

NIST Response to the World Trade Center Disaster

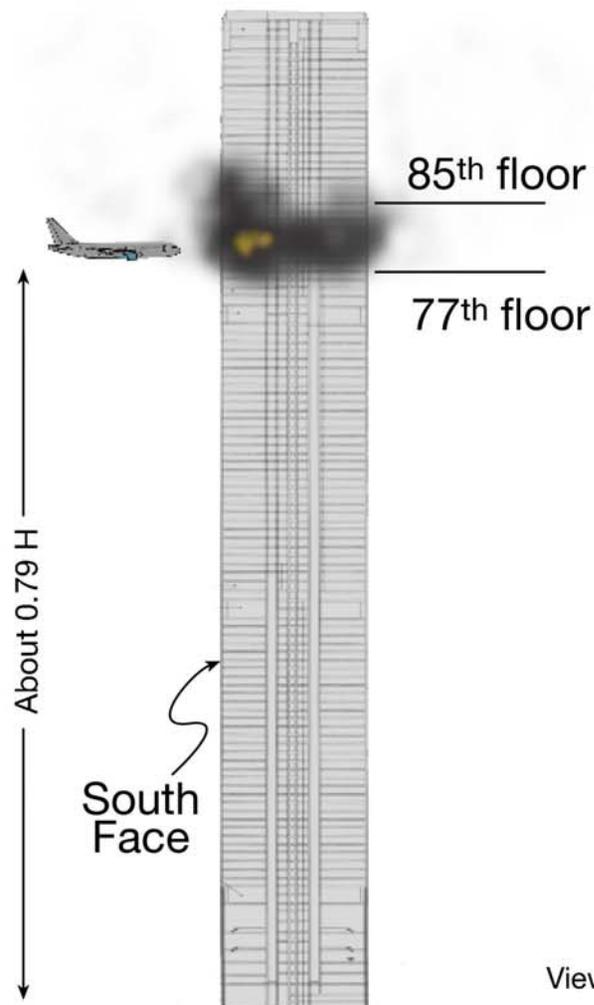
**Federal Building and Fire Safety Investigation
of
the World Trade Center Disaster**

**Media and Public Briefings
June 23, 2005**

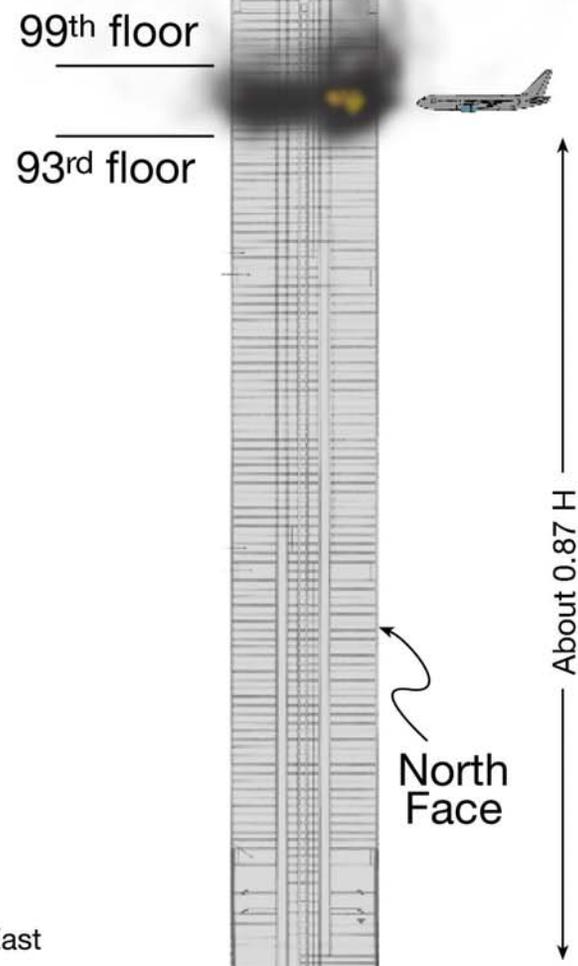
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U.S. Department of Commerce**

NIST WTC Investigation Objectives

- Determine:
 - why and how the WTC towers collapsed following the initial impact of the aircraft, and
 - why and how the 47-story WTC 7 collapsed
- Determine why the numbers of injuries and fatalities were so low or high depending on location, including technical aspects of fire protection, occupant behavior, evacuation, and emergency response
- Determine the procedures and practices that were used in the design, construction, operation, and maintenance of the WTC buildings
- **Identify, as specifically as possible, areas in current national building and fire model codes, standards, and practices that warrant revision**



WTC 2: Hit at 9:02:59 a.m.
Collapsed after 56 minutes



WTC 1: Hit at 8:46:30 a.m.
Collapsed after 102 minutes

View from the East

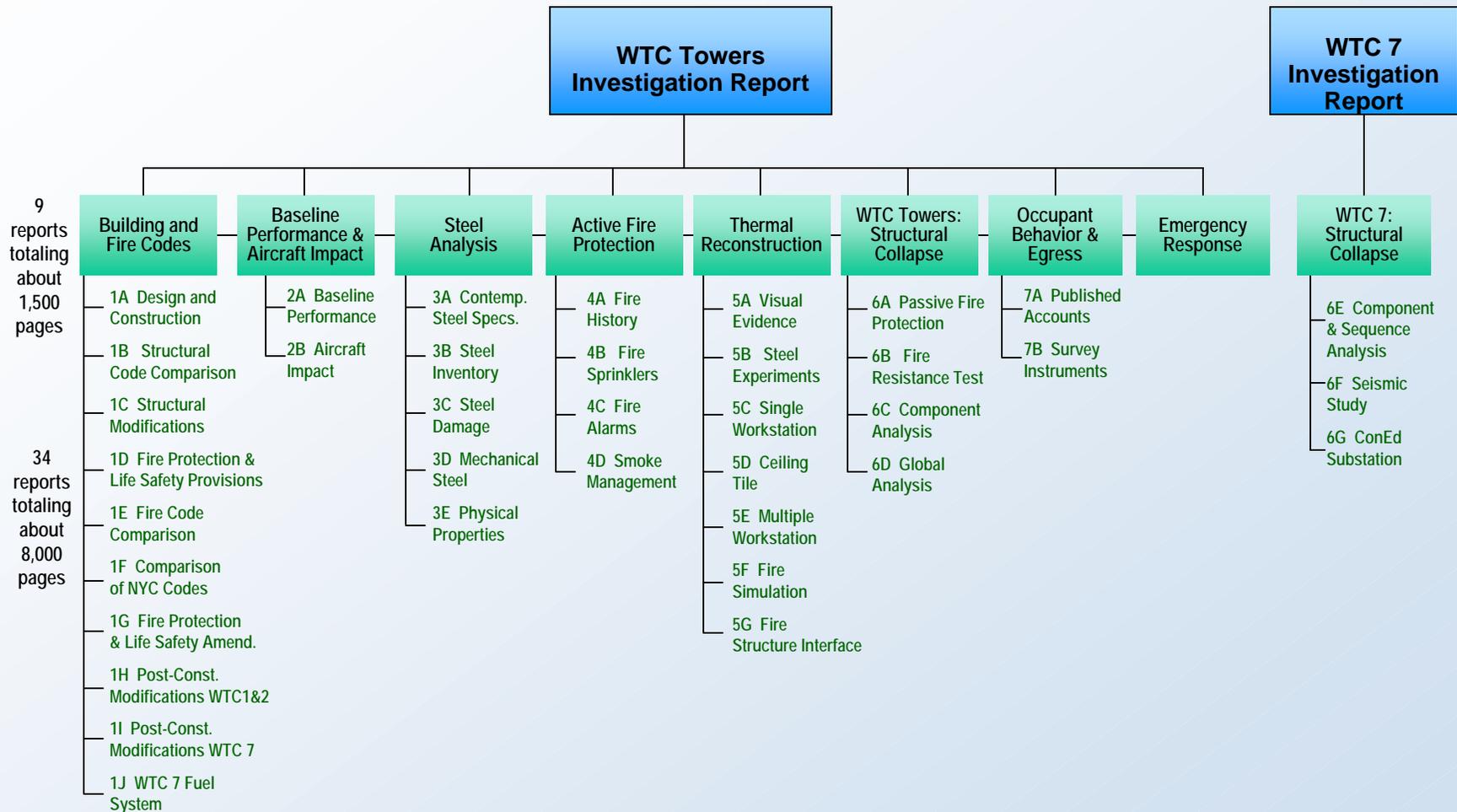
Some Specific Questions

- ❑ How and why did WTC 1 stand nearly **twice** as long as WTC 2 before collapsing (102 min. vs. 56 min.) though they were hit by virtually identical aircraft?
- ❑ What factors related to **normal** building and fire safety considerations not unique to the terrorist attacks of September 11, 2001, if any, could have delayed or prevented the collapse of the WTC towers?
- ❑ Would the undamaged WTC towers have remained standing in a **conventional** large building fire scenario?
- ❑ What factors related to **normal** building and fire safety considerations, if any, could have saved additional WTC occupant lives or could have minimized the loss of life among the ranks of first responders?
- ❑ How well did the procedures and practices used in the design, construction, operation, and maintenance of the WTC buildings **conform** to accepted national practices, standards, and codes?

WTC Investigation Overview

- \$16 million investigation announced August 2002; drew talent from about 200 NIST, outside experts, and contractors; \$5.5 million in contracts.
- Two written public updates (December 2002, December 2003); two technical progress reports issued (May 2003, June 2004).
- Three public meetings held:
 - June 24, 2002 (NYC) to present draft WTC investigation plan and solicit comments on the plan.
 - February 12, 2004 (NYC) to present and solicit comments on (1) technical aspects of investigation, (2) additional information that NIST might consider, (3) areas to be considered for recommendations.
 - August 24, 2004 (Chicago) to observe fire resistance test of WTC floor system at Underwriters Laboratories
- Seven media/public briefings on investigation progress, six meetings of the National Construction Safety Team Advisory Committee, and one meeting to solicit public input for first-person interviews of occupants and first responders.

WTC Investigation Reports



43 reports for WTC Towers; 5 reports for WTC 7

Schedule for Reports

- The 43 reports for the WTC towers include a summary report, 8 separate project reports, and 34 supporting technical reports, totaling some 10,000 pages.
- Today, NIST is releasing a draft of the summary report on the WTC towers for public comment along with 5 project reports and 22 supporting technical reports; the summary report contains the principal findings and recommendations; the remaining 15 reports on the WTC towers were released on April 5, 2005.
- Six-week public comment period ending August 4, 2005; NIST plans to release the final reports for the WTC towers in September 2005.
- WTC 7 report will be issued as a supplement to the main report: draft planned for October 2005; final for December 2005.
 - Decoupling of WTC 7 report necessary to accommodate overlapping staffing demands for work on WTC towers.
 - This change affects mainly the collapse analysis; other WTC 7 work reported with the other Investigation reports.
- WTC Conference: Putting Recommendations into Practice, September 13-15, 2005.

Approach to Recommendations

- NIST is issuing recommendations in accordance with the National Construction Safety Team Act.
- NIST considered:
 - Findings from the investigation;
 - If findings were unique to the terrorist attacks or related to normal building and fire safety considerations;
 - What technical solutions are needed to address potential identifiable risks; and
 - Whether the risks apply to all buildings or are limited to certain types of building (e.g., iconic status, critical function, or design).

Context for Recommendations

- The tragic consequences of the September 11, 2001, attacks were directly attributable to the fact that terrorists flew large jet-fuel laden commercial airliners into the WTC towers.
- Buildings for use by the general population are not designed to withstand aircraft attacks; building codes do not require building designs to consider aircraft impact.
- In our cities, there has been **no experience with a disaster of such magnitude**, nor has there been any in which the total collapse of a high-rise building occurred so rapidly and with little warning.
- NIST is making recommendations based on its findings related to **procedures and practices that are commonly used for buildings under normal conditions**.
- Public officials and building owners will need to determine appropriate performance requirements for **buildings that are at higher risk due to their iconic status, critical function, or design**.

Context for Recommendations (2)

- NIST believes that the **recommendations are realistic and achievable** within a reasonable period of time.
- **Implementation of the recommendations would make buildings, occupants, and emergency responders safer in future emergencies.**
- **The recommendations do not prescribe specific systems, materials, or technologies.** Instead, NIST encourages competition among alternatives that can meet performance requirements.
- **The recommendations do not prescribe specific threshold levels.** This responsibility falls within the purview of the public policy setting process, in which standards and codes development plays a key role.

Recommendations: Call to Action

- **NIST strongly urges:**
 - **The building and fire safety communities to give *immediate and serious consideration* to these recommendations in order to achieve appropriate improvements in the way buildings are designed, constructed, maintained, and used and in evacuation and emergency response procedures.**
 - **Building owners and public officials to:**
 1. **evaluate the safety implications of these recommendations to their existing inventory of buildings; and**
 2. **take the steps necessary to mitigate any unwarranted risks without waiting for changes to occur in codes, standards, and practices.**
 - **State and local agencies, well trained and managed, to rigorously enforce building codes and standards since such enforcement is critical to ensure the expected level of safety.**
- **NIST is assigning top priority to work vigorously with the building and fire safety communities to assure that there is a complete understanding of the recommendations and to provide needed technical assistance.**

Federal Building and Fire Safety Investigation of the World Trade Center Disaster

Recommendations

Group 1: Increased Structural Integrity

The standards for estimating the load effects of potential hazards (e.g., progressive collapse, wind) -- and the design of structural systems to mitigate the effects of those hazards -- should be improved to enhance structural integrity.

Increased Structural Integrity

Recommendation 1. NIST recommends that:

1. progressive collapse should be prevented in buildings through the development and nationwide adoption of consensus standards and code provisions, along with the tools and guidelines needed for their use in practice; and
2. a standard methodology should be developed—supported by analytical design tools and practical design guidance—to reliably predict the potential for complex failures in structural systems subjected to multiple hazards.

Recommendation 2. NIST recommends that nationally accepted performance standards be developed for: (1) conducting wind tunnel testing of prototype structures based on sound technical methods that result in repeatable and reproducible results among testing laboratories; and (2) estimating wind loads and their effects on tall buildings for use in design, based on wind tunnel testing data and directional wind speed data.

Recommendation 3. NIST recommends that an appropriate criterion should be developed and implemented to enhance the performance of tall buildings by limiting how much they sway under lateral load design conditions (e.g., winds and earthquakes).

Group 2: Enhanced Fire Resistance of Structures

The procedures and practices used to ensure the fire resistance of structures should be enhanced by:

- **improving the technical basis for construction classifications and fire resistance ratings,**
- **improving the technical basis for standard fire resistance testing methods,**
- **use of the “structural frame” approach to fire resistance ratings, and**
- **developing in-service performance requirements and conformance criteria for spray-applied fire resistive materials.**

Enhanced Fire Resistance of Structures

Recommendation 4. NIST recommends evaluating, and where needed improving, the technical basis for determining appropriate construction classification and fire rating requirements (especially for tall buildings greater than 20 stories in height)—and making related code changes now as much as possible—by explicitly considering factors including:

- timely access by emergency responders and *full evacuation* of occupants, or the time required for burnout without local collapse;
- the extent to which *redundancy* in active fire protection (sprinkler and standpipe, fire alarm, and smoke management) systems *should be credited* for occupant life safety;
- the need for *redundancy* in fire protection systems that are critical to structural integrity;
- the ability of the structure and local floor systems to withstand a *maximum credible fire scenario without collapse*, recognizing that sprinklers could be compromised, not operational, or non-existent;
- *compartmentation* requirements (e.g., 12,000 ft²) to protect the structure, including fire rated doors and automatic enclosures, and limiting air supply (e.g., thermally resistant window assemblies) to retard fire spread in buildings with large, open floor plans;
- the impact of spaces containing *unusually large fuel concentrations* for the expected occupancy of the building; and
- the extent to which fire control systems, including suppression by automatic or manual means, should be credited as part of the prevention of fire spread.

Enhanced Fire Resistance of Structures (2)

Recommendation 5. NIST recommends that the technical basis for the century-old *standard for fire resistance testing* of components, assemblies, and systems should be improved through a national effort. Necessary guidance also should be developed for extrapolating the results of tested assemblies to prototypical building systems.

Recommendation 6. NIST recommends the development of criteria, test methods, and standards:

1. for the in-service performance of spray-applied fire resistive materials (SFRM, also commonly referred to as fireproofing or insulation) used to protect structural components; and
2. to ensure that these materials, *as-installed*, conform to conditions in tests used to establish the fire resistance rating of components, assemblies, and systems.

Recommendation 7. NIST recommends the nationwide adoption and use of the “structural frame” approach to fire resistance ratings (structural members connected to the columns carry the high fire resistance rating of the columns).

Group 3: New Methods for Fire Resistance Design of Structures

Procedures and practices used in the fire resistance design of structures should be enhanced by requiring an objective that *uncontrolled fires result in burnout without local or global collapse*. Performance-based methods are an alternative to prescriptive design methods.

This effort should include the development and evaluation of:

- **new fire resistive coating materials and technologies and**
- **evaluation of the fire performance of conventional and high-performance structural materials.**

Technical and standards barriers to the introduction of new materials and technologies should be eliminated.

New Methods for Fire Resistance Design of Structures

Recommendation 8. NIST recommends that the fire resistance of structures should be enhanced by requiring a performance objective that uncontrolled building fires result in burnout without local or global collapse.

Recommendation 9. NIST recommends the development of:

1. performance-based standards and code provisions, as an alternative to current prescriptive design methods, to enable the design and retrofit of structures to resist real building fire conditions, including their ability to achieve the performance objective of burnout without structural or local floor collapse: and
2. the tools, guidelines, and test methods necessary to evaluate the fire performance of the structure as a whole system.

Recommendation 10. NIST recommends the development and evaluation of new fire resistive coating materials, systems, and technologies with significantly enhanced performance and durability to provide protection following major events.

New Methods for Fire Resistance Design of Structures (2)

Recommendation 11. NIST recommends that the performance and suitability of advanced structural steel, reinforced and pre-stressed concrete, and other high-performance material systems should be evaluated for use under conditions expected in building fires.

Group 4: Improved Active Fire Protection

Active fire protection systems (i.e., sprinklers, standpipes/hoses, fire alarms, and smoke management systems) should be enhanced through improvements to:

- Design
- Performance
- Reliability, and
- Redundancy

of such systems.

Improved Active Fire Protection

Recommendation 12. NIST recommends that the performance and redundancy of active fire protection systems (sprinklers, standpipes/hoses, fire alarms, and smoke management systems) in buildings should be enhanced to accommodate the greater risks associated with increasing building height and population, increased use of open spaces, available compartmentation, high-risk building activities, fire department response limits, transient fuel loads, and higher threat profile.

Recommendation 13. NIST recommends that fire alarm and communications systems in buildings should be developed to provide continuous, reliable, and accurate information on the status of life safety conditions at a level of detail sufficient to manage the evacuation process in building fire emergencies, and that standards for their performance be developed.

Recommendation 14. NIST recommends that control panels at fire/emergency command stations in buildings should be adapted to accept and interpret a larger quantity of more reliable information from the active fire protection systems that provide tactical decision aids to fireground commanders, including water flow rates from pressure and flow measurement devices, and that standards for their performance be developed.

Improved Active Fire Protection (2)

Recommendation 15. NIST recommends that systems should be developed and implemented for:

1. real-time off-site secure transmission of valuable information from fire alarm and other monitored building systems for use by emergency responders, at any location, to enhance situational awareness and response decisions and maintain safe and efficient operations; and
2. preservation of that information either off-site or in a black box that will survive a fire or other building failure for purposes of subsequent investigations and analysis.

Standards for the performance of such systems should be developed, and their use should be required.

Group 5: Improved Building Evacuation

Building evacuation should be improved to include:

- **system designs that facilitate safe and rapid egress,**
- **methods for ensuring clear and timely emergency communications to occupants,**
- **better occupant preparedness for evacuation during emergencies, and**
- **incorporation of appropriate egress technologies.**

Improved Building Evacuation

Recommendation 16. NIST recommends that public agencies, non-profit organizations concerned with building and fire safety, and building owners and managers should develop and carry out *public education campaigns*, jointly and on a nationwide scale, to improve building occupants' preparedness for evacuation in case of building emergencies.

Recommendation 17. NIST recommends that tall buildings should be designed to accommodate *timely full building evacuation* of occupants due to building-specific or large-scale emergencies such as widespread power outages, major earthquakes, tornadoes, hurricanes without sufficient advanced warning, fires, accidental explosions, and terrorist attacks. Building size, population, function, and iconic status should be taken into account in designing the egress system. Stairwell and exit capacity should be adequate to accommodate counterflow due to access by emergency responders.

Improved Building Evacuation (2)

Recommendation 18. NIST recommends that egress systems should be designed:

1. to *maximize remoteness of egress components* (i.e., stairs, elevators, exits) without negatively impacting the average travel distance;
2. to maintain their functional *integrity and survivability* under foreseeable building-specific or large-scale emergencies; and
3. with consistent layouts, standard signage, and guidance so that systems become *intuitive and obvious* to building occupants during evacuations.

Improved Building Evacuation (3)

Recommendation 19. NIST recommends that building owners, managers, and emergency responders develop a joint plan and take steps to *ensure that accurate emergency information is communicated* in a timely manner to enhance the situational awareness of building occupants and emergency responders affected by an event. This should be accomplished through:

- better coordination of information among different emergency responder groups,
- efficient sharing of that information among building occupants and emergency responders,
- more robust design of emergency public address systems,
- improved emergency responder communication systems, and
- use of the Emergency Broadcast System (now known as the Integrated Public Alert and Warning System) and Community Emergency Alert Networks.

Recommendation 20. NIST recommends that the full range of current and *next generation evacuation technologies* should be evaluated for future use, including protected/hardened elevators, exterior escape devices, and stairwell navigation devices, which may allow all occupants an equal opportunity for evacuation and facilitate emergency response access.

Group 6: Improved Emergency Response Technologies and Procedures

Technologies and procedures for emergency response should be improved to enable better access to buildings, response operations, emergency communications, and command and control in large-scale emergencies

Improved Emergency Response Technologies and Procedures

Recommendation 21. NIST recommends the installation of *fire-protected and structurally hardened elevators* to improve emergency response activities *in tall buildings* by providing timely emergency access to responders and allowing evacuation of mobility impaired building occupants. Such elevators should be installed for exclusive use by emergency responders during emergencies. In tall buildings, consideration also should be given to installing such elevators for use by all occupants.

Recommendation 22. NIST recommends the installation, inspection, and testing of *emergency communications systems, radio communications, and associated operating protocols* to ensure that the systems and protocols:

1. are effective for large-scale emergencies in buildings with challenging radio frequency propagation environments; and
2. can be used to identify, locate, and track emergency responders within indoor building environments and in the field.

Improved Emergency Response Technologies and Procedures (2)

Recommendation 23. NIST recommends the establishment and implementation of detailed procedures and methods for gathering, processing, and delivering critical information through *integration of relevant voice, video, graphical, and written data* to enhance the situational awareness of all emergency responders. *An information intelligence sector* should be established to coordinate the effort for each incident.

Recommendation 24. NIST recommends the establishment and implementation of codes and protocols for ensuring *effective and uninterrupted operation of the command and control system* for large-scale building emergencies.

Group 7: Improved Procedures and Practices

The procedures and practices used in the design, construction, maintenance, and operation of buildings should be improved by:

- **encouraging code compliance by nongovernmental and quasi-governmental entities,**
- **adoption and application of egress and sprinkler requirements in codes for existing buildings, and**
- **retention and availability of building documents over the life of a building.**

Improved Procedures and Practices

Recommendation 25. *Nongovernmental and quasi-governmental entities* that own or lease buildings -- and are not subject to building and fire safety code requirements of any governmental jurisdiction -- are nevertheless concerned about the safety of the building occupants and the responding emergency personnel.

- NIST recommends that such entities should be encouraged to provide a level of safety that *equals or exceeds* the level of safety that would be provided by strict compliance with the code requirements of an appropriate governmental jurisdiction.
- To gain broad public confidence in the safety of such buildings, NIST further recommends that it is important that as-designed and as-built safety be *certified by a qualified third party*, independent of the building owner(s). The process *should not use self-approval* for code enforcement in areas including interpretation of code provisions, design approval, product acceptance, certification of the final construction, and post-occupancy inspections over the life of the buildings.

Improved Procedures and Practices (2)

Recommendation 26. NIST recommends that state and local jurisdictions should adopt and *aggressively enforce* available provisions in building codes *to ensure that egress and sprinkler requirements are met* by existing buildings. Further, occupancy requirements should be modified where needed (such as when there are assembly use spaces within an office building) to meet the requirements in model building codes.

Recommendation 27. NIST recommends that building codes should incorporate a provision that requires building owners to *retain documents*, including supporting calculations and test data, related to building design, construction, maintenance and modifications over the entire life of the building. Means should be developed for offsite storage and maintenance of the documents. In addition, NIST recommends that relevant building information should be made available in suitably designed hard copy or electronic format for use by emergency responders. Such information should be *easily accessible by responders* during emergencies.

Improved Procedures and Practices (3)

Recommendation 28. NIST recommend that the role of the “Design Professional in Responsible Charge” should be clarified to ensure that:

1. all appropriate design professionals (including, e.g., the fire protection engineer) are part of the design team providing the standard of care when designing buildings employing innovative or unusual fire safety systems, and
2. all appropriate design professionals (including, e.g., the structural engineer and the fire protection engineer) are part of the design team providing the standard of care when designing the structure to resist fires, in buildings that employ innovative or unusual structural and fire safety systems.

Group 8: Education and Training

The professional skills of building and fire safety professionals should be upgraded through a national education and training effort for fire protection engineers, structural engineers, and architects.

Education and Training

Recommendation 29. NIST recommends that *continuing education curricula* should be developed and programs should be implemented for:

- training fire protection engineers and architects in structural engineering principles and design, and
- training structural engineers, architects, and fire protection engineers in modern fire protection principles and technologies, including fire-resistance design of structures.

Recommendation 30. NIST recommends that academic, professional short-course, and web-based training materials in the use of computational fire dynamics and thermostructural analysis tools should be developed and delivered to strengthen the base of available technical capabilities and human resources.

Recommendations: Call to Action

- **NIST strongly urges:**
 - **The building and fire safety communities to give *immediate and serious consideration* to these recommendations in order to achieve appropriate improvements in the way buildings are designed, constructed, maintained, and used and in evacuation and emergency response procedures.**
 - **Building owners and public officials to:**
 1. **evaluate the safety implications of these recommendations to their existing inventory of buildings; and**
 2. **take the steps necessary to mitigate any unwarranted risks without waiting for changes to occur in codes, standards, and practices.**
 - **State and local agencies, well trained and managed, to rigorously enforce building codes and standards since such enforcement is critical to ensure the expected level of safety.**

Recommendations: NIST Actions

- After issuance of the final report, the National Construction Safety Team Act requires NIST to:
 - Conduct, or enable or encourage the conduct of, appropriate research recommended by the NCST Team; and
 - Promote the appropriate adoption of the recommendations by the Federal Government and other agencies and organizations.
- NIST is assigning *top priority* to work vigorously with the building and fire safety communities to assure that there is a complete understanding of the recommendations and to provide needed technical assistance.

Recommendations: NIST Actions (2)

- As part of NIST's overall WTC response plan, the Institute has begun to reach out to the building and fire safety communities to pave the way for timely, expedited consideration of recommendations stemming from this investigation.
 - Outreach to:
 - model code organizations (ICC, NFPA)
 - standards development organizations (e.g., ASCE, NFPA, ASTM, ASME, UL)
 - state and local building officials (NCSBCS, AMCBO, NYC DOB)
 - the professional community, including presentations at major conferences (e.g., NFPA, ASCE, AIA, CTBUH, Chicago Committee on High-Rise Buildings, Structural Engineers Foundation of Chicago, NCSBCS/AMCBO, CII, CERF Corporate Advisory Board)
 - Detailed briefing for designers of the WTC redevelopment (including Silverstein, Port Authority, and NYC DOB officials).
 - WTC Technical Conference: Putting Recommendations into Practice, September 13-15, 2005.
 - NIST will establish a web-based system to track the status of the recommendations.

Recommendations: NIST Actions (3)

- NIST also has expanded its research in areas of high priority need. Examples include:
 - Prevention of Progressive Collapse
 - Fire Resistance Design and Retrofit of Structures
 - Fire Resistive Coatings for Structural Steel
 - Fire Resistance of Uncoated Structural Steel with Improved Thermal Properties
 - Fire Resistance of Building Partitions
 - Occupant Behavior and Egress
 - Emergency Use of Elevators
 - Equipment Standards for First Responders
 - Standard Building Information Models for Vulnerability Assessment
 - Technologies for Building Operations in CBR Attacks
 - Cost-effective Risk Management Tools

Process for Submitting Public Comments

- NIST welcomes comments from the public on the draft investigation reports for the WTC towers.
- The public is welcome to comment on any of the 43 draft reports issued by NIST, totaling about 10,000 pages.
- **NIST especially encourages public comment on the approximately 200-page draft summary report, which contains the principal findings and recommendations for changes to codes, standards, and practices.**
- NIST will consider all comments received from the public on the 43 draft reports before they are issued in final form.

Process for Submitting Public Comments (2)

- Comments must be as specific as possible.
- Provide a short reason for any suggested change.
- Provide suggested language for the requested revision.
- All comments shall include the following information:

Name:

Affiliation:

Contact: Phone number or e-mail address where you can be contacted in case of questions.

Report Number: (e.g., NCSTAR 1-1)

Page Number:

Paragraph/Sentence: (e.g., paragraph 2/sentences 2-4)

Comment:

Reason for Comment:

Suggestion for Revision:

Process for Submitting Public Comments (3)

- NIST will accept public comments on any of the draft reports until **5 pm EDT August 4, 2005**.
- Comments may be submitted:
 - through a link on the WTC Investigation web site:
<http://wtc.nist.gov>
 - Via e-mail to wtc@nist.gov
 - By fax to 301-975-6122
 - By mail to:

WTC Technical Information Repository
Attention: Mr. Stephen Cauffman
National Institute of Standards and Technology
100 Bureau Drive Stop 8610
Gaithersburg, MD 20899-8610

WTC Technical Conference: Putting Recommendations into Practice

- **Objectives:**
 - To present the technical foundation for the NIST recommendations for improving building and fire codes, standards, and practices.
 - To solicit feedback on the NIST Investigation Reports from the technical community, with an emphasis on spurring action on recommendations.

- **Presenters:**
 - NIST WTC Investigation Team Project Leaders.
 - Key NIST team members.
 - Selected contractors and experts who contributed to the WTC Investigation.

- **Other Presenters:***
 - Technical representatives from standards and codes development and building regulatory organizations.
 - Technical experts from academia and industry not involved in the NIST investigation.
 - Members of the general public.

* Selected based upon relevance of technical comments (250 to 500 words) received by August 1, 2005.

WTC Technical Conference (2)

- Dates: September 13-15, 2005
- Location: National Institute of Standards and Technology, Gaithersburg, MD
- Registration Fee: \$110
- Registration: Online registration is available through the WTC Investigation website: <http://wtc.nist.gov>
- For those wishing to present their comments at the Conference, a 250-500 word summary should be submitted by **August 1, 2005** to:

WTC Conference, MS 8610
100 Bureau Drive
Gaithersburg, MD 20899-8610, USA
Email: wtc@nist.gov
fax: (301) 975-6122

Disclaimer No. 1

Certain commercial entities, equipment, products, or materials are identified in this document in order to describe a procedure or concept adequately or to trace the history of the procedures and practices used. Such identification is not intended to imply recommendation, endorsement, or implication that the entities, products, materials, or equipment are necessarily the best available for the purpose. Nor does such identification imply a finding of fault or negligence by the National Institute of Standards and Technology.

Disclaimer No. 2

The policy of NIST is to use the International System of Units (metric units) in all publications. In this document, however, units are presented in metric units or the inch-pound system, whichever is prevalent in the discipline.

Disclaimer No. 3:

Pursuant to section 7 of the National Construction Safety Team Act, the NIST Director has determined that certain evidence received by NIST in the course of this Investigation is “voluntarily provided safety-related information” that is “not directly related to the building failure being investigated” and that “disclosure of that information would inhibit the voluntary provision of that type of information” [15 USC 7306(c)].

In addition, a substantial portion of the evidence collected by NIST in the course of the Investigation has been provided to NIST under nondisclosure agreements.

Disclaimer No. 4:

NIST takes no position as to whether the design or construction of a WTC building was compliant with any code since, due to the destruction of the WTC buildings, NIST could not verify the actual (or as-built) construction, the properties and condition of the materials used, or changes to the original construction made over the life of the buildings. In addition, NIST could not verify the interpretations of codes used by applicable authorities in determining compliance when implementing building codes. Where an Investigation report states whether a system was designed or installed as required by a code *provision*, NIST has documentary or anecdotal evidence indicating whether the requirement was met, or NIST has independently conducted tests or analyses indicating whether the requirement was met.

Use in Legal Proceedings

No part of any report resulting from a NIST investigation into a structural failure or from an investigation under the National Construction Safety Team Act may be used in any suit or action for damages arising out of any matter mentioned in such report (15 USC 281a, as amended by P.L. 107-231).

Web site <http://wtc.nist.gov>

Email to wtc@nist.gov

Facsimile to (301) 975-6122

Regular mail:

**WTC Technical Information Repository, Stop 8610,
100 Bureau Drive, Gaithersburg, MD 20899-8610.**