

# **GUIDLINE DOCUMENT**

## **ERRCS - PERMITTING & PLAN SUBMITAL**

### **GENERAL**

The contractor will apply for permits to install a new Emergency Responder Radio Coverage System (ERRCS) or when modifying an existing system. The contractor shall submit plans for the ERRCS that provide sufficient information for the City of Sunnyvale to determine appropriate equipment and materials are being utilized; the survivability of the cable pathway; and that the system meets the requirements specified in the fire code including backup power, alarms and appropriate RF signal levels.

### **PERMITS REQUIRED**

1. A fire construction permit is required to install or modify emergency responder radio coverage systems. (2016 CFC 105.7.5, 510.3 and 2016 NFPA 72;24.9.1.2)
2. A City of Sunnyvale Building Inspection or City of Sunnyvale Building Department electrical permit for compliance with 2016 CEC is required when changes to the electrical system or panels are needed.
3. A City of Sunnyvale Fire Alarm permit is required when changes to the fire alarm panels are needed.

### **PLAN REVIEW SUBMITTAL DOCUMENTS**

- The City of Sunnyvale permit application and permit fees.
- A copy of the SVRIA System Registration document and proof of registration.
- A copy of Contractors license and or system designer qualifications in accordance with 2016 NFPA 72;10.5.1-3. The supplier and installation contractor must be qualified for the selected products and have manufacturer's certification.
- Identify the Benchmark Test Report Number on the construction permit application. The Benchmark Test Report must confirm that the ERRCS is necessary to improve radio coverage.
- Prior to submitting your Plan Review Documents to the City of Sunnyvale for the ERRCS permit, the contractor shall submit an electronic copy of the ERRCS Construction and Design plans in .PDF format for review and approval (NFPA 1221; 9.6.2.1.2; NFPA 72;24.3.13.8.2) to the Sunnyvale Department of Public Safety approved third party company (RFSignalman). Please set up an account and upload you plan sets at [www.planchecker.rfsignalman.com](http://www.planchecker.rfsignalman.com). You may contact RFSignalman at [PlanChecker@RFSignalman.com](mailto:PlanChecker@RFSignalman.com) to coordinate submittal of your electronic plan sets. Allow 15 working days for plan review. Please allow 10 working days to review plans that have been resubmitted to address the reviewer's comments. After the ERRCS Construction and Design Plans have been reviewed and accepted, three sets of scaled ERRCS Construction / Design Plans shall be submitted to the City of Sunnyvale to receive the fire construction permit for the ERRCS (2016 NFPA 1221 9.6.6). The ERRCS Construction and Design plans will include the following at a minimum:
  - Title Page with :
    - Project name, address, and location map.
    - Designer name, Contractor name and contact information.
    - Designers FCC License number, Contractors License Number,
    - Project notes
    - Statement of Compliant Installation - compliance to CA fire code, NFPA and City of Sunnyvale Code and Policy
  - Site plan with north arrow, scaled or dimensioned showing the subject building and surrounding property. Site plan will include a table documenting the SVRIA Registration Number, Equipment Room ID, outdoor antenna model number, antenna gain, azimuth, ERP and distance to the donor site.
  - System Diagram showing the interconnection of the whole system. Include a numbered cable list and symbol chart.

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- Floor plan for each level of the building showing equipment, power, and antenna locations, coax routes, conduit size, and locations of any miscellaneous system components, including splitters, couplers, filters, inline amplifiers and alarm/protection equipment. All components shall be named or labeled and referenced in the contactors materials lists and power budget calculation tables.
- A Radio coverage diagram for each level of the building showing where the signal level reaches -95dBm from each indoor antenna.
- Elevation and roof plans indicating the location, orientation and height above roof level of donor antenna mounts and the location of cable routes and entries. Include Detail Diagrams indicating grounding (NFPA 70: NFPA 1221; 5.8), surge protection (2016 NFPA 1221; 5.6), anchoring and cable entries in compliance with 2016 CFC Section 504.4.
- Construction details including the power budget calculations, the location of the 24 hour secondary power source and an Electrical one-line diagram showing primary power, backup power and emergency power off connections (2016 CFC 510.4.2.3: NFPA 1221; 5.5-5.10, 9.6.12).
- Grounding and lightning protection diagram showing the antenna mount, cable, cabinet and electrical ground connections to the building ground system (2016 NFPA 1221; 5.8, 9.6.3).
- Construction details indicating how the ERRCS system is connected to the building fire alarm or monitoring system including a description of sequence of events associated with testing the alarms. (2016 CFC 510.4.2.4; NFPA 1221; 9.6.13) Include a Schematic drawing of alarm interconnection.
- Construction details for the 2 hour rated riser for the coaxial cables between the amplifier and antennas on each floor. (2016 NFPA 1221; 9.6.2.1.3: NFPA 72, 24.3.6.8 – 24.3.6.8.4.)
- Construction details for pathway survivability meeting Level 1, 2 or 3 on each of the cable extensions to the indoor mounted antennas. Plenum rated coaxial cables will be used inside buildings. Cables that are exposed to sunlight shall be UV rated and suitable for outdoor use (2016 NFPA 1221; 5.10, 9.6.2).
- Construction details indicating how the cable is protected against physical damage in areas that have public access and on roof tops.
- Construction details and or notes showing physical installation of equipment and panels, climate control, fire protection, security, power and lightning protection (2016 NFPA 1221; 4.10). Indicate how signal booster components and battery systems are mounted in NEMA 4-type waterproof cabinets. (2016 CFC 510.4.2.4; 2016 NFPA 1221; 4.10)
- Equipment list including manufacturer part number, description, quantity and symbol to be used on plans. Include a matrix showing FCC issued certification numbers for all electronic equipment. (2016 NFPA 1221; 9.6.11) The equipment list may be a separate document to the drawing set. Include specification sheets for :
  - Amplifiers
  - Antennas
  - Coaxial cables and connectors
  - Splitters, combiners, couplers or any other passive components proposed.
  - NEMA 4-type waterproof enclosure for repeaters, transmitters, receivers, signal booster components and battery system components.
  - Any equipment requiring FCC certification. (2013 CFC 510.4.2.4)
  - Backup battery and charging system or if used, generator specifications and plans.
  - Signage “ERRCS Installed”

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### **INSPECTION DOCUMENTATION**

The ERRCS shall not be placed on the air until inspected by the fire code official. The contractor will request physical inspection of cable installation prior to closing ceilings and walls. A test certificate / report is required from Sunnyvale's approved third party testing company (RFSignalman) to document the operation of the ERRCS and indoor radio coverage. (2016 NFPA 72; 7.5.8.1). Prior to requesting formal Acceptance or Annual tests the contractor will have submitted to the City of Sunnyvale fire code official and will have on-site and available for the inspector to review:

- A written statement by the installing contractor that the system has been installed in accordance with the approved plans and tested in accordance with the manufactures published instructions and regulating requirements. (2016 NFPA 72, 7.5.2)
- A written statement by the fire alarm service provider / contractor that the system has been installed in accordance with the approved plans and tested in accordance with the manufacturers published instructions, 2016 NFPA 72 and other regulating requirements. (2016 NFPA 72 7.5.2)
- A record of completion form (2016 NFPA 72, 7.8.2, Figure 7.8.2(b))
- A supplementary record of completion form (2016 NFPA 72 Figure 7.8.2(j))
- As-built construction drawings.
- Equipment and software manuals.

### **INSPECTION PROCEDURES**

1. Coordinate the physical inspection of the 2hr riser and conduit installation, with the Building Department, prior to closing walls or ceilings.
2. Call the Sunnyvale approved 3<sup>rd</sup> party testing company (RFSignalman) at (916) 686-1776 to schedule Acceptance and Annual Tests. Allow 10days to schedule the inspection service.
3. Supply the required inspection documentation prior to requesting a formal Acceptance Test of the ERRCS. The City's third party testing company (RFSignalman) will schedule an Acceptance Test within 10days after receiving the request from the Owner/Contractor.
4. Failure of the Acceptance Test will require that the contractor resubmit the Inspection Documentation. The retest of the ERRCS will be scheduled within 10 days after receipt of the Inspection Documentation.
5. The City of Sunnyvale reserves the right to inspect radio coverage at any time with reasonable notice.

### **ACCEPTANCE TESTING** (2016 CFC 510.5.3: NFPA 1221; 11.3.9)

Acceptance testing is required to demonstrate compliance to the provisions of CFC Section 510. The Inspection/Test fees are paid to the City of Sunnyvale with the permit application and will be performed to the published Acceptance Test Procedure for SVRIA System Certification.

The two primary considerations for the Acceptance Tests are Equipment Validation (before it is placed on the air) and Coverage Validation (to document the improved coverage). The contractor will not place an amplifier on air before it is verified.

Equipment Validation will be performed with the contractor and Sunnyvale Department of Public Safety's third party testing company (RFSignalman) present to demonstrate operation of the system including; frequency settings, signal levels, gain settings, antenna isolation, alarm operation and backup power operation. The goal is to achieve the minimum power required to carry out the desired operation. 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. As part of the installation, a spectrum analyzer or other suitable test equipment shall be

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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.

Coverage Validation will be performed by the Sunnyvale Department of Public Safety's third party testing company (RFSignalman) to document radio coverage in the general floor area and critical locations of the building. The coverage measurements will verify that the contractors system meets the minimum signal level and audio quality requirements specified in the fire code. This can be either "native" or "amplified" radio coverage. It is not uncommon for a building to have acceptable radio coverage without a signal booster. Coverage validation is performed as follows

1. Talk-back testing from a site to the Silicon Valley Regional Interoperability Authority (SVRIA) P25 Phase 2 700 MHz Digital Trunked Radio System shall use Sunnyvale Department of Public Safety radio(s) on the designated control channel (Channel 2) and may be witnessed by a representative of the Sunnyvale Department of Public Safety.
2. Each floor of the building shall be divided into a grid of 20 approximately equal test areas.
3. The test shall be conducted using a calibrated portable radio of the latest brand and model used by the agency talking through the agency's radio communications system.
4. In the event that three of the test areas on a floor fail the talk back test, in order to be more statistically accurate, the floor shall be permitted to be divided into 40 equal test areas. If the system fails the 90% coverage requirement for the 40-area test, the emergency responder radio system shall be altered to meet the 90 percent coverage requirement.  
**Exception:** Critical areas shall be provided with 99 percent floor area coverage.
5. 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 Silicon Valley Regional Interoperability Authority (SVRIA) P25 Phase 2 700 MHz Digital Trunked Radio 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.
6. The test for emergency responder radio coverage will be considered passed when 90% of the test locations on each floor are able to pass two-way communications to and from the outside of the building.  
**Exception:** Critical areas shall be provided with 99 percent floor area radio coverage.
7. The gain values/output levels 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.
8. 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.

Prior to issuance of the building Certificate of Occupancy, a system acceptance test report shall be submitted to the fire code official, maintained on the premises and be made available to the fire code official upon request. The report shall verify compliance with Section 510.5.4. The contractor will ensure that the "as-built" system records includes equipment data sheets, diagram showing device locations and wiring schematic, test reports, a copy of the system SVRIA Registration and the renewable operating permit issued by the City of Sunnyvale Fire Prevention Unit.

After completion of the Acceptance Tests, Sunnyvale Department of Public Safety – Fire Prevention Unit will schedule a walk through to survey the building and verify Fire Command and Dispatch radio operation. Failure of the operational check will require that the owner correct deficiencies and re-schedule Acceptance Testing.