



CHARLESTON FIRE DEPARTMENT



Fire Marshal Division

Information Bulletin

Emergency Responder Radio Coverage

The ability for all first responders to communicate during an emergency is critical. The Charleston Fire and Police Departments, in addition to Charleston County EMS, utilize the South Carolina Palmetto 800 Radio Network. Building location, construction type, Leadership in Energy & Environmental Designs (LEED), or adjacent buildings may adversely impact or interrupt radio coverage within a building, quickly jeopardizing the safety of responders.

The information contained within this document is offered as a general guide to assist design professionals and qualified vendors to understand the requirements of the South Carolina Fire Code (SCFC) as they work through the assessment and determine the need for an Emergency Responder Radio Coverage (ERRC) system to achieve minimum code compliance. This information pertains only to structures built using the currently adopted edition of the South Carolina Building and Fire Code. Structures built under the South Carolina Residential Building Code shall be exempt from this bulletin.

Qualified Vendors

Installation vendors shall hold a current FCC General Radio Operators License and certification on in-building system training issued by an approved organization or approved school, or a certificate issued by the manufacture for the equipment being installed. The qualified vendor must review the information published by the Public Safety Communications and Emergency Operations Section of the SC Department of Administration. This documentation provides additional required coordination elements to assist you in achieving compliance with FCC and the Charleston County License Manager requirements. A link to their website is provided in the *Additional Resources* section of this document.

Engineering Assessment

The South Carolina Fire Code (SCFC) requires all buildings to achieve adequate Emergency Responder Radio Coverage (ERRC) based on signal strength and Delivered Audio Quality (DAQ) and does not provide specific criteria based on occupancy, size, or building height. Section 510 of the 2021 SCFC requires a minimum inbound radio strength of -95dBm and DAQ of 3.0 or higher. A minimum outbound radio strength shall be provided to ensure a DAQ of 3.0 or higher. The design professional, working with a qualified vendor, is responsible for assessing the need for the system and providing the results to the local jurisdiction.

Radio signal levels can be affected by environmental conditions such as weather, building materials, tree cover, etc. In total, the farther away from the county radio tower and the more obstructions in the radio signal path, the less signal received by the public safety radio.

A qualified vendor must obtain readings and evaluate the current or projected need for a system. Based on recent experiences in our jurisdiction, the following thresholds are offered to assist owners, developers and designers determine when to proceed with engineering evaluations.

- Projects greater than 12,000 square feet in area per floor.
- Projects that include 1 or more floors below grade level.
- The project is greater than 3 floors above the lowest level of fire department access.
- The project is a H or S Occupancy, regardless of area per floor.
- All high-rise buildings shall be equipped with an Emergency Responder Radio System, regardless of signal strength from Public Radio System, per SCFC 914.3.6

Please note that we have encountered smaller structures than those outlined above that have not met the signal strength threshold. This list is only offered as a recommendation to initiate an engineering evaluation without delay.

The assessment report and recommendation from the vendor must be provided to the Fire Marshal Division for review. Systems will not be required when the engineering evaluation predicts the system is not needed and the qualified vendor performs verification testing validating the results. If the engineering evaluation or the verification test fail to produce the minimum required signal strengths, as outlined in the SCFC, a system will be required, and the permitting process must be initiated.

Please note that the engineering evaluations must be completed and submitted as soon as practical to ensure required systems can be installed properly and without destructive installation measures. We strongly encourage a Preliminary (Initial) Site Survey be completed early on in the project. This will gain some minimal signal level readings and identify probable locations for system infrastructure. In addition, this will give the building owner some rough pricing to assist with budgeting purposes in the event a system is required. Verification testing may be necessary at various points during the construction process to validate the signal strength. These systems shall only be installed in buildings or portions of buildings to improve weak signals per FCC CFR Title 47 Section 90.203(a)(2) and part 2, subpart J.

Permitting Process

The ERRC is considered a life safety system and must be in place before the final Certificate of Occupancy will be issued for a project. The following benchmarks are provided to help reduce potential delays in the occupancy of the building:

- 1) Submit a completed permit application, with all required documentation outlined on the application, to initiate the review process.
- 2) A copy of the final Palmetto 800 Retransmission Consent Authorization issued by SC Department of Administration. Applications can be submitted online at [SC Dept. of Admin's website](#).
- 3) Review of the submitted project may take between 12 to 20 business days, so please plan accordingly.
- 4) Work may commence upon permitting.
- 5) Rough inspection(s) shall be conducted to ensure all conduit and junction boxes are properly installed.
- 6) A final inspection shall be conducted to ensure adequate radio signal is provided without interference and/or signal oscillation.

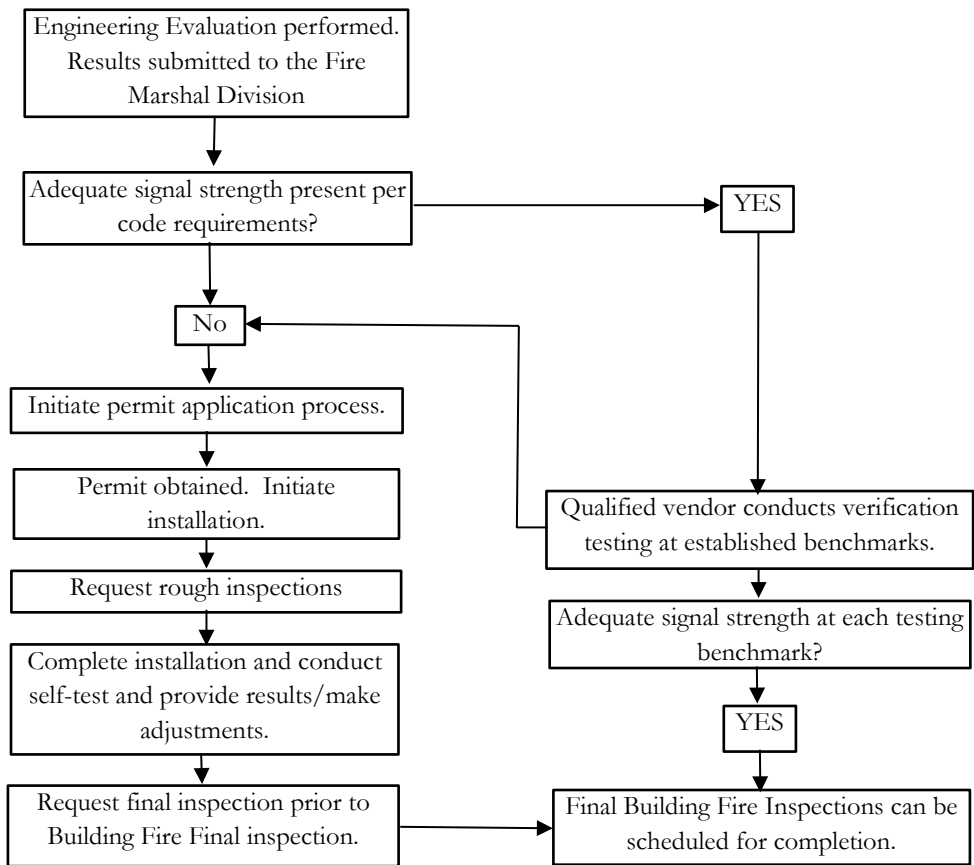
Installation Requirements

The following is a list of items required to ensure an Emergency Responder Radio System meets the installation requirements of Section 510 of the 2021 edition of the SCFC and the 2019 edition of NFPA 1221. This list is not all inclusive and is only intended to address common questions and/or concerns. The design professional and qualified vendor are responsible for ensuring the system meets the requirements of the SCFC, NFPA 1221, requirements of The Public Safety Communications and Emergency Operations Section of the SC Department of Administration, and the FCC.

- 1) All Bi-Directional Distributed Antenna (BDA) shall be of Class A so only the Public Safety frequencies are being amplified in accordance with IFC 510.4.2.1.
- 2) BDA systems shall be equipped with Oscillation Prevention in accordance with IFC 510.5.4(5). An oscillation alarm at the BDA shall send a supervisory signal to the supervisory station for immediate action by the building owner.
- 3) BDA systems shall be monitored by a fire alarm control unit that monitors the conditions outlined in IFC 510.4.2.5. The supervisory signal shall be a non-latching signal at the fire alarm control unit.
- 4) All backbone cables shall be routed through an enclosure that matches the building's fire rating. Examples are Type IIA building, cable rating shall be 1-hour rated, Type IA – cable rating shall be 2-hour rated.

- 5) All conductors installed in a vertical riser that connects two or more floors shall be riser-rated and shall be part of a listed 2-hour fire-resistive cable system or a listed 2-hour electrical circuit protective system as require by NFPA 1221, 5.5.6 and NFPA 70, 708.14.
- 6) All other coaxial cables shall meet the requirements of NFPA 1221, 5.5.2 with a minimum of all cables installed in metal raceways.
- 7) All critical areas of the building as outlined in NFPA 1221 section 9.6.7.3 shall be provided with adequate radio coverage.
- 8) The BDA shall be powered by a branch circuit, secured with breaker lock, with red marking next to the breaker per NFPA 1221, 9.6.12.1.
- 9) Contractor shall provide documentation to the property owner outlining the maintenance and testing requirements for the system. All documentation shall be provided in a labeled lockable documents container located at the BDA. A copy of the key shall be provided to the owner and located in the Knox Box.
- 10) All BDA systems shall be affixed with FCC required device label. The installing contractor shall be required to provide the labels.
- 11) Donor antenna shall be engineered and maintained so it will not provide interference with an adjacent system.
- 12) Fiber based systems providing radio coverage to multiple buildings from a single BDA may be acceptable and must be identified in your application package. Individual permits by building or BDA may be required based on the construction sequencing. Coordinate with the general contractor prior to submitting permit application(s) for review.

Construction Inspection Flow Chart



Maintenance Requirements

As a building ages, things change inside a building including maintenance activities, changes to and inside the building, inventory type and placement, etc. As such, yearly annual inspections shall occur to ensure that the installed emergency responder radio system is operational and not creating interference contrary to FCC regulations.

All Emergency Response Radio Systems shall be inspected annually by an FCC Licensed and qualified vendor. Testing shall include, but not be limited to: 1) In-Building coverage test as per IFC 510.5.3, 2) Verify gain is same as upon initial installation and acceptance, 3) Backup power supply is testing to ensure battery are functioning properly, 4) All components are check to verify operation.

Maintenance shall be considered repair or replacement of system components that do not effect the inbound or outbound signal of the ERRC system. Examples will be system batteries, lighting arrestors, interior antennae.

Construction permits shall be required for replacement of donor antennas, BDA, internal attenuators, or reprogramming of a BDA.

Additional Resources

- South Carolina Fire Code - <https://codes.iccsafe.org>
- NFPA 72, 2019 - <https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=72>
- NFPA 1221, 2019 - <https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=1221>
- SC Division of Technology, Palmetto 800 Radio System: Email at palmetto800@admin.sc.gov or visit their website at <https://scdto.maps.arcgis.com/home/index.html>.

Charleston County Radio System

The following is provided as a reference. It is the responsibility of the design professional to verify the following information with the Charleston County Consolidated Dispatch Center.

Tower locations can be obtained from William Hernandez, Charleston County Radio and Telecommunications Division at 843-958-4029.

Simulcast Frequencies					
Channel	Frequency	Channel	Frequency	Channel	Frequency
1	858.9375 (control)	9	860.9375	17	858.7375
2	857.9375 (control)	10	860.2375	18	856.7375
3	858.4875 (control)	11	860.4875	19	852.3500
4	857.4875 (control)	12	860.7375	20	851.3500
5	859.9375	13	859.7375	21	859.2375
6	856.9375	14	857.7375	22	858.2375
7	859.4875	15	853.5375	23	857.2375
8	856.4875	16	852.9000	24	856.2375

Please contact the City of Charleston Fire Department – Fire Marshal Division at (843)724-3429 with any questions or for additional information.