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NRC Single Egress Construction (SEC) Consultation
Draft Observer Comments – Meeting 1 Information Session

submitted by email to Mr. Ahmed Kashef - Ahmed.Kashef@nrc-cnrc.gc.ca

Dear NRC,

Thank you for the opportunity to submit comments as an observer of the Single Egress Construction consultation group. I am the co-author of the original code change requests, CCR 1815 and 1816, submitted in April 2022 to the national model codes system.

As a participant in the NFPA Single Exit Stair symposium in Boston last week, it was helpful for attendees to understand what is being proposed by single egress proponents in Canada and the United States - particularly in terms of the building height, floor area and occupant load served. It may be useful to provide the consultation members with examples of single egress designs to ensure that the feedback is relevant to the proposed scale of small multi-unit residential buildings.

The following questions and comments intend to be constructive and to clarify scope of this consultation.

1. **The terms of engagement are for *"the evaluation of safety related challenges for single means of egress in multi-unit residential occupancies"*. How is multi-unit residential occupancy being defined to exclude occupancies other than dwelling units?** Please note that the original code change requests were intended to support infill housing within urban areas on smaller properties. This question is to caution against scope creep to study single egress within floor areas of non-residential occupancy or for short-term/transient residential occupancy. Many other jurisdictions have single egress conditions specifically for apartment buildings of limited floor area (although some countries allow office buildings up to a certain height and floor area). It would be helpful to clarify which Group C occupancies are excluded (such as hotel, motel, retirement home, monastery, etc.), while acknowledging that certain dwelling unit type occupancies, such as live/work units, student housing, etc. may require additional consideration. For context, the International Building Code classification of R-2 (non-transient, defined as more than 30 days) is a relevant example. It may be worthwhile to consider subcategories within Group C occupancy to prevent confusion and future interpretation challenges. For instance, subdividing Group C into C-1, C-2, C-3 to address differences between transient and non-transient residential occupancy types.

2. **The terms of engagement states that *"Residential buildings for this project are considered to be a building of only residential occupancy above grade and may include below grade parking serving only the residential building above".*** This definition excludes the consideration of building archetypes having floor areas of other occupancies within the same building (such as Group E or D) that are separate and not served by the single exit stair. This limits the opportunity for small multi-unit residential buildings along mixed-use main streets in precisely the urban locations where they are most likely to be supported by planning policies for building height and density. It is also inconsistent with egress requirements applying to the floor areas and occupancies

they serve. It is unclear why consideration of single egress serving residential occupancy should prohibit retail, personal service and office occupancies in other parts of the building provided that they do not communicate directly with the single exit stair serving the residential occupancy.

3. **Is the consultation structured to primarily hear concerns from fire safety and accessibility experts or to consult more broadly on relevant aspects both in terms of the challenges and also the benefits to fire and life safety, accessibility, housing supply, urban planning, sustainability and architecture?** The consultation membership may benefit from an architect or urban planner with recent relevant experience in the design, planning and development of small multi-unit residential buildings. A list of experts below:

Architecture: Ken Borton - ken@5468796.ca - 5468796 architecture in Winnipeg (Part 9 and 3 projects)

Architecture: Toon Dreesen - tdreessen@architectsdca.com – architect in Ottawa

Architecture: Jamie Harte - jamie@publicarchitecture.ca – architect in Vancouver (Part 3 projects)

Architecture: Bryn Davidson - bryn@lanefab.com – builder and architect in Vancouver (Part 9 projects)

Architecture/Building Code: Tavis McAuley - tavis@mcauleyconsulting.ca – architect/CP in Vancouver

Architecture/Sustainability: Kelly Alvarez Doran - kelly@halfclimatedesign.com - Ha/f Climate Design

Urban Planning: Chris Higgins - chris.higgins@vancouver.ca - City of Vancouver, Green Building Planner

Urban Planning: Carl Isaak - carl@smallhousingbc.org - Director of Planning, Small Housing BC

Educator/Academic: Lloyd Alter - lloydalter@me.com - Editor, Writer, Adjunct Professor, BArch, OAA (ret)

4. **What minimum level of performance required by Division B acceptable solutions will be used to establish minimum acceptable levels of risk for single egress construction?** There are many minimum acceptable solutions within Division B that could be applicable for comparison of occupant and firefighter safety using probabilistic and event tree analysis of fire scenarios to establish acceptable risk within multi-unit residential buildings. A few examples:

    - For Part 9 buildings: occupant and firefighter safety within three-storey unsprinklered townhouses
    - For Part 9 buildings: occupant and firefighter safety within three-storey unsprinklered small apartment buildings of not more than 600m2 building area, served by two exit stairs each having 900mm minimum width
    - For Part 3 buildings: occupant and firefighter safety within six-storey mid-rise apartment buildings served by two exit stairs each having 1100mm min. width (resulting in an occupant load of 275 persons per storey) and a building area determined by the maximum travel distance of 45m to at least one exit, resulting in a 102m maximum effective corridor length
    - For Part 3 buildings: reverse analysis by first determining the building area and height for a single stair building design, limited by 6m dead-end travel distance and a proposed occupant load and number of dwelling units, and then comparing this to a scissor-stair building design having the same building area (i.e. a more restrictive method than the aforementioned scenarios where the comparison assumes the same building area, i.e. “site-specific” method)

Each of these archetypical acceptable solutions and corresponding building designs could be used to inform probabilistic analysis of relevant fire scenarios (fire in dwelling unit, fire in corridor, fire in exit, fire at exit discharge). The analysis could then be layered to include appropriate mitigation (smoke control measures, increased stair width, improved compartmentation, etc.) that are otherwise not required. Given the number of relevant variables could result in several hundreds/thousands of design options, it would be prudent to prevent scope creep by defining maximum thresholds/trigger limits for building height, number of dwelling units per storey, and occupant load per storey to reduce excessive parameterizing. As a suggestion, working with a defined building height limit and occupant load per storey limit, and then adjusting for a more stringent occupant load and introducing a limit to the number of dwelling units per storey (as well as introducing additional mitigating measures) could offer a method of parametric risk assessment while controlling for too many variables.

Please note that several North American fire services have published position papers expressing opposition and concerns with single egress building design (available at www.cafc.ca/single-egress). Many of these statements mischaracterize single egress as simply “removing the second exit” from buildings without making any reference to the strict conditions and proposed mitigating measures in relation to current code. At least one of these papers provides an example of single egress for high-rise buildings having 13 dwelling units per storey and an 8,000+ sq. ft. building area (See Ontario Association of Fire Chiefs). Such an example is not representative of the original code change requests.

At the NFPA Single Exit Stair symposium on September 11-12, 2024, a concerned U.S. fire marshal stated that fire safety is first about preventing fires from occurring, second about preventing fires from spreading, and third about ensuring safe occupant egress and firefighter ingress. It is worth remarking that this hierarchy is precisely what the requirements of the original code change requests for single egress are able to provide - limited height, floor area and occupant load reduces risk of fire events occurring within a building, increased compartmentation reduces risk of fire spread beyond the suite of origin and smoke control measures reduce the risk of smoke infiltration into the exit during egress and firefighter operations. Single egress with appropriate mitigating measures addresses both the first, second and third priority, whereas the provision of two exits solely addresses the third priority.

Thank you.

P.s. Please note the varied use of the terminology of single exit, single exit stair, single egress and single egress construction. Given the proposed conditions impact the design of the public corridor and floor areas served, a descriptive title of Single Egress was selected for the original code change request. However, some jurisdictions (NFPA 101, IBC, Seattle, British Columbia) use the term Single Exit and Single Exit Stair (SES).