Tower Engineering Professionals, Inc.
SECTION 106 EXCLUSION CHECKLIST

Project Name: MA Tower Site **Project Number:** N/A

Street or Other Address: 171 Cherry Street

City, State: Middleborough, MA 02346

County: Plymouth

Scope of Action:
- ☐ **Maintenance (I)**
- ☐ **Construction/Enhancement of a Tower (II)**
- ☒ **Collocation on a Tower or Building/Non-Tower Structure (III)**
- ☐ **Collocation on Historic Buildings/Non-Tower Structures (IV)**
- ☐ **Additional Utility Structure/Building/Non-Tower Structure Exclusions (V)**

This checklist is based upon information obtained from the following FCC documents:
Nationwide Programmatic Agreement (NPA) dated 10/2004
Amended Nationwide Programmatic Agreement for the Collocation of Wireless Antennas dated 03/2001
Report and Order for the Acceleration of Broadband Deployment (R&O) dated 10/21/2014
First Amendment to the Nationwide Programmatic Agreement for the Collocation of Wireless Antennas (CNPA) dated 08/03/2016
Second Amendment to the Nationwide Programmatic Agreement for the Collocation of Wireless Antennas (CNPA) dated 07/10/2020

Note – this checklist does not apply to actions on "tribal lands," defined as "all lands within the exterior boundaries of any Indian reservation and all dependent Indian communities." *(NPA - I. D)* and does not include an analysis of compliance with the FCC's RF exposure guidelines (*47 CFR Section 1.1307(b), 11310 and 2.1093*).

Scope I. Maintenance

The routine maintenance or servicing of existing Section 106 permitted antennas and/or their associated equipment is exempt from Section 106 review (*NPA - I.B*). If the scope of the proposed action is "Maintenance," no further review is required and work may proceed.

Scope II. Select an Exclusion below based upon the scope of construction work (NPA)

☐	**Exclusion A - Enhancement of a Tower**	
	Will the action consist of a collocation? (if so, proceed to Section III below)	Yes☐ No☐
	Will the action cause the height of the tower to be increased by more than 10% OR by the height of one additional antenna array with separation from the nearest antenna not to exceed 20 feet (whichever is greater)?	Yes☐ No☐
	Will the action involve the installation of more than four additional cabinets or more than one additional equipment shelter?	Yes☐ No☐
	Will the action involve excavation outside of the current leased or owned property surrounding the tower or any access and/or utility easements?	Yes☐ No☐
	Was the tower constructed after March 16, 2001 AND lacking the required Sec. 106 and environmental review processes?	Yes☐ No☐
	If the answer to all above questions is "No," then no further review is required. If the answer to any of the above questions is "Yes," (and the action is not a collocation covered in Section III below) then proceed to Section 106 Consultation.	

☐	**Exclusion B – Construction of a Replacement Tower**	
	Will the action cause the height of the structure to be increased by more than 10% OR by the height of one additional antenna array with separation from the nearest antenna not to exceed 20 feet (whichever is greater)?	Yes☐ No☐
	Will the action involve the installation of more than four additional cabinets OR more than one additional equipment shelter?	Yes☐ No☐
	Would mounting the proposed antenna increase the width of the tower by more than 20 feet OR by more than the current width of the tower at the level of the proposed appurtenance (whichever is greater)? Note – the proposed action may exceed these limits if necessary to shelter the antenna from inclement weather or to connect the antenna to the tower via cable	Yes☐ No☐
	Will the action increase the boundaries of the leased or owned property surrounding the tower by more than 30 feet in any direction OR involve excavation outside of these expanded boundaries or any existing access or utility easements?	Yes☐ No☐
	Was the tower constructed after March 16, 2001 AND lacking the required Sec. 106 and environmental review processes?	Yes☐ No☐
	If the answer to all above questions is "No," then no further review is required. If the answer to any of the above questions is "Yes," then additional review is required through Section 106 Consultation.	

☐	**Exclusion C – Construction of a temporary communications tower or facility (e.g. STA grants, COWs, authorized broadcast auxiliary services, ballast mount tower, etc.)**	
	Will the action involve excavation reaching a depth of disturbance greater than 2 feet from the depth of previous disturbance? Note – this does NOT apply to footings and other anchoring mechanisms	Yes☐ No☐
	Will the temporary installation be in operation for more than twenty-four months?	Yes☐ No☐
	If the answer to all above questions is "No," then no further review is required. If the answer to any of the above questions is "Yes," then additional review is required through Section 106 Consultation. **EXCEPTION: if the temporary installation will be in operation for more than twenty-four months AND is associated with national security, this exclusion applies*	

☐	**Exclusion D – Construction of a facility within an existing industrial park, commercial strip mall, or shopping center**	
	Will the installation be over 200 feet above ground level?	Yes☐ No☐
	Does the industrial park, commercial strip mall, or shopping center occupy less than 100,000 square feet?	Yes☐ No☐
	Is the industrial park, commercial strip mall, or shopping center located within the boundaries of OR within 500 feet of a Historic Property?	Yes☐ No☐
	If the answer to all above questions is "No," then only consultation with Indian Tribes and NHOs is required to meet this exclusion. If the answer to any of the above questions is "Yes," then additional review is required through Section 106 Consultation.	

☐	**Exclusion E – Construction of a facility in or within 50' of the outer boundaries of an active right-of-way for communications towers or above-ground utility transmission or distribution lines**	
	Will the action cause the height of the structure to be increased by more than 10% OR by the height of one additional antenna array with separation from the nearest antenna not to exceed 20 feet (whichever is greater)?	Yes☐ No☐
	Will the action involve the installation of more than four additional cabinets OR more than one additional equipment shelter?	Yes☐ No☐
	Would mounting the proposed antenna increase the width of the tower by more than 20 feet OR by more than the current width of the tower at the level of the proposed appurtenance (whichever is greater)?	Yes☐ No☐

	Note – the proposed action may exceed these limits if necessary to shelter the antenna from inclement weather or to connect the antenna to the tower via cable	
	Will the proposed facility be located within the boundaries of a Historic Property?	Yes☐ No☐
	If the answer to all above questions is "No," then only consultation with Indian Tribes and NHOs is required to meet this exclusion. If the answer to any of the above questions is "Yes," then additional review is required through Section 106 Consultation.	

☐	**Exclusion F – Construction of a Tower in a SHPO/THPO permitted area**	
	Does the action occur in an area previously designated by the SHPO/THPO as having limited potential to affect Historic Properties?	Yes☐ No☐
	Was consultation with appropriate Indian tribes and NHOs achieved to determine this area?	Yes☐ No☐
	If the answer to all above questions is "Yes," then no further review is required HOWEVER, such designation should be documented and made publicly available for review by the SHPO/THPO. If the answer to any of the above questions is "No," then additional review is required through either Section 106 Consultation or exclusions in IV below.	

Scope III. Select an Exclusion below based upon the scope of your collocation (CNPA)

☐	**Exclusion A – Collocation of antennas on towers constructed on or before March 16, 2001**	
	Will the action cause the height of the structure to be increased by more than 10% OR by the height of one additional antenna array with separation from the nearest antenna not to exceed 20 feet (whichever is greater)?	Yes☐ No☐
	Will the action involve the installation of more than four additional cabinets or more than one additional equipment shelter?	Yes☐ No☐
	Would mounting the proposed antenna increase the width of the tower by more than 20 feet OR by more than the current width of the tower at the level of the proposed appurtenance (whichever is greater)? Note – the proposed action may exceed these limits if necessary to shelter the antenna from inclement weather or to connect the antenna to the tower via cable	Yes☐ No☐
	Will the action involve the expansion of the current tower site by more than 30 feet in any direction or involve excavation outside these expanded boundaries? The word "site" is defined as "the current boundaries of the leased or owned property surrounding the tower and any access or utility easements currently related to the site and, for other eligible support structures, further restricted to that area in proximity to the structure and to other transmission equipment already deployed on the ground. The current boundaries of a site are the boundaries that existed as of the date that the original support structure or a modification to that structure was last reviewed and approved by a State or local government, if the approval of the modification occurred prior to the Spectrum Act or otherwise outside of the Section 6409(a) process."	Yes☐ No☐
	Has the FCC determined that the tower has an "adverse effect" on one or more historic properties?	Yes☐ No☐
	Is the tower the subject of a pending environmental review before the FCC involving Section 106 compliance?	Yes☐ No☐
	Has the collocation licensee or the owner of the tower received notification of a complaint from the public, an Indian Tribe, a SHPO, or the Council that the collocation has an "adverse effect" on one or more historic properties?	Yes☐ No☐
	If the answer to all above questions is "No," then no further review is required. If the answer to any of the above questions is "Yes," then proceed to Section 106 Consultation.	

☐	**Exclusion B – Collocation of antennas on towers constructed after March 16, 2001**	
	Has the tower NOT previously undergone Section 106 and associated environmental reviews?	Yes☐ No☐

	Will the action cause the height of the structure to be increased by more than 10% OR by the height of one additional antenna array with separation from the nearest antenna not to exceed 20 feet (whichever is greater)?	Yes☐ No☐
	Will the action involve the installation of more than four additional cabinets or more than one additional equipment shelter?	Yes☐ No☐
	Would mounting the proposed antenna increase the width of the tower by more than 20 feet OR by more than the current width of the tower at the level of the proposed appurtenance (whichever is greater)? Note – the proposed action may exceed these limits if necessary to shelter the antenna from inclement weather or to connect the antenna to the tower via cable	Yes☐ No☐
	Will the action involve the expansion of the current tower site by more than 30 feet in any direction or involve excavation outside these expanded boundaries? The word "site" is defined as "the current boundaries of the leased or owned property surrounding the tower and any access or utility easements currently related to the site and, for other eligible support structures, further restricted to that area in proximity to the structure and to other transmission equipment already deployed on the ground. The current boundaries of a site are the boundaries that existed as of the date that the original support structure or a modification to that structure was last reviewed and approved by a State or local government, if the approval of the modification occurred prior to the Spectrum Act or otherwise outside of the Section 6409(a) process."	Yes☐ No☐
	Has the FCC determined that the tower has an "adverse effect" on one or more historic properties?	Yes☐ No☐
	Is the tower the subject of a pending environmental review before the FCC involving Section 106 compliance?	Yes☐ No☐
	Has the collocation licensee or the owner of the tower received notification of a complaint from the public, an Indian Tribe, a SHPO, or the Council that the collocation has an "adverse effect" on one or more historic properties?	Yes☐ No☐
	If the answer to all above questions is "No," then no further review is required. If the answer to any of the above questions is "Yes," then proceed to Section 106 Consultation.	

☒	**Exclusion C – Collocation of antennas on buildings / non-tower structures**	
	A – antennas mounted ON a building or non-tower structure	
	Is the building/structure over 45 years old?	Yes☐ No☒
	Is the building/structure inside of a historic district, OR if the antenna is visible from the ground level of a historic district, is the building/structure within 250 feet of the boundary of the historic district?	Yes☐ No☒
	Is the building/structure a National Historic Landmark or listed in or eligible for listing in the National Register of Historic Places?	Yes☐ No☒
	Has the collocation licensee or the owner of the tower received notification of a complaint from the public, an Indian Tribe, a SHPO, or the Council that the collocation has an "adverse effect" on one or more historic properties?	Yes☐ No☒
	B – antennas mounted IN the interior of a building* *Regardless of building's age, location within a historic district, or antenna's size	
	Is the building/structure a National Historic Landmark or listed in or eligible for listing in the National Register of Historic Places?	Yes☐ No☐
	Has the collocation licensee or the owner of the tower received notification of a complaint from the public, an Indian Tribe, a SHPO, or the Council that the collocation has an "adverse effect" on one or more historic properties?	Yes☐ No☐
	If the answer to all above questions is "No," then no further review is required. If the answer to any of the above question is "Yes," then proceed to additional exclusions below (if applicable) or Section 106 Consultation.	

Scope IV. Select an additional exclusion below based on the scope of the small antenna work (CNPA)

☐	**Exclusion A – Collocation of small wireless antennas and associated equipment on buildings/non-tower structures NOT in historic districts and which are NOT historic properties (regardless of age)**	
	Is the building/structure inside of a historic district, OR if the antenna is visible from the ground level of a historic district, is the building/structure within 250 feet of the boundary of the historic district?	Yes☐ No☐

	Is the building/structure a National Historic Landmark?	Yes☐ No☐
	Is the building/structure listed in or eligible for listing in the National Register of Historic Places?	Yes☐ No☐
	Has the collocation licensee or the owner of the tower received notification of a complaint from the public, an Indian Tribe, a SHPO, or the Council that the collocation has an "adverse effect" on one or more historic properties?	Yes☐ No☐
	Does the antenna exceed the volume limits as specified below? - Each individual antenna must fit within an enclosure (or imaginary enclosure if antenna is exposed) that is no more than three cubic feet in volume, and all antennas on the structure (including any pre-existing antennas) must total no more than six cubic feet in volume in said enclosures (imaginary or otherwise) - All other wireless equipment associated with the structure (excluding cable runs for connection of power/other services) may not cumulatively exceed: o Non-pole structures (buildings, water tanks, etc.) supporting fewer than 3 providers – 28 cubic feet o Pole structures (light poles, traffic signal poles, utility poles, etc.) supporting fewer than 3 providers – 21 cubic feet o Non-pole structures that can support at least 3 providers – 35 cubic feet o Pole structures that can support at least 3 providers – 28 cubic feet *omit any equipment not visible from public spaces at the ground level from 250 feet or less	Yes☐ No☐
	Does the depth and width of any proposed ground disturbance associated with the action exceed the depth and width of any previous ground disturbance? Note - up to four lightning grounding rods of no more than three-quarters of an inch in diameter may be installed per project regardless of previous ground disturbance	Yes☐ No☐
	If the answer to all above questions is "No," then no further review is required. If the answer to any of the above questions is "Yes," then proceed to additional exclusions below (if applicable) or Section 106 Consultation.	

☐	**Exclusion B – Collocation of small or minimally visible wireless antennas and associated equipment IN historic districts or ON historic properties**	
	☐***A – small antennas mounted on a building or non-tower structure OR in the interior of a building that is a historic property OR inside or within 250 feet of the boundary of a historic district***	
	Is the building/structure a National Historic Landmark?	Yes☐ No☐
	Does the **antenna or antenna enclosure** meet any of the following: - visible from the ground level or from public spaces within the building - fits within an enclosure (or imaginary enclosure if the antenna is exposed) that is more than three cubic feet in volume - the antenna is NOT installed using stealth techniques that match or complement the structure on which or within which it is deployed?	Yes☐ No☐
	Is the **antenna's associated equipment** visible from the following? - The ground level anywhere in a historic district (*if action is inside a historic district*) OR - Immediately adjacent streets or public spaces at ground level (*if action is on a historic property but not in a historic district*) OR - Public spaces within the building (*if action is in the interior of a building*)	Yes☐ No☐
	Are the facilities being installed in a way that damages historic materials OR does not permit the removal of such facilities without damaging historic materials?	Yes☐ No☐
	Does the depth and width of any proposed ground disturbance associated with the action exceed the depth and width of any previous ground disturbance? Note - up to four lightning grounding rods of no more than three-quarters of an inch in diameter may be installed per project regardless of previous ground disturbance	Yes☐ No☐
	Has the collocation licensee or the owner of the tower received notification of a complaint from the public, an Indian Tribe, a SHPO, or the Council that the collocation has an "adverse effect" on one or more historic properties?	Yes☐ No☐

	If the answer to all above questions is "No," then further review is not required. If the answer to any of the above questions is "Yes," then additional exclusions below (if applicable) or Section 106 Consultation.	
	☐ ***B – Small antennas mounted on a utility structure (not including structures whose primary purpose is to provide public lighting) in active use and either is a historic property, located on a historic property, or located inside or within 250 feet of the boundary of a historic district***	
	Does the antenna fit within an enclosure (or imaginary enclosure if antenna is exposed) that exceeds more than three cubic feet in volume, OR exceeds a cumulative limit of six cubic feet in volume if there is more than one antenna/antenna enclosure on the structure?	Yes☐ No☐
	Does the wireless equipment associated with the antenna and any pre-existing antennas and equipment (excluding cable runs for power) exceed 21 cubic feet in volume?	Yes☐ No☐
	Does the depth and width of any proposed ground disturbance associated with the action exceed the depth and width of any previous ground disturbance? Note - up to four lightning grounding rods of no more than three-quarters of an inch in diameter may be installed per project regardless of previous ground disturbance	Yes☐ No☐
	If the answer to all above questions is "No," then further review is not required. If the answer to any of the above questions is "Yes," then additional exclusions below (if applicable) or Section 106 Consultation.	
	☐ ***C – Mounting small antennas on a traffic control structure or on a light pole, lamp post, or other structure whose primary purpose is to provide public lighting, located inside or within 250' of the boundary of a historic district***	
	Is the structure a National Historic Landmark or listed in or eligible for listing in the National Register of Historic Places?	Yes☐ No☐
	Does the antenna fit within an enclosure (or imaginary enclosure if antenna is exposed) that exceeds more than three cubic feet in volume, OR exceeds a cumulative limit of six cubic feet in volume if there is more than one antenna/antenna enclosure on the structure?	Yes☐ No☐
	Does the wireless equipment associated with the antenna and any pre-existing antennas and equipment (excluding cable runs for power) exceed 21 cubic feet in volume?	Yes☐ No☐
	Does the depth and width of any proposed ground disturbance associated with the action exceed the depth and width of any previous ground disturbance? Note - up to four lightning grounding rods of no more than three-quarters of an inch in diameter may be installed per project regardless of previous ground disturbance	Yes☐ No☐
	If the answer to all above questions is "No," then consultation with the SHPO in writing is required on a case-by-case basis to determine that the structure is not a contributing or compatible element within the historic district. If the answer to any of the above questions is "Yes," then proceed to Section 106 Consultation.	

☐	**Exclusion C – <u>Replacements of existing small wireless antennas</u> and associated equipment mounted ON a building or non-tower structure or IN the interior of a building that IS: a historic property (including a National Historic Landmark or property listed or eligible for listing in the National Register of Historic Places), inside or within 250 feet of the boundary of a historic district, or located on or inside a building/non-tower structure that is over 45 years of age (regardless of visibility)**	
	Has the antenna deployment being replaced undergone Section 106 review process (unless such review was not required at the time the antenna being replaced was installed)?	Yes☐ No☐
	Is the facility a replacement for an existing facility AND does not exceed the greater of these two options? 1. The size of the existing antenna/enclosure and associated equipment 2. The antenna (excluding associated equipment) fits within an enclosure (or imaginary enclosure if antenna is exposed) that is no more than three cubic feet in volume, with a cumulative limit of 6 cubic feet (if there is more than one antenna) AND the wireless equipment associated with the antenna and any pre-existing antennas and equipment (excluding cable runs for power) are cumulatively no more than 21 cubic feet in volume	Yes☐ No☐
	Does the replacement of the facilities not damage historic materials and permits the removal of such facilities without damaging historic materials?	Yes☐ No☐
	Does the depth and width of any proposed ground disturbance associated with the action NOT exceed the depth and width of any previous ground disturbance?	Yes☐ No☐

	Note - up to four lightning grounding rods of no more than three-quarters of an inch in diameter may be installed per project regardless of previous ground disturbance	
	If the answer to all above questions is "Yes," then no further review is required. If the answer to any of the above questions is "No," then proceed to Section 106 Consultation.	

Scope V. Select a further exclusion below based on the scope of the small-cell work (R&O)

☐	**Additional Exemptions for collocations on buildings/non-tower structures over 45 years old**	
	Is there an existing antenna on the building/structure?	Yes☐ No☐
	Will the new antenna comply with all zoning conditions and historic preservation conditions applicable to existing antennas in the same vicinity (i.e. camouflage or concealment requirements)?	Yes☐ No☐
	Will the deployment of the new antenna NOT involve the disturbance of new ground? "no new ground disturbance": when the depth and width of previous disturbance exceeds the proposed construction depth and width by at least two feet	Yes☐ No☐
	Is the structure over 45 years old BUT NOT a designated National Historic Landmark, listed or eligible for listing in the National Register of Historic Places, or inside or within 250 feet of the boundary of a historic district?	Yes☐ No☐
	i. ☐*Non-Visible Antennas*	
	Is the new antenna NOT visible from any adjacent streets or surrounding public spaces?	Yes☐ No☐
	Is the new antenna being placed in the same vicinity as a pre-existing antenna? "same vicinity": on the same rooftop, façade, or other surface	Yes☐ No☐
	ii. ☐*Visible Replacement Antennas*	
	Is the antenna a replacement for a pre-existing antenna?	Yes☐ No☐
	Is the new antenna to be located in the same vicinity of the pre-existing antenna? "same vicinity": on the same rooftop, façade, or other surface AND centerpoint of new antenna is within ten feet of the centerpoint of the pre-existing antenna	Yes☐ No☐
	Is the new antenna visible only from adjacent streets and surrounding public spaces that also afforded a view of the pre-existing antenna?	Yes☐ No☐
	Is the new antenna no more than 3 feet larger in height or width than the pre-existing antenna?	Yes☐ No☐
	Will no new equipment cabinets be visible from the adjacent streets or surrounding public spaces?	Yes☐ No☐
	iii. ☐*Other Visible Antennas*	
	Is the new antenna to be located in the same vicinity of the pre-existing antenna? "same vicinity": on the same rooftop, façade, or other surface AND centerpoint of new antenna is within ten feet of the centerpoint of the pre-existing antenna	Yes☐ No☐
	Will the new antenna only be visible from adjacent streets and surrounding public spaces that also afford views of the pre-existing antennas?	Yes☐ No☐
	Was the pre-existing antenna used to justify this exclusion NOT ALSO justified previously via this exclusion (1.1307(a)(4)(ii)(B)(2)(iii))?	Yes☐ No☐
	Is the new antenna no more than 3 feet larger in height or width than the pre-existing antenna?	Yes☐ No☐
	Will no new equipment cabinets be visible from the adjacent streets or surrounding public spaces?	Yes☐ No☐
	If the answer to all above questions is "Yes," then no further review is required. If the answer to any of the above questions is "No," then proceed to Section 106 Consultation.	

FINDINGS:

Section 106 consultation is required In accordance with the process set forth in the FCC's NPA and 47 CFR Part 1.1301 – 1.1319 of the FCC regulations	**Yes**☐ **No**☒
Only consultation with Indian Tribes and NHOs is required to meet this exclusion In accordance with Section III of the FCC NPA. If as a result of this process the Applicant or the Commission identifies a Historic Property that may be affected, the Applicant must complete the Section 106 review process.	**Yes**☐ **N/A**☒

I hereby certify that the proposed project has been properly evaluated under the terms of the above-referenced FCC regulations.

Pertinent notes: Per the review of historical aerial photographs, the structure appears to have been constructed between 2007 and 2009 and per the photograph provided by the Middleborough GIS Mapper, the structure does not appear to have been constructed "for the sole or primary purpose of supporting FCC-licensed antennas and their associated facilities," as the structure appears to be training/testing lattice structure. Also, pursuant to the NIER Study completed by TEP, the proposed installation will be in compliance with the current FCC MPE limits. Therefore, the proposed installation is categorically excluded from further FCC environmental processing.

Ryan A. Malek

Signature — 4/27/2023 (Date)

Ryan Malek

(Print name)

Director of Environmental Regulatory Compliance

Title

rmalek@tepgroup.net 919-661-6351

Contact

47 CFR § 1.1306 - Actions which are categorically excluded from environmental processing.

- CFR

§ 1.1306 Actions which are categorically excluded from environmental processing.

(a) Except as provided in § 1.1307 (c) and (d), Commission actions not covered by § 1.1307 (a) and (b) are deemed individually and cumulatively to have no significant effect on the quality of the human environment and are categorically excluded from environmental processing.

(b) Specifically, any Commission action with respect to any new application, or minor or major modifications of existing or authorized facilities or equipment, will be categorically excluded, provided such proposals do not:

(1) Involve a site location specified under § 1.1307(a) (1)-(7), or

(2) Involve high intensity lighting under § 1.1307(a)(8).

(3) Result in human exposure to radiofrequency radiation in excess of the applicable safety standards specified in § 1.1307(b).

(c)

(1) Unless § 1.1307(a)(4) is applicable, the provisions of § 1.1307(a) requiring the preparation of EAs do not encompass the construction of wireless facilities, including deployments on new or replacement poles, if:

(i) The facilities will be located in a right-of-way that is designated by a Federal, State, local, or Tribal government for communications towers, above-ground utility transmission or distribution lines, or any associated structures and equipment;

(ii) The right-of-way is in active use for such designated purposes; and

(iii) The facilities would not

(A) Increase the height of the tower or non-tower structure by more than 10% or twenty feet, whichever is greater, over existing support structures that are located in the right-of-way within the vicinity of the proposed construction;

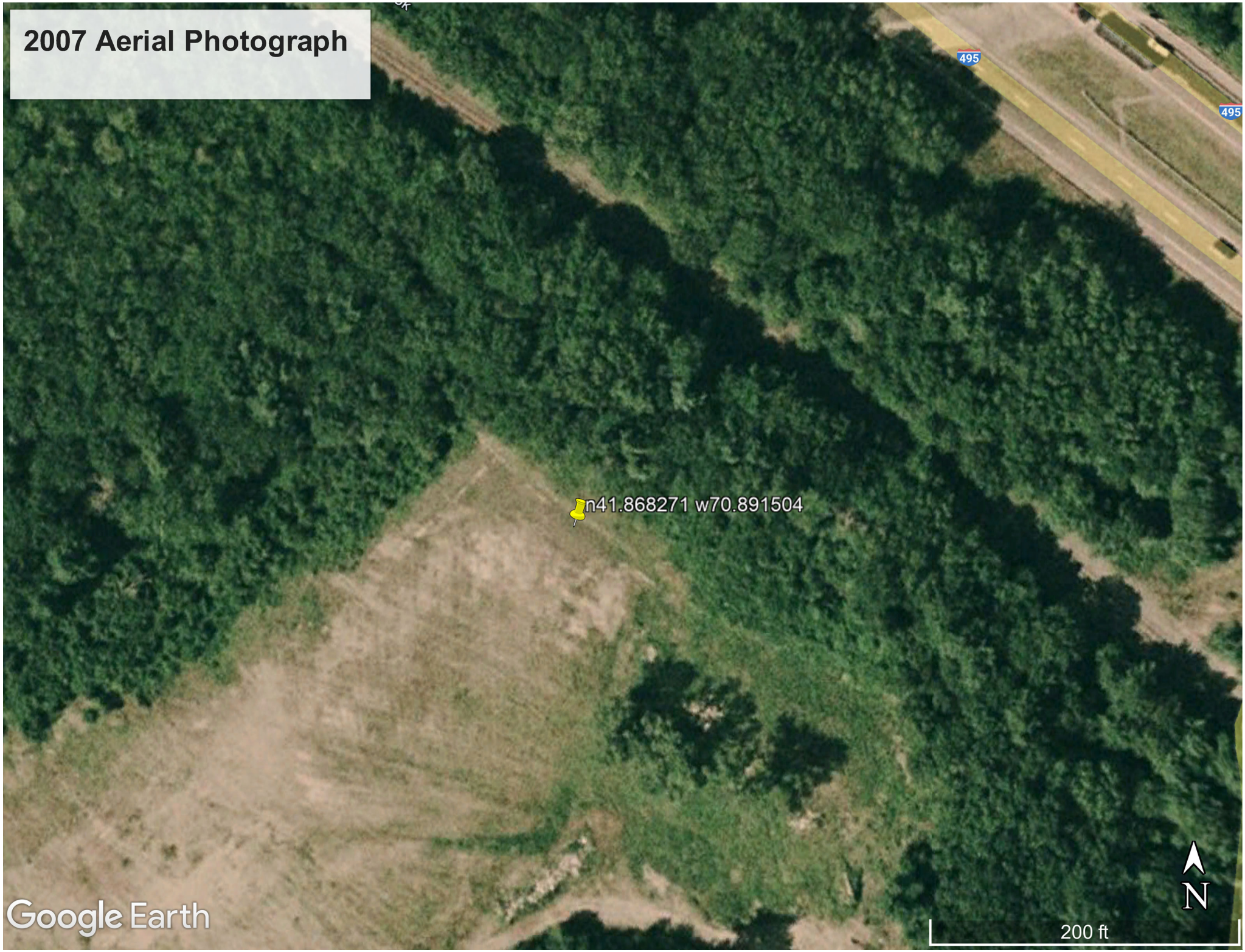
(B) Involve the installation of more than four new equipment cabinets or more than one new equipment shelter;

(C) Add an appurtenance to the body of the structure that would protrude from the edge of the structure more than twenty feet, or more than the width of the structure at the level of the appurtenance, whichever is greater (except that the deployment may exceed this size limit if necessary to shelter the antenna from inclement weather or to connect the antenna to the tower via cable); or

(D) Involve excavation outside the current site, defined as the area that is within the boundaries of the leased or owned property surrounding the deployment or that is in proximity to the structure and within the boundaries of the utility easement on which the facility is to be deployed, whichever is more restrictive.

(2) Such wireless facilities are subject to § 1.1307(b) and require EAs if their construction would result in human exposure to radiofrequency radiation in excess of the applicable health and safety guidelines cited in § 1.1307(b).

NOTE 1:
The provisions of § 1.1307(a) requiring the preparation of EAs do not encompass the mounting of antenna(s) and associated equipment (such as wiring, cabling, cabinets, or backup-power), on or in an existing building, or on an antenna tower or other man-made structure, unless § 1.1307(a)(4) is applicable. Such antennas are subject to § 1.1307(b) of this part and require EAs if their construction would result in human exposure to radiofrequency radiation in excess of the applicable health and safety guidelines cited in § 1.1307(b) of this part. The provisions of § 1.1307 (a) and (b) of this part do not encompass the installation of aerial wire or cable over existing aerial corridors of prior or permitted use or the underground installation of wire or cable along existing underground corridors of prior or permitted use, established by the applicant or others. The use of existing buildings, towers or corridors is an environmentally desirable alternative to the construction of new facilities and is encouraged. The provisions of § 1.1307(a) and (b) of this part do not encompass the construction of new submarine cable systems.


2007 Aerial Photograph
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Google Earth


2009 Aerial Photograph
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Google Earth
Image MassGIS, Commonwealth of Massachusetts EOEA
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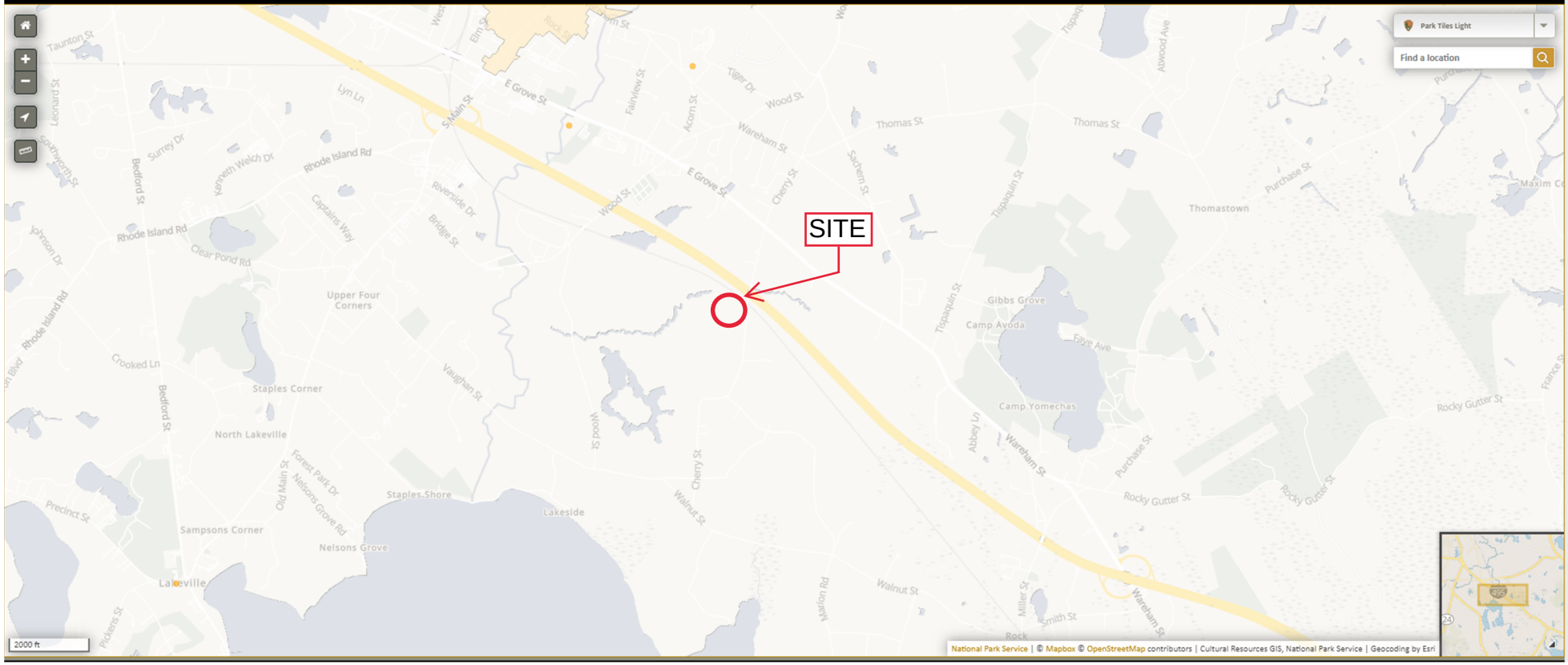
03/01/2019
CORMACH

National Register of Historic Places

Public, non-restricted data depicting National Register spatial data processed by the Cultural Resources GIS facility. Last minor update, September 2020.

National Park Service
U.S. Department of the Interior



RF Design and Services
326 Tryon Road
Raleigh, North Carolina 27603
(815) 721-6954
WWW.TEPGROUP.NET

Non-Ionizing Electromagnetic Radiation (NIER) Study

Prepared For:

Antenna Research Associates

Location:

Middleboro, Massachusetts

Site Name:

MA Tower Site

Site Number:

N/A

April 22nd, 2023

0330170 P-396215

Michael W. Hayden NCE CPBE CBNT AMD CPI
Director, RF Design & Services
Tower Engineering Professionals

RF Design and Services
326 Tryon Road
Raleigh, North Carolina 27603
(815) 721-6954
WWW.TEPGROUP.NET

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RF Design and Services
326 Tryon Road
Raleigh, North Carolina 27603
(815) 721-6954
WWW.TEPGROUP.NET

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326 Tryon Road
Raleigh, North Carolina 27603
(815) 721-6954
WWW.TEPGROUP.NET

Non-Ionizing Electromagnetic Radiation (NIER) Study

MA Tower Site
Middleboro, MA

INTRODUCTION

Tower Engineering Professionals RF Design & Services Division (TEP-RF) of Raleigh, North Carolina, has been retained by Antenna Research Associates (ARA) of Laurel, Maryland to evaluate the RF emissions compared to the Maximum Permissible Exposure (MPE) limit in support of an application for a Federal Communications Commission (FCC) Experimental License for a test antenna installation at this location. This evaluation uses compliance standards as outlined in FCC OET-65.

SITE AND FACILITY CONSIDERATIONS

Site MA Tower Site is located at 171 Cherry Street in Middleboro, MA at coordinates 41.868271, -70.891504. The center of radiation (COR) will vary between 20' & 30'. This facility will be used for the development of directional antennae. This study will use CORs of both 20' & 30' above ground level. A frequency of 1030 MHz with a transmitter output power (TPO) of 1 KW was used for this study. Antennae which are under development will have gains of 15 dB, yielding an effective radiated power (ERP) of 31.6 KW. Antenna beamwidth is unknown, but irrelevant for the close-in distances used in this study. As the azimuth of the antenna under test is unknown, a bearing line of 0.0°relative to the face of the antenna was used. The support structure type is unknown. A satellite view of the study and exclusion areas for both 20' & 30' may be found in Appendix 1, Study & Exclusion Areas.

POWER DENSITY CALCULATIONS

Power densities were calculated based on FCC MPE limits for both General Population/Uncontrolled and Occupational/Controlled environments.

For the purpose of this study, a radius of 200' from the antenna with a height of 6' above ground level was used, beyond 200' the MPE levels become *di minimus*. This study utilized FCC recognized and accepted software programs using the emissions, ERP levels, and antenna data provided by ARA. The results of this study are located in Appendix 2, FCC OET-65 MPE Limit Study. A discussion regarding the FCC limits may be found in Appendix 3, Study Methodology. A discussion describing Non-ionizing Radiation Prediction Models used in this study may be found in Appendix 4.

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SITE MITIGATION & CONTROL

In order to comply with FCC requirements, TEP-RF recommends the placement signage at the base of the support structure to alert workers of potential exposure to RF fields while working on or near the antenna. The following exclusion zones should be marked using physical barriers such as traffic cones with chains:

20' COR

Occupational/Controlled: 55' from antenna.
General Population/Uncontrolled: 122' from antenna.

30' COR

Occupational/Controlled: 51' from antenna.
General Population/Uncontrolled: 122' from antenna.

TEP-RF recommends that all personnel working in the area of the antenna be trained in RF safety procedures and carry a personal RF monitor at all times.

COMPLIANCE DETERMINATION

This installation ***WILL BE*** incompliance with current FCC MPE limits as described in FCC OET-65 if recommended mitigation procedures are implemented.

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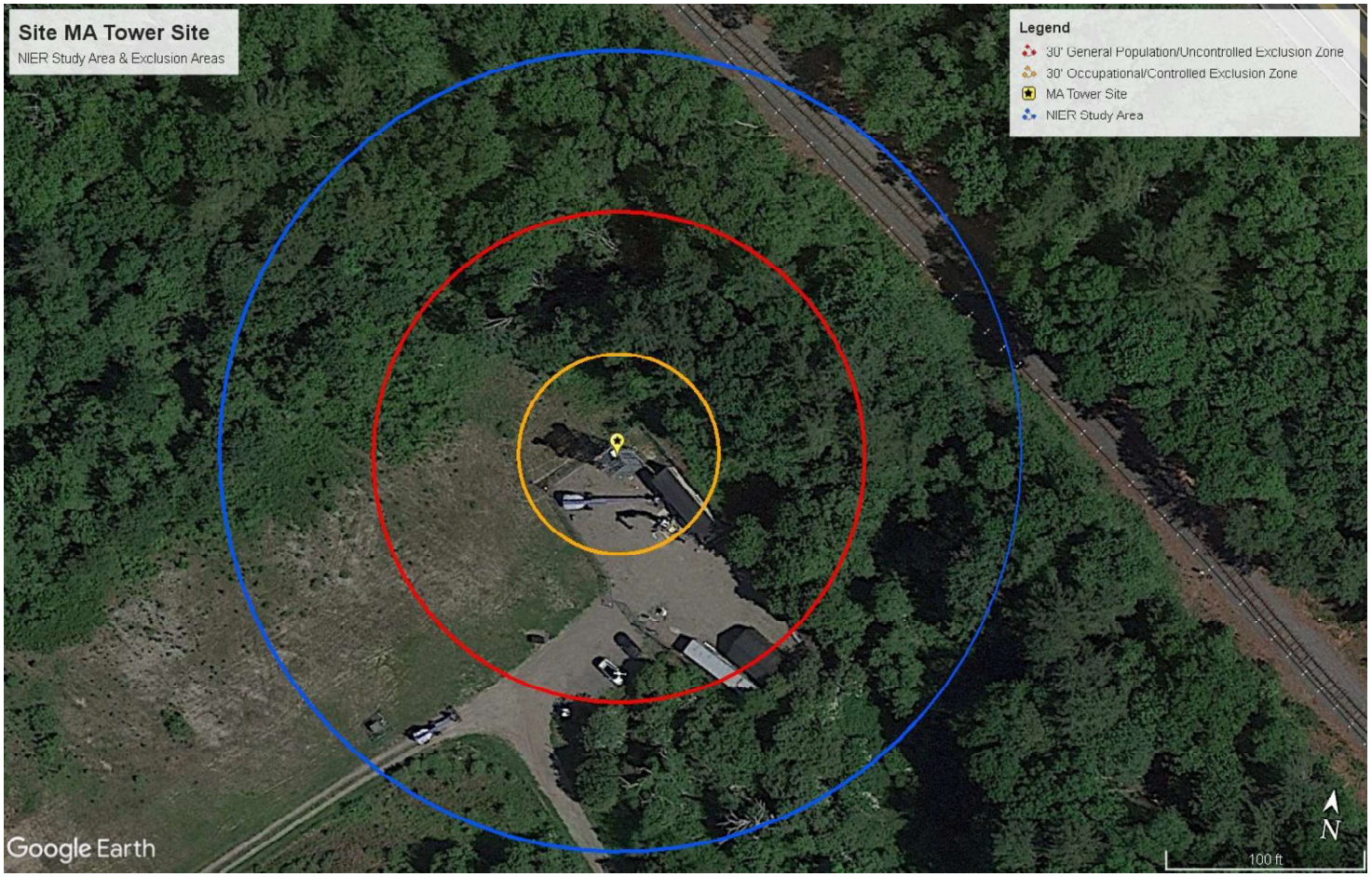
APPENDIX 1a Study and Exclusion Areas



30' COR

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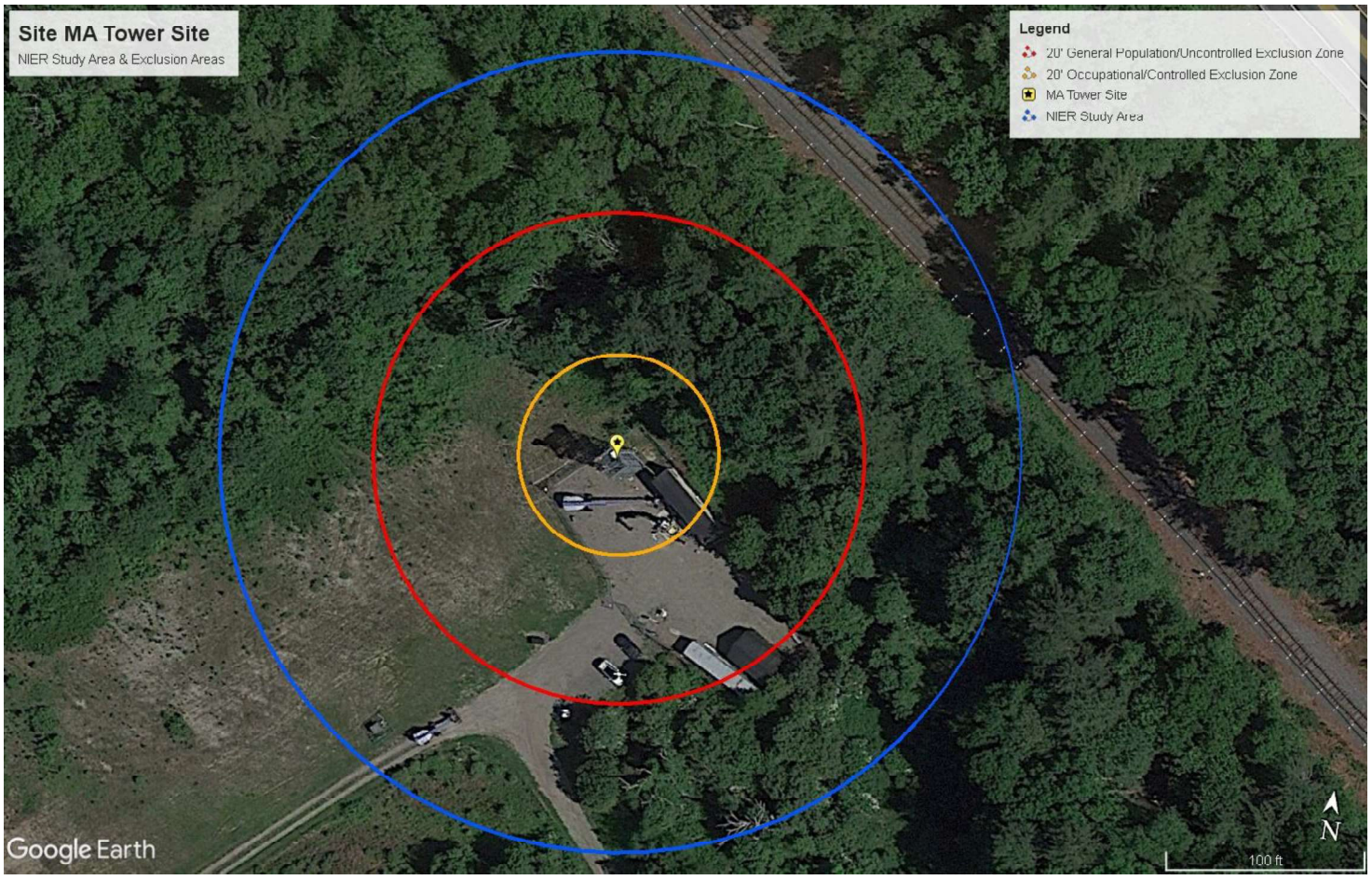
APPENDIX 1b Study and Exclusion Areas



20’ COR

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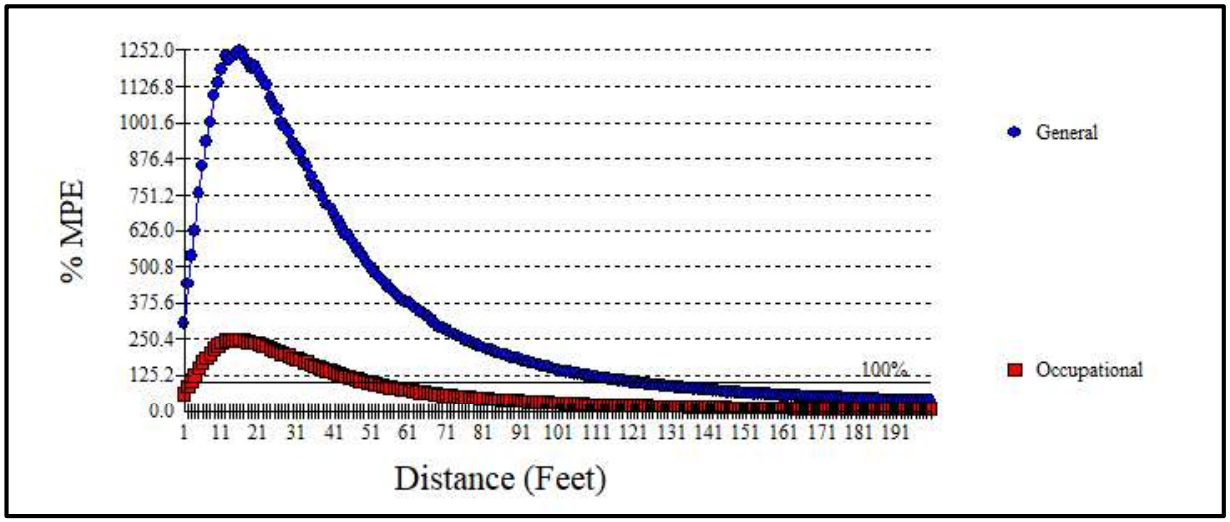
APPENDIX 2a FCC OET-65 MPE Limit Study (30')



Maximum Power Density (@12'):	8.4462 mW/cm^2
General Population MPE (@12'):	1230.0%
Occupational MPE (@12'):	246.0%

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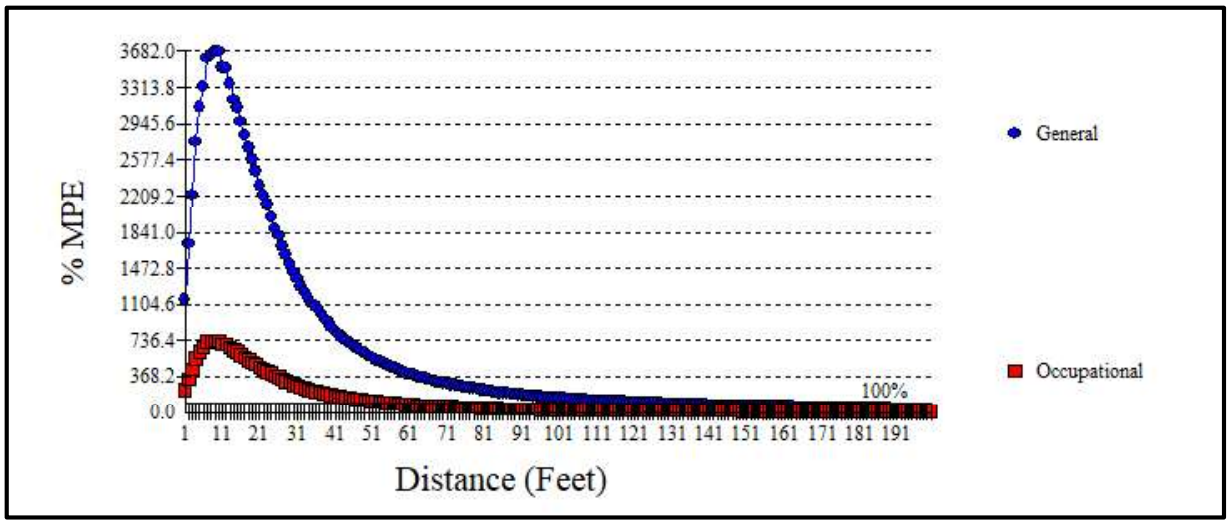
APPENDIX 2b FCC OET-65 MPE Limit Study (20')



Maximum Power Density (@10'):	25.2157 mW/cm²
General Population MPE (@10'):	3681.0%
Occupational MPE (@10'):	736.0%

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APPENDIX 3 INFORMATION PERTAINING TO MPE STUDIES

In 1985, the FCC first adopted guidelines to be used for evaluating human exposure to RF emissions. The FCC revised and updated these guidelines on August 1, 1996, as a result of a rule-making proceeding initiated in 1993. The new guidelines incorporate limits for Maximum Permissible Exposure (MPE) in terms of electric and magnetic field strength and power density for transmitters operating at frequencies between 300 kHz and 100 GHz.

The FCC's MPE limits are based on exposure limits recommended by the National Council on Radiation Protection and Measurements (NCRP) and, over a wide range of frequencies, the exposure limits were developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI) to replace the 1982 ANSI guidelines. Limits for localized absorption are based on recommendations of both ANSI/IEEE and NCRP.

The FCC's limits, and the NCRP and ANSI/IEEE limits on which they are based, are derived from exposure criteria quantified in terms of specific absorption rate (SAR). The basis for these limits is a whole-body averaged SAR threshold level of 4 watts per kilogram (4 W/kg), as averaged over the entire mass of the body, above which expert organizations have determined that potentially hazardous exposures may occur. The MPE limits are derived by incorporating safety factors that lead, in some cases, to limits that are more conservative than the limits originally adopted by the FCC in 1985. Where more conservative limits exist, they do not arise from a fundamental change in the RF safety criteria for whole-body averaged SAR, but from a precautionary desire to protect subgroups of the general population who, potentially, may be more at risk.

The FCC exposure limits are also based on data showing that the human body absorbs RF energy at some frequencies more efficiently than at others. The most restrictive limits occur in the frequency range of 30-300 MHz where whole-body absorption of RF energy by human beings is most efficient. At other frequencies, whole-body absorption is less efficient, and consequently, the MPE limits are less restrictive.

MPE limits are defined in terms of power density (units of milliwatts per centimeter squared: mW/cm^2), electric field strength (units of volts per meter: V/m) and magnetic field

strength (units of amperes per meter: A/m). The far-field of a transmitting antenna is where the electric field vector (E), the magnetic field vector (H), and the direction of propagation can be considered to be all mutually orthogonal ("plane-wave" conditions).

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

General population/uncontrolled exposure limits apply to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public would always be considered under this category when exposure is not employment-related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area. Additional details can be found in FCC OET 65.

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APPENDIX 4 MPE STANDARDS METHODOLOGY

This study predicts RF field strength and power density levels that emanate from communications system antennae. It considers all transmitter power levels (less filter and line losses) delivered to each active transmitting antenna at the communications site. Calculations are performed to determine power density and MPE levels for each antenna as well as composite levels from all antennas. The calculated levels are based on where a human (Observer) would be standing at various locations at the site. The point of interest where the MPE level is predicted is based on the height of the Observer.

Compliance with the FCC limits on RF emissions are determined by spatially averaging a person's exposure over the projected area of an adult human body, that is approximately six-feet or two-meters, as defined in the ANSI/IEEE C95.1 standard. The MPE limits are specified as time-averaged exposure limits. This means that exposure is averaged over an identifiable time interval. It is 30 minutes for the general population/uncontrolled RF environment and 6 minutes for the occupational/controlled RF environment. However, in the case of the general public, time averaging should not be applied because the general public is typically not aware of RF exposure and they do not have control of their exposure time. Therefore, it should be assumed that any RF exposure to the general public will be continuous.

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The FCC's limits for exposure at different frequencies are shown in the following Tables.

Limits for Occupational/Controlled Exposure				
Frequency Range (MHz)	**Electric Field Strength (E) (V/m)**	**Magnetic Field Strength (H) (A/m)**	**Power Density (S) (mW/cm^2)**	**Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)**
0.3 - 3.0	614	1.63	100*	6
3.0 - 30	1842/f	4.89/f	$900/F^2$	6
30 - 300	61.4	0.163	1.0	6
300 - 1500	--	--	f/300	6
1500 - 100,000	--	--	5	6

f = frequency

* = Plane-wave equivalent power density

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Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (E) (V/m)**	**Magnetic Field Strength (H) (A/m)**	**Power Density (S) (mW/cm^2)**	**Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)**
0.3 - 1.34	614	1.63	100*	30
1.34 - 30	824/f	2.19/f	$180/F^2$	30
30 -300	27.5	0.073	0.2	30
300 -1500	--	--	f/1500	30
1500 -100,000	--	--	1.0	30

f = frequency

* = Plane-wave equivalent power density

General population/uncontrolled exposures apply in situations in which the general public may be exposed or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

It is important to understand that these limits apply cumulatively to all sources of RF emissions affecting a given area. For example, if several different communications system antennas occupy a shared facility such as a tower or rooftop, then the total exposure from all systems at the facility must be within compliance of the FCC guidelines.

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The field strength emanating from an antenna can be estimated based on the characteristics of an antenna radiating in free space. There are basically two field areas associated with a radiating antenna. When close to the antenna, the region is known as the Near Field. Within this region, the characteristics of the RF fields are very complex and the wave front is extremely curved. As you move further from the antenna, the wave front has less curvature and becomes planar. The wave front still has a curvature but it appears to occupy a flat plane in space (plane-wave radiation). This region is known as the Far Field.

Two models are utilized to predict Near and Far field power densities. They are based on the formulae in FCC OET 65. As this study is concerned only with Near Field calculations, we will only describe the model used for this study. For additional details, refer to FCC OET Bulletin 65.

Cylindrical Model (Near Field Predictions)

Spatially averaged plane-wave equivalent power densities parallel to the antenna may be estimated by dividing the antenna input power by the surface area of an imaginary cylinder surrounding the length of the radiating antenna. While the actual power density will vary along the height of the antenna, the average value along its length will closely follow the relation given by the following equation:

$$S = P \div 2\pi RL$$

Where:

S = Power Density

P = Total Power into antenna

R = Distance from the antenna

L = Antenna aperture length

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For directional-type antennas, power densities can be estimated by dividing the input power by that portion of a cylindrical surface area corresponding to the angular beam width of the antenna. For example, for the case of a 120-degree azimuthal beam width, the surface area should correspond to 1/3 that of a full cylinder. This would increase the power density near the antenna by a factor of three over that for a purely omni-directional antenna. Mathematically, this can be represented by the following formula:

$$S = (180 / \theta_{BW}) P \div \pi RL$$

Where:

S = Power Density

θ_{BW} = Beam width of antenna in degrees (3 dB half-power point)

P = Total Power into antenna

R = Distance from the antenna

L = Antenna aperture length

If the antenna is a 360-degree omni-directional antenna, this formula would be equivalent to the previous formula.

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Spherical Model (Far Field Predictions)

Spatially averaged plane-wave power densities in the Far Field of an antenna may be estimated by considering the additional factors of antenna gain and reflective waves that would contribute to exposure.

The radiation pattern of an antenna has developed in the Far Field region and the power gain needs to be considered in exposure predictions. Also, if the vertical radiation pattern of the antenna is considered, the exposure predictions would most likely be reduced significantly at ground level, resulting in a more realistic estimate of the actual exposure levels.

Additionally, to model a truly "worst case" prediction of exposure levels at or near a surface, such as at ground-level or on a rooftop, reflection off the surface of antenna radiation power can be assumed, resulting in a potential four-fold increase in power density.

These additional factors are considered and the Far Field prediction model is determined by the following equation:

$$S = EIRP \times Rc \div 4\pi R^2$$

Where:

S = Power Density

EIRP = Effective Radiated Power from antenna

Rc = Reflection Coefficient (2.56)

R = Distance from the antenna

The EIRP includes the antenna gain. If the antenna pattern is considered, the antenna gain is relative based on the horizontal and vertical pattern gain values at that particular location in space, on a rooftop or on the ground. However, it is recommended that the antenna radiation pattern characteristics not be considered to provide a conservative "worst case" prediction. This is the equation is utilized for the Far Field exposure predictions herein.