

beams, and floor slabs experienced significant impact-induced damage on floors 79 to 81, particularly in the path of the fuselage. The analyses indicated that the wing structures were fragmented due to the interaction with the exterior wall and, as a result, aircraft fuel was dispersed on multiple floors. The aircraft debris substantially damaged the building's contents and also dislodged insulation in its path. The bulk of the fuel was concentrated on floors 79, 81, and 82, while the bulk of the aircraft debris was deposited in floors 78 through 80, with the largest concentration on floor 80.

- Other effects of the aircraft impacts included (a) severing of the sprinkler and fire hose water supply systems, negating any possible fire suppression efforts; (b) dispersing of jet fuel and ignition of building contents over large areas; (c) increasing the air supply into the damaged buildings that permitted very large fires; and (d) damaging ceilings, enabling unabated heat transport to the floor structure above and over the floor-to-ceiling partition walls to the next compartment. These effects were consistent with photographic evidence and with the accounts of building occupants and emergency responders.
- The simulations fairly closely matched the exterior wall damage patterns from each of the aircraft impacts and correctly predicted the collapse of five of the six stairwell walls and the lesser damage to the sixth, the trajectories of the engine and wheels that penetrated the buildings, and the accumulation of furnishings and debris in the northeast corner of the 80th and 81st floors of WTC 2.

8.3.4 Reconstruction of the Fires

- In each tower, the fires were initiated simultaneously on multiple floors by ignition of some of the jet fuel from the aircraft. The initial jet fuel fires themselves lasted at most a few minutes.
- The principal combustibles on the fire floors were workstations. The total combustible fuel load on the WTC floors was about 4 lb/ft². Higher combusted fuel loadings resulted in slower fire spread rates that did not match the patterns observed in the photographic evidence. Under these higher combusted fuel loadings, the fires likely would not have reached the south side of WTC 1 in the time needed to cause inward bowing and collapse initiation.
- The aircrafts added significant combustible material to their paths (and the paths of their breakup fragments) through the buildings.
- It is possible to reconstruct a complex fire in a large building, even if the building is no longer standing. However, this requires extraordinary information to replace what might have been gleaned from an inspection of the post-fire premises. In the case of the WTC tower, this information included floor plans of the fire zones, burning behavior of the combustibles, simulations of damage to the building interior, and frequent photographic observations of the fire progress from the building exterior.
- The fires in WTC 1 were generally ventilation limited, i.e., they burned and spread only as fast as windows broke. Where the combustibles were not significantly relocated by the aircraft debris, they tended to burn out in about 20 min. This was consistent with the results