Site Name:	Duncan
Site Number:	HP-1071
Site Address:	8494 Christian Light Road, Fuquay Varina, Harnett County, NC 27526
Latitude: **Longitude:**	35.550208° -78.851067°
Structure Type(s):	Proposed 293.0-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: 0.173 / Seismic S1: 0.083 / 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 Drake Lighting, 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 un-braced 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

PROPOSED ANTENNA SCHEDULE								
OWNER	QTY.	SIZE (FT)	TYPE	MANUFACTURER - ANTENNA MODEL NUMBER	ANTENNA AZIMUTH	MOUNT ELEVATION	LEG	CABLE (QTY.) TYPE
NCSHP	1	17.1	OMNI	RFI - CC807-11 (RX)	--	283'-0"	A	(1) 5/8" COAX
NCSHP	1	2.0	TTA	--	--	283'-0"	A	(1) 1/2" COAX
NCSHP	1	17.1	OMNI	RFI - CC807-11 (TX)	--	283'-0"	B	(1) 7/8" COAX
NCSHP (FUTURE)	1	8.0	DISH	RFS - UXA8-U57AC2H	--	280'-0"		(1) EW63 (FUTURE)
NCSHP (FUTURE)	1	17.1	OMNI	RFI - CC807-11 (RX)	--	260'-0"	C	(1) 1-5/8" COAX (FUTURE)
NCSHP (FUTURE)	1	17.1	OMNI	RFI - CC807-11 (TX)	--	260'-0"	B	(1) 7/8" COAX (FUTURE)
NCSHP (FUTURE)	1	6.0	DISH	RFS - UXA8-U57AC2H	--	250'-0"	--	(1) EW63 (FUTURE)
NCSHP (TO BLUE RIDGE)	1	8.0	DISH	RFS - UXA8-U57AC2H	25°	239'-0"	A	(1) EW63
NCSHP (FUTURE)	1	8.0	DISH	RFS - UXA8-U57AC2H	--	239'-0"	--	(1) EW63 (FUTURE)
NCSHP (DIVERSITY TO BLUE RIDGE)	1	6.0	DISH	RFS - UXA8-U57AC2H	25°	209'-0"	A	(1) EW63
NCSHP (FUTURE)	1	6.0	DISH	RFS - UXA8-U57AC2H	--	209'-0"	--	(1) EW63 (FUTURE)
NCSHP (FUTURE)	1	2.0	DISH	CAMBIUM NETWORKS - RDH4508C	--	189'-0"	--	(1) CAT5e (FUTURE)
NCSHP (TO FUQUAY)	1	6.0	DISH	RFS - UXA8-U57AC2H	86°	160'-0"	B	(1) EW63
NCSHP (TO LILLINGTON)	1	8.0	DISH	RFS - UXA8-U57AC2H	166°	135'-0"	C	(1) EW63
NCSHP (TO COKESBURY)	1	6.0	DISH	RFS - UXA8-U57AC2H	239°	120'-0"	C	(1) EW63
BROADBAND (FUTURE)	3	2.36	PANEL	UBIQUITI - AM-V5G-TI	0, 120, 240	80'-0"	A, B, C	(3) CAT5e (FUTURE)

Notes:
A-Leg orientation is set to an azimuth of ~0 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 as current (2 total). However, tower manufacturer shall design tower so that side arms with side struts are considered for all dipole and omni antennas listed above as current and future (4 total).
5) The builder will supply microwave pipe mounts and high wind kits for all microwaves listed above as current (5 total). However, the tower manufacturer shall design tower so that pipe mounts and high wind kits are considered for all microwave listed above as current and future (10 total).

APPENDIX A

Verification of Design Loads

APPENDIX B

Site Vicinity and Location Map