BY-LAW NO. 14070

A By-law to amend Building By-law No. 12511
Regarding BC Building Code Amendments for Mass Timber Construction

THE COUNCIL OF THE CITY OF VANCOUVER, in public meeting, enacts as follows:

1. This by-law amends the indicated provisions of Building By-law 12511.

2. In Table 1.3.1.2., of Article 1.3.1.2. of Division B of Book I, Council:

(a) strikes out the row:

"

ASTM	C840-13	Application and Finishing of Gypsum Board	3.1.19.2.(2) Table 5.9.1.1.

",

and substitutes:

"

ASTM	C840-18b	Standard Specification for Application and Finishing of Gypsum Board	3.1.19.2.(6)(c) Table 5.9.1.1.

";

(b) strikes out the row:

"

ASTM	C1396/C1396M-17	Gypsum Board	3.1.5.14.(6) 3.1.5.15.(4) 3.1.18.13.(1) 3.1.19.2.(2) Table 5.9.1.1. Table 9.23.17.2.-A 9.29.5.2.(1) Table 9.29.5.3.

",

and substitutes:

"

ASTM	C1396/C1396M-17	Standard Specification for Gypsum Board	3.1.5.14.(6) 3.1.5.15.(4) 3.1.18.13.(1) 3.1.19.2.(2) 3.1.19.2.(3) 3.1.19.2.(4) 3.1.19.2.(5) Table 5.9.1.1. Table 9.23.17.2.-A 9.29.5.2.(1) Table 9.29.5.3.

”.

(c) strikes out the row:

“

ASTM	D2898-10	Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing	3.1.4.8.(2) 3.1.5.5.(3) 3.1.5.24.(1) 3.1.18.7.(6) 3.2.3.7.(4) 9.10.14.5.(3) 9.10.15.5.(3)

”,

and substitutes:

“

ASTM	D2898-10	Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing	3.1.4.8.(3) 3.1.5.5.(3) 3.1.5.24.(1) 3.1.18.7.(9) 3.2.3.7.(4) 9.10.14.5.(3) 9.10.15.5.(3)

”; and

(d) strikes out the row:

“

CSA	CAN/CSA A82.27-M	Gypsum Board	3.1.5.14.(6) 3.1.5.15.(4) 3.1.18.13.(1) 3.1.19.2.(2)

”,

and substitutes:

“

CSA	CAN/CSA A82.27-M	Gypsum Board	3.1.5.14.(6) 3.1.5.15.(4) 3.1.18.13.(1) 3.1.19.2.(2) 3.1.19.2.(3) 3.1.19.2.(4) 3.1.19.2.(5)

”.

3. In Article 3.1.18.4. of Division B of Book I, Council strikes out Sentence (1) and substitutes the following:

“**1)** Except as provided in Sentences (3) to (9), 3.1.18.3.(4), 3.1.18.14.(2) and 3.1.18.15.(2), and Articles 3.1.18.5. and 3.1.18.10., the exposed surfaces of structural mass timber elements conforming to Article 3.1.18.3. shall be protected from adjacent spaces in the *building*, including adjacent concealed spaces within wall, floor and roof assemblies, by a

material or assembly of materials conforming to Sentence (2) that provides an *encapsulation rating* that

a) is not less than 50 minutes in a building or part of a *building* constructed in conformance with Article 3.2.2.48EMTC. or 3.2.2.57EMTC., or

b) conforms to the minimum values stated in Table 3.2.2.91. for the applicable *major occupancy* and *building height*.".

4. In Article 3.1.18.4. of Division B of Book I, Council strikes out Sentence (3) and substitutes the following:

"**3)** Except as provided in Sentences (5) and (7), the exposed surfaces of mass timber beam columns and arches within a suite, other than a *residential suite*, or *fire compartment* in a *building* or part of a *building* constructed in conformance with Article 3.2.2.48EMTC. or 3.2.2.57EMTC. or permitted by Article 3.2.2.91. to have a 50 min *encapsulation rating* other than a *residential suite*, need not be protected in accordance with Sentence (1), provided

a) their aggregate exposed surface area does not exceed 35% of the total wall area of the perimeter of the *suite* or *fire compartment* in which they are located, and
b) the *flame-spread rating* on any exposed surface is not more than 150.

(See Note A-3.1.18.4.(3) to (8).)".

5. In Article 3.1.18.4. of Division B of Book I, Council strikes out Sentence (4) and substitutes the following:

"**4)** Except as provided in Sentences (5) to (7), the exposed surfaces of mass timber walls within a *suite,* other than a *residential suite,* in a *building* or part of a *building* constructed in conformance with Article 3.2.2.48EMTC. or 3.2.2.57EMTC. or permitted by Article 3.2.2.91. to have a 50 min *encapsulation rating,* need not be protected in accordance with Sentence (1), provided

a) each portion of an exposed surface of a mass timber wall faces
   (i) faces the same direction, or
   (ii) is separated from any other exposing mass timber wall by a horizontal distance of not less than 4.5 m, and
b) the *flame-spread rating* on any exposed surface is not more than 150.

(See Note A-3.1.18.4.(4) and A-3.1.18.4.(3) to (8).)".

6. In Article 3.1.18.4. of Division B of Book I, Council strikes out Sentence (5) and substitutes the following:

"**5)** Except as provided in Sentence (7), the aggregated exposed surface area of mass timber elements within a *suite* permitted in Sentences (3) and (4) shall not exceed 35% to the total wall area of the perimeter of the *suite*.

(See Note A-3.1.18.4.(4) to (8).)".

7. In Article 3.1.18.4. of Division B of Book I, Council strikes out Sentence (6) and substitutes:

"**6)** Except as provided in Sentence (7), the exposed surfaces of mass timber ceilings within a *suite,* other than a *residential suite,* or *fire compartment,* other than an *exit, public corridor,*

in a *building* or part of a *building* constructed in conformance with Article 3.2.2.48EMTC. or 3.2.2.57EMTC. or permitted by Article 3.2.2.91. to have a 50 min *encapsulation rating*, need

not be protected in accordance with Sentence (1), provided their aggregated surface area does not exceed

a) 10% of the total ceiling area of the *suite* or *fire compartment*, where the *flame-spread rating* on any exposed surface is not more than 150, or
b) 25% of the total ceiling area of the *suite* or *fire compartment*, where the *flame-spread rating* on any exposed surface of a mass timber wall or ceiling is not more than 75.

(See Note A-3.1.18.4.(3) to (8).)".

8. In Article 3.1.18.4 of Division B of Book I, Council adds the following after Sentence (6):

"**7)** The exposed surfaces of mass timber ceilings within a *suite,* other than a *residential suite,* in a *building* or part of a *building* constructed in conformance with Article 3.2.2.48EMTC. or 3.2.2.57EMTC. or permitted by Article 3.2.2.91. to have a 50 min *encapsulation rating*, need not be protected in accordance with Sentences (1) or (6), provided

a) the aggregate surface area of any exposed mass timber beams, columns and arches does not exceed 20% of the total wall area of the perimeter of the *suite* in which they are located,
b) all surfaces of mass timber walls are
   i) protected in accordance with Sentence (1), or
   ii) mass timber walls that are not otherwise permitted to be exposed in accordance with Sentence (5) are protected by a material or assembly of materials conforming to Sentence (2) that provides an *encapsulation rating* or not less than 80 min, and
c) the *flame spread rating* on any exposed surface of a mass timber wall or ceiling is not more than 75.

(See Note A-3.1.18.4.(3) to (8).)

8) Structural mass timber elements in a *building* or part of a *building* permitted by Article 3.2.2.91. to have a 0 min *encapsulation rating* need not be protected in accordance with Sentence (1), provided

a) mass timber walls and ceilings within *vertical service spaces, public corridors,* and *exits* are protected on the interior side with a material or assembly of materials conforming to Sentence (2) that provides an *encapsulation rating* of not less than 25 min, and
b) concealed spaces are protected in conformance with Sentence 3.1.18.3.(4).

(See Note A-3.1.18.4.(3) to (8).)

9) In a *building* or part of a *building* required by Clause 3.1.18.4.(1)(b) to have a minimum *encapsulation rating* of 70 min, the upper surface of a mass timber floor or roof assembly is permitted to be encapsulated by a material or assembly of materials conforming to Sentence 3.1.18.4.(2) that provides an *encapsulation rating* of 50 min.".

9. In Division B of Book I, Council strikes out Article 3.1.18.7. and substitutes the following:

"**3.1.18.7. Exterior Cladding**

1) Except as provided in Sentences (2), (3), (4), (6) and (9), cladding on an exterior wall assembly of a *building* or part of a *building* permitted to be of *encapsulated mass timber construction* shall be

a) *noncombustible*,
b) a material or combination of materials that satisfy the criteria of Sentence 3.1.5.1.(2),
c) except as provided in Sentence (7), a wall assembly that satisfies the criteria of Clause 3.1.5.5.(1)(b), or
d) a combination of the cladding described in Clauses (a) to (c).

(See Note A-3.1.18.7.(1), (2), (4) and (6).)

2) Except as provided in Sentences (3), (4), (6) and (8), cladding on an exterior wall assembly of a *building* or part of a *building* permitted to be of *encapsulated mass timber construction* that is not more than 12 *storeys* in *building height* is permitted to consist of

a) *combustible* cladding that
   i) is not contiguous over more than 4 *storeys*,
   ii) represents not more than 10% of the cladding on each exterior wall of each *storey*,
   iii) is not more than 1.2 m in width,
   iv) has a *flame-spread rating* not more than 75 on any exposed surface, or any surface that would be exposed by cutting through the material in any direction,
   v) is separated from other portions of *combustible* cladding on adjacent *storeys* by a horizontal distance of not less than 2.4 m, and
   vi) is separated from other portions of *combustible* cladding by a horizontal distance of not less than 1.2 m,

b) *combustible* cladding that
   i) is not contiguous across adjacent *storeys*,
   ii) represents not more than 10% of the cladding on each exterior wall of each *storey*,
   iii) has a *flame-spread rating* not more than 75 on any exposed surface, or any surface that would be exposed by cutting through the material in any direction, and
   iv) is separated from other portions of *combustible* cladding on adjacent *storeys* by a horizontal distance of not less than 2.4 m,

c) *combustible* cladding representing up to 100% of the cladding on exterior walls of the *first storey*, provided all portions of the cladding can be directly accessed and are located not more than 15 m from a *street* or access route conforming to Article 3.2.5.6., measured horizontally from the face of the *building*, or

d) a combination of cladding described in Sentence (1) and the cladding described in Clauses (a) to (c).

(See Note A-3.1.18.7.(1), (2), (4) and (6).)

3) The permitted area of combustible cladding in Clauses (2)(a) or (b) shall not exceed 5% of the cladding on each exterior wall of each *storey* where the time from receipt of notification of a fire by the fire department until the arrival of the first fire department vehicle at the *building* exceeds 10 min in 10% or more of all fire department calls to the *building*. (See Note A-3.2.3.1.(8).)

4) Except as provided in Sentences (6) and (8), cladding on an exterior wall assembly of a *building* or part of a *building* permitted to be of *encapsulated mass timber construction* that is not more than 6 *storeys* in *building height* is permitted to consist of

a) *combustible* cladding that
   i) represents not more than 10% of the cladding on each exterior wall of each *storey*, and
   ii) has a *flame-spread rating* not more than 75 on any exposed surface, or any surface that would be exposed by cutting through the material in any direction, or
b) a combination of the cladding described in Clause (a) and the cladding described in Sentence (1) and Clause (2)(c).

(See Note A-3.1.18.7.(1),(2),(4) and (6).)

5) Where *combustible* cladding conforming to Clauses (2)(a),(b) or (4)(a) on the exterior wall of a *fire compartment* is exposed to *combustible* cladding conforming to Clauses (2)(a),(b) or (4)(a) on an exterior wall of the same *fire compartment* or of another *fire compartment*, and the planes of the two walls are parallel of at an angle less than $135°$ measured from the exterior of the *building*, the different portions of *combustible* cladding shall

a) be separated by a horizontal distance of not less than 3 m, and
b) not be contiguous over more than 2 storeys.

6) Except as provided in Sentence (8), cladding on an exterior wall assembly of a *building* or part of a *building* permitted to be of *encapsulated mass timber construction* and not more than 4 *storeys* in *building height* is permitted to consist of *combustible* material with a *flame-spreading rating* not more than 75 on any exposed surface, or any surface that would be exposed by cutting through the material in any direction. (See Note A-3.1.18.7.(1),(2),(4) and (6).)

7) An exterior wall assembly constructed in conformance with Section D-6 of Appendix D is deemed to satisfy the criteria of Clause (1)(c).

8) Except as provided in Article 3.2.3.10., where the *limiting distance* in Table 3.2.3.1.-D or 3.2.3.1.-E permits an area of *unprotected openings* of not more than 10% of the *exposing building face*, the construction requirements of Table 3.2.3.7. shall be met.

9) A wall assembly conforming to Clause (1)(c) that includes *combustible* cladding made of fire-retardant-treated wood shall be tested for fire exposure after the cladding has been subjected to the accelerated weathering test specified in ASTM D2898, “Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing.”. ”

10. In Sentence 3.1.18.12.(2) of Division B of Book I, Division B, Council strikes out “Sentences 3.1.18.4.(3) and (4),” and substitutes “Sentences 3.1.18.4.(3),(4),(7) and (8)”.

11. In Sentence 3.1.18.12.(3) of Division B of Book I, Division B, Council strikes out “Sentences (4) and 3.1.18.4.(3), and (6)” and substitutes “Sentences (4) and 3.1.18.4.(3),(6),(7) and (8)”

12. In Article 3.1.19.2. of Division B of Book I, Council strikes out Sentence (2) and substitutes the following:

> “**2)** One layer of Type X gypsum board conforming to ASTM C 1396/C 1396M, “Standard Specification for Gypsum Board,” or CAN/CSA-A82.27-M, “Gypsum Board,” not less than 12.7 mm thick, is deemed to have an *encapsulation rating* of 25 min when installed on a mass timber element in accordance with Sentence (6).”

13. In Article 3.1.19.2. of Division B of Book I, Council adds the following Sentences after Sentence (2):

> “**3)** Two layers of Type X gypsum board conforming to ASTM C1396/C1396M,” Standard Specification for Gypsum Board,” or CAN/CSA-A82.27-M,”Gypsum Board,” each not less than 12.7 mm thick are deemed to have an *encapsulation rating* of 50 min when installed on a mass timber element accordance to Sentence (6).
>
> **4)** Two layers of Type X gypsum board conforming to ASTM C1396/C1396M,” Standard Specification for Gypsum Board,” or CAN/CSA-A82.27-M,” Gypsum Board,” each not less than 15.9 mm thick, are deemed to have an *encapsulation rating* of 70 min when installed on a mass timber element in accordance with Sentence (6).
>
> **5)** Three layers of Type X gypsum board conforming to ASTM C1396/C1396M, “Standard Specification for Gypsum Board,” or CAN/CAS-A82.27-M,” Gypsum Board,” each not less than 12.7 mm thick, are deemed to have an *encapsulation rating* of 80 min when installed on a mass timber element in accordance with Sentence (6).
>
> **6)** The gypsum board described in Sentences (2) to (5) shall be
>
> (a) fastened with a minimum of two rows of screws in each layer
> i) directly to the mass timber element with screws of sufficient length to penetrate not less than 20 mm into the mass timber element that are spaced not more than 400 mm o.c. and 20 mm to 38 mm from the boards’ edges, or
> ii) to wood furring or resilient metal or steel furring channels not more than 25 mm thick spaced not more than 400 mm o.c. on the mass timber element,
> (b) for multiple layer systems, installed with the joints in each layer staggered from those in the adjacent layer, and
> (c) installed in conformance with ASTM C840, “Standard Specification for Application and Finishing of Gypsum Board,” except that, for multiple layer systems, their joints need not be taped and finished.
>
> (See Note A-3.1.19.2.(6).)”.

14. In Article 3.2.1.4. of Division B of Book I, Council strikes out Sentence (1) and substitutes the following:

> “**1)** Except as permitted by Sentences 3.2.2.47.(3), 3.2.2.48.(3), 3.2.2.48EMTC.(3), 3.2.2.49.(3), 3.2.2.50.(3), 3.2.2.51.(3), 3.2.2.52.(3), 3.2.2.53.(3), or 3.2.2.54.(3), or 3.2.2.91.(3), a floor assembly immediately above a *basement* shall be constructed as a *fire separation* having a *fire-resistance rating* conforming to the requirements of Articles 3.2.2.20. to 3.2.2.91. for a floor assembly, but not less than 45 min.”

15. In Article 3.2.1.6. of Division B of Book I, Council in Sentence (1) strikes out “3.2.2.90.” and substitutes “3.2.2.91.”.

16. In Article 3.2.2.2. of Division B of Book I, Council in Sentence (1) strikes out “3.2.2.90.” and substitutes “3.2.2.91.”.

17. In Article 3.2.2.6. of Division B of Book I, Council strikes out Sentences (1) and Sentence (2) and substitutes the following:

> “**1)** Except as permitted by Articles 3.2.2.7. and 3.2.2.8., and Sentences 3.2.2.48EMTC.(4), 3.2.2.50.(5), 3.2.2.57EMTC.(3), 3.2.2.58.(4) and 3.2.2.91.(5) to (7), in a *building* containing more than one *major occupancy*, the requirements of this Subsection for the most restricted *major occupancy* contained shall apply to the whole *building.*
>
> **2)** In a *building* or part of a *building* constructed in conformance with Articles 3.2.2.48EMTC., 3.2.2.57EMTC. or 3.2.2.91(3). containing more than one *major occupancy*, the most restrictive encapsulation requirements of Article 3.1.18.4. and Table 3.2.2.91. for any *major occupancy* contained within a *storey* shall apply to the encapsulation required on the interior of a *public corridor* or *exit* within that *storey*.”.

18. In Article 3.2.2.7. of Division B of Book I, Council:

(a) strikes out Sentence (1) and substitutes the following:

> “**1)** Except as provided in Article 3.2.2.8. and Sentences 3.2.2.18.(2), 3.2.2.48EMTC.(4), 3.2.2.50.(5), 3.2.2.57EMTC.(3), 3.2.2.58.(4) and 3.2.2.91.(5) to (7), in a *building* in which one *major occupancy* is located entirely above another *major occupancy*, the requirements in this Subsection for each portion of the *building* containing a *major occupancy* shall apply to that portion as if the entire *building* were of that *major occupancy*.”, and

(b) after Sentence (2), adds the following:

> “**3)** In a *building* or part of a *building* constructed in conformance with Article 3.2.2.48EMTC., 3.2.2.57EMTC., or 3.2.2.91., if one *major occupancy* is located above another *major occupancy,*
>
> a) the most restrictive encapsulation requirements of Article 3.1.18.4. and Table 3.2.2.91. for any *major occupancy* contained within the *building* shall apply to the encapsulation required on the interior of *vertical service spaces* and *exit* stairs, and
> b) the encapsulation requirements of Article 3.1.18.4. and Table 3.2.2.91. for a mass timber floor assembly between the *major occupancies* shall be determined on the basis of the requirements for
> i) the upper *major occupancy* for the encapsulation of the upper surface of the mass timber floor assembly, and
> ii) the lower *major occupancy* for the encapsulation of the underside of the mass timber floor assembly.”.

19. In Article 3.2.2.11. of Division B of Book I, Council:

(a) in Sentence (1) strikes out “3.2.2.90.” and substitutes “3.2.2.91.”, and

(b) in Sentence (2) strikes out “3.2.2.48EMTC. or 3.2.2.57EMTC.” and substitutes “3.2.2.48EMTC., 3.2.2.57EMTC. or 3.2.2.91.”.

20. In Sentence 3.2.2.12.(1) of Division B of Book I, Council strikes out “3.2.2.90.” and substitutes “3.2.2.91”.

21. In Sentence 3.2.2.13.(1) of Division B of Book I, Council strikes out “3.2.2.90.” and substitutes “3.2.2.91.”.

22. In Article 3.2.2.14. of Division B of Book I, Council:

(a) in Sentence (1) strikes out “3.2.2.90.” and substitutes “3.2.2.91.”, and

(b) in Sentence (3) strikes out “3.2.2.90.” and substitutes “3.2.2.91.”.

23. In Sentence 3.2.2.16.(1) of Division B of Book I, Council strikes out “3.2.2.90.” and substitutes “3.2.2.91.”.

24. In Division B of Book I, Council strikes out Article 3.2.2.18. and substitutes the following:

“**1)** Except as permitted by Sentence (2), an automatic sprinkler system conforming to the requirements of Articles 3.2.4.7., 3.2.4.8., 3.2.4.9. and 3.2.5.12. shall be installed throughout a *building* regulated by one or more of Articles 3.2.2.20., 3.2.2.21., 3.2.2.22., 3.2.2.23., 3.2.2.24., 3.2.2.26., 3.2.2.27., 3.2.2.29., 3.2.2.31., 3.2.2.33., 3.2.2.36., 3.2.2.37., 3.2.2.38.,3.2.2.39., 3.2.2.40., 3.2.2.41., 3.2.2.42., 3.2.2.43., 3.2.2.44., 3.2.2.45., 3.2.2.46., 3.2.2.47.,3.2.2.48.,3.2.2.48EMTC., 3.2.2.50., 3.2.2.51., 3.2.2.54., 3.2.2.55., 3.2.2.57., 3.2.2.57EMTC, 3.2.2.58., 3.2.2.59., 3.2.2.61., 3.2.2.63., 3.2.2.64., 3.2.2.65., 3.2.2.67., 3.2.2.69.,3.2.2.70., 3.2.2.71., 3.2.2.72., 3.2.2.74., 3.2.2.75., 3.2.2.77., 3.2.2.79., 3.2.2.80., 3.2.2.82., 3.2.2.84., 3.2.2.86., 3.2.2.88., and 3.2.2.91.

2) If a *storey* in a *building* or a *floor area* is required to have an automatic sprinkler system installed throughout in accordance with one or more of Articles 3.2.2.20. to 3.2.2.91. or Section 3.3., the automatic sprinkler system shall also be installed throughout all lower *storeys* in the *building* notwithstanding permission in Articles 3.2.2.20. to 3.2.2.91. to construct one or more of those *storeys* without installing automatic sprinkler protection. (See Note A-3.2.2.18.(2).)”.

25. In Sentence 3.2.2.19.(1) of Division B of Book I, Council strikes out “3.2.2.90.” and substitutes “3.2.2.91.”.

26. In Sentence 3.2.2.23.(1) of Division B of Book I, Council adds “and 3.2.2.91.” after “3.2.2.28.”.

27. In Sentence 3.2.2.42.(1) of Division B of Book I, Council adds “ and 3.2.2.91.” after “3.2.2.46.”.

28. In Sentence 3.2.2.47.(1) of Division B of Book I, Council adds “and 3.2.2.91.” after “3.2.2.54.”.

29. In Sentence 3.2.2.48EMTC.(4) of Division B of Book I, Council strikes out “See Note A-3.2.2.48EMTC.(4) and 3.2.2.57EMTC.(3)” and substitutes “See Note A-3.2.2.48EMTC.(4), 3.2.2.57EMTC.(3) and 3.2.2.91.(5) to (7)”.

30. In Sentence 3.2.2.55.(1) of Division B of Book I, Council adds “and 3.2.2.91.” after “3.2.2.63.”.

31. In Sentence 3.2.2.57EMTC.(3) of Division B of Book I, Council strikes out “See Note A-3.2.2.48EMTC.(4) and 3.2.2.57EMTC.(3)” and substitutes “See Note A-3.2.2.48EMTC.(4), 3.2.2.57EMTC.(3) and 3.2.2.91.(5) to (7)”.

32. In Sentence 3.2.2.64.(1) of Division B of Book I, Council adds “and 3.2.2.91.” after “3.2.2.69.”.

33. In Sentence 3.2.2.74.(1) of Division B of Book I, Council adds “and 3.2.2.91.” after “3.2.2.79.”.

34. In Sentence 3.2.2.80.(1) of Division B of Book I, Council strikes out “3.2.2.90.” and substitutes “3.2.2.91.”.

35. In Subsection 3.2.2. of Division B of Book I, after Article 3.2.2.90., Council adds the following:

“**3.2.2.91. Encapsulated Mass Timber Construction, Various Occupancies, Heights and Areas, Sprinklered**

1) A building that is classified as Group A, Division 2, Group B, Division 3, Group C, Group D, Group E, or Group F, Division 2 or 3, is permitted to conform to Sentence (2) provided

a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered*,
b) the *building* has a *building height* not exceeding the number of *storeys* shown in Table 3.2.2.91. for the applicable *major occupancy* and minimum encapsulation rating,
c) the *building* has a maximum height that conforms to the value shown in Table 3.2.2.91. for the applicable *major occupancy* and minimum encapsulation rating that is measured between the floor of the *first storey* and the uppermost floor level that does not serve a rooftop enclosure for elevator machinery, a stairway or a *service room* used only for service to the *building*,
d) the *building* has a maximum *building area* that conforms to the value shown in Table 3.2.2.91. for the applicable *major occupancy*, and
e) except as provided in Sentences 3.1.18.3.(4) and 3.1.18.5.(1) and Article 3.1.18.4., the *encapsulation rating* conforms to the value shown in Table 3.2.2.91. for the applicable *major occupancy* and maximum *building height*.

(See Note A-3.2.2.91.(1) and Table 3.2.2.91. See also Articles 3.2.2.48EMTC. and 3.2.2.57EMTC.)

TABLE 3.2.2.91.
Encapsulated Mass Timber Construction Requirements [(1) (2)]
Forming part of Sentence 3.2.2.91.(1)

OCCUPANCY	**MAX. *BUILDING HEIGHT*, *STOREYS***	**MAX. HEIGHT, m**	**MAX. *BUILDING AREA*, m2**	**MINIMUM *ENCAPSULATION RATING*, min**
A-2	18	76	7200	70
	12	51		50
	6	26		0
B-3	10	42	8000	70
	6	26		50
	4	17		0
C	18	76	6000	70
	8	34		0
D	18	76	7200	70
	9	38		0
E	12	51	6000	70
	8	34		50
	6	26		0
F-2	10	42	4500	70
	7	30		50
	5	21		0
F-3	12	51	7200	70
	8	34		50

Notes to Table 3.2.2.91:

(1) See Sentences (5) to (7) and Articles 3.2.2.4. to 3.2.2.8. for information pertaining to multiple *major occupancies*.
(2) Linear interpolation is not permitted in using Table 3.2.2.91.

2) Except as provided in Article 3.2.2.16., the building referred to in Sentence (1) is permitted to be of *encapsulated mass timber construction* or *noncombustible construction*, used singly or in combination, and

a) except as provided in Sentence (3), floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 hours,
b) *mezzanines* shall have a *fire-resistance rating* not less than 1 hour, and
c) *loadbearing* walls, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

3) In a *building* classified as a Group C *major occupancy* that contains *dwelling units* that have more than one *storey*, subject to the requirements of Sentence 3.3.4.2.(3), the floor assemblies, including floors over *basement*s, that are entirely contained within these *dwelling units* shall have a *fire-resistance rating* not less than 1 h, but need not be constructed as *fire separations*.

4) In *buildings* referred to in Sentence (1) where the roof assembly of an *exit* stairway or *vertical service space* used as an elevator hoistway has a height greater than 55 m measured from *grade* to the highest point of the roof assembly, the enclosure for the stairway or hoistway shall be of *encapsulated mass timber construction* or constructed of concrete.

5) Group E *major occupancies* and *storage garages* located in a *building* or part of a *building* classified as a Group A, Division 2, Group C, or Group D *major occupancy* within the scope of this Article are permitted to be constructed in accordance with this Article and the corresponding Group A, Division 2, Group C, or Group D *major occupancy* requirements contained in Table 3.2.2.91., provided

a) the Group E *major occupancy* is located below the third *storey*, and
b) the *storage garage* is located below the fifth *storey* (see also Article 4.4.2.1.).
(See Note A-3.2.2.48EMTC.(4), 3.2.2.57EMTC.(3) and 3.2.2.91.(5) to (7).)

6) Group A, Division 2 *major occupancies* located in a *building* or part of a *building* classified as a Group C or Group D *major occupancy* within the scope of this Article are permitted to be constructed in accordance with this Article and the corresponding Group C or Group D *major occupancy* requirements contained in Table 3.2.2.91., provided they are located below the fourth *storey*. (See Note A-3.2.2.48EMTC.(4), 3.2.2.57EMTC.(3) and 3.2.2.91.(5) to (7).)

7) Group F, Division 2 and 3 *major occupancies* located in a *building* or part of a *building* classified as a Group D *major occupancy* within the scope of this Article are permitted to be constructed in accordance with this Article and the corresponding Group D *major occupancy* requirements contained in Table 3.2.2.91., provided they are located below the third *storey*. (See Note A-3.2.2.48EMTC.(4), 3.2.2.57EMTC.(3) and 3.2.2.91.(5) to (7).)".

36. In Article 3.2.3.7. of Division B of Book I, Council strikes out Table 3.2.3.7. and substitutes the following:

"**Table 3.2.3.7.**
Minimum Construction Requirements for Exposing Building Faces
Forming Part of Sentences 3.1.6.9.(5) and 3.2.3.7.(1) to (4)

Occupancy ***Classification of*** *Building* ***or*** *Fire Compartment*	***Maximum Area of*** *Unprotected Openings* ***Permitted, % of*** *Exposing Building Face* ***Area***	***Minimum Required*** *Fire-Resistance Rating*	***Type of Construction Required***	***Type of Cladding Required***
Group A, B, C, D, or Group F, Division 3	*0 to 10*	*1 h*	*Noncombustible*	*Noncombustible*
	> 10 to 25	*1 h*	*Combustible, Encapsulated mass timber, or Noncombustible*	*Noncombustible*
	> 25 to 50	*45 min*	*Combustible, Encapsulated mass timber, or Noncombustible*	*Noncombustible*
	> 50 to < 100	*45 min*	*Combustible, Encapsulated mass timber, or Noncombustible*	*Combustible or Noncombustible*[(1)(2)]
Group E, or Group F, Division 1 or 2	*0 to 10*	*2 h*	*Noncombustible*	*Noncombustible*
	> 10 to 25	*2 h*	*Combustible, Encapsulated mass timber, or Noncombustible*	*Noncombustible*
	> 25 to 50	*1 h*	*Combustible, Encapsulated mass timber, or Noncombustible*	*Noncombustible*
	> 50 to < 100	*1 h*	*Combustible, Encapsulated mass timber, or Noncombustible*	*Combustible or Noncombustible*[(32)]

Notes to Table 3.2.3.7.:

(1) The cladding on Group C *buildings* conforming to Article 3.2.2.50. and on Group D *buildings* conforming to Article 3.2.2.58. shall be *noncombustible* or consist of a wall that satisfies the requirements of Article 3.1.4.8.

(2) The cladding on *buildings* or parts thereof conforming to Articles 3.2.2.48EMTC., 3.2.2.57EMTC. or 3.2.2.91. shall conform to Article 3.1.18.7. or be *noncombustible*.

(3) See also Article 3.1.4.8. for additional requirements for exterior cladding on *buildings* or parts thereof conforming to Articles 3.2.2.50. and 3.2.2.58.".

37. In Sentence 3.2.3.9.(1) of Division B of Book I, Council strikes out “3.2.2.90.” and substitutes “3.2.2.91.”.

38. In Article 3.2.5.12. of Division B of Book I, Council strikes out Sentence 3.2.5.12.(8) and substitutes the following:

> “**8)** Notwithstanding the requirements of the standards referenced in Sentences (1) and (2) regarding the installation of automatic sprinkler systems, in *buildings* conforming to Article 3.2.2.48EMTC., 3.2.2.50., 3.2.2.57EMTC., 3.2.2.58., or 3.2.2.91., sprinklers shall be provided for balconies and decks exceeding 610 mm in depth measured perpendicular to the exterior wall. (See Note A-3.2.5.12.(8).)”

39. In Sentence 3.3.3.7.(4) of Division B of Book I, Council strikes out “3.2.2.90.” and substitutes “3.2.2.91.”.

40. In Sentence 3.10.1.1.(1) of Division B of Book I, Council amends Table 3.10.1.1. by adding the following after the rows associated with 3.2.2.90.:

“

3.2.2.91. Encapsulated Mas Timber Construction, Various Heights and Occupancies, Sprinklered	
(2)	(b),(c) [F04 – OS1.3]
	(b),(c) [F04 – OP1.3]
	(a),(c) [F03 – OS1.2][F04 – OS1.2, OS1.3]
	(a),(c) [F03 – OP1.2][F04 – OP1.2, OP1.3]

”.

41. In Division B of Book I, Council strikes out Note A-3.1.18.4.(1) and substitutes the following:

> “**A-3.1.18.4.(1) Encapsulation of Mass Timber Elements**. The general intent of Sentence 3.1.18.4.(1), which generally applies for any building where a 50- or 70-minute encapsulation rating is otherwise required, is that all exposed surfaces of the mass timber elements be encapsulated, including the upper surface of a mass timber floor assembly. However, for some buildings, depending on the building height and occupancy, portions of mass timber elements are permitted to be exposed to varying degrees in accordance with the permissions stated in Sentences 3.1.18.4.(3) to (8). Also, the exposed surfaces in certain concealed spaces formed by or contained within mass timber elements are exempted from complying with this Sentence (see Sentences 3.1.18.3.(4), 3.1.18.14.(2), 3.1.18.15.(2), and Articles 3.1.18.5. and 3.1.18.10.). Moreover, the upper surface of a mass timber roof assembly need not be encapsulated where there is no concealed space above it. As well, the exterior side of a mass timber exterior wall assembly need not be encapsulated; however, the provisions of Article 3.1.18.7. and Subsection 3.2.3. for exterior walls still need to be considered.”.

42. In Division B of Book I, Council strikes out Note A-3.1.18.4.(3) to (6) and substitutes the following:

> “**A-3.1.18.4.(3) to (8) Fire-Resistance Rating of Mass Timber with Exposed Surfaces**. Portions of mass timber elements required to have a fire-resistance rating are permitted to be exposed in accordance with the permissions stated in Sentences 3.1.18.4.(3) to (8); however, it is important to note that applying those permissions does not waive the requirement for these elements to have a fire-resistance rating.

In the calculation of the total wall area of the perimeter of a suite or fire compartment in Sentences 3.1.18.4.(3), (5) and (7), the area of any wall openings, such as doors or windows, is included.".

43. In Division B of Book I, Council strikes out Note A-3.1.18.4.(4) and substitutes the following:

"**A-3.1.18.4.(4) Exposed Surfaces of Mass Timber Walls** The primary objective of encapsulating mass timber elements is to limit the probability that these elements will significantly contribute to fire spread and fire duration in the event of a fire. Since thick wood members require a source of imposed heat flux to burn, Clause 3.1.18.4.(4)(a) stipulates that any portions of the exposed surfaces of different mass timber walls within a suite either face the same direction or have a minimum horizontal distance between one another. If the sprinkler system fails to operate or to control the fire, this directional orientation or minimum distance is intended to avoid or reduce the potential for re-radiation between portions of burning mass timber surfaces on different walls, and particularly those that either face or are in close proximity to one another, which could sustain flaming combustion into the decay phase of a fire. Additionally, if the sprinkler system fails to operate or to control the fire, the maximum percentages of exposed surface areas and maximum flame-spread ratings stated in Article 3.1.18.4. are intended to be insufficient to sustain a ventilation-controlled fire that might provide the radiation required to sustain flaming combustion into the decay phase of a fire.".

44. In Division B of Book I, Council strikes out Note A-3.1.18.7.(1) and (2) and substitutes the following:

"**A-3.1.18.7.(1), (2), (4) and (6) Exterior Cladding**. The requirements in Sentences 3.1.18.7.(1), (2), (4) and (6) are intended to reduce the potential for fire spread on the exterior cladding of buildings of encapsulated mass timber construction through the use of noncombustible finishes on the exterior of the wall assembly or the use of a cladding/wall assembly that has been proven to resist flame propagation as a function of increasing building height, including provisions to allow 100% combustible cladding where the height does not exceed 4 storeys. These cladding/wall assembly combinations can be used as infill or panel-type walls between structural elements, or attached directly to a loadbearing structural system. Note that the requirements in Article 3.1.18.7. do not supersede the provisions in Subsection 3.2.3. regarding spatial separation and exposure protection.".

45. In Division B of Book I, Council strikes out Note A-3.1.19. and substitutes the following:

"**A-3.1.19.2. Encapsulation Materials**. Research has been conducted on different types of encapsulation materials, such as gypsum board, gypsum concrete and cement board. The results of tests using an intermediate-scale furnace and of cone calorimeter tests indicate that a combustible timber element protected with a 38 mm thick layer of gypsum-concrete topping or with one (25 min), two (50 min) or three (80 min) layers of 12.7 mm Type X gypsum board or two layers (70 min) of 15.9 mm Type X gypsum board will not ignite or contribute significant heat to a fire until the time at which average temperatures of 325°C to 380°C are attained at the interface between the encapsulation material or assembly of materials and the combustible substrate. These temperatures are consistent with the ignition temperatures of wood-based materials.".

46. In Division B of Book I, Council amends Note A-3.1.19.2. by striking out "A-3.1.19.2.(2)" and substituting "A-3.1.19.2.(6)".

47. In Division B of Book I, Council amends Note A-3.1.11.5.(3) by striking out:

"A 5- or 6-storey building constructed in accordance with Article 3.2.2.48EMTC., 3.2.2.57EMTC., or 3.2.2.50. and buildings constructed in accordance with Article 3.2.2.58.",

and substituting the following:

"A 5- or 6-storey building constructed in accordance with Article 3.2.2.48EMTC, 3.2.2.57EMTC, 3.2.2.50., 3.2.2.58. or 3.2.2.91.".

48. In Division B of Book I, Council strikes out Note A-3.2.2.48EMTC.(4) and 3.2.2.57EMTC.(3) and substitutes the following:

"A-3.2.2.48EMTC.(4), 3.2.2.57EMTC.(3) and 3.2.2.91.(5) to (7) Occupancy Combinations in Buildings of Mixed Construction. Buildings conforming to the building height and area limits and the other fire protection requirements of Article 3.2.2.48EMTC., 3.2.2.57EMTC. or 3.2.2.91. may be entirely constructed of encapsulated mass timber construction and incorporate the occupancies specifically permitted by Sentence 3.2.2.48EMTC.(4), 3.2.2.57EMTC.(3) or 3.2.2.91.(5) to (7): e.g., Group A, Division 2 major occupancies on the first to third storeys, Group E major occupancies on the first and second storeys, and a parking garage on the first to fourth storeys.
Alternatively, the requirements of Articles 3.2.2.4. to 3.2.2.8. for superimposed major occupancies can be applied, resulting in buildings of mixed construction conforming to the building height and area limits for encapsulated mass timber construction and in which the lower storeys are of noncombustible construction and the upper storeys are of encapsulated mass timber construction. For example, a Group A, Division 2 or Group B, Division 3 major occupancy could be located on the first 4 storeys of a 12-storey Group C building constructed in accordance with Article 3.2.2.48EMTC., as long as these first 4 storeys were constructed of noncombustible construction n accordance with Article 3.2.2.23. or 3.2.2.42., as applicable. (See also Articles 3.2.2.6. and 3.2.2.7.)".

49. In Division B of Book I, after Note A-3.2.2.50.(5) and 3.2.2.58.(4), Council adds the following:

"A-3.2.2.91.(1) and Table 3.2.2.91. Occupancy Combinations in Buildings of Mixed Encapsulation Ratings. Buildings conforming to the building height and minimum encapsulation rating requirements and the other fire protection requirements of Article 3.2.2.91. may be entirely constructed of encapsulated mass timber construction and incorporate the multiple major occupancies otherwise permitted by Articles 3.2.2.4. to 3.2.2.6. This would also include permitting mixing of major occupancies that require different levels of encapsulation for structural mass timber elements in accordance with Table 3.2.2.91.".

50. A decision by a court that any part of this by-law is illegal, void, or unenforceable severs that part from this by-law, and is not to affect the balance of this by-law.

51. This by-law is to come into force and take effect on the date of its enactment.

ENACTED by Council this 11th day of June, 2024

Signed "Ken Sim"
Mayor

Signed "Katrina Leckovic"
City Clerk