



**CITY OF SCOTTSDALE AMENDMENTS  
TO THE NATIONAL ELECTRIC CODE,  
2011 EDITION**

**ORDINANCE 4064**

**ORDINANCE NO. 4064**

AN ORDINANCE OF THE COUNCIL OF THE CITY OF SCOTTSDALE, MARICOPA COUNTY, ARIZONA, AMENDING CHAPTER 31, ARTICLE IV OF THE SCOTTSDALE REVISED CODE, RELATING TO THE ELECTRICAL CODE; ADOPTING THE 2011 EDITION OF THE "NATIONAL ELECTRICAL CODE" AND **AMENDING** THE 2011 NATIONAL ELECTRIC CODE".

BE IT ORDAINED by the Mayor and City Council of the City of Scottsdale, Arizona, as follows:

Section 1. Section 31-46 of the Scottsdale Revised Code is hereby repealed and replaced by a new Section 31-46, which shall read as follows:

**Section 31-46. Adoption.**

**The following document is hereby adopted by reference and shall be the Electrical Code of the City. Three copies shall at all times remain in the offices of the City Clerk and open to inspection.**

**(1)** The National Electrical Code, 2011 Edition, as published by the National Fire Protection Association, **declared a public record by Resolution No. 9261 of the City is hereby referred to, adopted and made a part hereof as if fully set out in this Ordinance.**

Section 2. Section 31-47 of the Scottsdale Revised Code is hereby repealed and replaced by a new Section 31-47, which shall read as follows:

**Section 31-47. Amendments.**

*(a) The Chapter One – Administration of the International Building Code, 2012 Edition, as adopted in Scottsdale Revised Code Sec. 31-31 and amended by Scottsdale Revised Code Sec. 31-32 shall also apply to the Electrical Code of the City of Scottsdale.*

*(b) The Code Provisions for the 2011 Edition of the National Electrical Code are amended in the following respects:*

*ARTICLE 230 is revised by adding 230-63 to read:*

**230-63 Location.**

All service equipment rated 1000 amperes or more located inside a building shall be enclosed within a room or space separated from the rest of the building by not less than one-hour fire-resistive occupancy separation.

*ARTICLE 250 118 is amended by adding the following:*

**250-118. Types of Equipment Grounding Conductors**

add "with an individual equipment grounding conductor" to item (4), (5) and (6)

*ARTICLE 358-10 is amended as follows:*

**358.10 Uses Permitted is amended by deleting the following:**

Delete paragraph (B) in its entirety

*ARTICLE 358-12 is amended by adding the following:*

**358.12 Uses Not Permitted**

- (7) Ferrous or nonferrous EMT, elbows, couplings, and fittings shall not be permitted to be installed in concrete, in the earth, or in areas subject to severe corrosive influences.

Article 810 is amended by adding the following:

**V. Public Safety Radio Amplification Systems**

**810-80. Radio Coverage.** Except as otherwise provided, no person, firm, or organization shall maintain, own, erect or construct any building or structure which is used for commercial, multi-family, or institutional use or cause the same to be done which fails to support adequate radio coverage to public safety workers, including but not limited to police officers and firefighters. A certificate of occupancy shall not be issued for any building or structure which fails to comply with this requirement.

The frequency range necessary to support public safety radio communications shall be 806MHz to 824MHz and 851MHz to 869MHz, and readily adaptable to other public safety emergency radio frequencies in the 700MHz radio frequency band, specifically 769MHz to 775MHz and 799MHz to 805MHz. The public safety radio amplification system shall be capable of modification or expansion in the event frequency changes are required by the FCC or additional frequencies are made available by the FCC.

The minimum acceptable radio signal coverage shall include both a measurement of signal strength in decibel milliwatt (dBm) and a measurement in delivered audio quality (DAQ) that meet or exceed all of the following:

- (A) A minimum radio signal strength of -95 dBm in 95% of the area on each floor of the building when transmitting to and from the City of Scottsdale public safety communications systems.
- (B) A minimum average delivered audio quality (DAQ) rating of three (3) for signal strength and intelligibility, as determined by City, in 95% of the area on each floor of the building when transmitting to and from the City of Scottsdale public safety communications systems.
- (C) A 95% reliability factor.
- (D) A 100% coverage level at the minimum levels set forth in 810-80(a) and 810-80(b) in all stairwells, stairways, and designated emergency personnel ingress and egress paths.

**810-81. Signal Quality.** The minimum acceptable DAQ ratings shall be met at all times. The signal strength and the intelligibility rating scales shall apply to all portable radio test locations on the property:

- Signal strength:
  - 0 - no detectable signal
  - 1 - barely detectable
  - 2 - detectable with difficulty
  - 3 - detectable at all times
  - 4 - strong signal, detectable at all times
- Intelligibility:
  - 0 - unintelligible

- 1 - intelligible with extreme difficulty (many repetitions required)
- 2 - intelligible with difficulty (repetition required)
- 3 - intelligible (repetition seldom required)
- 4 - intelligible at all times

An applicant shall provide to the building official sufficient evidence or proof showing compliance with this provision of the code before a certificate of occupancy is issued. The plans and specifications, and other data, filed by an applicant for a certificate of occupancy shall be reviewed by the building official or other qualified personnel.

**810-82. Enhanced Amplification Systems.** Amplification systems are allowed under Federal Communication Commission (FCC) Rules CFR Part 47, 90.219. Buildings and structures which cannot support the required minimum level of radio coverage shall be equipped with FCC certified amplification or booster systems that include either a radiating cable system or an internal distributed antenna system (DAS) with or without signal boosters in order to achieve the required minimum radio coverage:

- (A) All active in-building coverage devices shall be FCC Part 90 Type Certified and capable of modification or expansion in the event frequency changes are required by the FCC or additional frequencies are made available by the FCC.
- (B) All system components shall be 100% compatible with analog and digital modulation after installation without additional adjustments or modifications.
- (C) The signal booster shall include filters to reject frequencies below and above the public safety bands by a minimum of 35dB.
- (D) The maximum propagation delay (group delay) of any in-building signal booster shall not exceed 15 microseconds. The delay value includes the cumulative delays in signal boosters, coaxial cables, fiber optics, etc. used within the in-building system.
- (E) Antenna-to-antenna isolation – the outside-to-inside antenna isolation (loss) shall be at least 16dB more than the highest gain reading of the boosted inside signal.
- (F) Active system devices shall be encased in NEMA 4 dust/waterproof case and clearly labeled “City of Scottsdale Public Safety Radio.”
- (G) If any part of the installed system or systems contains an electrically powered component, the system shall be capable of operating on an independent battery and/or generator system for a minimum period of four (4) hours without external power input. The battery system shall be designed to automatically charge in the presence of an external power input.

**810-83. Testing Procedures.**

(A) **Initial Tests.** The building official shall require tests as evidence of compliance to be performed by a BDA equipment manufacturer certified technician or an FCC licensed technician. The building owner is responsible for all costs of performing these tests. The building owner shall submit the test results and documentation to the City’s radio communications office (See Exhibit A). Upon review of the results for the signal strength tests, the City’s radio communications engineer will schedule the final system acceptance test and will perform the DAQ tests using a portable radio unit.

To verify coverage for final system acceptance, the City’s radio engineer or designated staff member will perform radio signal strength and intelligibility tests in locations throughout the building. The locations selected will be consistent with processes and

procedures provided in the Telecommunications Industry Association's Telecommunications Systems Bulletin, TIA/TSB88-B, Chapter 8 and Annex E, and the test area as specified in 810-82(B).

**(B) Testing Area.** The coverage test must be performed after all windows, building cladding, and drywall have been installed on all floor levels. Each floor of the building shall be divided into a grid of approximately 40 equal areas. The tests shall be conducted using a City public safety portable radio with the tester verbally communicating through the City's radio communications system.

A spot located approximately in the center of a grid area will be selected for the test, then the radio will be keyed to verify two-way communications to and from the test location through the City's radio communications system. Once a spot is selected, prospecting for a better spot within the grid area will not be permitted. A maximum of two non-adjacent areas will be allowed to fail the test.

In the event that three (3) areas fail the test, in order to be statistically more reliable, the floor may be divided into 80 equal areas; a maximum of four (4) non-adjacent areas will be allowed to fail the test. If the floor area fails the 80 equal areas test the building owner shall be responsible for bringing the area into compliance before a re-test is conducted by a representative of the City's radio communications office.

The results of testing shall be documented and to a level of detail that demonstrates that the building or structure is in compliance with the coverage levels and signal quality standards set forth in section 810-80.

**(C) Annual Tests.** Upon providing five (5) days written notice to the property owner or the property owner's representative, the City's radio communications or public safety personnel shall have the right to enter onto the property and into buildings or structures, at times reasonable to conduct field testing of radio signal quality and coverage levels.

**(D) Radio Signal Strength Test Equipment.** Signal strength tests shall be conducted using a calibrated spectrum analyzer test set utilizing an omni-directional antenna with minimal gain. The resolution bandwidth shall be set to 10KHz.

**(E) Delivered Audio Quality Test Set.** DAQ tests will be performed using a Motorola XTS5000, or equivalent portable radio. All tests shall be performed with the radio unit antenna at a height of four (4) feet above the floor or ground.

**(F) Buildings that Fail the Annual Radio Signal Strength and Coverage Test.** Should an annual test fail to meet compliance, the owner or property manager shall bring the radio signal strength and coverage into compliance with the minimum levels within sixty (60) days of receiving the test results. Any person, corporation, association or enterprise who fails to bring the radio signal strength into compliance within the sixty (60) day timeframe is subject to provisions of Scottsdale Revised Code, Chapter 31, Article IV, Section 31-48.

**(G) Additional Information.** Direct questions about the processes and procedures for the initial and annual testing of public safety radio signal strength and quality to the City's radio communications office at 480 312-2264 or via email at [radioengineer@scottsdaleaz.gov](mailto:radioengineer@scottsdaleaz.gov).

**810-84. Uses Where Not Required.** This section shall not apply to any single-family residence. The requirements of this section may be waived by the City's radio communications office for buildings which do not have below grade spaces or parking. In such cases, the building owner shall obtain a waiver of this radio amplification requirement from the City's radio

communications engineering manager. The waiver shall be in writing and must be submitted to the City's building official prior to receiving a certificate of occupancy.

**810-85. Applicability.** The provisions of this ordinance shall apply to all buildings or structures, except as noted in section 810-83 of this ordinance, which are used for commercial, multi-family, or institutional use, regardless of a change in ownership or a transfer of ownership.

**810-86. As-built Drawings.** The owner of a building or structure shall provide the City's radio communications engineer a set of detailed plans (as-built drawings) of the amplification and/or signal booster system as installed and operating in their building or structure. The plans shall be printed on 24"x36" paper and include the location of electronic amplification and signal booster equipment, the manufacturer and model of the electronic equipment, the routes of all cabling between the electronic equipment and antennas, the location of all antennas, and all electrical circuits and components serving the amplification or signal booster system, and such additional information as requested by the City.

**810-87. Modifications in Radio System.** In the event that the City or other public safety organization modifies its radio communications equipment or frequencies in any way that impairs the ability of the City or other public safety organizations to communicate with an existing amplification or signal booster system installed, tested and approved in accordance with this ordinance, the City or public safety organization may participate in the reasonable costs associated with reestablishing reliable public safety radio communications with the affected building or structure.

(A) In the event that changes to the public safety radio frequencies are required by the FCC or when additional frequencies are made available by the FCC, all public safety radio amplification systems installed by the building owner, property owner or their agent after January 1, 2011, shall be modified, adjusted or expanded to amplify the new public safety radio frequencies. The building or property owner is responsible for any and all costs to properly modify, adjust or expand the amplification system. Prior approval of a public safety radio coverage system on previous frequencies does not exempt this requirement.

**810-88. Radio Signals Affected by New Building or Structure.** In the event that a building or structure that is in conformance with the provisions of this ordinance is subsequently found to be out of conformance due to the construction of a nearby building or structure, the City or public safety organization may participate in paying the reasonable costs associated with reestablishing reliable public safety radio communications with the affected building or structure. In cases where the construction of a new building or structure causes an existing building or structure that was in conformance with section 810-10 to then be out of conformance, and both the existing building or structure and the newly constructed building or structure are owned by, or is located on land or real property that is owned by the same corporation, partnership, business entity or persons, then such owner shall be fully responsible for the costs of bringing the non-conforming building or structure in conformance to the requirements of section 810-80.

**810-89. Building and Property Access to Install Antennas and Equipment.** In cases where a newly constructed or modified building, or a newly constructed or modified structure is deemed to have caused a building or structure that was in conformance with the radio coverage levels to be out of conformance, the owner of the newly constructed building or structure and its property owner shall allow the City to install a public safety radio amplification system on or within its building, structure or property without compensation or reimbursement to building owner or to the property owner for rent, fees, payments or any financial encumbrance. The amplification system will be installed to bring the non-complying structure into compliance with the public safety radio signal coverage requirements.

**810-90. Radio Frequency Communications Operations Restriction.** The owner of a building, the owner of a structure and any occupant of the building or structure shall not install, operate, or allow the use of equipment, methodology or technology that interferes or is likely to interfere with the optimum effective use or operation of the City's fire, emergency or other communication equipment, methodology or technology (i.e., voice or other data carrying, receiving or transmitting equipment). If such interference should occur, the building owner or occupant shall immediately discontinue using the equipment, methodology or technology that causes the interference until corrective measures are taken to alter the communication equipment to eliminate such interference. Any such corrective measures shall be made at no cost to the City. Upon request from the City, the building owner or occupant shall give to the City Radio Communications Engineer a list of the radio frequencies in use at the building or property.

**EXHIBIT A**

**BDA Installation RF Power Measurements**

<b>Provide the following data for the downlink band.</b>		
1.	Ambient Scottsdale downlink signal strength @ donor antenna =	(dBm)
2.	Donor antenna gain +	(dB)
3.	Donor antenna cable system loss -	(dB)
4.	Total donor antenna system gain =	(dB)
5.	Downlink signal level at input to amplifier =	(dBm)
6.	Amplifier gain +	(dB)
Provide the isolation measurement between the donor antenna and the indoor antenna system		(dB)

For questions about the processes and procedures for the initial testing of public safety radio signal strength and quality, contact the City of Scottsdale's radio communications office at 480 312-2264 or via email at radioengineer@scottsdaleaz.gov.

**END OF AMENDMENTS**

Section 3. Any person found guilty of violating this Ordinance shall, in addition to any other applicable penalty, is subject to the following:

**105.6 Suspension or revocation.** The building official is authorized to suspend or revoke a permit issued under the provisions of this code wherever the permit is issued in error or on the basis of incorrect, inaccurate or incomplete information, or in violation of any ordinance or regulation or any of the provisions of this code.

**110.4 Revocation.** The building official is authorized to, in writing, suspend or revoke a certificate of occupancy or completion issued under the provisions of this code wherever the certificate is issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.

**114.4 Violation penalties.** Any person who violates a provision of this code or fails to comply with any of the requirements thereof or who erects, constructs, alters or repairs a building or structure in violation of the approved construction documents or directive of the building official,

or of a permit or certificate issued under the provisions of this code, shall be subject to penalties as prescribed by law.

Section 4. Any person found guilty of violating this Ordinance shall, in addition to any other applicable penalty, be subject to the following:

**Sec. 31-168. Violations.**

(a) Any person, firm or corporation, whether as principal, owner, agent, tenant, or otherwise, who violates, disobeys, omits, or refuses to comply with, or who resists the enforcement of any of the provisions of this code is guilty of a Class 1 misdemeanor, and upon conviction thereof, may be punished by a fine not exceeding one thousand dollars (\$1,000.00) or by imprisonment for a term not exceeding six (6) months, or by both such fine and imprisonment, at the discretion of the city magistrate. Probation may be imposed in accordance with the provisions of title 13, chapter 9, Arizona Revised Statutes. Each day of any violation of any provision of this code continues or the failure to perform any act or duty required by this code, shall constitute a separate offense.

(b) In addition to any other remedies, the city may institute any appropriate action or proceedings to restrain, correct or abate any violation of this code. In any such action or proceeding, the court with jurisdiction thereof has the power and in its discretion may issue a restraining order, or a preliminary injunction, as well as a permanent injunction, upon such terms and under such conditions as will do justice and enforce the purposes of this code.

Section 5. If any section, subsection, sentence, clause, phrase or portion of this ordinance or any part of these amendments to the International Plumbing Code adopted herein by reference is for any reason held to be invalid or unconstitutional by the decision of any court of competent jurisdictions, such decision shall not affect the validity of the remaining portions thereof. If there is any conflict or inconsistency between the provisions of this ordinance, the more restrictive provisions apply.

Section 6. The effective date of this ordinance shall be **January 07, 2013**

PASSED AND ADOPTED BY THE Council of the City of Scottsdale, Maricopa County, Arizona this 4th day of December, 2012.

ATTEST:

CITY OF SCOTTSDALE  
A municipal corporation

\_\_\_\_\_  
Carolyn Jagger  
City Clerk

\_\_\_\_\_  
W. J. "Jim" Lane  
Mayor

APPROVED AS TO FORM:  
OFFICE OF THE CITY ATTORNEY

\_\_\_\_\_  
Bruce Washburn, City Attorney  
By: Joe Padilla, Senior Assistant City Attorney