



**National Fire Protection Association**

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## ***High Rise Building Safety Advisory Committee***

### **MEMORANDUM**

**TO:** High Rise Building Safety Advisory Committee (HRB-SAC)  
**FROM:** Kristin Bigda, Staff Liaison  
**DATE:** April 18, 2012  
**SUBJ:** Ballot on Draft Public Inputs

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Attached you will find the ballot and ballot materials on the draft public inputs prepared at the March 22, 2012 meeting.

The ballot is for formally voting on whether or not you agree with the public inputs. If you do not agree, or you abstain you **must** provide your reasons for doing so. As with previous ballots you can vote and comment on individual items if you choose.

Please do not vote negatively because of editorial errors. However, please bring such errors to my attention for correction.

Please complete and return your ballot as soon as possible, but not later than **Wednesday, April 25, 2012**. As discussed during our last conference call, we are on a tight timeline. Your cooperation in meeting this deadline is appreciated. You may fax your ballot to (617) 984-7110 or email it to [lmackay@nfpa.org](mailto:lmackay@nfpa.org).

Enclosures: Ballot Form  
Comments

cc: R. Solomon

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

With respect to the draft public comments prepared by HRB-SAC at the March 22, 2012 meeting, I:

Agree

Disagree \*

Abstain \*

Provide reasons if you Disagree or Abstain.

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**Return by Wednesday, April 25, 2012.**

To: Linda Mackay

Fax: (617) 984-7110

Email: [lmackay@nfpfa.org](mailto:lmackay@nfpfa.org).

Signature:

Name – Please Print:

Date:

## **101 PUBLIC INPUT #1 – Video Monitoring and Situational Awareness**

Add new section to read as follows:

7.xx.1\* For new high rise 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 and 7.13.3

7.xx.2\* Approved occupant flow monitoring equipment or video 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.xx.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.

### **SUBSTANTIATION:**

The addition of 7.xx.1 through 7.xx.3 provide additions to the current provision of the code that have the potential to help the fire service, other fire safety personnel and building management to effectively monitor and manage egress during an emergency in a building. The use of equipment that would provide real time data to building command centers could lead to better direction of building evacuations and provide the ability for the command center to see conditions throughout the building. This would allow building officials and the fire service to observe if an egress route has become untenable and where they can most effectively redistribute occupants in the building. The High Rise Building Safety Advisory Committee (HRB-SAC) felt that while this language would provide the ability to better manage and control egress through real-time management, at this time it is only feasible for it to be included in new high rise buildings with occupant loads of over 4000.

One may see it as an invasion of privacy to install video equipment in the stairwells. However, in a report, “Public Perceptions of High-rise Building Safety and Emergency Evacuation Procedures” completed in 2007 for HRB-SAC by the Fire Protection Research Foundation, an independent, non-profit organization, it was found that very few persons have concern over privacy issues if their exit stairwells were equipped with video cameras. A summary of this finding is copied below. When asked about their level of concern over privacy issues if the exit stairwells in their building were equipped with video cameras to permit monitoring of stairwells during evacuations, about nine out of ten respondents (89 percent) reported they would not be concerned at all. Of the remaining, 7 percent reported they would be somewhat concerned and 3 percent would be very concerned.

Clearly, the topic of improving situation awareness of what happens in exit stairs during an evacuation is seen as an important topic and one worthy of new attention in the Code. Also, for the fire protection engineering profession, the need to replace the current technology of people movement in evacuations is getting widespread attention internationally because of the still unknown impact (thus far and forthcoming) of major demographic changes affecting people’s body size, body mass and fitness generally—all of which has profound effects on speed, flow and density during evacuations, especially in high-population buildings addressed in this proposal. The profession has to see this proposal plus the comments from NFPA HRB-SAC and me as working to its benefit as well as to the benefit of real-time situation awareness which has been a major factor in many fire incidents as well as other disasters.

The proposed Annex notes, as submitted in Public Input#XX-#XX 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, realtime 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.

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).

This public input was prepared by the NFPA High Rise Building Safety Advisory Committee. The HRB-SAC members are:

James Quiter (Chair), Arup

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John Miller, Los Angeles City Fire Department

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**HRBSAC Ballot Results for This Comment:...**

## **101 PUBLIC INPUT #2 (Link: Public Input #1) Video Monitoring and Situational Awareness**

Add text to read as follows:

**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.

### **SUBSTANTIATION:**

The addition of 7.xx.1 through 7.xx.3 provide additions to the current provision of the code that have the potential to help the fire service, other fire safety personnel and building management to effectively monitor and manage egress during an emergency in a building. The use of equipment that would provide real time data to building command centers could lead to better direction of building evacuations and provide the ability for the command center to see conditions throughout the building. This would allow building officials and the fire service to observe if an egress route has become untenable and where they can most effectively redistribute occupants in the building. The High Rise Building Safety Advisory Committee (HRB-SAC) felt that while this language would provide the ability to better manage and control egress through real-time management, at this time it is only feasible for it to be included in new high rise buildings with occupant loads of over 4000.

One may see it as an invasion of privacy to install video equipment in the stairwells. However, in a report, “Public Perceptions of High-rise Building Safety and Emergency Evacuation Procedures” completed in 2007 for HRB-SAC by the Fire Protection Research Foundation, an independent, non-profit organization, it was found that very few persons have concern over privacy issues if their exit stairwells were equipped with video cameras. A summary of this finding is copied below. When asked about their level of concern over privacy issues if the exit stairwells in their building were equipped with video cameras to permit monitoring of stairwells during evacuations, about nine out of ten respondents (89 percent) reported they would not be concerned at all. Of the remaining, 7 percent reported they would be somewhat concerned and 3 percent would be very concerned.

Clearly, the topic of improving situation awareness of what happens in exit stairs during an evacuation is seen as an important topic and one worthy of new attention in the Code. Also, for the fire protection engineering profession, the need to replace the current technology of people movement in evacuations is getting widespread attention internationally because of the still unknown impact (thus far and forthcoming) of major demographic changes affecting people’s body size, body mass and fitness generally—all of which has profound effects on speed, flow and density during evacuations, especially in high-population buildings addressed in this proposal. The profession has to see this proposal plus the comments from NFPA HRB-SAC and me as working to its benefit as well as to the benefit of real-time situation awareness which has been a major factor in many fire incidents as well as other disasters.

The proposed Annex notes, as submitted in Public Input#XX-#XX 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, realtime 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.

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).

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**HRBSAC Ballot Results for This Comment:...**

### **101 PUBLIC INPUT #3 (Link: Public Input #1) Video Monitoring and Situational Awareness**

Add new text to read as follows:

**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 postincident 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.

#### **SUNSTANTIATION:**

The addition of 7.xx.1 through 7.xx.3 provide additions to the current provision of the code that have the potential to help the fire service, other fire safety personnel and building management to effectively monitor and manage egress during an emergency in a building. The use of equipment that would provide real time data to building command centers could lead to better direction of building evacuations and provide the ability for the command center to see conditions throughout the building. This would allow building officials and the fire service to observe if an egress route has become untenable and where they can most effectively redistribute occupants in the building. The High Rise Building Safety Advisory Committee (HRB-SAC) felt that while this language would provide the ability to better manage and control egress through real-time management, at this time it is only feasible for it to be included in new high rise buildings with occupant loads of over 4000.

One may see it as an invasion of privacy to install video equipment in the stairwells. However, in a report, "Public Perceptions of High-rise Building Safety and Emergency Evacuation Procedures" completed in 2007 for HRB-SAC by the Fire Protection Research Foundation, an independent, non-profit organization, it was found that very few persons have concern over privacy issues if their exit stairwells were equipped with video cameras. A summary of this finding is copied below. When asked about their level of concern over privacy issues if the exit stairwells in their building were equipped with video cameras to permit monitoring of stairwells during evacuations, about nine out of ten respondents (89 percent) reported they would not be concerned at all. Of the remaining, 7 percent reported they would be somewhat concerned and 3 percent would be very concerned.

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The proposed Annex notes, as submitted in Public Input#XX-#XX 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.

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**HRBSAC Ballot Results for This Comment:...**

## **101 PUBLIC INPUT #4 (Link: Public Input #1) Video Monitoring and Situational Awareness**

Add new text to read as follows:

**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.

### **SUBSTANTIATION:**

The addition of 7.xx.1 through 7.xx.3 provide additions to the current provision of the code that have the potential to help the fire service, other fire safety personnel and building management to effectively monitor and manage egress during an emergency in a building. The use of equipment that would provide real time data to building command centers could lead to better direction of building evacuations and provide the ability for the command center to see conditions throughout the building. This would allow building officials and the fire service to observe if an egress route has become untenable and where they can most effectively redistribute occupants in the building. The High Rise Building Safety Advisory Committee (HRB-SAC) felt that while this language would provide the ability to better manage and control egress through real-time management, at this time it is only feasible for it to be included in new high rise buildings with occupant loads of over 4000.

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**HRBSAC Ballot Results for This Comment:...**

## **101 PUBLIC INPUT #5 - Emergency Action Plan**

Global Change – Change “Emergency Plan” to “Emergency Action Plan” throughout the document.

### **SUBSTANTIATION:**

The High Rise Building Safety Advisory Committee (HRB-SAC) recommends revising the term “emergency plan” to “emergency action plan”. The term “emergency action plan” is consistent with that used by the industry as well as the fire service. The term “emergency action plan” is also consistent with the document currently being produced by HRB-SAC, titled “Guide for the Development of Emergency Action Plans for High Rise Buildings”. Emergency action plans primarily describe the required actions and responsibilities of building occupants, staff and personnel during a fire emergency and other emergencies that may occur in a building. This includes fire drills, evacuation procedures and strategies, and the use and availability of fire protection systems.

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**HRBSAC Ballot Results for This Comment:...**

## **101 PUBLIC INPUT #6 – Emergency Action Plans**

Add new annex text to read as follows:

**A.4.8.2.3** Emergency action plans are a critical component of assuring life safety in buildings. Life safety is the result of an interaction of technical and social systems within the building and in the community. Gathering information to evaluate the performance and effectiveness of emergency plans is important for verifying system performance and as a basis for improvement. Such reports should be retained by the building and used to inform the process for revision of the building emergency plan.

Following any drill or actual emergency or reported emergency occurring in the building, an after action report should be prepared by building management to document the function of the building's life safety hardware, procedures, and occupant emergency organization.

For ordinary drills and reported emergencies, a short form should be completed. The purpose of this short form is to identify areas of success and areas for improvement.

For actual emergencies in the building, where there is major occupant movement, damage, or casualties, a long form should be used. The long form includes specific questions concerning the event, as well as performance of life safety systems. It also identifies improvements in areas such as training, maintenance, interaction with local emergency response organizations, or occupant management. The reports from these significant events shall be shared with the local emergency response organization.

**SUBSTANTIATION:** Currently, the Code does not contain adequate guidance on after action reporting. As the proposed language states, emergency action plans are a critical component for assuring life safety in buildings. A lot of time, effort, and coordination is required to put together an emergency action plan that is specific to the building. Emergency action plans vary from building to building and address the specific characteristics and hazards of that particular building. Thus, it is important to have means in place to review these plans after emergencies and ensure they are working effectively and are updated where necessary.

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**HRBSAC Ballot Results for This Comment:...**

**101 PUBLIC INPUT #8 - Evacuation Strategies**

Revise table A.4.8.2.1(3) to read as follows:

	Managed Sequence	Unmanaged Sequence
<u>Shelter in place (Remain-in-place)</u> <del>No Evacuation</del>	No-movement – <del>Remain in place</del> <u>Shelter-In-Place</u> upon direction	No-movement – <del>Remain in place</del> <u>Shelter-In-Place</u> per prior instruction
Partial Evacuation	Managed or controlled partial evacuation <ul style="list-style-type: none"> <li>• In-building relocation on same floor</li> <li>• In-building relocation to different floors</li> <li>• Occupants of some floors leave building</li> </ul>	Unmanaged or uncontrolled partial evacuation
Total Evacuation	Managed or controlled total evacuation	Unmanaged or uncontrolled total evacuation

**SUBSTANTIATION:** The table entry for “No Evacuation” is not accurate and is more appropriately and commonly referred to as “Shelter in Place”. The table should be updated to reflect the commonly used terminology in the field.

This public input was prepared by the NFPA High Rise Building Safety Advisory Committee. The HRB-SAC members are:

- James Quiter (Chair), Arup
- Geoff Craighead, Universal Protection Service
- Jon Magnusson, National Council of Structural Engineers Associations
- John Miller, Los Angeles City Fire Department
- Jack Murphy, Fire Safety Directors Association of Greater New York
- Steven Nilles, Council on Tall Buildings and Urban Habitat
- Jake Pauls, American Public Health Association
- Jim Shea, Tishman Speyer
- William Stewart, Metropolitan Fire Chiefs-IAFC
- Sally Regenhard, The Skyscraper Safety Campaign
- Charles Jennings (Alternate to Regenhard), The Skyscraper Safety Campaign
- Kristin Bigda, NFPA Staff

HRB-SAC is an advisory committee established by the NFPA Standards Council to advise the association, and especially the association’s technical committees, on all safety issues related to high rise buildings.

**HRBSAC Ballot Results for This Comment:...**

## **1 PUBLIC INPUT #1 - Emergency Action Plan**

Global Change – Change “Emergency Plan” to “Emergency Action Plan” throughout the document.

### **SUBSTANTIATION:**

The High Rise Building Safety Advisory Committee (HRB-SAC) recommends revising the term “emergency plan” to “emergency action plan”. The term “emergency action plan” is consistent with that used by the industry as well as the fire service. The term “emergency action plan” is also consistent with the document currently being produced by HRB-SAC, titled “Guide for the Development of Emergency Action Plans for High Rise Buildings”. Emergency action plans primarily describe the required actions and responsibilities of building occupants, staff and personnel during a fire emergency and other emergencies that may occur in a building. This includes fire drills, evacuation procedures and strategies, and the use and availability of fire protection systems.

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**HRBSAC Ballot Results for This Comment:...**