



# SOUTH SAN JOAQUIN COUNTY FIRE AUTHORITY & TRACY POLICE DEPARTMENT



## Community Risk Reduction

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## Emergency Responder Radio Coverage Standard

### Intent and Purpose

The intent of this document is to provide a regulatory framework for the purpose of providing effective Radio System coverage throughout the South San Joaquin County Fire Authority Radio System coverage area & City of Tracy Law Enforcement.

### Authority

The California Fire Code, 2019 Edition, Section 510.

### Definitions

*FCC-Certified Technician:* An individual who is qualified with a General Radiotelephone Operator License (GROL/PG), or equivalent, to review design plans and perform tests in affected structures to measure South San Joaquin County Fire Authority & the City of Tracy Law Enforcement Radio System Coverage Specifications.

*Independent Inspector:* An FCC Certified Technician Independent of the Installation Contractor, Property Owner, Occupant, Lessee, Equipment Manufacturer, ERRCS System Designer/Engineer.

### Use and Occupancy

Except as otherwise provided, no person shall own, erect, construct or occupy, any building or structure, or any part thereof, or cause the same to be done, which fails to support reliable radio coverage for emergency service workers operating on the South San Joaquin County Fire Authority & the City of Tracy Law Enforcement Radio System. Further, owners must maintain a reasonable standard of reliable radio communication within their buildings and structures once a Certificate of Occupancy is issued. For the purposes of this section, reliable radio coverage shall include those specifications in the South San Joaquin County Fire Authority & the Tracy Police Department Radio System Coverage Standard incorporated herein.



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### Standard of Reliable Radio Coverage – California Fire Code Section 510.4.1

A building shall be considered to have acceptable emergency responder radio coverage when signal strength measurements on each floor above and below grade demonstrate a delivered audio quality (DAQ) of 3.0 or a minimum SINR of 12dB and a minimum signal strength of -95dBm with a 95 percent reliability factor.

### Permit Required – California Fire Code Section 510

A construction permit for the installation of or modification to emergency responder radio coverage systems and related equipment is required by South San Joaquin County Fire Authority. Maintenance performed in accordance with the California Fire Code is not considered a modification and does not require a permit.

### Amplification Systems Allowed

Buildings and structures that cannot support the required level of radio coverage shall be equipped with amplification systems as specified in the San Joaquin County Fire Authority & the Tracy Police Department Emergency Responder Radio Coverage Standard, attached and incorporated herein as Exhibit A, or any other system approved by the San Joaquin County Fire Authority & the Tracy Police Department, in writing.

### Compliance

#### 1. Test Standards, Design Review, and Certification.

##### A. Prior to issuance of a construction permit, the applicant shall:

1. Retain an FCC-certified technician who will review construction plans in order to ensure that such plans meet Exhibit A criteria, and recommend, if needed, an in-building solution for reliable radio communication.
2. Submit copies of plans certified with the signature of the technician to the South San Joaquin County Fire Authority Community Risk Reduction Division.

##### B. Prior to issuance of a Certificate of Occupancy, the applicant shall:

1. Retain an FCC-certified, South San Joaquin Fire Authority & the Tracy Police Department approved technician who will test all areas of the building or structure, verify installation and operation of in-building solutions, if needed, & certify all of the findings stated herein on the date of inspection with his/her signature. A passing test is one that demonstrates (DAQ) of 3.0 or a minimum SINR of 12dB and a minimum signal strength of -95dBm with a 95 percent



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reliability factor on each floor. Owners of buildings that fail to meet this standard will not be in compliance with this ordinance.

2. The building owner must retain all records of initial and annual inspections and submit copies to the South San Joaquin County Fire Authority Community Risk Reduction Division & the Tracy Police Department.

3. Fire Code Compliance. If not stated herein California Fire Code Section 510 shall be utilized for clarification.

4. Retention of Records. The building owner must retain all records of initial and annual inspections and submit copies to the South San Joaquin County Fire Authority Community Risk Reduction Division & the Tracy Police Department.

## Testing Procedures

1. Initial/Benchmark Tests. For purposes of testing, each floor above and below grade of the building shall be divided into a grid of approximately 20 equal areas. Each floor shall demonstrate a delivered audio quality (DAQ) of 3.0 or a minimum SINR of 12dB and a minimum signal strength of -95dBm with a 95 percent reliability factor. A maximum of two nonadjacent areas will be permitted to fail the test. In the event that three of the areas fail the test, and to provide greater statistical accuracy, the floor may be divided into 40 equal areas. In such an event, a maximum of four nonadjacent areas will be permitted to fail the test. As specified by the authority having jurisdiction, the test shall be conducted by using a portable radio equivalent to currently operational radios talking through the South San Joaquin County Fire Authority Community Risk Reduction Division & the Tracy Police Department Radio System. A spot located approximately in the center of a grid area will be selected for the test. The radio will then be keyed to verify two-way communication to and from the outside of the building through the South San Joaquin County Fire Authority & the Tracy Police Department Radio System. Once the spot has been selected, prospecting for a better spot within the grid area will not be permitted.
2. Acceptance Tests. Acceptance tests shall be performed by independent third-party FCC-certified technicians in accordance with test standards as listed in the South San Joaquin County Fire Authority & Tracy Police Department Radio System Coverage Specifications, attached and incorporated herein as Exhibit A. A Certificate of Occupancy shall not be issued if said structure, or any part thereof, fails to comply with these test standards. Once a system is installed, a Spectrum Analyzer will be used to evaluate the system for harmful interference to the South San Joaquin County Fire Authority & the Tracy Police Department Radio System backbone initially and annually thereafter by an FCC-certified, South San Joaquin Fire Authority & the Tracy Police Department approved technician. Any interference must be identified and removed before the system can be accepted.



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3. Annual Tests. When an in-building radio system is required, the building owner or authorized agent shall test all active components of the system, including but not limited to amplifiers, power supplies and backup batteries, a minimum of once every twelve months. Amplifiers shall be tested to ensure that the gain is the same as it was upon initial installation and acceptance. Backup batteries and power supplies shall be tested under load for a period of TWO hours to verify that they will properly operate during an actual power outage. If within the TWO hour test period, in the opinion of the testing technician, the battery exhibits symptoms of failure, the test shall be extended for additional TWO hour periods until the testing technician confirms the integrity of the battery. All other active components shall be checked to determine that they are operating within the manufacturer’s specifications for the intended purpose. The Annual Test shall include a radio coverage test as specified in Testing Procedures Section 1. After discovery of noncompliance, the building owner is provided six months to remedy the deficiency and gain compliance. Equipment shall be labeled with “Date of Last Inspection”.

### Required Level of Radio Coverage

1. Performance. Specifications are provided to assist property owners in satisfying a delivered audio quality (DAQ) of 3.0 or a minimum SINR of 12dB and a minimum signal strength of -95dBm with a 95 percent reliability factor for emergency personnel using radio communication in their buildings and structures. Property owners who can demonstrate full compliance with the reliability factor without adhering to all of the following specifications may be excused from all or part of these provisions. South San Joaquin County Fire Authority may require property owners to install a signal amplification system regardless of the reliability factor found in initial testing. Property owners who adhere to all of the specifications and fail to reach the reliability factor must employ all resources necessary to ensure full compliance. Performance and compliance will be inspected annually as part of the South San Joaquin County Fire Authority Fire Inspection.
  
2. Signal strength, signal rejection, modulation compatibility, and delivered audio quality. The following defines the minimum required level of radio signal strength:

- a. Frequencies Supported

South San Joaquin County Fire Authority Frequency Pairing;

“SCD SOUTH” 154.725 MHz Repeater Transmit  
158.895 MHz Repeater Receive  
DPL 165

“SJC TAC 16” 155.895 MHz Repeater Transmit  
153.815 MHz Repeater Receive  
DPL 165



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Tracy Police Department Frequency Pairing;

"TRACY PD 1" 453.9750 MHz Repeater Transmit

458.9750 MHz Repeater Receive

NAC 830

"TRACY PD 2" 453.9250 MHz Repeater Transmit

458.9250 MHz Repeater Receive

NAC 831

- b. All system components must be 100 percent compatible with analog and digital modulations after installation without additional adjustments or modifications. The systems must be capable of encompassing the frequencies stated herein and capable of future modifications to a frequency range subsequently established by South San Joaquin County Fire Authority & Tracy Police Department. If the system is not capable of modification to future frequencies, then a new system will need to be installed to accommodate the new frequency band.
- c. Active devices shall have a minimum of -50 dB 3rd order intermodulation protection.
- d. When a donor antenna exists, isolation shall be maintained between the donor antenna and all inside antennas to not less than 20dB greater than the system gain under all operating conditions.
- e. Bi-directional amplifiers used in emergency responder radio coverage systems shall have oscillation protection circuitry.
- f. All active in-building coverage devices shall be FCC Part 90 Type Certified.
- g. UL listing is required for any AC operated power supplies.
- h. The standby power supply shall be capable of operating the emergency responder radio coverage system at 100-percent system capacity for a duration of not less than 12 hours.
- i. Any in-building coverage system shall be installed by a South San Joaquin County Fire Authority approved and certified installer.



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- j. Any active devices (e.g. signal booster(s)) must be encased in a NEMA 4 (or equivalent) dust/waterproof case and clearly labeled "South San Joaquin County Fire Authority & Tracy Police Department Radio System."

### 3. Delivered audio quality definition.

DAQ Delivered Audio Quality	Subjective Performance Description
1	Unusable, speech present but unreadable.
2	Understandable with considerable effort. Frequent repetition due to noise/distortion.
3	Speech understandable with slight effort. Occasional repetition required due to noise/distortion.
3.5	Speech understandable with repetition only rarely required. Some noise/distortion.
4	Speech easily understood. Occasional noise/distortion.
4.5	Speech easily understood. Infrequent noise/distortion.
5	Speech easily understood.

- 4. System Monitoring. The emergency responder radio enhancement system shall be monitored by a listed fire control unit. Automatic supervisory signals shall include the following:
  - a. Loss of normal AC power supply.
  - b. System battery charger failure.
  - c. Malfunction of donor antenna.
  - d. Failure of active RF-emitting devices.
  - e. Low-battery capacity at 70-percent reduction of operating capacity.
  - f. Failure of critical system components.
  - g. The communication link between the fire alarm system and the emergency responder radio enhancement system.