

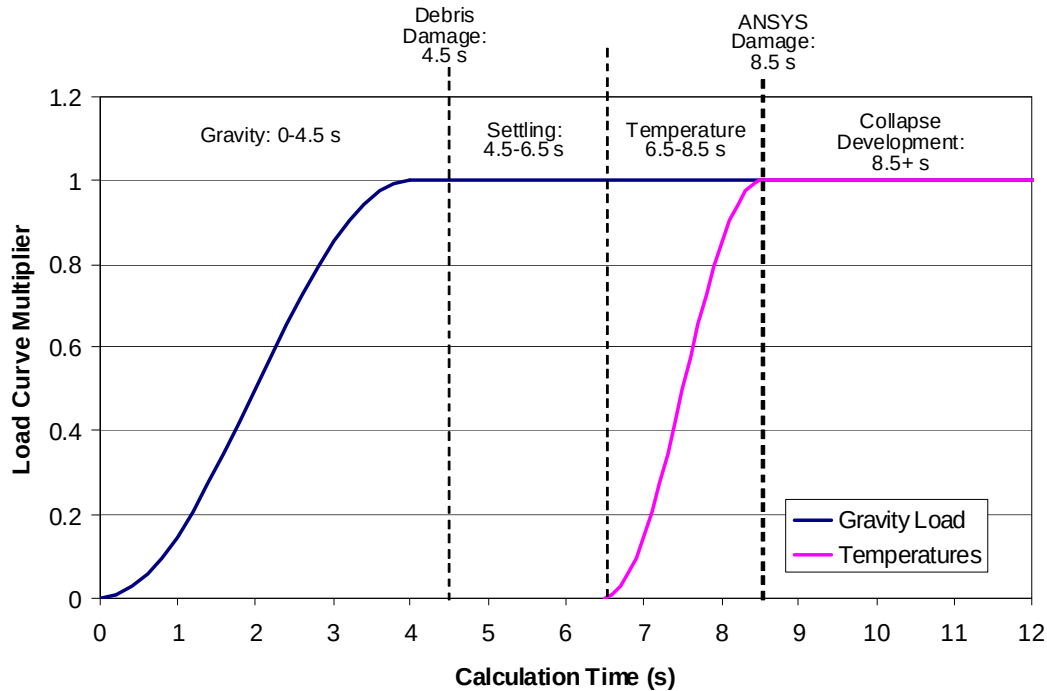


Figure 12-32. Initialization sequence for global model.

Gravity Loads

Similar to the 16 story ANSYS analysis (Chapter 11), gravity loads included: the dead load of the structure; superimposed dead loads consisting of the weight of ceilings, mechanical and electrical equipment, thermal insulation, and floor finishes; and service live load, which was taken as 25 percent of the design live load specified in the original design documents. The dead load of the structure, which was the self-weight of the steel and concrete slabs, was applied throughout the structure. At Floors 7 and 46, discrete loads were added to model the heavy localized weights of mechanical equipment. Live loads were applied by multiplying the modeled material densities with a scale factor to achieve a 25 percent live load. Gravity loads were applied as a smooth sinusoidal load curve over a duration of 4.5 s as shown in Figure 12-32.

Debris impact damage

After gravity initialization, debris impact damage due to the collapse of WTC 1 (Section 5.5.3) was applied to the global model instantaneously. The damage was applied to the building through the sudden removal of a number of elements from the model. The damage included two zones, as shown in Figure 12-33. Zone 1 was in the lower southwest quadrant of the building and included damage to the exterior columns and floor framing extending to the south core perimeter. In Zone 1, exterior Columns 14A through 20 were severed above Floor 7. Some floor sections in the debris zone that were not removed cantilevered out from the core. Damage to Zone 2 at the upper floors along the central-southern face was less extensive. Column 20 and some floor structure extending to the core perimeter were removed from the calculation above Floor 43. After the damage was instantaneously applied to the model, the calculation was allowed to progress for 2 s prior to temperature application.