



City of Richmond

Report to Committee

To: Planning Committee **Date:** October 29, 2024
From: James Cooper, Architect AIBC **File:** 12-8360-01/2024-Vol
 Director, Building Approvals 01

Jim Wishlove
 Fire Chief, Richmond Fire-Rescue

Re: **Changes to BC Building Code: Single Exit Stair**

Staff Recommendation

That a letter outlining the City of Richmond's concerns regarding the BC Building Code changes to allow Single Exit Stair buildings, as outlined in the staff report titled "Changes to BC Building Code: Single Exit Stair" dated October 29, 2024, from the Director, Building Approvals and Fire Chief be sent to the following:

- (a) Premier;
- (b) Minister of Housing;
- (c) Minister of Public Safety and Solicitor General; and
- (d) Members of the Legislative Assembly for Richmond.

James Cooper, Architect AIBC
 Director, Building Approvals
 (604-247-4606)

Jim Wishlove
 Fire Chief, Richmond Fire-Rescue
 (604-303-2715)

Att. 4

REPORT CONCURRENCE		
ROUTED TO:	CONCURRENCE	CONCURRENCE OF GENERAL MANAGER
Development Applications	<input checked="" type="checkbox"/>	
SENIOR STAFF REPORT REVIEW	INITIALS:	APPROVED BY CAO

Staff Report

Origin

At the September 4, 2024 Planning Committee, staff received the following referral:

That staff conduct a full analysis of the recent changes to the BC Building Code, including consultation with stakeholders, and report back.

This report supports Council's Strategic Plan 2022-2026 Focus Area #3 A Safe and Prepared Community:

Community safety and preparedness through effective planning, strategic partnerships and proactive programs.

Analysis

A Dramatic Change to Concepts for Building Safety in the BC Building Code

On August 27, 2024, the Provincial Government, through a Ministerial Order, introduced amendments to the BC Building Code allowing the construction of residential buildings up to six storeys to be served only by a single exit stair (SES), providing escape in the event of fire and emergency.

This is a significant departure from the BC Building Code, the National Building Code of Canada (NBCC) and almost all North American Codes, which have historically stipulated that buildings higher than three storeys will have at least two escape stairs to maintain at least two ways to safety should one be blocked. This concept has been part of the NBCC and US Codes since 1941. All Canadian provincial building codes are based on the current version of the NBCC, with relatively minor regional edits or additions.

The amendments to the BC Building Code are the first such code provision in any Canadian Province. The changes are currently in force, and multistorey residential buildings incorporating a single exit stair may currently be constructed in Richmond and across the Province.

Rationale for the Amendments

There have been discussions between governments and advocates for SES buildings within the last decade to introduce the SES design into North American codes similar to those used in Europe, Asia, Australia and New Zealand, and more recently adopted in Seattle and New York. The Ministry of Housing has referenced arguments for promoting innovative housing solutions as motivation for fast-tracking SES measures into the building code in efforts to facilitate residential development on a wider range of lot sizes and shapes.

Proponents argue that reducing to a single stair enables building designs on smaller lots that would otherwise require a disproportionate amount of space for corridors and stairs; and encourages floor layouts that primarily result in corner units that offer improved livability.

Designs incorporating units centered around one central stair would better enable development on smaller, more square-shaped lots, that would otherwise require consolidation to support a larger building (with multiple stairs) to achieve marketable density. However, such potential efficiencies are applicable to the individual relatively small buildings restrained by SES regulations. Consolidation of multiple SES buildings such as done in Europe forming one larger building would not be as efficient as one using multiple stairs connected by a corridor.

Proponents argue that SES buildings are equally as safe based on comparisons of fire deaths between those countries allowing a single stair in multistorey buildings and those requiring at least two stairs. However, the conclusions are disputed within the design and firefighting professions, since similar death rates between Europe and North America are not sorted according to building type; and North American deaths are largely from single-family houses, not multistorey apartments.

Evaluating the Proposed Amendments

The overarching principle of always having two means of egress from every floor for building three storeys and higher has been a fundamental part of the safety and performance standards prescribed by the BC Building Code. Departing from this principle represents a significant increase in risk to building safety posed by reduced ability to exit during an emergency.

In efforts to address this safety risk, the SES amendments provide for elements similar to those used in Europe and Seattle. Proposed are safety measures that seek to offset the increased risk posed by a single means of egress. In summary, they limit the overall size of the building to reduce the time and distance for occupants to access the single exit stair which is protected from fire and smoke.

All SES buildings have requirements for automatic sprinkler and fire alarm systems. There are maximum distances to the single stair from each floor that limit the size of floor plates, and each floor plate may have a maximum of four units and 24 occupants. A maximum six-storey building height results in 144 occupants. The single stair's width is somewhat wider to address the multiple functions of escape and firefighting access. Please see Attachment 1 for a detailed description of the measures.

These amendments were enacted singularly by the Province, without the standard consensus-based consultation with professional organizations, municipalities, and fire departments typical for major code changes, and without being informed by National Fire Protection Standards or evidence-based research. Richmond Fire-Rescue (RFR), along with the Greater Vancouver Fire Chief's Association and the region's professional firefighters, are united locally, provincially, nationally and internationally in the opinion that the SES amendments were unnecessarily rushed without proper due diligence. Please see Attachment 3 and Attachment 4.

After thorough review, staff have found that the SES measures do not fully address certain safety elements, particularly those involving required interactions with firefighting and rescue operations that contribute to the overall safety of buildings. Building and fire codes have always been developed to address these required interactions. Firefighting procedures are designed to

leverage a building's constructed safety requirements, developed over successive code iterations in a consultative process.

The present abrupt building code changes, not having considered this critical collaboration, result in conditions that reduce safety. The following are the safety items proposed to address those conditions.

1. Need for Multiple Protected Stairwells

In North America, firefighting procedures are based on attacking a fire from within the protected stairwells enclosing the exit stairs. Essential to this procedure is maintaining a minimum of two stairwells allowing occupants multiple ways to escape and allowing firefighters to have dedicated use of another. The European codes, from which the SES measures derive, assume firefighting is from the exterior and do not consider firefighting procedures established in North American cities.

2. Design of the Single Stair Enclosure

Fire crews staging with full equipment to address an emergency typically take up the entirety of the width of an exit stairway. Having only a single stair that functions for both the exiting of occupants and staging for firefighters presents a significant problem.

- a. The stair width, despite being widened (from 1.1 to 1.5 m) as part of the SES regulations, is insufficient to accommodate both.
- b. Hoses connected from inside the stairwell to fight fire will necessarily hold ajar the door, causing the potential for smoke from the floor to inundate the only stair (serving all floors) for occupant egress.
- c. Pressurized single exit stairwells should be mandatory for all building heights. Currently, the SES measures call for smoke control only on buildings over four storeys. The alternative of using smoke vestibules has been demonstrated as ineffective from documented fire rescue evidence.
- d. The dependency on a SES requires that the enclosure is constructed in a robust manner. The required two-hour fire resistance rating should derive from non-combustible materials that resist physical and water damage.

3. Exterior Rescue Design and Required Equipment

In Europe and Seattle, there are assumptions for exterior rescue instead of using protected interior stairs. Those SES buildings without balconies are constructed with demountable emergency rescue and escape openings or operable window sections large enough to allow exit onto a rescue ladder. It is incumbent on any city with SES buildings to have sufficient equipment to adequately address exterior rescue at six-storey buildings.

- a. Seattle's fire department has 33 fire stations and over 1,000 fire fighters. They have capacity to send 30–40 firefighters to SES buildings within eight minutes of alarm, including an aerial ladder truck.
- b. Richmond has three aerial rescue units capable of offering exterior evacuation to a six-storey building. The concern is that there is an insufficient number of aerial ladder trucks to provide the geographic coverage required. The current equipment roster suggests that six-storey SES buildings be confined to areas where suitable coverage can be provided.

- c. There will be additional major expenditures to acquire more aerial ladder units to facilitate the wider implementation of SES buildings to achieve the intended objective of providing more housing.
- d. Siting of buildings will be critical since SES buildings will potentially be inaccessible from the sides and not every area has suitable laneway access for an aerial ladder. This results in rescue only from the front roadway side of the building, leaving only 25 per cent of the windows and balconies accessible. Corner lots would allow 50 per cent. Since regular firetrucks carry ladders capable of accessing three storeys, this leaves 50–75 per cent of occupants on upper floors without a means of egress if the single exit is compromised. These are complications of the SES design that will have to be considered.
- e. Seattle's code limits the number of SES buildings on a property to one purposely to maintain the rescue standard of having access to as many sides of a building as possible. The SES should include such a provision.
- f. There is no requirement for exterior emergency rescue and escape openings in the proposed SES amendments in the BC Building Code. This should be included as a provision.

4. Need for Non-Combustible Building Materials

For buildings beyond three storeys, Seattle's and Europe's Building Codes require that construction materials should be non-combustible, or equivalent such as mass timber. The SES amendments do not require non-combustible materials construction.

- a. The medium rise wood frame construction permitted by the BC Building Code is based on having a minimum of two exit stairs as part of the overall system. Having only one exit may not work with the overall consideration of the safety of this class of buildings.
- b. There have been multiple examples of exterior fires quickly engulfing buildings due to cooking and smoking behaviors on balconies. The ignition of combustible cladding on the exterior of buildings quickly overwhelmed the external sprinkler system intended to address the risk. In those examples, it was critical that multiple stairs offered an escape route away from the fires' locations. SES measures do not require non-combustible cladding materials. In order to address the potential of a localized hazard becoming a blockage to the only means of escape, there needs to be a requirement for non-combustible exterior cladding materials.
- c. Although building systems may be regulated, behavior may not. Examples such as unsafe cooking practices, cluttering exit paths and ignoring occupant load maximums will have to be addressed by more stringent requirements in fire resistance construction.

5. Constant Vigilance and Inspections

Having a single exit stair necessitates constant vigilance for inspections from fire prevention officers and building management to maintain clear access to the stairwell and for it to be uncluttered.

- a. A 10-year sample of Canadian fire data occurring in apartments shows that 10 per cent of fires originate in the egress pathways (hallways, stairs, and lobbies). Often the source includes the charging of scooters or e-bikes in exit ways.

- b. Having only one exit pathway significantly raises the risk of being trapped by fire.
- c. The resultant requirement to provide enhanced inspections and constant vigilance to keep paths clear will require increased resources from RFR inspections staff.

6. Increased Reliance on Active Safety Systems and Firefighting Capacity

The SES amendments include a provision that state such buildings are to be considered only in regions with adequate firefighting resources and water supply.

- a. Since the risks posed by having a single exit are at least partially addressed through requirements for exterior rescue, the storey height maximum should be commensurate with the capacity to affect rescue by aerial ladder trucks.
- b. Those geographic locations that may not have a response by suitable equipment and enough crew within required response times should have SES buildings limited to three storeys.

Zoning and Development Controls

Although the SES code amendments allow for construction of residential buildings up to six storeys, the location, available density and height will be controlled by the zoning; and the form and character by development permit application. This allows the City to retain some influence on this typology and where these buildings may be constructed.

The intended purpose of SES designs to encourage the denser residential development of smaller, more square-shaped individual lots without consolidation will still have to align with the intended zoning and development regulations. However, the City's ability to require additional measures beyond those in the building code, such as those outlined in this report, are limited by the provincial Building Act.

Financial Impact

Although it is difficult to predict industry acceptance of this building type, should such buildings be constructed, there will be increased costs associated with providing required City fire safety levels in response to buildings constructed to SES provisions of the BC Building Code. There will be increased costs for the acquisition of additional aerial rescue equipment and staffing to provide increased inspection levels.

Conclusion

There are serious safety concerns stemming from the adoption of the SES amendments to the BC Building Code. The provisions have not addressed the required interaction between building construction standards and local firefighting methods essential to providing adequate safety levels.

We advise that City Council represent the results of this report in a letter to the Province requesting three items:

- 1. A pause to the SES amendments to allow for the National Model Code process, typically used in evaluating changes to the National Building Code of Canada, to conduct a

thorough consensus discussion, with supported research from the National Fire Protection Standards and the National Research Council, and informing the safety issues. This is the normal process where building code initiatives are initiated at the National Building Code and developed for provincial adoption.

2. Prior to a resolution being reached with the NBCC (guiding a more considered approach in the BC Building Code), the City requests the right to adjust portions of the SES provisions in accordance with section 3.2.10 of the building code to align with current firefighting equipment capacities, the time frame for acquiring additional equipment and resources, and to limit SES buildings to the geographic areas within adequate response time and resources until suitable equipment has been acquired.
3. Request funding from the Province for the required equipment purchase for additional aerial ladder rescue trucks and increased staff to provide increased vigilance for fire prevention.



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JC: JW

- Att. 1: Building Code Amendments for Single Exit Stair
- Att. 2: Fire Protection Perspective
- Att. 3: Greater Vancouver Fire Chief's Association Letter
- Att. 4: Ontario Association of Fire Chiefs Letter

Building Code Amendments for Single Exit Stair

Building codes fundamentally provide safety and performance standards for construction based on a building's size, height, materials, facilitated activities and associated hazard levels. The August 27 amendments allowing a single exit stair provides the following building code items to inform key safety elements associated with that construction.

1. The amendments allow for a single exit stair to serve residential buildings up to six storeys, where the maximum height to the highest floor level is 18 m.
2. The single stair must have at least 1.5 m width for the flights, which is typically wider than would be required in designs involving multiple stairs.
3. The stairwell will have to be constructed to provide two hours resistance to the passage of flame and smoke.
4. The discharge or the point where the stair leaves the building must be directly to the outside and not through the lobby.
5. The discharge point must be between three and 15 meters from a public way.
6. The size of a floor plate is determined by the number of units per floor and the following travel distance requirements to access the stair's door on each floor.
 - a. There is a maximum of four units per floor,
 - b. There is 25 m maximum distance from any point on a floor to the door of the stair,
 - c. The door to any dwelling unit must be within 6 m to the stair entry.
7. The maximum number of occupants is 24 per floor.
8. The front door of each dwelling unit will have a 45-minute fire resistive rating.
9. The buildings will be sprinklered according to the more stringent NFPA 13, complete with annunciator panel, and fire alarm connected to Richmond Fire-Rescue.
10. Balconies shall also be sprinklered.
11. For buildings higher than four storeys, additional measures are required:
 - a. The stair well shall be pressurized or be provided with protective smoke vestibule to protect from smoke inundation.
 - b. If stairwell is pressurized, emergency power will be required.
 - c. Roof to be made of non-combustible materials.
 - d. Elevator vestibule will be required to separate the elevator doors from the rest of the floor.
12. Designs will have to be provided by registered professionals as these are considered complex buildings in the BC Building Code.
13. The amendments are not applicable to seniors housing, rooming houses, short term rental buildings such as hotels, residential clubs, and residential care facilities.
14. Requirement for increased vigilance on the part of local fire departments and building facilities management to patrol the stair well in such buildings to prevent storage of materials and items blocking access.
15. Building designs need to be commensurate with capacity of the local Fire Department.

Fire Fighting Perspective

Richmond Fire-Rescue (RFR) expresses the following public safety, firefighting and fire management concerns developed in collaboration with the Lower Mainland Fire Chiefs Association representing the region's fire departments.

Provincial decision makers and advocates seeking ways to promote more housing have not considered fully the very significant fire protection and life safety implications of the SES building code provisions. The decisions to implement appear to reflect a belief that circumventing the established code (considered as obsolete and too restrictive) will enhance the development process and push forward "new" ideas for more affordable housing and permit innovative designs.

RFR, along with the Lower Mainland Fire Chiefs Association and the region's professional firefighters, are united locally, provincially, nationally and internationally in the opinion that the SES amendments were unnecessarily rushed without due diligence to required process. It appears consultation centered on a single report provided by a Professional Engineering firm hired by the Province to provide the technical rationale.

The professional fire service has experience, technical knowledge, and obligations and responsibilities to maintain public safety. RFR has nothing to gain from standing in the way of good ideas, if they do not compromise public safety.

These building code amendments present increased fire risk, which means that there will be an increased risk that the occupants may become victims; especially when existing codes are changed without thoroughly and carefully identifying the layers of safety measures that could help balance the risk equation.

Items of immediate concern are:

1. Stipulated single stairway width is insufficient to avoid potential congestion with evacuations and fire operations.
2. Stairway construction to be non-combustible, not dependent on drywall for fire resistance, and equipped with additional measures defending against intrusion of smoke.
 - a. A single stair removes a key safety redundancy; if that stairwell is filled with smoke or otherwise untenable, occupants on the upper three floors would have no means of escaping the building, except perhaps by a fire ladder truck.
 - b. Fire resistance conferred by drywall is vulnerable to physical damage and inundation with water.
3. As with other building codes permitting SES design, the maximum height of such buildings should be limited to the highest floor that the local fire brigade can reach with their equipment. This reflects the need to use the windows and balconies as a second safe means of egress.
 - a. The reality is that a single stairwell can be compromised by smoke when a fire in one unit opens their door when they evacuate. At that point, anybody that's above

the fire floor is trapped. Those occupants will have to await rescue via a ladder truck.

5. These code amendments require changes and increases to equipment.
 - a. Seattle will send 30–40 firefighters to SES buildings within eight minutes, when there is a fire alarm, including an aerial ladder truck.
 - b. Seattle Fire has 33 stations and over 1,000 firefighters and is not comparable to most, if not all, BC fire departments, including Richmond.
6. Over dependency on active safety systems.
 - a. Despite all the fire prevention systems in modern buildings, sprinklers do on occasion fail, exit ways get blocked, doors get propped open, and fires do occur, and will continue to occur.
7. Behaviors may not be regulated. Cooking activities, smoking materials and open flames cause fires in all buildings, including sprinklered buildings.
 - a. RFR has firsthand experience of four and five-storey sprinklered buildings catching fire due to cooking or smoking on the balcony.
 - b. Intended safety measures such as those proposed in the amendments cannot prevent fire due to unattended cooking and smoking, which can spread quickly up the exterior of the building where rescue is intended.
 - c. Even sprinklers on balconies as intended in the SES amendments were overwhelmed.
 - d. The two stairs within the building allowed occupants to safely escape the center portion where the fire started.
8. Building exterior cladding material is an important component in fire protection.
 - a. SES amendments need to address exterior materials prohibiting highly combustible siding material that, once on fire, spreads very quickly and will defeat exterior sprinkler systems.
9. Our experience informs our position that safety systems sometimes fail to operate as designed or expected, and more importantly, people fail to act as expected.
10. Smoke control is extremely important as it is a killer in fires when it blocks egress paths and exit stair(s).
 - a. Vestibules may not be effective since people will likely hold both doors open to allow for everyone to exit as quick as possible, exposing the exit to smoke.
 - b. Our suggestion is for pressurization of hallways and the exit stair, all supplied with emergency power.
11. Egress pathways at times become compromised.
 - a. In a 10-year sample of Canadian fire data occurring in apartments, nearly 2,000 out of 20,000 fires (10 per cent) had fires originating in the egress pathways (hallways, stairs, and lobbies).
 - b. For example, the charging of scooters or e-bikes in exit ways.

- c. By removing the second egress pathway in the BC Building code, the risk of being trapped by fire increases significantly.
12. Geographic considerations to meet adequate Fire Response.
- a. SES buildings should be in areas where RFR can ensure that the available equipment (aerial ladder truck) and number of trucks to meet the medium risk firefighter assembly numbers or in the standard assembly times can be met.
 - b. Consideration should be given to areas where help from neighboring fire departments will be available.
 - c. Local governments should be allowed to develop bylaws restricting SES locations, as it is a life safety matter. Bylaws could be enacted to address geographical zoning areas, which meet the response needs for the adequate assembly of firefighters and fire suppression.
13. Additional or more frequent inspections of SES buildings should be required to ensure egress paths, including the exit stair, are kept clear and equipment kept in good condition.
- a. Richmond may be required to hire additional compliance inspection resources, above their normal workload to staffing ratios, to keep up with the additional inspections required.
14. Additional equipment potentially required.
- a. Ground ladders are only effective up to three storeys maximum. Each fire engine will bring one or maybe two ground ladders for rescue. This means four to six fire trucks with ground ladders would be needed if the stairway was compromised.
15. Siting conditions will need to be addressed.
- a. An aerial ladder (which RFR deploys three) can typically reach six storeys, if there are no overhead wires.
 - b. However, SES buildings will potentially be inaccessible from the sides and not every area has laneway access wide enough to set up an aerial ladder. This results in only being able to rescue from the front roadway side of the building, 25 per cent of the windows and balconies, unless it is a corner lot, then 50 per cent.
 - c. This leaves 50–75 per cent of the occupants on the upper floors without a means of egress, if the exit is smoke compromised.



Greater Vancouver Fire Chiefs' Association

c/o 8767 132 St,
Surrey, BC V3W 4P1

August 6, 2024

Kevin Harding
John Thomson
Ministry of Housing
Province of British Columbia
building.safety@gov.bc.ca

Re: Invitation to review draft code language and provide suggestions to describe an adequate level of fire service where Single Egress Stair buildings are built.

Thank you for the opportunity to review the draft code language for enabling Single Egress Stair (SES) and invitation to suggest how we can use existing standards, definitions, or benchmarks to describe an adequate level of fire service to be provided where SES buildings are built and other tools our organization feel may be helpful in doing our work in fire safety.

The Greater Vancouver Fire Chiefs Association solicited comments from its membership on the request received from the Ministry. The results of the solicitation were wholly consistent in that every comment made is opposed to the BC Building code being amended prior to a more fulsome review process such as the national building code amendment process. Changes in building practice and codes in Canada have traditionally followed an in-depth, consensus-based process that considers all perspectives, extensive research and evidence. Due to the important and wide-ranging implications, it is not a process to be rushed, considered incremental or driven by single-issue agendas.

Other comments were also included and are provided below for the GVFCA submission on this topic.

Adequate level of Fire Service

The current National Fire Protection Association (NFPA) 1710 Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments provides definitions and benchmarks related to fire response. Appendix I contains samples of the NFPA 1710 definitions and benchmarks for reference to the request and this submission.

President: Fire Chief Larry Thomas, *Vice President:* Fire Chief Guy McKintuck, *Treasurer:* Fire Chief Jim Wishlove, *Director at Large:* Deputy Chief Norm McLeod, *Secretary:* Shristee Kumar

Special attention should be given to the deployment requirements in section 5.2.4 of the NFPA 1710 standard. The difference in resources required for a three-story “Apartment Initial Full Alarm Assignment Capability” and a “High-Rise Initial Full Alarm Assignment Capability” (building with the highest floor greater than 75 ft (23 m) above the lowest level of fire department vehicle access), is 27 to 43 on-duty career firefighting staff.

Further, the standard provides when responding to fires in occupancies that present hazards greater than those found in the occupancies described in section 5.2.4 shall deploy additional resources on the initial alarm. The fire department shall have the capability to deploy additional alarm assignments that can provide for additional command staff, members, and additional services, including the application of water to the fire; engagement in search and rescue, forcible entry, ventilation, and preservation of property; safety and accountability for personnel; and provision of support activities for those situations that are beyond the capability of the initial full alarm assignment.

A potential six-story SES building would meet the criteria of presenting a greater hazard than a three-story apartment building with additional means of egress. Therefore, the resource requirements for deployment would fit somewhere in between the three-story requirement of 27 staff and the high-rise resource requirements of 43.

The NFPA standard also provides response time requirements. The first due engine company at a fire suppression incident has 240 seconds or less travel time for arrival. The arrival of the second company has 360 seconds or less travel time, with a minimum staffing of 4 personnel at a fire suppression incident. For fire suppression incidents other than high-rise, 480 seconds or less travel time is allowed for the deployment of an initial full alarm assignment.

All of these NFPA 1710 requirements rely on an adequate supply of water from fire hydrants in a municipal water distribution system.

If SES building code amendments were to be adopted, local government, at a minimum, would require an exemption from needing building code concurrent authority approval from the province, so local bylaws could be enacted to address geographical zoning areas which meet the NFPA 1710 standard requirements.

Conflict with Public Safety Operations

The single means of egress will significantly impede the firefighter's ability to assist occupant egress, especially if the stairway is required for suppression operations.

With respect to firefighting assumptions in particular the Jensen Hughes comment "additional building protection measures may be required". The AHJ should have the authority to either approve or not approve SES and impose the addition of a second exit as the "additional building protection measure". Municipalities should be allowed to develop bylaws restricting SES, as it is a life safety matter. At a minimum, local government would require an exemption from needing building code concurrent authority approval from the province, so local bylaws could be enacted to address geographical zoning areas which meet the NFPA 1710 standard requirements.

Police operations as well as Emergency Medical responses and patient transport are also restricted with a limited 1500 mm single exit stair for access or egress.

The SES design increases occupant and responder risk due to there being a single point of failure in the building protection system. Whether the single point of failure is the sprinkler system, ventilation for egress or accidental/intentional obstruction of the exit stair, there does not appear to be any other design features that can facilitate access/egress in the event of an emergency.

Fire risk of overwhelming one of the single points of failure is further increased as the building construction material is combustible, as opposed to non-combustible materials, as used in international jurisdictions or in a large majority of high-rise buildings.

Adequate level of prevention oversight

The proposed code amendments for SES rely heavily on all building systems functioning as intended for fire protection and life safety 100% of the time. If there is a single point of failure in the building design, the most effective alternate life safety design for occupant and responder safety is the second egress stair, and it is proposed to be removed. Other areas of potential single point of failure which significantly increase access/egress risk during an emergency are:

- The egress pathway must remain clear of parcels/packages, storage and other obstructions.
- The exit facility should be non-combustible construction to be safer for all, rather than the alternate described.
- The exit facility should be automatically pressurized and not rely on a vestibule on the public corridor side of the doorway.
- The behavior of persons during an emergency is invariably the biggest wildcard when expecting egress systems to work as designed.

For these few reasons, the proposed code amendments will increase the need for prevention compliance inspections and follow up to achieve compliance with any violations. While the newly enacted Fire Safety Act provides a risk-based approach to adapt the frequency of compliance inspections, this will create an additional burden on the existing prevention staff resources within fire departments, because SES buildings will be higher risk due to multiple points of single system failure.

Local governments should not be required to hire additional compliance inspection prevention resources for SES high risk buildings, outside of their normal workload to staffing ratios.

In closing, emerging technologies and new hazards such as those posed by lithium-ion battery-powered devices, solar power, and building energy storage systems, underscore the need to be able to exit a building quickly and safely in an emergency. The proliferation of such risks necessitates stringent adherence to building codes that prioritize occupant and firefighter safety, with the inclusion of a second staircase serving as a cornerstone of this protective framework.

Enhancing safety and accessibility beyond its life-saving implications, the provision of two staircases enhances the efficiency, convenience, and inclusivity of residential living environments. It mitigates congestion, promotes equitable access for individuals with mobility challenges, and fosters a more welcoming community for all residents. This is especially important when more and more combustible products, including delivered packages, adds potential fuel loads into the corridors and egress pathways.

The top three causes of fires are People, People and People. Despite fire prevention systems and educational efforts, fires are always caused by the behavior and actions of people. This is why fire and safety system redundancy is a best practice to preserve life and property.

The GVFCFA and its members urge the Ministry to reconsider its initiative to adopt building code changes to enable SES building development for the many reasons we have provided.

Thank you for the opportunity to provide a submission on this important topic for public safety professionals.

A handwritten signature in black ink, appearing to read "Larry Thomas". The signature is written in a cursive, flowing style.

Larry Thomas, President
Greater Vancouver Fire Chiefs Association

APPENDIX I

Definitions

3.3.13 Career Fire Department - A fire department that utilizes full-time or full-time-equivalent (FTE) station-based personnel immediately available to comprise at least 50 percent of an initial full alarm assignment.

3.3.15 Fire Company – A group of members:

- (1) under the direct supervision of an officer;
- (2) trained and equipped to perform assigned tasks;
- (3) usually organized and identified as engine companies, ladder companies, rescue companies, squad companies, or multi-functional companies;
- (4) operating with one piece of fire apparatus (pumper, aerial fire apparatus, elevating platform, quint, rescue, squad, ambulance) except where multiple apparatus are assigned that are dispatched and arrive together, continuously operate together, and are managed by a single company officer;
- (5) arriving at the incident scene on fire apparatus. [1500, 2018]

3.3.16 Company Officer - A supervisor of a crew/company of personnel.

3.3.17 Crew - Two or more members who have been assigned a common task and are in communication with each other, coordinate their activities as a work group, and support the safety of one another. [1081, 2018]

3.3.27 Fire Suppression - Fire suppression includes all activities performed at the scene of a fire incident or training exercise that expose fire department members to the dangers of heat, flame, smoke, and other products of combustion, explosion, or structural collapse. [1500, 2018]

3.3.40 Initial Full Alarm Assignment - Those personnel, equipment, and resources ordinarily dispatched upon notification of a structure fire.

3.3.49.1 Emergency Operations - Activities of the fire department relating to rescue, fire suppression, emergency medical care, and special operations, including response to the scene of the incident and all functions performed at the scene. [1500, 2018]

3.3.53 Rapid Intervention Crew (RIC) – A dedicated crew of at least one officer and three members, positioned outside the IDLH, trained and equipped as specified in NFPA 1407, who are assigned for rapid deployment to rescue lost or trapped members.

3.3.54 Rescue - Those activities directed at locating endangered persons at an emergency incident, removing those persons from danger, treating the injured, and providing for transport to an appropriate health care facility. [1500, 2020]

3.3.64.7 Travel Time - The time interval that begins when a unit is enroute to the emergency incident and ends when the unit arrives at the scene.

Benchmarks

Response time:

4.1.2.1 - The fire department shall establish the following performance objectives for the first-due response zones that are identified by the AHJ:

(3) 240 seconds or less travel time for the arrival of the first engine company at a fire suppression incident

(4) 360 seconds or less travel time for the arrival of the second company with a minimum staffing of 4 personnel at a fire suppression incident

(5) For other than high-rise, 480 seconds or less travel time for the deployment of an initial full alarm assignment at a fire suppression incident

(6) For high-rise, 610 seconds or less travel time for the deployment of an initial full alarm assignment at a fire suppression incident

Fire Suppression Capability:

5.2.1.1 - Based on a formal community risk assessment, fire suppression operations shall be organized to ensure that the fire department's fire suppression capability encompasses deployment of personnel, equipment, and resources for an initial arriving company, the initial full alarm assignment, and additional alarm assignments.

5.2.2* Staffing - The number of on-duty fire suppression members shall be sufficient to perform the necessary fire-fighting operations given the expected fire-fighting conditions.

5.2.2.1 - These numbers shall be determined through task analyses that take the following factors into consideration:

- (1) Life hazard to the populace protected
- (2) Provisions of safe and effective fire-fighting performance conditions for the fire fighters
- (3) Potential property loss
- (4) Nature, configuration, hazards, and internal protection of the properties involved
- (5) Types of fireground tactics and evolutions employed as standard procedure, type of apparatus used, and results expected to be obtained at the fire scene

5.2.2.2 - On-duty members assigned to fire suppression shall be organized into company units and shall have appropriate apparatus and equipment assigned to such companies.

5.2.2.2.1 - The fire department shall identify minimum company staffing levels as necessary to meet the deployment criteria required in 5.2.4 to ensure that a sufficient number of members are assigned, on duty, and available to respond with each company.

5.2.2.2.2 - Each company shall be led by an officer who shall be considered a part of the company.

5.2.2.2.3 - Supervisory chief officers shall be dispatched or notified to respond to all full alarm assignments.

5.2.3 Operating Units - Fire company staffing requirements shall be based on minimum levels necessary for safe, effective, and efficient emergency operations.

5.2.3.1 Engine Companies - Fire companies whose primary functions are to pump and deliver water and perform basic fire fighting at fires, including search and rescue, shall be known as engine companies.

5.2.3.1.1 - These companies shall be staffed with a minimum of four on-duty members.

5.2.3.1.2 - In first-due response zones with a high number of incidents, geographical restrictions, geographical isolation, or urban areas, as identified by the AHJ, these companies shall be staffed with a minimum of five on-duty members.

5.2.3.1.2.1 - In first-due response zones with tactical hazards, high-hazard occupancies, or dense urban areas, as identified by the AHJ, these fire companies shall be staffed with a minimum of six on-duty members.

5.2.3.2 Ladder/Truck Companies - Fire companies whose primary functions are to perform the variety of services associated with truck work, such as forcible entry, ventilation, search and rescue, aerial operations for water delivery and rescue, utility control, illumination, overhaul, and salvage work, shall be known as ladder or truck companies.

5.2.3.2.1 - These fire companies shall be staffed with a minimum of four on-duty members.

5.2.3.2.2 - In first-due response zones with a high number of incidents, geographical restrictions, geographical isolation, or urban areas, as identified by the AHJ, these fire companies shall be staffed with a minimum of five on-duty members.

5.2.3.2.2.1 - In first-due response zones with tactical hazards, high-hazard occupancies, or dense urban areas, as identified by the AHJ, these fire companies shall be staffed with a minimum of six on-duty members.

5.2.3.3 Other Types of Companies.

5.2.3.3.1 - Other types of companies equipped with specialized apparatus and equipment shall be provided to assist engine and ladder companies where necessary to support the fire departments' SOPs.

5.2.3.3.2 - These companies shall be staffed with the minimum number of on-duty members required to deal with the tactical hazards, high-hazard occupancies, high incident frequencies, geographical restrictions, or other pertinent factors as identified by the AHJ.

5.2.3.4 Fire Companies with Quint Apparatus.

5.2.3.4.1 - A fire company that deploys with quint apparatus, designed to operate as either an engine company or a ladder company, shall be staffed as specified in 5.2.3.

5.2.3.4.2 - If the company is expected to perform multiple roles simultaneously, additional staffing, above the levels specified in 5.2.3, shall be provided to ensure that those operations can be performed as required.

Deployment

5.2.4.3 Apartment Initial Full Alarm Assignment Capability.

5.2.4.3.1 - The initial full alarm assignment to a structure fire in a typical 1200 ft² (111 m²) apartment within a three-story, garden-style apartment building shall provide for the following:

(1) Establishment of incident command outside the hazard area for the overall coordination, direction, and safety of the initial full alarm assignment with a minimum of two members dedicated to managing this task (2)

- (2) Establishment of two uninterrupted water supplies at a minimum of 400 gpm (1520 L/min), with each supply line maintained by an operator (2)
- (3) Establishment of an effective water flow application rate of 300 gpm (1140 L/min) from three handlines, each of which has a minimum flow rate of 100 gpm (380 L/min), with each handline operated by a minimum of two members to effectively and safely maintain each handline (6)
- (4) Provision of one support member for each attack, backup, and exposure line deployed to provide hydrant hookup and to assist in laying of hose lines, utility control, and forcible entry (3)
- (5) Provision of at least two victim search-and-rescue teams, each team consisting of a minimum of two members (4)
- (6) Provision of at least two teams, each team consisting of a minimum of two members, to raise ground ladders and perform ventilation (4)
- (7) If an aerial device is used in operations, one member to function as an aerial operator and maintain primary control of the aerial device at all times (1)
- (8) At a minimum, an initial rapid intervention crew (IRIC) assembled from the initial attack crew and, as the initial alarm response arrives, a full and sustained rapid intervention crew (RIC) established (4).
- (9) The establishment of an initial medical care component consisting of at least two members capable of providing immediate on-scene emergency medical support, and transport that provides rapid access to civilians or members potentially needing medical treatment (2)
- (10) Total effective response force a minimum of 27 (28 if an aerial device is used)

5.2.4.4* High-Rise Initial Full Alarm Assignment Capability.

5.2.4.4.1 - Initial full alarm assignment to a fire in a building with the highest floor greater than 75 ft (23 m) above the lowest level of fire department vehicle access shall provide for the following:

- (1) Establishment of a stationary incident command post outside the hazard area for overall coordination and direction of the initial full alarm assignment with a minimum of one officer with an aide dedicated to these tasks and all operations are to be conducted in compliance with the incident command system. (2)
- (2) Establishment of an uninterrupted water supply to the building standpipe/sprinkler connection sufficient to support fire attack operations

maintained by an operator and if the building is equipped with a fire pump, one additional member with a radio to be sent to the fire pump location to monitor and maintain operation. (1/1)

(3) Establishment of an effective water flow application rate on the fire floor at a minimum of 500 gpm (1892 L/m) from two handlines, each operated by a minimum of two members to safely and effectively handle the line. (4)

(4) Establishment of an effective water flow application rate on the floor above the fire floor at a minimum of 250 gpm (946 L/m) from at least one handline, with each deployed handline operated by a minimum of two members to safely and effectively handle the line. (2)

(5) At a minimum, an initial rapid intervention crew (IRIC) assembled from the initial attack crew and, as the initial alarm response arrives, a full and sustained rapid intervention crew (RIC) established. (4)

(6) Provision of two or more search-and-rescue teams consisting of a minimum of two members each. (4)

(7) Provision of one officer, with an aide, dedicated to establishing an oversight at or near the entry point on the fire floor(s). (2)

(8) Provision of one officer, with an aide, dedicated to establishing an oversight at or near the point of entry on the floor above the fire. (2)

(9) Provision of two or more evacuation management teams to assist and direct building occupants with evacuation or sheltering actions, with each team consisting of a minimum of two members. (4)

(10) Provision of one or more members to account for and manage elevator operations. (1)

(11) Provision of a minimum of one trained incident safety officer. (1)

(12) Provision of a minimum of one officer two floors below the fire floor to manage the interior staging area. (1)

(13) Provision of a minimum of two members to manage member rehabilitation and at least one of the members to be trained to the ALS level. (2)

(14) Provision of an officer and a minimum of three members to conduct vertical ventilation operations. (4)

(15) Provision of a minimum of one officer to manage the building lobby operations. (1)

(16) Provision of a minimum of two members to transport equipment to a location below the fire floor. (2)

(17) Provision of one officer to manage external base operations. (1)

(18) The establishment of an initial medical care component consisting of a minimum of two crews with a minimum of two members each with one member trained to the ALS level capable of providing immediate on-scene emergency medical support, and transport that provides rapid access to civilians or members potentially needing medical treatment. (4)

(19) Total effective response force a minimum of 42 (43 if the building is equipped with a fire pump).

5.2.4.6 Additional Alarm Assignments.

5.2.4.6.1 - Fire departments that respond to fires in occupancies that present hazards greater than those found in the occupancy described in 5.2.4.1 shall deploy additional resources on the initial alarm.

5.2.4.6.2 - The fire department shall have the capability to deploy additional alarm assignments that can provide for additional command staff, members, and additional services, including the application of water to the fire; engagement in search and rescue, forcible entry, ventilation, and preservation of property; safety and accountability for personnel; and provision of support activities for those situations that are beyond the capability of the initial full alarm assignment.



Ontario Association of Fire Chiefs (OAFC)

OAFC Position on Single Exits in Buildings up to Six Stories or that Exceed Current Code Requirements

January 09, 2024



ONTARIO ASSOCIATION OF FIRE CHIEFS

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Debate Origin | Introduction

The Ontario Association of Fire Chiefs (O AFC) was presented with an option under consideration by the Provincial Government regarding the acceptance of the use of single exits for the purposes of evacuations of persons from a building of up to six storeys in height.

The O AFC has reviewed the position paper [website](#) along with other documents relating to the argument to permit the use of single exits to be mindful of emerging trends in construction and alternate means of compliance.

Fire exits stairwells, and moreover, redundant fire exits based on travel distance and exit capacity is a fundamental concept in fire protection and life safety. These fundamental components are essential to the formulation of an entire building.

The present discussion over the acceptance and use of single staircase is contrary to the evolution of building codes and standards established in North America. An integral element to survival in a fire situation is a protected secondary means of escape for occupants to reach a place of safety. As a last resort, a protected area of refuge can be used until rescue by first responders is available.

As such, the O AFC is unable to endorse any reduction in exiting or reduction in the fire safety systems provided to protect firefighters and occupants within a building.

The following outlines specific arguments and rebuttals based on documents provided that are in favour of single exits, and fire safety concerns regarding their allowance.

Aesthetic Design Over Public Safety

The position of the Provincial Government references a website authored by a McGill University student as part of a [thesis paper](#). This website includes various references and examples of single stairwells and their existence in historical places, namely in Europe. These examples are based on construction prior to modern building codes being established with construction materials of a different era.

The concepts and design strategies for atrium spaces and inviting spaces for residents as suggested are achievable under the Ontario Building Code when these spaces are treated as convenience stairwells in an interconnected floor space rather than an exit stair. These suggested design features consume significant amounts of floor area. Their use is contrary to the student's argument that a single exit will permit additional residential space.

While creativity and innovation in construction should be encouraged, it should not be at the cost of public safety, particularly when the floorspace required for an exit is so minimal.



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Any architect who wishes to explore alternative means of design concepts can do so under the current framework of the Ontario Building Code, without compromising life safety, or without asking for reduction in current code requirements. An alternative solution acts as a compensating measures mechanism which requires designers, architects, and engineers to submit alternative plans to demonstrate how compliance will be achieved by alternate means than prescriptive code requirements. The designer is required to provide compensating measures and to identify how specific code objectives and functions will still be met by alternative installations or mechanisms. A decision to eliminate a secondary exit stairwell from a building goes outside of this established mechanism and should not be permitted.

As this argument places aesthetics needs ahead of life safety requirements, as such the OAFCA strongly disagrees with this position.

Firefighting Operations

To better understand the necessity for exit stairwells as it relates to firefighting operations, the following describes a typical firefighting scenario where fire crews approach a standard designed building with the attempt of fire suppression and occupant rescue.

In the event of a low rise, mid rise or high rise fire, firefighters will position themselves in a staging area two floors below the fire floor (where possible and floor dependant). Firefighters will then take control of an exit stairwell having connected to the standpipe system and running the hose up the stairwell. This ensures firefighters are equipped with water when making entry to the fire floor where the hose line can offer a screen of protection from the heat of the fire where necessary. In the event of a bail out, the firefighters can follow the hose line to the exit stairwell. The stairwell that is used to move the fire hose up then become contaminated, as the fire hose inherently blocks the door open at the floor it was connected and at the fire floor; making this stairwell unusable for the purpose of evacuating occupants. This leaves the alternate stairwell to be assigned as the evacuation/exit stairwell for occupants. The alternate stairwell is maintained smoke free (by pressurizing the stairwell and maintaining control of the doors) so it remains safe to evacuate occupants.

Firefighting operations also involve several firefighters advancing upwards, often with additional equipment. Use of the same stairwell by both firefighters and occupants has two life safety impacts: a) firefighters and equipment occupies available space in the stairwell, thereby impeding and slowing the egress of occupants, and b) descending occupants impede and slow fire operations.

In the event of a single stairwell, these fundamental fire attack strategies are not possible and set back firefighter strategy development by 40 years. Further, by removing the ability to engage the fire attack from a lower floor, the ability for firefighters to fight the fire has been significantly impacted and their safety further threatened.



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The removal of a second exit stair or elimination of a contained egress area now forces persons attempting to evacuate to pass by the firefighters, possibly without any protection.

With a single exit stair, firefighters will be required to modify their firefighting operations to expose themselves directly to the fire floor resulting in undue risk to firefighters as well as occupants during evacuation.

Understanding The Space Occupied by Exit Stairwells

Proponents advocating for a single exit of high-rise buildings will often indicate that the increased floor space will be used for residential needs or to accommodate additional dwelling units. In review of a sample building of 8,000 square feet per floor it can be demonstrated that this argument is without merit. Please see the below as an example as to the minimal space required by an exit stairwell when compared to an actual building arrangement in a nearby municipality.

Example 1:

Modern Highrise construction of tower on podium:

Project X in an a nearby municipality

13 units per tower floor totalling 8,329 ft²

2 stairwells 103.8 ft² + 103.8 ft² = 207.6ft² or 2.4% of building footprint

In the event this building was provided with one stairwell, this reduction in space would not create sufficient area to accommodate an additional unit rather, most likely would be absorbed into an adjacent unit.

Practical understanding of the space required by a secondary stairwell reveals this argument to be null.

Recommendations

The Ontario Association of Fire Chiefs' Fire Prevention and Public Education Advisory Committee (FPPE) strongly disagrees with the concept of single exit stairwell buildings and urges the Provincial Government and Minister of Municipal Affairs and Housing to be mindful of past incidents that have established the baseline building codes we follow today.

The OAFCA FPPE subcommittee strongly suggests that secondary exits remain in place to ensure the following:

- Sufficient exiting remains in place for the safe use of firefighters during firefighting operations and to ensure occupant survival and rescue;



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- Sufficient exiting is in place that meets the needs of occupants to evacuate safely in the event of an emergency; is a safe place for firefighters to operate during firefighting operations (firefighting and occupant rescue), while protecting both occupants and firefighters from undue risk that comes with that comes with single exits.

It should be noted and recognized that the cities of Seattle, Washington and London, England that had previously approved the use of single exiting are now in the process of removing/rescinding the allowance for this due to the life safety concerns identified within this document.

The OAFCh recommends rejecting any consideration for a single egress in multi-unit buildings. The Ministry of Municipal Affairs and Housing subcommittee on building code changes can address change recommendations through the regular process of subcommittee research and reviewing best practices. It is suggested that Ontario Building Code changes follow the normal process that provides the opportunity for public comment, keeping in mind that there is always an opportunity for applicants to utilize the alternative solution provision in the Ontario Building Code.