



## WOODSIDE FIRE PROTECTION DISTRICT

### *Emergency Responder Communication Coverage*

### *Design and Installation Standard*

808 Portola Rd. #C Portola Valley, CA 94028 Fire Prevention 650-851-1594 Fax 650-851-3960

February 2025

**SCOPE.** The purpose of this standard and guideline is to provide direction for the design and field acceptance testing to ensure that the radio coverage is adequate for first responders emergency operations. Existing buildings shall provide radio coverage for emergency responders as required in Chapter 11 of the California Fire Code.

#### **DEFINITIONS**

1. **Delivered Audio Quality (DAQ):** A measure of audio quality over a transmission medium defined by the following scale:
  - a. DAQ 1: Unusable. Speech is present but not understandable.
  - b. DAQ 2: Speech is understandable with considerable effort. Requires frequent repetition due to noise or distortion.
  - c. DAQ 3: Speech is understandable with slight effort. Requires occasional repetition due to noise or distortion.
  - d. DAQ 3.4: Speech is understandable without repetition. Some noise or distortion is present.
  - e. DAQ 4: Speech is easily understandable. Little noise or distortion.
  - f. DAQ 5: Perfect. No distortion or noise discernible.

#### **GENERAL**

1. **New Buildings**
  - a. **Evaluation of Existing Coverage During Design.** Expected radio coverage may be modeled during the design phase to determine if ERCCS will be required. However, even if modeling indicates that ERCCS should not be needed, the signal shall be tested upon completion of construction to determine if the actual conditions meet the minimum signal requirements.
    - i. **Conflict.** If the modeling indicated that ERCCS was not required, but actual conditions upon completion of construction do not meet the minimum requirements, a ERCCS shall be installed.
    - ii. **Consideration for future system.** Considerations should be made to install conduit during building construction to accommodate ERCCS coaxial cables if testing indicates a system is needed to provide acceptable coverage after building construction is completed.
2. **Existing Buildings.** Existing Buildings are required to comply when:
  - a. A previously required wired two-way fire department communication system is removed.
  - b. Within a time frame established by Woodside Fire Protection District.

## DESIGN SPECIFICATIONS

1. ERCC system shall be designed in accordance with CFC 510, NFPA 1225, NFPA 72, and other relevant codes.
2. **510.4.1 Emergency responder communication enhancement system signal strength.** The building shall be considered to have acceptable in-building, two-way emergency responder communication coverage where signal strength measurements in 95 percent of all areas and 99 percent of areas designated as critical areas by the fire code official on each floor of the building meet the signal strength requirements in CFC, Sections 510.4.1.1 through 510.4.1.3.
  - a. **510.4.1.1 Minimum signal strength into the building.** The minimum inbound signal strength shall be sufficient to provide usable voice communications throughout the coverage area as specified by the fire code official. The inbound signal level shall be a minimum of -95dBm throughout the coverage area and sufficient to provide not less than a Delivered Audio Quality (DAQ) of 3.0 or an equivalent Signal-to-Interference-Plus-Noise Ratio (SINR) applicable to the technology for either analog or digital signals.
  - b. **510.4.1.2 Minimum signal strength out of the building.** The minimum outbound signal strength shall be sufficient to provide usable voice communications throughout the coverage area as specified by the fire code official. The outbound signal level shall be sufficient to provide not less than a Delivered Audio Quality (DAQ) of 3.0 or an equivalent Signal-to-Interference-Plus-Noise Ratio (SINR) applicable to the technology for either analog or digital signals.
  - c. **510.4.1.3 System performance.** Signal strength shall be sufficient to meet the requirements of the applications being utilized by public safety for emergency operations through the coverage area as specified by the fire code official in Section 510.4.2.2.
3. Backbone cables and backbone cable components installed in buildings that are fully protected by an automatic sprinkler system in accordance with NFPA 13 shall not be required to have a fire resistance rating. (**NFPA 1225 Section 18.12.3.3**)
4. Backbone cables and backbone cable components installed in non-sprinklered buildings, in buildings that are partially protected by a sprinkler system, or in high-rise buildings shall be protected from attack by fire in accordance with one of the following: (**NFPA 1225 Section 18.12.3.4**)
  - a. Use a cable with a listed fire-resistance rating in accordance with the following:
    - i. Where the primary structural frame of a building is required to have a fire-resistance rating of 2 hours or more or is classified as heavy timber construction, the minimum fire-resistance rating shall be 2 hours.
    - ii. Where the primary structural frame of a building is required to have a fire-resistance rating of less than 2 hours, the minimum fire resistance rating shall be 1 hour.
    - iii. Where the primary structural frame of a building does not require a fire-resistance rating, a fire resistance rating shall not be required.
  - b. A protected enclosure or area shall have a fire-resistance rating in accordance with the following:

- i. Where the primary structural frame of a building is required to have a fire-resistance rating of 2 hours or more or is classified as heavy timber construction, the minimum fire-resistance rating shall be 2 hours.
  - ii. Where the primary structural frame of a building is required to have a fire-resistance rating of less than 2 hours, the minimum fire resistance rating shall be 1 hour.
  - iii. Where the primary structural frame of a building does not require a fire-resistance rating, a fire resistance rating shall not be required.
5. Details of ERCC system shall also be provided on the building construction plans for Building Division review purposes. Architectural pages shall indicate locations and methods of required rated pathways as required by NFPA 1225. Riser cables installed within a rated room which meets the minimum required rating, shall have physical protection against damage approved by the fire department.
6. Locations of Bi-directional Antennae and other related equipment shall be approved by Fire Department. Rooms which contain this equipment shall meet rating requirements and be clearly labeled. Uninterruptable Power Supply (UPS) equipment shall be contained within a NEMA Type 4 enclosure.
7. A dedicated functional panel for the ERCC system shall be installed and provided next to the building fire alarm control panel.
8. Radio channels shall be filtered in accordance with FCC bandwidth limitations for those specific radio frequencies. Example: if a VHF radio channel is licensed at 12.5 kHz bandwidth – filter in the system shall correspond to the same bandwidth.
9. Simplex channels will not be added to any system as they can cause irreparable harm in the form of interference.
10. Design shall include an Emergency Power Off (EPO) switch that when activated is capable of removing power from all active electronics in the system. EPO shall be located adjacent to the Fire Alarm Control Panel (FACP). This is for the purpose of interference mitigation. Systems should be left in the “on” position under normal conditions.
11. Design shall be flexible to allow for additions and deletions of radio frequencies and radio bands as specified by the FCC CFR 47 Part 90 for public safety.
12. Radio Frequency emissions generated within the building (downlink frequencies within the building OR captured signal to a portable radio (subscriber unit) generated within the building from the ERCC) shall be controlled and shall not propagate outside of the structure.
13. All systems shall be designed not to exceed CFR 47 FCC Part 90 for Public Safety radio frequency bandwidths per individual frequency utilized within the system.
14. Radio frequencies and radio frequency bands not used in the system shall be filtered for signal attenuation at or below surrounding noise floor as measured at the location of the system.

## **VENDOR QUALIFICATIONS**

**Designer:** On new systems designed for existing structures as well as new structures; a Professional Engineer (P.E.) licensed in the State of California shall approve by affixing their P.E. seal to the design documents.

**Testing:** For system acceptance a certified IEEE—WCET (Institute of Electrical and Electronics Engineers – Wireless Communications Engineering Technologies Certification) or other local fire authority approved professionally certified person shall test and sign-off on testing within the structure. The IEEE-WCET or other approved professionally certified person shall inspect and test on an annual basis and sign a record of completion attesting to the proper function of the system on all bands and frequencies designed into the system.

**Note:** This should not be a verification of the system design OR an acceptance test certification between the vendor and building owner. This test is functional and should be performed after acceptance testing is completed between the building owner and the installation vendor. This test should serve as the (ERRCS Qualification) – in other words, this test would certify to the local Fire Authority that the system is functioning.

**Installer:** Installation of approved ERRC systems shall be conducted by a State of California licensed C-7, C10 or C-16 contractor.

## **PERMIT**

A separate permit for ERCC shall be obtained from Woodside Fire Protection District. Application and plans shall be submitted for review and approval prior to installation.

## **TESTING**

1. Testing of channels and frequencies may only occur during specific conditions set forth by San Mateo County Public Safety Communications. Refer to WFPD ERCC Testing Requirements sheet for testing parameters. A list of radio frequencies is attached. Woodside Fire Protection District does not provide radio equipment for testing.
2. Contractor shall complete attached Emergency Responder Radio Communication System Testing Requirements document and give to Woodside Fire Protection District at least 7 days prior to testing.
3. Woodside Fire Protection District shall review third-party testing report prior to scheduling final inspection.
4. The ERCC system shall be successfully tested by Woodside Fire Protection District prior to building occupancy.
5. Property owner shall provide a copy of the maintenance contract for required annual service to the Woodside Fire Protection District at time of final inspection.

6. **CFC 510.5.4 Acceptance test procedure.** Where an in building, two-way emergency responder communication coverage system is required, and upon completion of installation, the building owner shall have the radio system tested to verify that the two-way coverage on each floor of the building is not less than 95 percent. The test procedure shall be conducted as follows:
- a. Each floor of the building shall be divided into a grid of 20 approximately equal test areas.
  - b. The test shall be conducted using equipment approved by the fire code official. Woodside Fire Protection District does not provide radio equipment for testing.
  - c. Failure of more than one test area shall result in failure of the test.
  - d. In the event that two of the test areas fail the test, in order to be more statistically accurate, the floor shall be permitted to be divided into 40 equal test areas. Failure of not more than two nonadjacent test areas shall not result in failure of the test. If the system fails the 40-area test, the system shall be altered to meet the 95 percent coverage requirement.
  - e. A test location approximately in the center of each test area shall be selected for the test, with the radio enabled to verify two-way communications to and from the outside of the building through the public agency's radio communications system. Once the test location has been selected, that location shall represent the entire test area. Failure in the selected test location shall be considered failure of that test area. Additional test locations shall not be permitted.
  - f. The 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 during annual tests. In the event that the measurement results become lost, the building owner shall be required to rerun the acceptance test to reestablish the gain values.
  - g. As part of the installation, a spectrum analyzer or other suitable test equipment shall be utilized to ensure spurious oscillations are not being generated by the subject signal booster. This test shall be conducted at time of installation and subsequent annual inspections.
  - h. Systems shall be tested using two portable radios simultaneously conducting subjective voice quality checks. One radio shall be positioned not greater than 10 feet from the indoor antenna and the second radio shall be positioned at the distance that represents the farthest distance from any indoor antenna. With both portable radios simultaneously keyed up on different frequencies within the same band, subjective audio testing shall be conducted and comply with DAQ levels as specified in Sections 510.4.1.1 and 510.4.1.2.

## **MAINTENANCE**

1. The in-building, two-way emergency responder communication coverage system shall be maintained operational at all times in accordance with CFC, Sections 510.6.1 through 510.6.4.
  - a. **CFC 510.6.1 Testing and proof of compliance.** The owner of the building or owner's authorized agent shall have the in-building, two-way emergency responder communication coverage system shall be inspected and tested annually or whenever structural changes occur including additions or remodels that could materially change the original field performance tests. Testing shall consist of the following:

- i. In-building coverage test as described in Section 510.5.4.
- ii. Signal boosters shall be tested to verify that the gain is the same as it was upon initial installation and acceptance or set to optimize the performance of the system.
- iii. Backup batteries and power supplies shall be tested under load of a period of 1-hour to verify that they will properly operate during an actual power outage. If within the 1-hour test period the battery exhibits symptoms of failure, the test shall be extended for additional 1-hour periods until the integrity of the battery can be determined.
- iv. All active components shall be checked to verify operation within the manufacturer's specifications.

At the conclusion of the testing, a report, which shall verify compliance with Section 510.5.4, shall be submitted to the fire code official.

**ATTACHMENTS:**

- 1. ERRC Information Sheet**
- 2. ERRC Testing Requirements**
- 3. Woodside Fire Protection District frequency lists**

San Mateo County Fire Service  
Policy & Guideline Manual

**P - 500**

---

Attachment 1:

EMERGENCY RESPONDER RADIO COMMUNICATION SYSTEM INFORMATION SHEET

Building Address: \_\_\_\_\_

Building Name: \_\_\_\_\_

Administrative contact name (24hr/7days): \_\_\_\_\_

Administrative contact phone (24hr/7days): \_\_\_\_\_

Administrative contact email (24hr/7days): \_\_\_\_\_

Technical contact name (24hr/7days): \_\_\_\_\_

Technical contact phone (24hr/7days): \_\_\_\_\_

Technical contact email (24hr/7days): \_\_\_\_\_

ERRCS Equipment Make/Model: \_\_\_\_\_

System shutdown instructions: \_\_\_\_\_

---

Complete list of transmit / receive frequencies:

_____	_____
_____	_____
_____	_____
_____	_____

San Mateo County Fire Service  
Policy & Guideline Manual

**P - 500**

---

**Attachment 2:**

**EMERGENCY RESPONDER RADIO COVERAGE SYSTEM TESTING REQUIREMENTS**

1. Compliance testing of emergency responder radio coverage systems shall be done under the following conditions:
  - a. Complete and submit this sheet to the local fire authority for approval at least 7 days prior to testing.
  - b. Contact all affected dispatch centers at least 30 minutes in advance of testing for notification.
  - c. Testing must be performed ONLY between 3:00am-6:00am, 7 days a week.
  - d. The radio technician must contact the dispatch centers when testing is complete.
  - e. Test results must be submitted to the local fire authority for review and approval as part of final approval of fire permit.
  - f. 30 minutes prior to testing, the technician performing the test must contact the dispatch centers and report the information below.

i. Testing address: \_\_\_\_\_

ii. Radio frequencies/channels to be tested: \_\_\_\_\_

iii. Expected dates/duration of testing: \_\_\_\_\_

iv. Third party testing company: \_\_\_\_\_

v. Name: \_\_\_\_\_

vi. Phone: \_\_\_\_\_

vii. FCC License #: \_\_\_\_\_

viii. Name and contact number of technician on site (in the event testing must be stopped): \_\_\_\_\_  
\_\_\_\_\_

ix. Does testing require Dispatcher interaction? Yes \_\_\_\_\_ No \_\_\_\_\_

San Mateo County Fire Service  
Policy & Guideline Manual

**P - 500**

Appendix T (Woodside):

**Emergency Responder Radio System Frequency Requirements**

Always try a secondary channel first and only test on channels designated for the City in which the building is located.

DISPLAY	RX FREQ	RX CTCSS	TX FREQ	TX CTCSS	NOTES
<b>Fire Woodside</b>					<b>SMCPSC</b> (650) 368-1421
Command 11 (primary)	154.37000	114.8	156.01500	123.0	South Command
Command 51 (secondary)	151.47500	167.9	159.01500	167.9	County Command
<b>Police Woodside</b>					<b>Woodside PD</b> (650) 363-4911 option 1
SMCO TAC 2 (Secondary)	488.71250	114.8	491.71250	114.8	Police County wide (650) 368-1421
<b>Sheriff/EMS Trunked</b>					<b>SMCPSC</b> (650) 368-1421
700 MHz system range	770.03125	to	773.48125	Downlink Base to Portable	
	795.03125	to	798.48125	Uplink Portable to Base	