**Emergency Responder Communications Enhancement System (ERCES) Plan Review Checklist**

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| **Revision History** |
| **Revision Date** | **Section/Nature of Revision** |
| **9/18/24** | Document Issued |

* Approved Radio Signal Strength test demonstrating need for ERCES [NFPA 1225:18.2.1].
* Provide building owner/agent and address [61G6 FAC].
* Provide scope of work narrative [FFPC 1:1.7.12.3].
* FCC GROL license holder name and number noted on cover sheet [NFPA 1225:18.2.1].
* EF/EC contractor name, address, city, state and license number on each drawing [NFPA 1225:18.2.1] (must be licensed EF or EC).
* Signature and seal of the Engineer of Record (EOR).
* Name, PE number, business name, address and contact information provided the plans.
* Authority Having Jurisdiction (AHJ) may require that the EOR provide evidence of experience and training in Electrical Engineering. [61G15-30.003(2) FAC/NFPA 1225:18.2.2].
* Note indicating design conforms to the following codes using the most current version:
* Florida Fire Prevention Code
* NFPA 1225
* NFPA 70
* NFPA 72
* FCC Title 47 CFR
* Motorola R56
* IEEE 1692
* TIA 569 and TIA 607
* UL 2524/UL 60950 [61G15-30.003(1b) FAC]
* Provide building description indicating:
* Building construction type
* Building occupancy
* Total square footage
* Number of floors
* Total height of building [NFPA 1225:18.2.1]
* Note indicating the proposed system will transmit all public safety radio frequencies assigned to the AHJ and capable of using any modulation technology. [NFPA 1225:18.11].
* Note indicating system components will be compatible with the existing public safety radio system [NFPA 1225:18.11].
* Note indicating system is upgradable [NFPA 1225:18.11.2].
* Note on cover sheet stating: “The system shall never be energized for testing or operation until written, or on site, approval is obtained from the FCC License Holder” [NFPA1225:18.12.2].
* Note indicating an information binder, to be stored near the amplifier, shall be provided and include:
* As-built drawings
* Manufacturer’s data sheets and specifications
* Heat map (if applicable)
* Final radio signal strength measurement grid (dB)
* Maintenance contract
* Final Retransmission Agreement
* Maintenance Repair Log [NFPA 1225:18.15.6]
* Note indicating placard (1-inch-high white letters on red background) will be posted on or near the FACP stating: “This building is equipped with an Emergency Radio Communications Enhancement System” [PCR&T].
* Provide equipment specification sheets with manufacturer’s part numbers for ALL proposed system components that include equipment temperature limits [NFPA 1225:18.2.1].
* Note indicating that active RF-emitting components (signal boosters) meet the following:
* FCC Certification prior to installation
* Minimum Class B (Class A preferred) [PCR&T]
* Compatible with both analog and digital communications simultaneously [NFPA 1225:18.12.2]
* Note indicating that all repeaters, transmitters, receivers, signal-booster components, remote annunciators and operational consoles, power supplies and battery charging system components shall be listed and labeled in accordance with UL 2524 [NFPA 1225:18.12.1.3].
* Note indicating the proposed radio signal strength coverage shall meet a minimum of:
* 99% in critical areas, such as the fire command center(s), the fire pump room(s), exit stairs, exit passageways, elevator lobbies, standpipe cabinets, sprinkler sectional valve locations and other areas deemed critical by the AHJ.
* 95% in non-critical areas [NFPA 1225:18.8].
* Note indicating isolation between the donor antenna and all inside antennas shall be a minimum of 20 dB above the signal booster gain [NFPA 1225:18.10].
* Complete set of drawings including:
* Original approved RSS test grid plan with initial signal test results
* Riser diagram
* Sequence of operation in either an input/output matrix or narrative form
* Date of each sheet origination and any subsequent revisions noted
* Each sheet shall be numbered
* Clearly labeled match lines [NFPA 1225:18.2.1]
* Provide floor plan sheet, drawn to a graphic scale, for each floor detailing:
* Floor or level identification.
* Point of compass.
* Room/area descriptions.
* Layout of system device locations, control equipment and FACP location (if applicable).
* System riser location(s).
* Locations of monitor/control interfaces to other systems.
* Type and number of system components/devices on each feeder, on each floor or level.
* All fire-rated enclosures (call out fire-rated enclosures for cables and ERCES room).
* All material architectural details (doors, windows, etc.).
* Riser/feeder pathway type(s) and conduit runs.
* Type and quantity of connectors and conduit for each riser/feeder.
* Propagation modeling (if provided) [NFPA 1225:18.2.1].
* Riser diagram shall correlate with the floor plan and include:
* General arrangement of the system in building cross-section.
* Number of risers.
* Type and number of components in each riser.
* Type and number of components/devices on each feeder, on each floor/level [NFPA 1225:18.2.1].
* Wiring diagrams provided for all control equipment, power supplies, battery chargers and annunciators and include:
* Identification of the control equipment depicted.
* Location(s) of control equipment.
* All field wiring terminals and terminal identifications.
* All circuits connected to field wiring terminals and circuit identifications.
* All indicators and manual controls.
* Connections to supervising station signaling equipment [NFPA 1225:18.2.1].
* Provide antenna mast structural installation details:
* Mast shall be designed and installed per FBC, current edition [NFPA 1225:18.3.3.3].
* Donor antenna orientation shall be coordinated with Pinellas County R&T.
* Include FAA lighting (if applicable).
* Shall be rated 160 MPH or higher wind gusts [NFPA 1225:18.3.3.3].
* Shall meet the wind loading requirements of the FBC and ANSI/TIA-222-G [PCR&T].
* Compliance with antenna/mast structural requirements shall be certified by a Florida- licensed professional structural engineer.
* Antennas shall be permanently affixed on the building or to approved sled-mounts.
* Sled-mounted antennas shall have a visible sign affixed stating “movement or repositioning of this antenna is prohibited without approval from the AHJ”[NFPA 1225:18.3.3.1].
* Provide antenna technical and performance notes:
* Donor antenna orientation shall be coordinated with Pinellas County R&T.
* Donor antenna shall be:
	+ Narrow band
	+ High gain
	+ Vertically polarized
	+ Designed for specific frequency band
	+ Yagi or corner-reflector type recommended [PCR&T]
* Propagation (heat) map drawings, if provided, shall include the following:
* Indoor prediction legend
* Materials legend
* Pictogram legend
* Cables legend
* Calculations legend
* Number of channels and frequencies
* Predictive propagation on floor plans
* Name of certified designer and company [NFPA 1225:18.2.1]
* Note indicating propagation delay shall not exceed 8 µS [PCR&T].
* Battery calculations for battery secondary power source [NFPA 1221(2019):9.6.6.1].
* Provide all firewall penetration details [61G15 FAC].
* Indicate that backbone and antenna distribution cable(s):
* Will be installed per Chapters 7 and 8 of NFPA 70
* Mechanical protection of work and raceways for coaxial cables shall comply with NFPA 70, Article 820 [NFPA 1221:18.12]
* Backbone cables and components installed in NFPA 13 fully-sprinklered buildings shall not be required to be fire resistive [NFPA 1225:18.12.3.3].
* Note indicating that all backbone cables and components installed in non-sprinklered, partially sprinklered, or high-rise buildings will meet one of the following:
* Use a cable with a listedfire-resistance rating orbe installed in a protected enclosure/area in accordance with the following:
	+ Where the primary structural frame of a building is required to have a fire-resistance rating of 2 hours or more or is heavy timber construction, the minimum fire-resistance rating shall be 2 hours.
	+ 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.
	+ Where the primary structural frame of a building does not require a fire-resistance rating, a fire resistance rating shall not be required [NFPA 1225:18.12.3.4].
* Backbone and distribution antenna cables installed in a fire-resistant enclosure/area, shall meet both of the following:
* The connection between the backbone cable and the distribution antenna cables shall be made within an enclosure/area.
* Passage of the distribution antenna cable in and out of the enclosure/area shall be fire- stopped to an equivalent rating of the enclosure/area [NFPA 1225:18.12.3.5].
* The following shall be contained in a NEMA 4 or 4X enclosure:
* Repeater
* Transmitter
* Signal booster components
* Optical-to-RF and RF-to-optical converters
* External filters [NFPA 1225:18.3.1.2]
* The following shall be contained in a minimum NEMA 3R-type (or higher) enclosure:
* Battery system components
* Batteries that require venting shall be in a NEMA-3R type enclosure [NFPA 1225:18.3.1].
* Note indicating that signal booster enclosure(s) shall be fire engine red color, with locking mechanism and 1-inch-high contrasting letters with the following data:
* Fire Department Radio Signal Booster
* Permit Number
* Serviced by [PCR&T]
* Indicate power supply has at least two independent sources:
* Primarypower shall be from a dedicated circuit in compliance with NFPA 72.
	+ Primary power shall be permanently connected.
	+ Supplied from a dedicated branch circuit.
	+ Protected from overvoltage [NFPA 1225:18.13.1].
* Secondarypower source shall be either of the following:
	+ Dedicated storage battery with 12 hours of operation at 100% capacity.
	+ Approved alternative power source with 12 hours of operation at 100% capacity.
	+ Life Safety generator with at least 12 hours of operation at 100% and a battery with at least 2 hours of operation at 100% [NFPA 1225:18.13.2].
* Note indicating the building fire alarm system will supervise the following:
* Donor/distribution antenna malfunction
* Signal booster failure
* Active system component failure
* Loss of AC power
* Low-battery indication when 70 percent of the operating capacity is depleted
* Failure of battery charger
* Link between ERCES and FACP shall be monitored for integrity [NFPA 1225:18.14.1.2]
* Provide dedicated panel (annunciator panel) that shall indicate:
* Normal AC power
* Loss of normal AC power
* Signal booster malfunction
* Battery charger failure
* Low battery capacity
* Donor/distribution antenna malfunction
* Active system component malfunction
* The link between annunciator and ERCES shall be monitored for integrity [NFPA 1225:18.14.2]
* Detail grounding and mounting details for antenna, mast, surge protection, amplifier, power supply, battery enclosure, etc. [61G15 FAC]:
* Connected to building an electrical ground system and coaxial lightning protector.
* Motorola R56 and Harris Site Grounding and Lightning Protection Guidelines.
* Antenna, antenna mast and antenna discharge units shall be grounded per NFPA 70, Article 820 [NFPA 1225:18.4.4].
* Provide antenna lightning protection [NFPA 1225:18.4]:
* Impedance 50 Ω
* Frequency range as needed
* VSWR/SWR = 1.1:1 or better
* Insertion Loss = 0.1dB or better
* Impulse Discharge Current = 10KA or better
* Turn-on voltage = 600V
* Turn-on time = 2.5nS for 2kV/nS
* Energy Throughput Rating = 5nJoules for 3kA (8/20µS waveform)
* Continuous handling RF power = 100W or better [PCR&T]
* Donor antenna coaxial cables shall be protected by listed antenna discharge units in accordance with NFPA 70, Article 820 [NFPA 1225:18.4.1]
* Antenna discharge units shall be listed in accordance with UL 497C [NFPA 1225:18.4.2].
* Indicate the panel and circuit breaker ID; detail panel location on submission [NFPA 72].
* Indicate provision of circuit breaker lock for primary power source [NFPA 72].
* Indicate circuits will have an isolated ground, if required by the manufacturer [NFPA 70].
* Indicate system equipment (amplifier/transmitter, battery pack) will be installed in air- conditioned/mechanically ventilated room/space/box where the manufacturer’s installation specifications recommend a temperature/humidity limit [NFPA 70:110.3].

**\*\*\*END OF SECTION\*\*\***