HOMELAND TOWERS

January 19, 2017

Via Federal Express
Honorable Robert Stein, Chairman
And Members of the Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

Re: Docket No. 467 – Homeland Towers LLC (HT) and Cellco Partnership d/b/a Verizon Wireless (Verizon) Development & Management Plan- Tower Facility at 100 Pocono Road, Brookfield CT (CT777).

Dear Chairman Stein and Members of the Siting Council,

Homeland Towers ("HT") respectfully requests that you please accept for review and Council approval this Development & Management Plan ("D&M Plan") filing for the Facility as approved in Docket No. 467.

Tower, Compound & Other Equipment

Enclosed are fifteen (15) sets of 11"x17" Development & Management Plans being filed in accordance with the Council's Decision and Order dated October 13, 2016 ("Decision and Order"). Two full-sized sets of the Development & Management Plans are also enclosed. The D&M Plan incorporates a 150' monopole as provided for in the Siting Council's Decision and Order in this Docket. Verizon will mount twelve (12) panel antennas and (9) RRU's at a centerline of 146'. The Town of Brookfield will mount their public safety equipment which consists of (3) whip antennas and (1) microwave dish at mounting height of 154', (1) whip antenna at 75' and (1) microwave dish at 65' as depicted on the drawings prepared by All Points Technology Corporation. Since the October 13, 2016 Decision and Order, The Town of Brookfield has requested to add a dedicated space for a generator within the approved compound. All of the above equipment is depicted on the drawings prepared by All Points Technology. Attached please also find a geotechnical study from NOBIS Engineering as well as a structural design report from Ambor Structures for the tower and foundation. Specifications for the antennas and generator are also provided. Please note that the Structural provided is for future build out and the site plan drawings show the initial proposed configuration.

The proposed D&M Plan also includes construction plans for the site clearing, drainage, and erosion and sedimentation control measures consistent with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control as amended.

Required Notifications

In accordance with the provisions of RCSA Section 16-50j-77, Homeland Towers hereby notifies the Council of its intention to begin site work immediately after Council approval of the D&M Plan. Construction of the tower and other site improvements will commence upon issuance of a local building permit. The supervisor for all construction related matters on this project is Christian Carmody, located at InSite Towers, 1199 North Fairfax Street, Suite 700, Alexandria, VA 22314 and can be reached by telephone at 617-595-7254.

HOMELAND TOWERS

We respectfully request that this matter be included on the Council's next available agenda for review and approval.
Thank you for your consideration of the enclosed.

Sincerely,

Raymond Vergati

Raymond Vergati
rv@homelandtowers.us

Enclosures

cc: Honorable Steve Dunn, First Selectman, Town of Brookfield
Manny Vicente, Homeland Towers LLC
Anthony Befera, Verizon
Scott Chasse, P.E., APT
Kenneth Baldwin, Esq., Cuddy & Feder LLP

CERTIFICATION OF SERVICE

I hereby certify that a copy of the foregoing D&M filing was sent by certified mail, return receipt requested, to each of the parties listed below.

Date: January 19, 2017

Manuel Vicente
Homeland Towers, LLC
22 Shelter Rock Lane, Bldg. C
Danbury, CT 06810

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Hartford, CT 06103-3597
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Anthony Befera
Cellco Partnership d/b/a Verizon Wireless
99 East River Drive
East Hartford, CT 06108
anthony.befera@VerizonWireless.com

Honorable Steve Dunn, First Selectman
Town of Brookfield
100 Pocono Road
Brookfield, CT 06804
sdunn@brookfieldct.gov

Geotechnical Engineering Report

Proposed Homeland Towers: Brookfield CT-777
100 Pocono Road
Brookfield, Connecticut

FOR

All-Points Technology Corporation, P.C.
3 Saddlebrook Drive
Killingworth, CT 06419

BY

NOBIS ENGINEERING, INC.
122 CHURCH STREET
NAUGATUCK, CT 06770

(203) 409-1292
www.nobiseng.com

Nobis Project No. 92230.00
NOVEMBER 5, 2016

Engineering a Sustainable Future

November 5, 2016
File No. 92230.00

All-Points Technology Corporation, P.C.
Mr. Scott M. Chasse, P.E.
3 Saddlebrook Drive
Killingworth, CT 06419

Re: Transmittal of Geotechnical Engineering Report
Proposed Homeland Towers: Brookfield CT-777
100 Pocono Road, Brookfield, Connecticut

Dear Scott:

This report provides the results of Nobis Engineering Inc.'s (Nobis') geotechnical engineering review for the proposed telecommunications tower to be located at 100 Pocono Road in Brookfield, Connecticut. Our services were performed in general accordance with our October 12, 2016, *Geotechnical Engineering Services Proposal*. This report provides geotechnical recommendations for earthwork and foundation design for the proposed tower and associated equipment cabinets. The results of our field exploration program and geotechnical analyses are provided herein.

We appreciate the opportunity to work with you. Please call if you have any questions.

Sincerely,

NOBIS ENGINEERING, INC.

Raymond P. Janeiro, PE
Project Manager

Scott M. Carter, PE
Reviewer

Nobis
Engineering a Sustainable Future

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GEOTECHNICAL ENGINEERING REPORT
PROPOSED HOMELAND TOWERS: BROOKFIELD CT-777
100 POCONO ROAD
BROOKFIELD, CONNECTICUT

NOBIS FILE NO. 92230.00

APPENDIX

1.0 INTRODUCTION

Nobis Engineering, Inc. (Nobis) prepared this geotechnical engineering report for the proposed telecommunications tower and associated equipment foundations located at 100 Pocono Road in Brookfield, Connecticut ("Site") for All-Points Technology Corporation, P.C. ("Client"). A Site Locus Plan is included as **Figure 1**.

Existing conditions and proposed features relating to Site development are generally based on the Client's provided drawings (*Brookfield, 100 Pocono Road, sheets T-1, A-1, SP-1 through SP-3, prepared by All-Points Technology Corp., revision dated 05/26/2016*). Elevations referenced herein are based on Sheet SP-2 of the provided drawings, which states the Site elevation (El) is near approximately El 337 feet Above Mean Sea Level (AMSL). This report is subject to the limitations presented in **Appendix C**.

2.0 SITE AND PROJECT DESCRIPTIONS

2.1 Existing Site Conditions

The Site is located at the Town of Brookfield Department of Public Works materials yard and is generally bordered by U.S. Route 7 to the west, town-owned athletic fields to the north, a volunteer fire station to the east, and industrial/commercial parcels to the south. Existing site grades are relatively level at about El 336± feet AMSL. Existing site conditions consist of an unpaved yard and material stockpiles. An apparent asphalt millings stockpile was recently relocated from the proposed compound area prior to completing our subsurface exploration program.

2.2 Proposed Construction

The project consists of constructing 150-foot monopole telecommunications tower and associated equipment cabinets within a 75-foot by 75-foot fenced compound with a gravel wearing surface. The estimated vertical load of the tower is approximately 60 kips, and bearing pressure for the equipment pads approximately 150 pounds per square foot (psf). It's anticipated that nominal cuts and fills on the order of 1-foot or less are anticipated to achieve design grade and that no significant slopes will be required. Refer to the Exploration Location Plan (**Figure 2 – Appendix A**) for additional proposed development details.

3.0 SUBSURFACE CONDITIONS

3.1 Geologic Information

We reviewed available subsurface/geological information in the vicinity of the project area (1:125,000 scale, *Surficial Materials Map of Connecticut, Janet Radway Stone, 1992* and *Bedrock Geology of the Danbury Quadrangle, Connecticut, James W. Clarke, 1958).*

The surficial material within the area of the proposed telecommunications compound is mapped as glacial till consisting of a variable mixture of gravel, sand, silt, and clay that is intermixed with cobbles and boulders. The underlying bedrock is classified as white, medium-grained calcite marble interlayered with schist or phyllite (Inwood Marble Formation).

3.2 Subsurface Exploration Program

The subsurface exploration program coordinated and logged by Nobis included the observation of one test boring (NB-1) and three test probes (NP-1 through NP-3). The test boring and probes were completed on October 19, 2016, by New England Boring Contractors, Inc. of Glastonbury, Connecticut. Test borings were completed to assess in-situ soil conditions, and, if encountered, groundwater and bedrock conditions at the Site. The explorations were field located using taped measurements referencing existing site features. The approximate, as-drilled exploration locations are depicted on the attached **Figure 2**, *Exploration Location Plan*.

The explorations were completed using a CME-75 truck-mounted drill rig utilizing drive and wash drilling methods to advance the test boring to a depth of approximately 25 feet (El. 311 feet) below ground surface (bgs). Upon encountering refusal at a depth of approximately 20 feet bgs, a rock core sample was obtained to aid in bedrock confirmation and evaluating the type and quality of bedrock. The core samples were drilled using a five foot, double-barrel, NQ-size core barrel. The core times were recorded every foot of core length and rock quality was determined using visual classification.

The test probes were advanced using 4-inch outside diameter solid-stem augers to refusal at depths ranging from approximately 5.5 to 14.5 feet bgs. Refusal is defined as the depth at which the augers are unable to be advanced further despite increasing the downward pressure and torque applied by the drill rig. It should be noted that auger refusal can result under a variety of

circumstances, including but not limited to: very dense soils; nested cobbles along the auger flights; boulders, or other obstructions; and decomposed, weathered, or unweathered bedrock.

Soil samples were obtained in the boring by split-spoon sampling procedures in general accordance with ASTM D-1586. The split-spoon sampling procedure utilizes a standard 2-inch O.D. split-barrel sampler that is driven into the bottom of the boring with a 140-pound hammer falling a distance of 30 inches. The number of blows required to advance the sampler the middle 12-inches of a typical 24-inch penetration is recorded as the Standard Penetration Resistance Value (N). The blows are indicated on the boring log at their depth of occurrence and provide an indication of the relative consistency of the material.

3.3 Generalized Subsurface Profile

Excluding the presence of fill, the explorations were generally consistent with published geologic mapping. The generalized subsurface profile in the area of the proposed telecommunications compound, as inferred from the subsurface exploration data, is summarized as follows:

- Fill: Loose to medium dense, dark brown, silty SAND with gravel, containing wood debris (SM)
  – 4 to 6 feet thick (to about Elev. 332 to 330); over

- Glacial Till: Medium dense to dense, brown, silty SAND with gravel (SM)
  – 1 to 10.5 feet thick (to about Elev. 330.5 to 321.5); over

- Decomposed Rock: Very dense, brown-white, well-graded SAND with gravel (SW)
  – 13 feet thick in NB-1 (to about Elev. 316); over

- Marble Bedrock – Bedrock was cored below the Decomposed Rock stratum in NB-1. Bedrock was classified as moderately hard, moderately weathered, white/gray Marble. The core recovery and rock quality designation (RQD), was 100% and 72%, respectively, indicating a fair rock mass quality. Additionally, the core sample reacted strongly with hydrochloric acid.

Visual classifications of soil and rock, and conditions encountered at each exploration location can be found in the provided boring and test probes logs, included as **Appendix B**.

3.4 Groundwater

Groundwater levels were measured in the boreholes at the times and under the conditions stated on the logs. Water was encountered at about 19 feet bgs during drilling at NB-1; however, drive and wash drilling and rock coring introduced water to the borehole.

Our measurements were taken over a relatively short period of time and may not be indicative of the fluctuations in yearly groundwater levels. Groundwater levels will vary due to seasonal factors, temperature, precipitation, construction activity and other conditions which may be different from the time of the exploration program.

3.5 Soil Resistivity Testing

On October 19, 2016, Nobis field personnel conducted in-situ soil resistivity testing in accordance with accepted engineering practices using the Wenner electrode configuration. Electrodes were spaced at 5, 10, 20, 30 and 40 feet. Two approximately perpendicular resistivity lines were completed in the general vicinity of the proposed tower location. The approximate locations and orientations of the resistivity lines are shown on the attached Figure 2. The results of the resistivity tests are as follows:

	Resistivity (ohm-cm)	
Electrode Spacing (ft)	Line 1	Line 2
5	3,734	7,708
10	5,745	5,745
20	11,490	19,533
30	17,235	17,235
40	19,150	22,980

Field resistivity results may be influenced by boulders, concrete, foundations, and underground utilities within the test area. Resistivity results will also fluctuate depending on the degree of compaction, moisture content, constituent solubility, and temperature. Field resistivity values may also vary depending upon season, precipitation, and other conditions that may differ from those at the time of testing.

3.6 Karst Geology

The site is located over carbonate marble bedrock and may be susceptible to karst topography (e.g., fissures, caverns, etc.). Sinkhole activity, though uncommon in the New England area, may result from the dissolution of the underlying bedrock stratum. Construction in karst topography is always accompanied by some degree of risk for future ground subsidence and instability. We are available to further discuss this matter with the Owner or Design Team if there are concerns about associated risks with developing this Site.

4.0 GEOTECHNICAL DESIGN AND CONSTRUCTION RECOMMENDATIONS

4.1 Geotechnical Evaluation

Based on the results of our subsurface investigation, it is our opinion the proposed steel monopole telecommunications tower may be supported on a monolithic mat or a pier-and-pad foundation bearing on the glacial till, or compacted Structural Fill or Crushed Stone (see Section 4.5 Materials and Compaction) placed over the glacial till. Crushed stone, if used, should be separated from soil subgrades, excavation sidewalls and backfill using a nonwoven geotextile, such as Mirafi 140N or equivalent.

Alternatively, the proposed telecommunications tower may be supported on a drilled shaft foundation extending through overburden soils and weathered rock into competent bedrock. The proposed equipment platform and other ancillary structures may derive support from the glacial till. Design recommendations and construction considerations for the recommended foundation systems are presented in the following sections.

4.2 Seismic Design Recommendations

Based on the density/consistency of the soils encountered in the explorations, it is our opinion that Site soils are not considered susceptible to liquefaction. Seismic forces on foundations should be designed in accordance with the Connecticut State Building Code. We recommend using the following seismic design values based on the 2016 Connecticut State Building Code:

- Site Class: C;
- MCE Spectral Response Accelerations: S_s = 0.208g and S_1 = 0.066g;
- Site Coefficients: F_a = 1.2 and F_v = 1.7; and
- Seismic Design Parameters: S_{MS} = 0.250 and S_{M1} = 0.113; S_{DS} = 0.167 and S_{D1} = 0.075.

4.3 Tower Foundation Design Recommendations

4.3.1 Shallow Foundation (Mat/Pad) Alternative

Nobis recommends a maximum net allowable bearing pressure of 6 kips per square foot (ksf). Foundations should be embedded a minimum of 42 inches below final grades for frost protection. The total settlement is anticipated to be less than 1 inch and differential settlement to be less than 0.5 inches. Foundation settlement will depend on the variations within the subsurface soil profile, the structural loading conditions, the embedment depth of the foundation, the thickness of compacted fill, and the quality of earthwork operations.

We recommend an ultimate passive pressure coefficient (Kp) of 3.0. Calculated passive pressures should be reduced by a minimum factor of safety of 3, to reflect the amount of movement required to mobilize the passive resistance. We also recommend an ultimate coefficient of sliding friction of 0.5. A factor of safety of at least 1.5 should be applied to calculated sliding resistance.

To summarize, we recommend the following static design parameters:

Description	Value
Maximum Net Allowable Bearing Pressure[1]	6 kips per square foot
Minimum Embedment Below Finished Grade	42 inches
Estimated Total Settlement[2]	1 inch
Estimated Differential Settlement[2]	½ inch
Total Soil Unit Weight	125 pounds per cubic foot
Ultimate Passive Pressure Coefficient, Kp[3]	3.0
Ultimate Coefficient of Sliding Friction[4]	0.5

Uplift resistance for the tower foundation may be computed as the sum of the weight of the foundation element and the weight of the soil overlying the foundation. For this computation, we recommend using a soil unit weight of 100 pounds per cubic foot (pcf) for engineered fill.

4.3.2 Shallow Foundation (Mat/Pad) Construction Recommendations

The proposed mat/pad foundation and associated equipment areas should be cleared of existing structures and vegetation and grubbed; and existing cobbles, boulders, and any identifiable deleterious materials should be removed. Existing fill (including re-worked parent materials), and

any other unsuitable materials, must be removed from beneath footing zones of influence to the top of firm, natural glacial till prior to construction. The zone of influence is defined as the area within a line projecting outward and downward from the outside edges of the foundation at a 1H:1V slope. Footings shall bear on a prepared subgrade of firm natural soil, or compacted Structural Fill or Crushed Stone (over firm natural soil). Refer to Section 4.5 Materials and Compaction for material placement recommendations.

Excavations for foundation subgrades are anticipated to consist of native glacial till containing varying amounts of silt that will be easily disturbed when wet. Earthwork should be performed in dry conditions so that disturbance to foundation subgrades is limited. During earthwork, the Contractor should be responsible for protecting subgrades from the elements and maintaining the soils in a suitable state until completion of the project. Backfill should not be placed over a subgrade with standing water or that is frozen. Standing water, if present, should be removed and any soft and yielding soil should be removed prior to backfill placement. Excavations to subgrade levels should be performed using a smooth-edged bucket in order to minimize possible disturbance to the in-place subgrade soils.

Soil subgrades should be proof-rolled under the observation of a qualified Geotechnical Engineer with at least four (4) passes of a smooth-drum vibratory roller (minimum 8,000 pounds, minimum centrifugal force of 12,500 pounds) or, where approved by the geotechnical engineer, a vibratory plate compactor with a minimum of 2,500 pounds of centrifugal force. Any soft or loose zones identified during proof-rolling should be excavated and replaced with compacted Structural Fill, as necessary, and as required by the Geotechnical Engineer.

4.3.3 Deep Foundation (Drilled Shaft) Alternative

We recommend the following static design parameters for a drilled shaft foundation alternative:

Description	Value
Maximum Net Allowable Bearing Capacity Competent Bedrock[1]	10 kips per square foot (ksf)
Ultimate Bond Values[2] Glacial Till Decomposed Rock Competent Bedrock	 See Note 2 See Note 2 75 pounds per square inch

Coefficient of Lateral Subgrade Reaction[3] Glacial Till Decomposed Rock Competent Bedrock	 50 (z/D) kips per cubic foot (kcf) 70 (z/D) kcf 100 (z/D) kcf
Angle of Internal Friction Glacial Till Decomposed Rock Competent Bedrock	 34 36 40
Total Soil Unit Weight Glacial Till Decomposed Rock Competent Bedrock	 125 pounds per cubic foot (pcf) 130 (pcf) 140 (pcf)
Minimum Drilled Shaft Diameter	Diameter of Monopole Base
Allowable Deflection at Top of Shaft	0.5 inch

1. End-bearing in a rock socket should be neglected for design due to the movement required to mobilize side resistance in a drilled shaft is less than the movement required to mobilize end-bearing resistance. Therefore, ultimate bond values should be used to design the drilled shaft foundation. The allowable end bearing capacity also assumes that loose, disturbed material has been removed from the base of the shaft.
2. Due to the relatively shallow bedrock, side resistance from overburden soils and decomposed rock should be ignored in design for strain compatibility reasons. The uplift capacity should be based on the dead weight of the shaft and side resistance provided by the competent rock. It's assumed that applied loading will not have a significant Poissons-effect on the shaft.
3. z represents the depth below ground surface (feet) and D is the diameter of the foundation element (feet).

We anticipate that the design length of the shaft will be primarily dependent on the embedment/lateral capacity required to resist live loading. The drilled shaft will be subject to tension loads and therefore should have reinforcing steel that extend through the entire length of the shaft.

4.3.4 Deep Foundation (Drilled Shaft) Construction Recommendations

Technical specifications should be prepared by the specialty Contractor that require detailed material and construction submittals and proof of experience in drilled shaft installation. The drilling method or combination of methods selected by the contractor should be submitted for review by the geotechnical engineer, prior to mobilization of drilling equipment.

A section of temporary casing may be required to reduce the likelihood of caving of the side walls of the shaft hole. Concrete should be placed by directing the concrete down the center of the shaft in order to reduce the likelihood of hitting the reinforcing steel and segregating. Groundwater, if encountered in the shaft, should be removed prior to placing concrete; alternatively, concrete may be placed by tremie methods.

4.4 Equipment Platform Foundations

The proposed equipment cabinets and accessory structures may be designed as slabs-on-grade bearing on a base course of at least 12-inches of compacted Structural Fill or Crushed Stone overlying densified native soils as described in **Section 4.3.2 Shallow Foundation (Mat/Pad) Construction Recommendations** above. Alternatively, subsurface conditions are favorable for construction of concrete pier foundations placed below existing fill, on natural, undisturbed glacial till.

4.4.1 Equipment Platform Slab-on-grade Foundations

We recommend a maximum net allowable bearing pressure of 2 kips per square foot (ksf) for slab design. Frost walls should be embedded a minimum of 42 inches below final grades for frost protection. Alternatively, dense insulation boards could be used under lightly loaded slabs-on-grade to reduce frost penetration.

The total settlement is expected to be less than 1 inch and differential settlement to be less than 0.5 inches. We recommend an ultimate coefficient of sliding friction of 0.5 (except if insulation boards are used to minimize frost penetration). A factor of safety of at least 1.5 should be applied to calculated sliding resistance.

A modulus of subgrade reaction, k_{sl} of no greater than 200 pounds per cubic inch (pci) should be used for design of the slab. Note, however, that the value of k_{sl} is for a one (1) square foot area. The k_{sl} value should be adjusted for larger areas using the following expression:

Modulus of Subgrade Reaction (k_s) = k_{sl} $[(B+1)/(2B)]^2$

Where: k_s = Coefficient of vertical subgrade reaction for loaded area,

k_{sl} = Coefficient of vertical subgrade reaction for 1 x 1 square foot area, and

B = Width of load area (footing) in feet.

We recommend adopting the same construction recommendations in Section 4.3.2 above for preparation of slab-on-grade subgrades.

4.4.2 Equipment Platform Pier Foundations

We recommend a maximum allowable soil bearing capacity of 4 kips per square foot (ksf) for piers end bearing on glacial till. Based on anticipated loads and the recommended soil bearing capacity, the anticipated total and differential settlement is less than one inch and one-half inch, respectively. Bottom of piers must be constructed at a minimum depth of 42-inches below final site grades. We recommend a minimum pier diameter of 12 inches. Construction operations should be planned to mitigate disturbance to the final subgrade. The base of pier excavations should be free of water and loose soils prior to placing concrete.

4.5 Materials and Compaction

Recommended earthwork materials are as follows:

Structural Fill is to be used beneath footings and slabs-on-grade, and other areas as appropriate, or as directed by the Geotechnical Engineer or his/her representative. The material shall consist of hard, inert, durable particles of stone and coarse sand. It shall be free from ice and snow, roots, surface coatings, sod, loam, clay, rubbish, and other deleterious or organic matter, and shall conform to the following gradation requirements:

Sieve Size	Percent Passing by Weight
3-inch	100
½-inch	50-85
No. 4	40-75
No. 50	8-28
No. 200	0-10*

Crushed Stone shall consist of either angular fragments of crushed rock or durable crushed gravel stone, be reasonably free of loam, clay, or other deleterious or organic matter, and shall conform to the following gradation requirements:

Sieve Size	Percent Passing by Weight
¾-inch	100
½-inch	10-50
⅜-inch	0-20
No. 4	0-5

Structural Fill and Crushed Stone should be placed in loose lifts not exceeding 8 inches in depth, and compacted to at least 95 percent of its maximum dry density, and within 2% of optimum moisture content, as determined by ASTM D1557, Method C (Modified Proctor).

4.6 Additional Construction Considerations

Based on information obtained from the subsurface exploration program, the proposed foundations and slabs-on-grade will be constructed above the groundwater table and construction dewatering is not anticipated. Stormwater runoff should not be permitted to accumulate on/within exposed subgrades and the runoff should be directed away from the exposed subgrade areas.

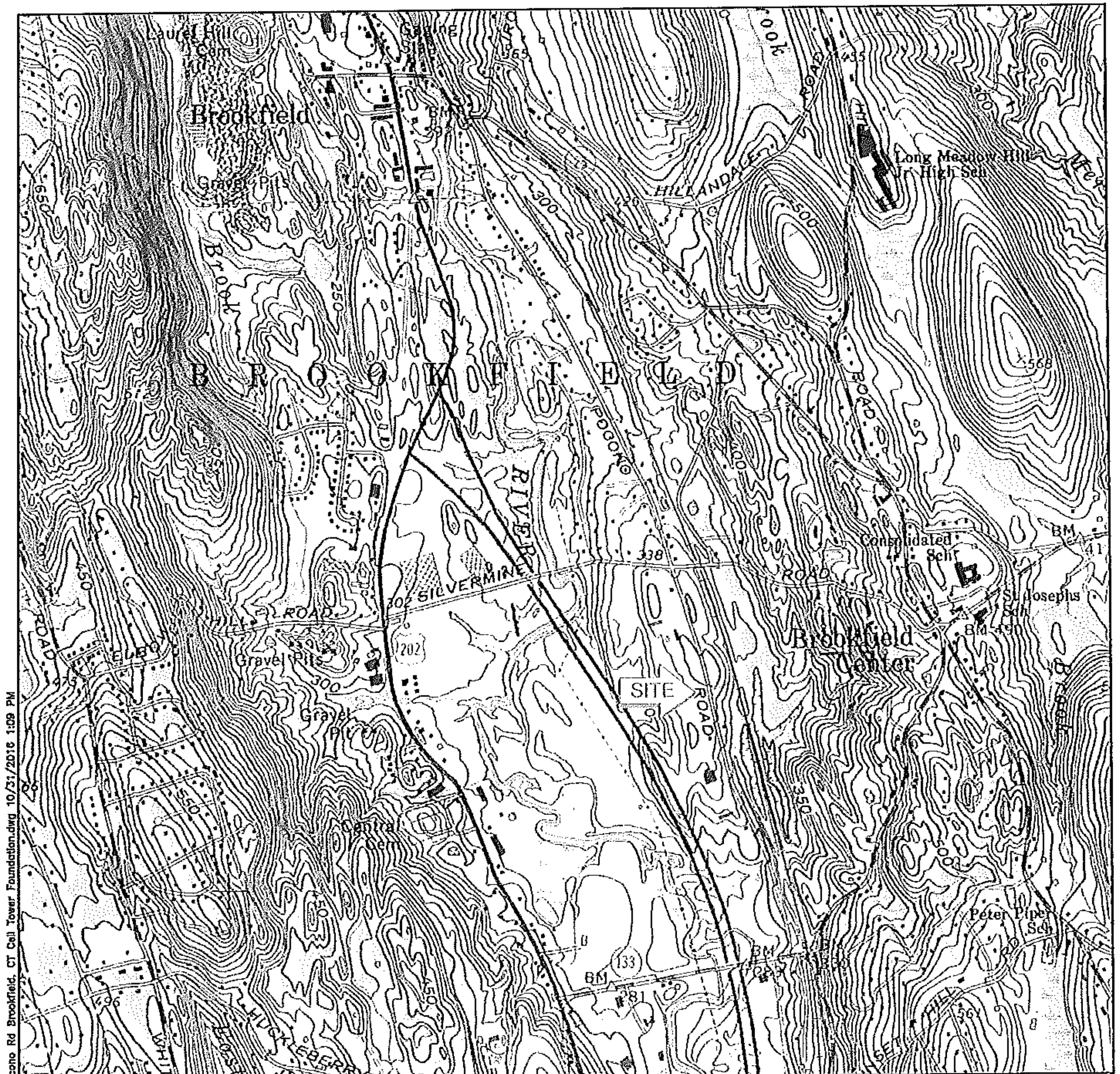
Where space permits and as needed, temporary slopes no steeper than 1.5H:1V appear to be appropriate. Excavation geometry should conform to OSHA excavation regulations contained in 29 CFR Part 1926. Temporary earth support will likely not be required for the excavations. If needed, temporary earth support systems should be designed by a Professional Engineer registered in the State of Connecticut.

We recommend that Nobis be provided the opportunity to review the final design plans and specifications to ensure that the recommendations of this report have been incorporated as intended. We further recommend that Nobis observes excavation to subgrade levels, subgrade preparation, and fill placement and compaction. This is recommended to evaluate and document the bearing material for the foundation subgrades. We also recommend that Nobis be retained to monitor the construction of the drilled shaft, if selected as the foundation alternative. The geotechnical engineer in the field should observe the work for compliance with the recommendations in this report, identify changes in subsurface conditions from those observed in the explorations should they become apparent, and assist in the development of design changes should subsurface conditions differ from those anticipated prior to the start of construction.

5.0 CLOSURE

This report is subject to the Limitations, included as **Appendix C**.

APPENDIX A – Figures



USGS TOPOGRAPHIC MAP

Brookfield, CT
October 2016

APPROX. SCALE IN FEET
0 1000' 2000'

NORTH

Nobis
Engineering a Sustainable Future
Nobis Engineering, Inc.
122 Church Street
Naugatuck, CT 06770
T(203) 409-1292
www.nobiseng.com

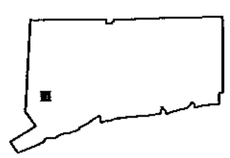
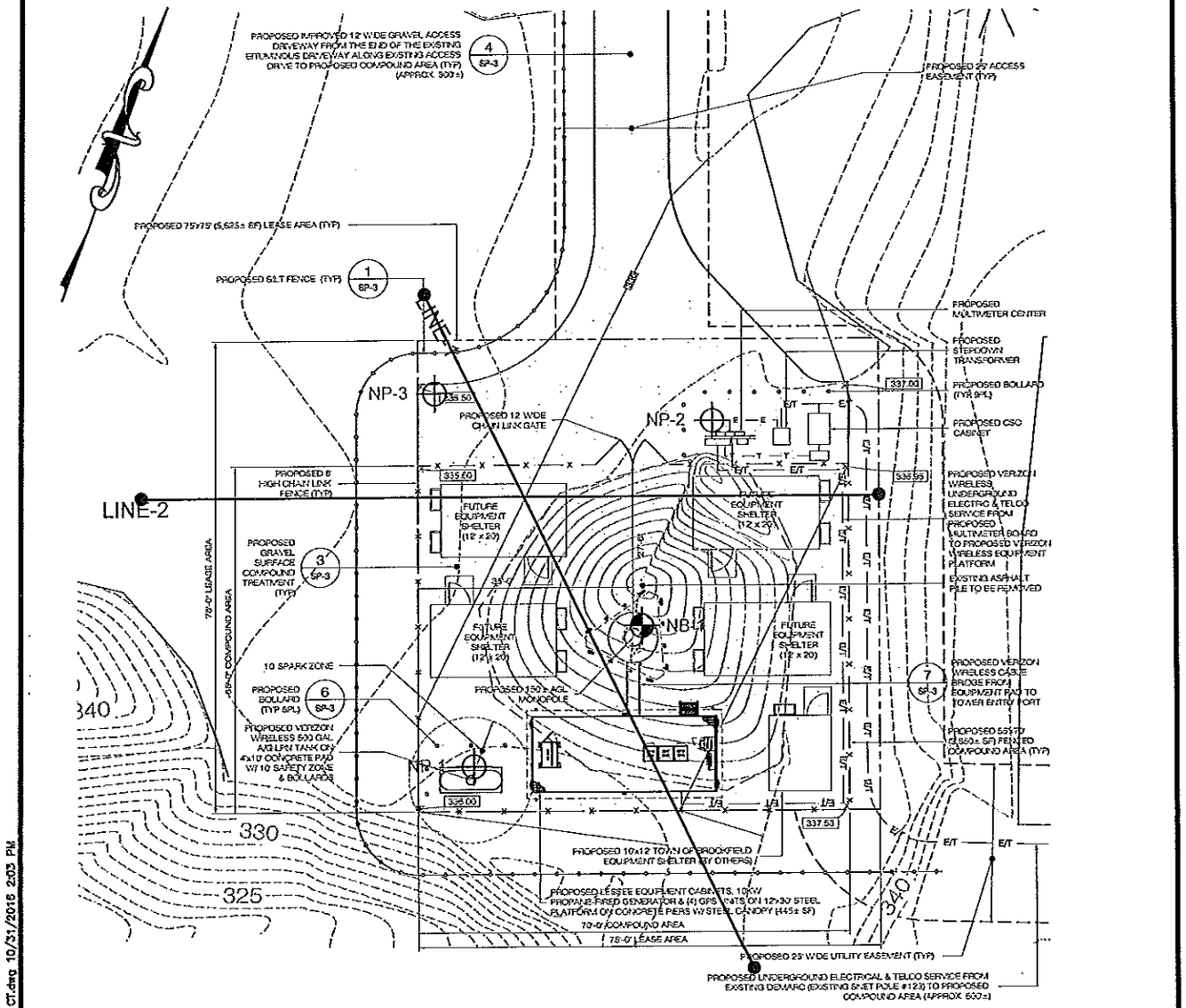


FIGURE 1

LOCUS PLAN
Proposed Homeland Towers, CT-777
100 Pocono Road
Brookfield, CT 06804

.00 -- Cell Tower Foundation, Brookfield, Brookfield, CT\CAD\LOCUS PLAN 100 Pocono Rd Brookfield, CT Cell Tower Foundation.dwg 10/31/2016 1:09 PM



NOTES:

1. THE BASE PLAN WAS DEVELOPED FROM FIGURE ENTITLED, "COMPOUND PLAN AND TOWER ELEVATION," PREPARED BY ALL-POINTS TECHNOLOGY CORPORATION, P.C., REVISION DATED MAY 26, 2016.
2. TEST BORINGS AND PROBES WERE DRILLED BY NEW ENGLAND BORING CONTRACTORS, INC. OF GLASTONBURY, CONNECTICUT, AND OBSERVED BY NOBIS ON OCTOBER 19, 2016.
3. RESISTIVITY TESTING WAS PERFORMED ON OCTOBER 19, 2016 BY NOBIS FIELD STAFF.
4. THE APPROXIMATE LOCATIONS OF THE TEST BORING, TEST PROBES, AND RESISTIVITY TESTS WERE TAPED FROM EXISTING SITE FEATURES. THE LOCATIONS SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

LEGEND:

- NP-1 TEST PROBE LOCATION
- NB-1 TEST BORING LOCATION
- LINE-1 RESISTIVITY TEST LOCATION (TYP.)

Nobis

Engineering a Sustainable Future

Nobis Engineering, Inc.
122 Church Street
Naugatuck, CT 06770
T(203) 409-1292

APPROX. SCALE IN FEET
0 25' 50'

DRAWN BY: JDV

FIGURE 2

EXPLORATION LOCATION PLAN

Proposed Homeland Towers, CT-777
100 Pocono Road
Brookfield, CT 06804

APPENDIX B – Exploration Logs

Nobis

Engineering a Sustainable Future

BORING LOG

Project: Proposed Homeland Towers Brookfield CT-777

Location: 100 Pocono Road Brookfield, CT

Nobis Project No.: 92230.00

Boring No.: NB-1

Boring Location: See Exploration Location Plan

Checked by: R. Janeiro

Date Start: October 19, 2016

Date Finish: October 19, 2016

Contractor: New England Boring Contractors

Driller: Mike St. John

Nobis Rep.: A. Epstein

Rig Type / Model: Truck / B-53 Mobile

Hammer Type: Safety Hammer

Hammer Hoist: Wire Winch

Ground Surface Elev.: (+/-) 336

Datum: AMSL

	Drilling Method	Sampler
Type	Casing	Split-Spoon
Size ID (in.)	4	1-3/8
Advancement	Drive and Wash	140-lb Hammer

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time
▼ 10/19/16	12:30	19.0	N/A	24.65	2 hr

Depth (ft.)	SAMPLE INFORMATION Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	REC % / RQD %	Drilling Rate (min/ft)	Ground Water	LITHOLOGY Graphic	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
1	S-1	14	0-2	8 7 7						S-1: Medium dense, dark brown, fine to medium SAND, some fine Gravel, little Silt, few asphalt fragments, very few wood fragments. dry. (FILL).	
2				5							
3	S-2	8	2-4	5 6					FILL	S-2: Medium dense, dark brown, fine to medium SAND and fine Gravel, little Silt, few asphalt fragments, few wood fragments. dry. (FILL).	
4				7 7							
5									330.5 / 5.5	S-3: Medium dense, light brown, fine to medium SAND, some Silt, trace fine Gravel. dry. (FILL to GLACIAL TILL).	
6	S-3	12	5-7	10 17					Glacial Till		
7				8 16					329.0 / 7.0		
8	S-4	8	7-9	24 16						S-4: Medium dense, light brown to gray, fine to coarse SAND, some Silt, little fine Gravel. dry. (DECOMPOSED BEDROCK).	
9				7 11							
10											
11	S-5	14	10-12	9 7						S-5: Very dense, light brown-white, fine to coarse SAND and Gravel, little Silt. dry. (DECOMPOSED BEDROCK).	
12				51 35							
13									Decomposed Rock		
14											
15											
16	S-6	7	15-17	12 100						S-6: Very dense, light brown, fine to coarse GRAVEL and Sand, trace Silt. dry. (DECOMPOSED BEDROCK).	
17											
18											
19							▼				
20	S-7	0	20-20	50/0"					316.0 / 20.0	S-7: Very dense (refusal), No Recovery.	
21	RC-1	60	20-25		100/72	0.1 4			Bedrock	RC-1: Moderately Hard, moderately weathered, slightly fractured, white, medium-grained, MARBLE, joints spaced 2 to 10 inches apart and dipping from near horizontal to approximately 45 degrees. Reacts with HCL.	
22						3					

Soil	Percentage	Non-Soil
trace	5 - 10	very few

NOTES:

1) Boring was backfilled with cuttings.

Nobis

Engineering a Sustainable Future

BORING LOG

Project: Proposed Homeland Towers Brookfield CT-777

Location: 100 Pocono Road Brookfield, CT

Nobis Project No.: 92230.00

Boring No.: NB-1

Boring Location: See Exploration Location Plan

Checked by: R. Janeiro

Date Start: October 19, 2016

Date Finish: October 19, 2016

Contractor: New England Boring Contractors

Driller: Mike St. John

Nobis Rep.: A. Epstein

Rig Type / Model: Truck / B-53 Mobile

Hammer Type: Safety Hammer

Hammer Hoist: Wire Winch

Ground Surface Elev.: (+/-) 336

Datum: AMSL

	Drilling Method	Sampler
Type	Casing	Split-Spoon
Size ID (in.)	4	1-3/8
Advancement	Drive and Wash	140-lb Hammer

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time
▼ 10/19/16	12:30	19.0	N/A	24.65	2 hr

Depth (ft.)	SAMPLE INFORMATION: Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	REC % / RQD %	Drilling Rate (min/ft)	Ground Water	LITHOLOGY: Graphic	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
23						2.5					
24									Bedrock		
25						3			311.0 / 25.0		
26										Boring terminated at 25 feet.	
27											
28											
29											
30											
31											
32											
33											
34											
35											
36											
37											
38											
39											
40											
41											
42											
43											
44											
45											

Soil	Percentage	Non-Soil
trace	5 - 10	very few

NOTES:

1) Boring was backfilled with cuttings.

Nobis

Engineering a Sustainable Future

BORING LOG

Project: Proposed Homeland Towers Brookfield CT-777

Location: 100 Pocono Road Brookfield, CT

Nobis Project No.: 92230.00

Boring No.: NP-1

Boring Location: See Exploration Location Plan

Checked by: R. Janeiro

Date Start: October 19, 2016

Date Finish: October 19, 2016

Contractor: New England Boring Contractors

Driller: Mike St. John

Nobis Rep.: A. Epstein

Rig Type / Model: Truck / B-53 Mobile

Hammer Type: N/A

Hammer Hoist: N/A

Ground Surface Elev.: (+/-) 336

Datum: AMSL

	Drilling Method	Sampler
Type	Solid Stem Auger	N/A
Size ID (in.)	4 (O.D.)	N/A
Advancement	Augered	N/A

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time
10/19/16	12:30	Not Encountered	N/A	9.5	10 min

Depth (ft.)	SAMPLE INFORMATION Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	Ground Water	LITHOLOGY Graphic	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
1								Dark brown, fine to medium SAND, little Silt, trace fine Gravel, few wood debris. dry. (FILL).	
2							FILL		
3									
4									
5									
6									
7								Light brown, fine to medium SAND, some Silt, some fine Gravel. dry. (GLACIAL TILL).	
8							Glacial Till		
9									
10							326.5 / 9.5	Boring terminated at 9.5 feet.	
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									

Soil	Percentage	Non-Soil
trace	5 - 10	very few

NOTES:

1) End of exploration at approximately 9.5 feet below ground surface after SSA refusal on inferred weathered rock.

Nobis

Engineering a Sustainable Future

BORING LOG

Project: Proposed Homeland Towers Brookfield CT-777

Location: 100 Pocono Road Brookfield, CT

Nobis Project No.: 92230.00

Boring No.: NP-2

Boring Location: See Exploration Location Plan

Checked by: R. Janeiro

Date Start: October 19, 2016

Date Finish: October 19, 2016

Contractor: New England Boring Contractors

Driller: Mike St. John

Nobis Rep.: A. Epstein

Rig Type / Model: Truck / B-53 Mobile

Hammer Type: N/A

Hammer Hoist: N/A

Ground Surface Elev.: (+/-) 336

Datum: AMSL

	Drilling Method	Sampler
Type	Solid Stem Auger	N/A
Size ID (in.)	4 (O.D.)	N/A
Advancement	Augered	N/A

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time
10/19/16	12:30	Not Encountered	N/A	5.5	10 min

Depth (ft.)	SAMPLE INFORMATION Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	Ground Water	LITHOLOGY Graphic	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
1							FILL	Dark brown, fine to medium SAND, little Silt, trace fine Gravel, few wood debris. dry. (FILL).	
2									
3									
4									
5							Glacial Till 330.5 / 5.5	Light brown, fine to medium SAND, some Silt, little fine Gravel. dry. (GLACIAL TILL).	
6								Boring terminated at 5.5 feet.	
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									

Soil	Percentage	Non-Soil
trace	5 - 10	very few

NOTES:

1) End of exploration at approximately 5.5 feet below ground surface after SSA refusal on inferred weathered rock.

Nobis

Engineering a Sustainable Future

BORING LOG

Project: Proposed Homeland Towers Brookfield CT-777

Location: 100 Pocono Road Brookfield, CT

Nobis Project No.: 92230.00

Boring No.: NP-3

Boring Location: See Exploration Location Plan

Checked by: R. Janeiro

Date Start: October 19, 2016

Date Finish: October 19, 2016

Contractor: New England Boring Contractors

Driller: Mike St. John

Nobis Rep.: A. Epstein

Rig Type / Model: Truck / B-53 Mobile

Hammer Type: N/A

Hammer Hoist: N/A

Ground Surface Elev.: (+/-) 336

Datum: AMSL

	Drilling Method	Sampler
Type	Solid Stem Auger	N/A
Size ID (in.)	4 (O.D.)	N/A
Advancement	Augered	N/A

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time
10/19/16	12:30	Not Encountered	N/A	14.5	10 min

Depth (ft.)	SAMPLE INFORMATION Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	Ground Water	LITHOLOGY Graphic	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
1								Dark brown, fine to medium SAND, little Silt, trace fine Gravel, very few wood debris. dry. (FILL).	
2							FILL		
3									
4									
5								Brown, fine to medium SAND, some Silt, little fine Gravel. dry. (GLACIAL TILL).	
6									
7									
8									
9									
10							Glacial Till		
11								Brown, fine to coarse SAND, some Silt, little fine Gravel. dry. (GLACIAL TILL).	
12									
13									
14									
15							321.5 / 14.5	Boring terminated at 14.5 feet.	
16									
17									
18									
19									
20									
21									
22									

Soil	Percentage	Non-Soil
trace	5 - 10	very few

NOTES:

1) End of exploration at approximately 14.5 feet below ground surface after SSA refusal on inferred weathered rock.

APPENDIX C – Limitations

GEOTECHNICAL LIMITATIONS

Explorations and Subsurface Conditions

1. The analyses and design recommendations submitted in this report are based in part upon the data obtained from subsurface explorations. The nature and extent of variations between these explorations may not become evident until construction. If variations then appear evident, it will be necessary to reevaluate the recommendations of this report.

   In preparing this report, Nobis relied on certain information provided by the Client and other parties referenced therein which were made available to Nobis at the time of our evaluation. Nobis did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this evaluation.

2. The generalized soil profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretations of widely spaced explorations and samples; actual soil transitions are probably more erratic. For specific information, refer to the exploration logs.

3. Water level readings have been made in the explorations at times and under conditions stated on the logs. These data have been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, and other factors occurring since the time measurements were made. The water table encountered in the course of the work may differ from that indicated in the Report.

   Recommendations for foundation drainage, waterproofing, and moisture control address the conventional geotechnical engineering aspects of seepage control. These recommendations may not preclude an environment that allows the infestation of mold or other biological pollutants.

4. Nobis' geotechnical services did not include an assessment of the presence of oil or hazardous materials at the property. Consequently, we did not consider the potential impacts (if any) that contaminants in soil or groundwater may have on construction activities, or the use of structures on the property.

Additional Services

5. Nobis recommends that we be retained to provide services during future site observations, design, implementation activities, construction and/or property development/ redevelopment. This will allow us the opportunity to: i) observe conditions and compliance with our recommendations, design concepts and/or opinions; ii) allow for changes in the event that conditions are other than anticipated; iii) provide modifications to our design recommendations; and iv) assess the consequences of changes in technologies and/or regulations.

Use of Report

6. Nobis prepared this report on behalf of, and for the exclusive use of our Client for the stated purpose(s) and location(s) identified in our proposal and/or report. Use of this report, in whole or in part, at other locations, or for other purposes, may lead to inappropriate conclusions; and we do not accept any responsibility for the consequences of such use(s). Reliance by any party not expressly identified in the agreement, for any use, without our prior written permission, shall be at that party's sole risk, and without any liability to Nobis.

   This report is for design purposes only and is not sufficient to prepare an accurate construction bid. Contractors wishing a copy of the report may secure it with the understanding that its scope is limited to design considerations only.

7. Nobis' findings and conclusions are based on the work conducted as part of the scope of work set forth in our proposal and/or report, and reflect our professional judgment. These findings and conclusions must be considered not as scientific or engineering certainties, but rather as our professional opinions considering the limited data gathered during the course of our work. If conditions other than those described in this report are found at the subject location(s), or the project design has been altered in any way, Nobis shall be so notified and afforded the opportunity to revise the report, as appropriate, to reflect the unanticipated changed conditions.

8. Nobis' services were performed using the degree of skill and care ordinarily exercised by qualified professionals performing the same type of services, at the same time, under similar conditions, at the same or a similar property. No warranty, expressed or implied, is made.

Compliance with Codes and Regulations

9. Nobis used reasonable care in identifying and interpreting applicable codes and regulations. These codes and regulations are subject to various, and possibly contradictory, interpretations. Compliance with codes and regulations by other parties is beyond our control.

Opinion of Cost

10. This report may contain or be based on comparative cost opinions for the purpose of evaluating alternative foundation schemes. These opinions may also involve approximate quantity evaluations. It should be noted that quantity estimates may not be accurate enough for construction bids. In addition, since we are not professional estimators of labor and materials cost, the evaluation of construction costs should be considered as approximate guidelines and could vary significantly from actual costs. Nobis does not guarantee the accuracy of our cost opinions as compared to contractor's bids for construction costs.

END OF LIMITATIONS

Structural Design Report

Date: January 12, 2016

Customer: Insite Wireless Group, LLC

Project: 150' of 170' Monopole

Site: Brookfield, CT

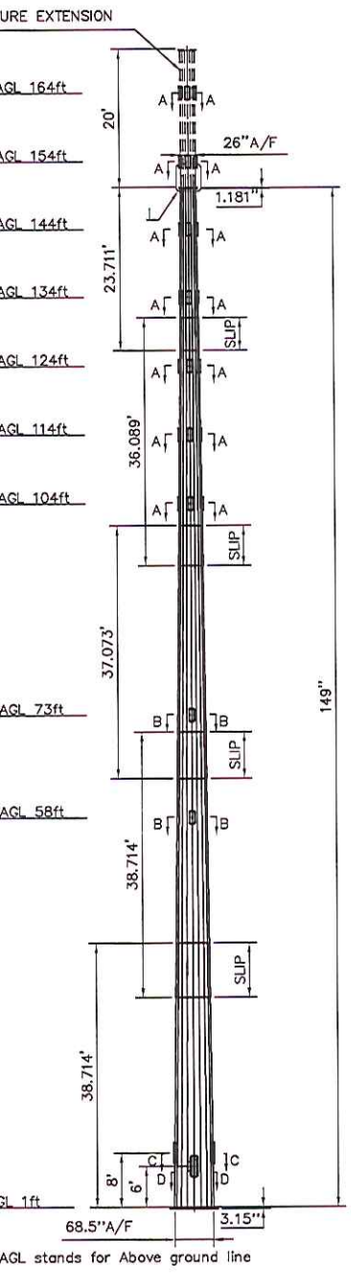
Site Number: CT777

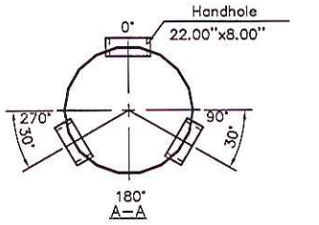
Ambor Job Number: C15019008

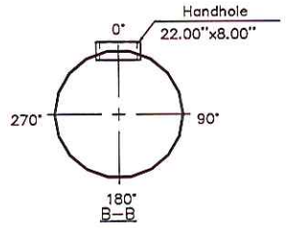
Prepared by Vince Jiang

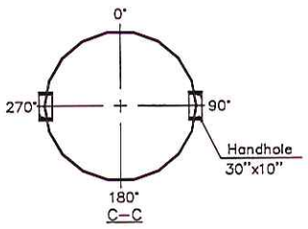
Ambor Structures, Inc.

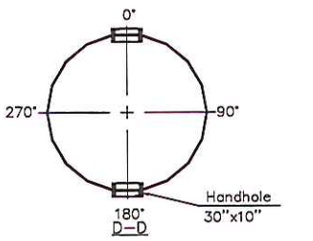
C15019008
QUOTATION #

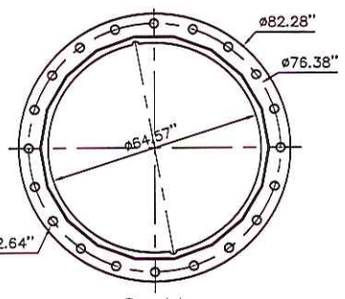


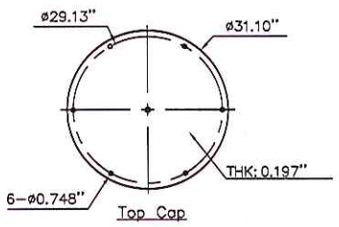


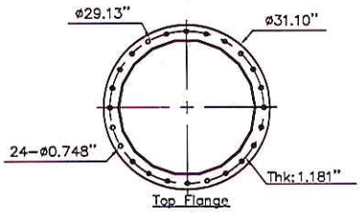


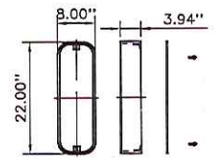




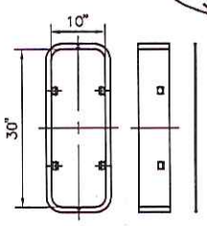








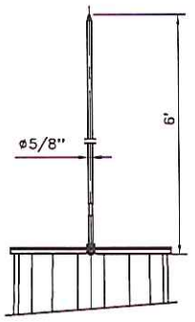
Handhole–22.00"x8.00"



Handhole 30"x10"

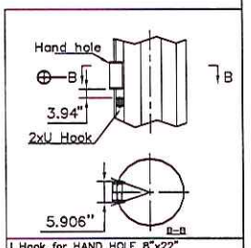
Tower Design Notes:

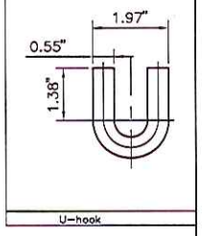
1. Material:
   Pole shaft: ASTM A572 GR65
   Baseplate: GR50 or Q345B; Top Flange: Q345B;
   Top Cap: Q235B
2. Pole section has 18 sides
3. Finished: Galvanizing per ASTM A123
   Lightning Rod will be copper–clad
4. Fasteners following Chinese standard
   (Equivalent Bolt ISO spec will be ISO 4017
   or ISO 4014)



DETAIL I

5'Lightning Rod(copper clad)





Please refer to separate drawing
for step bolts with safety system

* Future extension and connection bolts will
not be supplied with bottom tower

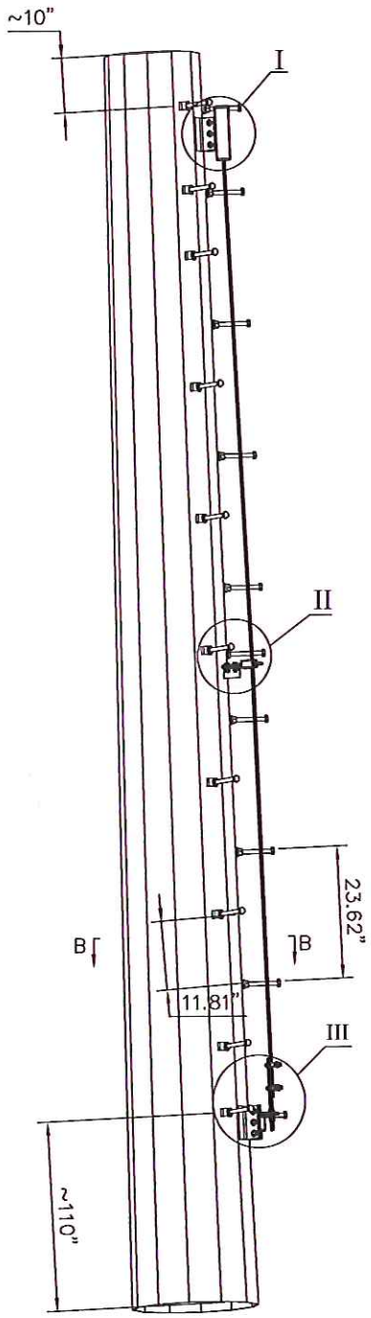
NO	PART NO.	DESCRIPTION	WEIGHT	QTY
7		6' Steel Lightning Rod		1
6		Top Cap		1
5		Safety Device		TBD
4		Step Bolts		1
3		Handhole 22.00"x8.00"		17
2		Hand Hole 30"x10"		4
1		Pole		1

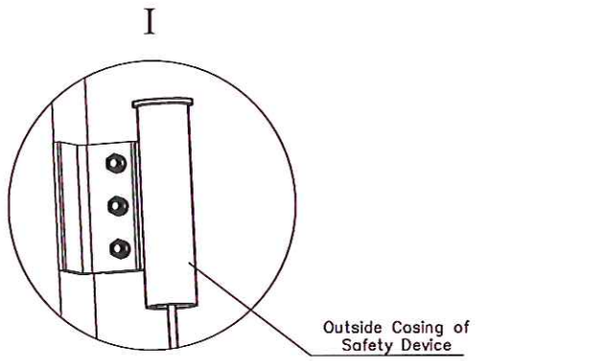
AMBOR Ambor Structures
amborstructures.com

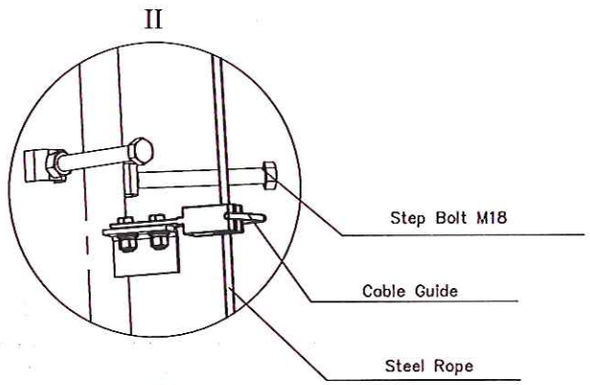
CLIENT	Insite
TITLE	150ft of 170ft 90mph CP

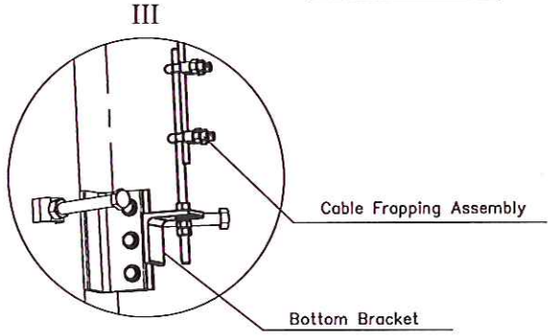
REV ID	DATE	REVISION DESCRIPTION
A		

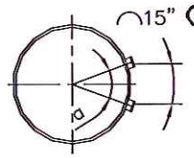
DRAWN	ZHJ	2017.1.11	MATERIAL		MANUFACTURING ORDER
ENGR	JW	2017.1.11	THK(mm)		
CHECKED	JW	2017.1.11	WT(kg)		REVISION B
SPECIFICATIONS			SCALE		



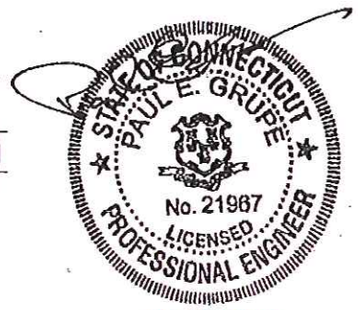








B–B



01/12/2017

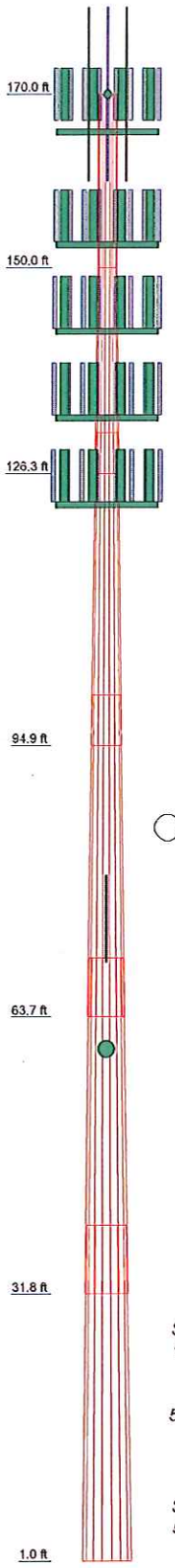
Note:

1. Arc length between two sides step bolt brackets is around 15". The angle "a" will be no bigger than 120°
2. Vertical distance between two step bolts on same side is around 23.62"
3. Vertical distance between two step bolts on different sides is around 11.81"

AMBOR Ambor Structures
amborstructures.com

CLIENT

Section	6	5	4	3	2	1
Length (ft)	38'8-5/8"	38'8-17/32"	37'27/32"	36'1-3/32"	23'8-5/8"	20'
Number of Sides	18	18	18	18	18	18
Thickness (in)	0.43	0.39	0.39	0.31	0.24	0.20
Socket Length (ft)		7'11-1/32"	6'9-15/32"	5'10-3/32"	4'9-1/8"	
Top Dia (in)	56.76	48.21	39.81	31.26	25.98	25.98
Bot Dia (in)	68.50	59.95	51.06	42.21	33.18	25.98
Grade	A572-65					
Weight (K) 34.5	11.3	8.8	7.1	4.5	1.8	1.1



MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 90 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 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'
8. Installation per TIA/EIA-222 and AISC Specifications.
9. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards. Assume that there will be a one (1) foot caisson reveal
10. TOWER RATING: 96.7%

ALL REACTIONS ARE FACTORED

AXIAL 206 K
SHEAR 15 K / *MOMENT 1950 kip-ft*
TORQUE 0 kip-ft
50 mph WIND - 0.75 in ICE

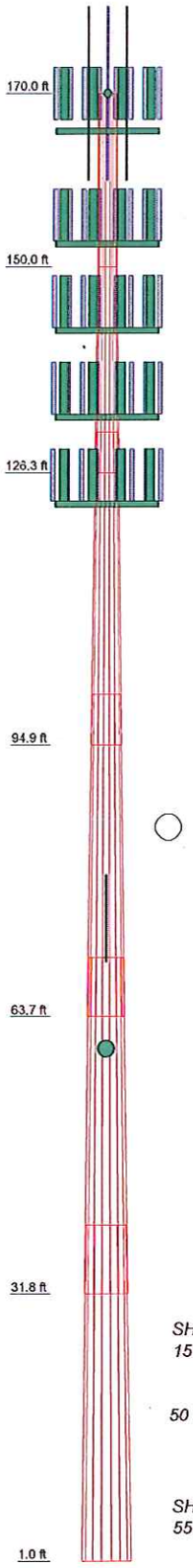
AXIAL 73 K
SHEAR 55 K / *MOMENT 7148 kip-ft*
TORQUE 0 kip-ft
REACTIONS - 90 mph WIND

STATE OF CONNECTICUT
PAUL E. GRUPE
No. 21967
LICENSED PROFESSIONAL ENGINEER
01/12/2017

	Bennett & Pless	Job: *150ft of 170ft,90mph*

Section	1	2	3	4	5	6
Length (ft)	20'	23'8-5/8"	36'1-3/32"	37'27/32"	38'8-17/32"	38'8-5/8"
Number of Sides	18	18	18	18	18	18
Thickness (in)	0.20	0.24	0.31	0.39	0.39	0.43
Socket Length (ft)		4'9-1/8"	5'10-3/32"	6'9-15/32"	7'11-1/32"	
Top Dia (in)	25.98	25.98	31.26	39.81	48.21	56.76
Bot Dia (in)	25.98	33.18	42.21	51.06	59.95	68.50
Grade	A572-65					
Weight (K)	1.1	1.8	4.5	7.1	8.8	11.3

Total Weight: 34.5 K



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION
21.9' Omni Antenna	170
21.9' Omni Antenna	170
21.9' Omni Antenna	170
1' HP	170
(4) Generic 96"x12"x7" Panel	166
(4) Ericsson RRUS 11	166
(2) Raycap DC6-48-60-18-8F	166
(2) Ericsson RRUS A2 Module	166
12.6' Low Profile Platform w/Rails Sector	166
(4) Generic 96"x12"x7" Panel	166
(4) Ericsson RRUS 11	166
Raycap DC6-48-60-18-8F	166
(2) Ericsson RRUS A2 Module	166
12.6' Low Profile Platform w/Rails Sector	166
(4) Generic 96"x12"x7" Panel	166
(4) Ericsson RRUS 11	166
Raycap DC6-48-60-18-8F	166
(2) Ericsson RRUS A2 Module	166
12.6' Low Profile Platform w/Rails Sector	166
(4) Generic 96"x12"x7" Panel	156
(4) Ericsson RRUS 11	156
Raycap DC6-48-60-18-8F	156
12.6' Low Profile Platform w/Rails Sector	156
(4) Generic 96"x12"x7" Panel	156
(4) Ericsson RRUS 11	156
12.6' Low Profile Platform w/Rails Sector	156
(4) Generic 96"x12"x7" Panel	156
(4) Ericsson RRUS 11	156
12.6' Low Profile Platform w/Rails Sector	156
(4) Generic 96"x12"x7" Panel	146
(8) Ericsson RRUS 11	146
(2) Raycap DC6-48-60-18-8F	146
(2) Ericsson RRUS A2 Module	146
12.6' Low Profile Platform w/Rails Sector	146
(4) Generic 96"x12"x7" Panel	146
(8) Ericsson RRUS 11	146
Raycap DC6-48-60-18-8F	146
(2) Ericsson RRUS A2 Module	146
12.6' Low Profile Platform w/Rails Sector	146
(4) Generic 96"x12"x7" Panel	146

TYPE	ELEVATION
(8) Ericsson RRUS 11	146
Raycap DC6-48-60-18-8F	146
(2) Ericsson RRUS A2 Module	146
12.6' Low Profile Platform w/Rails Sector	146
(4) Generic 96"x12"x7" Panel	136
(4) Ericsson RRUS 11	136
Raycap DC6-48-60-18-8F	136
(2) PCTEL GPS-TMG-HR-26N 5"x3.2"	136
(2) Diplexers 5.8x6.5x1.5 FD9R6004/1C-3L	136
12.6' Low Profile Platform w/Rails Sector	136
(4) Generic 96"x12"x7" Panel	136
(4) Ericsson RRUS 11	136
Raycap DC6-48-60-18-8F	136
PCTEL GPS-TMG-HR-26N 5"x3.2"	136
(2) Diplexers 5.8x6.5x1.5 FD9R6004/1C-3L	136
12.6' Low Profile Platform w/Rails Sector	136
(4) Generic 96"x12"x7" Panel	136
(4) Ericsson RRUS 11	136
Raycap DC6-48-60-18-8F	136
PCTEL GPS-TMG-HR-26N 5"x3.2"	136
(2) Diplexers 5.8x6.5x1.5 FD9R6004/1C-3L	136
12.6' Low Profile Platform w/Rails Sector	136
(4) Generic 96"x12"x7" Panel	126
(4) Ericsson RRUS 11	126
Raycap DC6-48-60-18-8F	126
(4) E15S09P78 (TMA)	126
12.6' Low Profile Platform w/Rails Sector	126
(4) Generic 96"x12"x7" Panel	126
(4) Ericsson RRUS 11	126
(4) E15S09P78 (TMA)	126
12.6' Low Profile Platform w/Rails Sector	126
21.9' Omni	75
2ft Dish	60

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

ALL REACTIONS ARE FACTORED

AXIAL 206 K
SHEAR 15 K
MOMENT 1950 k
TORQUE 0 kip-ft
50 mph WIND - 0.75 in ICE

AXIAL 73 K
SHEAR 55 K
MOMENT 7148 kip-ft
TORQUE 0 kip-ft
REACTIONS - 90 mph WIND

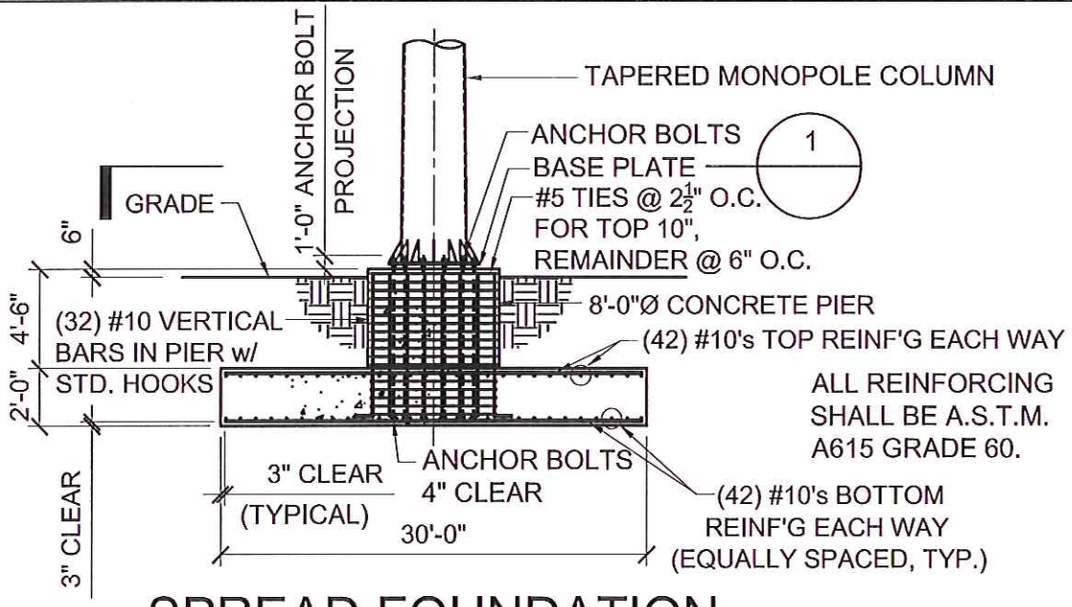
TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 90 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 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'
8. Installation per TIA/EIA-222 and AISC Specifications.
9. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards. Assume that there will be a one (1) foot caisson reveal
10. TOWER RATING: 96.7%

STATE OF CONNECTICUT
PAUL E. GRUPE
No. 21987
LICENSED
PROFESSIONAL ENGINEER

01/12/2017

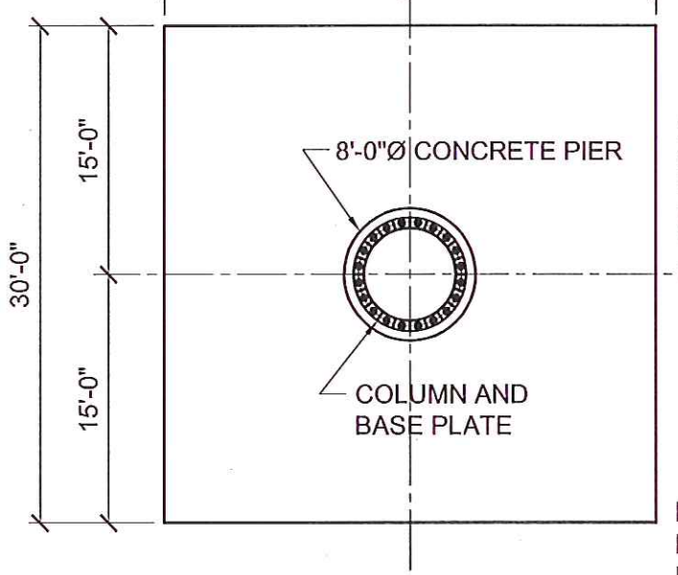
	Bennett & Pless	Job: *150ft of 170ft,90mph*



SPREAD FOUNDATION

NOT TO SCALE

NOTE: CONCRETE SHALL BE 3000 P.S.I. (MINIMUM) @ 28 DAYS COMPRESSIVE STRENGTH.

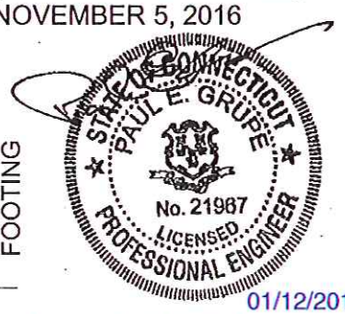


SECTION

1

SCALE: 3/32" = 1'-0"

NOTE: FOUNDATION DESIGN PER SOIL REPORT BY:
NOBIS ENGINEERING, INC.
122 CHURCH STREET
NAUGATUCK, CT 06770
(PROJECT N0. 92230.00)
NOVEMBER 5, 2016



01/12/2017

NOTE: FOUNDATION INSTALLATION SHALL BE OBSERVED BY AN ENGINEER FROM NOBIS ENGINEERING

REFER TO SOIL REPORT FOR PROPER PREPARATION AND INSTALLATION REQUIREMENTS.

AMBER STRUCTURES

B&P JOB NO. 16700.021

bennett & pless
Experience Structural Expertise
Atlanta, GA•Chattanooga, TN•Boca Raton, FL
1301 Riverfront Parkway Suite 105

job name	MONOPOLE CELL TOWER	date	1/12/17	sheet #
	SPREAD FOUNDATION w/ PIER		TED	1

tnxTower	Job	Page
Bennett & Pless 550 River Drive North Sioux City, SD 57049 Phone: 605-540-4621 FAX: 678-990-8701	150ft of 170ft.90mph	1 of 33
	Project Brookfield CT	Date 17:04:39 01/11/17
	Client Ambor	Designed by Chunhui Song

Tower Input Data

There is a pole section.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:
Tower is located in Fairfield County, Connecticut.
Basic wind speed of 90 mph.
Structure Class II.
Exposure Category C.
Topographic Category 1.
Crest Height 0'.
Nominal ice thickness of 0.75 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
Installation per TIA/EIA-222 and AISC Specifications..
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards. Assume that there will be a one (1) foot caisson reveal.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned	√	Calculate Redundant Bracing Forces
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification	√	Use Clear Spans For Wind Area		SR Leg Bolts Resist Compression
√	Use Code Stress Ratios		Use Clear Spans For KL/r		All Leg Panels Have Same Allowable
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice		Bypass Mast Stability Checks		Consider Feed Line Torque
	Always Use Max Kz	√	Use Azimuth Dish Coefficients		Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-G Bracing Resist. Exemption
	Include Bolts In Member Capacity		Autocalc Torque Arm Areas	√	Use TIA-222-G Tension Splice Exemption
	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
	Secondary Horizontal Braces Leg		Sort Capacity Reports By Component	√	Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric				

Tapered Pole Section Geometry

Section	*Elevation*	*Section Length*	*Splice Length*	*Number of Sides*	*Top Diameter*	*Bottom Diameter*	*Wall Thickness*	*Bend Radius*	*Pole Grade*
	ft	*ft*	*ft*		*in*	*in*	*in*	*in*	

tnxTower	Job: 150ft of 170ft.90mph	Page: 2 of 33
Bennett & Pless 550 River Drive North Sioux City, SD 57049 Phone: 605-540-4621 FAX: 678-990-8701	Project: Brookfield CT	Date: 17:04:39 01/11/17
	Client: Ambor	Designed by: Chunhui Song

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	170'-150'	20'	0'	18	25.98	25.98	0.20	0.79	A572-65 (65 ksi)
L2	150'-126'3-3/8"	23'8-5/8"	4'9-1/8"	18	25.98	33.18	0.24	0.94	A572-65 (65 ksi)
L3	126'3-3/8"-94'11-13/32"	36'1-3/32"	5'10-3/32"	18	31.26	42.21	0.31	1.26	A572-65 (65 ksi)
L4	94'11-13/32"-63'8-5/8"	37'27/32"	6'9-15/32"	18	39.81	51.06	0.39	1.57	A572-65 (65 ksi)
L5	63'8-5/8"-31'9-15/32"	38'8-17/32"	7'11-1/32"	18	48.21	59.95	0.39	1.57	A572-65 (65 ksi)
L6	31'9-15/32"-1'	38'8-5/8"		18	56.76	68.50	0.43	1.73	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in²	I in⁴	r in	C in	I/C in³	J in⁴	It/Q in²	w in	w/t
L1	26.39	16.11	1353.64	9.15	13.20	102.55	2709.06	8.06	4.23	21.472
	26.39	16.11	1353.64	9.15	13.20	102.55	2709.06	8.06	4.23	21.472
L2	26.39	19.30	1616.94	9.14	13.20	122.50	3236.00	9.65	4.16	17.6
	33.69	24.70	3385.86	11.69	16.85	200.89	6776.18	12.35	5.42	22.959
L3	33.21	30.94	3743.35	10.99	15.88	235.71	7491.62	15.47	4.95	15.709
	42.86	41.88	9289.02	14.87	21.44	433.18	18590.26	20.95	6.88	21.828
L4	42.22	49.26	9668.23	13.99	20.22	478.07	19349.19	24.63	6.31	16.037
	51.84	63.31	20527.82	17.98	25.94	791.48	41082.66	31.66	8.29	21.064
L5	51.04	59.75	17257.41	16.97	24.49	704.69	34537.54	29.88	7.79	19.791
	60.87	74.42	33347.87	21.14	30.45	1095.02	66739.63	37.22	9.86	25.04
L6	60.07	77.42	31031.79	20.00	28.83	1076.26	62104.42	38.72	9.23	21.306
	69.56	93.57	54775.62	24.17	34.80	1574.01	109623.32	46.79	11.29	26.08

Tower Elevation ft	Gusset Area (per face) ft²	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 170'-150'				1	1	1			
L2 150'-126'3-3/8"				1	1	1			
L3 126'3-3/8"-94'11-13/32"				1	1	1			
L4 94'11-13/32"-63'8-5/8"				1	1	1			
L5 63'8-5/8"-31'9-15/32"				1	1	1			
L6 31'9-15/32"-1'				1	1	1			

Monopole Base Plate Data

tnxTower	Job: 150ft of 170ft.90mph	Page: 3 of 33
Bennett & Pless 550 River Drive North Sioux City, SD 57049 Phone: 605-540-4621 FAX: 678-990-8701	Project: Brookfield CT	Date: 17:04:39 01/11/17
	Client: Ambor	Designed by: Chunhui Song

Base Plate Data	
Base plate is square	
Base plate is grouted	√
Anchor bolt grade	A615-75
Anchor bolt size	2.25 in
Number of bolts	20
Embedment length	98.43 in
f'_c	6.00 ksi
Grout space	2.00 in
Base plate grade	A572-50
Base plate thickness	3.15 in
Bolt circle diameter	76.38 in
Outer diameter	82.28 in
Inner diameter	64.57 in
Base plate type	Plain Plate

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft²/ft	Weight klf
LDF-50A (1 5/8 FOAM)	C	No	CaAa (Out Of Face)	170' - 5'	4	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
LDF-50A (1 5/8 FOAM)	C	No	CaAa (Out Of Face)	166' - 5'	12	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
LDF-50A (1 5/8 FOAM)	C	No	CaAa (Out Of Face)	156' - 5'	14	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
LDF-50A (1 5/8 FOAM)	C	No	CaAa (Out Of Face)	146' - 5'	12	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
LDF-50A (1 5/8 FOAM)	C	No	CaAa (Out Of Face)	136' - 5'	20	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
LDF-50A (1 5/8 FOAM)	C	No	CaAa (Out Of Face)	126' - 5'	14	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
LDF-50A (1 5/8 FOAM)	C	No	CaAa (Out Of Face)	75' - 5'	1	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
LDF-50A (1 5/8 FOAM)	C	No	CaAa (Out Of Face)	60' - 5'	1	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
L1	170'-150'	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.29
L2	150'-126'3-3/8"	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.94
L3	126'3-3/8"-94'11-1	A	0.000	0.000	0.000	0.000	0.00

tnxTower	Job	Page
	150ft of 170ft.90mph	4 of 33
Bennett & Pless 550 River Drive North Sioux City, SD 57049 Phone: 605-540-4621 FAX: 678-990-8701	Project Brookfield CT	Date 17:04:39 01/11/17
	Client Ambor	Designed by Chunhui Song

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
	3/32"	B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	1.95
L4	94'11-13/32"-63'8-5/8"	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	1.96
L5	63'8-5/8"-31'9-15/32"	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	2.04
L6	31'9-15/32"-1'	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	1.71

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	170'-150'	A	1.757	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	2.96
L2	150'-126'3-3/8"	A	1.730	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	9.32
L3	126'3-3/8"-94'11-1 3/32"	A	1.692	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	19.38
L4	94'11-13/32"-63'8-5/8"	A	1.637	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	18.93
L5	63'8-5/8"-31'9-15/32"	A	1.556	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	18.96
L6	31'9-15/32"-1'	A	1.399	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	14.98

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
21.9' Omni Antenna	C	From Leg	1.50	0.00	170'	No Ice	3.00	3.00	0.01

tnxTower	Job: 150ft of 170ft.90mph	Page: 5 of 33
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	Client: Ambor	Designed by: Chunhui Song

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0'			1/2" Ice	0.00	0.00	0.02
			0'			1" Ice	0.00	0.00	0.03
21.9' Omni Antenna	B	From Leg	1.50	0.00	170'	No Ice	3.00	3.00	0.01
			0'			1/2" Ice	0.00	0.00	0.02
			0'			1" Ice	0.00	0.00	0.03
21.9' Omni Antenna	A	From Leg	1.50	0.00	170'	No Ice	3.00	3.00	0.01
			0'			1/2" Ice	0.00	0.00	0.02
			0'			1" Ice	0.00	0.00	0.03
******									
12.6' Low Profile Platform w/Rails Sector	A	From Face	2.00	0.00	166'	No Ice	11.00	11.00	0.50
			0'			1/2" Ice	0.00	0.00	0.65
			0'			1" Ice	0.00	0.00	0.80
(4) Generic 96"x12"x7" Panel	A	From Face	3.00	0.00	166'	No Ice	11.47	9.48	0.07
			0'			1/2" Ice	12.08	10.90	0.16
			4'			1" Ice	12.71	12.17	0.25
(4) Ericsson RRUS 11	A	From Face	2.00	0.00	166'	No Ice	2.80	1.57	0.06
			0'			1/2" Ice	3.01	1.83	0.09
			4'			1" Ice	3.22	2.11	0.12
(2) Raycap DC6-48-60-18-8F	A	From Face	0.00	0.00	166'	No Ice	2.22	2.22	0.02
			0'			1/2" Ice	2.44	2.44	0.04
			4'			1" Ice	2.66	2.66	0.06
(2) Ericsson RRUS A2 Module	A	From Face	2.00	0.00	166'	No Ice	2.06	0.75	0.03
			0'			1/2" Ice	2.24	0.95	0.04
			4'			1" Ice	2.43	1.17	0.07
12.6' Low Profile Platform w/Rails Sector	B	From Face	2.00	0.00	166'	No Ice	11.00	11.00	0.50
			0'			1/2" Ice	0.00	0.00	0.65
			0'			1" Ice	0.00	0.00	0.80
(4) Generic 96"x12"x7" Panel	B	From Face	3.00	0.00	166'	No Ice	11.47	9.48	0.07
			0'			1/2" Ice	12.08	10.90	0.16
			4'			1" Ice	12.71	12.17	0.25
(4) Ericsson RRUS 11	B	From Face	2.00	0.00	166'	No Ice	2.80	1.57	0.06
			0'			1/2" Ice	3.01	1.83	0.09
			4'			1" Ice	3.22	2.11	0.12
Raycap DC6-48-60-18-8F	B	From Face	0.00	0.00	166'	No Ice	2.22	2.22	0.02
			0'			1/2" Ice	2.44	2.44	0.04
			4'			1" Ice	2.66	2.66	0.06
(2) Ericsson RRUS A2 Module	B	From Face	2.00	0.00	166'	No Ice	2.06	0.75	0.03
			0'			1/2" Ice	2.24	0.95	0.04
			4'			1" Ice	2.43	1.17	0.07
12.6' Low Profile Platform w/Rails Sector	C	From Face	2.00	0.00	166'	No Ice	11.00	11.00	0.50
			0'			1/2" Ice	0.00	0.00	0.65
			0'			1" Ice	0.00	0.00	0.80
(4) Generic 96"x12"x7" Panel	C	From Face	3.00	0.00	166'	No Ice	11.47	9.48	0.07
			0'			1/2" Ice	12.08	10.90	0.16
			4'			1" Ice	12.71	12.17	0.25
(4) Ericsson RRUS 11	C	From Face	2.00	0.00	166'	No Ice	2.80	1.57	0.06
			0'			1/2" Ice	3.01	1.83	0.09
			4'			1" Ice	3.22	2.11	0.12
Raycap DC6-48-60-18-8F	C	From Face	0.00	0.00	166'	No Ice	2.22	2.22	0.02
			0'			1/2" Ice	2.44	2.44	0.04
			4'			1" Ice	2.66	2.66	0.06
(2) Ericsson RRUS A2 Module	C	From Face	2.00	0.00	166'	No Ice	2.06	0.75	0.03
			0'			1/2" Ice	2.24	0.95	0.04
			4'			1" Ice	2.43	1.17	0.07
******									
12.6' Low Profile Platform w/Rails Sector	A	From Face	2.00	0.00	156'	No Ice	11.00	11.00	0.50
			0'			1/2" Ice	0.00	0.00	0.65

tnxTower	Job: 150ft of 170ft.90mph	Page: 6 of 33
Bennett & Pless 550 River Drive North Sioux City, SD 57049 Phone: 605-540-4621 FAX: 678-990-8701	Project: Brookfield CT	Date: 17:04:39 01/11/17
	Client: Ambor	Designed by: Chunhui Song

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			-3'			1" Ice	0.00	0.00	0.80
(4) Generic 96"x12"x7" Panel	A	From Face	3.00	0.00	156'	No Ice	11.47	9.48	0.07
			0'			1/2" Ice	12.08	10.90	0.16
			0'			1" Ice	12.71	12.17	0.25
(4) Ericsson RRUS 11	A	From Face	2.00	0.00	156'	No Ice	2.80	1.57	0.06
			0'			1/2" Ice	3.01	1.83	0.09
			0'			1" Ice	3.22	2.11	0.12
Raycap DC6-48-60-18-8F	A	None		0.00	156'	No Ice	2.22	2.22	0.02
						1/2" Ice	2.44	2.44	0.04
						1" Ice	2.66	2.66	0.06
12.6' Low Profile Platform w/Rails Sector	B	From Face	2.00	0.00	156'	No Ice	11.00	11.00	0.50
			0'			1/2" Ice	0.00	0.00	0.65
			-3'			1" Ice	0.00	0.00	0.80
(4) Generic 96"x12"x7" Panel	B	From Face	3.00	0.00	156'	No Ice	11.47	9.48	0.07
			0'			1/2" Ice	12.08	10.90	0.16
			0'			1" Ice	12.71	12.17	0.25
(4) Ericsson RRUS 11	B	From Face	2.00	0.00	156'	No Ice	2.80	1.57	0.06
			0'			1/2" Ice	3.01	1.83	0.09
			0'			1" Ice	3.22	2.11	0.12
12.6' Low Profile Platform w/Rails Sector	C	From Face	2.00	0.00	156'	No Ice	11.00	11.00	0.50
			0'			1/2" Ice	0.00	0.00	0.65
			-3'			1" Ice	0.00	0.00	0.80
(4) Generic 96"x12"x7" Panel	C	From Face	3.00	0.00	156'	No Ice	11.47	9.48	0.07
			0'			1/2" Ice	12.08	10.90	0.16
			0'			1" Ice	12.71	12.17	0.25
(4) Ericsson RRUS 11	C	From Face	2.00	0.00	156'	No Ice	2.80	1.57	0.06
			0'			1/2" Ice	3.01	1.83	0.09
			0'			1" Ice	3.22	2.11	0.12
******									
12.6' Low Profile Platform w/Rails Sector	A	From Face	2.00	0.00	146'	No Ice	11.00	11.00	0.50
			0'			1/2" Ice	0.00	0.00	0.65
			-3'			1" Ice	0.00	0.00	0.80
(4) Generic 96"x12"x7" Panel	A	From Face	3.00	0.00	146'	No Ice	11.47	9.48	0.07
			0'			1/2" Ice	12.08	10.90	0.16
			0'			1" Ice	12.71	12.17	0.25
(8) Ericsson RRUS 11	A	From Face	2.00	0.00	146'	No Ice	2.80	1.57	0.06
			0'			1/2" Ice	3.01	1.83	0.09
			0'			1" Ice	3.22	2.11	0.12
(2) Raycap DC6-48-60-18-8F	A	None		0.00	146'	No Ice	2.22	2.22	0.02
						1/2" Ice	2.44	2.44	0.04
						1" Ice	2.66	2.66	0.06
(2) Ericsson RRUS A2 Module	A	From Face	2.00	0.00	146'	No Ice	2.06	0.75	0.03
			0'			1/2" Ice	2.24	0.95	0.04
			0'			1" Ice	2.43	1.17	0.07
12.6' Low Profile Platform w/Rails Sector	B	From Face	2.00	0.00	146'	No Ice	11.00	11.00	0.50
			0'			1/2" Ice	0.00	0.00	0.65
			-3'			1" Ice	0.00	0.00	0.80
(4) Generic 96"x12"x7" Panel	B	From Face	3.00	0.00	146'	No Ice	11.47	9.48	0.07
			0'			1/2" Ice	12.08	10.90	0.16
			0'			1" Ice	12.71	12.17	0.25
(8) Ericsson RRUS 11	B	From Face	2.00	0.00	146'	No Ice	2.80	1.57	0.06
			0'			1/2" Ice	3.01	1.83	0.09
			0'			1" Ice	3.22	2.11	0.12
Raycap DC6-48-60-18-8F	B	None		0.00	146'	No Ice	2.22	2.22	0.02
						1/2" Ice	2.44	2.44	0.04
						1" Ice	2.66	2.66	0.06
(2) Ericsson RRUS A2	B	From Face	2.00	0.00	146'	No Ice	2.06	0.75	0.03

tnxTower	Job: 150ft of 170ft.90mph	Page: 7 of 33
Bennett & Pless 550 River Drive North Sioux City, SD 57049 Phone: 605-540-4621 FAX: 678-990-8701	Project: Brookfield CT	Date: 17:04:39 01/11/17
	Client: Ambor	Designed by: Chunhui Song

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Module			0'			1/2" Ice	2.24	0.95	0.04
			0'			1" Ice	2.43	1.17	0.07
12.6' Low Profile Platform w/Rails Sector	C	From Face	2.00	0.00	146'	No Ice	11.00	11.00	0.50
			0'			1/2" Ice	0.00	0.00	0.65
			-3'			1" Ice	0.00	0.00	0.80
(4) Generic 96"x12"x7" Panel	C	From Face	3.00	0.00	146'	No Ice	11.47	9.48	0.07
			0'			1/2" Ice	12.08	10.90	0.16
			0'			1" Ice	12.71	12.17	0.25
(8) Ericsson RRUS 11	C	From Face	2.00	0.00	146'	No Ice	2.80	1.57	0.06
			0'			1/2" Ice	3.01	1.83	0.09
			0'			1" Ice	3.22	2.11	0.12
Raycap DC6-48-60-18-8F	C	None		0.00	146'	No Ice	2.22	2.22	0.02
						1/2" Ice	2.44	2.44	0.04
						1" Ice	2.66	2.66	0.06
(2) Ericsson RRUS A2 Module	C	From Face	2.00	0.00	146'	No Ice	2.06	0.75	0.03
			0'			1/2" Ice	2.24	0.95	0.04
			0'			1" Ice	2.43	1.17	0.07
******									
12.6' Low Profile Platform w/Rails Sector	A	From Face	2.00	0.00	136'	No Ice	11.00	11.00	0.50
			0'			1/2" Ice	0.00	0.00	0.65
			-3'			1" Ice	0.00	0.00	0.80
(4) Generic 96"x12"x7" Panel	A	From Face	3.00	0.00	136'	No Ice	11.47	9.48	0.07
			0'			1/2" Ice	12.08	10.90	0.16
			0'			1" Ice	12.71	12.17	0.25
(4) Ericsson RRUS 11	A	From Face	2.00	0.00	136'	No Ice	2.80	1.57	0.06
			0'			1/2" Ice	3.01	1.83	0.09
			0'			1" Ice	3.22	2.11	0.12
Raycap DC6-48-60-18-8F	A	None		0.00	136'	No Ice	2.22	2.22	0.02
						1/2" Ice	2.44	2.44	0.04
						1" Ice	2.66	2.66	0.06
(2) PCTEL GPS-TMG-HR-26N 5"x3.2"	A	None		0.00	136'	No Ice	0.08	0.08	0.01
						1/2" Ice	0.12	0.12	0.01
						1" Ice	0.18	0.18	0.01
(2) Diplexers 5.8x6.5x1.5 FD9R6004/1C-3L	A	From Face	2.00	0.00	136'	No Ice	0.31	0.09	0.03
			0'			1/2" Ice	0.39	0.13	0.03
			0'			1" Ice	0.47	0.19	0.04
12.6' Low Profile Platform w/Rails Sector	B	From Face	2.00	0.00	136'	No Ice	11.00	11.00	0.50
			0'			1/2" Ice	0.00	0.00	0.65
			-3'			1" Ice	0.00	0.00	0.80
(4) Generic 96"x12"x7" Panel	B	From Face	3.00	0.00	136'	No Ice	11.47	9.48	0.07
			0'			1/2" Ice	12.08	10.90	0.16
			0'			1" Ice	12.71	12.17	0.25
(4) Ericsson RRUS 11	B	From Face	2.00	0.00	136'	No Ice	2.80	1.57	0.06
			0'			1/2" Ice	3.01	1.83	0.09
			0'			1" Ice	3.22	2.11	0.12
Raycap DC6-48-60-18-8F	B	None		0.00	136'	No Ice	2.22	2.22	0.02
						1/2" Ice	2.44	2.44	0.04
						1" Ice	2.66	2.66	0.06
PCTEL GPS-TMG-HR-26N 5"x3.2"	B	None		0.00	136'	No Ice	0.08	0.08	0.01
						1/2" Ice	0.12	0.12	0.01
						1" Ice	0.18	0.18	0.01
(2) Diplexers 5.8x6.5x1.5 FD9R6004/1C-3L	B	From Face	2.00	0.00	136'	No Ice	0.31	0.09	0.03
			0'			1/2" Ice	0.39	0.13	0.03
			0'			1" Ice	0.47	0.19	0.04
12.6' Low Profile Platform w/Rails Sector	C	From Face	2.00	0.00	136'	No Ice	11.00	11.00	0.50
			0'			1/2" Ice	0.00	0.00	0.65
			-3'			1" Ice	0.00	0.00	0.80

tnxTower	Job: 150ft of 170ft.90mph	Page: 8 of 33
Bennett & Pless 550 River Drive North Sioux City, SD 57049 Phone: 605-540-4621 FAX: 678-990-8701	Project: Brookfield CT	Date: 17:04:39 01/11/17
	Client: Ambor	Designed by: Chunhui Song

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(4) Generic 96"x12"x7" Panel	C	From Face	3.00 0' 0'	0.00	136'	No Ice 1/2" Ice 1" Ice	11.47 12.08 12.71	9.48 10.90 12.17	0.07 0.16 0.25
(4) Ericsson RRUS 11	C	From Face	2.00 0' 0'	0.00	136'	No Ice 1/2" Ice 1" Ice	2.80 3.01 3.22	1.57 1.83 2.11	0.06 0.09 0.12
Raycap DC6-48-60-18-8F	C	None		0.00	136'	No Ice 1/2" Ice 1" Ice	2.22 2.44 2.66	2.22 2.44 2.66	0.02 0.04 0.06
PCTEL GPS-TMG-HR-26N 5"x3.2"	C	None		0.00	136'	No Ice 1/2" Ice 1" Ice	0.08 0.12 0.18	0.08 0.12 0.18	0.01 0.01 0.01
(2) Diplexers 5.8x6.5x1.5 FD9R6004/1C-3L	C	From Face	2.00 0' 0'	0.00	136'	No Ice 1/2" Ice 1" Ice	0.31 0.39 0.47	0.09 0.13 0.19	0.03 0.03 0.04
******									
12.6' Low Profile Platform w/Rails Sector	A	From Face	2.00 0' -3'	0.00	126'	No Ice 1/2" Ice 1" Ice	11.00 0.00 0.00	11.00 0.00 0.00	0.50 0.65 0.80
(4) Generic 96"x12"x7" Panel	A	From Face	3.00 0' 0'	0.00	126'	No Ice 1/2" Ice 1" Ice	11.47 12.08 12.71	9.48 10.90 12.17	0.07 0.16 0.25
(4) Ericsson RRUS 11	A	From Face	2.00 0' 0'	0.00	126'	No Ice 1/2" Ice 1" Ice	2.80 3.01 3.22	1.57 1.83 2.11	0.06 0.09 0.12
Raycap DC6-48-60-18-8F	A	None		0.00	126'	No Ice 1/2" Ice 1" Ice	2.22 2.44 2.66	2.22 2.44 2.66	0.02 0.04 0.06
(4) E15S09P78 (TMA)	A	From Face	2.00 0' 0'	0.00	126'	No Ice 1/2" Ice 1" Ice	0.75 0.86 0.97	0.53 0.68 0.85	0.02 0.03 0.05
12.6' Low Profile Platform w/Rails Sector	B	From Face	2.00 0' -3'	0.00	126'	No Ice 1/2" Ice 1" Ice	11.00 0.00 0.00	11.00 0.00 0.00	0.50 0.65 0.80
(4) Generic 96"x12"x7" Panel	B	From Face	3.00 0' 0'	0.00	126'	No Ice 1/2" Ice 1" Ice	11.47 12.08 12.71	9.48 10.90 12.17	0.07 0.16 0.25
(4) Ericsson RRUS 11	B	From Face	2.00 0' 0'	0.00	126'	No Ice 1/2" Ice 1" Ice	2.80 3.01 3.22	1.57 1.83 2.11	0.06 0.09 0.12
(4) E15S09P78 (TMA)	B	From Face	2.00 0' 0'	0.00	126'	No Ice 1/2" Ice 1" Ice	0.75 0.86 0.97	0.53 0.68 0.85	0.02 0.03 0.05
12.6' Low Profile Platform w/Rails Sector	C	From Face	2.00 0' -3'	0.00	126'	No Ice 1/2" Ice 1" Ice	11.00 0.00 0.00	11.00 0.00 0.00	0.50 0.65 0.80
(4) Generic 96"x12"x7" Panel	C	From Face	3.00 0' 0'	0.00	126'	No Ice 1/2" Ice 1" Ice	11.47 12.08 12.71	9.48 10.90 12.17	0.07 0.16 0.25
(4) Ericsson RRUS 11	C	From Face	2.00 0' 0'	0.00	126'	No Ice 1/2" Ice 1" Ice	2.80 3.01 3.22	1.57 1.83 2.11	0.06 0.09 0.12
(4) E15S09P78 (TMA)	C	From Face	2.00 0' 0'	0.00	126'	No Ice 1/2" Ice 1" Ice	0.75 0.86 0.97	0.53 0.68 0.85	0.02 0.03 0.05
******									

tnxTower	Job: 150ft of 170ft.90mph	Page: 9 of 33
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	Client: Ambor	Designed by: Chunhui Song

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0'			1/2" Ice	0.00	0.00	0.02
			0'			1" Ice	0.00	0.00	0.03

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
1' HP		Paraboloid w/Shroud (HP)	None		0.00		170'	1.00	No Ice	0.79	0.02
									1/2" Ice	0.92	0.03
									1" Ice	1.06	0.04
2ft Dish		Paraboloid w/Shroud (HP)	None		0.00		60'	2.00	No Ice	3.14	0.03
									1/2" Ice	3.41	0.05
									1" Ice	3.68	0.07

Tower Pressures - No Ice

$G_H = 1.100$

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 170'-150'	160'	1.397	0	43.975	A	0.000	43.975	43.975	100.00	0.000	0.000
					B	0.000	43.975		100.00	0.000	0.000
					C	0.000	43.975		100.00	0.000	0.000
L2 150'-126'3-3/8"	137'7-29/32"	1.354	0	59.377	A	0.000	59.377	59.377	100.00	0.000	0.000
					B	0.000	59.377		100.00	0.000	0.000
					C	0.000	59.377		100.00	0.000	0.000
L3 126'3-3/8"-94'1 1-13/32"	110'27/32"	1.291	0	99.311	A	0.000	99.311	99.311	100.00	0.000	0.000
					B	0.000	99.311		100.00	0.000	0.000
					C	0.000	99.311		100.00	0.000	0.000
L4 94'11-13/32"-63'8-5/8"	78'11-17/32"	1.204	0	122.411	A	0.000	122.411	122.411	100.00	0.000	0.000
					B	0.000	122.411		100.00	0.000	0.000
					C	0.000	122.411		100.00	0.000	0.000
L5 63'8-5/8"-31'9-15/32"	47'6-27/32"	1.082	0	148.858	A	0.000	148.858	148.858	100.00	0.000	0.000
					B	0.000	148.858		100.00	0.000	0.000
					C	0.000	148.858		100.00	0.000	0.000
L6 31'9-15/32"-1'	16'4-13/16"	0.865	0	166.335	A	0.000	166.335	166.335	100.00	0.000	0.000
					B	0.000	166.335		100.00	0.000	0.000
					C	0.000	166.335		100.00	0.000	0.000

Tower Pressure - With Ice

tnxTower	Job: 150ft of 170ft.90mph	Page: 10 of 33
Bennett & Pless 550 River Drive North Sioux City, SD 57049 Phone: 605-540-4621 FAX: 678-990-8701	Project: Brookfield CT	Date: 17:04:39 01/11/17
	Client: Ambor	Designed by: Chunhui Song

$G_H = 1.100$

Section Elevation ft	z ft	K_Z	q_z ksf	t_Z in	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 170'-150'	160'	1.397	0	1.76	49.830	A	0.000	49.830	49.830	100.00	0.000	0.000
						B	0.000	49.830		100.00	0.000	0.000
						C	0.000	49.830		100.00	0.000	0.000
L2 150'-126'3-3/8"	137'7-29/32"	1.354	0	1.73	66.217	A	0.000	66.217	66.217	100.00	0.000	0.000
						B	0.000	66.217		100.00	0.000	0.000
						C	0.000	66.217		100.00	0.000	0.000
L3 126'3-3/8"-94'11 -13/32"	110'27/32"	1.291	0	1.69	108.346	A	0.000	108.346	108.346	100.00	0.000	0.000
						B	0.000	108.346		100.00	0.000	0.000
						C	0.000	108.346		100.00	0.000	0.000
L4 94'11-13/32"-63' 8-5/8"	78'11-17/32"	1.204	0	1.64	131.218	A	0.000	131.218	131.218	100.00	0.000	0.000
						B	0.000	131.218		100.00	0.000	0.000
						C	0.000	131.218		100.00	0.000	0.000
L5 63'8-5/8"-31'9-1 5/32"	47'6-27/32"	1.082	0	1.56	157.566	A	0.000	157.566	157.566	100.00	0.000	0.000
						B	0.000	157.566		100.00	0.000	0.000
						C	0.000	157.566		100.00	0.000	0.000
L6 31'9-15/32"-1'	16'4-13/16"	0.865	0	1.40	174.320	A	0.000	174.320	174.320	100.00	0.000	0.000
						B	0.000	174.320		100.00	0.000	0.000
						C	0.000	174.320		100.00	0.000	0.000

Tower Pressure - Service

$G_H = 1.100$

Section Elevation ft	z ft	K_Z	q_z ksf	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 170'-150'	160'	1.397	0	43.975	A	0.000	43.975	43.975	100.00	0.000	0.000
					B	0.000	43.975		100.00	0.000	0.000
					C	0.000	43.975		100.00	0.000	0.000
L2 150'-126'3-3/8"	137'7-29/32"	1.354	0	59.377	A	0.000	59.377	59.377	100.00	0.000	0.000
					B	0.000	59.377		100.00	0.000	0.000
					C	0.000	59.377		100.00	0.000	0.000
L3 126'3-3/8"-94'1 1-13/32"	110'27/32"	1.291	0	99.311	A	0.000	99.311	99.311	100.00	0.000	0.000
					B	0.000	99.311		100.00	0.000	0.000
					C	0.000	99.311		100.00	0.000	0.000
L4 94'11-13/32"-6 3'8-5/8"	78'11-17/32"	1.204	0	122.411	A	0.000	122.411	122.411	100.00	0.000	0.000
					B	0.000	122.411		100.00	0.000	0.000
					C	0.000	122.411		100.00	0.000	0.000
L5 63'8-5/8"-31'9- 15/32"	47'6-27/32"	1.082	0	148.858	A	0.000	148.858	148.858	100.00	0.000	0.000
					B	0.000	148.858		100.00	0.000	0.000
					C	0.000	148.858		100.00	0.000	0.000
L6 31'9-15/32"-1'	16'4-13/16"	0.865	0	166.335	A	0.000	166.335	166.335	100.00	0.000	0.000
					B	0.000	166.335		100.00	0.000	0.000
					C	0.000	166.335		100.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

tnxTower	Job: 150ft of 170ft.90mph	Page: 11 of 33
Bennett & Pless 550 River Drive North Sioux City, SD 57049 Phone: 605-540-4621 FAX: 678-990-8701	Project: Brookfield CT	Date: 17:04:39 01/11/17
	Client: Ambor	Designed by: Chunhui Song

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1 170'-150'	0.29	1.10	A	1	0.65	0	1	1	43.975	0.87	0.04	C
			B	1	0.65		1	1	43.975			
			C	1	0.65		1	1	43.975			
L2 150'-126'3-3/8"	0.94	1.78	A	1	0.65	0	1	1	59.377	1.13	0.05	C
			B	1	0.65		1	1	59.377			
			C	1	0.65		1	1	59.377			
L3 126'3-3/8"-94' 11-13/32"	1.95	4.47	A	1	0.65	0	1	1	99.311	1.81	0.06	C
			B	1	0.65		1	1	99.311			
			C	1	0.65		1	1	99.311			
L4 94'11-13/32"-63'8-5/8"	1.96	7.10	A	1	0.65	0	1	1	122.411	2.07	0.07	C
			B	1	0.65		1	1	122.411			
			C	1	0.65		1	1	122.411			
L5 63'8-5/8"-31'9-15/32"	2.04	8.84	A	1	0.65	0	1	1	148.858	2.26	0.07	C
			B	1	0.65		1	1	148.858			
			C	1	0.65		1	1	148.858			
L6 31'9-15/32"-1'	1.71	11.26	A	1	0.65	0	1	1	166.335	2.09	0.07	C
			B	1	0.65		1	1	166.335			
			C	1	0.65		1	1	166.335			
Sum Weight:	8.89	34.55						OTM	788.36 kip-ft	10.23		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1 170'-150'	0.29	1.10	A	1	0.65	0	1	1	43.975	0.87	0.04	C
			B	1	0.65		1	1	43.975			
			C	1	0.65		1	1	43.975			
L2 150'-126'3-3/8"	0.94	1.78	A	1	0.65	0	1	1	59.377	1.13	0.05	C
			B	1	0.65		1	1	59.377			
			C	1	0.65		1	1	59.377			
L3 126'3-3/8"-94' 11-13/32"	1.95	4.47	A	1	0.65	0	1	1	99.311	1.81	0.06	C
			B	1	0.65		1	1	99.311			
			C	1	0.65		1	1	99.311			
L4 94'11-13/32"-63'8-5/8"	1.96	7.10	A	1	0.65	0	1	1	122.411	2.07	0.07	C
			B	1	0.65		1	1	122.411			
			C	1	0.65		1	1	122.411			
L5 63'8-5/8"-31'9-15/32"	2.04	8.84	A	1	0.65	0	1	1	148.858	2.26	0.07	C
			B	1	0.65		1	1	148.858			
			C	1	0.65		1	1	148.858			
L6 31'9-15/32"-1'	1.71	11.26	A	1	0.65	0	1	1	166.335	2.09	0.07	C
			B	1	0.65		1	1	166.335			
			C	1	0.65		1	1	166.335			
Sum Weight:	8.89	34.55						OTM	788.36 kip-ft	10.23		

Tower Forces - No Ice - Wind 90 To Face

tnxTower	Job: 150ft of 170ft.90mph	Page: 12 of 33
Bennett & Pless 550 River Drive North Sioux City, SD 57049 Phone: 605-540-4621 FAX: 678-990-8701	Project: Brookfield CT	Date: 17:04:39 01/11/17
	Client: Ambor	Designed by: Chunhui Song

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1 170'-150'	0.29	1.10	A	1	0.65	0	1	1	43.975	0.87	0.04	C
			B	1	0.65		1	1	43.975			
			C	1	0.65		1	1	43.975			
L2 150'-126'3-3/8"	0.94	1.78	A	1	0.65	0	1	1	59.377	1.13	0.05	C
			B	1	0.65		1	1	59.377			
			C	1	0.65		1	1	59.377			
L3 126'3-3/8"-94'11-13/32"	1.95	4.47	A	1	0.65	0	1	1	99.311	1.81	0.06	C
			B	1	0.65		1	1	99.311			
			C	1	0.65		1	1	99.311			
L4 94'11-13/32"-63'8-5/8"	1.96	7.10	A	1	0.65	0	1	1	122.411	2.07	0.07	C
			B	1	0.65		1	1	122.411			
			C	1	0.65		1	1	122.411			
L5 63'8-5/8"-31'9-15/32"	2.04	8.84	A	1	0.65	0	1	1	148.858	2.26	0.07	C
			B	1	0.65		1	1	148.858			
			C	1	0.65		1	1	148.858			
L6 31'9-15/32"-1'	1.71	11.26	A	1	0.65	0	1	1	166.335	2.09	0.07	C
			B	1	0.65		1	1	166.335			
			C	1	0.65		1	1	166.335			
Sum Weight:	8.89	34.55						OTM	788.36 kip-ft	10.23		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1 170'-150'	2.96	2.30	A	1	1.2	0	1	1	49.830	0.56	0.03	C
			B	1	1.2		1	1	49.830			
			C	1	1.2		1	1	49.830			
L2 150'-126'3-3/8"	9.32	3.36	A	1	1.2	0	1	1	66.217	0.72	0.03	C
			B	1	1.2		1	1	66.217			
			C	1	1.2		1	1	66.217			
L3 126'3-3/8"-94'11-13/32"	19.38	7.03	A	1	1.2	0	1	1	108.346	1.12	0.04	C
			B	1	1.2		1	1	108.346			
			C	1	1.2		1	1	108.346			
L4 94'11-13/32"-63'8-5/8"	18.93	10.13	A	1	1.2	0	1	1	131.218	1.27	0.04	C
			B	1	1.2		1	1	131.218			
			C	1	1.2		1	1	131.218			
L5 63'8-5/8"-31'9-15/32"	18.96	12.31	A	1	1.2	0	1	1	157.566	1.36	0.04	C
			B	1	1.2		1	1	157.566			
			C	1	1.2		1	1	157.566			
L6 31'9-15/32"-1'	14.98	14.73	A	1	1.2	0	1	1	174.320	1.25	0.04	C
			B	1	1.2		1	1	174.320			
			C	1	1.2		1	1	174.320			
Sum Weight:	84.53	49.86						OTM	491.03 kip-ft	6.28		

tnxTower	Job: 150ft of 170ft.90mph	Page: 13 of 33
Bennett & Pless 550 River Drive North Sioux City, SD 57049 Phone: 605-540-4621 FAX: 678-990-8701	Project: Brookfield CT	Date: 17:04:39 01/11/17
	Client: Ambor	Designed by: Chunhui Song

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1 170'-150'	2.96	2.30	A	1	1.2	0	1	1	49.830	0.56	0.03	C
			B	1	1.2		1	1	49.830			
			C	1	1.2		1	1	49.830			
L2 150'-126'3-3/8"	9.32	3.36	A	1	1.2	0	1	1	66.217	0.72	0.03	C
			B	1	1.2		1	1	66.217			
			C	1	1.2		1	1	66.217			
L3 126'3-3/8"-94'11-13/32"	19.38	7.03	A	1	1.2	0	1	1	108.346	1.12	0.04	C
			B	1	1.2		1	1	108.346			
			C	1	1.2		1	1	108.346			
L4 94'11-13/32"-63'8-5/8"	18.93	10.13	A	1	1.2	0	1	1	131.218	1.27	0.04	C
			B	1	1.2		1	1	131.218			
			C	1	1.2		1	1	131.218			
L5 63'8-5/8"-31'9-15/32"	18.96	12.31	A	1	1.2	0	1	1	157.566	1.36	0.04	C
			B	1	1.2		1	1	157.566			
			C	1	1.2		1	1	157.566			
L6 31'9-15/32"-1'	14.98	14.73	A	1	1.2	0	1	1	174.320	1.25	0.04	C
			B	1	1.2		1	1	174.320			
			C	1	1.2		1	1	174.320			
Sum Weight:	84.53	49.86						OTM	491.03 kip-ft	6.28		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1 170'-150'	2.96	2.30	A	1	1.2	0	1	1	49.830	0.56	0.03	C
			B	1	1.2		1	1	49.830			
			C	1	1.2		1	1	49.830			
L2 150'-126'3-3/8"	9.32	3.36	A	1	1.2	0	1	1	66.217	0.72	0.03	C
			B	1	1.2		1	1	66.217			
			C	1	1.2		1	1	66.217			
L3 126'3-3/8"-94'11-13/32"	19.38	7.03	A	1	1.2	0	1	1	108.346	1.12	0.04	C
			B	1	1.2		1	1	108.346			
			C	1	1.2		1	1	108.346			
L4 94'11-13/32"-63'8-5/8"	18.93	10.13	A	1	1.2	0	1	1	131.218	1.27	0.04	C
			B	1	1.2		1	1	131.218			
			C	1	1.2		1	1	131.218			
L5 63'8-5/8"-31'9-15/32"	18.96	12.31	A	1	1.2	0	1	1	157.566	1.36	0.04	C
			B	1	1.2		1	1	157.566			
			C	1	1.2		1	1	157.566			
L6 31'9-15/32"-1'	14.98	14.73	A	1	1.2	0	1	1	174.320	1.25	0.04	C
			B	1	1.2		1	1	174.320			
			C	1	1.2		1	1	174.320			
Sum Weight:	84.53	49.86						OTM	491.03 kip-ft	6.28		

tnxTower	Job: 150ft of 170ft.90mph	Page: 14 of 33
Bennett & Pless 550 River Drive North Sioux City, SD 57049 Phone: 605-540-4621 FAX: 678-990-8701	Project: Brookfield CT	Date: 17:04:39 01/11/17
	Client: Ambor	Designed by: Chunhui Song

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1 170'-150'	0.29	1.10	A	1	0.65	0	1	1	43.975	0.34	0.02	C
			B	1	0.65		1	1	43.975			
			C	1	0.65		1	1	43.975			
L2 150'-126'3-3/8"	0.94	1.78	A	1	0.65	0	1	1	59.377	0.45	0.02	C
			B	1	0.65		1	1	59.377			
			C	1	0.65		1	1	59.377			
L3 126'3-3/8"-94' 11-13/32"	1.95	4.47	A	1	0.65	0	1	1	99.311	0.72	0.02	C
			B	1	0.65		1	1	99.311			
			C	1	0.65		1	1	99.311			
L4 94'11-13/32"-63'8-5/8"	1.96	7.10	A	1	0.65	0	1	1	122.411	0.82	0.03	C
			B	1	0.65		1	1	122.411			
			C	1	0.65		1	1	122.411			
L5 63'8-5/8"-31'9 -15/32"	2.04	8.84	A	1	0.65	0	1	1	148.858	0.90	0.03	C
			B	1	0.65		1	1	148.858			
			C	1	0.65		1	1	148.858			
L6 31'9-15/32"-1'	1.71	11.26	A	1	0.65	0	1	1	166.335	0.83	0.03	C
			B	1	0.65		1	1	166.335			
			C	1	0.65		1	1	166.335			
Sum Weight:	8.89	34.55						OTM	313.50 kip-ft	4.07		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1 170'-150'	0.29	1.10	A	1	0.65	0	1	1	43.975	0.34	0.02	C
			B	1	0.65		1	1	43.975			
			C	1	0.65		1	1	43.975			
L2 150'-126'3-3/8"	0.94	1.78	A	1	0.65	0	1	1	59.377	0.45	0.02	C
			B	1	0.65		1	1	59.377			
			C	1	0.65		1	1	59.377			
L3 126'3-3/8"-94' 11-13/32"	1.95	4.47	A	1	0.65	0	1	1	99.311	0.72	0.02	C
			B	1	0.65		1	1	99.311			
			C	1	0.65		1	1	99.311			
L4 94'11-13/32"-63'8-5/8"	1.96	7.10	A	1	0.65	0	1	1	122.411	0.82	0.03	C
			B	1	0.65		1	1	122.411			
			C	1	0.65		1	1	122.411			
L5 63'8-5/8"-31'9 -15/32"	2.04	8.84	A	1	0.65	0	1	1	148.858	0.90	0.03	C
			B	1	0.65		1	1	148.858			
			C	1	0.65		1	1	148.858			
L6 31'9-15/32"-1'	1.71	11.26	A	1	0.65	0	1	1	166.335	0.83	0.03	C
			B	1	0.65		1	1	166.335			
			C	1	0.65		1	1	166.335			
Sum Weight:	8.89	34.55						OTM	313.50 kip-ft	4.07		

tnxTower	Job	Page
	150ft of 170ft.90mph	15 of 33
Bennett & Pless 550 River Drive North Sioux City, SD 57049 Phone: 605-540-4621 FAX: 678-990-8701	Project Brookfield CT	Date 17:04:39 01/11/17
	Client Ambor	Designed by Chunhui Song

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1 170'-150'	0.29	1.10	A	1	0.65	0	1	1	43.975	0.34	0.02	C
			B	1	0.65		1	1	43.975			
			C	1	0.65		1	1	43.975			
L2 150'-126'3-3/8"	0.94	1.78	A	1	0.65	0	1	1	59.377	0.45	0.02	C
			B	1	0.65		1	1	59.377			
			C	1	0.65		1	1	59.377			
L3 126'3-3/8"-94' 11-13/32"	1.95	4.47	A	1	0.65	0	1	1	99.311	0.72	0.02	C
			B	1	0.65		1	1	99.311			
			C	1	0.65		1	1	99.311			
L4 94'11-13/32"-63'8-5/8"	1.96	7.10	A	1	0.65	0	1	1	122.411	0.82	0.03	C
			B	1	0.65		1	1	122.411			
			C	1	0.65		1	1	122.411			
L5 63'8-5/8"-31'9-15/32"	2.04	8.84	A	1	0.65	0	1	1	148.858	0.90	0.03	C
			B	1	0.65		1	1	148.858			
			C	1	0.65		1	1	148.858			
L6 31'9-15/32"-1'	1.71	11.26	A	1	0.65	0	1	1	166.335	0.83	0.03	C
			B	1	0.65		1	1	166.335			
			C	1	0.65		1	1	166.335			
Sum Weight:	8.89	34.55						OTM	313.50 kip-ft	4.07		

Discrete Appurtenance Pressures - No Ice $G_H = 1.100$

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z ksf	C_AA_C Front ft²	C_AA_C Side ft²
21.9' Omni Antenna	240.00	0.01	-2'2-7/8"	1'3-15/32"	170'	1.415	0	3.00	3.00
21.9' Omni Antenna	120.00	0.01	2'2-7/8"	1'3-15/32"	170'	1.415	0	3.00	3.00
21.9' Omni Antenna	0.00	0.01	0'	-2'6-31/32"	170'	1.415	0	3.00	3.00
12.6' Low Profile Platform w/Rails Sector	300.00	0.50	-2'8-1/32"	-1'6-15/32"	166'	1.408	0	11.00	11.00
Generic 96"x12"x7" Panel	300.00	0.28	-3'6-15/32"	-2'15/32"	170'	1.415	0	45.87	37.91
Ericsson RRUS 11	300.00	0.24	-2'8-1/32"	-1'6-15/32"	170'	1.415	0	11.19	6.27
Raycap DC6-48-60-18-8F	300.00	0.04	-11-9/32"	-6-15/32"	170'	1.415	0	4.44	4.44
Ericsson RRUS A2 Module	300.00	0.06	-2'8-1/32"	-1'6-15/32"	170'	1.415	0	4.13	1.50
12.6' Low Profile Platform w/Rails Sector	60.00	0.50	2'8-1/32"	-1'6-15/32"	166'	1.408	0	11.00	11.00
Generic 96"x12"x7" Panel	60.00	0.28	3'6-15/32"	-2'15/32"	170'	1.415	0	45.87	37.91
Ericsson RRUS 11	60.00	0.24	2'8-1/32"	-1'6-15/32"	170'	1.415	0	11.19	6.27
Raycap	60.00	0.02	11-9/32"	-6-15/32"	170'	1.415	0	2.22	2.22

tnxTower	Job: 150ft of 170ft.90mph	Page: 16 of 33
Bennett & Pless 550 River Drive North Sioux City, SD 57049 Phone: 605-540-4621 FAX: 678-990-8701	Project: Brookfield CT	Date: 17:04:39 01/11/17
	Client: Ambor	Designed by: Chunhui Song

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z ksf	C_AA_C Front ft^2	C_AA_C Side ft^2
DC6-48-60-18-8F									
Ericsson RRUS A2 Module	60.00	0.06	2'8-1/32"	-1'6-15/32"	170'	1.415	0	4.13	1.50
12.6' Low Profile Platform w/Rails Sector	180.00	0.50	0'	3'31/32"	166'	1.408	0	11.00	11.00
Generic 96"x12"x7" Panel	180.00	0.28	0'	4'31/32"	170'	1.415	0	45.87	37.91
Ericsson RRUS 11	180.00	0.24	0'	3'31/32"	170'	1.415	0	11.19	6.27
Raycap	180.00	0.02	0'	1'31/32"	170'	1.415	0	2.22	2.22
DC6-48-60-18-8F									
Ericsson RRUS A2 Module	180.00	0.06	0'	3'31/32"	170'	1.415	0	4.13	1.50
12.6' Low Profile Platform w/Rails Sector	300.00	0.50	-2'8-1/32"	-1'6-15/32"	153'	1.384	0	11.00	11.00
Generic 96"x12"x7" Panel	300.00	0.28	-3'6-15/32"	-2'15/32"	156'	1.390	0	45.87	37.91
Ericsson RRUS 11	300.00	0.24	-2'8-1/32"	-1'6-15/32"	156'	1.390	0	11.19	6.27
Raycap	0.00	0.02	0'	0'	156'	1.390	0	2.22	2.22
DC6-48-60-18-8F									
12.6' Low Profile Platform w/Rails Sector	60.00	0.50	2'8-1/32"	-1'6-15/32"	153'	1.384	0	11.00	11.00
Generic 96"x12"x7" Panel	60.00	0.28	3'6-15/32"	-2'15/32"	156'	1.390	0	45.87	37.91
Ericsson RRUS 11	60.00	0.24	2'8-1/32"	-1'6-15/32"	156'	1.390	0	11.19	6.27
12.6' Low Profile Platform w/Rails Sector	180.00	0.50	0'	3'31/32"	153'	1.384	0	11.00	11.00
Generic 96"x12"x7" Panel	180.00	0.28	0'	4'31/32"	156'	1.390	0	45.87	37.91
Ericsson RRUS 11	180.00	0.24	0'	3'31/32"	156'	1.390	0	11.19	6.27
12.6' Low Profile Platform w/Rails Sector	300.00	0.50	-2'8-17/32"	-1'6-27/32"	143'	1.365	0	11.00	11.00
Generic 96"x12"x7" Panel	300.00	0.28	-3'6-31/32"	-2'27/32"	146'	1.371	0	45.87	37.91
Ericsson RRUS 11	300.00	0.48	-2'8-17/32"	-1'6-27/32"	146'	1.371	0	22.37	12.54
Raycap	0.00	0.04	0'	0'	146'	1.371	0	4.44	4.44
DC6-48-60-18-8F									
Ericsson RRUS A2 Module	300.00	0.06	-2'8-17/32"	-1'6-27/32"	146'	1.371	0	4.13	1.50
12.6' Low Profile Platform w/Rails Sector	60.00	0.50	2'8-17/32"	-1'6-27/32"	143'	1.365	0	11.00	11.00
Generic 96"x12"x7" Panel	60.00	0.28	3'6-31/32"	-2'27/32"	146'	1.371	0	45.87	37.91
Ericsson RRUS 11	60.00	0.48	2'8-17/32"	-1'6-27/32"	146'	1.371	0	22.37	12.54
Raycap	0.00	0.02	0'	0'	146'	1.371	0	2.22	2.22
DC6-48-60-18-8F									
Ericsson RRUS A2 Module	60.00	0.06	2'8-17/32"	-1'6-27/32"	146'	1.371	0	4.13	1.50
12.6' Low Profile Platform w/Rails Sector	180.00	0.50	0'	3'1-9/16"	143'	1.365	0	11.00	11.00
Generic 96"x12"x7" Panel	180.00	0.28	0'	4'1-9/16"	146'	1.371	0	45.87	37.91
Ericsson RRUS 11	180.00	0.48	0'	3'1-9/16"	146'	1.371	0	22.37	12.54
Raycap	0.00	0.02	0'	0'	146'	1.371	0	2.22	2.22
DC6-48-60-18-8F									
Ericsson RRUS A2 Module	180.00	0.06	0'	3'1-9/16"	146'	1.371	0	4.13	1.50
12.6' Low Profile	300.00	0.50	-2'9-27/32"	-1'7-9/16"	133'	1.344	0	11.00	11.00

tnxTower	Job: 150ft of 170ft.90mph	Page: 17 of 33
Bennett & Pless 550 River Drive North Sioux City, SD 57049 Phone: 605-540-4621 FAX: 678-990-8701	Project: Brookfield CT	Date: 17:04:39 01/11/17
	Client: Ambor	Designed by: Chunhui Song

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z ksf	C_AA_C Front ft^2	C_AA_C Side ft^2
Platform w/Rails Sector									
Generic 96"x12"x7" Panel	300.00	0.28	2" -3'8-9/32"	-2'1-9/16"	136'	1.350	0	45.87	37.91
Ericsson RRUS 11	300.00	0.24	-2'9-27/32"	-1'7-9/16"	136'	1.350	0	11.19	6.27
Raycap DC6-48-60-18-8F	0.00	0.02	0'	0'	136'	1.350	0	2.22	2.22
PCTEL GPS-TMG-HR-26N 5"x3.2"	0.00	0.02	0'	0'	136'	1.350	0	0.16	0.16
Diplexers 5.8x6.5x1.5 FD9R6004/1C-3L	300.00	0.06	-2'9-27/32"	-1'7-9/16"	136'	1.350	0	0.63	0.17
12.6' Low Profile Platform w/Rails Sector	60.00	0.50	2'9-27/32"	-1'7-9/16"	133'	1.344	0	11.00	11.00
Generic 96"x12"x7" Panel	60.00	0.28	3'8-9/32"	-2'1-9/16"	136'	1.350	0	45.87	37.91
Ericsson RRUS 11	60.00	0.24	2'9-27/32"	-1'7-9/16"	136'	1.350	0	11.19	6.27
Raycap DC6-48-60-18-8F	0.00	0.02	0'	0'	136'	1.350	0	2.22	2.22
PCTEL GPS-TMG-HR-26N 5"x3.2"	0.00	0.01	0'	0'	136'	1.350	0	0.08	0.08
Diplexers 5.8x6.5x1.5 FD9R6004/1C-3L	60.00	0.06	2'9-27/32"	-1'7-9/16"	136'	1.350	0	0.63	0.17
12.6' Low Profile Platform w/Rails Sector	180.00	0.50	0'	3'3-1/8"	133'	1.344	0	11.00	11.00
Generic 96"x12"x7" Panel	180.00	0.28	0'	4'3-1/8"	136'	1.350	0	45.87	37.91
Ericsson RRUS 11	180.00	0.24	0'	3'3-1/8"	136'	1.350	0	11.19	6.27
Raycap DC6-48-60-18-8F	0.00	0.02	0'	0'	136'	1.350	0	2.22	2.22
PCTEL GPS-TMG-HR-26N 5"x3.2"	0.00	0.01	0'	0'	136'	1.350	0	0.08	0.08
Diplexers 5.8x6.5x1.5 FD9R6004/1C-3L	180.00	0.06	0'	3'3-1/8"	136'	1.350	0	0.63	0.17
12.6' Low Profile Platform w/Rails Sector	300.00	0.50	-2'11-1/32"	-1'8-5/32"	123'	1.322	0	11.00	11.00
Generic 96"x12"x7" Panel	300.00	0.28	-3'9-3/8"	-2'2-5/32"	126'	1.329	0	45.87	37.91
Ericsson RRUS 11	300.00	0.24	-2'11-1/32"	-1'8-5/32"	126'	1.329	0	11.19	6.27
Raycap DC6-48-60-18-8F	0.00	0.02	0'	0'	126'	1.329	0	2.22	2.22
E15S09P78 (TMA)	300.00	0.08	-2'11-1/32"	-1'8-5/32"	126'	1.329	0	2.99	2.10
12.6' Low Profile Platform w/Rails Sector	60.00	0.50	2'11-1/32"	-1'8-5/32"	123'	1.322	0	11.00	11.00
Generic 96"x12"x7" Panel	60.00	0.28	3'9-3/8"	-2'2-5/32"	126'	1.329	0	45.87	37.91
Ericsson RRUS 11	60.00	0.24	2'11-1/32"	-1'8-5/32"	126'	1.329	0	11.19	6.27
E15S09P78 (TMA)	60.00	0.08	2'11-1/32"	-1'8-5/32"	126'	1.329	0	2.99	2.10
12.6' Low Profile Platform w/Rails Sector	180.00	0.50	0'	3'4-7/16"	123'	1.322	0	11.00	11.00
Generic 96"x12"x7" Panel	180.00	0.28	0'	4'4-7/16"	126'	1.329	0	45.87	37.91
Ericsson RRUS 11	180.00	0.24	0'	3'4-7/16"	126'	1.329	0	11.19	6.27
E15S09P78 (TMA)	180.00	0.08	0'	3'4-7/16"	126'	1.329	0	2.99	2.10

tnxTower	Job: 150ft of 170ft.90mph	Page: 18 of 33
Bennett & Pless 550 River Drive North Sioux City, SD 57049 Phone: 605-540-4621 FAX: 678-990-8701	Project: Brookfield CT	Date: 17:04:39 01/11/17
	Client: Ambor	Designed by: Chunhui Song

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z ksf	C_AA_C Front ft^2	C_AA_C Side ft^2
21.9' Omni	180.00	0.01	0'	3'5-3/4"	75'	1.191	0	3.00	3.00
	Sum Weight:	17.15							

Discrete Appurtenance Pressures - With Ice $G_H = 1.100$

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z ksf	C_AA_C Front ft^2	C_AA_C Side ft^2	t_z in
21.9' Omni Antenna	240.00	0.04	-2'2-7/8"	1'3-15/32"	170'	1.415	0	0.00	0.00	1.77
21.9' Omni Antenna	120.00	0.04	2'2-7/8"	1'3-15/32"	170'	1.415	0	0.00	0.00	1.77
21.9' Omni Antenna	0.00	0.04	0'	-2'6-31/32"	170'	1.415	0	0.00	0.00	1.77
12.6' Low Profile Platform w/Rails Sector	300.00	1.03	-2'8-1/32"	-1'6-15/32"	166'	1.408	0	0.00	0.00	1.76
Generic 96"x12"x7" Panel	300.00	1.70	-3'6-15/32"	-2'15/32"	170'	1.415	0	54.61	55.41	1.76
Ericsson RRUS 11	300.00	0.72	-2'8-1/32"	-1'6-15/32"	170'	1.415	0	14.28	10.34	1.76
Raycap DC6-48-60-18-8F	300.00	0.18	-11-9/32"	-6-15/32"	170'	1.415	0	5.99	5.99	1.76
Ericsson RRUS A2 Module	300.00	0.21	-2'8-1/32"	-1'6-15/32"	170'	1.415	0	5.46	3.10	1.76
12.6' Low Profile Platform w/Rails Sector	60.00	1.03	2'8-1/32"	-1'6-15/32"	166'	1.408	0	0.00	0.00	1.76
Generic 96"x12"x7" Panel	60.00	1.70	3'6-15/32"	-2'15/32"	170'	1.415	0	54.61	55.41	1.76
Ericsson RRUS 11	60.00	0.72	2'8-1/32"	-1'6-15/32"	170'	1.415	0	14.28	10.34	1.76
Raycap DC6-48-60-18-8F	60.00	0.09	11-9/32"	-6-15/32"	170'	1.415	0	3.00	3.00	1.76
Ericsson RRUS A2 Module	60.00	0.21	2'8-1/32"	-1'6-15/32"	170'	1.415	0	5.46	3.10	1.76
12.6' Low Profile Platform w/Rails Sector	180.00	1.03	0'	3'31/32"	166'	1.408	0	0.00	0.00	1.76
Generic 96"x12"x7" Panel	180.00	1.70	0'	4'31/32"	170'	1.415	0	54.61	55.41	1.76
Ericsson RRUS 11	180.00	0.72	0'	3'31/32"	170'	1.415	0	14.28	10.34	1.76
Raycap DC6-48-60-18-8F	180.00	0.09	0'	1'31/32"	170'	1.415	0	3.00	3.00	1.76
Ericsson RRUS A2 Module	180.00	0.21	0'	3'31/32"	170'	1.415	0	5.46	3.10	1.76
12.6' Low Profile Platform w/Rails Sector	300.00	1.03	-2'8-1/32"	-1'6-15/32"	153'	1.384	0	0.00	0.00	1.75
Generic 96"x12"x7" Panel	300.00	1.69	-3'6-15/32"	-2'15/32"	156'	1.390	0	54.56	55.31	1.75
Ericsson RRUS 11	300.00	0.72	-2'8-1/32"	-1'6-15/32"	156'	1.390	0	14.26	10.32	1.75
Raycap DC6-48-60-18-8F	0.00	0.09	0'	0'	156'	1.390	0	2.99	2.99	1.75
12.6' Low Profile Platform w/Rails Sector	60.00	1.03	2'8-1/32"	-1'6-15/32"	153'	1.384	0	0.00	0.00	1.75
Generic 96"x12"x7" Panel	60.00	1.69	3'6-15/32"	-2'15/32"	156'	1.390	0	54.56	55.31	1.75
Ericsson RRUS 11	60.00	0.72	2'8-1/32"	-1'6-15/32"	156'	1.390	0	14.26	10.32	1.75

tnxTower	Job: 150ft of 170ft.90mph	Page: 19 of 33
Bennett & Pless 550 River Drive North Sioux City, SD 57049 Phone: 605-540-4621 FAX: 678-990-8701	Project: Brookfield CT	Date: 17:04:39 01/11/17
	Client: Ambor	Designed by: Chunhui Song

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z ksf	C_AA_C Front ft²	C_AA_C Side ft²	t_z in
12.6' Low Profile Platform w/Rails Sector	180.00	1.03	0'	3'31/32"	153'	1.384	0	0.00	0.00	1.75
Generic 96"x12"x7" Panel	180.00	1.69	0'	4'31/32"	156'	1.390	0	54.56	55.31	1.75
Ericsson RRUS 11	180.00	0.72	0'	3'31/32"	156'	1.390	0	14.26	10.32	1.75
12.6' Low Profile Platform w/Rails Sector	300.00	1.02	-2'8-17/32"	-1'6-27/32"	143'	1.365	0	0.00	0.00	1.74
Generic 96"x12"x7" Panel	300.00	1.68	-3'6-31/32"	-2'27/32"	146'	1.371	0	54.50	55.21	1.74
Ericsson RRUS 11	300.00	1.43	-2'8-17/32"	-1'6-27/32"	146'	1.371	0	28.49	20.58	1.74
Raycap DC6-48-60-18-8F	0.00	0.18	0'	0'	146'	1.371	0	5.97	5.97	1.74
Ericsson RRUS A2 Module	300.00	0.21	-2'8-17/32"	-1'6-27/32"	146'	1.371	0	5.44	3.07	1.74
12.6' Low Profile Platform w/Rails Sector	60.00	1.02	2'8-17/32"	-1'6-27/32"	143'	1.365	0	0.00	0.00	1.74
Generic 96"x12"x7" Panel	60.00	1.68	3'6-31/32"	-2'27/32"	146'	1.371	0	54.50	55.21	1.74
Ericsson RRUS 11	60.00	1.43	2'8-17/32"	-1'6-27/32"	146'	1.371	0	28.49	20.58	1.74
Raycap DC6-48-60-18-8F	0.00	0.09	0'	0'	146'	1.371	0	2.99	2.99	1.74
Ericsson RRUS A2 Module	60.00	0.21	2'8-17/32"	-1'6-27/32"	146'	1.371	0	5.44	3.07	1.74
12.6' Low Profile Platform w/Rails Sector	180.00	1.02	0'	3'1-9/16"	143'	1.365	0	0.00	0.00	1.74
Generic 96"x12"x7" Panel	180.00	1.68	0'	4'1-9/16"	146'	1.371	0	54.50	55.21	1.74
Ericsson RRUS 11	180.00	1.43	0'	3'1-9/16"	146'	1.371	0	28.49	20.58	1.74
Raycap DC6-48-60-18-8F	0.00	0.09	0'	0'	146'	1.371	0	2.99	2.99	1.74
Ericsson RRUS A2 Module	180.00	0.21	0'	3'1-9/16"	146'	1.371	0	5.44	3.07	1.74
12.6' Low Profile Platform w/Rails Sector	300.00	1.02	-2'9-27/32"	-1'7-9/16"	133'	1.344	0	0.00	0.00	1.73
Generic 96"x12"x7" Panel	300.00	1.67	-3'8-9/32"	-2'1-9/16"	136'	1.350	0	54.44	55.10	1.73
Ericsson RRUS 11	300.00	0.71	-2'9-27/32"	-1'7-9/16"	136'	1.350	0	14.22	10.26	1.73
Raycap DC6-48-60-18-8F	0.00	0.09	0'	0'	136'	1.350	0	2.98	2.98	1.73
PCTEL GPS-TMG-HR-26N 5"x3.2"	0.00	0.04	0'	0'	136'	1.350	0	0.55	0.55	1.73
Diplexers 5.8x6.5x1.5 FD9R6004/1C-3L	300.00	0.09	-2'9-27/32"	-1'7-9/16"	136'	1.350	0	1.20	0.57	1.73
12.6' Low Profile Platform w/Rails Sector	60.00	1.02	2'9-27/32"	-1'7-9/16"	133'	1.344	0	0.00	0.00	1.73
Generic 96"x12"x7" Panel	60.00	1.67	3'8-9/32"	-2'1-9/16"	136'	1.350	0	54.44	55.10	1.73
Ericsson RRUS 11	60.00	0.71	2'9-27/32"	-1'7-9/16"	136'	1.350	0	14.22	10.26	1.73
Raycap DC6-48-60-18-8F	0.00	0.09	0'	0'	136'	1.350	0	2.98	2.98	1.73
PCTEL GPS-TMG-HR-26N 5"x3.2"	0.00	0.02	0'	0'	136'	1.350	0	0.28	0.28	1.73
Diplexers 5.8x6.5x1.5 FD9R6004/1C-3L	60.00	0.09	2'9-27/32"	-1'7-9/16"	136'	1.350	0	1.20	0.57	1.73
12.6' Low Profile	180.00	1.02	0'	3'1-9/16"	133'	1.344	0	0.00	0.00	1.73

tnxTower	Job: 150ft of 170ft.90mph	Page: 20 of 33
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	Client: Ambor	Designed by: Chunhui Song

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z ksf	C_AA_C Front ft^2	C_AA_C Side ft^2	t_z in
Platform w/Rails Sector Generic 96"x12"x7" Panel	180.00	1.67	0'	4'3-1/8"	136'	1.350	0	54.44	55.10	1.73
Ericsson RRUS 11	180.00	0.71	0'	3'3-1/8"	136'	1.350	0	14.22	10.26	1.73
Raycap DC6-48-60-18-8F	0.00	0.09	0'	0'	136'	1.350	0	2.98	2.98	1.73
PCTEL GPS-TMG-HR-26N 5"x3.2"	0.00	0.02	0'	0'	136'	1.350	0	0.28	0.28	1.73
Diplexers 5.8x6.5x1.5	180.00	0.09	0'	3'3-1/8"	136'	1.350	0	1.20	0.57	1.73
FD9R6004/1C-3L										
12.6' Low Profile Platform w/Rails Sector	300.00	1.01	-2'11-1/32"	-1'8-5/32"	123'	1.322	0	0.00	0.00	1.72
Generic 96"x12"x7" Panel	300.00	1.66	-3'9-3/8"	-2'2-5/32"	126'	1.329	0	54.38	54.99	1.72
Ericsson RRUS 11	300.00	0.71	-2'11-1/32"	-1'8-5/32"	126'	1.329	0	14.20	10.23	1.72
Raycap DC6-48-60-18-8F	0.00	0.09	0'	0'	126'	1.329	0	2.97	2.97	1.72
E15S09P78 (TMA)	300.00	0.28	-2'11-1/32"	-1'8-5/32"	126'	1.329	0	4.63	4.56	1.72
12.6' Low Profile Platform w/Rails Sector	60.00	1.01	2'11-1/32"	-1'8-5/32"	123'	1.322	0	0.00	0.00	1.72
Generic 96"x12"x7" Panel	60.00	1.66	3'9-3/8"	-2'2-5/32"	126'	1.329	0	54.38	54.99	1.72
Ericsson RRUS 11	60.00	0.71	2'11-1/32"	-1'8-5/32"	126'	1.329	0	14.20	10.23	1.72
E15S09P78 (TMA)	60.00	0.28	2'11-1/32"	-1'8-5/32"	126'	1.329	0	4.63	4.56	1.72
12.6' Low Profile Platform w/Rails Sector	180.00	1.01	0'	3'4-7/16"	123'	1.322	0	0.00	0.00	1.72
Generic 96"x12"x7" Panel	180.00	1.66	0'	4'4-7/16"	126'	1.329	0	54.38	54.99	1.72
Ericsson RRUS 11	180.00	0.71	0'	3'4-7/16"	126'	1.329	0	14.20	10.23	1.72
E15S09P78 (TMA)	180.00	0.28	0'	3'4-7/16"	126'	1.329	0	4.63	4.56	1.72
21.9' Omni	180.00	0.04	0'	3'5-3/4"	75'	1.191	0	0.00	0.00	1.63
	Sum Weight:	57.08								

Discrete Appurtenance Pressures - Service $G_H = 1.100$

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z ksf	C_AA_C Front ft^2	C_AA_C Side ft^2
21.9' Omni Antenna	240.00	0.01	-2'2-7/8"	1'3-15/32"	170'	1.415	0	3.00	3.00
21.9' Omni Antenna	120.00	0.01	2'2-7/8"	1'3-15/32"	170'	1.415	0	3.00	3.00
21.9' Omni Antenna	0.00	0.01	0'	-2'6-31/32"	170'	1.415	0	3.00	3.00
12.6' Low Profile Platform w/Rails Sector	300.00	0.50	-2'8-1/32"	-1'6-15/32"	166'	1.408	0	11.00	11.00
Generic 96"x12"x7" Panel	300.00	0.28	-3'6-15/32"	-2'15/32"	170'	1.415	0	45.87	37.91
Ericsson RRUS 11	300.00	0.24	-2'8-1/32"	-1'6-15/32"	170'	1.415	0	11.19	6.27
Raycap DC6-48-60-18-8F	300.00	0.04	-11-9/32"	-6-15/32"	170'	1.415	0	4.44	4.44

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	Client: Ambor	Designed by: Chunhui Song

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z ksf	C_AA_C Front ft^2	C_AA_C Side ft^2
Ericsson RRUS A2 Module	300.00	0.06	-2'8-1/32"	-1'6-15/32"	170'	1.415	0	4.13	1.50
12.6' Low Profile Platform w/Rails Sector	60.00	0.50	2'8-1/32"	-1'6-15/32"	166'	1.408	0	11.00	11.00
Generic 96"x12"x7" Panel	60.00	0.28	3'6-15/32"	-2'15/32"	170'	1.415	0	45.87	37.91
Ericsson RRUS 11	60.00	0.24	2'8-1/32"	-1'6-15/32"	170'	1.415	0	11.19	6.27
Raycap DC6-48-60-18-8F	60.00	0.02	11-9/32"	-6-15/32"	170'	1.415	0	2.22	2.22
Ericsson RRUS A2 Module	60.00	0.06	2'8-1/32"	-1'6-15/32"	170'	1.415	0	4.13	1.50
12.6' Low Profile Platform w/Rails Sector	180.00	0.50	0'	3'31/32"	166'	1.408	0	11.00	11.00
Generic 96"x12"x7" Panel	180.00	0.28	0'	4'31/32"	170'	1.415	0	45.87	37.91
Ericsson RRUS 11	180.00	0.24	0'	3'31/32"	170'	1.415	0	11.19	6.27
Raycap DC6-48-60-18-8F	180.00	0.02	0'	1'31/32"	170'	1.415	0	2.22	2.22
Ericsson RRUS A2 Module	180.00	0.06	0'	3'31/32"	170'	1.415	0	4.13	1.50
12.6' Low Profile Platform w/Rails Sector	300.00	0.50	-2'8-1/32"	-1'6-15/32"	153'	1.384	0	11.00	11.00
Generic 96"x12"x7" Panel	300.00	0.28	-3'6-15/32"	-2'15/32"	156'	1.390	0	45.87	37.91
Ericsson RRUS 11	300.00	0.24	-2'8-1/32"	-1'6-15/32"	156'	1.390	0	11.19	6.27
Raycap DC6-48-60-18-8F	0.00	0.02	0'	0'	156'	1.390	0	2.22	2.22
12.6' Low Profile Platform w/Rails Sector	60.00	0.50	2'8-1/32"	-1'6-15/32"	153'	1.384	0	11.00	11.00
Generic 96"x12"x7" Panel	60.00	0.28	3'6-15/32"	-2'15/32"	156'	1.390	0	45.87	37.91
Ericsson RRUS 11	60.00	0.24	2'8-1/32"	-1'6-15/32"	156'	1.390	0	11.19	6.27
12.6' Low Profile Platform w/Rails Sector	180.00	0.50	0'	3'31/32"	153'	1.384	0	11.00	11.00
Generic 96"x12"x7" Panel	180.00	0.28	0'	4'31/32"	156'	1.390	0	45.87	37.91
Ericsson RRUS 11	180.00	0.24	0'	3'31/32"	156'	1.390	0	11.19	6.27
12.6' Low Profile Platform w/Rails Sector	300.00	0.50	-2'8-17/32"	-1'6-27/32"	143'	1.365	0	11.00	11.00
Generic 96"x12"x7" Panel	300.00	0.28	-3'6-31/32"	-2'27/32"	146'	1.371	0	45.87	37.91
Ericsson RRUS 11	300.00	0.48	-2'8-17/32"	-1'6-27/32"	146'	1.371	0	22.37	12.54
Raycap DC6-48-60-18-8F	0.00	0.04	0'	0'	146'	1.371	0	4.44	4.44
Ericsson RRUS A2 Module	300.00	0.06	-2'8-17/32"	-1'6-27/32"	146'	1.371	0	4.13	1.50
12.6' Low Profile Platform w/Rails Sector	60.00	0.50	2'8-17/32"	-1'6-27/32"	143'	1.365	0	11.00	11.00
Generic 96"x12"x7" Panel	60.00	0.28	3'6-31/32"	-2'27/32"	146'	1.371	0	45.87	37.91
Ericsson RRUS 11	60.00	0.48	2'8-17/32"	-1'6-27/32"	146'	1.371	0	22.37	12.54
Raycap DC6-48-60-18-8F	0.00	0.02	0'	0'	146'	1.371	0	2.22	2.22
Ericsson RRUS A2 Module	60.00	0.06	2'8-17/32"	-1'6-27/32"	146'	1.371	0	4.13	1.50
12.6' Low Profile	180.00	0.50	0'	3'1-9/16"	143'	1.365	0	11.00	11.00

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	Client: Ambor	Designed by: Chunhui Song

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z ksf	C_AA_C Front ft^2	C_AA_C Side ft^2
Platform w/Rails Sector Generic 96"x12"x7" Panel	180.00	0.28	0'	4'1-9/16"	146'	1.371	0	45.87	37.91
Ericsson RRUS 11	180.00	0.48	0'	3'1-9/16"	146'	1.371	0	22.37	12.54
Raycap DC6-48-60-18-8F	0.00	0.02	0'	0'	146'	1.371	0	2.22	2.22
Ericsson RRUS A2 Module	180.00	0.06	0'	3'1-9/16"	146'	1.371	0	4.13	1.50
12.6' Low Profile Platform w/Rails Sector	300.00	0.50	-2'9-27/32"	-1'7-9/16"	133'	1.344	0	11.00	11.00
Generic 96"x12"x7" Panel	300.00	0.28	-3'8-9/32"	-2'1-9/16"	136'	1.350	0	45.87	37.91
Ericsson RRUS 11	300.00	0.24	-2'9-27/32"	-1'7-9/16"	136'	1.350	0	11.19	6.27
Raycap DC6-48-60-18-8F	0.00	0.02	0'	0'	136'	1.350	0	2.22	2.22
PCTEL GPS-TMG-HR-26N 5"x3.2"	0.00	0.02	0'	0'	136'	1.350	0	0.16	0.16
Diplexers 5.8x6.5x1.5 FD9R6004/1C-3L	300.00	0.06	-2'9-27/32"	-1'7-9/16"	136'	1.350	0	0.63	0.17
12.6' Low Profile Platform w/Rails Sector	60.00	0.50	2'9-27/32"	-1'7-9/16"	133'	1.344	0	11.00	11.00
Generic 96"x12"x7" Panel	60.00	0.28	3'8-9/32"	-2'1-9/16"	136'	1.350	0	45.87	37.91
Ericsson RRUS 11	60.00	0.24	2'9-27/32"	-1'7-9/16"	136'	1.350	0	11.19	6.27
Raycap DC6-48-60-18-8F	0.00	0.02	0'	0'	136'	1.350	0	2.22	2.22
PCTEL GPS-TMG-HR-26N 5"x3.2"	0.00	0.01	0'	0'	136'	1.350	0	0.08	0.08
Diplexers 5.8x6.5x1.5 FD9R6004/1C-3L	60.00	0.06	2'9-27/32"	-1'7-9/16"	136'	1.350	0	0.63	0.17
12.6' Low Profile Platform w/Rails Sector	180.00	0.50	0'	3'3-1/8"	133'	1.344	0	11.00	11.00
Generic 96"x12"x7" Panel	180.00	0.28	0'	4'3-1/8"	136'	1.350	0	45.87	37.91
Ericsson RRUS 11	180.00	0.24	0'	3'3-1/8"	136'	1.350	0	11.19	6.27
Raycap DC6-48-60-18-8F	0.00	0.02	0'	0'	136'	1.350	0	2.22	2.22
PCTEL GPS-TMG-HR-26N 5"x3.2"	0.00	0.01	0'	0'	136'	1.350	0	0.08	0.08
Diplexers 5.8x6.5x1.5 FD9R6004/1C-3L	180.00	0.06	0'	3'3-1/8"	136'	1.350	0	0.63	0.17
12.6' Low Profile Platform w/Rails Sector	300.00	0.50	-2'11-1/32"	-1'8-5/32"	123'	1.322	0	11.00	11.00
Generic 96"x12"x7" Panel	300.00	0.28	-3'9-3/8"	-2'2-5/32"	126'	1.329	0	45.87	37.91
Ericsson RRUS 11	300.00	0.24	-2'11-1/32"	-1'8-5/32"	126'	1.329	0	11.19	6.27
Raycap DC6-48-60-18-8F	0.00	0.02	0'	0'	126'	1.329	0	2.22	2.22
E15S09P78 (TMA)	300.00	0.08	-2'11-1/32"	-1'8-5/32"	126'	1.329	0	2.99	2.10
12.6' Low Profile Platform w/Rails Sector	60.00	0.50	2'11-1/32"	-1'8-5/32"	123'	1.322	0	11.00	11.00
Generic 96"x12"x7" Panel	60.00	0.28	3'9-3/8"	-2'2-5/32"	126'	1.329	0	45.87	37.91

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	Client: Ambor	Designed by: Chunhui Song

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z ksf	C_AA_C Front ft^2	C_AA_C Side ft^2
E15S09P78 (TMA)	60.00	0.08	2'11-1/32"	-1'8-5/32"	126'	1.329	0	2.99	2.10
12.6' Low Profile Platform w/Rails Sector	180.00	0.50	0'	3'4-7/16"	123'	1.322	0	11.00	11.00
Generic 96"x12"x7" Panel	180.00	0.28	0'	4'4-7/16"	126'	1.329	0	45.87	37.91
Ericsson RRUS 11	180.00	0.24	0'	3'4-7/16"	126'	1.329	0	11.19	6.27
E15S09P78 (TMA)	180.00	0.08	0'	3'4-7/16"	126'	1.329	0	2.99	2.10
21.9' Omni	180.00	0.01	0'	3'5-3/4"	75'	1.191	0	3.00	3.00
	Sum Weight:	17.15							

Dish Pressures - No Ice

Elevation ft	Dish Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	K_z	A_A ft^2	q_z ksf
170'	1' HP	0.00	0.02	0'	0'	1.415	0.79	0
60'	2ft Dish	0.00	0.03	0'	0'	1.137	3.14	0
		Sum Weight:	0.05					

Dish Pressures - With Ice

Elevation ft	Dish Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	K_z	A_A ft^2	q_z ksf	t_z in
170'	1' HP	0.00	0.06	0'	0'	1.415	1.27	0	1.77
60'	2ft Dish	0.00	0.09	0'	0'	1.137	3.99	0	1.59
		Sum Weight:	0.14						

Dish Pressures - Service

Elevation ft	Dish Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	K_z	A_A ft^2	q_z ksf
170'	1' HP	0.00	0.02	0'	0'	1.415	0.79	0
60'	2ft Dish	0.00	0.03	0'	0'	1.137	3.14	0
		Sum Weight:	0.05					

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	24.55					

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Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Bracing Weight	0.00					
Total Member Self-Weight	34.55			0.03	0.02	
Total Weight	60.63			0.03	0.02	
Wind 0 deg - No Ice		0.00	-34.34	-4295.64	0.02	-0.05
Wind 30 deg - No Ice		17.17	-29.74	-3720.13	-2147.82	0.08
Wind 60 deg - No Ice		29.74	-17.17	-2147.80	-3720.15	0.18
Wind 90 deg - No Ice		34.34	0.00	0.03	-4295.66	0.24
Wind 120 deg - No Ice		29.74	17.17	2147.87	-3720.15	0.23
Wind 150 deg - No Ice		17.17	29.74	3720.20	-2147.82	0.16
Wind 180 deg - No Ice		0.00	34.34	4295.71	0.02	0.05
Wind 210 deg - No Ice		-17.17	29.74	3720.20	2147.86	-0.08
Wind 240 deg - No Ice		-29.74	17.17	2147.87	3720.18	-0.18
Wind 270 deg - No Ice		-34.34	0.00	0.03	4295.70	-0.24
Wind 300 deg - No Ice		-29.74	-17.17	-2147.80	3720.18	-0.23
Wind 330 deg - No Ice		-17.17	-29.74	-3720.13	2147.86	-0.16
Member Ice	15.32					
Total Weight Ice	191.61			0.08	0.08	
Wind 0 deg - Ice		0.00	-14.59	-1703.09	0.08	-0.02
Wind 30 deg - Ice		7.29	-12.63	-1474.91	-851.50	-0.02
Wind 60 deg - Ice		12.63	-7.29	-851.51	-1474.90	-0.02
Wind 90 deg - Ice		14.59	0.00	0.08	-1703.08	-0.01
Wind 120 deg - Ice		12.63	7.29	851.66	-1474.90	0.00
Wind 150 deg - Ice		7.29	12.63	1475.06	-851.50	0.01
Wind 180 deg - Ice		0.00	14.59	1703.24	0.08	0.02
Wind 210 deg - Ice		-7.29	12.63	1475.06	851.67	0.02
Wind 240 deg - Ice		-12.63	7.29	851.66	1475.07	0.02
Wind 270 deg - Ice		-14.59	0.00	0.08	1703.25	0.01
Wind 300 deg - Ice		-12.63	-7.29	-851.51	1475.07	0.00
Wind 330 deg - Ice		-7.29	-12.63	-1474.91	851.67	-0.01
Total Weight	60.63			0.03	0.02	
Wind 0 deg - Service		0.00	-13.66	-1708.19	0.02	-0.02
Wind 30 deg - Service		6.83	-11.83	-1479.33	-854.09	0.03
Wind 60 deg - Service		11.83	-6.83	-854.08	-1479.35	0.07
Wind 90 deg - Service		13.66	0.00	0.03	-1708.20	0.10
Wind 120 deg - Service		11.83	6.83	854.15	-1479.35	0.09
Wind 150 deg - Service		6.83	11.83	1479.40	-854.09	0.07
Wind 180 deg - Service		0.00	13.66	1708.26	0.02	0.02
Wind 210 deg - Service		-6.83	11.83	1479.40	854.13	-0.03
Wind 240 deg - Service		-11.83	6.83	854.15	1479.38	-0.07
Wind 270 deg - Service		-13.66	0.00	0.03	1708.24	-0.10
Wind 300 deg - Service		-11.83	-6.83	-854.08	1479.38	-0.09
Wind 330 deg - Service		-6.83	-11.83	-1479.33	854.13	-0.07

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice

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Comb. No.	Description
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	170 - 150	Pole	Max Tension	36	0.00	-0.00	-0.00
			Max. Compression	26	-28.71	0.09	0.05
			Max. Mx	20	-7.14	227.20	0.01
			Max. My	2	-7.14	0.01	227.19
			Max. Vy	20	-17.94	227.20	0.01
			Max. Vx	2	-17.94	0.01	227.19
			Max. Torque	16			-0.10
L2	150 - 126.279	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-64.87	0.09	0.05
			Max. Mx	20	-16.89	748.79	0.01
			Max. My	2	-16.89	0.02	748.78
			Max. Vy	20	-36.13	748.79	0.01

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	14	36.13	0.02	-748.76
			Max. Torque	16			-0.10
L3	126.279 - 94.9479	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-102.23	0.09	0.05
			Max. Mx	20	-28.24	2066.65	-0.00
			Max. My	2	-28.24	0.02	2066.64
			Max. Vy	20	-46.18	2066.65	-0.00
			Max. Vx	14	46.18	0.02	-2066.61
			Max. Torque	16			-0.10
L4	94.9479 - 63.7161	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-132.26	0.09	-0.08
			Max. Mx	20	-39.42	3509.81	-0.04
			Max. My	14	-39.42	0.02	-3509.83
			Max. Vy	20	-49.14	3509.81	-0.04
			Max. Vx	14	49.14	0.02	-3509.83
			Max. Torque	9			-0.38
L5	63.7161 - 31.7943	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-165.09	0.09	-0.08
			Max. Mx	20	-52.90	5070.91	-0.04
			Max. My	14	-52.90	0.02	-5070.93
			Max. Vy	20	-52.06	5070.91	-0.04
			Max. Vx	14	52.06	0.02	-5070.93
			Max. Torque	9			-0.38
L6	31.7943 - 1	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-206.32	0.09	-0.08
			Max. Mx	20	-72.73	7147.97	-0.04
			Max. My	14	-72.73	0.02	-7147.99
			Max. Vy	20	-54.99	7147.97	-0.04
			Max. Vx	14	54.99	0.02	-7147.99
			Max. Torque	9			-0.38

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	36	206.32	14.59	0.00
	Max. H_x	20	72.76	54.95	0.00
	Max. H_z	2	72.76	0.00	54.95
	Max. M_x	2	7147.90	0.00	54.95
	Max. M_z	8	7147.92	-54.95	0.00
	Max. Torsion	21	0.38	54.95	0.00
	Min. Vert	23	54.57	47.59	27.47
	Min. H_x	8	72.76	-54.95	0.00
	Min. H_z	14	72.76	0.00	-54.95
	Min. M_x	14	-7147.99	0.00	-54.95
	Min. M_z	20	-7147.97	54.95	0.00
	Min. Torsion	9	-0.38	-54.95	0.00

Tower Mast Reaction Summary

tnxTower	Job: 150ft of 170ft.90mph	Page: 27 of 33
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	Client: Ambor	Designed by: Chunhui Song

Load Combination	Vertical K	Shear$_x$ K	Shear$_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	60.63	0.00	0.00	0.03	0.02	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	72.76	0.00	-54.95	-7147.90	0.02	-0.08
0.9 Dead+1.6 Wind 0 deg - No Ice	54.57	0.00	-54.95	-7072.83	0.02	-0.08
1.2 Dead+1.6 Wind 30 deg - No Ice	72.76	27.47	-47.59	-6190.26	-3573.95	0.12
0.9 Dead+1.6 Wind 30 deg - No Ice	54.57	27.47	-47.59	-6125.25	-3536.41	0.12
1.2 Dead+1.6 Wind 60 deg - No Ice	72.76	47.59	-27.47	-3573.93	-6190.28	0.29
0.9 Dead+1.6 Wind 60 deg - No Ice	54.57	47.59	-27.47	-3536.40	-6125.26	0.29
1.2 Dead+1.6 Wind 90 deg - No Ice	72.76	54.95	0.00	0.04	-7147.92	0.38
0.9 Dead+1.6 Wind 90 deg - No Ice	54.57	54.95	0.00	0.03	-7072.84	0.38
1.2 Dead+1.6 Wind 120 deg - No Ice	72.76	47.59	27.47	3574.01	-6190.28	0.37
0.9 Dead+1.6 Wind 120 deg - No Ice	54.57	47.59	27.47	3536.46	-6125.26	0.37
1.2 Dead+1.6 Wind 150 deg - No Ice	72.76	27.47	47.59	6190.35	-3573.95	0.26
0.9 Dead+1.6 Wind 150 deg - No Ice	54.57	27.47	47.59	6125.31	-3536.41	0.26
1.2 Dead+1.6 Wind 180 deg - No Ice	72.76	0.00	54.95	7147.99	0.02	0.08
0.9 Dead+1.6 Wind 180 deg - No Ice	54.57	0.00	54.95	7072.89	0.02	0.08
1.2 Dead+1.6 Wind 210 deg - No Ice	72.76	-27.47	47.59	6190.35	3574.00	-0.12
0.9 Dead+1.6 Wind 210 deg - No Ice	54.57	-27.47	47.59	6125.31	3536.45	-0.12
1.2 Dead+1.6 Wind 240 deg - No Ice	72.76	-47.59	27.47	3574.02	6190.33	-0.29
0.9 Dead+1.6 Wind 240 deg - No Ice	54.57	-47.59	27.47	3536.46	6125.30	-0.29
1.2 Dead+1.6 Wind 270 deg - No Ice	72.76	-54.95	0.00	0.04	7147.97	-0.38
0.9 Dead+1.6 Wind 270 deg - No Ice	54.57	-54.95	0.00	0.03	7072.88	-0.38
1.2 Dead+1.6 Wind 300 deg - No Ice	72.76	-47.59	-27.47	-3573.93	6190.33	-0.37
0.9 Dead+1.6 Wind 300 deg - No Ice	54.57	-47.59	-27.47	-3536.40	6125.30	-0.37
1.2 Dead+1.6 Wind 330 deg - No Ice	72.76	-27.47	-47.59	-6190.26	3574.00	-0.26
0.9 Dead+1.6 Wind 330 deg - No Ice	54.57	-27.47	-47.59	-6125.25	3536.45	-0.26
1.2 Dead+1.0 Ice+1.0 Temp	206.32	0.00	0.00	0.08	0.09	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	206.32	0.00	-14.59	-1950.17	0.12	-0.02
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	206.32	7.29	-12.63	-1688.89	-975.01	-0.03
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	206.32	12.63	-7.29	-975.04	-1688.85	-0.02
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	206.32	14.59	0.00	0.09	-1950.14	-0.01
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	206.32	12.63	7.29	975.21	-1688.85	-0.00

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	Client: Ambor	Designed by: Chunhui Song

Load Combination	Vertical K	Shear$_x$ K	Shear$_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	206.32	7.29	12.63	1689.06	-975.01	0.01
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	206.32	0.00	14.59	1950.34	0.12	0.02
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	206.32	-7.29	12.63	1689.06	975.25	0.03
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	206.32	-12.63	7.29	975.21	1689.09	0.02
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	206.32	-14.59	0.00	0.09	1950.37	0.01
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	206.32	-12.63	-7.29	-975.04	1689.09	0.00
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	206.32	-7.29	-12.63	-1688.89	975.25	-0.01
Dead+Wind 0 deg - Service	60.63	0.00	-13.66	-1767.80	0.02	-0.02
Dead+Wind 30 deg - Service	60.63	6.83	-11.83	-1530.96	-883.90	0.03
Dead+Wind 60 deg - Service	60.63	11.83	-6.83	-883.88	-1530.97	0.07
Dead+Wind 90 deg - Service	60.63	13.66	0.00	0.04	-1767.82	0.10
Dead+Wind 120 deg - Service	60.63	11.83	6.83	883.96	-1530.97	0.09
Dead+Wind 150 deg - Service	60.63	6.83	11.83	1531.03	-883.90	0.07
Dead+Wind 180 deg - Service	60.63	0.00	13.66	1767.87	0.02	0.02
Dead+Wind 210 deg - Service	60.63	-6.83	11.83	1531.03	883.94	-0.03
Dead+Wind 240 deg - Service	60.63	-11.83	6.83	883.96	1531.01	-0.07
Dead+Wind 270 deg - Service	60.63	-13.66	0.00	0.04	1767.86	-0.10
Dead+Wind 300 deg - Service	60.63	-11.83	-6.83	-883.88	1531.01	-0.09
Dead+Wind 330 deg - Service	60.63	-6.83	-11.83	-1530.96	883.94	-0.07

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-60.63	0.00	0.00	60.63	0.00	0.000%
2	0.00	-72.76	-54.95	0.00	72.76	54.95	0.000%
3	0.00	-54.57	-54.95	0.00	54.57	54.95	0.000%
4	27.47	-72.76	-47.59	-27.47	72.76	47.59	0.000%
5	27.47	-54.57	-47.59	-27.47	54.57	47.59	0.000%
6	47.59	-72.76	-27.47	-47.59	72.76	27.47	0.000%
7	47.59	-54.57	-27.47	-47.59	54.57	27.47	0.000%
8	54.95	-72.76	0.00	-54.95	72.76	0.00	0.000%
9	54.95	-54.57	0.00	-54.95	54.57	0.00	0.000%
10	47.59	-72.76	27.47	-47.59	72.76	-27.47	0.000%
11	47.59	-54.57	27.47	-47.59	54.57	-27.47	0.000%
12	27.47	-72.76	47.59	-27.47	72.76	-47.59	0.000%
13	27.47	-54.57	47.59	-27.47	54.57	-47.59	0.000%
14	0.00	-72.76	54.95	0.00	72.76	-54.95	0.000%
15	0.00	-54.57	54.95	0.00	54.57	-54.95	0.000%
16	-27.47	-72.76	47.59	27.47	72.76	-47.59	0.000%
17	-27.47	-54.57	47.59	27.47	54.57	-47.59	0.000%
18	-47.59	-72.76	27.47	47.59	72.76	-27.47	0.000%
19	-47.59	-54.57	27.47	47.59	54.57	-27.47	0.000%
20	-54.95	-72.76	0.00	54.95	72.76	0.00	0.000%
21	-54.95	-54.57	0.00	54.95	54.57	0.00	0.000%
22	-47.59	-72.76	-27.47	47.59	72.76	27.47	0.000%
23	-47.59	-54.57	-27.47	47.59	54.57	27.47	0.000%
24	-27.47	-72.76	-47.59	27.47	72.76	47.59	0.000%
25	-27.47	-54.57	-47.59	27.47	54.57	47.59	0.000%
26	0.00	-206.32	0.00	0.00	206.32	0.00	0.000%

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	Client: Ambor	Designed by: Chunhui Song

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
27	0.00	-206.32	-14.59	0.00	206.32	14.59	0.000%
28	7.29	-206.32	-12.63	-7.29	206.32	12.63	0.000%
29	12.63	-206.32	-7.29	-12.63	206.32	7.29	0.000%
30	14.59	-206.32	0.00	-14.59	206.32	0.00	0.000%
31	12.63	-206.32	7.29	-12.63	206.32	-7.29	0.000%
32	7.29	-206.32	12.63	-7.29	206.32	-12.63	0.000%
33	0.00	-206.32	14.59	0.00	206.32	-14.59	0.000%
34	-7.29	-206.32	12.63	7.29	206.32	-12.63	0.000%
35	-12.63	-206.32	7.29	12.63	206.32	-7.29	0.000%
36	-14.59	-206.32	0.00	14.59	206.32	0.00	0.000%
37	-12.63	-206.32	-7.29	12.63	206.32	7.29	0.000%
38	-7.29	-206.32	-12.63	7.29	206.32	12.63	0.000%
39	0.00	-60.63	-13.66	0.00	60.63	13.66	0.000%
40	6.83	-60.63	-11.83	-6.83	60.63	11.83	0.000%
41	11.83	-60.63	-6.83	-11.83	60.63	6.83	0.000%
42	13.66	-60.63	0.00	-13.66	60.63	0.00	0.000%
43	11.83	-60.63	6.83	-11.83	60.63	-6.83	0.000%
44	6.83	-60.63	11.83	-6.83	60.63	-11.83	0.000%
45	0.00	-60.63	13.66	0.00	60.63	-13.66	0.000%
46	-6.83	-60.63	11.83	6.83	60.63	-11.83	0.000%
47	-11.83	-60.63	6.83	11.83	60.63	-6.83	0.000%
48	-13.66	-60.63	0.00	13.66	60.63	0.00	0.000%
49	-11.83	-60.63	-6.83	11.83	60.63	6.83	0.000%
50	-6.83	-60.63	-11.83	6.83	60.63	11.83	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00002914
3	Yes	5	0.00000001	0.00000950
4	Yes	7	0.00000001	0.00000772
5	Yes	6	0.00000001	0.00004791
6	Yes	7	0.00000001	0.00000773
7	Yes	6	0.00000001	0.00004795
8	Yes	5	0.00000001	0.00002902
9	Yes	5	0.00000001	0.00000946
10	Yes	7	0.00000001	0.00000774
11	Yes	6	0.00000001	0.00004800
12	Yes	7	0.00000001	0.00000772
13	Yes	6	0.00000001	0.00004787
14	Yes	5	0.00000001	0.00002914
15	Yes	5	0.00000001	0.00000950
16	Yes	7	0.00000001	0.00000773
17	Yes	6	0.00000001	0.00004798
18	Yes	7	0.00000001	0.00000773
19	Yes	6	0.00000001	0.00004794
20	Yes	5	0.00000001	0.00002902
21	Yes	5	0.00000001	0.00000946
22	Yes	7	0.00000001	0.00000772
23	Yes	6	0.00000001	0.00004788
24	Yes	7	0.00000001	0.00000774
25	Yes	6	0.00000001	0.00004801
26	Yes	4	0.00000001	0.00000001
27	Yes	7	0.00000001	0.00006452

28	Yes	7	0.00000001	0.00009787
29	Yes	7	0.00000001	0.00009798
30	Yes	7	0.00000001	0.00006451
31	Yes	7	0.00000001	0.00009792
32	Yes	7	0.00000001	0.00009789
33	Yes	7	0.00000001	0.00006452
34	Yes	7	0.00000001	0.00009802
35	Yes	7	0.00000001	0.00009792
36	Yes	7	0.00000001	0.00006453
37	Yes	7	0.00000001	0.00009797
38	Yes	7	0.00000001	0.00009800
39	Yes	5	0.00000001	0.00000815
40	Yes	6	0.00000001	0.00000451
41	Yes	6	0.00000001	0.00000452
42	Yes	5	0.00000001	0.00000814
43	Yes	6	0.00000001	0.00000452
44	Yes	6	0.00000001	0.00000450
45	Yes	5	0.00000001	0.00000815
46	Yes	6	0.00000001	0.00000452
47	Yes	6	0.00000001	0.00000451
48	Yes	5	0.00000001	0.00000814
49	Yes	6	0.00000001	0.00000451
50	Yes	6	0.00000001	0.00000453

Maximum Tower Deflections - Service Wind

Section No.	*Elevation* ft	*Horz. Deflection* in	*Gov. Load Comb.*	*Tilt* °	*Twist* °
L1	170 - 150	34.45	48	1.94	0.00
L2	150 - 126.279	26.43	48	1.85	0.00
L3	131.036 - 94.9479	19.57	48	1.58	0.00
L4	100.789 - 63.7161	10.90	45	1.11	0.00
L5	70.5078 - 31.7943	5.05	45	0.71	0.00
L6	39.7188 - 1	1.52	46	0.35	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	*Appurtenance*	*Gov. Load Comb.*	*Deflection* in	*Tilt* °	*Twist* °	*Radius of Curvature* ft
170'	1' HP	48	34.45	1.94	0.00	35827
166'	12.6' Low Profile Platform w/Rails Sector	48	32.81	1.93	0.00	26870
156'	12.6' Low Profile Platform w/Rails Sector	48	28.78	1.89	0.00	7677
146'	12.6' Low Profile Platform w/Rails Sector	48	24.90	1.80	0.00	4943
136'	12.6' Low Profile Platform w/Rails Sector	48	21.27	1.66	0.00	4119
126'	12.6' Low Profile Platform w/Rails Sector	48	17.92	1.50	0.00	3788
75'	21.9' Omni	45	5.76	0.77	0.00	4785
60'	2ft Dish	45	3.57	0.58	0.00	4805

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	Client Ambor	Designed by Chunhui Song

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	170 - 150	139.13	20	7.85	0.00
L2	150 - 126.279	106.80	20	7.47	0.00
L3	131.036 - 94.9479	79.11	20	6.40	0.00
L4	100.789 - 63.7161	44.09	14	4.49	0.00
L5	70.5078 - 31.7943	20.41	14	2.88	0.00
L6	39.7188 - 1	6.15	14	1.44	0.00

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
170'	1' HP	20	139.13	7.85	0.00	9192
166'	12.6' Low Profile Platform w/Rails Sector	20	132.55	7.81	0.00	6893
156'	12.6' Low Profile Platform w/Rails Sector	20	116.29	7.65	0.00	1967
146'	12.6' Low Profile Platform w/Rails Sector	20	100.65	7.30	0.00	1262
136'	12.6' Low Profile Platform w/Rails Sector	20	85.97	6.73	0.00	1046
126'	12.6' Low Profile Platform w/Rails Sector	20	72.46	6.07	0.00	957
75'	21.9' Omni	14	23.29	3.11	0.00	1189
60'	2ft Dish	14	14.45	2.36	0.00	1191

Base Plate Design Data

Plate Thickness in	Number of Anchor Bolts	Anchor Bolt Size in	Actual / Allowable Ratio Bolt Tension K	Actual / Allowable Ratio Concrete Stress ksi	Actual / Allowable Ratio Plate Stress ksi	Actual / Allowable Ratio Stiffener Stress ksi	Controlling Condition	Critical Ratio
3.15	20	2.25	171.83 223.65 0.77	3.37 6.12 0.55	32.26 45.00 0.72		Bolt T	0.77 ✓

Compression Checks

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Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	170 - 150 (1)	TP25.98x25.98x0.2	20'	169'	221.5	16.11	-28.56	74.17	0.385
L2	150 - 126.279 (2)	TP33.18x25.98x0.24	23'8-5/8"	169'	181.4	23.62	-16.89	162.20	0.104
L3	126.279 - 94.9479 (3)	TP42.21x31.26x0.31	36'1-3/32"	169'	142.4	40.11	-28.24	447.07	0.063
L4	94.9479 - 63.7161 (4)	TP51.06x39.81x0.39	37'27/32"	169'	117.5	60.73	-39.42	993.07	0.040
L5	63.7161 - 31.7943 (5)	TP59.95x48.21x0.39	38'8-17/32"	169'	100.0	71.42	-52.90	1614.82	0.033
L6	31.7943 - 1 (6)	TP68.5x56.76x0.43	38'8-5/8"	169'	83.9	93.57	-72.73	2874.73	0.025

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	170 - 150 (1)	TP25.98x25.98x0.2	61.07	585.65	0.104	0.00	585.65	0.000
L2	150 - 126.279 (2)	TP33.18x25.98x0.24	748.79	1041.97	0.719	0.00	1041.97	0.000
L3	126.279 - 94.9479 (3)	TP42.21x31.26x0.31	2066.66	2290.43	0.902	0.00	2290.43	0.000
L4	94.9479 - 63.7161 (4)	TP51.06x39.81x0.39	3509.84	4243.98	0.827	0.00	4243.98	0.000
L5	63.7161 - 31.7943 (5)	TP59.95x48.21x0.39	5070.94	5535.76	0.916	0.00	5535.76	0.000
L6	31.7943 - 1 (6)	TP68.5x56.76x0.43	7148.00	8349.25	0.856	0.00	8349.25	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	170 - 150 (1)	TP25.98x25.98x0.2	4.84	552.09	0.009	0.00	1172.72	0.000
L2	150 - 126.279 (2)	TP33.18x25.98x0.24	36.13	804.07	0.045	0.00	2086.50	0.000
L3	126.279 - 94.9479 (3)	TP42.21x31.26x0.31	46.18	1387.94	0.033	0.00	4586.46	0.000
L4	94.9479 - 63.7161 (4)	TP51.06x39.81x0.39	49.14	2123.77	0.023	0.12	8498.33	0.000
L5	63.7161 - 31.7943 (5)	TP59.95x48.21x0.39	52.06	2352.92	0.022	0.12	11085.08	0.000
L6	31.7943 - 1 (6)	TP68.5x56.76x0.43	54.99	2977.96	0.018	0.12	16719.00	0.000

tnxTower	Job: 150ft of 170ft.90mph	Page: 33 of 33
Bennett & Pless 550 River Drive North Sioux City, SD 57049 Phone: 605-540-4621 FAX: 678-990-8701	Project: Brookfield CT	Date: 17:04:39 01/11/17
	Client: Ambor	Designed by: Chunhui Song

Pole Interaction Design Data

Section No.	Elevation ft	Ratio P_u / ϕP_n	Ratio M_{ux} / ϕM_{nx}	Ratio M_{uy} / ϕM_{ny}	Ratio V_u / ϕV_n	Ratio T_u / ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	170 - 150 (1)	0.385	0.104	0.000	0.009	0.000	0.489 ✔	1.000	4.8.2 ✔
L2	150 - 126.279 (2)	0.104	0.719	0.000	0.045	0.000	0.825 ✔	1.000	4.8.2 ✔
L3	126.279 - 94.9479 (3)	0.063	0.902	0.000	0.033	0.000	0.967 ✔	1.000	4.8.2 ✔
L4	94.9479 - 63.7161 (4)	0.040	0.827	0.000	0.023	0.000	0.867 ✔	1.000	4.8.2 ✔
L5	63.7161 - 31.7943 (5)	0.033	0.916	0.000	0.022	0.000	0.949 ✔	1.000	4.8.2 ✔
L6	31.7943 - 1 (6)	0.025	0.856	0.000	0.018	0.000	0.882 ✔	1.000	4.8.2 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	170 - 150	Pole	TP25.98x25.98x0.2	1	-28.56	74.17	48.9	Pass
L2	150 - 126.279	Pole	TP33.18x25.98x0.24	2	-16.89	162.20	82.5	Pass
L3	126.279 - 94.9479	Pole	TP42.21x31.26x0.31	3	-28.24	447.07	96.7	Pass
L4	94.9479 - 63.7161	Pole	TP51.06x39.81x0.39	4	-39.42	993.07	86.7	Pass
L5	63.7161 - 31.7943	Pole	TP59.95x48.21x0.39	5	-52.90	1614.82	94.9	Pass
L6	31.7943 - 1	Pole	TP68.5x56.76x0.43	6	-72.73	2874.73	88.2	Pass
							Summary	
						Pole (L3)	96.7	Pass
						Base Plate	76.8	Pass
						RATING =	**96.7**	**Pass**

Base/Flange Plate	Plate Type	*Baseplate*	
	Pole Diameter	68.5	in
	Pole Thickness	0.43	in
	Plate Diameter	82.28	in
	Plate Thickness	3.15	in
	Plate Fy	50	ksi
	Weld Length	0.3125	in
	ϕ_s Resistance	1201.11	k-in
	Applied	528.22	k-in
Stiffeners	#	*0*	

Bolts	#	*20*	
	Bolt Circle	76.38	in
	(R)adial / (S)quare	R	
●	Diameter	2.25	in
	Hole Diameter	2.625	in
	Type	A615-75	
	Fy	75	ksi
	Fu	100	ksi
	ϕ_s Resistance	259.82	k
	Applied	228.17	k
Reinforcement ●	#	*0*	
Extra Bolts O	#	*0*	

Code Rev. *G*

Moment 7148.0 k-ft
Axial 73.0 k

Date 1/11/2017
Engineer CS
Site # CT777 Brookfield
Carrier

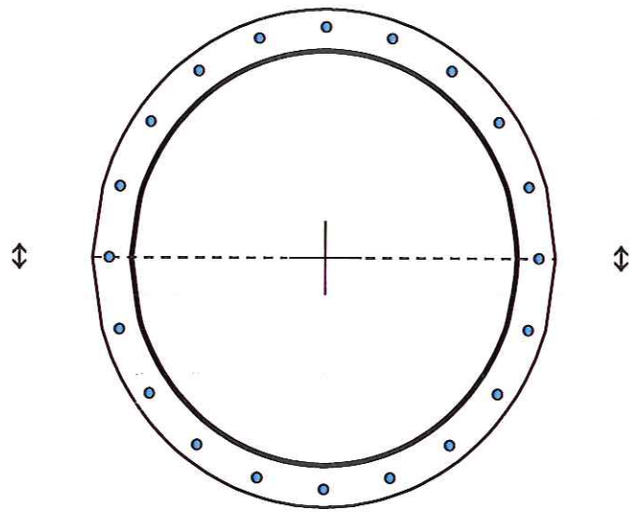


Plate Stress Ratio:
0.44 (Pass)

Bolt Stress Ratio:
0.88 (Pass)

PROJECT No:	16700.021	ENG:	CS
PROJECT NAME:	CT777 Brookfield	CHK:	PG
	Ambor/Insite		
DATE:	January 11, 2017	PAGE:	of

TIA-222-G

SINGLE GLOBAL FOUNDATION WITH PIER(s) CHECKS

Global Tower Reactions		*Factored Loads*		*Calculated Reactions*		Factored Resistance				
◉TIA-G	Maximum Moment	7,148.00	k-ft	Disturbing Moment	7,505.5	8,719.5	k-ft	pass	86.1%	[GOVERNS]
○EIA-F	Axial Load	73.00	kips	Maximum Bearing	3.24	9.00	kips	pass	36.0%	
	Shear Load	55.00	kips	Punching Shear	711.5	1,224.0	kips	pass	58.1%	
	Pier Rebar Required	(minimum only, use PCACOL for total quantity)		(32) #10 @ 8.84 in **MINIMUM**						
	Rebar Required	(checked rebar for 6" min to 24" max spacing)		(42) #10 @ 8.63 in					SF=2.32	

Soil Parameters	Soils Report		Pier Geometry		Pad Geometry	
ϕ	30.0 °		Qty of Piers	1	Width (Bm)	30.00 ft
Water Level	19.00 ft	(5.79 m)	Width (Bp)	8.00 ft	Width (Wm)	30.00 ft
Soil Dry Density (γ_{dry})	0.100 kcf	(15.7 kN/m^3)	Width (Wp)	8.00 ft	Height (Hm)	2.00 ft
Soil Sub Density (γ_{sub})	0.050 kcf	(7.85 kN/m^3)	Height (Hp)	4.50 ft	Depth (D)	6.00 ft
All. Bearing Pressure	6.000 ksf	(287.3 kPa)	Pier Type	R (Rnd or Sq)		
Bearing Safety Factor	2		Conc γ_{dry}	0.150 kcf (23.6)		

Volume of Concrete/Soil	Concrete (75.0cuyd) 1 Pier	Mat	Soil	
Depth (above)	0.50	--	--	ft
Depth (dry)	4.00	2.00	4.00	ft
Depth (submerged)	0.00	0.00	0.00	ft
Volume (above)	25.09	--	--	ft^3
Volume (dry)	200.70	1,800.00	3982.00	ft^3
Volume (submerged)	0.00	0	0.00	ft^3
Total	226	1800	3982	ft^3

Calculations	*Factored*	*Allowable*	
Axial Download	73.0	--	kips
Weight of Concrete (not factored)	303.9	--	kips(75.0yds)
Weight of Soil (not factored)	398.2	--	kips
Total Download (P)	775.1	--	kips
Resisting Moment Arm	15.0	--	ft
Moment Resistance	8719.5	--	k-ft
	(x 0.75, cl 9.4.1)		

Concrete Reinforcing Design

f'c	3.000	ksi	(20.7 MPa)
fy	60.00	ksi	(413.7 MPa)
	MAT		PIER
Steel (Metric/ASTM)	ASTM		ASTM
Bar size	10	#	10 #
	1.270	in²	1.270 in²

Slab Reinforcing

½ Disturbing Moment	3752.75	kip-ft		
Ku	283.65		Wgt of Rebar	
ρ	0.00562		21,417	lbs
4/3•ρ if ρ < ρ min	0.00749			
ρ min ≥ 0.0018	0.00180			
As	40.44	in²		
Number of bars	42	bars on	8.63	in c/c

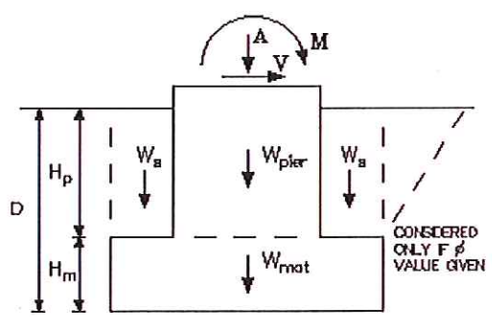
Note: The 1/2 moment is derived from a bending moment diagram that considered the uplift and download components at the exact face width of the tower.

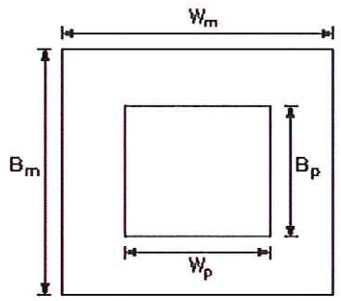
Bearing Capacity Check

Contact Area	900.00	--	ft²
Calculate eccentricity e	9.68	--	ft [>L/6]
Calculate (c = L/2 - e)	5.32	--	ft
1) q_{max} = P/A • (1+6e/L)	--	--	
2) q_{max} = 2P / b•3c	3.24	--	ksf [GOV]
$q_{allowable}$	9.00	--	ksf
	(2 • 0.75)		

Check for 2-Way Shear (Punching)

Shear Area (b_o x d)	51.73	--	ft²
Factored Bearing Stress	0.861	--	ksf
Factored Shear Force	711.46	--	kips
Factored Shear Resistance	1224.0	--	kips
Check for 2-way Shear	0.58	--	
	(ACI-318)		





M =	7148.0	k-ft
A =	73.0	kips
V =	55.0	kips
Bp =	8.00	ft
Wp =	8.00	ft
Hp =	4.50	ft
Bm =	30.00	ft
Wm =	30.00	ft
Hm =	2.00	ft
D =	6.00	ft
V_{mat} =	2025.8	cuft

Rebar = (42) #10 @ 8.63 in

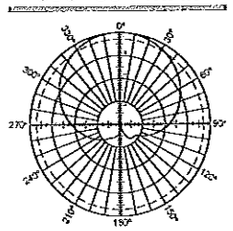
KATHREIN
SCALA DIVISION

800 10735V01

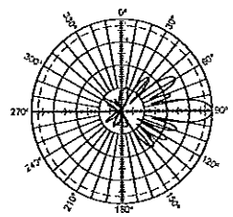
65° Single Band Panel Antenna, 6'

	Antenna
Single Band (MHz)	698–894
Dual Polarization	X
HPBW	65°
Adj. Electrical Downtilt Manual or optional remote control	0°–10°

698–894 MHz



Horizontal pattern
±45°- polarization



Vertical pattern
±45°- polarization
0°–10° electrical downtilt

General specifications:

Frequency range	698–894 MHz
VSWR	<1.5:1
Impedance	50 ohms
Intermodulation (2x20w)	IM3: <-150 dBc
Polarization	+45° and -45°
Maximum input power	500 watts per input (at 50°C)
Connector	2 x 7-16 DIN female (long neck) (bottom mounted)
Isolation	>30 dB
Electrical downtilt	0–10 degrees (continuously adjustable)
See reverse for order information.	

Specifications:	698–806 MHz	824–894 MHz
Gain	15.5 dBi	16 dBi
Front-to-back ratio	>30 dB (co-polar) 35 dB (average)	>30 dB (co-polar) 35 dB (average)
+45° and -45° polarization horizontal beamwidth	67° (half-power)	65° (half-power)
+45° and -45° polarization vertical beamwidth	11.3° (half-power)	10° (half-power)
Min. sidelobe suppression for first sidelobe above main beam average	0° 5° 10° T 16 17 17 dB 16 19 20 dB	0° 5° 10° T 18 17 16 dB 20 20 20 dB
Cross polar ratio Main direction 0° Sector ±60°	25 dB (typical) >11 dB, Average: 15 dB	25 dB (typical) >11 dB, Average: 15 dB

IRT specifications:

Logical interface ex factory[1]	3GPP/AISG 2.0
Protocols	AISG 1.1 and 3GPP/AISG 2.0 compliant
Hardware interface[2]	2 x 8 pin connector acc. IEC 60130-9; according to AISG: – IRT in (male): Control / Daisy chain in – IRT in (female): Daisy chain out
Power supply	10–30 V
Power consumption	<1 watt (standby) <8.5 watts (motor activated)
Adjustment time (full range)	40 sec.
Adjustment cycles	>50,000
Certification	FCC 15.107 Class B Computing Devices

[1] The protocol of the logical interface can be switched from 3GPP/AISG 2.0 to AISG 1.1 and vice versa with a vendor specific command. Start-up operation of the RCU 86010149 is possible in an RET system supporting AISG 1.1 or supporting 3GPP/AISG 2.0 after performing a layer 2 reset before address assignment. The protocol can also be changed as follows: AISG 1.1 to 3GPP: Enter "3GPP" into the additional data filed "Installer's ID" and perform a layer 7 reset or a power reset. 3GPP to AISG 1.1: Enter "AISG 1" into the additional datafield "Installer's ID" and perform a layer 2 reset or a power reset. After switching the protocol any other information can be entered into the "Installer's ID" field.

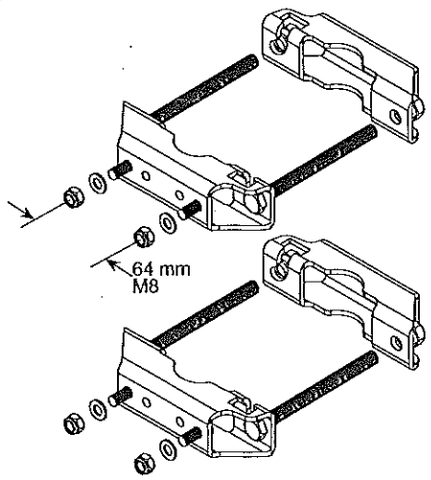
[2] The tightning torque for fixing the connector must be 0.5 – 1.0 Nm ('hand-tightened'). The connector should be tightened by hand only!

RoHS

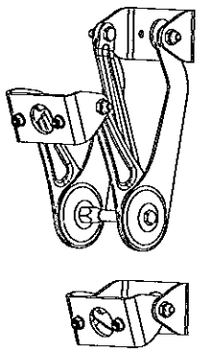
KATHREIN
SCALA DIVISION

800 10735V01

65° Single Band Panel Antenna, 6'



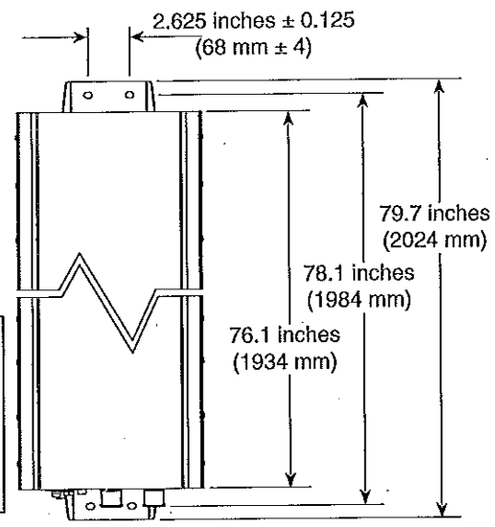
Mounting Brackets
for use with 2-point mount antennas
Mast dia. 2–4.5 inches (50–115 mm)
Weight: 4.4 lb (2 kg)



Mechanical Tilt Brackets
for use with 2-point mount antennas
Weight: 9.5 lb (4.3 kg)
(Model 850 10008)

Mechanical specifications:

Weight		30.9 lb (14 kg) 35.3 lb (16 kg) clamps included
Dimensions	H x W x D	76.1 x 11.9 x 3.9 inches (1934 x 303 x 99 mm)
Wind load Front/Side/Rear		at 93 mph (150kph) 203 lbf / 70 lbf / 232 lbf (900 N / 310 N / 1030 N)
Mounting category		H (Heavy)
Wind survival rating*		150 mph (240 kph)
Shipping dimensions		81.1 x 12.4 x 4.5 inches (2060 x 315 x 115 mm)
Shipping weight		39.7 lb (18 kg)
Mounting bracket		2-point hot-dip galvanized with stainless steel hardware for 2 to 4.5 inch (50 to 115 mm) OD masts.

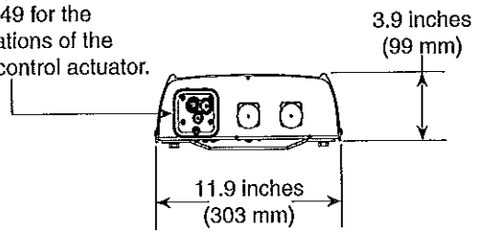


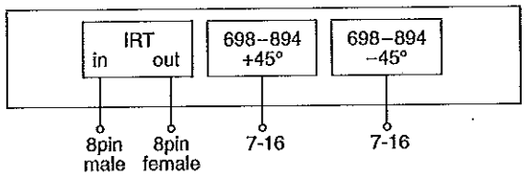
KATHREIN 860 10149

FC Tested To Comply With FCC Standards

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: Refer to part number 860 10149 for the specifications of the remote control actuator.





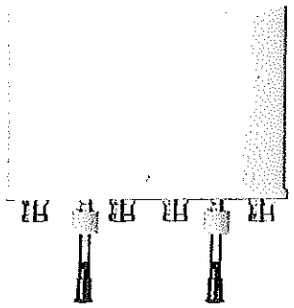
Order Information:

Model	Description
800 10735V01	Antenna with mounting bracket 0°–10° electrical downtilt
800 10735V01K	Antenna with mounting bracket and mechanical tilt bracket 0°–10° electrical downtilt

*Mechanical design is based on environmental conditions as stipulated in TIA-222-G-2 (December 2009) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.

Product Specifications

COMMSCOPE®



HBXX-6516DS-VTM | HBXX-6516DS-A2M

Single Band Quad Port Antenna, 1710–2180 MHz, 65° horizontal beamwidth, RET compatible

- Each DualPol® array can be independently adjusted for greater flexibility
- Excellent gain, VSWR, front-to-back ratio, and PIM specifications for robust network performance
- Ideal choice for site collocations and tough zoning restrictions
- Great solution to maximize network coverage and capacity

Electrical Specifications

Frequency Band, MHz	1710–1880	1850–1990	1920–2180
Gain, dBi	17.7	18.0	18.0
Beamwidth, Horizontal, degrees	67	66	64
Beamwidth, Vertical, degrees	7.5	7.0	6.6
Beam Tilt, degrees	0–10	0–10	0–10
USLS (First Lobe), dB	18	18	18
Front-to-Back Ratio at 180°, dB	30	30	30
CPR at Boresight, dB	22	22	21
CPR at Sector, dB	8	9	9
Isolation, dB	30	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350
Polarization	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	1710–1880	1850–1990	1920–2180
Gain by all Beam Tilts, average, dBi	17.2	17.2	17.5
Gain by all Beam Tilts Tolerance, dB	±0.3	±0.3	±0.5
Gain by Beam Tilt, average, dBi	0 ° | 17.0 5 ° | 17.3 10 ° | 17.0	0 ° | 17.1 5 ° | 17.4 10 ° | 17.0	0 ° | 17.4 5 ° | 17.7 10 ° | 17.2
Beamwidth, Horizontal Tolerance, degrees	±2.7	±2.3	±3.5
Beamwidth, Vertical Tolerance, degrees	±0.5	±0.4	±0.4
USLS, beampeak to 20° above beampeak, dB	18	19	19
Front-to-Back Total Power at 180° ± 30°, dB	26	26	26
CPR at Boresight, dB	22	22	22
CPR at Sector, dB	9	9	9

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

General Specifications

Operating Frequency Band	1710 – 2180 MHz
Antenna Type	Sector
Band	Single band
Performance Note	Outdoor usage

Product Specifications

COMMSCOPE®

HBXX-6516DS-VTM | HBXX-6516DS-A2M

Mechanical Specifications

RF Connector Quantity, total	4
RF Connector Quantity, high band	4
RF Connector Interface	7-16 DIN Female
Color	Light gray
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Radiator Material	Low loss circuit board
Radome Material	PVC, UV resistant
RF Connector Location	Bottom
Wind Loading, frontal	419.0 N @ 150 km/h 94.2 lbf @ 150 km/h
Wind Loading, lateral	113.0 N @ 150 km/h 25.4 lbf @ 150 km/h
Wind Loading, rear	488.0 N @ 150 km/h 109.7 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Length	1297.0 mm | 51.1 in
Width	305.0 mm | 12.0 in
Depth	166.0 mm | 6.5 in
Net Weight, without mounting kit	13.9 kg | 30.6 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 2.0 Actuator HBXX-6516DS-A2M

Packed Dimensions

Length	1427.0 mm | 56.2 in
Width	402.0 mm | 15.8 in
Depth	292.0 mm | 11.5 in
Shipping Weight	23.5 kg | 51.8 lb

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system

Included Products

600899A-2 — Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket

Product Specifications

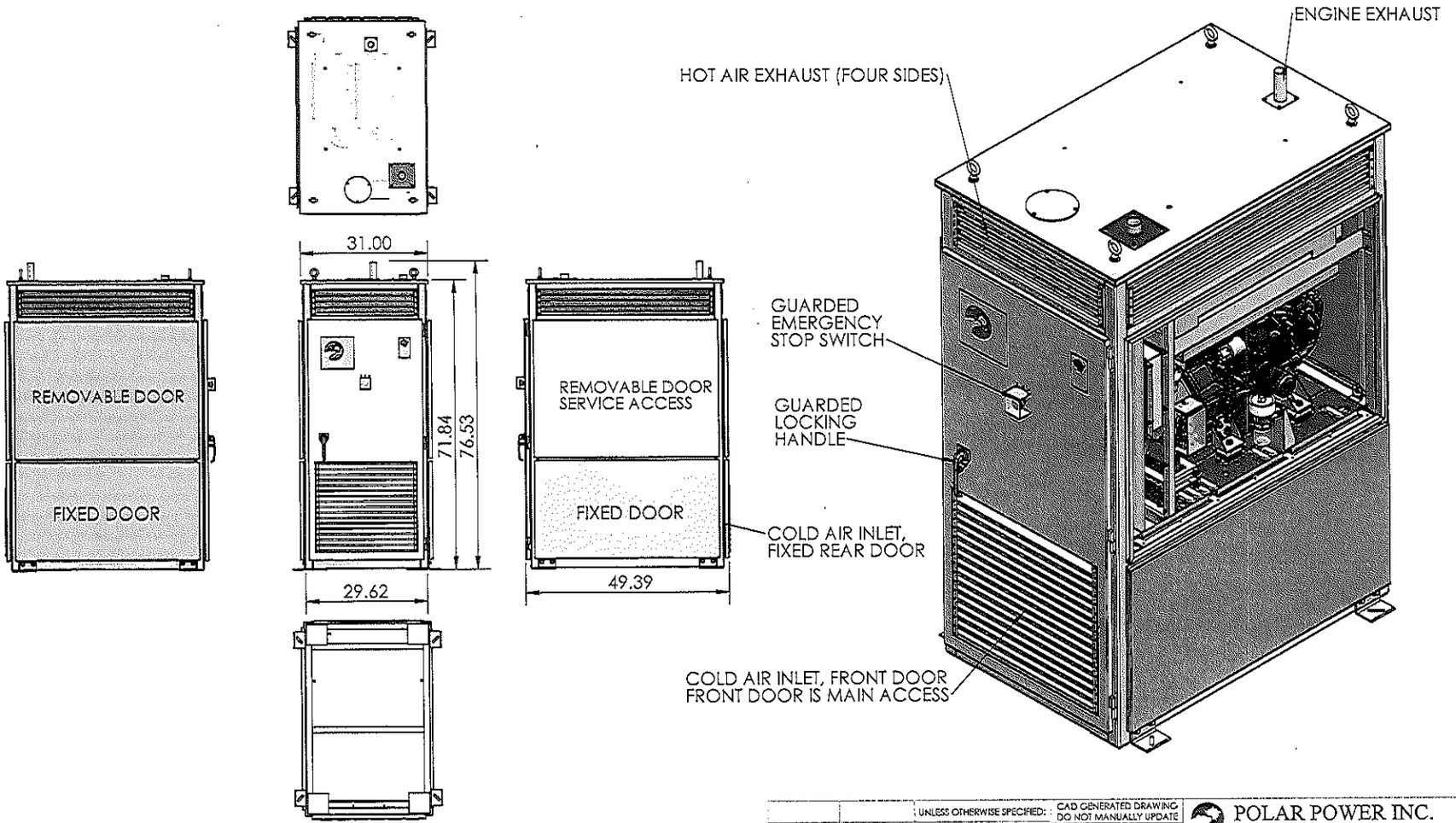
COMMSCOPE®

HBXX-6516DS-VTM | HBXX-6516DS-A2M

set and one bottom bracket set.

*** Footnotes**

Performance Note	Severe environmental conditions may degrade optimum performance



TIAL RELEASE	-						
DESCRIPTION	ECO#	BY	DATE		NEXT ASSY	USED ON	
					APPLICATION	DO NOT SCALE DRAWING	

COMMENTS:

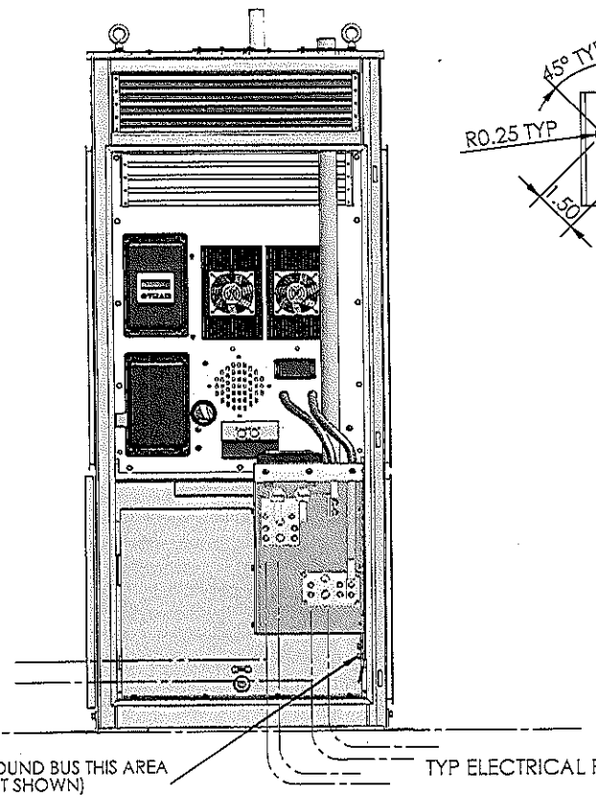
UNLESS OTHERWISE SPECIFIED:	CAD GENERATED DRAWING DO NOT MANUALLY UPDATE	
DIMENSIONS ARE IN INCHES	APPROVALS	DATE
TOLERANCES ARE:	DRAWN GLEDSON	1/22/2015
FRACTIONS ±1/32" DECIMALS X.X±0.1" X.XX±0.02" X.XXX±0.010" ANGLES ±1/2°	CHECKED	
MATERIAL	ENG APPR.	
FINISH	MFG APPR.	
	Q.A.	

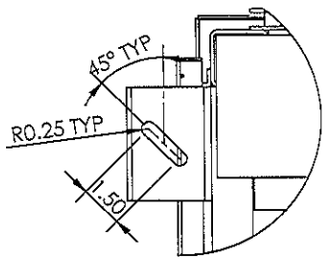
POLAR POWER INC.
249 E GARDENA AVE, GARDENA CA. 90248

TITLE: ALUMINUM VERTICAL ENCLOSURE, 72 IN

SIZE	DWG. NO.	REV
B	88-25-0603	A-1

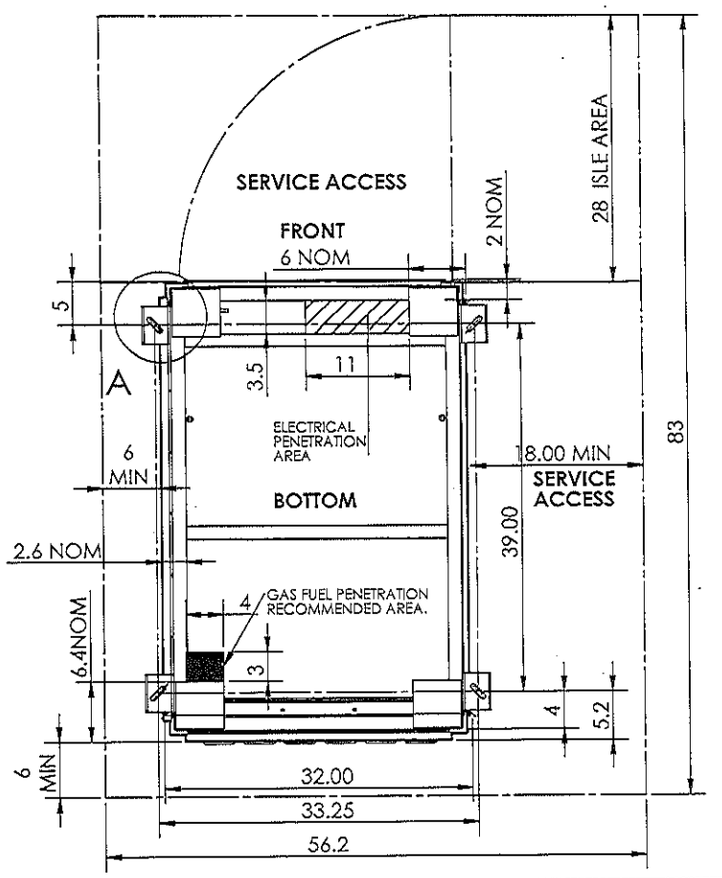
SCALE: 1:24 WEIGHT: SHEET 1 OF 4





DETAIL A
SCALE 1 : 4

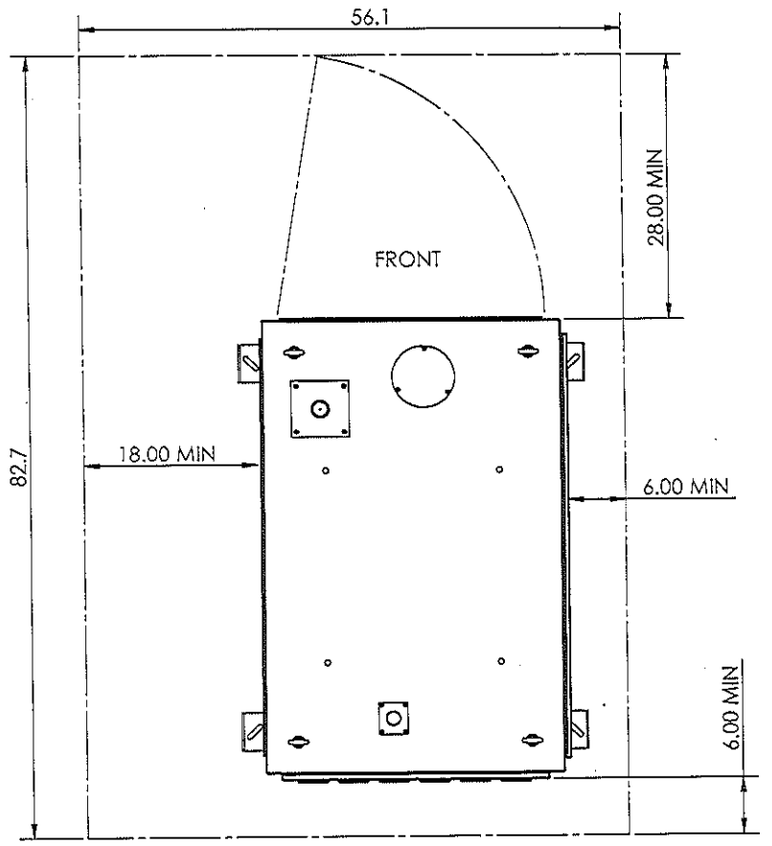
INSTALLATION FOOTPRINT, BOTTOM VIEW



FRONT DOOR REMOVED FOR CLARITY

						UNLESS OTHERWISE SPECIFIED:	CAD GENERATED DRAWING DO NOT MANUALLY UPDATE	POLAR POWER INC. 249 E GARDENA AVE, GARDENA CA. 90248	
						DIMENSIONS ARE IN INCHES TOLERANCES ARE:	APPROVALS DATE		
						FRACTIONS ±1/32" DECIMALS X.X±0.1" X.XX±0.03" X.XXX±0.010" ANGLES ±1/2°	DRAWN GLEASON 1/22/2015 CHECKED	TITLE: ALUMINUM VERTICAL ENCLOSURE, 72 IN	
						MATERIAL	ENG APPR.	SIZE B	DWG. NO. 88-25-0603 REV A-1
						FINISH	MFG APPR.		
						NEXT ASSY USED ON	Q.A.	SCALE: 1:24 WEIGHT:	SHEET 2 OF 4
IAL RELEASE	–			COMMENTS:		APPLICATION	DO NOT SCALE DRAWING		
DESCRIPTION	ECO#	BY	DATE	PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF POLAR POWER INC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF POLAR POWER INC. IS PROHIBITED.					

ALLATION FOOTPRINT, PLAN VIEW



TIAL RELEASE	–				
DESCRIPTION	ECO#	BY	DATE	COMMENTS:	

NEXT ASSY	USED ON
APPLICATION	DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED: CAD GENERATED DRAWING DO NOT MANUALLY UPDATE

DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS ±1/32" DECIMALS X.X±0.1" X.XX±0.03" X.XXX±0.010" ANGLES ±1/2°

	APPROVALS	DATE
DRAWN	GLEESON	1/22/2015
CHECKED		
ENG APPR.		
MFG APPR.		
Q.A.		
MATERIAL		
FINISH		

POLAR POWER INC.
249 E GARDENA AVE, GARDENA CA. 90248

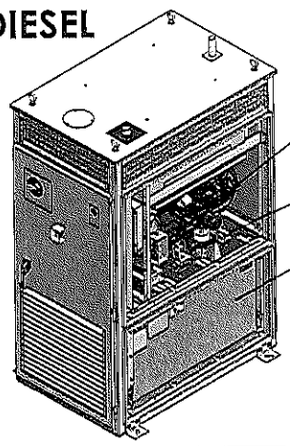
TITLE: ALUMINUM VERTICAL ENCLOSURE, 72 IN

SIZE	DWG. NO.	REV
B	88-25-0603	A-1

SCALE: 1:24 WEIGHT: SHEET 3 OF 4

ONFIGURATIONS

DIESEL



8220I-3CA1-101
6 KW DIESEL

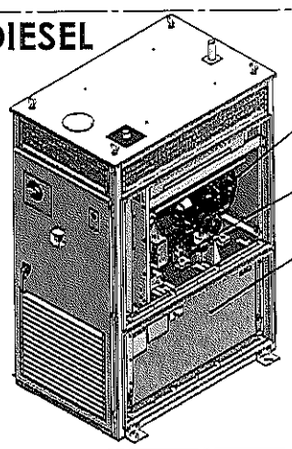
8220I-3CA1-102
10 KW DIESEL

ISUZU 3CJ1
(SINGLE DIODE BRIDGE)

FUEL PUMP ASSY

54 GALLON FUEL TANK

DIESEL



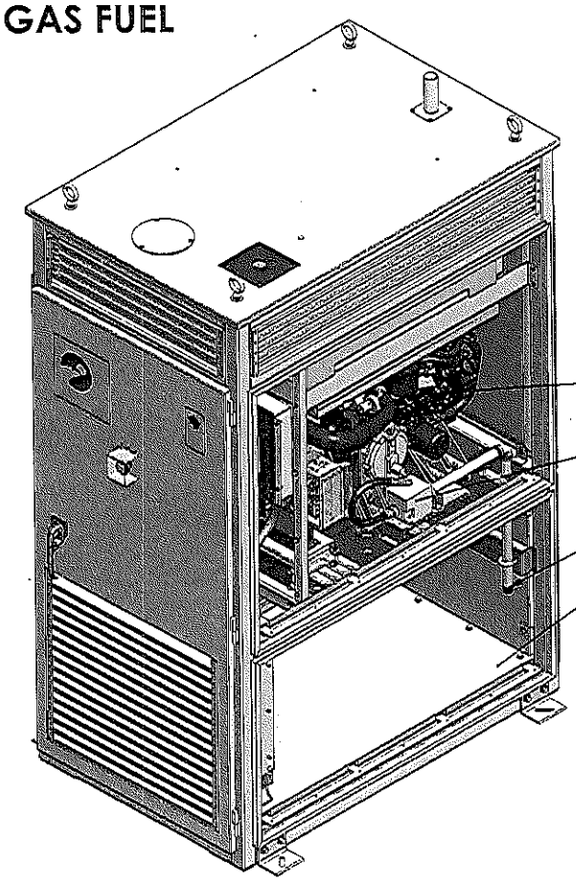
8220Y-3TNV88-101
15 KW DIESEL

YANMAR 3TNV88
(DUAL DIODE BRIDGE)

FUEL PUMP ASSY

54 GALLON FUEL TANK

GAS FUEL



8220K-DG972-101
6 KW NATURAL GAS

8220K-DG972-102
10 KW NATURAL GAS

8220K-WG972-101
6 KW PROPANE

8220K-WG972-102
10 KW PROPANE

KUBOTA DG OR WG 972
(SINGLE DIODE BRIDGE)

GAS FUEL ASSEMBLY.
HOSES FOR LPG OR
PROPANE

GAS FUEL STUB OUT

GAS FUEL
PENETRATION
AREA

TIAL RELEASE	–						
DESCRIPTION	ECO#	BY	DATE	COMMENTS:	NEXT ASSY	USED ON	

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APPLICATION

UNLESS OTHERWISE SPECIFIED:	CAD GENERATED DRAWING. DO NOT MANUALLY UPDATE	
DIMENSIONS ARE IN INCHES	APPROVALS	DATE
TOLERANCES ARE:	DRAWN CLEESON	1/22/2015
FRACTIONS ±1/32" DECIMALS X.XX±0.1" X.XXX±0.03" X.XXXX±0.010" ANGLES: ±1/2°	CHECKED	
MATERIAL	ENG APPR.	
FINISH	MFG APPR.	
DO NOT SCALE DRAWING	Q.A.	

POLAR POWER INC.
249 E GARDENA BLVD, GARDENA, CA 90248

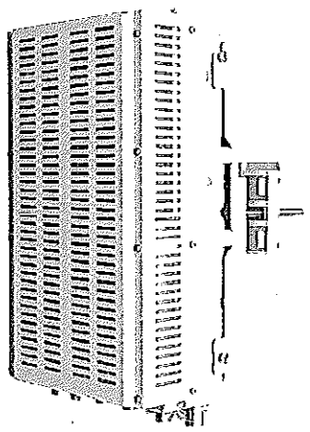
TITLE: ALUMINUM VERTICAL ENCLOSURE, 72 IN

SIZE	DWG. NO.	REV
B	88-25-0603	A-1

SCALE: 1:24 WEIGHT: SHEET 4 OF 4

ALCATEL-LUCENT B13 RRH 4X30

Alcatel-Lucent B13 Remote Radio Head 4x30 is the newest addition of Remote Radio Head to the extended product line of Alcatel-Lucent's distributed Base Station solutions, aimed at facilitating smooth RF site acquisition and related civil engineering.



Supporting 2Tx/4Tx MIMO and 4-way Rx diversity, Alcatel-Lucent B13 RRH 4x30 allows operators to have a compact radio solution to deploy LTE in the 700U band (700 MHz, 3GPP band 13), providing them with the means to achieve high capacity, high quality and high coverage with minimum site requirements.

The Alcatel-Lucent B13 RRH 4x30 product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x60 W or 4x30 W RF output power. It also supports 4-way Rx diversity at 10MHz instantaneous bandwidth.

The Alcatel-Lucent B13 RRH 4x30 is a near zero-footprint solution and operates noise free, simplifying negotiations with site property owners and minimizing environmental impacts.

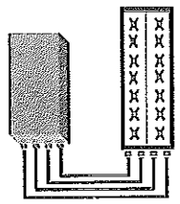
Its compactness and slim design makes the Alcatel-Lucent B13 RRH 4x30 easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the RF feeder needs and installation costs.

FEATURES

- Supporting LTE in 700 MHz band (700U, 3GPP band 13)
- LTE 2Tx or 4Tx MIMO (SW switchable)
- Output power: Up to 2x60W or 4x30W
- 10MHz LTE carrier with 4Rx Diversity
- Convection-cooled (fan-less)
- Supports AISG 2.0 ALD devices (RET, TMA) through RS485 or RF ports

BENEFITS

- Compact to reduce additional footprint when adding LTE in 700U band
- MIMO scheme operation selection (2Tx or 4Tx) by software only
- Improves downlink spectral efficiency through MIMO4
- Increases LTE coverage thanks to 4Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options: Pole or Wall



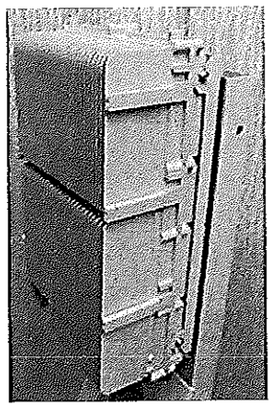
4x30W with 4T4R
or
2x60W with 2T4R

Can be switched between modes via SW w/o site visit

TECHNICAL SPECIFICATIONS

Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	U700 (C) (3GPP bands 13): DL: 746 - 756 MHz / UL: 777 - 787 MHz
Instantaneous bandwidth - #carriers	10MHz – 1 LTE carrier (in 10MHz occupied bandwidth)
LTE carrier bandwidth	10 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure – RX Diversity scheme	2 dB typ. (<2.5 dB max) – 2 or 4 way Rx diversity
Sizes (HxWxD) in mm (in.) Volume in L Weight in kg (lb) (w/o mounting HW)	530 x 300 x 190 (20.9" x 11.8" x 7.5") (with solar shield); 525 x 290 x 175 (20.7" x 11.4" x 6.9") (w/o solar shield) 30.2 (with solar shield) 25.2kg (55.6lb) (with solar shield)
DC voltage range DC power consumption	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 520W typical @100% RF load (in 2Tx or 4TX mode); 380W @50% RF load; Add 50W for 2A*24V for AISG
Environmental conditions Wind load (@150km/h or 93mph)	-40°C (-40°F) /+55°C (+131°F) IP65 Frontal: <200N / Lateral :<150N
Antenna ports	4 ports 7/16 DIN female (50 ohms) VSWR < 1.5
CPRI ports	2 CPRI ports (HW ready for Rate7, 9.8 Gbps) SFP single mode dual fiber
AISG interfaces	1 AISG2.0 output (RS485) Integrated Smart Bias Tees (x2)
Misc. Interfaces	4 external alarms (1 connector) – 4 RF Tx & 4 RF Rx monitor ports - 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27

Alcatel-Lucent Remote Radio Head B25 RRH 4x30-4R is the newest addition of Remote Radio Head to the extended product line of Alcatel-Lucent's distributed Base Station solutions, aimed at facilitating smooth RF site acquisition and related civil engineering.



Supporting 2Tx/4Tx MIMO and 4-way Rx diversity, Alcatel-Lucent B25 RRH4x30-4R allows operators to have a compact radio solution to deploy LTE in the PCS band (1.9 GHz, 3GPP band 25), providing them with the means to achieve high capacity, high quality and high coverage with minimum site requirements.

The Alcatel-Lucent B25 RRH4x30-4R product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x60 W or 4x30 W RF output power. It supports also 4-way Rx diversity, LTE carriers from 3MHz up to 20MHz and up to 65MHz instantaneous bandwidth.

The Alcatel-Lucent B25 RRH4x30-4R is a near zero-footprint solution and operates noise free, simplifying negotiations with site property owners and minimizing environmental impacts.

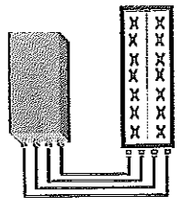
Its compactness and slim design makes the Alcatel-Lucent B25 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the RF feeder needs and installation costs.

FEATURES

- Supporting LTE in 1.9 GHz band (PCS, 3GPP band 2 & 25)
- LTE 2Tx or 4Tx MIMO (SW switchable)
- Output power: Up to 2x60W or 4x30W
- 3, 5, 10, 15 or 20MHz LTE carrier with 4Rx Diversity
- Up to 4 carriers anywhere in 65MHz instantaneous bandwidth
- Convection-cooled (fan-less)
- Supports AISG 2.0 ALD devices (RET, TMA) through RS485 or RF ports

BENEFITS

- Compact to reduce additional footprint when adding LTE in PCS band
- MIMO scheme operation selection (2Tx or 4Tx) by software only
- Full flexibility for multiple carriers operation over entire PCS spectrum
- Improves downlink spectral efficiency through MIMO4
- Increases LTE coverage thanks to 4Rx diveristy capability and best in class Rx sensitivity
- Flexible mounting options: Pole or Wall



4x30W with 4T4R
or
2x60W with 2T4R

Can be switched between modes via SW w/o site visit

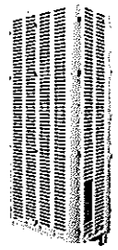
TECHNICAL SPECIFICATIONS

Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	PCS-G (3GPP bands 2 & 25): DL: 1930 - 1995 MHz / UL: 1850 - 1915 MHz
Instantaneous bandwidth - #carriers	65MHz – Up to 4 LTE carriers (in 40MHz occupied bandwidth)
LTE carrier bandwidth	3, 5, 10, 15 or 20 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure – RX Diversity scheme	2.5 dB typ. (<3 dB max) – 2 or 4 way Rx diversity
Sizes (HxWxD) in mm (in.) Volume in L Weight in kg (lb) (w/o mounting HW)	544 x 305 x 184 (21.4" x 12.0" x 7.2") (with solar shield) 30.5 (with solar shield) 23 (51) (with solar shield)
DC voltage range DC power consumption	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 520W typical @100% RF load
Environmental conditions Wind load (@150km/h or 93mph)	-40°C (-40°F) /+55°C (+131°F) IP65 Frontal: <200N / Lateral :<150N
Antenna ports	4 ports 7/16 DIN female (50 ohms) VSWR < 1.5
CPRI ports	2 CPRI ports (HW ready for Rate7, 9.8 Gbps) SFP single mode dual fiber
AISG interfaces	1 AISG2.0 output (RS485) Integrated Smart Bias Tees (x2)
Misc. Interfaces	4 external alarms (1 connector) – 4 RF Tx & 4 RF Rx monitor ports - 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27

ALCATEL-LUCENT B66A RRH4X45

The Alcatel-Lucent B66a Remote Radio Head 4x45 is the newest addition of Remote Radio Head to the extended product line of Alcatel-Lucent's distributed Base Station solutions, aimed at facilitating smooth RF site acquisition and related civil engineering. Its operational range covers beyond that of B4 (AWS) and B10 (AWS+).

Supporting 2Tx/4Tx MIMO and 2-way/4-way Rx diversity, the Alcatel-Lucent B66a RRH4x45 allows operators to have a compact radio solution to deploy LTE in the 2100 band (3GPP band 4, 10, and 66), providing them with the means to achieve high capacity, high quality, high reliability, large instantaneous bandwidth, and high coverage with minimum site requirements.



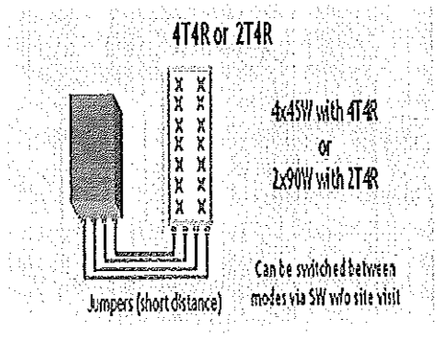
The Alcatel-Lucent B66a RRH4x45 product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x90W or 4x45W RF output power. It also supports 4-way Rx diversity at the 70 MHz instantaneous bandwidth.

The Alcatel-Lucent B66a RRH4x45 is a compact (near zero-footprint) solution and operates noise free, simplifying negotiations with site property owners and minimizing environmental impacts.

Its compactness and slim design makes the Alcatel-Lucent B66a RRH4x45 easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the RF feeder needs and installation costs.

FEATURES

- Supporting LTE in 2110 - 2180 MHz band/DL, 1710-1780MHz/UL (3GPP band 4, 10, and 66a)
- LTE 2Tx or 4Tx MIMO (SW selectable)
- Configuration: 2T2R/2T4R/4T4R
- Output power: Up to 2x90W or 4x45W (SW configurable)
- 70MHz LTE carrier with 4Rx Diversity
- Convection-cooled (fan-less)
- Supports AISG 2.0 ALD devices (RET, TMA) through RS485 or RF ports



BENEFITS

- Compact to reduce additional footprint when adding LTE in AWS 1-3 band
- Selection of MIMO configuration (2Tx or 4Tx) by software only
- Improves downlink spectral efficiency through 4Tx MIMO
- Increases LTE coverage thanks to 4Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options: Pole or Wall

TECHNICAL SPECIFICATIONS

Features & Performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R selectable by SW)
Frequency band	AWS 1-3, B4/B66a DL: 2110-2180 MHz / UL: 1710-1780 MHz
Instantaneous bandwidth - #carriers	70 MHz – 4 LTE MIMO carriers (in 70 MHz occupied bandwidth)
LTE carrier bandwidth	5, 10, 15, 20 MHz
RF output power	2x90W or 4x45W (selectable by SW)
Noise figure – RX Diversity scheme Receiver Sensivity (FRC A1-3)	2 dB typical (<2.5 dB max) – 2 or 4 way Rx diversity -104.5 dBm maximum
Sizes (HxWxD) in mm (in.) Volume in Liters Weight in kg (lb) (w/o mounting HW)	655x299x182 (25.8x11.8x7.2) (with solar shield) 640x290x160 (25.2x11.4x6.3) (without solar shield) 35.5 (with solar shield) 29.7 (without solar shield) 25.8kg (56.8lb) (with solar shield)
DC voltage range DC power consumption	Nominal: -48V, -40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 750W typical @100% RF load (in 2Tx or 4Tx mode); Add 58W for 2A*29V for AISG
Environmental conditions Wind load (@150km/h or 93mph)	-40°C (-40°F) /+55°C (+131°F) UL50E Type 4 Enclosure 250N (56lb) Frontal/150N (34lb) Lateral
Antenna ports	4 ports 4.3-10 female (50 ohms) VSWR < 1.5
CPRI ports	2 CPRI ports (HW ready for Rate 7, 9.8 Gbps) SFP: SMDF (HW supports also SMSF and MMDF)
AISG interfaces	1 AISG 2.0 output (RS485) Integrated Smart Bias Tees (x2)
Misc. Interfaces	4 external alarms (1 connector) 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-487 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27 / FCC Part 15 / GR-3178-CORE

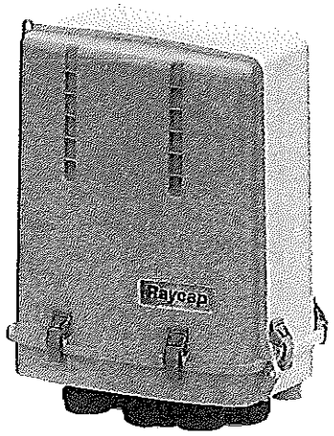
DATA SHEET

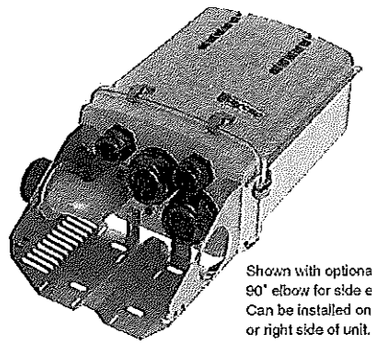
DC Surge Protection for RRH/Integrated Antenna Radio Head

RxxDC-4750-PF-48 • RxxDC-3103-PF-48 • RxxDC-3315-PF-48

Tower / Base / Rooftop / Rooftop Distribution Models

Raycap's flexible Tower, Base Stations and Rooftop protection and Distribution products provide protection for up to 6 Remote Radio Heads/Integrated Antennas. The solutions mitigate the risk of damage due to lightning and provide high levels of availability and reliability to radio equipment.





Shown with optional 90° elbow for side entry. Can be installed on left or right side of unit.

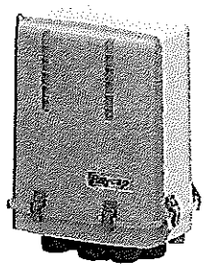
Mounting Bracket Included

Features

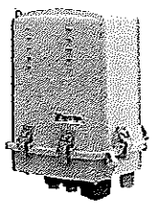
- Employs the Strikesorb® 30-V1-HV Surge Protective Device (SPD) specifically designed for the Remote Radio Head (RRH) installation environment and certified for use in DC applications and at low DC operating voltages (48V).
- The Strikesorb 30-V1-HV is a Class I SPD, certified by VDE per the IEC 61643-1 standard as suitable for installation in areas where direct lightning exposure is expected. Strikesorb 30-V1-HV is able to withstand direct lightning currents of up to 5kA (10/350) and induced surge currents of up to 60kA (8/20).
- Provides very low let through / clamping voltage - unique for a Class I product - as it does not employ spark gaps or other switching elements. Strikesorb offers unique protection levels to the RRH equipment as well as the Base Band Units.
- Alarms for SPD sacrifice, Moisture detection and Intrusion.
- Fully recognized to the UL 1449 3rd Edition Safety Standard.
- Patent pending design

Benefits

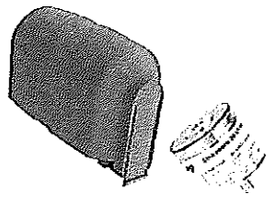
- Offers unique maintenance-free protection against direct lightning currents.
- Protects up to 6 Remote Radio Heads and connects up to 12 fiber pairs.
- Utilizes an IP 67 rated enclosure, allowing for indoor or outdoor installation on a roof or tower top.
- Configurable cable ports are designed to accommodate varying diameters of hybrid (combined power and fiber optic) or standard cables with diameters up to 2" (will fit most standard 1⅝" coax class cables) depending upon port configuration.
- Lightweight aerodynamic design provides maximum flexibility for tower top installation.
- Companion to the RxxDC-4291-PF-48 / RxxDC-1064-PF-48 (Sector) models.



Tower / Base / Rooftop / Rooftop Distribution Models
RxxDC-4750-PF-48
RxxDC-3103-PF-48
RxxDC-3315-PF-48



Companion Sector Models:
RxxDC-4291-PF-48
RxxDC-1064-PF-48



SPECIFICATIONS

DC Surge Protection for RRH/Integrated Antenna Radio Head

RxxDC-4750-PF-48 • RxxDC-3103-PF-48 • RxxDC-3315-PF-48

Tower / Base / Rooftop / Rooftop Distribution Models

Electrical

Model Numbers	RxxDC-4750-PF-48	RxxDC-3103-PF-48	RxxDC-3315-PF-48
Nominal Operating Voltage	48 VDC	48 VDC	48 VDC
Nominal Discharge Current (I_n)	20 kA 8/20 µs	20 kA 8/20 µs	20 kA 8/20 µs
Maximum Surge Current (I_{max})	60 kA 8/20 µs	60 kA 8/20 µs	60 kA 8/20 µs
Maximum Impulse (Lightning) Current per IEC 61643-1	5 kA 10/350 µs	5 kA 10/350 µs	5 kA 10/350 µs
Maximum Continuous Operating Voltage (U_c)	75 VDC	75 VDC	75 VDC
Voltage Protection Rating (VPR) per UL 1449 3rd Edition	400V	400V	400V
Protection Class as per IEC 61643-1	Class I	Class I	Class I
SPD Alarm	upon sacrifice	upon sacrifice	upon sacrifice
Intrusion Sensor	microswitch	microswitch	microswitch
Moisture Sensor	infrared moisture detector	infrared moisture detector	infrared moisture detector
Strikesorb Module Type	**No Strikesorb modules installed**	30-V1-HV **Strikesorb modules installed to protect 3 Remote Radio Heads**	30-V1-HV **Strikesorb modules installed to protect 6 Remote Radio Heads**

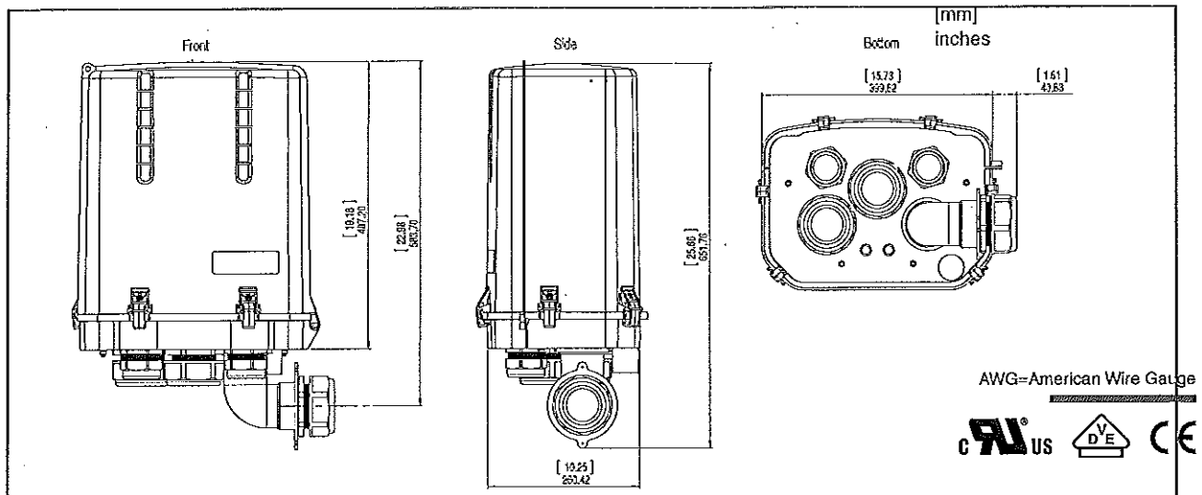
Mechanical

Suppression Connection Method	Compression lug, #14 - #2/0 AWG (2.5 mm² - 70 mm²) Copper; #12 - #2/0 AWG (4 mm² - 70 mm²) Aluminum		
Fiber Connection Method	LC-LC Single mode		
Pressure Equalizing Vent	Gore™ Vent		
Environmental Rating	IP 67		
Operating Temperature	-40° C to +80° C		
UV Resistant	Yes		
Weight	System: 16.0 lbs (7.25 kg) Mount: 5.5 lbs (2.49 kg) Total: 21.5 lbs (9.75 kg)	System: 18.7 lbs (8.48 kg) Mount: 5.5 lbs (2.49 kg) Total: 24.2 lbs (10.98 kg)	System: 21.4 lbs (9.70 kg) Mount: 5.5 lbs (2.49 kg) Total: 26.9 lbs (12.20 kg)
Combined Wind Loading	150mph (sustained): 200 lbs (889.6 N)		

Strikesorb modules are compliant to the following Surge Protective Device (SPD) Standards

Standards	ANSI/UL 1449 3rd Edition		
	IEEE C62.41		
	NEMA LS-1, IEC 61643-1:2005 2nd Edition (Class I Protection)		
	IEC 61643-12		
	EN 61643-11:2002 (including A11:2007)		

Product Diagram



AWG=American Wire Gauge

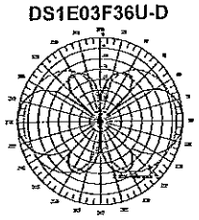
dbSpectra

VHF Omni Antennas (140-164 MHz)

		140-150 MHz						150-164 MHz									
	Model Number	DS1E03F36U-N	DS1E03F36U-D	DS1E06F36U-N	DS1E06F36U-D	DS1E03F36D-N	DS1E03F36D-D	DS1F00F36U-N	DS1F00F36U-D	DS1F03F36U-N	DS1F03F36U-D	DS1F06F36U-N	DS1F06F36U-D	DS1F03F36D-N	DS1F03F36D-D	DS1F06F36U3N	DS1F06F36U3D
	Input Connector	N(F)	7/16 DIN	N(F)	7/16 DIN	N(F)	7/16 DIN	N(F)	7/16 DIN	N(F)	7/16 DIN	N(F)	7/16 DIN	N(F)	7/16 DIN	N(F)	7/16 DIN
	Type	Single		Single		Dual		Single		Single		Single		Dual		Beamtilt	
ELECTRICAL	**Bandwidth**, MHz	10		10		10		14		14		14		14		14	
ELECTRICAL	**Power**, Watts	500		500		350		500		500		500		350		500	
ELECTRICAL	**Gain**, dBd	3		6		3		0		3		6		3		6	
ELECTRICAL	**Horizontal Beamwidth**, degrees	360		360		360		360		360		360		360		360	
ELECTRICAL	**Vertical Beamwidth**, degrees	30		16		30		65		30		16		30		16	
ELECTRICAL	**Beam Tilt**, degrees	0		0		0		0		0		0		0		3 Down	
ELECTRICAL	**Isolation (minimum)**, dB	N/A		N/A		30		N/A		N/A		N/A		30		N/A	
MECHANICAL	**Number of Connectors**	1		1		2		1		1		1		2		1	
MECHANICAL	**Flat Plate Area**, $ft^2(m^2)$	2.5 (0.23)		4.58 (0.43)		4.1 (0.38)		1.63 (0.15)		2.53 (0.24)		4.38 (0.41)		4.5 (0.42)		4.38 (0.41)	
MECHANICAL	**Lateral Windload Thrust**, lbf(N)	105 (467)		172 (765)		169 (752)		60 (267)		95 (423)		164 (730)		169 (752)		164 (730)	
MECHANICAL	**Survival Wind Speed**																
MECHANICAL	**without ice**, mph(kph)	120 (193)		72 (116)		75 (121)		200 (322)		110 (177)		75 (121)		75 (121)		75 (121)	
MECHANICAL	**with 0.5" radial ice**, mph(kph)	100 (161)		52 (84)		65 (105)		161 (260)		93 (150)		60 (97)		65 (105)		60 (97)	
MECHANICAL	**Mounting Hardware** included	DSH3V3N		DSH3V3N		DSH3V3N		DSH2V3R		DSH3V3R		DSH3V3N		DSH3V3N		DSH3V3N	
DIMENSIONS	**Length**, ft(m)	14.9 (4.5)		22.9 (7)		24.3 (7.4)		8.2 (2.5)		12.6 (3.8)		21.9 (6.7)		22.3 (6.8)		21.9 (6.7)	
DIMENSIONS	**Radome O.D.**, in(cm)	3 (7.6)		3 (7.6)		3 (7.6)		3 (7.6)		3 (7.6)		3 (7.6)		3 (7.6)		3 (7.6)	
DIMENSIONS	**Mast O.D.**, in(cm)	2.5 (6.4)		2.5 (6.4)		2.5 (6.4)		2.5 (6.4)		2.5 (6.4)		2.5 (6.4)		2.5 (6.4)		2.5 (6.4)	
DIMENSIONS	**Net Weight** w/o bracket, lb(kg)	43 (19.5)		65 (29.5)		70 (31.8)		20 (9.1)		37 (16.8)		60 (27.2)		63 (28.6)		60 (27.2)	
DIMENSIONS	**Shipping Weight**, lb(kg)	73 (33.1)		95 (43.1)		100 (45.4)		40 (18.1)		67 (30.4)		90 (40.8)		93 (42.2)		90 (40.8)	

VERTICAL PATTERNS

DS1E03F36U-N
DS1E03F36U-D



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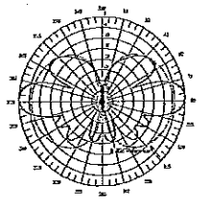

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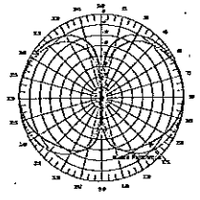

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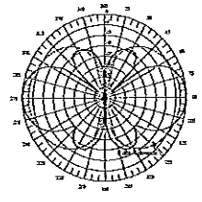

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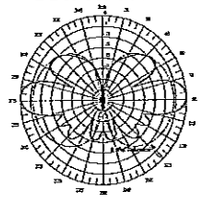

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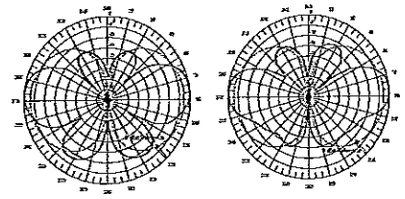

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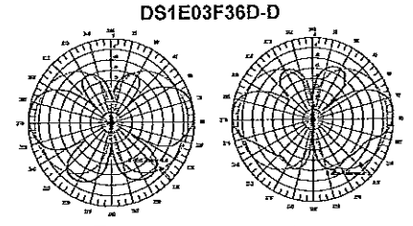
DS1E03F36D-D



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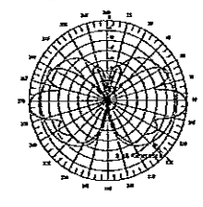


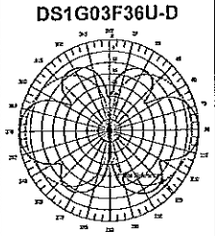
dbSpectra

VHF Omni Antennas (160-222 MHz)

		160-174 MHz						217-222 MHz									
	Model Number	DS1G03F36U-N	DS1G03F36U-D	DS1G06F36U-N	DS1G06F36U-D	DS1G03F36D-N	DS1G03F36D-D	DS2C00F36U-N	DS2C00F36U-D	DS2C03F36U-N	DS2C03F36U-D	DS2C06F36U-N	DS2C06F36U-D	DS2C00F36D-N	DS2C00F36D-D	DS2C03F36D-N	DS2C03F36D-D
	Input Connector	N(F)	7/16 DIN	N(F)	7/16 DIN	N(F)	7/16 DIN	N(F)	7/16 DIN	N(F)	7/16 DIN	N(F)	7/16 DIN	N(F)	7/16 DIN	N(F)	7/16 DIN
	Type	Single		Single		Dual		Single		Single		Single		Dual		Dual	
ELECTRICAL	**Bandwidth**, MHz	14		14		14		5		5		5		5		5	
	Power, Watts	500		500		350		500		500		500		350		350	
	Gain, dBd	3		6		3		0		3		6		0		3	
	Horizontal Beamwidth, degrees	360		360		360		360		360		360		360		360	
	Vertical Beamwidth, degrees	30		16		30		60		30		16		60		30	
	Beam Tilt, degrees	0		0		0		0		0		0		0		0	
	Isolation (minimum), dB	N/A		N/A		30		N/A		N/A		N/A		30		30	
MECHANICAL	**Number of Connectors**	1		1		2		1		1		1		2		2	
	Flat Plate Area, ft²(m²)	2.53 (0.24)		4.38 (0.41)		4.5 (0.42)		1.9 (0.18)		1.9 (0.18)		2.58 (0.24)		2.4 (0.22)		4.1 (0.38)	
	Lateral Windload Thrust, lbf(N)	95 (423)		164 (730)		169 (752)		53 (236)		69 (307)		108 (480)		90 (400)		169 (752)	
	Survival Wind Speed																
	without ice, mph(kph)	110 (177)		75 (121)		75 (121)		222 (357)		172 (277)		110 (177)		130 (209)		75 (121)	
	with 0.5" radial ice, mph(kph)	93 (150)		60 (97)		65 (105)		193 (311)		150 (241)		96 (154)		115 (185)		65 (105)	
	Mounting Hardware included	DSH3V3R		DSH3V3N		DSH3V3N		DSH2V3R		DSH2V3R		DSH3V3N		DSH3V3R		DSH3V3N	
DIMENSIONS	**Length**, ft(m)	12.7 (3.9)		21.9 (6.7)		22.3 (6.8)		7.7 (2.3)		9.9 (3)		18.1 (5.5)		13.6 (4.1)		24.3 (7.4)	
	Radome O.D., in(cm)	3 (7.6)		3 (7.6)		3 (7.6)		3 (7.6)		3 (7.6)		3 (7.6)		3 (7.6)		3 (7.6)	
	Mast O.D., in(cm)	2.5 (6.4)		2.5 (6.4)		2.5 (6.4)		2.5 (6.4)		2.5 (6.4)		2.5 (6.4)		2.5 (6.4)		2.5 (6.4)	
	Net Weight w/o bracket, lb(kg)	37 (16.8)		60 (27.2)		63 (28.6)		19 (8.6)		26 (11.8)		47 (21.3)		40 (18.1)		70 (31.8)	
	Shipping Weight, lb(kg)	67 (30.4)		90 (40.8)		93 (42.2)		39 (17.7)		56 (25.4)		77 (34.9)		70 (31.8)		100 (45.4)	

VERTICAL PATTERNS

DS1G03F36U-N
DS1G03F36U-D



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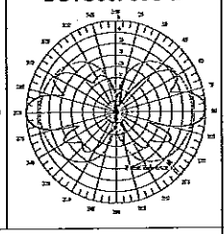

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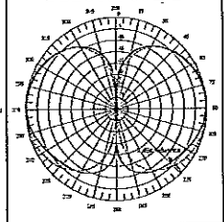

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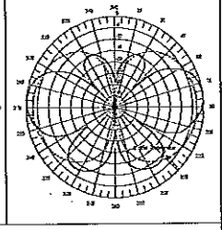

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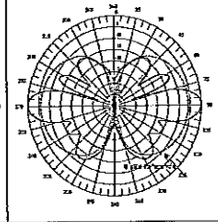

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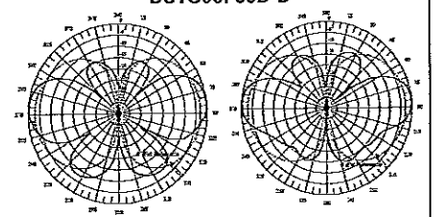

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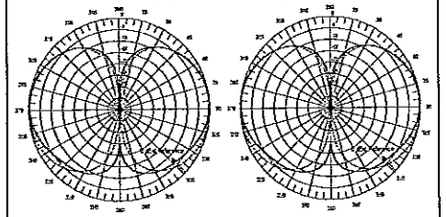

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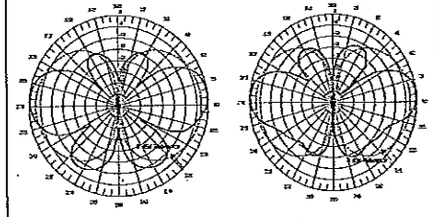

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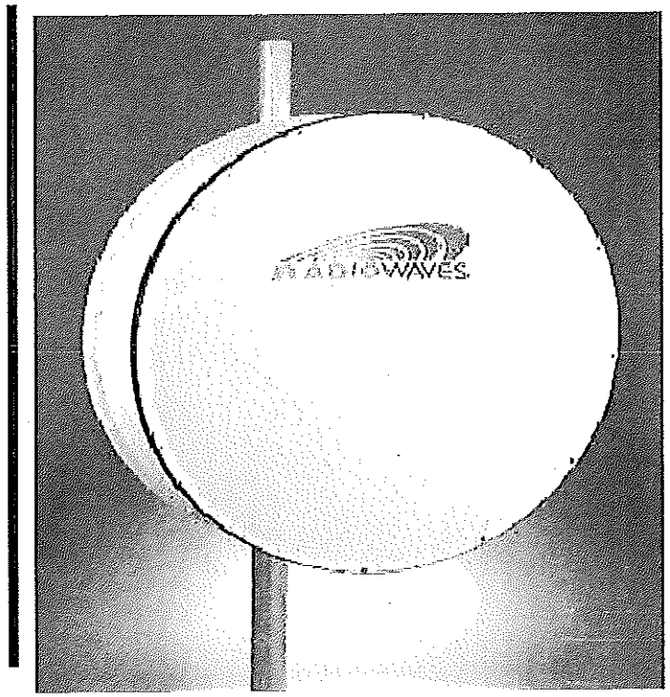
RADIOWAVES
THE LEADER IN MICROWAVE ANTENNA INNOVATION

High Performance Series for 4.4-5.0 GHz Frequencies

Key Features

- High Performance antennas minimize interference as they have more stringent radiation side lobe and front-to-back suppression characteristic
- Lightweight and rugged design
- Easily installed with our superior mounting system included with the antenna
- RF connector: "N" female connector. Some models are available with 7/16 DIN Connector. Please call the factory for availability
- Our industry leading 5-year warranty
- Radome is included
- Single (HP) and Dual (HPD) polarization are available



Antenna Specifications, Electrical (typical)

Model Number	Diameter ft. (m)	Frequency GHz	Gain (dBi) Low	Mid	High	3dB BW degs	X-Pol Rejection. dB	F/B Ratio dB	VSWR, Max (R.L., dB)	Antenna Weight
HP2-4.7	2 (0.6)	4.4-5.0	25.8	26.4	29.6	7.1 deg.	28 dB	48 dB	1.5:1 (14.0)	27 lbs. (12.3 kg)
HP3-4.7	3 (0.9)	4.4-5.0	29.2	29.8	30.3	4.7 deg.	30 dB	52 dB	1.5:1 (14.0)	50 lbs. (22.7 kg)
HP4-4.7	4 (1.2)	4.4-5.0	31.8	32.4	32.9	3.6 deg.	30 dB	54 dB	1.5:1 (14.0)	85 lbs. (38.3 kg)
HP6-4.7	6 (1.8)	4.4-5.0	34.8	35.4	35.3	2.6 deg.	30 dB	57 dB	1.5:1 (14.0)	251 lbs. (113.0 kg)
HP8-4.7	8 (2.4)	4.4-5.0	48.2	38.8	39.3	1.8 deg.	30 dB	61 dB	1.5:1 (14.0)	424 lbs. (194.5 kg)
HPD2-4.7	2 (0.6)	4.4-5.0	25.8	26.4	26.9	7.1 deg.	28 dB	48 dB	1.5:1 (14.0)	27 lbs. (12.3 kg)
HPD3-4.7	3 (0.9)	4.4-5.0	29.2	29.8	30.3	4.7 deg.	30 dB	52 dB	1.5:1 (14.0)	50 lbs. (22.7 kg)
HPD4-4.7	4 (1.2)	4.4-5.0	31.8	32.4	32.9	3.6 deg.	30 dB	54 dB	1.5:1 (14.0)	85 lbs. (38.3 kg)
HPD6-4.7	6 (1.8)	4.4-5.0	34.8	35.4	35.9	2.6 deg.	30 dB	57 dB	1.5:1 (14.0)	251 lbs. (113.0 kg)
HPD8-4.7	8 (2.4)	4.4-5.0	38.2	38.8	39.3	1.8 deg.	30 dB	61 dB	1.5:1 (14.0)	424 lbs. (194.5 kg)

Note: LMR jumpers and Side Struts available from Radio Waves

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