

Building Code, but NIST was unable to find evidence indicating that the requirements for the number of exits for the evacuation of over 1,000 people from each of these floors had been considered in the design or operation of the buildings. In 1995, the NYC Department of Buildings, however, had reviewed the egress capacity from these floors and apparently concurred that the proposed remodel to these spaces would meet the intent of the NYC Building Code.

Subsequently, NIST communications in 2005 with The Port Authority and the NYC Department of Buildings identified a difference of interpretation regarding the number of exits required to serve these floors. The Port Authority stated that a fourth exit was not required since the assembly use space in question constituted less than 20 percent of the area of principal use, with principal use area defined as the entire building. The Department of Buildings stated that the 20 percent rule did not apply to assembly spaces such as restaurants and observation decks that are open to the public, and therefore exit reduction cannot be applied and a fourth exit was required.

The Department further clarified that areas of refuge and horizontal exits are not to be credited for required means of egress (unless the spaces are used non-simultaneously) and that for places of assembly, with occupant load in excess of 1,000, the floor shall have a minimum of four independent means of egress (stairs) to street. If the floor were divided into areas of refuge with rated walls, as was the case for the WTC towers, each area is to be considered an independent place of assembly that needs its own access to two means of egress (stairs) without going through another assembly space if they have an occupant load of less than 500 each (or three means of egress if the area of refuge had an occupant load between 500 and 999). Further, since the only means of egress from the roof-top deck was through the space on the observation floor, the Department clarified that occupant load from the deck would need to be added to the occupant load of the observation floor and that the travel distance from the roof deck along the connecting stairs to the required means of egress at the observation floor shall be within the maximum permitted by the NYC Building Code. The Department, however, did not raise the issue of a fourth stairwell in its December 1994 meeting with The Port Authority and when it subsequently concurred with The Port Authority's proposal to remodel the spaces.

Given the low occupancy level on September 11, 2001, NIST found that the issue of egress capacity from these places of assembly, or from elsewhere in the buildings, was not a significant factor on that day. It is conceivable that such a fourth stairwell, depending on its location and the effects of aircraft impact on its functional integrity, could have remained passable, allowing evacuation by an unknown number of additional occupants from above the floors of impact. If the buildings had been filled to their capacity with 20,000 occupants, the required fourth stairway would likely have mitigated the insufficient egress capacity for conducting a full building evacuation within the available time.

The elevator system was described in Chapter 1. These were not to be used for emergency evacuation except under the control of the fire department. Roughly 3,000 of the people who were initially at or above the impact floors in WTC 2 and were warned by the attack on WTC 1 survived, however, in large part by taking the elevators downward before the aircraft struck WTC 2.

Following the 1993 bombing, The Port Authority instituted the following changes to reduce egress time, in addition to those stairwell improvements mentioned in Section 1.1.2:

- Construction of new egress corridors, north (to Church Street and Vesey Street) and south (to Liberty Street) for faster evacuation from the Concourse (mall), and of two escalators from