

# 2009 BFRL Project Description

## Project Title: Implementation of WTC Recommendations

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**BFRL Program:** Measurement Science for Structural Performance Under Multi-Hazards

**Objective:** To facilitate the adoption of WTC recommendations into codes, standards, and practices.

### **Problem:**

*What is the problem?* The Federal Building and Fire Safety Investigation of the World Trade Center Disaster conducted by NIST resulted in a series of reports and recommendations for improvements to codes, standards, and practices. The National Construction Safety Team Act requires NIST to:

- Conduct, or enable or encourage the conduct of, appropriate research recommended by the Team;
- Promote (consistent with existing procedures for the establishment of building standards, codes, and practices) the appropriate adoption by the Federal Government, and encourage the appropriate adoption by other agencies and organizations, of the recommendations of the Team with respect to
  - Technical aspects of evacuation and emergency response procedures;
  - Specific improvements to building standards, codes, and practices; and
  - Other actions needed to help prevent future building failures

*Why is it hard to solve?* The Federal government in the U.S. is in a unique position in that constitutionally, it has no formal role in the code development process (which is a State and local governmental function). Thus the federal government is relegated to the position of a participant in the code development process as defined by the developing organizations making it harder to effect change.

Affecting change to building codes, standards and practices is hard because the system for development of these is designed to be difficult to change. Provisions in place have been shown to be effective to the extent that buildings meet the objectives of regulations and the needs of users. Designers, builders and owners have adapted to the regulations and can produce

compliant buildings. Changes to codes, standards and practices must demonstrate that there is a problem, it can be corrected by the proposed change, and it is enforceable and not arbitrary. Since building regulations create markets for materials, products and services, there are numerous interests involved in the code development process whose sole purpose is to protect those markets by resisting change.

***How is it solved today, and by whom?*** Proposals for changes to codes and standards are generally developed by code officials, industry professionals, and technical committees. NIST provides technical support to facilitate understanding of the NIST WTC Investigation recommendations through participation by key NIST personnel.

***Why NIST?*** The National Construction Safety Team Act requires follow-up on the 30 recommendations from WTC Investigation. NIST has a comprehensive understanding of the Investigation findings and the objectivity to speak to the recommendations.

### **Approach:**

***What is the new technical idea?*** In consultation with the NIBS WTC building code experts, NIST is assisting in developing and tracking many specific code proposals developed in response to the WTC Investigation recommendations. These proposals represent new technical ideas for consideration by the relevant codes and standards bodies.

***Why can we succeed now?*** The 30 recommendations from the WTC Investigation have significant momentum which will wane over time. It is important to work the proposals through the relevant codes and standards bodies in a timely manner.

***What is the research plan?*** The 30 recommendations presented in the NIST WTC report cover a broad range of topics which are addressed in numerous codes, standards, and practices applicable to the built environment. Some recommendations are suitable for immediate consideration, some require the development of consensus of professional societies whose members are called upon to apply them, some require the establishment of thresholds that represent public policy decisions not within the scope of NIST's authorities, and some require the conduct of research to develop technical knowledge and tools not currently available. Thus the strategy for pursuit of the recommendations actually requires 30 strategies, each tailored to the specific subject and objective of the recommendation and the manner in which it would be applied within the building regulatory system.

Depending on the development process and schedules of the individual target codes and standards, some recommendations need to be fast tracked and some can be held where proposals will not be due for some time. This will allow prioritization and resource allocation to be made in a manner consistent with the schedules and processes to be followed.

Where professional consensus is needed it is envisioned that workshops will be utilized to pull together affected parties to develop that consensus. Where public policy decisions are needed workshops may be used to establish options which can then be presented to policy makers for the final decisions.

Most of the recommendations involve technical issues for which expertise exists among NIST staff, and some of these staff represent NIST on target codes and standards committees. The

strategy involves these staff on teams, along with a team leader who is responsible for meeting deadlines and following the progress of each activity. A suitable tracking mechanism was constructed that shows progress against the objective for each recommendation over time, and was implemented on the NIST WTC web site.

Developmental activities initiated for FY09 will include:

- Continued support of proposals to NFPA for the cycles of various documents;
- Identification of improvements to ASTM E119 that will be pursued through the E5.11 committee and the development of a new test method through ISO TC92 SC2.

In addition, proposals to the model building codes (ICC and NFPA) will be supported by NIST staff, the NIBS building experts and allied organizations through their respective code development processes. For ICC, this involves the code development hearings on the IBC supplement. For NFPA this involves direct participation in the High Rise Building Safety Advisory Committee who are assigning specific topics to appropriate technical committees to develop code language for their documents. In the international arena, the ISO Technical Management Board (TMB) has asked ISO technical committees to review the recommendations and make appropriate changes. NIST provides the US delegate to ISO TAG 8 which advises the TMB on all topics related to buildings. TAG 8 recommended a matrix of specific assignments to ISO TC's to review the recommendations and make appropriate revisions to specific documents to address the recommendations. This draft resolution was adopted by TAG 8, endorsed by the ISO Security Advisory Group and adopted by the TMB. We are now following the activities of the ISO TC's to facilitate their review and actions. CIB is in a position to provide technical support to ISO (especially CIB W014 supporting ISO TC92) in areas where technical consensus is needed.

**Recent Results:** Following the adoption of eight code changes to the 2007 IBC supplement proposals for items disapproved in that process were modified and resubmitted for the 2009 IBC. Based on the results of the code development hearings in February 2008 there are several that are likely to be adopted at the final action hearings in September 2008. These include:

- Improvements to the building fire command center and the provision of systems to ensure that fire department communications (radio or other) operate properly within the building.
- Additional improvements to the structural frame requirements added in the supplement.
- Requirements addressing sprinkler redundancy
- Requirements for higher density/bond strength and periodic inspection of spray applied fireproofing
- Explicit requirements for emergency (evacuation) plans development and review.

- Occupant egress elevators.
- Exit path markings

In the NFPA system parallel requirements were submitted to the 101/5000 documents and NFPA 1 (Fire Code) with adoption likely for the following (2009 editions)

- Occupant egress elevators
- First responder elevators
- Evacuation plans
- Design for no local/global collapse
- Exit path markings
- Supplemental evacuation equipment
- Fire Service radio enhancement system
- 5 year inspection requirement for spray applied fireproofing

Further, the NFPA system includes technical standards cited equally in the NFPA and ICC Building Codes. Related proposals adopted here include:

- Support in NFPA 72 for cameras in stairways used to manage evacuation feeding to the fire command center
- NFPA 72 adoption of the second ed. of NEMA SB30 with improvements to security, operation, data collection, and display systems for the fire command center
- NFPA 72 requirements for transfer of functions off-site when the building becomes unsafe
- NFPA 72 requirements correlated with elevator requirements for occupants and first responders
- Requirements in NFPA 72 and 25 to permit automated testing as a means to increase operational reliability of active fire protection systems.

**Standards and Codes:** These activities are intended to support the WTC recommendations in the context of the NIST role. This means that the WTC recommendations raise technical issues and facilitate the discussion leading to public policy decisions through the model building code and standards development processes. NIST staff provides appropriate technical support to this process. The desired result is for US and International codes and standards to come to appropriate conclusions, establish public policy and relevant thresholds needed to address the issues identified by NIST.

