SECTION 403.009 EMERGENCY RESPONDER COMMUNICATION ENHANCEMENT SYSTEMS

PURPOSE

The purpose of this policy is to clarify the Fresno Fire Department's (FFD or Department) requirements regarding the installation of all emergency responder communication enhancement (ERCES) systems.

APPLICATION

This policy applies to all ERCES systems within the City of Fresno (COF) and contract service areas.

OPERATIONAL POLICY

Based upon the need for uniformity in application across the Department's diverse service delivery area, and after careful deliberation, the Department has determined the following:

Permit Requirements (Baseline / Preliminary Testing)

1. Prior to baseline / preliminary testing, all person(s) or firm(s) completing testing shall first obtain a test permit from FFD.

Required Test Permit Application Documents (Baseline / Preliminary Testing)

1. Copy of the current COF Business Tax Certificate for the testing firm.

2. Copy of the current Federal Communications Commission (FCC) license for the person(s) completing the test.

3. Copy of the formal testing procedures to be used. Formal testing procedures shall comply with the criteria noted in California Fire Code (CFC) §510.5.4, COF Communications Division policies, and shall not include algorithmic or extrapolated results.

4. Detailed information which shows the test instruments' conformance with either Underwriters Laboratory (UL), FCC or other equipment listing agency requirements and last date of test instrument calibration.

Permit Requirement (New Installations)

1. ERCES systems are required to be installed in an approved location. Where required to be installed per the *CFC*, or the *Fresno Municipal Code (FMC)*, permits for installation must be obtained from FFD prior to the commencement of work.

Testing Requirements

1. Prior to any ERCES testing, the permit applicant/testing contractor shall notify the Department to ensure the test is in conformance with the Department's required testing items, including every FFD required "critical point" – See "Definitions" below.

2. Automatic pass / fail criteria:

   Where initial testing of any building indicates an inbound and outbound -95 dBm signal strength, as well as a signal-to-noise and distortion ratio (SINAD) of equal to or less than 20 (= / < 20), the test will be deemed an automatic failure, and an ERCES system will be required throughout the building.

   Where initial testing of any building indicates an inbound and outbound -95 dBm signal strength, as well as a signal-to-noise and distortion ratio (SINAD) of 21 or greater (> 21), the test will be deemed an automatic pass and an ERCES system will not be required.

Planning and Construction Requirements

1. It is the obligation of the property owner (and agents of the owner as necessary) to plan for the installation of an ERCES. ERCES systems are required as noted in the CFC and FMC.

2. If an owner or permit applicant chooses to complete ERCES testing (which must be completed as a building is substantially complete – including equipment installation) as permitted in the FMC, in lieu of the required ERCES installation, any resultant delays in obtaining a certificate of occupancy which are caused by the failure of the property owner to plan for and coordinate required ERCES testing and installation will result in delays in obtaining a certificate of occupancy.

3. As the permitting authority, a sworn FFD staff member, will determine which frequencies are to be amplified, etc. These frequencies may include those at the local, state, federal or tribal level, and will be determined after a formal application has been submitted for review and approval. No other department, division, agency or person has the authority to make this determination.

Plan Submittal Documents

1. ERCES system documents must be drawn with due care by a trained person meeting all the requirements found within the applicable laws, codes, ordinances, standards, and this policy.

2. Plans must be drawn on a minimum of twenty-four (24") inch by thirty-six (36") inch paper and must be drawn to an indicated scale of not less than one-eighth (1/8") inch = one (1') foot.

3. All notes and information on each plan sheet will be a minimum of twelve (12) pt. font or larger. Fonts will be Engineers font, Architects font, Arial font or Calibri font. Plans using unusual or difficult to read fonts will not be accepted. The Fire Marshal, or designee will make the determination of acceptability, and the determination will be final.

4. An area of no less than four (4") inches by six (6") inches, located in the bottom right-hand corner of each plan sheet (excluding the title block), must be left free of any text, mark, etc., to facilitate the marking of plans by Department staff.

5. Drawings must be organized (generally) based upon the *United States Department of Energy, Fundamentals Handbook for Engineering Symbology, Prints, and Drawings* (Vols. 1 & 2) (1993 edition). Available for download at: http://edtech2.boisestate.edu/jasonclemens/512/files/DOE-v1.pdf

6. Drawing line weights, matchlines (where used) and legibility (including printed pages) must be in accordance with either the *United States Department of Energy, Fundamentals Handbook for Engineering Symbology, Prints, and Drawings* (Vols. 1 & 2) (1993 edition), or the latest edition of the American Institute of Architects design guidelines.

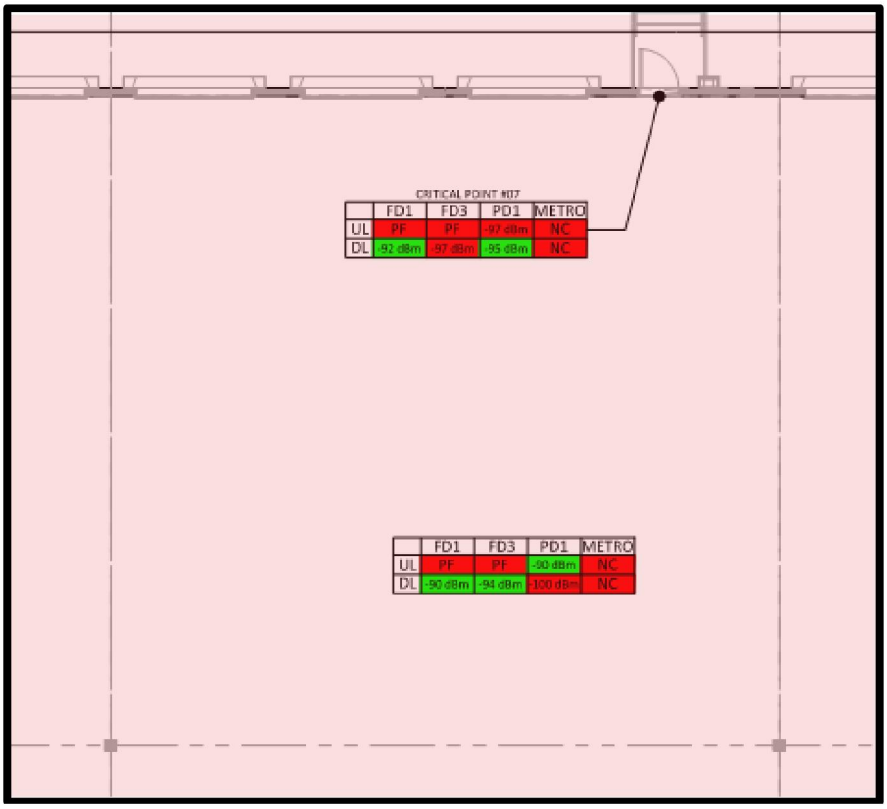
7. All electrical plan symbols must be in accordance with *National Electrical Contractors Association (NECA) 100 Symbols for Electrical Construction Drawings (ANSI) (2013 edition)*, where a symbol is provided. Other symbols are not permitted by FFD.

8. All fire protection symbols must be in accordance with *National Fire Protection Association (NFPA) 170* – Standard for Fire Safety and Emergency Symbols (2018 ed.) where a symbol is provided. Other symbols are not permitted by FFD. Initiating and activation devices shall be shown as required in Table 8.3 and notification appliances shall be shown as required in Table 8.4.2.

9. The use of "heat maps" to indicate signal strengths is not permitted.

   Designers shall provide clear delineation lines for each tested grid, then indicate the tested signal strength, and provide numeric coverage indications to show the signal strength and if the tested strength is compliant or not using only "Pass/Fail" language.

   An example of the proper way to show pass/fail for a grid is noted below:



10. Each of the following items must be included on submitted plans. Plans will be returned for revision when the following items are not present:

    a. A detailed scope of work for the project including a description sufficient to clearly indicate the location, nature, and extent of the work. A scope of work indicating "installation of an ERCES system" or similar non-descript scoping is inadequate for the purposes of compliance with this policy.

    b. Location of the project, including the COF officially assigned address.

    c. A site plan of the location. The required site plan (including north arrow) shall be scaled or dimensioned and show the subject building and surrounding property. A location pin from mapping software does not meet this requirement.

    d. The site plan shall also include a table showing the following information: Equipment Room ID, Outdoor antenna model number and type, Antenna gain, Azimuth, and distance to the donor site.

    e. The site plan must indicate the location of the building's Knox box. Buildings equipped with an ERCES system must have a Knox box installed in an approved location. The Knox box shall have a sign located directly adjacent to the Knox box stating: "ERCES". Signage shall be in conformance with FFD Policy #402.016

    f. Name of the permit applicant, installing contractor, address, phone number, type of license and license number, with wet stamp and signature on each plan sheet.

    g. *The California Building Code* (CBC) occupancy group of the building and an indication of whether the building is equipped with a fire sprinkler system.

    h. Equipment legend. Equipment legends must be prepared in the format shown on the sample legend at the end of this policy. All equipment must be shown including Conduit, Cabling, Cable ties, Attachment equipment, Signage, etc.

    i. The total square footage of the building.

    j. A complete interior floor plan of the building including all critical areas.

k. A roof detail which shows whether the roof is of combustible construction. Where the building is constructed with a combustible roof, all interior cabling shall be enclosed in rigid, metallic conduit. Where interior cabling is run in combustible concealed spaces (i.e., floor / ceiling assemblies, etc.) the cabling shall be run in rigid, metallic conduit.

l. ERCES equipment rooms shall be constructed of a minimum of 1 hr. fire resistant rated construction. No exceptions.

m. Applicable details of the ERCES equipment room, including the room dimensions which clearly indicate the required three foot (3') clear working space has been provided in front of and adjacent to all ERCES equipment. Room finished ceiling height, etc.

NOTE: ERCES system components that are installed in any area, including fire pump rooms, must not interfere with the FFD required three foot (3') clear working space for all fire protection system equipment. It is the obligation of the permit applicant/designing and installing contractor to coordinate the installation and maintain the required clear working space in front of and adjacent to all fire protection equipment. Installations of ERCES equipment which interferes with clear working space requirements will be required to be relocated. No exceptions.

n. Approved permanent and durable signage affixed to all doors containing ERCES equipment. Required signage shall include a sign noting: "ERCES" which conforms to FFD policy #402.016, and a sign as shown below.

The sign shall have the exact text, exact color, and exact symbol. The sign shall be at least 7" in height and 5" in width.

Because this signage is likely to be installed on fire resistance rated door assemblies, it is incumbent on the installer to ensure that proper mounting does not inadvertently reduce the doors rating.

o. A radio coverage grid diagram, with a minimum of twenty (20) grids per floor, no grid shall be larger than eighty feet by eighty feet (80' X 80').

p. Partial ERCES systems are not permitted. Any system which is required to be installed shall be provided throughout the entire building. No exceptions.

q. All new buildings required to have an ERCES system installed in buildings that are fully protected by an automatic sprinkler system in accordance with the CFC, NFPA 13, and the FMC may have unrated cables and cable components installed, except as noted below.

r. All new buildings required to have an ERCES system installed shall have cabling run in not less than a two-inch (2") rigid, metallic conduit installed between the ground floor (or the bottom subterranean floor as applicable) and the roof.

s. Construction documents shall include installation details for the cable between the amplifier and the antennas on each floor. Cabling that is run in open air, shall have a minimum 1-hr. fire resistance rating. Unrated cabling between the amplifier and antennas on each floor shall be run in rigid, metallic conduit – no exceptions. All cabling shall be located below fire sprinkler deflectors. General notes or descriptions are not sufficient to meet this requirement.

t. Elevation and roof plans must be provided indicating the location, orientation, and height above roof level of donor antenna mounts, method of mounting, and the location of cable routes and entries to the roof or wall below. The designer shall include detailed diagrams indicating grounding, surge protection, anchoring and cable entries in compliance with the *California Electrical Code* (CEC). General/generic notes or descriptions are not sufficient to meet this requirement.

u. Antennas and their supporting appurtenances shall not be mounted to the sides of buildings, unless specifically approved by the Fire Marshal (or designee).

v. A grounding and lightning protection diagram and details showing the antenna mount, cable, cabinet, and electrical ground connections to the building ground system shall be provided.

w. Construction details and a note which clearly states the pathway survivability level for the system using the NFPA 72 survivability criteria. Designer shall note on plans if the system meets NFPA level 1, 2 or 3 for survivability for each of the cable extensions to the indoor mounted antennas.

x. Construction details indicating how the ERCES system is connected to the building fire alarm system including a description and sequence/matrix of events associated with testing the alarms shall be provided. The sequence/matrix shall be prepared as noted in NFPA 72 §A.14.6.2.4.

y. Include a schematic drawing of fire alarm interconnection including address points, etc. General notes or descriptions are not sufficient to meet this requirement.

z. Construction details and notes showing physical installation of equipment and panels, climate control system, fire protection features, security features shall be provided. Indicate on plans how signal booster components and battery systems are mounted in NEMA 4-type waterproof cabinets. General notes are not sufficient to meet this requirement.

aa. The required, rigid metallic conduit shall extend from the ERCES equipment room to the center of the building, then extend upwards to the center of the building's roof.

bb. Construction details indicating how the cable is protected against physical damage in areas that have public access and on roof tops. General notes are not sufficient to demonstrate compliance.

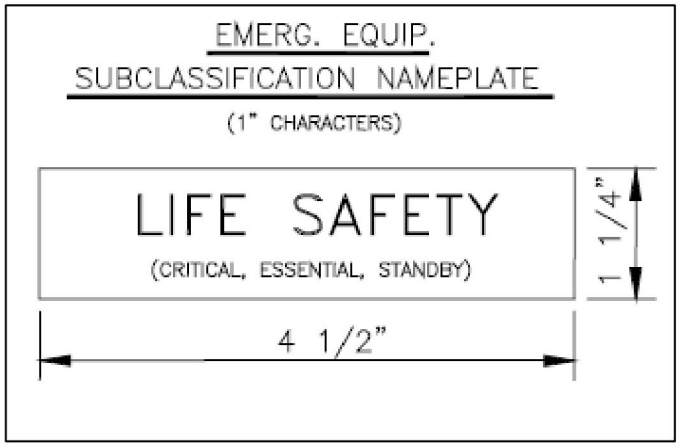
cc. On each floor and the building roof, a CBC and CEC compliant opening shall be made to allow unencumbered access to the conduit from the ceiling or roof.

dd. Penetrations in any fire resistance rated assemblies shall be protected as required in the CBC/CEC and shall be a one-hour (1 hr.) fire resistive rating minimum.

ee. All floors in subterranean parking garages are required to have a similar conduit installation.

ff. No other cabling is permitted to comingle with the ERCES system cable in the conduit.

gg. Conduit containing ERCES cabling shall be marked/labeled with a red label with white lettering which reads “ERCES” or “EM – CR” (Emergency Critical). The size of the labeling shall be as noted in the diagram below:



hh. Every marking/label shall also comply with ANSI/ASME A13.1-2023 ed. requirements for UV resistance, environmental durability, and adhesion requirements.

ii. ERCES conduit in a room shall have at least one label placed on the conduit in a given room. When the conduit exceeds 4’ in length labeling shall be placed at intervals of no less than 10’.

jj. The designer shall note the branch circuit means supplying the ERCES, and circuit shall be permanently identified at the control unit.

kk. All ERCES circuit disconnecting means must have an approved (prominent) marking at the circuit and a lock off/out clip.

ll. ERCES systems must be provided with at least two (2) independent and reliable power supply sources conforming to the requirements of the currently adopted edition of NFPA 72 and the CEC. One source shall be designated as the primary and one shall be designated as the secondary.

mm. The standby power supply shall be an approved UPS system or backup batteries capable of operating the emergency responder radio coverage system for a duration of not less than twenty-four (24) hours. When primary power is lost, the power supply to the emergency responder radio coverage system shall automatically transfer to the standby power supply. The ERCES or UPS system shall be equipped with an emergency power off (EPO) switch.

nn. The ERCES or UPS system EPO switch shall be listed, indicating, of an approved size and type, and shall be placed in an approved position. The EPO switch must also be labeled in accordance with FFD policy #402.016.

oo. An equipment list shall be provided. The list shall include the following information: Manufacturer part number, description, quantity, and symbol to be used on plans. Include a table showing FCC-issued certification numbers for all electronic equipment. NFPA 1225 §18.12.1.

At a minimum, the equipment list shall include the following:

- Amplifiers
- Antennas & mounts
- Coaxial cables
- Connectors
- Splitters
- Combiners
- Couplers and 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.
- Backup battery/UPS and charging system or if used, generator including City of Fresno approved plans and specifications.

13. The following standard notes must be applied to the first sheet of plans:

    a. It is the permit applicant's/installing contractor's responsibility to make all work available for inspection.

    b. A full-sized, complete, copy of the approved plan set (incl. manufactures. equipment) is required to be on-site during any fire department inspection.

    c. Installation must comply with CEC §300.21, Spread of Fire or Products of Combustion, regarding penetrations through fire-resistive assemblies to prevent the spread of fire and toxic products of combustion.

    d. Exterior components are required to be mounted in a weather-tight manner.

    e. All existing equipment is required to be noted with an (E) on all submittal documents (if applicable).

    f. The designer has verified all equipment to be installed is compatible with existing equipment (if applicable).

    g. All applicable code references must be provided (i.e., NFPA 72, 1225, etc.).

14. Each ERCES plan submittal must be accompanied by a submittal booklet which includes the following information:

    a. The submittal book cover sheet must include the CBC occupancy classification, official COF address and note that it is for an ERCES system.

    b. The submittal book must include an equipment legend that identifies all equipment on an eight and one-half inch by eleven-inch (8 ½" X 11") sheet. The following information must be in the legend: Equipment manufacturer name, model #, plan symbol, and quantity to be installed as required. This should be a separate page in the submittal booklet.

    c. Provide the laboratory listing sheets (UL 2524), for all equipment that is to be installed.

d. Manufacturer's information sheets each type and piece of equipment to be installed, this includes conduit, hangers, fasteners, etc.

NOTE: It is the permit applicant's/designer's responsibility to provide completed, comprehensive booklets, not loose sheets. Loose sheets will not be accepted. No exceptions.

OPERATIONAL GUIDELINE

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PROCESS

This section intentionally left blank.

INFORMATION

As noted in the CFC, the fire code official has the authority to formulate policies they deem necessary based upon local conditions related to plan submittals for all systems and applications. Additionally, as noted in the FMC, ERCES systems shall comply with the CFC, NFPA 1225, Standard for Emergency Services Communications, and FFD policy.

The requirements noted in this policy apply to both required and voluntary systems.

DEFINITIONS

1. Critical Areas: Critical areas for the purposes of this policy are defined as a six-foot (6') radius circle in front of all fire protection features, on every floor, including, but not limited to:

   Every required high-piled storage access door, every elevator hoistway door, every enclosed interior stair door, all interior fire sprinkler system control valves, all hose valves, fire alarm control units and remote annunciators, fire pumps and their associated appurtenances including controllers, etc., all emergency responder communications enhancement system equipment, etc.

CROSS-REFERENCES

Fresno Fire Department Fire Prevention Manual Section 402.016, Fire Department Required Signage

California Fire Code

California Building Code

California Electrical Code

Fresno Municipal Code

NECA 100, Symbols for Electrical Construction Drawings (ANSI) (2013 edition)

NFPA 170, Standard for Fire Safety and Emergency Symbols (2018 edition)

NFPA 1225, Standard for Emergency Services Communications (2022 edition)

UL 2524, Standard for In-Building 2-Way Emergency Radio Communication Enhancement Systems.

United States Department of Energy, Fundamentals Handbook for Engineering Symbology, Prints, and Drawings (Vols. 1 & 2) (1993 edition)

SAMPLE EQUIPMENT LEGEND

E.R.R.C.S. SYMBOL LEGEND

QTY.	SYMBOL	PART NUMBER	DESCRIPTION	FCC ID #	MANUFACTURER
001		BDA-YDA450470-9-1	YAGI DIRECTIONAL ANTENNA 450-470MHz, N FEMALE	N/A	HONEYWELL
002		BDA-YDA150160-7-1	DONOR ANTENNA, YAGI DIRECTIONAL 150-160MHZ 7 dBi	N/A	HONEYWELL
001	M	BDA-ANT-MONKIT-001	UPLINK VHF ANTENNA MONITORING KIT (UHF & DOWNLINK VHF SELF-MONITOR VIA BDA)	N/A	HONEYWELL
009		BDA-OIA-1301000-2	DOWN-LINK OMNI INDOOR 130-1000MHz 2dBi	N/A	HONEYWELL
010		BDA-FA-150175-2-1	UP-LINK OMNI INDOOR 150-175 MHz	N/A	HONEYWELL
001	COMB	BDA-DBC-12	DUAL BAND COMBINER	N/A	HONEYWELL
001	ATT#	BDA-NATTEN-0505	RF COAXIAL FIXED ATTENUATOR DC - 3000 MHz	N/A	HONEYWELL
005	6dB	BDA-DC6-L2	DIRECTIONAL COUPLERS, 6 dB COUPLING, 136 - 870 MHz	N/A	HONEYWELL
005	10dB	BDA-DC10-L2	DIRECTIONAL COUPLERS, 10 dB COUPLING, 136 - 870 MHz	N/A	HONEYWELL
001	15dB	BDA-DC15-L2	DIRECTIONAL COUPLERS, 15 dB COUPLING, 136 - 870 MHz	N/A	HONEYWELL
002	20dB	BDA-DC20-L2	DIRECTIONAL COUPLERS, 20 dB COUPLING, 136 - 870 MHz	N/A	HONEYWELL
002		BDA-PS2-L2	2-WAY POWER SPLITTERS, 136-870 MHz	N/A	HONEYWELL
003	SRP	BDA-PSIAX09-6IG-N/FF	COAXIAL RF SURGE PROTECTOR, DC - 6GHz, 90W, IP67, 60V MAX	N/A	HONEYWELL
001	ERRC	HONBDA-EA-AVU-ND20	VHF + UHF 136-174MHz + 450-512MHz SIGNAL BOOSTER, 0.5W/+27dBm IN VHF, 1W/+30dBm IN UHF WITHIN NEMA 4X ENCLOSURE	P3TDH14-1A	HONEYWELL
001	BB	HONBDA-BTTY-100100	BBU, 100AH, 24VDC WITHIN NEMA 4X ENCLOSURE	N/A	HONEYWELL

NOTE: ALL SIGNAGE SHALL BE PROVIDED BY GENERAL CONTRACTOR. SEE SHEET NOTE 2 ON SHEET ERRC0.1 AND SHEET NOTE 3 ON SHEETS ERRC1.1C & ERRC1.1M, PERTAINING TO SIGNAGE REQUIREMENTS.

E.R.R.C. SYSTEM CABLE LEGEND*

PART NUMBER	DESCRIPTION	USE	MANUFACTURER
ICA12-50JPLLR	1/2" ALUMINUM PLENUM RATED LOW-LOSS DIELETRIC COAX	ANTENNAS	HONEYWELL

*ALL CABLE SHALL SHOWN SHALL BE ICA12-JPLLR COAX, EXCEPT FOR THE MASTER-TO-REMOTE BOOSTER INTERCONNECTING FIBER OPTIC CABLE