

Floor 12

Figure 10–16 shows that the intense fire on this floor resulted in the most severe heating of a floor slab. Peak temperatures reached over 675 °C on much of the east side and the east portion of the south side of the floor. These temperatures remained high for about 2 h. Figure 10–17 shows that the floor beams, heated by the fire on the 11th floor below, reached similar temperatures in these same locations.

Floor 13

Figure 10–18 shows the severe heating of the top of the 13th floor slab. The temperature pattern was similar to that on the 12th floor slab one-half hour earlier, as expected from the manner in which the 13th floor fire was simulated. The highest column temperatures were about 300 °C, reflecting the effectiveness of the insulation. Figure 10–19 shows that many of the floor beams in the southeast half of the floor reached temperatures around 600 °C and remained that hot for over an hour.

The computed thermal response of the perimeter and core columns was highly dependent on the thickness of the insulation, the shape and size of the column, and to a lesser extent, on the fire growth and spread pattern. The perimeter and core columns were covered with a mean fireproofing thickness of 7/8 in., which resulted in only a very moderate increase in the temperature of the columns. The maximum perimeter and core column temperature at 5:00 p.m. was between 100 °C to 200 °C, depending on its location.

Floor 14

Figure 10–20 provides an example of the degree of conductive heat transfer through the floor slab. With no fire on the 14th floor, but a severe fire on the 13th floor, the temperature on the top of the slab rose only about 100 °C by the end of the simulation. The temperature rise in the floor beams in Figure 10–21 was as expected from a fire on the 13th floor that was equal to the 12th floor fire displaced one-half hour earlier.