

As discussed further in Chapter 12, there were two phases in the probable WTC 7 collapse sequence that could have resulted in seismic signals.

- The first comprised the initial local failure and the vertical progression of failure. These began prior to the descent of the east penthouse (as suggested by the increasingly larger magnitudes of vibration of the building as described in Appendix C) and involved a cascade of floor failures within the east side of the building. The interior debris falling onto the lower floors of WTC 7 on the east side transmitted impact loads to the foundation. This impact would have coincided roughly with or slightly preceded the initial descent of the east penthouse, about 7 s prior to the visible initiation of global collapse. This time estimate is within the uncertainty in collapse time determined by NIST from the video record as listed in Table 5-1.
- The second seismic phase comprised the global collapse of the building, as seen in the videos (Section 5.7). Here, the entire building above the fire-damaged and buckled floors moved downward as a single unit, transmitting impact loads to the foundation. One would have expected seismic signals from this second phase of collapse to be generated over this entire episode (which lasted approximately 14 s) since debris was continuously impacting the ground either unobserved within the core or externally as seen from the videos of the perimeter walls. However, because the total energy dissipated by the impact was distributed over a long period of time, the strength of the signal at any given time was small and difficult to interpret.

Twelve other signals analyzed in the current study could be associated with specific seismic events, including two natural earthquakes and ten quarry blasts and explosions at construction sites. Five weak signals may have originated from sources at the WTC site based upon the criterion that E-W component signals at PAL are stronger than signals for the N-S or vertical components, but their location and strength could not be confirmed by the other stations. These signals were very small in amplitude (Richter magnitudes below 0.5), and all but one were not recorded at the other stations of the seismic network, putting them close to the level of the "noise" that accompanies daily earthquake monitoring activity at the reference station PAL.

Thus, the collapse of WTC 7 observed in the videographic evidence can be associated with the signals on the seismic record. There were no other seismic signals that could be associated with other specific events at the World Trade Center that were identifiable in the videographic or photographic records gathered by NIST, or with any events reported by witnesses that were interviewed by NIST.