

June 3, 2016

Mr. Glen LeConche  
Building Official  
Town of East Hampton  
20 East High Street  
East Hampton, CT 06424

*Re: Independent Structural Engineer's Review  
Eversource – Site Ref: East High Street Microwave  
22 East High Street  
East Hampton, CT 06424*

*Centek Project No. 16057.00*

Dear Mr. LeConche,

Centek Engineering, Inc., has been authorized by Eversource to perform an independent structural review and evaluation of the proposed 120-ft tall self-supporting lattice tower, to be located at the above referenced communications facility. Specifically, structural design calculations prepared by Sabre Industries; Job No. 142140, dated 5/05/2016 signed and sealed by Robert E. Beacom, PE (CT PE License No. 28396) were reviewed for compliance with the requirements of the 2005 Connecticut State Building Code, inclusive of the 2005 Connecticut Supplement to the 2005 CSBC and the 2009, 2011 & 2013 amendments and Northeast Utilities Substation Standard 090.

This review was conducted as stipulated in Section 106.1 of the 2005 Connecticut State Building Code and Section 29-276b of the Connecticut General Statute for independent structural analysis and evaluation.

#### **APPROACH**

The calculation and design documents referenced above were reviewed for compliance with Section 3108.0 of the International Building Code (IBC) and the 2005 Connecticut State Building Code as amended by the 2005 Connecticut State Supplement and subsequent amendments and Northeast Utilities Substation Standard 090. The applicable design standard for loading and analysis of steel antenna towers is ANSI/TIA-222-G entitled "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures". The tower structure was also reviewed for compliance with the requirements of the ANSI/TIA/EIA-222-F standard currently in effect within the State of Connecticut.

Specifically, the following key items were considered:

- Construction Materials
- Tower Loading
- Material Design Strength
- Foundation and Anchors

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**CONSTRUCTION MATERIALS**

IBC 2003/2005 CSBC Section 3108.3 is satisfied - the steel used is of corrosion resistant construction [Bolts galvanized per ASTM A153 (hot dipped) or ASTM 695 (mechanical); all other structural materials hot dipped galvanized per ASTM A123].

Table 5-1 of the TIA-222-G standard is satisfied - steel grades are as follows: pipe tower legs - ASTM A500-50; steel angle – ASTM A72 Grade 50, misc plates - ASTM A36, connection bolts ASTM A325; anchor bolts ASTM F1554 grade 105.

**TOWER LOADING**

Tower loading is determined by the basic wind speed as applied to projected surface areas with modification factors per TIA-222-G, gravity loads of the tower structure and its components, and the application of 0.75" radial ice. The analysis prepared by Sabre was conducted utilizing the requirements of the ANSI/TIA-222-G standard. The tower structure was also reviewed for compliance with the requirements of the ANSI/TIA/EIA-222-F standard currently in effect within the State of Connecticut. The wind speed requirements for the TIA/EIA-222-F and TIA-222-G standards are provided below.

Basic Wind Speed:	Middlesex County; v = 85 mph (fastest mile)	[Section 16 of TIA/EIA-222-F-1996]
	Middlesex County; v = 100-120 mph (3 second gust)	[Annex B of TIA-222-G]
	East Hampton; v = 105 mph (3 second gust) equivalent to v = 85 mph (fastest mile)	[Appendix K of the 2005 CT Building Code Supplement]
Load Cases Used:	<u>Load Case 1</u> ; 120 mph wind speed w/ no ice plus gravity load (Class III Structure Type, Exposure Category C)	[Annex B of TIA-222-G-2005]
	<u>Load Case 2</u> ; 50 mph wind speed w/ 0.75" radial ice plus gravity load (Class III Structure Type, Exposure Category C)	[Annex B of TIA-222-G-2005]
	<u>Load Case 3</u> ; Seismic – not checked	[Section 1614.5 of 2005 CT State Bldg. Code] does not control in the design of this structure type

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**MATERIAL DESIGN STRENGTH**

The maximum tower steel usage was calculated as **0.996 (99.6%)** utilizing the ANSI TIA-222-G design standard which is less than the maximum ratio of 1.00, as required by Section 9.4 of the ANSI/TIA-222-G standard.

**FOUNDATION AND ANCHORS**

The proposed foundation consists of three (3) 2.5-ft dia x 3.0-ft. long reinforced concrete piers and one (1) 25.0-ft square x 1.5-ft thick pad. The sub-grade conditions used in the design of the foundation were obtained from the geotechnical soils report prepared by Dr. Clarence Welti dated 12/31/2015. The tower is connected to the foundation by means of six (6) 1.00" dia. ASTM F1554-GR105 anchor bolts embedded approximately 3.75-ft. into the concrete foundation structure.

Review of the foundation and anchor bolt design consisted of verification of the applied loads obtained from the Sabre tower design calculations and code checks of the available strength:

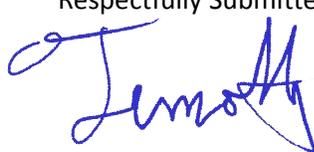
- ❑ The tower anchor bolts were found to be within allowable limits.
- ❑ The foundation was found to be within allowable limits.

**CONCLUSION**

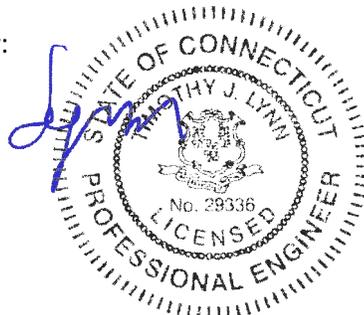
Based on our review of structural analysis provided, it is our opinion that the proposed installation was engineered in conformance with the applicable structural requirements of the 2003 International Building Code (IBC); 2005 Connecticut State Building Code as amended by the 2005 Connecticut State Supplement and subsequent amendments, ANSI TIA/EIA 222-F, ANSI TIA-222-G. It is noted that our review does not constitute a design, nor is it all-inclusive; the responsibility for the structural design remains with the Structural Engineer of Record.

This completes the independent structural engineering review for this project. Should you have any questions, please do not hesitate to contact us.

Respectfully Submitted by:



Timothy J. Lynn, PE  
Structural Engineer



Cc: Steve Florio - Eversource (via email)