

- c. The collapse of WTC 7 was different from that of WTC 1 and WTC 2. The towers showered debris in a wide radius as their external frames essentially “peeled” outward and fell from the top to the bottom. In contrast, the collapse of WTC 7 had a relatively small debris field because the façade came straight down, suggesting an internal collapse. Review of video footage indicates that the collapse began at the lower floors on the east side. Studies of WTC 7 indicate that the collapse began in the lower stories, either through failure of major load transfer members located above an electrical substation structure or in columns in the stories above the transfer structure. Loss of strength due to the transfer trusses could explain why the building imploded, with collapse initiating at an interior location. The collapse may have then spread to the west, causing interior members to continue collapsing. The building at this point may have had extensive interior structural failures that then led to the collapse of the overall building, including the cantilever transfer girders along the north elevation, the strong diaphragms at the 5th and 7th floors, and the seat connections between the interior beams and columns at the building perimeter.

8.2.5.2 Recommendations

Certain issues should be explored before final conclusions are reached and additional studies of the performance of WTC 7, and related building performance issues should be conducted. These include the following:

- a. Additional data should be collected to confirm the extent of the damage to the south face of the building caused by falling debris.
- b. Determination of the specific fuel loads, especially at the lower levels, is important to identify possible fuel supplied to sustain the fires for a substantial duration. Areas of interest include storage rooms, file rooms, spaces with high-density combustible materials, and locations of fuel lines. The control and operation of the emergency power system, including generators and storage tanks, needs to be thoroughly understood. Specifically, the ability of the diesel fuel pumps to continue to operate and send fuel to the upper floors after a fuel line is severed should be confirmed.
- c. Modeling and analysis of the interaction between the fires and structural members are important. Specifically, the anticipated temperatures and duration of the fires and the effects of the fires on the structure need to be examined, with an emphasis on the behavior of transfer systems and their connections.
- d. Suggested mechanisms for a progressive collapse should be studied and confirmed. How the collapse of an unknown number of gravity columns brought down the whole building must be explained.
- e. The role of the axial capacity between the beam-column connection and the relatively strong structural diaphragms may have had in the progressive collapse should be explained.
- f. The level of fire resistance and the ratio of capacity-to-demand required for structural members and connections deemed to be critical to the performance of the building should be studied. The collapse of some structural members and connections may be more detrimental to the overall performance of the building than other structural members. The adequacy of current design provisions for members whose failure could result in large-scale collapse should also be studied.

8.2.6 Chapter 6: Bankers Trust Building

8.2.6.1 Observations and Findings

- a. An evaluation of the damage patterns revealed several interesting interpretations. The spandrels were sheared by the impactor, between column lines C and D, from the 23rd to the 19th floors. The D-8 column splices failed at the 18th floor and at the 16th floor, but there are no clues to indicate why