

4. Identify, as specifically as possible, areas in current building and fire codes, standards, and practices that warrant revision.

E.2 APPROACH

To meet these goals, NIST complemented its in-house expertise with an array of specialists in key technical areas. In all, over 200 staff contributed to the Investigation. NIST and its contractors compiled and reviewed tens of thousand of pages of documents; conducted interviews with over a thousand people who had been on the scene or who had been involved with the design, construction, and maintenance of the WTC; analyzed 236 pieces of steel that were obtained from the wreckage; performed laboratory tests, measured material properties, and performed computer simulations of the sequence of events that happened from the instant of aircraft impact to the initiation of collapse for each tower.

Cooperation in obtaining the resource materials and in interpreting the results came from a large number of individuals and organizations, including The Port Authority of New York and New Jersey and its contractors and consultants; Silverstein Properties and its contractors and consultants; the City of New York and its departments; the manufacturers and fabricators of the building components; the companies that insured the WTC towers; the building tenants; the aircraft manufacturers; the airlines; the public, including survivors and family members; and the media.

The scarcity of physical evidence that is typically available in place for reconstruction of a disaster led to the following approach:

- Accumulation of copious photographic and video material. With the assistance of the media, public agencies and individual photographers, NIST acquired and organized nearly 7,000 segments of video footage, totaling in excess of 150 hours and nearly 7,000 photographs representing at least 185 photographers. This guided the Investigation Team's efforts to determine the condition of the buildings following the aircraft impact, the evolution of the fires, and the subsequent deterioration of the structure.
- Establishment of the baseline performance of the WTC towers, i.e., estimating the expected performance of the towers under normal design loads and conditions. The baseline performance analysis also helped to estimate the ability of the towers to withstand the unexpected events of September 11, 2001. Establishing the baseline performance of the towers began with the compilation and analysis of the procedures and practices used in the design, construction, operation, and maintenance of the structural, fire protection, and egress systems of the WTC towers. The additional components of the performance analysis were the standard fire resistance of the WTC truss-framed floor system, the quality and properties of the structural steels used in the towers, and the response of the WTC towers to the design gravity and wind loads.
- Simulations of the behavior of each tower on September 11, 2001, in four steps:
 1. The aircraft impact into the tower, the resulting distribution of aviation fuel, and the damage to the structure, partitions, thermal insulation materials, and building contents.
 2. The evolution of multi-floor fires.