSED PROFESSIONAL ENGINEER
06/15/2020

PROJECT LOCATION:

US.CT.CCI.871584
115 BIRCH MTN. ROAD
GLASTONBURY, CT 06033
HARTFORD COUNTY

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SCALE:AS SHOWN | DESIGNED BY: ZDT | DRAWN BY: ZDT

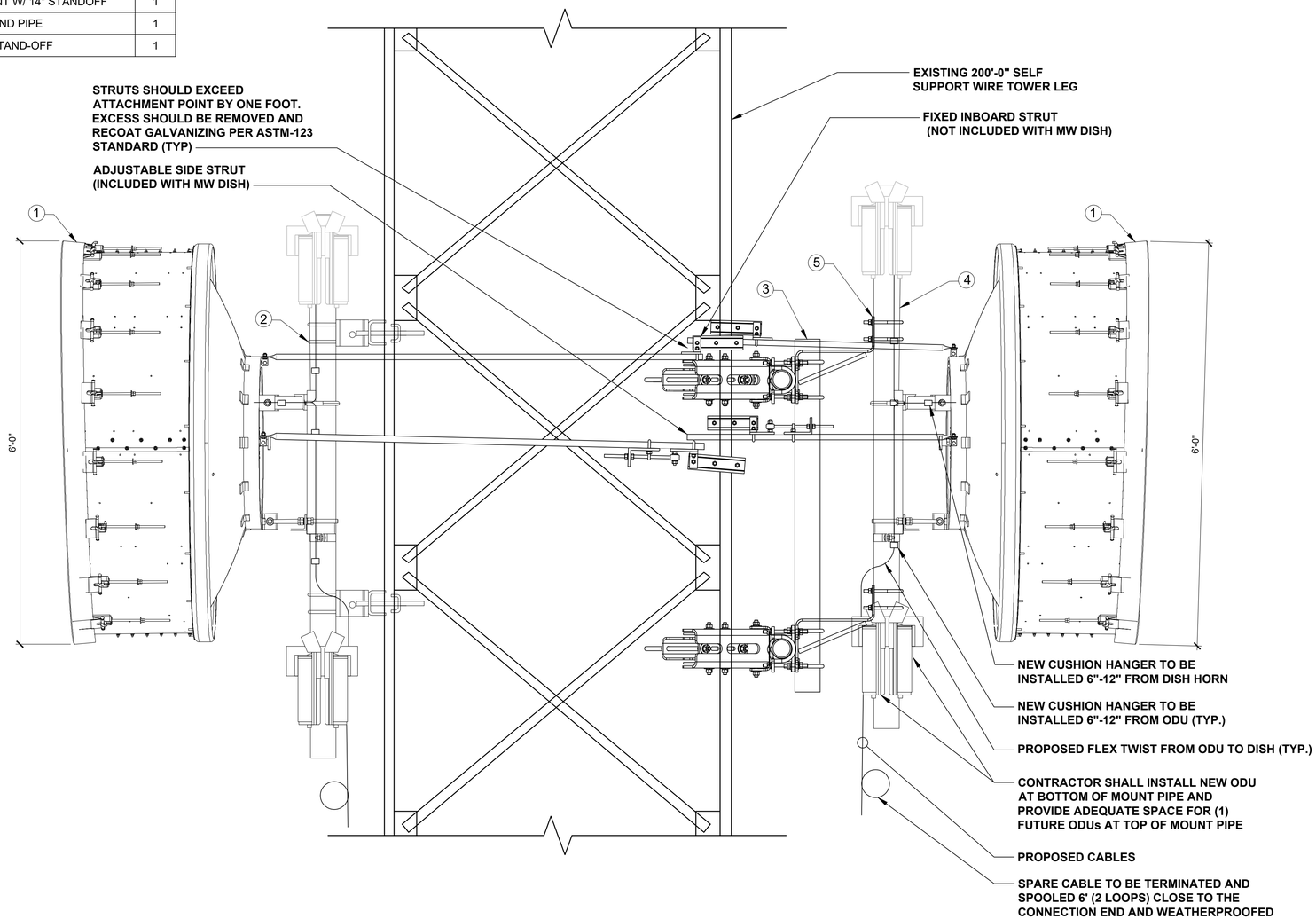
GPD#:2020796.01.US.CT.CCI.871584.01

PROJECT NAME:
US.CT.CCI.871584

DRAWING TITLE:
DISH PLAN @ 190'-0" A.G.L.

DRAWING NUMBER:
T-3

COMMSCOPE BILL OF MATERIAL FOR DISH & MOUNTING COMPONENTS			
ITEM	PART NO.	DESCRIPTION	QTY
1	USX6-6W-6GR	6'-0" MW DISH	2
2	PM-SC4-96	UNIVERSAL OPEN FACE PIPE MOUNT	1
3	TF-ML3-8	TOWER FACE MOUNT W/ 14" STANDOFF	1
4	MT-653-63	PLAIN END PIPE	1
5	TF-ST	MOUNT STAND-OFF	1



NOTE:
1. THE SIDE STRUTS MUST BE ATTACHED POINTING DIRECTLY BEHIND THE ANTENNA WITHIN THE FOLLOWING ANGULAR LIMITS:
   SIDE STRUT (WITH AZIMUTH ADJUSTMENT):
   25° HORIZONTALLY
   5° VERTICALLY
   SIDE STRUT (WITHOUT AZIMUTH ADJUSTMENT):
   25° HORIZONTALLY
   25° VERTICALLY

2. REFER TO SOW DOCUMENT FOR ODU CABLING DETAILS

3 THE PIPE MOUNT CAN BE EXTENDED VERTICALLY TO ACCOMMODATE THE PROPOSED ODU'S IF SITE CONSTRAINTS PREVENT THE INSTALLATION OF ODU'S BELOW THE PROPOSED DISH

4.CONTRACTOR SHALL FIELD ADJUST/MODIFY BACK STRUTS VERTICALLY UP TO 5° TO AVOID CONFLICT

TYPICAL 6' MW DISH MOUNT ELEVATION

12" 9" 6" 3" 0 1' 2'
1"=1'-0"

1

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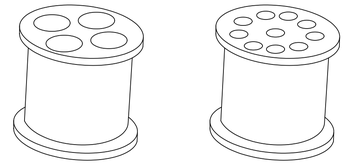
GPD#:2020796.01.US.CT.CCI.871584.01

PROJECT NAME:
US.CT.CCI.871584

DRAWING TITLE:
DISH ELEVATIONS

DRAWING NUMBER:
T-4

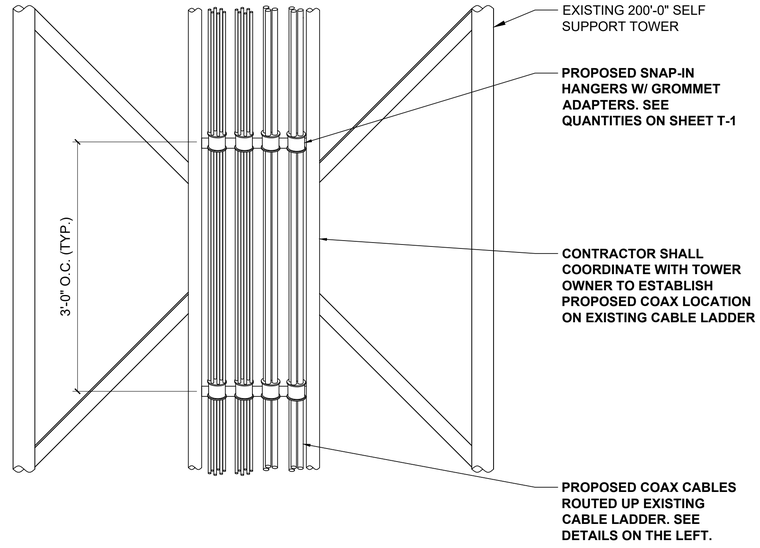
COMMSCOPE PART #	CABLE SIZE & TYPE
SSH-158-3	1-5/8" COAXIAL CABLE (GROMMET)



VALMONT PART #	CABLE SIZE & TYPE	# OF HOLES	HOLE SIZE	MATING HANGER SIZE
BC124	1/2" COAX	4	0.63 (16)	1-5/8"
BC1410	1/4" CAT6 1/4" COPPER POWER	10	0.24 (6)	1-5/8"

NOTES:

1. REFER TO OWNERS MANUAL FOR MANUFACTURES SPECIFICATIONS
2. ALL QUANTITIES ARE ASSUMED. CONSULT WITH DRW NX AND CONSTRUCTION MANAGER BEFORE ORDERING.
3. HANGERS SHOULD BE INSTALLED ON EVERY HORIZONTAL LEVEL OF THE LADDER (MINIMUM EVERY 3 FEET)
4. HOISTING GRIPS AND GROUNDING KITS TO BE INSTALLED PER MANUFACTURER SPECIFICATIONS.
5. GROUND KITS ARE TO BE INSTALLED ABOVE THE HOISTING GRIPS.
6. CONTRACTOR TO VERIFY QUANTITIES DURING PRE CONSTRUCTION WALK FOR SNAP-INS AND GROMMETS. ALL CURRENT QUANTITIES ARE FOR A REFERENCE ONLY



WAVE GUIDE LADDER

SCALE: N.T.S. | 2

EXECUTION

1. STRUCTURAL EXCAVATION
   A. FOUNDATION EXCAVATIONS SHALL BE CUT TO FIRM MATERIAL HAVING A SAFE BEARING VALUE OF 3000 PSF AND SHALL BE FREE OF ALL LOOSE AND WET MATERIALS. IF THE BOTTOM OF THE EXCAVATION IS NOT FIRM AND STABLE, OVER-EXCAVATE AN ADDITIONAL 12 INCHES, COMPACT SUB-GRADE AND FILL WITH 12 INCHES OF SELECT STRUCTURAL FILL.
   B. AFTER EXCAVATION, THE EXPOSED SOILS SHALL BE INSPECTED AND TESTED AND ANY UNSUITABLE DEPOSITS REMOVED AS DIRECTED TO REACH SUITABLE BEARING SOIL. ALL OVER-EXCAVATED AREAS SHALL BE BACK FILLED WITH SELECT STRUCTURAL FILL OR WITH LEAN CONCRETE FILL TO THE ELEVATION OF THE BOTTOM OF FOOTING OR FOUNDATION AS INDICATED ON THE DRAWINGS.
   C. PRIOR TO PLACEMENT OF CONC. FOUNDATIONS, THE SURFACE ON WHICH THE CONCRETE IS TO BE PLACED SHALL BE COMPACTED TO A MINIMUM OF 95% OF THE MODIFIED PROCTOR DENSITY BY THE MODIFIED PROCTOR TEST, ASTM D1557.
   D. NO FOUNDATIONS OR STRUCTURES SHALL BE CONSTRUCTED UNTIL THE BASE MATERIALS HAVE BEEN INSPECTED BY THE DRW NX CONSTRUCTION SUPERVISOR.

2. STRUCTURAL FILL:
   ALL COMPACTED FILL SHALL BE PLACED IN LAYERS NOT EXCEEDING A LOOSE 8" THICKNESS AND COMPACTED TO A MINIMUM DENSITY OF 95% OF THE MODIFIED PROCTOR DENSITY OBTAINED IN ACCORDANCE WITH ASTM D-1557.

DETAIL NOT USED

SCALE: N.T.S. | 1

NOTES

SCALE: N.T.S. | 3

DRW NX

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SEAL:

PROJECT LOCATION:

US.CT.CCI.871584
115 BIRCH MTN. ROAD
GLASTONBURY, CT 06033
HARTFORD COUNTY

SCHEDULE OF REVISIONS

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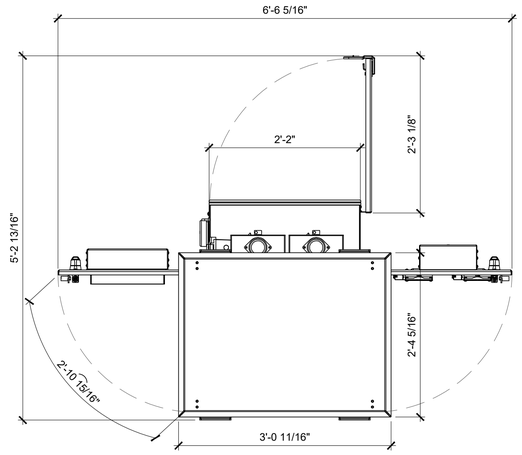
SCALE:AS SHOWN | DESIGNED BY: ZDT | DRAWN BY: ZDT

GPD#:2020796.01.US.CT.CCI.871584.01

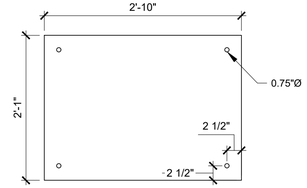
PROJECT NAME: US.CT.CCI.871584

DRAWING TITLE: COAX MOUNTING DETAILS

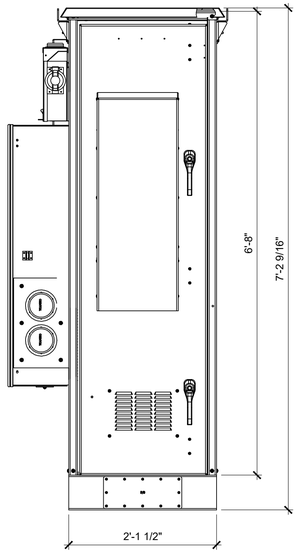
DRAWING NUMBER: T-5



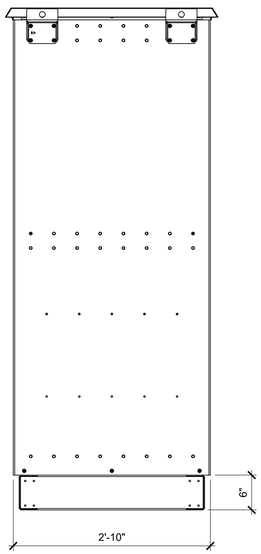
PLAN VIEW



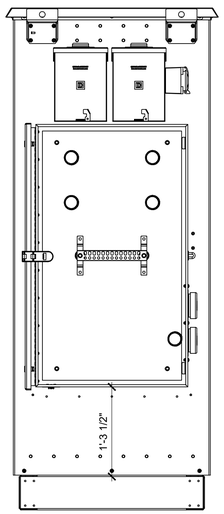
MOUNTING DETAIL



SIDE VIEW



FRONT VIEW



BACK VIEW

CABINET SPECIFICATIONS

SCALE: N.T.S.

1

DRIVENX

REFERENCE ONLY

SEAL:

REFERENCE ONLY

PROJECT LOCATION:

US.CT.CCI.871584
115 BIRCH MTN. ROAD
GLASTONBURY, CT 06033
HARTFORD COUNTY

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GPD#:2020796.01.US.CT.CCI.871584.01

PROJECT NAME:
US.CT.CCI.871584

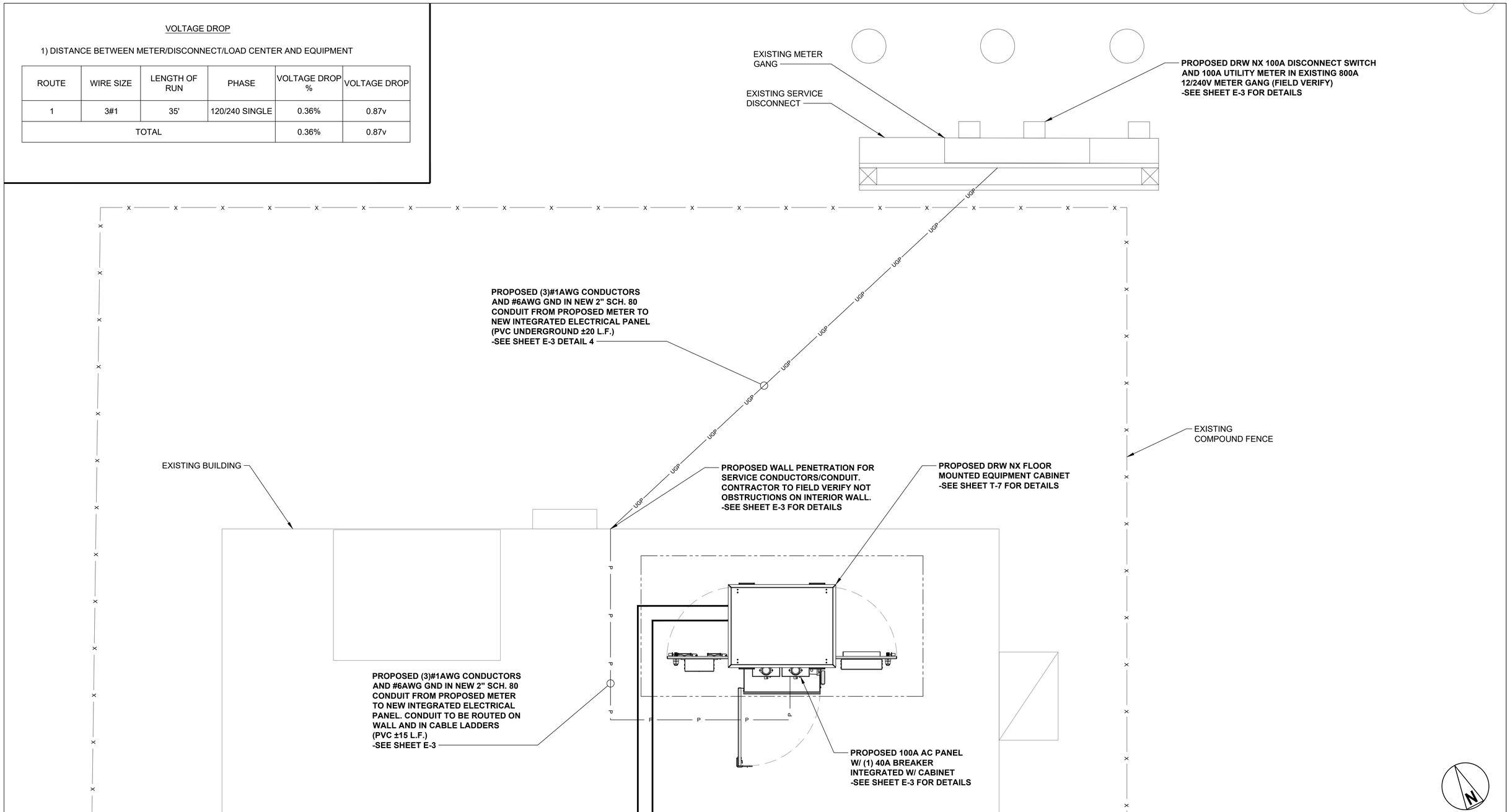
DRAWING TITLE:
CABINET DETAILS

DRAWING NUMBER:
T-6

VOLTAGE DROP

1) DISTANCE BETWEEN METER/DISCONNECT/LOAD CENTER AND EQUIPMENT

ROUTE	WIRE SIZE	LENGTH OF RUN	PHASE	VOLTAGE DROP %	VOLTAGE DROP
1	3#1	35'	120/240 SINGLE	0.36%	0.87v
TOTAL				0.36%	0.87v



SITE UTILITY PLAN

12" 6" 0 1' 2' 3'
3/4"=1'-0"

1

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SEAL:

STATE OF CONNECTICUT · STEVEN P. SCHAUB · LICENSED PROFESSIONAL ENGINEER

06/15/2020

PROJECT LOCATION:

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GLASTONBURY, CT 06033
HARTFORD COUNTY

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GPD#:2020796.01.US.CT.CCI.871584.01

PROJECT NAME:
US.CT.CCI.871584

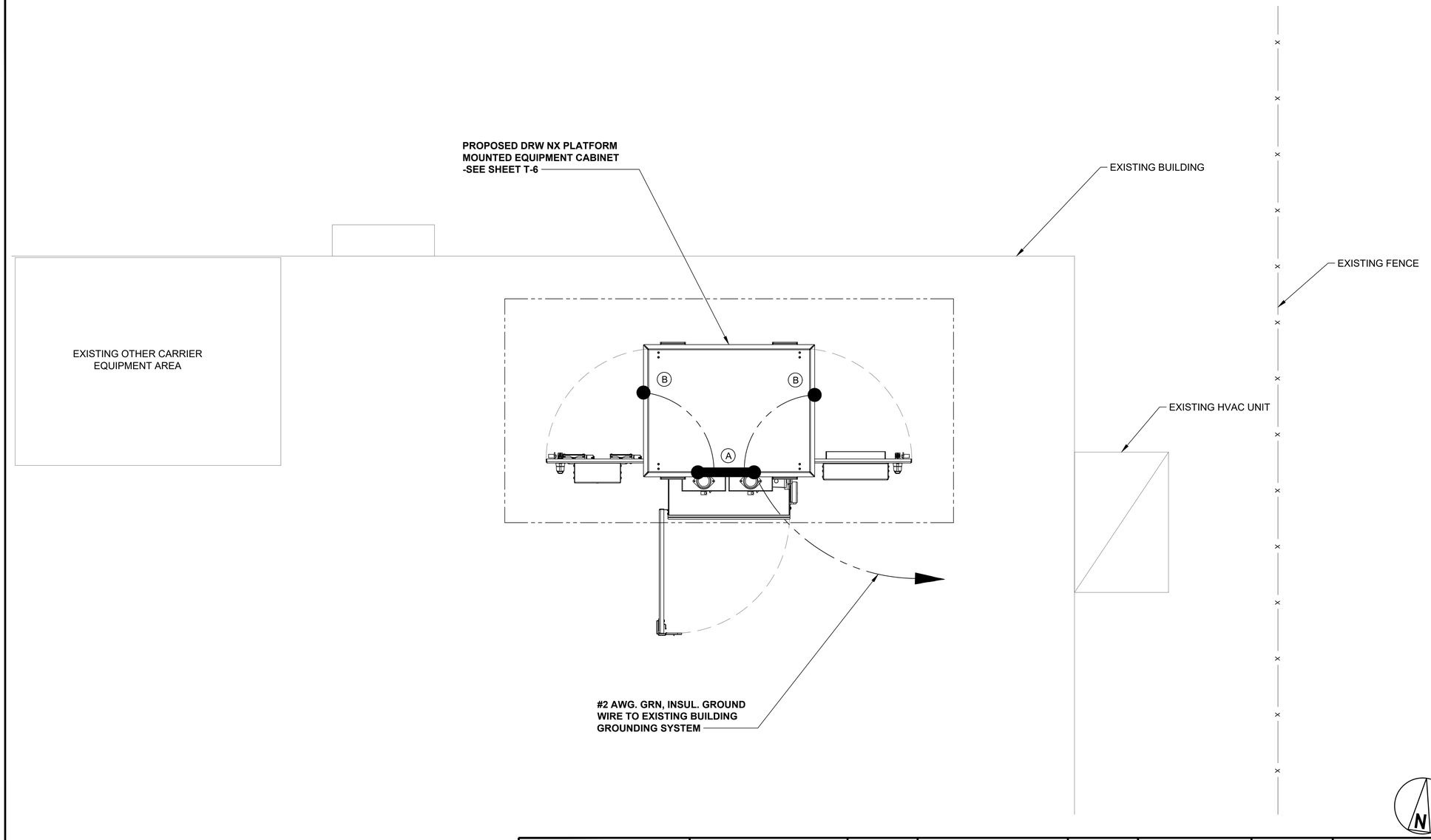
DRAWING TITLE:
UTILITY PLAN

DRAWING NUMBER:
E-1

Ⓐ EXTERIOR UNIT BONDS: METALLIC OBJECTS, EXTERNAL TO OR MOUNTED TO THE H-FRAME, CABINETS, SHALL BE BONDED TO THE EXTERIOR GROUND RING W/ #2 AWG SOLID TINNED CU.

Ⓑ MASTER GROUNDING BAR: EXTEND TWO (2) #2 AWG TINNED CU CONDUCTORS FROM BURIED GROUNDING RING UP TO MASTER GROUNDING BAR & MAKE EXOTHERMIC CONNECTIONS.

CONTRACTOR SHALL FIELD VERIFY ALL EXISTING GROUNDING PRIOR TO COMMENCING WORK



SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
⊙	3/4" x 10' COPPER CLAD STEEL GROUND ROD	⊙	3/4" x 10' COPPER CLAD TEST WELL GROUND ROD W/INSPECTION SLEEVE	●	EXOTHERMIC WELD (CADWELD) (UNLESS OTHERWISE NOTED)	●	EXOTHERMIC WELD (CADWELD) WITH INSPECTION SLEEVE

GROUNDING NOTES | 1

GROUNDING PLAN

12" 9" 6" 3" 0 1' 2'
1"=1'-0"

2

DRW NX

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STATE OF CONNECTICUT STEVEN P. SCHAUB LICENSED PROFESSIONAL ENGINEER
06/15/2020

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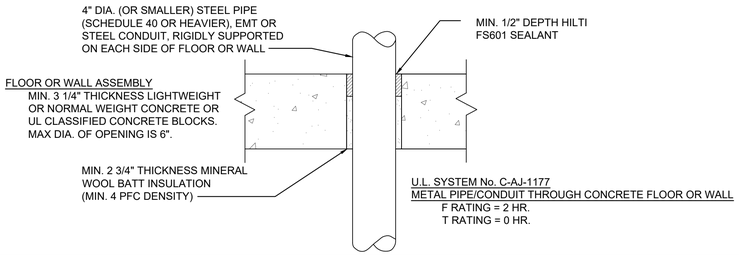
GPD#:2020796.01.US.CT.CCI.871584.01

PROJECT NAME:
US.CT.CCI.871584

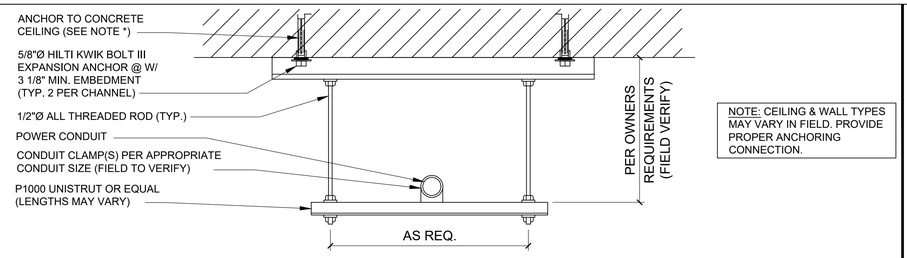
DRAWING TITLE:
GROUNDING PLAN

DRAWING NUMBER:
E-2



FLOOR/WALL PENETRATION DETAIL

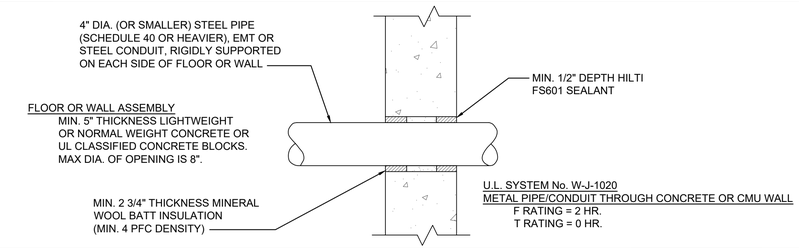
SCALE: N.T.S. | 1



NOTE: CEILING & WALL TYPES MAY VARY IN FIELD. PROVIDE PROPER ANCHORING CONNECTION.

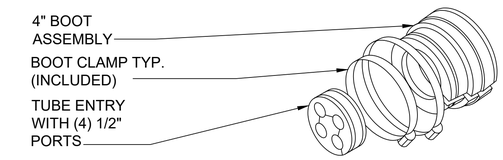
CONDUIT SUPPORT DETAIL

SCALE: N.T.S. | 5



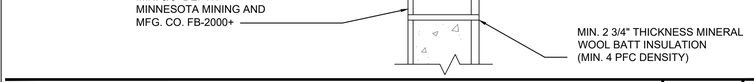
CONCRETE/CMU PENETRATION DETAIL

SCALE: N.T.S. | 2



CABLE PORT DETAIL

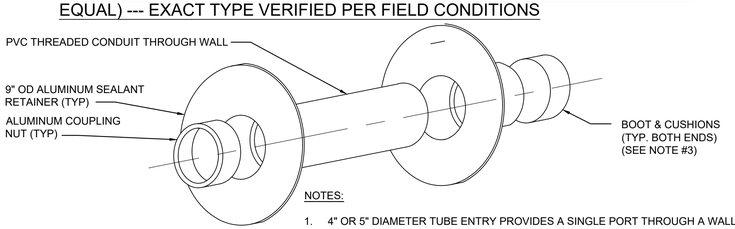
SCALE: N.T.S. | 6



FIRE RATED GYPSUM BOARD WALL PENETRATION DETAIL

SCALE: N.T.S. | 3

TUBE ENTRIES: BY VALMONT #B101, #B241, #B242, #B518, #B519 & #B520 (OR EQUAL) --- EXACT TYPE VERIFIED PER FIELD CONDITIONS



NOTES:

1. 4" OR 5" DIAMETER TUBE ENTRY PROVIDES A SINGLE PORT THROUGH A WALL OR ROOF. USE FOR A SMALL NUMBER OF LINES, EITHER STANDING ALONE OR ADDING ON TO EXISTING SYSTEMS.
2. FOR USE ON WALLS FROM 8" TO 2'-0" THK. (NOTE: CAN BE CUT DOWN TO FIT SIZE OF EXACT WALL WIDTH).
3. BOOTS AND CUSHIONS ARE USED TO WEATHERPROOF BETWEEN THE TUBE ENTRY AND THE TRANSMISSION LINE(S). PROVIDE FOR PROPER INSTALLATION ACCORDING TO NUMBER OF LINES REQUIRED. 4" BOOT ASSEMBLY #B570 OR 5" BOOT ASSEMBLY #B530 W/ CUSHION INSERTS #1603A OR #SR129 FOR (9) 1/2" LINES.

TUBE PANEL DETAIL

SCALE: N.T.S. | 4

GENERAL NOTES

1. CONTRACTOR SHALL INSPECT THE EXISTING CONDITIONS PRIOR TO SUBMITTING BID. ANY QUESTIONS ARISING DURING THE BID PERIOD IN REGARDS TO THE CONTRACTORS FUNCTIONS, THE SCOPE OF WORK, OR ANY OTHER ISSUE RELATED TO THIS PROJECT SHALL BE BROUGHT UP DURING THE BID PERIOD WITH THE PROJECT MANAGER FOR CLARIFICATION, NOT AFTER THE CONTRACT HAS BEEN AWARDED.
2. LOCATION OF EQUIPMENT, CONDUIT AND DEVICES SHOWN ON THE DRAWINGS ARE APPROXIMATE AND SHALL BE COORDINATED WITH FIELD CONDITIONS PRIOR TO ROUGH-IN.
3. THE CONDUIT RUNS AS SHOWN ON THE PLANS ARE APPROXIMATE. EXACT LOCATION AND ROUTING SHALL BE PER EXISTING FIELD CONDITIONS. LOCATION OF ALL SHALL BE CONFIRMED WITH THE OWNER'S REPRESENTATIVE PRIOR TO ROUGH-IN.
4. PROVIDE PULL BOXES AND JUNCTION BOXES WHERE SHOWN OR REQUIRED BY NEC.
5. ALL CONDUITS SHALL BE MET WITH BENDS MADE IN ACCORDANCE WITH NEC TABLE 346-10. NO RIGHT ANGLE DEVICE OTHER THAN STANDARD CONDUIT ELBOWS WITH 12" MINIMUM INSIDE SWEEPS FOR ALL CONDUITS 2" OR LARGER.
6. ALL COAX, FIBER OR WIRES SHALL BE TAGGED AT ALL PULL BOXES, J-BOXES, EQUIPMENT BOXES AND CABINETS WITH APPROVED PLASTIC TAGS, ACTION CRAFT, BRADY, OR APPROVED EQUAL.
7. ALL NEW MATERIAL SHALL HAVE A U.L. LABEL.
8. WHERE APPLICABLE: INSTALL AN EQUIPMENT GROUNDING CONDUCTOR IN ALL CONDUITS PER THE SPECIFICATIONS AND NEC. THE EQUIPMENT GROUNDING CONDUCTORS SHALL BE BONDED AT ALL JUNCTION BOXES, PULLBOXES, AND ALL DISCONNECT SWITCHES, STARTERS, AND EQUIPMENT CABINETS. ALL CONDUIT TERMINATIONS SHALL BE PROVIDED WITH PLASTIC THROAT INSULATING GROUNDING BUSHINGS.
9. PROVIDE CORE DRILLING AS NECESSARY FOR PENETRATIONS OR RISERS THROUGH BUILDING. DO NOT PENETRATE STRUCTURAL MEMBERS WITHOUT CONSTRUCTIONS MANAGERS APPROVAL. SLEEVES AND/OR PENETRATIONS IN FIRE RATED CONSTRUCTION SHALL BE PACKED WITH FIRE RATED MATERIAL WHICH SHALL MAINTAIN THE FIRE RATING OF THE WALL OR STRUCTURE. FILL FOR FLOOR PENETRATIONS SHALL PREVENT PASSAGE OF WATER, SMOKE, FIRE AND FUMES. ALL MATERIAL SHALL BE UL APPROVED FOR THIS PURPOSE.
10. THE EQUIPMENT (THE DESIGN OF THESE PLANS ARE BASED UPON BEST AVAILABLE INFORMATION AT THE TIME OF DESIGN AND SOME EXISTING AS-BUILT CONDITIONS MAY VARY FROM DESIGN AS SHOWN ON THESE DRAWINGS). LOCATION OF ALL SHOWN PENETRATIONS ON THESE PLANS SHALL BE CONFIRMED WITH THE OWNER'S REPRESENTATIVE PRIOR TO ROUGH-IN.

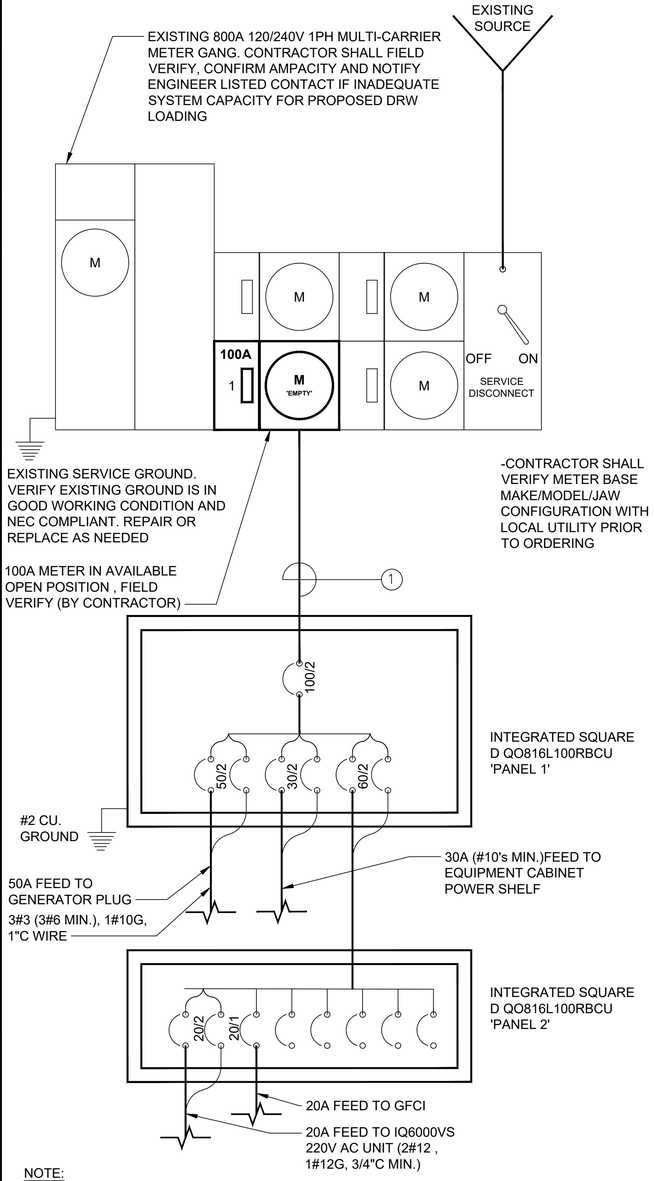
GENERAL COAXIAL ANTENNA CABLE NOTES:

1. TYPES AND SIZES OF THE ANTENNA CABLE ARE BASED ON ESTIMATED LENGTHS. PRIOR TO ORDERING CABLE, CONTRACTOR SHALL VERIFY ACTUAL LENGTH BASED ON CONSTRUCTION LAYOUT AND NOTIFY THE PROJECT MANAGER IF ACTUAL LENGTHS EXCEED ESTIMATED LENGTHS.
2. CONTRACTOR TO CONFIRM COAX COLOR CODING PRIOR TO CONSTRUCTION. REFER TO "ANTENNA SYSTEM LABELING STANDARD" ND-00027, REFER TO THE LATEST VERSION.
3. ALL JUMPERS TO THE ANTENNAS FROM THE MAIN TRANSMISSION LINE WILL BE 1/2" DIA. LDF AND SHALL NOT EXCEED 6'-0".
4. ALL COAXIAL CABLE WILL BE SECURED TO THE DESIGNED SUPPORT STRUCTURE, IN AN APPROVED MANNER, AT DISTANCES NOT TO EXCEED 4'-0" OC.
5. CONTRACTOR MUST FOLLOW ALL MANUFACTURER'S RECOMMENDATIONS REGARDING BOTH THE INSTALLATION AND GROUNDING OF ALL COAXIAL CABLES, CONNECTORS, ANTENNAS, AND ALL OTHER EQUIPMENT.
6. WEATHERPROOF ALL ANTENNA CONNECTORS WITH SELF AMALGAMATING TAPE. WEATHERPROOFING SHALL BE COMPLETED IN STRICT ACCORDANCE WITH AT&T STANDARDS
7. CONTRACTOR SHALL GROUND ALL EQUIPMENT. INCLUDING ANTENNAS, RET MOTORS, TMA'S, COAX CABLES, AND RET CONTROL CABLES AS A COMPLETE SYSTEM. GROUNDING SHALL BE EXECUTED BY QUALIFIED WIREMEN IN COMPLIANCE WITH MANUFACTURER'S SPECIFICATION AND RECOMMENDATION.
8. CONTRACTOR SHALL PROVIDE STRAIN-RELIEF AND CABLE SUPPORTS FOR ALL CABLE ASSEMBLIES, COAX CABLES, AND RET CONTROL CABLES. CABLE STRAIN-RELIEFS AND CABLE SUPPORTS SHALL BE APPROVED FOR THE PURPOSE. INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND RECOMMENDATIONS.

NOTES

SCALE: N.T.S. | 7

1	METER GANG	100A DISTR. PANEL	(3)#1AWG & (1)#6AWG GND 2" CONDUIT



NOTE:
CONTRACTOR SHALL COORDINATE WITH LOCAL UTILITY TO VERIFY EXISTING TRANSFORMER SHORT CIRCUIT FAULT CURRENT AT PANEL, AND VERIFY ALL NEW ELECTRICAL EQUIPMENT HAS AN AIC RATING THAT EXCEEDS FAULT CURRENT AT SOURCE.

ONE-LINE DIAGRAM

SCALE: N.T.S. | 3

DRW NX

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SEAL:

STATE OF CONNECTICUT · STEVEN P. SCHUCK · LICENSED PROFESSIONAL ENGINEER · 23234

06/15/2020

PROJECT LOCATION:

US.CT.CCI.871584
115 BIRCH MTN. ROAD
GLASTONBURY, CT 06033
HARTFORD COUNTY

SCHEDULE OF REVISIONS

REV.	DESCRIPTION OF CHANGE	DRAWN BY:	AUTH BY:	ISSUE DATE
0	ISSUED FOR PERMITTING	ZDT	JWB	06/15/2020
A	90% REVIEW	ZDT	JWB	06/10/2020

SCALE:AS SHOWN | DESIGNED BY: ZDT | DRAWN BY: ZDT

GPD#:2020796.01.US.CT.CCI.871584.01

PROJECT NAME:
US.CT.CCI.871584

DRAWING TITLE:
ONE-LINE DIAGRAM & UTILITY DETAILS

DRAWING NUMBER:
E-3

SITE NUMBER:	US.CT.CCI.871584			MODEL NUMBER:	SQUARE D QO816L100RBCU - 1			
VOLTAGE:	120/240V			PHASE:	1	WIRE:	3	
MAIN BREAKER:	100 AMP			BUSS RATING:	100 AMPS	AIC:	22K (SEE NOTE)	
MOUNT:	SURFACE			NEUTRAL BAR:	YES	GROUND BAR:	YES	
ENCLOSURE TYPE:	NEMA 3R			N to GROUND BOND:	NO			
PANEL STATUS:	PROPOSED			INTERNAL TVSS:	YES			

CKT	LOAD DESCRIPTION	BREAKER AMPS	BREAKER POLES	BREAKER STATUS	SERVICE LOAD VA	USAGE FACTOR	PHASE A VA	PHASE B VA
1	100A MAIN	100	2	ON	0	1.00	0	
2					0	1.00		0
3	GENERATOR PLUG	50	2	ON	0	1.00	0	
4					0	1.00		0
5	DC POWER SHELF	30	2	ON	2800	1.00	2800	
6					2800	1.00		2800
7	PANEL 2 (PROVIDED BY MANUFACTURER)	60	2	ON	1850	1.00	1850	
8					1850	1.00		1850
							4650	4650

VA

TOTAL KVA	9.30
AMPS	38.75

PROPOSED PANEL

NOTE:
CONTRACTOR SHALL COORDINATE WITH LOCAL UTILITY TO VERIFY EXISTING TRANSFORMER SHORT CIRCUIT FAULT CURRENT AT PANEL, AND VERIFY ALL NEW ELECTRICAL EQUIPMENT HAS AN AIC RATING THAT EXCEEDS FAULT CURRENT AT SOURCE.

DRW NX PANEL SCHEDULE - PANEL 1

1

SITE NUMBER:	US.CT.CCI.871584			MODEL NUMBER:	SQUARE D QO816L100RBCU - 2			
VOLTAGE:	120/240V			PHASE:	1	WIRE:	3	
MAIN BREAKER:	N/A (MLO)			BUSS RATING:	100 AMPS	AIC:	22K (SEE NOTE)	
MOUNT:	SURFACE			NEUTRAL BAR:	YES	GROUND BAR:	YES	
ENCLOSURE TYPE:	NEMA 3R			N to GROUND BOND:	NO			
PANEL STATUS:	PROPOSED			INTERNAL TVSS:	YES			

CKT	LOAD DESCRIPTION	BREAKER AMPS	BREAKER POLES	BREAKER STATUS	SERVICE LOAD VA	USAGE FACTOR	PHASE A VA	PHASE B VA
1	AC UNIT	20	2	ON	1760	1.00	1760	
2					1760	1.00		1760
3	GFCI	20	1	ON	180	1.00	180	
4	---	---	---	N/A	0	1.00		0
5	---	---	---	N/A	0	1.00	0	
6	---	---	---	N/A	0	1.00		0
7	---	---	---	N/A	0	1.00	0	
8	---	---	---	N/A	0	1.00		0
							1940	1760

VA

TOTAL KVA	3.70
AMPS	15.42

PROPOSED PANEL

NOTE:
CONTRACTOR SHALL COORDINATE WITH LOCAL UTILITY TO VERIFY EXISTING TRANSFORMER SHORT CIRCUIT FAULT CURRENT AT PANEL, AND VERIFY ALL NEW ELECTRICAL EQUIPMENT HAS AN AIC RATING THAT EXCEEDS FAULT CURRENT AT SOURCE.

DRW NX PANEL SCHEDULE - PANEL 2

2

DRW NX

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SEAL:

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06/15/2020

PROJECT LOCATION:

US.CT.CCI.871584
115 BIRCH MTN. ROAD
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HARTFORD COUNTY

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A	90% REVIEW	ZDT	JWB	06/10/2020

SCALE:AS SHOWN | DESIGNED BY: ZDT | DRAWN BY: ZDT

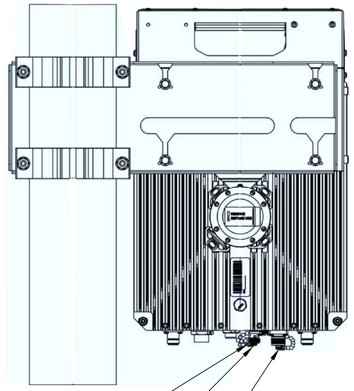
GPD#:2020796.01.US.CT.CCI.871584.01

PROJECT NAME:
US.CT.CCI.871584

DRAWING TITLE:
PANEL SCHEDULE

DRAWING NUMBER:
E-4

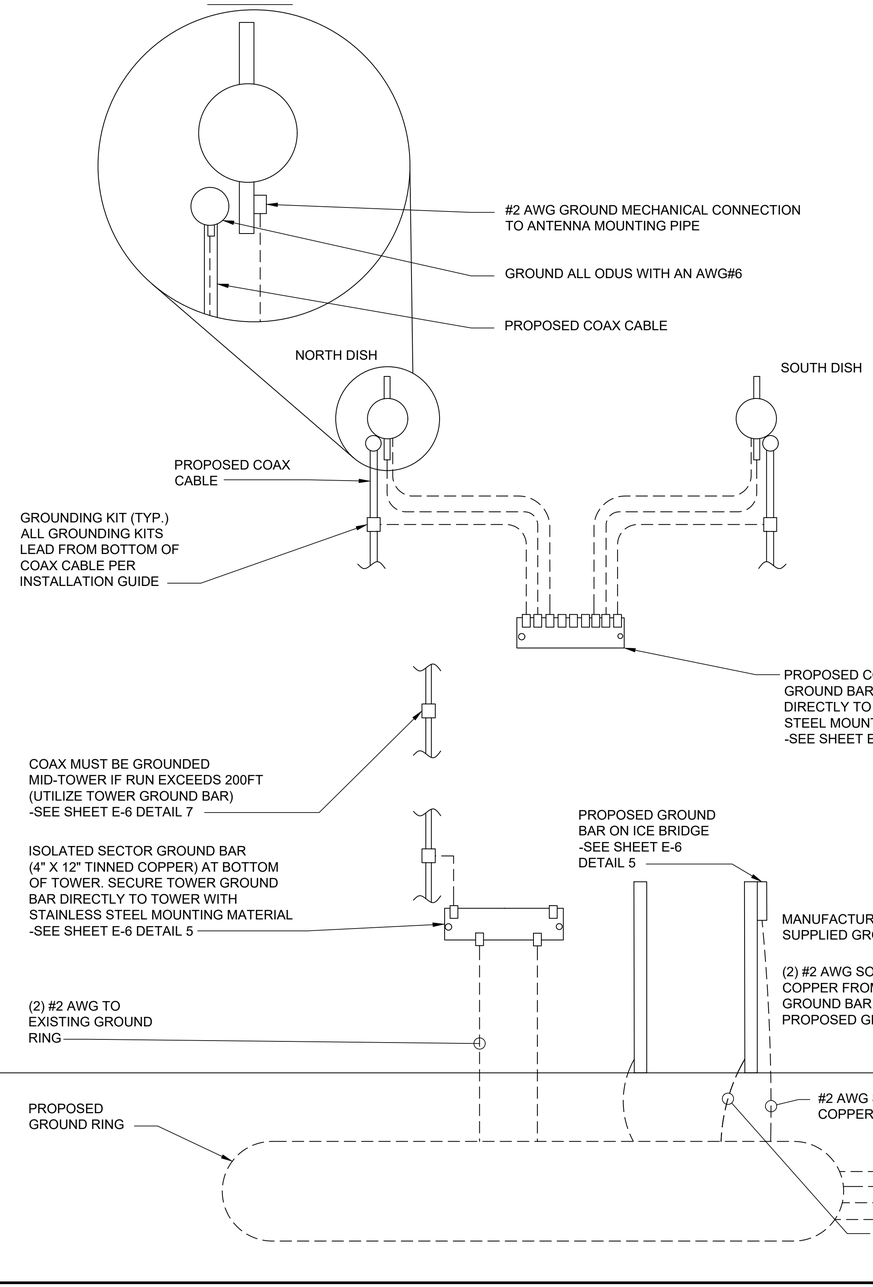
DETAIL



GROUND LUG

BNC RSL
VOLTAGE TEST
PORT

N-FEMALE
CONNECTOR



NOTE:

1. COAX NEEDS TO BE GROUND AT ALL VERTICAL AND HORIZONTAL TRANSITIONS

ANTENNA GROUNDING RISER

SCALE: N.T.S.

1

DRW NX

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Professional Corporation

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SEAL:

STATE OF CONNECTICUT · STEVEN F. SCHAUB · 25034 · LICENSED PROFESSIONAL ENGINEER

06/15/2020

PROJECT LOCATION:

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A	90% REVIEW	ZDT	JWB	06/10/2020

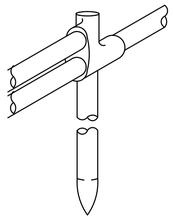
SCALE:AS SHOWN | DESIGNED BY: ZDT | DRAWN BY: ZDT

GPD#:2020796.01.US.CT.CCI.871584.01

PROJECT NAME:
US.CT.CCI.871584

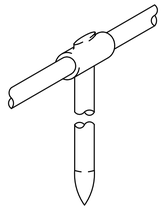
DRAWING TITLE:
GROUNDING RISER DIAGRAM

DRAWING NUMBER:
E-5



CADWELD TYPE NC
THERMOWELD TYPE CR-17

DOUBLE CABLE TO GROUND ROD

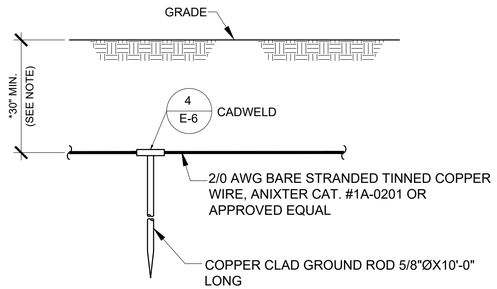


CADWELD TYPE GT
THERMOWELD TYPE CR-2

HORIZONTAL TO GROUND ROD

GROUND ROD

SCALE: N.T.S. | 1

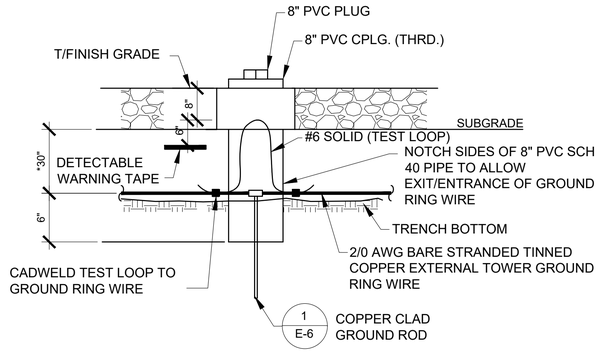


NOTE:

*GROUND ROD SHALL BE MIN. 30" BELOW GRADE OR 6" BELOW FROST LINE. (WHICH EVER IS GREATER) AS PER N.E.C. ARTICLE 250-50(D)

GROUND ROD DETAIL

SCALE: N.T.S. | 2

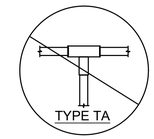


NOTE:

* GROUND WIRE SHALL BE MIN. 30" BELOW GRADE OR 6" BELOW FROST LINE. (WHICH EVER IS GREATER) AS PER N.E.C. ARTICLE 250-50(D)

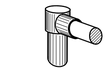
INSPECTION PORT DETAIL

SCALE: N.T.S. | 3



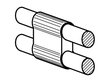
TYPE TA

NOT PERMITTED



TYPE GR

TYPE SV



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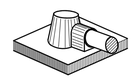
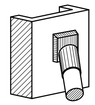


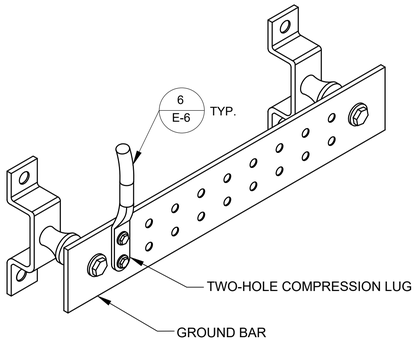
TYPE KA



TYPE VS

CADWELDS (TYPICAL)

SCALE: N.T.S. | 4

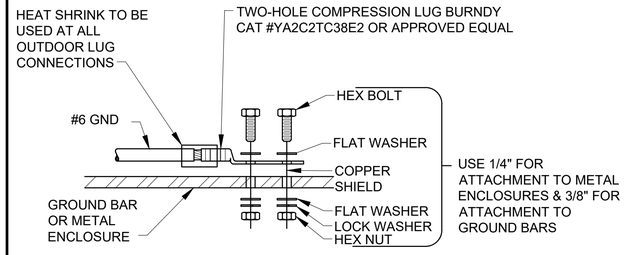


NOTES:

1. SECURE TO INTERIOR OR EXTERIOR WALL w/S.S. LAG HARGER CAT #GBB-1442-G OR APPROVED EQUAL

TOWER BASE INSULATED GROUND BAR

SCALE: N.T.S. | 5

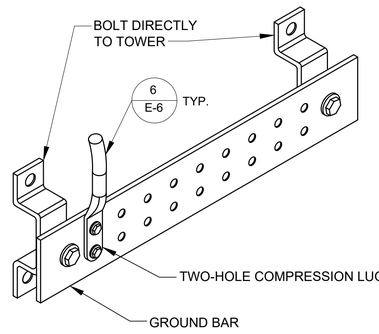


INSTALLATION NOTES:

1. BOLTS, WASHERS, AND NUTS SHALL BE STAINLESS STEEL.
2. SELECT BOLT LENGTH TO PROVIDE MINIMUM OF TWO EXPOSED THREADS.
3. BURNISHING MOUNTING SURFACE TO REMOVE PAINT IN THE ARE OF LUG CONTACT.
4. APPLY COPPER SHIELD COMPOUND TO MATING SURFACE OF LUG AND WIPE CLEAN EXCESS COMPOUND.
5. ALL METAL ELECTRICAL EQUIPMENT SHALL BE EXTERNALLY GROUNDED TO THE TOWER EGR. (PAINTED METAL SURFACES MUST HAVE SMALL SECTION OF PAINT REMOVED BEFORE INSTALLATION, AND SHALL BE SPRAYED LIGHTLY WITH CLEAR COAT LACQUER FINISH.

GROUNDING FLAT SURFACES (TYPICAL)

SCALE: N.T.S. | 6



TOWER GROUND BAR

SCALE: N.T.S. | 7

DETAIL NOT USED

SCALE: N.T.S. | 8

DRAWNX

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SEAL:

06/15/2020

PROJECT LOCATION:

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HARTFORD COUNTY

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SCALE:AS SHOWN | DESIGNED BY: ZDT | DRAWN BY: ZDT

GPD#:2020796.01.US.CT.CCI.871584.01

PROJECT NAME:
US.CT.CCI.871584

DRAWING TITLE:
GROUNDING DETAILS

DRAWING NUMBER:
E-6

Exhibit B

Structural Analysis

Date: **June 5, 2020**

Jason Rouse
Crown Castle
6325 Ardrey Kell Rd Suite 600
Charlotte, NC 28277

Crown Castle
2000 Corporate Dr.
Canonsburg, PA
(724) 416-2000

Subject:	**Structural Modification Report**	
Carrier Designation:	***DRW Canada Co* Co-Locate**	
	Carrier Site Name:	US.CT.CCI.871584
Crown Castle Designation:	**Crown Castle BU Number:**	871584
	Crown Castle Site Name:	John Tom Hill
	Crown Castle JDE Job Number:	607657
	Crown Castle Work Order Number:	1853234
	Crown Castle Order Number:	519195 Rev. 0
Engineering Firm Designation:	**Crown Castle Project Number:**	1853234
Site Data:	**115 Birch Mtn. Road, GLASTONBURY, Hartford County, CT** **Latitude *41° 42' 32.24"*, Longitude *-72° 28' 24.41"*** **200 Foot - Self Support Tower**	

Dear Jason Rouse,

Crown Castle is pleased to submit this **"Structural Modification Report"** to determine the structural integrity of the above-mentioned tower.

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:

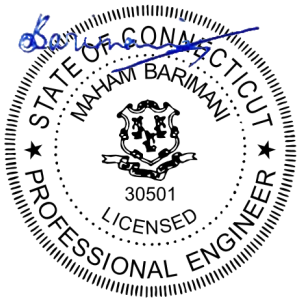
LC4: Modified Structure w/ Proposed Equipment Configuration **Sufficient Capacity**

This analysis utilizes an ultimate 3-second gust wind speed of 125 mph as required by the 2018 Connecticut Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Structural analysis prepared by: Alexander Greguric, E.I.T. / DBS

Respectfully submitted by:

Maham Barimani, P.E.
Senior Project Engineer



Jun 8 2020 1:21 PM

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 200 ft Self Support tower designed by Sabre Communications.

The modification drawings designed by CCI and attached in Appendix D, have been considered in this analysis.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	125 mph
Exposure Category:	C
Topographic Factor:	1
Ice Thickness:	2 in
Wind Speed with Ice:	50 mph
Service Wind Speed:	60 mph

Table 1 - Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
190.0	190.0	3	commscope	USX6-6W-6GR	18 9	1/4 1/2
		6	saf	MXM REPEATER MK2		
		1	tower mounts	Pipe Mount [PM 601-3]		

Table 2 - Other Considered Equipment

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
198.0	208.0	1	rfs celwave	ALR10-O	2 3	1/2 7/8
	205.0	1	decibel	DB225-A		
		1	rfs celwave	PD1107-1		
		1	rfs celwave	PD201-7		
	204.0	1	scala	OGB6-928N		
		1	tower mounts	Sector Mount [SM 702-3]		
182.0	183.0	3	ericsson	KRY 112 489/2	12	1-5/8
	182.0	3	SitePro	STK-U Stiff Arm Kit		
		1	tower mounts	Sector Mount [SM 702-3]		
	177.0	3	ericsson	RADIO 4449 B12/B71		
		3	rfs celwave	APXV18-209015-C-A20 w/ Mount Pipe		
		3	rfs celwave	APXVAARR24_43-U-NA20 w/ Mount Pipe		
170.0	171.0	3	alcatel lucent	PCS 1900MHZ 4X45W-65MHZ	4	1-1/4
		6	alcatel lucent	RRH2X50-800		
		3	alcatel lucent	TD-RRH8X20-25		
		3	commscope	NNVV-65B-R4 w/ Mount Pipe		
		3	rfs celwave	APXVTM14-ALU-I20 w/ Mount Pipe		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
		1	tower mounts	Sector Mount [SM 506-3]		
163.0	163.0	1	kathrein	PR-850	1	1/2
		1	tower mounts	Pipe Mount [PM 601-1]		
144.0	155.0	1	sinclair	SRL480N1DT4	2 3	7/8 1/2
	152.0	2	rfs celwave	PD1109-1		
		1	tower mounts	Sector Mount [SM 702-3]		
53.0	55.0	1	lucent	KS24019-L112A	1	1/2
	53.0	1	tower mounts	Side Arm Mount [SO 202-1]		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Clarence Welti, P.E.	1404208	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Sabre/ TEP (Mapped)	2068370	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Sabre	1403674	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	Crown Castle	Appendix D	On File

3.1) Analysis Method

tnxTower (version 8.0.5.0), 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. When applicable, Crown Castle has calculated and provided the effective area for panel antennas using approved methods following the intent of the TIA-222 Standard.

3.2) Assumptions

1) Tower and structures were maintained in accordance with the TIA-222 Standard.
2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T1	200 - 180	Leg	Sabre 2.875x.375	3	-26.74	100.37	26.6	Pass
T2	180 - 160	Leg	Sabre 3.5 x .3	33	-76.51	116.34	65.8	Pass
T3	160 - 140	Leg	Sabre 4 x .318	60	-120.05	149.09	80.5	Pass
T4	140 - 120	Leg	Sabre 4.5 x .438	87	-159.16	211.28	75.3	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T5	120 - 100	Leg	Sabre 5.5625 x .375	108	-195.74	251.62	77.8	Pass
T6	100 - 80	Leg	Sabre 5.5625 x .375	129	-230.15	251.62	91.5	Pass
T7	80 - 60	Leg	Sabre 6.625 x .432	148	-261.73	319.52	81.9	Pass
T8	60 - 40	Leg	Sabre 8.625 x .322	163	-296.52	351.50	84.4	Pass
T9	40 - 20	Leg	Sabre 8.625 x .5	178	-331.18	531.40	62.3	Pass
T10	20 - 0	Leg	Sabre 8.625 x .5	193	-364.85	531.40	68.7	Pass
T1	200 - 180	Diagonal	L1 3/4x1 3/4x3/16	10	-5.35	13.85	38.6 64.4 (b)	Pass
T2	180 - 160	Diagonal	L1 3/4x1 3/4x3/16	37	-5.83	9.47	61.6 70.2 (b)	Pass
T3	160 - 140	Diagonal	L1 3/4x1 3/4x3/16	64	-6.13	6.54	93.8	Pass
T4	140 - 120	Diagonal	L2 1/2x2 1/2x3/16	91	-6.70	12.36	54.2 64.5 (b)	Pass
T5	120 - 100	Diagonal	L2 1/2x2 1/2x3/16	113	-6.93	9.61	72.1	Pass
T6	100 - 80	Diagonal	L3x3x3/16	134	-7.35	13.18	55.8 65.2 (b)	Pass
T7	80 - 60	Diagonal	L3 1/2x3 1/2x1/4	155	-8.56	18.99	45.1 55.0 (b)	Pass
T8	60 - 40	Diagonal	L3 1/2x3 1/2x1/4	166	-9.25	16.23	57.0 58.5 (b)	Pass
T9	40 - 20	Diagonal	L3 1/2x3 1/2x1/4	181	-9.80	13.73	71.4	Pass
T10	20 - 0	Diagonal	L4x4x1/4	196	-10.94	17.67	61.9 66.1 (b)	Pass
T1	200 - 180	Top Girt	L1 3/4x1 3/4x3/16	4	-0.43	7.66	5.6	Pass
							Summary	
						Leg (T6)	91.5	Pass
						Diagonal (T3)	93.8	Pass
						Top Girt (T1)	5.6	Pass
						Bolt Checks	72.6	Pass
						Rating =	93.8	Pass

Table 5 - Tower Component Stresses vs. Capacity - LC4

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	57.5	Pass
1	Base Foundation Structural	0	73.1	Pass
1	Base Foundation Soil Interaction	0	69.0	Pass

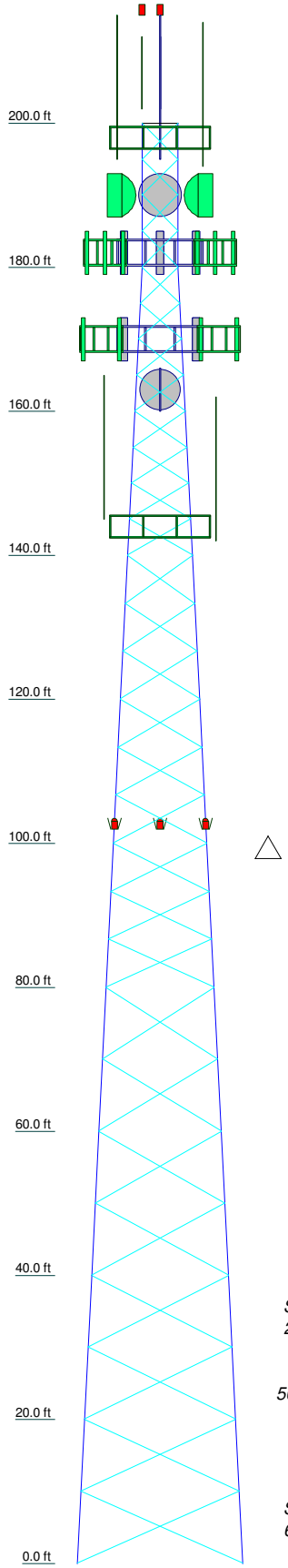
Structure Rating (max from all components) =	93.8%

4.1) Recommendations

Perform the modifications detailed in "Appendix D" to remedy the deficiencies identified in Crown Castle Work Order No. 1847521.

APPENDIX A

TNXTOWER OUTPUT



Section		T1	T2	T3	T4	T5	T6	T7	T8	T9	T10			
Legs		Sabre 2.875x.375	Sabre 3.5 x .3	Sabre 4 x .318	Sabre 4.5 x .438	Sabre 5.5625 x .375		Sabre 6.625 x .432	Sabre 8.625 x .322	Sabre 8.625 x .5				
Leg Grade		A572-50												
Diagonals		L1 3/4x1 3/4x3/16			L2 1/2x2 1/2x3/16		L3x3x3/16		L3 1/2x3 1/2x1/4		L4x4x1/4			
Diagonal Grade		A36												
Top Girts		L1 3/4x1 3/4x3/16												
Face Width (ft)	23	5		7	9	11	13	15	17	19	21			
# Panels @ (ft)		12 @ 4.97917			9 @ 6.63889			8 @ 9.95833						
Weight (K)	25.4	1.0	1.1	1.3	1.9	2.1	2.4	3.2	3.3	4.4	4.7			

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 125 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 2.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 93.8%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 373 K
SHEAR: 38 K

UPLIFT: -327 K
SHEAR: 34 K

AXIAL 174 K
SHEAR 20 K *MOMENT 2405 kip-ft*
TORQUE 12 kip-ft
50 mph WIND - 2.000 in ICE

AXIAL 60 K
SHEAR 61 K *MOMENT 7042 kip-ft*
TORQUE 28 kip-ft
REACTIONS - 125 mph WIND

CROWN CASTLE
The Pathway to Possible
Crown Castle
2000 Corporate Drive
Canonsburg, PA 15317
Phone: 724-416-2000
FAX:

Job: ***BU 871584***			
Project:			
Client: Crown Castle	Drawn by: dstephens		App'd:
Code: TIA-222-H	Date: 06/03/20		Scale: NTS
Path: R:\Modification Design\Work Area\2020\06 June\871584 WO 1853234\Working\QA\871584.eri			Dwg No. E-1

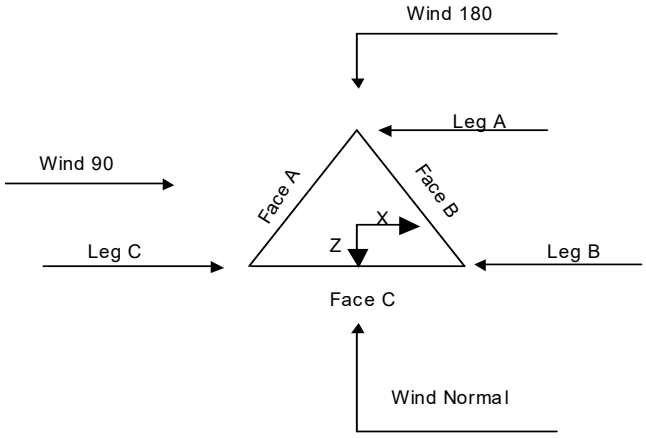
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 200.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 5.000 ft at the top and 23.000 ft at the base.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

1) Tower is located in Hartford County, Connecticut.
2) Tower base elevation above sea level: 878.00 ft.
3) Basic wind speed of 125 mph.
4) Risk Category II.
5) Exposure Category C.
6) Simplified Topographic Factor Procedure for wind speed-up calculations is used.
7) Topographic Category: 1.
8) Crest Height: 0.00 ft.
9) Nominal ice thickness of 2.000 in.
10) Ice thickness is considered to increase with height.
11) Ice density of 56 pcf.
12) A wind speed of 50 mph is used in combination with ice.
13) Temperature drop of 50 °F.
14) Deflections calculated using a wind speed of 60 mph.
15) A non-linear (P-delta) analysis was used.
16) Pressures are calculated at each section.
17) Tower analysis based on target reliabilities in accordance with Annex S.
18) Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
19) Stress ratio used in tower member design is 1.05.
20) 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-H Bracing Resist. Exemption
√	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-H Tension Splice Exemption
	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
√	Secondary Horizontal Braces Leg	√	Sort Capacity Reports By Component		Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric		Ignore KL/ry For 60 Deg. Angle Legs		Pole Without Linear Attachments
					Pole With Shroud Or No Appurtenances
					Outside and Inside Corner Radii Are Known



Triangular Tower

Tower Section Geometry

Tower Section	*Tower Elevation*	*Assembly Database*	*Description*	*Section Width*	*Number of Sections*	*Section Length*
	ft			*ft*		*ft*
T1	200.00-180.00			5.000	1	20.00
T2	180.00-160.00			5.000	1	20.00
T3	160.00-140.00			7.000	1	20.00
T4	140.00-120.00			9.000	1	20.00
T5	120.00-100.00			11.000	1	20.00
T6	100.00-80.00			13.000	1	20.00
T7	80.00-60.00			15.000	1	20.00
T8	60.00-40.00			17.000	1	20.00
T9	40.00-20.00			19.000	1	20.00
T10	20.00-0.00			21.000	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	*Tower Elevation*	*Diagonal Spacing*	*Bracing Type*	*Has K Brace End Panels*	*Has Horizontals*	*Top Girt Offset*	*Bottom Girt Offset*
	ft	*ft*				*in*	*in*
T1	200.00-180.00	4.979	X Brace	No	No	0.000	1.000
T2	180.00-160.00	4.979	X Brace	No	No	0.000	1.000
T3	160.00-140.00	4.979	X Brace	No	No	0.000	1.000
T4	140.00-120.00	6.639	X Brace	No	No	0.000	1.000
T5	120.00-100.00	6.639	X Brace	No	No	0.000	1.000
T6	100.00-80.00	6.639	X Brace	No	No	0.000	1.000
T7	80.00-60.00	9.958	X Brace	No	No	0.000	1.000
T8	60.00-40.00	9.958	X Brace	No	No	0.000	1.000
T9	40.00-20.00	9.958	X Brace	No	No	0.000	1.000
T10	20.00-0.00	9.958	X Brace	No	No	0.000	1.000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 200.00-180.00	Pipe	Sabre 2.875x.375	A572-50 (50 ksi)	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T2 180.00-160.00	Pipe	Sabre 3.5 x .3	A572-50 (50 ksi)	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T3 160.00-140.00	Pipe	Sabre 4 x .318	A572-50 (50 ksi)	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T4 140.00-120.00	Pipe	Sabre 4.5 x .438	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 120.00-100.00	Pipe	Sabre 5.5625 x .375	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T6 100.00-80.00	Pipe	Sabre 5.5625 x .375	A572-50 (50 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T7 80.00-60.00	Pipe	Sabre 6.625 x .432	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T8 60.00-40.00	Pipe	Sabre 8.625 x .322	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T9 40.00-20.00	Pipe	Sabre 8.625 x .5	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T10 20.00-0.00	Pipe	Sabre 8.625 x .5	A572-50 (50 ksi)	Equal Angle	L4x4x1/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 200.00-180.00	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 200.00-180.00	0.00	0.375	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T2 180.00-160.00	0.00	0.375	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T3 160.00-140.00	0.00	0.375	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T4 140.00-120.00	0.00	0.375	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T5 120.00-100.00	0.00	0.375	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T6 100.00-80.00	0.00	0.375	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T7 80.00-60.00	0.00	0.375	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T8 60.00-40.00	0.00	0.375	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T9 40.00-20.00	0.00	0.375	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T10 20.00-0.00	0.00	0.375	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 200.00-180.00	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 180.00-160.00	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 160.00-140.00	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 140.00-120.00	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 120.00-100.00	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T6 100.00-80.00	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T7 80.00-60.00	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T8 60.00-40.00	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T9 40.00-20.00	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T10 20.00-0.00	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	U	Diagonal Net Width Deduct in	U	Top Girt Net Width Deduct in	U	Bottom Girt Net Width Deduct in	U	Mid Girt Net Width Deduct in	U	Long Horizontal Net Width Deduct in	U	Short Horizontal Net Width Deduct in	U
T1 200.00-180.00	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T2 180.00-160.00	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T3 160.00-140.00	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T4 140.00-120.00	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T5 120.00-100.00	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T6 100.00-80.00	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T7 80.00-60.00	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T8 60.00-40.00	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T9 40.00-20.00	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T10 20.00-0.00	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 200.00-180.00	Flange	0.750 A325X	4	0.625 A325X	1	0.625 A325X	1	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.625 A325N	0
T2 180.00-160.00	Flange	1.000 A325X	4	0.625 A325X	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.625 A325N	0
T3 160.00-140.00	Flange	1.000 A325X	4	0.625 A325X	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.625 A325N	0
T4 140.00-120.00	Flange	1.250 A325X	4	0.625 A325X	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.625 A325N	0
T5 120.00-100.00	Flange	1.250 A325X	4	0.625 A325X	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.625 A325N	0
T6 100.00-80.00	Flange	1.250 A325X	6	0.750 A325X	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.625 A325N	0
T7 80.00-60.00	Flange	1.250 A325X	6	0.750 A325X	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.625 A325N	0
T8 60.00-40.00	Flange	1.375 A325X	6	0.750 A325X	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.625 A325N	0
T9 40.00-20.00	Flange	1.375 A325X	6	0.750 A325X	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.625 A325N	0
T10 20.00-0.00	Flange	0.000 A572-50	0	0.750 A325X	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.625 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
***													
LDF4-50A(1/2)	B	No	No	Ar (CaAa)	198.00 - 163.00	0.000	0.18	1	1	0.500	0.630		0.150
LDF4-50A(1/2)	C	No	No	Ar (CaAa)	198.00 - 0.00	-2.000	0.03	1	1	0.500	0.630		0.150
LDF5-50A(7/8)	B	No	No	Ar (CaAa)	198.00 - 144.00	0.000	0.16	3	2	0.500	1.090		0.330
***													
760178129(1/4)	B	No	No	Ar (CaAa)	190.00 - 182.00	1.000	-0.08	18	9	0.330	0.330		0.044
LDF4-50A(1/2)	B	No	No	Ar (CaAa)	190.00 - 182.00	0.000	-0.08	9	9	0.625	0.625		0.150
760178129(1/4)	B	No	No	Ar (CaAa)	182.00 - 0.00	3.000	-0.08	18	9	0.330	0.001		0.040
LDF4-50A(1/2)	B	No	No	Ar (CaAa)	182.00 - 0.00	2.000	-0.08	9	9	0.625	0.001		0.150
***													
AVA7-50(1-5/8)	B	No	No	Ar (CaAa)	182.00 - 0.00	0.000	-0.1	12	8	0.500	2.010		0.700
Feedline Ladder (Af)	B	No	No	Af (CaAa)	168.00 - 0.00	0.000	-0.1	1	1	1.500	1.500		8.400
***													
HB114-1-0813U4-M5J(1-1/4)	C	No	No	Ar (CaAa)	170.00 - 0.00	-2.000	0.02	4	4	0.500	1.540		1.200
Feedline Ladder (Af)	C	No	No	Af (CaAa)	170.00 - 0.00	-1.000	0.005	1	1	3.000	3.000		8.400
***													
FLC 12-50J(1/2)	B	No	No	Ar (CaAa)	163.00 - 144.00	0.000	0.14	2	2	0.500	0.640		0.170
***													
LDF5-50A(7/8)	B	No	No	Ar (CaAa)	144.00 - 0.00	0.000	0.15	5	5	0.500	1.090		0.330

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
LDF4-50A(1/2) ***	B	No	No	Ar (CaAa)	144.00 - 56.00	0.000	0.12	5	5	0.625	0.630		0.150
LDF4-50A(1/2) ***	C	No	No	Ar (CaAa)	53.00 - 0.00	-1.500	0.03	1	1	0.630	0.630		0.150
LDF4-50A(1/2)	B	No	No	Ar (CaAa)	56.00 - 0.00	1.000	0.15	6	6	0.630	0.630		0.150
LDF2-50(3/8")	B	No	No	Ar (CaAa)	100.00 - 0.00	0.000	0.04	1	1	0.500	0.440		0.080
50-AC-208-8SM(3/4")	B	No	No	Ar (CaAa)	200.00 - 0.00	0.000	0.05	1	1	0.740	0.740		0.290
Feedline Ladder (Af) ***	B	No	No	Af (CaAa)	200.00 - 0.00	0.000	0.05	1	1	3.000	3.000		8.400
Feedline Ladder (Af)	B	No	No	Af (CaAa)	200.00 - 0.00	0.000	0.15	1	1	3.000	3.000		8.400
Thin Flat Bar Climbing Ladder	C	No	No	Af (CaAa)	200.00 - 0.00	0.000	0	1	1	2.000	2.000		4.000
Safety Line 3/8 ***	C	No	No	Ar (CaAa)	200.00 - 0.00	0.000	0	1	1	0.375	0.375		0.220
1 1/2" Rigid Conduit **	B	No	No	Ar (CaAa)	200.00 - 0.00	0.000	0.06	1	1	1.500	1.500		1.000
Feedline Ladder (Af)	A	No	No	Af (CaAa)	180.00 - 0.00	0.000	-0.13	1	1	3.000	3.000		8.400
Feedline Ladder (Af) ***	A	No	No	Af (CaAa)	140.00 - 0.00	0.000	-0.03	1	1	3.000	3.000		8.400

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	C_AA_A ft^2/ft	Weight plf
***								

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	200.00-180.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	45.581	0.000	0.42
		C	0.000	0.000	8.551	0.000	0.09
T2	180.00-160.00	A	0.000	0.000	10.000	0.000	0.17
		B	0.000	0.000	82.769	0.000	0.66
		C	0.000	0.000	19.837	0.000	0.22
T3	160.00-140.00	A	0.000	0.000	10.000	0.000	0.17
		B	0.000	0.000	88.494	0.000	0.77
		C	0.000	0.000	30.997	0.000	0.35
T4	140.00-120.00	A	0.000	0.000	20.000	0.000	0.34
		B	0.000	0.000	94.974	0.000	0.79
		C	0.000	0.000	30.997	0.000	0.35
T5	120.00-100.00	A	0.000	0.000	20.000	0.000	0.34

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
		B	0.000	0.000	94.974	0.000	0.79
		C	0.000	0.000	30.997	0.000	0.35
T6	100.00-80.00	A	0.000	0.000	20.000	0.000	0.34
		B	0.000	0.000	95.854	0.000	0.79
		C	0.000	0.000	30.997	0.000	0.35
T7	80.00-60.00	A	0.000	0.000	20.000	0.000	0.34
		B	0.000	0.000	95.854	0.000	0.79
		C	0.000	0.000	30.997	0.000	0.35
T8	60.00-40.00	A	0.000	0.000	20.000	0.000	0.34
		B	0.000	0.000	96.862	0.000	0.79
		C	0.000	0.000	31.816	0.000	0.35
T9	40.00-20.00	A	0.000	0.000	20.000	0.000	0.34
		B	0.000	0.000	97.114	0.000	0.79
		C	0.000	0.000	32.257	0.000	0.35
T10	20.00-0.00	A	0.000	0.000	20.000	0.000	0.34
		B	0.000	0.000	97.114	0.000	0.79
		C	0.000	0.000	32.257	0.000	0.35

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	200.00-180.00	A	2.025	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	123.790	0.000	2.17
		C		0.000	0.000	32.043	0.000	0.57
T2	180.00-160.00	A	2.003	0.000	0.000	18.011	0.000	0.47
		B		0.000	0.000	203.249	0.000	3.50
		C		0.000	0.000	57.862	0.000	1.06
T3	160.00-140.00	A	1.978	0.000	0.000	17.912	0.000	0.47
		B		0.000	0.000	220.788	0.000	3.77
		C		0.000	0.000	82.449	0.000	1.52
T4	140.00-120.00	A	1.950	0.000	0.000	35.598	0.000	0.92
		B		0.000	0.000	232.059	0.000	3.93
		C		0.000	0.000	81.812	0.000	1.49
T5	120.00-100.00	A	1.918	0.000	0.000	35.340	0.000	0.91
		B		0.000	0.000	230.342	0.000	3.87
		C		0.000	0.000	81.081	0.000	1.47
T6	100.00-80.00	A	1.879	0.000	0.000	35.035	0.000	0.89
		B		0.000	0.000	236.718	0.000	3.90
		C		0.000	0.000	80.218	0.000	1.44
T7	80.00-60.00	A	1.833	0.000	0.000	34.662	0.000	0.88
		B		0.000	0.000	234.057	0.000	3.80
		C		0.000	0.000	79.162	0.000	1.40
T8	60.00-40.00	A	1.772	0.000	0.000	34.177	0.000	0.85
		B		0.000	0.000	232.956	0.000	3.72
		C		0.000	0.000	83.217	0.000	1.42
T9	40.00-20.00	A	1.684	0.000	0.000	33.471	0.000	0.82
		B		0.000	0.000	228.534	0.000	3.55
		C		0.000	0.000	83.790	0.000	1.38
T10	20.00-0.00	A	1.509	0.000	0.000	32.069	0.000	0.75
		B		0.000	0.000	218.613	0.000	3.21
		C		0.000	0.000	79.134	0.000	1.24

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	200.00-180.00	5.847	-1.460	6.654	-0.478
T2	180.00-160.00	5.585	-3.969	7.038	-2.635
T3	160.00-140.00	6.551	-4.056	8.384	-2.584

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T4	140.00-120.00	5.952	-4.835	8.184	-3.492
T5	120.00-100.00	6.615	-5.366	9.189	-3.893
T6	100.00-80.00	6.915	-5.611	10.521	-4.458
T7	80.00-60.00	7.886	-6.347	11.916	-5.057
T8	60.00-40.00	8.383	-6.297	12.513	-4.546
T9	40.00-20.00	8.944	-6.569	13.222	-4.547
T10	20.00-0.00	8.895	-6.602	13.377	-4.955

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	2	LDF4-50A(1/2)	180.00 - 198.00	0.6000	0.5372
T1	3	LDF4-50A(1/2)	180.00 - 198.00	0.6000	0.5372
T1	4	LDF5-50A(7/8)	180.00 - 198.00	0.6000	0.5372
T1	6	760178129(1/4)	182.00 - 190.00	0.6000	0.5372
T1	7	LDF4-50A(1/2)	182.00 - 190.00	0.6000	0.5372
T1	8	760178129(1/4)	180.00 - 182.00	0.6000	0.5372
T1	9	LDF4-50A(1/2)	180.00 - 182.00	0.6000	0.5372
T1	11	AVA7-50(1-5/8)	180.00 - 182.00	0.6000	0.5372
T1	26	50-AC-208-8SM(3/4")	180.00 - 200.00	0.6000	0.5372
T1	27	Feedline Ladder (Af)	180.00 - 200.00	0.6000	0.5372
T1	29	Feedline Ladder (Af)	180.00 - 200.00	0.6000	0.5372
T1	30	Thin Flat Bar Climbing Ladder	180.00 - 200.00	0.6000	0.5372
T1	31	Safety Line 3/8	180.00 - 200.00	0.6000	0.5372
T1	33	1 1/2" Rigid Conduit	180.00 - 200.00	0.6000	0.5372
T2	2	LDF4-50A(1/2)	163.00 - 180.00	0.6000	0.5938
T2	3	LDF4-50A(1/2)	160.00 - 180.00	0.6000	0.5938
T2	4	LDF5-50A(7/8)	160.00 - 180.00	0.6000	0.5938
T2	8	760178129(1/4)	160.00 - 180.00	0.6000	0.5938
T2	9	LDF4-50A(1/2)	160.00 - 180.00	0.6000	0.5938
T2	11	AVA7-50(1-5/8)	160.00 - 180.00	0.6000	0.5938
T2	12	Feedline Ladder (Af)	160.00 - 168.00	0.6000	0.5938
T2	14	HB114-1-0813U4-M5J(1-1/4)	160.00 - 170.00	0.6000	0.5938
T2	15	Feedline Ladder (Af)	160.00 - 170.00	0.6000	0.5938
T2	17	FLC 12-50J(1/2)	160.00 - 163.00	0.6000	0.5938
T2	26	50-AC-208-8SM(3/4")	160.00 - 180.00	0.6000	0.5938

Tower Section	*Feed Line Record No.*	*Description*	*Feed Line Segment Elev.*	*K_a No Ice*	*K_a Ice*
T2	27	Feedline Ladder (Af)	160.00 - 180.00	0.6000	0.5938
T2	29	Feedline Ladder (Af)	160.00 - 180.00	0.6000	0.5938
T2	30	Thin Flat Bar Climbing Ladder	160.00 - 180.00	0.6000	0.5938
T2	31	Safety Line 3/8	160.00 - 180.00	0.6000	0.5938
T2	33	1 1/2" Rigid Conduit	160.00 - 180.00	0.6000	0.5938
T2	35	Feedline Ladder (Af)	160.00 - 180.00	0.6000	0.5938
T3	3	LDF4-50A(1/2)	140.00 - 160.00	0.6000	0.6000
T3	4	LDF5-50A(7/8)	144.00 - 160.00	0.6000	0.6000
T3	8	760178129(1/4)	140.00 - 160.00	0.6000	0.6000
T3	9	LDF4-50A(1/2)	140.00 - 160.00	0.6000	0.6000
T3	11	AVA7-50(1-5/8)	140.00 - 160.00	0.6000	0.6000
T3	12	Feedline Ladder (Af)	140.00 - 160.00	0.6000	0.6000
T3	14	HB114-1-0813U4-M5J(1-1/4)	140.00 - 160.00	0.6000	0.6000
T3	15	Feedline Ladder (Af)	140.00 - 160.00	0.6000	0.6000
T3	17	FLC 12-50J(1/2)	144.00 - 160.00	0.6000	0.6000
T3	19	LDF5-50A(7/8)	140.00 - 144.00	0.6000	0.6000
T3	20	LDF4-50A(1/2)	140.00 - 144.00	0.6000	0.6000
T3	26	50-AC-208-8SM(3/4")	140.00 - 160.00	0.6000	0.6000
T3	27	Feedline Ladder (Af)	140.00 - 160.00	0.6000	0.6000
T3	29	Feedline Ladder (Af)	140.00 - 160.00	0.6000	0.6000
T3	30	Thin Flat Bar Climbing Ladder	140.00 - 160.00	0.6000	0.6000
T3	31	Safety Line 3/8	140.00 - 160.00	0.6000	0.6000
T3	33	1 1/2" Rigid Conduit	140.00 - 160.00	0.6000	0.6000
T3	35	Feedline Ladder (Af)	140.00 - 160.00	0.6000	0.6000
T4	3	LDF4-50A(1/2)	120.00 - 140.00	0.6000	0.6000
T4	8	760178129(1/4)	120.00 - 140.00	0.6000	0.6000
T4	9	LDF4-50A(1/2)	120.00 - 140.00	0.6000	0.6000
T4	11	AVA7-50(1-5/8)	120.00 - 140.00	0.6000	0.6000
T4	12	Feedline Ladder (Af)	120.00 - 140.00	0.6000	0.6000
T4	14	HB114-1-0813U4-M5J(1-1/4)	120.00 - 140.00	0.6000	0.6000
T4	15	Feedline Ladder (Af)	120.00 - 140.00	0.6000	0.6000
T4	19	LDF5-50A(7/8)	120.00 - 140.00	0.6000	0.6000
T4	20	LDF4-50A(1/2)	120.00 - 140.00	0.6000	0.6000
T4	26	50-AC-208-8SM(3/4")	120.00 - 140.00	0.6000	0.6000
T4	27	Feedline Ladder (Af)	120.00 -	0.6000	0.6000

Tower Section	*Feed Line Record No.*	*Description*	*Feed Line Segment Elev.*	*K_a No Ice*	*K_a Ice*
T4	29	Feedline Ladder (Af)	140.00 120.00 - 140.00	0.6000	0.6000
T4	30	Thin Flat Bar Climbing Ladder	140.00 120.00 - 140.00	0.6000	0.6000
T4	31	Safety Line 3/8	140.00 120.00 - 140.00	0.6000	0.6000
T4	33	1 1/2" Rigid Conduit	140.00 120.00 - 140.00	0.6000	0.6000
T4	35	Feedline Ladder (Af)	140.00 120.00 - 140.00	0.6000	0.6000
T4	36	Feedline Ladder (Af)	140.00 120.00 - 140.00	0.6000	0.6000
T5	3	LDF4-50A(1/2)	120.00 100.00 - 120.00	0.6000	0.6000
T5	8	760178129(1/4)	120.00 100.00 - 120.00	0.6000	0.6000
T5	9	LDF4-50A(1/2)	120.00 100.00 - 120.00	0.6000	0.6000
T5	11	AVA7-50(1-5/8)	120.00 100.00 - 120.00	0.6000	0.6000
T5	12	Feedline Ladder (Af)	120.00 100.00 - 120.00	0.6000	0.6000
T5	14	HB114-1-0813U4-M5J(1-1/4)	120.00 100.00 - 120.00	0.6000	0.6000
T5	15	Feedline Ladder (Af)	120.00 100.00 - 120.00	0.6000	0.6000
T5	19	LDF5-50A(7/8)	120.00 100.00 - 120.00	0.6000	0.6000
T5	20	LDF4-50A(1/2)	120.00 100.00 - 120.00	0.6000	0.6000
T5	26	50-AC-208-8SM(3/4")	120.00 100.00 - 120.00	0.6000	0.6000
T5	27	Feedline Ladder (Af)	120.00 100.00 - 120.00	0.6000	0.6000
T5	29	Feedline Ladder (Af)	120.00 100.00 - 120.00	0.6000	0.6000
T5	30	Thin Flat Bar Climbing Ladder	120.00 100.00 - 120.00	0.6000	0.6000
T5	31	Safety Line 3/8	120.00 100.00 - 120.00	0.6000	0.6000
T5	33	1 1/2" Rigid Conduit	120.00 100.00 - 120.00	0.6000	0.6000
T5	35	Feedline Ladder (Af)	120.00 100.00 - 120.00	0.6000	0.6000
T5	36	Feedline Ladder (Af)	120.00 100.00 - 120.00	0.6000	0.6000
T6	3	LDF4-50A(1/2)	120.00 80.00 - 100.00	0.6000	0.6000
T6	8	760178129(1/4)	100.00 80.00 - 100.00	0.6000	0.6000
T6	9	LDF4-50A(1/2)	100.00 80.00 - 100.00	0.6000	0.6000
T6	11	AVA7-50(1-5/8)	100.00 80.00 - 100.00	0.6000	0.6000
T6	12	Feedline Ladder (Af)	100.00 80.00 - 100.00	0.6000	0.6000
T6	14	HB114-1-0813U4-M5J(1-1/4)	100.00 80.00 - 100.00	0.6000	0.6000
T6	15	Feedline Ladder (Af)	100.00 80.00 - 100.00	0.6000	0.6000
T6	19	LDF5-50A(7/8)	100.00 80.00 - 100.00	0.6000	0.6000
T6	20	LDF4-50A(1/2)	100.00 80.00 - 100.00	0.6000	0.6000
T6	25	LDF2-50(3/8")	100.00 80.00 - 100.00	0.6000	0.6000
T6	26	50-AC-208-8SM(3/4")	100.00 80.00 - 100.00	0.6000	0.6000

Tower Section	*Feed Line Record No.*	*Description*	*Feed Line Segment Elev.*	*K_a No Ice*	*K_a Ice*
T6	27	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.6000
T6	29	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.6000
T6	30	Thin Flat Bar Climbing Ladder	80.00 - 100.00	0.6000	0.6000
T6	31	Safety Line 3/8	80.00 - 100.00	0.6000	0.6000
T6	33	1 1/2" Rigid Conduit	80.00 - 100.00	0.6000	0.6000
T6	35	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.6000
T6	36	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.6000
T7	3	LDF4-50A(1/2)	60.00 - 80.00	0.6000	0.6000
T7	8	760178129(1/4)	60.00 - 80.00	0.6000	0.6000
T7	9	LDF4-50A(1/2)	60.00 - 80.00	0.6000	0.6000
T7	11	AVA7-50(1-5/8)	60.00 - 80.00	0.6000	0.6000
T7	12	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T7	14	HB114-1-0813U4-M5J(1-1/4)	60.00 - 80.00	0.6000	0.6000
T7	15	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T7	19	LDF5-50A(7/8)	60.00 - 80.00	0.6000	0.6000
T7	20	LDF4-50A(1/2)	60.00 - 80.00	0.6000	0.6000
T7	25	LDF2-50(3/8")	60.00 - 80.00	0.6000	0.6000
T7	26	50-AC-208-8SM(3/4")	60.00 - 80.00	0.6000	0.6000
T7	27	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T7	29	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T7	30	Thin Flat Bar Climbing Ladder	60.00 - 80.00	0.6000	0.6000
T7	31	Safety Line 3/8	60.00 - 80.00	0.6000	0.6000
T7	33	1 1/2" Rigid Conduit	60.00 - 80.00	0.6000	0.6000
T7	35	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T7	36	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T8	3	LDF4-50A(1/2)	40.00 - 60.00	0.6000	0.6000
T8	8	760178129(1/4)	40.00 - 60.00	0.6000	0.6000
T8	9	LDF4-50A(1/2)	40.00 - 60.00	0.6000	0.6000
T8	11	AVA7-50(1-5/8)	40.00 - 60.00	0.6000	0.6000
T8	12	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T8	14	HB114-1-0813U4-M5J(1-1/4)	40.00 - 60.00	0.6000	0.6000
T8	15	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T8	19	LDF5-50A(7/8)	40.00 - 60.00	0.6000	0.6000
T8	20	LDF4-50A(1/2)	56.00 - 60.00	0.6000	0.6000
T8	22	LDF4-50A(1/2)	40.00 -	0.6000	0.6000

Tower Section	*Feed Line Record No.*	*Description*	*Feed Line Segment Elev.*	*K_a No Ice*	*K_a Ice*
			53.00		
T8	24	LDF4-50A(1/2)	40.00 - 56.00	0.6000	0.6000
T8	25	LDF2-50(3/8")	40.00 - 60.00	0.6000	0.6000
T8	26	50-AC-208-8SM(3/4")	40.00 - 60.00	0.6000	0.6000
T8	27	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T8	29	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T8	30	Thin Flat Bar Climbing Ladder	40.00 - 60.00	0.6000	0.6000
T8	31	Safety Line 3/8	40.00 - 60.00	0.6000	0.6000
T8	33	1 1/2" Rigid Conduit	40.00 - 60.00	0.6000	0.6000
T8	35	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T8	36	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T9	3	LDF4-50A(1/2)	20.00 - 40.00	0.6000	0.6000
T9	8	760178129(1/4)	20.00 - 40.00	0.6000	0.6000
T9	9	LDF4-50A(1/2)	20.00 - 40.00	0.6000	0.6000
T9	11	AVA7-50(1-5/8)	20.00 - 40.00	0.6000	0.6000
T9	12	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T9	14	HB114-1-0813U4-M5J(1-1/4)	20.00 - 40.00	0.6000	0.6000
T9	15	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T9	19	LDF5-50A(7/8)	20.00 - 40.00	0.6000	0.6000
T9	22	LDF4-50A(1/2)	20.00 - 40.00	0.6000	0.6000
T9	24	LDF4-50A(1/2)	20.00 - 40.00	0.6000	0.6000
T9	25	LDF2-50(3/8")	20.00 - 40.00	0.6000	0.6000
T9	26	50-AC-208-8SM(3/4")	20.00 - 40.00	0.6000	0.6000
T9	27	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T9	29	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T9	30	Thin Flat Bar Climbing Ladder	20.00 - 40.00	0.6000	0.6000
T9	31	Safety Line 3/8	20.00 - 40.00	0.6000	0.6000
T9	33	1 1/2" Rigid Conduit	20.00 - 40.00	0.6000	0.6000
T9	35	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T9	36	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T10	3	LDF4-50A(1/2)	0.00 - 20.00	0.6000	0.6000
T10	8	760178129(1/4)	0.00 - 20.00	0.6000	0.6000
T10	9	LDF4-50A(1/2)	0.00 - 20.00	0.6000	0.6000
T10	11	AVA7-50(1-5/8)	0.00 - 20.00	0.6000	0.6000
T10	12	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T10	14	HB114-1-0813U4-M5J(1-1/4)	0.00 - 20.00	0.6000	0.6000
T10	15	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T10	19	LDF5-50A(7/8)	0.00 - 20.00	0.6000	0.6000
T10	22	LDF4-50A(1/2)	0.00 - 20.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T10	24	LDF4-50A(1/2)	0.00 - 20.00	0.6000	0.6000
T10	25	LDF2-50(3/8")	0.00 - 20.00	0.6000	0.6000
T10	26	50-AC-208-8SM(3/4")	0.00 - 20.00	0.6000	0.6000
T10	27	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T10	29	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T10	30	Thin Flat Bar Climbing Ladder	0.00 - 20.00	0.6000	0.6000
T10	31	Safety Line 3/8	0.00 - 20.00	0.6000	0.6000
T10	33	1 1/2" Rigid Conduit	0.00 - 20.00	0.6000	0.6000
T10	35	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T10	36	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000

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
15" Dia. x 15" Beacon	A	From Leg	0.00 0.000 15.000	0.000	200.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.78 1.24 1.40 1.75	0.78 1.24 1.40 1.75	0.03 0.05 0.07 0.12
2.4" x 16' Mount Pipe	A	From Leg	0.00 0.000 7.000	0.000	200.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.84 5.47 7.11 10.45	3.84 5.47 7.11 10.45	0.06 0.09 0.13 0.23
15" Dia. x 15" Beacon	C	From Leg	0.00 0.000 15.000	0.000	200.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.78 1.24 1.40 1.75	0.78 1.24 1.40 1.75	0.03 0.05 0.07 0.12
2.4" x 16' Mount Pipe	C	From Leg	0.00 0.000 7.000	0.000	200.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.84 5.47 7.11 10.45	3.84 5.47 7.11 10.45	0.06 0.09 0.13 0.23
3" x 6" SideLight	A	From Leg	0.00 0.000 0.000	0.000	102.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.09 0.14 0.19 0.34	0.09 0.14 0.19 0.34	0.00 0.00 0.00 0.01
3" x 6" SideLight	B	From Leg	0.00 0.000 0.000	0.000	102.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.09 0.14 0.19 0.34	0.09 0.14 0.19 0.34	0.00 0.00 0.00 0.01
3" x 6" SideLight	C	From Leg	0.00 0.000 0.000	0.000	102.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.09 0.14 0.19 0.34	0.09 0.14 0.19 0.34	0.00 0.00 0.00 0.01
**									
DB225-A	A	From Leg	4.00 0.000 7.000	0.000	198.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.21 5.78 8.35 13.48	3.21 5.78 8.35 13.48	0.04 0.05 0.06 0.08

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
ALR10-O	B	From Leg	4.00 0.000 10.000	0.000	198.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.63 15.31 17.39 20.79	6.63 15.31 17.39 20.79	0.09 0.18 0.28 0.52
OGB6-928N	B	From Leg	4.00 0.000 6.000	0.000	198.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.97 1.33 1.63 2.26	0.97 1.33 1.63 2.26	0.01 0.02 0.03 0.06
PD1107-1	C	From Leg	4.00 0.000 7.000	0.000	198.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.18 3.29 4.43 6.42	2.18 3.29 4.43 6.42	0.01 0.02 0.05 0.12
PD201-7	C	From Leg	4.00 0.000 7.000	0.000	198.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.02 1.81 2.62 3.76	1.02 1.81 2.62 3.76	0.00 0.01 0.03 0.07
(4) 6' x 2" Mount Pipe	A	From Leg	4.00 0.000 0.000	0.000	198.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
(4) 6' x 2" Mount Pipe	B	From Leg	4.00 0.000 0.000	0.000	198.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
(4) 6' x 2" Mount Pipe	C	From Leg	4.00 0.000 0.000	0.000	198.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
(2) 4' x 2" Pipe Mount	A	From Leg	4.00 0.000 0.000	0.000	198.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.79 1.03 1.28 1.81	0.79 1.03 1.28 1.81	0.03 0.04 0.04 0.07
(2) 4' x 2" Pipe Mount	B	From Leg	4.00 0.000 0.000	0.000	198.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.79 1.03 1.28 1.81	0.79 1.03 1.28 1.81	0.03 0.04 0.04 0.07
(2) 4' x 2" Pipe Mount	C	From Leg	4.00 0.000 0.000	0.000	198.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.79 1.03 1.28 1.81	0.79 1.03 1.28 1.81	0.03 0.04 0.04 0.07
Sector Mount [SM 702-3]	C	None		0.000	198.00	No Ice 1/2" Ice 1" Ice 2" Ice	38.89 50.40 61.77 84.35	38.89 50.40 61.77 84.35	1.55 2.28 3.22 5.70
***									
(2) MXM REPEATER MK2	A	From Leg	1.00 0.000 0.000	0.000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.57 1.73 1.90 2.26	0.75 0.88 1.01 1.29	0.02 0.03 0.04 0.08
(2) MXM REPEATER MK2	B	From Leg	1.00 0.000 0.000	0.000	190.00	No Ice 1/2" Ice 1" Ice	1.57 1.73 1.90 2.26	0.75 0.88 1.01 1.29	0.02 0.03 0.04 0.08

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft* *ft* *ft*	*Azimuth Adjustment* *°*	*Placement* *ft*		*C_AA_A Front* *ft^2*	*C_AA_A Side* *ft^2*	*Weight* *K*
						2" Ice			
(2) MXM REPEATER MK2	C	From Leg	1.00 0.000 0.000	0.000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.57 1.73 1.90 2.26	0.75 0.88 1.01 1.29	0.02 0.03 0.04 0.08
Pipe Mount [PM 601-1]	A	From Leg	0.50 0.000 0.000	0.000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.32 1.58 1.84 2.40	1.32 1.58 1.84 2.40	0.07 0.08 0.09 0.13
Pipe Mount [PM 601-1]	B	From Leg	0.50 0.000 0.000	0.000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.32 1.58 1.84 2.40	1.32 1.58 1.84 2.40	0.07 0.08 0.09 0.13
Pipe Mount [PM 601-1]	C	From Leg	0.50 0.000 0.000	0.000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.32 1.58 1.84 2.40	1.32 1.58 1.84 2.40	0.07 0.08 0.09 0.13
***									
APXVAARR24_43-U-NA20 w/ Mount Pipe	A	From Leg	4.00 0.000 -5.000	0.000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice	14.69 15.46 16.23 17.82	6.87 7.55 8.25 9.67	0.19 0.31 0.46 0.79
APXVAARR24_43-U-NA20 w/ Mount Pipe	B	From Leg	4.00 0.000 -5.000	0.000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice	14.69 15.46 16.23 17.82	6.87 7.55 8.25 9.67	0.19 0.31 0.46 0.79
APXVAARR24_43-U-NA20 w/ Mount Pipe	C	From Leg	4.00 0.000 -5.000	0.000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice	14.69 15.46 16.23 17.82	6.87 7.55 8.25 9.67	0.19 0.31 0.46 0.79
APXV18-209015-C-A20 w/ Mount Pipe	A	From Leg	4.00 0.000 -5.000	0.000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.79 4.36 4.94 6.14	3.16 3.71 4.28 5.47	0.06 0.10 0.15 0.28
APXV18-209015-C-A20 w/ Mount Pipe	B	From Leg	4.00 0.000 -5.000	0.000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.79 4.36 4.94 6.14	3.16 3.71 4.28 5.47	0.06 0.10 0.15 0.28
APXV18-209015-C-A20 w/ Mount Pipe	C	From Leg	4.00 0.000 -5.000	0.000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.79 4.36 4.94 6.14	3.16 3.71 4.28 5.47	0.06 0.10 0.15 0.28
RADIO 4449 B12/B71	A	From Leg	4.00 0.000 -5.000	0.000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.65 1.81 1.98 2.34	1.16 1.30 1.45 1.76	0.07 0.09 0.11 0.16
RADIO 4449 B12/B71	B	From Leg	4.00 0.000 -5.000	0.000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.65 1.81 1.98 2.34	1.16 1.30 1.45 1.76	0.07 0.09 0.11 0.16
RADIO 4449 B12/B71	C	From Leg	4.00 0.000 -5.000	0.000	182.00	No Ice 1/2" Ice	1.65 1.81 1.98	1.16 1.30 1.45	0.07 0.09 0.11

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*
						1" Ice	2.34	1.76	0.16
						2" Ice			
(2) KRY 112 489/2	B	From Leg	4.00	0.000	182.00	No Ice	0.56	0.37	0.02
			0.000			1/2"	0.66	0.45	0.02
			1.000			Ice	0.76	0.54	0.03
						1" Ice	1.00	0.75	0.05
						2" Ice			
KRY 112 489/2	C	From Leg	4.00	0.000	182.00	No Ice	0.56	0.37	0.02
			0.000			1/2"	0.66	0.45	0.02
			1.000			Ice	0.76	0.54	0.03
						1" Ice	1.00	0.75	0.05
						2" Ice			
Sector Mount [SM 702-3]	C	None		0.000	182.00	No Ice	38.89	38.89	1.55
						1/2"	50.40	50.40	2.28
						Ice	61.77	61.77	3.22
						1" Ice	84.35	84.35	5.70
						2" Ice			
(3) 6' x 2" Mount Pipe	A	From Leg	4.00	0.000	182.00	No Ice	1.43	1.43	0.02
			0.000			1/2"	1.92	1.92	0.03
			0.000			Ice	2.29	2.29	0.05
						1" Ice	3.06	3.06	0.09
						2" Ice			
(3) 6' x 2" Mount Pipe	B	From Leg	4.00	0.000	182.00	No Ice	1.43	1.43	0.02
			0.000			1/2"	1.92	1.92	0.03
			0.000			Ice	2.29	2.29	0.05
						1" Ice	3.06	3.06	0.09
						2" Ice			
(3) 6' x 2" Mount Pipe	C	From Leg	4.00	0.000	182.00	No Ice	1.43	1.43	0.02
			0.000			1/2"	1.92	1.92	0.03
			0.000			Ice	2.29	2.29	0.05
						1" Ice	3.06	3.06	0.09
						2" Ice			
SitePro STK-U Stiff Arm Kit	A	From Leg	2.00	0.000	182.00	No Ice	1.14	0.00	0.02
			0.000			1/2"	1.76	0.00	0.03
			0.000			Ice	2.14	0.00	0.04
						1" Ice	2.90	0.00	0.08
						2" Ice			
SitePro STK-U Stiff Arm Kit	B	From Leg	2.00	0.000	182.00	No Ice	1.14	0.00	0.02
			0.000			1/2"	1.76	0.00	0.03
			0.000			Ice	2.14	0.00	0.04
						1" Ice	2.90	0.00	0.08
						2" Ice			
SitePro STK-U Stiff Arm Kit	C	From Leg	2.00	0.000	182.00	No Ice	1.14	0.00	0.02
			0.000			1/2"	1.76	0.00	0.03
			0.000			Ice	2.14	0.00	0.04
						1" Ice	2.90	0.00	0.08
						2" Ice			
**									
APXVTM14-ALU-I20 w/ Mount Pipe	A	From Leg	4.00	0.000	170.00	No Ice	4.09	2.86	0.08
			0.000			1/2"	4.48	3.23	0.13
			1.000			Ice	4.88	3.61	0.19
						1" Ice	5.71	4.40	0.33
						2" Ice			
APXVTM14-ALU-I20 w/ Mount Pipe	B	From Leg	4.00	0.000	170.00	No Ice	4.09	2.86	0.08
			0.000			1/2"	4.48	3.23	0.13
			1.000			Ice	4.88	3.61	0.19
						1" Ice	5.71	4.40	0.33
						2" Ice			
APXVTM14-ALU-I20 w/ Mount Pipe	C	From Leg	4.00	0.000	170.00	No Ice	4.09	2.86	0.08
			0.000			1/2"	4.48	3.23	0.13
			1.000			Ice	4.88	3.61	0.19
						1" Ice	5.71	4.40	0.33
						2" Ice			
NNVV-65B-R4 w/ Mount Pipe	A	From Leg	4.00	0.000	170.00	No Ice	7.55	4.23	0.11
			0.000			1/2"	8.04	4.67	0.20

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
			1.000			Ice	8.53	5.12	0.30
						1" Ice	9.56	6.05	0.53
						2" Ice			
NNVV-65B-R4 w/ Mount Pipe	B	From Leg	4.00	0.000	170.00	No Ice	7.55	4.23	0.11
			0.000			1/2"	8.04	4.67	0.20
			1.000			Ice	8.53	5.12	0.30
						1" Ice	9.56	6.05	0.53
						2" Ice			
NNVV-65B-R4 w/ Mount Pipe	C	From Leg	4.00	0.000	170.00	No Ice	7.55	4.23	0.11
			0.000			1/2"	8.04	4.67	0.20
			1.000			Ice	8.53	5.12	0.30
						1" Ice	9.56	6.05	0.53
						2" Ice			
PCS 1900MHZ 4X45W-65MHZ	A	From Leg	4.00	0.000	170.00	No Ice	2.32	2.24	0.06
			0.000			1/2"	2.53	2.44	0.08
			1.000			Ice	2.74	2.65	0.11
						1" Ice	3.19	3.09	0.17
						2" Ice			
PCS 1900MHZ 4X45W-65MHZ	B	From Leg	4.00	0.000	170.00	No Ice	2.32	2.24	0.06
			0.000			1/2"	2.53	2.44	0.08
			1.000			Ice	2.74	2.65	0.11
						1" Ice	3.19	3.09	0.17
						2" Ice			
PCS 1900MHZ 4X45W-65MHZ	C	From Leg	4.00	0.000	170.00	No Ice	2.32	2.24	0.06
			0.000			1/2"	2.53	2.44	0.08
			1.000			Ice	2.74	2.65	0.11
						1" Ice	3.19	3.09	0.17
						2" Ice			
TD-RRH8X20-25	A	From Leg	4.00	0.000	170.00	No Ice	4.05	1.53	0.07
			0.000			1/2"	4.30	1.71	0.10
			1.000			Ice	4.56	1.90	0.13
						1" Ice	5.10	2.30	0.20
						2" Ice			
TD-RRH8X20-25	B	From Leg	4.00	0.000	170.00	No Ice	4.05	1.53	0.07
			0.000			1/2"	4.30	1.71	0.10
			1.000			Ice	4.56	1.90	0.13
						1" Ice	5.10	2.30	0.20
						2" Ice			
TD-RRH8X20-25	C	From Leg	4.00	0.000	170.00	No Ice	4.05	1.53	0.07
			0.000			1/2"	4.30	1.71	0.10
			1.000			Ice	4.56	1.90	0.13
						1" Ice	5.10	2.30	0.20
						2" Ice			
(2) RRH2X50-800	A	From Leg	4.00	0.000	170.00	No Ice	1.70	1.28	0.05
			0.000			1/2"	1.86	1.43	0.07
			1.000			Ice	2.03	1.58	0.09
						1" Ice	2.40	1.91	0.14
						2" Ice			
(2) RRH2X50-800	B	From Leg	4.00	0.000	170.00	No Ice	1.70	1.28	0.05
			0.000			1/2"	1.86	1.43	0.07
			1.000			Ice	2.03	1.58	0.09
						1" Ice	2.40	1.91	0.14
						2" Ice			
(2) RRH2X50-800	C	From Leg	4.00	0.000	170.00	No Ice	1.70	1.28	0.05
			0.000			1/2"	1.86	1.43	0.07
			1.000			Ice	2.03	1.58	0.09
						1" Ice	2.40	1.91	0.14
						2" Ice			
10' horizontal x 2" Pipe Mount	A	From Leg	2.00	0.000	170.00	No Ice	1.90	0.01	0.03
			0.000			1/2"	2.92	0.04	0.04
			0.000			Ice	3.97	0.09	0.06
						1" Ice	5.65	0.21	0.13
						2" Ice			
10' horizontal x 2" Pipe Mount	B	From Leg	2.00	0.000	170.00	No Ice	1.90	0.01	0.03
			0.000			1/2"	2.92	0.04	0.04

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*
			0.000			Ice	3.97	0.09	0.06
						1" Ice	5.65	0.21	0.13
						2" Ice			
10' horizontal x 2" Pipe Mount	C	From Leg	2.00 0.000 0.000	0.000	170.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.90 2.92 3.97 5.65	0.01 0.04 0.09 0.21	0.03 0.04 0.06 0.13
6' x 2" Mount Pipe	A	From Leg	4.00 0.000 0.000	0.000	170.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
6' x 2" Mount Pipe	B	From Leg	4.00 0.000 0.000	0.000	170.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
6' x 2" Mount Pipe	C	From Leg	4.00 0.000 0.000	0.000	170.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
Sector Mount [SM 506-3]	C	None		0.000	170.00	No Ice 1/2" Ice 1" Ice 2" Ice	32.27 45.45 58.44 84.07	32.27 45.45 58.44 84.07	1.74 2.39 3.23 5.54
***									
Pipe Mount [PM 601-1]	A	From Leg	0.50 0.000 0.000	0.000	163.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.32 1.58 1.84 2.40	1.32 1.58 1.84 2.40	0.07 0.08 0.09 0.13
***									
(2) PD1109-1	B	From Leg	4.00 0.000 8.000	0.000	144.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.83 3.89 4.97 6.37	2.83 3.89 4.97 6.37	0.02 0.04 0.07 0.14
SRL480N1DT4	C	From Leg	4.00 0.000 11.000	0.000	144.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.35 8.08 9.81 13.32	6.35 8.08 9.81 13.32	0.03 0.07 0.11 0.25
(4) 6' x 2" Mount Pipe	A	From Leg	4.00 0.000 0.000	0.000	144.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
(4) 6' x 2" Mount Pipe	B	From Leg	4.00 0.000 0.000	0.000	144.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
(4) 6' x 2" Mount Pipe	C	From Leg	4.00 0.000 0.000	0.000	144.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
(2) 4' x 2" Pipe Mount	A	From Leg	4.00 0.000 0.000	0.000	144.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.79 1.03 1.28 1.81	0.79 1.03 1.28 1.81	0.03 0.04 0.04 0.07

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) 4' x 2" Pipe Mount	B	From Leg	4.00 0.000 0.000	0.000	144.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.79 1.03 1.28 1.81	0.79 1.03 1.28 1.81	0.03 0.04 0.04 0.07
(2) 4' x 2" Pipe Mount	C	From Leg	4.00 0.000 0.000	0.000	144.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.79 1.03 1.28 1.81	0.79 1.03 1.28 1.81	0.03 0.04 0.04 0.07
Sector Mount [SM 702-3]	C	None		0.000	144.00	No Ice 1/2" Ice 1" Ice 2" Ice	38.89 50.40 61.77 84.35	38.89 50.40 61.77 84.35	1.55 2.28 3.22 5.70
***									
KS24019-L112A	C	From Leg	2.00 0.000 2.000	-30.000	53.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.10 0.18 0.26 0.42	0.10 0.18 0.26 0.42	0.01 0.01 0.01 0.01
Side Arm Mount [SO 202-1]	C	From Leg	1.00 0.000 0.000	-30.000	53.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.78 2.24 2.75 3.89	2.97 3.57 4.19 5.55	0.11 0.13 0.16 0.25
**									

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
USX6-6W-6GR	A	Paraboloid w/Shroud (HP)	From Leg	1.00 0.000 0.000	-6.000		190.00	6.00	No Ice 1/2" Ice 1" Ice 2" Ice	28.27 29.07 29.86 31.44	0.20 0.35 0.50 0.80
USX6-6W-6GR	B	Paraboloid w/Shroud (HP)	From Leg	1.00 0.000 0.000	53.000		190.00	6.00	No Ice 1/2" Ice 1" Ice 2" Ice	28.27 29.07 29.86 31.44	0.20 0.35 0.50 0.80
USX6-6W-6GR	C	Paraboloid w/Shroud (HP)	From Leg	1.00 0.000 0.000	-49.000		190.00	6.00	No Ice 1/2" Ice 1" Ice 2" Ice	28.27 29.07 29.86 31.44	0.20 0.35 0.50 0.80
**											
PR-850	A	Grid	From Leg	1.00 0.000 0.000	30.000		163.00	5.67	No Ice 1/2" Ice 1" Ice 2" Ice	25.22 25.97 26.71 28.21	0.04 0.17 0.30 0.57
***											

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice
12	1.2 Dead+1.0 Wind 150 deg - No Ice
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	200 - 180	Leg	Max Tension	15	26.97	-0.03	-0.53
			Max. Compression	2	-33.19	0.05	1.15
			Max. Mx	8	-3.65	1.06	0.04
			Max. My	2	-33.19	0.05	1.15
			Max. Vy	18	-5.45	0.97	-0.50
			Max. Vx	2	-6.92	0.05	1.15
		Diagonal	Max Tension	24	5.32	0.00	0.00
			Max. Compression	24	-5.35	0.00	0.00
			Max. Mx	31	0.90	0.03	0.00
			Max. My	16	-4.50	-0.00	0.01
			Max. Vy	31	-0.02	0.03	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	16	-0.00	-0.00	0.01
		Top Girt	Max Tension	3	0.38	0.00	0.00
			Max. Compression	14	-0.43	0.00	0.00
			Max. Mx	31	0.01	-0.04	0.00
			Max. My	16	0.08	0.00	0.00
			Max. Vy	31	-0.03	0.00	0.00
			Max. Vx	16	-0.00	0.00	0.00
T2	180 - 160	Leg	Max Tension	15	70.78	-0.09	0.00
			Max. Compression	2	-82.72	0.68	-0.02
			Max. Mx	2	-38.89	1.15	-0.05
			Max. My	17	-5.53	0.08	0.53
			Max. Vy	2	-6.69	0.68	-0.02
			Max. Vx	16	-2.66	0.05	0.26
		Diagonal	Max Tension	24	5.80	0.00	0.00
			Max. Compression	24	-5.88	0.00	0.00
			Max. Mx	31	1.50	0.03	0.00
			Max. My	24	-5.46	-0.01	-0.01
			Max. Vy	31	-0.03	0.03	0.00
			Max. Vx	24	0.00	0.00	0.00
T3	160 - 140	Leg	Max Tension	15	109.36	-0.30	0.02
			Max. Compression	2	-125.99	0.97	-0.05
			Max. Mx	3	-123.77	0.97	-0.05
			Max. My	16	-14.91	0.02	0.87
			Max. Vy	18	-8.37	0.97	-0.01
			Max. Vx	16	-3.11	0.02	0.87
		Diagonal	Max Tension	24	6.01	0.00	0.00
			Max. Compression	24	-6.13	0.00	0.00
			Max. Mx	27	1.48	0.04	-0.00
			Max. My	28	-0.98	0.03	-0.01
			Max. Vy	29	0.04	0.04	-0.01
			Max. Vx	28	0.00	0.00	0.00
T4	140 - 120	Leg	Max Tension	15	145.54	-0.20	0.01
			Max. Compression	2	-166.14	0.91	-0.04
			Max. Mx	3	-130.04	0.97	-0.05
			Max. My	16	-15.23	0.02	0.87
			Max. Vy	18	-9.11	0.92	-0.03
			Max. Vx	16	-3.37	0.03	0.68
		Diagonal	Max Tension	24	6.71	0.00	0.00
			Max. Compression	24	-6.90	0.00	0.00
			Max. Mx	27	1.70	0.08	-0.01
			Max. My	27	-0.02	0.07	-0.01
			Max. Vy	29	0.06	0.08	-0.01
			Max. Vx	27	0.00	0.00	0.00
T5	120 - 100	Leg	Max Tension	7	179.39	-0.35	0.03
			Max. Compression	2	-202.19	1.19	-0.05
			Max. Mx	18	-199.35	1.21	-0.03
			Max. My	4	-0.35	-0.03	-0.86
			Max. Vy	18	-10.08	1.21	-0.03
			Max. Vx	16	-3.71	0.05	0.85
		Diagonal	Max Tension	4	6.73	0.00	0.00
			Max. Compression	4	-6.93	0.00	0.00
			Max. Mx	29	1.88	0.10	-0.01
			Max. My	27	-0.28	0.10	-0.01
			Max. Vy	29	0.07	0.10	-0.01
			Max. Vx	27	-0.00	0.00	0.00
T6	100 - 80	Leg	Max Tension	7	211.51	-0.70	0.05
			Max. Compression	2	-236.25	1.60	-0.09
			Max. Mx	18	-235.63	1.66	-0.04
			Max. My	4	-1.37	-0.04	-1.38
			Max. Vy	18	-11.02	1.66	-0.04
			Max. Vx	16	-4.34	0.05	1.38
		Diagonal	Max Tension	4	7.14	0.00	0.00
			Max. Compression	4	-7.35	0.00	0.00
			Max. Mx	29	2.03	0.15	0.02
			Max. My	28	-1.18	0.12	-0.02
			Max. Vy	29	0.09	0.15	0.02
			Max. Vx	28	-0.00	0.00	0.00
T7	80 - 60	Leg	Max Tension	7	242.27	-1.01	0.03
			Max. Compression	18	-271.28	2.13	-0.03

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	18	-271.28	2.13	-0.03
			Max. My	4	-1.51	-0.04	-1.38
			Max. Vy	18	-12.30	2.13	-0.03
			Max. Vx	16	-4.58	0.11	1.18
		Diagonal	Max Tension	4	8.30	0.00	0.00
			Max. Compression	4	-8.56	0.00	0.00
			Max. Mx	29	2.28	0.25	-0.03
			Max. My	27	-0.32	0.23	-0.03
			Max. Vy	29	0.12	0.25	-0.03
			Max. Vx	27	-0.01	0.00	0.00
T8	60 - 40	Leg	Max Tension	7	271.90	-1.15	0.06
			Max. Compression	18	-306.25	2.40	-0.05
			Max. Mx	18	-306.25	2.40	-0.05
			Max. My	4	-3.42	-0.16	-2.32
			Max. Vy	18	-13.89	2.40	-0.05
			Max. Vx	16	-4.65	0.12	1.65
		Diagonal	Max Tension	4	8.82	0.00	0.00
			Max. Compression	18	-9.25	0.00	0.00
			Max. Mx	29	2.55	0.29	-0.04
			Max. My	27	-0.11	0.27	-0.04
			Max. Vy	29	0.13	0.29	-0.04
			Max. Vx	27	-0.01	0.00	0.00
T9	40 - 20	Leg	Max Tension	7	300.51	-1.26	0.04
			Max. Compression	18	-340.76	2.68	-0.02
			Max. Mx	29	58.59	-4.29	-0.01
			Max. My	4	-4.67	-0.01	-1.67
			Max. Vy	18	-15.03	2.68	-0.02
			Max. Vx	17	-4.89	0.15	1.34
		Diagonal	Max Tension	5	9.27	0.00	0.00
			Max. Compression	18	-9.80	0.00	0.00
			Max. Mx	29	1.80	0.31	-0.04
			Max. My	27	-0.99	0.30	-0.04
			Max. Vy	29	0.14	0.31	-0.04
			Max. Vx	27	-0.01	0.00	0.00
T10	20 - 0	Leg	Max Tension	7	328.28	1.23	0.00
			Max. Compression	18	-374.82	0.00	-0.00
			Max. Mx	35	-159.25	4.55	-0.04
			Max. My	4	-7.43	-0.22	-3.19
			Max. Vy	18	-16.84	0.00	-0.00
			Max. Vx	17	-4.54	-0.00	-0.00
		Diagonal	Max Tension	16	9.97	0.00	0.00
			Max. Compression	18	-10.94	0.00	0.00
			Max. Mx	29	0.60	0.42	0.05
			Max. My	28	-4.05	0.40	-0.06
			Max. Vy	29	0.15	0.42	0.05
			Max. Vx	28	0.01	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	18	373.26	32.98	-18.92
	Max. H_x	18	373.26	32.98	-18.92
	Max. H_z	7	-326.85	-29.44	16.95
	Min. Vert	7	-326.85	-29.44	16.95
	Min. H_x	7	-326.85	-29.44	16.95
	Min. H_z	18	373.26	32.98	-18.92
Leg B	Max. Vert	10	346.04	-29.86	-17.69
	Max. H_x	23	-295.68	26.13	15.61
	Max. H_z	23	-295.68	26.13	15.61
	Min. Vert	23	-295.68	26.13	15.61
	Min. H_x	10	346.04	-29.86	-17.69
	Min. H_z	10	346.04	-29.86	-17.69
Leg A	Max. Vert	2	363.76	0.62	36.14

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Max. H_x	21	15.06	4.19	1.08
	Max. H_z	2	363.76	0.62	36.14
	Min. Vert	15	-311.20	-0.64	-31.71
	Min. H_x	9	15.26	-4.17	1.10
	Min. H_z	15	-311.20	-0.64	-31.71

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	50.01	-0.00	0.00	-4.36	-13.43	-0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	60.01	0.05	-57.69	-6847.20	-25.59	24.91
0.9 Dead+1.0 Wind 0 deg - No Ice	45.01	0.05	-57.69	-6835.03	-21.50	24.87
1.2 Dead+1.0 Wind 30 deg - No Ice	60.01	28.52	-51.86	-6173.47	-3306.68	25.62
0.9 Dead+1.0 Wind 30 deg - No Ice	45.01	28.52	-51.86	-6162.37	-3297.52	25.59
1.2 Dead+1.0 Wind 60 deg - No Ice	60.01	49.50	-30.51	-3687.13	-5751.00	1.49
0.9 Dead+1.0 Wind 60 deg - No Ice	45.01	49.50	-30.51	-3679.91	-5738.04	1.48
1.2 Dead+1.0 Wind 90 deg - No Ice	60.01	56.16	-0.00	-6.51	-6563.50	-18.75
0.9 Dead+1.0 Wind 90 deg - No Ice	45.01	56.16	-0.00	-5.19	-6549.21	-18.73
1.2 Dead+1.0 Wind 120 deg - No Ice	60.01	47.26	28.98	3481.04	-5489.08	-15.46
0.9 Dead+1.0 Wind 120 deg - No Ice	45.01	47.26	28.98	3476.76	-5476.49	-15.44
1.2 Dead+1.0 Wind 150 deg - No Ice	60.01	24.99	45.50	5515.59	-2958.14	-10.79
0.9 Dead+1.0 Wind 150 deg - No Ice	45.01	24.99	45.50	5508.01	-2949.44	-10.75
1.2 Dead+1.0 Wind 180 deg - No Ice	60.01	0.03	54.19	6506.48	-20.99	-25.22
0.9 Dead+1.0 Wind 180 deg - No Ice	45.01	0.03	54.19	6497.39	-16.91	-25.19
1.2 Dead+1.0 Wind 210 deg - No Ice	60.01	-28.42	51.51	6100.19	3254.47	-27.66
0.9 Dead+1.0 Wind 210 deg - No Ice	45.01	-28.42	51.52	6091.85	3253.51	-27.63
1.2 Dead+1.0 Wind 240 deg - No Ice	60.01	-52.26	31.86	3765.95	5950.73	-4.17
0.9 Dead+1.0 Wind 240 deg - No Ice	45.01	-52.25	31.86	3761.31	5945.65	-4.16
1.2 Dead+1.0 Wind 270 deg - No Ice	60.01	-56.18	0.02	-2.52	6535.39	18.60
0.9 Dead+1.0 Wind 270 deg - No Ice	45.01	-56.18	0.02	-1.19	6529.24	18.58
1.2 Dead+1.0 Wind 300 deg - No Ice	60.01	-44.36	-27.57	-3388.38	5197.57	18.01
0.9 Dead+1.0 Wind 300 deg - No Ice	45.01	-44.36	-27.57	-3381.55	5193.46	17.99
1.2 Dead+1.0 Wind 330 deg - No Ice	60.01	-24.97	-45.78	-5577.83	2923.35	12.48
0.9 Dead+1.0 Wind 330 deg - No Ice	45.01	-24.97	-45.78	-5567.50	2922.80	12.45
1.2 Dead+1.0 Ice+1.0 Temp	174.26	0.00	-0.00	-24.75	-95.32	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	174.26	0.01	-18.53	-2281.81	-96.89	11.95
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	174.26	9.41	-16.73	-2056.81	-1219.59	11.74

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
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	174.26	16.52	-9.88	-1229.86	-2066.95	3.81
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	174.26	18.57	-0.01	-27.13	-2326.93	-4.53
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	174.26	15.39	9.19	1105.50	-1948.42	-6.91
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	174.26	8.39	15.35	1876.30	-1108.33	-7.38
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	174.26	-0.12	18.12	2198.99	-74.84	-11.21
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	174.26	-9.44	16.75	2009.24	1032.51	-11.87
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	174.26	-16.90	10.21	1215.28	1906.23	-4.43
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	174.26	-18.65	0.21	10.56	2148.29	4.63
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	174.26	-15.00	-9.00	-1141.39	1723.09	7.39
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	174.26	-8.52	-15.23	-1908.69	939.13	8.56
Dead+Wind 0 deg - Service	50.01	0.01	-13.99	-1662.05	-15.75	6.03
Dead+Wind 30 deg - Service	50.01	6.92	-12.58	-1498.83	-810.73	6.20
Dead+Wind 60 deg - Service	50.01	12.01	-7.40	-896.42	-1402.96	0.36
Dead+Wind 90 deg - Service	50.01	13.62	-0.00	-4.67	-1599.80	-4.54
Dead+Wind 120 deg - Service	50.01	11.46	7.03	840.28	-1339.48	-3.75
Dead+Wind 150 deg - Service	50.01	6.06	11.04	1333.19	-726.27	-2.62
Dead+Wind 180 deg - Service	50.01	0.01	13.14	1573.27	-14.64	-6.11
Dead+Wind 210 deg - Service	50.01	-6.89	12.49	1474.85	778.96	-6.70
Dead+Wind 240 deg - Service	50.01	-12.67	7.73	909.32	1432.22	-1.01
Dead+Wind 270 deg - Service	50.01	-13.63	0.00	-3.70	1573.84	4.50
Dead+Wind 300 deg - Service	50.01	-10.76	-6.69	-824.01	1249.71	4.37
Dead+Wind 330 deg - Service	50.01	-6.06	-11.10	-1354.47	698.71	3.03

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-50.01	0.00	0.00	50.01	-0.00	0.000%
2	0.05	-60.01	-57.69	-0.05	60.01	57.69	0.001%
3	0.05	-45.01	-57.69	-0.05	45.01	57.69	0.001%
4	28.53	-60.01	-51.86	-28.52	60.01	51.86	0.008%
5	28.53	-45.01	-51.86	-28.52	45.01	51.86	0.008%
6	49.51	-60.01	-30.52	-49.50	60.01	30.51	0.010%
7	49.51	-45.01	-30.52	-49.50	45.01	30.51	0.009%
8	56.17	-60.01	-0.01	-56.16	60.01	0.00	0.008%
9	56.17	-45.01	-0.01	-56.16	45.01	0.00	0.008%
10	47.26	-60.01	28.98	-47.26	60.01	-28.98	0.001%
11	47.26	-45.01	28.98	-47.26	45.01	-28.98	0.001%
12	24.99	-60.01	45.50	-24.99	60.01	-45.50	0.008%
13	24.99	-45.01	45.50	-24.99	45.01	-45.50	0.007%
14	0.03	-60.01	54.20	-0.03	60.01	-54.19	0.010%
15	0.03	-45.01	54.20	-0.03	45.01	-54.19	0.009%
16	-28.42	-60.01	51.52	28.42	60.01	-51.51	0.009%
17	-28.42	-45.01	51.52	28.42	45.01	-51.52	0.009%
18	-52.25	-60.01	31.86	52.26	60.01	-31.86	0.001%
19	-52.25	-45.01	31.86	52.25	45.01	-31.86	0.001%
20	-56.19	-60.01	0.01	56.18	60.01	-0.02	0.008%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
21	-56.19	-45.01	0.01	56.18	45.01	-0.02	0.007%
22	-44.37	-60.01	-27.57	44.36	60.01	27.57	0.009%
23	-44.37	-45.01	-27.57	44.36	45.01	27.57	0.008%
24	-24.98	-60.01	-45.78	24.97	60.01	45.78	0.007%
25	-24.98	-45.01	-45.78	24.97	45.01	45.78	0.006%
26	0.00	-174.26	0.00	-0.00	174.26	0.00	0.000%
27	0.01	-174.26	-18.53	-0.01	174.26	18.53	0.000%
28	9.41	-174.26	-16.73	-9.41	174.26	16.73	0.000%
29	16.52	-174.26	-9.88	-16.52	174.26	9.88	0.000%
30	18.57	-174.26	-0.01	-18.57	174.26	0.01	0.000%
31	15.39	-174.26	9.19	-15.39	174.26	-9.19	0.000%
32	8.39	-174.26	15.35	-8.39	174.26	-15.35	0.000%
33	-0.12	-174.26	18.12	0.12	174.26	-18.12	0.000%
34	-9.44	-174.26	16.75	9.44	174.26	-16.75	0.000%
35	-16.90	-174.26	10.21	16.90	174.26	-10.21	0.000%
36	-18.65	-174.26	0.21	18.65	174.26	-0.21	0.000%
37	-15.00	-174.26	-9.00	15.00	174.26	9.00	0.000%
38	-8.52	-174.26	-15.23	8.52	174.26	15.23	0.000%
39	0.01	-50.01	-13.99	-0.01	50.01	13.99	0.001%
40	6.92	-50.01	-12.58	-6.92	50.01	12.58	0.001%
41	12.01	-50.01	-7.40	-12.01	50.01	7.40	0.002%
42	13.62	-50.01	-0.00	-13.62	50.01	0.00	0.001%
43	11.46	-50.01	7.03	-11.46	50.01	-7.03	0.001%
44	6.06	-50.01	11.04	-6.06	50.01	-11.04	0.001%
45	0.01	-50.01	13.14	-0.01	50.01	-13.14	0.002%
46	-6.89	-50.01	12.50	6.89	50.01	-12.49	0.001%
47	-12.67	-50.01	7.73	12.67	50.01	-7.73	0.001%
48	-13.63	-50.01	0.00	13.63	50.01	-0.00	0.001%
49	-10.76	-50.01	-6.69	10.76	50.01	6.69	0.002%
50	-6.06	-50.01	-11.10	6.06	50.01	11.10	0.001%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00007779	0.00039142
3	Yes	4	0.00005533	0.00028221
4	Yes	4	0.00008127	0.00041055
5	Yes	4	0.00005869	0.00030052
6	Yes	4	0.00008574	0.00043123
7	Yes	4	0.00006293	0.00032084
8	Yes	4	0.00008201	0.00040779
9	Yes	4	0.00005945	0.00029960
10	Yes	4	0.00007826	0.00038880
11	Yes	4	0.00000001	0.00028112
12	Yes	4	0.00008308	0.00041454
13	Yes	4	0.00006032	0.00030513
14	Yes	4	0.00008625	0.00043364
15	Yes	4	0.00006330	0.00032267
16	Yes	4	0.00008247	0.00041566
17	Yes	4	0.00005983	0.00030574
18	Yes	4	0.00007745	0.00038777
19	Yes	4	0.00005515	0.00027991
20	Yes	4	0.00008201	0.00040738
21	Yes	4	0.00005945	0.00029941
22	Yes	4	0.00008606	0.00042795
23	Yes	4	0.00006317	0.00031847
24	Yes	4	0.00008192	0.00040911
25	Yes	4	0.00005922	0.00029984
26	Yes	4	0.00000001	0.00009812
27	Yes	5	0.00000001	0.00029590
28	Yes	5	0.00000001	0.00030129
29	Yes	5	0.00000001	0.00030248
30	Yes	5	0.00000001	0.00029776

31	Yes	5	0.00000001	0.00029383
32	Yes	5	0.00000001	0.00029474
33	Yes	5	0.00000001	0.00029618
34	Yes	5	0.00000001	0.00029415
35	Yes	5	0.00000001	0.00028893
36	Yes	5	0.00000001	0.00028609
37	Yes	5	0.00000001	0.00028689
38	Yes	5	0.00000001	0.00029073
39	Yes	4	0.00000001	0.00029664
40	Yes	4	0.00000001	0.00029957
41	Yes	4	0.00000001	0.00030214
42	Yes	4	0.00000001	0.00029697
43	Yes	4	0.00000001	0.00029435
44	Yes	4	0.00000001	0.00030084
45	Yes	4	0.00000001	0.00030447
46	Yes	4	0.00000001	0.00029955
47	Yes	4	0.00000001	0.00029241
48	Yes	4	0.00000001	0.00029592
49	Yes	4	0.00000001	0.00030145
50	Yes	4	0.00000001	0.00029992

Maximum Tower Deflections - Service Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	in		°	°
T1	200 - 180	6.644	40	0.329	0.039
T2	180 - 160	5.263	40	0.316	0.032
T3	160 - 140	3.993	40	0.270	0.023
T4	140 - 120	2.929	40	0.217	0.018
T5	120 - 100	2.069	40	0.177	0.014
T6	100 - 80	1.372	40	0.138	0.010
T7	80 - 60	0.840	40	0.098	0.007
T8	60 - 40	0.469	47	0.069	0.005
T9	40 - 20	0.220	47	0.039	0.003
T10	20 - 0	0.069	47	0.019	0.002

Critical Deflections and Radius of Curvature - Service Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
200.00	15" Dia. x 15" Beacon	40	6.644	0.329	0.039	177657
198.00	DB225-A	40	6.505	0.329	0.038	177657
190.00	USX6-6W-6GR	40	5.947	0.325	0.036	88828
182.00	APXVAARR24_43-U-NA20 w/ Mount Pipe	40	5.398	0.318	0.033	49270
170.00	APXVTM14-ALU-I20 w/ Mount Pipe	40	4.607	0.296	0.028	28110
163.00	PR-850	40	4.172	0.278	0.025	22405
144.00	(2) PD1109-1	40	3.124	0.227	0.019	22214
102.00	3" x 6" SideLight	40	1.434	0.142	0.011	28544
53.00	KS24019-L112A	47	0.370	0.058	0.005	43592

Maximum Tower Deflections - Design Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	in		°	°
T1	200 - 180	27.305	4	1.352	0.160

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T2	180 - 160	21.635	4	1.297	0.134
T3	160 - 140	16.415	4	1.109	0.097
T4	140 - 120	12.042	4	0.892	0.075
T5	120 - 100	8.510	4	0.728	0.058
T6	100 - 80	5.642	4	0.569	0.042
T7	80 - 60	3.470	18	0.404	0.029
T8	60 - 40	1.943	18	0.282	0.021
T9	40 - 20	0.911	18	0.159	0.014
T10	20 - 0	0.286	18	0.080	0.006

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
200.00	15" Dia. x 15" Beacon	4	27.305	1.352	0.160	42956
198.00	DB225-A	4	26.730	1.349	0.157	42956
190.00	USX6-6W-6GR	4	24.442	1.336	0.148	21478
182.00	APXVAARR24_43-U-NA20 w/ Mount Pipe	4	22.189	1.308	0.137	11914
170.00	APXVTM14-ALU-I20 w/ Mount Pipe	4	18.938	1.216	0.115	6821
163.00	PR-850	4	17.150	1.143	0.102	5443
144.00	(2) PD1109-1	4	12.845	0.932	0.078	5399
102.00	3" x 6" SideLight	4	5.899	0.585	0.044	6948
53.00	KS24019-L112A	18	1.532	0.238	0.019	10610

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	200	Leg	A325X	0.750	4	6.74	30.10	0.224	1.05	Bolt Tension
		Diagonal	A325X	0.625	1	5.32	7.88	0.676	1.05	Member Block Shear
		Top Girt	A325X	0.625	1	0.38	7.88	0.048	1.05	Member Block Shear
T2	180	Leg	A325X	1.000	4	17.70	54.52	0.325	1.05	Bolt Tension
		Diagonal	A325X	0.625	1	5.80	7.88	0.737	1.05	Member Block Shear
T3	160	Leg	A325X	1.000	4	27.34	54.52	0.502	1.05	Bolt Tension
		Diagonal	A325X	0.625	1	6.01	7.88	0.763	1.05	Member Block Shear
T4	140	Leg	A325X	1.250	4	36.38	87.22	0.417	1.05	Bolt Tension
		Diagonal	A325X	0.625	1	6.71	9.91	0.677	1.05	Member Block Shear
T5	120	Leg	A325X	1.250	4	44.85	87.22	0.514	1.05	Bolt Tension
		Diagonal	A325X	0.625	1	6.73	9.91	0.679	1.05	Member Block Shear
T6	100	Leg	A325X	1.250	6	35.25	87.22	0.404	1.05	Bolt Tension
		Diagonal	A325X	0.750	1	7.14	10.42	0.685	1.05	Member Block Shear
T7	80	Leg	A325X	1.250	6	40.38	87.22	0.463	1.05	Bolt Tension
		Diagonal	A325X	0.750	1	8.30	14.36	0.578	1.05	Member Bearing
T8	60	Leg	A325X	1.375	6	45.32	103.94	0.436	1.05	Bolt Tension
		Diagonal	A325X	0.750	1	8.82	14.36	0.615	1.05	Member Bearing
T9	40	Leg	A325X	1.375	6	50.08	103.94	0.482	1.05	Bolt Tension
		Diagonal	A325X	0.750	1	9.27	14.36	0.645	1.05	Member

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T10	20	Diagonal	A325X	0.750	1	9.97	14.36	0.694	1.05	Bearing Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	200 - 180	Sabre 2.875x.375	20.00	4.98	66.9 K=1.00	2.945	-26.74	95.59	0.280 [1]
T2	180 - 160	Sabre 3.5 x .3	20.03	4.99	52.7 K=1.00	3.016	-76.51	110.80	0.690 [1]
T3	160 - 140	Sabre 4 x .318	20.03	4.99	45.8 K=1.00	3.678	-120.05	141.99	0.845 [1]
T4	140 - 120	Sabre 4.5 x .438	20.03	6.65	55.2 K=1.00	5.589	-159.16	201.22	0.791 [1]
T5	120 - 100	Sabre 5.5625 x .375	20.03	6.65	43.4 K=1.00	6.111	-195.74	239.63	0.817 [1]
T6	100 - 80	Sabre 5.5625 x .375	20.03	6.65	43.4 K=1.00	6.111	-230.15	239.63	0.960 [1]
T7	80 - 60	Sabre 6.625 x .432	20.03	9.97	54.5 K=1.00	8.405	-261.73	304.30	0.860 [1]
T8	60 - 40	Sabre 8.625 x .322	20.03	9.97	40.7 K=1.00	8.399	-296.52	334.76	0.886 [1]
T9	40 - 20	Sabre 8.625 x .5	20.03	9.97	41.6 K=1.00	12.763	-331.18	506.09	0.654 [1]
T10	20 - 0	Sabre 8.625 x .5	20.03	9.97	41.6 K=1.00	12.763	-364.85	506.09	0.721 [1]

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	200 - 180	L1 3/4x1 3/4x3/16	7.06	3.21	114.2 K=1.02	0.621	-5.35	13.19	0.405 [1]
T2	180 - 160	L1 3/4x1 3/4x3/16	8.38	4.02	140.4 K=1.00	0.621	-5.83	9.01	0.647 [1]
T3	160 - 140	L1 3/4x1 3/4x3/16	10.06	4.84	169.0 K=1.00	0.621	-6.13	6.22	0.985 [1]
T4	140 - 120	L2 1/2x2 1/2x3/16	12.56	6.11	148.1 K=1.00	0.902	-6.70	11.77	0.569 [1]
T5	120 - 100	L2 1/2x2 1/2x3/16	14.30	6.93	168.0 K=1.00	0.902	-6.93	9.15	0.757 [1]
T6	100 - 80	L3x3x3/16	16.09	7.83	157.6 K=1.00	1.090	-7.35	12.56	0.586 [1]
T7	80 - 60	L3 1/2x3 1/2x1/4	19.27	9.46	163.5 K=1.00	1.690	-8.56	18.09	0.473 [1]
T8	60 - 40	L3 1/2x3 1/2x1/4	21.01	10.23	176.9 K=1.00	1.690	-9.25	15.45	0.598 [1]
T9	40 - 20	L3 1/2x3 1/2x1/4	22.79	11.12	192.4	1.690	-9.80	13.07	0.750 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T10	20 - 0	L4x4x1/4	24.60	12.03	K=1.00 181.6 K=1.00	1.940	-10.94	16.83	0.650 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	200 - 180	L1 3/4x1 3/4x3/16	5.00	4.47	156.1 K=1.00	0.621	-0.43	7.29	0.059 [1]

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	200 - 180	Sabre 2.875x.375	20.00	0.08	1.1	2.945	26.97	132.54	0.203 [1]
T2	180 - 160	Sabre 3.5 x .3	20.03	0.08	0.9	3.016	70.78	135.72	0.522 [1]
T3	160 - 140	Sabre 4 x .318	20.03	0.08	0.8	3.678	109.36	165.53	0.661 [1]
T4	140 - 120	Sabre 4.5 x .438	20.03	0.08	0.7	5.589	145.54	251.52	0.579 [1]
T5	120 - 100	Sabre 5.5625 x .375	20.03	0.08	0.5	6.111	179.39	275.01	0.652 [1]
T6	100 - 80	Sabre 5.5625 x .375	20.03	0.08	0.5	6.111	211.51	275.01	0.769 [1]
T7	80 - 60	Sabre 6.625 x .432	20.03	0.08	0.5	8.405	242.27	378.22	0.641 [1]
T8	60 - 40	Sabre 8.625 x .322	20.03	0.08	0.3	8.399	271.90	377.97	0.719 [1]
T9	40 - 20	Sabre 8.625 x .5	20.03	0.08	0.3	12.763	300.51	574.32	0.523 [1]
T10	20 - 0	Sabre 8.625 x .5	20.03	0.08	0.3	12.763	328.28	574.32	0.572 [1]

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	200 - 180	L1 3/4x1 3/4x3/16	7.06	3.21	75.1	0.360	5.32	15.68	0.340 [1]
T2	180 - 160	L1 3/4x1 3/4x3/16	8.38	4.02	93.1	0.360	5.80	15.68	0.370 [1]
T3	160 - 140	L1 3/4x1 3/4x3/16	10.06	4.84	111.4	0.360	6.01	15.68	0.383 [1]
T4	140 - 120	L2 1/2x2 1/2x3/16	11.45	5.56	88.1	0.571	6.71	24.84	0.270 [1]
T5	120 - 100	L2 1/2x2 1/2x3/16	14.30	6.93	109.1	0.571	6.73	24.84	0.271 [1]
T6	100 - 80	L3x3x3/16	16.09	7.83	101.9	0.694	7.14	30.21	0.236 [1]
T7	80 - 60	L3 1/2x3 1/2x1/4	19.27	9.46	105.7	1.103	8.30	48.00	0.173 [1]
T8	60 - 40	L3 1/2x3 1/2x1/4	21.01	10.23	114.3	1.103	8.82	48.00	0.184 [1]
T9	40 - 20	L3 1/2x3 1/2x1/4	22.79	11.12	124.1	1.103	9.27	48.00	0.193 [1]
T10	20 - 0	L4x4x1/4	24.60	12.03	116.9	1.291	9.97	56.16	0.177 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	200 - 180	L1 3/4x1 3/4x3/16	5.00	4.47	106.4	0.360	0.38	15.68	0.024 [1]

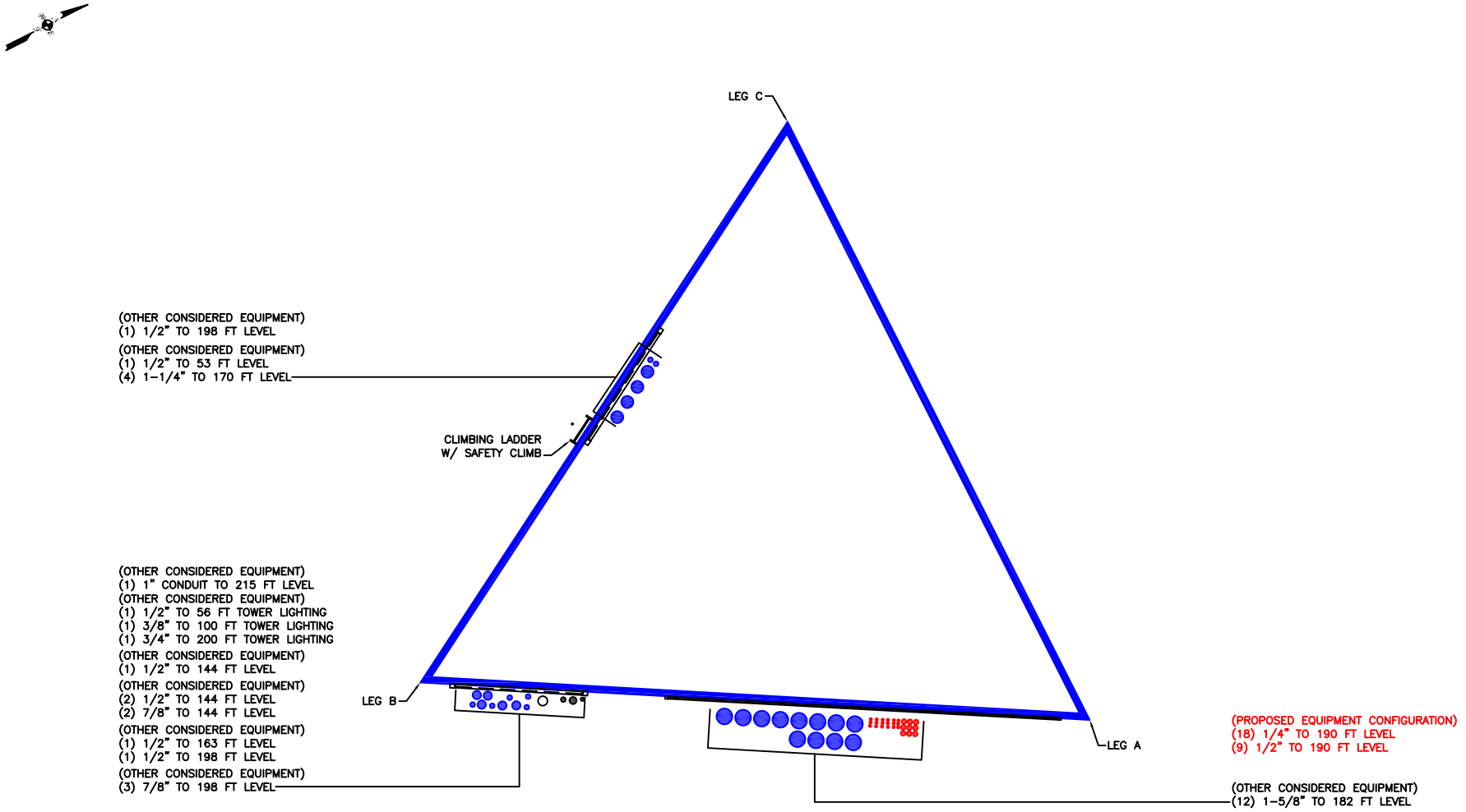
[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	200 - 180	Leg	Sabre 2.875x.375	3	-26.74	100.37	26.6	Pass
T2	180 - 160	Leg	Sabre 3.5 x .3	33	-76.51	116.34	65.8	Pass
T3	160 - 140	Leg	Sabre 4 x .318	60	-120.05	149.09	80.5	Pass
T4	140 - 120	Leg	Sabre 4.5 x .438	87	-159.16	211.28	75.3	Pass
T5	120 - 100	Leg	Sabre 5.5625 x .375	108	-195.74	251.62	77.8	Pass
T6	100 - 80	Leg	Sabre 5.5625 x .375	129	-230.15	251.62	91.5	Pass
T7	80 - 60	Leg	Sabre 6.625 x .432	148	-261.73	319.52	81.9	Pass
T8	60 - 40	Leg	Sabre 8.625 x .322	163	-296.52	351.50	84.4	Pass
T9	40 - 20	Leg	Sabre 8.625 x .5	178	-331.18	531.40	62.3	Pass
T10	20 - 0	Leg	Sabre 8.625 x .5	193	-364.85	531.40	68.7	Pass
T1	200 - 180	Diagonal	L1 3/4x1 3/4x3/16	10	-5.35	13.85	38.6 64.4 (b)	Pass
T2	180 - 160	Diagonal	L1 3/4x1 3/4x3/16	37	-5.83	9.47	61.6 70.2 (b)	Pass
T3	160 - 140	Diagonal	L1 3/4x1 3/4x3/16	64	-6.13	6.54	93.8	Pass
T4	140 - 120	Diagonal	L2 1/2x2 1/2x3/16	91	-6.70	12.36	54.2 64.5 (b)	Pass
T5	120 - 100	Diagonal	L2 1/2x2 1/2x3/16	113	-6.93	9.61	72.1	Pass
T6	100 - 80	Diagonal	L3x3x3/16	134	-7.35	13.18	55.8 65.2 (b)	Pass
T7	80 - 60	Diagonal	L3 1/2x3 1/2x1/4	155	-8.56	18.99	45.1 55.0 (b)	Pass
T8	60 - 40	Diagonal	L3 1/2x3 1/2x1/4	166	-9.25	16.23	57.0 58.5 (b)	Pass
T9	40 - 20	Diagonal	L3 1/2x3 1/2x1/4	181	-9.80	13.73	71.4	Pass
T10	20 - 0	Diagonal	L4x4x1/4	196	-10.94	17.67	61.9 66.1 (b)	Pass
T1	200 - 180	Top Girt	L1 3/4x1 3/4x3/16	4	-0.43	7.66	5.6	Pass
						Summary		
						Leg (T6)	91.5	Pass
						Diagonal (T3)	93.8	Pass
						Top Girt (T1)	5.6	Pass
						Bolt Checks	72.6	Pass
						RATING =	**93.8**	**Pass**

APPENDIX B

BASE LEVEL DRAWING


LEG C
(OTHER CONSIDERED EQUIPMENT)
(1) 1/2" TO 198 FT LEVEL
(OTHER CONSIDERED EQUIPMENT)
(1) 1/2" TO 53 FT LEVEL
(4) 1-1/4" TO 170 FT LEVEL
CLIMBING LADDER
W/ SAFETY CLIMB
(OTHER CONSIDERED EQUIPMENT)
(1) 1" CONDUIT TO 215 FT LEVEL
(OTHER CONSIDERED EQUIPMENT)
(1) 1/2" TO 56 FT TOWER LIGHTING
(1) 3/8" TO 100 FT TOWER LIGHTING
(1) 3/4" TO 200 FT TOWER LIGHTING
(OTHER CONSIDERED EQUIPMENT)
(1) 1/2" TO 144 FT LEVEL
(OTHER CONSIDERED EQUIPMENT)
(2) 1/2" TO 144 FT LEVEL
(2) 7/8" TO 144 FT LEVEL
(OTHER CONSIDERED EQUIPMENT)
(1) 1/2" TO 163 FT LEVEL
(1) 1/2" TO 198 FT LEVEL
(OTHER CONSIDERED EQUIPMENT)
(3) 7/8" TO 198 FT LEVEL
LEG B
LEG A
(PROPOSED EQUIPMENT CONFIGURATION)
(18) 1/4" TO 190 FT LEVEL
(9) 1/2" TO 190 FT LEVEL
(OTHER CONSIDERED EQUIPMENT)
(12) 1-5/8" TO 182 FT LEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

CCIplate

Project Information

BU #	871584
Site Name	John Tom Hill
Order #	519195 rev. 0

Tower Information

Tower Type	Self Support
TIA-222 Rev	H

☑ Apply TIA-222-H Section 15.5

Applied Loads

	Comp.	Uplift
Axial (k)	373.00	327.00
Shear (k)	38.00	34.00

Anchor Rod Data

Quantity:	8
Diameter (in):	1.5
Material Grade:	A572-50
Grout Considered:	
l_{ar} (in):	1.125
Eta Factor, η:	
Thread Type:	N-Included
Configuration:	Symmetrical

Fy=50 ksi Fu=65 ksi

Not Considered, lar<=1(d)

Anchor Rod Results

Axial, Pu_c (kips)	46.63
Shear, Vu (kips)	4.75
Moment, Mu (kip-in)	-
Axial Cap., φPn_c (kips)	79.52
Shear Cap., ϕVn (kips)	35.78
Moment Cap., ϕMn (kip-in)	-
Stress Rating	57.5%

Pass

Pier and Pad Foundation

BU # :	871584
Site Name:	John Tom Hill
App. Number:	519195 rev 0

TIA-222 Revision:	H
Tower Type:	Self Support

Top & Bot. Pad Rein. Different?:	☐
Block Foundation?:	☐

Superstructure Analysis Reactions

Compression, P_{comp}:	373	kips
Compression Shear, Vu_comp:	20.3333333	kips
Uplift, P_{uplift}:	327	kips
Uplift Shear, V_{u_uplift}:	20.3333333	kips
Tower Height, **H**:	200	ft
Base Face Width, **BW**:	23	ft
BP Dist. Above Fdn, bp_{dist}:	2.625	in

Pier Properties

Pier Shape:	Circular	
Pier Diameter, **dpier**:	3.5	ft
Ext. Above Grade, **E**:	0.4167	ft
Pier Rebar Size, **Sc**:	7	
Pier Rebar Quantity, **mc**:	14	
Pier Tie/Spiral Size, **St**:	3	
Pier Tie/Spiral Quantity, **mt**:	10	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier}:	3	in

Pad Properties

Depth, **D**:	10.5	ft
Pad Width, **W**:	15	ft
Pad Thickness, **T**:	1.75	ft
Pad Rebar Size (Bottom), **Sp**:	7	
Pad Rebar Quantity (Bottom), **mp**:	20	
Pad Clear Cover, cc_{pad}:	3	in

Material Properties

Rebar Grade, **Fy**:	60	ksi
Concrete Compressive Strength, **F'c**:	3	ksi
Dry Concrete Density, δ**c**:	150	pcf

Soil Properties

Total Soil Unit Weight, γ:	125	pcf
Ultimate Gross Bearing, Qult:	16.000	ksf
Cohesion, **Cu**:	0.000	ksf
Friction Angle, φ:	36	degrees
SPT Blow Count, N_{blows}:	28	
Base Friction, μ:	0.6	
Neglected Depth, **N**:	3.33	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, **gw**:	8	ft

<--Toggle between Gross and Net

Foundation Analysis Checks

	Capacity	Demand	Rating*	Check
Uplift (kips)	451.48	327.00	**69.0%**	**Pass**
Lateral (Sliding) (kips)	124.75	20.33	**15.5%**	**Pass**
Bearing Pressure (ksf)	12.00	3.11	**24.7%**	**Pass**
*Pier Flexure (Comp.) (kip*ft)*	983.54	186.39	**18.0%**	**Pass**
*Pier Flexure (Tension) (kip*ft)*	242.88	186.39	**73.1%**	**Pass**
Pier Compression (kip)	4592.74	388.33	**8.1%**	**Pass**
*Pad Flexure (kip*ft)*	858.77	414.66	**46.0%**	**Pass**
Pad Shear - 1-way (kips)	246.78	109.35	**42.2%**	**Pass**
Pad Shear - 2-way (Comp) (ksi)	0.164	0.105	**61.0%**	**Pass**
*Flexural 2-way (Comp) (kip*ft)*	990.20	111.83	**10.8%**	**Pass**
Pad Shear - 2-way (Uplift) (ksi)	0.164	0.114	**65.8%**	**Pass**
*Flexural 2-way (Tension) (kip*ft)*	990.20	111.83	**10.8%**	**Pass**

**Rating per TIA-222-H Section 15.5*

Soil Rating*:	**69.0%**
Structural Rating*:	**73.1%**

Concrete Grade Beam Verification

Reference

Inputs:

$V := 61 \cdot kip$

$fc := 4000 \cdot psi$

$fy := 60000 \cdot psi$

$Ag := 2.5ft \cdot 2ft = 5\,ft^2$

$Ast := 8 \cdot 0.79in^2 = 6.32 \cdot in^2$

$L := 20ft$

Forcea on Grade Beam: $Pu := \frac{V}{3}$

Compression: $Pu = 20.33 \cdot kip$

Tension: $Tu := Pu = 20.33\ kip$

$w_{soil} := 6in \cdot 2ft \cdot 118pcf = 118 \cdot plf$

$w_{beam} := 2ft \cdot 2ft \cdot 150pcf = 600 \cdot plf$

$w := 1.2 \cdot (w_{soil} + w_{beam}) = 861.6 \cdot plf$

Moment: $M_u := \frac{w \cdot L^2}{12} = 28.72 \cdot kip \cdot ft$

$d := 2.5 \cdot ft$

$d_t := 2ft - 3in - 0.375in - \frac{1in}{2} = 20.13 \cdot in$

$b := 2ft$

$a := \frac{Ast \cdot fy}{0.85 \cdot fc \cdot b} = 4.65 \cdot in$

[ACI 318-14 Eq. 22.2.2.4.1]

$\varepsilon_{ty} := 0.002$

[ACI 318-14 21.2.2.1]

$$\beta_1 := \begin{cases} 0.85 & \text{if } fc \geq 2500 \cdot psi \wedge fc \leq 4000 \cdot psi \\ \left[0.85 - .05\left(\frac{\frac{fc}{psi} - 4000}{1000}\right)\right] & \text{if } fc > 4000 \cdot psi \wedge fc < 8000 \cdot psi \\ 0.65 & \text{if } fc \geq 8000 \cdot psi \end{cases} = 0.85$$

[ACI 318-14 Table 22.2.2.4.3]

$c := \frac{a}{\beta_1} = 5.47\ in$

$\varepsilon_t := \frac{0.003(d_t - c)}{c} = 0.008$

$$\phi := \begin{cases} 0.9 & \text{if } \varepsilon_t \geq 0.005 \\ 0.65 + 0.25 \cdot \dfrac{(\varepsilon_t \cdot \varepsilon_{ty})}{0.005 - \varepsilon_{ty}} & \text{if } \varepsilon_t > \varepsilon_{ty} \wedge \varepsilon_t < 0.005 \\ 0.65 & \text{if } \varepsilon_t \leq \varepsilon_{ty} \end{cases} = 0.9$$

[ACI 318-14 Table 21.2.2]

Compression Check:

$P_o := 0.85 \cdot fc \cdot (Ag - Ast) + fy \cdot Ast = 2805.71\ kip$ [ACI 318-14 Eq. 22.4.2.2]

$P_{nmax} := 0.80 \cdot P_o = 2244.57\ kip$ [ACI 318-14 Table 22.4.2.1]

$\phi Pn := \phi \cdot P_{nmax} = 2020.11\ kip$

$\phi Pn = 2020.11 \cdot kip$

CompressionCheck = "SUFFICIENT"

Capacity = 1.01·%

Tension Check:

$\phi Tn := \phi \cdot fy \cdot Ast$

$\phi Tn = 341.28 \cdot kip$ [ACI 318-14 Eq. 22.4.3.1]

TensionCheck = "SUFFICIENT"

TensionCapacity = 5.96·%

Bending Check:

$$\phi Mn := \phi \cdot \frac{Ast}{2} \cdot fy \cdot \left(d_t - \frac{a}{2} \right) = 253.14 \cdot kip \cdot ft$$

BendingCheck = "SUFFICIENT"

BendingCapacity = 11.35·%

Dowel Embedment:

Horizontal Dowel Size: #6

Total Number of Dowels: (Per End) $n_d := 8$

Grade: $Fy_{dowel} := 60ksi$ $Fu_{dowel} := 90ksi$

Maximum Allowable Yield Strength: $Check_{yield} := \begin{cases} \text{"REDESIGN"} & \text{if } Fy_{dowel} > 60ksi \\ \text{"Okay"} & \text{otherwise} \end{cases} = \text{"Okay"}$

Dowel Diameter: $D_{dowel} := vlookup(dowel, Rebar, 2) \cdot in = 0.75 \cdot in$

Singel Dowel Area: $A_{dowel} := vlookup(dowel, Rebar, 3) \cdot in^2 = 0.44 \cdot in^2$

Dowel Development into Existing Pier (Hilti Catalog Tables)

Epoxy := Hilti HIT-HY 200

Rebar Embedment into Exisiting Pad: $L_{re} := 9in$

Epoxy Design Tensile Strength: (Inc. Load Adjustment Factors) $\phi N_n := 3.87kip$

Epoxy Design Shear Strength: (Inc. Load Adjustment Factors) $\phi V_n := 3.31kip$

New Concrete Modification Factor: $\lambda_n := 1.0$

Pier Surface: Roughened Concrete

Coefficient of Friction: $\mu := coeff\ \lambda_n = 1.0$ ACI 318-14 Table 22.9.4.2

Minimum Embedment from HILTI: $L_{r\_min} := \begin{cases} L_{500\_min} & \text{if Epoxy} = 0 \\ L_{200\_min} & \text{otherwise} \end{cases} = 3.5 \cdot in$

$Check := \begin{cases} \text{"Okay"} & \text{if } L_{re} \geq L_{r\_min} \\ \text{"No Good"} & \text{otherwise} \end{cases}$

Check = "Okay"

Minimum Spacing of Adhesive Anchors: $S_v := 6 \cdot D_{dowel} = 4.5 \cdot in$ ACI 318-14 17.7.1

Minimum Distance from Edge of Concrete for Adhesive Anchors: $Edge_v := 6 \cdot D_{dowel} = 4.5 \cdot in$ ACI 318-14 17.7.3

Tensile Force per single Dowel $T_{dowel} := \frac{Pu}{n_d} = 2.54 \cdot kip$

Dowel Tension Check $Check := \begin{cases} \text{"Okay"} & \text{if } \phi N_n \geq T_{dowel} \\ \text{"No Good"} & \text{otherwise} \end{cases}$

$Check = \text{"Okay"}$

Dowel Tension Rating: $rating := \frac{T_{dowel}}{\phi N_n} = 65.68 \cdot \%$

Shear Force per single Dowel $V_{dowel} := \frac{\frac{w \cdot L}{2}}{n_d} = 1.08 \cdot kip$

Dowel Tension Check $Check := \begin{cases} \text{"Okay"} & \text{if } \phi N_n \geq T_{dowel} \\ \text{"No Good"} & \text{otherwise} \end{cases}$

$Check = \text{"Okay"}$

Dowel Tension Rating: $rating := \frac{V_{dowel}}{\phi N_n} = 27.83 \cdot \%$

Dowel Combined Rating: $rating := \left(\frac{T_{dowel}}{\phi N_n}\right)^2 + \left(\frac{V_{dowel}}{\phi V_n}\right)^2 = 53.72 \cdot \%$

Dowel Development into to New Beam (ACI 318-14 Chapter 25)

Assumed Development Length: $L_d := 18 \cdot in$

New Concrete Compressive Strength: $f_c := 4000 \cdot psi$

Concrete Modification Factor: $\lambda := 1.0$

Modification Factors: $\psi_c := 1$ $\psi_e := 1$ $\psi_r := 1$

Required Embedment Length: (Standard Hook Termination) — ACI 318-14 25.4.3.2

$$l_d := \frac{1}{50} \cdot \frac{\frac{Fy_{dowel}}{psi}}{\lambda \cdot \sqrt{\frac{f_c}{psi}}} \cdot \psi_c \cdot \psi_e \cdot \psi_r \cdot D_{dowel} = 14.23 \cdot in$$

$$l_{d\_req} := \max\left(l_d, 8 \cdot D_{dowel}, 6in\right) = 14.23 \cdot in$$

$$Check := \begin{cases} \text{"Okay"} & \text{if } L_d \geq l_{d\_req} \\ \text{"No Good"} & \text{otherwise} \end{cases} = \text{"Okay"}$$

Check = "Okay"

Designed Development Length: $L_{dh} := L_d = 18 \cdot in$

Required Hook Extension Length: (90 degree hook) — ACI 318-14 Table 25.3.1

$L_{ext} := 12 \cdot D_{dowel} = 9 \cdot in$

Minimum Inside Bend Diameter: (90 degree hook) — ACI 318-14 Table 25.3.1

$d_{bend} = 4.5 \cdot in$

Shear Reinforcement Check (ties/stirrups) (ACI 318-14 Chapter 9)

$D_{tie} := 0.375 \cdot in$

$A_{tie} := 0.11 \cdot in^2$

$A_v := A_{tie} = 0.11\ in^2$

$s := 16 \cdot in$

$$V_s := \begin{cases} \frac{A_v \cdot fy \cdot d}{s} & \text{if } \frac{A_v \cdot fy \cdot d}{s} \le \frac{8 \cdot \frac{b}{in} \cdot \frac{d}{in} \cdot \sqrt{\frac{fc}{psi}}}{1000} \cdot kip \\ \left(\frac{8 \cdot \frac{b}{in} \cdot \frac{d}{in} \cdot \sqrt{\frac{fc}{psi}}}{1000} \cdot kip \right) & \text{otherwise} \end{cases} = 12.38\ kip$$

$$V_c := \frac{2 \cdot \frac{b}{in} \cdot \frac{d}{in} \cdot \sqrt{\frac{fc}{psi}}}{1000} \cdot kip = 91.07\ kip$$

$V_n := V_s + V_c = 103.45\ kip$

$\phi V_n := 0.75 \cdot V_n = 77.59\ kip$

$V_u := \frac{w \cdot L}{2} = 8.62\ kip$

$$Check := \begin{cases} \text{"Okay"} & \text{if } \phi V_n \ge V_u \\ \text{"No Good"} & \text{otherwise} \end{cases} = \text{"Okay"}$$

Check = "Okay"

$$Check := \begin{cases} \text{"Stirrups Not Required"} & \text{if } V_u \le 0.5 \cdot 0.75 \cdot V_c \\ \text{"Stirrup Design Required"} & \text{otherwise} \end{cases} = \text{"Stirrups Not Required"}$$

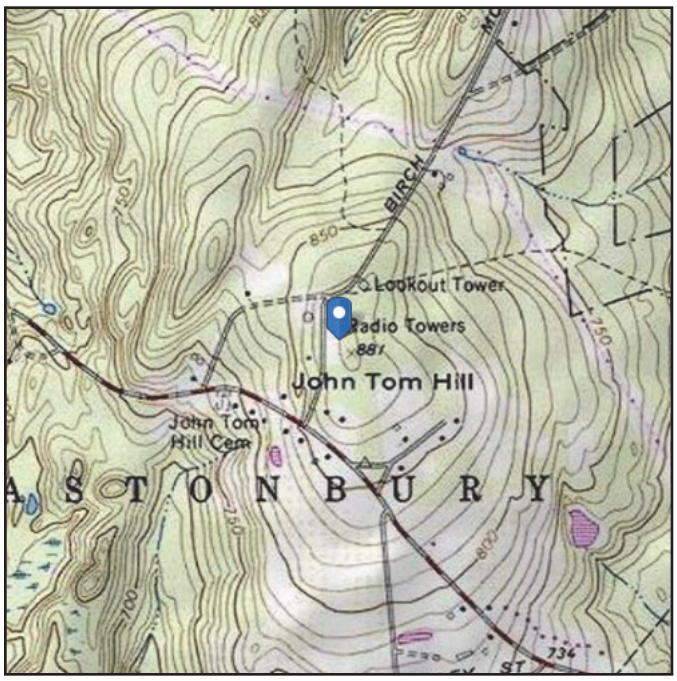
Check = "Stirrups Not Required"

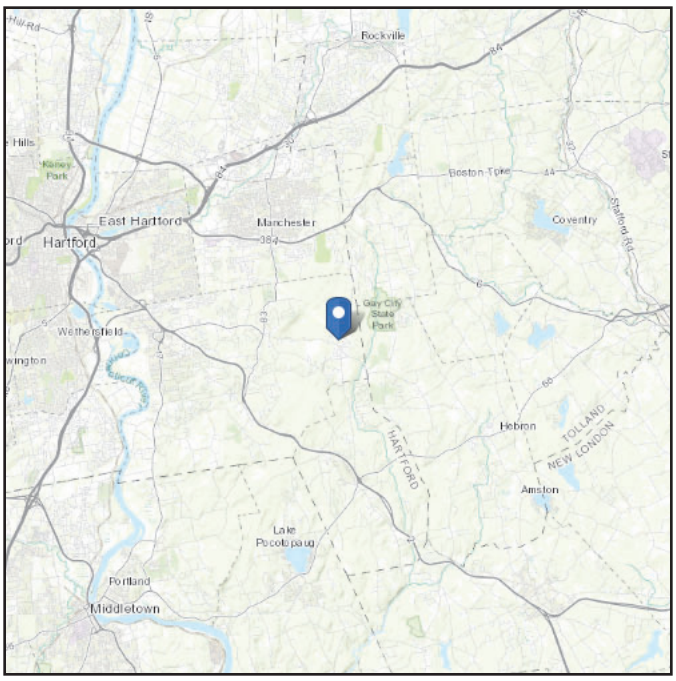
ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-10
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 877.95 ft (NAVD 88)
Latitude: 41.708956
Longitude: -72.473447





Wind

Results:

Wind Speed:	125 Vmph
10-year MRI	77 Vmph
25-year MRI	87 Vmph
50-year MRI	94 Vmph
100-year MRI	102 Vmph
Data Source:	ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, incorporating errata of March 12, 2014
Date Accessed:	Fri Apr 24 2020

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-10 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2. Glazed openings need not be protected against wind-borne debris.

Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

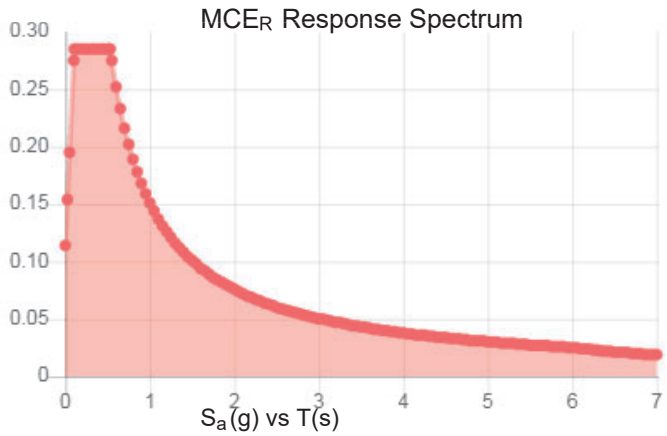
Seismic

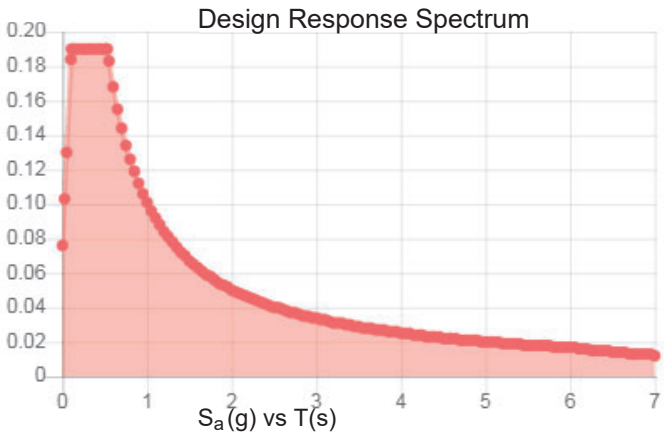
Site Soil Class: D - Stiff Soil

Results:

S_S :	0.178	S_{DS} :	0.19
S_1 :	0.063	S_{D1} :	0.101
F_a :	1.6	T_L :	6
F_v :	2.4	PGA :	0.09
S_{MS} :	0.285	PGA_M :	0.143
S_{M1} :	0.151	F_{PGA} :	1.6
		I_e :	1

Seismic Design Category B





Data Accessed: Fri Apr 24 2020

Date Source: USGS Seismic Design Maps based on ASCE/SEI 7-10, incorporating Supplement 1 and errata of March 31, 2013, and ASCE/SEI 7-10 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-10 Ch. 21 are available from USGS.

Ice

Results:

Ice Thickness:	1.00 in.
Concurrent Temperature:	5 F
Gust Speed:	50 mph
Data Source:	Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8
Date Accessed:	Fri Apr 24 2020

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 50-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

APPENDIX D

REQUIRED MODIFICATION DRAWINGS

TOWER MODIFICATION DRAWINGS

SITE NAME: JOHN TOM HILL
BU NUMBER: 871584

SITE ADDRESS:
115 BIRCH MTN. ROAD
GLASTONBURY, CT 06033
HARTFORD COUNTY, USA

PROJECT CONTACTS:

1. CROWN PROJECT MANAGER

DAN VADNEY
(518) 373-3510
DAN.VADNEY@CROWNCASTLE.COM
3 CORPORATE PARK DRIVE, SUITE 101
CLIFTON PARK, NY 12065

2. CROWN DESIGN ENGINEER (EOR)

MAHAM BARIMANI, P.E.
(724) 416-9627
EORAPPROVAL@CROWNCASTLE.COM
2000 CORPORATE DRIVE
CANONSBURG, PA 15317

TOWER INFORMATION

TOWER MANUFACTURER / DWG #:	SABRE / DWG # 9010764
TOWER HEIGHT / TYPE:	200 FT SELF SUPPORT TOWER
TOWER LOCATION:	LAT 41º 42' 32.24"
DATUM: (NAD 1983)	LONG -72º 28' 24.41"
	ELEV 879.0 FT AMSL
STRUCTURAL DESIGN DRAWING:	CCI / WO # 1853234
STRUCTURAL ANALYSIS REPORT:	TEP / WO # 1847521
STRUCTURAL ANALYSIS DATE:	04/28/20
ORDER #:	519195 REV # 0
CCISITES DOCUMENT ID:	9052570

CODE COMPLIANCE

THIS MODIFICATION DESIGN IS BASED ON THE REQUIREMENTS OF THE TIA-222-H STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES BASED UPON AN ULTIMATE 3-SECOND GUST WIND SPEED OF 125 MPH WITH NO ICE AS REQUIRED BY THE 2018 CONNECTICUT BUILDING CODE, 50 MPH WITH 2 INCH ICE THICKNESS AND 60 MPH UNDER SERVICE LOADS, EXPOSURE CATEGORY C AND RISK CATEGORY II.

HOT WORK INCLUDED

NA	BASE GRINDING ONLY
NA	BASE WELDING (AND GRINDING)
NA	AERIAL GRINDING ONLY
NA	AERIAL WELDING (AND GRINDING)

ATTENTION ALL CONTRACTORS, ANYTIME YOU ACCESS A CROWN SITE FOR ANY REASON YOU ARE TO CALL THE CROWN NOC UPON ARRIVAL AND DEPARTURE, DAILY AT 800-788-7011

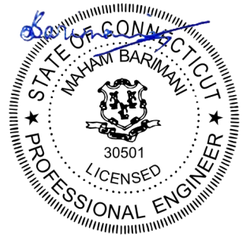
SAFETY CLIMB: 'LOOK UP'
THE INTEGRITY OF THE WIRE ROPE SAFETY CLIMB SYSTEM SHALL BE CONSIDERED DURING ALL STAGES OF DESIGN, INSTALLATION, AND INSPECTION. TOWER REINFORCEMENTS AND EQUIPMENT INSTALLATIONS SHALL NOT COMPROMISE THE INTEGRITY OR FUNCTIONAL USE OF ANY WIRE ROPE SAFETY CLIMB ON THE STRUCTURE. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO: PINCHING OF THE WIRE ROPE, BENDING OF THE WIRE ROPE FROM ITS SUPPORTS, DIRECT CONTACT OR CLOSE PROXIMITY TO THE WIRE ROPE WHICH MAY CAUSE FRICTIONAL WEAR, OR IMPACT TO THE ANCHORAGE POINTS IN ANY WAY. ANY COMPROMISED SAFETY CLIMB MUST BE REPORTED TO YOUR CROWN POC FOR RESOLUTION, INCLUDING EXISTING CONDITIONS.

DRAWINGS INCLUDED

SHEET NUMBER	DESCRIPTION
S-1	TITLE PAGE
S-2	MODIFICATION INSPECTION CHECKLIST
S-3 & S-4	NOTES
S-5	TOWER MODIFICATION SCHEDULE
S-6	DETAILS
S-7	REBAR SCHEDULE

NO.	DATE	DESCRIPTION	BY

REVISIONS



Jun 8 2020 1:21 PM

SITE NAME: JOHN TOM HILL
BU NUMBER: 871584
WO NUMBER: 1853234
SITE ADDRESS:
115 BIRCH MTN. ROAD
GLASTONBURY, CT 06033
HARTFORD COUNTY, USA

ENG/QA BY: **DBS** DATE: **06/03/20**
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DFT/QA BY: **BF** DATE: **06/05/20**
APRV'D BY: **AJG** DATE: **06/05/20**
SCALE: N.T.S.

TITLE PAGE

S-1 REV 0

MI CHECKLIST

REQUIRED	REPORT ITEM	APPLICABLE CROWN DOC #	BRIEF DESCRIPTION
PRE-CONSTRUCTION			
X	MI CHECKLIST DRAWING	CED-SOW-10007	THIS CHECKLIST SERVES AS A GUIDELINE FOR THE REQUIRED CONSTRUCTION DOCUMENTS AND INSPECTIONS FOR THIS MODIFICATION.
NA	EOR APPROVED SHOP DRAWINGS	CED-SOW-10007	ONCE THE PRE-MODIFICATION MAPPING IS COMPLETE AND PRIOR TO FABRICATION, THE CONTRACTOR SHALL PROVIDE DETAILED ASSEMBLY DRAWINGS AND/OR SHOP DRAWINGS. THESE ARE TO INCLUDE, BUT ARE NOT LIMITED TO, A VISUAL LAYOUT OF NEW REINFORCEMENT, EXISTING REINFORCEMENT CONFIGURATION, PORTHOLES, MOUNTS, STEP PEGS, SAFETY CLIMBS AND ANY OTHER MISCELLANEOUS ITEMS WHICH MAY AFFECT SUCCESSFUL INSTALLATION OF MODIFICATIONS ON THE TOWER. THESE DRAWINGS SHALL BE SUBMITTED TO THE EOR FOR APPROVAL. SHOP DRAWINGS SUBMISSION SHALL INCLUDE THE EOR RFI FORM DETAILING ANY CHANGES FROM THE ORIGINAL DESIGN.
NA	FABRICATION INSPECTION	CED-SOW-10007	A LETTER FROM THE FABRICATOR, STATING THAT THE WORK WAS PERFORMED IN ACCORDANCE WITH INDUSTRY STANDARDS AND THE CONTRACT DOCUMENTS, SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	FABRICATOR CERTIFIED WELD INSPECTION	CED-SOW-10007 CED-STD-10069	A CWI SHALL INSPECT ALL WELDING PERFORMED ON STRUCTURAL MEMBERS DURING FABRICATION. A WRITTEN REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	MATERIAL TEST REPORTS (MTR)	CED-SOW-10007	MATERIAL TEST REPORTS SHALL BE PROVIDED FOR MATERIAL USED AS REQUIRED PER SECTION 9.2.5 OF CED-SOW-10007. MTRS SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	FABRICATOR NDE INSPECTION REPORT	CED-SOW-10066 CED-STD-10069	CRITICAL SHOP WELDS THAT REQUIRE TESTING ARE NOTED ON THESE CONTRACT DRAWINGS. A CERTIFIED NDT INSPECTOR SHALL PERFORM NON-DESTRUCTIVE EXAMINATION AND A REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	NDE OF MONOPOLE BASE PLATE	ENG-SOW-10033	A NDE OF THE POLE TO BASE PLATE CONNECTION IS REQUIRED AND A WRITTEN REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	PACKING SLIPS	CED-SOW-10007	PACKING/SHIPPING LIST FOR ALL MATERIAL THAT WAS USED DURING CONSTRUCTION OF THE MODIFICATION.
ADDITIONAL TESTING AND INSPECTIONS:			
X OR NA			
CONSTRUCTION			
X	FOUNDATION INSPECTIONS	CED-SOW-10144	A VISUAL OBSERVATION OF THE EXCAVATION AND REBAR SHALL BE PERFORMED BEFORE PLACING THE CONCRETE. A VISUAL OBSERVATION OF THE REBAR SHALL BE PERFORMED BEFORE PLACING THE EPOXY. A SEALED WRITTEN REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	CONCRETE COMP. STRENGTH AND SLUMP TEST	CED-SOW-10144	THE CONCRETE MIX DESIGN, SLUMP TEST, AND COMPRESSIVE STRENGTH TESTS SHALL BE PROVIDED AS PART OF THE FOUNDATION REPORT.
X	EARTHWORK	CED-SOW-10144	FOUNDATION SUB-GRADES SHALL BE INSPECTED AND APPROVED BY AN APPROVED FOUNDATION INSPECTOR AND RESULTS INCLUDED AS PART OF THE FOUNDATION REPORT.
NA	MICROPILE/ROCK ANCHOR	CED-SOW-10144	MICROPILES/ROCK ANCHORS SHALL BE INSPECTED BY THE FOUNDATION INSPECTION VENDOR AND SHALL BE INCLUDED AS PART OF THE FOUNDATION INSPECTION REPORT, ADDITIONAL TESTING AND/OR INSPECTION REQUIREMENTS ARE NOTED IN THESE CONTRACT DOCUMENTS.
NA	POST-INSTALLED ANCHOR ROD VERIFICATION	CED-SOW-10007	POST INSTALLED ANCHOR ROD VERIFICATION SHALL BE PERFORMED IN ACCORDANCE WITH CROWN REQUIREMENTS AND A REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	BASE PLATE GROUT VERIFICATION	ENG-STD-10323	THE GENERAL CONTRACTOR SHALL PROVIDE DOCUMENTATION TO THE MI INSPECTOR THAT CERTIFIES THAT THE GROUT WAS REMOVED AND/OR INSTALLED IN ACCORDANCE WITH CROWN REQUIREMENTS FOR INCLUSION IN THE MI REPORT.
NA	FIELD CERTIFIED WELD INSPECTION	CED-SOW-10066 CED-STD-10069	A CROWN APPROVED CERTIFIED WELD INSPECTOR SHALL INSPECT AND TEST FIELD WELDS, FOLLOWING ALL PROCEDURES SPECIFIED IN CROWN STANDARD DOCUMENTS APPLICABLE TO WELD INSPECTIONS. A REPORT SHALL BE PROVIDED. NDE OF FIELD WELDS SHALL BE PERFORMED AS REQUIRED BY CROWN STANDARDS AND CONTRACT DOCUMENTS. THE NDE REPORT SHALL BE INCLUDED IN THE CWI REPORT.
NA	ON-SITE COLD GALVANIZING VERIFICATION	ENG-STD-10149	THE GENERAL CONTRACTOR SHALL PROVIDE WRITTEN AND PHOTOGRAPHIC DOCUMENTATION TO THE MI INSPECTOR VERIFYING THAT ANY ON-SITE COLD GALVANIZING WAS APPLIED PER MANUFACTURER SPECIFICATIONS AND APPLICABLE STANDARDS.
NA	TENSION TWIST AND PLUMB	CED-PRC-10182 CED-STD-10261	THE GENERAL CONTRACTOR SHALL PROVIDE A REPORT IN ACCORDANCE WITH APPLICABLE STANDARDS DOCUMENTING TENSION TWIST AND PLUMB.
X	GC AS-BUILT DRAWINGS	CED-SOW-10007	THE GENERAL CONTRACTOR SHALL SUBMIT A LEGIBLE COPY OF THE ORIGINAL DESIGN DRAWINGS EITHER STATING "INSTALLED AS DESIGNED" OR NOTING ANY CHANGES THAT WERE REQUIRED AND APPROVED BY THE ENGINEER OF RECORD. EOR/RFI FORMS APPROVING ALL CHANGES SHALL BE SUBMITTED.
ADDITIONAL TESTING AND INSPECTIONS:			
X OR NA			
POST-CONSTRUCTION			
X	CONSTRUCTION COMPLIANCE LETTER	CED-SOW-10007	A LETTER FROM THE GENERAL CONTRACTOR STATING THAT THE WORKMANSHIP WAS PERFORMED IN ACCORDANCE WITH INDUSTRY STANDARDS AND THESE CONTRACT DRAWINGS, INCLUDING LISTING ADDITIONAL PARTIES TO THE MODIFICATION PROCESS.
NA	POST-INSTALLED ANCHOR ROD PULL TESTS	CED-PRC-10119	POST-INSTALLED ANCHOR RODS SHALL BE TESTED BY A CROWN APPROVED PULL TEST INSPECTOR AND A REPORT SHALL BE PROVIDED INDICATING TESTING RESULTS.
X	PHOTOGRAPHS	CED-SOW-10007	PHOTOGRAPHS SHALL BE SUBMITTED TO THE MI. PHOTOS SHALL DOCUMENT ALL PHASES OF THE CONSTRUCTION. THE PHOTOS SHALL BE ORGANIZED IN A MANNER THAT EASILY IDENTIFIES THE EXACT LOCATION OF THE PHOTO.
NA	BOLT HOLE INSTALLATION VERIFICATION REPORT	CED-SOW-10007	THE MI INSPECTOR SHALL VERIFY THE INSTALLATION AND TIGHTNESS 10% OF ALL NON PRE-TENSIONED BOLTS INSTALLED AS PART OF THE MODIFICATION. THE MI INSPECTOR SHALL LOOSEN THE NUT AND VERIFY THE BOLT HOLE SIZE AND CONDITION. THE MI REPORT SHALL CONTAIN THE COMPLETED BOLT INSTALLATION VERIFICATION REPORT, INCLUDING THE SUPPORTING PHOTOGRAPHS.
X	PUNCHLIST DEVELOPMENT AND CORRECTION DOCUMENTATION	CED-PRC-10283 CED-FRM-10285	FINAL PUNCHLIST INDICATING ALL NONCONFORMANCE(S) IDENTIFIED AND THE FINAL RESOLUTION/APPROVAL.
X	MI INSPECTOR REDLINE OR RECORD DRAWING(S)	CED-SOW-10007	THE MI INSPECTOR SHALL OBSERVE AND REPORT ANY DISCREPANCIES BETWEEN THE CONTRACTOR'S REDLINE DRAWING AND THE ACTUAL COMPLETED INSTALLATION.
ADDITIONAL TESTING AND INSPECTIONS:			
X OR NA			

THE MI CHECKLIST SHALL BE REVIEWED PRIOR TO THE START OF CONSTRUCTION. ALL PARTIES TO THE MODIFICATION SHALL UNDERSTAND CROWN REQUIREMENTS AND INSPECTION/DOCUMENTATION THAT IS APPLICABLE TO THE SCOPE OF WORK THEY ARE PERFORMING. ERRORS ON THE MI CHECKLIST SHALL BE BROUGHT TO THE ATTENTION OF THE CROWN POC AND EOR AS SOON AS POSSIBLE.

MODIFICATION INSPECTION NOTES

GENERAL

THE MI IS AN ON-SITE VISUAL AND HANDS-ON INSPECTION OF TOWER MODIFICATIONS INCLUDING A REVIEW OF CONSTRUCTION REPORTS AND ADDITIONAL PERTINENT DOCUMENTATION PROVIDED BY THE GENERAL CONTRACTOR (GC), AS WELL AS ANY INSPECTION DOCUMENTS PROVIDED BY 3RD PARTY INSPECTORS. THE MI IS TO ENSURE THE INSTALLATION WAS CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, NAMELY THE MODIFICATION DRAWINGS; IN ACCORDANCE WITH APPLICABLE CROWN STANDARDS; AND AS DESIGNED BY THE ENGINEER OF RECORD (EOR).

NO DOCUMENT, CODE OR POLICY CAN ANTICIPATE EVERY SITUATION THAT MAY ARISE. ACCORDINGLY, THIS CHECKLIST IS INTENDED TO SERVE AS A SOURCE OF GUIDING PRINCIPLES IN ESTABLISHING GUIDELINES FOR MODIFICATION INSPECTION.

THE MI IS TO CONFIRM INSTALLATION CONFIGURATION AND WORKMANSHIP ONLY AND IS NOT A REVIEW OF THE MODIFICATION DESIGN ITSELF, AND THE MI INSPECTOR DOES NOT TAKE OWNERSHIP OF THE MODIFICATION DESIGN. OWNERSHIP OF THE STRUCTURAL MODIFICATION DESIGN EFFECTIVENESS AND INTEGRITY RESIDES WITH THE EOR AT ALL TIMES. THE MI INSPECTOR SHALL INSPECT AND NOTE CONFORMANCE/NONCONFORMANCE AND PROVIDE TO THE CROWN POINT OF CONTACT (CROWN POC) FOR EVALUATION.

ALL MI'S SHALL BE CONDUCTED BY A CROWN APPROVED MI INSPECTOR, WORKING FOR A CROWN APPROVED MI VENDOR. SEE CROWN CED-LST-10173, "APPROVED MI VENDORS".

TO ENSURE THAT THE REQUIREMENTS OF THE MI ARE MET, IT IS VITAL THAT THE GENERAL CONTRACTOR (GC) AND THE MI INSPECTOR BEGIN COMMUNICATING AND COORDINATING AS SOON AS A PURCHASE ORDER (PO) IS RECEIVED. IT IS EXPECTED THAT EACH PARTY WILL BE PROACTIVE IN REACHING OUT TO THE OTHER PARTY. IF CONTACT INFORMATION IS NOT KNOWN THE GC AND/OR INSPECTOR SHALL CONTACT THE CROWN POINT OF CONTACT (POC).

REFER TO CROWN CED-SOW-10007, "MODIFICATION INSPECTION SOW", FOR FURTHER DETAILS AND REQUIREMENTS.

SERVICE LEVEL COMMITMENT

THE FOLLOWING RECOMMENDATIONS AND SUGGESTIONS ARE OFFERED TO ENHANCE THE EFFICIENCY AND EFFECTIVENESS OF DELIVERING AN MI REPORT:

- THE GC SHALL PROVIDE A MINIMUM OF 5 BUSINESS DAYS NOTICE, PREFERABLY 10, TO THE MI INSPECTOR AS TO WHEN THE SITE WILL BE READY FOR THE MI TO BE CONDUCTED.
- THE GC AND MI INSPECTOR COORDINATE CLOSELY THROUGHOUT THE ENTIRE PROJECT.
- WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE SIMULTANEOUSLY FOR ANY GUY WIRE TENSIONING OR RE-TENSIONING OPERATIONS.
- WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE DURING THE MI TO HAVE ANY MINOR DEFICIENCIES CORRECTED DURING THE INITIAL MI. THEREFORE, THE GC MAY CHOOSE TO COORDINATE THE MI CAREFULLY TO ENSURE ALL CONSTRUCTION FACILITIES ARE AT THEIR DISPOSAL WHEN THE MI INSPECTOR IS ON SITE.

REQUIRED PHOTOS

BETWEEN THE GC AND THE MI INSPECTOR THE FOLLOWING PHOTOGRAPHS, AT A MINIMUM, ARE TO BE TAKEN AND INCLUDED IN THE MI REPORT:

- PRE-CONSTRUCTION GENERAL SITE CONDITION
- PHOTOGRAPHS DURING THE REINFORCEMENT MODIFICATION CONSTRUCTION/ERECTION AND INSPECTION
  - RAW MATERIALS
  - PHOTOS OF ALL CRITICAL DETAILS
  - FOUNDATION MODIFICATIONS
  - WELD PREPARATION
  - BOLT INSTALLATION
  - FINAL INSTALLED CONDITION
  - SURFACE COATING REPAIR
- POST CONSTRUCTION PHOTOGRAPHS
  - FINAL INFIELD CONDITION

PHOTOS OF ELEVATED MODIFICATIONS TAKEN ONLY FROM THE GROUND SHALL BE CONSIDERED INADEQUATE.

THIS IS NOT A COMPLETE LIST OF REQUIRED PHOTOS, FOR A COMPLETE LIST OF PHOTOS SEE CED-SOW-10007.

NO.	DATE	DESCRIPTION	BY

REVISIONS

STATE OF CONNECTICUT
MAHAM BARIMANI
30501
LICENSED
PROFESSIONAL ENGINEER

Jun 8 2020 1:21 PM

CROWN CASTLE

SITE NAME: JOHN TOM HILL

BU NUMBER: 871584

WO NUMBER: 1853234

SITE ADDRESS:
115 BIRCH MTN. ROAD
GLASTONBURY, CT 06033
HARTFORD COUNTY, USA

ENG/QA BY: **DBS** DATE: **06/03/20**

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DFT/QA BY: **BF** DATE: **06/05/20**

APRV'D BY: **AJG** DATE: **06/05/20**

SCALE: N.T.S.

MODIFICATION INSPECTION CHECKLIST

S-2 REV 0

GENERAL NOTES

1. The General Contractor (GC) shall reference CED-STD-10159, "Tower Modification Construction Specifications", as a continuation of the following General Notes. The GC shall keep a copy of this document with the Structural Design Drawings (SDD) at all times, and shall ensure that all Contractor Personnel are aware of the information enclosed within the General Notes and CED-STD-10159.
2. The Contract Documents are the property of Crown Castle (Crown). They are provided to the GC and its Lower Tier Contractors and material suppliers for the limited purpose of use in completing the Work for this Site, and shall be kept in strict confidence and not disclosed to any third parties. The Contract Documents shall not be used for any other purpose whatsoever without the prior written consent of Crown.
3. Detail drawings, including notes and tables, shall govern over general notes and typical details. Contact the Crown Point of Contact (POC) and Engineer of Record (EOR) for clarification as needed.
4. Do not scale drawings.
5. Any Work performed without a prefabrication mapping is done at the risk of the GC and/or fabricator. All dimensions of existing structural elements are assumed based on the available documentation and are preliminary until field-verified by the GC, unless noted otherwise (UNO). Where discrepancies are found, GC shall contact the Crown POC and EOR through RFI.
6. For this analysis and modification, the tower has been assumed to be in good condition without any structural defects, UNO. If the GC discovers any indication of an existing structural defect, contact the Crown POC and EOR immediately.
7. All construction means and methods, including but not limited to erection plans, rigging plans, climbing plans, and rescue plans, shall be the responsibility of the GC responsible for the execution of the Work contained herein, and shall meet ANSI/ASSE A10.48 (latest edition); federal, state, and local regulations; and any applicable industry consensus standards related to the construction activities being performed. All rigging plans shall adhere to ANSI/ASSE A10.48 (latest edition) and Crown standard CED-STD-10253, "Rigging Program", including the required involvement of a qualified engineer for class IV construction to certify the supporting structure(s) in accordance with the ANSI/TIA-322 (latest edition).
8. The structural integrity of the modification design extends to the complete condition only. The GC must be cognizant that the removal of any structural component of an existing tower has the potential to cause the partial or complete collapse of the structure. All necessary precautions must be taken to ensure structural integrity, including, but not limited to, engineering assessment of construction stresses with installation maximum wind speed and/or temporary bracing and shoring.
9. Aerial and underground utilities and facilities may or may not be shown on the drawings. The GC shall take every precaution to preserve and protect these items, which may include aerial or underground power lines, telephone lines, water lines, sewer lines, cable television facilities, pipelines, structures and other public and private improvements within or adjacent to the Work area. The responsibility for determining the actual on-site location of these items shall rest exclusively with the GC.
10. All manufacturer's hardware assembly instructions shall be followed, UNO. Conflicting notes shall be brought to the attention of the EOR and the Crown POC.
11. The GC shall fabricate all required items per the materials specified below, UNO on the detail drawing sheets. If the GC finds for any component that the materials have not been clearly specified, the GC shall submit an RFI to the EOR to confirm the required material.

    All structural elements shall be new and shall conform to the following requirements, UNO:

    Monopoles:
    - Structural shapes and plates: ASTM A572 Grade 65 (FY = 65 KSI)
    - Welding electrodes, SMAW: E80XX
    - Welding electrodes, FCAW: E8XT-XX
    - Welding electrodes, GMAW: ER80S-X

    Self-Support and Guyed Towers:
    - Structural shapes and plates: ASTM A572 Grade 50 (FY = 50 KSI)
    - Welding electrodes, SMAW: E70XX
    - Welding electrodes, FCAW: E7XT-XX
    - Welding electrodes, GMAW: ER70S-X

    All tower types:
    - Steel angle: ASTM A572 Grade 50 (FY = 50 KSI)
    - Solid rod: ASTM A36 (FY = 36 KSI)
    - Pipe/tube (round): ASTM A500 Grade C (FY = 46 KSI)
    - Pipe/tube (square): ASTM A500 Grade C (FY = 50 KSI)
    - Bolts: ASTM F3125 Grade A325 Type 1
    - U-bolts: ASTM A307 Grade A, or SAE J429 Grade 2
    - Nuts: ASTM A563 Grade DH
    - Washers: ASTM F436 Type 1
    - Guy Wires: ASTM A475 Grade EHS
    - Bridge Strand: ASTM A586 Grade 1
12. After fabrication, hot-dip galvanize all steel items, UNO. Galvanize per ASTM A123, ASTM A153/A153M, or ASTM A653 G90, as applicable. ASTM A490 bolts shall not be hot-dip galvanized, but shall instead be coated with Magni 565 or EOR approved equivalent, per ASTM F2833.
13. Contractor Personnel shall not drill holes in any new or existing structural members, other than those drilled holes shown on structural drawings, without the approval of the EOR.
14. For a list of Crown-approved cold galvanizing compounds, refer to ENG-STD-10149, “Tower Protective Coatings Guidelines”.
15. All exposed structural steel as the result of this scope of Work including welds (after final inspection of the weld by the CWI), field drilled holes, and shaft interiors (where accessible), shall be cleaned and two (2) coats cold galvanizing shall be applied by brush in accordance with ENG-STD-10149, “Tower Protective Coatings Guidelines”. Photo documentation is required to be submitted to the MI Inspector.
16. If removal of existing modifications is required per the modification scope, the GC shall clean and cold galvanize any existing empty bolt holes, UNO. If additional unexpected, oversized, or slotted holes are found, the GC shall contact the EOR and Crown POC for guidance prior to proceeding with the modifications.
17. All Work involving base plate grout scope items or resulting in disturbance of base plate grout shall reference ENG-STD-10323, "Base Plate Grout", and shall follow any Base Plate Grout Removal Notes contained herein.
18. All tower grounding affected by the Work shall be repaired or replaced in accordance with OPS-STD-10090, "Tower Grounding", and OPS-BUL-10133, "Grounding Repair Recommendation".
19. If scope of modification requires removal or covering of tower ID tag, the tag must be replaced.
20. Any hardware removed from the existing tower shall be replaced with new hardware of equal size and quality, UNO. No existing fasteners shall be reused.
21. All joints using ASTM A325 or A490 bolts, U-bolts, V-bolts, and threaded rods shall be snug tightened, UNO.
22. A nut locking device shall be installed on all proposed and/or replaced snug tightened ASTM A325 or A490 bolts, U-bolts, V-bolts, and threaded rods.
23. All joints are bearing type connections UNO. If no bolt length is given in the Bill of Materials, the connection may include threads in the shear planes, and the GC is responsible for sizing the length of the bolt.
24. Blind bolts shall be installed per the installation specifications on the corresponding Approved Fastener sheets contained in CED-CAT-10300, "Monopole Standard Drawings and Approved Reinforcement Components".
25. If ASTM A325 or A490 bolts, and/or threaded rods are specified to be pre-tensioned, these shall be installed and tightened to the pretensioned condition according to the requirements of the RCSC Specification for Structural Joints Using ASTM High Strength Bolts.
26. All proposed and/or replaced bolts shall be of sufficient length such that the end of the bolt be at least flush with the face of the nut. It is not permitted for the bolt end to be below the face of the nut after tightening is completed.

NO.	DATE	DESCRIPTION	BY

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STATE OF CONNECTICUT
MAHAM BARIMANI
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SCALE: N.T.S.

NOTES

S-3 REV 0

CONCRETE NOTES

1. All concrete work shall be in accordance with ACI 301 specifications for structural concrete (latest edition). All concrete shall have a minimum 28 day compressive strength of 4000 PSI and air entrained at 6% ± 1.5%.
2. Prepare and submit batch tickets for each type and strength of concrete. All concrete parameters (strength, slump, water content, aggregates, additives, etc.) shall meet the requirements of the concrete design mix engineer.
3. For field mixing, prepare and submit mix designs for pre-approval for each type and strength of concrete in accordance with ACI 211, “Proportioning Concrete Mixtures”, and ACI 301, “Specifications for Structural Concrete”.
4. All concrete shall be normal weight concrete.
5. Slump test shall be made in accordance with ASTM C143. The allowable concrete slump shall be 4 inches unless super-plasticizers are used.
6. The engineer shall pre-approve superplasticizer use.
7. Cement shall conform to ASTM C150 Type II. Fine aggregate shall conform to ASTM C33. Course aggregate shall be gravel or crushed stone conforming to ASTM C33. maximum aggregate size shall be 3/4”.
8. Water shall be clean and free from oils, acids, alkalies, and organic materials. No additional water shall be added to the concrete at the job site.
9. Do not use chloride-containing admixtures.
10. Air entraining admixtures shall conform to ASTM C260.
11. Hot weather concrete placement shall comply with ACI 305R. Cold weather concrete placement shall comply with ACI 306.1.
12. Concrete shall be placed within 24 hours of excavation inspections. The contractor shall be responsible for protecting exposed excavations prior to concrete placement.
13. Place concrete by using a chute or hopper device such that concrete shall not free fall from a height greater than 5 feet. Deposit concrete within the center of the steel reinforcing cage to prevent segregation.
14. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 309R. Do not use vibrators to transport concrete.
15. Concrete shall be cured in accordance with ACI 301. When applicable, curing compounds shall be water clear, styrene acrylate type with a minimum solids content of 30%. Application shall be in conformance with manufacturer's instructions.

CONCRETE REINFORCING STEEL NOTES

1. All reinforcing steel shall be deformed billet steel conforming to ASTM A615, Grade 60 unless noted otherwise.
2. Reinforcing steel shall be detailed, fabricated, bent and placed in accordance with the CRSI Manual of Standard Practice and the ACI 315 (latest edition).
3. Welding of reinforcing and embedments is prohibited.
4. All reinforcing steel shall have a minimum three (3) inches concrete coverage unless noted otherwise.
5. Spacing devices shall be used as required to maintain the side and bottom clearance between the steel reinforcement and excavation.

NO.	DATE	DESCRIPTION	BY

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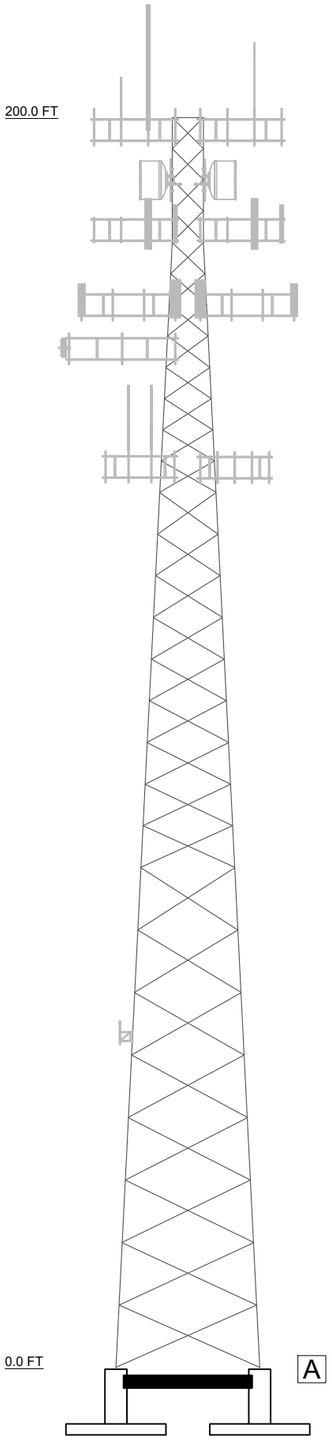
NOTES

S-4

REV 0



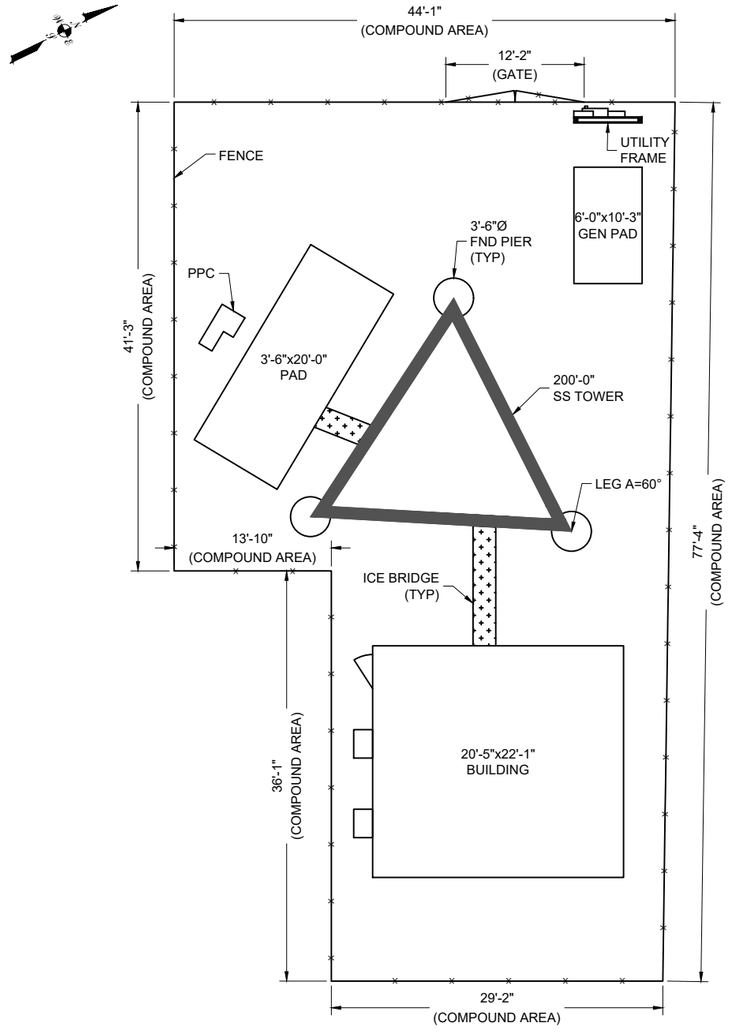
TOWER ELEVATION

TOWER MODIFICATION SCHEDULE

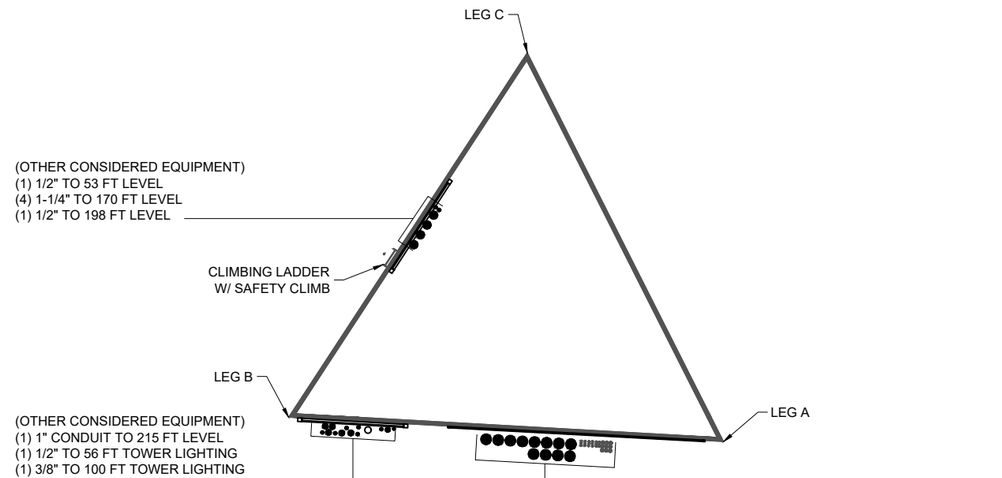
	ELEVATION (FT)	TOWER MODIFICATION DESCRIPTION	REFERENCE SHEET
A	0.0	**ADD NEW CONCRETE GRADE BEAM BETWEEN EACH FOUNDATION PIER**	S-6

PRIOR TO FABRICATION AND INSTALLATION, CONTRACTOR SHALL FIELD VERIFY ALL LENGTHS AND QUANTITIES GIVEN. LENGTH AND QUANTITIES PROVIDED ARE FOR QUOTING PURPOSES ONLY, AND SHALL NOT BE USED FOR FABRICATION.

FOR PARTS NOT DETAILED WITHIN THE DRAWING AND STARTING WITH "CCI-", SEE THE FOLLOWING CATALOG FOR DETAILS: CED-CAT-10301, GUYED TOWER STANDARD DRAWINGS AND APPROVED REINFORCEMENT COMPONENTS / CED-CAT-10302, SELF SUPPORT TOWER STANDARD DRAWINGS AND APPROVED REINFORCEMENT COMPONENTS



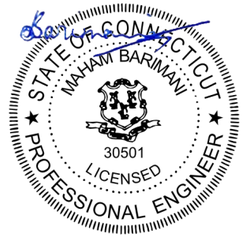
SITE PLAN DRAWING



BASE LEVEL DRAWING

NO.	DATE	DESCRIPTION	BY

REVISIONS



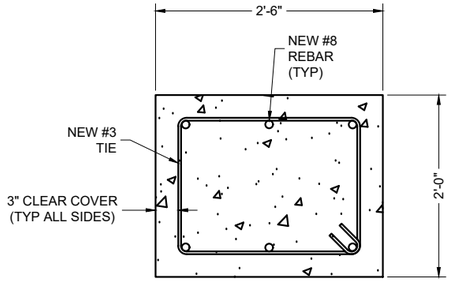
Jun 8 2020 1:21 PM

SITE NAME: JOHN TOM HILL
BU NUMBER: 871584
WO NUMBER: 1853234
SITE ADDRESS:
115 BIRCH MTN. ROAD
GLASTONBURY, CT 06033
HARTFORD COUNTY, USA

ENG/QA BY: **DBS** DATE: **06/03/20**
DFT BY: **TE** DATE: **06/04/20**
DFT/QA BY: **BF** DATE: **06/05/20**
APRV'D BY: **AJG** DATE: **06/05/20**
SCALE: N.T.S.

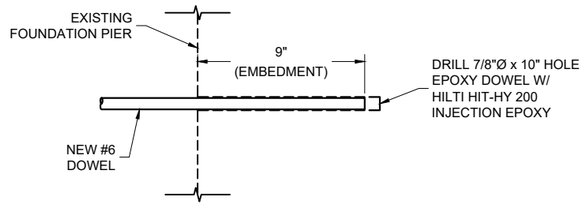
TOWER MODIFICATION SCHEDULE

S-5 REV 0



A-A
S-6

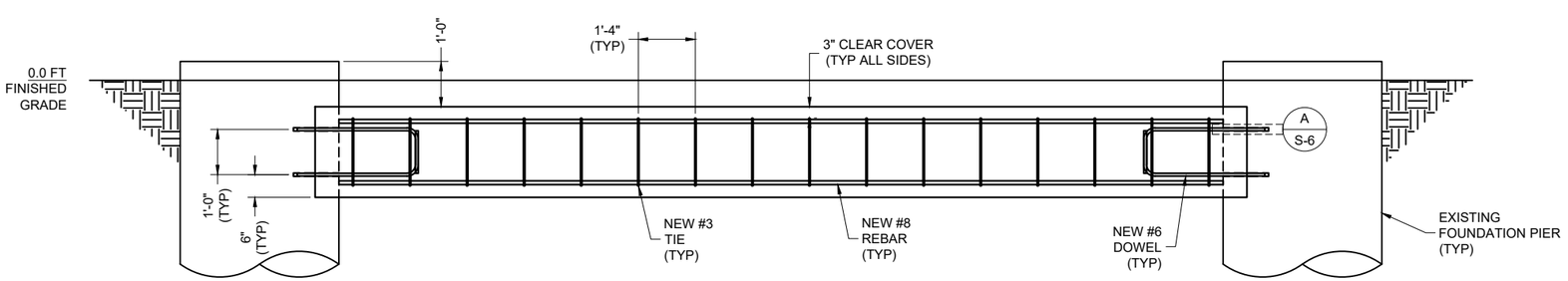
CONCRETE GRADE BEAM



A
S-6

DOWEL DETAIL

FOUNDATION PLAN VIEW



FOUNDATION ELEVATION VIEW

NOTES:

1. TAKE ALL MEASUREMENTS NECESSARY TO AVOID DAMAGING EXISTING REINFORCING BARS DURING DRILLING OPERATIONS. MINOR ADJUSTMENT TO PROPOSED LOCATION OF NEW DOWELS MAY BE REQUIRED.
2. CORED HOLES SHALL BE MECHANICALLY ROUGHENED USING A CARBIDE HOLE ROUGHENER OR EQUIVALENT. BRUSHING WITH A NYLON OR WIRE BRUSH SHALL BE USED IN THE PROCESS OF HOLE CLEANING, BUT DOES NOT SATISFY THE HOLE ROUGHENING REQUIREMENT.
3. FOLLOW EPOXY MANUFACTURER'S RECOMMENDATIONS FOR HOLE CLEANING, HANDLING OF EPOXY, AS WELL AS ALL INSTALLATION INSTRUCTIONS AND REQUIREMENTS.
4. ALL HOLES SHALL BE DRY PRIOR TO PLACING EPOXY.
5. EXISTING FOUNDATION SHOULD BE CLEANED OF GREASE, DIRT & LOOSE DEBRIS PRIOR TO PLACING NEW CONCRETE. APPLY AN EPOXY BONDING AGENT TO ALL SURFACES BETWEEN OLD & NEW CONCRETE. SEAL ALL EXPOSED JOINTS BETWEEN OLD & NEW CONCRETE FOLLOWING CONSTRUCTION.
6. CONCRETE SHALL BE ALLOWED TO CURE FOR A MINIMUM OF 24 HOURS BEFORE BACKFILLING & COMPACTION WITH HANDHELD VIBRATORY EQUIPMENT. FOR LARGER VIBRATION DEVICES, A MINIMUM OF 3 DAYS OF CONCRETE CURE TIME IS REQUIRED.
7. BACKFILL IS TO BE MADE IN LIFTS NOT TO EXCEED 8 INCHES. EACH LIFT IS TO BE COMPACTED TO A MINIMUM OF 95 PERCENT OF MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D-698 SPECIFICATIONS. EXCAVATED AREA TO HAVE A MINIMUM 6" MOUND ABOVE NATURAL GROUND SURFACE WHEN COMPLETED. NO FROZEN MATERIAL, LARGE ROCKS OR ORGANIC MATERIAL IS TO BE USED FOR BACKFILL.
8. EXISTING WAVEGUIDE POSTS & GROUND LEADS MAY REQUIRE TEMPORARY SHORING (OR RELOCATION - FIELD VERIFY) PRIOR TO EXCAVATION.
9. CONTRACTOR SHALL ALTERNATE HOOK LOCATION AND DRILLED HOLE LOCATIONS ON ADJACENT DOWEL LAYERS TO AVOID INTERFERENCE ISSUES.
10. CONTRACTOR TO DETERMINE CUBIC YARDS OF CONCRETE REQUIRED.
11. REFERENCE S-4 FOR ADDITIONAL CONCRETE AND REBAR NOTES.

NO.	DATE	DESCRIPTION	BY

REVISIONS

STATE OF CONNECTICUT
MAHAWI BARIMANI
30501
LICENSED
PROFESSIONAL ENGINEER

Jun 8 2020 1:21 PM

SITE NAME: JOHN TOM HILL

BU NUMBER: 871584

WO NUMBER: 1853234

SITE ADDRESS:
115 BIRCH MTN. ROAD
GLASTONBURY, CT 06033
HARTFORD COUNTY, USA

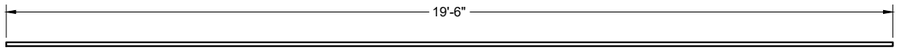
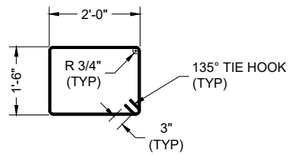
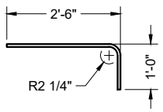
ENG/QA BY: **DBS**	DATE: **06/03/20**	
DFT BY: **TE**	DATE: **06/04/20**	
DFT/QA BY: **BF**	DATE: **06/05/20**	
APRV'D BY: **AJG**	DATE: **06/05/20**	
SCALE: N.T.S.		

DETAILS

S-6

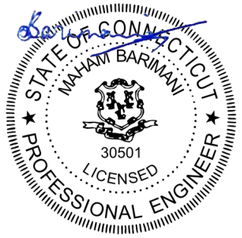
REV
0

REBAR SCHEDULE

BAR SIZE	TYPE	BENDING DIAGRAM	QUANTITY REQUIRED
#8	STRAIGHT		18
#3	TIES		48
#6	DOWELS		48

NO.	DATE	DESCRIPTION	BY

REVISIONS



Jun 8 2020 1:21 PM

CROWN CASTLE

SITE NAME: JOHN TOM HILL

BU NUMBER: 871584

WO NUMBER: 1853234

SITE ADDRESS:
115 BIRCH MTN. ROAD
GLASTONBURY, CT 06033
HARTFORD COUNTY, USA

ENG/QA BY: **DBS**	DATE: **06/03/20**
DFT BY: **TE**	DATE: **06/04/20**
DFT/QA BY: **BF**	DATE: **06/05/20**
APRV'D BY: **AJG**	DATE: **06/05/20**
SCALE: N.T.S.	

REBAR SCHEDULE

S-7

REV 0

Exhibit C

Mount Analysis

DRW NX LLC
(514) 320-2056

GPD Engineering and Architecture Professional Corporation
Matt Dickson
520 South Main Street, Suite 2531
Akron, OH 44311
(469) 573-4308
mdickson@gpdgroup.com

GPD# US.CT.CCI.871584.01
June 19, 2020

MOUNT ANALYSIS REPORT

SITE DESIGNATION:	**Site Name #:**	**US.CT.CCI.871584**
ANALYSIS CRITERIA:	**Codes:**	**TIA-222-G, 2015 IBC, 2018 Connecticut Building Code, & AISC-360** **125 mph (ultimate 3-second gust) w/ 0" ice** **97 mph (nominal 3-second gust) w/ 0" ice** **50 mph (3-second gust) w/ 1" ice**
SITE DATA:		**115 Birch Mtn. Road, Glastonbury, CT 06033, Hartford County** **Latitude 41° 42' 32.24" N, Longitude 72° 28' 24.41" W** **(1) Commscope PM-SC4-96 Universal Pipe Mount** **(1) Commscope TF-ML4-8 Face Mount**

Dear Sacha Ferrari-Apollon,

GPD is pleased to submit this Mount Analysis Report to determine the structural integrity of the aforementioned mount. The purpose of the analysis is to determine the suitability of the mount with the proposed loading configuration detailed in the analysis report.

Analysis Results

Mount Stress Level with Proposed Equipment:	71.0%	Pass

We at GPD appreciate the opportunity of providing our continuing professional services to you and DRW NX LLC. If you have any questions or need further assistance on this or any other projects please do not hesitate to call.

Respectfully submitted,

Christopher J. Scheks, P.E.
Connecticut #: 0030026

6/19/2020

SUMMARY & RESULTS

The purpose of this analysis was to verify whether the proposed mounts are capable of carrying the proposed loading configuration as specified by DRW NX LLC.

This analysis utilizes an ultimate 3-second gust wind speed of 125 mph (converted to an equivalent 97 mph nominal 3-second gust wind speed per Section 1609.3.1 for use with TIA-222 G) as required by the 2015 International Building Code & 2018 Connecticut Building Code. Applicable Standard references and design criteria are listed in Appendices A & B.

The mount was verified to be capable of withstanding a 500 lb live load concurrent with 30-mph wind speeds.

MOUNT SUMMARY AND RESULTS

Member	Capacity	Results
Mount	71.0%	Pass
Mount to Tower Connection	36.3%	Pass

RECOMMENDATIONS

The mount has sufficient capacity to carry the proposed loading configuration. No modifications are required at this time.

ANALYSIS METHOD

RISA-3D (Version 17.0.2), a commercially available analysis software package, and hand calculations were used to create a three-dimensional model of the mount and calculate member stresses for the proposed loading configuration. Selected calculations from this analysis are included in Appendices B & C. The following table details the information provided to complete this structural analysis. This analysis is solely based on this information.

DOCUMENTS PROVIDED

Document	Remarks	Source
Construction Drawings	GPD Project #: 2020796.01.US.CT.CCI.871584.01, dated 6/15/2020	DRW NX LLC
Mount Design	Commscope Drawing #: TF-M Series, dated 1/23/2009	Commscope
Mount Design	Commscope Drawing #: PM-SC Series, dated 4/20/2010	Commscope
Mount Mapping	Not Provided	N/A
Previous Mount Analysis	Not Provided	N/A
Mount Modification Drawings	Not Provided	N/A
Tower Design	Not Provided	N/A
Previous Tower Analysis	Not Provided	N/A

ASSUMPTIONS

This mount structural analysis is based on the theoretical capacity of the members and is not a condition assessment of the mount. This analysis is from information supplied, and therefore, its results are based on and are as accurate as that supplied data. GPD has made no independent determination, nor is it required to, of its accuracy. The following assumptions were made for this structural analysis.

1. The mount member sizes and shapes are considered accurate as supplied. The material grade is as per data supplied and/or as assumed based on experience with similar mounts.
2. The antenna configuration is as supplied and/or as modeled in the analysis. When information was not provided, the configuration was modeled based upon past experience with similar loading.
3. Some assumptions are made regarding antennas and mount sizes and their projected areas based on best interpretation of data supplied and of best knowledge of antenna type and industry practice.
4. The mount has been properly maintained in accordance with TIA Standards and/or with manufacturer's specifications.
5. All welds and connections are assumed to develop at least the member capacity unless determined otherwise and explicitly stated in this report.
6. The threaded rods at the mount to tower connection are considered to be sufficiently tightened to resist rotation.

If any of these assumptions are not valid or have been made in error, this analysis may be affected, and GPD should be allowed to review any new information to determine its effect on the structural integrity of the mount.

DISCLAIMER OF WARRANTIES

GPD has not performed a site visit to the mount to verify the member sizes and antenna/coax loading. If the existing conditions are not as represented on the mount elevation contained in this report, we should be contacted immediately to evaluate the significance of the discrepancy. This is not a condition assessment of the mount. This report does not replace a full mount inspection. The mount is assumed to have been properly fabricated, maintained, in good condition, twist free, and plumb.

The engineering services rendered by GPD in connection with this Mount Analysis are limited to a computer analysis of the mount structure and theoretical capacity of its main structural members. All mount components have been assumed to only resist dead loads when no other loads are applied. No allowance was made for any damaged, bent, missing, loose, or rusted members (above and below ground). No allowance was made for loose bolts or cracked welds.

This analysis is limited to the designated maximum wind and seismic conditions per the governing mount standards and code. Wind forces resulting in tower vibrations near the structure's resonant frequencies were not considered in this analysis and are outside the scope of this analysis. Lateral loading from any dynamic response was not evaluated under a time-domain based fatigue analysis.

GPD does not analyze the fabrication of the structure (including welding). It is not possible to have all the very detailed information needed to perform a thorough analysis of every structural sub-component and connection of an existing mount. GPD provides a limited scope of service in that we cannot verify the adequacy of every weld, plate connection detail, etc. The purpose of this report is to assess the feasibility of adding appurtenances usually accompanied by transmission lines to the structure.

It is the owner's responsibility to determine the amount of ice accumulation in excess of the specified code recommended amount, if any, that should be considered in the structural analysis.

The attached sketches are a schematic representation of the analyzed mount. If any material is fabricated from these sketches, the contractor shall be responsible for field verifying the existing conditions, proper fit, and clearance in the field. Any mentions of structural modifications are reasonable estimates and should not be used as a precise construction document. Precise modification drawings are obtainable from GPD, but are beyond the scope of this report.

Towers are designed to carry gravity, wind, and ice loads. All members, legs, diagonals, struts, and redundant members provide structural stability to the tower with little redundancy. Absence or removal of a member can trigger catastrophic failure unless a substitute is provided before any removal. Legs carry axial loads and derive their strength from shorter unbraced lengths by the presence of redundant members and their connection to the diagonals with bolts or welds. If the bolts or welds are removed without providing any substitute to the frame, the leg is subjected to a higher unbraced length that immediately reduces its load carrying capacity. If a diagonal is also removed in addition to the connection, the unbraced length of the leg is greatly increased, jeopardizing its load carrying capacity. Failure of one leg can result in a tower collapse because there is no redundancy. Redundant members and diagonals are critical to the stability of the tower.

GPD makes no warranties, expressed and/or implied, in connection with this report and disclaims any liability arising from material, fabrication, and erection of this mount. GPD will not be responsible whatsoever for, or on account of, consequential or incidental damages sustained by any person, firm, or organization as a result of any data or conclusions contained in this report. The maximum liability of GPD pursuant to this report will be limited to the total fee received for preparation of this report.

APPENDIX A

Mount Analysis Summary Form

Mount Analysis Summary Form

General Info

Site Name	US.CT.CCI.871584
Date of Analysis	6/19/2020
Company Performing Analysis	GPD

The information contained in this summary report is not to be used independently from the PE stamped mount analysis.

Structure Info	Description	Date
Tower Type (G, SST, MP)	SST	
Tower Height (top of steel AGL)	200'	
Mount Manufacturer	Commscope	
Mount Model	PM-SC4-63	
Mount Design	Commscope Drawing #: PM-SC Series	4/20/2010
Mount Mapping	n/a	
Previous Mount Analysis	n/a	
Mount Modification Design	n/a	
Tower Design	n/a	
Previous Tower Analysis	n/a	
Mount Design	Commscope Drawing #: TF-M Series	1/23/2009

Design Parameters

Design Code Used	TIA-222-G, 2015 IBC, 2018 Connecticut Building Code, & AISC-360
Location of Tower (County, State)	Hartford, CT
Wind Speed (mph)	97 (nominal 3-second gust)
Ice Thickness (in)	1
Risk Category (I, II, III)	II
Exposure Category (B, C, D)	C
Topographic Category (1 to 5)	1

Analysis Results (% Maximum Usage)

Proposed Condition	
Mount (%)	71.0%
Mount to Tower Connection (%)	36.3%

Steel Yield Strength (ksi)

Pipes	35
Solid Round	36
Bolts	A325

Note: Steel grades have been assumed based upon experience with similar mounts.

The mount was verified to be capable of withstanding a 500 lb live load concurrent with 30-mph wind speeds.

Proposed Configuration

Antenna								Mount		
Antenna Owner	Mount Height (ft)	Antenna CL (ft)	Quantity	Type	Manufacturer	Model	Azimuth	Quantity	Manufacturer	Type
DRW NX	190	190	3	Dish	Commscope	USX6-6W-6GR	53/232/250	1	Commscope	PM-SC4-96 Universal Pipe Mount
DRW NX	190	190	6	ODU	SAF	MXM MK2		1	Commscope	TF-ML4-8 Face Mount

APPENDIX B

Wind Calculations and RISA-3D Output File

TIA-222-G: Mount Analysis Wind Loading
US.CT.CCI.871584 - US.CT.CCI.871584
US.CT.CCI.871584.01

Structure Information		
Structure Type:	Self Support	
Structure Height:	200	ft
z (Mount Centerline) =	190	ft
Gh (Mount Gust Effect Factor) =	1.00	
Risk Category:	II	

Code Specifications		
TIA/EIA Code:	G	
Nominal Wind Speed (No Ice) =	97	mph (3-s gust)
Nominal Wind Speed (With Ice) =	50	mph (3-s gust)
Ice Thickness	1	in
Exposure Category	C	

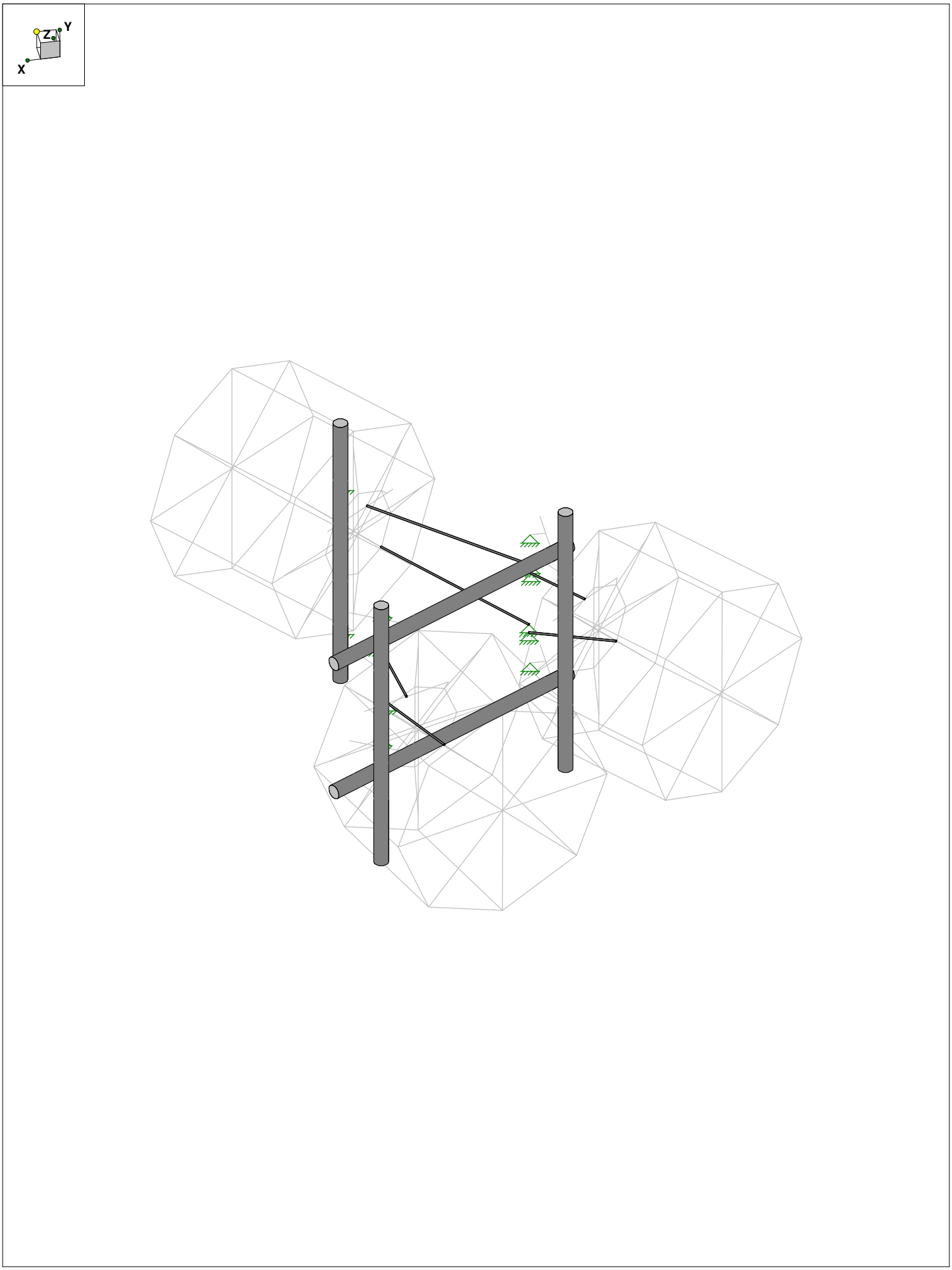
Topographic Inputs	
Topographic Feature:	N/A

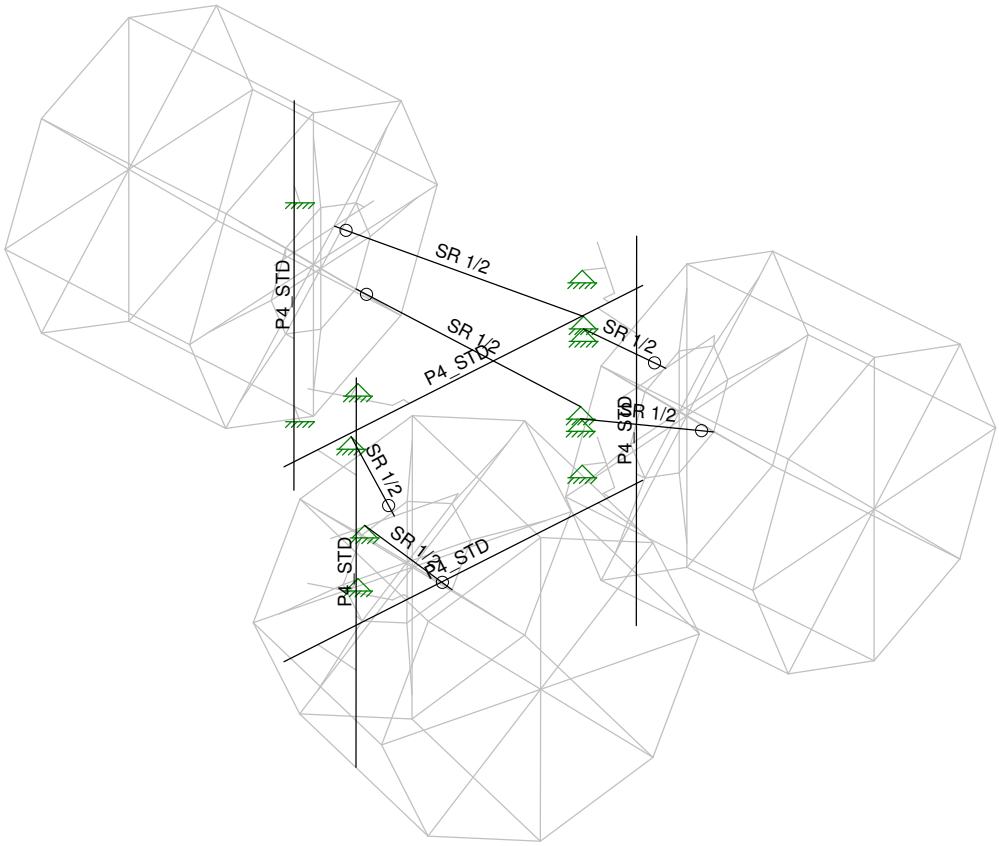
Section Sets										No Ice	Ice Output	
Mount Components	Member Type	Length (in)	Side (Longest seeing wind) (in)	Other Side (in)	Calculated Dc, for ice weight (in)	Dc, for ice weight (in)	Area Type (Round or Flat)	K_a	User's Wind Multiplier	Normal Wind Force (lb/ft)*	Normal Ice Wind Force (lb/ft)*	Ice Weight (lb/ft)*
Face Pipe	Pipe	96.000	4.5	4.5		4.50	Round	1.00	1.00	13.90	5.95	20.03
Mount Pipe	Pipe	96.000	4.5	4.5		4.50	Round	1.00	1.00	13.90	5.95	20.03
Dish Strut	Pipe	61.615	0.5	0.5		0.50	Round	1.00	1.00	1.66	3.50	8.39

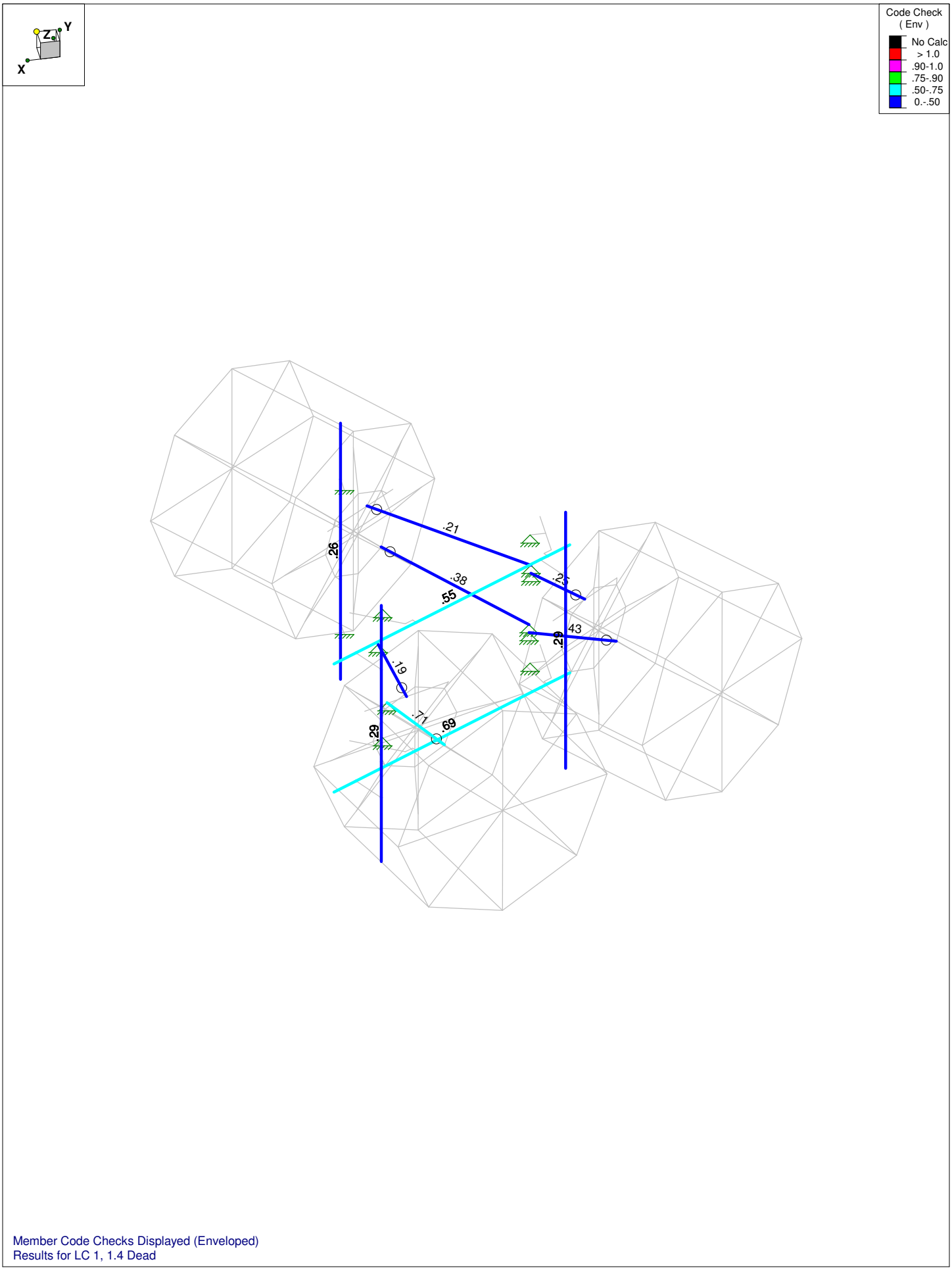
*All forces are unfactored.

Appurtenances							Shielding			No Ice		Ice Output	
Appurtenance Model	Loading Elevation (ft)	Height (in)	Front Width (in)	Side Depth (in)	Wt (lbs)	Type for Area	Front Shielding (%)	Side Shielding (%)	K_a and/or block shielding	Normal Wind Force (lbs)*	Wt (lbs) (no ice)*	Normal Wind Force (lbs) (w/ ice)*	Wt (lbs) (only ice)*
(3) USX6-6W-6GR	190	72	72	59.8	198	HP Dish	0%	0%	1.00	1182.62	198.00	357.19	711.02
(6) MXM MK2	190	17.13	11.02	5.12	17.64	Flat	0%	0%	1.00	52.15	17.64	20.57	79.40

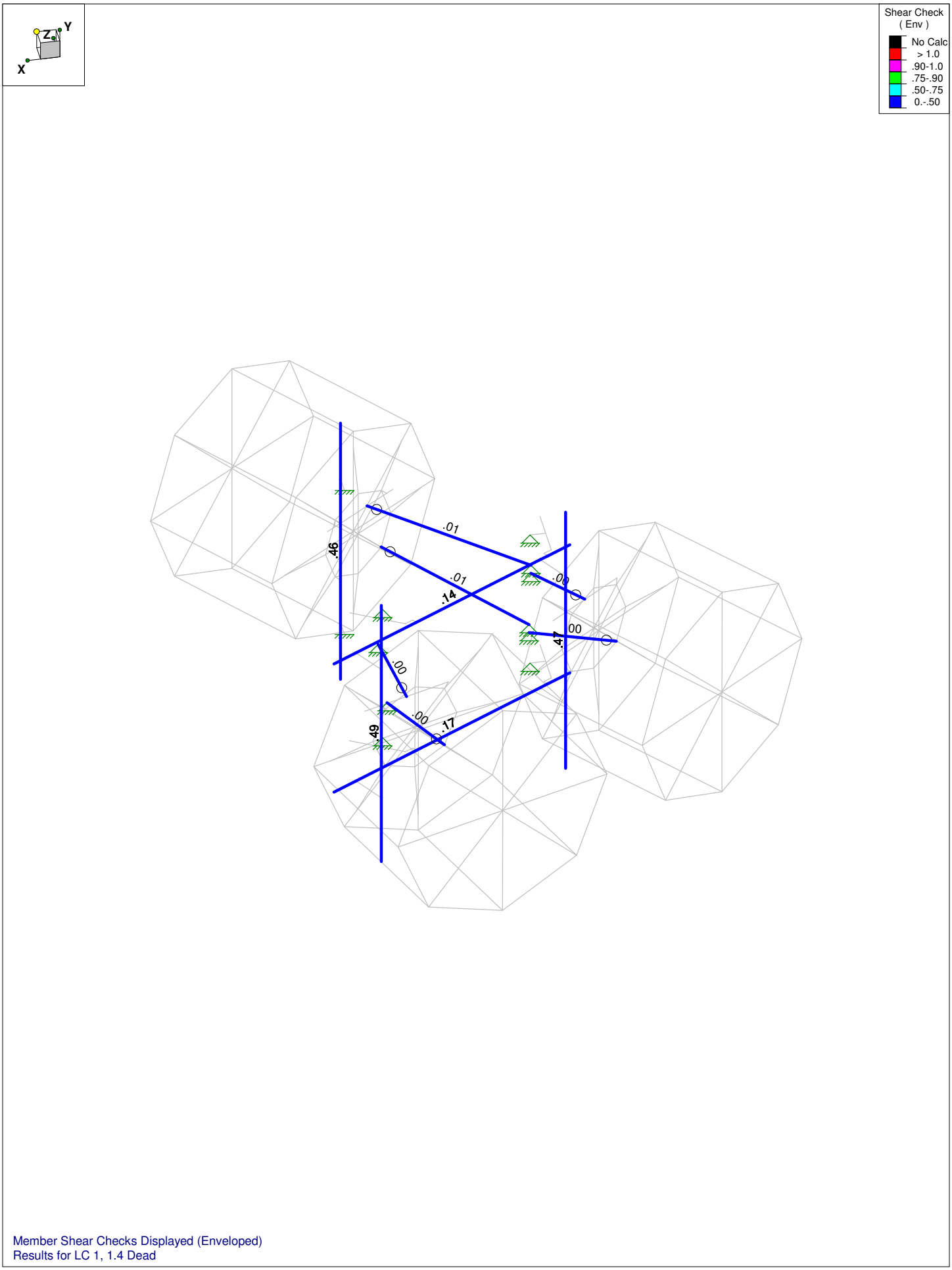
*All forces are unfactored.


Z
Y
X

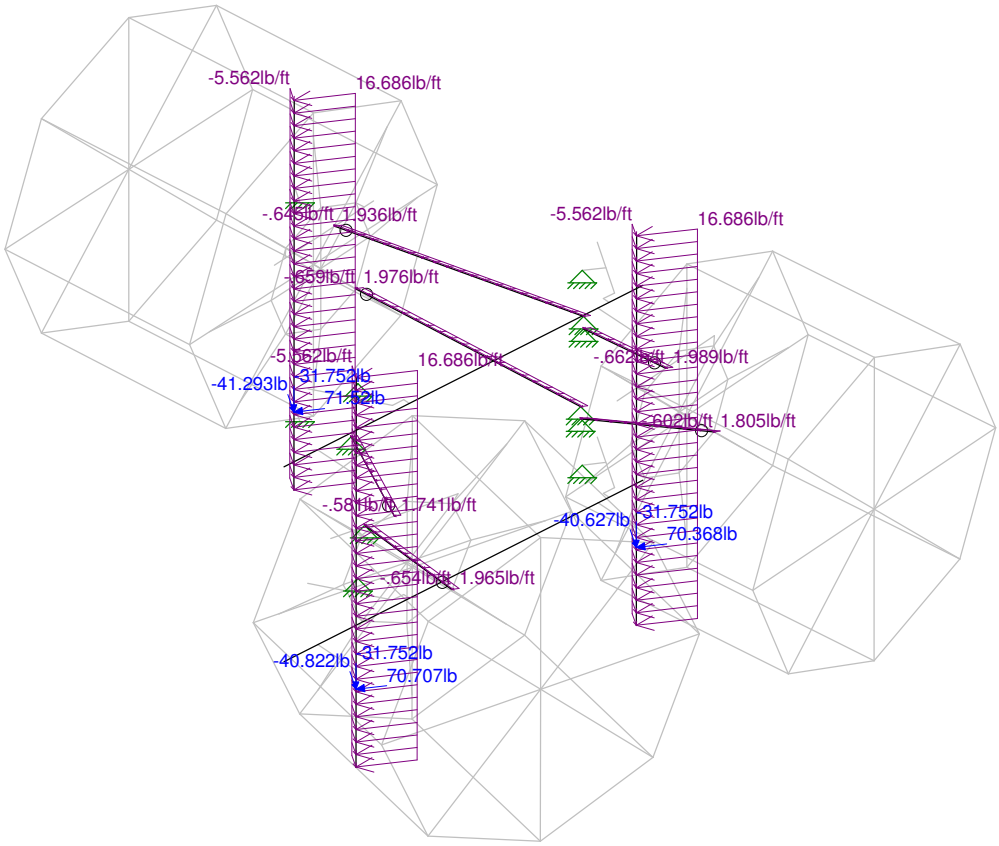

Z
Y
X
SR 1/2
SR 1/2
SR 1/2
SR 1/2
SR 1/2
SR 1/2
P4_STD
P4_STD
P4_STD
P4_STD
P4_STD



Member Code Checks Displayed (Enveloped)
Results for LC 1, 1.4 Dead



Member Shear Checks Displayed (Enveloped)
Results for LC 1, 1.4 Dead



Loads: LC 25, 0.9 Dead + 1.6 Wind @ 330° - No Ice

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1...	Density[k/...	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
2	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	65	1.1
3	A992	29000	11154	.3	.65	.49	50	1.1	65	1.1
4	A500 Gr.42	29000	11154	.3	.65	.49	42	1.4	58	1.3
5	A500 Gr.46	29000	11154	.3	.65	.49	46	1.4	58	1.3
6	A53 Gr. B	29000	11154	.3	.65	.49	35	1.5	60	1.2

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design ...	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Face Pipe	P4_STD	None	None	A53 Gr. B	Typical	3.174	7.233	7.233	14.465
2	Mount Pipe	P4_STD	None	None	A53 Gr. B	Typical	3.174	7.233	7.233	14.465
3	Dish Strut	SR 1/2	None	None	A36 Gr.36	Typical	.196	.003	.003	.006

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
1	Dead	DL		-1			12			
2	No Ice Wind 0 deg	None					12	11		
3	No Ice Wind 30 deg	None					24	22		
4	No Ice Wind 60 deg	None					24	22		
5	No Ice Wind 90 deg	None					12	11		
6	No Ice Wind 120 deg	None					24	22		
7	No Ice Wind 150 deg	None					24	18		
8	No Ice Wind 180 deg	None					12	11		
9	No Ice Wind 210 deg	None					24	22		
10	No Ice Wind 240 deg	None					24	22		
11	No Ice Wind 270 deg	None					12	11		
12	No Ice Wind 300 deg	None					24	22		
13	No Ice Wind 330 deg	None					24	18		
14	Ice Weight	None					12	11		
15	Ice Wind 0 deg	None					12	11		
16	Ice Wind 30 deg	None					24	22		
17	Ice Wind 60 deg	None					24	22		
18	Ice Wind 90 deg	None					12	11		
19	Ice Wind 120 deg	None					24	22		
20	Ice Wind 150 deg	None					24	18		
21	Ice Wind 180 deg	None					12	11		
22	Ice Wind 210 deg	None					24	22		
23	Ice Wind 240 deg	None					24	22		
24	Ice Wind 270 deg	None					12	11		
25	Ice Wind 300 deg	None					24	22		
26	Ice Wind 330 deg	None					24	18		
27	Live Load - M55	None					1			
28	Live Load - M136	None					1			
29	Live Load - M169	None					1			
30	Live Load - M1 (Start)	None					1			
31	Live Load - M1 (Midd...	None					1			
32	Live Load - M1 (End)	None					1			
33	Live Load - M78A (St...	None					1			
34	Live Load - M78A (Mi...	None					1			
35	Live Load - M78A (E...	None					1			

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1.4 Dead	Yes	Y		1	1.4	0		0		0		0		0		0		0					
2	1.2 Dead + 1.6 Wind @ 0°...	Yes	Y		1	1.2	2	1.6	0		0		0		0		0		0					
3	0.9 Dead + 1.6 Wind @ 0°...	Yes	Y		1	.9	2	1.6	0		0		0		0		0		0					
4	1.2 Dead + 1.6 Wind @ 30...	Yes	Y		1	1.2	3	1.6	0		0		0		0		0		0					
5	0.9 Dead + 1.6 Wind @ 30...	Yes	Y		1	.9	3	1.6	0		0		0		0		0		0					
6	1.2 Dead + 1.6 Wind @ 60...	Yes	Y		1	1.2	4	1.6	0		0		0		0		0		0					
7	0.9 Dead + 1.6 Wind @ 60...	Yes	Y		1	.9	4	1.6	0		0		0		0		0		0					
8	1.2 Dead + 1.6 Wind @ 90...	Yes	Y		1	1.2	5	1.6	0		0		0		0		0		0					
9	0.9 Dead + 1.6 Wind @ 90...	Yes	Y		1	.9	5	1.6	0		0		0		0		0		0					
10	1.2 Dead + 1.6 Wind @ 12...	Yes	Y		1	1.2	6	1.6	0		0		0		0		0		0					
11	0.9 Dead + 1.6 Wind @ 12...	Yes	Y		1	.9	6	1.6	0		0		0		0		0		0					
12	1.2 Dead + 1.6 Wind @ 15...	Yes	Y		1	1.2	7	1.6	0		0		0		0		0		0					
13	0.9 Dead + 1.6 Wind @ 15...	Yes	Y		1	.9	7	1.6	0		0		0		0		0		0					
14	1.2 Dead + 1.6 Wind @ 18...	Yes	Y		1	1.2	8	1.6	0		0		0		0		0		0					
15	0.9 Dead + 1.6 Wind @ 18...	Yes	Y		1	.9	8	1.6	0		0		0		0		0		0					
16	1.2 Dead + 1.6 Wind @ 21...	Yes	Y		1	1.2	9	1.6	0		0		0		0		0		0					
17	0.9 Dead + 1.6 Wind @ 21...	Yes	Y		1	.9	9	1.6	0		0		0		0		0		0					
18	1.2 Dead + 1.6 Wind @ 24...	Yes	Y		1	1.2	10	1.6	0		0		0		0		0		0					
19	0.9 Dead + 1.6 Wind @ 24...	Yes	Y		1	.9	10	1.6	0		0		0		0		0		0					
20	1.2 Dead + 1.6 Wind @ 27...	Yes	Y		1	1.2	11	1.6	0		0		0		0		0		0					
21	0.9 Dead + 1.6 Wind @ 27...	Yes	Y		1	.9	11	1.6	0		0		0		0		0		0					
22	1.2 Dead + 1.6 Wind @ 30...	Yes	Y		1	1.2	12	1.6	0		0		0		0		0		0					
23	0.9 Dead + 1.6 Wind @ 30...	Yes	Y		1	.9	12	1.6	0		0		0		0		0		0					
24	1.2 Dead + 1.6 Wind @ 33...	Yes	Y		1	1.2	13	1.6	0		0		0		0		0		0					
25	0.9 Dead + 1.6 Wind @ 33...	Yes	Y		1	.9	13	1.6	0		0		0		0		0		0					
26	1.2 Dead + 1.0 Ice Wind ...	Yes	Y		1	1.2	15	1	14	1		1	0		0		0		0					
27	1.2 Dead + 1.0 Ice Wind ...	Yes	Y		1	1.2	16	1	14	1		1	0		0		0		0					
28	1.2 Dead + 1.0 Ice Wind ...	Yes	Y		1	1.2	17	1	14	1		1	0		0		0		0					
29	1.2 Dead + 1.0 Ice Wind ...	Yes	Y		1	1.2	18	1	14	1		1	0		0		0		0					
30	1.2 Dead + 1.0 Ice Wind ...	Yes	Y		1	1.2	19	1	14	1		1	0		0		0		0					
31	1.2 Dead + 1.0 Ice Wind ...	Yes	Y		1	1.2	20	1	14	1		1	0		0		0		0					
32	1.2 Dead + 1.0 Ice Wind ...	Yes	Y		1	1.2	21	1	14	1		1	0		0		0		0					
33	1.2 Dead + 1.0 Ice Wind ...	Yes	Y		1	1.2	22	1	14	1		1	0		0		0		0					
34	1.2 Dead + 1.0 Ice Wind ...	Yes	Y		1	1.2	23	1	14	1		1	0		0		0		0					
35	1.2 Dead + 1.0 Ice Wind ...	Yes	Y		1	1.2	24	1	14	1		1	0		0		0		0					
36	1.2 Dead + 1.0 Ice Wind ...	Yes	Y		1	1.2	25	1	14	1		1	0		0		0		0					
37	1.2 Dead + 1.0 Ice Wind ...	Yes	Y		1	1.2	26	1	14	1		1	0		0		0		0					
38	1.2 Dead + 1.5 Live_M - M...	Yes	Y		1	1.2	27	1.5	2	.096	0		0		0		0		0					
39	1.2 Dead + 1.5 Live_M - M...	Yes	Y		1	1.2	27	1.5	3	.096	0		0		0		0		0					
40	1.2 Dead + 1.5 Live_M - M...	Yes	Y		1	1.2	27	1.5	4	.096	0		0		0		0		0					
41	1.2 Dead + 1.5 Live_M - M...	Yes	Y		1	1.2	27	1.5	5	.096	0		0		0		0		0					
42	1.2 Dead + 1.5 Live_M - M...	Yes	Y		1	1.2	27	1.5	6	.096	0		0		0		0		0					
43	1.2 Dead + 1.5 Live_M - M...	Yes	Y		1	1.2	27	1.5	7	.096	0		0		0		0		0					
44	1.2 Dead + 1.5 Live_M - M...	Yes	Y		1	1.2	27	1.5	8	.096	0		0		0		0		0					
45	1.2 Dead + 1.5 Live_M - M...	Yes	Y		1	1.2	27	1.5	9	.096	0		0		0		0		0					
46	1.2 Dead + 1.5 Live_M - M...	Yes	Y		1	1.2	27	1.5	10	.096	0		0		0		0		0					
47	1.2 Dead + 1.5 Live_M - M...	Yes	Y		1	1.2	27	1.5	11	.096	0		0		0		0		0					
48	1.2 Dead + 1.5 Live_M - M...	Yes	Y		1	1.2	27	1.5	12	.096	0		0		0		0		0					
49	1.2 Dead + 1.5 Live_M - M...	Yes	Y		1	1.2	27	1.5	13	.096	0		0		0		0		0					
50	1.2 Dead + 1.5 Live_M - M...	Yes	Y		1	1.2	28	1.5	2	.096	0		0		0		0		0					
51	1.2 Dead + 1.5 Live_M - M...	Yes	Y		1	1.2	28	1.5	3	.096	0		0		0		0		0					
52	1.2 Dead + 1.5 Live_M - M...	Yes	Y		1	1.2	28	1.5	4	.096	0		0		0		0		0					
53	1.2 Dead + 1.5 Live_M - M...	Yes	Y		1	1.2	28	1.5	5	.096	0		0		0		0		0					
54	1.2 Dead + 1.5 Live_M - M...	Yes	Y		1	1.2	28	1.5	6	.096	0		0		0		0		0					
55	1.2 Dead + 1.5 Live_M - M...	Yes	Y		1	1.2	28	1.5	7	.096	0		0		0		0		0					
56	1.2 Dead + 1.5 Live_M - M...	Yes	Y		1	1.2	28	1.5	8	.096	0		0		0		0		0					

Load Combinations (Continued)

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
57	1.2 Dead + 1.5 Live_M - M..	Yes	Y		1	1.2	28	1.5	9	.096	0		0		0		0		0					
58	1.2 Dead + 1.5 Live_M - M..	Yes	Y		1	1.2	28	1.5	10	.096	0		0		0		0		0					
59	1.2 Dead + 1.5 Live_M - M..	Yes	Y		1	1.2	28	1.5	11	.096	0		0		0		0		0					
60	1.2 Dead + 1.5 Live_M - M..	Yes	Y		1	1.2	28	1.5	12	.096	0		0		0		0		0					
61	1.2 Dead + 1.5 Live_M - M..	Yes	Y		1	1.2	28	1.5	13	.096	0		0		0		0		0					
62	1.2 Dead + 1.5 Live_M - M..	Yes	Y		1	1.2	29	1.5	2	.096	0		0		0		0		0					
63	1.2 Dead + 1.5 Live_M - M..	Yes	Y		1	1.2	29	1.5	3	.096	0		0		0		0		0					
64	1.2 Dead + 1.5 Live_M - M..	Yes	Y		1	1.2	29	1.5	4	.096	0		0		0		0		0					
65	1.2 Dead + 1.5 Live_M - M..	Yes	Y		1	1.2	29	1.5	5	.096	0		0		0		0		0					
66	1.2 Dead + 1.5 Live_M - M..	Yes	Y		1	1.2	29	1.5	6	.096	0		0		0		0		0					
67	1.2 Dead + 1.5 Live_M - M..	Yes	Y		1	1.2	29	1.5	7	.096	0		0		0		0		0					
68	1.2 Dead + 1.5 Live_M - M..	Yes	Y		1	1.2	29	1.5	8	.096	0		0		0		0		0					
69	1.2 Dead + 1.5 Live_M - M..	Yes	Y		1	1.2	29	1.5	9	.096	0		0		0		0		0					
70	1.2 Dead + 1.5 Live_M - M..	Yes	Y		1	1.2	29	1.5	10	.096	0		0		0		0		0					
71	1.2 Dead + 1.5 Live_M - M..	Yes	Y		1	1.2	29	1.5	11	.096	0		0		0		0		0					
72	1.2 Dead + 1.5 Live_M - M..	Yes	Y		1	1.2	29	1.5	12	.096	0		0		0		0		0					
73	1.2 Dead + 1.5 Live_M - M..	Yes	Y		1	1.2	29	1.5	13	.096	0		0		0		0		0					
74	1.2 Dead + 1.5 Live_V - M...	Yes	Y		1	1.2	30	1.5	0		0		0		0		0		0					
75	1.2 Dead + 1.5 Live_V - M...	Yes	Y		1	1.2	31	1.5	0		0		0		0		0		0					
76	1.2 Dead + 1.5 Live_V - M...	Yes	Y		1	1.2	32	1.5	0		0		0		0		0		0					
77	1.2 Dead + 1.5 Live_V - M...	Yes	Y		1	1.2	33	1.5	0		0		0		0		0		0					
78	1.2 Dead + 1.5 Live_V - M...	Yes	Y		1	1.2	34	1.5	0		0		0		0		0		0					
79	1.2 Dead + 1.5 Live_V - M...	Yes	Y		1	1.2	35	1.5	0		0		0		0		0		0					

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

	Member	Shape	Cod...	Loc...	LC	She...	Loc[in]	...	LC	phi*P...	phi*P...	phi*M...	phi*M.....		Eqn
1	M165	SR 1/2	.710	0	25	.004	28.426		26	857.7...	6361....	.053	.053	...	H1-...
2	M1	P4_STD	.686	63	2	.170	63		2	81287...	99982...	11.318	11.318	...	H1-1b
3	M78A	P4_STD	.552	63	14	.138	9		30	81287...	99982...	11.318	11.318	...	H1-1b
4	M92	SR 1/2	.434	28....	23	.004	0		35	863.8...	6361....	.053	.053	...	H1-...
5	M237A	SR 1/2	.383	61....	25	.009	61.126		37	185.4...	6361....	.053	.053	...	H1-...
6	M136	P4_STD	.294	59	2	.489	72		12	81287...	99982...	11.318	11.318	...	H1-1b
7	M55	P4_STD	.290	72	10	.472	72		10	81287...	99982...	11.318	11.318	...	H3-6
8	M169	P4_STD	.259	21	12	.463	21		12	81287...	99982...	11.318	11.318	...	H3-6
9	M93	SR 1/2	.246	21....	22	.003	0		37	1499....	6361....	.053	.053	...	H1-...
10	M238	SR 1/2	.213	61....	24	.009	0		36	182.5...	6361....	.053	.053	...	H1-...
11	M166	SR 1/2	.190	29....	35	.004	29.002		32	823.9...	6361....	.053	.053	...	H1-...

APPENDIX C

Additional Calculations

TIA-222-G CONNECTION CHECK
Mount to Tower Connection - Typ. All Sectors
US.CT.CCI.871584.01

Bolt Information		
Bolt Diameter (d)	0.5	in
Net Tensile Area (An)	0.142	in^2
# of Bolts Total (n)	2	
Bolt Grade	A325N	
Bolt Tensile Strength (F_{ub})	120	ksi

RISA 3D Reactions		
Moment (M)	0.00	k-ft
Axial (T)	-3.06	kips
Shear (V)	5.77	kips

Bolt Capacity		
Nominal Tensile Strength (R_{nt})	17.028	kips
Nominal Shear Strength (R_{nv})	10.60	kips
Bolt Tensile Force (T_{ub})	-1.53	kips
Bolt Shear Force (V_{ub})	2.885	kips
$T_{ub}/\phi R_{nt}$	-0.11969	
$V_{ub}/\phi R_{nv}$	0.36277	
$(V_{ub}/\phi R_{nv})^2+(T_{ub}/\phi R_{nt})^2$	0.14592	
Bolt Capacity =	36.3%	OK

Exhibit D

Letter of Authorization

6325 Ardrey Kell Rd, Suite 600
Charlotte, NC 28277

Phone: (980) 209-8227
Fax: (724) 416-6110
www.crowncastle.com

Crown Castle Letter of Authorization

CT - CONNECTICUT SITING COUNCIL

Re: Application for Zoning/Building Permit
Crown Castle telecommunications site at: 115 BIRCH MTN. ROAD, GLASTONBURY, CT 06033

PINNACLE TOWERS LLC ("Crown Castle") hereby authorizes DRW NX LLC, including their Agent, to act as our Agent in the processing of all zoning applications, building permits and approvals through the CT - CONNECTICUT SITING COUNCIL for the existing wireless communications site described below:

Crown Site ID/Name: 871584/John Tom Hill
Customer Site ID: US.CT.CCI.871584
Site Address: 115 Birch Mtn. Road, GLASTONBURY, CT 06033

Crown Castle

By: Jeremy Thomas Date: 4/21/20

Jeremy Thomas
Real Estate Specialist

Exhibit E

Emissions Analysis Report

Sublight Engineering PLLC

US.CT.CCI.871584 RF EXPOSURE ASSESSMENT

GPD Group

Abstract

This installation will have no measurable effect on RF exposure levels near this facility. There are no areas that will exceed the FCC RF exposure limits based on this assessment of the proposed installation.

Matthew J Butcher
Registered Professional Engineer
Commonwealth of Virginia Lic. No.0402 40784

June 18, 2020

Matthew J Butcher
matt@sublight.net

US.CT.CCI.871584 RF Exposure Assessment

Sublight Engineering PLLC (Sublight) has been asked to assess Radio Frequency (RF) exposure levels near the proposed installation detailed below. GDP Group engaged Sublight and provided information for this report.

DRW NX proposes to add equipment at this location. The new installation will operate in the 6 GHz point-to-point microwave band.

This installation will have no measurable effect on RF exposure levels near this facility. There are no areas that will exceed the FCC RF exposure limits based on this assessment of the proposed installation.

Installation Location

The site is a collocation on an existing Crown Castle owned telecommunications tower in Glastonbury, CT.

Address: 115 Birch Mountain Road, Glastonbury, CT 06033
Coordinates: 41.708956° N, 72.473447° W.
Antenna Height (radiation center): 190 feet above ground level

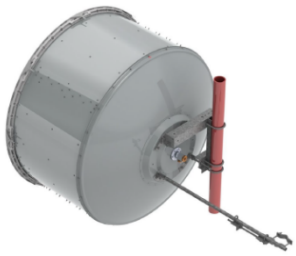
Figure 1 Overhead View

Antenna and Transmitter Information

The proposed DRW NX installation will add three microwave dish antennas to an existing communications tower.

The antennas proposed are Comscope USX6-6W-6GR microwave dishes.

USX6-6W-6GR



1.8m | 6ft Sentinel® Ultra High Performance, Super High XPD Antenna, dual-polarized, 5.925 – 7.125 GHz, grey, CPR137G flange

The three antennas are to be mounted at 190 feet above ground level and oriented at 53°, 232° and 250° relative to true north.

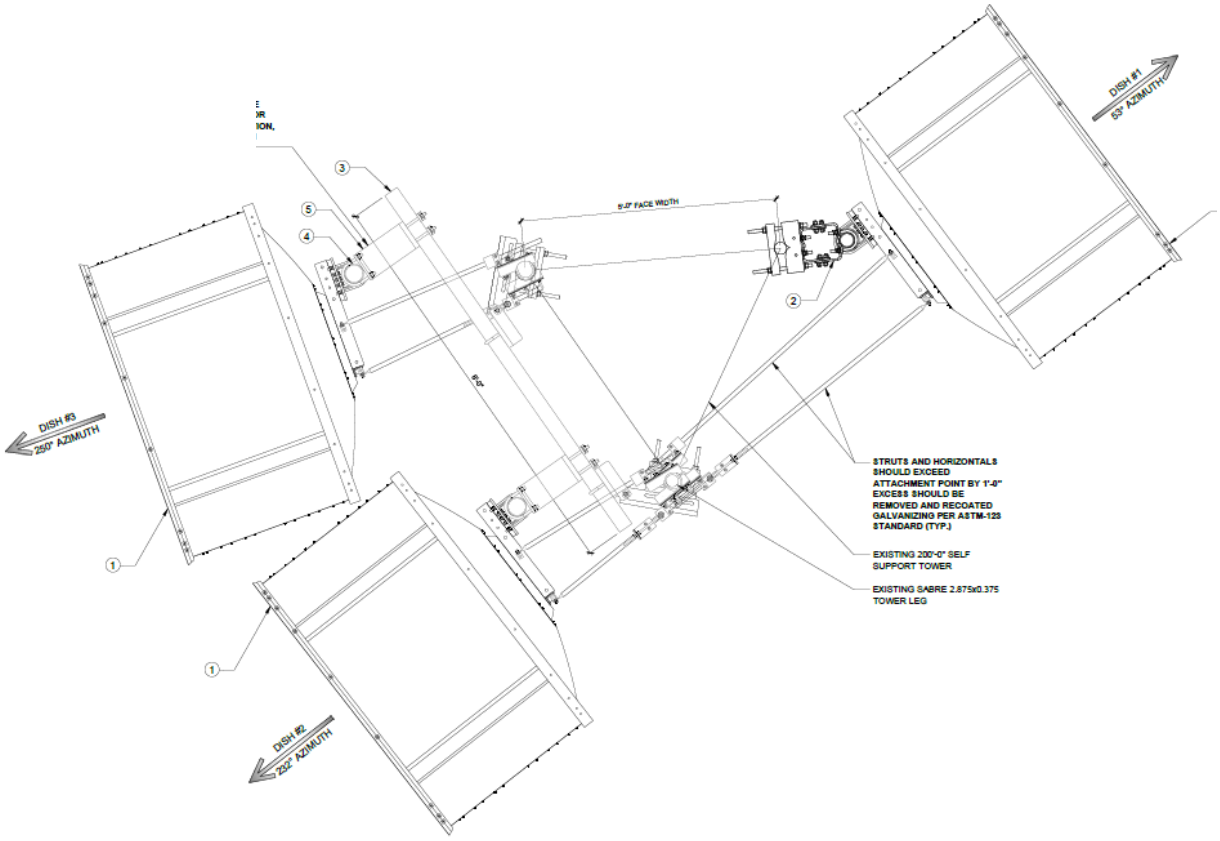


Figure 2 Antenna and Radio Configuration

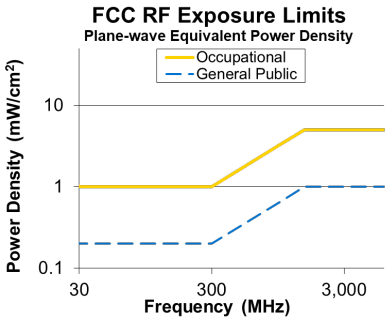
Each antenna is connected to a microwave radio operating at 5787 MHz with a transmit power of 1.25 W, 1 dB of loss, and an effective isotropic radiated power (EIRP) of 68.8 dBmW.

RF Exposure Assessment

This RF Exposure assessment is based on exposure limits set by the Federal Communications Commission (FCC), as addressed most recently in 2019[1], and codified in their rules[2]. The FCC has two limits: one for the General Public and a less conservative or higher limit for Occupational workers. An Occupational worker is defined as someone who through training and notification can understand and control their exposure to RF that they may encounter in the workplace. Everyone else is considered the General Public. In this assessment, both limits are considered but the stricter, General Public, limits are used to determine compliance.

This assessment uses worst-case modelling of maximum transmitter power to the antennas and conservative techniques to determine compliance boundaries. Outside the boundaries, exposure levels will be below the limits.

FCC plane-wave equivalent power density limits for maximum permissible exposure are derived from the whole-body SAR limits and expressed in milliwatts per square centimeter (mW/cm^2). FCC exposure limits are for continuous exposure spatial-averaged over the whole body and time-averaged, over 6 minutes for Occupational and 30 minutes for General Public limits. To account for changes in absorption relative to frequency, the limits are dependent on the frequency of the RF energy. This graph indicates that frequency relationship.



To calculate exposure and compliance boundaries, power density from each source (exposure value by frequency EV_f) is divided by the appropriate exposure limit (EL_f), creating an exposure ratio (ER_f).

$$ER_f = \frac{EV_f}{EL_f}$$

Ratios from each source are combined to determine a total exposure ratio TER. This ratio is used to determine exposure and compliance boundaries.

$$TER = \sum_{i=1}^{n} ER_i$$

[1] FCC-19-126 *Proposed Changes in the Commission's Rules Regarding Human Exposure to Radiofrequency Electromagnetic Fields; Reassessment of Federal Communications Commission Radiofrequency Exposure Limits and Policies*

[2] 47 CFR § 1.1310 Radiofrequency radiation exposure limits, US Code of Federal Regulations

RF power density levels are calculated using the IXUS Modeler[3]. IXUS employs a synthetic ray tracing method for panel and omnidirectional antennas and a conservative cylindrical envelope method for microwave dish (parabolic reflector / aperture) antennas.

The ray tracing method is an advanced computation method described in IEC 62232[4]. The power is summed from elemental sources representing the individual components of the antenna. These elemental sources are selected by an analysis of the proposed antennas and their manufacturers datasheets. Ray tracing algorithms typically overestimate RF field strength due to absorption of RF energy in the ground, building walls and other man-made structures.

The conservative cylindrical envelope method for microwave dish antennas from ETSI[5] is used to determine worst-case RF power density. This technique is derived from common configurations and shown to be conservative based on measurement results from real systems. Dish antennas are extremely directional and almost all the RF energy is confined to a cylindrical beam in the direction the antenna is pointed, levels outside the beam are negligible.

IXUS combines results from all sources to create graphic 3D compliance boundaries around antennas.

The following depiction graphically shows the worst-case compliance boundaries with respect to surrounding structures. Yellow indicates areas that may exceed the FCC's General Public exposure limits while red indicates areas that may exceed the Occupational limits. Because of the low power to this installation there are no areas that exceed the limits. To show the modeling, light blue indicates areas that exceed 5% or 1/20th of the limit.

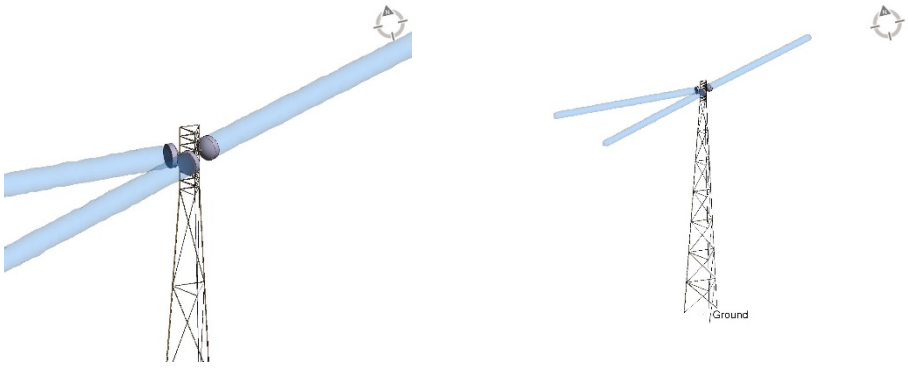


Figure 3 Modeling of Installation – top of tower & whole tower

The graph below shows the power density estimation (ETSI Envelope) for the proposed antennas in this installation with respect to the FCC Whole Body Limit for the General Public. It

[3] IXUS EMF Compliance Management Software version 3.8 (0) (Calculator 15.0) provided by Alphawave Mobile Network Products http://www.ixusapp.com.

[4] IEC 62232:2017, Determination of RF field strength and SAR in the vicinity of radiocommunication base stations for the purpose of evaluating human exposure, International Electrotechnical Commission, Geneva.

[5] ETSI TR 102 457. Fixed Radio Systems; Evaluation of the ElectroMagnetic Field (EMF) radiated by Line-of-Sight (LoS) fixed radio stations using parabolic dish directional antennas. V2.1.0 (2018-09)

also shows 5% or 1/20th of that limit. This indicates that even at zero distance from the antenna, the exposure levels are below the limit.

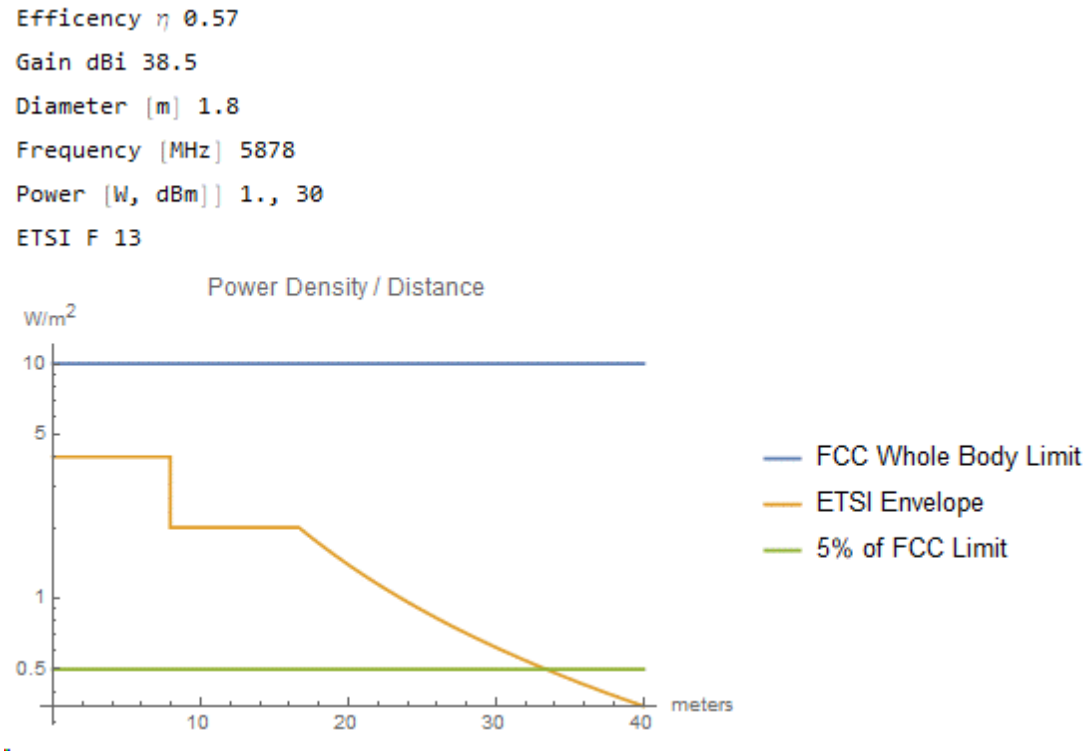


Figure 4 ETSI power density estimation

Because of the low power, installation height, and directionality of the proposed installation, there will be no change to the RF exposure levels on or around this site. RF levels on the ground from this installation will not be measurable.

RF Safety Program

Crown Castle, the tower owner, has an RF Exposure Safety Program for their transmitting sites. Part of this program requires the installation of signs near antennas where workers could access areas that exceed FCC RF exposure limits.

Because this installation will have no effect on RF exposure levels on or around the tower, there will be no need to update the existing RF Exposure Safety Program.

Conclusions

This installation will have no measurable effect on RF exposure levels near this facility. There are no areas that will exceed the FCC RF exposure limits based on this assessment of the proposed installation.

This engineer hereby certifies that this proposed wireless facility, installed by GPD Group, will comply with the RF exposure limits set forth by the FCC and as required by federal law.

If you have any questions on this assessment, please contact Sublight Engineering PLLC.

Engineering Statement

My professional engineer seal on this document certifies and affirms that:

I am registered as a Professional Engineer.

I am the principal of Sublight Engineering PLLC, in Arlington, Virginia.

I provide RF engineering services.

I am thoroughly familiar with the rules and regulations of the Federal Communications Commission (FCC) as well as the regulations of the Occupational Safety and Health Administration (OSHA), both in general and specifically as they apply to the FCC radiofrequency radiation exposure limits.

That I have prepared this RF Exposure Assessment and believe it to be true and accurate to the best of my knowledge.

June 18, 2020