Regulations controlling the construction of residential buildings over three stories high in Canada

Galbreath, M.

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PREPARED BY M. Galbreath CHECKED BY R.S.F. APPROVED BY R.F.L.

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SUBJECT REGULATIONS CONTROLLING THE CONSTRUCTION OF RESIDENTIAL BUILDINGS OVER THREE STORIES HIGH IN CANADA

This note has been prepared in response to a request from the secretary of the C.I.B./C.T.F.* for information on regulations concerning fire safety applicable to residential buildings over three stories high in Canada.

Most of the regulations governing buildings in Canada are contained in municipal building bylaws. Municipalities are given the power to prepare bylaws by the Provincial governments, who in turn derive their authority through the British North America Act of 1867 which defines the spheres of influence of Federal and Provincial governments.

As building regulations may vary greatly from one municipality to another, the National Building Code has been prepared by an Associate Committee of the National Research Council to provide uniformity in building codes throughout the country. The National Building Code is an advisory document only unless and untill it is adopted by a municipality as its bylaw. At present over 500 municipalities have adopted the National Building Code in whole or in part, but most of the larger cities still retain their own building bylaws. A new edition of the National Building Code is being prepared and will be issued later in 1960.

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* Conseil International du Bâtiment/Commission de Travail Feu

The Montreal building bylaw is based in part on the 1941 edition of the National Building Code; Metropolitan Toronto is preparing a new code using the National Building Code as a guide; and the Vancouver building bylaw makes some references to it. Calgary has adopted it. The Winnipeg Code is based on the 1941 edition.

In some provinces the Fire Marshals apply the fire safety requirements of the National Building Code to schools and the Code is used for Federal Government Buildings and housing under the National Housing Act.

The National Building Code may therefore be considered as the most generally applicable building law in Canada, and the detailed descriptions of fire safety regulations which follow refer first to the National Building Code. Parallel regulations in Montreal and Vancouver, the two largest cities apart from Toronto, are given as a basis of comparison. The Toronto bylaw has been omitted because it will soon be superseded.

References to buildings other than residential, and to residential buildings of three stories and under, have not been considered.

1. FIRE RESISTANCE REQUIREMENTS FOR FRAME OF BUILDING

	Construction	Height	Area of Fire Compartment Per Floor
(a) National Building Code			
(i)	1 hour non-combustible	6 stories	24,000 sq ft
(ii)	2 hour non-combustible	no limit	48,000 sq ft
(iii)	3 hour non-combustible	no limit	60,000 sq ft
(b) City of Montreal Bylaw			
(i)	Masonry & wood frame (ordinary)	4 stories 45 ft	5,000 sq ft
(ii)	Masonry & heavy timber	4 stories 45 ft	7,500 sq ft
(iii)	2 hour non-combustible	6 stories 75 ft	no limit
(iv)	3 hour non-combustible	no limit	no limit
(c) City of Vancouver Building Bylaw			
(i)	Ordinary construction (masonry & wood frame)	4 stories 55 ft	8,000 sq ft
(ii)	Masonry & heavy timber	5 stories 65 ft	12,000 sq ft
(iii)	3 hour non-combustible	no limit	no limit

2. FIRE RESISTANCE OF WALLS AND FLOORS

	Exterior Walls	Bearing Walls	Bearing Columns	Floors
(a) National Building Code.				
(i) 1 hour non-combustible	1 hr n.c.	2 hr n.c.	2 hr n.c.	1 hr n.c.
(ii) 2 hour non-combustible	2 hr n.c.	3 hr n.c.	3 hr n.c.	2 hr n.c.
(iii) 3 hour non-combustible	3 hr n.c.	4 hr n.c.	4 hr n.c.	3 hr n.c.
(b) City of Montreal Building Bylaw.				
(i) Masonry & wood frame	Masonry or reinforced concrete	Masonry or reinf. conc. Wood stud may not extend over more than 3 stories		1 hr
(ii) Masonry & heavy timber	Masonry or reinf. conc.	2 hr n.c.	8 by 8 in. wood	3 in. t&g plank 4 in laminated wood 1 hr n.c.
(iii) 2 hour non-combustible	4 hr n.c.	3 hr n.c.	3 hr n.c.	2 hr n.c.
(iv) 3 hour non-combustible	4 hr n.c.	4 hr n.c.	4 hr n.c.	3 hr n.c.
(c) City of Vancouver Building Bylaw.				
(i) Ordinary	Masonry or reinf. concrete Masonry & stud	Steel iron reinf. conc. solid timber Stud partitions		wood joists 3 in. thick (nom. 1-5/8 in sub floor
(ii) Masonry & heavy timber	Masonry or reinf. conc.	Stud iron reinf. conc.	8 by 8 in wood 2 hr n.c.	¾ finish floor 3 in. t&g or splined plank or 3 in. laminated
(iii) 3 hour non-combustible	Masonry reinf.conc. or 3 hr n.c. (walls facing 50-ft street may be unprotected non-combustible)	3 hr n.c.	3 hr n.c.	Masonry reinf. conc. reinf. gypsum

n.c. = non-combustible construction

2.1 Fire separations of compartment

(a) The National Building Code requires that each dwelling unit be separated from every other dwelling unit by 1-hour fire separation.

(b) City of Montreal Building Bylaw requires that:

(i) in masonry and wood frame construction walls and partitions separating dwelling units from one another and from public hallways in apartment houses have a fire resistance of at least 1 hour,

(ii) in masonry and heavy timber construction, all non-bearing partitions have 1-hour fire resistance,

(iii) in Fire resistive construction non-bearing partitions have 1-hour fire resistance,

(iv) there be fire walls between dwelling houses when the maximum number of dwellings or the maximum area for the type of construction of the building is reached or exceeded (see section 1).

(c) City of Vancouver Building Bylaw requires that:

(i) in ordinary construction, partitions must be

3 inch laminated wood covered with lath and plaster,

incombustible material,

or

material of 1-hour fire resistance,

(ii) in masonry and heavy timber construction partitions be of wood studs covered with lath and plaster, except that interior partitions in an apartment be of open studs not less than 3 by 4 inch nominal dimension,

(iii) in 3 hour fire resistive construction, all partitions be constructed of either

incombustible material

or

material having 1 hour fire resistance.

3. FLAME RETARDANT REQUIREMENTS FOR INTERIOR FINISHES

There are no requirements for flame retardant finish in any of these bylaws. Restrictions on flame spread are being considered and may be included in the National Building Code 1960 edition now in course of preparation.

4. REGULATIONS CONCERNING THE LAYOUT OF THE BUILDING INCLUDING MEANS OF ESCAPE

(a) National Building Code requires:

(i) two separate means of egress as widely separated as practicable are required from each floor in excess of 1,000 sq ft, (leading to exits as remote from each other as practicable.)

(ii) travel distance from the door of a dwelling unit to an exit must be not more than 100 ft,

(iii) minimum width for exit stairs and passages is 36 in.,

(iv) outside fire escapes are not permitted in new buildings.

(b) City of Montreal Building Bylaw requires:

(i) two independent exits from any dwelling unit not on the ground floor,

(ii) travel distance from the dwelling unit to an exit not more than 150 ft where construction is 2 or 3 hour noncombustible and not more than 75 ft in combustible construction,

(iii) minimum width for exit stairs 44 in.; this reduced to 36 in. in a building accommodating not more than 50 persons,

(iv) outside fire escapes are permitted as a means of egress.

(v) design of exit capacity

population is calculated from floor area at 125 sq ft per person.

Exit width: 50 persons per unit exit width ground floor
30 persons per unit exit width upper floor

The unit of exit width is 22 in.

(c) City of Vancouver Building Bylaw requires:

(i) two means of egress be provided in all buildings,

(ii) no limits on travel distance,

(iii) minimum width for exit stairs 42 in.,

(iv) fire escapes are not permitted in residential buildings over three stories high,

(v) design of exit capacity:

No. of stairs	Floor area (sq ft)	
	Class A & B Construction	Class C Construction
2	5,000 - 9,000	5,000 - 9,000
3	9,000 - 20,000	9,000 - 17,000
4	20,000 - 40,000	17,000 - 26,000
5	40,000 - 60,000	26,000 - 37,000
6	60,000 - 80,000	37,000 - 50,000
Class A Class B Class C	3 hour noncombustible masonry and heavy timber ordinary construction.	

These floor areas are decreased by 2 per cent for every story above the third, up to and including the eighth, and by 1 per cent for each story above the eighth.

"The Building Inspector may apply all or part of the provisions of the National Building Code in lieu of these provisions" in any case "where in his opinion a more reasonable distribution of means of egress would thereby be attained."

5. RESTRICTIONS ON THE SPACING OF BUILDINGS

(a) The National Building Code provides for space separation as an alternative to fire resistive construction as follows:

(i) where a fire separation wall has uniformly-distributed unprotected openings not exceeding 20 per cent of the area, a 7 ft 6 in. space separation is required.

(ii) where the fire endurance of the construction is less than 1 hour, 15 ft 0 in. space separation is required.

Space separation is measured from the face of a building to the property line or to a point midway between two buildings on the same property. The 1960 edition of the code will contain requirements for varying the percentage of unprotected openings in a wall relative to the distance from the property line. These are designed to limit the hazard of ignition by radiation between buildings and are based on experimental burning of buildings at Aultsville, Ontario.

(b) City of Montreal Building Bylaw requires in residential buildings:

(i) a rear yard of 10 ft plus $2\frac{1}{2}$ ft for every story above the third,

(ii) outer courts having a width of 6 ft 6 in. plus 2 ft for each story above the second; if the court is on the lateral limit of the lot the additional width is reduced to 1 ft 0 in. for each story above the second (The length of such a court not more than 30 ft unless the width is increased by 1 ft for each 10 ft increase in length over 30 ft),

(iii) an inner court having a width of 12 ft plus 2 ft for each story above the third, a length not less than $1\frac{1}{2}$ times the width, and that no dwelling have more than one room serving for day or night occupancy lighted by such a court.

(c) City of Vancouver Building Bylaw requires that:

all openings in exterior walls of buildings, except those fronting on a street, lane or court 20 ft or over in width, be 1-hour fire resistive.

6. REQUIREMENTS FOR FIRE RESISTANCE AND SMOKE STOP DOORS

(a) National Building Code

(i) a 3/4 hour fire door is required on stairs.

(ii) a 20 minute fire door is required between a dwelling unit and a common corridor.

(iii) there are no requirements for smoke stop doors.

(b) City of Montreal Building Bylaw

(i) there are no requirements for fire resistive doors but "the 'supervisor' may require as a safety measure fire resistive doors and windows whenever he derives it advisable".

(ii) no requirements for smoke stop doors.

(c) City of Vancouver Building Bylaw

(i) at enclosed stairs wooden doors of standard construction 1 5/8 in. thick are required fitted with substantial closing devices.

(ii) borrowed lights must be glazed with wired glass.

7. REGULATIONS GOVERNING THE PROVISION OF AIDS FOR FIREFIGHTING

(a) The National Building Code permits floor areas to be doubled where approved automatic sprinklers are installed but this would not be of any significance in residential buildings as each dwelling has to be a fire compartment.

(b) The City of Montreal Building Bylaw

All buildings of masonry and heavy timber construction of 5 stories shall be provided with a sprinkler system so installed as to meet the requirements of the National Fire Protection Association.

(c) The City of Vancouver Building Bylaw

Dry risers are required in all buildings over three stories in height, and one dry stand pipe for every 10,000 sq ft of base area or part thereof, so distributed that every part of the building is within 30 ft of a nozzle attached to a 100 ft length of hose.