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Colorado Springs, CO:

GENERAL:

Colorado Springs Fire Department has determined that within some occupancies in the City a “special hazard” exists in addition to the normal conditions of the occupancy. Due to the building size and/or building construction emergency service personnel may have trouble using their portable radios. Based on the current codes and standards the issue of public safety radio amplification in buildings is not fully addressed. It is the position of Colorado Springs Fire Department that, when fire department communications is required or otherwise deemed necessary, it is the responsibility of building owners to provide for emergency communications within their buildings.

SUPPLEMENTAL RULE OR REGULATION:

Section 907.2.12.3 as amended allows the Colorado Springs Fire Department to authorize a public safety radio amplification system to be installed within certain buildings and structures within the City of Colorado Springs to provide for emergency communications to and from the emergency communication center in lieu of an internal two-way fire department communication system.

This document establishes a uniform practice on the installation of a public safety radio amplification system to insure a reasonable degree of reliability for emergency services communication from within certain buildings and structures within the City of Colorado including to and from the emergency communication center.

These provisions apply to:

- 1.Required fire department communications systems per 2003 International Fire Code, Section 907.2.12.3
- 2.New buildings and structures of Type I or Type II construction greater than 50,000 square feet or additions and/or modifications which cause the buildings to be greater than 50,000 square feet (for purposes of this section, area separation walls cannot be used to define separate buildings).
- 3.All basements over 10,000 square feet where, regardless of the occupancy.
- 4.Any building that creates a “special hazard” for emergency services communication in addition to the normal hazard of the occupancy.
- 5.Any building additions or remodel work involving over 20 % of the building where the above conditions apply and/or testing identifies radio signal strengths not meeting the minimum standards of this policy.

Any building meeting the criteria above must either install the necessary radio amplification equipment, or through approved testing measures prove that the performance requirements of this policy are met at the time of issuance of the Certificate of Occupancy. In buildings where it is determined that the use/storage arrangements of the building have the potential to create additional signal strength problems, additional testing may be required once the facility is operational. Structures failing to meet the performance requirements will have three months from the test date to install the necessary equipment for compliance.

Radio Coverage:

Except as otherwise provided in this SRR, no person shall erect, construct, or modify any building or structure or any part thereof, or cause the same to be done which fails to support adequate radio coverage for emergency services providers. For purposes of this section, adequate radio coverage shall constitute a successful communications test between the building interior and the communications centers for all appropriate emergency service providers for the building.

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Enhanced Amplification Systems:

Where buildings and structures are required to provide amenities to achieve adequate signal strength, such buildings and structures shall be equipped with any of the following to achieve the required adequate radio coverage: radiating cable systems, internal multiple antenna systems with a frequency range as established by Colorado Springs Fire Department, with amplification systems as needed, voting receiver system, or any other approved system.

If any part of the installed system or systems contains an electrically powered component, the system shall be capable of operation on an independent battery and/or generator system for a period of at least four hours without external power input or maintenance. The battery system shall automatically charge in the presence of external power input.

System Design:

Radio amplification system design must be coordinated between the property owner, vendor, Colorado Springs Fire Department, and the communications center. Upon request by the owner, or the owner's agent, the Colorado Springs Fire Department will identify the frequency range or ranges that must be supported.

Performance Requirements - Inbound into the Building:

1. A minimum average in-building field strength of 3.99uV (-95 dBm or 53dBu) throughout 95% of the area of each floor of the building when transmitted from the appropriate emergency service dispatch centers which are providing fire and emergency medical protection services to the building.
2. As used in this regulation, 95% coverage or reliability means the radio will transmit 100% of the time at the field strength and levels as defined in this regulation within 95% of the building's area.
3. The following areas must be 100% covered: Fire Command Center's, elevators, stairwells, protect-in-place areas, lobby refuge areas, equipment rooms, high hazard areas, basements, and underground parking areas.
4. If the field strength OUTSIDE the building where the receiving antenna system for the in-building system is located is less than the -95 dBm, then the minimum required in-building field strength shall equal the field strength being delivered to the receive antenna of the building.

Performance Requirements - Outbound from the Building:

A minimum average signal strength of 7uV (-90 dBm) as received at the appropriate emergency service radio site which will provide fire and emergency medical protection services to the building (-90 dBm equates to 17 dBu at 800 (MHz).

FCC Authorization:

If amplification is used in the system, all FCC authorizations must be obtained prior to the use of the system. A copy of these authorizations shall be provided to the Colorado Springs Fire Department.

Colorado Springs Fire Department Permit and Submittal Requirements:

Colorado Springs Fire Department requires a permit before the installation of all radio amplification systems that support emergency communications. The following information must be submitted:

1. Letter of Understanding

A letter of understanding that explains the systems capabilities and limitations of the system being installed. The Letter of Understanding must also include written agreement that regardless of the design approved at the time of plan review, failure of the system to meet the minimum performance requirements will cause for modification of or additional amplification equipment to be installed. The Letter of Understanding must be signed by designing contractor and co-signed by the building owner or owners authorized representative.

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2. Working Plans

Two sets of working plans shall be submitted for approval to the authority having jurisdiction before any equipment is installed or remodeled. If approved, one set will be marked as such and become the approved installation plans for the project. The other copy will be retained as official archived records. Deviation from approved plans shall require permission of the authority having jurisdiction and may require updated or as-built plans to be submitted.

Working plans shall be drawn to an indicated scale, on sheets of uniform size, with a plan of each floor, and shall show those items from the following list that pertain to the design of the system.

A. Radio Frequency Field Strength Information:

1. Location, elevation, date, and time of field strength test.
2. Test conducted by or information supplied by.
3. Other sources of radio frequency field strength information.
4. Map showing location of all government transmitter locations in relation to the building.
5. Location, height, and distance of all government transmitter locations in relation to the building.
6. List of frequencies and bandwidth calculations to be included in system.
7. Copy of FCC Licenses for frequencies.
8. Radio frequency field strength test results for each transmitter location.

B. Building Plans:

1. Name and address of contractor.
2. Name of owner and occupant.
3. Location, including street address.
4. Point of compass.
5. Full height cross section, or schematic diagram, including structural member information if required for clarity and including ceiling construction and method of protection for nonmetallic piping.
6. Location of partitions.
7. Location of fire walls.
8. Occupancy class and use of each area or room.
9. A graphic representation of the scale used on all plans.

C. System Equipment and Plans:

1. Make, type, model, and size of all cable, amplifiers, antennas, batteries, etc. (spec sheets).
2. Location of all cable, amplifiers, battery panels, etc.
3. Type and locations of hangers, sleeves, braces, and methods of securing cable and antennas, when applicable.
4. Battery and battery charging calculations.
5. System design calculations.
6. Where the equipment is to be installed as an addition to an existing system, enough of the existing system indicated on the plans to make all conditions clear.

The working plan submittal shall include the manufacturer's installation instructions for any specially listed equipment, including descriptions, applications, and limitations for any cable, amplifiers, antennas, batteries, etc.

D. Acceptance Test Plan:

The Acceptance Test Plan must be included with the installation and design plan and must incorporate all elements of the Acceptance Test Plan as listed below.



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System Testing and Acceptance:

Once implemented, the RF coverage system shall be tested via the pre-determined Acceptance Test Plan (ATP). The ATP should include personnel from the facility, fire, police, and the vendor. The ATP must be approved in advance by Colorado Springs Fire Department. A walk through test should be completed and any discrepancies noted and resolved by the vendor.

Qualification of Testing Personnel:

All tests shall be conducted, documented and signed by a person in possession of a current FCC license, or a current technician certification issued by the Associated Public-Safety Communications Officials International (APCO) or the Personal Communications Industry Association (PCIA). All test records shall be retained on the inspected premises and a copy submitted to the fire department officials.

Acceptance Test Plan (ATP):

The following method will be used to conduct the tests:

1. Tests shall be made using frequencies close to the frequencies used by the emergency services, and witnessed by city and fire department radio personnel
2. If testing is done on the actual frequencies, then this testing must be coordinated with the appropriate emergency services.
3. All testing must be done on frequencies that are authorized by the FCC.
4. A valid FCC license will be required if testing is done on frequencies different from the police, fire or emergency medical frequencies.
5. The plan and acceptance tests must be approved by fire department radio personnel and the city's radio shop.

Measurements Shall Be Made Using The Following Guidelines:

1. With a service monitor using a unity gain antenna on a small ground plane.
2. Measurements shall be made with the antenna held in a vertical position at 3 to 4 feet above the floor.
3. A calibrated service monitor (with a factory calibration dated within 24 months) may be used to make the tests.
4. If measurements in a location are varying, then average measurements may be used.
5. The Special Inspector for Colorado Springs Fire Department will witness a hands-on radio test to check the areas for proper radio operation/reception. (WE NEED TO DEFINE WHO THE SPECIAL INSPECTOR WILL BE AND WHO WILL DO THE PLAN REVIEWS)

Initial Tests:

All testing shall be done in the presence of the Special Inspector for the City of Colorado Springs Fire Department.

1. Signal strength, both inbound and outbound as defined above, shall be measured on each and every floor above and below ground including stairwells, basements, penthouse facilities, and parking areas of the structure.
2. The structure shall be divided into 100-foot grids and the measurements shall be taken at the center of each grid. In critical areas as determined by Colorado Springs Fire Department (Fire Command Center's, elevators, stairwells, protect-in-place areas, lobby refuge areas, equipment rooms, high hazard areas, basements, and underground parking areas) the grids shall be reduced to 25-feet. The size of the grids may also be reduced upon recommendations of the Special Inspector, in areas where displays, equipment, stock or any other obstruction may significantly affect communications in those areas.
3. The test shall be conducted using a portable radio approved by Colorado Springs Fire Department, talking through the Colorado Springs Fire Department communications system.
4. A spot located approximately in the center of a grid area will be selected for the test.
5. The radio will be keyed to verify two-way communications to and from the outside of the building through dispatch. Once the spot has been selected, prospecting for a better spot within the grid area will not be permitted.



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6. Each grid area will be tested for transmission/reception; minimum signal strength of -80 dBm. If signal strength fails to meet the requirement, the grid area shall be marked as a fail.

7. The gain values of all amplifiers shall be measured and the test measurement results shall be kept on file at the facility and the fire department, so that the measurements can be verified each year during the annual tests. In the event that the measurement results became lost, the building owner will be required to rerun the acceptance test to reestablish the gain values.

Annual Tests by Property Owner:

The property owner shall have an annual test conducted of all active components of the system, including but not limited to amplifiers, power supplies and backup batteries, a minimum of once every twelve (12) months. Amplifiers shall be tested to ensure that the gain is the same as it was upon initial installation and acceptance. Backup batteries and power supplies shall be tested under load for a period of one (1) hour to verify that they will properly operate during an actual power outage. If within the one (1) hour test period, in the opinion of the testing technician, the battery exhibits symptoms of failure, the test shall be extended for additional one (1) hour periods until the testing technician confirms the integrity of the battery. All other active components shall be checked to determine that they are operating within the manufacturer's specifications for the intended purpose.

Annual Tests by Emergency Response Agencies:

Annual tests shall also be conducted by the fire department, police department, or both. If the communications appear to have degraded or if the tests fail to demonstrate adequate system performance, the owner of the building or structure is required to remedy the problem and restore the system in a manner consistent with the original approval criteria. If the degradation to the system is due to building additions or remodeling, the owner of the building or structure is required to remedy the problem and restore the system in a manner consistent with the original approval criteria in order to obtain a final inspection for occupancy.

Field Testing:

Fire and police personnel, after providing reasonable notice to the property owner, shall have the right to enter property to conduct field-testing to be certain that the required level of radio coverage is present. Discrepancies from field-testing and recorded tests shall immediately be brought to the attention of the property owner who will provide corrective action in response to reported discrepancies.



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