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CORPORATE REPORT

NO: R029 COUNCIL DATE: February 6, 2017

REGULAR COUNCIL

TO: **Mayor & Council** DATE: **February 6, 2017**

FROM: **Fire Chief, Len Garis**
Chief Superintendent, Dwayne McDonald FILE: **3900-01**

SUBJECT: **Public Safety E-Comm Radio Building Amplification System Bylaw, 2005, No. 15740**

RECOMMENDATION

The Surrey Fire Service and RCMP recommend that Council:

1. Receive this report as information;

2. Authorize the City Clerk to bring forward the new bylaw "Public Safety Radio Building Amplification System Bylaw, 2017, No. 19108" for the required readings (Appendix "I").

PURPOSE

The purpose of this report is to obtain Council approval to repeal "Public Safety E-Comm Radio Building Amplification System Bylaw, 2005, No. 15740" and introduce the replacement bylaw, "Public Safety Radio Building Amplification System Bylaw, 2017, No. 19108". The repeal request is a result of the substantial changes to the current bylaw No. 15740 and to make sure the new bylaw remains relevant and continues to ensure First Responders in the City have adequate radio signals for reliable in-building communications.

BACKGROUND

In 2004 the Surrey Fire, Police and Ambulance services migrated onto the E-Comm wide area network to provide radio communications for all the emergency responders in the City. One of the natural limitations identified regarding a radio network is the ability of the system to provide adequate radio signals in larger densely constructed buildings to ensure first responders have good communication.

As a city grows, buildings can effectively shadow or block radio signals in certain types of buildings and then can have a tendency to degrade radio communications for it first responders. To address this, the City engaged a Radio Engineer to research and recommend best practices to provide alternatives to prevent radio communications degradation.

This resulted in the creation of the current bylaw in 2005 that requires all new buildings to undergo an assessment to determine if communications will be reliable in the proposed building and as needed install an internal bi-directional communications as part of the construction cost, thus the "Public Safety E-Comm Radio Building Amplification System By-law, 2005, No. 15740" was enacted. The purpose of the bylaw was to ensure large buildings that blocked or impaired radio signals have a Bi-Directional Amplifier (BDA) installed that would rebroadcast radio signals from the outside to the inside and vice versa.

DISCUSSION

At the time of the bylaw implementation, the E-Comm radio system used frequencies in the 800MHz band. The E-Comm system is now near end of life and radio systems for first responders have gone through a wholesale change in technology.

The frequency band has also changed from 800MHz to 700 MHz due to new frequency spectrum allocation by Innovation, Science and Economic Development Canada, (formerly Industry Canada). E-Comm is upgrading the Wide Area Radio System (WARS) to keep pace with current technology and new public safety frequency spectrum made available.

The purpose of the bylaw repeal and re-introduction is to reflect both changes in technology and frequency to ensure the bylaw remains relevant and continues to ensure First Responders in the city have adequate radio signals for reliable in-building communications. The bylaw will also enhance communications in structures built to the LEEDS environmental standard; such buildings are effectively opaque to radio signals. The provincial government has also indicated that bylaws requiring in-building radio repeater systems such as BDA's are not in conflict with the building regulations.

SUSTAINABILITY

The technology being used for Radio Building Amplification will create a sustainable public safety radio network over the time horizon of the technology. With the knowledge that tall, dense building construction within the City will increase over the life span of the technology; this bylaw will ensure sustainability of a reliable communication system. The improvement of communications in new and existing structures built to the LEEDS environmental standard will promote sustainable building and development practices.

The Sustainability Charter 2.0 was recently endorsed by Council and highlights a number of Strategic Directions, under the Economic and Social Pillars, which speak to the bylaw amendments proposed in this report:

SC11: Improve Public Safety and Security

EC3: Initiate a Sustainable Infrastructure Maintenance and Replacement Program

EC7: Promote Sustainable Building and Development Practices

EC9: Improve the Quality and Design in New Development and Redevelopment

CONCLUSION

Based on the above discussion, the Surrey Fire Service and RCMP recommends that Council authorize the City Clerk to bring forward the new bylaw "Public Safety Radio Building Amplification System Bylaw, 2017, No. 19108" for the required readings (Appendix "I").

Len Garis
Fire Chief

Dwayne McDonald
Chief Superintendent, OIC
Surrey RCMP

Attached:
Appendix "I" Public Safety Radio Building Amplification System Bylaw, 2017, No. 19108

CITY OF SURREY

BYLAW NO. 19108

Public Safety Radio Building Amplification System Bylaw

.....

(a) WHEREAS there is a need for certain buildings and structures to have radio support and amplification systems to ensure the City's fire service, law enforcement and other emergency services radio communications networks provide public safety grade reliability essential to public safety and emergency response;

(b) AND WHEREAS certain buildings and structures constructed of steel, reinforced concrete or reflective glass can cause radio signal penetration losses thereby degrading the quality of communications provided by emergency services radio communications networks;

(c) AND WHEREAS radio support and amplification systems within buildings or structures can overcome the degradation of emergency communications and are vital to public safety, policing and emergency services.

Under its statutory powers, including subsections 8(3), 8(7), 8(8), 63, 64 and 66(1) of the Community Charter, S.B.C. 2003, c. 26, the Council of the City of Surrey enacts the following provisions:

INTENT OF BYLAW

(a) to require new or renovated buildings and structures of reinforced concrete or structural steel or using metal cladding or reflective glass, and having greater than 5000 square metres in gross floor area or over 12 metres in height or basements of more than 1,000 square metres in area, to install and maintain Amplification Systems that provide highly reliable in-building communications for users of the public safety communications service provider radio system within the City;

(b) to provide highly reliable public safety and emergency response in-building radio communications ensuring the health, safety and protection of persons through the requirements of this Bylaw, and

(c) the activities undertaken by or on behalf of the City pursuant to this Bylaw are not contemplated nor intended to, nor does the purpose of this Bylaw, extend to the protection of persons from economic loss, the assumption by the City of any responsibility of ensuring compliance by a person with this Bylaw, or providing a warranty with respect to any building for which a Permit or Occupancy Permit is issued.

CONTENTS

Part 1
Introductory Provisions

Title

1. This Bylaw may be cited as the "Public Safety Radio Building Amplification System Bylaw, 2017, No. 19108".

Definitions

2. In this Bylaw,

"**Amplification System**" means the in-building radio communications support and amplification systems described in Section 4 of this Bylaw;

"**Building Official**" means the person appointed by the City as the General Manager of Planning and Development or such person's authorized delegate;

"**City**" means the City of Surrey;

For the City of Surrey, the designated public safety communications service provider is Emergency Communications for British Columbia Incorporated "**E-Comm**" and its services encompass all the features and functions of its radio communications systems, including microwave radio systems, provided to fire services, law enforcement, British Columbia Emergency Health Services (BCEHS) and other emergency services;

"**Fire Chief**" means the person appointed by the City to be the head of its fire services or such person's authorized delegate;

"**Occupancy Permit**" means the permission or authorization in writing by the Building Official to occupy a building or structure;

"**Permit**" means authorization in writing by the Building Official to perform construction regulated by "Surrey Building Bylaw, 2012, No. 17850", as amended; and

"**Shadowed Area**" means an area that suffers attenuation or obstruction of radio signals to or from the area as a result of the interposition of all or any part of the building or structure in the radio signal path between the area and the transmitting/receiving site of the public safety communications service provider.

Part 2
Requirements to Provide a
Radio Communications Support System

General

3. Except as otherwise provided, no person shall erect, construct, change the use of or provide an addition of more than 20% to any building or structure or any part thereof, or cause the same to be done, which degrade the radio coverage provided by the City's public safety communications service provider as experienced by its users, including but not limited to fire services and law enforcement personnel. For the purposes of this section, adequate radio coverage shall include all of the following:

(a) System access and "Delivered Audio Quality" (DAQ) of 3.4 or better (speech understandable with repetition only rarely, some noise or distortion may be present) for communication between a portable (handheld) radio with simple flexible whip antenna ("rubber ducky") and the public safety communications service provider radio communication sites:

(i) within the building, for a minimum of 90% of the area of each floor of the building, including underground areas such as for parking; and

(ii) within the building, for 100% of fire command centres, stairwells, protect-in-place areas, lobby refuge areas, equipment rooms and high-hazard areas; and

(iii) in areas that are in the Shadow Area of the building, in 90% of all areas where DAQ 3.4 could be achieved before the erection, construction or modification of the building or structure.

(b) As an aid to system design, DAQ 3.4 has been measured by NTIA (U.S. Department of Commerce, National Telecommunications and Information Administration) to be approximately equivalent to 22 dBs (22 dB SINAD) for analogue signals modulated with a 1 kHz tone at 1.5 kHz deviation, and to 2% BER (Bit Error Rate) for P25 digital signals. It may also be approximately equivalent to a received signal level of -95 dBm, in the absence of other signals that may affect the receiver. Good design should provide a margin of not less than 10 dB to allow for uncontrolled variables. Based on the foregoing, the design target for indoor coverage should be -85 dBm.

(c) The radio frequency range to be supported shall be any frequencies used by the public safety communications service provider's network. If signal

amplifiers are used, they shall include filters that will protect the amplifiers from overload and the system from interference by out-of-band signals.

(d) In the event that active amplification is required to meet the foregoing communication quality requirements in the building including Shadowed Area of the building, coordination with the public safety communications service provider is required to ensure that its outdoor radio communication performance is not degraded. If there is a trade-off to be made between maintaining the public safety communications service provider's outdoor radio communication performance and restoration of signal strength in the building and Shadowed Area, the trade-off decision shall be made by the public safety communications service provider and communicated to the Fire Chief by the building owner.

Amplification Systems Allowed

4. Where a building or structure requires an Amplification System to achieve adequate radio communication coverage, such system shall include any of the following that are sufficient to achieve the required coverage:

(a) passive antenna systems or radiating cable systems;

(b) distributed antenna systems with uni-directional or bi-directional amplifiers as needed;

(c) voting receiver systems; or

(d) any other system acceptable to the Fire Chief, as signified in writing on a case by case basis.

If any part of the installed Amplification System contains an electrically powered component, the system shall be equipped to operate on an independent "Uninterruptible Power Supply" (UPS), using a battery and/or generator system, for a period of at least four hours without external power or maintenance. All amplifiers and electronics required by the system shall be protected by NEMA type 4 or higher enclosures. The UPS shall automatically charge the batteries in the presence of external power. The UPS shall provide a monitored alarm signal to indicate failure of primary power, failure of the UPS system power output, and/or discharge of the batteries. Silencing of this alarm shall be the responsibility of the person maintaining the equipment. The Surrey Fire Service shall be notified of any failure, either immediately that the failure is detected, but not later than (2) hours after the initial failure occurred.

Critical alarms detected by the equipment regarding battery condition and amplifier performance shall be reported immediately.

A system summary alarm, consisting of a relay contact closure or equivalent, shall be provided to the building fire panel via a hard wired connection.

All active systems shall be licensed by the federal regulator, Innovation, Science & Economic Development Canada (ISED), and shall comply with the applicable Standard Radio Systems Plan (SRSP). Any license required shall be renewed annually by the building owner and the cost of the licensing borne solely by the building owner.

Radio equipment shall only be selected from the ISED Radio Equipment List as described at: https://www.ic.gc.ca/eic/site/ceb-bhst.nsf/eng/h_tt00020.html

Procedures to Verify and Maintain Compliance

5. Tests and measurements to verify and maintain compliance shall be made at the sole expense of the building owner. The procedures used shall be developed by the owner, subject to acceptance by the Fire Chief, and in compliance with the following guidelines:

(a) Acceptance Test Procedure

Acceptance tests and measurements shall be performed after completion of installation of the Amplification System. Tests shall be performed using radio frequencies assigned by the public safety communications service provider, after proper coordination with an authorized representative of that system and with the Fire Chief and the OIC of Police for the City of Surrey.

If queuing occurs on the radio system while testing is underway, testing shall be terminated immediately and resumed only when traffic levels on the system drop to the level where queuing will no longer occur.

(i) Where the Shadowed Area, or the floor plate area of a building, is greater than 4,500 m^2 the area shall be divided into a uniform grid of not more than 15 m on a side, or if the floor area is smaller than 4,500 m^2 it shall be divided into a uniform grid of approximately 20 equal areas, to a minimum of 9 m^2, and measurements shall be taken in each grid area. The size of the grids shall also be reduced, or the number of grids increased, upon recommendation of the Fire Chief or inspector in areas where special construction or other obstruction may significantly affect communications. Tests shall also be performed in fire command centres, stairwells, protect-in-

place areas, lobby refuge areas, equipment rooms, and high-hazard areas.

(ii) Tests shall first be made using a portable (handheld) radio of the type used by emergency service personnel, carried at hip level (with external speaker/mic) and using a simple "rubber ducky" antenna, and shall be deemed satisfactory if DAQ 3.4 or better (speech understandable with repetition only rarely, some noise or distortion may be present) can be achieved for a five-second test transmission in each direction. If system access is not reliable, or if DAQ 3.4 for five seconds cannot be achieved at any location, the test operator may move a maximum of 1.5 m in any direction inside of the grid and repeat the test. If system access continues to be unreliable, or if DAQ 3.4 still cannot be achieved, or if there is any doubt about whether it can be achieved, a failure shall be recorded for that location.

(iii) For all tests, a pre-defined “Harvard” sentence should be used, such that the listeners are not aware of the sentence in advance on each test. A different recorded sentence should be used at each location.

(iv) A maximum of two (2) non-adjacent grid areas on a floor or in a shadow will be allowed to fail the test. In the event that three (3) or more areas on a floor or in a shadow fail the test, the floor or Shadowed Area may be divided into 40 approximately equal areas to a minimum of 4 m^2, and the tests repeated. In such event, a maximum of four (4) non-adjacent grid areas will be allowed to fail the test. If the Amplification System fails the 40-area test, the building owner shall have the system altered to meet the 90% coverage requirement; otherwise the Amplification System will not be accepted.

(v) If the Amplification System fails to provide acceptable communication in any of the fire command centre, any portion of a stairwell, protect-in-place areas, lobby refuge areas, equipment rooms, or high-hazard areas, the building owner shall have the system altered to meet the 100% coverage requirement for these areas, otherwise the Amplification System will not be accepted.

(vi) Backup batteries and power supplies shall be tested under full load by generating communication traffic automatically for a duration of at least one hour. If within the one-hour period, the battery shows no symptom of failure or impending failure, the test shall be continued for additional one-hour periods to determine the

integrity of the battery. The battery shall not fail within a four-hour continuous test period.

The gain values of all amplifiers shall be measured, using a service monitor that has been calibrated by a certified laboratory within the past 12 months, and the results shall be kept on file by the building owner for future verification and monitoring of performance. The gain records file must have multiple back-ups and be stored in more than one location.

(b) Annual Tests

At least annually, the building owner shall test all active components of the Amplification System, including but not limited to all amplifiers, power supplies and back-up batteries, and shall keep a record of such tests as part of the Fire Safety Plan for inspection by the Fire Chief or other inspector designated by the City. Amplifier gain shall be adjusted if necessary to re-establish the gain recorded upon acceptance testing, and batteries and power supplies shall be tested under load for a period of at least one (1) hour to verify that they will function properly during a power outage.

Additional tests or inspection of records may be conducted from time to time by the Fire Service at the discretion of the Fire Chief, after giving reasonable notice to the building owner. If communications within the building or within the Shadowed Area appear to have degraded, or if the tests show unacceptable communications performance, the owner of the building or structure is required to remedy the problem and restore the Amplification System in a manner consistent with the original acceptance criteria, unless the owner can demonstrate conclusively that the degradation is solely the result of external changes not under his or her control.

(c) Qualifications of Testing Personnel and Test (Measurement) Equipment

Tests shall be performed by or under the direct supervision of a professional engineer registered in the Province of British Columbia and qualified in radio communications. Test reports shall bear the seal of the engineer.

Portable radios used shall be of a size and type as designated as acceptable by Surrey Fire, or such replacement radio as may be in use by Surrey Fire at the time, accepted by the public safety communications service provider and programmed to operate on a P25 radio tuned to a P25 test channel. SINAD, BER, and signal strength measurements shall be made using appropriate instrumentation acceptable to the Fire Chief. Radios and

measurement equipment shall have been tested for conformance to design specifications within twelve months prior to the conduct of Amplification System acceptance tests or re-tests.

Exemptions

6. This Bylaw shall not apply to:

   (a) any single-family detached or semi-detached residence;
   (b) any building or structure constructed of wood frame and not metal-clad;
   (c) any building or structure less than 5000 square metres; or
   (d) any building or structure less than 12 metres in height.

Permit and Occupancy Conditions

7. No Permit or Occupancy Permit shall be issued for any building or structure until the requirements of this Bylaw have been met to the satisfaction of the Building Official and the Fire Chief.

Right of Entry

8. Every owner or occupant of a building shall, at all reasonable times, permit the Building Official or the Fire Chief to enter into and inspect any building or structure to ascertain whether the regulations and provisions of this Bylaw are being obeyed and any person who refuses entry shall be in violation of this Bylaw and shall be liable to the penalties hereby imposed.

Deemed Nuisance

9. The construction or erection of a building or structure which interferes with the City's fire services, law enforcement and other emergency related telecommunications networks shall constitute a nuisance because it threatens the health, safety and welfare of the residents and visitors to the City of Surrey. In addition to any other remedies or enforcement procedures provided herein, the City may seek an injunction to restrain such a nuisance.

Part 3
Offences and Penalties

Offences

10. Every person who violates any of the provisions of this Bylaw or who suffers or permits any act or thing to be done in contravention of this Bylaw or who neglects to do or refrains from doing any act or thing which violates any of the provisions of this Bylaw shall be liable to the penalties hereby imposed and each day that such violation is permitted to exist shall constitute a separate offence.

Penalties

11. Any person who violates any of the provisions of this Bylaw shall upon summary conviction, be liable to a penalty of not less than $200 and not more than $5,000 plus the cost of the prosecution, or a term of imprisonment not exceeding thirty (30) days, or both.

Part 4
General Provisions

Repeal

12. "Public Safety E-Comm Radio Building Amplification System By-Law, 2015, No. 15740" and all amendments thereto are hereby repealed.

Commencement

13. This Bylaw shall come into force on the date of final adoption hereof.

PASSED FIRST READING on the _____ day of _____, 2017.

PASSED SECOND READING on the _____ day of _____, 2017.

PASSED THIRD READING on the _____ day of _____, 2017.

RECONSIDERED AND FINALLY ADOPTED, signed by the Mayor and Clerk, and sealed with the Corporate Seal on the ____ day of _____.

_____ MAYOR

_____ CLERK