# *MEETING MINUTES*

## NFPA High-Rise Building Safety Advisory Committee
## **(HRB-SAC)**

4-5 October 2006
Residence Inn Vancouver Downtown
Vancouver, British Columbia, Canada

1. **Call to Order**. Chair Quiter called the meeting to order at 8:30 AM. Chief Ray Holdgate welcomed the committee to the city of Vancouver, and provided a brief overview of some of the fire department's current concerns regarding the many residential high rise buildings in Vancouver. Chief Holdgate indicated that as a whole the buildings are performing well but that some issues have arisen with regard to building access and security, the high density of buildings and vehicle traffic, the need for bi- and multi-lingual emergency announcements, the increasing elderly population in some of the buildings and access to elevator controls.

2. **Introduction of Members and Guests**. The following committee members were in attendance:

| **Name** | **Representing** |
|---|---|
| James Quiter (chair) | Arup |
| Richard Bukowski (day 1 only) | National Institute of Standards and Technology – Building and Fire Research Laboratory |
| Geoff Craighead | Securitas Security Services USA, Inc. |
| Charles Jennings | City of White Plains NY / The Skyscraper Safety Campaign |
| John Miller | Los Angeles City Fire Department / International Association of Fire Fighters |
| Jack Murphy | JJM & Associates, LLC / Fire Safety Directors Association of Greater New York |
| Jake Pauls | Jake Pauls Consulting Services on Building Use and Safety / American Public Health Association |
| Robert Pratt | Tishman Speyer Properties |
| Wes Shoemaker (day 1 only) | Winnipeg Fire Paramedic Service / Metropolitan Fire Chiefs |
| Milosh Puchovsky (non-voting staff liaison) | NFPA |

The following committee members were not in attendance:

| Name | Representing |
|---|---|
| Jon Magnusson | Magnusson Klemencic Associates / National Council of Structural Engineering Associations |
| Steven Nilles | Goettsch Partners/ Council on Tall Buildings & Urban Habitat |
| Sally Regenhard (Alternate member Charles Jennings in attendance) | The Skyscraper Safety Campaign |

The following guests were also in attendance:

| Name | Representing |
|---|---|
| Rita Fahy | NFPA |
| Chief Ray Holdgate (day 1 only) | Vancouver Fire and Rescue Services |

3. **Agenda Review.** Chair Quiter reviewed the agenda and indicated that agenda item 11 would be addressed right after agenda item 4, and that agenda item 7 would be addressed after agenda item 12.

4. **Approval of October 22-23 March 2006 meeting minutes.** The minutes were approved without modification.

5. **Review of HRB-SAC ballot on policy positions.** The results of the ballot were reviewed as presented in Agenda Attachment B. No further actions were recommended.

6. **Review summary of HRB-SAC responses and action items to NIST WTC recommendations.** The committee reviewed the information presented in Agenda Attachment C and Agenda Attachment D. No further action was recommended other than in the Summary Report (Agenda Attachment C), a reference to NFPA 1720, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments,* should be added to Affected Documents column for NIST recommendations 20 and 21.

7. **Development of additional action items for NFPA technical committees.** Jake Pauls distributed three public proposals he submitted for code changes to NFPA 101 and NFPA 5000 (See **Minutes Attachment A**). It was agreed that the proposals are generally in-line with the action items proposed by the committee. However, it was also agreed that no further action should be taken until after the applicable technical committees have had an opportunity to react to the action items identified in the Summary Report (Agenda Attachment C), and other related public proposals submitted to NFPA. As indicated in agenda item 14, the committee is planning its next meeting in July of 2007 following the publication the Report on

Proposals for NFPA 1, NFPA 101 and NFPA 5000. This provides opportunity for responding to the actions of the Technical Committees on specific proposals concerning high rise buildings.

8. **Development of Emergency Procedures.** The committee reviewed information concerning emergency procedures. Information from the National Fire Code of Canada on emergency planning (**Minutes Attachment B**), an emergency action plan checklist from the text Extreme Event Mitigation in Buildings (**Minutes Attachment C**) and an outline of emergency procedures for a building in California (**Minutes Attachment D**) were also reviewed. The committee developed a list of information that should be included as part of an emergency plan for high rise buildings. It was agreed that this information should be forwarded to NFPA technical committees for their consideration. The committee directed chair Quiter to contact the chair of the technical committee responsible for sections 11.8 of NFPA 101 and chapter 33 of NFPA 5000 both which address high rise buildings to request that the technical committee develop a committee proposal requiring an emergency plan for all high rise buildings (**See Minutes Attachment E**). Chair Quiter appointed a task group consisting of Jack Murphy (chair), John Miller, Wes Shoemaker, Robert Pratt and Charles Jennings and charged them with further developing information on emergency plans that could be used by NFPA technical committees and others.

9. **Update on Leadership in Life Safety Design (LLSD) Concept.** NFPA staff indicated that the LLSD concept was discussed with members of the NFPA management team. While the management team was in general agreement with the overall merits of the concept especially as it advocates voluntary life safety enhancements, a number of concerns were raised primarily with the technical soundness of the concept as currently proposed. It was felt that a simple cumulative point score system, as modeled after the LEEDs program, cannot adequately addresses the number, variety and type of life safety enhancements for the range of potential life safety hazards being contemplated. A means of appropriately indexing and weighing various life safety enhancements poses a complex problem and the profession's collective gaps in knowledge on the relevant subjects present a significant obstacle. The application of LLSD to existing buildings further complicates matters, as does establishing a baseline of building performance from which to begin assessing the safety enhancements. Concerns were also raised with regard to the overall market demand and relevance for this type of product and service, the detrimental effect a poorly produced product and service could have, and the potential exposure if a building praised as having enhanced safety features experienced an undesirable outcome during an emergency situation. At the current time, the NFPA management team believes that the downsides of the concept outweigh the benefits. However, some members of the management team did suggest that the LLSD concept is worth investigating primarily from a research project perspective, and that a gap analysis of our current knowledge base be a key research priority. NFPA's Research Foundation was mentioned as a possible resource for exploring research opportunities. The management team also suggested that the efforts of other organizations such as those of the Building Security Council be reviewed.

Upon hearing the NFPA management team report, the HRB-SAC members acknowledged some of the concerns raised but believe that the LLSD concept is still worth pursing and should continue to be further explored. It was proposed that Steve Nilles, Bob Pratt, Jim Quiter and Wes Shoemaker and a representative from the Council on Tall Buildings and Urban Habitat (CTBUH) meet with members of NFPA's management team and the NFPA Research Foundation as a next step.

10. **Update on Fire Protection Research Foundation Projects**

    a. **High Rise Occupants & Evacuation.** Rita Fahy of NFPA provided a status report of the project which was initiated by HRB-SAC at their March 2006 meeting. Rita reported that the Foundation has undertaken the project and has appointed a Technical Project Panel, of which she is a member. The Panel has come to consensus on the project scope and has selected a project consultant to complete the study. Consensus has been reached on the questions to be posed to the sample of high rise building occupants. The occupants of both residential and office high rise buildings in New York, Chicago and San Francisco will be interviewed and surveyed. Recommendations on specific properties to be considered in the study can be forwarded to NFPA staff. The project is expected to be completed by January 1, 2007.

    b. **Standard Fire Resistance Testing**. Milosh Puchovsky provided an update on this project as summarized in Agenda Attachment G that NFPA's Fire Protection Research Foundation has undertaken a project to develop the technical basis for changes and additions to ASTM E 119 and NFPA 251 so that measurements and results can be used in performance-based design, without compromising the traditional use of the test standard for prescriptive building code compliance. This study will focus on the major aspects of the standard for which more data would be of value to the engineering community; for example thermal exposure conditions; furnace pressure conditions; structural loading conditions; test assembly deflections, etc. The study will focus on an exploration of these issues for two types of assemblies: 1) gypsum wall board covered load bearing steel stud walls and, 2) composite unrestrained concrete slab/protected unrestrained steel beam floor assemblies.

11. **Update on NIBS activity.** Dick Bukowski indicated that this effort resulted in the development of one proposal for a code change to building regulations, and that NIST's future funding of this activity is in question. Mr. Bukowski also provided a brief update on NIST related proposals for code changes to the International Code Council and indicated that the vast majority of these proposals were rejected.

12. **Update on Conferences and Other Events.** Geoff Craighead reported that BOMA has its national convention in New York City on July 21-25, 2007, and that American Society for Industrial Security (ASIS) has its convention in Singapore on Feb 6-7, 2007.

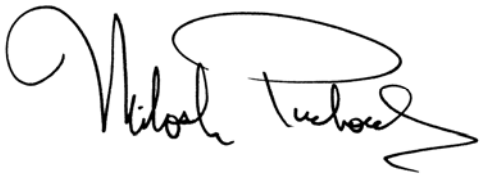
13. **Other Business**.

    a. **APCO**. Charles Jennings indicated that the Association of Public-Safety Communications Officials (APCO) could likely assist in addressing those NIST recommendations concerning communication systems and protocols. Mr. Jennings will provide more information in this regard.

14. **Scheduling of next meeting**. The next meeting was tentatively scheduled for Wednesday and Thursday, July 17-18, 2007 in Chicago, IL. The meeting was scheduled at this time so that the Report on Proposals for NFPA 1, NFPA 101 and NFPA 5000 could be reviewed and addressed.

15. **Adjournment**. Chair Jim Quiter adjourned the meeting at 12:00 Noon on Thursday, October 5, 2006.

Minutes prepared by



Milosh Puchovsky, P.E.
Staff Liaison

# Minutes Attachment A

# FORM FOR PROPOSALS ON NFPA TECHNICAL COMMITTEE DOCUMENTS

**Mail to: Secretary, Standards Council, National Fire Protection Association**
**1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269**
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**Please indicate in which format you wish to receive your ROP/ROC** Paper
**(Note: In choosing the download option you intend to view the ROP/ROC from our Website; no copy will be sent to you.)**

**Date** August 24, 2006 **Name** Jake Pauls **Telephone** 301-933-5275

**Company** Jake Pauls Consulting Services in Building Use and Safety

**Street Address** 12507 Winexburg Manor Drive, Suite 201 **City** Silver Spring **State** MD **Zip** 20906

**Please Indicate Organization Represented (if any)** Self

**1. a) NFPA Document Title** Life Safety Code **NFPA No. & Year** 101, 2006 edition

**b) Section/Paragraph** 101 – 11.8.5

**2. Proposal recommends:** New Text

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**Date Rec'd:**

**3. Proposal (include proposed new or revised wording, or identification of wording to be deleted): (Note: Proposed text should be in legislative format: i.e., use underscore to denote wording to be inserted (inserted wording) and strike-through to denote wording to be deleted (deleted wording).**

**See attached page(s), also provided as a Word format file.**

**4. Statement of Problem and Substantiation for Proposal: (Note: State the problem that will be resolved by your recommendation; give the specific reason for your proposal including copies of tests, research papers, fire experience, etc. If more than 200 words, it may be abstracted for publication.)**

**See attached page(s), also provided as a Word format file.**

**5. √ This Proposal is original material. (Note: Original material is considered to be the submitter's own idea based on or as a result of his/her own experience, thought, or research and, to the best of his/her knowledge, is not copied from another source.)**

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**PLEASE USE SEPARATE FORM FOR EACH PROPOSAL**

**Jake Pauls' Proposal on 101 – 11.8.5**

**11.8.5* Emergency Command Center.** An emergency command center shall be provided in a location approved by the fire department. The emergency command center shall contain the following:

(1) Voice fire alarm system panels and controls

(2) Fire department two-way telephone communication service panels and controls where required by another section of this *Code*

(3) Fire detection and fire alarm system annunciation panels

(4) Elevator floor location and operation annunciators

(5) Sprinkler valve and waterflow annunciators

(6) Emergency generator status indicators

(7) Controls for any automatic stairway door unlocking system

(8) Fire pump status indicators

(9) Telephone for fire department use with controlled access to the public telephone system

(10) Display of locations of video cameras, and the ability to display the video feed from selected cameras, monitoring exit stair usage as required by 7.13.

**Statement of Problem and Substantiation for Proposal**

Consistent with the annex note for 11.8.5, the requirement for equipment in the list is contingent on such equipment being provided or required by another section of the Code, in this case a requirement for monitoring of certain portions of exit stairs as proposed to the Means of Egress TC for 7.13. Much of the language used for the proposed item 10 of the list is consistent with Section 6, Incident Commander Display, in NEMA SB 30, "Fire Service Annunciator and Interface," as reproduced in accepted comment 72-533 in the ROC for NFPA 72-2006.

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**b) Section/Paragraph** 101 – 7.13 (New)

**2. Proposal recommends:** New Text

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**Jake Pauls' Proposal on 101 – 7.13 (New)**

**Insert a new section as follows. Underlining omitted for clarity.**

**7.13 Situation Awareness of Means of Egress Usage**

**7.13.1*** For new buildings having an Emergency Command Center, in accordance with 11.8.5, and serving an occupant load of 4,000 or more persons, monitoring of exit stair usage shall be provided in accordance with 7.13.2, 7.13.3, and 7.13.4.

**7.13.2*** Approved video camera equipment or approved occupant flow monitoring equipment shall be provided at the exit stair flight immediately adjacent to exit stair discharge doors to enable real-time, remote monitoring, by building management staff and fire service personnel, of all egress and ingress flows on the exit stair flight.

**7.13.3*** Approved monitoring equipment similar to that installed in accordance with 7.13.1 shall be provided for higher-story exit stair flights, at building height intervals not exceeding 5 stories, so that descent and ascent flows on the stairs can be remotely monitored by building management staff and fire service personnel.

**7.13.4*** Approved recording capability shall be provided of video signals or data from monitoring equipment required by 7.13.1 and 7.13.2 so that descent and ascent flows in the course of an evacuation can be analyzed as part of post-incident or post-drill evaluations. The recording shall be time coded and be capable of depicting activity at a minimum frame rate or frequency of 10 times per second with a resolution or data rate sufficient to assess flows quantitatively.

**New Annex Notes:**

**A.7.13.1** Human factors (ergonomics) experts, familiar with building egress issues, utilize the following definition (from Mica Endsley) of situation awareness: "the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning and the projection of their status in the near future." The experts note that this definition is especially appropriate for building fire events as it highlights the importance of not just making information available, but also the importance of understanding the significance of that information and predicting how events are likely to evolve. With video systems, real-time images of occupants' and emergency responders' presence and movement (or lack thereof) in exits, especially at multiple locations of the same exit stairway, can provide unique information about current and developing conditions to be taken into account in emergency management.

NEMA SB 30, "Fire Service Annunciator and Interface," as reproduced in an annex to NFPA 72, provides general guidelines for effective display of information within an Emergency Command Center. Video displays of images from exit stairways can be small LCD components (a couple of inches in dimension) situated appropriately within a graphic representation of the building (e.g., a vertical section) showing location of other safety systems and their status.

**A.7.13.2** Having video cameras positioned to capture images of the final flight of an exit stairway, just prior to the discharge doorway from the exit, provides information on the number and flow (in persons per minute for example) of the occupants, among other information, including access by responding firefighters using stairs if elevators are not available.

It is not essential that the camera views and image resolution be sufficient to identify specific individuals. Depending on the context (including security applications), such specific-person identification might be essential, desirable, undesirable or forbidden. Digital pixilation of images is one method for resolving personal privacy concerns while still providing information useful for other purposes. Another method could involve

having the camera positioned behind evacuating occupants so faces of evacuees are not visible. For post-incident evaluation and analysis of egress performance, it is helpful to have image quality and camera angle such that individuals' lateral and front-to-back positions, relative to the stair width, are clear.

**A.7.13.3** For example, a 14 story building would have cameras at the ground level (assuming this is the level of exit discharge), 6th floor, and 11th floor for each of the exit stairs. As well as providing a reasonable sampling of evacuee presence and movement within the exit stair system—*information important for real-time situation awareness*, a comparison of times at which particular individuals pass different cameras provides important data on evacuation movement speed and (indirectly) average occupant density, in addition to flow and number of evacuees overall.

**A7.13.4** Widespread availability of inexpensive video camera recording systems—including on mobile phones—was a factor, along with standard security camera recordings, in post-incident analysis of the underground (subway train) bombings in London in July 2005. For building exit stair video systems, the specified resolution is similar to that achievable (in 2005) with point-and-shoot, consumer-grade digital cameras, set at their low-resolution setting for video. This reduces substantially the storage capacity needed to preserve the video, a factor in choice of solid-state, chip storage media. At such low resolution, nearly a full day of video record—plus an audio record—from a single camera can be stored on a postage stamp size, two-gigabit chip. Measures should be taken to preserve video data after an event in which the exit stairs are utilized for egress. Utilization of such cameras for ongoing facility security might also dictate particular records management procedures and these should be compatible with records retention after an evacuation event. Off-site, real-time recording should also be considered to help guarantee records preservation.

**Statement of Problem and Substantiation for Proposal**

The proposed Annex notes provide background demonstrating that not only is use of videos very feasible and cost effective; it is very important to achieving life safety in larger buildings—through effective management of egress, especially in a more-complex, post-9/11, safety and security context.

Situation awareness is the most important feature of effective responses to emergencies. Situation awareness allows people impacted most directly by an emergency event, or managing the facility, or responding to the event (as with fire services) to make the most appropriate decisions on activities to mitigate the dangers of the event for themselves and others.

During emergencies, exit stairs provide a service that might be overwhelmed by demand. Constraints imposed by their limited capacity must be managed appropriately when many occupants are present, especially when there is a simultaneous egress demand from more than a few stories of a building. For example, in a building with 4,000 occupants and two exit stairs, even with a nominal width of 56 in. (1420 mm) each, a total evacuation could take a half hour or longer and such times would at least increase proportionately with larger occupant loads. Egress for especially endangered occupants, for example those closer to a fire, as well as firefighter access to a fire, would be significantly hampered if usage of the limited stair capacity is not effectively managed. Such management requires accurate, real-time information of exit stair usage. Making such information available at the Emergency Command Center is critical. A secondary use of such information is in post-incident or post-drill evaluation for a particular building/event. A tertiary use of such information is for subsequent research on actual capabilities of building occupants and building means of egress systems generally in all large buildings. All three uses of such information have been badly served by typical capabilities of building monitoring systems that, while monitoring water flows for example, do not convey any information on what is happening in the critical exit stair system.

Among other research efforts focused on building emergencies (as well as larger-scale disasters), NIST has underlined the importance of situation awareness in the World Trade Center on 9/11. As this proposal is

submitted NIST is involved with some long-overdue studies, utilizing video systems in exit stairways, to assess egress performance including performance when there is firefighter counter flow. Also, at this same time, there is a proposal submitted by ICC's Terrorism Resistant Buildings Ad Hoc Committee, for video cameras "at every fifth floor of each required stairway and connected to an approved constantly attended station."

Increasingly, video camera systems are becoming less costly, smaller, producing better images even in low-light or no-light conditions, using less power, utilizing more-compact and efficient recording/memory systems, and capable of having video—and audio—data transmitted in ways that, until recently, were not even imagined, let alone generally available to typical consumers using a personal computer. Moreover, alternative technologies are being developed that could provide basic people movement data without reliance on video imaging.

It is recognized that both the need for, and capability of, monitoring means of egress usage will grow in the future. Thus an entirely new section is proposed for the means of egress chapter of the Code to provide a home for expanded treatment of the situation awareness issues in egress as well as appropriate Code requirements (perhaps soon referencing appropriate systems standards). Ideally, it would have been most appropriate to designate such a section as 7.7 to make it most compatible with the existing code references, XX-7, for "Operating Features" that would scope and further expand on situation awareness issues for different occupancies. In the interim, the proposed scoping is similar to that used for the current Code's (2,000-person per stair) threshold for wider minimum exit stair width which, for example, begins to affect buildings of a height about twice the current threshold for "high-rise" buildings. This is because, based on deliberations in the last cycle, exit stair usage becomes significantly more challenging and the probability of concurrent emergency responder ingress and occupant egress is also significant at the 2,000-person per stair threshold. To best cope with these, situation awareness should be improved both in real time during an incident and through subsequent analysis of what happened. In essence, we need to manage evacuation to give precedence to certain occupants' egress. This means we also need to have accurate situation awareness about the context for, and effective implementation of, such precedence strategies.

A companion proposal has been submitted for the Code's section 11.8.5 which provides requirements for the Emergency Command Center for high-rise buildings. That proposal adds an item to the list of systems monitored at the Emergency Command Center. That proposal's use of the language, "Display of locations of video cameras, and the ability to display the video feed from selected cameras," comes from section 6, Incident Commander Display, in NEMA SB 30, "Fire Service Annunciator and Interface," as reproduced in accepted comment 72-533 in the ROC for NFPA 72-2006. Moreover, in what will hopefully be the beginning of expanded treatment in NFPA 1, its section 11.9 addresses features of the Emergency Command Center. With NFPA 1 being an extract-based document, it should adopt—for its next (2009) edtion—whatever changes are necessary, based on what is done in NFPA 101.

**Footnote on NFPA High Rise Building Safety Advisory Committee (HRB-SAC) recommendation on this topic addressed in relation to one of the recommendations of the NIST report on the WTC.** The following quote is from the compilation of recommendations made available to other NFPA committees in mid 2006.

**"13 (b) Closed Circuit Television.**
Affected NFPA TC's should consider the use of closed circuit television in exit stairs and elevator lobbies to provide real time situational awareness for emergency responders, for immediate assessment during and after the incident and for further research regarding occupant behavior. The system should provide for back-up data off site during emergency incidents and have information available for emergency responders in real time. HRB-SAC is requesting input on this subject from NFPA's Technical Committees. HRB-SAC specifically requests that threshold conditions under which such systems are to be used be established, and that design, installation, operational and maintenance criteria be developed. This proposal is partially inresponse to recommendations #13, #14 and #15 of NIST's World Trade Center Disaster study. *(Jan 06* ballot)"

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**1. a) NFPA Document Title** Life Safety Code **NFPA No. & Year** 101, 2006 edition

**b) Section/Paragraph** 101 – 7.2.2.2.1.2

**2. Proposal recommends:** Revised Text

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**Jake Pauls' Proposal on 101 – 7.2.2.2.1.2**

**7.2.2.2.1.2* Minimum New Stair Width.**

(A) Where the total occupant load of all stories served by the stair is fewer than 50, the minimum width clear of all obstructions, except projections not more than 4 1/2 in. (114 mm) at or below handrail height on each side, shall be 36 in. (915 mm).

(B)* Where stairs serve occupant loads exceeding that permitted by 7.2.2.2.1.2(A), the minimum width clear of all obstructions, except projections not more than 4 1/2 in. (114 mm) at or below handrail height on each side, shall be 56 in. (1420 mm) ~~in accordance with Table 7.2.2.2.1.2(B) and the requirements of 7.2.2.2.1.2(C), (D), and (E).~~

~~Table 7.2.2.2.1.2(B) New Stair Width~~

| ~~Total Cumulative Occupant Load Assigned to the Stair~~ |
|---|
| ~~<2000 persons~~ |
| ~~2000 persons~~ |

~~(C) The total cumulative occupant load assigned to a particular stair shall be that stair's prorated share of the total occupant load, as stipulated in 7.2.2.2.1.2(D) and (E), calculated in proportion to the stair width.~~

~~(D) For downward egress travel, stair width shall be based on the total number of occupants from stories above the level where the width is measured.~~

~~(E) For upward egress travel, stair width shall be based on the total number of occupants from stories below the level where the width is measured.~~

(~~F~~C) The clear width of door openings discharging from stairways required to comply with 7.2.2.2.1.2(B) shall be in accordance with 7.2.1.2.4(9).

Delete entire existing annex note and substitute the following.

**A.7.2.2.2.1.2(B)** The stair width requirement of 7.2.2.2.1.2(B) is based on two considerations. The first is the need to abandon a vestige of the traditional 22-in. (559 mm) unit of exit width that, until the early 1980s, was a core concept in the Life Safety Code and contemporary model building codes. This unit of exit width, dating back to the early 20th century, was abandoned as a flawed basis for crediting egress capacity for width increments of 22 in. (559 mm) and sometimes 12 in. (305 mm). In their place was adopted a per-person width increment such as 0.3 in. (7.6 mm), termed a "capacity factor" for the egress capacity sections of the Life Safety Code and contemporary model building codes.

In addition to showing the error of step-function egress rules, based on relatively large 12-in (305 mm) and 22-in. (559 mm) increments—including a purported two-unit, (two-lane) 44-in. (1120 mm) minimum width, research on crowd movement in a variety of contexts including high-rise office evacuation drills provided additional insights. For example, research demonstrated that two-abreast movement, overtaking flow and counter flow required considerably more than a 44-in. (1120 mm) minimum width. Indeed, the minimum width would have to be at least 25 percent wider than 44 in. (1120 mm) and, by some estimates by leading pedestrian researchers, 36 percent wider. Thus minimum widths ranging from 56 in. (1422 mm) to 60 in. (1524 mm) were recommended.

For the narrowest of the recommendations, the 56-in (1422 mm) nominal width stair, with about 48 in. (1220 mm) of clear width between handrails, characteristics noted by researchers three decades ago were its reasonable facilitation of two-abreast coherent flow, counter flow and overtaking movement while still permitting an adult to walk down the stairs grasping both handrails if such extra support were needed. The Code has also recognized 48-in. (1220 mm) as the narrowest stair width, clear between handrails, that will

accommodate reasonably safe movement, assisted by three adults, of an occupied wheelchair.

Regarding the second consideration—occupant demographics, recommendations for wider stairs were based on research performed in the 1960s and 1970s at a time that people were considerably thinner, lighter and more fit than is common today in the US and in an increasing number of developed countries. In the US, about two-thirds of adults are either overweight (with a Body Mass Index or BMI of 25 or more) or obese (with a BMI of 30 or more). Moreover, typical individual physical fitness—even independent of BMI—has deteriorated and the trend, judging from fitness of today's children, will only get worse. Thus the wider minimum stair widths advocated from research completed two or three decades ago are bare minimums today. They are not generous, nor are they guaranteed to compensate for the reduced movement capability of people using buildings now and intending to use them in the future. For example, not only are people geometrically larger in a static sense but, with reduced walking speeds and increased lateral stance distances (one consequence of wider bodies), lateral body sway—to maintain balance in bipedal gait—increases.

Thus a change from the traditional minimum 44-in. (1120 mm) width to 56 in. (1422 mm) is simply the smallest justifiable increase for codes and standards based on providing reasonable means of egress for occupants. It also provides an additional 12 in. (305 mm) of stair width, beyond the traditional width, to facilitate emergency responder counter flow, a significant concern for heavily loaded, encumbered and fatigued firefighters in the World Trade Center disaster in 2001 (according to the study performed by the US National Institute of Standards and Technology, NIST).

Further information on egress performance, based on research over the last few decades, can be found in the "Movement of People" chapter of the *SFPE Handbook of Fire Protection Engineering*. This includes discussion of the "Effective Width Model" for crowd flow which, notably, explains the disproportionately better crowd flow performance of stairs wider than the traditional 44 in. (1120 mm). Thus a 56-in. (1422 mm) stair, although only 27 percent wider than the traditional 44-in. (1120 mm) minimum, provides about 37 percent better egress flow performance, an improvement that has now been explicitly recognized in the Code's egress capacity requirements in 7.3.3.1. This is because a stair's flow performance increases linearly with its effective width (which is 12 in., 305 mm, less than the nominal width and about 4 in., 100 mm, less than the clear, handrail-to-handrail width) so that the relative flow performance of a 56-in. (1420 mm) and a 44-in. (1120 mm) stair has the ratio of 44 to 32 or 1.375. In essence, the wider stair is more cost-effective for egress flow.

**Statement of Problem and Substantiation for Proposal**

The problem of the outdated, indeed poorly substantiated 22-in, (560 mm) unit of exit width and its vestige in the two-unit minimum 44-in. (1120 mm) width for stairs, is dealt with in the proposed Annex note, in the remarks provided below, and in an accompanying proposal changing the way stairs wider than 44-in (1120 mm) are credited with egress capacity (section 7.3.3.1).

The bottom line, for this substantiation, is that:

1. The 22-in. (560 mm) unit-width based 44-in. (1120 mm) minimum width was flawed to begin with when it was developed about a century or more ago;
2. It was demonstrated to be flawed on the basis of pedestrian movement studies performed about three decades ago;
3. It is even more flawed today due to demographic changes over the last few decades; and
4. With a continuation of a trend to larger, heavier, less-fit people, buildings a few decades from now will—***unless improved***—perform even more poorly for pedestrian circulation including egress; thus heeding recommendations for minimum stair width based on the best available research is prudent and, due to the 37 percent better flow performance, will help compensate for reduced human capabilities.

An attempt was made by this proponent at the Comments stage of the last change cycle (for the 2006 edition) to have the 56-in. (1420 mm) minimum width apply to stairs generally as opposed to only stairs serving an accumulative occupant load of 2,000 or more people. Coming at the Comments stage, that effort failed as the emphasis by the Means of Egress Technical Committee was to develop a relatively complex scoping rule tied to a very limited justification based on counter flow of ascending emergency responders interfering with—and being interfered by—descending evacuees.

This proposal simplifies the scoping—deleting hundreds of words of requirements and annex—by simply referring to minimum stair width generally and avoiding occupant load and counter flow issues because they are of less importance than are significant demographic changes that have the effect of greatly reducing egress capability and performance of occupants of all types and sizes of buildings utilizing a variety of evacuation strategies.

Contrary to an approach taken in the Code for its 2006 edition, the problem is not restricted to high-population stairs or even certain high-rise building stairs. (Here it should be noted that NFPA's High Rise Building Safety Advisory Committee voted to recommend that minimum stair width be increased to 56 in., 1420 mm.) Post-9/11 evacuation observations by the US National Institute of Standards and Technology (NIST) show surprisingly low egress speeds and flows in buildings as low as six stories and only having a relatively low population per stair as described in a presentation by NIST's Jason Averill at NFPA's WSCE in June 2006). The stair egress problem is larger than that of total evacuation for very high buildings, with relatively large populations attempting to evacuate more or less at the same time.

Notably, during the last few years, some prominent developers of major projects have voluntarily elected, without revised code requirements, to design exit stairs in the 60-in. (1524 mm) to 72-in. (1830 mm) width range to enhance building safety and thus help to attract tenants.

To save having Means of Egress Technical Committee members and other interested persons from having to search for and retrieve the relevant comment (101-45) from the Report on Comments in 1995 (on NFPA's web site for example), the remainder of this justification extracts key parts of comment 101-45 from 2005, particularly on public health issues.

Being overweight or obese has become a national health problem in the US among adults and children—the very people who will occupy, and might need to evacuate, buildings for decades to come. Irrefutable evidence for this is in the statistics from the US Centers for Disease Control (CDC), which along with other public health organizations, has documented the major increases in overall body mass index (BMI) for US residents with these data being presented on a state-by-state, year-to-year basis on the web site http://www.cdc.gov/nccdphp/dnpa/obesity/resources.htm.

The occurrence of obesity (BMI greater than or equal to 30) has approximately doubled from about 15 percent to 31 percent between the early 1970s to 2000 among adults aged 20 to 74 in the US. (See www.cdc.gov/nchs/products/pubs/pubd/hestats/obese/obse99.htm.) The Surgeon General for the US (at http://www.surgeongeneral.gov/topics/obesity/calltoaction/fact_glance.htm) notes that: 61% of adults in the United States were overweight or obese (BMI> 25) in 1999. 13% of children aged 6 to 11 years and 14% of adolescents aged 12 to 19 years were overweight in 1999. This prevalence has nearly tripled for adolescents in the past two decades.

The increases in overweight and obesity cut across all ages, racial and ethnic groups, and both genders.

Notably, most of the Canadian office building evacuation studies—a major input for current US means of egress formulas on egress width and capacity— were already completed by the early 1970s. The same is true for the landmark studies of John Fruin whose book, *Pedestrian Planning and Design*, was based on field studies

(for his PhD) in the New York area before 1970. People, today—and even more so in the coming decades—are larger than those studied in the research of a few decades ago in Canada and the US. Moreover, it is likely that the differences between today's (tomorrow's) building populations and those of several decades ago, when building code requirements for means of egress were formulated in North America and the UK, are even more pronounced. (These earlier deliberations, resulting for example in the once standard 22-inch unit of exit width—*which is still the basis of the current 44-inch nominal, minimum egress stairway width*, have been described in critical reviews by Pauls, published in the journal *Fire Technology*, in 1984.)

In addition to being influenced by people's size and weight, egress performance is also impacted by people's reduced fitness and health generally. People's ability to cope with the physical demands of evacuation on stairs is affected both directly and indirectly (for example with disabling effects of Type 2 Diabetes—rapidly becoming an epidemic due to excess body weight, cardiovascular problems, and prematurely damaged knees). One indication of this trend is the estimate of how many people would (or did) have difficulty evacuating down multiple stories of stairs in evacuation of office buildings. Pauls' estimate of 3 percent of typical Canadian office workers, at about 1970, not being good candidates for using stairs for evacuation with a crowd of other descending persons, can be compared with more-recent US estimates about twice as large. Appendix O of the preliminary report issued by NIST in June 2004, on the World Trade Center evacuation, included the following finding, "Some 6 percent (n=52) reported having a limitation which impacted their ability to evacuate. These limitations included obesity, heart condition, needing assistance to walk, pregnancy, asthma, elderly, chronic condition, recent surgery or injury, and other." This is also reflected in lower-than expected speeds of movement down the WTC exit stairs, and longer than expected evacuation times, estimated in both US and UK studies so far of the WTC evacuation (as described, for example, in *Proceedings of the 3rd International Symposium on Human Behaviour in Fires*, 2004). Generally, there are multiple indications that people are not able to evacuate as quickly and efficiently as assumed in drawing up the current means of egress requirements.

Finally, we have an aging population generally. Increasingly, people are going to have to work longer than has been the case. Thus we must begin ***now*** to design for an older population generally as well as a population containing many people whose lifestyle-related poor health status will make them even less capable . This means providing more generous, easier-to-use egress facilities. All of the above factors point to wider minimum width for egress stairways.

Summing up with what was known a few years ago and what has been reported more recently as a result of research on occupant capabilities in the World Trade Center (WTC) evacuation (mainly from NIST in 2004 and 2005, but coming also in late 2006 from the Columbia University study which is more focused on occupant capabilities):

1. Among adults, obesity has doubled in the last few decades.
2. Among children, overweight has quadrupled in the last few decades.
3. Percentage of WTC survivors having difficulty using exit stairs on 9/11 was at least twice the estimate for incidence of such difficulty three decades ago.
4. Evacuation speed and flow down stairs apparently have dropped so substantially in the last few decades that the original author of the chapter, "Movement of People," in the *SFPE Handbook of Fire Protection Engineering* has recommended its predictions no longer be used to predict egress flow, speed and time because they are overly optimistic for today's demographics.

All of this should help spur action by those responsible for means of egress requirements to improve the usability and performance of means of egress stairways, including making sure their minimum width is actually based on the needs of today's and tomorrow's building occupants, and not merely representative of outdated, flawed ideas from the distant past.

**Footnote on NFPA High Rise Building Safety Advisory Committee (HRB-SAC) recommendation on this topic addressed in relation to one of the recommendations of the NIST report on the WTC.** The following quote is from the compilation of recommendations made available to other NFPA Committees in mid 2006.

**"17 (g) Minimum egress widths.** Affected NFPA TC's should consider changing the minimum width of egress stairs to 56 inches for all new high rise buildings regardless of the number of occupants using the stairs. (NFPA 101: 7.2.2.2.1.2, NFPA 5000:11.2.2.2.1.1). This proposal is based upon flow performance data of building occupants and subject 8a of the HRB-SAC Charter. *(Jan 06 ballot).*"

**Selected references on pedestrian circulation performance related to egress on stairs**


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J. Pauls, "Suggestions on Evacuation Models and Research Questions," in *Proceedings of 3rd International Symposium on Human Behaviour in Fires,* Interscience Communications, London, pp. 23-33 (2004).

J. Pauls, J. Fruin and J. Zupan, "Minimum Stair Width for Evacuation, Overtaking Movement and Counterflow: Technical bases and suggestions for the past, present and future," in *Proceedings of Pedestrian and Evacuation Dynamics,* Vienna (2005).

# Minutes Attachment B

## 2.7.2. Doors and Means of Egress

### 2.7.2.1. Exit Doors

**1)** Except as provided in Sentences (2), (3) and (4), all doors forming part of a *means of egress* shall be tested at intervals not greater than one month to ensure that they are operable.

**2)** The safety features of revolving doors shall be tested at intervals not greater than 12 months.

**3)** Sliding doors that are required to swing on their vertical axes in the direction of egress when pressure is applied shall be tested at intervals not greater than 12 months.

**4)** When doors are equipped with electromagnetic locks, these locks shall be tested at intervals not greater than 12 months.

### 2.7.2.2. Records

**1)** Records of tests required in Sentences 2.7.2.1.(2), (3) and (4) shall be retained in conformance with Article 2.2.1.2. of Division C.

## 2.7.3. Exit Lighting, Exit Signs and Emergency Lighting

### 2.7.3.1. Installation and Maintenance

**1)** *Exit* lighting, *exit* signs and emergency lighting shall be provided in *buildings* in conformance with the NBC. (See Appendix A.)

**2)** *Exit* lighting and *exit* signs shall be illuminated during times when the *building* is occupied.

**3)** Emergency lighting shall be maintained in operating condition, in conformance with Section 6.5.

# Section 2.8. Emergency Planning

## 2.8.1. General

### 2.8.1.1. Application

**1)** Fire emergency procedures conforming to this Section shall be provided for
a) every *building* containing an *assembly* or a *care or detention occupancy*,
b) every *building* required by the NBC to have a fire alarm system,
c) demolition and construction sites regulated under Section 5.6.,
d) storage areas required to have a fire safety plan in conformance with Articles 3.2.2.5. and 3.3.2.9.,
e) areas where *flammable liquids* or *combustible liquids* are stored or handled, in conformance with Article 4.1.5.5., and
f) areas where hazardous processes or operations occur, in conformance with Article 5.1.5.1.

### 2.8.1.2. Training of Supervisory Staff

**1)** *Supervisory staff* shall be trained in the fire emergency procedures described in the fire safety plan before they are given any responsibility for fire safety. (See Appendix A.)

### 2.8.1.3. Keys and Special Devices

**1)** Any keys or special devices needed to operate the fire alarm system or provide access to any fire protection systems or equipment shall be readily available to on-duty *supervisory staff*.

## 2.8.2. Fire Safety Plan

### 2.8.2.1. Measures in a Fire Safety Plan

**1)** In *buildings* or areas described in Article 2.8.1.1., a fire safety plan conforming to this Section shall be prepared in cooperation with the fire department and other applicable regulatory authorities and shall include

a) the emergency procedures to be used in case of fire, including
   i) sounding the fire alarm (see Appendix A),
   ii) notifying the fire department,
   iii) instructing occupants on procedures to be followed when the fire alarm sounds,
   iv) evacuating occupants, including special provisions for persons requiring assistance (see Appendix A),
   v) confining, controlling and extinguishing the fire,
b) the appointment and organization of designated *supervisory staff* to carry out fire safety duties,
c) the training of *supervisory staff* and other occupants in their responsibilities for fire safety,
d) documents, including diagrams, showing the type, location and operation of the *building* fire emergency systems,
e) the holding of fire drills,
f) the control of fire hazards in the *building*, and
g) the inspection and maintenance of *building* facilities provided for the safety of occupants.

(See Appendix A.)

**2)** The fire safety plan shall be reviewed at intervals not greater than 12 months to ensure that it takes account of changes in the use and other characteristics of the *building*.

### 2.8.2.2. Care or Detention Occupancies

**1)** A sufficient number of *supervisory staff* shall be on duty in *care or detention occupancies* to perform the tasks outlined in the fire safety plan described in Clause 2.8.2.1.(1)(a).

### 2.8.2.3. Assembly Occupancies

**1)** In Group A, Division 1 *assembly occupancies* containing more than 60 occupants, there shall be at least one *supervisory staff* member on duty in the *building* to perform the tasks outlined in the fire safety plan in Clause 2.8.2.1.(1)(a) whenever the *building* is open to the public.

### 2.8.2.4. High Buildings

**1)** In *buildings* within the scope of Subsection 3.2.6. of the NBC, the fire safety plan shall, in addition to the requirements of Sentence 2.8.2.1.(1), include

a) the training of *supervisory staff* in the use of the voice communication system,
b) the procedures for the use of elevators,
c) the action to be taken by *supervisory staff* in initiating any smoke control or other fire emergency systems installed in a *building* in the event of fire until the fire department arrives,
d) instructions to the *supervisory staff* and fire department for the operation of the systems referred to in Clause (c), and
e) the procedures established to facilitate fire department access to the *building* and fire location within the *building*.

### 2.8.2.5. Retention of Fire Safety Plans

**1)** The fire safety plan shall be kept in the *building* for reference by the fire department, *supervisory staff* and other personnel.

**2)** The fire safety plan for a *building* within the scope of Subsection 3.2.6. of the NBC shall be kept at the central alarm and control facility.

### 2.8.2.6. Distribution

**1)** A copy of the fire emergency procedures and other duties for *supervisory staff*, as laid down in the fire safety plan, shall be given to all *supervisory staff*.

### 2.8.2.7. Posting of Fire Emergency Procedures

**1)** At least one copy of the fire emergency procedures shall be prominently posted on each *floor area*.

**2)** In every hotel and motel bedroom, the fire safety rules for occupants shall be posted showing the locations of *exits* and the paths of travel to *exits*.

**3)** Where a fire alarm system has been installed with no provisions to transmit a signal to the fire department, a sign shall be posted at each manually actuated signalling box requesting that the fire department be notified, and including the telephone number of that department.

## 2.8.3. Fire Drills

### 2.8.3.1. Fire Drill Procedures

**1)** The procedure for conducting fire drills shall be determined by the person in responsible charge of the *building*, taking into consideration

a) the *building occupancy* and its fire hazards,
b) the safety features provided in the *building*,
c) the desirable degree of participation of occupants other than *supervisory staff*,
d) the number and degree of experience of participating *supervisory staff*,
e) the features of fire emergency systems installed in *buildings* within the scope of Subsection 3.2.6. of the NBC, and
f) the requirements of the fire department.

(See Appendix A.)

### 2.8.3.2. Fire Drill Frequency

**1)** Fire drills as described in Sentence 2.8.3.1.(1) shall be held at intervals not greater than 12 months for the *supervisory staff*, except that

a) in day-care centres and in Group B *major occupancies*, such drills shall be held at intervals not greater than one month,
b) in schools attended by children, total evacuation fire drills shall be held at least 3 times in each of the fall and spring school terms, and
c) in *buildings* within the scope of Subsection 3.2.6. of the NBC, such drills shall be held at intervals not greater than 2 months.

# Section 2.9. Tents and Air-Supported Structures

## 2.9.1. General

### 2.9.1.1. Tents and Air-Supported Structures

**1)** Tents and *air-supported structures* shall be in conformance with the NBC.

## 2.9.2. Materials

### 2.9.2.1. Flame Retardant Treatments

**1)** Flame retardant treatments shall be renewed as often as is required to ensure that the material will pass the match flame test in NFPA 705, "Field Flame Test for Textiles and Films." (See A-2.3.2.2.(1) in Appendix A.)

#### 2.7.2.2. Records

**1)** Records of tests required in Sentences 2.7.2.1.(2), (3) and (4) shall be retained in conformance with Article 1.1.1.2.

### 2.7.3. Exit Lighting, Exit Signs and Emergency Lighting

#### 2.7.3.1. Installation and Maintenance

**1)** ~~*Exit* lighting, *exit* signs and emergency lighting shall be provided in *buildings* in conformance with the National Building Code of Canada 1995. (See Appendix A.)~~

**2)** ~~*Exit* lighting and *exit* signs shall be illuminated during times the *building* is occupied.~~

**3)** ~~Emergency lighting shall be maintained in operating condition, in conformance with Section 6.7.~~

## Section 2.8. Emergency Planning

### 2.8.1. General

#### 2.8.1.1. Application

**1)** Fire emergency procedures conforming to this Section shall be provided for

a) every *building* containing an *assembly* or a *care or detention occupancy*,
b) every *building* required by the National Building Code of Canada 1995 to have a fire alarm system,
c) demolition and construction sites regulated under Section 2.14. of this Code,
d) storage areas required to have a fire safety plan in conformance with Articles 3.2.2.6. and 3.3.2.9.,
e) areas where *flammable liquids* or *combustible liquids* are stored or handled, in conformance with Article 4.1.5.6., ~~and~~
f) areas where hazardous processes or operations occur, in conformance with Article 5.1.5.1. and

#### 2.8.1.2. Training of Supervisory Staff

**1)** *Supervisory staff* shall be trained in the fire emergency procedures described in the fire safety plan before they are given any responsibility for fire safety. (See Appendix A.)

#### 2.8.1.3. Keys and Special Devices

**1)** Any keys or special devices needed to operate the fire alarm system or provide access to any fire protection systems or equipment shall be readily available to on-duty *supervisory staff*.

### 2.8.2. Fire Safety Plan

#### 2.8.2.1. Measures in a Fire Safety Plan

**1)** In *buildings* or areas described in Article 2.8.1.1., a fire safety plan conforming to this Section shall be prepared in cooperation with the fire department and other applicable regulatory authorities and shall include

a) the emergency procedures to be used in case of fire, including
   i) sounding the fire alarm (see Appendix A),
   ii) notifying the fire department,
   iii) instructing occupants on procedures to be followed when the fire alarm sounds,
   iv) evacuating occupants, including special provisions for persons requiring assistance (see Appendix A),
   v) confining, controlling and extinguishing the fire,
b) the appointment and organization of designated *supervisory staff* to carry out fire safety duties,
c) the training of *supervisory staff* and other occupants in their responsibilities for fire safety,
d) documents, including diagrams, showing the type, location and operation of the *building* fire emergency systems,
e) the holding of fire drills,
f) the control of fire hazards in the *building*, and
g) the inspection and maintenance of *building* facilities provided for the safety of occupants.

(See Appendix A.)

**2)** The fire safety plan shall be reviewed at intervals not greater than 12 months to ensure that it takes account of changes in the use and other characteristics of the *building*.

#### 2.8.2.2. Care or Detention Occupancies

**1)** A sufficient number of *supervisory staff* shall be on duty in *care or detention occupancies* to perform the tasks outlined in the fire safety plan described in Clause 2.8.2.1.(1)(a).

#### 2.8.2.3. Assembly Occupancies

**1)** In Group A, Division 1 *assembly occupancies* containing more than 60 occupants, there shall be at least one *supervisory staff* member on duty in the *building* to perform the tasks outlined in the fire safety plan in Clause 2.8.2.1.(1)(a) whenever the *building* is open to the public.

### 2.8.2.4. High Buildings

**1)** In *buildings* within the scope of Subsection 3.2.6. of the National Building Code of Canada 1995, the fire safety plan shall, in addition to the requirements of Sentence 2.8.2.1.(1), include

a) the training of *supervisory staff* in the use of the voice communication system,
b) the procedures for the use of elevators,
c) the action to be taken by *supervisory staff* in initiating any smoke control or other fire emergency systems installed in a *building* in the event of fire until the fire department arrives,
d) instructions to the *supervisory staff* and fire department for the operation of the systems referred to in Clause (c), and
e) the procedures established to facilitate fire department access to the *building* and fire location within the *building*.

### 2.8.2.5. Retention of Fire Safety Plans

**1)** The fire safety plan shall be kept in the *building* for reference by the fire department, *supervisory staff* and other personnel.

**2)** The fire safety plan for a *building* within the scope of Subsection 3.2.6. of the National Building Code of Canada 1995 shall be kept at the central alarm and control facility.

### 2.8.2.6. Distribution

**1)** A copy of the fire emergency procedures and other duties for *supervisory staff*, as laid down in the fire safety plan, shall be given to all *supervisory staff*.

### 2.8.2.7. Posting of Fire Emergency Procedures

**1)** At least one copy of the fire emergency procedures shall be prominently posted on each *floor area*.

**2)** In every hotel and motel bedroom the fire safety rules for occupants shall be posted showing the locations of *exits* and the paths of travel to *exits*.

**3)** Where a fire alarm system has been installed with no provisions to transmit a signal to the fire department, a sign shall be posted at each manually actuated signalling box requesting that the fire department be notified, and including the telephone number of that department.

## 2.8.3. Fire Drills

### 2.8.3.1. Fire Drill Procedures

**1)** The procedure for conducting fire drills shall be determined by the person in responsible charge of the *building*, taking into consideration

a) the *building occupancy* and its fire hazards,
b) the safety features provided in the *building*,
c) the desirable degree of participation of occupants other than *supervisory staff*,
d) the number and degree of experience of participating *supervisory staff*,
e) the features of fire emergency systems installed in *buildings* within the scope of Subsection 3.2.6. of the National Building Code of Canada 1995, and
f) the requirements of the fire department.

(See Appendix A.)

### 2.8.3.2. Fire Drill Frequency

**1)** Fire drills as described in Sentence 2.8.3.1.(1) shall be held at intervals not greater than 12 months for the *supervisory staff*, except that

a) ~~in day care centres and in Group B *major occupancies*, such drills shall be held at intervals not greater than one month,~~
b) ~~in schools attended by children, total evacuation fire drills shall be held at least 3 times in each of the fall and spring school terms, and~~
c) in *buildings* within the scope of Subsection 3.2.6. of the National Building Code of Canada 1995, such drills shall be held at intervals not greater than 2 months.

# Section 2.9. Tents and Air-Supported Structures

## 2.9.1. General

### 2.9.1.1. Tents and Air-Supported Structures

**1)** Tents and *air-supported structures* shall be in conformance with the National Building Code of Canada 1995.

## 2.9.2. Materials

### 2.9.2.1. Flame Retardant Treatments

**1)** Flame retardant treatments shall be renewed as often as required to ensure that the material will pass the match flame test in NFPA 701, "Fire Tests for Flame-Resistant Textiles and Films." (See A-2.3.2.2.(1) in Appendix A.)

## 2.9.3. Fire Hazards and Control

### 2.9.3.1. Electrical Systems

**1)** The electrical system in a tent or *air-supported structure* shall be maintained and operated in a safe manner.

# Minutes Attachment C

**FIGURE 12.5 EAP Topic Checklist.**

**EAP Checklist**

- ❑ Purpose of the plan
- ❑ List of events considered and major hazards within the building
- ❑ Procedures for accounting for employees and/or visitors and guests
- ❑ Procedures for reporting emergencies
- ❑ Assignment of the Fire Safety Director (FSD) or Emergency Coordinator (EC) with contact details
- ❑ Assignment of one or more deputy or Alternate Fire Safety Directors (AFSD) or Alternate Emergency Coordinators (AEC) with contact details
- ❑ Assignment of Floor Wardens, Deputy Floor Wardens, Area Wardens, Stairway Monitors and Elevator Monitors, as necessary, with contact detail
- ❑ Assignment of Crowd Managers, Emergency Evacuation Teams, Publicity Director, Utilities Superintendent, First Aid Officers, Fire Response Team or Fire Wardens, as necessary, with contact details
- ❑ Responsibilities matrix, including specific information on who is authorized to initiate evacuations, who is responsible for notifying the fire department, who is responsible for accounting for employees and/or visitors and guests, who is responsible for housekeeping, etc.
- ❑ Preferred means of building emergency notification
- ❑ Policies and procedures for those left behind to operate critical equipment, if any
- ❑ Procedures for critical operations shutdown
- ❑ Requirements and responsibilities for assisting persons with disabilities. This may include a confidential list of those with disabilities.
- ❑ Rescue and medical duties
- ❑ Essential fire and life safety features provided within the facility
- ❑ Fire and life safety system interfaces with the security measures
- ❑ Escape procedures, methods, and preferred evacuation routes for each event, including the appropriateness for use of elevators
- ❑ Post-emergency exit plans, minimally indicating exits, exit paths, and evacuation signs (emergency exit plans and posted locaitons for the plans should be included within the EAP, perhaps as an Appendix to the EAP)
- ❑ Responsibilities for in-house fire brigades
- ❑ Required frequency of fire drills
- ❑ Training requirements for occupants and key personnel (periodic training should be conducted. This may include evacuation drills. The plan should keep records of all training and drills.)
- ❑ Maintenance requirements for fire and life safety systems and features
- ❑ Procedures for control of housekeeping (this might include proper clean up, maintenance of egress paths, etc.)
- ❑ Procedures for control of hazards and fuel sources (this might include control of welding permits, smoking, proper storage, etc.)
- ❑ Means to update the plan as necessary
- ❑ Names or job titles of persons who can be contacted for further information or explanation of duties under the plan

(*Sources:* Adapted from BOMA, 2002. *Emergency Preparedness, Building Owners and Managers Association International,* Washington, DC; OSHA, 2001. "How to Plan for Workplace Emergencies and Evacuations," Occupational Health and Safety Administration, Washington, DC; NFPA, 2001. *Introduction to Employee Fire and Life Safety,* National Fire Protection Association, Quincy, MA.)



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# Minutes Attachment D

## Emergency Procedure Outline for Building in California.

***SECTION ONE***

**EMERGENCY TELEPHONE NUMBERS**
Emergency Telephone Numbers
Floor Warden Telephone List
Physically Impaired List

**FIRE PROCEDURES**
General Staff
If you are Trapped
Fire Safety Director (FSD) / Building Manager
Lobby Desk Security
Lobby Desk After-Hours Security
Receptionist
Engineers
Janitors
Fire Extinguishers
City of Los Angeles Fire Drill Requirement

**EVACUATION PROCEDURES**
Evacuation Procedures
Stairwell Safety Instructions / Locked Stairwell Door Information
Fire Escape Information and Instructions
Safe Refuge Area Map
Emergency Evacuation Procedures For The Physically Challenged
Emergency Procedures For The Physically Challenged
Emergency Carries

**EARTHQUAKE PROCEDURES**
Before The Earthquake
During The Earthquake
If You Are Outside
If You Are In An Elevator
After An Earthquake
Building Engineer
Security
All Staff
Evacuation Considerations
Post-Earthquake Considerations
When You Can Go Home

**OTHER EMERGENCIES**

Emergency Medical Procedures
Bomb Threat
Bomb Threat Report
Power Outage

**BUILDING EMERGENCY SYSTEMS AND EQUIPMENT**
Overview
Elevators
Emergency Power
Evacuation Plan Signage
Exit Signs
Fire Annunciator Panel
Fire Control Panel
Fire Control Room
Fire Department Lock Box
Fire Doors
Fire Escape
Fire Extinguishers
Fire Pump
Heating, Ventilating, and Air Conditioning (HVAC)
Pull Station
Security Desk
Smoke Detectors
Sprinklers
Stairwells
Strobes
Utility Shut-Off Locations
Water Filtration System

**FIRE SAFETY DIRECTOR**
Overview
Administrative Responsibilities
Emergency Operational Responsibilities – Overview
Training Responsibilities
Fire Drill Instructions – Overview
Fire Drill Documentation
High Rise Fire Drill Critique
Training Documentation
Floor Warden Training Documentation
Fire Drill Register
Fire Safety Director Fire Drill Checklist
Fire Safety Director Annual Building Fire Drill Report

**SUPPLEMENTAL**
Legal Requirements for High-Rise Buildings

*SECTION TWO*
**FLOOR WARDEN MANUAL**

*SECTION THREE*
**OCCUPANT INSTRUCTIONS (Tri-Fold pamphlet)**

# Minutes Attachment E

# High Rise Building Safety Advisory Committee

**MEMORANDUM**

**DATE:** October 11, 2006

**TO:** Wayne Holmes, Chair – TC on Industrial, Storage and Miscellaneous Occupancies (BLD-IND)

**FROM:** Jim Quiter, Chair – High Rise Building Safety Advisory Committee (HRB-SAC)

**CC:** Ron Cote, Martha Curtis, Hossein Davoodi, Allan Fraser, Casey Grant, Greg Harrington, Gary Keith, Milosh Puchovsky, Robert Solomon
HRB-SAC membership

**SUBJECT:** Emergency Plans for High Rise Buildings

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At its October 3-4, 2006 meeting, NFPA's High Rise Building Safety Advisory Committee directed me to write to you to request that BLD-IND develop a committee proposal requiring an emergency plan for all high rise buildings. HRB-SAC believes that the requirement should specifically indicate that the building owner be responsible for preparing and implementing the plan. Requirements should be developed for both NFPA 101 and NFPA 5000.

While certain occupancy chapters require an emergency plan in accordance with paragraph 4.8, no such requirement currently exists for high rise buildings. Based upon recent high rise events, HRB-SAC believes that the development of an emergency plan for all high rise buildings will prompt better pre-event operations, response and coordination of building occupants, emergency responders and others, and ultimately result in a more desired outcome following emergency situations.

As the requirement of for emergency plans in high rise buildings can affect other chapters of NFPA 101 and NFPA 5000 as well as NFPA 1, Uniform Fire Code, this request is being copied to all staff liaisons responsible for these documents so that the affected technical committees can monitor what happens, and amend or enhance the provisions specific to their scope of work as appropriate.

HRB-SAC believes that the emergency plan should not be limited to fire hazards only but should, to the extent possible, address other hazards affecting life safety whether such hazards

are initiated by persons or natural causes such as weather. HRB-SAC recommends that the emergency plan supplement the existing requirements in section 4.8, and that it include as a minimum the elements identified below. Annex material should be developed as necessary.

Proposed Elements of an Emergency Plan for High Rise Buildings

1. purpose of plan
2. building description, include Certificate of Occupancy
3. appointment, organization and contact details of designated building staff to carry out the emergency duties
4. identification of events (man-made and/or natural) considered life safety hazards impacting the building
5. responsibilities matrix (role-driven assignments)
6. policies and procedures for those left behind to operate critical equipment
7. specific procedures to be used for each type of emergency
8. egress procedures, methods, and preferred evacuation routes for each event, including the appropriateness of use of elevators
9. requirements and responsibilities for assisting people with disabilities
10. procedures for accounting for employees
11. training of building staff, building emergency response teams and other occupants in their responsibilities
12. documents, including diagrams, showing the type, location and operation of the building emergency features, components and systems
13. practices for controlling life safety hazards in the building
14. inspection and maintenance of building facilities that provide for the safety of occupants
15. conducting fire and evacuation drills
16. key building management must interface with emergency responders
17. names or job titles of persons who can be contacted for further info or explanation of duties
18. post-event (including drill) critique/evaluation (as addressed by NFPA 1600, 5.13.1)
19. means to update the plan as necessary

Excerpt from NFPA 1600

5.13.1 The entity shall evaluate program plans, procedures, and capabilities through periodic reviews, testing, post-incident reports, lessons learned, performance evaluations, and exercises.