

etc. were not required to be fire-rated, there was evidence from both the visual evidence and the fire simulations that some of these partitions did retard the spread of the fires.

- There was no evidence of floor-to-floor fire spread until perhaps just before the WTC 7 collapse. Thus, the fire-rated floors were successful as fire penetration barriers.

14.6 FUTURE FACTORS THAT COULD HAVE MITIGATED STRUCTURAL COLLAPSE

In the course of the Investigation, NIST and its contractors were aware that there were existing, emerging, or even anticipated capabilities that could have prevented the collapse of WTC 7, had they been in place on September 11, 2001. NIST did not conduct studies to evaluate the degree to which building performance could have been improved on September 11, 2001, had the capabilities been available. These include:

- More robust connections and framing systems to better resist the effects of thermal expansion on the structural system, which is not currently considered in design practice.
- Structural systems expressly designed to prevent progressive collapse. The current model building codes³ do not require that buildings be designed to resist progressive collapse.
- Better thermal insulation (i.e., reduced conductivity and/or increased thickness) to limit heating of structural steel and to minimize both thermal expansion and weakening effects. Currently, insulation is used to protect steel strength, but it could also be used to maintain a lower temperature in the steel framing to limit thermal expansion.
- Automatic fire sprinkler systems with independent and reliable sources for the primary and secondary water supply.
- Improved compartmentation in tenant areas to limit the spread of fires.
- Thermally resistant window assemblies which limit breakage, reduce air supply, and retard fire growth.

14.7 HUMAN PERFORMANCE FACTORS

Human performance factors contributed to the outcome of no loss of life at WTC 7:

- Reduced number of people in WTC 7 at the times of airplane impact on the towers.
- Shortness of delay in starting to evacuate.
- Evacuation assistance provided by emergency responders to evacuees.
- Participation of the building occupants in recent fire drills.

³ For an explanation of model building codes, see Section 5.1 of NIST NCSTAR 1.