

Permit to Install and Maintain a Signal Booster

New Fire Radio Installation, New Fire and Police Radio Installation or
Modification of existing system

BDA PERMIT INSTRUCTIONS

1. Complete the permit application and submit with the following in accordance with instructions in the BDA Instruction packet;
 - (a) Detailed drawings showing the location of the amplification equipment and associated antenna systems which include a view showing building access to the equipment. Also, the location of a remote annunciator.
 - (b) Schematic drawings of the electrical system, backup power, antenna system and any other associated equipment including panel locations and labeling.
 - (c) Manufacturer's data sheets on all equipment to be installed
 - (d) RF Grid survey showing signal strength
2. The Deputy Chief will review these plans and email you the Approved permit.

****You must also get approval from the Wires & Building Departments****

2. Complete the installation and submit an affidavit from your company stating you performed the work according to the plans and instructions.
3. Make an appointment for inspection in person at

**WALTHAM FIRE PREVENTION
175 LEXINGTON STREET
WALTHAM, MA 02452**

or call 781-314-3710

***** There is NO FEE for a BDA permit *****



**CITY OF WALTHAM
FIRE DEPARTMENT**
Permit to Install and Maintain a Signal Booster



Installation Address: _____ Zip: _____ Name of Bldg (if applicable): _____		<input type="checkbox"/> New Fire radio Installation <input type="checkbox"/> New Fire and Police radio Installation <input type="checkbox"/> Modification of existing system <input type="checkbox"/> 5-Year Waiver (survey required with permit application)						
Property Owner Name: _____ Address: _____	<table style="width: 100%;"> <tr> <td style="width: 50%;">Floors</td> <td style="width: 50%;">Distributed Antenna System</td> </tr> <tr> <td>Above Grade _____</td> <td><input type="checkbox"/> Shared (IM study required with permit)</td> </tr> <tr> <td>Below Grade _____</td> <td><input type="checkbox"/> Not Shared</td> </tr> </table>		Floors	Distributed Antenna System	Above Grade _____	<input type="checkbox"/> Shared (IM study required with permit)	Below Grade _____	<input type="checkbox"/> Not Shared
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Below Grade _____	<input type="checkbox"/> Not Shared							
<table style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> Property Manager Name: _____ <i>Property owner or agent</i> Signature: _____ <i>Note: Not to be signed by contractors</i> </td> <td style="width: 50%; vertical-align: top;"> Phone: _____ Email: _____ </td> </tr> </table>			Property Manager Name: _____ <i>Property owner or agent</i> Signature: _____ <i>Note: Not to be signed by contractors</i>	Phone: _____ Email: _____				
Property Manager Name: _____ <i>Property owner or agent</i> Signature: _____ <i>Note: Not to be signed by contractors</i>	Phone: _____ Email: _____							
Description of Work:								
NOTE:								
Radio System Installer	Name: _____ Electrician's License # _____ Address: _____ Email: _____ Phone _____ Fax _____							
<p>I certify that the property owner understands and has agreed to comply with the current Waltham Public Safety Radio Signal Booster Specification. If a conflict should result with any of these specifications it will be my responsibility to resolve it.</p> <p>The property owner has also acknowledged that upon final system acceptance, permission will be granted to operate a signal booster on frequencies licensed to the Waltham Wires Department, by the Federal Communications Commission (FCC) and that failure to maintain compliance with the Waltham Public Safety Radio Signal Booster specifications will result in the withdrawal of this permission.</p> <p>Radio Service Provider _____ Address _____</p> <p>Name _____ FCC License # _____</p> <p>Signature _____ Phone _____</p> <p>Email: _____ Fax _____ Date: _____</p>								

For office use only

WFD Permit Number : _____

FCC Signal Booster Registration # SB _____

Issued by: _____

Signal Booster Specification Version: _____

10/15/2018



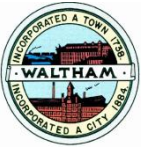
WALTHAM FIRE DEPARTMENT

FIRE PREVENTION BUREAU

175 Lexington Street, Waltham, MA 02452-4638

Phone: 781-314-3710

Fax: 781-647-0892



EMERGENCY RESPONDER RADIO COVERAGE IN BUILDINGS

REQUIREMENTS FOR THE INSTALLATION OF A FIREFIGHTER COMMUNICATION SYSTEM





-  The Waltham Fire Department has developed these requirements in conjunction with the requirements of the Massachusetts Building Code as amended on April 11, 2014.
-  The installation and operation of radio based firefighter communications system must comply with this document.
-  The voluntary installation of a radio based firefighter communication system must comply with **all** of the requirements of this document.
-  The in-building radio system is an integral component of the life safety equipment of a building or structure. The primary function is to provide reliable firefighter communications at the required signal strength within the specified areas.

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I **Emergency Responder Radio Coverage in Buildings:**

Section	Description
1.1	Emergency responder radio coverage shall be provided in all new buildings. The system shall be a UL 2524 system.
1.2	Buildings shall have approved radio coverage for firefighters within the building based upon the existing coverage levels of the Waltham Fire Dept. at the exterior of the building. This shall not require improvement of the existing Waltham Fire Dept. radio system.
1.3	Large residential complexes may be required to adhere to this regulation at the discretion of the Authority having Jurisdiction.
1.4	Exceptions: <ul style="list-style-type: none">(a) One and two family or at the discretion of the Waltham Fire Prevention Bureau.(b) Buildings that have sufficient levels of radio coverage after a survey has been conducted and approved by the Waltham Fire Dept.
1.5	Existing buildings undergoing substantial renovation, a change of occupancy, or the installation of a new fire alarm system are required to provide radio coverage for firefighters.
1.6	Buildings and structures that cannot support the required level of radio coverage shall be equipped with a system that includes a bi-directional amplifier(s) to achieve the required level of radio coverage.
1.7	RF emitting devices and cabling used in the installation of the BDA system shall be UL listed and approved by the City of Waltham Wires Dept. All RF emitting devices shall have the certification of the FCC and be suitable for public safety use prior to installation.

II **Waiver of Radio Coverage Systems:**

Section	Description
2.1	Buildings that have sufficient levels of radio coverage to satisfy the requirements may request a waiver by submitting a Permit Application indicating a waiver is being requested along with an RF survey showing sufficient levels of radio coverage. Coverage will be verified by WFD Fire Prevention Bureau.
2.2	Waivers are valid for 5 years and must be renewed.
2.3	At any time it is determined by the Waltham Fire Department that radio coverage is not adequate, the waiver will be withdrawn and the property owner is then required to provide radio coverage as required.

III **Approval and Permit:**

Section	Description				
3.1	Prior to the installation of a firefighter Communication system, a permit for the installation of a signal booster must be submitted to: <table><tr><td>Waltham Fire Prevention Bureau 175 Lexington St. Waltham, MA 02452</td><td>City of Waltham Building Dept 119 School St. Waltham, MA 02452</td></tr><tr><td colspan="2">City of Waltham Wires Dept. 119 School St. Waltham, MA 02452</td></tr></table>	Waltham Fire Prevention Bureau 175 Lexington St. Waltham, MA 02452	City of Waltham Building Dept 119 School St. Waltham, MA 02452	City of Waltham Wires Dept. 119 School St. Waltham, MA 02452	
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City of Waltham Wires Dept. 119 School St. Waltham, MA 02452					
3.2	The permit application shall include: <ul style="list-style-type: none">(a) Detailed drawings showing the location of the amplification equipment and associated antenna systems which include a view showing building access to the equipment. Also, the location of a remote annunciator.(b) Schematic drawings of the electrical system, backup power, antenna system and any other associated equipment including panel locations and labeling.(c) Manufacturer's data sheets on all equipment to be installed				
3.3	Upon approval, a permit for the installation of a signal booster will be issued. Any field changes that occur during construction shall be incorporated into new As-Built plans. These shall include any manufacturer's data sheets for any changes not submitted in the original submittal. As-Built plans, if required due to system changes, shall be submitted for approval.				
3.4	The City of Waltham Wires Dept. assumes the responsibility for registering approved signal boosters with the FCC.				
3.5	Property owners who maintain compliance with this document are granted permission to operate a signal booster on frequencies licensed to the City of Waltham by the Federal Communications Commission. Failure to maintain compliance with this specification will result in the automatic withdrawal of said permissions.				

IV **Radio Coverage:**

Section	Description
4.1	General building areas shall be provided with 90 percent floor area coverage.
4.2	Critical areas, including fire command centers, fire pump rooms, exit stairs, exit passageways, elevator lobbies, standpipe cabinets, sprinkler sectional valve locations, and other areas deemed critical, shall be provided with 99 percent floor area radio coverage.

V

System Design:

Section	Description
5.1	The distributing antenna system may be a radiating cable, fixed antennas or a combination of both.
5.2	The system must comply with all applicable sections of FCC rules. (appendix A)
5.3	Permanent external filters or attachments shall not be permitted.
5.4	Assembly/installation of all components shall comply with the National Electric Code.
5.5	Survivability from attack by fire shall meet NFPA 72. (s/d, 2 hour rated room)
5.6	All system components shall be installed, tested, inspected, and maintained in accordance with the manufacturer's published instructions.
5.7	The system design, and installation, shall not exceed the FCC's OET 65 standards.
5.8	The system shall be normally powered on and continuously provide passing of required frequencies.
5.9	Shall be compatible with both analog and digital communications, simultaneously at the time of installation.
5.10	Maximum propagation delay is 15us (microseconds).

VI

Signal Strength:

Section	Description
6.1	A minimum inbound (downlink) signal strength of -95dbm shall be provided throughout the coverage area. The inbound signal level shall be sufficient to provide a minimum of DAQ 3.0 for either analog or digital signals.
6.2	A minimum outbound (uplink) strength of m-95dBm shall be provided at the Waltham Fire Department receivers. The outbound signal level shall be sufficient to provide a minimum of DAQ 3.0 for either analog or digital signals.

VII

Isolation:

Section	Description
7.1	Antenna isolation shall be maintained between donor antenna and all inside antennas to a minimum of 20 dB under all operating conditions.

VIII Non-Interference & Non-Public Safety System Degradation:

Section	Description
8.1	No amplification system capable of operating on frequencies or causing interference on frequencies assigned to Waltham Public Safety by the FCC shall be installed without prior coordination and approval by the City of Waltham.
8.2	The property owner shall suspend and correct equipment installations the degrade performance of the Waltham Fire Dept. radio system or the BDA.
8.3	BDA systems that share infrastructure with non-public safety services shall ensure that the coverage and performance of the public safety communications channels are not degraded below the required level of performance, regardless of the amount of traffic carried by the non-public safety services.

IX System Frequencies

Section

Description

9.1

The BDA shall be capable of transmitting on all radio frequencies assigned to Waltham Public Safety, and be capable of using any modulation technology in current use by the Waltham Fire Dept.

9.2

Assigned Frequencies:

Label	Rx Freq	Tx Freq	Rx NAC	Tx NAC	Rx Sig	Tx Sig	Power	Bandwidth
WALTHM.F1.FM	470.1125	473.1125	293	293	C118.8	D223	High	12.5
WALTHM.F2.FM	482.2250	485.2250	225	225	C127.3	D271	High	12.5
WALTHAM PD 1	470.5125	473.5125	512	512	C131.8	C131.8	High	12.5
WALTHAM PD 2	460.1875	465.1875	837	837	C103.5	C103.5	High	12.5

X Frequency Changes:

Section	Description
10.1	The BDA system shall be upgradeable to allow for changes or additions to system frequencies to maintain radio system coverage as it was originally designed

XI Radio Survey:

Section	Description				
11.1	The building owner shall have the in-building radio system tested to insure that two-way radio coverage for each floor of the building meets or exceeds the required signal strength.				
11.2	Each floor of the building shall be divided into a grid of approximately twenty (20) equal areas. <ul style="list-style-type: none">(a) A maximum of two (2) areas will be allowed to fail the test per floor. A spot located approximately in the center of the grid will be selected for the test. Once the spot has been selected, prospecting for a better spot within the grid area will not be permitted.(b) Field strength testing instruments are to be calibrated annually and of the frequency selective type incorporating a flexible antenna similar to the ones used on Waltham Public Safety radios.				
11.3	RF plots indicating the initial assessment of radio coverage and the enhanced coverage shall be submitted at the time of acceptance testing.				
11.4	All compliance testing to be done with 50 ohm loads in place of the donor antenna to avoid interference to the Waltham Public Safety radio system.				
<table><tr><th>Note</th><th>Contact Number</th></tr><tr><td><i>The Waltham E911 Dispatch is to be notified prior to any testing.</i></td><td>781-893-4105</td></tr></table>		Note	Contact Number	<i>The Waltham E911 Dispatch is to be notified prior to any testing.</i>	781-893-4105
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11.5	Unattended operation of the BDA is not permitted until the completion of acceptance testing.				

XII Power Supply:

Section	Description
12.1	At least two independent and reliable power supplies shall be provided for all RF emitting devices and any other components of the system.
12.2	The primary power source shall be supplied from a dedicated branch circuit and comply with NFPA 72.
12.3	The secondary power source shall consist of a separate system with 24 hours of 100% system operation standby power.

XIII Component Enclosure:

Section	Description
13.1	All BDA components, RF filters, and battery system components shall be contained in a NEMA4 or NEMA4X type enclosure(s).
13.2	The cabinet shall be large enough to dissipate internal heat without venting the inside of the cabinet to the outside atmosphere. External or exposed RF filters are unacceptable.
13.3	Dedicated battery cabinets may be vented.
13.4	The cabinet shall be painted red and equipped with a locking mechanism.
13.5	The BDA room shall be labeled on the door with signage as noted below.
13.6	The cabinet shall be labeled (in bright yellow).

DOOR SIGN

**Waltham Public Safety Radio
BDA ROOM**

CABINET SIGN

**Waltham Public Safety Radio
BDA Permit #
Served By: (Vendor Name)
(Vendor Telephone)**

XIV System Monitoring:

Section	Description
14.1	A sign will be located at the dedicated monitoring panel with the name and telephone number of the radio service provider indicated that they shall be notified of any alarm.
14.2	Trouble signal must be immediately reported to the radio service provider.
14.3	The Waltham Fire Dept. must be notified of any failures that extend past the two (2) hour time limit.
14.4	The building's fire alarm system shall include automatic supervisory signals for malfunctions of the BDA system that are annunciated by the fire alarm system in accordance with NFPA 72, and shall comply with the following:
14.4.1	1. Monitoring for integrity of the system shall comply with NFPA 72, Ch.10
14.4.2	2. System supervisory signals shall include the following <ul style="list-style-type: none"> a. donor antenna malfunction b. active RF emitting device failure c. low battery – when 70% of the 12 hour operating capacity has been depleted
14.4.3	3. Power supply supervisory signals shall include the following for each RF emitting device and system component: <ul style="list-style-type: none"> a. Loss of normal ac power b. failure of battery charger
14.4.4	4. The communications link between the fire alarm system and the BDA must be monitored for integrity.
14.5	A dedicated monitoring panel shall be provided within the fire command center to annunciate the status of all RF emitting devices and system component locations. The monitoring panel shall provide visual and labeled indications of the following for each system for each system component and RF emitting device.
14.5.1	1. normal ac power
14.5.2	2. loss of normal ac power
14.5.3	3. battery charger failure
14.5.4	4. low battery capacity (to 70 percent depletion)
14.5.5	5. donor antenna malfunction
14.5.6	6. Active RF emitting device malfunction
14.5.7	7. system component malfunction
14.6	The communications link between the dedicated monitoring panel and the two-way radio communications enhancement system must be monitored for integrity.
14.7	Remote annunciators may be required and location to be approved by the Waltham Fire Department. Typically these are located in front lobby, Fire command center, and inside BDA room.

XV**Acceptance Testing:**

Section	Description
15.1	Delivered audio quality (DAQ) testing will be conducted by WFD/WPD personnel to ensure that two way radio coverage, on each floor of the building, meets the minimum requirements. At least five (5) business days' notice is required prior to the test being conducted.
15.2	It is the building owner's responsibility to ensure that acceptance testing occurs prior to fire alarm system testing for the building. BDA representative must be present for Fire Department Testing.
15.3	At the time of this test, the following are also required:
15.3.1	1. The approved radio technician shall certify that the in-building radio system was installed and tested in accordance with the requirements of the current WFD In-Building Radio Specification.
15.3.2	2. An approved radio service company shall certify that a maintenance contract is in effect that provides 24 hour by 7 day response within 2 hours of notification of a problem. This contract must be good for a period of atleast one (1) year.
15.3.3	3. Must submit RF survey results
15.3.4	4. Small scale drawings (11x17 maximum) of the structure shall be provided by the owner/contractor. The plans shall show each floor divided into grids. Each grid shall be labeled to indicate the DAQ result from the RF survey.
15.3.5	5. As built drawings (if needed)
15.3.6	6. BDA manufacturer, Model #, serial #, FCC certification #
15.3.7	7. Link budget

XVI**Testing Procedures:**

Section	Description												
16.1	For testing signal strength and quality, the testing shall be based on the DAQ system. A DAQ level below 3.0 shall be considered a failed test for a given grid cell.												
16.2	Delivered Audio Quality Definitions:												
<table border="1"> <thead> <tr> <th>DAQ:</th><th>Description:</th></tr> </thead> <tbody> <tr> <td>1</td><td>Unusable, speech present but unreadable noise/distortion.</td></tr> <tr> <td>2</td><td>Understandable with considerable effort. Frequent repetition due to noise/distortion</td></tr> <tr> <td>3</td><td>Understandable with slight effort. Occasional repetition due to noise/distortion</td></tr> <tr> <td>4</td><td>Speech easily understandable. Little noise or distortion.</td></tr> <tr> <td>5</td><td>Perfect. No distortion or noise discernible</td></tr> </tbody> </table>		DAQ:	Description:	1	Unusable, speech present but unreadable noise/distortion.	2	Understandable with considerable effort. Frequent repetition due to noise/distortion	3	Understandable with slight effort. Occasional repetition due to noise/distortion	4	Speech easily understandable. Little noise or distortion.	5	Perfect. No distortion or noise discernible
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4	Speech easily understandable. Little noise or distortion.												
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16.3	A number of cells shall be selected at random. Signal strength measurements shall be taken at the center of each cell.												
16.4	A maximum of two grid cells per floor will be allowed to fail the test. In the event that three of the areas fail the test, in order to be more statistically accurate, the testing grid may be doubled. If the number of grid cells is adjusted, the number of failed cells permitted shall be adjusted accordingly to meet the 90% coverage.												
16.5	Failures shall not be allowed in critical areas, including but not limited to the Fire Command Center, Fire Pump Room, Emergency generator room, stairwells with a standpipe, elevator lobbies serving the emergency elevator, and any other areas identified by the fire department.												

- 16.6 Both inbound and outbound signals shall be measured on each and every floor above and below grade including stairwells, basements, penthouse facilities and parking areas of the structure.
- 16.7 Measurements shall be made with the antenna held in a vertical position three (3) to four (4) feet above the floor. (As to simulate portable radio being worn on belt or turnout coat pocket).

XVII Annual Testing:

Section	Description
17.1	All active components of the in-building radio system, including but not limited to, amplifier, power supplies, and back up batteries, shall be inspected a minimum of every twelve (12) months.
17.2	Annual test shall be conducted by an authorized company.
17.3	Amplifiers shall be tested to insure that the gain is the same as it was upon initial installation and acceptance. The original gain shall be noted and any change shall be documented.
17.4	Back up batteries and power supplies shall be tested under load for a period of one (1) hour to verify that they will operate during an actual power outage.
17.5	Active components shall be tested to verify they are operating as designed by the manufacturer.
17.6	If communications appear to have degraded or if the tests fail to demonstrate adequate system performance, the owner of the building or structure is required to remedy the problem, and restore the system in a manner consistent with the original approval criteria.
17.7	The re-testing will be done at no expense to the City of Waltham as required in the original testing procedures.

XVIII Five (5) Year Survey:

Section	Description
18.1	An RF Survey shall be conducted a minimum of once every five (5) years to insure that the radio system continues to provide the required level of radio coverage.
18.2	The procedure set forth in "Section K. Radio Survey" shall apply to such tests.

XIX Maintenance & Servicing:

Section	Description
19.1	At final acceptance, the building owner shall supply a letter to the Waltham Fire Department accepting the property owner's responsibilities. These responsibilities are as follows:
19.1.1	1. Upgrades to system as directed by the Waltham Fire Department.
19.1.2	2. Maintenance contract in place with name of authorized company, who will provide a 24 hour by 7 day emergency response within two (2) hours after notification. The system shall be maintained in accordance with FCC requirements.

- 19.1.3 3. Maintain a list of contact personnel with phone numbers at the BDA cabinet. The contact personnel shall have knowledge of the building and the BDA system, and be available to respond to the building in the case of an emergency.
- 19.1.4 4. Annual Inspections.
- 19.1.5 5. 5-Year RF Surveys.
- 19.1.6 6. This letter is to be on company letterhead signed by the property owner or a legal representative.

XX **Modifications:**

Section	Description
20.1	Modification of an existing BDA system requires prior approval from the Waltham Fire Department.
20.2	A permit application shall be submitted which includes a description of the work to be performed and drawings showing intended modifications.
20.3	Modification work must not degrade radio coverage at any time.
20.4	An RF survey must be completed and submitted after any modification to an existing antenna system.

XXI **Radio Service Provider:**

Section	Description
21.1	An approved Radio Service provider is a company that employs individual(s) that are qualified by the equipment manufacturer (in writing) to work on the BDA system and holds a valid FCC license or equivalent.
21.2	Design, Installation and testing shall be conducted, documented, and signed by a technician qualified by the equipment manufacturer to work on the BDA system and who is in possession of one of the following:
21.2.1	1. A. FCC General radiotelephone operator license
21.2.2	2. B. APCO Radio Technician Certification
21.2.3	3. C. Certification from an industry organization acceptable to the WFD.
21.3	Radio service providers will be issued call signs for use when transmitting on the Waltham Public Safety Radio System.
21.4	Reports of annual inspections and 5-year RF surveys must be submitted to the Waltham Fire Department.
21.5	The Waltham Fire Department shall be notified in writing at least thirty (30) days prior to cancellation of a maintenance contract. Such notice shall contain the date and time such cancellation is to take effect, address of BDA location, and BDA permit #.
21.6	The Waltham Fire Prevention Bureau shall be notified in writing upon the procurement of contractual agreements relating to in-building radios covered by this specification.

XXII **Fire Department Inspection:**

Section	Description
22.1	Fire Department personnel, after providing reasonable notice to the owner or their representative, shall have the right to enter onto the property to conduct field testing. This is to be certain that the required level of radio coverage is present.

XXIII **Disclaimer:**

Section	Description
23.1	The Waltham Fire Department does not endorse, recommend or specify any specific product, service provider or configuration as the means to comply with this specification.
23.2	This document may change at any time due to code revisions.
23.3	The Waltham Fire Department, the Waltham Wires Department and the City of Waltham reserve the right to establish an approved vendor list.