

Table 6–2 lists the sources of data files for the four FSI transformations.

Table 6–2. Sources of WTC thermal response inputs.

Input	WTC 1		WTC 2	
	Case A	Case B	Case C	Case D
Structural damage, NIST NCSTAR 1-2 Case	Base	More severe	Base	More severe
Insulation damage, NIST NCSTAR 1-2 Case	Base	More severe	Base	More severe
Thermal and radiative environment to which the structure was exposed	FSI Case A	FSI Case B	FSI Case C	FSI Case D

All damage estimates were based on the aircraft impact simulations, with some confirmation of perimeter column damage from photographs and videos. Structural changes that occurred later, due to the fires, were not included. In the FSI computations, the concrete slab, trusses, or core beams identified as severed (NIST NCSTAR 1-6) were removed.

The thermal results presented in this chapter were transferred to Simpson, Gumpertz & Heger, Inc. (SGH), under a NIST contract, for analysis of the changes in structural performance that resulted from exposure to the fire environments (NIST NCSTAR 1-6D). The FSI calculations were performed at time steps ranging from 1 ms to 50 ms. Use of the resulting data set for structural analysis would have required a prohibitive amount of computation time. Thus, for each Case, the instantaneous temperature and temperature gradient for each grid volume was provided at 10 min intervals after aircraft impact. For WTC 1, there were 10 such intervals, ending at 6,000 s; for WTC 2 there were 6 intervals, ending at 3,600 s. The data files were in a format consistent with ANSYS 8.0.

Each floor in the FSI simulation provided thermal information for the floor assembly above. Thus, the lowest floor in the FSI simulations cannot be fully modeled. For WTC 1, the global thermal response generated by FSI included floors 93 through 99; for WTC 2, the included floors were 79 through 83.

The composite figures shown below depict visualizations of these snapshots of the external temperatures on the columns and floor structures. They are positioned to enable perception of the evolution of the temperatures from shortly after the aircraft impact until roughly the time of collapse. For space reasons, the presentations for WTC 1 omit the snapshot at 3,600 s.

6.10 GLOBAL THERMAL RESPONSE OF WTC 1, CASE A

Figures 6–31 through 6–44 depict the evolving temperatures on the columns and trusses. (NIST NCSTAR 1-6G also contains thermal plots of the floor slabs.) For ease of comparison, the equivalent drawings for Case B have been interspersed. In each case, the first sub-figure shows the north and east faces of the building for orientation.