City of Maple Grove

Guidelines and Permit Information: Emergency Responder Radio Coverage

Permit Required: 2020 MSFC 105.7.6

Emergency Responder Radio Coverage:

A construction permit is required for installation of or modification to emergency responder radio coverage systems and related equipment.

- Except as otherwise provided, no person shall erect, construct, change the use of or provide addition of more than twenty (20) percent to, any building or structure or any part thereof, or cause the same to be done which fails to support adequate radio coverage for the Minnesota Regional Radio Communications System, including but not limited to firefighters and police officers. (MG Chapter 18)

- Existing A, E, and I occupancies regardless of square footage and percentage of addition or modification, where it has been determined by the fire chief or fire chief's designee that a structure or area of a structure fails to support adequate radio coverage for the Minnesota Allied Radio Matrix for Emergency Response (ARMER) Radio System, and failure to provide public-safety 800 MHz radio in building radio amplification results in an increased life safety risk to occupants and public safety responders, the fire chief or fire chief's designees can require in-building radio amplification as defined herein. (MG Chapter 18)

- For purposes of this section, adequate radio coverage shall be an average received field strength of no less than -95 dBm, measured at 30 to 36 inches above the floor over 95 percent of the area of each floor and other critical areas determined by the fire chief or the fire chief's designee such as fire command centers, stairwells, elevators, high hazard areas, basements, and parking areas. Without an in-building radio system, only the received signal level standard must be achieved as the talk out path is equivalent to the talk in the path in this regional radio system. (MG Chapter 18)

Fees: The City of Maple Grove Fee Schedule is available for review on the city website.

Code Guidance/ General Requirements: MSFC App. P, NFPA, & Chapter 18 City Ordinance

- Permit shall be posted on site
- The system shall meet any requirement outlined in the Metropolitan Emergency Services Board Standard 1.8.1 for Bi-Directional Amplifier Systems, which includes review by the Hennepin County Sheriff's Office Communications Division, the ARMER sub-system administrator for Hennepin County.
    - Contact system administrator Mike Parker at Michael.parker@hennepin.us
    - A copy of an email, stating confirmation of the installed system conforms with the Metro Region ARMER standards, shall be submitted as part of the plan set

- The system shall be supplied with standby batteries capable of operating the system for twelve (12) hours or be connected to a building's emergency generator and be provided with two (2) hour standby batteries.
- The system coverage components and backup batteries shall be contained in a NEMA 4-type waterproof cabinet.
- Hardware shall be FCC certified
- Only Class A amplifiers shall be utilized
    - Exception: Class B (broadband amplifiers) shall be registered with the FCC prior to installation; and must have prior approval by the AHJ for use
- If amplification is used in the system, all required FCC authorizations must be obtained prior to the use of the system.
    - The radio coverage system, installation, components and operation shall comply with all federal regulations including FCC 47 CFR Part 90.219
- The emergency responder radio system shall be monitored by a listed fire alarm control unit.
- Automatic supervisory signals shall include:
    - Loss of normal AC power supply
    - Malfunction of donor antenna
    - Failure of active RF-emitting device(s)
    - Failure of critical system components
    - The communication link between the fire alarm system and the emergency responder radio system

Qualifications of testing personnel/equipment. Chapter 18 MG City Ordinance

- All tests shall be conducted, documented, and signed by qualified and competent personnel that includes: persons in possession of a current FCC license, or a current technician certification issued by the Associated Public-Safety Communications Officials International (APCO) or the Personal Communications Industry Association (PCIA), or a qualified radio engineer licensed as a registered professional engineer by the State of Minnesota, or as approved by the fire code official.
- Testing personnel shall have test equipment that is appropriate for the testing procedure, and that test equipment shall have been calibrated within six months prior to the testing.
- All test records shall be retained on the inspected premises by the building owner, and a copy shall be submitted to fire department officials.

Testing Requirements:

Testing shall occur to meet the standards of MG City Ordinance Chapter 18-96 or MNSFC App. P

- Acceptance test procedure. With or without an in-building radio system, it will be the building owner's responsibility to have the regional radio system performance tested to ensure that two-way coverage on each floor of the building is a minimum of 95 percent of the total floor area and the critical areas designated.
- Testing should occur when at least seventy (70) percent or greater of the building and finishes are complete, shell building tests will not be accepted.
- In multi-story buildings and parking ramps, testing shall begin at the lowest level, including any subgrade level(s), and continue up one floor at a time. In-building amplification may only be required on the lowest level or levels of a multi-story building or parking ramp.
- The donor antenna in an in-building amplification system may receive up to 87 800 MHz radio

frequencies of approximately equal field strength from the regional system, plus some others of approximately equal field strength from other radio systems. At any time, the donor antenna may be receiving at least 60 radio frequencies of approximately equal level in the passband ranges. For that reason, it shall be assumed that the output level of talk-in amplifiers will be at + 3.2 dBm per channel maximum when using a class, A BDA. Therefore, grid and critical areas tests shall be conducted while the head end amplifier is disconnected and a signal of + 3.2 dBm is inserted into the connector downstream from the headend amplifier.

- Any Class B in-building talk-in amplification system shall have passband filters before the input to the first (headend) amplifier that shall pass 806 to 817 MHz and 851-862 MHz only.
    a. In the future, within six months after notification by the fire chief or his designee, the passband filter frequency range shall be changed in accordance with instructions, or an additional passband filter for 700 MHz public safety radio band frequencies shall be added. When the donor antenna is installed, the average signal level received on the Hennepin East site control channel shall be measured at the antenna connector. A signal at that average received signal level shall be inserted into the cable to the headend amplifier and filter while the output level of the headend amplifier is measured, and the output level of the amplifier shall be set at 1 watt or +30 dBm.
- Alternative in-building amplification systems that do not involve broadband passband filters will be accepted provided that similar testing can be demonstrated.

Talk-out to the regional radio system testing.

- With an in-building amplification system, the talk-out (to the regional 800 MHz radio system) shall be measured at the same grid and critical area locations as the talk-in measurements were made.
- Gain values of all amplifiers shall be measured and the test measurement results shall be kept on file with the building owner so that the measurements can be verified each year during the annual tests. In the event that the measurement results become lost, the building owner will be required to rerun the acceptance test to reestablish the gain values.

Plan Submittal Requirements:

- ☐ Floor plans showing the proposed system design that is fully dimensioned and to scale
- ☐ Calculation sheets for battery backup
- ☐ Manufacturer's data sheets shall be provided for all equipment
- ☐ Designers name, business name, contact information
- ☐ Copies of all testing data, including the floor plans that show test results on a grid of 20 test areas per floor.
- ☐ A copy of an email, stating confirmation of the installed system conforms with the Metro Region ARMER standards

All plans shall be submitted electronically through ePermits online. No paper plans will be accepted.

Inspections Required:

- Rough-In
- Final

Metro Region ARMER Standards: Section 1 – Metro 1.8.1 Bi-Directional Amplifier Systems

1. **Purpose or Objective** To establish the procedure for approval of installations of bi-directional amplifier systems (BDAs) to the metropolitan region of the ARMER system.

2. **Technical Background**
   •Capabilities - None
   •Constraints - None

3. **Operational Context** Since changes to the metropolitan region of the ARMER system may affect more than one participant, changes and upgrades will need to be reviewed by the Metropolitan Emergency Services Board's (MESB) Radio Technical Operations Committee (RTOC) for possible performance or cost impact to some or all users of the system.

4. **Recommended Protocol/Standard**
   Requests for the installation of BDAs which do not connect directly to the ARMER system must be reviewed by the appropriate sub-system administrators to ensure no interference with the ARMER system is caused.

5. **Recommended Procedure**
   BDA requests which require a direct physical connection to the ARMER system must be reviewed by the RTOC and approved by the MESB per Metro Radio Standard 1.8.0.

   Requests for BDAs which are being installed to improve ARMER coverage in the building shall be submitted to the appropriate sub-system administrator for review. The sub-system administrator will review the request to ensure the BDA will not cause interference with the ARMER system. If the BDA request is determined to have no negative effect on the ARMER system, the sub-system administrator may approve the installation of the BDA. If a determination is made that the proposed BDA design poses a risk to the proper operation of any ARMER sub-system, the sub-system administrator can recommend a design change or request review by the RTOC. The sub-system administrator shall maintain a record of the installation and will notify first responders that a BDA exists in the building.

6. **Management**
   The appropriate system manager or sub-system administrator will be responsible for the approval and tracking of BDAs which are installed to improve ARMER system coverage but do not physically connect into the ARMER system.

Reference: https://mn-mesb.org/metro-armer-standards/

Click HERE to go to the ePermits website.