

**SUMMARY:**  
**DECEMBER 8-9, 2005, MEETING of the**  
**NIBS/MMC COMMITTEE TO TRANSLATE THE NIST WORLD TRADE CENTER**  
**INVESTIGATION RECOMMENDATIONS**  
**FOR THE MODEL BUILDING CODES**  
**National Institute of Building Sciences, Washington, D.C.**

**Committee Members Present**

Herman W. Brice, Co-Chair  
Gerald Jones, PE, Co-Chair  
Najib N. Abboud, PhD  
Scott W. Adams  
George Capko, Jr., PE  
William M. Connolly, AIA  
Carl Galioto, FAIA  
Kirk Harman, PE, SE  
Paul K. Heilstedt, PE, Hon. AIA  
John D. Hooper, SE  
Marsha Mazz  
Dennis Mileti, PhD  
Lawrence G. Perry, AIA  
James T. Ryan, CBO  
Jim W. Sealy, FAIA  
Robert Smilowitz, PhD, PE

**NIST Liaison Members Present**

Richard W. Bukowski, PE  
Stephen A. Cauffman  
S. Shyam Sunder, ScD

**NIBS/MMC Staff Present**

David A. Harris, FAIA  
Claret M. Heider  
Bernard F. Murphy, PE  
Carita Tanner

**Committee Members Unable to Attend**

Stephanie A. King, PhD, PE  
Arturo Mendez  
Timothy A. Reinhold, PhD, PE  
Martin H. Reiss, PE

**Guests Present**

Jason D. Averill, NIST  
David S. Collins, FAIA, The Preview Group  
William Davis, PhD, NIST  
John L. Gross, PhD, PE, NIST  
William Grosshandler, PhD, NIST  
Olwen F. M. Huxley, House Subcommittee on  
Environment, Technology, and Standards  
(December 9 only)  
James Randall Lawson, NIST  
H. S. Lew, PhD, PE, NIST  
Therese P. McAllister, PhD, PE, NIST  
Nancy McNabb, AIA, National Fire Protection  
Association  
Jake Pauls, CPE, Consulting Services in Building  
Use and Safety  
Michael Pfeiffer, ICC  
James Rossberg, ASCE  
Fahim Sadek, PhD, NIST  
Randy Tucker, The RJA Group, attending for  
committee member Martin Reiss  
Robert Wills, PE, AISI

The meeting began with a brief overview of the committee's charge from Co-Chair Brice and a round of self-introductions. During a review of the agenda (Attachment A), Mr. Brice indicated that discussion would begin with a review of ongoing activities by others.

Paul Heilstedt, Chair of the ICC Code Technology Committee (CTC), explained that the CTC and the ICC Ad Hoc Committee on Terrorism Resistant Buildings (AHC-TRB) met jointly

earlier in December. The NIST WTC investigation recommendations were discussed and the ICC committees identified those for which they might develop code change proposals. He added that the committees looked first at the recommendations themselves and then considered the strawmen developed by the NIST staff at the NIBS/MMC Committee's request. The following summarizes Mr. Heilstedt's comments:

- Recommendation 1 – Appears to be a lack of leadership in the standards community vis-à-vis progressive collapse and available guidance is vague. The CTC hopes that ASCE 7 will move forward on this issue and that design professionals will encourage the ASCE 7 committee to do so. The CTC does not plan to pursue it but the AHC-TRB plans to bring a proposal to the CTC for review. A definition of primary structural members might be of some utility.
- Recommendation 2 – The CTC is interested in incorporating the new ASCE standard for wind-tunnel testing. With respect to the NIST strawman, the CTC would like to know where the ratios came from.
- Recommendation 3 – The CTC thinks that the recommendation has some merit but questions the 1/300. The committee members have seen no problems; therefore, the group needs input from the design community.
- Recommendation 4 – A relatively long-term CTC initiative is focused on balanced fire protection design and this recommendation would be addressed in that framework.
- Recommendation 5 – ASTM is working on updating its standard and that work needs to go forward before a code change is made.
- Recommendation 6 – The TRB is developing a proposal to focus on inspection of sprayed-on fireproofing in existing buildings. A certification program might help but the problem still requires investigation. The industry should play a leading role.
- Recommendation 7 – The CTC plans to evaluate the structural frame issue to determine how to emphasize the problems with connections and possibly beams and girders.
- Recommendation 8 – The AHC-TRB plans to bring something forward.
- Recommendation 9 – No action is planned.
- Recommendations 10 and 11 – With respect to coatings, no code obstacles have been identified.
- Recommendation 12 – This issue would be covered during development of the balanced fire protection initiative.
- Recommendations 13, 14, and 15 – The CTC plans to review requirements developed by Montgomery County, Maryland.
- Recommendation 16 – The CTC plans to reference the fire code.
- Recommendation 17 – This issue would be covered during development of the CTC balanced fire protection initiative; however, the TRB might advance a proposal to deal with the counterflow issue.
- Recommendation 18 – The CTC discussed the issue, noting that marking of treads was proposed during the last cycle but failed because it was not clear whether it was mandatory for all buildings. Durability also was questioned.
- Recommendation 19 – Not a code issue.
- Recommendation 20 – Any requirements should be industry-driven.

- Recommendation 21 – Code changes await completion of the work on hardened elevators being conducted by the American Society of Mechanical Engineers (ASME).
- Recommendation 22 – The Montgomery County system also covers emergency communications.
- Recommendation 23 – Not a code issue.
- Recommendation 24 – The AHC-TRB plans to assess to determine whether something can be done in the *International Building Code*.
- Recommendation 25 – This is a code use issue, not a matter for the CTC.
- Recommendation 26 – The ADC-TRB plans to do something regarding sprayed-on fire protection.
- Recommendation 27 – The CTC has no interest in this document-retention issue.
- Recommendation 28 – Not of interest to the CTC.
- Recommendations 29 and 30 – Beyond the purview of the CTC.

In summary, Mr. Heilstedt explained that the CTC will be meeting on February 2-3, 2006, and then will hold a public hearing on March 9-10. It hopes to address issues raised by Recommendations 1, 2, 3, 6, 7, 8, 16, 17, 22, 24, and 26 but probably will not use the approaches put forth in the strawmen.

Dr. Grosshandler asked whether the committee thinks that some of the strawmen recommendations are going in the wrong direction. Mr. Heilstedt responded that the general problem with the strawmen is that they lack justification that focuses on documented defects the proposed change would correct.

Mr. Sealy indicated that he would not be comfortable with the NIBS/MMC committee moving forward with a change that would be overturned on the floor. Mr. Perry echoed Mr. Sealy indicating that it is extremely important to have sufficient and appropriate substantiation for changes; he noted that there simply may not be adequate time to develop the needed documentation before the March deadline. Mr. Jones noted that the membership of the NIBS/MMC committee is broader than that of the ICC committees and that he hopes we look at some of the items CTC is interested in and issue joint proposals. To be successful, a broad consensus is needed so it is within our power to add constructively to what the ICC committees are doing. Mr. Ryan stated that we need credibility and must set the correct tone at the onset.

Mr. Collins asked Mr. Heilstedt to explain how the CTC was making its decisions. Mr. Heilstedt responded that the committee utilized five study groups that reported back at the CTC meeting.

Mr. Connolly, chair of the ICC AHC-TRB, reported that his committee plans to focus on specific issues and to develop changes related to several of the NIST recommendations as follows:

- Recommendation 1 – The committee hopes to use the United Kingdom (UK) model which starts with a basic performance statement. He noted that this might not be the highest tech solution but that it has worked well for about 30 years. He added that the committee intends to apply its change to buildings five stories and taller. Mr. Smilowitz noted that the New York City (NYC) Building Department assembled local engineers to address the issue, and this group developed something based on the UK approach. More

recently, another group initiated an effort to develop code language but has not produced anything. In essence, he said, several models exist with that of the Department of Defense probably being the most comprehensive. He added that there is a need to balance what industry will tolerate and that the issue has been set aside for the time being with respect to the NYC code. Mr. Hooper indicated that ASCE would want to be involved, which means that it probably will be five years until something is developed for ASCE 7-2010, but that whatever is done needs to be done slowly through a consensus process. Mr. Smilowitz added that NYC's fear was that stiffer requirements would send development out of the city into New Jersey.

Mr. Connolly responded that the AHC-TRB believes the UK approach is a good one to start with and that any better approaches developed later could be adopted then. Mr. Heilstedt indicated the CTC is looking at definitions and text but not really addressing progressive collapse since it would rather wait for ASCE to do its work. Mr. Connolly noted that the AHC-TRB does not believe we need to wait that long to do something; he cited the experience with the Murrah Building where 20 percent of the building was damaged by an explosion and caused an 80 percent progressive collapse. Dr. Lew indicated that the NIST progressive collapse project is expected to result in a best-practices document on which ASCE input will be solicited.

Dr. Sunder asked whether the AHC-TRB will address only buildings potentially the subject of a terrorist attack, and Mr. Connolly responded that AHC-TRB proposals would address all buildings since actions taken to reduce the risk to potential terrorist targets have corollary benefits. Dr. Sunder noted that NIST is also working with DoD and GSA to ensure that all requirements mesh. Mr. Smilowitz noted that DoD plans to eliminate its requirements once an industry standard is available.

Mr. Galioto explained that without very strong supporting documentation, opposition will be substantial and that it might be wise to wait for ASCE to include requirements in ASCE 7. Mr. Brice asked whether the committee would like to give this priority as a long-term goal. Mr. Ryan noted that we still have the option of reviewing the change developed by the AHC-TRB and determining then if we want to support it. **Mr. Connolly agreed to keep NIBS staff involved in circulation of any changes developed by the AHC-TRB. Mr. Heilstedt agreed to do the same for relevant CTC proposals.**

- Recommendation 2 – Mr. Connolly indicated that the AHC-TRB had taken no position on this recommendation. Mr. Heilstedt suggested that while the strawman is something that requires longer term development, adoption of a new standard could be done now.

Dr. Abboud commented that the new ASCE standard puts forth requirements for how wind tunnel testing should be conducted and that it is no harsher than ASCE 7. He noted, however, that the strawman language making testing mandatory for buildings higher than 420 feet or with an aspect ratio greater than 1 to 5 will draw strong objections unless there is considerable technical substantiation for those numbers. Dr. Sunder indicated that NIST had consulted with practicing professionals in developing strawman proposal. Mr. Hooper stated that this topic needs to be considered by the ASCE 7 Wind Task

Committee; he added that it could be argued that no change is necessary. Dr. Sunder emphasized that there is justification in that the NIST investigation showed that test results can differ greatly and that consistent results are needed. Dr. Abboud indicated that we should prepare a proposal that adopts the new standard but that lets the threshold issues await further study. Mr. Heilstedt noted that copies of the standard will be needed 30 to 45 days before the hearings but that it seems reasonable to go forward with the change and hope for the best. **Dr. Abboud indicated he would draft for the NIBS/MMC committee an IBC change proposal adopting the new ASCE 7 wind tunnel testing standard for the NIBS/MMC committee.**

The issue of the desirability of posting the NIST strawmen proposals was raised. **It was concluded that the strawmen are internal working documents that can be shared with others but not posted on the internet and that the minutes of this meeting will reflect that the strawmen were prepared for committee use at the committee's request.**

Mr. Harman asked why we should be considering wind issues. Mr. Jones responded indicating that the WTC investigation report identified a number of issues not directly related to the WTC collapses that should be considered. As an example, he cited the fact that the WTC study highlighted the percentage of a building population that is mobility impaired at any given time, which is an important problem.

- Recommendation 3 – Mr. Heilstedt indicated that there appear to be vast differences in drift ratios already permitted so there really is no need to deal with the sway issue. Dr. Sunder indicated that the stability of very tall buildings is governed by deflection and that people are already using a drift ratio to control that. He further indicated that interstory drift is already used in practice but not in codes. Mr. Hooper noted that this is also an ASCE 7 matter that should be addressed by the Wind Task Committee and that the *IBC* Structural Committee will not want this in the code. Mr. Harman supported Mr. Hooper's statement indicating that exceptions to ASCE 7 would be opposed by the structural engineering community. Mr. Rossberg noted that the issue is a matter of concern for AISC and ACI as well as ASCE and that it should not be addressed in a vacuum. He added that the three groups will meet to determine how rapidly the issue can be dealt with. **The NIBS/MMC committee concluded that this is not directly an IBC issue but rather an AISC, ACI, and ASCE 7 issue but that the committee would send a letter to Mr. Rossberg and the chair of ASCE 7 indicating it's desire for the issue to be addressed in the near term and for the committee to have input to that process.**
- Recommendation 4 – Mr. Connolly indicated that the AHC-TRB is working on a change related to fire resistance ratings and adding to redundancy requirements for command communication systems, etc. He added that the committee did not find defining four types of high-rise building to be useful and that rather requirements should have individual thresholds. He noted that 75 feet is the limit for exterior fire fighting and that 420 feet is the limit for fire fighters with the equipment they can carry. Ms. McNabb indicated that 420 feet is the point at which NFPA standards stop permitting narrower

stair widths if a sprinkler system is present. Mr. Galioto indicated that he supports the classification system in principle but that three categories would be adequate. He added that code changes probably could be developed regarding improving sprinkler systems and the density and adhesion of sprayed on fireproofing above a certain height. Some minimal additional cost might be incurred for higher density material. Mr. Connolly said that the AHC-TRB agrees with Mr. Galioto and plans to prepare change proposals to meet the March deadline. In explaining the justification for such proposals, Mr. Galioto noted that the need to suppress fires is greater the taller the building is.

Mr. Tucker indicated that a change from light hazard to ordinary hazard might be warranted, even though NIST found the fire load to be lighter than anticipated, because the sprinkler system must be adequate to deal with the hazard present; however, in taller buildings, the focus should be on increasing redundancy, not on increasing the hazard level. Mr. Galioto also agreed that redundancy is more important. Mr. Connolly explained that the AHC-TRB concluded that a performance standard is the approach to take for very tall buildings.

In discussing the height thresholds, it was noted that 75 feet to 420 feet and 420 feet and above are really all that is needed with a third category perhaps being needed only for refuge floors. Mr. Perry said that 420 feet makes sense for hydraulics. Mr. Ryan asked how the bond strength would be verified, and Dr. Sunder replied that there is an ASTM test for verifying bond strength.

Mr. Jones asked whether megabuildings are actually designed using the building code in that he thought these special buildings were designed using peer review and other special techniques. Mr. Galioto replied that, in practice, design for special buildings always goes well beyond the code minimums. Mr. Connolly indicated that his committee was going to address a number of the issues raised including fire-resistance ratings and performance standards for very tall buildings.

Mr. Pauls indicated that the NFPA High-Rise Advisory Committee is asking its technical committees to develop criteria and that trying to force everything into a table may not be the best approach. He also noted that occupancy is very important. Ms. Mazz indicated that there is considerable new technology on the horizon but that there remain many unanswered questions regarding mobility impaired persons.

- Recommendation 4 – Mr. Connolly indicated that the ADC-TRB will refer to the performance code to deal with the burnout issue, at least as an interim response.
- Recommendation 5 – Dr. Abboud noted that the strawman proposal would be unenforceable in that ASTM E119 lacks the needed criteria but that the relevant ISO standard does have criteria for stopping the test. He added that the most appropriate response would be to modify the ASTM standard. Dr. Grosshandler indicated that NIST is working with ASTM but that he would like the committee's opinion on using hourly ratings. The NIBS/MMC committee concluded that it would support efforts to change

the ASTM E119 standard as well as related UL and NFPA standards. It also was noted that Section 403.12 of the strawman proposal contradicts the strawman on Chapter 10.

- Recommendation 6 – Mr. Connolly report that the AHC-TRB plans to develop a change that will focus primarily on installation – i.e., it will strengthen the code by improving the inspection requirements, the testing frequency protocol for density and thickness testing, the timing of special inspection, and the primer paint issue. Regarding the bond strength, Mr. Galioto indicated that the manufacturer should have recommendations regarding the substrate; he also noted that follow-up inspection should result in fixing problem areas before the ceiling is closed up. **It was concluded that the NIBS/MMC committee will review the proposals developed by the AHC-TRB.**
- Recommendation 7 – Mr. Heilstedt indicated again that the CTC plans to do something and that it probably will go beyond the WTC investigation recommendation. **It was concluded that the NIBS/MMC committee will review the proposals developed by the CTC.**
- Recommendation 8 – Mr. Connolly said that this issue was actually dealt with during the discussion of Recommendation 4 and that the AHC-TRB plans to reference the performance code. **It was concluded that the NIBS/MMC committee will review the any proposals developed by the AHC-TRB.**
- Recommendation 12 – Although this is a longer range issue, Mr. Connolly indicated that a change might be needed to ensure that the water supply is looped for high buildings. Mr. Capko indicated that his industry recommends a secondary water supply in such cases even though there is a cost involved. Mr. Harman noted that most high-rise buildings will not have on an on-site supply but will have a looped system and two sources. **It was concluded that the NIBS/MMC committee will review the any proposals developed by the AHC-TRB.**
- Recommendations 13, 14, and 15 – Mr. Connolly indicated that the Montgomery County language is being looked at by the CTC and will be considered by the AHC-TRB but that the AHC-TRB also will be looking at the electronics issues surrounding the command and control systems (Recommendations 13, 14, 15, 19, 23, 24). Regarding Recommendation 13, Dr. Mileti underscored the importance of being able to speak to everyone to help them make the decision to evacuate quickly. Regarding Recommendations 13 and 19, Ms. Mass commented that this is a very long-term problem but that we need to find a way to alert those who are deaf or hard of hearing about events other than fire. She noted that NFPA 72 requires visible alarms for fire but for nothing else. She added that the Access Board will work on this issue. It was indicated that the NFPA 72 issue will not be treated by either the CTC or the AHC-TRB. Mr. Perry noted that communications-related issues are very important to BOMA. It was mentioned that emergency alert system messages similar to those used in nuclear power plants might be considered. Ms. McNabb indicated that NFPA is looking at the public education aspect

of the issues. **It was concluded that the NIBS/MMC committee will review the proposals developed by the CTC and AHC-TRB.**

- Recommendation 16 – Dr. Mileti commented that public education is important and that a national campaign would help but will not be enough. The idea was advanced that perhaps the NIBS/MMC committee can issue white papers related to the issues. It also was noted that some would question whether we should ever plan on full evacuation. Mr. Ryan noted that we might want to eventually develop a white paper to stimulate the relevant organizations to provide needed training. Dr. Sunder commented that there appears to be a lack of coordination surrounding these issues. Mr. Perry mentioned that the BOMA members appear to be looking for a one-size-fits-all emergency plan. He also indicated that BOMA would support the committee’s development of a white paper that encourages all the relevant interest groups to cooperate. **The NIBS/MMC committee agreed to that approach.**
- Recommendations 17, 18, and 21 – Mr. Galioto noted that all three of these recommendations are related to fire service shafts, stairways, vestibules, occupant evacuation. He volunteered to develop a graphic example of how such areas might be treated. **(See Attachment B of this summary for Mr. Galioto’s graphics.)** Comments made during discussion indicated refuge floors are a cause of confusion. During mention of how evacuation decisions are made, it was noted that during emergency planning sessions, four or five types of event are examined and decisions are made ahead of time as to what to do vis-à-vis evacuation, etc. For a fire situation, fires are categorized and it should be known ahead of time who does what; thus, the only decision should be what category the fire is. Mr. Connolly noted that the AHC-TRB endorses doing something about Recommendations 17 and 18 but doesn’t believe the strawman is the way to go. The AHC-TRB proposes requiring an extra stairway with the trigger being something like 20 stories. He added that his committee does not believe there is justification for refuge areas and is considering prohibiting transfer corridors. Further, he noted that the committee is reluctant to deal with elevator issues immediately because of electro-mechanical reliability issues and would rather wait until ASME has updated its standard. Mr. Averill noted that ASME is proceeding with its hazard analysis but is deliberately moving slowly to ensure that nothing is overlooked. As far as stair width is concerned, the committee is considering 44 inches but has not made a final decision yet. Mr. Pauls indicated that human factors professionals should be involved but do not now interact with the elevator industry or code groups. Mr. Jones noted that use of elevators will involve an important cultural shift.

With respect to Recommendation 21, Mr. Ryan noted that some of what is in the strawman is already in the code. Mr. Perry noted, however, that the *IBC* requirements are not as clear as they might be and that work will be needed during the 2006-2007 cycle. Dr. Grosshandler indicated that he hoped something could be done now rather than waiting for ASME and questioned why the code could not say something about people self-electing to utilize the elevators. Mr. Jones noted that consideration must be given to the fact that the safety consequences are great. Mr. Perry noted that, according to the code, elevators shut down automatically only if a detector in the shaft or machine room is

triggered but that the fire service generally says otherwise and always recalls the elevators to the lobby. Mr. Ryan said that even though the code does not require it, the code does not prohibit it so if the fire service opts to shut down the elevators, they can do it. Mr. Adams indicated that he'll survey the fire people to see whether they expect to recall the elevators when they arrive. Ms. McNabb indicated that she would explore whether NFPA has any documentation on the number of elevator deaths in fires. Mr. Wills asked whether the intent is to have all elevators working or just one and whether the technology exists to service 100 stories with a single elevator.

With respect to the strawman, Mr. Hooper asked about the source for the 2 psi overpressure. Dr. Sunder indicated that it could be any number that the committee felt was appropriate and Dr. Lew added that the number is threat independent. During discussion it was noted that we need to ensure that we do not create other problems – for example, we need to consider that seismic deformation is different from pressure deformation. Dr. Sunder indicated that if we consider the hose stream and an accidental gas explosion, something between 1 and 2 psi would likely be realistic. Mr. Connolly said that stairways have always been considered an area of relative safety and perhaps we should establish stairway width based on getting everyone into a stairway within three minutes. Mr. Pauls noted that based on the World Trade Center scenario, there was no way to get everyone in the stairways. Mr. Brice commented that it probably would be achievable in shorter buildings.

- Recommendation 22 – Considered with Recommendations 13, 14, and 15
- Recommendation 24 – Mr. Connolly explained that the AHC-TRB was giving attention to hardening or redundancy with respect to communication circuits to ensure situational awareness and command and control communications as well as the ability to send information off site if the control center in a building is lost. **It was concluded that the NIBS/MMC committee will review any proposals developed by the AHC-TRB.**
- Recommendation 26 – Mr. Connolly noted that what to do for new buildings must be decided before exploring the issues surrounding existing buildings but that the AHC-TRB plans to at least look at the communications issue. Mr. Jones hypothesized that perhaps we could use the seismic rehab guidelines in which we developed a maximum credible earthquake as a model and develop some kind of maximum credible load. Dr. Sunder indicated that the fire protection community does not use probabilities but rather scenarios so that a similar approach would not work right now. He added that once research associated with Recommendation 9 is completed it probably will be possible to develop additional scenarios, there being seven or eight now. **It was concluded that the NIBS/MMC committee will review any proposals developed by the AHC-TRB.**
- Recommendation 9 – This recommendation focuses on performance-based design. Mr. Perry noted that the retrofit issue is very important to BOMA. Dr. Sunder noted that the recommendation calls only for the development of a methodology, not for the actual retrofit of existing buildings. Dr. Abboud commented that in NYC structures are converted from one use to another – for example, old warehouses into high-tech offices –

and that performance-based design might facilitate that process. Dr. Sunder mentioned that AISC has published material on a performance-based approach and that SFPE also has work under way but that the Structural Engineering Institute's (SEI) Board is not interested in developing performance standards. Mr. Wills explained that AISC's published material is just a first step; he emphasized that some things are not specific to steel structures and that there is a need to work with the concrete community as well. Mr. Harman noted that only about 20 percent of the structural engineering community thinks they should be involved with fire and that retrofit is difficult to sell in many if not most communities. Mr. Collins indicated that performance tools would be helpful in that it is now difficult to evaluate existing assemblies. Dr. Grosshandler commented that all acknowledge solving this problem will require a long-term effort but that we should give some thought to what the building official will need once we are able to do performance-based retrofit design. Dr. Abboud mentioned that ASCE will need to be involved in some fashion whether they want to take responsibility for standards development or not. Mr. Jones stated that the MMC can bring the various entities to the table. Mr. Ryan noted that the ICC already has a performance code but that few adopt it in that small jurisdictions especially do not know what to do with it; perhaps one approach would be to involve the large jurisdictions since they are the only ones who can really do it. Mr. Ryan added that he agreed with Mr. Harman about the economics of rehab making it a very hard sell. Mr. Perry noted that the performance-based approach is good for new buildings and very large and complicated renovations. Mr. Connolly indicated that establishing performance design criteria is easy but developing a reliable and repeatable evaluation methodology is difficult. He added that it really does not matter whether the building official is comfortable with the performance approach; he or she just needs a repeatable and reliable evaluation method. After discussion it was concluded that serious federal funding would be needed to develop the required performance evaluation tools and that a proposal should be developed. Dr. Sunder noted that such an effort would probably require public-private partnering. Dr. Abboud noted that the effort would need to be accessible to the typical engineer since the academic research like that available for the seismic rehab effort will not be found for this issue. Mr. Jones added that it might be wise to develop a long-range action plan. Mr. Ryan noted that performance-based standards exist, but the challenge is to get jurisdictions to adopt them. Mr. Wills noted that while the ICC developed a performance code, the evaluation tools are still lacking.

The EuroCode helps but there are missing pieces such as how to measure conductivity of materials at high temperature. Since that applies to all materials, it will be essential to bring together all the various interests to identify gaps and then fill them. Mr. Harman commented that it will be difficult to get fire marshals to accept performance based criteria; most do not have a technical background so a broad educational effort will be needed. Ms. McNabb indicated that NFPA would support development of the needed tools but she said the problem is a difficult one – for example, we treat all steels as if they were one single material when they are not. Mr. Sealy stated that people misunderstand the *International Performance Code*: all the building official needs to do is accept the concept and the code tells the designer what he or she needs to do to reach the minimum levels, which is actually equivalent to the requirements in the prescriptive codes. **The group agreed to support the performance-based design concept and to bring**

**together those who need to be involved to identify the gaps with respect to evaluation tools and develop a detailed action plan for filling those gaps.** Ms. Huxley noted that including cost estimates will be important; even if funding isn't now available, Congress might be able to provide it in the future if the costs were known. The need for a U.S. facility to validate the models and that capacity for fire testing full-scale subassemblies under load full and with multiple degrees of freedom is needed.

- Recommendations 10 and 11 (new fire-resistive materials) – It was noted that this recommendation is not directly a code matter. The idea is to make sure that there are no barriers as the new materials are developed. New materials may not have attributes that are normally considered in current code assessments. For example, when ASTM E119 is used to evaluate high-temperature steels, the material will reach temperature sooner without the coating and the code does not recognize the benefit of not using the coating. Further, creep is important so it will be necessary to look at that in addition to time/temperature. Mr. Wills noted that work is being done to take a totally different approach to E119 but that there are no specific recommendations yet. Mr. Collins noted that the crucial issue involves the fire loading assumptions. We need to have real fire experience information and tools for determining how to use the new information and new materials. He added that many new materials are created but their developers need to know how to get them recognized. **The decision was made to develop a plan for how to look at new materials and facilitate their testing and use (Brice, Collins, Connolly, Jones, and Wills to be involved).**
- Recommendation 19 – Mr. Perry noted that this is difficult for BOMA to deal with because it is a largely local issue; he added that in NYC and several other jurisdictions, a BOMA representative is part of the fire department command team. Dr. Sunder commented that the recommendation was stimulated by the fact that people in the WTC towers were getting different information from different sources. Mr. Connolly explained that the AHC-TRB plans to address situational awareness vis-à-vis Section 9 of the *IBC* but that the remainder of the recommendation reflects a very serious issue. Dr. Mileti indicated that we have knowledge bases about how to organize the communication of information between groups and what to say and in what tone to say it to help people. He added that what people believe often is not real so there is a need to assess how they think if we are to influence what they do. He identified several reports that focus on these issues (e.g., a 1990 Oak Ridge National Laboratory report and the *Warning America* document). Mr. Pauls noted that in 1983 Ontario studied the attitudes and awareness of occupants of high-rise buildings but that we did not do that after 9-11 even though NFPA has volunteered to do a similar survey. Mr. Smilowitz noted that we saw the flip side of the recommendation in the Khobar Towers incident in Saudi Arabia where a guard's actions saved many people. He added, however, that accurate information is critical so what we may need are building-specific early warning systems that quickly identify what and where the threat is.

Dr. Abboud commented that Hurricane Katrina teaches us a sobering lesson in that for the first 72 hours, all emergency response people were using only one channel to communicate, which made it essentially useless. He also explained that three New

Orleans radio stations had been flooded but were given facilities by a Baton Rouge station and within 24 hours were doing public announcements from a wide variety of people who called in. Ms. Mazz indicated that the FCC closed captioning wasn't done but they hadn't received even one complaint. She added that she had hoped to gather information on alerting devices, etc., at an early November conference at Galludet University but found that most of what is used is idiosyncratic. She said that the U.S. Department of Agriculture seems to have a multilevel system that employs a variety of devices (e.g., Blackberries, buzzers, e-mail) but that it too was idiosyncratic. Dr. Mileti noted that there are data available on the problem of getting disabled people to evacuate and that friends and coworkers pitch in. Dr. Sunder indicated that NIOSH and CDC reportedly conduct a lot of research in the field. Mr. Pauls noted that the Veterans Administration (VA) is funding research on people with vision problems. Mr. Brice summed up the discussion by stating that the **NIBS/MMC committee supports the recommendation and will develop a white paper reflecting current knowledge and the needs of all involved.** Mr. Adams mentioned that it might be possible to use such a paper at the Fire Academy.

- Recommendation 20 – Discussion emphasized that the top priority is hardened and protected elevators and that the issue shouldn't be diluted by looking at such things as external chutes, etc. Mr. Perry noted that exterior escape devices were proposed for the code but omitted at the last minute and that an effort is being made to establish an ASTM committee to look at such things. Ms. Mazz indicated that NFPA is expected to initiate work on a stairwell descent device standard, noting that the ADA does not require them because they are considered furnishings. Mr. Heilstedt noted that CTC will draft a change for modifying shaftway design but that pressure ranges must be examined for such things as hose stream and gas explosions. **Committee members Connolly, Heilstedt, Hooper, Lew, and Smilowitz offered to research the issue.** Dr. Mileti noted that the problem for the mobility impaired is greater than we think because friends and coworkers tend to stay to assist them. He wondered why, given 9-11, buildings don't have stairwell descent devices to help people bring their friends down. Mr. Perry noted that many buildings have them but people often are not trained to use them and they are not deployed in appropriate numbers. Ms. Mazz noted that we probably will not see hardened elevators in anything but the tallest buildings so we will still have the problem with all the 10-story buildings.
- Recommendation 23 – Accurate information for first responders is crucial. Dr. Mileti indicated that the technology to do this is available but we need to think of buildings as communities in really large incidents when you have 1000+ people on site. Mr. Connolly noted that intelligence is not accorded the importance it should have and that information analysis, processing, and delivery are not recognized in the national models. Mr. Pauls asked why video surveillance in stairwells, etc., is not required by the building codes. Mr. Connolly noted that use of such equipment is sensitive because of right-to-privacy issues. Mr. Harman noted that all casinos have video surveillance but parking garages do not because of legal issues (i.e., if someone gets mugged and no one is monitoring the camera feed). Dr. Mileti supported the need for cameras in stairways. Mr. Perry noted that the liability issues remain as does the cost of monitoring but that many building

owners/operators are beginning to do it. Mr. Connolly noted that the AHC-TRB is looking at the use of cameras as sensors to improve situational awareness. It was noted that the media are probably the best source of “surveillance” information. Mr. Averill noted that there are alternatives to cameras that get around some of the legal issues by just counting heads. **The decision was made to develop a position paper on the intelligence aspect of information delivery for very large scale events. Committee members Adams, Brice, and Perry will work with staff to draft such a document.**

- Recommendation 24 – Mobile emergency operations centers have become very important and it also is possible to have virtual EOCs. A lot of technology exists but protocols are lacking with respect to use of the technology.
- Recommendation 25 – This is a jurisdictional standard of practice issue. Mr. Connolly noted that as a minimum the groups that develop model legislation for special authorities should eliminate the phrase “independent from codes” from their models. Mr. Harman indicated that the standard of care is still going to require compliance with the code. Influencing GSA to explicitly state the principle would be helpful. **The potential for writing to the relevant groups developing model legislation for special authorities will be explored.**
- Recommendation 26 – Existing buildings are a problem. Perhaps all that can be done is to encourage state and local jurisdictions to adopt requirements. It also was noted that Congress is considering incentives to motivate owners to deal with existing buildings. Dr. Abboud indicated that perhaps published case studies of incentives that have worked would be helpful. Ms. Mazz noted it is possible that the construction of areas of refuge could be a tax exemption or credit. **(See Attachment C presenting information on the matter provided by Ms. Mazz.)**
- Recommendation 27 – This document retention issue is beyond the code but Dr. Abboud indicated that such things are covered in other requirements. Perhaps a gradual process will work beginning with just drawings and specifications; saving calculation documents can pose liability issues that all will want to avoid. Building departments do not want the responsibility, and maintaining such documents are unreimbursed expenses for all. Mr. Perry reminded the group that ownership changes so there is a need to focus on on-site information, which is covered by the code. Mr. Connolly indicated the AHC-TRB was looking at this matter a bit. Mr. Pauls suggested that perhaps the Library of Congress could keep such documentation for really significant buildings. Also noted were state laws covering public requires and purging requirements. **The NIBS/MMC committee will revisit the issue based on AHC-TRB actions.**
- Recommendation 28 – Committee members Collins and Sealy will work with Mr. Bukowski to try to resolve issue before next meeting of committee.
- Recommendations 29 and 30 – To be discussed at February meeting.

**Next Meeting – NIBS Offices, February 23-24, 2006**  
**(Convene at 9 a.m. with continental breakfast at 8:30 on Feb. 23;**  
**Adjourn at noon on Feb. 24)**