



Site Name: Ellerbe - Viper

Site Address: 176 Jimmy Carriker Road, Ellerbe, Richmond County, NC 28338

Latitude: 35.120372°

Longitude: -79.710803°

Structure Type(s): Proposed 380.0-ft Self-Support Lattice Tower

Contact Information: Contact the owner with questions regarding the content of this Document. All questions or concerns shall be directed to the contact stipulated in the Bid Document.

Design Capacity: The tower shall be designed so that, once installed with all loading as shown in Table 1 – Preliminary Design Antenna/Coax Loading, the tower superstructure and substructure shall **NOT exceed 95% of its capacity**. If, upon evaluation, the design computes to be at a greater stress level than specified the bid will not be accepted. All bidders must provide design calculations verifying that this Design Capacity Requirement is met; see "Deliverables" for details.

Materials: Tower structures shall utilize solid round or angle structural steel members. No other materials or shapes shall be given consideration.

Structural bolts must meet the ASTM A325 specification, or equivalent if approved by the design engineer of record.

Design Fall Radius: ☐ No Fall Radius Required
☒ Fall Radius Required from Centerline of Tower: 50-ft

Standard: As a minimum, all towers shall be designed to the requirements of ANSI/TIA-222-G, including released addendums

Design Wind Speed: ☒ 122 mph ultimate 3-second gust wind speed (converted to an equivalent 95 mph nominal 3-second gust wind speed per Section 1609.3.1 for use with TIA-222 G) as required by the 2018 North Carolina Building Code (2015 IBC) and ASCE 7-10.

Structure Class: ☐ Structure Class I – Low Hazard
☐ Structure Class II – Significant Hazard (Default)
☒ Structure Class III – Substantial Hazard

Risk Category: ☐ Risk Category I – Low Hazard
☐ Risk Category II – Moderate Hazard (Default)
☐ Risk Category III – Substantial Hazard
☒ Risk Category IV – Essential Hazard (Essential Communications)

Topographic Cat.: ☒ Category I – No abrupt changes in general topography
☐ Category II – Structures located at or near the crest of an escarpment
☐ Category III – Structures located in the upper half of a hill
☐ Category IV – Structures located in the upper half of a ridge
☐ Category V – Wind speed up criteria based on a site-specific investigation (see attached)

Exposure Category: ☐ Exposure B – Urban and Suburban Areas
☒ Exposure C – Open Terrain where Exposure B or D does not apply
☐ Exposure D – Flat, Unobstructed Shorelines



- Design Ice Loading:**
- ☐ Not required
 - ☐ ANSI/TIA-222-H: x.xx inch escalating with a xx mph 3 second gust wind speed
 - ☒ ANSI/TIA-222-G: 0.75 inch escalating with a 30 mph 3 second gust wind speed
 - ☐ ANSI/TIA/EIA-222-F: x.xx inch escalating with an xx mph fastest mile wind speed
- Seismic:**
- ☒ Seismic Ss: 0.248 / Seismic S1: 0.105 / Seismic TL: 8
 - ☐ Ss exceeds 1.0. Seismic loads shall be evaluated in accordance with the Standard
- Tower Finish:**
- ☒ Galvanized
 - ☐ Painted per FAA Advisory Circular AC 70/7460-1K
 - ☐ Painted per Local Requirements
- All structural steel products shall be hot-dip galvanized in accordance with ASTM A123 specifications. Tower manufacturer shall produce documentation verifying the appropriate galvanizing process that is utilized. All steel hardware shall be galvanized in accordance with ASTM A153 or ASTM B695 specifications.
- Tower Lights:**
- ☐ Not required
 - ☒ Provide obstruction lights per FAA Advisory Circular AC 70/7460-1K. A lighting system by DrakeLighting, that complies with the FAA regulation, is required.
 - ☐ Tower lighting system with E2 Avian Compliant Obstruction Lighting System (white strobes by day, and red lights at night). Beacons and Obstruction lights shall be all LED and Dual Red/White medium intensity and shall meet the requirements of FAA Advisory Circular AC 70/7460-1K. Ice shields shall be installed above sidelights to prevent damage to lenses from falling objects.
- Grounding:**
- ☒ Grounding, lightning protection, and surge protection systems shall be installed as required in compliance with R56 specifications and the construction documents. Coordinate with the Duke Energy bid administrator for the portion of tower grounding scope of work as shown in the construction documents. Minimum of the tower ground ring, connections from the ring to the tower, the bottom tower ground bar, and the connection from the tower ground ring to the bottom ground bar shall be included.
- Climbing Facilities:**
- ☐ Not required
 - ☒ Provide Climbing Facilities with safety climb.
A single face mounted ladder is required. A single safety fall protection system incorporating a 3/8" diameter stainless steel cable meeting OSHA/ANSI specifications shall be installed the full height of the structure. Additionally, full height step pegs on all three tower legs are required.
- Ice Bridge:**
- ☒ Not required; Another contractor to provide
 - ☐ Provide an option for Ice Bridge
- Transmission Ladder:**
- ☐ Not required; carrier to provide
 - ☒ Provide Transmission Ladder. Include "per foot" pricing.
- Foundation:**
- ☐ Provide Preliminary Design using Presumptive Soil Parameters per the TIA-222-G Standard (Annex F). A Geotechnical Report will be provided at a later date for the final foundation design.
 - ☒ Design with Geotechnical Report provided. In accordance with ANSI/TIA-222-G, Annex A, Section A.9.0, the tower manufacturer shall ensure the proper development of anchor rods and anchorage materials.
- Antenna Mounts:**
- ☐ Not required; Antenna Mounts provided by carrier.
 - ☒ Provide mounts per Table 1 – Design Antenna/Coax Loading



Additional Design Requirements

Structural Guidelines:

All leg capacities for lattice towers shall be computed utilizing a global effective length factor (K) of 1.0. All leg capacities shall be calculated utilizing the working points between panel points. Utilizing the side (gusset) plate length to reduce the unbraced length of the leg is not permitted. Leg members are to consist only of steel solid rod and angle members. Tubular steel leg members are not permitted.

For round leg latticed towers, bracing member capacities shall be calculated considering the effective length to be the span between the weld lines of the gusset plates at the face of the round legs for both out-of-plane and in-plane buckling modes.

Hardened galvanized flat washers (ASTM F436) shall only be used in fully tensioned bolted connections and connections that utilize oversized or slotted holes.

Linear Appurtenances:

The tower analysis model shall include all feed lines, feed line ladders, step pegs, climbing ladder and safety climb.

Discrete Appurtenances:

Effective Projected Area (EPA)_A for antennas shall be determined according to TIA-222-G, Section 2.6.9.2, Design Wind Force on Appurtenances. If antenna or mount areas are specified, the provided values shall be used in lieu of calculated values. If height, width, and depth dimensions are provided by the antenna manufacturer, the panel shall be treated as a flat rectangular panel. Force coefficients shall be determined based on antenna aspect ratios and multiplied by the projected areas to calculate front and side EPAs.

Wind tunnel test results shall NOT be used unless the results have been provided to ETS and proposed effective areas have been approved. Back-calculating wind areas from published antenna manufacturer's wind loads are prohibited.

Deliverables: [Once awarded, Final Deliverables shall bear the seal of a North Carolina Professional Engineer]

A PDF softcopy of all deliverables shall be sent to ETS for recording purposes. All tower designs shall be complete with the following:

- General Notes
- Profile drawing (with tower reactions, design parameters, materials grades and referenced codes and standards shall be clearly shown)
- Foundation design drawings
- Supporting design calculations for tower and foundation
- Listing of main structural members
- Mount documentation specifically showing total EPA

Table 1 – Design Antenna/Coax Loading

Owner	Quantity	Model#	Elevation	Leg	Cable Size
NCSHP	1	CC807-11 (RX) (VIPER)	380	B	7/8"
NCSHP	1	TTA (VIPER)	380	B	1/2"
NCSHP	1	CC807-11 (TX) (VIPER)	380	C	1 5/8"
NCSHP	1	ANT150F6 (Telewave)(VIPER)	360	A	7/8"
NCSHP	1	CC807-11 (RX)	360	B	7/8"
NCSHP	1	CC807-11 (TX)	360	C	1 5/8"
NCSHP	1	CC807-11 (RX)	340	B	7/8"
NCSHP	1	CC807-11 (TX)	340	B	1 5/8"
NCSHP	1	8' Commscope	210	B	EW63
NCSHP	1	8' Commscope	201	B	EW63
NCSHP	1	6' Commscope	176	C	EW63
NCSHP	1	6' Commscope	176	A	EW63
NCSHP	1	6' Commscope	124	B	EW63
NCSHP	1	8' Commscope	265	C	EW63
NCSHP	1	6' Commscope	265	B	EW63
NCSHP	1	8' Commscope	265	B	EW63
Forestry	1	DB224	380	A	7/8"
Telewave	1	ANT150F6	338	C	7/8"
Army	1	RFI BA40-57-P 3' standoff	329	B	7/8"
FBI	1	Commander 150-5N	311	B	7/8"
-	1	DB5001 standoff			
Army	1	RFI BA40-57-P 3' standoff	299	B	7/8"
NOAA	1	20' x 4 element Dipole	289	A	7/8"
Telewave	1	ANT150F6	250	B	7/8"
-	1	DB-224	220	B	7/8"
-	1	3'x6-Element Yagi	113	A	7/8"
Broadband	3	Ubiquiti AM-V5G-Ti	80	B	CAT5e
-	1	Kathrein Paraflector	240	C	7/8"

Notes:

A-Leg orientation is set to an azimuth of ~335 degrees. The final orientation is set per the issued construction drawings

- 1) Minimum Total Mount EPA per latest vendor documentation
- 2) Ice Shields over all Microwaves are to be supplied, but installed by others
- 3) Reserved Loading to be included in initial tower design
- 4) The builder will supply side arms with side struts for all dipole and omni antennas listed above. However, tower manufacturer shall design tower so that all side arms with side struts are included in the loading.
- 5) The builder will supply microwave pipe mounts for all microwaves listed above. However, the tower manufacturer shall design tower so that all microwaves have pipe mounts that are included in the loading.



Tower Procurement Package
Ellerbe - Viper
February 29, 2024
ETS Job No. 23116978.STR.7405

APPENDIX A

Verification of Design Loads

ASCE 7 Hazards Report

Address:

No Address at This Location

Standard:

ASCE/SEI 7-10

Risk Category: IV**Soil Class:**

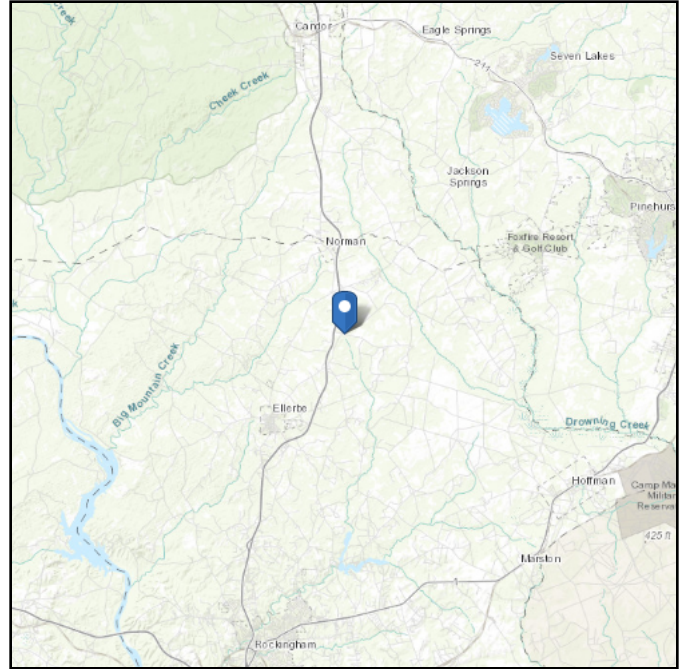
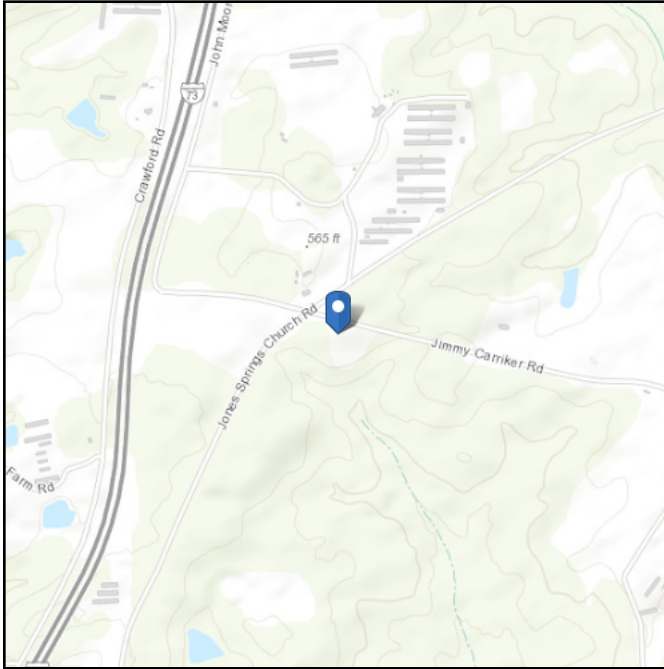
D - Stiff Soil

Latitude:

35.1204

Longitude: -79.7108

Elevation: 557.625855996914 ft (NAVD 88)



Wind

Results:

Wind Speed	122 Vmph
10-year MRI	76 Vmph
25-year MRI	84 Vmph
50-year MRI	90 Vmph
100-year MRI	96 Vmph

Data Source:

ASCE/SEI 7-10, Fig. 26.5-1B and Figs. CC-1–CC-4, and Section 26.5.2, incorporating errata of March 12, 2014

Date Accessed:

Mon Aug 14 2023

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-10 Standard. Wind speeds correspond to approximately a 3% probability of exceedance in 50 years (annual exceedance probability = 0.000588, MRI = 1,700 years).

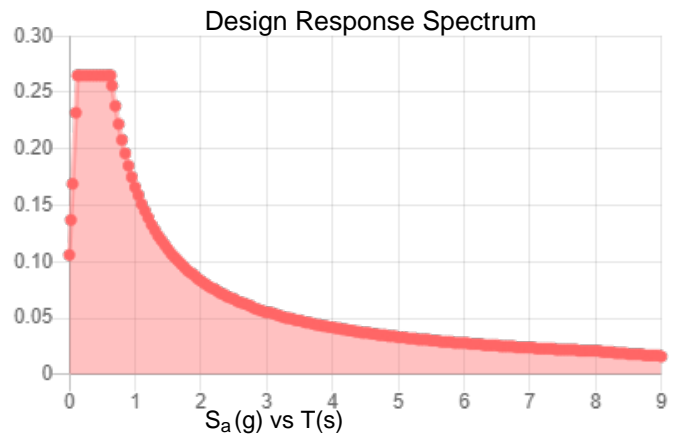
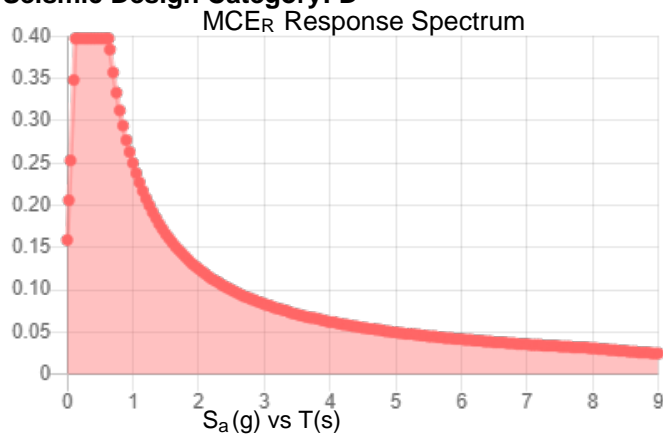
Site is not in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2.

Site Soil Class:

Results:

S_S :	0.248	S_{D1} :	0.166
S_1 :	0.105	T_L :	8
F_a :	1.6	PGA :	0.124
F_v :	2.38	PGA _M :	0.192
S_{MS} :	0.397	F_{PGA} :	1.552
S_{M1} :	0.25	I_e :	1.5
S_{DS} :	0.265		

Seismic Design Category: D



Data Accessed: Mon Aug 14 2023

Date Source:

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

Results:

Ice Thickness: 0.75 in.
Concurrent Temperature: 15 F
Gust Speed 30 mph

Data Source: Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8

Date Accessed: Mon Aug 14 2023

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

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

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided "as is" and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

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Tower Procurement Package

Ellerbe - Viper

February 29, 2024

ETS Job# 2111657.STR.6508


APPENDIX B

Site Vicinity and Location Map

Ellerbe - 380-ft SST

Exposure Category C
Topographic Category 1

Legend

 Tower Point

