

**FCC FORM 442 - FEDERAL COMMUNICATIONS COMMISSION  
APPLICATION FOR NEW OR MODIFIED RADIO STATION UNDER PART 5 OF FCC  
RULES - EXPERIMENTAL RADIO SERVICE (OTHER THAN BROADCAST)**

**Approved by  
OMB  
3060 - 0065  
Expires  
09/30/98**

**Applicant's Name (company):** Warren H. Ziegler      **File No.:** 0151-EX-PL-2007

**Mailing Address**

**Attention:** Warren H. Ziegler  
**Street Address:** 157 Plain Rd  
**P.O. Box:**  
**City:** Wayland  
**State:** MA  
**Country:**  
**Zip Code:** 01778  
**E-Mail Address:** k2ors@comcast.net

**Application Purpose**

**Application is for:** NEW LICENSE

**For Modification indicate below**

**File No.:**      **Callsign:**

**Government Contract**

**Is this authorization to be used for fulfilling the requirement of a government contract with an agency of the United States Government? If "YES", include as an exhibit a narrative statement describing the government project, agency and contract number.** No

**Foreign Government Use**

**Is this authorization to be used for the exclusive purpose of developing radio equipment for export to be employed by stations under the jurisdiction of a foreign government? If "YES", include the contract number and the name of the foreign government concerned as an exhibit.** No

**Research Project**

**Is this authorization to be used for providing communications essential to a research project? (The radio communication is not the objective of the research project)? If "YES", include as an exhibit the following information:**

- a. A description of the nature of the research project being conducted.
- b. A showing that the communications facilities requested are necessary for the research project involved.
- c. A showing that existing communications facilities are inadequate.

No

**Exhibit Information**

If all the answers to Items 4, 5, 6 are "NO", include as an exhibit a narrative statement describing in detail the following items:

- a. The complete program of research and experimentation proposed including description of equipment and theory of operation.
- b. The specific objectives sought to be accomplished.
- c. How the program of experimentation has a reasonable promise of contribution to the development, extension, expansion or utilization of the radio art, or is along line not already investigated.

**Estimated Duration**

Give an estimate of the length of time that will be required to complete the program of experimentation proposed in this application: 60 Months

**Environmental Impact**

Would a commission grant of this application come within Section 1.1307 of the FCC Rules, such that it may have a significant environmental impact? If "YES", include as an exhibit an Environmental Assessment as required by Section 1.1311. No

**Manufacturer**

List below transmitting equipment to be installed (if experimental, so state) if additional rows are required, please submit equipment list as an exhibit :

Manufacturer	Model Number	No. Of Units	Experimental
Nautel	NX-100	1	No
Warren H. Ziegler	Experimental	1	No
Jay Rusgrove	Experimental	1	No
John Andrews	Experimental	1	No
William Ashlock	Experimental	1	No

**Station ID**

Is the equipment listed in Item 10 capable of station identification pursuant to Section 5.115? Yes

**Applicant Type**

Applicant is: Partnership

**Foreign Government**

Is applicant a foreign government or a representative of a foreign government? No

**License Denied or Revoked**

Has applicant or any party to this application had any FCC station license or permit revoked or any application for permit, license or renewal denied by this Commission? If "YES", include as an exhibit a statement giving call sign of license or permit revoked and relate circumstances. No

**Owner and Operator**

**Will applicant be owner and operator of the station?** Yes

**Contact Information**

**Give the following information of person who can best handle inquiries pertaining to this application: First**

**Name:** Warren

**Last Name:** Ziegler

**Title:** Owner/Operator

**Phone Number:** 508 358 0216

**E-Mail Address:** k2ors@comcast.net

**Drug Abuse Question**

**APPLICANT ANTI-DRUG ABUSE CERTIFICATION:** By checking "YES", the individual applicant certifies that he or she is eligible for this license. This requires that he or she is not subject to a denial of federal benefits, including FCC benefits, as a result of a drug offense conviction pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862. A non-individual applicant, e.g., corporation, partnership or other unincorporated association, certifies that no party to the application is subject to a denial of federal benefits, pursuant to that section. For definition of a "party" for these purposes, see 47CFR 1.2002(b). Yes

**Certification****THE APPLICANT CERTIFIES THAT:**

- a. Copies of the FCC Rule Parts 2 and 5 are on hand; and
- b. Adequate financial appropriations have been made to carry on the program of experimentation which will be conducted by qualified personnel; and
- c. All operations will be on an experimental basis in accordance with Part 5 and other applicable rules, and will be conducted in such a manner and at such a time as to preclude harmful interference to any authorized station; and
- d. Grant of the authorization requested herein will not be construed as a finding on the part of the Commission:
  - 1. that the frequencies and other technical parameters specified in the authorization are the best suited for the proposed program of experimentation, and
  - 2. that the applicant will be authorized to operate on any basis other than experimental, and
  - 3. that the Commission is obligated by the results of the experimental program to make provision in its rules including its table of frequency allocations for applicant's type of operation on a regularly licensed basis.

**THE APPLICANT FURTHER CERTIFIES THAT:**

- e. All the statements in the application and attached exhibits are true, complete and correct to the best of the applicant's knowledge; and
- f. The applicant is willing to finance and conduct the experimental program with full knowledge and understanding of the above limitations; and
- g. The applicant waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the USA.

**Name of Applicant:** Warren H. Ziegler

**Signature (Authorized person filing form):** Warren H Ziegler

**Signature Date (Authorized person filing form):** 03/27/2007

**Title of Person Signing Application:** Owner/Operator

**Classification:** Member of applicant partnership

**WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND/OR IMPRISONMENT (U.S. CODE, TITLE 18, SECTION 1001), AND/OR REVOCATION OF ANY STATION LICENSE OR CONSTRUCTION PERMIT (U.S. CODE, TITLE 47, SECTION 312(A)(1)), AND/OR FORFEITURE (U.S. CODE, TITLE 47, SECTION 503).**

**NOTIFICATION TO INDIVIDUALS UNDER PRIVACY ACT OF 1974 AND THE PAPERWORK REDUCTION ACT OF 1980**

Information requested through this form is authorized by the Communications Act of 1934, as amended, and specified by Section 308 therein. The information will be used by Federal Communications Commission staff to determine eligibility for issuing authorizations in the use of the frequency spectrum and to effect the provisions of regulatory responsibilities rendered by the Commission by the Act. Information requested by this form will be available to the public unless otherwise requested pursuant to 47 CFR 0.459 of the FCC Rules and Regulations. Your response is required to obtain this authorization.

Public reporting burden for this collection of information is estimated to average four (4) hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden to the Federal Communications Commission, Records Management Branch, Paperwork Reduction Project (3060-0065), Washington DC 20554. DO NOT send completed applications to this address. Individuals are not required to respond to this collection unless it displays a currently valid OMD control number.

**THE FOREGOING NOTICE IS REQUIRED BY THE PRIVACY ACT OF 1974, P.L. 93-579, DECEMBER 31, 1974, 5 U.S.C. 552a(e)(3), AND THE PAPERWORK REDUCTION ACT OF 1980, P.L. 96-511, DECEMBER 11, 1980, 44 U.S.C. 3507.**

**Station Location**

City	State	Latitude	Longitude	Mobile	Street (or other indication of location)	County	Radius of Operation
0 Wayland	Massachusetts	North 42 21 55	West 71 20 8	300 KM radius of Wayland,MA	157 Plain Road	MIDDLESEX	300.00

**Datum:** NAD 83

**Is a directional antenna (other than radar) used?** No

**Exhibit submitted:** No

**(a) Width of beam in degrees at the half-power point:**

**(b) Orientation in horizontal plane:**

**(c) Orientation in vertical plane:**

**Will the antenna extend more than 6 meters above the ground, or if mounted on an existing building, will it extend more than 6 meters above the building, or will the proposed antenna be mounted on an existing structure other than a building?** Yes

**(a) Overall height above ground to tip of antenna in meters:** 30.00

**(b) Elevation of ground at antenna site above mean sea level in meters:** 49.00

**(c) Distance to nearest aircraft landing area in kilometers:** 12.00

**(d) List any natural formations of existing man-made structures (hills, trees, water tanks, towers, etc.) which, in the opinion of the applicant, would tend to shield the antenna from aircraft:** Fair Haven Hill in Lincoln,MA 109m above mean sea level. Numerous hills between the antenna and the aircraft landing area that are more than 90 meters above mean sea level. Trees above 30m in height abundant in the immediate area of the antenna.

Action	Frequency	Station Class	Output Power/ERP	Mean Peak	Frequency Tolerance (+/-)	Emission Designator	Modulating Signal
New	505.00000000-510.00000000 kHz	MO	2000.000000 W 200.000000 W	M		2K00G1D	MSK
New	505.00000000-510.00000000 kHz	FX	2.000000 kW 200.000000 W	M		2K00G1D	MSK
New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K80J3E	voice
New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		62H0J2B	psk31
New	505.00000000-510.00000000 kHz	MO	2000.000000 W 200.000000 W	M		2K80J3E	voice
New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		16H0F1B	8 baud
New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K00K2D	1 kB/s

New	505.00000000-510.00000000 kHz	MO	2000.000000 W 200.000000 W	M		2K00J2D	1 kB/s
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>
New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		100HN1A	20 baud
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>
New	505.00000000-510.00000000 kHz	MO	2000.000000 W 200.000000 W	M		62H0F1B	31 baud
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>
New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		150HA1A	on/off keying
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>
New	505.00000000-510.00000000 kHz	MO	2000.000000 W 200.000000 W	M		150HA1A	on/off keying
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K00G1D	MSK
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>
New	510.00000000-515.00000000 kHz	MO	2000.000000 W 200.000000 W	M		2K00G1D	MSK
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K00J2D	1kB/s
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K80J3E	voice
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>
New	510.00000000-515.00000000 kHz	MO	2000.000000 W 200.000000 W	M		2K80J3E	voice
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		62H0F1B	31 b/s
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>
New	510.00000000-515.00000000 kHz	MO	2000.000000 W 200.000000 W	M		62H0F1B	31 baud
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>
New	510.00000000-515.00000000 kHz	MO	2000.000000 W 200.000000 W	M		200HF1B	100 baud

Action Frequency	Station Class	Output Power/ERP	Mean Peak	Frequency Tolerance (+/-)	Emission Designator	Modulating Signal
New 510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		300HF1B	fs keying
Action Frequency	Station Class	Output Power/ERP	Mean Peak	Frequency Tolerance (+/-)	Emission Designator	Modulating Signal
New 510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		150HA1A	on/off keying
Action Frequency	Station Class	Output Power/ERP	Mean Peak	Frequency Tolerance (+/-)	Emission Designator	Modulating Signal
New 510.00000000-515.00000000 kHz	MO	2000.000000 W 200.000000 W	M		150HA1A	on/off keying

City	State	Latitude	Longitude	Mobile	Street (or other indication of location)	County	Radius of Operation
0 Burlington	Connecticut	North 41 45 29	West 73 0 4		15 Polly Dan Rd	HARTFORD	

**Datum:** NAD 83

**Is a directional antenna (other than radar) used?** No

**Exhibit submitted:** No

**(a) Width of beam in degrees at the half-power point:**

**(b) Orientation in horizontal plane:**

**(c) Orientation in vertical plane:**

**Will the antenna extend more than 6 meters above the ground, or if mounted on an existing building, will it extend more than 6 meters above the building, or will the proposed antenna be mounted on an existing structure other than a building?** Yes

**(a) Overall height above ground to tip of antenna in meters:** 30.00

**(b) Elevation of ground at antenna site above mean sea level in meters:** 309.00

**(c) Distance to nearest aircraft landing area in kilometers:** 2.40

**(d) List any natural formations of existing man-made structures (hills, trees, water tanks, towers, etc.) which, in the opinion of the applicant, would tend to shield the antenna from aircraft:** The antenna will be mounted between two existing 30 meter tall towers. The towers extend approximately 10 meters above surrounding trees. There are numerous trees and rolling hills between the antenna site and the heliport. In addition, there is a commercial FM broadcast antenna 1/2 mile southeast of approximately 50 meters MSL greater height that has obstruction lighting.

Action Frequency	Station Class	Output Power/ERP	Mean Peak	Frequency Tolerance (+/-)	Emission Designator	Modulating Signal
New 505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K00G1D	MSK
Action Frequency	Station Class	Output Power/ERP	Mean Peak	Frequency Tolerance (+/-)	Emission Designator	Modulating Signal
New 505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K00J2D	1kB/s
Action Frequency	Station Class	Output Power/ERP	Mean Peak	Frequency Tolerance (+/-)	Emission Designator	Modulating Signal
New 505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K80J3E	voice
Action Frequency	Station Class	Output Power/ERP	Mean Peak	Frequency Tolerance (+/-)	Emission Designator	Modulating Signal

New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		62H0F1B	31 baud
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>
New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		300HF1B	100 baud
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>
New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		150HA1A	on/off keying
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K00G1D	MSK
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K80J3E	voice
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		62H0F1B	31 baud
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		300HF1B	100 baud
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		150HA1A	on/off keying

City	State	Latitude	Longitude	Mobile	Street (or other indication of location)	County	Radius of Operation
0 Holden	Massachusetts	North 42 19 12	West 71 49 43		48 Sandy Glen Drive	WORCESTER	

Datum: NAD 27

Is a directional antenna (other than radar) used? No

Exhibit submitted: No

(a) Width of beam in degrees at the half-power point:

(b) Orientation in horizontal plane:

(c) Orientation in vertical plane:

Will the antenna extend more than 6 meters above the ground, or if mounted on an existing building, will it extend more than 6 meters above the building, or will the proposed antenna be mounted on an existing structure other than a building? Yes

(a) Overall height above ground to tip of antenna in meters: 20.00

(b) Elevation of ground at antenna site above mean sea level in meters: 230.00

(c) Distance to nearest aircraft landing area in kilometers: 7.00

(d) List any natural formations of existing man-made structures (hills, trees, water tanks, towers, etc.) which,



**in the opinion of the applicant, would tend to shield the antenna from aircraft:** The antenna is a wire loop suspended from existing trees, and is lower in elevation at all points than the tops of the trees.

Action	Frequency	Station Class	Output Power/ERP	Mean Peak	Frequency Tolerance (+/-)	Emission Designator	Modulating Signal
New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K00G1D	MSK
New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K80J3E	voice
New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K00J2D	1 kB/s
New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		62H0F1B	31 baud
New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		300HF1B	100 baud
New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		150HA1A	on/off keying
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K00G1D	MSK
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K80J3E	voice
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K00J2D	1 kB/s
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		300HF1B	100 baud
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		150HA1A	on/off keying

	<b>City</b>	<b>State</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Mobile</b>	<b>Street (or other indication of location)</b>	<b>County</b>	<b>Radius of Operation</b>
0	Andover	Massachusetts	North 42 36 50	West 71 8 2		1 Sleepy Hollow Ln	ESSEX	

**Datum:** NAD 83

**Is a directional antenna (other than radar) used?** No

**Exhibit submitted:** No

**(a) Width of beam in degrees at the half-power point:**

**(b) Orientation in horizontal plane:**

**(c) Orientation in vertical plane:**

**Will the antenna extend more than 6 meters above the ground, or if mounted on an existing building, will it extend more than 6 meters above the building, or will the proposed antenna be mounted on an existing structure other than a building?** Yes

**(a) Overall height above ground to tip of antenna in meters:** 25.00

**(b) Elevation of ground at antenna site above mean sea level in meters:** 41.50

**(c) Distance to nearest aircraft landing area in kilometers:** 10.00

**(d) List any natural formations of existing man-made structures (hills, trees, water tanks, towers, etc.) which, in the opinion of the applicant, would tend to shield the antenna from aircraft:** Numerous trees 30m or more in height between the antenna and the airport.

Action	Frequency	Station Class	Output Power/ERP	Mean Peak	Frequency Tolerance (+/-)	Emission Designator	Modulating Signal
New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K00G1D	MSK
New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K80J3E	voice
New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K00J2D	1 kB/s
New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		62H0F1B	31 baud
New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		300HF1B	100 baud
New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		150HA1A	on/off keying
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W				

New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K00G1D	MSK	
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>	
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K80J3E	voice	
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>	
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K80J3E	voice	
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>	
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K00J2D	1 kB/s	
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>	
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K00J2D	1 kB/s	
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>	
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		62H0F1B	31 baud	
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>	
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		62H0F1B	31 baud	
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>	
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		300HF1B	100 baud	
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>	
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		300HF1B	100 baud	
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>	
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		150HA1A	on/off keying	
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>	
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		150HA1A	on/off keying	
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>	
	<b>City</b>	<b>State</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Mobile</b>	<b>Street (or other indication of location)</b>	<b>County</b>	<b>Radius of Operation</b>
0	Ellsworth	New Hampshire	North 43 52 11	West 71 8 2		Lot #1 Arndt Rd	GRAFTON	

**Datum:** NAD 83

**Is a directional antenna (other than radar) used?** No

**Exhibit submitted:** No

**(a) Width of beam in degrees at the half-power point:**

**(b) Orientation in horizontal plane:**

**(c) Orientation in vertical plane:**

**Will the antenna extend more than 6 meters above the ground, or if mounted on an existing building, will it extend more than 6 meters above the building, or will the proposed antenna be mounted on an existing structure other than a building?** Yes

**(a) Overall height above ground to tip of antenna in meters:** 25.00

**(b) Elevation of ground at antenna site above mean sea level in meters:** 424.00

**(c) Distance to nearest aircraft landing area in kilometers:** 11.00

**(d) List any natural formations of existing man-made structures (hills, trees, water tanks, towers, etc.) which, in the opinion of the applicant, would tend to shield the antenna from aircraft:** There is a 760m high mountain ridge between the antenna and the airport.

Action	Frequency	Station Class	Output Power/ERP	Mean Peak	Frequency Tolerance (+/-)	Emission Designator	Modulating Signal
New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K00G1D	MSK
New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K80J3E	voice
New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K00J2D	1 kB/s
New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		62H0F1B	31 baud
New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		300HF1B	100 baud
New	505.00000000-510.00000000 kHz	FX	2000.000000 W 200.000000 W	M		150HA1A	on/off keying
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K80J3E	voice
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		2K00J2D	1 Kb/s
New	510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		62H0F1B	31 baud

Action Frequency	Station Class	Output Power/ERP	Mean Peak	Frequency Tolerance (+/-)	Emission Designator	Modulating Signal
New 510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		300HF1B	100 baud
Action Frequency	Station Class	Output Power/ERP	Mean Peak	Frequency Tolerance (+/-)	Emission Designator	Modulating Signal
New 510.00000000-515.00000000 kHz	FX	2000.000000 W 200.000000 W	M		150HA1A	on/off keying

City	State	Latitude	Longitude	Mobile	Street (or other indication of location)	County	Radius of Operation
0 Penn Yan	New York	North 42 40 5	West 77 4 28		2514 E. Sherman Hollow Rd	YATES	

**Datum:** NAD 27

**Is a directional antenna (other than radar) used?** No

**Exhibit submitted:** No

**(a) Width of beam in degrees at the half-power point:**

**(b) Orientation in horizontal plane:**

**(c) Orientation in vertical plane:**

**Will the antenna extend more than 6 meters above the ground, or if mounted on an existing building, will it extend more than 6 meters above the building, or will the proposed antenna be mounted on an existing structure other than a building?** Yes

**(a) Overall height above ground to tip of antenna in meters:** 30.00

**(b) Elevation of ground at antenna site above mean sea level in meters:** 340.00

**(c) Distance to nearest aircraft landing area in kilometers:** 10.00

**(d) List any natural formations of existing man-made structures (hills, trees, water tanks, towers, etc.) which, in the opinion of the applicant, would tend to shield the antenna from aircraft:** Top of antenna not over top of hill toward west.

Action Frequency	Station Class	Output Power/ERP	Mean Peak	Frequency Tolerance (+/-)	Emission Designator	Modulating Signal
New 505.00000000-510.00000000 kHz	FX	2.000000 kW 200.000000 W	M		2K00G1D	MSK
Action Frequency	Station Class	Output Power/ERP	Mean Peak	Frequency Tolerance (+/-)	Emission Designator	Modulating Signal
New 505.00000000-510.00000000 kHz	FX	2.000000 kW 200.000000 W	M		2K80J3E	voice
Action Frequency	Station Class	Output Power/ERP	Mean Peak	Frequency Tolerance (+/-)	Emission Designator	Modulating Signal
New 505.00000000-510.00000000 kHz	FX	2.000000 kW 200.000000 W	M		2K00J2D	1 Kb/s
Action Frequency	Station Class	Output Power/ERP	Mean Peak	Frequency Tolerance (+/-)	Emission Designator	Modulating Signal
New 505.00000000-510.00000000 kHz	FX	2.000000 kW 200.000000 W	M		62H0F1B	31 baud
Action Frequency	Station Class	Output Power/ERP	Mean Peak	Frequency Tolerance (+/-)	Emission Designator	Modulating Signal

New	505.00000000-510.00000000 kHz	FX	2.000000 kW 200.000000 W	M		300HF1B	100 baud
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>
New	505.00000000-510.00000000 kHz	FX	2.000000 kW 200.000000 W	M		150HA1A	on/off keying
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>
New	510.00000000-515.00000000 kHz	FX	2.000000 kW 200.000000 W	M		2K00G1D	MSK
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>
New	510.00000000-515.00000000 kHz	FX	2.000000 kW 200.000000 W	M		2K80J3E	voice
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>
New	510.00000000-515.00000000 kHz	FX	2.000000 kW 200.000000 W	M		2K00J2D	1 Kb/s
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>
New	510.00000000-515.00000000 kHz	FX	2.000000 kW 200.000000 W	M		62H0F1B	31 baud
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>
New	510.00000000-515.00000000 kHz	FX	2.000000 kW 200.000000 W	M		300HF1B	100 baud
<b>Action Frequency</b>		<b>Station Class</b>	<b>Output Power/ERP</b>	<b>Mean Peak</b>	<b>Frequency Tolerance (+/-)</b>	<b>Emission Designator</b>	<b>Modulating Signal</b>
New	510.00000000-515.00000000 kHz	FX	2.000000 kW 200.000000 W	M		150HA1A	on/off keying

## Part 5 Application

### Question 7

#### **Exhibit Detailing Program of Research for Part 5 Application**

##### **a. The complete program of research and experimentation proposed including description of equipment and theory of operation.**

This is a program of research and experimentation of radio at the 600m wavelength. This program is expected to run for a 5 year period. Research into the propagation of radio at 600m, suitability of this band for one- and two-way automatic (computer controlled) and aural communication, and the effects of the solar sunspot cycle, weather, season, time of day, radiated power and antenna height upon this communication. Modern narrowband signaling methods will be tested and optimized for suitability at MF. This communication will be through a radio beacon operated between 505 and 510 kHz and between 510 and 515 kHz using on/off keying (cw Morse code) for aural reception, slow Morse code for automatic reception (QRSS), low baud rate phase shift keying and MSK (minimum shift keying) for automatic reception as well as narrowband voice transmissions in the single-sideband suppressed carrier mode. Both one- and two-way communication (two-way with other Part-5 license holders and foreign amateur radio operators who are authorized to use the 600 meter band) will be attempted.

The transmitters and other equipment used for this experiment are and will be built by owner/operators Warren H. Ziegler(Wayland, MA), John Andrews(Holden,MA), Jay Rusgrove(Burlington,CT), Robert J. Raide (Penn Yan,NY) and William Ashlock (Andover,MA and Ellsworth,NH). The applicants for this license are the owners/operators of the experimental stations. The applicants individually and collectively have many years experience in long wave and medium wave engineering and experimentation, including experience in medium wave broadcast engineering. The transmitters frequency will be determined by a quartz crystal and operated at LF through division of the crystal frequency or direct digital synthesis. The transmitters are class-D designs using power MOSFETs, and linear designs capable of reproducing amplitude/phase modulation with low distortion. Operation will be either automatic (computer controlled) or hand keying for cw Morse code and computer generated low speed Morse and frequency/phase shift keying as well as narrow-band voice transmissions. The antennas will be an electrically short, top loaded monopole and electrically small transmitting loop variety (see attached diagrams).

##### **b. The specific objectives sought to be accomplished.**

Objectives to be accomplished are:

- Study and proof of effective communication in this band using stated techniques.
- Optimization of modern narrowband signaling techniques for long distance medium frequency propagation.
- Study of propagation and suitability of this band for one- and two-way communication particularly with regard to coherent techniques as applied to Minimum Shift Keying (MSK).
- Study of effects of solar cycle, weather, season, time of day, radiated power, and antenna height upon this communication.

##### **c. How the program of experimentation has a reasonable promise of contribution to the development, extension, expansion or utilization of the radio art, or is along line not already investigated.**

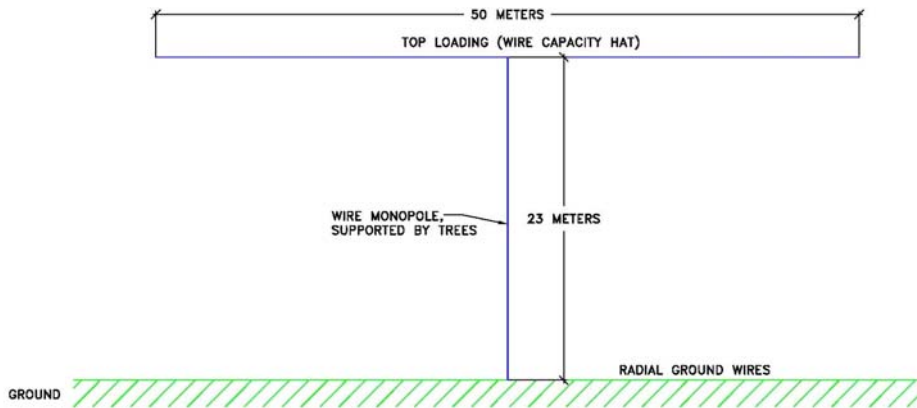
The lower end of the Medium Frequency range (300-3000 kHz) is characterized by stable ground wave paths with low to moderate path attenuation. This opens up the possibility of reliable communication on a scale of tens to a couple hundred kilometers independent of ionospheric propagation disturbances. Modern narrowband signaling techniques have not been studied in depth for application to the lower medium frequency range. This program will test both aural and automatic signaling techniques, and detail their effectiveness and how these techniques are influenced by sunspot cycle, weather, season, time of day, radiated

power, and antenna height. Of particular interest is the study of the stability of ground wave paths with respect to amplitude and phase variations. Minimum shift keying (MSK), a form of modulation where the phase changes are undertaken at the zero crossing points. By adopting the MSK technique the sidebands and hence the bandwidth required is reduced. It also enables coherent techniques to be used to gain a 3 dB advantage.

The results of this program will be made available to the public (for free) and to the FCC in hopes that the data may be used to further understand operation in this band and might perhaps be used by the FCC in any future consideration of uses for this band.

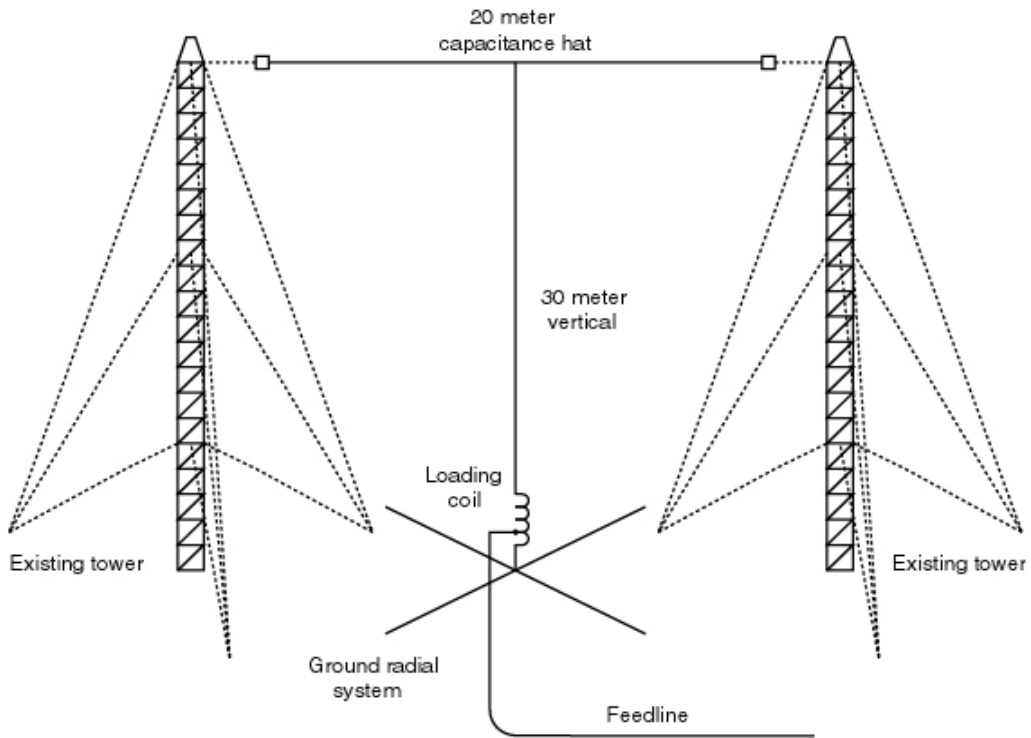


0151-EX-PL-2007  
Warren H. Ziegler  
157 Plain Rd  
Wayland, MA



Antenna Sketch for Wayland, MA location  
157 Plain Rd  
NL 42-21-55  
WL 71-20-08

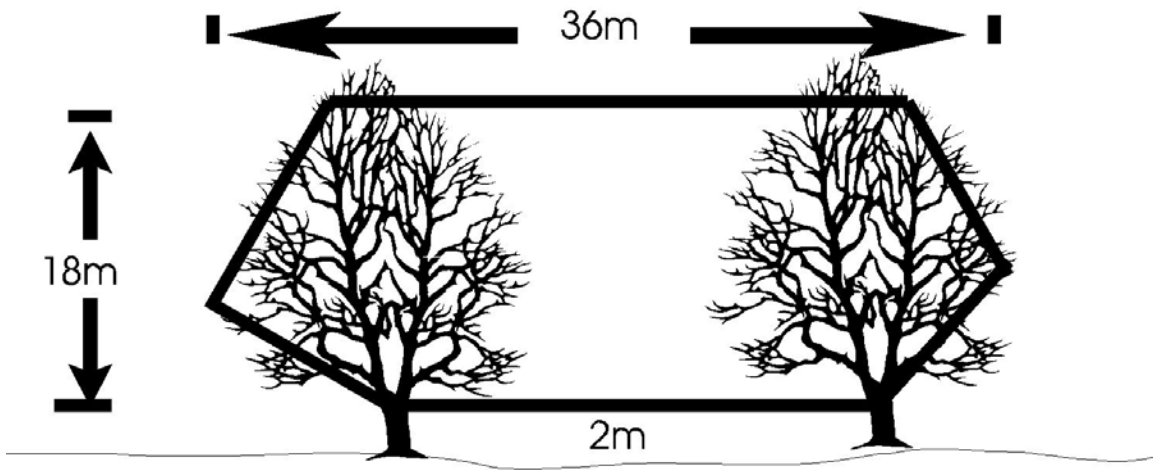
## Marconi Antenna



Jay B. Rusgrove  
February 11, 2005

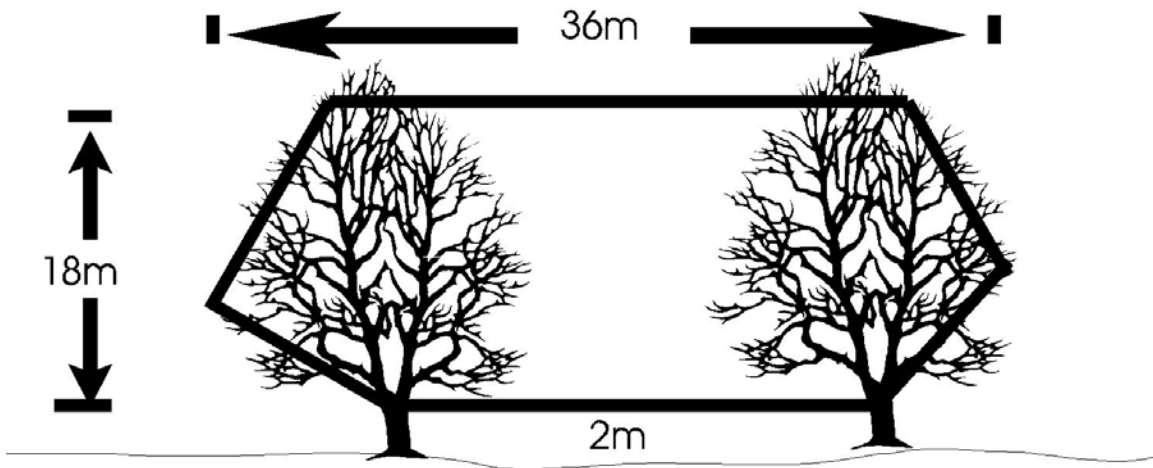
Burlington, CT Antenna Sketch  
15 Polly Dan Rd  
NL 41-45-29  
WL 73-00-04

0151-EX-PL-2007



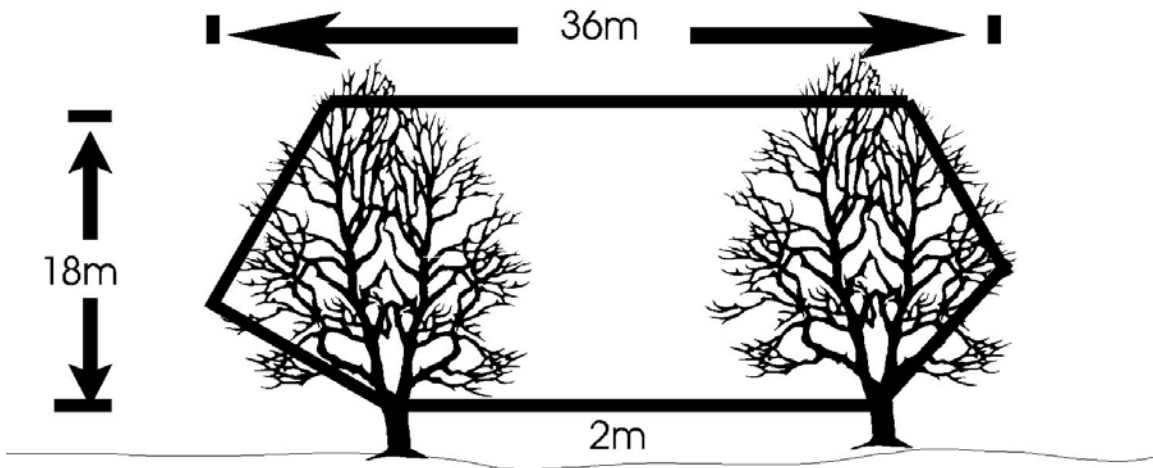
Holden MA Antenna Sketch  
48 Sandy Glen Drive  
NL 42-19-12  
WL 71-49-43

0151-EX-PL-2007



Andover MA Antenna Sketch  
1 Sleepy Hollow Ln  
NL 42-36-50  
WL 71-08-02

0151-EX-PL-2007



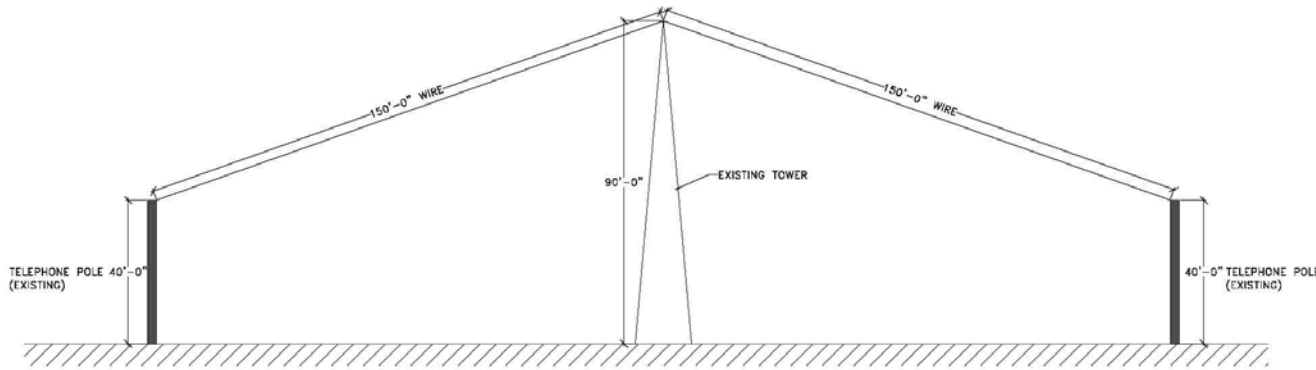
Ellsworth NH Antenna Sketch

Lot #1 Arndt Rd

NL 43-52-11

WL 71-44-44

0151-EX-PL-2007



Penn Yan, NY  
Yates County  
2514 E. Sherman Hollow Rd  
Penn Yan, NY 14527  
NL 42-40-05  
WL 77-04-28