TABLE OF CONTENTS

Broward County FCC license holders

1. Broward County
   Office of Regional Communications and Technology – Radio Administration Office
   1801 NW 64th St., Ste. 106A
   Fort Lauderdale, FL 33309

   Contact Information:
   Jose M. De Zayas
   Rob Brownstein
   954-357-8442 (O)
   BDA@broward.org

2. Coral Springs Communication Technical Coordinator
   Coral Springs Police Department
   2801 Coral Springs Drive
   Coral Springs, FL 33065

   Contact Information:
   Kathy Liriano
   Alyssa Picotte
   954-346-1365 (O)
   csbda@coralsprings.gov

3. Fort Lauderdale Communication Shop
   1301 SW 2nd Ct., Building 5 Fort Lauderdale FL 33312

   Contact Information:
   Bobby Brown Telecommunications Coordinator Sustainability Department
   954-828-5554 (O)
   bda@fortlauderdale.gov

4. Plantation Fire Department:
   550 NW 65th Avenue
   Plantation, FL. 33317

   Contact Information:
   Battalion Chief / Fire Marshal Tony Martins
   954-797-2150 (O)
   tmartins@psd.plantation.org

General Information – ORCAT:

1. Plans for all 700MHz ERCES installations in Broward County, shall require review and authorization by the Broward County Regional Public Safety Radio System FCC license holder (ORCAT). [1, 4]
2. Plans must comply with Section 118 of the Florida Building Code Broward County Amendments including the currently adopted editions of the NFPA codes and standards. [1, 4]
3. The AHJ may, at their discretion, allow the use of subsequent editions of referenced NFPA publications as stipulated in NFPA 1, Section 1.4.1.1. [5]
4. Plans will be submitted electronically. There shall be one file containing the design plan and equipment specifications. [1, 4]
5. All plans shall be signed and sealed. There are two methods of signing; "Digitally" or "Electronically", recognized by the Florida Board of Professional Engineers (FBPE) that ORCAT will accept. Plan sets not adhering to the proper digital or electronic signing methods described below will not be approved. Printed copies of digitally signed, dated, and sealed documents are not considered signed and sealed. Simply encrypting, securing, or locking an electronic file does not constitute a digital or electronic signature or seal. [1, 4]

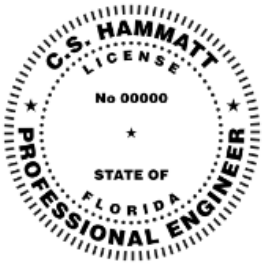
NOTE: The information in this section is from the FBPE website, is current as of the date of this publication, and is subject to change without notice.

A. "Digitally" Signing and Sealing:
   i. A digital signature is typically placed on the first page of an engineering document. A digitally signed and sealed document may include as many sheets as necessary. Each sheet must contain a title block.
   ii. A digital signature must be unique to the Professional Engineer (PE) using it, obtained from a third-party certification authority, and capable of verification. The certification authority will vet the PE and provide a password-protected digital signature file. (FBPE does not approve or provide a list of authorities.
   iii. The use of the digital option provided in Adobe Acrobat shall not be used as it is self-authenticated and does not use a third party. However, you may use Adobe Acrobat in conjunction with the digital signature provided by a proper certification authority.
   iv. The digital signature must be linked to the document in such a way that any change invalidates the signature and document.

General Information – ORCAT (cont.)

v. The digital signature shall be placed on the first page of the document. **On pages where a digitally created seal is used,** each sheet of the document must have a text box with text stating: *"This item has been digitally signed and sealed by [NAME] on the date adjacent to the seal. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.".* **On pages where a digitally created seal is <u>not</u> used, the text box must also contain all the information that would appear in the seal:** *"[NAME], State of Florida, Professional Engineer, License No. [NUMBER]. This item has been digitally signed and sealed by [NAME] on the date indicated here. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.".* Please note that while the formatting may be altered, **the text located within the text box <u>must remain identical</u> to the examples below**, must be placed on all the electronic plan sheets, but cannot be placed in the digital signature itself. Examples with seal and without are below:

a. Digital signature WITH seal:



This item has been digitally signed and sealed by [NAME] on the date adjacent to the seal.

Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

b. Digital signature WITHOUT seal:

[NAME], State of Florida, Professional Engineer, License No. [NUMBER]

This item has been digitally signed and sealed by [NAME] on the date indicated here.

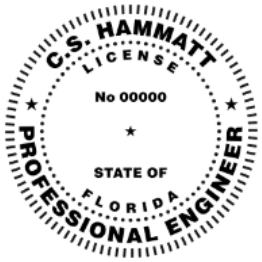
Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

General Information – ORCAT (cont.)

B. "Electronically" Signing and Sealing:
   i. The electronically signed and sealed file may include as many sheets as necessary. Each sheet must contain a title block.
   ii. An electronic signature for a file of engineering documents is created by a piece of software called a secure hash standard (or SHA) authentication code generator.
      a. After completing a project, you create a computer file that contains as many sheets as necessary for the engineering project. The file is run through the generator, which provides a string of numbers and letters (the SHA authentication code) that is used in your document's signature report.
      b. The printable signature report must include your name and license number and must list all items to which the electronic signature applies. The signature report must be printed, hand signed, dated, and sealed.
   iii. The signed and sealed report must be sent along with the electronically signed and sealed file either by hardcopy or electronic scan. If the signature report is scanned and sent electronically, the engineer must retain the hardcopy as required in Rule 61G15-30.009, F.A.C., Retention of Engineering Documents.
   iv. The digital signature shall be placed on the first page of the document. **On pages where a digitally created seal is used,** each sheet of the document must have a text box with text stating: *"This item has been electronically signed and sealed by [NAME] on the date adjacent to the seal using a SHA authentication code. Printed copies of this document are not considered signed and sealed and the SHA authentication code must be verified on any electronic copies.".* **On pages where a digitally created seal is <u>not</u> used, the text box must also contain all the information that would appear in the seal:** *"[NAME], State of Florida, Professional Engineer, License No. [NUMBER]. This item has been electronically signed and sealed by [NAME] on the date indicated here using a SHA authentication code. Printed copies of this document are not considered signed and sealed and the SHA authentication code must be verified on any electronic copies.".* Please note that while the formatting may be altered, **the text located within the text box <u>must remain identical</u> to the examples below**, must be placed on all the electronic plan sheets, but cannot be placed in the digital signature itself. Examples with seal and without are below:

General Information – ORCAT (cont.)

a. "Electronic" signature WITH seal:



This item has been electronically signed and sealed by [NAME] on the date adjacent to the seal using a SHA authentication code.

Printed copies of this document are not considered signed and sealed and the SHA authentication code must be verified on any electronic copies.

b. "Electronic" signature WITHOUT seal:

[NAME], State of Florida, Professional Engineer, License No. [NUMBER]

This item has been electronically signed and sealed by [NAME] on the date indicated here using a SHA authentication code.

Printed copies of this document are not considered signed and sealed and the SHA authentication code must be verified on any electronic copies.

6. All plan changes or modifications requested by ORCAT, the municipal code official(s), Fire AHJ, or other FCC license holders will require a re-submission of the entire design plan with changes clouded and indexed, signed and sealed, to ORCAT with a response letter explaining all changes, including page and/or block numbers, and who requested them. [1]
7. The ERCES design shall include a sufficient number of distribution antennas (density) to address areas where signal enhancement is deemed necessary by means of a grid survey and DAQ test. The design shall not include distribution antennas where the signal received directly from the radio tower is sufficient to produce a DAQ score of 3.0 or greater. [1,2,5]
8. DAQ Testing, Heat Maps and RF grid surveys: ** For all buildings, new and existing, the need for a 700MHz ERCES must be confirmed by an RF grid survey performed by a licensed ERCES contractor, and a DAQ test performed by the Fire AHJ, prior to a system being turned on. [1]
    A. DAQ Tests:
        i. ORCAT must witness the pre-installation and/or pre 700MHz turn-up DAQ test(s), if the results of the RF grid survey indicate that a 700MHz ERCES may be needed.
        ii. If a Fire AHJ chooses not to, ORCAT can perform a DAQ test for a flat fee plus an additional hourly rate for each technician, billable to the Fire AHJ.

General Information – ORCAT (cont.)

B. RF Grid surveys:
   i. Shall be generated by a licensed ERCES contractor using the Regional 700MHz P25 control channel(s).
   ii. Will be submitted to the FCC license holder(s) and Fire AHJ for review
   iii. Shall include all stairwells, elevator lobbies, and elevator cars. Elevators must have a certificate of operation – permanent or temporary.
   iv. Notes on the grid report shall include a description for each critical area that was tested (inside stairwell 1, elevator 2 lobby, etc.). Elevator cars are considered critical areas in Broward County.
   v. Shall include FBER and SINR in addition to RSSI levels.
      a. FBER, SINR and the calculated DAQ value are not to be used for pass/fail scoring.
      b. NFPA no longer refers to a quantitative signal measurement (dBm) to ensure proper indoor radio coverage. NFPA 1221 and NFPA 1225 now refer to signals that are sufficient to provide a minimum of DAQ 3.0 for either, narrowband analog or digital transmissions. ORCAT has established -102dBm as the minimum quantitative relative signal strength (RSSI) measurement on the 700MHz P25 phase 2 radio system, providing that the minimum DAQ requirement is met. -102dBm is a numeric value, to be used solely as a reference point (threshold) for RSSI grid reports on the Regional Phase II 700MHz system and not for determining sufficient indoor radio coverage.

C. Predictive Heat Maps:
   i. Shall be in full color.
   ii. Shall have a legend that includes RSSI level and band(s) being displayed.
   iii. Shall show propagation prediction for entire floor area.
   iv. All predictive heat maps used in design plans and RF grid surveys shall list the radio system's control channels.
      a. Broward County Regional Public Safety 700MHz Radio System:

774.90625MHz (primary)	774.63125MHz
774.38125MHz	773.73125Mhz

      b. City of Fort Lauderdale, City of Plantation, and the City of Coral Springs 800MHz radio system frequencies must be obtained from the respective FCC license holders.

General Information – ORCAT (cont.)

9. Multi-building complexes (campuses) shall: [1]
    A. Utilize a single head-end unit (One donor antenna / master signal booster for the complex / campus).
    B. Be issued a single provisional retransmission authorization when the headend is activated and the noise floor and uplink signals are confirmed to be within limits.
    C. Require turn-up and final inspections for all buildings with active equipment. Buildings with only passive equipment will not require ORCAT inspections.
        i. ***Following turn-up of a building having only passive equipment, an isolation test must be performed. A screenshot of the results and the date tested shall be submitted to ORCAT for filing.***
    D. Be issued one installation completion certificate when the last building is successfully activated, and the AHJ confirms that coverage in all buildings is satisfactory, ***and all documentation requested by ORCAT has been received and accepted.***

Notes:
1: Exceptions to this section may be made due to extenuating circumstances and will be reviewed on a case-by-case basis.
2: The connection between buildings should be considered prior to building construction. All avenues, including but not limited to conduits for CATV, internet, security systems, etc. should be evaluated.

10. Cable selection and protection: [1]
    A. The permitted use of protected (Armored) cable shall be decided by the AHJ(s).
    B. Fire protection and mechanical protection requirements for the ERCES, including its components and cables shall be decided by the AHJ(s).
    C. Coaxial cables shall have a solid metal shield.
    D. ½" type LDF foam core coaxial cable shall be used from the donor antenna connection to the first connection point inside the building. Air dielectric cables are not permitted for donor antenna feedlines.
    E. ½" type LDF foam or air core cables may be used as a backbone cable from the signal booster to the last donor antenna connection point inside the building and as distribution cable between the signal booster and the in-building distribution antennas.
    F. Although not recommended, radiating cable (leaky coax) may be used for indoor signal distribution.
    G. Cables with dissimilar metal construction and cable types commonly known as LMR, shall not be permitted. This includes, but is not limited to LMR400, RG8, 9913, and similar coaxial cables.

General Information – ORCAT (cont.)

11. Multi-Band BDA's: [1, 2]
    A. Effective February 19, 2025, all signal boosters being installed to replicate the Regional 700MHz P25 radio system frequencies SHALL BE CLASS "A" (channelized).
    B. ORCAT will not allow the use of any signal booster that does not have independent downlink and uplink control of both 700MHz and 800MHz bands.
    C. The use of a public safety signal booster for retransmitting cellular or LTE signals (including FirstNet) is strictly prohibited.
12. New construction projects: [1]
    A. Full color heat maps indicating predictive RF signal levels (described above) will be submitted to the FCC license holder (ORCAT) as part of the design plan submittal. The predictive heat maps shall be overlayed on floor plans and have a legend.
    B. An ERCES design plan should be generated for all new construction projects where a system may be required.
    C. Prior to or during construction, ORCAT recommends that:
        i. Design plans should be submitted for approval.
        ii. ERCES conduits and power provisions be provided during building construction.
        iii. Equipment is not installed until the necessity of an ERCES is confirmed by RF grid survey and DAQ test as outlined below.
    D. When the building under construction is nearing completion (Exterior walls, fire rated doors and windows are in place, and elevators are functional and have a certificate of operation – permanent or temporary):
        i. ORCAT will require an RF grid survey performed by a licensed ERCES contractor, followed by a DAQ test performed by the Fire AHJ.
            a. ORCAT must witness the pre-installation DAQ test if:
                i. The results of the RF grid survey indicate that an ERCES may be required.
                ii. The grid survey indicates that an ERCES is not required, but the Fire AHJ states that the building failed their initial DAQ test.
            b. The Fire AHJ shall submit to ORCAT a written summary of the DAQ test results, stating:
                i. The date, time, and address of the building tested.
                ii. Whether the in-building radio coverage was sufficient or insufficient.
                iii. The areas that failed testing (if any).

General Information – ORCAT (cont.)

E. Design plans approved prior to the building construction nearing completion as described above, may require modifications based on the results of the grid survey and DAQ test.
    i. Upon receipt of the RF grid survey and written confirmation from the Fire AHJ that an ERCES will not be required, ORCAT will consider the project complete, and no further action will be necessary.
        a. If a system has already been installed, photographic evidence that the system has been removed or the 700MHz booster has been made non-functional as outlined in General Information section 13.B.iv or 13.B.v below) shall be provided to the FCC license holder(s) and AHJ.

13. Existing buildings: [1]
    A. If a request is made to install a new 700MHz ERCES:
        i. ORCAT will require an RF grid survey performed by a licensed ERCES contractor, followed by a DAQ test performed by the Fire AHJ.
            a. ORCAT must witness the DAQ test if:
                i. The results of the RF grid survey indicate that an ERCES may be required.
                ii. The grid survey indicates that an ERCES is not required, but the Fire AHJ states that the building failed their initial DAQ test.
        ii. The Fire AHJ shall submit to ORCAT a written summary of the DAQ test results, stating**:**
            a. The date, time, and address of the building tested.
            b. Whether the in-building radio coverage was sufficient or insufficient.
            c. The areas that failed testing (if any).
        iii. If a 700MHz ERCES is required, a design plan shall be submitted for review.
        iv. Upon receipt of the RF grid survey and written confirmation from the Fire AHJ that a ERCES is not required, ORCAT will consider the project complete, and no further action will be necessary.
    B. Turning up a 700MHz ERCES where an 800MHz ERCES is currently operational:
        i. ORCAT will require an RF grid survey performed by a licensed ERCES contractor, followed by a DAQ test performed by the Fire AHJ.
            a. ORCAT must witness the DAQ test if:
                i. The results of the RF grid survey indicate that an ERCES may be required.
                ii. The grid survey indicates that an ERCES is not required, but the Fire AHJ states that the building failed their initial DAQ test

General Information – ORCAT (cont.)

ii. The Fire AHJ shall submit to ORCAT a written summary of the DAQ test results, stating:
   a. The date, time, and address of the building tested.
   b. Whether the in-building radio coverage was sufficient or insufficient.
   c. The areas that failed (if any).

iii. If a 700MHz booster is required:
   a. The as-built plans will be reviewed by ORCAT to confirm 700MHz compatibility.
   b. The results of the RF grid survey and DAQ test will be reviewed by the FCC license holder (ORCAT).
   c. Upon ORCAT approval of the plans, and concurrence of the RF grid survey and DAQ test results, a turn-up / final inspection will be scheduled.

iv. If a 700MHz booster is not required, and the 800MHz booster is no longer needed:
   a. At a minimum:
      i. Power shall be removed from the unit(s) and secured so as not to be accidentally restored.
      ii. Photographic evidence shall be provided to ORCAT that the donor antenna has been disconnected and a terminator placed on the donor port of the BDA/headend.
      iii. The 800MHz booster registration must be deleted from the FCC database. Evidence that the booster registration has been deleted shall be submitted to the FCC license holder (ORCAT) for filing.
   b. At the building owner's discretion, and with approval of the AHJ(s), the donor antenna and/or the amplifier(s) (head-end unit and/or remotes) may be completely removed.

General Information – ORCAT (cont.)

v. If a 700MHz booster is not required but the 800MHz booster must remain active:
   a. The following must be submitted to the 700MHz FCC license holder (ORCAT):
      i. The RF grid survey results.
      ii. A letter from the Fire AHJ confirming:
         1 That a DAQ test was performed.
         2 The 700MHz in-building radio coverage was sufficient.
         3 That a 700MHz ERCES is not needed.
      iii. Photographic evidence shall be provided to the FCC license holder (ORCAT) that the 700MHz booster (uplink) is not active.
      iv. The 800MHz booster registration in the FCC database must be amended to remove the Broward County 800MHz call signs. Evidence that the booster registration has been amended shall be submitted to the FCC license holder (ORCAT) for filing.

14. ERCES Registration: [1, 2]
    A. All 700MHz ERCES signal boosters shall be registered and entered in the FCC signal booster database by the 700MHz FCC license holder (ORCAT).
    B. If an 800MHz ERCES is active and:
       i. A 700MHz ERCES is not required but 800MHz must remain active, confirmation shall be provided to ORCAT that the Broward County 800MHz call signs have been removed from the FCC signal booster registration.
       ii. No ERCES is required, confirmation shall be provided to ORCAT that the 800MHz booster registration has been removed from the FCC signal booster database.
15. ERCES signal boosters shall have FCC Certification and meet the requirements of FCC Rule 90.219: [1, 5] https://www.ecfr.gov/current/title-47/chapter-I/subchapter-D/part-90/subpart-I/section-90.219
16. ERCES components shall be approved by and compatible with the Regional 700MHz Public Safety Radio System, and if necessary, the municipal 800MHz radio systems. [1, 4, 5]
17. ERCES signal boosters shall have at least two independent power sources. The secondary power source shall consist of one of the following: [1, 5]
    A. A storage battery dedicated to the system with 12 hours of 100 percent system operation capacity.
    B. An alternative power source of 12 hours at 100 percent system operation capacity as approved by the AHJ.

General Information – ORCAT (cont.)

18. Retransmission Authorization: [1, 2, 4, 5]
    A. Prior to the turn up inspection, an ORCAT provisional retransmission authorization form and a signed and notarized ORCAT owner acknowledgement form must be submitted to the 700MHz FCC license holder (ORCAT).
    B. Following the turn-up inspection, and the system is approved to remain operational for tuning and testing, ORCAT will provide the building owner/manager a provisional retransmission authorization that shall remain on site with the other ERCES documentation.
        i. The ORCAT retransmission authorization:
            a. Grants permission to the building owner, to retransmit the Broward County Regional 700MHz Public Safety radio system.
            b. DOES NOT authorize the retransmission of any frequencies not licensed to Broward County. This includes but is not limited to municipal 800MHz Public Safety radio systems and all cellular/LTE carriers including FirstNet.
            c. Must be obtained prior to **over the air** testing and commissioning.
            d. Is valid for a period not to exceed one (1) year from the date of issuance.
    C. A new retransmission authorization will be provided by ORCAT upon receipt of:
        i. Annual test results, indicating that the system has been tested as specified in the current NFPA standard(s), by a licensed ERCES service provider, and is operating within the manufacturers specifications, applicable FCC rules and regulations, and local guidelines. A full grid survey (quantitative measurement) shall be done, commencing with the initial post turn-up survey, and at intervals not to exceed every five years, or at the request of the FCC license holder(s).
        ii. A copy of an active service/maintenance agreement. The service/maintenance agreement should:
            a. Cover the system and its components for a minimum term of 12 months.
            b. Provide continuous coverage. Should there be a lapse in coverage:
                i. The FCC license holder(s) shall be notified by the service provider and/or the business owner/manager.
                ii. The retransmission authorization will be considered null and void.
                iii. A new retransmission authorization will be issued upon receipt of a new or renewed service/maintenance agreement providing the other requirements of this section have been met.
            c. When possible, be renewed concurrently with the issuance of the new retransmission authorization.

General Information – ORCAT (cont.)

19. Maintenance and testing. [1, 4, 5]
    A. During the annual maintenance and testing, or any time in between maintenance and testing periods, if any issues are noted and/or the system requires modifications or adjustments to any physical components and/or settings:
        i. The FCC license holder(s) and the Fire AHJ shall be notified immediately.
        ii. No changes or modifications shall be made without prior authorization from the FCC license holder(s); however, the system may be shut down without prior authorization from the FCC license holder(s) depending on the severity of the issue(s) found.
        iii. When the issues are resolved and/or modification(s) is/are complete, ORCAT will coordinate an inspection to:
            i. Turn the system back on.
            ii. Re-test for noise floor changes.
            iii. Retest the uplink signal level to confirm that the system is not causing any interference on the 700MHz regional public safety radio system.

20. Fee schedule: [1]
    A. A fee schedule has been implemented and shall be applied as follows:
        i. All fees are payable electronically via credit card only.
        ii. Payment must be remitted to ORCAT prior to any further plan reviews or inspections.
            a. Plan review:
                i. The initial intake review is complimentary. Should revisions be necessary, our office will inform you of the required changes.
                ii. If resubmitted plans contain errors, the current fee schedule will be applied.
                iii. Plan review fees are subject to change without notice.
            b. DAQ testing, initial and final inspections:
                i. The initial site visit is free of charge.
                ii. No-show events, or where failures occur that cannot be resolved before the allotted inspection time limit has passed, subsequent visits will incur a fee.
                iii. Testing and inspection fees are subject to change without notice.

* Back to Top *

Plan Review – ORCAT:

All Plans shall include the following information:

1. Building owner, site address, coordinates of the signal booster donor antenna in decimal degrees, building description showing building construction, building occupancy, total square footage, number of floors, total height of building and if the building is proposed or existing. [1, 4, 6]
2. Name of certified designer and company. [1]
3. Applicable codes and edition dates. [1]
4. System radio frequencies: [1, 4, 6]
    A. Broward County regional public safety radio system:
        i. Specific 700MHz frequencies shall be provided upon request.
            a. 19 trunked frequency pairs.
            b. 1 conventional frequency pair.
    B. Municipal public safety radio systems:
        i. Information to be obtained directly from the municipal FCC license holder(s)
5. Detailed riser diagrams that include but are not limited to: [1, 6]
    A. BDA Equipment (i.e. BDA, BBU, annunciator).
    B. Antennas.
    C. Cables, splitters, and tappers.
    D. A cable legend.
    E. An equipment (pictogram) legend.
6. Detailed floor plans showing: [1, 6]
    A. Device locations (including, but not limited to: BDA, remote(s) if applicable, antennas, remote annunciator, FACP., etc.).
    B. Fire-rated enclosures.
    C. Cable conduits.
    D. Propagation modeling showing the Radio System's Control Channels and predictive propagation legend.
    E. A cable legend.
    F. An equipment (pictogram) legend.

Plan Review – ORCAT (cont.):

7. Specification sheets for all equipment with the following items (if applicable) highlighted: [1, 6]
    A. Manufacturer's part numbers.
    B. Specific configuration options such as ordering information, model and option numbers, battery options, etc.
    C. Mechanical specifications.
    D. Electrical specifications.
    E. RF specifications.
    F. Temperature limits.
    G. Certifications / listings.
8. Consolidated equipment list including: [1, 4, 5, 6]
    A. Pictograms.
    B. Manufacturer's part numbers.
    C. Quantity being used.
9. Calculation Tables: [1, 5, 6]
    A. Battery backup (Provide calculations showing system operation at 100% for a minimum of 12 hours)
    B. Uplink budget:
        i. Signal at ORCAT Tower Sites not to exceed -70dBm.
        ii. Items to be included in calculation:
            a. Maximum signal booster uplink output.
            b. Donor antenna cable loss (from signal booster to antenna; include any passive devices).
            c. Antenna gain.
            d. Approx ERP at BDA donor antenna (booster output, minus passive devices and cable losses, plus donor antenna gain).
            e. Calculated, unobstructed free space loss (FSL at +/- 800MHz x distance to tower).
            f. Approximate signal level at tower site.

Plan Review – ORCAT (cont.):

10. BDA configuration: [1]
    - A. Signal booster frequency band(s) as listed in the manufacturer's specification sheets: 700MHz, 700MHz + FirstNet, 800MHz, 700MHz + 800MHz, 700MHz + FirstNet + 800MHz.
    - B. Detailed configuration:
        - i. Band(s) required by jurisdiction.
            - a. For the regional 700MHz public safety radio system:
                - i. 20 frequency pairs/filters are currently required for the Regional 700MHz public safety radio system and are available upon request.
                    - i. 19 Trunked frequencies.
                    - ii. 1 Conventional frequency - currently required for uplink testing.
                - ii. Individual Filter bandwidth.
                    - i. If filters are not all the same bandwidth, all filters should be listed.
                    - ii. If filters are all the same bandwidth, a statement indicating the bandwidth and that all filters will be the same should be added.
                - iii. Propagation delay (based on individual filter bandwidth(s) being used - maximum delay 30 microseconds).
            - b. For the Municipal 800MHz public safety radio systems:
                - i. Contact the FCC license holder and AHJ for their specific requirements.
        - ii. FCC license holder radio site(s) location (site name), azimuth and approximate distance to site, and effective radiated power (ERP).

11. Mounting and grounding illustrations and details for: [1, 6]
    - A. Donor antenna.
    - B. Mast.
    - C. Surge protector.
    - D. Coaxial cable grounding clamp.
    - E. Signal booster, battery backup unit, power supply, battery enclosure (block diagram).

Plan Review – ORCAT (cont.):

12. Notes on plans shall state: [1, 4]
    A. The HPA(s) shall never be turned on, for testing or operation until written, or on site, approval is obtained from all applicable FCC license holders.
    B. Inbound signal level shall be sufficient to provide a minimum of DAQ 3.0. Outbound signal level shall be sufficient to provide a minimum of DAQ 3.0.
    C. Isolation shall be a minimum of 20 dB above the (maximum) signal booster gain under all operating conditions.
    D. System shall be capable of transmitting all radio frequencies, as required by the Fire AHJ assigned to the jurisdiction and be capable of using any modulation technology.
    E. Frequency changes: Systems shall be upgradeable to allow for instances where the jurisdiction changes or adds system frequencies to maintain radio system coverage as it was originally designed.

* Back to Top *

INSPECTIONS – ORCAT:

Initial Inspection

1. The HPA(s) shall never be turned on, for testing or operation until written, or onsite approval is obtained from the FCC license holder(s). [1]
2. The following items must be received by the FCC license holder (ORCAT) prior to the initial inspection: [1]
    A. Written confirmation from the Engineer of Record or licensed ERCES service provider stating that the system installation is complete, has been installed as per design plans, and is ready to be energized for testing.
    B. ORCAT Provisional Retransmission Authorization form, complete and digitally signed.
    C. ORCAT Owner acknowledgement form, signed and notarized.
    D. ORCAT installation completion form.
    E. Pre-installation/turn-up RF grid survey.
    F. Written confirmation that the system has passed all necessary rough inspections (Fire, Electrical, and/or any other discipline deemed necessary by the AHJ) to permit the system to be powered up.
        i. The City of Fort Lauderdale performs their Fire rough inspection as a part of the initial inspection.
    G. Photographs of the installed major components including, but not limited to:
        i. BDA, labeled with the following information:
            a. “Fire Department Signal Booster”
            b. Permit number.
            c. Serviced by (company name and phone number).
        ii. Signal booster / remote serial numbers.
        iii. Enclosures with battery charger and batteries installed, wired with a label showing the battery’s date of manufacture and installation date.
        iv. Equipment, antenna, mast, and coaxial cable surge protection/grounding.
    H. A copy of a certificate or letter from Broward County Division of Elevators showing that the elevator(s) (if applicable) have been inspected and can be used for passenger transport.

INSPECTIONS – ORCAT (cont.):

Initial Inspection (cont.)

3. ORCAT shall coordinate the inspection with the ERCES integrator, Fire Official AHJ and any other FCC license holder(s). [1]
4. The ERCES integrator shall coordinate with and ensure that the Owner/Owners' representative is on site. [1]
    A. The following shall be notified by the ERCES integrator, but are not required to be present unless requested by the ERCES Integrator, any of the participating AHJ's, or any other FCC license holder(s):
        i. Electrical Contractor.
        ii. Fire Alarm Contractor.
        iii. System Engineer of Record,
        iv. Electrical AHJ.
5. The BDA integrator shall have on site: [1]
    A. A computer to gain access to the signal booster GUI to check settings and status.
    B. A fully charged spectrum analyzer to check measurable noise floor and downlink signal levels upon request.
    C. A variety of physical attenuators with different values of attenuation.
6. The Initial Inspection process shall include the following: [1]
    A. Items in Section 2 above shall be inspected for compliance.
    B. Baseline noise floor will be measured at the FCC license holder (ORCAT) tower site.
    C. The HPA(s) shall be turned on.
    D. The noise floor at FCC license holder (ORCAT) tower site will be rechecked. No change in the noise floor should be noted.
    E. Inbound signal strength shall be measured on a test frequency at the FCC license holder (ORCAT) tower site. The inbound signal shall be less than -70dBm.
    F. Upon a successful turn-up, a post turn-up grid survey shall be completed, and the report submitted to ORCAT no later than three business days after a successful turn-up, beginning the day after the inspection.
    G. Following the post turn-up grid survey, the 700MHz HPA(s) shall be turned off until the final inspection.

INSPECTIONS – ORCAT (cont.):

Initial Inspection (cont.)

NOTE:

- If the inbound signal at the FCC license holder (ORCAT) tower site is greater than -70dBm and/or if a change in the noise floor is noted when the HPA(s) is/are turned on, immediate actions shall be taken to reduce the uplink signal and/or eliminate the noise floor change. If the remedial actions do not resolve the issue(s) within the allotted inspection time, the 700MHz HPA(s) shall be powered off until a full systemic evaluation can be performed and a subsequent turn-up inspection scheduled. The 800MHz HPA(s) (if a dual band system) may also be turned off at the discretion of the 800MHz FCC license holder.

7. Pass / Fail Criteria: [1]
   A. If the building has certificate of occupancy (CO) and is occupied:
      i. Pass: (Must meet all criteria):
         1. No change in noise floor noted at tower site when HPA(s) is/are turned on.
         2. Uplink signal level is not greater than -70dBm.
         3. All areas that needed enhancement are addressed.
      ii. FAIL (if any item below):
         1. Change in noise floor noted at tower site when HPA(s) is/are turned on.
         2. Uplink signal level is greater than -70dBm.
         3. Any area that needed enhancement still has insufficient coverage, and remedial actions do not resolve the issue(s) within the allotted inspection time.
   B. Building without certificate of occupancy (CO) and is unoccupied
      i. Pass (Must meet all criteria):
         1. No change in noise floor noted at tower site when HPA(s) is/are turned on.
         2. Uplink signal level is not greater than -70dBm.

      *** This passing result applies even in critical areas that may not have adequate coverage confirmed by Fire, with the system on. The contractor will only be permitted to keep the system operational to make necessary adjustments to enhance signal strength in areas with inadequate coverage, and to perform a grid survey. The 700MHz HPA(s) shall then be powered off until the final inspection. The 800MHz HPA(s) (if a dual band system) may also be turned off at the discretion of the 800MHz FCC license holder
      ii. Fail (if any item below):
         1. Change in noise floor noted at tower site when HPA(s) is/are turned on.
         2. Uplink signal level is greater than -70dBm.

* Back to Top *

INSPECTIONS – ORCAT (cont.):

Final Inspection

1. Prior to the final inspection, a close out package shall be provided to the FCC license holder and Fire AHJ that includes: [1]
    A. A set of signed and sealed "As-Built" plans, in a single file.
    B. A post turn-up RF grid survey.
    C. A signed letter from the licensed ERCES contractor stating that the system has been balanced and tested and is ready for the final inspection.
    D. Proof of a current service agreement signed by the building owner and the ERCES integrator, for a 1-year minimum term.
    E. Copies of elevator variances if applicable.
    F. Screen shots of all GUI settings including, but not limited to configuration, gain and attenuation.
    G. Confirmation that an isolation test has been performed and that the result shows isolation greater than 20dB above the maximum signal booster gain.

    *NOTE: For ORCAT's internal document retention, "As-Built" plans must be compiled into a single file and must be signed and sealed. The Engineer of record has the option to include a disclaimer for non-drawing related documents, such as maintenance agreements and post turn-up grid surveys, indicating that they do not assume responsibility for the information contained in those documents.
2. ORCAT shall coordinate the inspection with the ERCES integrator, Fire Official AHJ and any other FCC license holder(s). [1]
3. The ERCES integrator shall coordinate with and ensure that the Owner/Owners' representative is on site. [1]
    A. The following shall be notified by the ERCES integrator, but are not required to be present unless requested by the ERCES integrator, any of the participating AHJ's, or any other FCC license holder(s):
        i. Electrical Contractor.
        ii. Fire Alarm Contractor.
        iii. System Engineer of Record,
        iv. Electrical AHJ.

INSPECTIONS – ORCAT (cont.):

Final Inspection (cont.)

4. The inspection process shall include the following: [1]
    A. Review of the GUI gain settings.
    B. Initial inspection items 6B through 6E shall be repeated.
5. Pass / Fail Criteria: [1]
    A. If the building has certificate of occupancy (CO) and is occupied:
        i. Pass: (Must meet all criteria):
            1. No change in noise floor noted at tower site when HPA(s) is/are turned on.
            2. The uplink signal level is not greater than -70dBm.
            3. All areas that needed enhancement have been addressed.
        ii. FAIL (if any item below):
            1. Change in noise floor noted at tower site when HPA(s) is/are turned on
            2. Uplink signal level is greater than -70dBm.
            3. Any area that needed enhancement still has insufficient coverage, and remedial actions do not resolve the issue(s) within the allotted inspection time.
    B. Building without certificate of occupancy (CO) and is unoccupied:
        i. Pass (Must meet all criteria):
            1. No change in noise floor noted at tower site when HPA(s) is/are turned on.
            2. Uplink signal level is no greater than -70dBm.
            3. All areas that needed enhancement have been addressed
        ii. Fail (if any item below):
            1. Change in noise floor noted at tower site when HPA(s) is/are turned on.
            2. Uplink signal level is greater than -70dBm.
            3. Any area that needed enhancement still has insufficient coverage, and remedial actions do not resolve the issue(s) within the allotted inspection time.
6. If, according to the Fire AHJ, the system meets the minimum requirement of DAQ 3.0 as required, RF uplink levels, and noise floor measurements are satisfactory, a certification of installation completion will be issued by ORCAT for the 700MHz radio system only. [1]

* Back to Top *

GLOSSARY:

AHJ(s)	**A**uthority **H**aving **J**urisdiction. Responsible for enforcing codes and standards. May represent multiple disciplines including but not limited to municipal fire, electrical and structural.
Annunciator Panel	A unit containing one or more indicator lamps, alpha-numeric displays, or other equivalent means in which each indication provides status information about a circuit, condition, or location.
Bandwidth	The bandwidth is the difference between the start and stop frequencies in a specified frequency spectrum.
BBU	**B**attery **B**ackup **U**nit. Battery based alternative power source, sufficient to operate a system for a prescribed duration of time under full load.
BDA	Bi-Directional Amplifier. Synonymous with signal booster. Provides an amplified transmit and receive (uplink and downlink) of radio frequencies to service in-building areas where coverage maybe weak, limited or blocked.
Class "A"	A signal booster designed to retransmit signals on one or more specific channels. A signal booster is deemed to be a Class A signal booster if none of its passbands exceed 75 kHz.
Class "B"	A signal booster designed to retransmit any signals within a wide frequency band. A signal booster is deemed to be a Class B signal booster if it has a passband that exceeds 75 kHz.
Critical Area	Any area listed as critical in the current NFPA standard(s) and/or any area deemed critical by the AHJ.
DAQ	Delivered Audio Quality. Subjective performance scale against which radio networks can be measured.
DAS	Distributed Antenna System. A system that uses passive (non-powered) or active (powered) networking equipment, such as antennas, fiber-optic, coaxial cable and other technologies to extend RF coverage (of any technology) inside a building.
dBm	A unit of power level expressed using a logarithmic decibel (dB) scale respective to one milliwatt (mW).

GLOSSARY (cont.):

ERCES	**E**mergency **R**esponder **C**ommunication **E**nhancement **S**ystem. A system that improves wireless communication for emergency responders in buildings. An ERCES is also known as a bi-directional amplifier system (BDA) or bi-directional signal booster and may include a distributed antenna system (DAS).
ERP	Effective Radiated Power. The combination of the power emitted by the transmitter and the ability of the antenna to direct that power in a given direction. It is equal to the input power to the antenna multiplied by the gain of the antenna.
FACP	Fire Alarm Control Panel.
FBER	The ratio of incorrectly received bits within a single frame to the total number of bits in that frame, essentially combining the concepts of "frame error rate" (FER) and "bit error rate" (BER) by focusing on errors occurring only within the boundaries of a data frame.
FCC	Federal Communications Commission.
Heat Map	A predictive representation of expected RF propagation in the form of a map or diagram in which data values are represented as colors overlayed on a buildings floor plan.
HPA	High Power Amplifier. In this document, HPA shall refer to the uplink amplifier in a BDA (signal booster).
LMR	Land Mobile Radio.
NFPA	National Fire Protection Association.
RF Grid Survey	A representation of collected RF data overlayed on a buildings floor plan, in which the data values are represented as colors, and includes a table of the data represented.
SINR	Signal to Interference plus Noise Ratio. A measure of RF signal quality by comparing the ratio between the intended signal and all other signals including background noise plus specific interference sources. Higher SINR values equate to higher delivered audio quality (DAQ).

* Back to Top *

REFERENCES:

[1] Broward County Office of Regional Communications and Technology

[2] Federal Communications Commission.

[3] Florida Board of Professional Engineers.

[4] Florida Building Code – Broward County Amendments.

[5] National Fire Protection Association:
NFPA 1
NFPA 70.
NFPA 72.
NFPA 1221.
NFPA 1225.

[6] Safer Buildings Coalition:
Complete ERCES Handbook (published 5/15/2023).

* Back to Top *