

- The increase in unsupported length led to the buckling failure of Column 79, which was the collapse initiation event for WTC 7.

Vertical Progression of Failure

- Once Column 79 buckled between Floors 5 and 14, the column section above began to descend. Column 79 began moving downward at the roof level approximately 0.2 s after Column 79 buckled and 0.6 s before Column 80 buckled.
- As Column 79 moved downward, the floor framing adjacent to Column 79 was pulled downward up to the roof and east penthouse, which led to the observed kink in the east penthouse roof framing on the north side.
- As Column 79 moved downward, the floor framing connections to interior Columns 76 and 80 and exterior Column 44 failed under increasing tensile in-plane floor forces, resulting in a vertical progression of failure of the floor systems around Column 79.
- Column 80 became laterally unsupported in both directions between Floors 5 and 15, as a result of the progressive floor system failures. Column 80 buckled about 0.7 s after Column 79 buckled.
- Column 81 became laterally unsupported in both directions between Floors 7 and 15, as a result of the progressive floor system failures. Column 81 buckled about 1.3 s after Column 79 buckled.
- As Columns 79, 80, and 81 each buckled, their column sections above Floor 14 began to descend downward and pulled the floor structures downward with them, thereby creating a vertical progression of floor collapses that spread across the entire east region of WTC 7.
- The east penthouse, which was supported by Columns 79, 80, and 81, fell downward.

Horizontal Progression of Failure

- Interior column buckling failures continued to propagate across the core in the lower floors from east to west, due to (1) loss of lateral support from floor system failures, (2) impact of falling debris from adjacent floors and columns, and (3) load redistributed from other buckled columns.
- During the vertical progression, the falling floors pulled on adjacent columns until the floor connections failed on the east side of Columns 76, 77, and 78.
- Truss 2 collapsed due to accumulated weight and impact loads from falling debris. The collapse of Truss 2 precipitated the buckling of Columns 77 and 78, which together with Column 76 had already lost lateral support.