

## **I. Effective Response Force**

### **General Background: Effective Response Force**

National Fire Protection Association (NFPA) Standard 1710 Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to Public by Career Fire Departments is the national industry consensus standard for “career firefighter deployment, including requirements for fire department arrival time, staffing levels, and fireground responsibility.”<sup>52</sup> Under this consensus standard, Authority Having Jurisdiction (AHJ) should have a minimum of four (4) on-duty members on engine companies (apparatus with a primary function to pump and deliver water). Additionally, an AHJ with a high volume of activity or many geographic restrictions ought to have five (5) on-duty personnel assigned to an engine company. All other companies, specifically those with specialized equipment, should be staffed with, “the minimum number of on-duty members required to deal with the tactical hazards, high-hazard occupancies, high incident frequencies, geographical restrictions, or other pertinent factors as identified by the AHJ.”<sup>53</sup>

Additionally, NFPA Standard 1720 Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments, addresses combination departments. The standards in NFPA 1720 apply to deployment models, crew size, and other factors. However, NFPA 1710 Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations by Career Fire Departments is a more appropriate benchmark for service delivery and safety even though Howard County Department of Fire and Rescue Services is a combination system.<sup>54</sup> Using NFPA Standard 1710 Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations by Career Fire Departments is a better benchmark for HCDFRS because all HCDFRS stations are career staffed, with response patterns and standards of coverage reliant on career staffing with volunteer units augmenting the system.

In 2010, the National Institute for Standards and Technology (NIST) — in conjunction with the International Fire Chiefs Association, International Association of Fire Fighters, and others — conducted a systematic study to provide quantitative data on the effect firefighter crew size,

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<sup>52</sup> NAT. INST. OF STAND. AND TECH., REPORT ON RESIDENTIAL FIREGROUND FIELD EXPERIMENTS, TECHNICAL NOTE 1661 (2010)

<sup>53</sup> NATIONAL FIRE PROTECTION ASSOCIATION, STANDARD FOR THE ORGANIZATION AND DEPLOYMENT OF FIRE SUPPRESSION OPERATIONS, EMERGENCY MEDICAL OPERATIONS, AND SPECIAL OPERATIONS TO THE PUBLIC BY CAREER FIRE DEPARTMENTS 1710 (2010)

<sup>54</sup> See HOWARD CO. FIRE DEP’T EMERGENCY SERV. STAFFING JOINT STUDY GROUP: FINAL REPORT (2019), <https://www.howardcountymd.gov/LinkClick.aspx?fileticket=ZgKy8B2Rat8%3d&portalid=0>. The Final Report uses NFPA 1710 as a benchmark for its recommendations: “The goal is to strive for improved response times as recommended by NFPA 1710.” Id. At 11. Specifically, the report also recommends “evaluating how to improve our effective response force of fifteen firefighter on the scene within ten minutes . . .” Id.

arrival time, and other factors had on a fire departments ability to protect civilians and their property as well as the occupational safety of firefighters. From this study, which was limited to low-hazard, residential structure fires, there were statistically significant changes to outcome based on apparatus arrival time and/or crew sizes. Key findings include:<sup>55</sup>

- Four (4) person crews completing fireground tasks an average of seven (7) minutes faster than two (2) person crews in low-hazard residential fires
- Four (4) person crews completing fireground tasks an average of five (5) minutes faster than three (3) person crews in low hazard residential fires
- Three (3) person crews were 10-percent faster to getting water onto the fire than two (2) person crews
- Three (3) person crews completed primary search and rescue 25% faster than two (2) person crews
- Five (5) person crews assembled the industry standard effective response force three minutes faster than four-person crews

Specific staffing levels for effective firefighting are found in the NFPA standards, with the Maryland Occupational Safety and Health consensus standard only stating that all AHJs “shall develop policies and procedures that determine the type, number and staffing of units that are dispatched to specific call types.”<sup>56</sup>

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<sup>55</sup> NATIONAL FIRE PROTECTION ASSOCIATION, STANDARD FOR THE ORGANIZATION AND DEPLOYMENT OF FIRE SUPPRESSION OPERATIONS, EMERGENCY MEDICAL OPERATIONS, AND SPECIAL OPERATIONS TO THE PUBLIC BY CAREER FIRE DEPARTMENTS 1710 (2010)

<sup>56</sup> MD. OCC. SAFETY. AND HEALTH: MARYLAND FIRE SERVICE HEALTH AND SAFETY CONSENSUS STANDARD (MD. DEPT. LABOR, LICENSING, AND REG. 2002).

## **Policies and Standards Applicable to Howard County Department of Fire and Rescue Services: Effective Response Force**

Howard County Department of Fire and Rescue Services (HCDFRS) [General Order 100.17 Standard of Coverage](#) establishes the minimum staffing levels for fire and non-fire emergencies.<sup>57</sup> Under [General Order 100.17 Standard of Coverage](#), the regular staffing by apparatus is:

- Special Services – includes aerial apparatus, squads: four (4) personnel
- Extrication Unit – includes aerial apparatus with extrication equipment, squads, and rescues: four (4) personnel
- Engines: three (3) personnel
- Tankers – unit carrying 1,500 gallons or greater of water: two (2) personnel
- EMS Transport Units: two (2) personnel
- Chief Officers and Staff Personnel: one (1) personnel

Additionally, under the order the staffing levels sent to a residential structure incident is separated into two categories: rural and metro. The specific list of equipment and personnel in use to respond to each type are detailed below:

<b>Unit Type</b>	<b>Metro</b>	<b>Rural</b>
Engines	4 (12 personnel)	4 (12 personnel)
Special Services	2 (8 personnel)	2 (8 personnel)
Aerial	1 (4 personnel)	1 (4 personnel)
Water Tankers		1 (2 personnel)
Transport unit	1 (2 personnel)	1 (2 personnel)
Battalion Chief	1 (1 personnel)	1 (1 personnel)
Personnel Totals	27 personnel	29 personnel

Notably, the Standards of Coverage listed in [General Order 100.17 Standards of Coverage](#) is no longer aligned with HCDFRS daily practices. Response packages sent to a box alarm in daily practice is different from the packages established in the General Order.

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<sup>57</sup> HOWARD CO. DEP'T OF FIRE AND RESCUE SERV. GENERAL ORDER 100.17 STANDARD OF COVERAGE (2006).

### **Woodscape Drive Incident Overview: Impact of Initial Response Assignment: Effective Response Force**

A 911 call was received from the occupants of 7005 Woodscape Drive at 01:51 on July 23, 2018 reporting smoke in the house and indicating that there was a recent nearby lightning strike. The callers did not report seeing visible flames and a Local Box 5-62 was dispatched. The Local Box assignment consisted of two (2) engines, one (1) aerial, one (1) ambulance, and one (1) battalion chief. The compilations of these crews are below:

Apparatus Type	Identification Number	Number of Personnel
Engine	E51	5
Engine	E101	3
Aerial	Tower 10	4
Ambulance	Paramedic 56	2
Battalion Chief	Battalion 1	2
Total Personnel		16

After arriving at the dwelling, Engine 51's officer in the role of Incident Commander in Tactical Command mode upgraded the incident to a full box. This upgrade added two (2) engines, two (2) aerials, one (1) ambulance, one (1) medical duty officer, and one (1) safety officer. The compilations of these crews are below:

Apparatus Type	Identification Number	Number of Personnel
Engine	E71	4
Engine	E111	3
Aerial	Truck 7	4
Aerial	Tower 3	5
Ambulance	Paramedic 105	2
Medical Duty Officer	EMS1	1
Safety Officer	Safety1	1
Total Personnel		20

Additionally, Battalion Chief 2 self-initiated his response to the scene when the full-box upgrade was dispatched. Then, at 02:19 hours Command requested the working fire task force, adding the following operational units: two (2) engines, one (1) special service, and one (1) on-call battalion chief/safety officer. The compilation of those units are below:

Apparatus Type	Identification Number	Number of Personnel
Engine	E91	4
Engine	E61	4
Special Service	SQ1	4

Battalion Chief	BC2	2
Total Personnel		14

By the end of the period covered by this investigation, there were fifty (50) personnel on the fireground to respond to the rural residential structure with active fire.

## Findings and Recommendations: Effective Response Force

First, the response force dispatched to manage this incident—two (2) engines, one (1) aerial, one (1) EMS unit and one (1) Battalion Chief—was consistent with HCDFRS policies in place at the time of the incident. However, this initial dispatch was insufficient to conduct fire department operations at the normal scale and with the normal speed of progression as a standard house fire assignment. This is likely due to unclear parameters in determining whether to issue a Local Box Alarm or a Full Box Alarm.

In reviewing current dispatch parameters, HCDFRS should also address the expectations of units responding to a Local Box Alarm. For example, current dispatch of a Local Box Alarm does not have a dedicated RIC company or an ability to establish a secondary water supply. In revising the dispatch numbers, HCDFRS should both increase the number of units dispatched on a Local Box Alarm as well as establish standardized roles assigned in order of dispatch. Additionally, Local Box Alarm and Full Box Alarm assignments should be standardized throughout the Baltimore Metropolitan Region, enabling mutual aid companies to easily integrate with HCDFRS crews when responding to either a Local Box or Full Box Alarm.

Second, 7005 Woodscape Drive was an 8,400 square foot residential structure, however, initial response treated it similarly to a smaller single-family home rather than adapting staffing, strategy and tactics for the unique size and scale of the residence. The size of a structure, especially interior volume, affects smoke characteristics observed from the exterior of a structure. During this incident, smoke venting from the structure was described as “lazy” and not venting under pressure when initial units arrived on scene. This was likely due to the size and construction of the structure, which had large open areas more consistent with a commercial structure than a typical residential ranch-type structure. These larger open areas affect smoke travel and require a greater volume of smoke to build within the structure before it vents under pressure. When “lazy” smoke is observed from a ranch-style structure the fire would likely be relatively small. Whereas, a significant fire could evolve in a mansion-type structure and present with the same “lazy” smoke, due to the volume provided for the smoke to fill inside the structure. Personnel should be aware of this aspect of building construction and view structures, also, by size and volume. With this mindset, a mansion-type structure may be more effectively evaluated from a firefighting perspective similarly to a commercial structure of the same size.

<b>Findings</b>	<b>Recommendations</b>
I.1 Response assignment initially dispatched to manage this incident was consistent with HCDFRS policies in place at the time of the incident. However, the initial dispatch was insufficient to conduct full-scale fire department operations.	I.1.1 HCDFRS must clearly define parameters of a Local Box Alarm versus a Full Box Alarm. I.1.2 HCDFRS should define expectations for units responding to Local Box Alarms, including adding a dedicated RIC

<b>Findings</b>	<b>Recommendations</b>
	<p>company and an ability to establish a secondary water supply.</p> <p>I.1.3 Local Box Alarm and Full Box Alarm assignments should be standardized throughout the Baltimore Metropolitan Region.</p>
<p>I.2 7005 Woodscape Drive was an 8,400 square foot residential structure, however initial response treated it similarly to a smaller single-family home rather than adapting staffing, strategy and tactics for the unique size and scale of the residence.</p>	<p>I.2.1 HCDFRS must train personnel to recognize how structure size, residential or commercial, affects visual cues such as smoke characteristics.</p>