

SEARCH AND RESCUE ON THE FIRE FLOOR: TACTICAL DIFFERENCES BASED ON CREW SIZE

Key challenges in a high-rise fire include the sheer scope and scale of conducting search and rescue operations. Every floor, every office, every cubicle, every hallway, every stairway, every elevator, every square foot of the high-rise structure must be searched during a fireground operation.

Search and Rescue Search Strategy

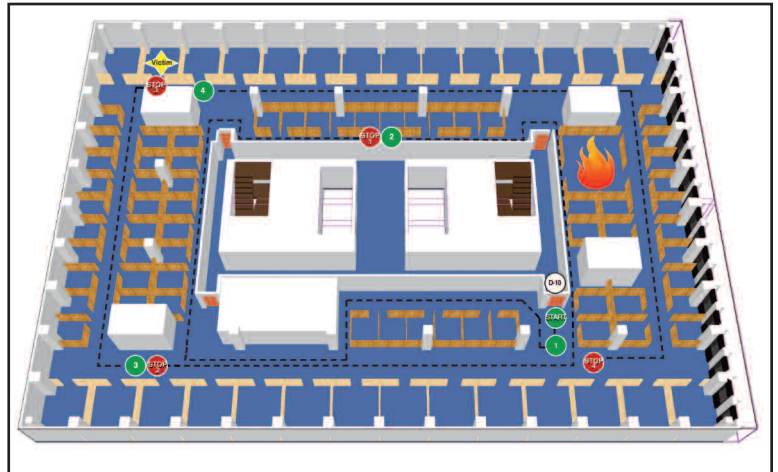
Crew size has a dramatic impact on the manner of crew deployment for search and rescue operations. This is due to the ability of larger search and rescue companies to split into multiple crews and search the floor area in parallel, rather than in series. All fireground operations in IDLH environments must be conducted with at least two persons for safety and accountability.

Search and Rescue 10th Floor

The fire floor was an open floor plan and contained 96 cubicles. In the high hazard high-rise commercial building, the 4-person crew started the search 1 min 23 s (7.8 %) faster and completed the search and rescue 11 min 21 s (18.4 %) faster than the 3-person crews. In the same structure, the 5-person crews started the search 1 min 4 s (6.7 %) faster than the 4-person crews and 2 min 27 s (14.1%) faster than the 3-person crew. Additionally, 5-person crews completed the search faster than the 4- and 3-person crews by 13 min 34 s (29 %) and 24 min 55 s (42 %) respectively. Six-person crews had the best performance, starting the search 1 min 19 s faster and completing the search 2 min 57 s (8.0%) faster than 5-person crews. The greatest difference in search times was between 6- and 3-person crews. Six-person crews started the search on the fire floor 3 min 46 s (22 %) faster and completed the search 27 min 51 s (47 %) faster than the 3-person crews.

Three-Person Search Crews

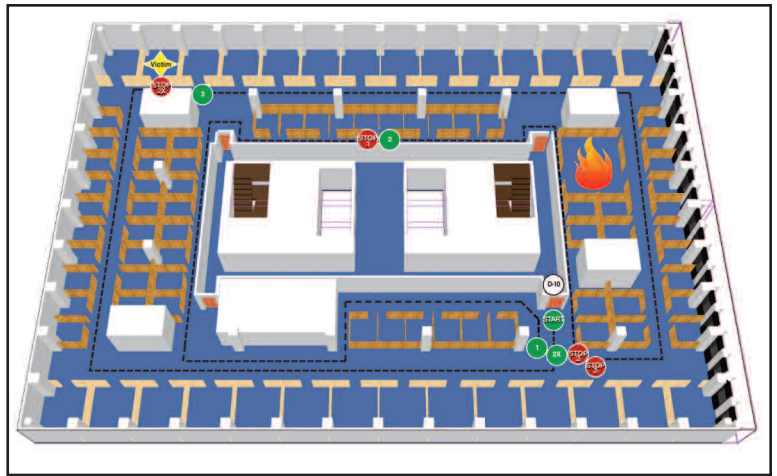
The first-arriving 3-person crew (Truck 1) left one member in the lobby for PPV in the stairwells (as described above). Thus, Truck 1 became a two-person crew for the remainder of the experiment. After completing the Check for Fire Extension task, Truck 1 commenced a right-hand search on the inner loop of the fire floor, at the location in Figure 48 marked by Symbol 1 (the number 1 in a green circle). In most circumstances, Truck 1 searched for 200 ft (61 m) and called for relief upon reaching the end of the search rope (marked by Symbol 2). No crew was allowed by convention to search more than 200 ft (61 m). The relief crew operating with 3 firefighters followed the inside loop search rope, starting the search once the search bag (or search tool) left by Truck 1 at Symbol 2 was located. As the second search crew completed the inside loop search, the search was continued by crossing to the outside loop and commencing to the right. The second search crew typically completed their search when they ran out of rope at Symbol 3 in the figure above. After calling for relief and leaving an indicator for the next search crew, the second crew followed the search line back to the entry door, roughly 60 ft (20 m) from their stop point, and communicated with Division 10 and/or the relief crew. Division 10 was located at the symbol with "D10" within a white circle. The relief company proceeded to the end of the search rope located along the outer loop at Symbol 3 and resumed the search. The third crew typically encountered the fire floor victim, represented in the figure above and subsequent figures by the word "Victim" in a yellow star. Procedures for victim



rescue have been described previously in this report. As the victim rescue required the effort of all 3 crew members, a fourth search company was called to the fire floor when the victim was located. With only three full alarms available for this incident response, the only search crew available was one that had completed a prior task, had been processed through Rehab, and had been declared fit for return to operations by the ALS medic crew. The final search crew on the fire floor followed the outer loop search line from the entry door to the location where the victim was found (Symbol 4) and completed the fire floor search. The location of the search completion is shown by the Stop symbol in the figure above.

Four-person Search Crews

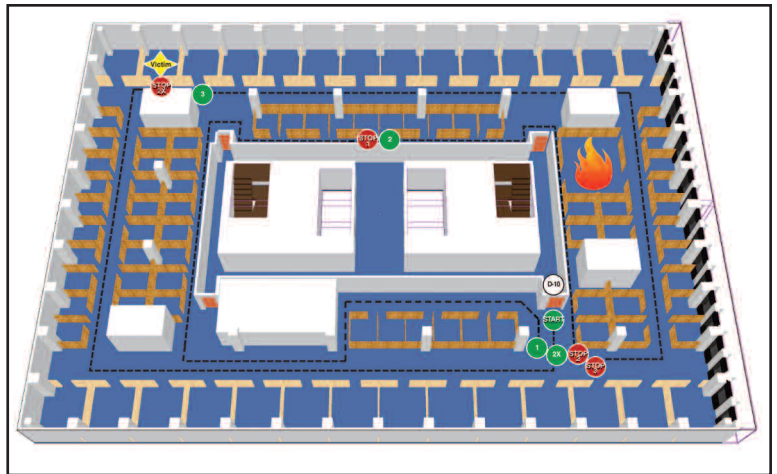
The first-arriving 3-person crew (Truck 1) left one member in the lobby to handle PPV for the stairwells (as described previously). Thus, Truck 1 operated as a 3-person crew for the remainder of the experiment. After completing the Check for Fire Extension task, Truck 1 commenced a right-hand search on the inner loop at Symbol 1 in the figure above. In most circumstances, Truck 1 searched for 200 ft (61 m) and then called for relief upon reaching the end of the search rope at Symbol 2. The relief crew, operating with four personnel, split into two search teams (one team on the inside loop and one team on the outside loop). The relief crew on the inside loop followed the search rope previously searched by Truck 1 until they located the search bag (or search tool) left by Truck 1 at Symbol 2. The relief crew then continued searching until the inner loop search was complete. Once complete, the crew on the inner loop waited briefly to reassemble with the X-Ray team. The relief X-Ray crew commenced the outer loop search at Symbol 2X, typically finding the incapacitated victim at the star. Upon locating the victim, the X-Ray crew informed Division 10 that a victim had been located and that an ambulance team was needed to meet them in the stairwell. In addition, as an ambulance was requested, relief was also requested so that another crew could be



sent to complete the search on the fire floor. The second crew members all met in the stairwell to maintain full crew accountability. The crew carried the victim to meet the EMS crew on the 8th floor and then proceeded to Rehab. A third crew then relieved the second and completed the search of the outer loop on the fire floor from Symbol 3 as a 4-person crew. The location of the search completion is shown by a stop sign in the figure above.

Five-person Search Crews

The first-arriving 5-person crew (Truck 1) left one member in the lobby to handle PPV in the stairwells (as described above). Thus, Truck 1 operated as a 4-person crew for the remainder of the experiment. Upon arrival on the fire floor, Truck 1 immediately split into Truck 1 and Truck 1 X-Ray crews. Truck 1 completed the Check for Fire Extension task, and then started a right-hand search on the inner loop, beginning at Symbol 1 in the figure above. Truck 1 typically searched for 200 ft (61 m) and called for relief upon reaching the end of the search rope at Symbol 2. Meanwhile, Truck 1 X-Ray commenced the outer loop search at Symbol 1X, typically finding the incapacitated victim at the star. Upon locating the victim, Truck 1 X-Ray informed Division 10 that a victim had been located and that an ambulance crew was needed to meet them in the stairwell. In addition, relief was requested in order to complete the search on the fire floor. Truck 1 met the X-Ray team in the stairwell to maintain full crew accountability. The crew delivered the victim to the EMS crew on the 8th floor landing and then proceeded to Rehab. The relief crew, operating with all 5 personnel, split into two search teams (one team with 2 persons on the inside loop and the other team (X-Ray) with 3 persons on the outside loop). The crew on the inside loop followed the search rope until they located the search bag (or search tool) left by the previous crew then continued searching until the inner loop search was complete. Upon completion, the crew waited briefly to reassemble with the X-Ray team. The X-Ray crew typically completed the search of the outer loop on the fire floor.



right-hand search on the inner loop, beginning at Symbol 1 in the figure above. Truck 1 typically searched for 200 ft (61 m) and called for relief upon reaching the end of the search rope at Symbol 2. Meanwhile, Truck 1 X-Ray commenced the outer loop search at Symbol 1X, typically finding the incapacitated victim at the star. Upon locating the victim, Truck 1 X-Ray informed Division 10 that a victim had been located and that an ambulance crew was needed to meet them in the stairwell. In addition, relief was requested in order to complete the search on the fire floor. Truck 1 met the X-Ray team in the stairwell to maintain full crew accountability. The crew delivered the victim to the EMS crew on the 8th floor landing and then proceeded to Rehab. The relief crew, operating with all 6 personnel, split into two search teams with 3 persons each. The crew on the inside loop followed the search rope until they located the search bag (or search tool) left by the previous crew at Symbol 2, then continued searching until the inner loop search was complete. Upon completion, the crew waited briefly to reassemble with the X-Ray team. The X-Ray crew typically completed the search of the outer loop on the fire floor from Symbol 2X.

Six-person Search Crews

The first-arriving 6-person crew (Truck 1) left one member in the lobby to handle PPV in the stairwells (as described previously). Thus, Truck 1 operated as a 5-person crew for the remainder of the experiment. Upon arrival on the fire floor, Truck 1 immediately split into Truck 1 and Truck 1 X-Ray crews. Truck 1 completed the Check for Fire Extension task, and then started a