CITY OF BURNABY

BYLAW NO. 13888

A BYLAW respecting the installation and maintenance of in-building radio amplification systems to provide uninterrupted public safety and emergency response network communications

The Council of the City of Burnaby ENACTS as follows:

PART 1: CITATION

1.1 This Bylaw may be cited as **BURNABY EMERGENCY RADIO BUILDING AMPLIFICATION BYLAW 2018.**

PART 2: INTERPRETATION

2.1 In this Bylaw,

"applicable building" means a **building**, other than a single family or two family dwelling, which:

(a) is constructed using:
  (i) reinforced concrete or structural steel, or
  (ii) metal cladding, studs and/or flooring, or
  (iii) reflective or low-emissivity glass, or
  (iv) other materials that attenuate radio signals,

and

(b) have:
  (i) a **total floor area** greater than 5,000 square metres, or
  (ii) a height greater than 12 metres from the lowest street level of the **building** to the top of the roof, or
  (iii) below-grade **total floor area** greater than 1,000 square metres, or
  (iv) below-grade floor area greater than 10 metres below the lowest street level of the **building**.

"building" means a building or structure or portion thereof, which is used or intended to be used for supporting or sheltering any use or occupancy.

"building permit" means authorization in writing by the **Chief Building Inspector** to perform **construction** regulated by the Burnaby Building Bylaw 2016.

"Chief Building Inspector"	means the Chief Building Inspector for the **City**.
"City"	means the City of Burnaby.
"construct" or "construction"	means to build, erect, install, repair, alter, add, enlarge, move, locate, relocate or reconstruct, with respect to a **building**.
"E-Comm"	means Emergency Communications for Southwest British Columbia Incorporated and all the features and functions of the trunked public safety radio telecommunications systems, including microwave and VHF/UHF radio systems, provided by E-Comm to fire services, law enforcement and other emergency services.
"Fire Chief"	means the person appointed by the **City** to be the head of its Fire Department, or such person's lawful delegate.
"occupancy certificate"	means the permission or authorization in writing by the **Chief Building Inspector** to occupy a **building**.
"owner"	includes the registered owner of an estate in fee simple of land, and also where the context or circumstances so require: (a) a tenant for life under a registered life estate; (b) a registered holder of an agreement for sale; (c) a holder or occupier of land held in the manner mentioned in sections 228 and 229 of the *Community Charter*; (d) a lessee with authority to **construct** on the land.
"shadowed area"	means an area that is subject to attenuation or obstruction of radio signals to or from the areas as a result of the interposition of all or any part of the **building** in the radio signal path (line of sight) between the area and the transmitting/receiving site of E-Comm or the **City** radio communications network(s).
"total floor area"	means the total area of all the floors of a **building** measured to the extreme outer limits of each floor of the **building**

PART 3: PURPOSE

3.1 This Bylaw is enacted for the purpose of enhancing emergency radio communications networks in **applicable buildings** within the **City** in the general public interest. The requirements and activities of the **City** under this Bylaw are solely for this purpose and shall, notwithstanding any other provision herein, be interpreted in accordance with this Part.

3.2 It is not contemplated nor intended that this Bylaw shall provide, nor shall this Bylaw be interpreted as providing:

(a) protection to **owners**, builders, contractors, occupants or any other persons from personal injury, death or any other damage or loss (including economic loss);

(b) the assumption by the **City** of any responsibility for ensuring the compliance by any **owner**, agent of an **owner** or any employees, builders, constructors or designers retained by an owner, with the requirements of this Bylaw; or

(c) a warranty or assurance to any person in respect to **construction** undertaken pursuant to this Bylaw.

PART 4: APPLICATION AND PROHIBITIONS

4.1 This **Bylaw** applies to:

(a) **construction** of each new **applicable building**; and

(b) **construction** of a portion of a **building** which:

(i) adds more than 20% floor area to the **total floor area** of the **building**;

(ii) results in the **building** meeting the definition of an **applicable building**; and

(iii) has a **building permit construction** value exceeding $1,000,000.

4.2 No person shall undertake **construction** pursuant to section 4.1(a) or (b) of this Bylaw unless the **applicable building** subject to the **construction** supports adequate radio coverage for the area-wide public safety communications service provider and the **City** radio communications network(s), 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 rarely, some noise or distortion may be present) for

communication between a portable (handheld) radio using a simple flexible whip antenna and both the area-wide public safety communications service provider and the **City** radio communications network(s) transmitting/receiving sites:

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

(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 **shadowed area** of the **applicable building**, in 90% of all areas where DAQ 3.4 could be achieved before the **construction** of the **building** or portion thereof.

(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 dB SINAD (SIgnal-to-Noise And Distortion ratio) 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.

(c) The radio frequency ranges to be supported are any frequencies used by the area-wide public safety communications service provider and **City** communications networks(s). 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 a radio amplification system is required to meet the foregoing communication quality requirements in the **applicable building** including **shadowed area** of the **building**, coordination with the public safety communications service provider and the **City** communications network provider is required to ensure that its outdoor radio communication performance is not degraded. Where a decision must be made regarding the maintenance of either service provider's outdoor radio communication performance and restoration of signal strength in the **building** and **shadowed area**, the decision shall be made by the public safety communications service provider(s) and communicated to the **Fire Chief** by the **owner**.

4.3 Notwithstanding that an **owner** is otherwise entitled, a **building permit** or an **occupancy certificate** shall not be issued for any **construction** pursuant to section 4.1(a) or (b) of this Bylaw unless the **construction** complies with this Bylaw to the satisfaction of the **Fire Chief**.

PART 5: RADIO AMPLIFICATION SYSTEM

5.1 Where a radio amplification system is required in order to achieve adequate radio coverage for an **applicable building**, as set out in section 4.2 of this Bylaw, such radio amplification system shall include one or more of the following that are sufficient to achieve adequate radio coverage:

(a) passive antenna systems or radiating cable systems;

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

(c) voting receiver systems;

(d) any other system approved in writing by the **Fire Chief**.

5.2 If any part of an installed radio 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 (4) hours without external input or maintenance. All amplifiers and electronics required by the system shall be protected by National Electrical Manufacturers Association (NEMA) type 4 enclosures with physical security. 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.

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

5.4 Radio equipment shall only be selected from the Innovation, Science & Economic Development Canada (ISED) Radio Equipment List, and all active systems shall be licensed by ISED and shall comply with the applicable Standard Radio Systems Plan (SRSP). Any license required shall be renewed annually by the **owner** and the cost of the licensing borne solely by the **owner**.

PART 6: PROCEDURES TO VERIFY AND MAINTAIN COMPLIANCE

6.1 Tests and measurements to verify and maintain a radio amplification system in compliance with this Bylaw shall be made at the sole expense of an **owner** and be developed by the **owner**, in accordance with the requirements set-out in sections 6.2 and 6.3, for prior approval by the **Fire Chief**.

6.2 The initial acceptance test procedures shall comply with the following requirements:

(a) Initial acceptance tests and measurements shall be performed, to the satisfaction and acceptance of the **Fire Chief**, after completion of installation of the radio amplification system, using radio frequencies assigned to the area-wide public safety communications service provider and the **City**, after proper coordination with an agent for that system and the **Fire Chief**.

(b) If queuing occurs on the radio amplification system while testing is underway, testing shall be terminated immediately and resumed only when traffic levels on the system reach a level where queuing no longer occurs.

(c) 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.

(d) Where the **shadowed area**, or the floor area of any floor of an **applicable building**, is greater than 4,500 square metres, the area shall be divided into a uniform grid of not more than 15 metres on a side, or if the floor area is smaller than 4,500 square metres, it shall be divided into a uniform grid of approximately 20 equal areas to a minimum of 9 square metres, 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** 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.

(e) Tests shall first be made using a portable (handheld) radio of the type used by the **City's** Fire or RCMP – Burnaby Detachment service personnel, carried at 1.5 metre from the floor and using a simple flexible 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 1.5m 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.

(f) 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 square metres, 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 radio amplification system fails the 40-area test, the **owner** shall have the system altered to meet the 90% coverage requirement.

(g) If the radio amplification system fails to provide acceptable communication in any fire command centre, portion of a stairwell, protect-in-place areas, lobby refuge areas, equipment rooms, or high-hazard areas, the **owner** shall have the system altered to meet the 100% coverage requirement for these areas.

(h) Backup batteries and power supplies shall be tested under full load by generating communication traffic automatically for a duration of at least one (1) hour. If within this period the battery shows any 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 (4) hour continuous test period.

(i) 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 **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.

6.3 The annual test procedures shall comply with the following requirements:

(a) At least annually, the **owner** of an **applicable building** with a radio amplification system shall test all active components of the system, including but not limited to 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**. Amplifier gain shall be adjusted if necessary to re-establish the gain recorded upon initial acceptance testing, and batteries and power supplies shall be tested under full load by generating communication traffic for a period of at least one (1) hour to verify that they will function properly during a power outage.

(b) The **Fire Chief** may request, from time to time, additional tests or inspections of records of a radio amplification system and the **owner** of the **applicable building** shall promptly comply with such request at its expense.

(c) Additional tests of radio amplification system may be conducted from time to time by the **City's** Fire Department at the discretion of the **Fire Chief**, after giving reasonable notice to the **owner** of an **applicable building**.

(d) If any tests indicate communications within the **applicable building** or within the **shadowed area** have degraded, or if a test indicate unacceptable communications performance, the **owner** is required to remedy the problem and restore the radio amplification system in a manner consistent with the tests and measurements accepted by the **Fire Chief** pursuant to section 6.2(a) of this

Bylaw, unless the **owner** can demonstrate conclusively that the degradation is solely the result of external changes not under the **owner's** control.

6.4 All tests of installed radio amplification systems shall be performed by or under the direct supervision of a Professional Engineer (P.Eng.), Applied Science Technologist (AScT) or Certified Technician (CTech) registered in the Province of British Columbia and qualified in radio communications. Test reports shall bear the seal of the Professional Engineer or approval of the Applied Scicence Technologist or Certified Technician.

6.5 All portable radios used in testing radio amplification systems shall be of a size and type as may be in used at the time by the **City's** Fire Department and RCMP – Burnaby Detachment, and programmed to operate on an analogue test channel and on a digital test band channel as designated by the **Fire Chief**. 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

PART 7: INSPECTION AND REMEDY BY CITY

7.1 Every **owner** and occupant of an **applicable building** shall, at all reasonable times, permit the **Fire Chief** to enter into and inspect any **applicable building** to determine compliance with this Bylaw.

7.2 Every owner of an **applicable building** shall comply with this Bylaw and upon failure to do so the **City**, by its employees or other persons, at reasonable times and in a reasonable manner, may enter into the **applicable building** and remedy the non-compliance at the expense of the **owner**, and the expenses for so doing, if unpaid on the 31st day of December of the year in which the expenses are incurred, shall be added to and form part of the taxes payable in respect of that **applicable building** as taxes in arrear.

PART 8: OFFENCES AND PENALTIES

8.1 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 any of the provisions of this Bylaw, or who neglects to do or refrains from doing anything required to be done by any of the provisions of this Bylaw, or who does any act, or who violates any of the provisions of this Bylaw, is guilty of an offence and is liable, on summary conviction, to a fine of not less than five thousand dollars ($5,000.00) and not more than ten thousand dollars ($10,000.00).

8.2 If an offence continues for more than one day, a separate offence occurs on each day or part of a day, and separate fines may be issued for each day or part of a day in respect of which the offence occurs or continues.

PART 9: SEVERABILITY AND REPEAL

9.1 If a portion of this Bylaw is held invalid by a Court of competent jurisdiction, the invalid portion must be severed and the remainder of this Bylaw is deemed to have been adopted without the severed section, subsection, paragraph, subparagraph, clause or phrase.

Read a first time this 14th day of May 2018

Read a second time this 14th day of May 2018

Read a third time this 14th day of May 2018

Reconsidered and adopted by Council this 28th day of May 2018

MAYOR

CLERK