

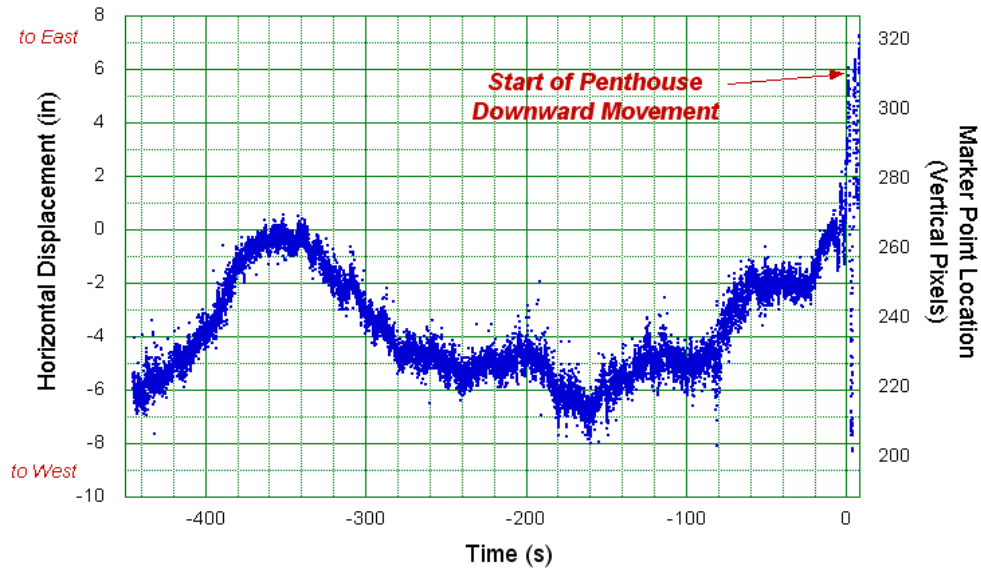


Figure C-9. Horizontal displacement of northwest corner of WTC 7 and marker point location for full 7½ min duration of video before collapse initiation.

Using the conversion factor determined in section C.1.3 allowed labeling of the vertical axis in both marker locations by vertical pixel number and in inches of horizontal displacement. The zero point for displacement was chosen to be vertical pixel number 265, the location of the marker point at the time when final oscillations began. In Figure C-8, some important behavior is apparent. Starting at about 6 s before the penthouse began its downward movement into the building, there was an abrupt change in the slope of the data that marked the beginning of oscillations that continue until collapse. There was also a second abrupt change in the data at about 1.5 s before the penthouse started moving downward.

In Figure C-9, there are major changes in the location of the marker point that occurred over long time intervals of 20 s or greater. These changes were likely due to movement of the camera.

The harmonic motion that began 6 s before the penthouse began to fall had an amplitude of nine vertical pixels, equivalent to sideways motion of 0.1 ft, or slightly over one inch in each direction. The maximum range of motion, which occurred after the penthouse had disappeared, totaled about 107 vertical pixels, or about 14 in. $\pm$ 1 in. Section C.2 takes a closer look at these vibrations.

C.2 VIBRATION RESULTS

Of primary interest in this analysis was any information that could shed light on the collapse sequence of WTC 7. The starting point of the final set of building vibrations at 6 s before the east penthouse began to fall indicated that an event had occurred within the building at that time. In addition, a comparison of the oscillatory period with a model of the building's motion indicated the mode that had been excited by the event. Whether the building swayed in a single plane with a translational mode or twisted with a torsional mode, this information provided more insight for the structural engineer trying to piece together the sequence of events.