

COMMONWEALTH OF MASSACHUSETTS

CITY OF NEWTON

SUPPLEMENTAL INFORMATION
FOR AN AMATEUR RADIO FACILITY
ACCOMPANYING APPLICATION
FOR A BUILDING PERMIT,
UNDER §6.9.4.B.
("EQUIPMENT OWNED AND OPERATED BY AN
AMATEUR RADIO OPERATOR LICENSED BY THE
FCC")

PARCEL ID # 820070001900
ZONE SR2



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PREAMBLE

This is an application for a building permit under § 6.9.4.B., to erect and maintain a private, non-commercial amateur radio station antenna structure for personal use. The Applicant is an individual and is licensed by the Federal Communications Commission (FCC). See **Exhibit A** for his FCC license, which qualifies him for the protections of the limited preemption for amateur radio by federal law contained in **47 CFR § 97.15(b)**, and the comparable preemption found at **M.G.L. Chapter 40A, § 3, ¶ 10**, requiring that a zoning ordinance “effectively accommodate amateur radio communications,” and “constitute the minimum practicable regulation.” Amateur radio station antenna structures, inherently non-commercial, are an ordinary accessory use of a residence.

The proposed antenna system will not cause substantial detriment to the public good; in fact, the proposed system will serve the public good due to the findings of the Congress, the FCC, the Courts, and, most particularly as displayed in this application, the availability of this station to serve in time of emergency – including power and cell phone blackouts. Recent weather emergencies, as well as hurricane events, show how important amateur radio communications can be when cell and power outages occur. See, *e.g.*, **Exhibits I and J** (articles on hurricanes and amateur radio assistance). In addition, this station can be important during public events – such as the Boston Marathon.

In times of emergency (such as the recent experience in Puerto Rico, when continental American radio amateurs with good antenna systems provided critical communications by relaying messages from stricken areas of the island), amateur radio operators such as the Applicant provide invaluable local communications assistance to ARES (the Amateur Radio Emergency Service) and the SKYWARN programs. It is therefore no surprise that zoning regulations that impinge on the erection and maintenance of amateur radio station antenna structures are preempted by federal law. As demonstrated below, the building inspector can, and should, grant a permit for the structures as currently constituted without any further action.

A permit for the proposed system would be consistent with public policies, both state and federal, protecting the rights of licensed radio amateurs to construct and use amateur radio facilities. Granting of this application will be in harmony with the general purposes and intent of the regulations of the Zoning Ordinance (Chapter 30).¹

As mentioned above, the position of a radio amateur in the permitting process is uniquely enhanced by a Congressional finding that “reasonable accommodation should be made for the effective operation of amateur radio from residences, private vehicles and public areas, and that regulation at all levels of government should facilitate and encourage amateur radio operation as **a public benefit.**” Public Law 103-408, § 1 (3), October 22, 1994. (*Emphasis added.*) **While defining “effective operation” may be challenging, the Applicant is confident that, by comparison, no one would accept as “effective operation” a cell phone or TV station that was only useful six or seven days out of ten. Nonetheless, the Applicant has used that highly compromised standard as his threshold.**

The Applicant and his wife own the property. The deed is filed in Book 55195, pp. 531-533 of the Middlesex South Registry of Deeds, and appears as **Exhibit D**. The Applicant's wife supports and encourages this application.

This application presents the most viable option for the placement of the proposed system on the Applicant's property, approximately 11,256 sq. ft. in size, in the **SR2** district.

¹ The Ordinance is “for the purpose of promoting the health, safety, convenience and welfare of its inhabitants.” § 1.2 Purpose of the Chapter. The Applicant's proposed amateur radio use promotes each of those goals.

EXECUTIVE SUMMARY

This is a proposal to erect and maintain an amateur radio station antenna structure on a property of 11,256 sq. ft. of Newton. Amateur radio is a permitted use in all zones in Town. The proposed station antenna structure furthers the Zoning Ordinance purposes of “promoting the health, safety, convenience and welfare of [Newton’s] inhabitants.” § 1.2. It is not “Wireless Communication Equipment” requiring a Special permit under § 6.9.5.

Conclusion: Two questions are presented -- use and height. The use is plainly legal as an ordinary use accessory to a residence, and recognized in § 6.9.4.B. **The Commissioner of Inspectional Services should issue a building permit as an “allowed as-of-right” use.**

THE TELECOMMUNICATIONS ACT OF 1996 (47 USC § 332 ET SEQ.) DOES NOT APPLY

As a preliminary matter, it should be emphasized that the Telecommunications Act of 1996 (especially § 704), the contents of which are now found at 47 USC § 332 *et seq.*, regulating the cellular telephone industry (Commercial Mobile Radio Services, or CMRS, also “personal wireless services”), does not apply in this case. 47 USC § 332 is unrelated to the Amateur Radio Service. The Applicant is a licensed amateur radio operator whose activities are outside the provisions of 47 USC § 332.

In particular, an opponent might erroneously cite, 47 USC § 332(c)(7)(A):

(7) Preservation of local zoning authority

(A) General authority

Except as provided in this paragraph, nothing in this chapter shall limit or affect the authority of a State or local government or instrumentality thereof over decisions regarding the placement, construction, and modification of **personal wireless service facilities**. (*Emphasis added.*)

An opponent might also cite (in part) 47 USC § 332(c)(7)(B):

(B) Limitations

(i) The regulation of the placement, construction, and modification of **personal wireless service facilities** by any State or local government or instrumentality thereof -

(I) shall not unreasonably discriminate among providers of functionally equivalent services; and

(II) shall not prohibit or have the effect of prohibiting the provision of personal wireless services.

(*Emphasis added.*)

Reliance on these provisions is instantly defeated by a focused reading of **47 USC § 332(c)(7)(C):**

(C) Definitions

For purposes of this paragraph -

(i) the term "personal wireless services" means commercial mobile services, unlicensed wireless services, and common carrier wireless exchange access services;

(ii) the term "personal wireless service facilities" means facilities for the provision of personal wireless services.

(Emphasis added.)

The Applicant is not a commercial mobile service, an unlicensed wireless service, or a common carrier. The Applicant is a non-commercial, FCC-licensed radio amateur, in a wholly different service and subject to a wholly different set of regulations (47 CFR Part 97), and the beneficiary of a wholly different preemption (47 CFR § 97.15(b)). A discussion of the law that applies to amateur radio generally – and the Applicant in particular – is found later in this document, in the section entitled “Preemption.”

**THE STATION ANTENNA STRUCTURE COMPLIES WITH NEWTON’S ZONING
ORDINANCE**

Amateur radio is a permitted use in all zoning districts because amateur radio cannot be forbidden. “State and local regulation of a station antenna structure must not preclude amateur service communications.” **47 C.F.R. § 97.15(b)**. It is a use permitted as-of-right. **Zoning Ordinance § 6.9.4.B**.

AMATEUR RADIO IS NOT A COMMERCIAL USE

This particular use and the structures involved are permitted as-of-right. Nonetheless it is important to point out what this is NOT.

This is NOT a use requiring a Special Permit under § 6.9.5 (“Wireless Communication Equipment Allowed by Special Permit”), for the simple reason that it is a non-commercial use. All amateur radio uses are inherently non-commercial, under the terms of the license. See especially **47 CFR §97.1 (a)**:

PART 97--AMATEUR RADIO SERVICE

Subpart A--General Provisions

Sec. 97.1 Basis and purpose.

The rules and regulations in this part are designed to provide an amateur radio service having a fundamental purpose as expressed in the following principles:

- (a) Recognition and enhancement of the value of the amateur service to the public as a **voluntary noncommercial communication service, particularly with respect to providing emergency communications.**
- (b) Continuation and extension of the amateur's proven ability to contribute to the advancement of the radio art.
- (c) Encouragement and improvement of the amateur service through rules which provide for advancing skills in both the communication and technical phases of the art.
- (d) Expansion of the existing reservoir within the amateur radio service of trained operators, technicians, and electronics experts.
- (e) Continuation and extension of the amateur's unique ability to enhance international goodwill. *(Emphasis supplied.)*

This station antenna structure is for amateur radio, not broadcasting, cellular telephone, paging, or any other commercial purpose. The Applicant will accept a permit condition to the following effect: “The station antenna structure shall not be used to support common-carrier cellular telephone or any other commercial purpose antennas.”

As the FCC and the courts have said, height affects propagation. Height may be required for effective communications that the individual radio amateur desires. PRB-1, ¶ 25.² Here the station antenna structure, to the top of the antenna pole, when extended, is only 68' 1 1/2" tall (~78 feet to the top of the mast). When retracted, the structure will only be 27'5" in height (~38 to the top of the mast). It is designed to withstand 127 mph winds. That height is critical to ensuring that the underlying purpose of this amateur radio station is fulfilled and that the amateur radio operator is reasonably accommodated. See "Showing of Need for Height of an Amateur Radio Antenna Support Structure with Propagation Maps," by Dennis Egan, and "Antenna Height and Communications Effectiveness," prepared by the technical staff at the American Radio Relay League. Both of those documents accompany this Supplement.

PERMITTED BY § 6.9.4.B. WIRELESS COMMUNICATION EQUIPMENT ALLOWED AS-OF-RIGHT

This section of the Supplement responds to each requirement of the zoning ordinance relevant to an application for an amateur radio station antenna structure under § 6.9.4.B, which reads:

B. Equipment owned and operated by an amateur radio operator licensed by the FCC, which device shall be installed at the minimum height necessary for the functioning of amateur radio communication in accordance with the licensing requirements for that location. Such equipment, which may include a ground-mounted lattice style tower, shall be allowed in accordance with the setback requirements for primary structures in the district in which it is located and the administrative site plan review process outlined in Sec. 6.9.7., below. No commercial use of equipment or supporting structures which were installed for amateur radio operation is permitted.

What follows is a response to each element.

"amateur radio operator licensed by the FCC"

Response: The license of the applicant, Dr. Kopp, may be found at **Exhibit A**.

"the minimum height necessary for the functioning of amateur radio communication"

Response: The communication to which this element refers is the communication that the applicant desires. As the FCC ruled: "Some amateur antenna configurations require more substantial installations than others if they are to provide the amateur operator with the communications that he/she desires to engage in." PRB-1 at ¶ 25. This means that we are talking about the communication Dr. Kopp desires. For further confirmation that it is his desired communication that controls, see *Marchand v. Town of Hudson*, 147 N.H. 380, 386, 788 A.2d 250, 254-255 (N.H. 2001): "[T]he zoning board should . . . consider what steps must be taken to "reasonably accommodate" amateur radio communications. In making this determination, the ZBA may consider whether the particular height and number of towers are necessary to accommodate the particular

² 25. Because amateur station communications are only as effective as the antennas employed, antenna height restrictions directly affect the effectiveness of amateur communications. **Some amateur antenna configurations require more substantial installations than others if they are to provide the amateur operator with the communications that he/she desires to engage in.** For example, an antenna array for International amateur communications will differ from an antenna used to contact other amateur operators at shorter distances. . . . local regulations which involve placement, screening, or height of antennas based on health, safety, or aesthetic considerations must be crafted to accommodate reasonably amateur communications, and to represent the minimum practicable regulation to accomplish the local authority's legitimate purpose. FCC Order PRB-1, 101 FCC 2d 952, 50 Fed. Reg. 38813 (September 25, 1985), ("PRB-1"). (*Emphasis supplied*) You may find the full text of PRB-1 at <http://wireless.fcc.gov/services/amateur/prb/index.html>

ham operator's communication objectives.” Note that it is improper to balance the interests of the radio amateur with the interests of the local authority. “[I]t is clear that a “balancing of interests approach is not appropriate.” <http://www.fcc.gov/Bureaus/Wireless/Orders/1999/da992569.txt> at ¶ 7.

Note that Dr. Kopp’s interests are entirely natural. He was born in the former Yugoslavia, He was raised in Switzerland, where he obtained his higher education, including medical school, before coming to the United States in 1992. He is a citizen of the United States. His family and friends now live in Europe and Israel. Dr. Kopp and his wife have hosted students studying in Boston from many European countries and South Korea, which is why the *Egan study* accompanying this application shows results for communication to those target areas, using the height desired. The propagation maps show limited performance at the height requested, but Dr. Kopp is willing to compromise, and live with, the substantially sub-optimum results shown.

“in accordance with the licensing requirements for that location.”

Response: The relevant licensing requirements for the location are that the applicant must not interfere with air traffic, and he won’t. **See Exhibit H.** In addition, he must meet the RF emission guidelines for power density, which he does. **See Exhibit P.**

“in accordance with the setback requirements for primary structures”

Response: The site is in the SR2 zone. Using the “Principal Building Setbacks (On or After 12/7/1953)” found Zoning Ordinance 3.1.3, page 3-3, here are required and actual distances:

Lot Line	SR2 Setback (min)	Application (actual)
Front	30’	97.7’ (rear yard)
Side	15’	30’
Rear	15’	44’

“in accordance with . . . the administrative site plan review process outlined in Sec. 6.9.7.”

Response: Section 6.9.7 is entitled “Wireless Mesh Networks Allowed by Permit with a Majority Vote of the City Council.” The Applicant assumes that this is a scrivener’s error, and the appropriate reference is to § 6.9.8, entitled “Administrative Site Plan Review for Wireless Communication Equipment,” which reads –

A. Application. Except for wireless communication equipment described in Sec. 6.9.4.A. [referring to conventional television or radio antenna, fixed wireless personal communication system, direct broadcast satellite antenna 1 meter or less in diameter, and multipoint distribution service antenna or home satellite dish of not more than 2 meters in diameter] or Sec. 6.9.4.H. [referring to satellite earth station antennas], no wireless communication equipment shall be constructed or installed until **an application** has been submitted to the Commissioner of Inspectional Services **with 2 copies** of an accompanying **site plan** showing the location of the device along with any **buildings, lot lines, easements and rights of way and also an elevation showing details of the device.** The applicant shall simultaneously send **a copy of the application and 5 copies** of the plans to the Director of Planning and Development. The applicant shall also **notify in writing immediate abutters** and the **Councilors of the Ward** in which the device is to be erected, installed or used of such application. *(Emphasis added)*

Response: The applicant is filing an application and two copies to the Commissioner, and a copy and five copies with the Director of Planning and Development, for a total of NINE copies, as required. The applicant is notifying the immediate abutters, as well as the Councilors

of the Ward, by copy of the letter attached as **Exhibit S**. The site plan required appears as **Exhibit B**. The elevation details appear as **Exhibit E**.

B. Report. The Director of Planning and Development shall submit an advisory report to the Commissioner of Inspectional Services within 3 weeks of the application filing date. In making the advisory report, the Director of Planning and Development shall evaluate the application based on the requirements of Sec. 6.9.3 and may seek input from relevant City agencies including, but not limited to the Urban Design Commission, Newton Historical Commission, Historic District Commission or any other City agency. The Commissioner shall not approve a permit for wireless communication equipment until the advisory report of the Director of Planning and Development has been received or 3 weeks have elapsed without receipt of such report, and until all required agency approvals have been issued. The Commissioner of Inspectional Services has the authority to deny any building permit application which the Commissioner determines does not comply with the **requirements of Sec. 6.9.3**

Response: The applicant responds to the relevant requirements of § 6.9.3, Design and Operating Criteria, below.

6.9.3. Design and Operating Criteria

All wireless communication equipment, except that described in Sec. 6.9.4.A. [referring to conventional television or radio antenna, fixed wireless personal communication system, direct broadcast satellite antenna 1 meter or less in diameter, and multipoint distribution service antenna or home satellite dish of not more than 2 meters in diameter] or Sec. 6.9.4.H. [referring to satellite earth station antennas], and Sec. 6.9.4.H. [referring to satellite earth station antennas], must satisfy the following criteria and the applicable procedures of Sec. 6.9.6 [referring to Special Permit Procedure] or Sec. 6.9.7 [referring to Mesh Networks]:

Response: Responses which follow attempt to show that all criteria are satisfied. The procedures of §§ 6.9.6 and 6.9.7 do not apply, as no special permit procedure is required and this is not an application for a mesh network.

A. Wireless communication equipment shall be installed, erected, maintained and used in **compliance with all applicable federal and state laws** and regulations, including, but not limited to, **radio frequency emissions regulations issued pursuant to the Telecommunications Act of 1996** including all successors to such laws and regulations. An applicant seeking to construct or install wireless communication equipment shall submit a **report from a qualified engineer or other appropriate professional certifying that the proposed equipment meets the requirements of these regulations**. This report shall be submitted prior to any administrative review, site plan approval or special permit application or at the time of a building permit application if there is no such review. (*Emphasis added*)

Response: The applicant agrees to comply with all applicable federal and state laws. While the zoning ordinance requires compliance with the radio frequency regulations issued pursuant to the Telecommunications Act of 1996, those regulations do not apply to FCC-licensed radio amateurs. For radio amateurs, the relevant regulations were issued pursuant to the Communications Act of 1934, as amended. Nonetheless, as to radio frequency emissions, see **Exhibit P**, Power Density Calculations, prepared by the Applicant, in accordance with 47 CFR § 97.12(c)(1). In addition, John D. Allen, BSEE, MSEE, has certified that the proposed equipment meets the RF emission requirements of the FCC. Mr. Allen's resume accompanies the report, showing that he is a qualified engineer, experienced in RF matters.

B. Wireless communication equipment must at all times be maintained in good and safe condition and comply with all **applicable FCC standards** and shall be **removed within 30 days of the date when all use of such equipment ceases**. This provision shall apply to all wireless communication equipment and structures in support of that equipment, including such equipment and structures existing on the effective date of this Sec. 6.9. Continued compliance with these conditions shall be maintained by the operator of the equipment and the owner of the structure. Failure to comply with these conditions shall constitute a zoning violation. (*Emphasis added.*)

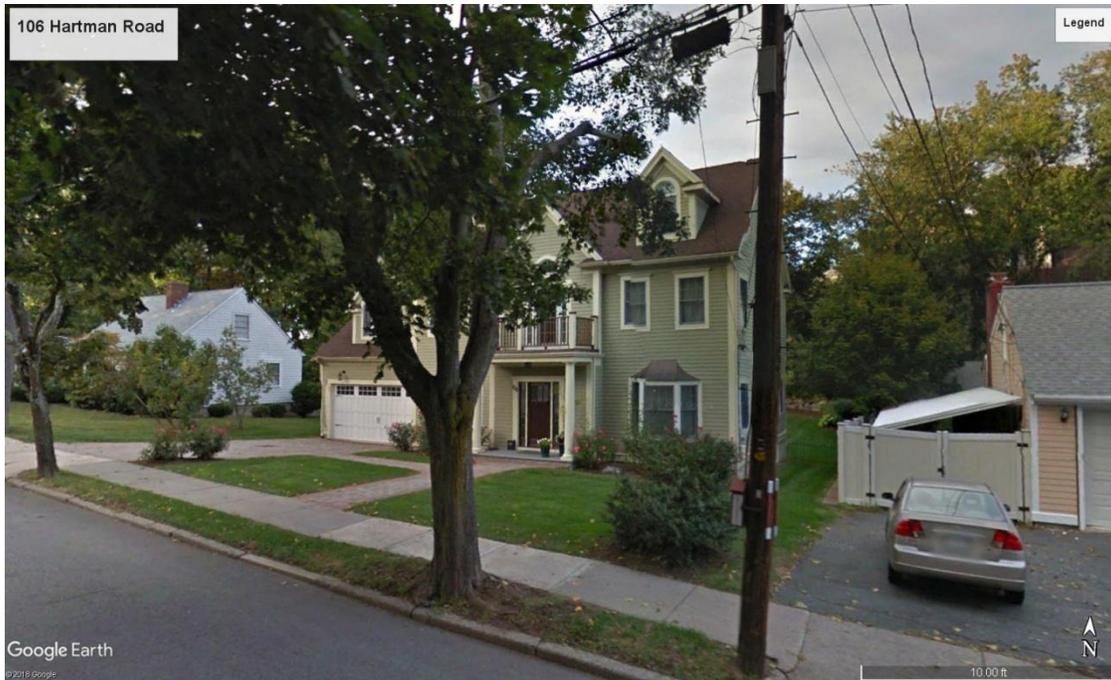
Response: The applicant uses no home-made transmitting equipment. All of his equipment that is required to have FCC type acceptance has such type acceptance and he agrees to maintain the equipment in compliance with all FCC standards. He agrees to remove the station antenna structure as required.

C. All wireless communication equipment shall be **sited, screened and/or painted or otherwise colored or finished to blend in with the building or structure on which it is mounted or in a manner which aesthetically minimizes the visibility of the devices in the surrounding landscape** or on the building or structure to which they are attached. In certain circumstances, additional architectural features or changes to the facade may be necessary to maintain the balance and integrity of the design of the building or structure with building-mounted wireless communication equipment. (*Emphasis added*)

Response: The station antenna structure will be located in the rear yard, screened by the house and trees in several directions, especially from the street (see photo below). For screening in other directions, see **Exhibit N**. Painting the pole would be a terrible idea, as hot-dipped galvanized steel weathers quickly to a non-reflective, dull-gray finish, further diminishing its visibility. Recall that haze-gray (as in “haze gray and under way”) is the color chosen by the U.S. Navy and U.S. Air Force, after considerable research, to make things less visible at sea and in the air. Furthermore, painting could interfere with the smooth retraction of the pole when it is lowered while the Applicant is away, or high winds are expected.

To keep things in perspective, you should note that an ordinary telephone pole is about 12 inches in diameter. It is tar-black in color, which is much more noticeable against blue or gray skies than a dull-gray galvanized steel lattice tower—and few people pay much attention to telephone poles.

The rear yard location, with fencing all around, minimizes the visibility of the station antenna structure. No building-mounted equipment is planned.



The site, with trees fully leafed out, showing that the backyard location of the proposed station antenna structure will be obscured by trees, a utility pole and wiring.



The site, in winter and bereft of leaves on the trees, showing that the backyard location of the proposed station antenna structure will still be obscured by trees, a utility pole and wiring.

D. Any **fencing used to control access** to wireless communication equipment shall be compatible with the visual character of the structures in the surrounding neighborhood to the extent possible. *(Emphasis added)*

Response: The existing rear yard is entirely, and compatibly, fenced. No change is contemplated.

E. **Equipment boxes for building-mounted** wireless communication equipment must be either interior to the building on which it is located, completely camouflaged, and/or completely **screened from view from the public way**. *(Emphasis added)*

Response: There will be no building mounted equipment.

F. All free-standing wireless communication equipment must meet any **setback requirements for the district** in which it is located and, to the greatest extent possible, shall be **screened from the public way by fencing and/or landscaping**. Such equipment shall be located **in the rear yard** of the lot on which it is located. *(Emphasis added)*

Response: The proposed equipment meets the setback requirements for the SR2 district.

Lot Line	SR2 Setback (min)	Application (actual)
Front	30'	97.7' (in rear yard)
Side	15'	30'
Rear	15'	44'

Please note that § 6.9.3.F. calls for screening from the public way, not screening from rear or adjacent houses. The station antenna structure will be screened from the public way by the house, existing fencing, existing trees, utility wires and poles. See below. The station antenna structure will be in the rear yard. See **Exhibit B**.

G. No part of any building-mounted wireless communication equipment shall be located over a public way.

Response: True.

H. The construction of wireless communication equipment shall **avoid major topographic changes and shall minimize the removal of trees** and soil in order for any topographic changes to be in keeping with the appearance of neighboring properties. *(Emphasis added)*

Response: There will be no topographic changes, and no trees will be removed.

I. The installation of wireless communication equipment shall avoid the removal or disruption of **historic resources** on and off-site. Historic resources shall include designated historic structures or sites, historical architectural elements or archaeological sites and shall comply with the requirements of the historic district and the landmark preservation ordinances. *(Emphasis added)*

Response: Historic resources will be unaffected.

J. There shall be **no illumination** of the wireless communication equipment except as required by state and federal law. *(Emphasis added)*

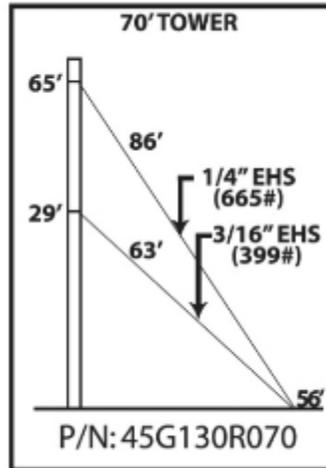
Response: Neither state nor federal law requires illumination of the station antenna structure, see FCC “Towair” Report **Exhibit H**. There will be no lighting on the structure.

K. Equipment owned and operated by an amateur radio operator shall be constructed at the **minimum height necessary to effectively accommodate amateur radio communications** in order to minimize the aesthetic impact. The relative **safety and aesthetic impact of different style towers** or antennas shall be taken into consideration during the administrative site plan review process outlined in Sec. 6.9.8. *(Emphasis added)*

Response:

Minimum Height. The proposed height is less than the minimum height necessary to effectively accommodate the applicant’s needs, but he is willing to compromise, and accept the proposed height. As guyed, self-supporting, and crank-up towers, as well as poles, can all be engineered to be safe and meet building code requirements, there is no “relative safety . . . of different style towers,” and the requirement is irrelevant. However, different styles of antenna support structure were considered by the Applicant.

Different Style Towers. While a guyed tower (in particular Rohn Model 45G, perhaps the most popular guyed tower ever made and only 18" on a face, would have been possible, it was rejected so as to avoid the two sets of guys that would be required (totaling six guy wires). Following the manufacturer's recommendations, three guy anchors would be positioned 56 feet away from the base. That's three sets of two guy wires. Given the size of this backyard, it would have the appearance of a forest of guy wires.



Rohn 45 requires guy wires and guy anchors.

A self-supporting tower was rejected as it would be a more imposing structure, wider at the base than the "tilt-over, crank-up" style proposed. The AN Wireless HD-70 (the same height as is proposed) was seriously considered and almost proposed. But see below for a sense of the mass. It was rejected for this reason. For a complete series of installation photos, of an installation in Ames, IA, involving another client of Atty. Hopengarten, see <http://www.anwireless.com/ia1.html>.



The AN Wireless HD-70, though it does not require guy wires, is wider at the bottom, and has more mass to resist wind.

A sturdy (and more expensive!) tilt-over, crank-up pole model was selected to serve several purposes:

- (1) It is relatively slender, and even smaller above the roof of the house and near its top where it is most visible.
- (2) It can be raised and lowered to work on antennas at a lower height.
- (3) It can be lowered in case of high wind events, and when the Applicant is not in residence.
- (4) As a result of its decreasing face-size, it does not require guy wires

L. Wireless communication equipment must at all times be maintained and operated in a way which meets the standards of any ordinance of the City pertaining to **noise** (“Noise Ordinance”).³ An applicant seeking to construct or install any external noise producing equipment ancillary to antennas shall use best efforts to minimize noise emanating from such equipment by the use of air-tight seals and noise absorbing materials on the walls and ducts of such equipment. The applicant shall also submit a report from a qualified acoustical engineer or other appropriate professional certifying that the proposed equipment meets the requirements of the Noise Ordinance. This provision shall apply to all wireless communication equipment and structures existing on the effective date of this Sec. 6.9.

³ The noise ordinance is Article II, § 20-13. Under § 20-13(i): “(1) The mayor or his designee may grant a permit for any activity otherwise forbidden by the provisions of this ordinance upon a determination by the mayor or his designee that compliance in the conduct of such activity would cause undue hardship on the person or persons conducting such activity or on the community, taking into account: (i) the extent of noise pollution caused by not requiring such compliance; and (ii) whether reasonable efforts have been made to abate the noise.” Thus the Director of Inspectional Services may grant a building permit without a “report from a qualified acoustical engineer or other appropriate professional certifying that the proposed equipment meets the requirements of the Noise Ordinance.”

Failure to comply with any such ordinance shall constitute a zoning violation. (*Emphasis added*)

Response: While this requirement of § 6.9.3 is certainly tied to the requirements of a § 6.9.4.B application, the Applicant believes it was intended for commercial installations, with large commercial generators. This proposal does not include a generator, which the Applicant believes is the concern of § 6.9.3.L. (the section refers to “air-tight seals and noise absorbing materials on the walls and ducts” – materials rarely, if ever, found in an amateur radio situation). In accordance with Article II § 20-13(i)(1), the Applicant asks for the equivalent of a waiver of the report from a qualified acoustical engineer because “the extent of noise pollution” does not require such compliance. In periods of approximately five minutes, totaling perhaps only one hour *per year*, the ¼ hp electric motor cannot reasonably be said to make “excessive noise.” After installation, the Department of Inspectional Services is welcome to send a representative to the site and listen to see if the ¼ hp electric motor makes “excessive noise,” and then, perhaps, if required, sound deadening techniques can be ordered. The Applicant’s position is that there is no excessive noise, and that requiring a report from a qualified acoustical engineer, when such a report is not, to the knowledge of counsel, required for this purpose anywhere else in the United States, fails the federal and state requirement for “minimum practicable regulation” (a “least restrictive means” test).

PROPAGATION MAPS SHOW TECHNICAL JUSTIFICATION FOR HEIGHT

The accompanying document from Dennis Egan, B.S., Mathematics (Concentration in Computer Science) (the *Egan Report*) discusses the intended purpose (reliable communications over routine paths to Eastern Europe, Israel, and South Korea), and the differences between performance of an antenna system at a lower height, as well as the compromise height that the Applicant is willing to accept. At lower height, the performance does not meet the need. In the amateur radio cases, the need is specific and defined by the individual radio amateur. This concept has been confirmed by the Court in *Snook v. Missouri City (TX)*, 2003 U.S. Dist. LEXIS 27256, 2003 WL 25258302 (S.D. Tex. Aug. 26, 2003, Hittner, J.) (the Order, Slip Opinion, 63 pp.), see also the Final Judgment, Slip Opinion, 2 pp. This case may be most easily found at <http://www.arrl.org/files/file/Snook%20KB5F%20Decision%20&%20Order%2034.pdf> (USDC, SDTX, 2003, Hittner, J.), wherein the Court stated:

To conduct effective emergency communications, Snook must be able to achieve at least a 75 to 90 percent successful signal under the changing variables that impact emergency or other amateur radio communications. *Snook Findings of Fact ¶ 9*

Based on his emergency and amateur radio experience, he estimated that an antenna array of 180 to 185 feet would be optimal. *Snook Findings of Fact ¶ 15*. [Note that Snook’s requirements were for Texas, where hills – which impact propagation needs -- are rare.]

The key test is: What communications does the amateur desire? That is what must be accommodated by the municipality. Here is the way the test was originally stated by the FCC in 1985.

DESCRIPTION OF THE PROPOSED SYSTEM

The station antenna structures will be erected to the rear of the Applicant’s parcel, 92.6 feet from Hartman Road, and much farther from Juniper Lane or Greenwood Streets (the streets to the North).

THE STATION ANTENNA STRUCTURE

The Applicant proposes to erect a “motorized tilt-over, crank-up” station antenna structure manufactured by Tashian Tower Company, model TM-370 HD, on which antennas will be mounted to provide directional coverage between 7 MHz and 29.7 MHz, with the hope that the station antenna structure

will provide reliable, effective communications on a variety of frequency bands, for both local and long distance communications. This structure is 70' tall. Directional antennas (e.g., Yagi beams, one of which works on more than one band) will be mounted on a 2" OD x 1/4" wall, 4130 Chrome-Moly high-strength mast, rated at ~100 k psi. The mast will extend 9' above the top of the support structure, for a **total height of ~78'**. The Applicant has chosen to install the TM-370HD model for the following reasons:

- It is possible to attain the required antenna-supporting capacity and height with a substantial additional margin of safety.
- The structure will not require guy wires. This will simplify antenna experimentation and structure maintenance and reduce the visual impact to the surrounding neighbors.
- In high wind situations, or when leaving on vacation, it can be tilted over to almost ground-level.

This station antenna structure will also be used to support some light-weight wire antennas.

Engineering analysis by FSL Associates, Brighton, MA, indicates the tower will support 45 square feet of projected area at the basic wind speed of **127 MPH**, 3 second gust per ANSI/TIA EIA RS 222 Rev. H.

NO EFFECT ON MICROCLIMATE

The proposed installation will not emit heat, vapor or fumes. As it is unlighted, there will be no impact on dark skies. It will not impact air or water resources. It will not generate noise, nor change any temperatures. No additional traffic will be associated with this installation. It is not a hazard to air traffic.

EFFECTIVE VISUAL IMPACT IS MINIMAL

While the first 25'1" feet of this structure is 10 3/4" O.D., that section is entirely below the roof line of the house and hidden in the back yard. As you go higher, the pole sections are 8 5/8" O.D., and 6 5/8" O.D.

Most of the pole above the roof line is only 6 5/8" O.D. To keep things in perspective, an ordinary telephone pole is about 12 inches in diameter and more noticeable against blue or gray skies than a dull-gray galvanized steel pole. Few people pay much attention to telephone poles.

The hot-dipped galvanized steel weathers quickly to a non-reflective, dull-gray finish, further diminishing its visibility. Recall that haze-gray (as in "haze gray and under way") is the color chosen by the U.S. Navy and U.S. Air Force to make things less visible at sea and in the air.

WIND LOADING CONSISTENT WITH STANDARDS

Total wind load of the proposed antenna system will never exceed the 45 square feet of projected area allowable under ANSI/TIA EIA RS-222 Rev. H. Amateur radio is, by design promoted in Federal law, an experimental service. It is natural and expected that amateurs will change their antenna systems as interests change, and as propagation changes with the season and the 11-year sunspot cycle. In addition, the Applicant wishes to perform experiments in radio signal propagation, communications effectiveness, and antenna design and configuration needed to advance his knowledge and ability in the field of radio communications. Nonetheless, the antenna system shall not exceed the building code requirements for wind load, and will be well within the manufacturer's wind load specifications for this antenna support structure.

SITE CAREFULLY SELECTED

The careful reader of this application will note that the height of the proposed antenna structure is greater than the distance from its base to the nearest property line. Nonetheless, the site was carefully chosen in order to meet the setback requirements of the city.

Accidents involving such structures are rare. They are so rare, in fact, that ARRL Volunteer Counsel Fred Hopengarten, of Lincoln, Massachusetts, reviewing 40 years of literature in amateur radio, was able to discover only a few published photographs, out of thousands of antenna photographs, showing how an antenna structure falls. In conjunction with these several photos, further discussions with mechanical engineers have yielded a better understanding of the failure modes of antenna structures.

A typical failure mode, which may occur when an antenna system is completely out in the open, involves a tower twisting and buckling. In effect, the structure corkscrews onto the ground. Towers do not fall the full length of their height, like a pencil. Instead, a failure occurs at the location of the highest combined stress ratio, as if there is a “mechanical fuse.” This phenomenon is well known in physics, and is usually demonstrated in physics textbooks with a photograph of a falling chimney. As an example, see *Fundamentals of Physics*, 2nd Edition, by Halliday and Resnick, page 174, published by John Wiley & Sons:

When a tall chimney is toppled by means of an explosive charge at its base, it will often break near its middle, the rupture starting at the leading edge. The top part will then reach the ground later than the bottom part.

We note that as the chimney topples, it has at any instant an angular acceleration $[A]$ about an axis through its base. The tangential acceleration $[A_t]$ of its top is given by $[A_t = A_r]$.

As the chimney leans more and more, the vertical component of A_t comes to exceed g [gravity, or 9.8 m/s^2], so that the bricks at the top are accelerating downward more than they would in free fall. This can happen only as long as the chimney is a rigid body. As the chimney continues to fall, internal tension stresses develop along its leading edge. In nearly all cases rupture occurs, thus relieving those stresses.

Instances of damage caused by a falling antenna system are so rare that the presence of an amateur radio antenna system has no impact on the cost or availability of insurance for the homeowner. See **Exhibit O (Insurance Letter)**.

An aerial view of the area is provided at **Exhibit R**.

WHY THIS HEIGHT? “EFFECTIVE COMMUNICATIONS”

There are 11 commonly used amateur radio bands between 1.8 MHz and 144 MHz. The choice of which band to use depends on the distance between communicating stations, time of day, time of year, point in the 11-year sunspot cycle, as well as daily propagation conditions. At a given point in time, only one or two of these bands may be useful for communication to a particular location. To have a reasonably high probability of effective communications with a given location, at any given point in time, it is therefore necessary to have high performance antennas on all or most of these bands.

High performance is obtained by using directional antennas. (Recall, before cable TV, the need to aim our television antennas in the correct direction, or in some outlying areas, a rotator was necessary to receive signals from more than one direction.) Directivity not only strengthens received signals, but is also extremely useful to “null out” interfering stations.

High performance antennas can be particularly important under emergency conditions, when operating under auxiliary power sources, when operation may require communications with only low power output or communications with other stations operating under adverse conditions. In addition, doubling the height of the antenna is considered to be approximately equivalent to doubling the power output (permitting lower power, consistent with emergency batteries as power sources). While doubling the power output might be within the capability of the Applicant (up to a maximum of 1500 watts output), doubling the power output on

the Applicant's end has no impact on received signals. The height of the antenna is a critical factor in two-way communications.

For communications at frequencies below 30 MHz (the "shortwave bands"), the height of an antenna above ground is the major controlling factor on the vertical angle at which signals are transmitted ("takeoff"), which in turn directly affects the reliability and dependability of worldwide signal paths. Besides height above ground, the local terrain in the vicinity of the structure can also affect takeoff, as it can reflect and diffract the signal in the near field. If the antenna is not "high enough," signal reliability is compromised; in other words, communications to certain parts of the world can be strictly limited, or nonexistent.

"High enough" is commonly accepted to be, *at a minimum*, $\frac{1}{2}$ wavelength high at the lowest frequency used. A height of 1 to $1\frac{1}{2}$ wavelengths at this lowest frequency is more preferable. The proposed station antenna structure will support antennas for 7 MHz and above. At 7 MHz, $\frac{1}{2}$ wavelength is approximately 70 feet, and 1 wavelength is approximately 140 feet. Thus, the proposed structure represents a significant, but acceptable, compromise by the Applicant.

Communications at frequencies above 30 MHz (known as VHF for Very High Frequencies, or UHF for Ultra High Frequencies -- examples: FM radio, TV, police and fire departments) can be dependent on 'line of sight'. Most *local* emergency communications are conducted above 30 MHz. Here, topography, trees and buildings all cause significant signal loss. Thus, antennas that are above the trees, free and clear of such obstructions, permit the amateur to communicate more effectively, over greater distances and using lower power levels. These are the frequencies at which most local emergency communications are conducted. Doubling the height of the antenna is considered to be approximately equivalent to doubling the power output. Considered together, these two factors are strong arguments for higher antennas.

Accompanying this application is a radio propagation study for High Frequencies. It shows that the height of the proposed structure represents a significant compromise, but one that is acceptable to the Applicant. At this height and at this location, no lighting or painting is required. 47 CFR § 17.7. See **Exhibit H**.

It is a well-recognized phenomenon that communications effectiveness is often a function of height. This was suggested by the American Red Cross when it encouraged the FCC to adopt its limited preemption for amateur radio antenna systems. See **Exhibit G**. The concept is also plainly stated by the FCC in PRB-1, see the discussion above, and has been reiterated by the courts numerous times.

When complete, the amateur radio station, with its indispensable antenna system, will be a substantial addition to the emergency communications capabilities of the community, and the county, aligning it with the very basis and purpose of the FCC's amateur radio service -- including his desire to participate in the Amateur Radio Emergency Service (ARES), and SKYWARN. See **Exhibit T** for the Applicant's SKYWARN card. As an example, these are services are called upon during the Boston Marathon.

ENVIRONMENTAL EFFECTS ARE BENIGN

The maximum legal limit for transmitter output power is 1500 watts. As an amateur radio station, and a hobby of the Applicant, the transmitter will be in intermittent service. Even when an amateur is active, transmissions occupy less than 50% of the time of activity, as amateurs listen more than half the time.

By contrast, typical FM broadcast or AM broadcast stations use from 5,000 to 50,000 watts, continuous duty. Think of it another way—the energy of a ham radio station, at maximum power output, is about the same as a kitchen toaster⁴. Nonetheless, in accordance with 47 CFR § 97.13(c)(1), as the proposed power

⁴ See e.g. Sylvania KWS 1517-01 Electric Oven.

output exceeds 50 watts at 10 meters (28 MHz), the Applicant has performed the required “routine RF environmental evaluation prescribed by 47 CFR § 1.1307(b),” see http://edocket.access.gpo.gov/cfr_2006/octqtr/pdf/47cfr97.13.pdf. Using the output power at the antenna, after feed-line losses, and calculating the energy per square centimeter, the standard units of measurement in these matters are expressed in mW/cm², this amateur station, in a worst-case scenario, will produce only 0.036 milliwatts per square centimeter of power, or 16.4% percent of the American National Standards Institute (ANSI) and FCC safety standard at that frequency (the worst case frequency), as measured at 33 feet away from the station antenna structure, at the property line. **Exhibit P** contains the computations for the engineering calculations of power density supporting the statements above. The closest dwelling, at 114 Hartman Road, is approximately 40 feet away from the station antenna structure. That house is occupied by the Otero family, who have endorsed this project and urged the City to grant the permit requested by letter contained in **Exhibit Q**.

In this case, if the Applicant were to put up the antenna at a lower height, the power required for the same reliability of communications would increase. Thus, a lower antenna would be closer to a neighbor and increase exposure (although exposure would still remain well below the regulatory threshold).

Under the Environmental Policy Act of 1969 (NEPA), 42 USC § 4321 *et seq.* (1976) at § 4332 (2)(c), and as allowed by regulations of the Council on Environmental Quality (CEQ), 40 CFR § 1508.4, the FCC has ordered categorical exclusion of amateur radio stations from the need to do Environmental Assessments. FCC Gen. Docket No. 79-144, adopted February 12, 1987.

Furthermore, a search of the literature fails to find a single example in the history of radio in which an amateur radio station has caused injury or death to a neighbor from exposure to amateur radio signals at any power level.

When amateurs complete FCC Form 605, to obtain or renew a license, they must understand and certify by signature the following statement: “Amateur Applicant certifies that the construction of the station would NOT be an action that is likely to have a significant environmental effect” (see FCC Rules 47 CFR §§ 1.1301-1.1319 and § 97.13(a)). The only amateurs who may be required to file an Environmental Assessment (EA) under the National Environmental Policy Act of 1969 are those whose stations will be located in an officially designated wildlife area; areas that are significant in American history, architecture, archeology, engineering or culture; areas that are listed, or are eligible for listing, in the National Register of Historic Places; where the facility may affect Indian religious sites; facilities located in a flood plain; facilities whose construction will involve significant change in surface features (e.g., wetland fill, deforestation or water diversion), those which require tower lighting; and stations that exceed the maximum permitted RF exposure limits. 47 CFR § 1.1307 (a)-(b).

The Applicant’s location for the antenna system does not involve any such concerns. No environmental assessment need be filed.

GOOD ENGINEERING PRACTICES EMPLOYED

The TIA/EIA (Telecommunications Industry Association/Electronics Industries Association) Standard TIA/EIA-222-H has been adopted by the Uniform Building Code (UBC) and has been incorporated by reference in many state and local building codes. The TIA/EIA-222 Standard includes a table with minimum wind speed rating for every county in the United States. The Standard also includes the formulas to be used in calculating the wind-exposure surface area for a variety of antenna support structures and antennas. The standard is met with this antenna support structure.

All engineering has been confirmed by **FSL Associates, Inc., Brighton, MA**, under the supervision of its president, **Fred Lebow**, who may be contacted at **617.232.0001**.

INSURANCE COVERS LOSSES

If a tree falls in a forest and no one is around to hear it, does it make a sound? This popular philosophical riddle may not have any practical application to the matter at hand, but it does beg the question: What if the station antenna structure falls?

A typical failure mode, which may occur when an antenna system is completely out in the open, involves a tower twisting and buckling. In effect, the structure corkscrews onto the ground. Towers do not fall the full length of their height, like a pencil. Instead, a failure occurs at the location of highest combined stress ratio, as if there is a mechanical “fuse.” Instances of damage caused by a falling antenna system are so rare that the presence of an amateur radio antenna system has no impact on the cost or availability of insurance for the homeowner. The Applicant’s standard homeowner’s policy provides liability coverage due to failure of an amateur radio antenna structure, without additional premium.

The Applicant’s standard Massachusetts homeowner’s policy, Section 2, provides coverage for personal liability and medical payments due to failure of an amateur radio antenna structure, without additional premium. See **Exhibit O**. From an actuarial point of view, this means that these structures are considerably safer than allowing a teenage boy to drive.

Not an Attractive Nuisance. An opponent to the project might argue that the proposed structure is an attractive nuisance. Certainly the station antenna structure can be seen as “attractive,” in the sense that it is majestic. But can such a structure potentially be an *attractive nuisance* in the legal sense? No. The station antenna structure is located in the backyard of the property and existing fencing blocks access at all times.

RADIO FREQUENCY INTERFERENCE COMPLETELY PREEMPTED

The question of the potential for radio-frequency interference (RFI) has been completely preempted by Federal law on the matter. In amending the Communications Act of 1934 in 1982, the Congress clearly expressed its opinion:

The Conference Substitute is further intended to clarify the reservation of exclusive jurisdiction to the Federal Communications Commission over matters involving RFI [radio frequency interference]. Such matters shall not be regulated by local or state law, nor shall radio transmitting apparatus be subject to local or state regulation as part of any effort to resolve an RFI complaint. [T]he Conferees intend that regulation of RFI phenomena shall be imposed only by the Commission.

H.R. Report No. 765, 97th Cong., 2d Sess. 33 (1982), reprinted in 1982 U.S. Code Cong. & Ad. News 2277, referring to amendments to Section 302(a) of the Communications Act.

In a private letter opinion to the American Radio Relay League, Inc., dated February 14, 1990, Robert L. Pettit, General Counsel of the Federal Communications Commission (FCC) adopts the position of the Congress as the position of the FCC, writing:

State laws that require amateurs to cease operations or incur penalties as a consequence of radio interference thus have been entirely preempted by Congress.

These opinions have been confirmed repeatedly by the courts. See, for example, *Broyde v. Gotham Tower*, 13 F.3d 994 (6th Cir., 1994). For an excellent discussion, and a wealth of cases, see *Southwestern Bell*

Wireless, Inc. v. Johnson County Board of County Commissioners, 199 F.3d 1185, 1193 (10th Cir. 1999), *cert. denied*, 530 U.S. 1204 (2000).

Another well-written and thorough discussion states plainly: “We conclude that allowing local zoning authorities to condition construction and use permits on any requirement to eliminate or remedy RF interference ‘stands as an obstacle to the accomplishment and execution of the full purposes and objectives of Congress.’” *Freeman v. Burlington Broadcasters, Inc.*, 204 F. 3d 311 (2d Cir. 2000), *cert. denied*, 531 U.S. 917 (2000).

In 2000, the Congress passed, and the President signed, P.L. 106-521 which further clarified, if there was room for doubt, that municipalities have no authority to act with respect to interference. The Communications Act, at 47 USC § 302a, now reads, in relevant part:

47 USC § 302a. Devices which interfere with radio reception

SUBCHAPTER III - SPECIAL PROVISIONS RELATING TO RADIO

...

(f) (2) A station that is licensed by the Commission pursuant to section 301 of this title in any radio service for the operation at issue shall not be subject to action by a State or local government under this subsection. A State or local government statute or ordinance enacted for purposes of this subsection shall identify the exemption available under this paragraph.

(3) The Commission shall, to the extent practicable, provide technical guidance to State and local governments regarding the detection and determination of violations of the regulations specified in paragraph (1).

(4) (A) In addition to any other remedy authorized by law, a person affected by the decision of a State or local government agency enforcing a statute or ordinance under paragraph (1) may submit to the Commission an appeal of the decision on the grounds that the State or local government, as the case may be, enacted a statute or ordinance outside the authority provided in this subsection.

(B) A person shall submit an appeal on a decision of a State or local government agency to the Commission under this paragraph, if at all, not later than 30 days after the date on which the decision by the State or local government agency becomes final, but prior to seeking judicial review of such decision.

(C) The Commission shall make a determination on an appeal submitted under subparagraph (B) not later than 180 days after its submittal.

(D) If the Commission determines under subparagraph (C) that a State or local government agency has acted outside its authority in enforcing a statute or ordinance, the Commission shall preempt the decision enforcing the statute or ordinance.

(5) The enforcement of statute or ordinance that prohibits a violation of a regulation by a State or local government under paragraph (1) in a particular case shall not preclude the Commission from enforcing the regulation in that case concurrently.

(6) Nothing in this subsection shall be construed to diminish or otherwise affect the jurisdiction of the Commission under this section over devices capable of interfering with radio communications.

Finally, we call attention to a ruling of the United States District Court for the Northern District of New York in *Palmer v. City of Saratoga Springs*, 180 F. Supp. 2d 379, 385 (N.D.N.Y. 2001):

The few Planning Board requests that Palmer refused to agree to were unreasonable on their face. . . . Palmer refused to give the Planning Board any additional information on the issue of interference for the simple reason that the issue of possible interference was beyond the Board's purview.

...

Normally, the Court would simply instruct the Planning Board to comply with [the preemption]. However, given that the Planning Board was already fully apprised of its duties under [the preemption] when it reconsidered Palmer's application, such action would likely be futile. The Court thus enjoins the Planning Board from taking further action interfering with Palmer's special use permit application and orders the Planning Board to grant the application with the conditions already agreed to by Palmer.

Nonetheless, amateurs generally, and this Applicant in particular, are prepared to offer aid beyond the requirements of law. Should it be necessary, the Applicant pledges to cooperate with any individual, whether or not an abutter, who owns equipment that might be affected.

At least one study by the FCC Field Operations Bureau has shown that amateurs are responsible for less than 1% of all interference complaints (400 of 42,000 complaints during a fiscal year in the early 1970's) filed with the Commission. (Source: FCC data, as reported in *QST*, July 1974, p. 10). Today, with cable TV, that percentage has declined. Part of the preparation for licensing involves studying how to minimize and correct such problems, if they should ever occur.

Furthermore, many home entertainment electronic devices, including portable telephones, bear the following required label, in accordance with 47 CFR §15.19(a)(3):

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Actually, the erection of this antenna system will have a tendency to *decrease*, not increase, the likelihood of television interference, as higher antenna systems (with directional arrays) are farther away from neighboring television sets and transmit *over* nearby homes. Lower antennas, erected in trees, or on a shorter antenna support structure, for example, have a greater likelihood of interference, since they would direct more energy toward a neighboring TV set.

This is exactly the position that was taken by the FCC's Chief of the Private Radio in a letter to the Board of Zoning Appeals of Hempstead, NY (October 25, 1994):

(A)ntenna height is inversely related to the strength, in the horizontal plane, of the radio signal that serves as a catalyst for interference in susceptible home electronic equipment. It is a matter of technical fact that the higher an amateur antenna, the less likely it is that radio frequency interference will appear in home electronic equipment.

For a review of the field of radio frequency interference (RFI), see *The Ghost in the Computer: Radio Frequency Interference and the Doctrine of Federal Preemption*, Brock, 1999 Computer L. Rev. & Tech. J. 17 (Fall

1998-Spring 1999), available on-line at <http://www.arrl.org/files/file/Rfi-art.pdf>. Here is the conclusion to that law review article covering the subject and reviewing the case law. It sums up the situation.

V. CONCLUSION

Although home electronic equipment is immersed in a sea of radio frequency energy from myriad sources, most of it functions as intended. The FCC has the authority to virtually eliminate RFI problems by requiring manufacturers to implement design features and filtering that would make all home electronic equipment “bullet proof.” Instead, it has chosen to require such equipment to accept any interference it receives, while relying on the marketplace to compel manufacturers to produce serviceable merchandise.

Historically, local authorities have attempted to regulate RFI as a common-law nuisance or trespass. But as courts have consistently concluded, Congress has completely preempted the field of RFI regulation, thus precluding local regulation and state-law claims. Although legislation has been proposed that would yield some limited authority to local governments to regulate illegal CB operations, such legislation has not been enacted.

City, county, and private attorneys who understand how federal preemption applies in RFI matters can prevent potential litigants, beset by RFI problems, from filing ineffective lawsuits. Attorneys should also help their clients to understand that under current law, RFI is properly viewed as the equipment’s inability to reject unwanted signals, not as transmitter interference. The focus of eliminating RFI can then properly shift to improving the filtering capabilities of home electronic equipment. Unless the law changes, this approach is the only reliable method of exorcizing the ghost in the computer.

PROPERTY VALUES ARE UNAFFECTED

Research by the American Radio Relay League, the National Organization for Amateur Radio, has failed to find any evidence in the appraisal literature, or anywhere else, that home values are harmed by the presence of amateur radio antenna systems. The only study found concluded:

In the course of this study, I have looked at seven different locations. I have considered thirty three matched pairs. As I indicated in the introduction, this has covered a variety of types, styles locations, time periods, and lot sizes. In no instance have I been able to discover any measurable, uniform decline in value that can be attributed to the presence of a radio antenna. This is verified by my general real estate experience in over 35 years of selling various kinds of residential properties throughout the Denver Metropolitan Area. The presence of a radio antenna has not only failed to make a measurable difference in value, it has not affected the sales time for the properties involved. Therefore, I have concluded that it is not a measurable factor in value.

Russ Wehner, Jr., MAI, SRPA (Appraiser), evidence in *Evans v. Boulder*, 994 F2d 755 (10th Cir., 1993) (decided on other grounds).

LEGAL: PREEMPTION & CASE LAW SUPPORT THE APPLICATION

Zoning for amateur radio antenna systems is one of those rare areas of law where an application must be considered against the background of a federal preemption of local zoning law. The Congress of the United States has weighed in on the subject.

SENSE OF CONGRESS

Sec. 10

(a) The Congress finds that —

- (1) more than four hundred thirty-five thousand four hundred radio amateurs in the United States are licensed by the Federal Communications Commission upon examination in radio regulations, technical principles, and the international Morse code;
- (2) by international treaty and the Federal Communications Commission regulation, the amateur is authorized to operate his or her station in a radio service of intercommunications and technical investigations solely with a personal aim and without pecuniary interest;
- (3) **among the basic purposes for the Amateur Radio Service is the provision of voluntary, noncommercial radio service, particularly emergency communications;** and
- (4) volunteer amateur radio emergency communications services have consistently and reliably been provided **before, during, and after floods, tornadoes, forest fires, earthquakes, blizzards, train wrecks, chemical spills, and other disasters.**

(b) It is the sense of Congress that —

- (1) it strongly encourages and supports the Amateur Radio Service and its emergency communications efforts; and
- (2) Government agencies shall take into account the valuable contributions made by amateur radio operators when considering actions affecting the Amateur Radio Service.

(Emphasis added.)

Federal Communications Commission Authorization Act of 1988. Pub. L. No. 100-594, 102 Stat. 3021, 3025 (November 3, 1988); *see also* Joint Explanatory Statement of the Committee of Conference on H.R. Conf. Rep. No. 386, 101st Cong., 1st Sess. 415, 433 (November 21, 1989), *reprinted in* 1990 U.S. Code Cong. & Admin. News 3018, 3037 (amateur licensees exempted from new Commission-wide fees program because “[t]he Conferees recognize that amateur licensees do not operate for profit and can play an important public safety role in times of disaster or emergency”). Joint Explanatory Statement of the Committee of Conference on H.R. Conf. Rep. No. 765, 97th Cong., 2d Sess. 18-19 (August 19, 1982), *reprinted in* 1982 U.S. Code Cong. & Admin. News 2261, 2262-63.

PUBLIC LAW 103-408—OCT. 22, 1994

103d Congress
Joint Resolution

To recognize the achievements of radio amateurs, and to establish support for such amateurs as national policy.

Whereas Congress has expressed its determination in section 1 of the Communications Act of 1934 (47 U.S.C. 151) to promote safety of life and property through the use of radio communication;

Whereas Congress, in section 7 of the Communications Act of 1934 (47 U.S.C. 157), established a policy to encourage the provision of new technologies and services;

Whereas Congress, in section 3 of the Communications Act of 1934, defined radio stations to include amateur stations operated by persons interested in radio technique without pecuniary interest;

Whereas the Federal Communications Commission has created an effective regulatory framework through which the amateur radio service has been able to achieve the goals of the service;

Whereas these regulations, set forth in Part 97 of title 47 of the Code of Federal Regulations clarify and extend the purposes of the amateur radio service as a—

- (1) voluntary noncommercial communication service, particularly with respect to providing emergency communications;
- (2) contributing service to the advancement of the telecommunications infrastructure;
- (3) service which encourages improvement of an individual's technical and operating skills;
- (4) service providing a national reservoir of trained operators, technicians and electronics experts; and
- (5) service enhancing international good will;

Whereas Congress finds that members of the amateur radio service community has provided invaluable emergency communications services following such disasters as Hurricanes Hugo, Andrew, and Iniki, the Mt. St. Helens Eruption, the Loma Prieta earthquake, tornadoes, floods, wild fires, and industrial accidents in great number and variety across the Nation; and

Whereas Congress finds that the amateur radio service has made a contribution to our Nation's communications by its crafting, in 1961, of the first Earth satellite licensed by the Federal Communications Commission, by its proof-of-concept for search rescue satellites, by its continued exploration of the low Earth orbit in particular pointing the way to commercial use thereof in the 1990s, by its pioneering of communications using reflections from meteor trails, a technique now used for certain government and commercial communications, and by its leading role in development of low-cost, practical data transmission by radio which increasingly is being put to extensive use in, for instance, the land mobile service: Now, therefore, be it

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. FINDINGS AND DECLARATIONS OF CONGRESS

Congress finds and declares that—

- (1) radio amateurs are hereby commended for their contributions to technical progress in electronics, and for their emergency radio communications in times of disaster;
- (2) the Federal Communications Commission is urged to continue and enhance the development of the amateur radio service as a public benefit by adopting rules and regulations which encourage the use of new technologies within the amateur radio service; and
- (3) reasonable accommodation should be made for the effective operation of amateur radio from residences, private vehicles and public areas, and that **regulation at all levels of government should facilitate and encourage amateur radio operation as a public benefit.**

Approved October 22, 1994.

(Emphasis added.)

(text) <http://thomas.loc.gov/cgi-bin/query/z?c103:S.J.RES.90.ENR>:

(PDF) http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=103_cong_bills&docid=f:sj90enr.pdf

The Applicant wishes to call attention to Federal law that preempts certain elements of regulation by a municipality. Federal Communications Commission Order PRB-1, 101 FCC 2d 952, 50 Fed. Reg. 38813 (September 25, 1985), declares in pertinent part:

Local regulations which involve placement, screening, or height of antennas based on health, safety or aesthetic considerations must be crafted to accommodate reasonably amateur communications, and to represent the **minimum** practicable regulation to accomplish the local authority's legitimate purpose.

(Emphasis added.)

Source: <http://wireless.fcc.gov/services/amateur/prb/index.html>

The above order has subsequently become part of the Code of Federal Regulations, as 47 C.F.R. § 97.15 (b):

Except as otherwise provided, a station antenna structure may be erected at heights and dimensions sufficient to accommodate amateur service communications. State and **local regulation of a station antenna structure** must not preclude amateur service communications. Rather, it **must reasonably accommodate** such communications **and must constitute the minimum practicable regulation** to accomplish the state or local authority's legitimate purpose.

(Emphasis added.)

In 1999, the FCC amplified the restrictions on the powers of municipalities and zoning boards when it issued a further Order, holding that:

. . . the very least regulation necessary for the welfare of the community must be the aim of its regulations so that such regulations will not impinge on the needs of amateur operators to engage in amateur communications.

(Emphasis added.)

In the Matter of Modification and Clarification of Policies and Procedures Governing Siting and Maintenance of Amateur Radio Antennas and Support Structures, etc.

<http://www.fcc.gov/Bureaus/Wireless/Orders/1999/da992569.txt>, at ¶ 9.

Federal regulations have the same preemptive force as federal statutes. See *Fidelity Savings and Loan Ass'n v. de la Cuesta*, 458 U.S. 141, 153-54 (1983). A local authority that ignores these federal laws violates the supremacy clause of the U.S. Constitution, Article VI, clause 2 which states:

This Constitution, and the Laws of the United States which shall be made in Pursuance thereof; and all Treaties made, or which shall be made, under the Authority of the United States, shall be the supreme Law of the Land; and the Judges in every State shall be bound thereby, **any Thing in the Constitution or Laws of any state to the Contrary notwithstanding.** *(Emphasis added.)*

Finally, Newton should be aware of *Borowski v. City of Burbank (IL)*, 101 F.R.D. 59 (N.D. Ill. 1984), authorizing a class action in Illinois federal court for a claim that a local ordinance illegally regulated the “size, location and height” of amateur radio antennas.

In addition to the above matters of Federal law, Massachusetts law limits municipal action. M.G.L.A Chapter 40A, Section 3 requires of municipalities that:

No zoning ordinance or by-law shall prohibit the construction of or use of an antenna structure by a federally licensed amateur radio operator. Zoning ordinances and by-laws may reasonably regulate the location and height of such antenna structures for the purposes of health, safety, or aesthetics; provided, however, that such ordinances and by-laws reasonably allow for sufficient height of such antenna structures so as to **effectively accommodate** amateur radio

communications by federally licensed amateur radio operators and constitute the minimum practicable regulation necessary to accomplish the legitimate purposes of the city or town enacting such ordinance or by-law. (*Emphasis added.*)

Please note that the wording of the Massachusetts statute requires “effective” accommodation of amateur radio communications and not merely a reasonable compromise.

Why is it important to know about all of this legal background? Because Newton has an obligation to accommodate the radio amateur in the communications that he or she desires to realize; because Newton may only impose “the minimum practicable regulation,” and Newton may *not* balance the amateur’s needs with the needs of the city. The FCC has already done the balancing. As the Commission has ruled: “[I]t is clear that a “balancing of interests” approach is not appropriate in this context.” FCC DA 99-2569 at ¶ 7.

<http://www.fcc.gov/Bureaus/Wireless/Orders/1999/da992569.txt>

THE CITY MUST ACCOMMODATE THE INDIVIDUAL RADIO AMATEUR

The New Hampshire Supreme Court has decided:

In light of the FCC's requirement, a zoning board's fact-finding and analysis should focus, first, on whether the three towers are permitted under local zoning regulations. If, as we have determined here, they are not, the zoning board should then consider what steps must be taken to "reasonably accommodate" amateur radio communications. In making this determination, the ZBA may consider whether the particular height and number of towers are necessary to **accommodate the particular ham operator's communication objectives.**

There was some evidence presented to the ZBA that the tower and antenna operation "was not the typical installation, but rather was something that every ham who was interested in reliable international communication on a regular basis aspired to own." The ZBA, however, did not make any factual findings regarding whether Muller even requires the proposed three radio towers **to facilitate his international ham radio operations.** Therefore, we vacate the superior court's decision and remand with instructions to remand to the ZBA for proceedings consistent with this opinion.

(*Emphasis added.*)

Marchand v. Town of Hudson, 788 A.2d 250 (N.H. 2001). So the question is not whether some other amateur might be satisfied, or some communications would be effective. The question relates to "the particular ham."

As the Federal District Court said in the *Snook* case:

PRB-1 requires a site-specific, antenna-specific, array-specific, operations-specific, ordinance-specific, and city action-specific analysis. PRB-1 at p. 7.

Snook v. Missouri City, Id.

The reference to “PRB-1 at p.7” by the *Snook* Court is to PRB-1 ¶ 25:

25. Because amateur station communications are only as effective as the antennas employed, antenna height restrictions directly affect the effectiveness of amateur communications. Some amateur antenna configurations require more substantial installations than others if they are to provide the amateur operator with the communications that he/she desires to engage in.

FCC Order PRB-1, 101 FCC 2d 952, 50 Fed. Reg. 38813, September 25, 1985, ("PRB-1"), <http://wireless.fcc.gov/services/amateur/prb/index.html> (retrieved May 2, 2015).

If another radio amateur were to come along and say: "I'm perfectly happy with a dipole at 18 feet," that would not, in any way, address the PRB-1 requirement "to provide the amateur operator with the communications that he/she desires to engage in."

Note that this not a "Reasonable Man" test, and it is not a "Reasonable Ham" test. Re-read the FCC Preemption (PRB-1), at ¶ 25:

Some amateur antenna configurations require more substantial installations than others if they are to provide the amateur operator with the **communications that he/she desires to engage in**.

It is very important to understand that this is a subjective test. The amateur determines the communications desired. After the amateur operator has determined the communications desired, regulation "must constitute the **minimum practicable regulation**" 47 CFR Sec. 97.15(b). Furthermore, the law requires that such regulation "will **not impinge on the needs** of amateur operators to engage in amateur communications." FCC DA 99-2569, at ¶ 9. <http://wireless.fcc.gov/services/amateur/prb/prb1999.html> (*Emphasis supplied.*)

NO ADDITIONAL BALANCING BY THE CITY PERMITTED

It may be common in other areas of zoning law to balance the needs of the community with the needs of an applicant for a permit. But this is not one of those areas. Balancing local interests against Federal government's interests in promoting amateur communications is not permitted. The FCC has already done the balancing. *Pentel v. Mendota Heights*, 13 F.3d 1261, 1266 at fn 5 (8th Cir. 1994) The municipality must reasonably accommodate the radio amateur.

This "no balancing" approach was affirmed by the FCC in 1999, in an order known as DA 99-2569, which rejects balancing tests, and includes the must "not impinge" language in ¶ 9, last sentence. The FCC ruling may be found at <http://wireless.fcc.gov/services/amateur/prb/prb1999.html>

7. . . . PRB-1 decision precisely stated the principle of "reasonable accommodation". In PRB-1, the Commission stated: "Nevertheless, local regulations which involve placement, screening, or height of antennas based on health, safety, or aesthetic considerations must be crafted to accommodate reasonably amateur communications, and to represent the minimum practicable regulation to accomplish the local authority's legitimate purpose." **Given this express Commission language, it is clear that a "balancing of interests" approach is not appropriate** in this context.

(Emphasis added.)

SUPPORT FROM NEIGHBOR

The neighbor at 114 Hartman Road, immediately to the East of the project site is Mr. Victor Otero, who has provided a letter of support that may be found at **Exhibit O**.

REMOTE CONTROL IS NOT A PROPER OPTION

Recall that amateur radio is an ordinary accessory use of a residential property, and this is an "as-of-right" project. In addition, under 47 CFR § 97.15(b), and MGL Ch. 40A, § 3, ¶ 10, local regulation must not

preclude amateur radio communications. Any requirement that a radio amateur's antennas must be located at a remote site would preclude communications from the amateur's home site. A requirement that antennas be located off-site would also frustrate the requirement of the law that regulation must be "the minimum practicable,"⁵ and must be regulation that "will not impinge on the needs of amateur operators to engage in amateur communications."⁶ Furthermore, a remote-site requirement would frustrate one of the purposes of amateur radio, which is to have stations ready from residences⁷ in time of emergency. An amateur radio station designed to be available when telephone and internet communications systems go down would be useless when needed most.

CONCLUSION

For the reasons set forth above, the Applicant requests that this application be granted for the amateur radio station antenna structure as submitted.

Respectfully submitted,



Fred Hopengarten, Esq.
Six Willarch Road
Lincoln, MA 01773
(781)259-0088
Maine Bar #1660, D.C. Bar # 114124

⁵ 47 C.F.R. § 97.15(b)

⁶ FCC DA 99-2569, at ¶ 9. <http://wireless.fcc.gov/services/amateur/prb/prb1999.html>

⁷ Public Law 103-408 (J.Res., 103d Congress, 1994) § 1(3),
<http://thomas.loc.gov/cgi-bin/query/D?c103:1:/temp/~c103axha51::> ,
or http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=103_cong_bills&docid=f:sj90enr.txt.pdf

EXHIBITS

EXHIBIT A: APPLICANT'S FCC AMATEUR RADIO LICENSE



ULS License

Vanity License - AK1MD - Kopp, Alexander

Call Sign	AK1MD (Vanity)	Radio Service	HV - Vanity
Status	Active	Auth Type	Regular
Dates			
Grant	09/05/2018	Expiration	09/05/2028
Effective	09/05/2018	Cancellation	
Licensee Information			
FRN	0027511567	Type	Individual
Licensee Name			
Kopp, Alexander 106 Hartman Rd Newton Center, MA 02459			
Amateur Data			
Operator Class	Amateur Extra	Prev. Op. Class	General
Group	A	Prev. Call Sign	KC1JRR
Eligibility Code	Primary Station Preference List		
Trustee/Custodian (for Non-Individuals Only)			
Name		Call Sign	
Basic Qualifications			
Has the applicant or any party to this application, or any party directly or indirectly controlling the applicant, ever been convicted of a felony by any state or federal court?			No

The validity of the Applicant's license may be confirmed by checking FCC records by callsign or by licensee name:
<http://wireless2.fcc.gov/UlsApp/UlsSearch/searchLicense.jsp>

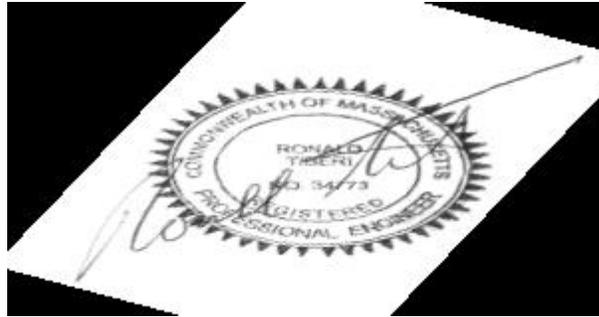
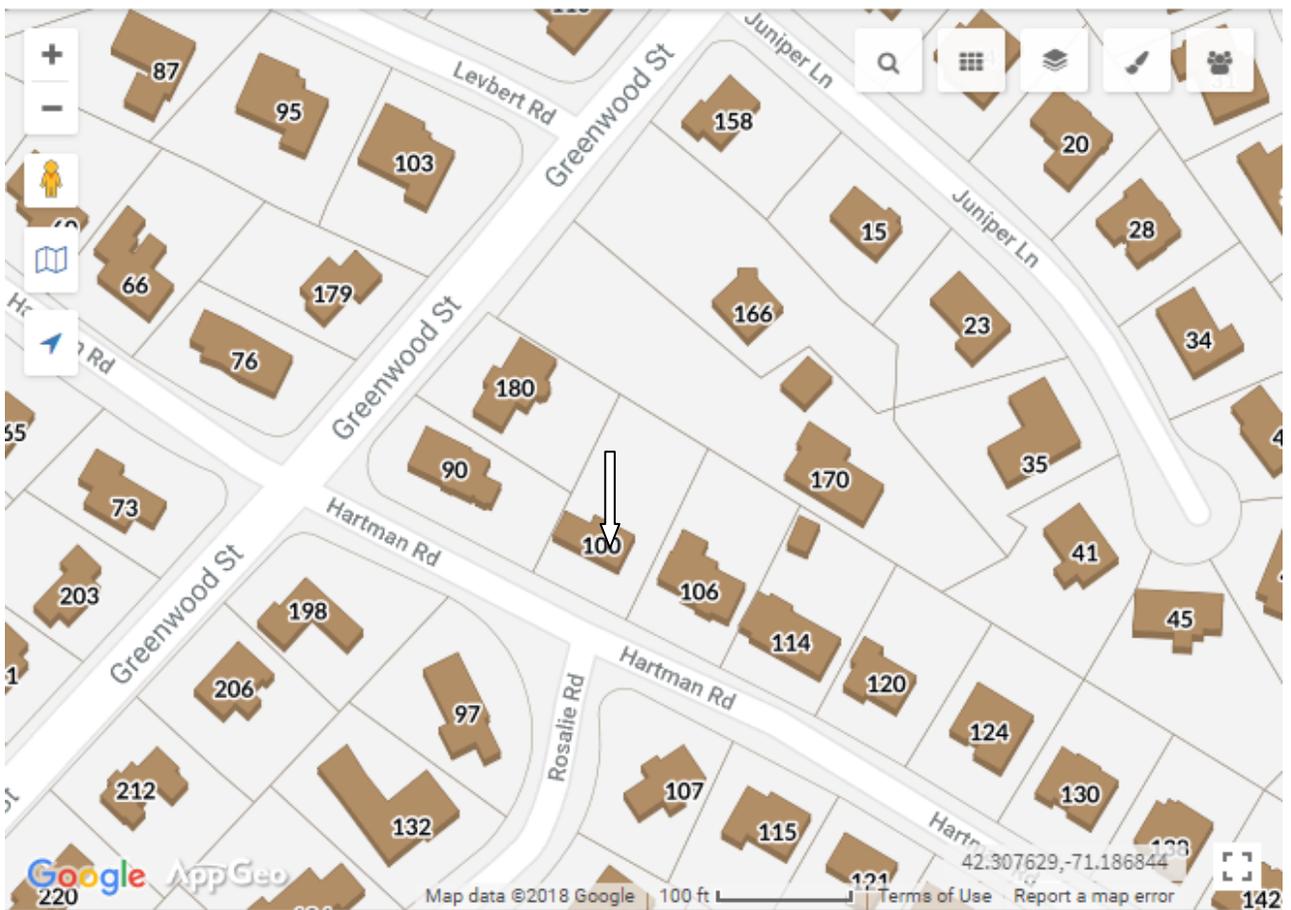


EXHIBIT C: LOCAL ROAD MAP



The location of the Applicant's parcel and the proposed station antenna structures is 106 Hartman Road.

EXHIBIT D: DEED

Bk: 55195 Pg: 532

Bk: 55195 Pg: 532

MASSACHUSETTS QUITCLAIM DEED

I, **Elka Miller-Kopp**, of 106 Hartman Road, Newton, Middlesex County, Massachusetts

for consideration paid of **Less Than One Hundred Dollars**

grant to **Alexander Kopp and Elka Miller-Kopp**, husband and wife, tenants by the entirety of 106 Hartman Road, Newton, Middlesex County, Massachusetts

with quitclaim covenants

The land in said Newton, together with the buildings thereon shown as Lot No. 203 on a plan by Rowland H. Barnes and Company, dated February 1946, and recorded with Middlesex South District Registry of Deeds as Plan No. 1393 of 1947, recorded in Book 7190, Page 553, bounded and described as follows:

SOUTHWESTERLY by Hartman Road Extension, eighty (80) feet;

SOUTHEASTERLY by Lot 204, one hundred thirty four and 97/100 (134.97) feet;

NORTHEASTERLY by land of Beck, eighty three (83) feet; and

NORTHWESTERLY by Lot 202, one hundred forty one and 77/100 (141.77) feet.

Containing 11,256 square feet, more or less.

For title see Deed dated February 9, 2010 recorded in Middlesex South Registry of Deeds at Book 54282, Page 70.

Property Address: 106 Hartman Road, Newton, MA 02459

Bk: 55195 Pg: 533

Bk: 55195 Pg: 533

WITNESS my hand and seal this 13th day of August, 2010.



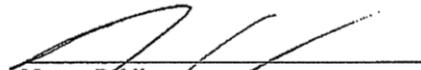
Elka Miller-Kopp

COMMONWEALTH OF MASSACHUSETTS

Middlesex , ss

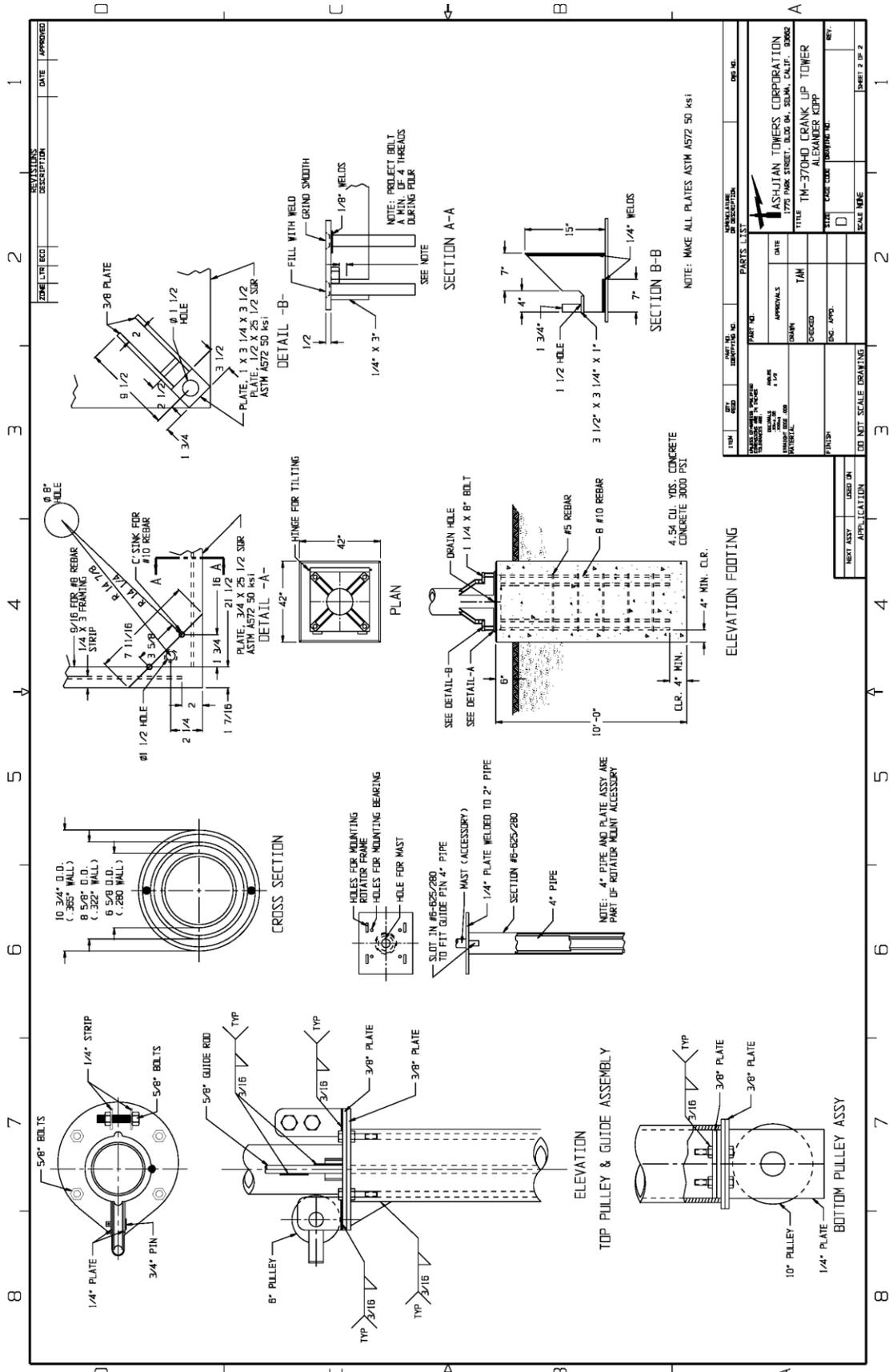
August 13, 2010

On this 13th day of August, 2010, before me, the undersigned notary public, personally appeared Elka Miller-Kopp proved to me through satisfactory evidence of identification, which was a MA state driver's license, to be the person whose name is signed on the preceding or attached document, and acknowledged to me that she signed it voluntarily for its stated purpose.



Notary Public:
My Commission Expires





REVISIONS		DATE	APPROVED

YEAR	REV.	DESCRIPTION	DATE

PARTS LIST		QTY.	DESCRIPTION

DESIGNER		DATE	

APPROVALS		DATE	

PROJECT		TITLE	

SCALE		SCALE NAME	

PROJECT		SCALE	

EXHIBIT F: ANTENNA MANUFACTURER SPECIFICATIONS

 In-Stock

 Freight Item

MFJ MFJ-1848

8-Bands: 40, 30, 20, 17, 15, 12, 10, 6 Meter
Hex Beam - Freight Added

HRO Discount Price: \$719.95*

 Buy It

*After Coupons & Promotions. Due to the shipping complexity of this item an additional shipping charge will be added when shipped.

* Reservation orders are excluded from additional freight.



 Tweet

 Share

 Save

 Add To Wish List

MFJ-1848 Specifications

Gain/front-to-back ratio: see www.mfjenterprises.com

Turning Radius: 14 ft.; Max Mast Size: 2 inches OD

Weight: 28 lbs.; Wind Load: 3.5 sq. ft.

Some Outstanding MFJ-1848 Features:

- Lightweight -- mounts on a TV mast, tripod, gable mount, or even chimney straps
- Solid Construction -- gives years of reliable service
- Proven directivity and gain from a time-tested design
- Rotates with an inexpensive rotor -- only 3.5 square-feet of wind loading
- Handles maximum legal power, all modes, all six bands
- Delivers full-band coverage without a tuner
- Great for contesting, QSY instantly among all six bands
- Just one coax feed, a real convenience and cost saver
- Sky-gray spreaders disappear against most backgrounds
- Small footprint -- 14-foot turning radius fits cramped spaces
- Symmetrical footprint -- stays balanced when coated with ice and snow

Source: <https://www.mfjenterprises.com/Product.php?productid=MFJ-1848>

The complete Product Manual can be found at:

<https://www.mfjenterprises.com/Downloads/index.php?productid=MFJ-1848&filename=MFJ-1848%20MANUAL%20REV2D.pdf&company=mfj>

EXHIBIT G: RED CROSS SUPPORT FOR AMATEUR RADIO ANTENNAS



National Headquarters
8111 Gatehouse Road
Falls Church, VA 22042

September 11, 2002

President Jim Haynie
The American Radio Relay League
225 Main Street
Newington, CT 06111-1494

Dear President Jim Haynie:

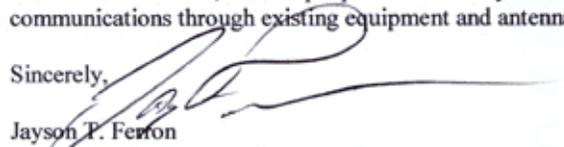
Each year, on average, the American Red Cross provides services in over 62,000 emergencies in various places around the United States. Whether flood, fires, earthquakes, hurricanes, or man made disasters, the American Red Cross is there to respond. As our corporate slogan states "Together, we can save a life". When the Red Cross asks for help from America's radio hams we get it. Every time we ask, radio hams volunteer the use of their stations, including antennas, and they volunteer their time. For this, and for the results they achieve for victims of tragedies, we are grateful. Your membership helps us at the disaster scene or from their home running emergency communications.

Even in an era of cell phones and satellite communications, amateur radio continues to provide crucial links in disaster stricken areas. When the emergency arises, it is too late to build or transport communications systems equivalent to those available in the existing stock of amateur radio stations.

We understand the in emergency communications the one of the key issues is to have trained emergency communicators who have equipment and antennas set up for fast response. For this reason, we supported the American Radio Relay League when it sought preemption of zoning and other local regulations that, either as written or as applied, act to inhibit effective communications. We applauded when the Federal Communications Commission recognized an obvious fact of physics – that effective communications is often a function of height.

For these reasons, the American Red Cross strongly supports amateur radio, and the construction of station antenna systems to provide effective local and long distance communications. We have done so through Memoranda of Understanding with the American Radio Relay League dating back before World War II, and still current today. We encourage municipalities and Home Owner Associations to employ their regulations so they will not impinge on the needs of amateur radio operators. In emergencies, the American Red Cross, and the people we serve in your area, need what radio amateurs provide – effective communications through existing equipment and antenna systems.

Sincerely,



Jayson P. Fenon
Disaster Telecommunications Partner
Disaster Services

Together, we can save a life



EXHIBIT H: FAA TOWAIR STUDY

Antenna Structure Registration - TOWAIR Determination Results

***** NOTICE *****

TOWAIR's findings are not definitive or binding, and we cannot guarantee that the data in TOWAIR are fully current and accurate. In some instances, TOWAIR may yield results that differ from application of the criteria set out in 47 C.F.R. Section 17.7 and 14 C.F.R. Section 77.13. A positive finding by TOWAIR recommending notification should be given considerable weight. On the other hand, a finding by TOWAIR recommending either for or against notification is not conclusive. It is the responsibility of each ASR participant to exercise due diligence to determine if it must coordinate its structure with the FAA. TOWAIR is only one tool designed to assist ASR participants in exercising this due diligence, and further investigation may be necessary to determine if FAA coordination is appropriate.

DETERMINATION Results	
Structure does not require registration. There are no airports within 8 kilometers (5 miles) of the coordinates you provided.	
Your Specifications	
NAD83 Coordinates	
Latitude	42-18-24.0 north
Longitude	071-11-13.0 west
Measurements (Meters)	
Overall Structure Height (AGL)	24.4
Support Structure Height (AGL)	21.3
Site Elevation (AMSL)	54.9
Structure Type	
MTOWER - Monopole	

Federal Communications Commission
 445 12th Street SW
 Washington, DC 20554

Phone: 1-877-480-3201
 TTY: 1-717-338-2824

Source: <http://wireless2.fcc.gov/UlsApp/AsrSearch/towairResult.jsp>
 To convert decimal locations to degrees, minutes and seconds: <https://www.fcc.gov/media/radio/dms-decimal>

EXHIBIT I: THE IMPORTANCE OF AMATEUR RADIO IN EMERGENCIES



When Hurricane Harvey hit the coast of Texas in late August, it brought with it "catastrophic rain" and flooding that caused billions of dollars in damage, especially in and around the Houston area. Fortune reports the storm knocked out 70 percent of the cell towers in affected counties.

According to a report from MySanAntonio.com, Hurricane Harvey knocked out internet and telephones service to almost 200,000 homes, more than 360 cell towers and 16,911 call centers. A study from the Federal Communications Commission shows that about 1,000 cell towers were knocked out during Hurricane Katrina.

Source: <https://www.sunherald.com/news/weather/article213083739.html> (updated June 19, 2018)

EXHIBIT J: TYPICAL EMERGENCY SITUATION



Ham radio operators are saving Puerto Rico one transmission at a time



By [Paul P. Murphy](#) and Michelle Krupa, CNN

Updated 4:18 PM ET, Wed September 27, 2017

(CNN) The phone call from the Red Cross came in late Friday night, just as the full scale of Hurricane Maria's calamity began taking shape.

"We need 50 of your best radio operators to go down to Puerto Rico."

In the days after [the worst storm in three generations hit the American island](#) -- and for many more to come -- public electrical, land-line and cellular communication systems showed few signs of life. And radio networks used routinely by police officers, power company workers and other first responder still were down.



[No gas. No food. No power. Puerto Ricans fear their future](#)

Yet, a key mode of communication -- one not reliant on infrastructure vulnerable to strong winds and flooding -- still crackled: the "ham" radio.

Answering the phone that night in Connecticut was the emergency manager for the American Radio Relay League, the group's CEO said. For more than a century, this group has served as a hub for amateurs licensed to operate the dependable, if archaic, medium known as ham radio and eager to pitch in when disaster strikes.

When the Red Cross made its latest appeal for heroes, these were the people it had in mind.

Jumping to respond to disaster

Already gearing up on his own that night to go to work, turning knobs and flipping switches, was Oscar Resto.

As one of dozens of ham -- shorthand for "amateur" -- operators across Puerto Rico, Resto had been authorized by the Federal Communications Commission [to use radios, computers, satellites or the Internet to assist and support public safety during emergencies](#).

Often untethered from wires and cables, operators share information by voice, Morse code and other methods on a wide range of frequencies above the AM broadcast band. Such communications were [critical during rescue operations after the 9/11 attacks and Hurricane Katrina](#).



Oscar Resto works with another volunteer to pass along information at the Red Cross headquarters in San Juan, Puerto Rico.

For three days after Maria hit, Resto sawed through the downed trees that separated his home from the road, he told CNN. Then he packed his car with radio gear, left his family and made the 25-mile journey to a makeshift Red Cross headquarters, where generators and batteries could power his equipment.

"I have the responsibility to establish the required emergency communications that the American Red Cross needed for understanding the needs of the citizens impacted by the hurricane," said Resto, a section manager for the [American Radio Relay League](#), which boasts 160,000 members.

Survivors needed food, water, shelter and fuel to power generators after Maria knocked out the entire electrical grid. They also needed to communicate, to share critical information about [diabetics nearing the end of their insulin reserves](#), babies threatened by dehydration, [families rationing crackers](#).

Transmitting radio signals to other ham operators in the Caribbean, Resto and his shortwave brethren traded National Hurricane Center reports on Maria's position. He also contacted a ham operator in Florida, and asked "just to tell my daughter, Astrid, that we were fine," he recalled.

Before long, Resto and his compatriots realized their messages were the only ones getting off the island.

In an instant, their mission expanded: Anyone with the requisite skills and equipment was conscripted.

Shoulder to shoulder with first responders

Two ham volunteers, Raul Gonzalez and Jose Santiago, set up a radio control hub run by generator power in Monacillo, near San Juan, and other centers quickly followed suit. There, ham operators work shoulder to shoulder with public safety and utility officials to transmit information to other ham operators working with teams in the field.



Puerto Rico governor: Power could be out for months

A full week after Maria battered their homes, Resto and two dozen other Puerto Rican ham operators were still running radio operations for the police and the local power company, whose own wireless communications systems rely in part on computers and power sources knocked out by the storm.

For instance, ham operators riding with police use radios tuned to the special broadcast frequencies to transmit calls to other ham operators hunkered down at the command centers with officers, who in turn respond with orders.

A power company generator low on fuel? A ham operator from Resto's team deployed with the power company calls his counterpart at the command center and coordinates a fuel delivery.



Raul Gonzalez and Jose Santiago work to maintain the communication infrastructure they set up between ham radio operators in the Monacillo Control Center.

For his part, Resto learned Tuesday via a ham radio at the command center that an unsanitary hospital in western Puerto Rico was transferring patients to another hospital. It was just one of countless threads of information squawked across the operational frequencies in a massive effort to deliver relief and supplies.

"I am very proud of them," Resto said of his crew of amateurs. "They are the real heroes."

More help on the way

Less than 48 hours after the American Radio Relay League's emergency manager fielded the Red Cross' call, 350 ham operators had offered to help, said Tom Gallagher, the group's CEO.

Fifty of them prepared this week to embark upon a three-week deployment to Puerto Rico. They include retired executives and public safety officers, and hail from places from Washington to Texas to New Hampshire, he said.

"It's an incredibly personal sacrifice from individuals who are dedicated to serving communities," Gallagher said. "They have the skills and the motivation and the sense of responsibility."



Volunteers will deploy to the island with equipment kits so they can be agile and provide for themselves.

Volunteers will be outfitted with self-sustaining kits provided by radio manufacturers and dealer partners so they can be agile and won't burden those they're trying to help, he said.

Southwest Airlines was due to transport the equipment for free Wednesday from the group's New York headquarters to Atlanta, where volunteers planned to convene Thursday to board a chartered JetBlue flight for San Juan, Gallagher said.

There, they plan to connect with the Red Cross and likely spread out across Puerto Rico to continue the life-saving work of radio operators already well underway, Gallagher said.

"It's the first time they've asked us to do this on this scale," he said. "This is why we're here."

Source: <https://www.cnn.com/2017/09/27/us/puerto-rico-maria-ham-radio-operators-tmd/index.html>

EXHIBIT K: PRESIDENTIAL RECOGNITION



THE WHITE HOUSE

WASHINGTON

January 8, 2007

I send greetings to all those celebrating 100 years of voices over the airwaves.

Radio plays an important role in informing, entertaining, and protecting people everywhere. At the turn of the last century, Reginald Fessenden pioneered wireless communications and opened the door for technological advances that have improved the lives of Americans and individuals around the world. This occasion is an opportunity to remember Fessenden's broadcast of voice and music over the air a century ago and a chance to celebrate the many ways radio has enriched our lives and our Nation.

I appreciate all who work in radio, and I am grateful to the amateur radio operators who provide emergency communications that help make our country safer and more secure. Your good work strengthens our society and represents the American spirit.

Laura and I send our best wishes. May God bless you.

A handwritten signature in black ink, appearing to read "George W. Bush".

Source: <http://www.arrl.org/news/stories/2007/01/17/102/PresBush-VoiceOverRadio-large.jpg>

EXHIBIT L: ARRL-FEMA AFFILIATION




**STATEMENT OF AFFILIATION
BETWEEN
THE FEDERAL EMERGENCY MANAGEMENT AGENCY
AND THE AMERICAN RADIO RELAY LEAGUE**

The *Department of Homeland Security (DHS)* and the *American Radio Relay League (ARRL)* view community disaster preparedness and response as top priorities for their respective organizations and for the American people. As such, our organizations have come together to provide mutual support for *Citizen Corps*.

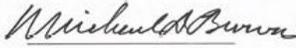
Under the direction of *DHS*, *Citizen Corps* is a community-based initiative to engage all citizens in homeland security and community and family preparedness through public education and outreach, training opportunities, and volunteer programs. Programs under the Citizen Corps umbrella include federally sponsored programs and other activities that share the goal of helping communities prevent, prepare for, and respond to terrorism, public health issues, and disasters of all kinds. It encourages all Americans to take an active role in building safer, stronger, and better-prepared communities.

ARRL is a non-commercial membership association of radio amateurs organized for the promotion of interest in Amateur Radio communication and experimentation, for the establishment of networks to provide communications in the event of disasters or other emergencies, for the advancement of the public welfare, and for the representation of the Radio Amateur in legislative and regulatory matters. *ARRL* is the principal organization representing the interests of the more than 650,000 U.S. Radio Amateurs. Because of its organized emergency communications capability, *ARRL's Amateur Radio Emergency Service (ARES)* can be of valuable assistance in providing critical and essential communications during emergencies and disasters when normal lines of communication are disrupted. *ARRL* conducts emergency communications training and certifies proficiency in emergency communications skills.

Together *DHS* and the *ARRL* agree to work collaboratively to:

- Raise public awareness about the use of Amateur Radio as a public safety resource;
- Provide training and accreditation for Amateur Radio Emergency Communications;
- Promote the formation of local *Citizen Corps Councils* and assist these Councils with providing public education, training and volunteer service opportunities that support first responders, disaster relief organizations, and community safety efforts;
- Publicly acknowledge the affiliation of *Citizen Corps* and the *ARRL*, which may include website links, co-logos on publications, and references in printed materials, including articles and news releases;
- Coordinate their respective activities to further their shared mission; and
- Keep each other informed of activities conducted in support of *Citizen Corps* and to provide an annual report summarizing those activities.

On this 21st day of June 2003, both parties enter into this agreement in good faith and agree to pursue the shared mission as stated.

MICHAEL D. BROWN
UNDER SECRETARY
DEPARTMENT OF HOMELAND SECURITY
EMERGENCY PREPAREDNESS AND RESPONSE



JIM HAYNIE
PRESIDENT
AMERICAN RADIO RELAY LEAGUE, INCORPORATED

Source: <http://www.arrl.org/files/file/Public%2520Service/FEMA-ARRL-SOA1.pdf>

EXHIBIT M: COMPARABLE AMATEUR RADIO STATION ANTENNA STRUCTURE



Figure M-1. Amateur Radio Antenna Structure in Newton

The Applicant estimates that this antenna is at a height of 60'.

EXHIBIT N: VIEWS TOWARD NEIGHBORING PROPERTIES



*Figure N-1. The house behind the fence, at 170 Greenwood Street, is 55 feet away from the proposed structure, to the Northeast. As can be seen in the aerial view, at **Exhibit P**, the house is oriented toward a backyard pool (to the right as shown in this picture). The front door faces Greenwood Street (to the left as shown in this picture). This photo, taken in winter, shows that four trees (two on the neighbor's lot, and two on the Applicant's lot) provide screening.*



*Figure N-2. The house in the distance, at 180 Greenwood Street, is 220 Feet Away, to the West. As can be seen in the aerial view, **Exhibit P**, in warmer weather the dense tree area will provide significant visual blockage. There are ten trees between the house at 180 Greenwood Street and the proposed installation. Note that this photo shows the wire fence keeping children away from the proposed installation.*

EXHIBIT O: INSURANCE LETTER



THE MURPHY INSURANCE GROUP

14 Storrs Avenue • Braintree, Massachusetts 02184-4002
TEL: (781) 380-0599 • FAX: (781) 380-0686 • www.murphyinsurancegroup.com

April 3, 2019

Alexander Kopp, M.D.
106 Hartman Road
Newton, MA 02459

RE: Arbella Mutual Homeowner Policy

Dear Dr. Kopp:

On behalf of ARBELLA Mutual Insurance Company, for your information and as a matter of record, the amateur radio antenna-support structure (tower and mast) that you propose to install, located at your residence and lot on 106 Hartman Road, Newton, MA, will be insured under your Homeowners Policy without additional premium, provided they are not used in any way for business, nor rented to anyone.

The antenna-support structure would be insured against the same types of losses (with the same exclusions) as other Permanent Structures, Coverage B.

I hope this addresses your questions and concerns. Should you need additional information, please let us know and we would be happy to assist you.

Sincerely,

Charles F. Murphy III, CLU

CHARLES F. MURPHY, INC.

SECURITIES OFFERED THROUGH COMMONWEALTH FINANCIAL NETWORK. MEMBER FINRA/SIPC.

EXHIBIT P: POWER DENSITY CALCULATION

Far Field Power Density Calculation
From PWR_DENS V3.7 by E. S. Parsons, BSEE, MSEE, K1TR

SITE: Newton Centre, MA

INPUTS:

Output Power from transmitter is 1000 Watts.
Antenna Gain over a dipole is 6.0 dBd.
Frequency of operation is 28.5 MHz.
Total system losses are 0.9 dB.
Distance: property line to foundation 30 feet; to antenna 77 feet.

OUTPUTS:

Average Power at antenna feedpoint is 270.91 Watts.
Average Effective Radiated Power (ERP) is 1769 Watts.
FCC OET-65 maximum limit is 0.22 mW/sq cm.

Computed Power Density is 0.026 mW/sq cm (0.255 W/sq meter).
(Power density calculated along antenna boresight in free-space;
no assumptions made about antenna pattern.)

- Hence:
1. The Computed Power Density is 11.0% of the FCC OET-65 Maximum Permissible Exposure (MPE).
 2. The Computed Power Density is -9.39 dB from the FCC OET-65 MPE.
 3. Transmitter output power must be increased by at least a factor of 9 to exceed the FCC OET-65 MPE.

Note: All calculations conform to [FCC OET Bulletin 65 Supplement B](http://www.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet65/oet65b.pdf),
http://www.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet65/oet65b.pdf

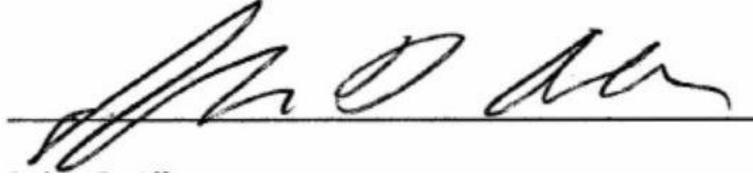
Far field power density is a measure, in units of milliwatts per square centimeter (mW/cm²), of the radio frequency power to which a human or animal is exposed. To put this in context and add meaning, the power density at the point specified (usually the home closest to the amateur's antenna, but in this case the property line closest to the antenna) is compared to the Maximum Permissible Exposure (MPE) for uncontrolled environments set forth by the FCC in the Commission's Report and Order No. 96-326.
http://www.fcc.gov/Bureaus/Engineering_Technology/Orders/1996/fcc96326.pdf.

An uncontrolled environment is an area where people would not normally be aware of potential RF exposure. The property boundary is an example of an uncontrolled RF environment. The FCC 96-326 Report and Order adopted the standards set forth in IEEE C95.1-1991 for uncontrolled RF environments.

This analysis assumes that the antenna is pointed at the nearest dwelling. For rotary antenna systems, the antenna is often pointed in other directions, over time, this results in much lower power densities at the nearest dwelling.

FCC OET Bulletin 65B, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields" states duty factors in Table 2. SSB and CW are less than 50% duty cycle, whereas FM and RTTY are somewhat more than 50%. To calculate power density, the FCC method assumes a 30 minute averaging time (10 minutes of transmitting, 10 minutes of receiving, 10 minutes of transmitting). This is then compared to the FCC OET-65 Maximum Permissible Exposure limits for the general population with an uncontrolled exposure.

I certify that the radio frequency emissions comply with FCC standards for such emissions both individually and cumulatively with any other facilities located on or immediately adjacent to the proposed facility, as required by the Communications Act.



BSEE, MSEE, Cornell University

Mr. Allen is a qualified engineer, as required by the zoning ordinance. Here is his resume.

John D. Allen

93 Spectacle Hill Road,
Bolton, MA 01740

Cell: 508-361-6229

Email: john@pcsupportolutions.com

ELECTRICAL ENGINEER

A hands-on technical Engineer with broad and deep experience in hardware development and test including board level design, signal integrity, fiber optics, electronics systems, high speed analog, RF and Microwave design. Strong knowledge of microwave theory and techniques. Excellent judgment and team leadership.

AREAS OF EXPERTISE

- RF and Microwave test
- Digital, RF and microwave skills
- FCC, EMC CE Mark, etc.
- All Electronic Test Equipment
- Relationship Building
- Team Leadership
- Excellent at Debugging
- Tactful Problem Solver
- Analog, RF & Digital Design

KEY SKILLS ASSESSMENT

Knowledge of test equipment: DC to light. Microwave measurements. Network Analyzers etc.

Team Leadership: Proven ability to motivate co-workers and build teams and lead them to success.

Customer Service and Satisfaction: Ability to rapidly build strong relationships with customers, vendors and teams.

Written Communication: Concise, accurate and effective written and verbal communication skills.

Superior Computer skills: Microsoft Office, Outlook, CAD tools, Windows, including debugging.

PROFESSIONAL EXPERIENCE

Personal Experience, Bolton, MA

(1992 - PRESENT)

- Microwave experimentation and test, also amateur radio operation on 10 GHz.
- Attended over 30 conferences on microwave technology
- Operated test equipment. Including VNAs, Spectrum Analyzers. Power meters and signal generators to 26/40 GHz. Measured S parameters, insertion and transmission loss, etc.
- I own HP 8510C NA, 8562A SA, 8673B Sig. Gen., HP 435 & 436A Power Meters and much more.
- Built and improved my 10 GHz. transverter and antenna feed. Made SSB contacts to 400 miles.
- Evaluated antenna performance on outdoor antenna range.
- Constructed VHF transmit and receive converters, VHF power amps, preamps and various VHF and Microwave antennae.

PC Support Solutions, Bolton, MA

2002 – **PRESENT**

PRESIDENT (2002 – PRESENT)

- Consults on computer and networking system configurations.
- Solves complex problems on computer systems,
- Debugs computer and networking hardware and software problems for businesses and homes.

Gotham Networks, Acton, MA.

2001-2001

HARDWARE DEVELOPMENT ENGINEER and MANAGER (2001-2001)

Responsible for all board level design and layout, all signal integrity design and debug, FPGA design, firmware design, internal and external mechanical design, management of outside vendors for chassis, industrial design, board fabrication and surface mount assembly manufacturing, management of outside power supply design.

Accomplishments:

- Managed the Allegro PC Board design and the surface mount manufacturing done by the contract manufacturer.
- Managed and participated in the design of I/O modules for DS-3 FR, DS-3 ATM, OC-3, OC-12, OC-48, Ethernet, and Gigabit Ethernet as well as the Universal Service Card with Agere Network Processor.
- Introduced PC board 5 mil Buried Capacitance layer for Vcc and GND, substantially reducing noise and improving signal quality, especially for 2.5 Gb/s OC-48 signals.

IronBridge Networks, Inc., Lexington, MA.

1998-2001

SENIOR CONSULTING ENGINEER / HARDWARE DEVELOPMENT MANAGER

- Responsible for a million dollar lab test equipment budget including **selection of all digital and RF lab test equipment.**
- **Designed and tested equipment to 40 GHz. with Spectrum Analyzer.**
- Managed the design, construction and operation of a raised floor lab. Specified all power, cooling and test equipment. Managed all aspects of a terabit router design.

Accomplishments:

- Introduced micro-vias, buried capacitance material and high performance PCB materials, allowing the product to meet timing and signal integrity requirements without serious board cost increases.

Adaptive Networks, Inc., Newton, MA.

1997-1998

DIRECTOR OF ENGINEERING

- Managed development of a mixed signal ASIC for 10 Mbit/sec. Power Line Networking.
- Debugged mixed signal ASIC with 70 MHz adaptive analog filters, Found latch-up problem caused by layout design, traced to exact source on die.

Pixelvision, Inc., Acton, MA.

1995-1997

SR. MEMBER OF THE TECHNICAL STAFF (1995 - 1996)

Group Leader, Flat Panel AMLCD Monitor Development (1996 - 1997)

- Brought products to market with short design cycles, responsible for signal integrity and all regulatory and emissions compliance work, both design and debug.
 - Solved FCC emissions problems in only 1 shift - FCS was the next day.
 - Managed four people, signal integrity, FCC, CE and UL Compliance Design
-

EDUCATION & TRAINING

BS AND MASTERS OF ELECTRICAL ENGINEERING, CORNELL UNIVERSITY, ITHACA, NY

Over 120 hours of Leadership, Management and Supervisory Training

FCC First Class Radiotelephone license with RADAR endorsement
Amateur Radio Extra class license

AWARDS & DISTINCTIONS

Two patents in data communications as Principal Inventor:
4,910,754: Initialization and Synchronization Method for a Two-Way Communication Link
5,020,081: Communication Link Interface with Different Clock Rate Tolerance

Honored by Data General with a Technical Achievement award with all expenses paid vacation.

EXHIBIT Q: LETTER OF SUPPORT (OTERO)

Victor Otero

114 Hartman Road

Newton Center, MA 02459

January 13, 2019

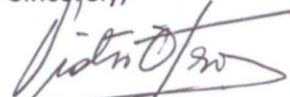
To whom it may concern:

Dr. Alexander Kopp, of 106 Hartman Road, is my next-door neighbor. He has explained his proposed amateur radio antenna project to me and answered all my questions. I know that the antenna structure will be in his back yard which directly adjoins my property and my yard.

I am a retired electrical engineer, and MIT graduate, and I fully support Dr. Kopp's interests in amateur radio. I have no objection to Dr. Kopp's project to erect an antenna supporting structure which I fully understand will be in the vicinity of 25 feet from my property. His antenna will be closer to my house than any other neighbor.

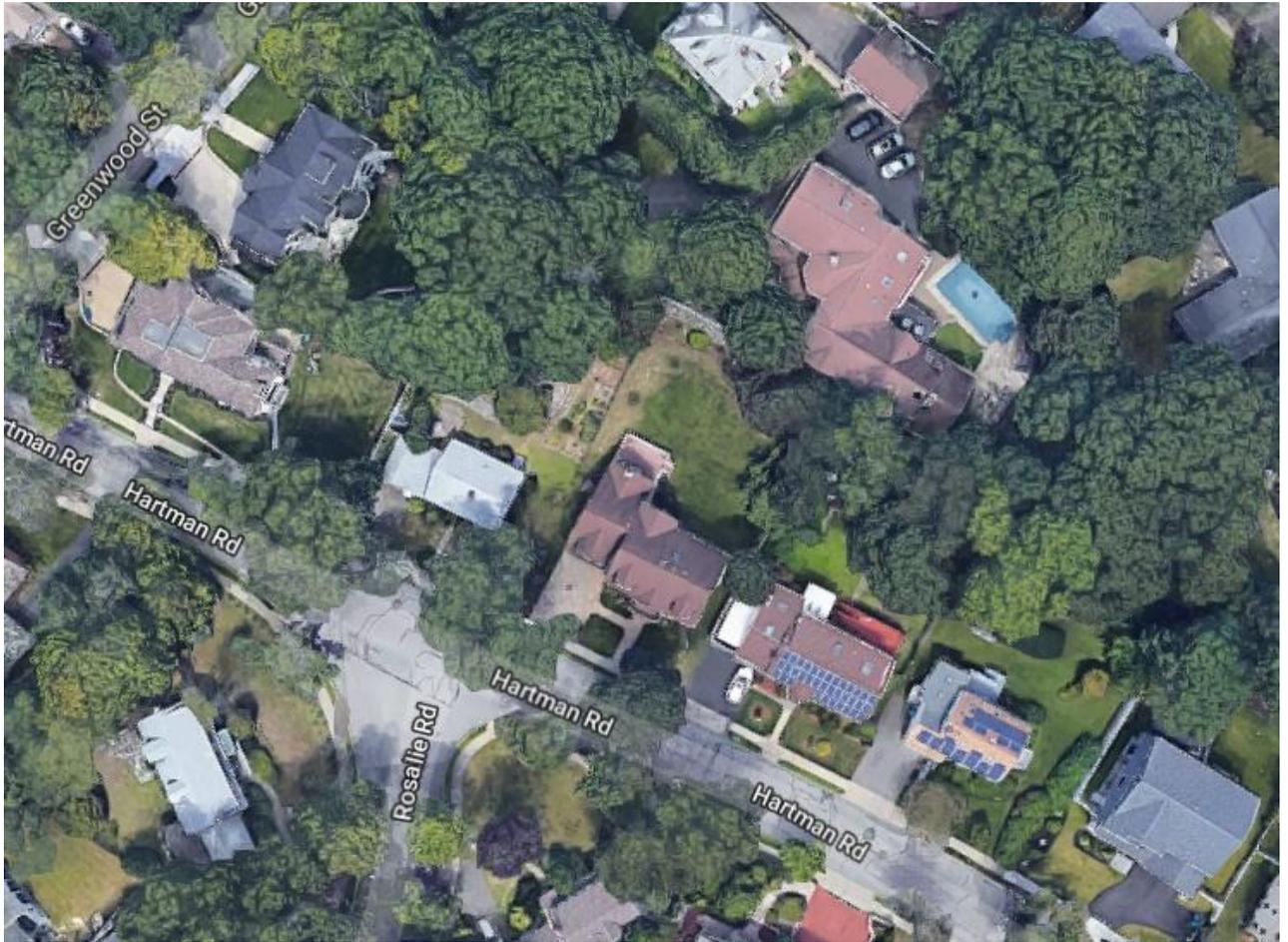
I am in support of granting to him a Building Permit, and I encourage the City to do so.

Sincerely,



Victor Otero

EXHIBIT R: AERIAL VIEW



Source: www.maps.google.com

Aerial View Centered on 106 Hartman Road (the project site).

Several interesting things are noticeable. The property to the rear of the Applicant, at 170 Greenwood Street, has a swimming pool, and their outdoor activities are oriented away from the proposed antenna structure, and their house is in between. At the property to the West of the site, 100 Hartman Road, views of the proposed antenna structure are blocked by the Applicant's house. Also, in the summer, there is a density of leafed-out trees.

EXHIBIT S: LETTER TO ABUTTERS AND COUNCILORS OF THE WARD

Alexander Kopp, MD

*106 Hartman Road
Newton Centre, MA 02459
email: akopp@drkoppmd.com
cell: 617.584.0833*

Dear Neighbor,

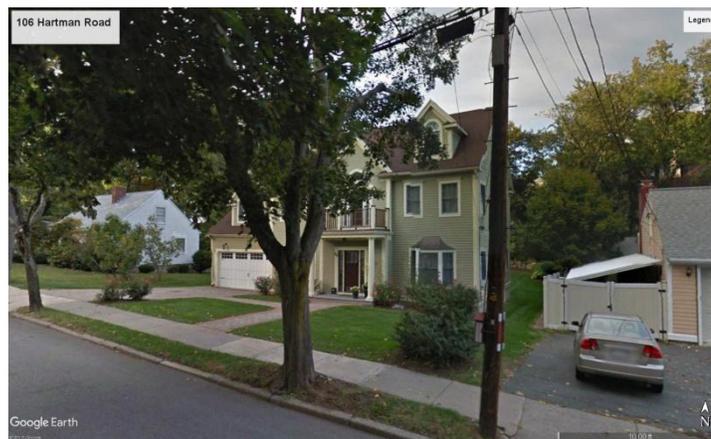
I live at 106 Hartman Road, and I am an FCC-licensed radio amateur (“radio ham”). I hold the extra class amateur radio license issued by the Federal Communications Commission. My call sign is AK1MD. I am a member of the Amateur Radio Emergency Service, and trained in the SKYWARN program.

Newton Zoning Ordinance § 6.9.8.A provides that, at the time I submit my application for an amateur radio station antenna structure to the Commissioner of Inspectional Services to get my building permit, I am required to notify in writing my immediate abutters.

My application is for a building permit under Zoning Ordinance §6.9.4.B. It will be subject to Section 6.9.8, which calls for “Administrative Site Plan Review.” This means that I have submitted a site plan showing my house, “lot lines, easements and rights of way and an elevation showing details of the device.” Nothing commercial will be built.

Ham radio antennas have been installed all around Newton. In Newton, the safety of antenna structures is of the utmost priority. The amateur radio station antenna structure I plan to erect will be constructed in accordance with the Building Code, as well the National Electrical Code. I have chosen a crank-up antenna structure that can be retracted to 27’5 feet in height, ~38’ with antenna, when not in use, and tilted over, almost to the ground, when I am travelling. When in use, the pole will be only ~78 feet high. My antenna will rest on top, just above the trees in the neighborhood. The antenna system will be in my backyard, obscured from the street by the house.

Here are some photos of my house, taken from the street. The antenna system will be in my backyard, obscured from the street by the house (which is 35 feet tall to the top of the roof).



House with trees fully leafed out.



House in winter. Trees with no leaves.

A copy of my building permit application may be reviewed at the Planning Department, Newton City Hall, telephone: 617.796.1120. Should you have any questions, I'd be pleased to speak with you. I may be reached evenings, before 10 PM please, at 617.584.0833.

Sincerely,

A handwritten signature in black ink, appearing to read "A. Kopp".

Alexander Kopp, MD

EXHIBIT T: OPERATION SKYWARN

Alexander Kopp MD



Call 1 – 800 – 330 – 1147

Spotter I.D. 19-109

Report What, Where, and When

National Weather Service
46 Commerce Way
Norton, MA 02766

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