*Filed by:*
*G. Scott Shepherd, Site Development Specialist II - SBA Communications*
*134 Flanders Rd., Suite 125, Westborough, MA 01581*
*508.251.0720 x 3807 - gshepherd@sbasite.com*

December 4, 2020

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

**RE: Notice of Exempt Modification**
**277 Huckleberry Hill Road, Avon, CT 06013**
**Latitude: 41.788055**
**Longitude: -72.918166**
**T-Mobile Site #: CTHA510A_L600**

Dear Ms. Bachman:

T-Mobile currently maintains three (3) antennas at the 80-foot level of the existing 100-foot Guyed Laminated Wood Pole at 277 Huckleberry Hill Rd., Avon, CT. The 100-foot tower is owned by SBA 2012 TC Assets, LLC. The property is owned by the Town of Avon. T-Mobile now intends to remove (3) three L2100/L1900 MHz antennas and replace with three (3) new L700/L600/L2100/L1900 MHz antennas. The new antennas support 5G services and would be installed at the 80-foot level of the tower.

**Please note:** Per the Connecticut Siting Council Website: CSC COVID 19 Guidelines.
*In order to prevent the spread of Coronavirus and protect the health and safety of our members and staff, as of March 18, 2020, the Connecticut Siting Council shall convert to full remote operations until March 30, 2020. Please be advised that during this time period, all hard copy filing requirements will be waived in lieu of an electronic filing. Please also be advised that the March 26, 2020 regular meeting shall be held via teleconference. The Council's website is not equipped with an on-line filing fee receipt service. Therefore, filing fees and/or direct cost charges associated with matters received electronically during the above-mentioned time period will be directly invoiced at a later date.*

Planned Modifications:

TOWER

Remove:
- N/A

Remove and Replace:
- (3) RFS APXV16DWV-16DWVS-C antenna (remove) – (3) RFS APXVAR18_43-C-NA20 ANTENNA (replace)

Install New:

- N/A

Existing Equipment to Remain:

- (3) Flush Mounts
- (12) 7/8" coax

Entitlements:

- N/A

GROUND

Install New:

- Equipment inside existing RBS 6201 equipment cabinet

This facility was approved by Council on January 24, 2005 under Docket 297. Approval was given for a laminated wood monopole with flush mounted antennas no taller than 100' above ground level to provide telecommunications services to both public and private entities. A recalculated EME report was to be provided when circumstances in operation would cause a change in power density levels. Upon the establishment of any new State or Federal radio frequency standards applicable to the facility, the facility was to be brought into compliance. Public and/or private entities were to be permitted to share space on the tower for fair consideration, or to be provided with specific legal, technical, environmental, or economic reasons precluding such sharing. The Certificate Holder was to provide reasonable space on the tower for no compensation for any municipal antennas, provide they were compatible with the structural integrity of the tower. Any antenna that became obsolete and ceased to function was to be removed within 60 days. There were no further post construction stipulations set. Please see attached.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. §16.50j-72(b)(2). In accordance with R.C.S.A. § 16.50j-73, a copy of this letter is being sent to the Town of Avon's Town Manager, Brandon Robertson, and Director of Planning and Community Development, Hiram Peck. (Separate notice is not being sent to tower owner, as it belongs to SBA.)

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. §16.50j-72(b)(2).

1. The proposed modifications will not result in an increase in the height of the existing structure.
2. The proposed modification will not require the extension of the site boundary.
3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard.
5. The proposed modification will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The existing structure and its foundation can support the proposed loading.

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

Sincerely,

G. Scott Shepherd
Site Development Specialist II
SBA COMMUNICATIONS CORPORATION
134 Flanders Rd., Suite 125
Westborough, MA 01581
508.251.0720 x3807 + T
508.366.2610 + F
508.868.6000 + C
gshepherd@sbasite.com

Attachments
cc: Brandon Robertson, Town Manager / with attachments
*Avon Town Hall: 60 West Main Street (Route 44) Avon, CT 06001*
Hiram Peck III, Director of Planning and Community Development / with attachments
*Avon Town Hall: 60 West Main Street (Route 44) Avon, CT 06001*

**EXHIBIT LIST**

| | | |
|---|---|---|
| Exhibit 1 | Check Copy | To be invoiced at a later date per Covid guidelines |
| Exhibit 2 | Notification Receipts | X |
| Exhibit 3 | Property Card | X |
| Exhibit 4 | Property Map | X |
| Exhibit 5 | Original Zoning Approval | CSC 1/24/05 |
| Exhibit 6 | Construction Drawings | Chappell Engineering 12/3/20 |
| Exhibit 7 | Structural Analysis | TES 10/16/20 |
| Exhibit 8 | Mount Analysis | TES 8/19/19 |
| Exhibit 9 | EME Report | Transcom Engineering 6/16/19 |

EXHIBIT 1

Normally, Exhibit 1 would contain a copy of the check for the filing fee.

# EXHIBIT 2


---

**After printing this label**:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

**Warning**: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.


---

**After printing this label**:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

**Warning**: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.


---

**After printing this label**:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

**Warning**: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

# EXHIBIT 3

Property at 00277 HUCKLEBERRY HILL RD | Prop ID 2810277 | Printed 14-Feb-2019 6:30 PM | Design and Layout (C) Right/Angles

BAAX

**Administrative Information**

Owner name: AVON TOWN OF
Second name:
Address: 60 WEST MAIN STREET
City/state: AVON CT Zip: 06001

**Location Information**

Map: 016 Clerk map:
Lot: 2810277 Neigh.: Zone: R40 Vol: 80 Page: 20

**Assessments**

| Assmt category | Qty | Amount |
|---|---|---|
| Resident Excess | 73.40 | 385,350 |
| Resident Outbldg | 3.00 | 28,460 |

**Exemptions**

| Exempt | Cat | Amount |
|---|---|---|

**Last sale**

Sale date: 19-Dec-1972
Sale price:
Sale valid:

**Values**

Mkt value :
Cost value: 591,157

**Summary**

| | |
|---|---|
| Total assessments | 413,810 |
| Total exemptions | |
| Net assessment | 413,810 |

**Utilities**

| | |
|---|---|
| Water | None |
| Sewer | None |
| Gas | None |

**Sales ratios**

Cost/sale :
Mkt/sale :
Assmt/sale:

**Land Information**

| Type | Use | Acres/SqFt | Rate | Total | Infl Fact | Value | 70% Value |
|---|---|---|---|---|---|---|---|
| RES | 12 | 73.400 | 7,500 | 550,500 | | 550,500 | 385,350 |
| Residual | | 3,197,304 | | | | | |
| | | 73.400 acres | | Total land value | | 550,500 | 385,350 |

**Outbuilding Information**

| Description | Wid | Len | Area | Rate | Year | Cnd | RCN | Depr | Value |
|---|---|---|---|---|---|---|---|---|---|
| C18 1 story frame | 16 | 28 | 448 | 80.75 | 1957 | C | 36,176 | 50 | 18,090 |
| RG1 Frame or Con Block Detach Garage | 30 | 40 | 1,200 | 28.85 | | C | 34,620 | 50 | 17,310 |
| C84 Canopy | 16 | 42 | 672 | 15.63 | 1992 | C | 10,503 | 50 | 5,250 |
| | | | Value at 70% | 28,455 | | | Value at 100% | | 40,650 |

No sketch for this property

AVON LANDFILL

# EXHIBIT 4

277 Huckleberry Hill

Search Results

Parcel Details

**AVON TOWN OF**

60 WEST MAIN STREET
AVON, 06001

Parcel ID: 2810277
Sale Price: $

Links
Parcel Details
Google Map
Bing Bird's Eye
Abutter Distance:
Adjacent
Adjacent
50 ft
100 ft
200 ft
300 ft
400 ft
500 ft
Find Abutters
Clear Abutters

Abutters
Add Parcel
Remove Parcel
Print Labels
Export List

**Parcel Number** 2810
**Property Type** PARC
BERRY HILL RD
**Zone** R40
**Volume** 80
**Page** 20
**Owner** AVON TOWN OF
**Owner Address** 60 WEST MAIN STREET
**City** AVON
**State** CT
**ZIP** 06001
**GISPin** 2810277
**RecordCard** http://www.avonassessor.com/prop

About
Layers
Identify


Email Map Link

lat:41.7917, long:-72.9075

Tighe&Bond

Copy and paste the following string into an email to link to the current map view:


Close

-->

lat:41.7917, long:-72.9075

# EXHIBIT 5

# Connecticut Siting Council

## Decisions

| | | |
|---|---|---|
| **DOCKET NO. 297 –** Sprint Spectrum, L.P. application for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance and operation of a telecommunications facility in Avon, Connecticut. | }<br>}<br>} | Connecticut<br>Siting<br>Council<br>January 24, 2005 |

**Decision and Order**

Pursuant to the foregoing Findings of Fact and Opinion, the Connecticut Siting Council (Council) finds that the effects associated with the construction, operation, and maintenance of a telecommunications facility including effects on the natural environment; ecological integrity and balance; public health and safety; scenic, historic, and recreational values; forests and parks; air and water purity; and fish and wildlife are not disproportionate either alone or cumulatively with other effects when compared to need, are not in conflict with the policies of the State concerning such effects, and are not sufficient reason to deny the application and therefore directs that a Certificate of Environmental Compatibility and Public Need, as provided by General Statutes **§** 16-50k, be issued to Sprint Spectrum, L.P. for the construction, maintenance and operation of a wireless telecommunications facility at 277 Huckleberry Hill Road, Avon, Connecticut.

The facility shall be constructed, operated, and maintained substantially as specified in the Council's record in this matter, and subject to the following conditions:

1. The tower shall be designed as a laminated wood monopole and shall be constructed no taller than 100 feet above ground level to provide telecommunications services to both public and private entities. The location of the tower and equipment compound shall be adjusted to avoid cutting down an existing 33" dbh tree.
2. The Certificate Holder shall prepare a Development and Management (D&M) Plan for this site in compliance with Sections 16-50j-75 through 16-50j-77 of the Regulations of Connecticut State Agencies. The D&M Plan shall be served on all parties and intervenors, as listed in the service list, and submitted to and approved by the Council prior to the commencement of facility construction and shall include:

    a. a final site plan(s) of site development to include specifications for the tower, tower foundation, flush-mounted antennas, equipment building, access road, utility line, and landscaping; and

    b) construction plans for site clearing, water drainage, and erosion and sedimentation control consistent with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, as amended.

3.The Certificate Holder shall, prior to the commencement of operation, provide the Council worst-case modeling of electromagnetic radio frequency power density of all proposed entities' antennas at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin No. 65, August 1997. The Certificate Holder shall ensure a recalculated report of electromagnetic radio frequency power density is submitted to the Council in the event other carriers locate at this facility or if circumstances in operation cause a change in power density

above the levels calculated and provided pursuant to this Decision and Order.
4.Upon the establishment of any new State or federal radio frequency standards applicable to frequencies of this facility, the facility granted herein shall be brought into compliance with such standards.
5.The Certificate Holder shall permit public or private entities to share space on the proposed tower for fair consideration, or shall provide any requesting entity with specific legal, technical, environmental, or economic reasons precluding such tower sharing.
6.The Certificate Holder shall provide reasonable space on the tower for no compensation for any municipal antennas, provided such antennas are compatible with the structural integrity of the tower.
7.If the facility does not initially provide wireless services within one year of completion of construction or ceases to provide wireless services for a period of one year, this Decision and Order shall be void, and the Certificate Holder shall dismantle the tower and remove all associated equipment or reapply for any continued or new use to the Council before any such use is made.
8.Any antenna that becomes obsolete and ceases to function shall be removed within 60 days after such antennas become obsolete and cease to function.
9.Unless otherwise approved by the Council, this Decision and Order shall be void if the facility authorized herein is not operational within one year of the effective date of this Decision and Order or within one year after all appeals to this Decision and Order have been resolved. Any request for extensions of the period shall be filed with the Council not later than sixty days prior to expiration date of the Certificate and shall be served on all parties and intervenors, as listed in the service list. Any proposed modifications to this Decision and Order shall likewise be so served.
10.In accordance with Section 16-50j-77 of the Regulations of Connecticut State Agencies, the Certificate Holder shall provide the Council with notice in writing two weeks prior to the commencement of construction activities at the approved site. In addition, the Certificate Holder shall provide the Council with written notice of the completion of construction.

Pursuant to General Statutes **§** 16-50p, we hereby direct that a copy of the Findings of Fact, Opinion, and Decision and Order be served on each person listed below, and notice of issuance shall be published in the Hartford Courant, Valley News, and the Farmington Valley Post.

By this Decision and Order, the Council disposes of the legal rights, duties, and privileges of each party named or admitted to the proceeding in accordance with Section 16-50j-17 of the Regulations of Connecticut State Agencies.

The parties and intervenors to this proceeding are:

| **Applicant** | **Its Representative** |
|---|---|
| Sprint Spectrum, L.P.<br>d/b/a Sprint PCS | Thomas J. Regan, Esq.<br>Brown Rudnick Berlack Israels LLP<br>CityPlace I, 38th Floor<br>185 Asylum Street<br>Hartford, CT 06103-3402<br>(860) 509-6522<br>(860) 509-6501 – fax |

Content Last Modified on 1/28/2005 4:44:58 PM

# EXHIBIT 6

# SBA AVON MONOPOLE

277 HUCKLEBERRY HILL ROAD
AVON, CT 06001
HARTFORD COUNTY

## SITE NO.: CTHA510A

SITE TYPE: 100'± GUYED LAMINATED WOOD POLE

RF DESIGN GUIDELINE: CUSTOM

## APPROVALS

| | | | |
|---|---|---|---|
| PROJECT MANAGER: | DATE: | ZONING/SITE ACQ.: | DATE: |
| CONSTRUCTION: | DATE: | OPERATIONS: | DATE: |
| RF ENGINEERING: | DATE: | TOWER OWNER: | DATE: |

## T-MOBILE TECHNICIAN SITE SAFETY NOTES

| LOCATION | SPECIAL RESTRICTIONS |
|---|---|
| SECTOR A: | ACCESS BY CERTIFIED CLIMBER |
| SECTOR B: | ACCESS BY CERTIFIED CLIMBER |
| SECTOR C: | ACCESS BY CERTIFIED CLIMBER |
| SECTOR D: | ACCESS BY CERTIFIED CLIMBER |
| GPS/LMU: | UNRESTRICTED |
| RADIO CABINETS: | UNRESTRICTED |
| PPC DISCONNECT: | UNRESTRICTED |
| MAIN CIRCUIT D/C: | UNRESTRICTED |
| NIU/T DEMARC: | UNRESTRICTED |
| OTHER/SPECIAL: | NONE |

## SITE NOTES

1. THIS IS AN UNMANNED AND RESTRICTED ACCESS TELECOMMUNICATION FACILITY, AND IS NOT FOR HUMAN HABITATION. IT WILL BE USED FOR THE TRANSMISSION OF RADIO SIGNAL FOR THE PURPOSE OF PROVIDING PUBLIC CELLULAR SERVICE.
   - ADA COMPLIANCE NOT REQUIRED.
   - POTABLE WATER OR SANITARY SERVICE IS NOT REQUIRED.
   - NO OUTDOOR STORAGE OR ANY SOLID WASTE RECEPTACLES REQUIRED.
2. CONTRACTOR SHALL VERIFY ALL PLANS, EXISTING DIMENSIONS, AND CONDITIONS ON JOB SITE. CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ARCHITECT/ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK. FAILURE TO NOTIFY THE ARCHITECT/ENGINEER PLACE THE RESPONSIBILITY ON THE CONTRACTOR TO CORRECT THE DISCREPANCIES AT THE CONTRACTOR'S EXPENSE.
3. NEW CONSTRUCTION WILL CONFORM TO ALL APPLICABLE CODES AND ORDINANCES.
   - BUILDING CODE: 2018 CONNECTICUT STATE BUILDING CODE
   - ELECTRICAL CODE: 2017 NATIONAL ELECTRICAL CODE
   - STRUCTURAL CODE: TIA/EIA-222-G STRUCTURAL STANDARDS FOR ANTENNA SUPPORTING STRUCTURES AND ANTENNAS.

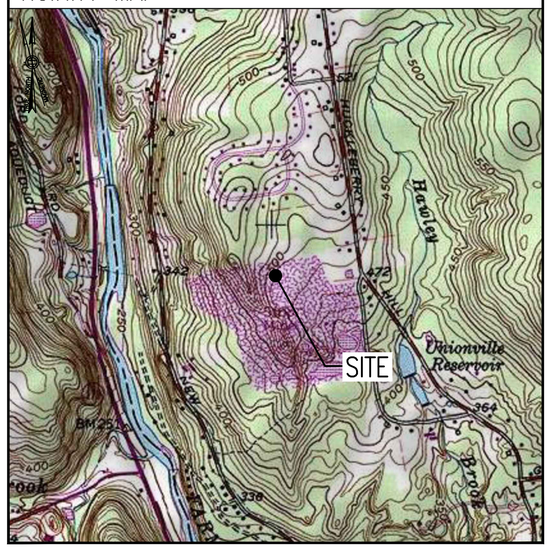
## GENERAL NOTES

1. THE CONTRACTOR SHALL GIVE ALL NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY, MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS, AND LOCAL AND STATE JURISDICTIONAL CODES BEARING ON THE PERFORMANCE OF THE WORK. THE WORK PERFORMED ON THE PROJECT AND THE MATERIALS INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES.
2. THE ARCHITECT/ENGINEER HAVE MADE EVERY EFFORT TO SET FORTH IN THE CONSTRUCTION AND CONTRACT DOCUMENTS THE COMPLETE SCOPE OF WORK. THE CONTRACTOR BIDDING THE JOB IS NEVERTHELESS CAUTIONED THAT MINOR OMISSIONS OR ERRORS IN THE DRAWINGS AND OR SPECIFICATIONS SHALL NOT EXCUSE SAID CONTRACTOR FROM COMPLETING THE PROJECT AND IMPROVEMENTS IN ACCORDANCE WITH THE INTENT OF THESE DOCUMENTS.
3. THE CONTRACTOR OR BIDDER SHALL BEAR THE RESPONSIBILITY OF NOTIFYING (IN WRITING) THE OMNIPOINT REPRESENTATIVE OF ANY CONFLICTS, ERRORS, OR OMISSIONS PRIOR TO THE SUBMISSION OF CONTRACTOR'S PROPOSAL OR PERFORMANCE OF WORK. IN THE EVENT OF DISCREPANCIES THE CONTRACTOR SHALL PRICE THE MORE COSTLY OR EXTENSIVE WORK, UNLESS DIRECTED IN WRITING OTHERWISE.
4. THE SCOPE OF WORK SHALL INCLUDE FURNISHING ALL MATERIALS, EQUIPMENT, LABOR AND ALL OTHER MATERIALS AND LABOR DEEMED NECESSARY TO COMPLETE THE WORK/PROJECT AS DESCRIBED HEREIN.
5. THE CONTRACTOR SHALL VISIT THE JOB SITE PRIOR TO THE SUBMISSION OF BIDS OR PERFORMING WORK TO FAMILIARIZE HIMSELF WITH THE FIELD CONDITIONS AND TO VERIFY THAT THE PROJECT CAN BE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
6. THE CONTRACTOR SHALL OBTAIN AUTHORIZATION TO PROCEED WITH CONSTRUCTION PRIOR TO STARTING WORK ON ANY ITEM NOT CLEARLY DEFINED BY THE CONSTRUCTION DRAWINGS/CONTRACT DOCUMENTS.
7. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS ACCORDING TO THE MANUFACTURER'S/VENDOR'S SPECIFICATIONS UNLESS NOTED OTHERWISE OR WHERE LOCAL CODES OR ORDINANCES TAKE PRECEDENCE.
8. THE CONTRACTOR SHALL PROVIDE A FULL SET OF CONSTRUCTION DOCUMENTS AT THE SITE UPDATED WITH THE LATEST REVISIONS AND ADDENDUMS OR CLARIFICATIONS AVAILABLE FOR THE USE BY ALL PERSONNEL INVOLVED WITH THE PROJECT.
9. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE PROJECT DESCRIBED HEREIN. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES AND FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.
10. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL NECESSARY CONSTRUCTION CONTROL SURVEYS, ESTABLISHING AND MAINTAINING ALL LINES AND GRADES REQUIRED TO CONSTRUCT ALL IMPROVEMENTS AS SHOWN HEREIN.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS WHICH MAY BE REQUIRED FOR THE WORK BY THE ARCHITECT/ENGINEER, THE STATE, COUNTY OR LOCAL GOVERNMENT AUTHORITY.
12. THE CONTRACTOR SHALL MAKE NECESSARY PROVISIONS TO PROTECT EXISTING IMPROVEMENTS, EASEMENTS, PAVING, CURBING, ETC. DURING CONSTRUCTION. UPON COMPLETION OF WORK, THE CONTRACTOR SHALL REPAIR ANY DAMAGE THAT MAY HAVE OCCURRED DUE TO CONSTRUCTION ON OR ABOUT THE PROPERTY.
13. THE CONTRACTOR SHALL KEEP THE GENERAL WORK AREA CLEAN AND HAZARD FREE DURING CONSTRUCTION AND DISPOSE OF ALL DIRT, DEBRIS, RUBBISH AND REMOVE EQUIPMENT NOT SPECIFIED AS REMAINING ON THE PROPERTY. PREMISES SHALL BE LEFT IN CLEAN CONDITION AND FREE FROM PAINT SPOTS, DUST, OR SMUDGES OF ANY NATURE.
14. THE CONTRACTOR SHALL COMPLY WITH ALL OSHA REQUIREMENTS AS THEY APPLY TO THIS PROJECT.
15. THE CONTRACTOR SHALL NOTIFY THE PROJECT OWNER'S REPRESENTATIVE WHERE A CONFLICT OCCURS ON ANY OF THE CONTRACT DOCUMENTS. THE CONTRACTOR IS NOT TO ORDER MATERIAL OR CONSTRUCT ANY PORTION OF THE WORK THAT IS IN CONFLICT UNTIL CONFLICT IS RESOLVED BY THE LESSEE/LICENSEE REPRESENTATIVE.
16. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS, PROPERTY LINES, ETC. ON THE JOB.
17. ALL UNDERGROUND UTILITY INFORMATION WAS DETERMINED FROM SURFACE INVESTIGATIONS AND EXISTING PLANS OF RECORD. THE CONTRACTOR SHALL LOCATE ALL UNDERGROUND UTILITIES IN THE FIELD PRIOR TO ANY SITE WORK.

AT LEAST 72 HOURS PRIOR TO DIGGING, THE CONTRACTOR IS REQUIRED TO CALL DIG SAFE AT 811

## VICINITY MAP

SCALE: 1" = 1000'-0"




## DO NOT SCALE DRAWINGS

CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE PROJECT OWNER'S REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

## SHEET INDEX

| SHEET NO. | DESCRIPTION | REV. NO. |
|---|---|---|
| T-1 | TITLE SHEET | 1 |
| | | |
| GN-1 | GENERAL NOTES | 1 |
| | | |
| A-1 | COMPOUND & EQUIPMENT PLAN | 1 |
| A-2 | TOWER ELEVATIONS & ANTENNA PLAN | 1 |
| A-3 | SITE DETAILS | 1 |
| | | |
| E-1 | ELECTRIC & GROUNDING DETAILS | 1 |

SPECIAL ZONING NOTE:
BASED ON INFORMATION PROVIDED BY T-MOBILE REGULATORY COMPLIANCE PROFESSIONALS AND LEGAL COUNSEL, THIS TELECOMMUNICATIONS EQUIPMENT DEPLOYMENT IS CONSIDERED AN ELIGIBLE FACILITY UNDER THE MIDDLE CLASS TAX RELIEF AND JOB CREATION ACT OF 2012, 47 USC 1455(A), SECTION 6409(A), AND IS SUBJECT TO AN ELIGIBLE FACILITY REQUEST, EXPEDITED REVIEW, AND LIMITED/PARTIAL ZONING PRE-EMPTION FOR LOCAL DISCRETIONARY PERMITS (VARIANCE, SPECIAL PERMIT, SITE PLAN REVIEW, OR ADMINISTRATIVE REVIEW).

## PROJECT SUMMARY

| | |
|---|---|
| SITE NUMBER: | CTHA510A |
| SBA SITE NUMBER: | CT46143 |
| SBA SITE NAME: | BURLINGTON-AVON LANDFILL |
| SITE ADDRESS: | 277 HUCKLEBERRY HILL ROAD<br>AVON, CT 06001 |
| PROPERTY OWNER: | TOWN OF AVON<br>60 WEST MAIN STREET<br>AVON, CT 06001 |
| TOWER OWNER: | SBA 2012 TC ASSETS, LLC<br>8501 CONGRESS AVENUE<br>BOCA RATON, FL 33487<br>PHONE: 561-226-9523 |
| COUNTY: | HARTFORD COUNTY |
| ZONING DISTRICT: | R-40 (RESIDENTIAL) |
| STRUCTURE TYPE: | GUYED LAMINATED WOOD POLE |
| STRUCTURE HEIGHT: | 100'± |
| APPLICANT: | T-MOBILE NORTHEAST LLC<br>15 COMMERCE WAY, SUITE B<br>NORTON, MA 02766 |
| SBA RSM: | STEPHEN ROTH<br>PHONE: 860-539-4920<br>EMAIL: SRoth@sbasite.com |
| ARCHITECT: | CHAPPELL ENGINEERING ASSOCIATES, LLC.<br>201 BOSTON POST ROAD WEST, SUITE 101<br>MARLBOROUGH, MA 01752 |
| STRUCTURAL ENGINEER: | CHAPPELL ENGINEERING ASSOCIATES, LLC.<br>201 BOSTON POST ROAD WEST, SUITE 101<br>MARLBOROUGH, MA 01752 |
| SITE CONTROL POINT: | LATITUDE: N.41.788200°<br>LONGITUDE W.72.918200° |


T-MOBILE NORTHEAST LLC
15 COMMERCE WAY, SUITE B
NORTON, MA 02766
(508) 286-2700

SBA COMMUNICATIONS CORP.
134 FLANDERS ROAD, SUITE 125
WESTBOROUGH, MA 01581
(508) 251-0720

CHAPPELL ENGINEERING ASSOCIATES, LLC
Civil ·Structural ·Land Surveying
R.K. EXECUTIVE CENTRE
201 BOSTON POST ROAD WEST, SUITE 101
MARLBOROUGH, MA 01752
(508) 481-7400
www.chappellengineering.com


STATE OF CONNECTICUT
JAMES M. FITZGERALD
No. 25997
LICENSED PROFESSIONAL CIVIL ENGINEER
12/3/20

CHECKED BY: JMT

APPROVED BY: JMT

### SUBMITTALS

| REV. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| 1 | 12/02/20 | ISSUED FOR CONSTRUCTION | CMC |
| 0 | 05/17/19 | ISSUED FOR REVIEW | JRV |

SITE NUMBER:
CTHA510A

SITE ADDRESS:
277 HUCKLEBERRY HILL ROAD
AVON, CT 06001

SHEET TITLE
TITLE SHEET

SHEET NUMBER
T-1

1815.108

## GENERAL NOTES:

1. FOR THE PURPOSE OF CONSTRUCTION DRAWINGS, THE FOLLOWING DEFINITIONS SHALL APPLY:
   CONTRACTOR – T–MOBILE
   SUBCONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
   OWNER – T–MOBILE
   OEM – ORIGINAL EQUIPMENT MANUFACTURER

2. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING SUBCONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CONTRACTOR.

3. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. SUBCONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK.

4. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL, STATE AND FEDERAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.

5. DRAWINGS PROVIDED HERE ARE NOT TO BE SCALED AND ARE INTENDED TO SHOW OUTLINE ONLY.

6. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.

7. THE SUBCONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.

8. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE SUBCONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY THE CONTRACTOR.

9. SUBCONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER, T1 CABLES AND GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. SUBCONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. SUBCONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH THE CONTRACTOR AND/OR LANDLORD PRIOR TO CONSTRUCTION.

10. THE SUBCONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT SUBCONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE OWNER.

11. SUBCONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY.

12. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION AND RETURN DISTURBED AREAS TO ORIGINAL CONDITIONS.

13. THE SUBCONTRACTOR SHALL SUPERVISE AND DIRECT THE PROJECT DESCRIBED HEREIN. THE SUBCONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.

14. SUBCONTRACTOR SHALL NOTIFY CHAPPELL ENGINEERING ASSOCIATES, LLC 48 HOURS IN ADVANCE OF POURING CONCRETE OR BACKFILLING TRENCHES, SEALING ROOF AND WALL PENETRATIONS AND POST DOWNS, FINISHING NEW WALLS OR FINAL ELECTRICAL CONNECTIONS FOR ENGINEERING REVIEW.

15. CONSTRUCTION SHALL COMPLY WITH ALL T–MOBILE STANDARDS AND SPECIFICATIONS.

16. SUBCONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS MUST BE VERIFIED. SUBCONTRACTOR SHALL NOTIFY THE CONTRACTOR OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.

17. THE EXISTING CELL SITES ARE IN FULL COMMERCIAL OPERATION. ANY CONSTRUCTION WORK BY SUBCONTRACTOR SHALL NOT DISRUPT THE EXISTING NORMAL OPERATION. ANY WORK ON EXISTING EQUIPMENT MUST BE COORDINATED WITH CONTRACTOR. ALSO, WORK SHOULD BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.

18. IF THE EXISTING CELL SITE IS ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUTDOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE TO BE WORN TO ALERT OF ANY DANGEROUS EXPOSURE LEVELS.

## SITE WORK GENERAL NOTES:

1. THE SUBCONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION.

2. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES, AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY ENGINEERS. EXTREME CAUTION SHOULD BE USED BY THE SUBCONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. SUBCONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT BE LIMITED TO A) FALL PROTECTION B) CONFINED SPACE C) ELECTRICAL SAFETY D) TRENCHING AND EXCAVATION.

3. ALL SITE WORK SHALL BE AS INDICATED ON THE DRAWINGS AND PROJECT SPECIFICATIONS.

4. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.

5. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE BTS EQUIPMENT AND TOWER AREAS.

6. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.

7. THE SUB GRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.

8. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF ENGINEERING, OWNER AND/OR LOCAL UTILITIES.

9. THE AREAS OF THE OWNERS PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE AND STABILIZED TO PREVENT EROSION AS SPECIFIED IN THE PROJECT SPECIFICATIONS.

10. SUBCONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.

11. THE SUBCONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE T–MOBILE SPECIFICATION FOR SITE SIGNAGE.

## CONCRETE AND REINFORCING STEEL NOTES:

1. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 301, ACI 318, ACI 336, ASTM A184, ASTM A185 AND THE DESIGN AND CONSTRUCTION SPECIFICATION FOR CAST–IN–PLACE CONCRETE.

2. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS, UNLESS NOTED OTHERWISE. A HIGHER STRENGTH (4000PSI) MAY BE USED. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 381 CODE REQUIREMENTS

3. REINFORCING STEEL SHALL CONFORM TO ASTM A 615, GRADE 60, DEFORMED UNLESS NOTED OTHERWISE. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A 185 WELDED STEEL WIRE FABRIC UNLESS NOTED OTHERWISE. SPLICES SHALL BE CLASS "B" AND ALL HOOKS SHALL BE STANDARD, UNO.

4. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCING STEEL UNLESS SHOWN OTHERWISE ON DRAWINGS:
   CONCRETE CAST AGAINST EARTH.....3 IN.
   CONCRETE EXPOSED TO EARTH OR WEATHER:
   #6 AND LARGER .....2 IN.
   #5 AND SMALLER & WWF .....1½ IN.
   CONCRETE NOT EXPOSED TO EARTH OR WEATHER OR NOT CAST AGAINST THE GROUND:
   SLAB AND WALL .....¾ IN.
   BEAMS AND COLUMNS .....1½ IN.

5. A CHAMFER ¾" SHALL BE PROVIDED AT ALL EXPOSED EDGES OF CONCRETE, UNO, IN ACCORDANCE WITH ACI 301 SECTION 4.2.4.

6. INSTALLATION OF CONCRETE EXPANSION/WEDGE ANCHORS SHALL BE PER MANUFACTURER'S WRITTEN RECOMMENDED PROCEDURE. THE ANCHOR BOLT, DOWEL OR ROD SHALL CONFORM TO THE MANUFACTURERS RECOMMENDATION FOR EMBEDMENT DEPTH OR AS SHOWN ON THE DRAWINGS. NO REBAR SHALL BE CUT WITHOUT PRIOR CONTRACTOR APPROVAL WHEN DRILLING HOLES IN CONCRETE. SPECIAL INSPECTIONS, REQUIRED BY GOVERNING CODES, SHALL BE PERFORMED IN ORDER TO MAINTAIN MANUFACTURER'S MAXIMUM ALLOWABLE LOADS. ALL EXPANSION/WEDGE ANCHORS SHALL BE STAINLESS STEEL OR HOT DIPPED GALVANIZED. EXPANSION BOLTS SHALL BE PROVIDED BY SIMPSON OR APPROVED EQUAL.

7. CONCRETE CYLINDER TIES ARE NOT REQUIRED FOR SLAB ON GRADE WHEN CONCRETE IS LESS THAN 50 CUBIC YARDS (IBC1905.6.2.3) IN THAT EVENT THE FOLLOWING RECORDS SHALL BE PROVIDED BY THE CONCRETE SUPPLIER;
   (A) RESULTS OF CONCRETE CYLINDER TEST PERFORMED AT THE SUPPLIERS PLANT.
   (B) CERTIFICATION OF MINIMUM COMPRESSIVE STRENGTH FOR THE CONCRETE GRADE SUPPLIED.
FOR GREATER THAN 50 CUBIC YARDS THE GC SHALL PERFORM THE CONCRETE CYLINDER TEST.

8. AS AN ALTERNATIVE TO ITEM 7. TEST CYLINDERS SHALL BE TAKEN INITIALLY AND THEREAFTER FOR EVERY 50 YARDS OF CONCRETE FROM EACH DIFFERENT BATCH PLANT.

9. EQUIPMENT SHALL NOT BE PLACED ON NEW PADS FOR SEVEN DAYS AFTER PAD IS POURED, UNLESS IT IS VERIFIED BY CYLINDER TESTS THAT COMPRESSIVE STRENGTH HAS BEEN ATTAINED.

## STRUCTURAL STEEL NOTES:

1. ALL STEEL WORK SHALL BE PAINTED OR GALVANIZED IN ACCORDANCE WITH THE DRAWINGS AND T–MOBILE SPECIFICATIONS UNLESS OTHERWISE NOTED. STRUCTURAL STEEL SHALL BE ASTM–A–36 UNLESS OTHERWISE NOTED ON THE SITE SPECIFIC DRAWINGS. STEEL DESIGN, INSTALLATION AND BOLTING SHALL BE IN ACCORDANCE WITH THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) "MANUAL OF STEEL CONSTRUCTION".

2. ALL WELDING SHALL BE PERFORMED USING E70XX ELECTRODES AND WELDING SHALL CONFORM TO AISC AND AWS D1.1. WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLE J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION", 9TH EDITION. PAINTED SURFACES SHALL BE TOUCHED UP.

3. BOLTED CONNECTIONS SHALL USE BEARING TYPE ASTM A325 BOLTS (¾"ø) AND SHALL HAVE MINIMUM OF TWO BOLTS UNLESS NOTED OTHERWISE. ALL BOLTS SHALL BE GALVANIZED OR STAINLESS STEEL.

4. NON–STRUCTURAL CONNECTIONS FOR STEEL GRATING MAY USE ⅝" DIA. ASTM A 307 BOLTS (GALV) UNLESS NOTED OTHERWISE.

5. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR ENGINEER REVIEW & APPROVAL ON PROJECTS REQUIRING STRUCTURAL STEEL

6. ALL STRUCTURAL STEEL WORK SHALL BE DONE IN ACCORDANCE WITH AISC SPECIFICATIONS.

## SOIL COMPACTION NOTES FOR SLAB ON GRADE:

1. EXCAVATE AS REQUIRED TO REMOVE VEGETATION AND TOPSOIL TO EXPOSE NATURAL SUBGRADE AND PLACE CRUSHED STONE AS REQUIRED.

2. COMPACTION CERTIFICATION: AN INSPECTION AND WRITTEN CERTIFICATION BY A QUALIFIED GEOTECHNICAL TECHNICIAN OR ENGINEER IS ACCEPTABLE.

3. AS AN ALTERNATE TO INSPECTION AND WRITTEN CERTIFICATION, THE "UNDISTURBED SOIL" BASE SHALL BE COMPACTED WITH "COMPACTION EQUIPMENT", LISTED BELOW, TO AT LEAST 90% MODIFIED PROCTOR MAXIMUM DENSITY PER ASTM D 1557 METHOD C.

4. COMPACTED SUBBASE SHALL BE UNIFORM AND LEVELED. PROVIDE 6" MINIMUM CRUSHED STONE OR GRAVEL COMPACTED IN 3" LIFTS ABOVE COMPACTED SOIL. GRAVEL SHALL BE NATURAL OR CRUSHED WITH 100% PASSING #1 SIEVE.

5. AS AN ALTERNATE TO ITEMS 2 AND 3, THE SUBGRADE SOILS WITH 5 PASSES OR A MEDIUM SIZED VIBRATORY PLATE COMPACTOR (SUCH AS BOMAG BPR 30/38) OR HAND–OPERATED SINGLE DRUM VIBRATORY ROLLER (SUCH AS BOMAG BW 55E). AND SOFT AREAS THAT ARE ENCOUNTERED SHOULD BE REMOVED AND REPLACED WITH A WELL–GRADED GRANULAR FILL AND COMPACTED AS STATED ABOVE.

## COMPACTION EQUIPMENT:

1. HAND OPERATED DOUBLE DRUN, VIBRATORY ROLLER, VIBRATORY PLATE COMPACTOR OR JUMPING JACK COMPACTOR.

## CONSTRUCTION NOTES:

1. FIELD VERIFICATION:
SUBCONTRACTOR SHALL FIELD VERIFY SCOPE OF WORK, T–MOBILE ANTENNA PLATFORM LOCATION AND UTILITY TRENCHWORK.

2. COORDINATION OF WORK:
SUBCONTRACTOR SHALL COORDINATE RF WORK AND PROCEDURES WITH CONTRACTOR.

3. CABLE LADDER RACK:
SUBCONTRACTOR SHALL FURNISH AND INSTALL CABLE LADDER RACK, CABLE TRAY AND/OR ICE BRIDGE, AND CONDUIT AS REQUIRED TO SUPPORT CABLES TO THE NEW BTS LOCATION.

## ELECTRICAL INSTALLATION NOTES:

1. WIRING, RACEWAY, AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC AND TELCORDIA.

2. SUBCONTRACTOR SHALL MODIFY OR INSTALL CABLE TRAY SYSTEM AS REQUIRED TO SUPPORT RF AND TRANSPORT CABLING TO THE NEW BTS EQUIPMENT. SUBCONTRACTOR SHALL SUBMIT MODIFICATIONS TO CONTRACTOR FOR APPROVAL.

3. ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC AND TELCORDIA.

4. CABLES SHALL NOT BE ROUTED THROUGH LADDER–STYLE CABLE TRAY RUNGS.

5. EACH END OF EVERY POWER, GROUNDING, AND T1 CONDUCTOR AND CABLE SHALL BE LABELED WITH COLOR–CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2 INCH PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC AND OSHA, AND MATCH INSTALLATION REQUIREMENTS.

6. POWER PHASE CONDUCTORS (I.E., HOTS) SHALL BE LABELED WITH COLOR–CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, ½ INCH PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). PHASE CONDUCTOR COLOR CODES SHALL CONFORM WITH THE NEC AND OSHA.

7. ALL ELECTRICAL COMPONENTS SHALL BE CLEARLY LABELED WITH ENGRAVED LAMACOID PLASTIC LABELS. ALL EQUIPMENT SHALL BE LABELED WITH THEIR VOLTAGE RATING, PHASE CONFIGURATION, WIRE CONFIGURATION, POWER OR AMPACITY RATING, AND BRANCH CIRCUIT ID NUMBERS (I.E., PANELBOARD AND CIRCUIT ID'S).

8. PANELBOARDS (ID NUMBERS) AND INTERNAL CIRCUIT BREAKERS (CIRCUIT ID NUMBERS) SHALL BE CLEARLY LABELED WITH ENGRAVED LAMACOID PLASTIC LABELS.

9. ALL TIE WRAPS SHALL BE CUT FLUSH WITH APPROVED CUTTING TOOL TO REMOVE SHARP EDGES.

10. POWER, CONTROL, AND EQUIPMENT GROUND WIRING IN TUBING OR CONDUIT SHALL BE SINGLE CONDUCTOR (#34 AWG OR LARGER), 600 V, OIL RESISTANT THHN OR THWN–2, CLASS B STRANDED COPPER CABLE RATED FOR 90 °C (WET AND DRY) OPERATION; LISTED OR LABELED FOR THE LOCATION AND RACEWAY SYSTEM USED, UNLESS OTHERWISE SPECIFIED.

11. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED INDOORS SHALL BE SINGLE CONDUCTOR (#6 AWG OR LARGER), 600 V, OIL RESISTANT THHN OR THWN–2 GREEN INSULATION, CLASS B STRANDED COPPER CABLE RATED FOR 90 °C (WET AND DRY) OPERATION; LISTED OR LABELED FOR THE LOCATION AND RACEWAY SYSTEM USED, UNLESS OTHERWISE SPECIFIED.

12. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED OUTDOORS, OR BELOW GRADE, SHALL BE SINGLE CONDUCTOR #2 AWG SOLID TINNED COPPER CABLE, UNLESS OTHERWISE SPECIFIED.

13. POWER AND CONTROL WIRING, NOT IN TUBING OR CONDUIT, SHALL BE MULTI–CONDUCTOR, TYPE TC CABLE (#34 AWG OR LARGER), 600 V, OIL RESISTANT THHN OR THWN–2, CLASS B STRANDED COPPER CABLE RATED FOR 90 °C (WET AND DRY) OPERATION; WITH OUTER JACKET; LISTED OR LABELED FOR THE LOCATION USED, UNLESS OTHERWISE SPECIFIED.

14. ALL POWER AND GROUNDING CONNECTIONS SHALL BE CRIMP–STYLE, COMPRESSION WIRE LUGS AND WIRENUTS BY HARGER (OR EQUAL). LUGS AND WIRENUTS SHALL BE RATED FOR OPERATION AT NO LESS THAN 75°C (90°C IF AVAILABLE).

15. RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND NEC.

16. NEW RACEWAY OR CABLE TRAY WILL MATCH THE EXISTING INSTALLATION WHERE POSSIBLE.

17. ELECTRICAL METALLIC TUBING (EMT) OR RIGID NONMETALLIC CONDUIT (I.E., RIGID PVC SCHEDULE 40 OR RIGID PVC SCHEDULE 80 FOR LOCATIONS SUBJECT TO PHYSICAL DAMAGE) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.

18. ELECTRICAL METALLIC TUBING (EMT), ELECTRICAL NONMETALLIC TUBING (ENT), OR RIGID NONMETALLIC CONDUIT (RIGID PVC, SCHEDULE 40) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.

19. GALVANIZED STEEL INTERMEDIATE METALLIC CONDUIT (IMC) SHALL BE USED FOR OUTDOOR LOCATIONS ABOVE GRADE.

20. RIGID NONMETALLIC CONDUIT (I.E., RIGID PVC SCHEDULE 40 OR RIGID PVC SCHEDULE 80) SHALL BE USED UNDERGROUND; DIRECT BURIED, IN AREAS OF OCCASIONAL LIGHT VEHICLE TRAFFIC OR ENCASED IN REINFORCED CONCRETE IN AREAS OF HEAVY VEHICLE TRAFFIC.

21. LIQUID–TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID–TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.

22. CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION–TYPE AND APPROVED FOR THE LOCATION USED. SETSCREW FITTINGS ARE NOT ACCEPTABLE.

23. CABINETS, BOXES AND WIREWAYS SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND NEC.

24. CABINETS, BOXES AND WIREWAYS TO MATCH THE EXISTING INSTALLATION WHERE POSSIBLE.

25. WIREWAYS SHALL BE EPOXY–COATED (GRAY) AND INCLUDE A HINGED COVER, DESIGNED TO SWING OPEN DOWNWARD; SHALL BE PANDUIT TYPE E (OR EQUAL); AND RATED NEMA 1 (OR BETTER) INDOORS, OR NEMA 3R (OR BETTER) OUTDOORS.

26. EQUIPMENT CABINETS, TERMINAL BOXES, JUNCTION BOXES, AND PULL BOXES SHALL BE GALVANIZED OR EPOXY–COATED SHEET STEEL, SHALL MEET OR EXCEED UL 50, AND RATED NEMA 1 (OR BETTER) INDOORS, OR NEMA 3R (OR BETTER) OUTDOORS.

27. METAL RECEPTACLE, SWITCH, AND DEVICE BOXES SHALL BE GALVANIZED, EPOXY–COATED, OR NON–CORRODING; SHALL MEET OR EXCEED UL 514A AND NEMA OS 1; AND RATED NEMA 1 (OR BETTER) INDOORS, OR WEATHER PROTECTED (WP OR BETTER) OUTDOORS.

28. NONMETALLIC RECEPTACLE, SWITCH, AND DEVICE BOXES SHALL MEET OR EXCEED NEMA OS 2; AND RATED NEMA 1 (OR BETTER) INDOORS, OR WEATHER PROTECTED (WP OR BETTER) OUTDOORS.

29. THE SUBCONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM THE CONTRACTOR BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.

30. THE SUBCONTRACTOR SHALL PROVIDE NECESSARY TAGGING ON THE BREAKERS, CABLES AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD AGAINST LIFE AND PROPERTY.

31. ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE LOCAL CODES.

32. CONDUIT ROUTINGS ARE SCHEMATIC. SUBCONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT BLOCKED.


T-MOBILE NORTHEAST LLC
15 COMMERCE WAY, SUITE B
NORTON, MA 02766
(508) 286–2700

SBA COMMUNICATIONS CORP.
134 FLANDERS ROAD, SUITE 125
WESTBOROUGH, MA 01581
(508) 251–0720

CHAPPELL ENGINEERING ASSOCIATES, LLC
Civil ·Structural ·Land Surveying
R.K. EXECUTIVE CENTRE
201 BOSTON POST ROAD WEST, SUITE 101
MARLBOROUGH, MA 01752
(508) 481–7400
www.chappellengineering.com


STATE OF CONNECTICUT
JAMES M. FITZGERALD
No. 25937
LICENSED
PROFESSIONAL CIVIL ENGINEER
12/3/20

CHECKED BY: JMT

APPROVED BY: JMT

SUBMITTALS

| REV. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| 1 | 12/02/20 | ISSUED FOR CONSTRUCTION | CMC |
| 0 | 05/17/19 | ISSUED FOR REVIEW | JRV |

SITE NUMBER:
CTHA510A

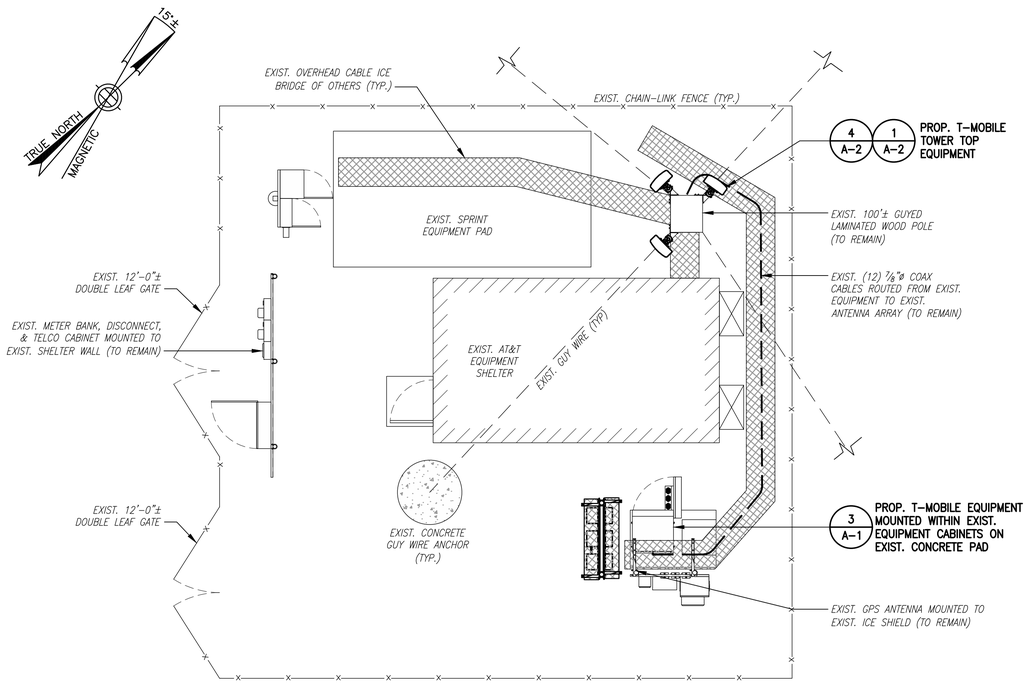
SITE ADDRESS:
277 HUCKLEBERRY HILL ROAD
AVON, CT 06001

SHEET TITLE
GENERAL NOTES

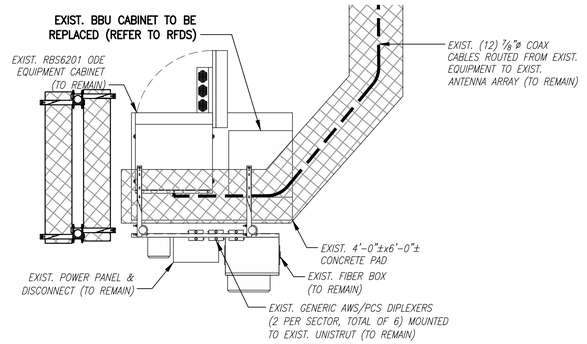
SHEET NUMBER
GN-1

1815.108

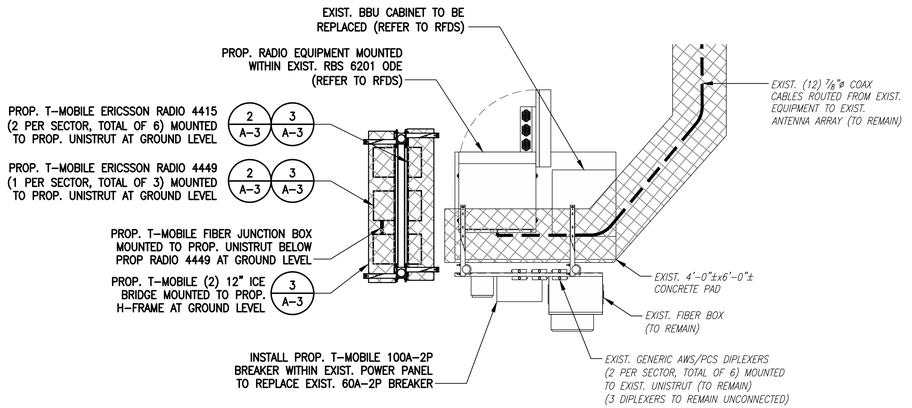
SPECIAL PRE-CONSTRUCTION WORK NOTE (SBA-PROVIDED TOWER STRUCTURAL ANALYSIS SPECIAL EQUIPMENT INSTALLATION REQUIREMENTS):
GENERAL CONTRACTOR SHALL FURNISH AND INSTALL ALL SPECIAL OR SUPPLEMENTAL ADDITIONAL TOWER-MOUNTED EQUIPMENT PER RECOMMENDATIONS FROM SBA-PROVIDED TOWER STRUCTURAL ANALYSIS FOR ANY SPECIAL SHIELDING OF TOWER TOP EQUIPMENT AND FOR ANY SPECIAL FEEDLINE BUNDLING OR RELOCATION.




## COMPOUND PLAN
1 A-1
SCALE: 1" = 5'-0"
0 5'-0" 10'-0" 15'-0"




## EXISTING EQUIPMENT PLAN
2 A-1
SCALE: 3/8" = 1'-0"
0 2'-8" 5'-4" 8'-0"




## PROPOSED EQUIPMENT PLAN
3 A-1
SCALE: 3/8" = 1'-0"
0 2'-8" 5'-4" 8'-0"


T-MOBILE NORTHEAST LLC
15 COMMERCE WAY, SUITE B
NORTON, MA 02766
(508) 286-2700

SBA COMMUNICATIONS CORP.
134 FLANDERS ROAD, SUITE 125
WESTBOROUGH, MA 01581
(508) 251-0720

CHAPPELL ENGINEERING ASSOCIATES, LLC
Civil ·Structural ·Land Surveying
R.K. EXECUTIVE CENTRE
201 BOSTON POST ROAD WEST, SUITE 101
MARLBOROUGH, MA 01752
(508) 481-7400
www.chappellengineering.com


STATE OF CONNECTICUT
JAMES M. FITZGERALD
No. 25937
LICENSED PROFESSIONAL CIVIL ENGINEER
12/3/20

CHECKED BY: JMT

APPROVED BY: JMT

SUBMITTALS

| REV. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| 1 | 12/02/20 | ISSUED FOR CONSTRUCTION | CMC |
| 0 | 05/17/19 | ISSUED FOR REVIEW | JRV |

SITE NUMBER:
CTHA510A

SITE ADDRESS:
277 HUCKLEBERRY HILL ROAD
AVON, CT 06001

SHEET TITLE
COMPOUND & EQUIPMENT PLAN

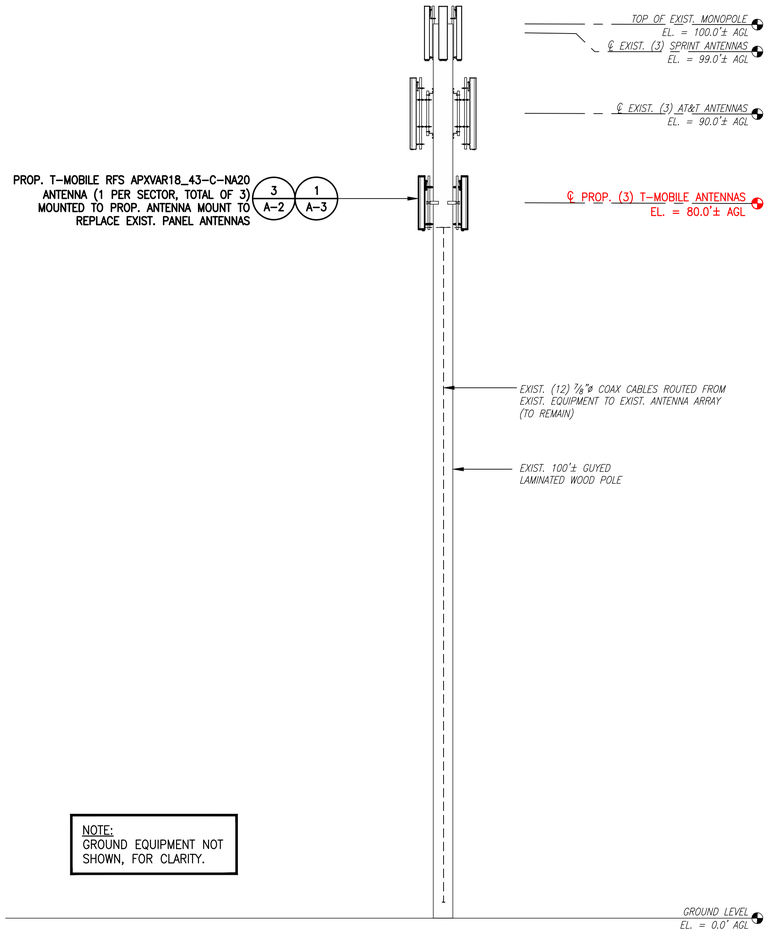
SHEET NUMBER
A-1

1815.108

SPECIAL PRE-CONSTRUCTION WORK NOTE (SBA-PROVIDED TOWER STRUCTURAL ANALYSIS SPECIAL EQUIPMENT INSTALLATION REQUIREMENTS):
GENERAL CONTRACTOR SHALL FURNISH AND INSTALL ALL SPECIAL OR SUPPLEMENTAL ADDITIONAL TOWER-MOUNTED EQUIPMENT PER RECOMMENDATIONS FROM SBA-PROVIDED TOWER STRUCTURAL ANALYSIS FOR ANY SPECIAL SHIELDING OF TOWER TOP EQUIPMENT AND FOR ANY SPECIAL FEEDLINE BUNDLING OR RELOCATION.

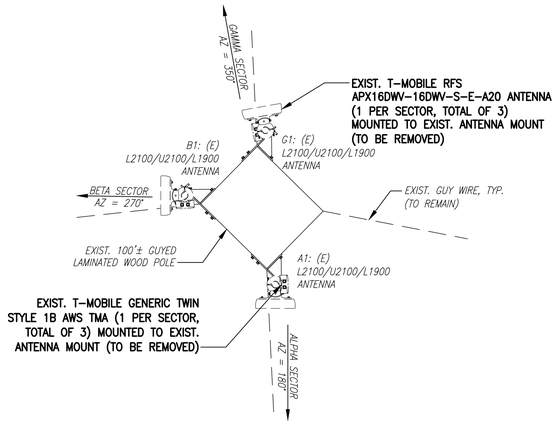
SPECIAL TOWER TOP EQUIPMENT INSTALLATION WORK NOTE (SAFETY-CLIMB ALIGNMENT REQUIREMENTS):
GENERAL CONTRACTOR SHALL ORIENT PROPOSED PLATFORM REINFORCEMENT KIT RING-MOUNTS SO THAT EXISTING SAFETY CLIMB CABLE IS NOT OBSTRUCTED/RE-ROUTED FROM VERTICAL ALIGNMENT AND IS NOT IN PHYSICAL CONTACT WITH EXISTING OR PROPOOSED RING-MOUNT HARDWARE. GENERAL CONTRACTOR SHALL INSTALL NEW OR ADDITIONAL SAFETY-CLIMB CABLE GUIDES IF ADDITIONAL CLEARANCE IS REQUIRED. ADDITIONAL CABLE GUIDES SHALL BE ATTACHED SECURELY TO THE POLE USING MECHANICAL FASTENERS OR FIELD WELDED BY A CERTIFIED WELDING TECHNICIAN.

RAD CENTER NOTE:
T-MOBILE RAD CENTER SHOWN IN RED TEXT BASED ON SBA-PROVIDED CO-LOCATION APPLICATION, EQUIPMENT DATABASE, AND STRUCTURAL ANALYSIS. THE SBA-PROVIDED ANTENNA RAD CENTER SHALL SUPERSEDE ANY CONFLICTING INFORMATION DERIVED FROM THE T-MOBILE RFDS.

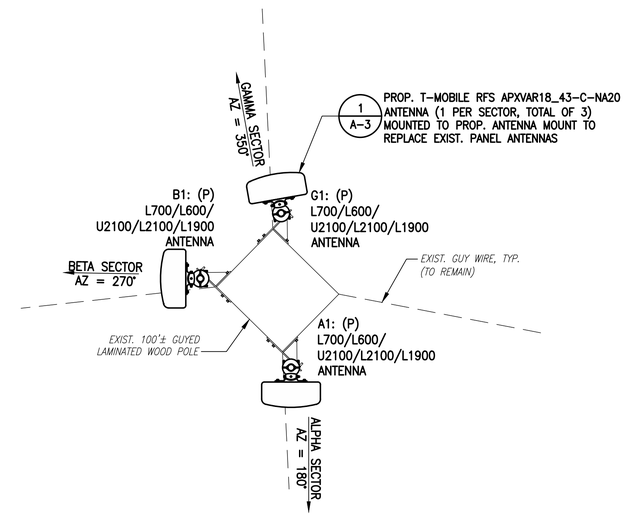



NOTE:
GROUND EQUIPMENT NOT SHOWN, FOR CLARITY.

TOWER ELEVATION
SCALE: 1/8" = 1'-0"
1
A-2
0 4' 8' 16' 24'




EXISTING ANTENNA PLAN
SCALE: 1/2" = 1'-0"
2
A-2




PROPOSED ANTENNA PLAN
SCALE: 1/2" = 1'-0"
3
A-2

NOTE:
VERIFY PROPOSED AZIMUTHS WITH RF ENGINEER PRIOR TO INSTALLATION.

ANTENNA STATUS LEGEND:

EMPTY – EMPTY PIPE

(E) – EXISTING
(P) – INSTALL
(F) – FUTURE


T-MOBILE NORTHEAST LLC
15 COMMERCE WAY, SUITE B
NORTON, MA 02766
(508) 286-2700

SBA COMMUNICATIONS CORP.
134 FLANDERS ROAD, SUITE 125
WESTBOROUGH, MA 01581
(508) 251-0720

CHAPPELL ENGINEERING ASSOCIATES, LLC
Civil ·Structural ·Land Surveying
R.K. EXECUTIVE CENTRE
201 BOSTON POST ROAD WEST, SUITE 101
MARLBOROUGH, MA 01752
(508) 481-7400
www.chappellengineering.com


STATE OF CONNECTICUT
JAMES M. FITZGERALD
No. 25997
LICENSED PROFESSIONAL CIVIL ENGINEER
12/3/20

CHECKED BY: JMT

APPROVED BY: JMT

SUBMITTALS

| REV. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| 1 | 12/02/20 | ISSUED FOR CONSTRUCTION | CMC |
| 0 | 05/17/19 | ISSUED FOR REVIEW | JRV |

SITE NUMBER:
CTHA510A

SITE ADDRESS:
277 HUCKLEBERRY HILL ROAD
AVON, CT 06001

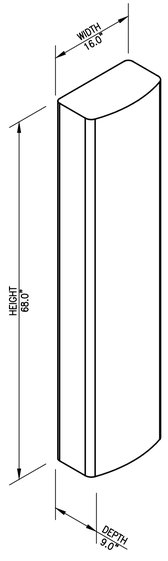
SHEET TITLE
TOWER ELEVATIONS & ANTENNA PLAN

SHEET NUMBER
A-2

1815.108

## FINAL ANTENNA CONFIGURATION

| SECTOR | ANTENNA | RAD CENTER | AZIMUTH (TRUE NORTH) | MECHANICAL DOWNTILT | ELECTRICAL DOWNTILT | BAND | RADIOS/TMAS | CABLES |
|---|---|---|---|---|---|---|---|---|
| ALPHA | RFS APXVAR18_43-C-NA20 | 80'± AGL | 180° | 0° | 2° | L600/L700 | RADIO 4449 B71+B12 (AT CABINET) | (2) 7/8" COAX CABLES |
| | | | | | | U2100/L2100/L1900 | (2) RADIO 4415 (AT CABINET) AWS/PCS DIPLEXER (AT CABINET) | (2) 7/8" COAX CABLES |
| BETA | RFS APXVAR18_43-C-NA20 | 80'± AGL | 270° | 0° | 2° | L600/L700 | RADIO 4449 B71+B12 (AT CABINET) | (2) 7/8" COAX CABLES |
| | | | | | | U2100/L2100/L1900 | (2) RADIO 4415 (AT CABINET) AWS/PCS DIPLEXER (AT CABINET) | (2) 7/8" COAX CABLES |
| GAMMA | RFS APXVAR18_43-C-NA20 | 80'± AGL | 350° | 0° | 2° | L600/L700 | RADIO 4449 B71+B12 (AT CABINET) | (2) 7/8" COAX CABLES |
| | | | | | | U2100/L2100/L1900 | (2) RADIO 4415 (AT CABINET) AWS/PCS DIPLEXER (AT CABINET) | (2) 7/8" COAX CABLES |




RFS APXVAR18_43-C-NA20 PANEL ANTENNA
DIMENSIONS: 68.0"H x 16.0"W x 9.0"D
WEIGHT: 48.4 LBS
1 PER SECTOR, TOTAL OF 3

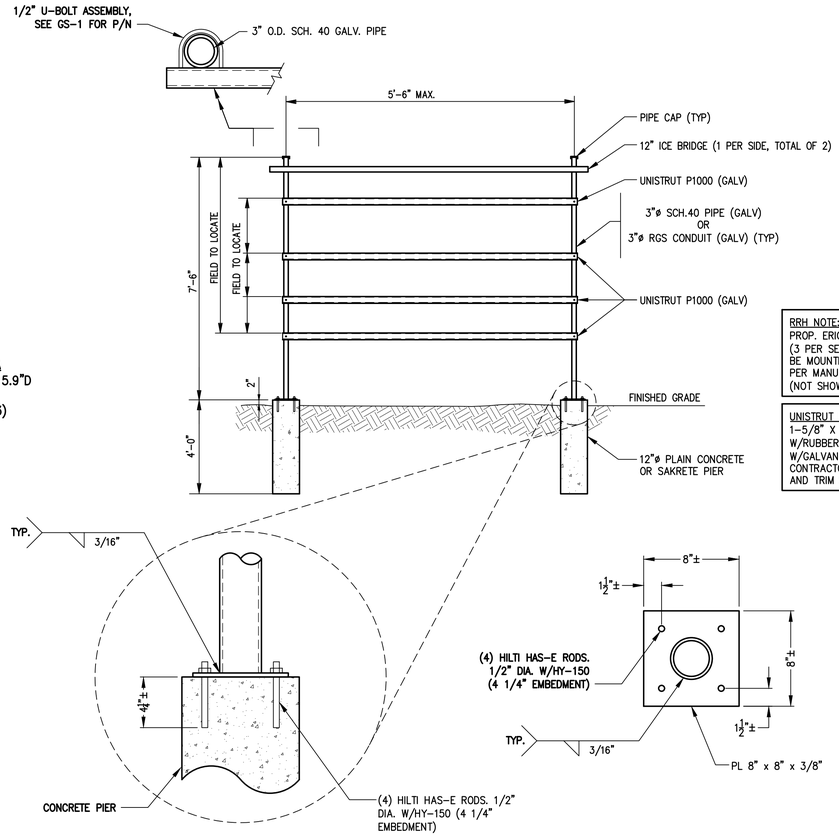
## ANTENNA DETAILS
SCALE: N.T.S.
1 / A-3

ERICSSON RRUS 4415 B25
DIMENSIONS: 16.5"H x 13.4"W x 5.9"D
WEIGHT: 46 LBS
(1 PER SECTOR, TOTAL OF 3)

ERICSSON RRUS 4415 B66A
DIMENSIONS: 16.5"H x 13.4"W x 5.9"D
WEIGHT: 46 LBS
(1 PER SECTOR, TOTAL OF 3)

ERICSSON RADIO 4449 B12+B71
DIMENSIONS: 14.9"H x 13.2"W x 9.3"D
WEIGHT: 74.0 LBS
1 PER SECTOR, TOTAL OF 3

## RRUS DETAILS
SCALE: N.T.S.
2 / A-3




RRH NOTE:
PROP. ERICSSON RRH'S (3 PER SECTOR, TOTAL OF 9) TO BE MOUNTED TO PROP H-FRAME PER MANUFACTURES REQUIREMENTS. (NOT SHOWN FOR CLARITY)

UNISTRUT NOTE:
1-5/8" X 1-5/8" GALVANIZED STEEL STRUTS W/RUBBER CAPS. FASTEN STRUT TO POST W/GALVANIZED BOLTS, WASHERS AND NUTS (TYP). CONTRACTOR TO VERIFY QUANTITY OF STRUTS NEEDED AND TRIM STRUTS TO CORRECT LENGTH IN FIELD.

## PROPOSED H-FRAME DETAIL
SCALE: NOT TO SCALE
3 / A-3


T-MOBILE NORTHEAST LLC
15 COMMERCE WAY, SUITE B
NORTON, MA 02766
(508) 286-2700

SBA COMMUNICATIONS CORP.
134 FLANDERS ROAD, SUITE 125
WESTBOROUGH, MA 01581
(508) 251-0720

CHAPPELL ENGINEERING ASSOCIATES, LLC
Civil ·Structural ·Land Surveying
R.K. EXECUTIVE CENTRE
201 BOSTON POST ROAD WEST, SUITE 101
MARLBOROUGH, MA 01752
(508) 481-7400
www.chappellengineering.com


STATE OF CONNECTICUT
JAMES M. FITZGERALD
No. 25997
LICENSED
PROFESSIONAL CIVIL ENGINEER
12/3/20

CHECKED BY: JMT

APPROVED BY: JMT

SUBMITTALS

| REV. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| 1 | 12/02/20 | ISSUED FOR CONSTRUCTION | CMC |
| 0 | 05/17/19 | ISSUED FOR REVIEW | JRV |

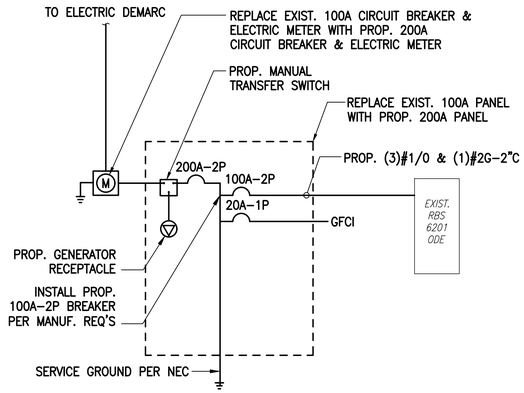
SITE NUMBER:
CTHA510A

SITE ADDRESS:
277 HUCKLEBERRY HILL ROAD
AVON, CT 06001

SHEET TITLE
SITE DETAILS

SHEET NUMBER
A-3

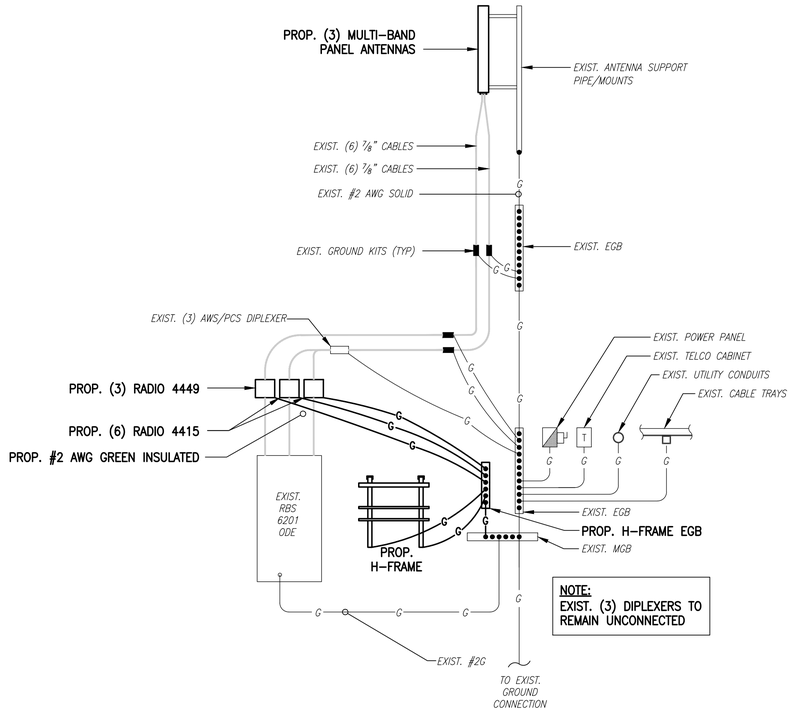
1815.108




## ONE LINE DIAGRAM

SCALE: NOT TO SCALE

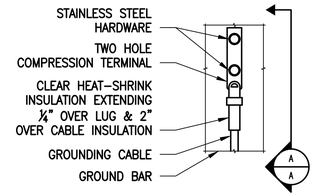
1 E-1



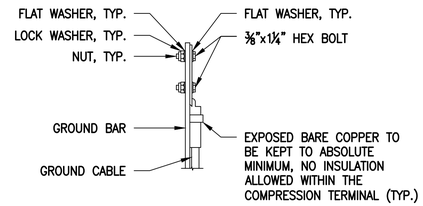

## GROUNDING RISER DIAGRAM

SCALE: NOT TO SCALE

2 E-1




**ELEVATION**



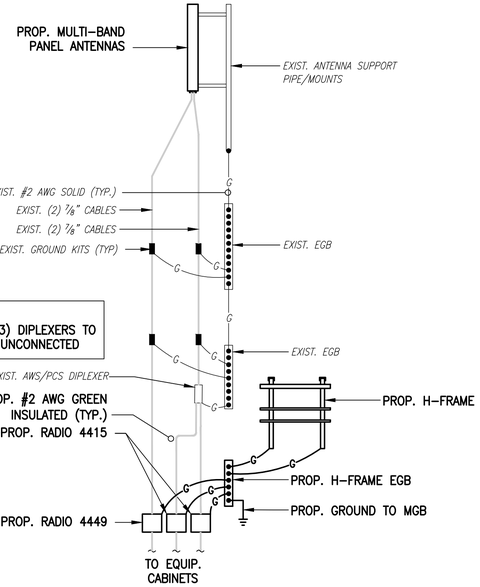

**SECTION A-A**

NOTES:
1. "DOUBLING UP" OR "STACKING" OF CONNECTION IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.
3. CADWELL DOWNLEADS FROM UPPER EGB, LOWER EGB AND MGB.

## TYPICAL GROUND BAR CONNECTIONS DETAIL

SCALE: NOT TO SCALE

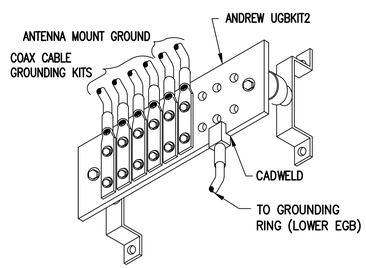
3 E-1




## COAX CABLE CONNECTION AND GROUNDING DETAIL

SCALE: NOT TO SCALE

4 E-1




## GROUND BAR (EGB)

SCALE: NOT TO SCALE

5 E-1

## ELECTRICAL AND GROUNDING NOTES

1. ALL ELECTRICAL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC) AS WELL AS APPLICABLE STATE AND LOCAL CODES.
2. ALL ELECTRICAL ITEMS SHALL BE U.L. APPROVED OR LISTED AND PROCURED PER SPECIFICATION REQUIREMENTS.
3. THE ELECTRICAL WORK INCLUDES ALL LABOR AND MATERIAL DESCRIBED BY DRAWINGS AND SPECIFICATION INCLUDING INCIDENTAL WORK TO PROVIDE COMPLETE OPERATING AND APPROVED ELECTRICAL SYSTEM.
4. GENERAL CONTRACTOR SHALL PAY FEES FOR PERMITS, AND IS RESPONSIBLE FOR OBTAINING SAID PERMITS AND COORDINATION OF INSPECTIONS.
5. ELECTRICAL AND TELCO WIRING OUTSIDE A BUILDING AND EXPOSED TO WEATHER SHALL BE IN WATER TIGHT GALVANIZED RIGID STEEL CONDUITS OR SCHEDULE 80 PVC (AS PERMITTED BY CODE) AND WHERE REQUIRED IN LIQUID TIGHT FLEXIBLE METAL OR NONMETALLIC CONDUITS.
6. BURIED CONDUIT SHALL BE SCHEDULE 40 PVC.
7. ELECTRICAL WIRING SHALL BE COPPER WITH TYPE XHHW, THWN, OR THININSULATION.
8. RUN ELECTRICAL CONDUIT OR CABLE BETWEEN ELECTRICAL UTILITY DEMARCATION POINT AND PROJECT OWNER CELL SITE PPC AS INDICATED ON THIS DRAWING. PROVIDE FULL LENGTH PULL ROPE. COORDINATE INSTALLATION WITH UTILITY COMPANY.
9. RUN TELCO CONDUIT OR CABLE BETWEEN TELEPHONE UTILITY DEMARCATION POINT AND PROJECT OWNER CELL SITE TELCO CABINET AND BTS CABINET AS INDICATED ON THIS DRAWING PROVIDE FULL LENGTH PULL ROPE IN INSTALLED TELCO CONDUIT. PROVIDE GREENLEE CONDUIT MEASURING TAPE AT EACH END.
10. WHERE CONDUIT BETWEEN BTS AND PROJECT OWNER CELL SITE PPC AND BETWEEN BTS AND PROJECT OWNER CELL SITE TELCO SERVICE CABINET ARE UNDERGROUND USE PVC, SCHEDULE 40 CONDUIT. ABOVE THE GROUND PORTION OF THESE CONDUITS SHALL BE PVC CONDUIT.
11. ALL EQUIPMENT LOCATED OUTSIDE SHALL HAVE NEMA 3R ENCLOSURE.
12. PPC SUPPLIED BY PROJECT OWNER.
13. GROUNDING SHALL COMPLY WITH NEC ART. 250. ADDITIONALLY, GROUNDING, BONDING AND LIGHTNING PROTECTION SHALL BE DONE IN ACCORDANCE WITH "T-MOBILE BTS SITE GROUNDING STANDARDS".
14. GROUND COAXIAL CABLE SHIELDS MINIMUM AT BOTH ENDS USING MANUFACTURERS COAX CABLE GROUNDING KITS SUPPLIED BY PROJECT OWNER.
15. USE #6 COPPER STRANDED WIRE WITH GREEN COLOR INSULATION FOR ABOVE GRADE GROUNDING (UNLESS OTHERWISE SPECIFIED) AND #2 SOLID TINNED BARE COPPER WIRE FOR BELOW GRADE GROUNDING AS INDICATED ON THE DRAWING.
16. ALL GROUND CONNECTIONS TO BE BURNDY HYGROUND COMPRESSION TYPE CONNECTORS OR CADWELD EXOTHERMIC WELD. DO NOT ALLOW BARE COPPER WIRE TO BE IN CONTACT WITH GALVANIZED STEEL.
17. ROUTE GROUNDING CONDUCTORS ALONG THE SHORTEST AND STRAIGHTEST PATH POSSIBLE, EXCEPT AS OTHERWISE INDICATED. GROUNDING LEADS SHOULD NEVER BE BENT AT RIGHT ANGLE. ALWAYS MAKE AT LEAST 12" RADIUS BENDS. #6 WIRE CAN BE BENT AT 6" RADIUS WHEN NECESSARY. BOND ANY METAL OBJECTS WITHIN 6 FEET OF PROJECT OWNER EQUIPMENT OR CABINET TO MASTER GROUND BAR OR GROUNDING RING.
18. CONNECTIONS TO GROUND BARS SHALL BE MADE WITH TWO HOLE COMPRESSION TYPE COPPER LUGS. APPLY OXIDE INHIBITING COMPOUND TO ALL LOCATIONS.
19. APPLY OXIDE INHIBITING COMPOUND TO ALL COMPRESSION TYPE GROUND CONNECTIONS.
20. CONTRACTOR SHALL PROVIDE AND INSTALL OMNI DIRECTIONAL ELECTRONIC MARKER SYSTEM (EMS) BALLS OVER EACH GROUND ROD AND BONDING POINT BETWEEN EXIST. TOWER/ MONOPOLE GROUNDING RING AND EQUIPMENT GROUNDING RING.
21. CONTRACTOR SHALL TEST COMPLETED GROUND SYSTEM AND RECORD RESULTS FOR PROJECT CLOSE-OUT DOCUMENTATION. 5 OHMNS MINIMUM RESISTANCE REQUIRED.
22. CONTRACTOR SHALL CONDUCT ANTENNA, COAX, AND LNA RETURN-LOSS AND DISTANCE- TO-FAULT MEASUREMENTS (SWEEP TESTS) AND RECORD RESULTS FOR PROJECT CLOSE OUT.


T-MOBILE NORTHEAST LLC
15 COMMERCE WAY, SUITE B
NORTON, MA 02766
(508) 286-2700

SBA
SBA COMMUNICATIONS CORP.
134 FLANDERS ROAD, SUITE 125
WESTBOROUGH, MA 01581
(508) 251-0720

CHAPPELL ENGINEERING ASSOCIATES, LLC
Civil ·Structural ·Land Surveying
R.K. EXECUTIVE CENTRE
201 BOSTON POST ROAD WEST, SUITE 101
MARLBOROUGH, MA 01752
(508) 481-7400
www.chappellengineering.com


STATE OF CONNECTICUT
JAMES M. FITZGERALD
No. 25937
LICENSED PROFESSIONAL CIVIL ENGINEER
12/3/20

CHECKED BY: JMT

APPROVED BY: JMT

SUBMITTALS

| REV. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| 1 | 12/02/20 | ISSUED FOR CONSTRUCTION | CMC |
| 0 | 05/17/19 | ISSUED FOR REVIEW | JRV |

SITE NUMBER:
CTHA510A

SITE ADDRESS:
277 HUCKLEBERRY HILL ROAD
AVON, CT 06001

SHEET TITLE
ELECTRIC & GROUNDING DETAILS

SHEET NUMBER
E-1

1815.108

# EXHIBIT 7

Tower Engineering Solutions
Phone (972) 483-0607, Fax (972) 975-9615
1320 Greenway Drive, Suite 600, Irving, Texas 75038

# Structural Analysis Report

**Existing 100 ft Guyed Laminated Wood Pole**

**Customer Name: SBA Communications Corp**

**Customer Site Number: CT46143-A**

**Customer Site Name: Burlington - Avon Landfill**

**Carrier Name: T-Mobile (App#: 116800, v2)**

**Carrier Site ID / Name: CTHA510A / Burlington-Avon Landfill**

**Site Location: 277 Huckleberry Hill Road**

**Avon, Connecticut**

**Hartford County**

**Latitude: 41.788055**

**Longitude: -72.918166**


**Analysis Result:**

**Max Structural Usage: 86.1% [Pass]**

**Max Foundation Usage: 82.0% [Pass]**

**Additional Usage Caused by New Mount/Mount Modification: N/A**

**Report Prepared By: Sital Shrestha**

## Introduction

The purpose of this report is to summarize the analysis results on the 100 ft Guyed Laminated Wood Pole to support the proposed antennas and transmission lines in addition to those currently installed. Any modification listed under Sources of Information was assumed completed and was included in this analysis.

## Sources of Information

| | |
|---|---|
| **Tower Drawings** | Laminated Wood Systems, Inc. (DWG No. SPSM-0079) original design drawings dated April 7, 2005 |
| **Foundation Drawing** | Laminated Wood Systems, Inc. (DWG No. SPSM-0079) original design drawings dated April 7, 2005 |
| **Geotechnical Report** | Dr. Clarence Welti, P.E., P.C. Geotechnical Engineering (Project Name Avon Landfill Sprint Site) geotechnical report dated March 25, 2005 |
| **Modification Drawings** | FDH, Project # 1309511400, Dated 6/28/2013<br>FDH, Project # 146EW81400, Dated 10/23/2014<br>TES Job # 36667, Dated 3/19/18 |

## Analysis Criteria

The rigorous analysis was performed in accordance with the requirements and stipulations of the ANSI/TIA/EIA 222-G**.** In accordance with this standard, the structure was analyzed using **tnxTower**. The program considers the structure as an elastic 3-D model with second-order effects and temperature effects incorporated in the analysis. The analysis was performed using multiple wind directions.

| | |
|---|---|
| **Wind Speed Used in the Analysis:** | Ultimate Design Wind Speed $V_{ult}$ = 125.0 mph (3-Sec. Gust)/ Nominal Design Wind Speed $V_{asd}$ = 97.0 mph (3-Sec. Gust) |
| **Wind Speed with Ice:** | 50 mph (3-Sec. Gust) with 1” radial ice concurrent |
| **Operational Wind Speed:** | 60 mph + 0” Radial ice |
| **Standard/Codes:** | ANSI/TIA/EIA 222-G / 2015 IBC / 2018 Connecticut State Building Code |
| **Exposure Category:** | C |
| **Structure Class:** | II |
| **Topographic Category:** | 1 |
| **Crest Height:** | 0 ft |

This structural analysis is based upon the tower being classified as a Structure Class II; however, if a different classification is required subsequent to the date hereof, the tower classification will be changed to meet such requirement and a new structural analysis will be run.

## Existing Antennas, Mounts and Transmission Lines

The table below summarizes the antennas, mounts and transmission lines that were considered in the analysis as existing on the tower.

| Items | Elevation (ft) | Qty. | Antenna Descriptions | Mount Type & Qty. | Transmission Lines | Owner |
|---|---|---|---|---|---|---|
| 1 | 99.0 | 3 | Andrew DHHTT65B-3XR - Panel | (3) Flush Mounts | (4) 1-1/4" | Sprint Nextel |
| 2 | | 4 | RFS ACU-A20-N RET | | | |
| 3 | | 3 | ALU 1900MHz RRH | | | |
| 4 | | 3 | ALU 800 MHz RRH | | | |
| 5 | | 3 | ALU TD-RRH8x20-25 | | | |
| 6 | | 3 | ALU 800 MHz Filter | | | |
| 7 | 90.0 | 3 | Andrew SBNHH-1D65C | (3) Flush Mounts | (1) 7/16" Fiber* (2) 3/4" DC* (6) 1 5/8" | AT&T |
| 8 | | 3 | Powerwave LGP21401 TMA | | | |
| 9 | | 3 | Cci TMABPD7823VG12A | | | |
| 10 | | 3 | Andrew APTDC-BDFDM-DBW | | | |
| - | 80.0 | 3 | RFS APXV16DWV-16DWVS-C - Panel | (3) Flush Mounts | (12) 7/8" | T-Mobile |
| - | | 6 | RFS ATMAA1412D-1A20 - TMA | | | |

*(1) 3" Conduit housing (2) 3/4" DC and (1) 7/16" fiber cables.

## Proposed Carrier's Final Configuration of Antennas, Mounts and Transmission Lines

Information pertaining to the proposed carrier's final configuration of antennas and transmission lines was provided by SBA Communications Corp. The proposed antennas and lines are listed below.

| Items | Elevation (ft) | Qty. | Antenna Descriptions | Mount Type & Qty. | Transmission Lines | Owner |
|---|---|---|---|---|---|---|
| 11 | 80.0 | 3 | RFS APXVAR18_43-C-NA20 | (3) Flush Mounts | (12) 7/8" Coax | T-Mobile |
| 12 | | 6 | RFS ATMAA1412D-A1A20 | | | |

See the attached coax layout for the line placement considered in the analysis.

## Analysis Results

The results of the structural analysis, performed for the wind and ice loading and antenna equipment as defined above, are summarized as the following:

| | Pole shafts | Guy Wires |
|---|---|---|
| Max. Usage: | **72.7%** | **86.1%** |
| Pass/Fail | **Pass** | **Pass** |

## Foundations

| | Base Reactions | | | Anchors | |
|---|---|---|---|---|---|
| | Moment (Kip-Ft) | Shear (Kips) | Axial (Kips) | Uplift (Kips) | Shear (Kips) |
| Analysis Reactions | 154 | 5.9 | 91.9 | 38.2 | 15.9 |

The foundation has been investigated using the supplied documents and soils report and was found adequate. Therefore, no modification to the foundation will be required.

## Conclusions

Based on the analysis results, the existing structure and its foundation were found to be adequate to safely support the existing and proposed equipment and meet the minimum requirements per the ANSI/TIA-222-G standards and the 2015 IBC under the design basic wind speed specified in the Analysis Criteria.

# Standard Conditions

1. This analysis was performed based on the information supplied to **(TES) Tower Engineering Solutions, LLC.** Verification of the information provided was not included in the Scope of Work for **TES**. The accuracy of the analysis is dependent on the accuracy of the information provided.

2. The structural analysis was performance based upon the evidence available at the time of this report. All information provided by the client is considered to be accurate.

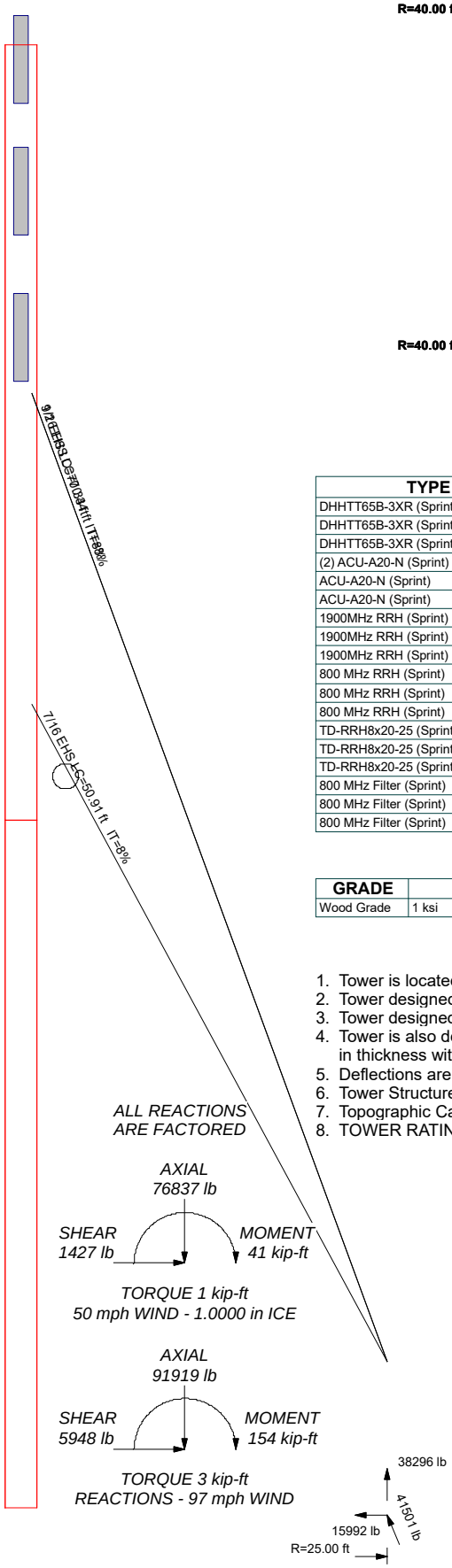
3. The analyses will be performed based on the codes as specified by the client or based on the best knowledge of the engineering staff of **TES**. In the absence of information to the contrary, all work will be performed in accordance with the latest relevant revision of ANSI/TIA-222. If wind speed and/or ice loads are different from the minimum values recommended by the EIA/TIA-222 standard or other codes, **TES** should be notified in writing and the applicable minimum values provided by the client.

4. The configuration of the existing mounts, antennas, coax and other appurtenances were supplied by the customer for the current structural analysis. **TES** has not visited the tower site to verify the adequacy of the information provided. If there is any discrepancy found in the report regarding the existing conditions, **TES** should be notified immediately to evaluate the effect of the discrepancy on the analysis results.

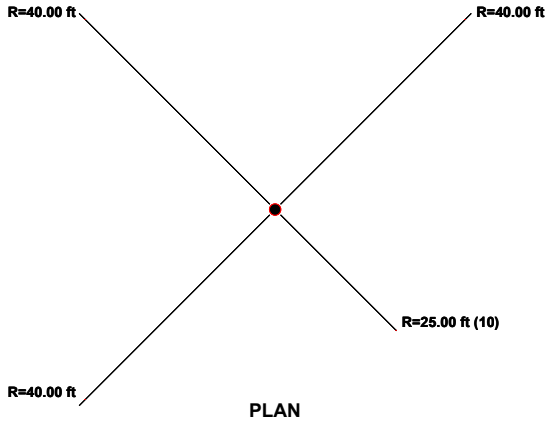
5. The client will assume responsibility for rework associated with the differences in initially provided information, including tower and foundation information, existing and/or proposed equipment and transmission lines.

6. If a feasibility analysis was performed, final acceptance of changed conditions shall be based upon a rigorous structural analysis.

| Section | Length (ft) | Number of Sides | Thickness (in) | Top Dia (in) | Bot Dia (in) | Grade | Weight (lb) |
|---|---|---|---|---|---|---|---|
| 1 | 53.00 | 1 | 13.1250 | 26.2500 | 26.2500 | Wood Grade | 7967.5 |
| 2 | 47.00 | 1 | 13.1250 | 26.2500 | 26.2500 | | 7065.5 |
| | | | | | | | 15033.0 |




ALL REACTIONS ARE FACTORED




PLAN

## DESIGNED APPURTENANCE LOADING

| TYPE | ELEVATION | TYPE | ELEVATION |
|---|---|---|---|
| DHHTT65B-3XR (Sprint) | 99 | SBNHH-1D65C (ATI) | 90 |
| DHHTT65B-3XR (Sprint) | 99 | SBNHH-1D65C (ATI) | 90 |
| DHHTT65B-3XR (Sprint) | 99 | SBNHH-1D65C (ATI) | 90 |
| (2) ACU-A20-N (Sprint) | 99 | APTDC-BDFDM-DBW (ATI) | 90 |
| ACU-A20-N (Sprint) | 99 | APTDC-BDFDM-DBW (ATI) | 90 |
| ACU-A20-N (Sprint) | 99 | APTDC-BDFDM-DBW (ATI) | 90 |
| 1900MHz RRH (Sprint) | 99 | LGP21401 (ATI) | 90 |
| 1900MHz RRH (Sprint) | 99 | LGP21401 (ATI) | 90 |
| 1900MHz RRH (Sprint) | 99 | LGP21401 (ATI) | 90 |
| 800 MHz RRH (Sprint) | 99 | TMABPD7823VG12A (ATI) | 90 |
| 800 MHz RRH (Sprint) | 99 | TMABPD7823VG12A (ATI) | 90 |
| 800 MHz RRH (Sprint) | 99 | TMABPD7823VG12A (ATI) | 90 |
| TD-RRH8x20-25 (Sprint) | 99 | APXVAR18_43-C-NA20 (T-Mobile) | 80 |
| TD-RRH8x20-25 (Sprint) | 99 | APXVAR18_43-C-NA20 (T-Mobile) | 80 |
| TD-RRH8x20-25 (Sprint) | 99 | APXVAR18_43-C-NA20 (T-Mobile) | 80 |
| 800 MHz Filter (Sprint) | 99 | (2) ATMAA1412D-1A20 (T-Mobile) | 80 |
| 800 MHz Filter (Sprint) | 99 | (2) ATMAA1412D-1A20 (T-Mobile) | 80 |
| 800 MHz Filter (Sprint) | 99 | (2) ATMAA1412D-1A20 (T-Mobile) | 80 |

## MATERIAL STRENGTH

| GRADE | Fy | Fu | GRADE | Fy | Fu |
|---|---|---|---|---|---|
| Wood Grade | 1 ksi | 2 ksi | | | |

## TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 86.1%


**Tower Engineering Solutions**
1320 Greenway Drive, Ste. 600
Irving, TX 75038
Phone: (972) 483-0807
FAX:


| | | |
|---|---|---|
| Job: CT46143-A | | |
| Project: 98772 | | |
| Client: T-Mobile | Drawn by: sital.shrestha | App'd: |
| Code: TIA-222-G | Date: 10/16/20 | Scale: NTS |
| Path: R:\CT46143-A-SBA\Miscellaneous\98772\tnx\CT46143-A-SBA_78523_Guyed Wood Pole (26,25).eri | | Dwg No. E-1 |

# Guy-Tensioning Information

| Guy Elevation | | H | V | Temperature At Time Of Tensioning: 0 F Initial Tension | 0 F Intercept | 20 F Initial Tension | 20 F Intercept | 40 F Initial Tension | 40 F Intercept | 60 F Initial Tension | 60 F Intercept | 80 F Initial Tension | 80 F Intercept | 100 F Initial Tension | 100 F Intercept | 120 F Initial Tension | 120 F Intercept |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ft | | ft | ft | lb | ft | lb | ft | lb | ft | lb | ft | lb | ft | lb | ft | lb | ft |
| 76.15 | A | 38.91 | 76.15 | 2404 | 0.78 | 2320 | 0.81 | 2236 | 0.84 | 2152 | 0.87 | 2068 | 0.90 | 1985 | 0.94 | 1901 | 0.98 |
| | B | 38.91 | 76.15 | 2404 | 0.78 | 2320 | 0.81 | 2236 | 0.84 | 2152 | 0.87 | 2068 | 0.90 | 1985 | 0.94 | 1901 | 0.98 |
| | C | 23.91 | 66.15 | 2293 | 0.55 | 2246 | 0.56 | 2199 | 0.58 | 2152 | 0.59 | 2105 | 0.60 | 2058 | 0.62 | 2011 | 0.63 |
| | D | 38.91 | 76.15 | 2404 | 0.78 | 2320 | 0.81 | 2236 | 0.84 | 2152 | 0.87 | 2068 | 0.90 | 1985 | 0.94 | 1901 | 0.98 |
| 54.95 | A | 38.91 | 54.95 | 1978 | 0.45 | 1873 | 0.48 | 1768 | 0.51 | 1664 | 0.54 | 1560 | 0.58 | 1456 | 0.62 | 1352 | 0.66 |
| | B | 38.91 | 54.95 | 1978 | 0.45 | 1873 | 0.48 | 1768 | 0.51 | 1664 | 0.54 | 1560 | 0.58 | 1456 | 0.62 | 1352 | 0.66 |
| | C | 23.91 | 44.95 | 1872 | 0.27 | 1803 | 0.29 | 1733 | 0.30 | 1664 | 0.31 | 1595 | 0.32 | 1525 | 0.34 | 1456 | 0.35 |
| | D | 38.91 | 54.95 | 1978 | 0.45 | 1873 | 0.48 | 1768 | 0.51 | 1664 | 0.54 | 1560 | 0.58 | 1456 | 0.62 | 1352 | 0.66 |
| 76.15 | A | 38.91 | 76.15 | 3127 | 0.78 | 3018 | 0.81 | 2909 | 0.84 | 2800 | 0.87 | 2691 | 0.90 | 2583 | 0.94 | 2475 | 0.98 |
| | B | 38.91 | 76.15 | 3127 | 0.78 | 3018 | 0.81 | 2909 | 0.84 | 2800 | 0.87 | 2691 | 0.90 | 2583 | 0.94 | 2475 | 0.98 |
| | C | 23.91 | 66.15 | 2983 | 0.55 | 2922 | 0.56 | 2861 | 0.58 | 2800 | 0.59 | 2739 | 0.60 | 2678 | 0.61 | 2617 | 0.63 |
| | D | 38.91 | 76.15 | 3127 | 0.78 | 3018 | 0.81 | 2909 | 0.84 | 2800 | 0.87 | 2691 | 0.90 | 2583 | 0.94 | 2475 | 0.98 |

# Tower Pressures - No Ice

$G_H$ = 1.100

| Section Elevation | z | $K_Z$ | $q_z$ | $A_G$ | Face | $A_F$ | $A_R$ | $A_{leg}$ | Leg % | $C_AA_A$ In Face | $C_AA_A$ Out Face |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ft | ft | | psf | $ft^2$ | | $ft^2$ | $ft^2$ | $ft^2$ | | $ft^2$ | $ft^2$ |
| L1 | 74.01 | 1.188 | 27 | 115.938 | A | 0.000 | 193.268 | 193.268 | 100.00 | 39.204 | 0.000 |
| 100.00-47.00 | | | | | B | 0.000 | 193.268 | | 100.00 | 0.000 | 0.000 |
| | | | | | C | 0.000 | 193.268 | | 100.00 | 51.084 | 0.000 |
| | | | | | D | 0.000 | 193.268 | | 100.00 | 26.000 | 0.000 |
| L2 47.00-0.00 | 24.55 | 0.942 | 21 | 102.813 | A | 0.000 | 171.388 | 171.388 | 100.00 | 55.836 | 0.000 |
| | | | | | B | 0.000 | 171.388 | | 100.00 | 0.000 | 0.000 |
| | | | | | C | 0.000 | 171.388 | | 100.00 | 55.836 | 0.000 |
| | | | | | D | 0.000 | 171.388 | | 100.00 | 23.500 | 0.000 |

# Tower Pressure - With Ice

$G_H$ = 1.100

| Section Elevation | z | $K_Z$ | $q_z$ | $t_Z$ | $A_G$ | Face | $A_F$ | $A_R$ | $A_{leg}$ | Leg % | $C_AA_A$ In Face | $C_AA_A$ Out Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ft | ft | | psf | in | $ft^2$ | | $ft^2$ | $ft^2$ | $ft^2$ | | $ft^2$ | $ft^2$ |
| L1 100.00-47.00 | 74.01 | 1.188 | 7 | 2.1682 | 135.090 | A | 0.000 | 225.195 | 225.195 | 100.00 | 66.893 | 0.000 |
| | | | | | | B | 0.000 | 225.195 | | 100.00 | 0.000 | 0.000 |
| | | | | | | C | 0.000 | 225.195 | | 100.00 | 147.441 | 0.000 |
| | | | | | | D | 0.000 | 225.195 | | 100.00 | 60.687 | 0.000 |
| L2 47.00-0.00 | 24.55 | 0.942 | 6 | 1.9417 | 118.022 | A | 0.000 | 196.743 | 196.743 | 100.00 | 92.610 | 0.000 |
| | | | | | | B | 0.000 | 196.743 | | 100.00 | 0.000 | 0.000 |
| | | | | | | C | 0.000 | 196.743 | | 100.00 | 147.365 | 0.000 |
| | | | | | | D | 0.000 | 196.743 | | 100.00 | 52.190 | 0.000 |

## Tower Pressure - Service

$G_H$ = 1.100

| Section Elevation ft | z ft | $K_Z$ | $q_z$ psf | $A_G$ ft² | Face | $A_F$ ft² | $A_R$ ft² | $A_{leg}$ ft² | Leg % | $C_AA_A$ In Face ft² | $C_AA_A$ Out Face ft² |
|---|---|---|---|---|---|---|---|---|---|---|---|
| L1 | 74.01 | 1.188 | 9 | 115.938 | A | 0.000 | 193.268 | 193.268 | 100.00 | 39.204 | 0.000 |
| 100.00-47.00 | | | | | B | 0.000 | 193.268 | | 100.00 | 0.000 | 0.000 |
| | | | | | C | 0.000 | 193.268 | | 100.00 | 51.084 | 0.000 |
| | | | | | D | 0.000 | 193.268 | | 100.00 | 26.000 | 0.000 |
| L2 47.00-0.00 | 24.55 | 0.942 | 7 | 102.813 | A | 0.000 | 171.388 | 171.388 | 100.00 | 55.836 | 0.000 |
| | | | | | B | 0.000 | 171.388 | | 100.00 | 0.000 | 0.000 |
| | | | | | C | 0.000 | 171.388 | | 100.00 | 55.836 | 0.000 |
| | | | | | D | 0.000 | 171.388 | | 100.00 | 23.500 | 0.000 |

## Tower Forces - No Ice - Wind Normal To Face

| Section Elevation ft | Add Weight lb | Self Weight lb | Face | e | $C_F$ | $q_z$ psf | $D_F$ | $D_R$ | $A_E$ ft² | F lb | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L1 | 875.11 | 7967.50 | A | 1 | 0.6 | 27 | 1 | 1 | 193.268 | 7952.09 | 150.04 | D |
| 100.00-47.00 | | | B | 1 | 1.2 | | 1 | 1 | 193.268 | | | |
| | | | C | 1 | 0.6 | | 1 | 1 | 193.268 | | | |
| | | | D | 1 | 1.2 | | 1 | 1 | 193.268 | | | |
| L2 47.00-0.00 | 1064.55 | 7065.52 | A | 1 | 0.6 | 21 | 1 | 1 | 171.388 | 5923.25 | 126.03 | D |
| | | | B | 1 | 1.2 | | 1 | 1 | 171.388 | | | |
| | | | C | 1 | 0.6 | | 1 | 1 | 171.388 | | | |
| | | | D | 1 | 1.2 | | 1 | 1 | 171.388 | | | |
| Sum Weight: | 1939.66 | 15033.01 | | | | | | | | 13875.34 | | |

## Tower Forces - No Ice - Wind 45 To Face

| Section Elevation ft | Add Weight lb | Self Weight lb | Face | e | $C_F$ | $q_z$ psf | $D_F$ | $D_R$ | $A_E$ ft² | F lb | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L1 | 875.11 | 7967.50 | A | 1 | 0.6 | 27 | 1 | 1 | 193.268 | 3452.81 | 65.15 | D |
| 100.00-47.00 | | | B | 1 | 0.6 | | 1 | 1 | 193.268 | | | |
| | | | C | 1 | 0.6 | | 1 | 1 | 193.268 | | | |
| | | | D | 1 | 0.6 | | 1 | 1 | 193.268 | | | |
| L2 47.00-0.00 | 1064.55 | 7065.52 | A | 1 | 0.6 | 21 | 1 | 1 | 171.388 | 2415.21 | 51.39 | D |
| | | | B | 1 | 0.6 | | 1 | 1 | 171.388 | | | |
| | | | C | 1 | 0.6 | | 1 | 1 | 171.388 | | | |
| | | | D | 1 | 0.6 | | 1 | 1 | 171.388 | | | |
| Sum Weight: | 1939.66 | 15033.01 | | | | | | | | 5868.02 | | |

## Tower Forces - With Ice - Wind Normal To Face

| Section Elevation<br>ft | Add Weight<br>lb | Self Weight<br>lb | Face | e | $C_F$ | $q_z$<br>psf | $D_F$ | $D_R$ | $A_E$<br>$ft^2$ | F<br>lb | w<br>plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L1 | 5555.86 | 11957.33 | A | 1 | 1.2 | 7 | 1 | 1 | 225.195 | 2877.02 | 54.28 | D |
| 100.00-47.00 | | | B | 1 | 1.2 | | 1 | 1 | 225.195 | | | |
| | | | C | 1 | 1.2 | | 1 | 1 | 225.195 | | | |
| | | | D | 1 | 1.2 | | 1 | 1 | 225.195 | | | |
| L2 47.00-0.00 | 5807.83 | 10208.71 | A | 1 | 1.2 | 6 | 1 | 1 | 196.743 | 2119.63 | 45.10 | D |
| | | | B | 1 | 1.2 | | 1 | 1 | 196.743 | | | |
| | | | C | 1 | 1.2 | | 1 | 1 | 196.743 | | | |
| | | | D | 1 | 1.2 | | 1 | 1 | 196.743 | | | |
| Sum Weight: | 11363.68 | 22166.04 | | | | | | | | 4996.66 | | |

## Tower Forces - With Ice - Wind 45 To Face

| Section Elevation<br>ft | Add Weight<br>lb | Self Weight<br>lb | Face | e | $C_F$ | $q_z$<br>psf | $D_F$ | $D_R$ | $A_E$<br>$ft^2$ | F<br>lb | w<br>plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L1 | 5555.86 | 11957.33 | A | 1 | 1.2 | 7 | 1 | 1 | 225.195 | 2137.96 | 40.34 | D |
| 100.00-47.00 | | | B | 1 | 1.2 | | 1 | 1 | 225.195 | | | |
| | | | C | 1 | 1.2 | | 1 | 1 | 225.195 | | | |
| | | | D | 1 | 1.2 | | 1 | 1 | 225.195 | | | |
| L2 47.00-0.00 | 5807.83 | 10208.71 | A | 1 | 1.2 | 6 | 1 | 1 | 196.743 | 1473.33 | 31.35 | D |
| | | | B | 1 | 1.2 | | 1 | 1 | 196.743 | | | |
| | | | C | 1 | 1.2 | | 1 | 1 | 196.743 | | | |
| | | | D | 1 | 1.2 | | 1 | 1 | 196.743 | | | |
| Sum Weight: | 11363.68 | 22166.04 | | | | | | | | 3611.29 | | |

## Tower Forces - Service - Wind Normal To Face

| Section Elevation<br>ft | Add Weight<br>lb | Self Weight<br>lb | Face | e | $C_F$ | $q_z$<br>psf | $D_F$ | $D_R$ | $A_E$<br>$ft^2$ | F<br>lb | w<br>plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L1 | 875.11 | 7967.50 | A | 1 | 0.6 | 9 | 1 | 1 | 193.268 | 2722.30 | 51.36 | D |
| 100.00-47.00 | | | B | 1 | 1.2 | | 1 | 1 | 193.268 | | | |
| | | | C | 1 | 0.6 | | 1 | 1 | 193.268 | | | |
| | | | D | 1 | 1.2 | | 1 | 1 | 193.268 | | | |
| L2 47.00-0.00 | 1064.55 | 7065.52 | A | 1 | 0.6 | 7 | 1 | 1 | 171.388 | 2027.75 | 43.14 | D |
| | | | B | 1 | 1.2 | | 1 | 1 | 171.388 | | | |
| | | | C | 1 | 0.6 | | 1 | 1 | 171.388 | | | |
| | | | D | 1 | 1.2 | | 1 | 1 | 171.388 | | | |
| Sum Weight: | 1939.66 | 15033.01 | | | | | | | | 4750.05 | | |

## Tower Forces - Service - Wind 45 To Face

| Section Elevation<br>ft | Add Weight<br>lb | Self Weight<br>lb | Face | e | $C_F$ | $q_z$<br>psf | $D_F$ | $D_R$ | $A_E$<br>$ft^2$ | F<br>lb | w<br>plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L1 | 875.11 | 7967.50 | A | 1 | 0.6 | 9 | 1 | 1 | 193.268 | 1182.03 | 22.30 | D |
| 100.00-47.00 | | | B | 1 | 0.6 | | 1 | 1 | 193.268 | | | |
| | | | C | 1 | 0.6 | | 1 | 1 | 193.268 | | | |
| | | | D | 1 | 0.6 | | 1 | 1 | 193.268 | | | |
| L2 47.00-0.00 | 1064.55 | 7065.52 | A | 1 | 0.6 | 7 | 1 | 1 | 171.388 | 826.82 | 17.59 | D |
| | | | B | 1 | 0.6 | | 1 | 1 | 171.388 | | | |
| | | | C | 1 | 0.6 | | 1 | 1 | 171.388 | | | |
| | | | D | 1 | 0.6 | | 1 | 1 | 171.388 | | | |
| Sum Weight: | 1939.66 | 15033.01 | | | | | | | | 2008.84 | | |

## Force Totals (Does not include forces on guys)

| Load Case | Vertical Forces<br>lb | Sum of Forces X<br>lb | Sum of Forces Z<br>lb | Sum of Torques<br>kip-ft |
|---|---|---|---|---|
| Leg Weight | 15033.01 | | | |
| Bracing Weight | 0.00 | | | |
| Total Member Self-Weight | 15033.01 | | | |
| Guy Weight | 488.90 | | | |
| Total Weight | 18811.23 | | | |
| Wind 0 deg - No Ice | | 0.00 | -16843.59 | -0.01 |
| Wind 45 deg - No Ice | | 6574.04 | -6248.19 | -1.24 |
| Wind 90 deg - No Ice | | 9297.10 | 0.00 | -1.75 |
| Wind 135 deg - No Ice | | 6574.04 | 6248.19 | -1.23 |
| Wind 180 deg - No Ice | | 0.00 | 16843.59 | 0.01 |
| Wind 225 deg - No Ice | | -6574.04 | 6248.19 | 1.24 |
| Wind 270 deg - No Ice | | -9297.10 | 0.00 | 1.75 |
| Wind 315 deg - No Ice | | -6574.04 | -6248.19 | 1.23 |
| Member Ice | 7133.03 | | | |
| Guy Ice | 5630.45 | | | |
| Total Weight Ice | 42774.70 | | | |
| Wind 0 deg - Ice | | 0.00 | -6015.77 | -0.00 |
| Wind 45 deg - Ice | | 3360.30 | -3274.19 | -0.44 |
| Wind 90 deg - Ice | | 4752.18 | 0.00 | -0.62 |
| Wind 135 deg - Ice | | 3360.30 | 3274.19 | -0.44 |
| Wind 180 deg - Ice | | 0.00 | 6015.77 | 0.00 |
| Wind 225 deg - Ice | | -3360.30 | 3274.19 | 0.44 |
| Wind 270 deg - Ice | | -4752.18 | 0.00 | 0.62 |
| Wind 315 deg - Ice | | -3360.30 | -3274.19 | 0.44 |
| Total Weight | 18811.23 | | | |
| Wind 0 deg - Service | | 0.00 | -5766.19 | -0.00 |
| Wind 45 deg - Service | | 2250.54 | -2138.99 | -0.42 |
| Wind 90 deg - Service | | 3182.75 | 0.00 | -0.60 |
| Wind 135 deg - Service | | 2250.54 | 2138.99 | -0.42 |
| Wind 180 deg - Service | | 0.00 | 5766.19 | 0.00 |
| Wind 225 deg - Service | | -2250.54 | 2138.99 | 0.42 |
| Wind 270 deg - Service | | -3182.75 | 0.00 | 0.60 |
| Wind 315 deg - Service | | -2250.54 | -2138.99 | 0.42 |

## Load Combinations

| Comb. No. | Description |
|---|---|
| 1 | Dead Only |
| 2 | 1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy |
| 3 | 1.2 Dead+1.6 Wind 45 deg - No Ice+1.0 Guy |
| 4 | 1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy |
| 5 | 1.2 Dead+1.6 Wind 135 deg - No Ice+1.0 Guy |
| 6 | 1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy |
| 7 | 1.2 Dead+1.6 Wind 225 deg - No Ice+1.0 Guy |
| 8 | 1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy |
| 9 | 1.2 Dead+1.6 Wind 315 deg - No Ice+1.0 Guy |
| 10 | 1.2 Dead+1.0 Ice+1.0 Temp+Guy |
| 11 | 1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 12 | 1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 13 | 1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 14 | 1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 15 | 1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 16 | 1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 17 | 1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 18 | 1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 19 | Dead+Wind 0 deg - Service+Guy |
| 20 | Dead+Wind 45 deg - Service+Guy |
| 21 | Dead+Wind 90 deg - Service+Guy |
| 22 | Dead+Wind 135 deg - Service+Guy |
| 23 | Dead+Wind 180 deg - Service+Guy |
| 24 | Dead+Wind 225 deg - Service+Guy |
| 25 | Dead+Wind 270 deg - Service+Guy |
| 26 | Dead+Wind 315 deg - Service+Guy |

## Maximum Member Forces

| Section No. | Elevation ft | Component Type | Condition | Gov. Load Comb. | Axial lb | Major Axis Moment kip-ft | Minor Axis Moment kip-ft |
|---|---|---|---|---|---|---|---|
| L1 | 100 - 47 | Pole | Max Tension | 14 | 0.13 | 0.00 | 0.00 |
| | | | Max. Compression | 2 | -82202.33 | 9.51 | 60.38 |
| | | | Max. Mx | 8 | -6252.45 | 116.83 | 1.29 |
| | | | Max. My | 2 | -6150.95 | 0.23 | 147.45 |
| | | | Max. Vy | 8 | -8161.93 | 116.83 | 1.29 |
| | | | Max. Vx | 2 | -10798.23 | 0.23 | 147.45 |
| | | | Max. Torque | 4 | | | 2.80 |
| | | Guy A | Bottom Tension | 6 | 10834.38 | | |
| | | | Top Tension | 6 | 10872.37 | | |
| | | | Top Cable Vert | 6 | 9685.26 | | |
| | | | Top Cable Norm | 6 | 4940.06 | | |
| | | | Top Cable Tan | 6 | 4.35 | | |
| | | | Bot Cable Vert | 6 | -9592.87 | | |
| | | | Bot Cable Norm | 6 | 5034.42 | | |
| | | | Bot Cable Tan | 6 | 123.34 | | |
| | | Guy A | Bottom Tension | 6 | 7494.08 | | |
| | | | Top Tension | 6 | 7515.44 | | |
| | | | Top Cable Vert | 6 | 6141.50 | | |
| | | | Top Cable Norm | 6 | 4331.71 | | |
| | | | Top Cable Tan | 6 | 6.33 | | |
| | | | Bot Cable Vert | 6 | -6079.87 | | |

| Section No. | Elevation ft | Component Type | Condition | Gov. Load Comb. | Axial lb | Major Axis Moment kip-ft | Minor Axis Moment kip-ft |
|---|---|---|---|---|---|---|---|
| | | | Bot Cable Norm | 6 | 4380.85 | | |
| | | | Bot Cable Tan | 6 | 67.44 | | |
| | | Guy A | Bottom Tension | 6 | 14059.06 | | |
| | | | Top Tension | 6 | 14108.58 | | |
| | | | Top Cable Vert | 6 | 12563.96 | | |
| | | | Top Cable Norm | 6 | 6418.64 | | |
| | | | Top Cable Tan | 6 | 15.93 | | |
| | | | Bot Cable Vert | 6 | -12452.38 | | |
| | | | Bot Cable Norm | 6 | 6524.79 | | |
| | | | Bot Cable Tan | 6 | 149.78 | | |
| | | Guy B | Bottom Tension | 6 | 10967.79 | | |
| | | | Top Tension | 6 | 11005.78 | | |
| | | | Top Cable Vert | 6 | 9803.32 | | |
| | | | Top Cable Norm | 6 | 5002.20 | | |
| | | | Top Cable Tan | 6 | 4.07 | | |
| | | | Bot Cable Vert | 6 | -9710.94 | | |
| | | | Bot Cable Norm | 6 | 5096.56 | | |
| | | | Bot Cable Tan | 6 | 123.05 | | |
| | | Guy B | Bottom Tension | 6 | 7598.75 | | |
| | | | Top Tension | 6 | 7620.12 | | |
| | | | Top Cable Vert | 6 | 6226.47 | | |
| | | | Top Cable Norm | 6 | 4392.86 | | |
| | | | Top Cable Tan | 6 | 6.50 | | |
| | | | Bot Cable Vert | 6 | -6164.83 | | |
| | | | Bot Cable Norm | 6 | 4442.00 | | |
| | | | Bot Cable Tan | 6 | 67.27 | | |
| | | Guy B | Bottom Tension | 6 | 14232.45 | | |
| | | | Top Tension | 6 | 14281.98 | | |
| | | | Top Cable Vert | 6 | 12717.40 | | |
| | | | Top Cable Norm | 6 | 6499.41 | | |
| | | | Top Cable Tan | 6 | 15.56 | | |
| | | | Bot Cable Vert | 6 | -12605.83 | | |
| | | | Bot Cable Norm | 6 | 6605.55 | | |
| | | | Bot Cable Tan | 6 | 149.41 | | |
| | | Guy C | Bottom Tension | 2 | 13427.09 | | |
| | | | Top Tension | 2 | 13459.50 | | |
| | | | Top Cable Vert | 2 | 12633.99 | | |
| | | | Top Cable Norm | 2 | 4640.95 | | |
| | | | Top Cable Tan | 2 | 45.13 | | |
| | | | Bot Cable Vert | 2 | -12564.74 | | |
| | | | Bot Cable Norm | 2 | 4732.03 | | |
| | | | Bot Cable Tan | 2 | 148.10 | | |
| | | Guy C | Bottom Tension | 2 | 10723.35 | | |
| | | | Top Tension | 2 | 10740.54 | | |
| | | | Top Cable Vert | 2 | 9464.01 | | |
| | | | Top Cable Norm | 2 | 5078.48 | | |
| | | | Top Cable Tan | 2 | 27.83 | | |
| | | | Bot Cable Vert | 2 | -9418.95 | | |
| | | | Bot Cable Norm | 2 | 5125.03 | | |
| | | | Bot Cable Tan | 2 | 87.54 | | |
| | | Guy C | Bottom Tension | 2 | 17429.12 | | |
| | | | Top Tension | 2 | 17471.47 | | |
| | | | Top Cable Vert | 2 | 16396.97 | | |
| | | | Top Cable Norm | 2 | 6032.17 | | |
| | | | Top Cable Tan | 2 | 67.49 | | |
| | | | Bot Cable Vert | 2 | -16312.78 | | |
| | | | Bot Cable Norm | 2 | 6134.63 | | |
| | | | Bot Cable Tan | 2 | 183.34 | | |
| | | Guy D | Bottom Tension | 2 | 10979.21 | | |
| | | | Top Tension | 2 | 11016.91 | | |
| | | | Top Cable Vert | 2 | 9812.96 | | |

| Section No. | Elevation ft | Component Type | Condition | Gov. Load Comb. | Axial lb | Major Axis Moment kip-ft | Minor Axis Moment kip-ft |
|---|---|---|---|---|---|---|---|
| | | | Top Cable Norm | 2 | 5007.71 | | |
| | | | Top Cable Tan | 2 | 30.45 | | |
| | | | Bot Cable Vert | 2 | -9720.58 | | |
| | | | Bot Cable Norm | 2 | 5102.06 | | |
| | | | Bot Cable Tan | 2 | 149.43 | | |
| | | Guy D | Bottom Tension | 2 | 7572.81 | | |
| | | | Top Tension | 2 | 7594.05 | | |
| | | | Top Cable Vert | 2 | 6205.21 | | |
| | | | Top Cable Norm | 2 | 4377.78 | | |
| | | | Top Cable Tan | 2 | 6.45 | | |
| | | | Bot Cable Vert | 2 | -6143.57 | | |
| | | | Bot Cable Norm | 2 | 4426.92 | | |
| | | | Bot Cable Tan | 2 | 80.22 | | |
| | | Guy D | Bottom Tension | 2 | 14247.26 | | |
| | | | Top Tension | 2 | 14296.46 | | |
| | | | Top Cable Vert | 2 | 12729.93 | | |
| | | | Top Cable Norm | 2 | 6506.56 | | |
| | | | Top Cable Tan | 2 | 49.79 | | |
| | | | Bot Cable Vert | 2 | -12618.36 | | |
| | | | Bot Cable Norm | 2 | 6612.70 | | |
| | | | Bot Cable Tan | 2 | 183.65 | | |
| L2 | 47 - 0 | Pole | Max Tension | 1 | 0.00 | 0.00 | 0.00 |
| | | | Max. Compression | 2 | -91915.20 | 16.18 | 153.57 |
| | | | Max. Mx | 8 | -62775.90 | 65.65 | 7.02 |
| | | | Max. My | 2 | -91915.20 | 16.18 | 153.57 |
| | | | Max. Vy | 4 | -2159.79 | -58.56 | 0.67 |
| | | | Max. Vx | 6 | 5994.46 | 0.97 | -138.32 |
| | | | Max. Torque | 4 | | | 2.80 |

## Maximum Reactions

| Location | Condition | Gov. Load Comb. | Vertical lb | Horizontal, X lb | Horizontal, Z lb |
|---|---|---|---|---|---|
| Mast | Max. Vert | 2 | 91918.95 | 34.26 | 5853.99 |
| | Max. $H_x$ | 8 | 72514.52 | 1380.54 | 22.82 |
| | Max. $H_z$ | 2 | 91918.95 | 34.26 | 5853.99 |
| | Max. $M_x$ | 2 | 153.57 | 34.26 | 5853.99 |
| | Max. $M_z$ | 4 | 44.05 | -1358.92 | 1.61 |
| | Max. Torsion | 4 | 2.80 | -1358.92 | 1.61 |
| | Min. Vert | 1 | 42200.79 | 28.40 | 13.89 |
| | Min. $H_x$ | 4 | 65890.52 | -1358.92 | 1.61 |
| | Min. $H_z$ | 6 | 82066.60 | 12.68 | -5947.60 |
| | Min. $M_x$ | 6 | -138.32 | 12.68 | -5947.60 |
| | Min. $M_z$ | 8 | -55.99 | 1380.54 | 22.82 |
| | Min. Torsion | 8 | -2.80 | 1380.54 | 22.82 |
| Guy D @ 40 ft Elev 0 ft Azimuth 225 deg | Max. Vert | 7 | -1313.17 | -382.99 | 384.06 |
| | Max. $H_x$ | 7 | -1313.17 | -382.99 | 384.06 |
| | Max. $H_z$ | 2 | -28482.50 | -11121.65 | 11706.15 |
| | Min. Vert | 2 | -28482.50 | -11121.65 | 11706.15 |
| | Min. $H_x$ | 2 | -28482.50 | -11121.65 | 11706.15 |
| | Min. $H_z$ | 6 | -1484.50 | -606.73 | 365.35 |
| Guy C @ 25 ft Elev 10 ft Azimuth 135 deg | Max. Vert | 14 | -1123.15 | 322.86 | 322.99 |

| Location | Condition | Gov. Load Comb. | Vertical lb | Horizontal, X lb | Horizontal, Z lb |
|---|---|---|---|---|---|
| | Max. $H_x$ | 2 | -38296.47 | 11011.56 | 11604.10 |
| | Max. $H_z$ | 2 | -38296.47 | 11011.56 | 11604.10 |
| | Min. Vert | 2 | -38296.47 | 11011.56 | 11604.10 |
| | Min. $H_x$ | 5 | -1414.25 | 271.09 | 271.47 |
| | Min. $H_z$ | 6 | -1457.18 | 421.90 | 211.73 |
| Guy B @ 40 ft Elev 0 ft Azimuth 45 deg | Max. Vert | 3 | -1311.30 | 383.06 | -382.69 |
| | Max. $H_x$ | 6 | -28481.60 | 11175.38 | -11655.84 |
| | Max. $H_z$ | 2 | -1478.20 | 607.05 | -360.38 |
| | Min. Vert | 6 | -28481.60 | 11175.38 | -11655.84 |
| | Min. $H_x$ | 3 | -1311.30 | 383.06 | -382.69 |
| | Min. $H_z$ | 6 | -28481.60 | 11175.38 | -11655.84 |
| Guy A @ 40 ft Elev 0 ft Azimuth -45 deg | Max. Vert | 18 | -777.69 | -424.80 | -424.85 |
| | Max. $H_x$ | 9 | -1073.71 | -288.11 | -288.35 |
| | Max. $H_z$ | 2 | -1228.62 | -504.06 | -265.18 |
| | Min. Vert | 6 | -28125.13 | -11030.51 | -11512.13 |
| | Min. $H_x$ | 6 | -28125.13 | -11030.51 | -11512.13 |
| | Min. $H_z$ | 6 | -28125.13 | -11030.51 | -11512.13 |

## Tower Mast Reaction Summary

| Load Combination | Vertical lb | $Shear_x$ lb | $Shear_z$ lb | Overturning Moment, $M_x$ kip-ft | Overturning Moment, $M_z$ kip-ft | Torque kip-ft |
|---|---|---|---|---|---|---|
| Dead Only | 42200.79 | -28.40 | -13.89 | -1.59 | 1.90 | 0.00 |
| 1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy | 91918.95 | -34.26 | -5853.99 | -153.57 | 16.18 | -0.06 |
| 1.2 Dead+1.6 Wind 45 deg - No Ice+1.0 Guy | 63523.96 | 959.71 | -1169.00 | -38.13 | -30.41 | -2.01 |
| 1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy | 65890.52 | 1358.92 | -1.61 | -0.97 | -44.05 | -2.80 |
| 1.2 Dead+1.6 Wind 135 deg - No Ice+1.0 Guy | 63338.24 | 990.69 | 1161.74 | 35.26 | -33.01 | -1.96 |
| 1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy | 82066.60 | -12.68 | 5947.60 | 138.32 | 0.97 | 0.04 |
| 1.2 Dead+1.6 Wind 225 deg - No Ice+1.0 Guy | 63793.02 | -1032.50 | 1133.04 | 32.39 | 36.92 | 2.02 |
| 1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy | 72514.52 | -1380.54 | -22.82 | -10.73 | 55.99 | 2.80 |
| 1.2 Dead+1.6 Wind 315 deg - No Ice+1.0 Guy | 71933.19 | -1014.94 | -1150.95 | -49.48 | 47.97 | 1.95 |
| 1.2 Dead+1.0 Ice+1.0 Temp+Guy | 70324.66 | -82.08 | -40.87 | -6.10 | 6.96 | -0.00 |
| 1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy | 76837.41 | -90.33 | -1423.97 | -40.07 | 10.34 | -0.05 |
| 1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp+1.0 Guy | 72564.76 | 506.54 | -670.43 | -19.17 | -4.09 | -0.51 |
| 1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy | 73266.77 | 749.60 | -31.98 | -4.33 | -14.20 | -0.66 |
| 1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp+1.0 Guy | 71860.42 | 508.85 | 576.08 | 8.67 | -7.67 | -0.44 |
| 1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy | 73687.44 | -71.60 | 1352.52 | 26.48 | 4.97 | 0.04 |
| 1.2 Dead+1.0 Wind 225 | 72629.00 | -686.35 | 574.38 | 5.01 | 19.94 | 0.52 |

| Load Combination | Vertical | $Shear_x$ | $Shear_z$ | Overturning Moment, $M_x$ | Overturning Moment, $M_z$ | Torque |
|---|---|---|---|---|---|---|
| | lb | lb | lb | kip-ft | kip-ft | kip-ft |
| deg+1.0 Ice+1.0 Temp+1.0 Guy 1.2 Dead+1.0 Wind 270 | 75732.17 | -910.64 | -49.78 | -9.20 | 29.47 | 0.67 |
| deg+1.0 Ice+1.0 Temp+1.0 Guy 1.2 Dead+1.0 Wind 315 | 75269.53 | -681.37 | -665.54 | -22.35 | 23.06 | 0.43 |
| deg+1.0 Ice+1.0 Temp+1.0 Guy Dead+Wind 0 deg - Service+Guy | 42802.51 | -28.73 | -1308.03 | -25.51 | 2.85 | -0.01 |
| Dead+Wind 45 deg - Service+Guy | 42375.06 | 198.91 | -273.14 | -6.69 | -2.60 | -0.43 |
| Dead+Wind 90 deg - Service+Guy | 42370.02 | 292.88 | -14.61 | -1.17 | -5.03 | -0.60 |
| Dead+Wind 135 deg - Service+Guy | 42365.19 | 198.97 | 243.81 | 4.07 | -3.30 | -0.42 |
| Dead+Wind 180 deg - Service+Guy | 42402.92 | -26.75 | 1282.33 | 22.07 | 1.23 | 0.01 |
| Dead+Wind 225 deg - Service+Guy | 42388.37 | -256.95 | 244.12 | 3.33 | 6.60 | 0.43 |
| Dead+Wind 270 deg - Service+Guy | 42508.20 | -349.09 | -12.59 | -2.12 | 8.97 | 0.60 |
| Dead+Wind 315 deg - Service+Guy | 42447.24 | -255.05 | -270.68 | -7.26 | 7.13 | 0.42 |

# Solution Summary

| | Sum of Applied Forces | | | Sum of Reactions | | | |
|---|---|---|---|---|---|---|---|
| Load Comb. | PX<br>lb | PY<br>lb | PZ<br>lb | PX<br>lb | PY<br>lb | PZ<br>lb | % Error |
| 1 | 0.00 | -18811.22 | 0.00 | -0.26 | 18811.26 | -0.32 | 0.002% |
| 2 | -27.24 | -22433.15 | -28538.89 | 27.17 | 22433.15 | 28538.68 | 0.001% |
| 3 | 11620.10 | -22475.68 | -11098.72 | -11619.92 | 22475.68 | 11098.55 | 0.001% |
| 4 | 16464.51 | -22518.21 | 27.24 | -16464.35 | 22518.21 | -27.26 | 0.001% |
| 5 | 11677.80 | -22527.32 | 11156.43 | -11677.67 | 22527.32 | -11156.30 | 0.001% |
| 6 | 27.24 | -22518.21 | 28538.89 | -27.27 | 22518.20 | -28538.50 | 0.001% |
| 7 | -11620.10 | -22475.68 | 11098.72 | 11619.92 | 22475.68 | -11098.56 | 0.001% |
| 8 | -16464.51 | -22433.15 | -27.24 | 16464.42 | 22433.15 | 27.20 | 0.000% |
| 9 | -11677.80 | -22424.04 | -11156.43 | 11677.66 | 22424.04 | 11156.29 | 0.001% |
| 10 | 0.00 | -46438.98 | 0.00 | -1.39 | 46438.96 | -1.45 | 0.004% |
| 11 | -40.37 | -46377.47 | -8376.47 | 40.19 | 46377.46 | 8376.15 | 0.001% |
| 12 | 4997.25 | -46438.98 | -4911.14 | -4997.08 | 46438.97 | 4910.40 | 0.002% |
| 13 | 7112.88 | -46500.50 | 40.37 | -7112.30 | 46500.48 | -40.45 | 0.001% |
| 14 | 5082.74 | -46513.22 | 4996.63 | -5080.97 | 46513.14 | -4995.05 | 0.005% |
| 15 | 40.37 | -46500.50 | 8376.47 | -40.39 | 46500.48 | -8375.70 | 0.002% |
| 16 | -4997.25 | -46438.98 | 4911.14 | 4996.51 | 46438.97 | -4911.04 | 0.002% |
| 17 | -7112.88 | -46377.47 | -40.37 | 7112.61 | 46377.46 | 40.20 | 0.001% |
| 18 | -5082.74 | -46364.74 | -4996.63 | 5082.27 | 46364.72 | 4996.16 | 0.001% |
| 19 | -5.83 | -18802.12 | -6106.21 | 4.90 | 18802.10 | 6104.84 | 0.008% |
| 20 | 2486.25 | -18811.22 | -2374.69 | -2486.20 | 18811.22 | 2374.58 | 0.001% |
| 21 | 3522.76 | -18820.32 | 5.83 | -3522.54 | 18820.32 | -5.83 | 0.001% |
| 22 | 2498.59 | -18822.27 | 2387.04 | -2498.46 | 18822.27 | -2386.93 | 0.001% |
| 23 | 5.83 | -18820.32 | 6106.21 | -5.87 | 18820.32 | -6105.86 | 0.002% |
| 24 | -2486.25 | -18811.22 | 2374.69 | 2486.11 | 18811.22 | -2374.68 | 0.001% |
| 25 | -3522.76 | -18802.12 | -5.83 | 3522.27 | 18802.11 | 5.57 | 0.003% |
| 26 | -2498.59 | -18800.17 | -2387.04 | 2498.35 | 18800.17 | 2386.80 | 0.002% |

## Non-Linear Convergence Results

| Load Combination | Converged? | Number of Cycles | Displacement Tolerance | Force Tolerance |
|---|---|---|---|---|
| 1 | Yes | 6 | 0.00000001 | 0.00001104 |
| 2 | Yes | 10 | 0.00000001 | 0.00006507 |
| 3 | Yes | 9 | 0.00000001 | 0.00006966 |
| 4 | Yes | 9 | 0.00000001 | 0.00005854 |
| 5 | Yes | 9 | 0.00000001 | 0.00005208 |
| 6 | Yes | 9 | 0.00000001 | 0.00011103 |
| 7 | Yes | 9 | 0.00000001 | 0.00006917 |
| 8 | Yes | 10 | 0.00000001 | 0.00003683 |
| 9 | Yes | 10 | 0.00000001 | 0.00005937 |
| 10 | Yes | 7 | 0.00000001 | 0.00014509 |
| 11 | Yes | 9 | 0.00000001 | 0.00008028 |
| 12 | Yes | 8 | 0.00000001 | 0.00009052 |
| 13 | Yes | 8 | 0.00000001 | 0.00005450 |
| 14 | Yes | 7 | 0.00000001 | 0.00010491 |
| 15 | Yes | 8 | 0.00000001 | 0.00008395 |
| 16 | Yes | 8 | 0.00000001 | 0.00009005 |
| 17 | Yes | 9 | 0.00000001 | 0.00006561 |
| 18 | Yes | 9 | 0.00000001 | 0.00014264 |
| 19 | Yes | 6 | 0.00000001 | 0.00010720 |
| 20 | Yes | 6 | 0.00000001 | 0.00000824 |
| 21 | Yes | 6 | 0.00000001 | 0.00001269 |
| 22 | Yes | 6 | 0.00000001 | 0.00000984 |
| 23 | Yes | 6 | 0.00000001 | 0.00001797 |
| 24 | Yes | 6 | 0.00000001 | 0.00000873 |
| 25 | Yes | 6 | 0.00000001 | 0.00002802 |
| 26 | Yes | 6 | 0.00000001 | 0.00001766 |

## Maximum Tower Deflections - Service Wind

| Section No. | Elevation<br>ft | Horz. Deflection<br>in | Gov. Load Comb. | Tilt<br>° | Twist<br>° |
|---|---|---|---|---|---|
| L1 | 100 - 47 | 2.534 | 19 | 0.2466 | 0.0052 |
| L2 | 47 - 0 | 0.584 | 19 | 0.0890 | 0.0026 |

## Critical Deflections and Radius of Curvature - Service Wind

| Elevation<br>ft | Appurtenance | Gov. Load Comb. | Deflection<br>in | Tilt<br>° | Twist<br>° | Radius of Curvature<br>ft |
|---|---|---|---|---|---|---|
| 99.00 | DHHTT65B-3XR | 19 | 2.491 | 0.2434 | 0.0051 | 174047 |
| 90.00 | SBNHH-1D65C | 19 | 2.104 | 0.2141 | 0.0047 | 87023 |
| 80.00 | APXVAR18_43-C-NA20 | 19 | 1.688 | 0.1822 | 0.0042 | 43512 |
| 76.15 | Guy | 19 | 1.534 | 0.1702 | 0.0041 | 36488 |
| 76.15 | Guy | 19 | 1.534 | 0.1702 | 0.0041 | 36488 |
| 54.95 | Guy | 19 | 0.796 | 0.1090 | 0.0030 | 19317 |

## Maximum Tower Deflections - Design Wind

| Section No. | Elevation<br>ft | Horz. Deflection<br>in | Gov. Load Comb. | Tilt<br>° | Twist<br>° |
|---|---|---|---|---|---|
| L1 | 100 - 47 | 17.718 | 2 | 1.5424 | 0.0250 |
| L2 | 47 - 0 | 4.371 | 2 | 0.7312 | 0.0123 |

## Critical Deflections and Radius of Curvature - Design Wind

| Elevation<br>ft | Appurtenance | Gov. Load Comb. | Deflection<br>in | Tilt<br>° | Twist<br>° | Radius of Curvature<br>ft |
|---|---|---|---|---|---|---|
| 99.00 | DHHTT65B-3XR | 2 | 17.424 | 1.5271 | 0.0248 | 26718 |
| 90.00 | SBNHH-1D65C | 2 | 14.793 | 1.3900 | 0.0227 | 13359 |
| 80.00 | APXVAR18_43-C-NA20 | 2 | 11.959 | 1.2374 | 0.0203 | 6679 |
| 76.15 | Guy | 2 | 10.911 | 1.1786 | 0.0194 | 5600 |
| 76.15 | Guy | 2 | 10.911 | 1.1786 | 0.0194 | 5600 |
| 54.95 | Guy | 2 | 5.846 | 0.8537 | 0.0143 | 2964 |

## Guy Design Data

| Section No. | Elevation<br>ft | Size | Initial Tension<br>lb | Breaking Load<br>lb | Actual $T_u$<br>lb | Allowable $\phi T_n$<br>lb | Required S.F. | Actual S.F. |
|---|---|---|---|---|---|---|---|---|
| L1 | 76.15 (A) (6) | 1/2 EHS | 2152.00 | 26900.04 | 10872.40 | 16140.00 | 1.000 | 1.484 ✔ |
| | 76.15 (B) (5) | 1/2 EHS | 2152.00 | 26900.04 | 11005.80 | 16140.00 | 1.000 | 1.467 ✔ |
| | 76.15 (C) (4) | 1/2 EHS | 2152.00 | 26900.04 | 13459.50 | 16140.00 | 1.000 | 1.199 ✔ |
| | 76.15 (D) (3) | 1/2 EHS | 2152.00 | 26900.04 | 11016.90 | 16140.00 | 1.000 | 1.465 ✔ |
| | 54.95 (A) (10) | 7/16 EHS | 1664.00 | 20800.02 | 7515.44 | 12480.00 | 1.000 | 1.661 ✔ |
| | 54.95 (B) (9) | 7/16 EHS | 1664.00 | 20800.02 | 7620.12 | 12480.00 | 1.000 | 1.638 ✔ |
| | 54.95 (C) (8) | 7/16 EHS | 1664.00 | 20800.02 | 10740.50 | 12480.00 | 1.000 | 1.162 ✔ |
| | 54.95 (D) (7) | 7/16 EHS | 1664.00 | 20800.02 | 7594.05 | 12480.00 | 1.000 | 1.643 ✔ |
| | 76.15 (A) (14) | 9/16 EHS | 2800.00 | 35000.04 | 14108.60 | 21000.00 | 1.000 | 1.488 ✔ |
| | 76.15 (B) (13) | 9/16 EHS | 2800.00 | 35000.04 | 14282.00 | 21000.00 | 1.000 | 1.470 ✔ |
| | 76.15 (C) (12) | 9/16 EHS | 2800.00 | 35000.04 | 17471.50 | 21000.00 | 1.000 | 1.202 ✔ |
| | 76.15 (D) (11) | 9/16 EHS | 2800.00 | 35000.04 | 14296.50 | 21000.00 | 1.000 | 1.469 ✔ |

## *Compression Checks*

## Pole Design Data

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| L1 | 100 - 47 (1) | TP26.25x26.25x13.125 | 53.00 | 0.00 | 0.0 | 541.1880 | -6150.95 | 584484.00 | 0.011 |
| L2 | 47 - 0 (2) | TP26.25x26.25x13.125 | 47.00 | 0.00 | 0.0 | 541.1880 | -91915.20 | 584484.00 | 0.157 |

## Pole Bending Design Data

| Section No. | Elevation ft | Size | $M_{ux}$ kip-ft | $\phi M_{nx}$ kip-ft | Ratio $\frac{M_{ux}}{\phi M_{nx}}$ | $M_{uy}$ kip-ft | $\phi M_{ny}$ kip-ft | Ratio $\frac{M_{uy}}{\phi M_{ny}}$ |
|---|---|---|---|---|---|---|---|---|
| L1 | 100 - 47 (1) | TP26.25x26.25x13.125 | 147.45 | 271.32 | 0.543 | 0.00 | 271.32 | 0.000 |
| L2 | 47 - 0 (2) | TP26.25x26.25x13.125 | 154.42 | 271.32 | 0.569 | 0.00 | 271.32 | 0.000 |

## Pole Shear Design Data

| Section No. | Elevation ft | Size | Actual $V_u$ lb | $\phi V_n$ lb | Ratio $\frac{V_u}{\phi V_n}$ | Actual $T_u$ kip-ft | $\phi T_n$ kip-ft | Ratio $\frac{T_u}{\phi T_n}$ |
|---|---|---|---|---|---|---|---|---|
| L1 | 100 - 47 (1) | TP26.25x26.25x13.125 | 10798.20 | 292242.00 | 0.037 | 0.01 | 319.64 | 0.000 |
| L2 | 47 - 0 (2) | TP26.25x26.25x13.125 | 5912.62 | 292242.00 | 0.020 | 0.06 | 319.64 | 0.000 |

## Pole Interaction Design Data

| Section No. | Elevation ft | Ratio $\frac{P_u}{\phi P_n}$ | Ratio $\frac{M_{ux}}{\phi M_{nx}}$ | Ratio $\frac{M_{uy}}{\phi M_{ny}}$ | Ratio $\frac{V_u}{\phi V_n}$ | Ratio $\frac{T_u}{\phi T_n}$ | Comb. Stress Ratio | Allow. Stress Ratio | Criteria |
|---|---|---|---|---|---|---|---|---|---|
| L1 | 100 - 47 (1) | 0.011 | 0.543 | 0.000 | 0.037 | 0.000 | 0.555 ✔ | 1.000 | 4.8.2 ✔ |
| L2 | 47 - 0 (2) | 0.157 | 0.569 | 0.000 | 0.020 | 0.000 | 0.727 ✔ | 1.000 | 4.8.2 ✔ |

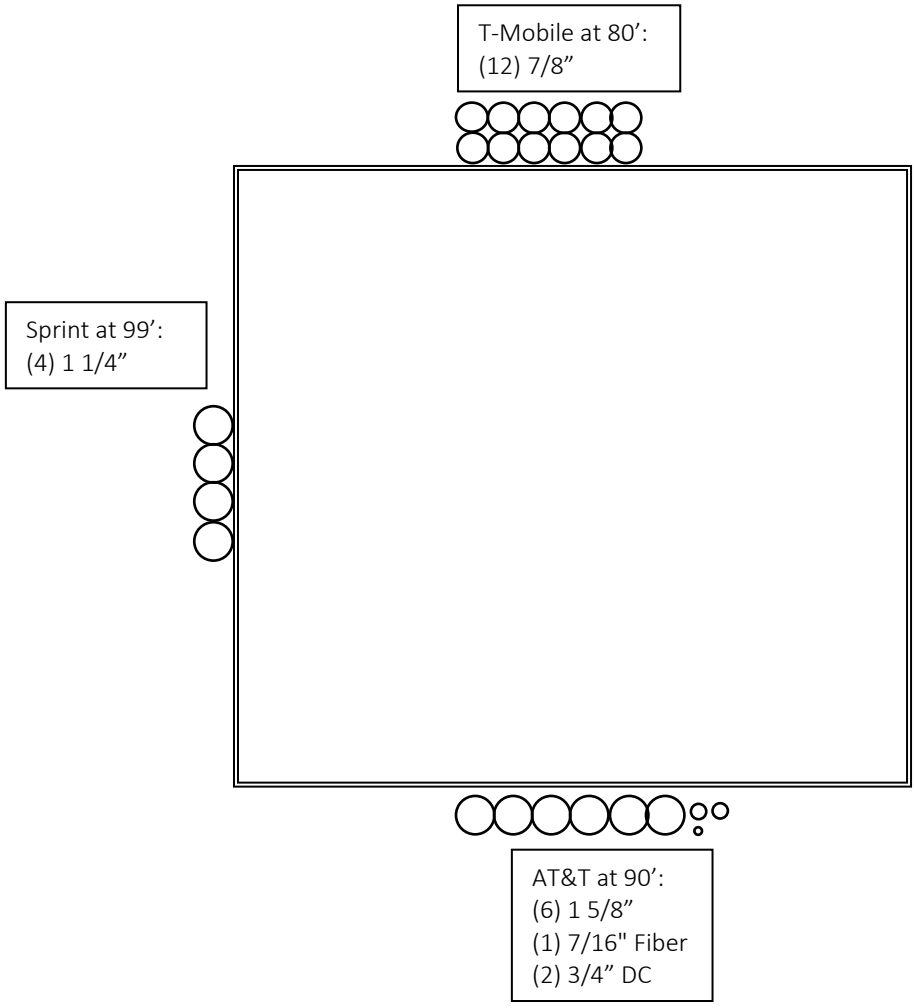
## Section Capacity Table

| Section No. | Elevation ft | Component Type | Size | Critical Element | P lb | $\phi P_{allow}$ lb | % Capacity | Pass Fail |
|---|---|---|---|---|---|---|---|---|
| L1 | 100 - 47 | Pole | TP26.25x26.25x13.125 | 1 | -6150.95 | 584484.00 | 55.5 | Pass |
| | | Guy A@76.15 | 1/2 | 6 | 10872.40 | 16140.00 | 67.4 | Pass |
| | | Guy A@54.95 | 7/16 | 10 | 7515.44 | 12480.00 | 60.2 | Pass |

| Section No. | Elevation ft | Component Type | Size | Critical Element | P lb | $\phi P_{allow}$ lb | % Capacity | Pass Fail |
|---|---|---|---|---|---|---|---|---|
| | | Guy A@76.15 | 9/16 | 14 | 14108.60 | 21000.00 | 67.2 | Pass |
| | | Guy B@76.15 | 1/2 | 5 | 11005.80 | 16140.00 | 68.2 | Pass |
| | | Guy B@54.95 | 7/16 | 9 | 7620.12 | 12480.00 | 61.1 | Pass |
| | | Guy B@76.15 | 9/16 | 13 | 14282.00 | 21000.00 | 68.0 | Pass |
| | | Guy C@76.15 | 1/2 | 4 | 13459.50 | 16140.00 | 83.4 | Pass |
| | | Guy C@54.95 | 7/16 | 8 | 10740.50 | 12480.00 | 86.1 | Pass |
| | | Guy C@76.15 | 9/16 | 12 | 17471.50 | 21000.00 | 83.2 | Pass |
| | | Guy D@76.15 | 1/2 | 3 | 11016.90 | 16140.00 | 68.3 | Pass |
| | | Guy D@54.95 | 7/16 | 7 | 7594.05 | 12480.00 | 60.8 | Pass |
| | | Guy D@76.15 | 9/16 | 11 | 14296.50 | 21000.00 | 68.1 | Pass |
| L2 | 47 - 0 | Pole | TP26.25x26.25x13.125 | 2 | -91915.20 | 584484.00 | 72.7 | Pass |
| | | | | | | | Summary | |
| | | | | | | | Pole (L2) 72.7 | Pass |
| | | | | | | | Guy A (L1) 67.4 | Pass |
| | | | | | | | Guy B (L1) 68.2 | Pass |
| | | | | | | | Guy C (L1) 86.1 | Pass |
| | | | | | | | Guy D (L1) 68.3 | Pass |
| | | | | | | | **RATING =** **86.1** | **Pass** |

# Coax Layout

CT46143-A



# Pier Foundation For Guy Anchors

| | | | |
|---|---|---|---|
| | | | Date: 7/16/2019 |
| Customer Name: | SBA Communications Corp | EIA/TIA Standard: | EIA-222-G |
| Site Name: | | Structure Height (Ft.): | 100 |
| Site Number: | CT46143-A-SBA | Engineer Name: | J. Chen |
| Engr. Number: | 98772 | Manager Login Req'd: | |

**Foundation Info Obtained from:** Drawings/Calculations

**Structure Type:** Guy Anchor

**Analysis or Design?** Analysis

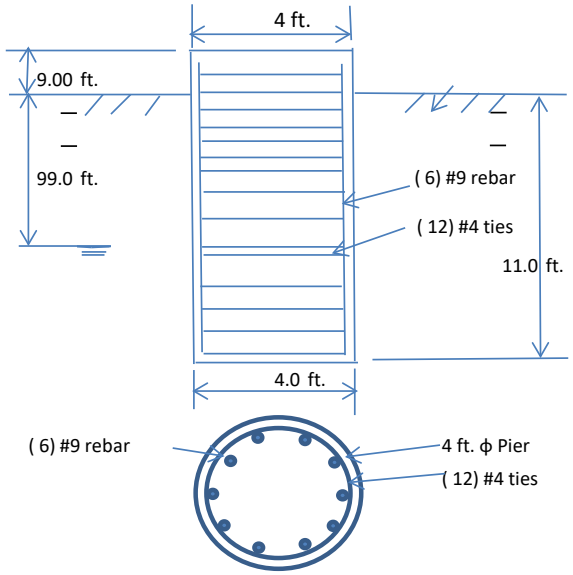
Acceptable overstress (ϕ 5.0%

**Base Reactions (Factored):**

| | | | |
|---|---|---|---|
| Axial Load (Kips): | 0.0 | Shear Force (Kips): | 16.0 |
| Uplift Force (Kips): | 38.3 | Moment (Kips-ft): | 0.0 |

**Foundation Geometries:**

| | | | | |
|---|---|---|---|---|
| Diameter of Pier (ft.): | 4.0 | Depth of Base B. G. S. : | 11.0 | ft. |
| Pier Height A. G. (ft.): | 9.00 | | | |




Guy Anchor

**Material Properties and Reabr Info:**

| | | | | |
|---|---|---|---|---|
| Concrete Strength (psi): | 3000 | Steel Elastic Modulus: | 29000 | ksi |
| Vertical bar yield (ksi) | 60 | Tie steel yield strength: | 40 | ksi |
| Vertical Rebar Size #: | 9 | Tie / Stirrup Size #: | 4 | |
| Qty. of Vertical Rebars: | 6 | Tie Spacing: | 12.0 | in. |
| Concrete Cover (in.): | 3 | Concrete unit weight: | 150.0 | pcf |

Consider ties in concrete shear strength? Yes

**Soil Design Parameters:**

| | | | | |
|---|---|---|---|---|
| Water Table B.G.S. (ft): | 99.0 | Unit weight of water: | 62.4 | psf |
| Ratio of Uplift/Axial Skin Friction: | 1.00 | Pullout failure Angle: | 30 | (°) |

Skin Frictions are to be obtained from: Calculations

Please Enter Ultimate End Bearing Pressure (psf): 5000

Kc = 1.15 For Sand

Kc = 1.0 Silt/Clay

Kt = 0.7 For Sand and Silt

Kt = 0.85 For Clay

Friction δ Between Pier & Soil = 0.95

| Depth of Layers (ft) Top | Bottom | $\gamma_{soil}$ (pcf) | ϕ (°) | Cohesion (psf) | | | Soil Types | Ultimate Uplift Skin Friction (psf) | Ultimate Axial Skin Friction (psf) | Kc | Kt | α |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 3.0 | 100 | 0 | 0 | | | Sand | | | 1.15 | 0.70 | |
| 3.0 | 15.0 | 100 | 34 | 0 | | | Sand | 331.9 | 545.2 | 1.15 | 0.70 | |
| 15.0 | 20.0 | 100 | 34 | 0 | | | Sand | 442.5 | 727.0 | 1.15 | 0.70 | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

Soil weight Increase Factor for bouyant soils (1.0 to 1.15): 1.1

**Foundation Analysis and Design:**

| | | | | |
|---|---|---|---|---|
| Uplift Strength Reduction Factor: | 0.75 | Soil Bearing Strength Reduction Factor: | 0.75 | |
| Total Dry Soil Volume from Conical Failure (cu. Ft.): | 790 | Dry Soil Weight from Conical Failure: | 79 | Kips |
| Total Buoyant Soil Volume from Conical Failure (cu. Ft.): | 0 | Buoyant Soil Weight from Conical Failure (Kips): | 0 | Kips |
| Total Dry Concrete Volume (cu. Ft.): | 251 | Total Dry Concrete Weight: | 37.70 | Kips |
| Total Buoyant Concrete Volume (cu. Ft.): | 0 | Total Buoyant Concrete Weight: | 0.00 | Kips |
| Total Effective Concrete Weight (Kips): | 37.7 | Total Effective Soil Weight: | 79 | Kips |
| Total Effective Vertical Load on Base (Kips): | 24 | | | |

**Check Soil Capacities:**

| | | | | | Usage | |
|---|---|---|---|---|---|---|
| Calculated Foundation Uplift Capacity (Kips): | 58.95 | > | Design Factored Uplift Load (Kips): | 38 | 0.65 | OK! |
| Allowable Overturning Moment Resistance (Kips-ft.): | 315.5 | > | Design Factored Momont (kips-ft): | 257 | 0.82 | OK! |

**Check the capacities of Reinforceing Concrete:**

| | | | | |
|---|---|---|---|---|
| Strength reduction factor (Flexure and axial tension): | 0.90 | Strength reduction factor (Shear): | 0.75 | |
| Strength reduction factor (Axial compression): | 0.65 | Wind Load Factor on Concrete Design: | 1.00 | |

Reinforcing Concrete Pier:

| | | | | | Usage | |
|---|---|---|---|---|---|---|
| Vertical Steel Rebar Area (sq. in./each): | 1.00 | | Tie / Stirrup Area (sq. in./each): | 0.20 | | |
| Maximum Moment Location Below Grade Surface (ft.): | 3.98 | | Max. Shear force Location B. G. S. (ft.): | 4.76 | | |
| Calculated Moment Capacity (Mn,Kips-Ft): | 505 | > | Design Factored Moment (Mu, K-Ft): | 207.3 | 0.41 | OK! |
| Calculated Shear Capacity (Kips): | 169.4 | > | Design Factored Shear (Kips): | 16.0 | 0.09 | OK! |
| Calculated Tension Capacity (Tn, Kips): | 324.0 | > | Design Factored Tension (Tu Kips): | 38.3 | 0.12 | OK! |
| Calculated Compression Capacity (Pn, Kips): | 2392 | > | Design Factored Axial Load (Pu Kips): | 0.0 | 0.00 | OK! |
| Moment & Axial Strength Combination(Tu/Tn+Mu/Mn): | 0.41 | OK! | Max. Allowable Tie/Stirrup Spacing: | 12.00 | in. | |
| Pier Reinforcement Ratio: | 0.003 | | Reinforcement Ratio is too small | | | |

**Reinforce Pier Foundation by Adding Concrete Block (Yes/No ?)** No

# EXHIBIT 8

Tower Engineering Solutions
Phone (972) 483-0607, Fax (972) 975-9615
1320 Greenway Drive, Suite 600, Irving, Texas 75038

# Antenna Mount Analysis Report

**Existing 100.0 FT Guyed laminated wood pole**

**Customer Name: SBA Communications Corp**

**Customer Site Number: CT46143-A-SBA**

**Customer Site Name: Burlington - Avon Landfill**

**Carrier Name: T-Mobile (Application #: 116800, v1)**

**Carrier Site ID / Name: CTHA510A / Burlington-Avon Landfill**

**Site Location: 277 Huckleberry Hill Road**

**Avon, Connecticut**

**Hartford County**

**Latitude: 41.788055**

**Longitude: -72.918166**


8/19/19

**Analysis Result:**

**Max Structural Usage: 55.6% [Pass]**

**Report Prepared By: Saurav Devkota**

## Introduction

The purpose of this report is to summarize the analysis results on the (3) Flush Mount at 80.00' elevation to support the proposed antenna configuration. Any modification listed under Sources of Information was assumed completed and was included in this analysis.

## Sources of Information

| | |
|---|---|
| Mount Drawings | Full Metal Services, Dated 4/28/2019 |
| Antenna Loading | SBA, Application #: 116800, v1 |
| Modification Drawings | N/A |

## Analysis Criteria

Wind Speed Used in the Analysis: 116 mph (3-Sec. Gust) (Ultimate Wind Speed)
Wind Speed with Ice: 50 mph (3-Sec. Gust) with 1.5" radial ice concurrent
Service Load Wind Speed: 60 mph +0" Radial ice
Standard/Codes: ANSI/TIA/EIA 222-H / 2015 IBC / 2018 CBSC
Exposure Category: C
Risk Category: II
Topographic Category: 1
Crest Height (Ft): 0

The site is a Risk Category II structure per table 1604.5 of the IBC. This site does not support emergency communication equipment for first responders such as fire departments, police, hospitals, ambulance services or any of the facilities listed for Risk Categories III and IV. The scope of work detailed in this structural analysis does not include items that are a part of emergency service as the 911 or essential facility service of an emergency response system.

## Mount Information

(3) Flush Mount at 80.00' elevation.

## Final Antenna Configuration

3 RFS APXVAR18_43-C-NA20
6 RFS ATMAA1412D-A1A20

Any proposed antennas not currently installed should be mounted such that the centers of the antennas do not exceed 0.5 ft vertically from the center of the Flush Mount.

In addition to the proposed equipment loading, a 500 lb serviceability load was also considered in this analysis in accordance with TIA requirements.

## Analysis Results

Our calculations have determined that under design wind load the existing mounts will be structurally adequate to support the proposed antenna configuration. The maximum structural usage is 55.6%, which occurs in the plate. The proposed equipment must be installed as stipulated in the Final Antenna Configuration section of this report. The analysis results are void if the proposed equipment is not installed in accordance with this report.

## Attachments

1. Mount Photos
2. Antenna Placement Diagram
3. Mount Mapping Information
4. Analysis Calculations

# Standard Conditions

1. The loading configuration as analyzed in this report is as provided from the customer. Any deviation from this design shall be communicated to TES to verify deviation will not adversely impact the analysis.

2. The analysis is based on the presumption that the antenna mount members and components along with any existing reinforcement items have been correctly and properly designed, manufactured, installed and maintained.

3. All the existing structural members were assumed to be in good condition with no physical damage or deterioration associated with corrosion. The mount analysis is not a condition assessment of the mount.

4. The mount analysis was performed in accordance with the loading provided, and if applicable the modification required to support the additional loading.

5. If the mount is modified, installation must adhere to the configuration communicated in the modification drawings.

6. The modification drawings are not intended to convey means or methods. These are the responsibility of the installing contractor.

7. Rigging plan review is available if the contractor requires for a construction class IV or other if required. Review fee would apply.

8. The mount modification package was created based upon information provided for the mount loading. The underlying tower is assumed to provide support and sufficient rigidity to support the mount loads as a tower analysis was not part of the mount analysis.

9. TES is not responsible for modifications to climbing facilities unless communicated to TES in writing.


04.28.2


04.28.2019 06:0

# Structure: CT46143-A-SBA - Burlington - Avon Landfill

**Sector:** **A**

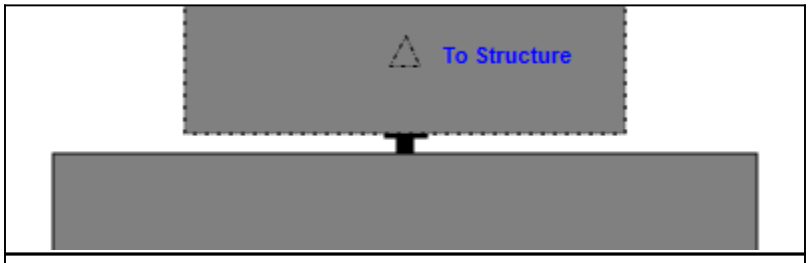
**Structure Type:** Monopole

**Mount Elev:** 80.00

6/26/2019

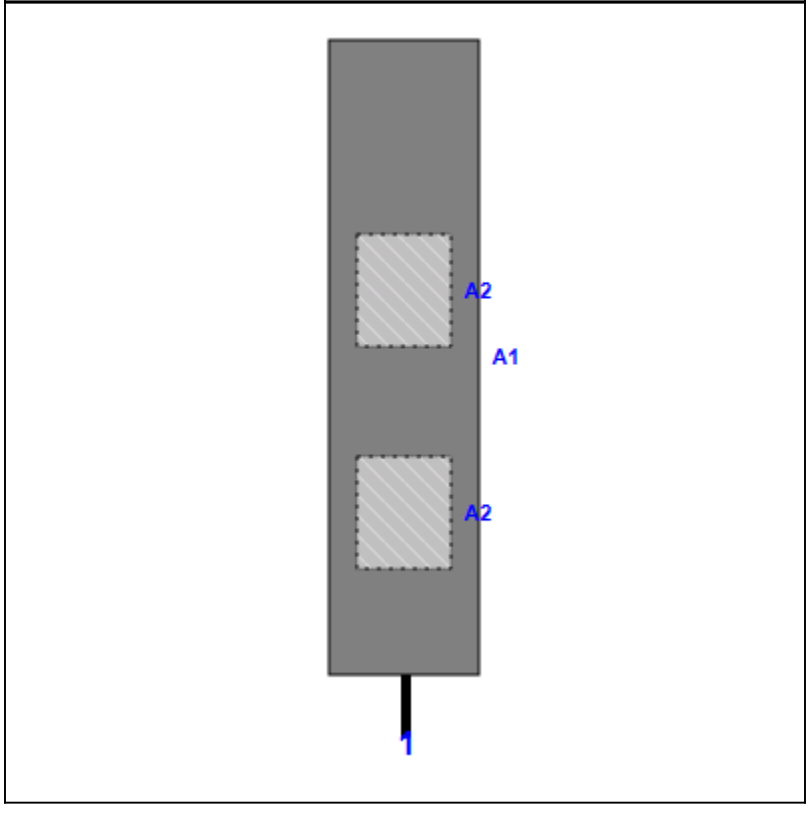


## Plan View




## Front View

**Looking Toward Structure**




| Ref # | Model | Height (in) | Width (in) | H Dist From Left | Pipe # | Pipe Pos V | Antenna Pos | Center Ant From Top | Antenna H Offset |
|---|---|---|---|---|---|---|---|---|---|
| A1 | RFS APXVAR18_43-C-NA20 | 68.00 | 16.00 | 0.50 | 1 | a | Front | 31.20 | 0.00 |
| A2 | RFS ATMAA1412D-A1A20 | 12.00 | 10.00 | 0.50 | 1 | a | Behind | 24.00 | 0.00 |
| A2 | RFS ATMAA1412D-A1A20 | 12.00 | 10.00 | 0.50 | 1 | b | Behind | 48.00 | 0.00 |

# Structure: CT46143-A-SBA - Burlington - Avon Landfill

**Sector:** B

**Structure Type:** Monopole

**Mount Elev:** 80.00

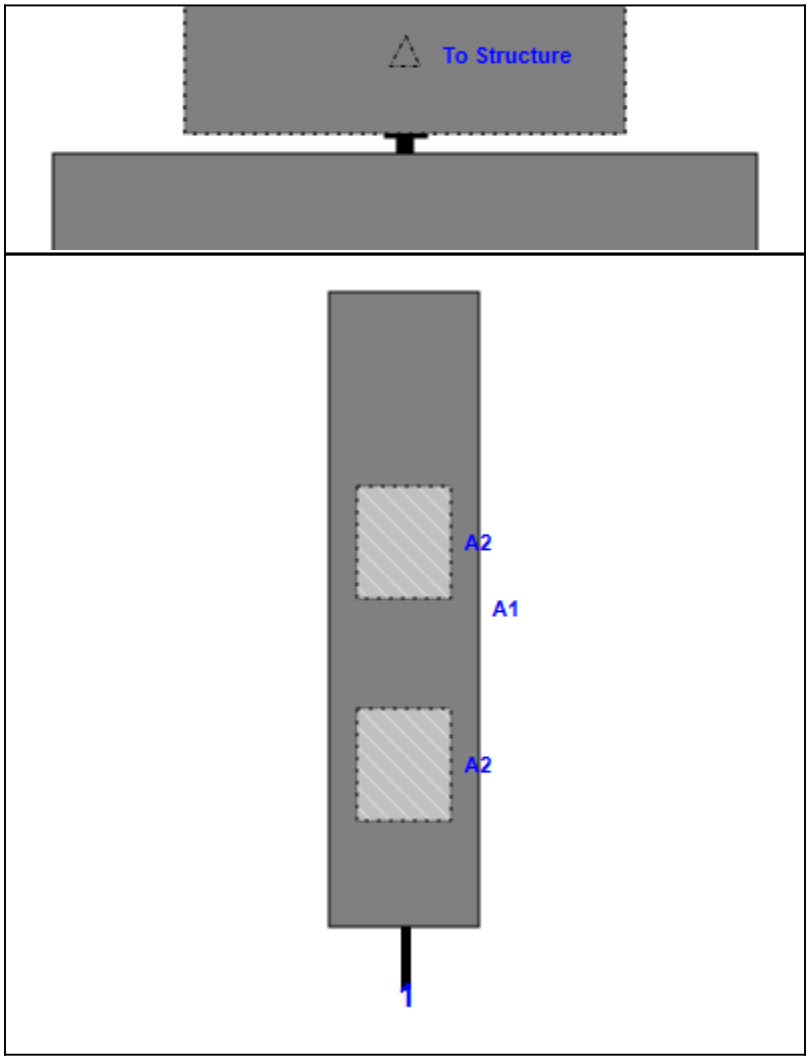
6/26/2019



## Plan View

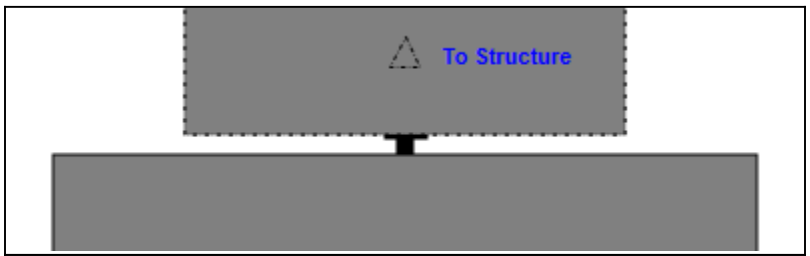
## Front View

**Looking Toward Structure**



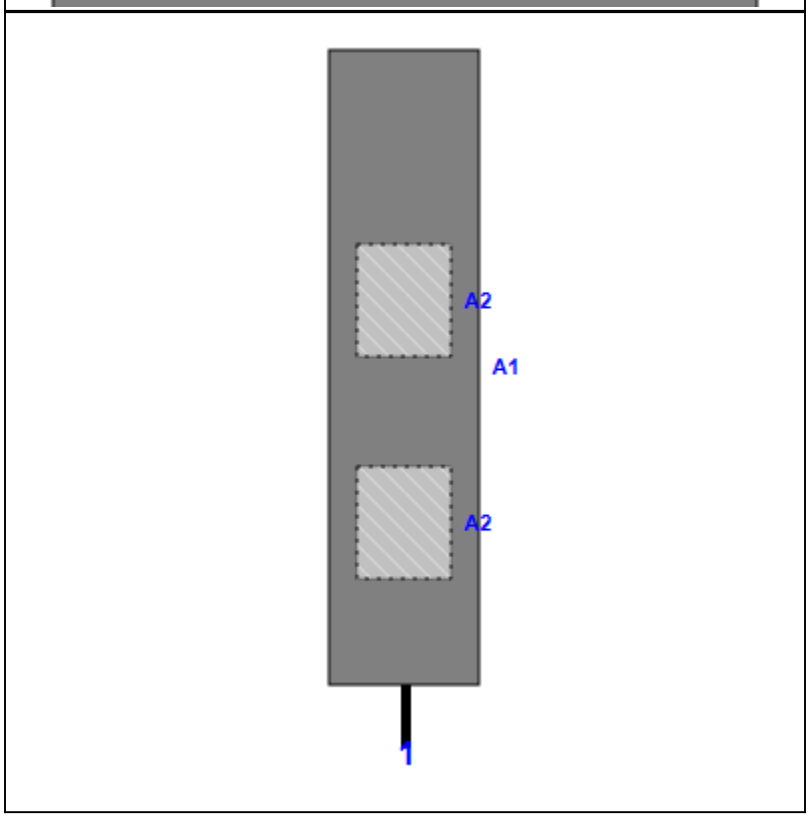

| Ref # | Model | Height (in) | Width (in) | H Dist From Left | Pipe # | Pipe Pos V | Antenna Pos | Center Ant From Top | Antenna H Offset |
|---|---|---|---|---|---|---|---|---|---|
| A1 | RFS APXVAR18_43-C-NA20 | 68.00 | 16.00 | 0.50 | 1 | a | Front | 31.20 | 0.00 |
| A2 | RFS ATMAA1412D-A1A20 | 12.00 | 10.00 | 0.50 | 1 | a | Behind | 24.00 | 0.00 |
| A2 | RFS ATMAA1412D-A1A20 | 12.00 | 10.00 | 0.50 | 1 | b | Behind | 48.00 | 0.00 |

### Plan View




### Front View

**Looking Toward Structure**




| Ref # | Model | Height (in) | Width (in) | H Dist From Left | Pipe # | Pipe Pos V | Antenna Pos | Center Ant From Top | Antenna H Offset |
|---|---|---|---|---|---|---|---|---|---|
| A1 | RFS APXVAR18_43-C-NA20 | 68.00 | 16.00 | 0.50 | 1 | a | Front | 31.20 | 0.00 |
| A2 | RFS ATMAA1412D-A1A20 | 12.00 | 10.00 | 0.50 | 1 | a | Behind | 24.00 | 0.00 |
| A2 | RFS ATMAA1412D-A1A20 | 12.00 | 10.00 | 0.50 | 1 | b | Behind | 48.00 | 0.00 |

# Antenna Mount Type "Other" Mapping Form (PATENT PENDING)

FCC # 1274440

| | | | |
|---|---|---|---|
| **Tower Owner:** | SBA Communications | **Mapping Date:** | 4/28/19 |
| **Site Name:** | Burlington - Avon Landfill | **Structure Type:** | Monopole |
| **Site Number or ID:** | CT46143-A-SBA | **Structure Height (Ft.):** | 100 |
| **Mapping Contractor:** | Full Metal Tower Services | **Mount Height (Ft.):** | 77.6 |



Please insert the sketches of the antenna mount on the Sheet "Sketch" with dimemsions and members and insert one sketch here.

**Geometries (Unit: inches)**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **a** | N/A | **e** | N/A | **j** | N/A | **o** | N/A | **s** | 7 |
| **b** | N/A | **f** | N/A | **k** | N/A | **p** | N/A | **t** | 15 & 22 |
| **c** | N/A | **g** | N/A | **m** | N/A | **q** | N/A | **u *** | 66 |
| **d** | N/A | **h** | N/A | **n** | N/A | **r** | N/A | **v *** | 72 |

**Members (Unit: inches)** — *** - See Ant. Layout for "u", "v" and member "K" (pipe)**

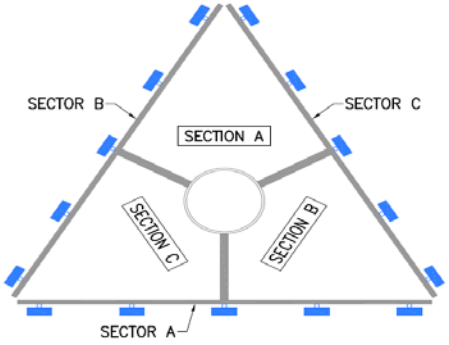
| Items | Member | Lx (O.D.) | Ly (I.D.) | T | F | Member | Lx (O.D.) | Ly (I.D.) | T |
|---|---|---|---|---|---|---|---|---|---|
| **A** | | | | | **F** | | | | |
| **B** | | | | | **G** | | | | |
| **C** | | | | | **H** | | | | |
| **D** | | | | | **J** | | | | |
| **E** | | | | | **K* (pipe)** | 2.375 OD x 0.154 Pipe | 2.375 | 2.067 | 0.154 |

| | |
|---|---|
| Distance from top of main platform member to lowest tip of ant./eqpt. of Carrier above. (N/A if > 10 ft.) | 3' |
| Distance from top of main platform member to highest tip of ant./eqpt. of Carrier below. (N/A if > 10 ft.) | N/A |

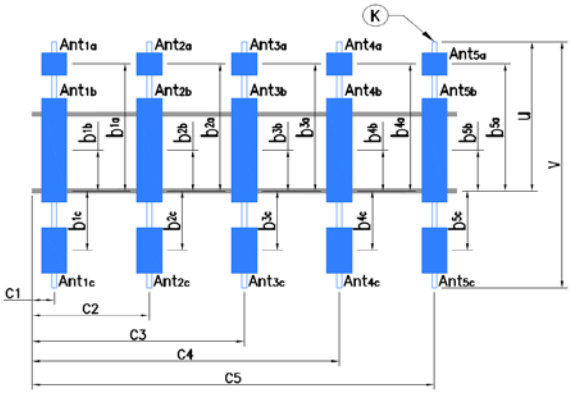
Please enter the infomation below if members can't be found from the drop down lists

plate 3/8"x4

Structure is square laminate wood pole (15"x22").
Mount is a mast pipe mounted directly to collar.




**Climbing ladder is Located at Section B, at 90° Degree Azimuth**



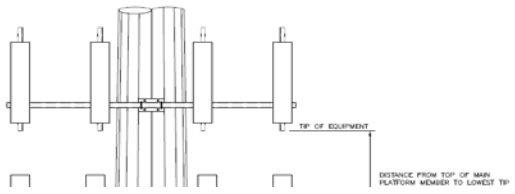

**Antenna Layout**

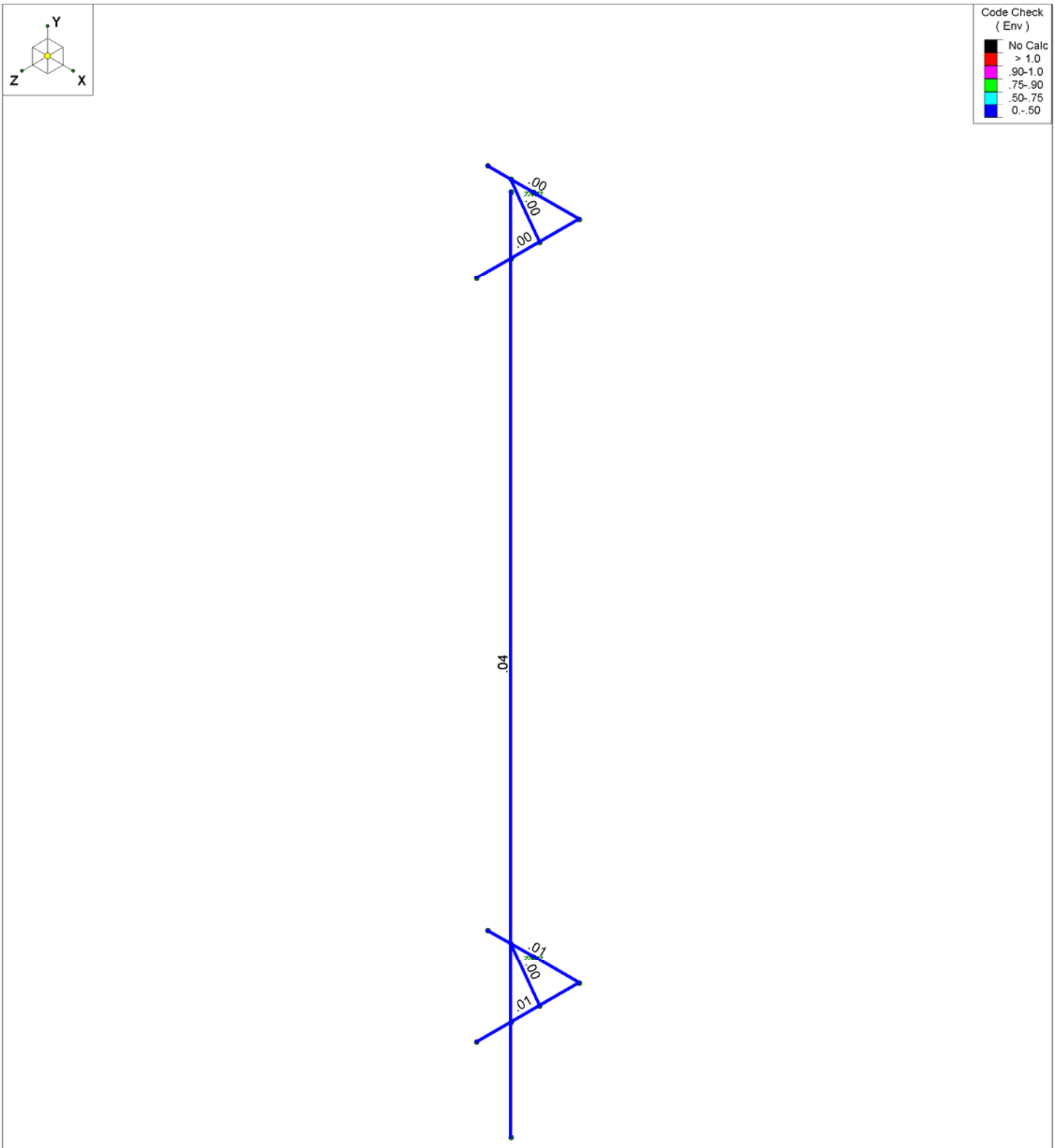
| | Enter antenna model. If not labled, enter "Unknown". If no antenna at specified location, enter "N/A". If antennas and the locations are the same on all three sectors, only enter one sector. | | | | | Mounting Locations (Unit: inches) | | | Photos of antennas |
|---|---|---|---|---|---|---|---|---|---|
| Ants. Items | Antenna Models if Known | Width (in.) | Depth (in.) | Height (in.) | Coax Size and Qty | Vertical Distances"$b_{1a}$, $b_{2a}$, $b_{3a}$, $b_{1b}$...." (In.) | Horiz. offset (Use "-" if Ant. is inside) | Horiz. offset "$C_1$, $C_2$, $C_3$, $C_4$, $C_5$" (in.) | Photo Numbers |
| **Sector A** | | | | | | | | | |
| $Ant_{1a}$ | | | | | | | | | |
| $Ant_{1b}$ | Antenna A | 13 | 3.5 | 56 | 1/2" (4) | +36" | 6 | 0 | |
| $Ant_{1c}$ | TMA A | 6.5 | 3 | 8 | 1/2" (2) | +21" | N/A | 0 | |
| $Ant_{2a}$ | | | | | | | | | |
| $Ant_{2b}$ | | | | | | | | | |
| $Ant_{2c}$ | | | | | | | | | |
| $Ant_{3a}$ | | | | | | | | | |
| $Ant_{3b}$ | | | | | | | | | |
| $Ant_{3c}$ | | | | | | | | | |
| $Ant_{4a}$ | | | | | | | | | |
| $Ant_{4b}$ | | | | | | | | | |
| $Ant_{4c}$ | | | | | | | | | |
| $Ant_{5a}$ | | | | | | | | | |
| $Ant_{5b}$ | | | | | | | | | |
| $Ant_{5c}$ | | | | | | | | | |
| Are Ant same as sector A? | | Yes | **Antennas on Sector B are the same as Sector A** | | | | | | |

**Azimuth (Degree) of Each Sector and Climbing Information**

| | | | |
|---|---|---|---|
| Sector A: | 10° | Deg | |
| Sector B: | 190° | Deg | |
| Sector C: | 280° | Deg | |
| Climbing | 90° | Deg | Located at Section B |
| Climbing Facility | Corrosion Type: | | Minor corrosion observed |
| | Access: | | Climbing path was unobstructed. |
| | Condition: | | N/A |

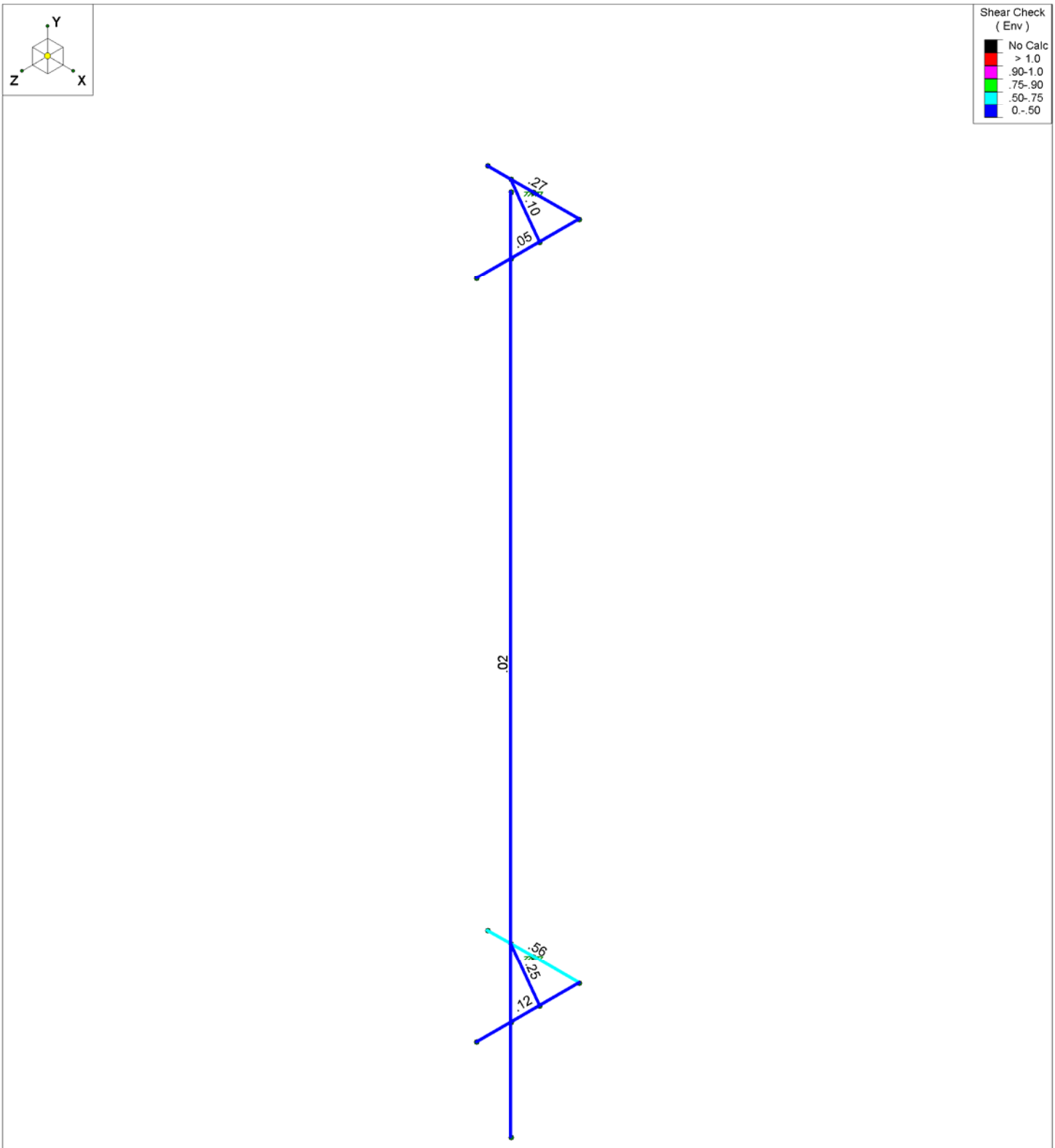
| | | |
|---|---|---|
| Are Ant same as sector A/B? | Same As A | **Antennas on Sector C are the same as Sector A** |





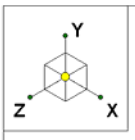

Member Code Checks Displayed (Enveloped)
Results for LC 1, 1.2D+1.0W (Front)

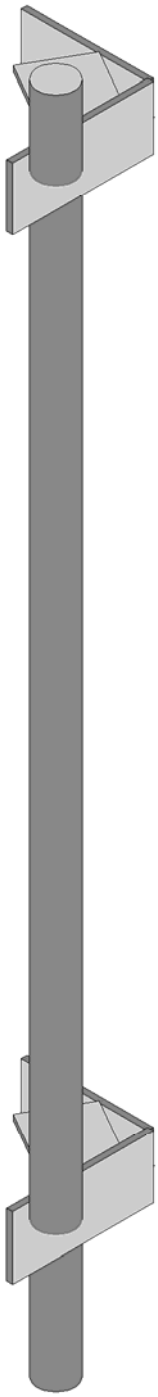
| | | |
|---|---|---|
| Tower Engineering Solutio... | CT46143-A-SBA_MT_LOT_Loads Only_Sector A_H | SK - 4 |
| | | June 26, 2019 at 12:47 PM |
| TES Project No. 78338 | | CT46143-A-SBA_78338_H_RISA_L... |




Member Shear Checks Displayed (Enveloped)
Results for LC 1, 1.2D+1.0W (Front)

| | | |
|---|---|---|
| Tower Engineering Solutio... | CT46143-A-SBA_MT_LOT_Loads Only_Sector A_H | SK - 5 |
| | | June 26, 2019 at 12:47 PM |
| TES Project No. 78338 | | CT46143-A-SBA_78338_H_RISA_L... |



| | | |
|---|---|---|
| Tower Engineering Solutio... | CT46143-A-SBA_MT_LOT_Loads Only_Sector A_H | SK - 6 |
| | | June 26, 2019 at 12:47 PM |
| TES Project No. 78338 | | CT46143-A-SBA_78338_H_RISA_L... |

## Basic Load Cases

| | BLC Description | Category | X Gravity | Y Gravity | Z Gravity | Joint | Point | Distributed | Area(Me... | Surface(P... |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Antenna D | None | | | | | 4 | | | |
| 2 | Antenna Di | None | | | | | 4 | | | |
| 3 | Antenna W Front | None | | | | | 4 | | | |
| 4 | Antenna Wi Front | None | | | | | 4 | | | |
| 5 | Antenna W Side | None | | | | | 4 | | | |
| 6 | Antenna Wi Side | None | | | | | 4 | | | |
| 7 | Service Lm1 | None | | | | | 1 | | | |
| 8 | Service Lm2 | None | | | | | 1 | | | |
| 9 | Structure D | None | | -1 | | | | | | |
| 10 | Structure Di | None | | | | | | 7 | | |
| 11 | Structure W Front | None | | | | | | 7 | | |
| 12 | Structure Wi Front | None | | | | | | 7 | | |
| 13 | Structure W Side | None | | | | | | 7 | | |
| 14 | Structure Wi Side | None | | | | | | 7 | | |
| 15 | Antenna Wm Front | None | | | | | 4 | | | |
| 16 | Antenna Wm Side | None | | | | | 4 | | | |
| 17 | Structure Wm Front | None | | | | | | 7 | | |
| 18 | Structure Wm Side | None | | | | | | 7 | | |
| 19 | Service Lv1 | None | | | | | 1 | | | |
| 20 | Service Lv2 | None | | | | | 1 | | | |

## Load Combinations

| | Description | So.. | P... | S... | BLC | Fac.. | BLC | Fac.. | BLC | Fac.. | BLC | Fac.. | BLC | Fac.. | BLC | Fac.. | BLC | Fac.. | BLC | Fac.. | BLC | Fac.. | BLC | Fac.. | BLC | Fac... |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.2D+1.0W (Front) | Yes | Y | | 1 | 1.2 | 9 | 1.2 | 3 | 1 | 11 | 1 | | | | | | | | | | | | | | |
| 2 | 1.2D+1.0W (Back) | Yes | Y | | 1 | 1.2 | 9 | 1.2 | 3 | -1 | 11 | -1 | | | | | | | | | | | | | | |
| 3 | 1.2D+1.0W (Left) | Yes | Y | | 1 | 1.2 | 9 | 1.2 | 5 | 1 | 13 | 1 | | | | | | | | | | | | | | |
| 4 | 1.2D+1.0W (Right) | Yes | Y | | 1 | 1.2 | 9 | 1.2 | 5 | -1 | 13 | -1 | | | | | | | | | | | | | | |
| 5 | 1.2D+1.0Di+1.0Wi (Fr.. | Yes | Y | | 1 | 1.2 | 9 | 1.2 | 2 | 1 | 10 | 1 | 4 | 1 | 12 | 1 | | | | | | | | | | |
| 6 | 1.2D+1.0Di+1.0Wi (B... | Yes | Y | | 1 | 1.2 | 9 | 1.2 | 2 | 1 | 10 | 1 | 4 | -1 | 12 | -1 | | | | | | | | | | |
| 7 | 1.2D+1.0Di+1.0Wi (L... | Yes | Y | | 1 | 1.2 | 9 | 1.2 | 2 | 1 | 10 | 1 | 6 | 1 | 14 | 1 | | | | | | | | | | |
| 8 | 1.2D+1.0Di+1.0Wi (Ri.. | Yes | Y | | 1 | 1.2 | 9 | 1.2 | 2 | 1 | 10 | 1 | 6 | -1 | 14 | -1 | | | | | | | | | | |
| 9 | 1.2D+1.5Lm1+1.0Wm.. | Yes | Y | | 1 | 1.2 | 9 | 1.2 | 7 | 1.5 | 15 | 1 | 17 | 1 | | | | | | | | | | | | |
| 10 | 1.2D+1.5LmL2+1.0W... | Yes | Y | | 1 | 1.2 | 9 | 1.2 | 8 | 1.5 | 15 | 1 | 17 | 1 | | | | | | | | | | | | |
| 11 | 1.2D+1.5Lv1 (Mainte... | Yes | Y | | 1 | 1.2 | 9 | 1.2 | 19 | 1.5 | | | | | | | | | | | | | | | | |
| 12 | 1.2D+1.5Lv2 (Mainte... | Yes | Y | | 1 | 1.2 | 9 | 1.2 | 20 | 1.5 | | | | | | | | | | | | | | | | |
| 13 | 1.4D | Yes | Y | | 1 | 1.4 | 9 | 1.4 | | | | | | | | | | | | | | | | | | |

## Joint Coordinates and Temperatures

| | Label | X [ft] | Y [ft] | Z [ft] | Temp [F] | Detach From Diap... |
|---|---|---|---|---|---|---|
| 1 | N1 | 4 | 0 | 0 | 0 | |
| 2 | N3 | 4 | -6 | 0 | 0 | |
| 3 | N3A | 4 | -.42 | 0 | 0 | |
| 4 | N4 | 4 | -.42 | -.5 | 0 | |
| 5 | N5 | 4 | -5.27 | 0 | 0 | |
| 6 | N6 | 4 | -5.27 | -.5 | 0 | |
| 7 | N7 | 4 | -.42 | .25 | 0 | |
| 8 | N8 | 4 | -5.27 | .25 | 0 | |
| 9 | N11 | 4 | -.42 | -.21 | 0 | |
| 10 | N12 | 4 | -5.27 | -.21 | 0 | |
| 11 | N13 | 3.5 | -.42 | -.5 | 0 | |

## Joint Coordinates and Temperatures (Continued)

| | Label | X [ft] | Y [ft] | Z [ft] | Temp [F] | Detach From Diap... |
|---|---|---|---|---|---|---|
| 12 | N14 | 3.5 | -5.27 | -.5 | 0 | |
| 13 | N15 | 3.33 | -.42 | -.5 | 0 | |
| 14 | N16 | 3.33 | -5.27 | -.5 | 0 | |
| 15 | N15A | 3.665 | -.42 | -.5 | 0 | |
| 16 | N16A | 3.665 | -5.27 | -.5 | 0 | |

## Hot Rolled Steel Section Sets

| | Label | Shape | Type | Design List | Material | Design ... | A [in2] | Iyy [in4] | Izz [in4] | J [in4] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Mount Pipes | PIPE_2.0 | Beam | Pipe | A53 Gr.B | Typical | 1.02 | .627 | .627 | 1.25 |
| 2 | All-Threaded Ro... | SR_0.5 | Beam | BAR | A36 Gr.36 | Typical | .196 | .003 | .003 | .006 |
| 3 | Plate Connection | PL1/4x3 | Beam | RECT | A36 Gr.36 | Typical | .75 | .004 | .563 | .015 |
| 4 | New Tube Braci... | HSS3x3x4 | Beam | SquareTube | A500 Gr.B Rect | Typical | 2.44 | 3.02 | 3.02 | 5.08 |
| 5 | New Bent Plate | PL3/8x7 | Beam | RECT | A36 Gr.36 | Typical | 2.625 | .031 | 10.719 | .119 |

## Cold Formed Steel Section Sets

| | Label | Shape | Type | Design List | Material | Design R... | A [in2] | Iyy [in4] | Izz [in4] | J [in4] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CF1A | 1.5CU1.25X035 | Beam | CU | A570 Gr.33 | Typical | .131 | .022 | .052 | 5.4e-5 |

## Aluminum Section Sets

| | Label | Shape | Type | Design List | Material | Design Rules | A [in2] | Iyy [in4] | Izz [in4] | J [in4] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | AL1A | AACS14X13.9 | Beam | AA Channel | 3003-H14 | Typical | 11.8 | 44.7 | 401 | 1.19 |

## Hot Rolled Steel Properties

| | Label | E [ksi] | G [ksi] | Nu | Therm (\1E... | Density[k/ft... | 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.B RND | 29000 | 11154 | .3 | .65 | .527 | 42 | 1.4 | 58 | 1.3 |
| 5 | A500 Gr.B Rect | 29000 | 11154 | .3 | .65 | .527 | 46 | 1.4 | 58 | 1.3 |
| 6 | A53 Gr.B | 29000 | 11154 | .3 | .65 | .49 | 35 | 1.6 | 60 | 1.2 |
| 7 | A1085 | 29000 | 11154 | .3 | .65 | .49 | 50 | 1.4 | 65 | 1.3 |

## Cold Formed Steel Properties

| | Label | E [ksi] | G [ksi] | Nu | Therm (\1E5 F) | Density[k/ft^... | Yield[ksi] | Fu[ksi] |
|---|---|---|---|---|---|---|---|---|
| 1 | A570 Gr.33 | 29500 | 11346 | .3 | .65 | .49 | 33 | 52 |
| 2 | A607 C1 Gr.55 | 29500 | 11346 | .3 | .65 | .49 | 55 | 70 |

## Aluminum Properties

| | Label | E [ksi] | G [ksi] | Nu | Therm (... | Density[... | Table B.4 | kt | Ftu[ksi] | Fty[ksi] | Fcy[ksi] | Fsu[ksi] | Ct |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3003-H14 | 10100 | 3787.5 | .33 | 1.3 | .173 | Table B.... | 1 | 19 | 16 | 13 | 12 | 141 |
| 2 | 6061-T6 | 10100 | 3787.5 | .33 | 1.3 | .173 | Table B.... | 1 | 38 | 35 | 35 | 24 | 141 |
| 3 | 6063-T5 | 10100 | 3787.5 | .33 | 1.3 | .173 | Table B.... | 1 | 22 | 16 | 16 | 13 | 141 |
| 4 | 6063-T6 | 10100 | 3787.5 | .33 | 1.3 | .173 | Table B.... | 1 | 30 | 25 | 25 | 19 | 141 |
| 5 | 5052-H34 | 10200 | 3787.5 | .33 | 1.3 | .173 | Table B.... | 1 | 34 | 26 | 24 | 20 | 141 |
| 6 | 6061-T6 W | 10100 | 3787.5 | .33 | 1.3 | .173 | Table B.... | 1 | 24 | 15 | 15 | 15 | 141 |

## Member Primary Data

| | Label | I Joint | J Joint | K Joint | Rotate(d... | Section/Shape | Type | Design List | Material | Design Ru... |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | MP1A | N1 | N3 | | | Mount Pipes | Beam | Pipe | A53 Gr.B | Typical |
| 2 | M2 | N7 | N4 | | | PL3/8x4 | Beam | RECT | A36 Gr.36 | Typical |
| 3 | M3 | N8 | N6 | | | PL3/8x4 | Beam | RECT | A36 Gr.36 | Typical |
| 4 | M4 | N11 | N13 | | 90 | PL3/8x4 | Beam | Wide Flange | A36 Gr.36 | Typical |
| 5 | M5 | N12 | N14 | | 90 | PL3/8x4 | Beam | Wide Flange | A36 Gr.36 | Typical |
| 6 | M6 | N15 | N4 | | | PL3/8x4 | Beam | RECT | A36 Gr.36 | Typical |
| 7 | M7 | N16 | N6 | | | PL3/8x4 | Beam | RECT | A36 Gr.36 | Typical |

## Member Advanced Data

| | Label | I Release | J Release | I Offset[in] | J Offset[in] | T/C Only | Physical | Analysis ... | Inactive | Seismic Design ... |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | MP1A | | | | | | Yes | | | None |
| 2 | M2 | | | | | | Yes | | | None |
| 3 | M3 | | | | | | Yes | | | None |
| 4 | M4 | | | | | | Yes | | | None |
| 5 | M5 | | | | | | Yes | | | None |
| 6 | M6 | | | | | | Yes | | | None |
| 7 | M7 | | | | | | Yes | | | None |

## Hot Rolled Steel Design Parameters

| | Label | Shape | Length[ft] | Lbyy[ft] | Lbzz[ft] | Lcomp top[ft] | Lcomp bot[ft] | L-torq... | Kyy | Kzz | Cb | Function |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | MP1A | Mount Pipes | 6 | | | Lbyy | | | 2.1 | 2.1 | | Lateral |
| 2 | M2 | PL3/8x4 | .75 | | | Lbyy | | | | | | Lateral |
| 3 | M3 | PL3/8x4 | .75 | | | Lbyy | | | | | | Lateral |
| 4 | M4 | PL3/8x4 | .578 | | | | | | | | | Lateral |
| 5 | M5 | PL3/8x4 | .578 | | | | | | | | | Lateral |
| 6 | M6 | PL3/8x4 | .67 | | | Lbyy | | | | | | Lateral |
| 7 | M7 | PL3/8x4 | .67 | | | Lbyy | | | | | | Lateral |

## Cold Formed Steel Design Parameters

| Label | Shape | Lengt... | Lbyy[ft] | Lbzz[ft] | Lcomp t... | Lcomp ... | L-torque... | Kyy | Kzz | Cm-... | Cm-... | Cb | R | a[ft] | y sw... | z sw... |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No Data to Print ... | | | | | | | | | | | | | | | | |

## Aluminum Design Parameters

| Label | Shape | Length[ft] | Lbyy[ft] | Lbzz[ft] | Lcomp top[ft] | Lcomp bot[ft] | L-torq... | Kyy | Kzz | Cb | Function |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No Data to Print ... | | | | | | | | | | | |

## Joint Loads and Enforced Displacements

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

## Member Point Loads (BLC 1 : Antenna D)

| | Member Label | Direction | Magnitude[lb,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 1 | MP1A | Y | -22.7 | 0 |
| 2 | MP1A | Y | -22.7 | 5.2 |
| 3 | MP1A | Y | -13 | 2 |
| 4 | MP1A | Y | -13 | 4 |

## Member Point Loads (BLC 2 : Antenna Di)

| | Member Label | Direction | Magnitude[lb,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 1 | MP1A | Y | -114.7 | 0 |
| 2 | MP1A | Y | -114.7 | 5.2 |
| 3 | MP1A | Y | -32.289 | 2 |
| 4 | MP1A | Y | -32.289 | 4 |

## Member Point Loads (BLC 3 : Antenna W Front)

| | Member Label | Direction | Magnitude[lb,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 1 | MP1A | Z | -168.719 | 0 |
| 2 | MP1A | Z | -168.719 | 5.2 |
| 3 | MP1A | Z | -30.684 | 2 |
| 4 | MP1A | Z | -30.684 | 4 |

## Member Point Loads (BLC 4 : Antenna Wi Front)

| | Member Label | Direction | Magnitude[lb,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 1 | MP1A | Z | -35.447 | 0 |
| 2 | MP1A | Z | -35.447 | 5.2 |
| 3 | MP1A | Z | -6.835 | 2 |
| 4 | MP1A | Z | -6.835 | 4 |

## Member Point Loads (BLC 5 : Antenna W Side)

| | Member Label | Direction | Magnitude[lb,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 1 | MP1A | X | 105.405 | 0 |
| 2 | MP1A | X | 105.405 | 5.2 |
| 3 | MP1A | X | 14.246 | 2 |
| 4 | MP1A | X | 14.246 | 4 |

## Member Point Loads (BLC 6 : Antenna Wi Side)

| | Member Label | Direction | Magnitude[lb,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 1 | MP1A | X | 23.186 | 0 |
| 2 | MP1A | X | 23.186 | 5.2 |
| 3 | MP1A | X | 4.594 | 2 |
| 4 | MP1A | X | 4.594 | 4 |

## Member Point Loads (BLC 7 : Service Lm1)

| | Member Label | Direction | Magnitude[lb,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 1 | M7 | Y | -500 | %50 |

## Member Point Loads (BLC 8 : Service Lm2)

| | Member Label | Direction | Magnitude[lb,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 1 | M7 | Y | -500 | 0 |

## Member Point Loads (BLC 15 : Antenna Wm Front)

| | Member Label | Direction | Magnitude[lb,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 1 | MP1A | Z | -11.285 | 0 |
| 2 | MP1A | Z | -11.285 | 5.2 |
| 3 | MP1A | Z | -2.052 | 2 |
| 4 | MP1A | Z | -2.052 | 4 |

## Member Point Loads (BLC 16 : Antenna Wm Side)

| | Member Label | Direction | Magnitude[lb,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 1 | MP1A | X | 7.05 | 0 |
| 2 | MP1A | X | 7.05 | 5.2 |
| 3 | MP1A | X | .953 | 2 |

## Member Point Loads (BLC 16 : Antenna Wm Side) (Continued)

| | Member Label | Direction | Magnitude[lb,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 4 | MP1A | X | .953 | 4 |

## Member Point Loads (BLC 19 : Service Lv1)

| | Member Label | Direction | Magnitude[lb,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 1 | M3 | Y | -250 | 0 |

## Member Point Loads (BLC 20 : Service Lv2)

| | Member Label | Direction | Magnitude[lb,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 1 | M3 | Y | -250 | %50 |

## Member Distributed Loads (BLC 10 : Structure Di)

| | Member Label | Direction | Start Magnitude[lb/ft,F,ksf] | End Magnitud... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|---|
| 1 | MP1A | Y | -8.037 | -8.037 | 0 | %100 |
| 2 | M2 | Y | -11.326 | -11.326 | 0 | %100 |
| 3 | M3 | Y | -11.326 | -11.326 | 0 | %100 |
| 4 | M4 | Y | -11.326 | -11.326 | 0 | %100 |
| 5 | M5 | Y | -11.326 | -11.326 | 0 | %100 |
| 6 | M6 | Y | -11.326 | -11.326 | 0 | %100 |
| 7 | M7 | Y | -11.326 | -11.326 | 0 | %100 |

## Member Distributed Loads (BLC 11 : Structure W Front)

| | Member Label | Direction | Start Magnitude[lb/ft,F,ksf] | End Magnitud... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|---|
| 1 | MP1A | PZ | -8.305 | -8.305 | 0 | %100 |
| 2 | M2 | PZ | -13.987 | -13.987 | 0 | %100 |
| 3 | M3 | PZ | -13.987 | -13.987 | 0 | %100 |
| 4 | M4 | PZ | -13.987 | -13.987 | 0 | %100 |
| 5 | M5 | PZ | -13.987 | -13.987 | 0 | %100 |
| 6 | M6 | PZ | -13.987 | -13.987 | 0 | %100 |
| 7 | M7 | PZ | -13.987 | -13.987 | 0 | %100 |

## Member Distributed Loads (BLC 12 : Structure Wi Front)

| | Member Label | Direction | Start Magnitude[lb/ft,F,ksf] | End Magnitud... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|---|
| 1 | MP1A | PZ | -3.672 | -3.672 | 0 | %100 |
| 2 | M2 | PZ | -4.728 | -4.728 | 0 | %100 |
| 3 | M3 | PZ | -4.728 | -4.728 | 0 | %100 |
| 4 | M4 | PZ | -4.728 | -4.728 | 0 | %100 |
| 5 | M5 | PZ | -4.728 | -4.728 | 0 | %100 |
| 6 | M6 | PZ | -4.728 | -4.728 | 0 | %100 |
| 7 | M7 | PZ | -4.728 | -4.728 | 0 | %100 |

## Member Distributed Loads (BLC 13 : Structure W Side)

| | Member Label | Direction | Start Magnitude[lb/ft,F,ksf] | End Magnitud... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|---|
| 1 | MP1A | PX | 8.305 | 8.305 | 0 | %100 |
| 2 | M2 | PX | 13.987 | 13.987 | 0 | %100 |
| 3 | M3 | PX | 13.987 | 13.987 | 0 | %100 |
| 4 | M4 | PX | 13.987 | 13.987 | 0 | %100 |
| 5 | M5 | PX | 13.987 | 13.987 | 0 | %100 |
| 6 | M6 | PX | 13.987 | 13.987 | 0 | %100 |
| 7 | M7 | PX | 13.987 | 13.987 | 0 | %100 |

## Member Distributed Loads (BLC 14 : Structure Wi Side)

| | Member Label | Direction | Start Magnitude[lb/ft,F,ksf] | End Magnitud... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|---|

## Member Distributed Loads (BLC 14 : Structure Wi Side) (Continued)

| | Member Label | Direction | Start Magnitude[lb/ft,F,ksf] | End Magnitud... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|---|
| 1 | MP1A | PX | 3.672 | 3.672 | 0 | %100 |
| 2 | M2 | PX | 4.728 | 4.728 | 0 | %100 |
| 3 | M3 | PX | 4.728 | 4.728 | 0 | %100 |
| 4 | M4 | PX | 4.728 | 4.728 | 0 | %100 |
| 5 | M5 | PX | 4.728 | 4.728 | 0 | %100 |
| 6 | M6 | PX | 4.728 | 4.728 | 0 | %100 |
| 7 | M7 | PX | 4.728 | 4.728 | 0 | %100 |

## Member Distributed Loads (BLC 17 : Structure Wm Front)

| | Member Label | Direction | Start Magnitude[lb/ft,F,ksf] | End Magnitud... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|---|
| 1 | MP1A | PZ | -.555 | -.555 | 0 | %100 |
| 2 | M2 | PZ | -.936 | -.936 | 0 | %100 |
| 3 | M3 | PZ | -.936 | -.936 | 0 | %100 |
| 4 | M4 | PZ | -.936 | -.936 | 0 | %100 |
| 5 | M5 | PZ | -.936 | -.936 | 0 | %100 |
| 6 | M6 | PZ | -.936 | -.936 | 0 | %100 |
| 7 | M7 | PZ | -.936 | -.936 | 0 | %100 |

## Member Distributed Loads (BLC 18 : Structure Wm Side)

| | Member Label | Direction | Start Magnitude[lb/ft,F,ksf] | End Magnitud... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|---|
| 1 | MP1A | PX | .555 | .555 | 0 | %100 |
| 2 | M2 | PX | .936 | .936 | 0 | %100 |
| 3 | M3 | PX | .936 | .936 | 0 | %100 |
| 4 | M4 | PX | .936 | .936 | 0 | %100 |
| 5 | M5 | PX | .936 | .936 | 0 | %100 |
| 6 | M6 | PX | .936 | .936 | 0 | %100 |
| 7 | M7 | PX | .936 | .936 | 0 | %100 |

## Member Area Loads

| Joint A | Joint B | Joint C | Joint D | Direction | Distribution | Magnitude[ksf] |
|---|---|---|---|---|---|---|
| No Data to Print ... | | | | | | |

## Joint Boundary Conditions

| | Joint Label | X [k/in] | Y [k/in] | Z [k/in] | X Rot.[k-ft/rad] | Y Rot.[k-ft/rad] | Z Rot.[k-ft/rad] |
|---|---|---|---|---|---|---|---|
| 1 | N4 | | | | | | |
| 2 | N6 | | | | | | |
| 3 | N13 | | | | | | |
| 4 | N14 | | | | | | |
| 5 | N15 | | | | | | |
| 6 | N16 | | | | | | |
| 7 | N15A | Reaction | Reaction | Reaction | Reaction | Reaction | Reaction |
| 8 | N16A | Reaction | Reaction | Reaction | Reaction | Reaction | Reaction |

## Envelope Joint Reactions

| | Joint | | X [lb] | LC | Y [lb] | LC | Z [lb] | LC | MX [k-ft] | LC | MY [k-ft] | LC | MZ [k-ft] | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | N15A | max | 157 | 4 | 349.397 | 6 | 237.221 | 1 | -.015 | 1 | .076 | 4 | .094 | 6 |
| 2 | | min | -157.252 | 3 | 142.684 | 1 | -238.042 | 2 | -.135 | 6 | -.076 | 3 | .018 | 4 |
| 3 | N16A | max | 161.224 | 4 | 907.558 | 10 | 244.143 | 1 | .006 | 1 | .078 | 4 | .143 | 12 |
| 4 | | min | -160.971 | 3 | 144.357 | 2 | -243.322 | 2 | -.276 | 11 | -.078 | 3 | -.217 | 10 |
| 5 | Totals: | max | 318.223 | 4 | 1056.475 | 9 | 481.364 | 1 | | | | | | |
| 6 | | min | -318.223 | 3 | 306.475 | 2 | -481.364 | 2 | | | | | | |

## Envelope Member Section Forces

| | Member | Sec | | Axial[lb] | LC | y Shear[lb] | LC | z Shea... | LC | Torqu... | LC | y-y Mo... | LC | z-z Mo... | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | MP1A | 1 | max | 141.94 | 5 | 105.407 | 4 | 168.722 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 2 | | | min | 27.24 | 3 | -105.407 | 3 | -168.7... | 2 | 0 | 1 | 0 | 1 | 0 | 1 |
| 3 | | 2 | max | -11.294 | 1 | 24.843 | 3 | 40.501 | 2 | 0 | 3 | 0 | 2 | 0 | 8 |
| 4 | | | min | -111.576 | 11 | -24.591 | 4 | -39.68 | 1 | 0 | 4 | -.002 | 5 | 0 | 3 |
| 5 | | 3 | max | 10.554 | 1 | 2.112 | 4 | 3.461 | 1 | 0 | 3 | .021 | 2 | .014 | 4 |
| 6 | | | min | -89.729 | 11 | -1.86 | 3 | -2.64 | 2 | 0 | 4 | -.021 | 1 | -.014 | 3 |
| 7 | | 4 | max | 72.512 | 5 | 28.815 | 4 | 46.602 | 1 | 0 | 3 | .009 | 1 | .005 | 3 |
| 8 | | | min | -67.881 | 11 | -28.563 | 3 | -45.781 | 2 | 0 | 4 | -.008 | 2 | -.006 | 4 |
| 9 | | 5 | max | 0 | 1 | 0 | 7 | 0 | 6 | 0 | 1 | 0 | 1 | 0 | 1 |
| 10 | | | min | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 11 | M2 | 1 | max | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 12 | | | min | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 13 | | 2 | max | 0 | 1 | -9.187 | 2 | 2.623 | 3 | 0 | 1 | 0 | 3 | .001 | 6 |
| 14 | | | min | 0 | 1 | -11.311 | 6 | -2.623 | 4 | 0 | 1 | 0 | 4 | 0 | 2 |
| 15 | | 3 | max | 220.856 | 1 | -63.156 | 1 | 147.951 | 3 | .014 | 3 | .019 | 3 | .035 | 2 |
| 16 | | | min | -221.677 | 2 | -251.486 | 6 | -147.6... | 4 | -.014 | 4 | -.019 | 4 | -.016 | 1 |
| 17 | | 4 | max | 191.632 | 1 | -46.906 | 4 | 32.869 | 2 | .01 | 8 | .007 | 3 | .042 | 6 |
| 18 | | | min | -192.147 | 2 | -180.663 | 6 | -32.768 | 1 | -.003 | 4 | -.007 | 4 | -.004 | 1 |
| 19 | | 5 | max | 191.632 | 1 | -56.094 | 4 | 32.869 | 2 | .01 | 8 | .008 | 2 | .077 | 6 |
| 20 | | | min | -192.147 | 2 | -191.975 | 6 | -32.768 | 1 | -.003 | 4 | -.008 | 1 | .008 | 1 |
| 21 | M3 | 1 | max | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 22 | | | min | 0 | 1 | -375 | 11 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 23 | | 2 | max | 0 | 1 | -9.187 | 12 | 2.623 | 3 | 0 | 1 | 0 | 3 | .071 | 11 |
| 24 | | | min | 0 | 1 | -384.187 | 11 | -2.623 | 4 | 0 | 1 | 0 | 4 | 0 | 12 |
| 25 | | 3 | max | 227.778 | 1 | -64.825 | 2 | 151.67 | 3 | .035 | 3 | .019 | 3 | .134 | 11 |
| 26 | | | min | -226.957 | 2 | -358.981 | 11 | -151.9... | 4 | -.035 | 4 | -.019 | 4 | -.045 | 1 |
| 27 | | 4 | max | 197.405 | 1 | -27.686 | 10 | 33.651 | 2 | .019 | 11 | .007 | 3 | .116 | 11 |
| 28 | | | min | -196.888 | 2 | -290.861 | 12 | -33.752 | 1 | -.012 | 4 | -.007 | 4 | -.021 | 1 |
| 29 | | 5 | max | 197.405 | 1 | -36.874 | 10 | 33.651 | 2 | .019 | 11 | .008 | 2 | .158 | 11 |
| 30 | | | min | -196.888 | 2 | -300.048 | 12 | -33.752 | 1 | -.012 | 4 | -.008 | 1 | -.004 | 1 |
| 31 | M4 | 1 | max | 195.788 | 4 | 41.771 | 1 | 82.256 | 7 | 0 | 1 | .011 | 3 | .023 | 4 |
| 32 | | | min | -196.072 | 3 | -41.959 | 2 | 7.933 | 3 | -.03 | 6 | -.007 | 4 | -.023 | 3 |
| 33 | | 2 | max | 196.665 | 4 | 43.284 | 1 | 90.974 | 7 | 0 | 1 | .018 | 8 | .021 | 4 |
| 34 | | | min | -196.949 | 3 | -43.472 | 2 | 15.014 | 3 | -.03 | 6 | -.001 | 4 | -.021 | 3 |
| 35 | | 3 | max | 197.543 | 4 | 44.796 | 1 | 99.691 | 7 | 0 | 1 | .032 | 6 | .019 | 4 |
| 36 | | | min | -197.827 | 3 | -44.984 | 2 | 22.094 | 3 | -.03 | 6 | .004 | 1 | -.019 | 3 |
| 37 | | 4 | max | 198.42 | 4 | 46.308 | 1 | 108.408 | 7 | 0 | 1 | .047 | 6 | .018 | 2 |
| 38 | | | min | -198.704 | 3 | -46.497 | 2 | 29.175 | 3 | -.03 | 6 | .008 | 1 | -.018 | 1 |
| 39 | | 5 | max | 199.297 | 4 | 47.821 | 1 | 117.125 | 7 | 0 | 1 | .063 | 6 | .025 | 2 |
| 40 | | | min | -199.581 | 3 | -48.009 | 2 | 36.256 | 3 | -.03 | 6 | .013 | 1 | -.025 | 1 |
| 41 | M5 | 1 | max | 201.222 | 4 | 43.158 | 1 | 148.737 | 11 | .008 | 1 | .023 | 3 | .024 | 4 |
| 42 | | | min | -200.938 | 3 | -42.97 | 2 | -12.467 | 3 | -.071 | 11 | -.019 | 4 | -.024 | 3 |
| 43 | | 2 | max | 202.099 | 4 | 44.67 | 1 | 155.818 | 11 | .008 | 1 | .04 | 11 | .021 | 4 |
| 44 | | | min | -201.816 | 3 | -44.483 | 2 | -5.387 | 3 | -.071 | 11 | -.011 | 4 | -.021 | 3 |
| 45 | | 3 | max | 202.976 | 4 | 46.183 | 1 | 162.899 | 11 | .008 | 1 | .063 | 11 | .019 | 4 |
| 46 | | | min | -202.693 | 3 | -45.995 | 2 | 1.694 | 3 | -.071 | 11 | -.001 | 4 | -.019 | 3 |
| 47 | | 4 | max | 203.854 | 4 | 47.695 | 1 | 169.979 | 11 | .008 | 1 | .087 | 11 | .018 | 2 |
| 48 | | | min | -203.57 | 3 | -47.507 | 2 | 8.775 | 3 | -.071 | 11 | .004 | 1 | -.018 | 1 |
| 49 | | 5 | max | 204.731 | 4 | 49.207 | 1 | 177.06 | 11 | .008 | 1 | .112 | 11 | .025 | 2 |
| 50 | | | min | -204.447 | 3 | -49.02 | 2 | 15.855 | 3 | -.071 | 11 | .008 | 1 | -.025 | 1 |
| 51 | M6 | 1 | max | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 52 | | | min | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 53 | | 2 | max | 0 | 1 | -8.207 | 1 | 2.343 | 2 | 0 | 1 | 0 | 2 | 0 | 5 |
| 54 | | | min | 0 | 1 | -10.105 | 5 | -2.343 | 1 | 0 | 1 | 0 | 1 | 0 | 4 |
| 55 | | 3 | max | 165.406 | 3 | 212.185 | 6 | 196.318 | 1 | -.008 | 1 | .057 | 2 | .077 | 6 |
| 56 | | | min | -165.253 | 4 | -78.065 | 4 | -196.8... | 2 | -.077 | 6 | -.057 | 1 | .018 | 4 |

## Envelope Member Section Forces (Continued)

| | Member | Sec | | Axial[lb] | LC | y Shear[lb] | LC | z Shea.. | LC | Torqu... | LC | y-y Mo... | LC | z-z Mo... | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 57 | | 4 | max | 32.769 | 1 | 202.08 | 6 | 193.975 | 1 | -.008 | 1 | .024 | 2 | .042 | 8 |
| 58 | | | min | -32.868 | 2 | 64.302 | 4 | -194.4... | 2 | -.077 | 6 | -.024 | 1 | .007 | 4 |
| 59 | | 5 | max | 32.769 | 1 | 191.976 | 6 | 191.632 | 1 | -.008 | 1 | .008 | 1 | .01 | 8 |
| 60 | | | min | -32.868 | 2 | 56.095 | 4 | -192.1... | 2 | -.077 | 6 | -.008 | 2 | -.003 | 4 |
| 61 | M7 | 1 | max | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 62 | | | min | 0 | 1 | -750 | 10 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 63 | | 2 | max | 0 | 1 | -8.207 | 4 | 2.343 | 2 | 0 | 1 | 0 | 2 | .126 | 10 |
| 64 | | | min | 0 | 1 | -758.208 | 10 | -2.343 | 1 | 0 | 1 | 0 | 1 | 0 | 4 |
| 65 | | 3 | max | 169.507 | 3 | 316.463 | 12 | 202.091 | 1 | .022 | 10 | .058 | 2 | .226 | 10 |
| 66 | | | min | -169.657 | 4 | -854.269 | 10 | -201.5... | 2 | -.158 | 11 | -.059 | 1 | .006 | 4 |
| 67 | | 4 | max | 33.753 | 1 | 308.256 | 12 | 199.748 | 1 | .004 | 1 | .025 | 2 | .063 | 12 |
| 68 | | | min | -33.65 | 2 | 45.081 | 10 | -199.23 | 2 | -.158 | 11 | -.025 | 1 | -.004 | 4 |
| 69 | | 5 | max | 33.753 | 1 | 300.048 | 12 | 197.405 | 1 | .004 | 1 | .008 | 1 | .019 | 11 |
| 70 | | | min | -33.65 | 2 | 36.874 | 10 | -196.8... | 2 | -.158 | 11 | -.008 | 2 | -.012 | 4 |

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

| | Member | Shape | Code Check | Loc[ft] | LC | Shear Ch... | Loc[ft] | Dir | ... | phi*P... | phi*P... | phi*M... | phi*M..... | | Eqn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M7 | PL3/8x4 | .007 | .335 | 10 | .556 | .335 | y | 11 | 3870... | 388800 | 24.3 | 32.4 | ... | H1-1b |
| 2 | M6 | PL3/8x4 | .003 | .335 | 2 | .271 | .335 | y | 6 | 3870... | 388800 | 24.3 | 32.4 | ... | H1-1b |
| 3 | M5 | PL3/8x4 | .005 | .578 | 11 | .250 | 0 | y | 11 | 3874... | 388800 | 24.3 | 32.4 | ... | H1-1b |
| 4 | M3 | PL3/8x4 | .005 | .453 | 11 | .124 | .453 | y | 4 | 3865... | 388800 | 24.3 | 32.4 | ... | H1-1b |
| 5 | M4 | PL3/8x4 | .003 | .578 | 6 | .105 | .578 | y | 6 | 3874... | 388800 | 24.3 | 32.4 | ... | H1-1b |
| 6 | M2 | PL3/8x4 | .003 | .75 | 6 | .051 | .453 | y | 4 | 3865... | 388800 | 24.3 | 32.4 | ... | H1-1b |
| 7 | MP1A | PIPE_2.0 | .036 | .375 | 2 | .023 | 5.25 | | 1 | 6195.... | 32130 | 1.872 | 1.872 | ... | H1-1b |

## Envelope AISI S100-10: LRFD Cold Formed Steel Code Checks

| Memb... | Shape | Code Check | Loc[..... | She... | Loc..... | ... | phi*P... | phi*T... | phi*... | phi*... | Cb | Cm... | Cm... | Eqn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No Data to Print ... | | | | | | | | | | | | | | |

## Envelope AA ADM1-10: ASD - Building Aluminum Code Checks

| Member | Shape | Code C... | Loc[ft] | LC | Shear ... | Loc[ft] | Dir | LC | Pnc/O... | Pnt/Om... | Mny/O... | Mnz/O... | Vny/O... | Vnz/O... | Cb | Eqn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No Data to Print ... | | | | | | | | | | | | | | | | |

# EXHIBIT 9

# Transcom Engineering, Inc.

Wireless Network Design and Deployment

# Radio Frequency Emissions Analysis Report

**T-MOBILE** Existing Facility

## Site ID: CTHA510A

SBA Avon Monopole
277 Huckleberry Hill Rd
Avon, CT 06001

**June 16, 2019**

**Transcom Engineering Project Number: 737001-0137**

| Site Compliance Summary | |
|---|---|
| Compliance Status: | **COMPLIANT** |
| Site total MPE% of FCC general population allowable limit: | **22.19 %** |

June 16, 2019

T-MOBILE
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, CT 6009

Emissions Analysis for Site: **CTHA510A – SBA Avon Monopole**

Transcom Engineering, Inc ("Transcom") was directed to analyze the proposed upgrades to the T-MOBILE facility located at **277 Huckleberry Hill Rd, Avon, CT**, for the purpose of determining whether the emissions from the Proposed T-MOBILE Antenna Installation located on this property are within specified federal limits.

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

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

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

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

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

Additional details can be found in FCC OET 65.

## CALCULATIONS

Calculations were performed for the proposed upgrades to the T-MOBILE antenna facility located at **277 Huckleberry Hill Rd, Avon, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-MOBILE is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panel antennas, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. All power values expressed and analyzed are maximum power levels expected to be used on all radios.

All emissions values for additional carriers were taken from the Connecticut Siting Council (CSC) active MPE database. Values in this database are provided by the individual carriers themselves

For each sector the following channel counts, frequency bands and power levels were utilized as shown in *Table 1*:

| Technology | Frequency Band | Channel Count | Transmit Power per Channel (W) |
|---|---|---|---|
| LTE | 1900 MHz (PCS) | 4 | 40 |
| LTE | 2100 MHz (AWS) | 2 | 60 |
| UMTS | 2100 MHz (AWS) | 1 | 40 |
| LTE / 5G NR | 600 MHz | 2 | 40 |
| LTE | 700 MHz | 2 | 20 |

*Table 1: Channel Data Table*

The following antennas listed in *Table 2* were used in the modeling for transmission in the 600 MHz, 700 MHz, 1900 MHz (PCS) and 2100 MHz (AWS) frequency bands. This is based on feedback from the carrier with regards to anticipated antenna selection. Maximum gain values for all antennas are listed in the Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panel antennas, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

| Sector | Antenna Number | Antenna Make / Model | Antenna Centerline (ft) |
|---|---|---|---|
| A | 1 | RFS APXVAR18_43-C-NA20 | 80 |
| B | 1 | RFS APXVAR18_43-C-NA20 | 80 |
| C | 1 | RFS APXVAR18_43-C-NA20 | 80 |

*Table 2: Antenna Data*

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

Cable losses were factored in the calculations for this site. Since all proposed radios are ground mounted the following cable loss values were used. For each ground mounted **600 MHz** radio there was **1.05 dB** of cable loss calculated into the system gains / losses for this site. For each ground mounted **700 MHz** radio there was **1.14 dB** of cable loss calculated into the system gains / losses for this site. For each ground mounted **1900 MHz (PCS)** radio there was **2.02 dB** of cable loss calculated into the system gains / losses for this site. For each ground mounted **2100 MHz (AWS)** radio there was **2.08 dB** of cable loss calculated into the system gains / losses for this site. These values were calculated based upon the manufacturers specifications for **120 feet** of **7/8”** coax.

## RESULTS

Per the calculations completed for the proposed T-MOBILE configurations *Table 3* shows resulting emissions power levels and percentages of the FCC's allowable general population limit.

| Antenna ID | Antenna Make / Model | Frequency Bands | Antenna Gain (dBd) | Channel Count | Total TX Power (W) | ERP (W) | MPE % |
|---|---|---|---|---|---|---|---|
| Antenna A1 | RFS APXVAR18_43-C-NA20 | 1900 MHz (PCS) / 2100 MHz (AWS) / 600 MHz / 700 MHz | 15.85 / 17.15 / 12.85 / 13.55 | 11 | 440 | 10,932.05 | 8.90 |
| | | | | | | Sector A Composite MPE% | **8.90** |
| Antenna B1 | RFS APXVAR18_43-C-NA20 | 1900 MHz (PCS) / 2100 MHz (AWS) / 600 MHz / 700 MHz | 15.85 / 17.15 / 12.85 / 13.55 | 11 | 440 | 10,932.05 | 8.90 |
| | | | | | | Sector B Composite MPE% | **8.90** |
| Antenna C1 | RFS APXVAR18_43-C-NA20 | 1900 MHz (PCS) / 2100 MHz (AWS) / 600 MHz / 700 MHz | 15.85 / 17.15 / 12.85 / 13.55 | 11 | 440 | 10,932.05 | 8.90 |
| | | | | | | Sector C Composite MPE% | **8.90** |

*Table 3: T-MOBILE Emissions Levels*

The Following table (*table 4*) shows all additional carriers on site and their MPE% as recorded in the CSC active MPE database for this facility along with the newly calculated maximum T-MOBILE MPE contributions per this report. FCC OET 65 specifies that for carriers utilizing directional antennas that the highest recorded sector value be used for composite site MPE values due to their greatly reduced emissions contributions in the directions of the adjacent sectors. For this site, all three sectors have the same configuration yielding the same results on all three sectors. *Table 5* below shows a summary for each T-MOBILE Sector as well as the composite MPE value for the site.

| **Site Composite MPE%** | |
|---|---|
| **Carrier** | **MPE%** |
| T-MOBILE – Max Per Sector Value | **8.90 %** |
| Sprint | 5.31 % |
| AT&T | 7.98 % |
| **Site Total MPE %:** | **22.19 %** |

*Table 4: All Carrier MPE Contributions*

| | |
|---|---|
| T-MOBILE Sector A Total: | 8.90 % |
| T-MOBILE Sector B Total: | 8.90 % |
| T-MOBILE Sector C Total: | 8.90 % |
| | |
| Site Total: | 22.19 % |

*Table 5: Site MPE Summary*

FCC OET 65 specifies that for carriers utilizing directional antennas that the highest recorded sector value be used for composite site MPE values due to their greatly reduced emissions contributions in the directions of the adjacent sectors. *Table 6* below details a breakdown by frequency band and technology for the MPE power values for the maximum calculated T-MOBILE sector(s). For this site, all three sectors have the same configuration yielding the same results on all three sectors.

| T-MOBILE _ Frequency Band / Technology Max Power Values (Per Sector) | # Channels | Watts ERP (Per Channel) | Height (feet) | Total Power Density ($\mu W/cm^2$) | Frequency (MHz) | Allowable MPE ($\mu W/cm^2$) | Calculated % MPE |
|---|---|---|---|---|---|---|---|
| T-Mobile 1900 MHz (PCS) LTE | 4 | 966.18 | 80 | 25.37 | 1900 MHz (PCS) | 1000 | 2.54% |
| T-Mobile 2100 MHz (AWS) LTE | 2 | 1,928.20 | 80 | 25.32 | 2100 MHz (AWS) | 1000 | 2.53% |
| T-Mobile 2100 MHz (AWS) UMTS | 1 | 1,303.35 | 80 | 8.56 | 2100 MHz (AWS) | 1000 | 0.86% |
| T-Mobile 600 MHz LTE / 5G NR | 2 | 605.42 | 80 | 7.95 | 600 MHz | 400 | 1.99% |
| T-Mobile 700 MHz LTE | 2 | 348.36 | 80 | 4.57 | 700 MHz | 467 | 0.98% |
| | | | | | | **Total:** | **8.90%** |

*Table 6: T-MOBILE Maximum Sector MPE Power Values*

## Summary

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

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

| T-MOBILE Sector | Power Density Value (%) |
|---|---|
| Sector A: | 8.90 % |
| Sector B: | 8.90 % |
| Sector C: | 8.90 % |
| T-MOBILE Maximum Total (per sector): | 8.90 % |
| | |
| Site Total: | 22.19 % |
| | |
| Site Compliance Status: | **COMPLIANT** |

The anticipated composite MPE value for this site assuming all carriers present is **22.19 %** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

Scott Heffernan
RF Engineering Director
**Transcom Engineering, Inc**
PO Box 1048
Sterling, MA 01564