Workforce Assessment
Key Biscayne Fire-Rescue

Key Biscayne, FL

**Final Report
3/21/2023**

THE ASSOCIATION & THE COMPANY

The International City/County Management Association is a 109-year old, nonprofit professional association of local government administrators and managers, with approximately 13,000 members located in over 30 countries.

Since its inception in 1914, ICMA has been dedicated to assisting local governments and their managers in providing services to its citizens in an efficient and effective manner.
ICMA advances the knowledge of local government best practices with its website (www.icma.org), publications, research, professional development, and membership. The ICMA Center for Public Safety Management (ICMA/CPSM) was launched by ICMA to provide support to local governments in the areas of police, fire, and emergency medical services.

ICMA also represents local governments at the federal level and has been involved in numerous projects with the Department of Justice and the Department of Homeland Security.

In 2014, as part of a restructuring at ICMA, the Center for Public Safety Management (CPSM) was spun out as a separate company. It is now the exclusive provider of public safety technical assistance for ICMA. CPSM provides training and research for the Association's members and represents ICMA in its dealings with the federal government and other public safety professional associations such as CALEA, PERF, IACP, IFCA, IPMA-HR, DOJ, BJA, COPS, NFPA, and others.

The Center for Public Safety Management, LLC, maintains the same team of individuals performing the same level of service as when it was a component of ICMA. CPSM's local government technical assistance experience includes workload and deployment analysis using our unique methodology and subject matter experts to examine department organizational structure and culture, identify workload and staffing needs, and align department operations with industry best practices. We have conducted 341 such studies in 42 states and provinces and 246 communities ranging in population from 8,000 (Boone, Iowa) to 800,000 (Indianapolis, Ind.).

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SECTION 1. INTRODUCTION

The Center for Public Safety Management (CPSM) was retained by the Village of Key Biscayne, FL to complete a workforce assessment of the Village's fire-rescue department. This assessment is designed to provide the Village with a thorough and unbiased review of the workforce in terms of staffing and organizational structure, and the elements of a fire-rescue department that are primary drivers of staffing and deployment of resources. This report documents this assessment, and includes our findings and observations, a comprehensive response and workload analysis, and recommendations structured to enhance programs and services, and improve internal and external service deliverables the department provides.

During our study, we analyzed operational, administrative, and performance data provided by Key Biscayne Fire-Rescue (KBFR), and we also examined first-hand the department's operations. CPSM found KBFR to be open and transparent about its operations, program gaps, and what they do great, which is provide high caliber Fire and EMS services to the Village of Ket Biscayne. Officers and members with whom the project team interacted were passionate about their service to the community.

The project team conducted an on-site visit in late October 2022, for the purpose of observing fire department and agency-connected supportive operations; interviewing key fire department and Village staff; examining the Village's structural and other risks; and reviewing department operations. Virtual and phone meetings were held throughout the study with senior fire staff and the Village Manager, where CPSM project staff could affirm project information and elicit further discussion regarding the workforce assessment.

The CPSM project team, while reviewing information and discussing operations with department members, always seeks first to understand existing operations, then to identify ways the department can improve efficiency, effectiveness, and safety for both its members as well as the community it serves.

In the conclusion section of this analysis, CPSM provides information on areas the CPSM project team has identified that need to be addressed by KBFR and the Village, as well as recommendations on programs and staffing KBFR and the Village should consider addressing.

Recommendations include:

1. CPSM recommends that KBFR organize the department so as to optimize and empower subordinate officers to the Fire Chief, to include senior level chief officers and company officers, within the leadership and management of all department operations. This includes the concepts of a Functional Organizational Chart, the Time Allocation Model and proposed organizational chart included in the conclusion section of this report to ensure a more efficient alignment of organizational resources, and the effective use of all members of the organization in order to achieve the organization's mission and core values.

2. CPSM recommends KBFR work with the collective bargaining unit and the city's Human Resources Director to develop a succession plan that is diverse, includes the entire organization, and has a focus on preparing current and future members to take on additional roles and responsibilities, and as well as prepares members for advancement and promotion into key roles in the organization. To ensure succession and continuity at the senior level, CPSM recommends the Village consider double-slotting the Deputy Chief of Operations position for a period of 6-9 months prior to the current Deputy Chief of Operations' retirement date.

3. As a result of a staffing factor analysis CPSM conducted, and from a budgeting standpoint, it would be prudent and recommended that KBFR budget:

   ■ 1.32 FTE equivalent in overtime to cover vacancies created by scheduled and unscheduled leave for A-Shift.

   ■ .32 FTE equivalent in overtime to cover vacancies created by scheduled and unscheduled leave for B-Shift.

   ■ .32 FTE equivalent in overtime to cover vacancies created by scheduled and unscheduled leave for C-Shift.

   By utilizing a staffing factor formula annually during budget preparations, KBFR can continue to manage the funding of operational staff and overtime to fill vacant positions created by leave (scheduled and unscheduled).

   An additional consideration over the longer term would add one FTE to A-shift, which would balance the staffing to twelve on each shift. Overtime budgeting would then be for the fractional FTE equivalent (i.e., .32 FTE per shift) as described above.

4. CPSM recommends maintaining the current staffing in the Fire Marshal's Office, to include alternatives outlined in the conclusion section of this report, with this staff focusing on required inspections (annual, permitting, special event, food truck, plan review inspections, and non-annual occupancies that the Fire Marshal directs to be inspected). CPSM further recommends that the plan review function continue to be contracted out, with this service being expanded to handle even those plan reviews that are not currently contracted out to free up staff time to concentrate on fire code enforcement. CPSM also recommends that the fire suppression fire safety inspection program continue as designed.

5. CPSM recommends a greater effort should be made to advance the public life safety education program through a combined effort of the Fire Marshal's Office and fire suppression companies.

6. CPSM recommends the Village develop a basic Emergency Management Response Plan that is applicable to all Village departments and employees, and one that extracts pertinent information from the Village CEMP regarding response and Emergency Support Function (ESF) roles; and that assigns specific ESF roles to Village employees by position, and not in general by department, and that includes specific roles and responsibilities of each assignment. CPSM further recommends that once these ESF roles are specifically assigned, future training exercises focus on ESF responsibilities and execution of these important duties.

7. CPSM recommends essential personnel assigned to the Village, City of Miami, or County EOC, and who have response assignments during an emergency or disaster, be trained to the appropriate NIMS level as outlined herein.

8. CPSM recommends the Village maintain an up to date COOP that is all-hazards and that has the ability to ensure the effects of any interruption in a Village office, system, operation, and staffing before or during an event are successfully managed and the Village is able to perform all essential functions.

9. CPSM recommends at a minimum, a member of the KBFR staff to be assigned the responsibility of emergency management planning and provided the resources to successfully carry out the objective of this role.

10. CPSM recommends the training and education function, to include state certification compliance be assigned to an appropriate staff member and personnel who can give this important fire-rescue department function consistent attention. CPSM also recommends

KBFR develop a training and education committee whose focus is on developing training and education policies and guidelines that are linked to local, state, and national standards, and as well links to the department's accreditation, strategic planning, and the ISO-PPC requirements.

11. CPSM recommends KBFR develop a health, safety, and wellness committee, which includes the Village Human Resources Department, and whose primary mission is to develop and implement a comprehensive health, safety, and wellness initiative program that aligns with NFPA 1500, Standard on Fire Department Occupational Safety and Wellness Programs, 2021 edition. CPSM further recommends the Deputy Chief of Operations have department health, safety, and wellness oversight as the department Health and Safety Officer.

12. CPSM recommends a KBFR employee be assigned accreditation and ISO-PPC review programs to ensure compliance with accreditation components when KBFR was designated as a fully accredited fire agency, and to ensure compliance with all components of the ISO-PPC Fire Suppression Rating System to receive maximum credits in each.

13. The Management Analyst is proposed as a new KBFR full time equivalent position. The position is proposed and recommended by CPSM due to the gaps in program work that exist and that have been outlined in this workforce assessment, particularly program work in Emergency Management, which is a Village-wide program.

This analysis contains a series of observations and recommendations provided by CPSM which are intended to help KBFR deliver services and programs more efficiently and effectively. CPSM recognizes there may be recommendations and considerations offered that first must be budgeted for, bargained, or for which processes must be developed prior to implementation. CPSM also acknowledges the recommendations may be adopted in whole, in part, or rejected by the department and Village.

SECTION 2. AGENCY CHARACTERISTICS

Department Overview and Organizational Structure

The Key Biscayne Fire Rescue Department (KBFR) is a career fire department that employs full-time command staff, community risk reduction, support staff, and operational officers and firefighters. KBFR deploys one engine company, one truck company, and two EMS ground transport units, from a centrally located fire facility. Operational shift Captains serve as station/shift commanders and provide day-to-day operational supervision to assigned station shift staff and initial incident command of incidents. Command staff, which includes the Fire Chief, and two Deputy Chiefs as well serve as incident commander on incident responses as necessary. Supervising the day-to-day operations of EMS ground transport includes the station Captain and assigned shift Lieutenants.

For maximum versatility, the KBFR truck company is a Quint (apparatus that has a fire pump; hose; water tank; engine and truck company equipment; and an elevated aerial device), which means this unit can respond as an engine company or as a ladder (truck) company, or can serve as both on the scene if adequate personnel are available to utilize both the fire pump and aerial device simultaneously.

KBFR operates with a typical 24-hour shift schedule. Operational shifts work 24 hours on duty and 48 hours off duty with Kelly Day every seven shifts to comply with the Fair Labor Standards Act (FLSA) regarding firefighter work period thresholds. There are three operational shifts or platoons (A, B, C shifts). There are eleven or twelve positions assigned to each operational shift (A-shift has eleven budgeted shift positions; B and C shifts have twelve budgeted shift positions assigned). The current operational deployment model that includes the cross-staffing of fire suppression and EMS ground transport apparatus requires a minimum operational shift level staffing of eight personnel per shift. KBFR allots three to four personnel per shift to cover scheduled and unscheduled leave (three on A-shift; four on B and C-shifts). *Remaining scheduled/unscheduled leave is backfilled utilizing overtime*.

When operating with a minimum staffing allotment of eight on a shift, the deployment of fire suppression and EMS ground transport resources (staff and apparatus) follows a flexible cross-staffing matrix that ensures the initial two EMS calls for service that require EMS transport are handled, as well as the response of an initial KBFR unit (squad) to the next incident (EMS or Fire) with a staffing of two when both ambulances are committed. The matrix also ensures the response of two fire suppression apparatus each with a staffing of four when KBFR staffing resources are not committed to an EMS transport incident, or the response of one fire suppression apparatus with a staffing of four when three personnel are committed to an EMS transport incident (Captain responds in Car 40 as overall scene supervisor in this scenario). KBFR relies heavily on automatic aid from the City of Miami. **The response matrix discussion is expanded later in this report.**

Command staff, community risk reduction, support services staff and functions operate from a joint facility that includes administrative office space, shift operations to include living quarters and apparatus response bays, logistics areas, and some training areas and props for specific training.
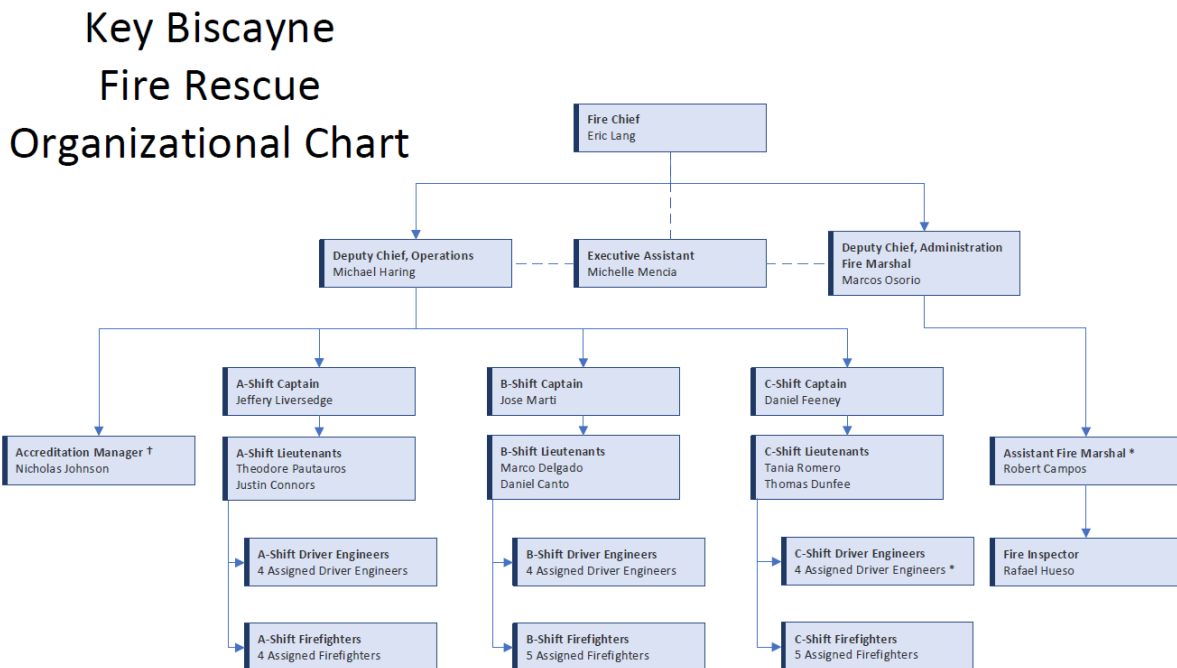
KBFR is led by a Fire Chief who has overall responsibility for the management and leadership of the department. The Fire Chief is assisted by two Deputy Chiefs who are direct reports. Additional support to the Fire Chief includes an executive assistant and accreditation manager (uniform Fire Lieutenant) who are assigned various administrative, research, and day-to-day department tasks and responsibilities. The Fire Chief also serves as the Village Emergency Management Director (Village Manager's designee per local ordinance). There are four positions assigned to the Fire Chief.

The Deputy Chief of Operations manages the three operational shifts as described above. This includes all operational components and staffing. Each of the operational shift Captains report directly to the Deputy Chief of Operations. Key areas the Deputy Chief of Operations manages include the department health and safety function, coordinates operational logistical support and fleet services, payroll, and coordinates and manages the department's training program. There are thirty-five positions assigned to the Deputy Chief of Operations.

The Deputy Chief, Administration also serves as the Fire Marshal, which is this position's primary role. Duties of the Fire Marshal include community risk reduction (fire prevention) and fire origin and cause to include arson investigation. The community risk reduction component is responsible for fire prevention code enforcement, fire protection plans review, and fire and life safety education. This division includes two positions assigned to community risk reduction functions.

FIGURE 3: KBFR Organizational Chart

Key Biscayne Fire Rescue Organizational Chart

Fire Chief — Eric Lang

Deputy Chief, Operations — Michael Haring
Executive Assistant — Michelle Mencia
Deputy Chief, Administration / Fire Marshal — Marcos Osorio

A-Shift Captain — Jeffery Liversedge
B-Shift Captain — Jose Marti
C-Shift Captain — Daniel Feeney

Accreditation Manager † — Nicholas Johnson

A-Shift Lieutenants — Theodore Pautauros, Justin Connors
B-Shift Lieutenants — Marco Delgado, Daniel Canto
C-Shift Lieutenants — Tania Romero, Thomas Dunfee
Assistant Fire Marshal * — Robert Campos

A-Shift Driver Engineers — 4 Assigned Driver Engineers
B-Shift Driver Engineers — 4 Assigned Driver Engineers
C-Shift Driver Engineers — 4 Assigned Driver Engineers *
Fire Inspector — Rafael Hueso

A-Shift Firefighters — 4 Assigned Firefighters
B-Shift Firefighters — 5 Assigned Firefighters
C-Shift Firefighters — 5 Assigned Firefighters

KBFR Service Area and Call Demand

The service area for the KBFR is 1.25 square miles of urban area that includes single and multi-family residential and lodging buildings of varying number of floors, units, heights, and construction type; light commercial and public assembly occupancies; parks; local roads and a limited access primary arterial that connects the village to the mainland; and ocean and bay front boundary.

Figure 4: Village of Key Biscayne Boundaries and Fire Station Location
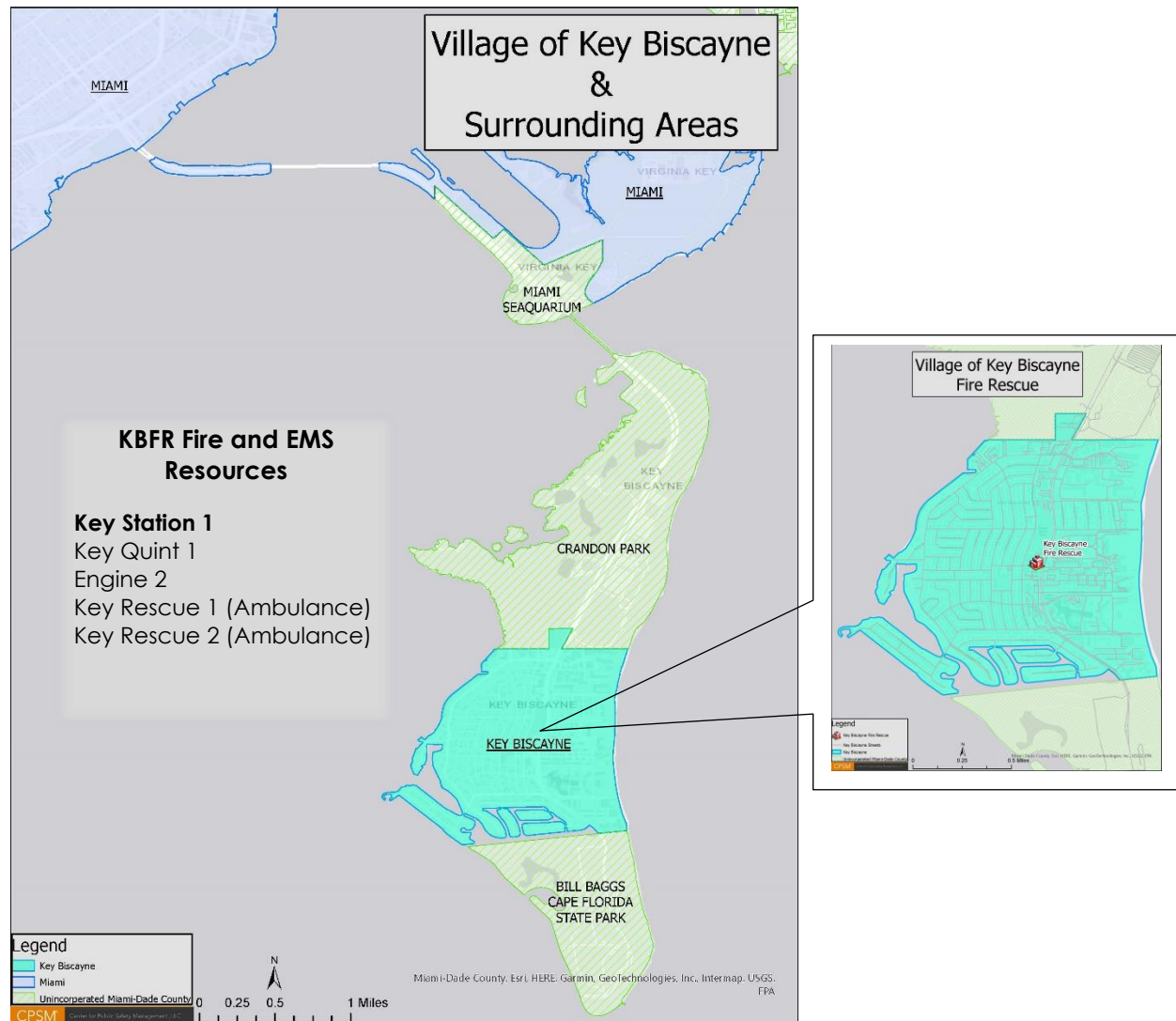
The service demands on the department generated from the service area include EMS first response and transport; fire suppression and fire related calls for service; water rescue; operations level technical rescue and hazardous materials; and transportation emergencies to include regular and light vehicle traffic, pedestrian, and biking traffic; and other non-emergency responses typical of urban/suburban fire departments.

CPSM analyzed KBFR workload for a one year period (June 1, 2021-May 31, 2022). In all, the KBFR responded to 1,980 incidents during this time period as outlined in the next table.

Table 1: KBFR Fire Incident Workload by Call Type

Call Type	Total Calls	Calls per Day
False alarm	654	1.8
Good intent	11	0.0
Hazard	55	0.2
Outside fire	11	0.0
Public service	206	0.6
Structure fire	11	0.0
Fire Total	**948**	**2.6**

48% of all calls

Table 2: KBFR EMS Workload by Call Type

Call Type	Total Calls	Calls per Day
Breathing difficulty	62	0.2
Cardiac and stroke	141	0.4
Fall and injury	243	0.7
Illness and other	359	1.0
MVA	30	0.1
Overdose and psychiatric	32	0.1
Seizure and unconsciousness	129	0.4
EMS Subtotal	**996**	**2.7**

50% of all calls

Calls by Month
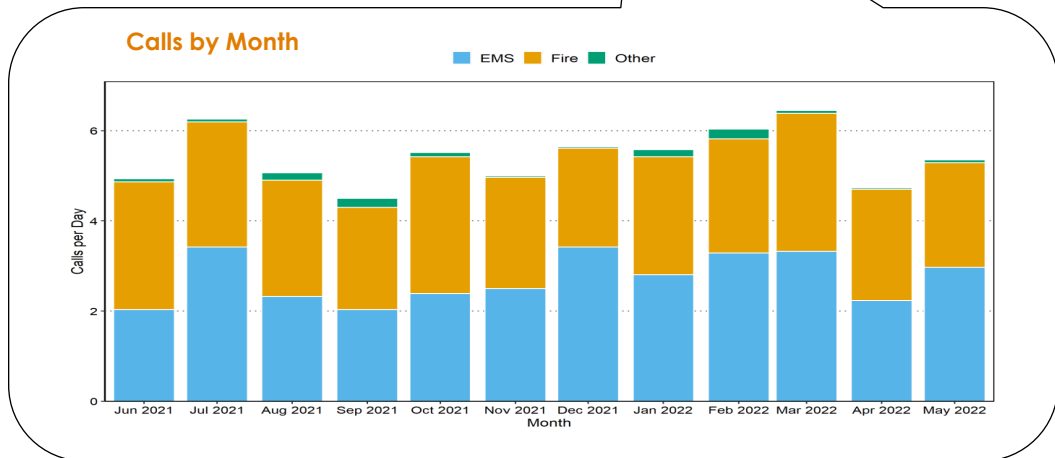
Included in the overall workload are cancelled calls, which calls the KBFR was dispatched to, and either cancelled enroute or prior to responding (issue resolved and KBFR not needed). There were 25 canceled calls during the study period. Additionally, the KBFR provided 11 automatic/mutual aid responses to neighboring jurisdictions. These calls make up the remaining 2% of the total calls for service.

Analyzing where the Fire and EMS incidents occur, and the demand density of Fire and EMS incidents, helps to determine adequate fire management zone resource assignment and deployment. The following figures illustrate Fire and EMS demand in the village.

Figure 5: Fire, EMS, MVA Call Demand

Fire Demand

EMS Demand
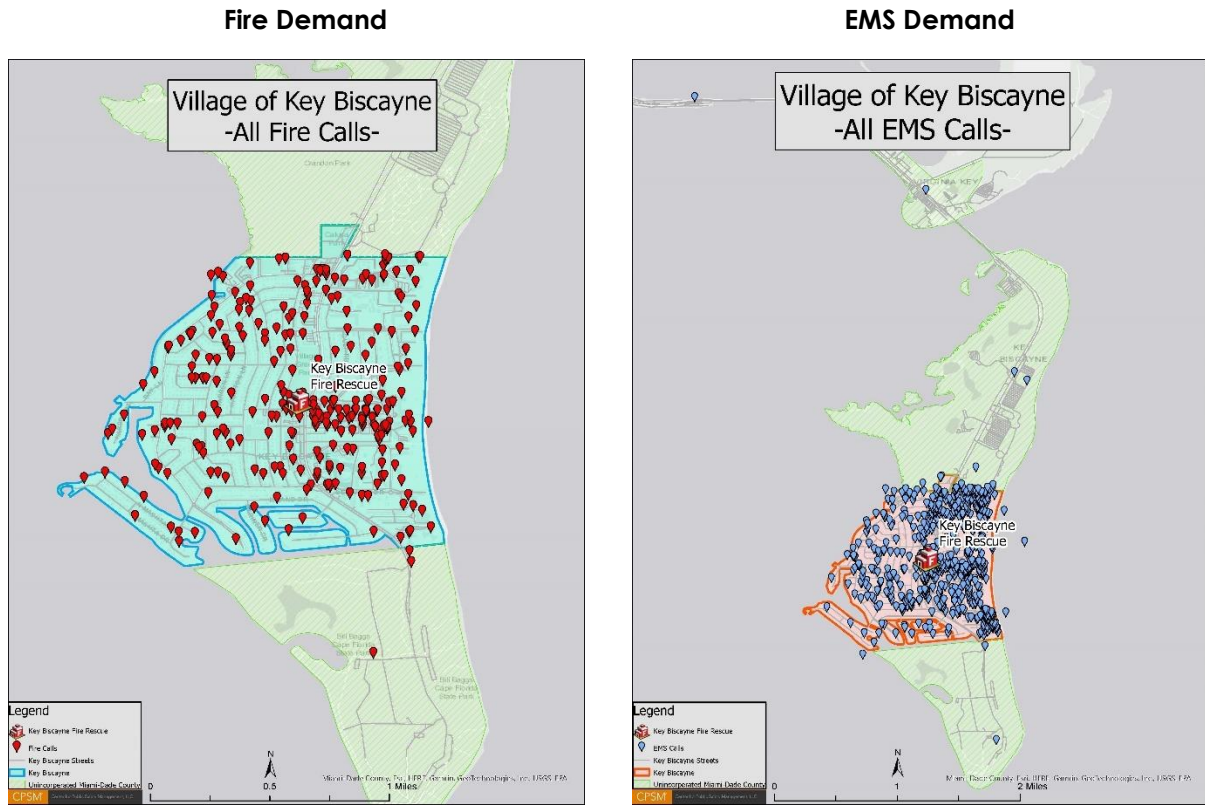
Motor Vehicle Accident Demand
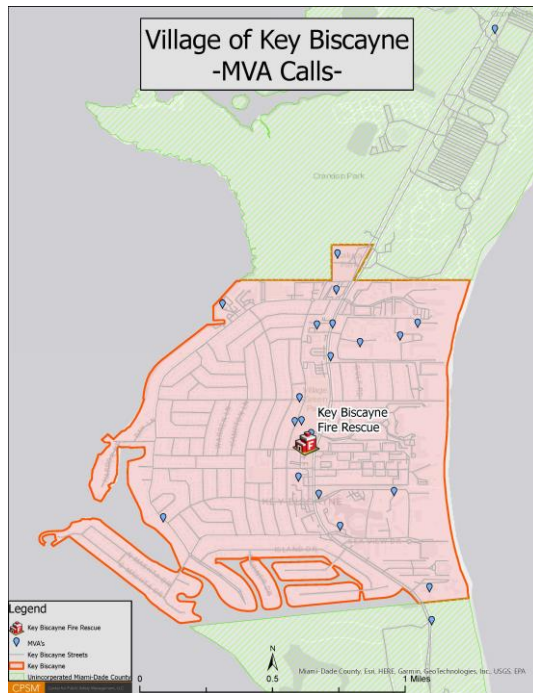
KBFR Response Times

Response times are typically the primary measurement for evaluating fire and EMS services. Response times can be used as a benchmark to determine how well a fire department is currently performing, to help identify response trends, and to predict future operational needs. Achieving the quickest and safest response times possible should be a fundamental goal of every fire department.

When discussing response times for fire incidents, established criteria are linked to the concept of "flashover." This is the state at which super-heated gases from a fire are released rapidly, causing the fire to burn freely, and become so volatile that the fire reaches an explosive state (simultaneous ignition of all the combustible materials in a room). In this situation, usually after an extended period (often eight to twelve minutes after ignition but times as quickly as five to seven minutes), and a combination of the right conditions (fuel and oxygen), the fire expands rapidly and is much more difficult to contain.

EMS response times are measured differently than fire service response times. Where the fire service uses NFPA 1710 and 1720 as response time benchmarking documents, EMS' focus is and should be directed to the evidence-based research relationship between clinical outcomes and response times. Much of the current research suggests response times have little impact on clinical outcomes outside of a small segment of call types. These include cerebrovascular accidents (stroke), injury or illness compromising the respiratory system, injury or illness compromising the cardiovascular system to include S-T segment elevation emergencies, and certain obstetrical emergencies. Each requires rapid response times, rapid on-scene treatment, and rapid transport to the hospital.

An important factor in the whole response time question is what we term "**detection time**." This is the time it takes to detect a fire or a medical situation and notify 911 to initiate the response. In many instances, particularly at night or when automatic detection systems (fire sprinklers and smoke detectors) are not present or inoperable, the detection process can be extended. Fires that go undetected and are allowed to expand in size become more destructive and are difficult to extinguish.

For the purpose of this analysis, *response time* is a product of three components: *dispatch time*, *turnout time*, and *travel time*.

Dispatch time (alarm processing time) is the difference between the time a call is received and the time a unit is dispatched. Dispatch time includes call processing time, which is the time required to determine the nature of the emergency and types of resources to dispatch.

The NFPA 1710 standard for these components of response times is shown below.

In the first component, **dispatch time**, the standard calls for the event to be processed and dispatched in:

- ≤ 64 seconds 90 percent of the time.
- ≤ 106 seconds 95 percent of the time.
- Special call types:
  - ≤ 90 seconds 90 percent of the time.
  - ≤ 120 seconds 99 percent of the time.

The next component of response time is **turnout time**, an aspect of response which is controlled by the responding fire department. NFPA 1710 states that turnout time shall be:

- ≤ 80 seconds for fire and special operations 90 percent of the time.

- ≤ 60 seconds for EMS responses.

The last component of response time is **travel time,** an aspect of response time that is affected by factors such as station location, road conditions, weather, and traffic control systems. NFPA 1710 states that travel time for the first arriving fire suppression unit to a fire incident shall be:

- ≤ 240 seconds for the first arriving engine company to a fire suppression incident 90 percent of the time.

- ≤ 360 seconds for the second company 90 percent of the time.

- ≤ 480 seconds to assemble the initial first alarm assignment on scene 90 percent of the time for low/medium hazards, and 610 seconds for high-rise fire incidents 90 percent of the time.

For EMS incidents the standard NFPA 1710 standard establishes a travel time of:

- ≤ 240 seconds for the first arriving engine company with automated external defibrillator (AED) or higher level capability.

- ≤ 480 seconds or less travel time of an Advanced Life Support (ALS) unit at an EMS incident where the service is provided by the fire department provided a first responder with an AED or basic life support unit arrived in 240 seconds or less travel time.

Table 3: KBFR Average and 90th Percentile Response Times (Minutes)

Call Type	Average Response Time				90th Percentile Response Time			
	Dispatch	Turnout	Travel	Total	Dispatch	Turnout	Travel	Total
Breathing difficulty	1.7	2.3	2.2	6.2	2.6	3.6	3.6	7.8
Cardiac and stroke	1.6	2.1	2.3	6.0	2.8	3.0	3.4	8.3
Fall and injury	1.6	2.0	2.4	6.0	2.9	2.9	3.6	8.3
Illness and other	1.5	2.1	2.1	5.8	2.8	3.1	3.4	7.9
MVA	1.0	2.1	1.4	4.5	1.9	3.2	2.5	6.6
OD*	1.7	2.6	2.1	6.5	3.2	3.4	2.8	8.5
Seizure and UNC**	1.7	2.2	2.2	6.1	2.8	3.0	3.8	8.4
EMS Subtotal	**1.6**	**2.1**	**2.2**	**5.9**	**2.8**	**3.2**	**3.5**	**8.1**
False alarm	1.6	2.2	2.3	6.1	3.8	3.0	3.4	9.5
Good intent	1.7	2.4	2.8	6.9	2.6	3.3	6.1	9.2
Hazard	1.2	2.2	2.4	5.8	2.0	3.2	3.8	8.3
Outside fire	1.0	2.6	2.6	6.1	2.0	3.3	5.7	8.2
Public service	1.6	2.3	2.1	6.0	3.3	3.4	3.3	8.8
Structure fire	0.9	2.4	1.4	4.7	1.4	3.4	2.7	6.1
Fire Subtotal	**1.6**	**2.2**	**2.2**	**6.1**	**3.3**	**3.1**	**3.5**	**9.1**
Total	**1.6**	**2.2**	**2.2**	**6.0**	**2.9**	**3.1**	**3.5**	**8.4**

The response times above tell us that:

- At the 90th percentile, KBFR <u>meets</u> the NFPA 1710 Standard for travel time of 240 seconds (4 minutes).

- At the 90th percentile, KBFR <u>does not meet</u> the NFPA 1710 Standard for turnout time for EMS (60 seconds) or Fire (80 seconds). This needs to be addressed by the command staff.

The next figure illustrates the excellent travel time coverage KBFR delivers from the central fire station.

Figure 6: KBFR 240 Second (4-Minute) Travel Time Bleed from Central Fire Station
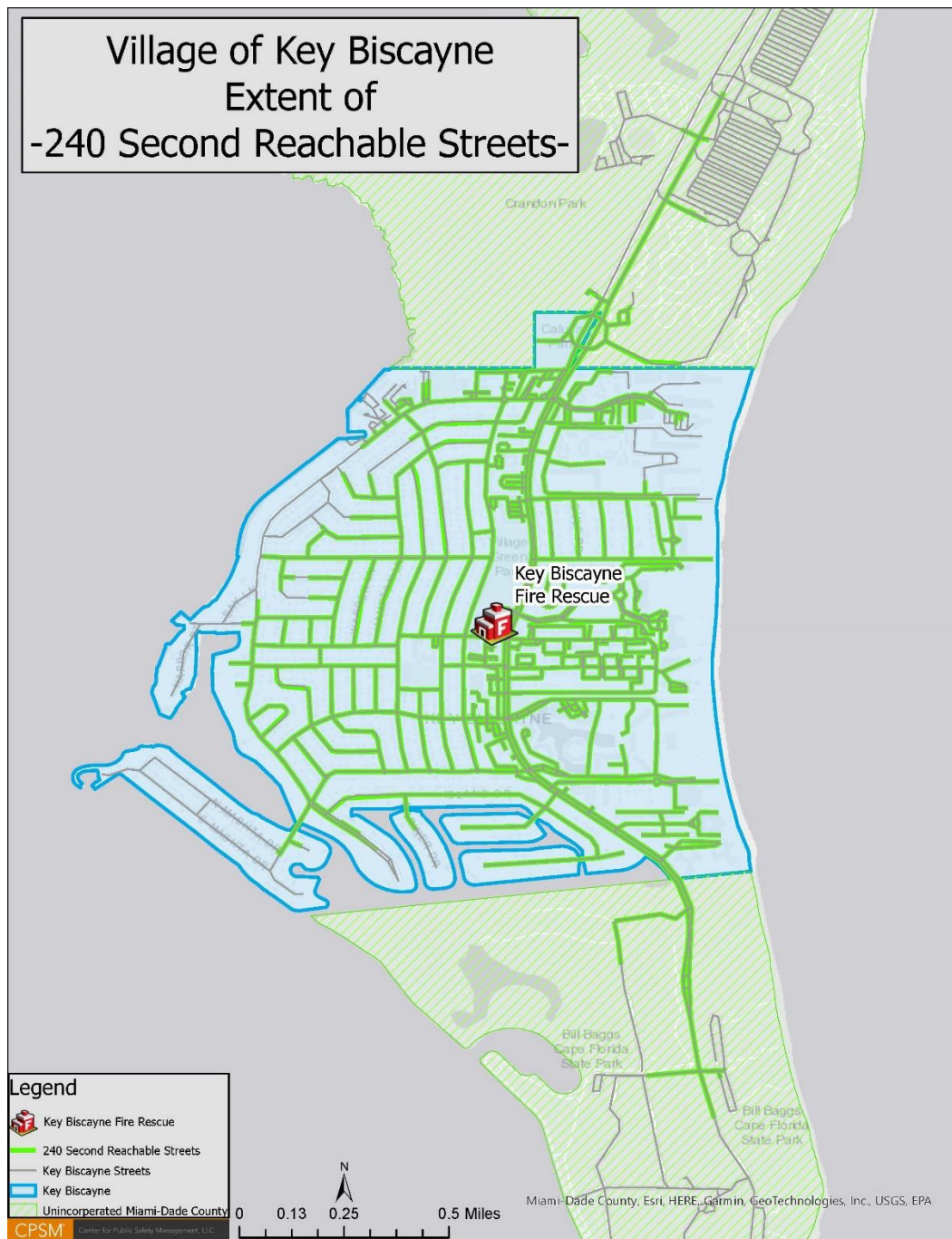
SECTION 3. CONSIDERATIONS FOR STAFFING FIRE AND EMS SERVICES

There are many factors which will ultimately determine the specific organizational structure of a fire department. Just as specifications vary for Fire and EMS apparatus, so do the conditions vary for how a fire department is organized and then staffed. Variables that must be considered include the location of the Fire and EMS department, size and complexity of the community served, and the size and complexity of the department needed to provide fire protection, community risk reduction, EMS ground transport services, and other supportive department and community-based functions.

The major functions and responsibilities of a contemporary Fire and EMS department are the same whether the department has 15-25 or more stations, or 1-5 stations. These include:

■ Operations, which includes fire protective services; EMS first tier response; EMS ground transport; specialty response capabilities such as technical rescue, hazardous materials, and water rescue (surface and under surface); and lower acuity fire related calls that do not include smoke or fire.

■ Community Risk Reduction, which includes services and programs designed to prevent fires from occurring and includes fire code inspection and enforcement; determining the origin and cause of fires; public life safety education; and fire protection system/fire code building plans review (new construction, renovations, new businesses, and permitting).

■ Training and Education, which is a primary function of Fire and EMS department as no fire department can perform effectively unless its staff are well trained and educated in basic and advanced coursework and skills in both Fire and EMS disciplines. The training process needs to be continuous and comprehensive; it needs to be documented, and it needs to comply with local, state, and benchmark agencies that include the National Fire Protection Association and Insurance Services Office-Public Protection Classification's review. The training and education section links directly with the department's medical director to ensure medical protocols are compliant and patient care is of a high quality.

■ Emergency Management, which is the discipline of dealing with and avoiding risks. Its role in the community is to assess and prepare for current risk conditions, to proactively take steps to mitigate those risks, and to respond/recover should an emergency situation occur. Further, through the crucial roles of planning and preparedness and the coordination of response and management of resources, emergency management plays a major role in mitigating the impacts of disasters. As Key Biscayne is an island-coastal community in southeast Florida, it is exposed to tropical events such as hurricanes, tropical storms, and tropical depressions, all of which have the potential of impacting the village. For this reason, emergency management in Key Biscayne is a major function.

■ Supportive Systems, which include a great number of services, programs, tasks that are required to support the major areas of a Fire and EMS department. These include: procurement; contract management; payroll, supply chain and logistical support; maintaining the departments Fire and EMS records management system(s); EMS billing services liaison and management; inventory; maintenance of facilities and fleet; emergency communications equipment management; training compliance; performance compliance; EMS compliance; if an accredited department-accreditation compliance and continual maintenance of plans and preparedness for quinquennial peer review; Insurance Services Office-Public Protection

Classification periodic evaluation; public information; community outreach; health, safety and wellness program for uniform staff to include mental health, annualized physicals, operational, vehicle, and facility safety, and monitoring emerging trends; developing, implementing, updating, and monitoring administrative and operational plans such as an emergency management operations plan, operational staffing plans, annualized fire code enforcement inspection plan, annualized training and education plan; employee relations and so on.

The key elements of the KBFR include:

- Fire protective services.

- EMS first-tier response (ALS level) and ground transport (ALS level).

- Technical rescue & Hazardous Materials operations level response.

- Emergency Management

- Fire prevention, fire code enforcement, fire protection plans review.

- Fire cause and origin/arson investigation.

- Community outreach and life safety education.

- Employee training and education.

- Fleet, facility, and logistical support and management.

- Special event support.

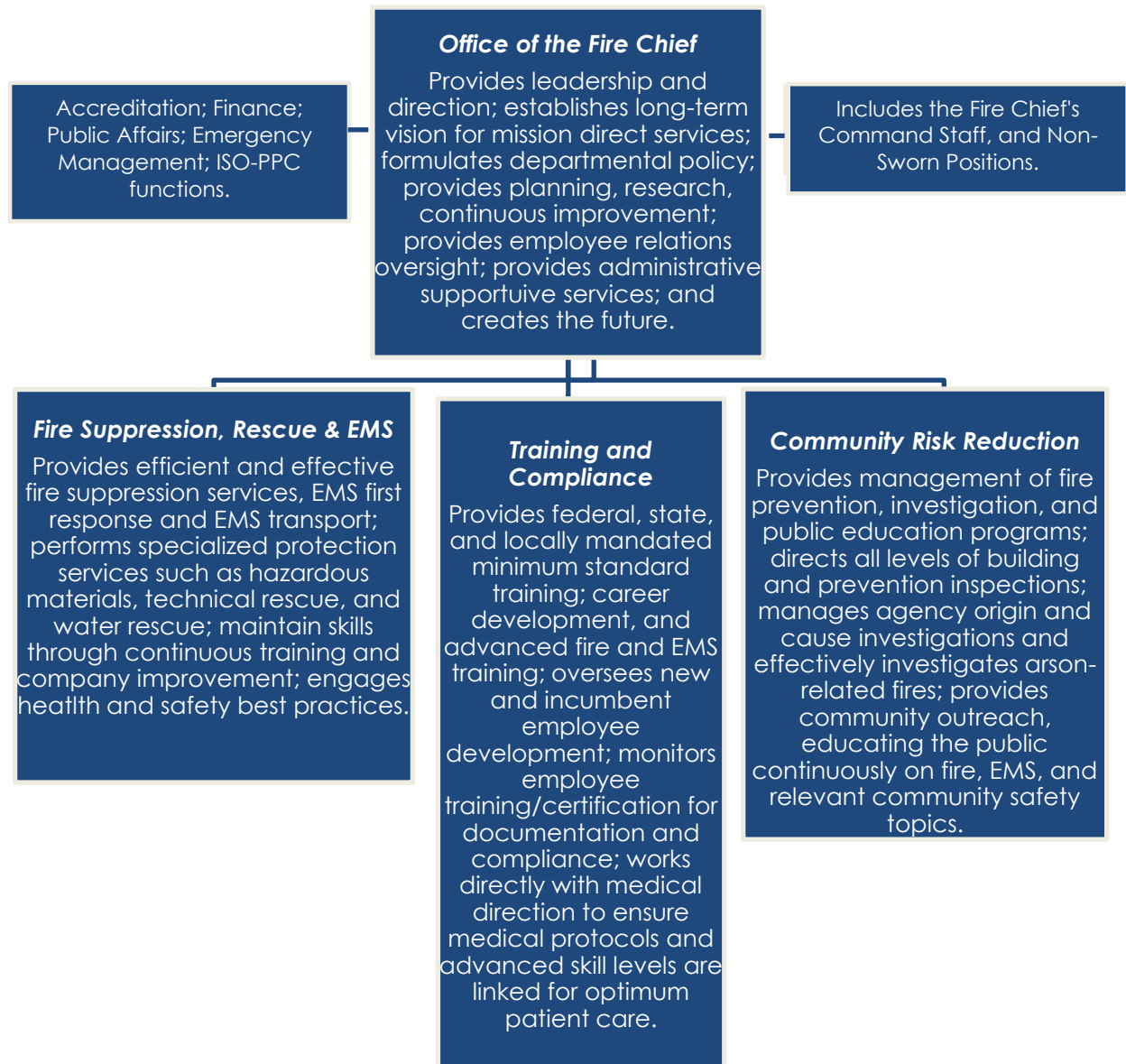## Functional Table of the Organization

As already discussed, KBFR, as a small career department, has a lean administrative staffing count and commits the majority of their total staffing count to Fire and EMS operations. This is normal and appropriate for this size department. Because there are many of the same functions, programs, and supportive tasks required in KBFR as there are in larger Fire and EMS departments, it is important for KBFR to staff administrative and support roles from a functional standpoint and not necessarily by title or person. This may be accomplished utilizing a functional table of the organization.

A functional table of the organization will provide a clear picture of the leadership functions at each level, and as well will illustrate the work of leadership to be performed at every level in the organization. Integrating the functional table of the organization with the traditional organizational model (typically a scalar model) directs leadership's attention from that of a specific focus of an individual to one of leadership viewed from an organizational perspective. This breaks down organizational silos and creates leadership teams within each organizational component, which promotes lateral team building between organizational shifts and divisions.

Additionally, a functional table of the organization illustrates to the community a clear picture of what and where key services of the organization are located within an organization. In this type of chart, each task or functional area becomes a focal point. Specialization is centralized and employees who are doing these specialized jobs or tasks are identified. A functional chart will enable KBFR to better visualize its division of responsibilities and offer a high level of transparency to both internal and external stakeholders.

The next figure outlines a basic fire department functional organizational table with four key elements that include the chief's office, fire suppression and rescue, training and education, and community risk reduction.

Figure 7: Sample Functional Table of the Organization

	Office of the Fire Chief Provides leadership and direction; establishes long-term vision for mission direct services; formulates departmental policy; provides planning, research, continuous improvement; provides employee relations oversight; provides administrative supportuive services; and creates the future.	
Accreditation; Finance; Public Affairs; Emergency Management; ISO-PPC functions.		Includes the Fire Chief's Command Staff, and Non-Sworn Positions.

Fire Suppression, Rescue & EMS Provides efficient and effective fire suppression services, EMS first response and EMS transport; performs specialized protection services such as hazardous materials, technical rescue, and water rescue; maintain skills through continuous training and company improvement; engages heatlth and safety best practices.	**Training and Compliance** Provides federal, state, and locally mandated minimum standard training; career development, and advanced fire and EMS training; oversees new and incumbent employee development; monitors employee training/certification for documentation and compliance; works directly with medical direction to ensure medical protocols and advanced skill levels are linked for optimum patient care.	**Community Risk Reduction** Provides management of fire prevention, investigation, and public education programs; directs all levels of building and prevention inspections; manages agency origin and cause investigations and effectively investigates arson-related fires; provides community outreach, educating the public continuously on fire, EMS, and relevant community safety topics.

Time Allocation Principles

To effectively operate in an organization, an employee must understand his or her role and, as importantly, where he/she should allocate his/her time during the workday or shift to be most effective. Understanding this concept is essential in an organization such as KBFR, which has a lean organizational chart. Managers and firefighters have a responsibility to understand their

organizational roles and responsibilities, and to effectively perform the tasks related to these roles and responsibilities. One would not expect senior-level officers to spend as much time operating the system as a frontline service provider does. Conversely, one would not expect a first-line or midlevel officer to spend as much time as a senior-level officer planning for the future of the organization. In this way, each level of the organization has a different set of priorities and employees at each level should allocate their time accordingly.

Three segments of organizational time allocation are central to achieving the goals and objectives of any organization and, more importantly, to enable the organization to fulfill its mission and realize its vision. These segments are (1) operating the system; (2) improving the system; and (3) creating the future.

Operating the system is that time during the workday that an organizational member is implementing service deliverables, touching those components of the organization that make it go.

Improving the system is the time during the workday that an organizational member spends seeking ways to make service deliverables and organizational components more efficient, or, more simply put, improved and better.

Creating the future is that critical piece of time allocation when an organizational member develops goals and objectives that link to strategic planning and considers the vision of the organization in a way that focuses on successful, effective outcomes.

In the time allocation model, each level in the organization spends a percentage of their day either *Operating the System*, *Improving the System*, or *Creating the Future*. Where a staff member may allocate their time is directly tied to the position in the organization they fill.

FIGURE 8: Time Allocation Model
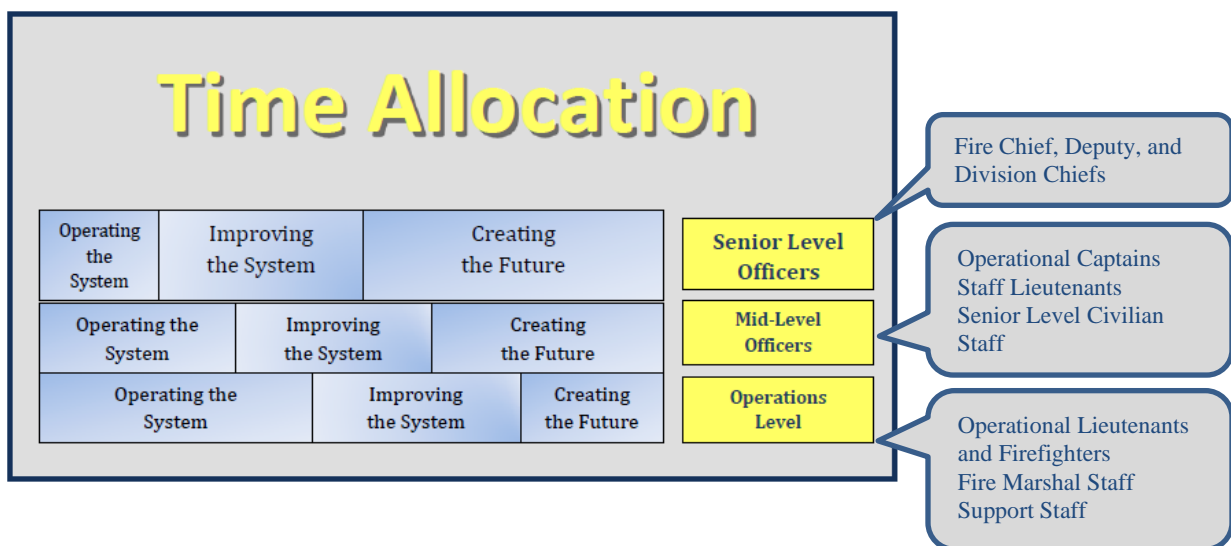
In KBFR, senior level officers include the fire chief and two deputy fire chiefs. These positions should spend the majority of their time creating the future for the department, the next greatest portion of their time improving the system, and the least amount of time operating the system. When senior management delves into operating the system more than improving the system and creating the future, several things occur and may include: critical planning goes undone;

unclear organizational priorities and goals; a lack of transparency in decision-making; low morale and employee engagement; employees do not reach their expectation level due to their lack of motivation; employees may not feel welcome or respected.

Middle managers in KBFR include the career shift captains. These positions should allocate their time evenly across the three categories of creating the future for the department, improving the system, and operating the system. In this scenario these positions plan, organize, lead, and evaluate the shift operations for the career staff. This level in the organization is important in that it creates the conduit of information between those who operate the system and those who improve the system and create the future. This level of the organization should be linked to committees, processes, and continuous improvement of the organization on a regular basis. They should also be included in strategic planning concepts through input and development of goals and objectives. Importantly, this level manages and leads those who operate the system and is responsible for ensuring this level of the organization is continuously prepared to respond and mitigate emergencies.

Those who operate the system in KBFR include lieutenants and firefighters. These positions should be allocating their time in reverse of senior leadership. This includes the greatest percentage of the day spent operating the system, the next greatest percent improving the system, and the least amount of time creating the future. While it is natural for this level of the organization to spend most of their time operating the system (preparation and response to emergencies), they are a valuable resource and should not be ignored when systems, processes, equipment, and response require improvement. Equally, when strategic goals and objectives are developed, this level operates the very pieces of the organization for which goals and objectives are being developed. Inclusion of this level empowers and creates trust and buy-in to organizational concepts and strategies.

Ideally, even in a compact organization such as KBFR, it is critical that the appropriate time be spent at the appropriate level in the organization to continuously operate the system, make improvements, and create the future. Given this, it is recommended that KBFR organize the department so as to optimize and empower subordinate officers to the Fire Chief to include senior level chief officers and company officers within the leadership and management of all department operations. This includes the concepts of a Functional Organizational Chart, the Time Allocation Model to ensure a more efficient alignment of organizational resources, and the effective use of all members of the organization in order to achieve the organization's mission and core values.

Succession Planning

During our analysis, CPSM was advised of impending retirements of middle and command staff level officers in the near term. While retirement of employees occurs organically in all organizations, because of the small size of KBFR, the impacts are greater given the short bandwidth of these retirements. The approaching retirements include:

- Fire Chief: May 2025
- Deputy Fire Chief, Operations: May 2024   **Command Staff**
- Deputy Chief, Fire Marshal: September 2025
- Captain A-Shift: November 2023
- Captain B-Shift: November 2023   **Middle Management**
- Captain C-Shift: January 2027

One important organizational concept, which is experiencing turnover of personnel at management and leadership ranks, is to implement programs that identify the future leaders of the organization; that is, programs that go beyond the technical courses for career advancement preparation. A key to this is to develop and implement a formal succession plan, focused on developing potential successors to ensure organizational leadership stability, and also serve as a retention plan. This type of planning is typically designed to identify, develop, and nurture potential future leaders.

There are a few examples of succession planning that work well in fire departments:

- Development-Based Processes: A succession planning model that equips an employee or group of employees for future roles and responsibilities through diverse organizational program exposure and assignments.

- Replacement Planning: A process of identifying replacement staff for key positions and functions and developing these employees over the short term.

- Career Path Training: A program that identifies technical and organizational development courses and/or formal education that must be completed as employees prepare to elevate responsibility or position in the organization. Ideally the officer candidate for any officer level in the department is experienced and has the foundational technical and formal education and training to be successful with each new level promoted to. To ensure this and to ensure KBFR is preparing future officers, a formal program that identifies those foundational technical and organizational courses germane to each level in the organization should be selected and implemented. A growing number of fire departments are employing task books for personnel who aspire to (or in some cases have already been promoted to) higher rank. For KBFR, task books would be appropriate for firefighters, lieutenants, and captains. The successful completion of any task book can be considered as a prerequisite for promotion to higher rank including captain, or alternatively, can be a required element of the post-hire/promotional evaluation process.

- Succession Planning: A more future-focused process of categorizing the knowledge, skills, and abilities needed to perform organizational functions. Linked to this is the development of a plan that has the intent of preparing multiple employees to potentially perform those functions and which creates opportunity for advancement in the organization.

Critical to the success of succession planning is the engagement and commitment of the senior leaders to the program, as well as the commitment of other members of the organization to their own personal and professional development. To be a part of the succession plan, one must commit to one's own professional development to be able to compete for and fill critical organizational leadership roles. CPSM recommends KBFR work with the collective bargaining unit and the city's Human Resources Director to develop a succession plan that is diverse, includes the entire organization, and has a focus on preparing current and future members to take on additional roles and responsibilities, and as well as prepares members for advancement and promotion into key roles in the organization.

Operational Staffing and Deployment of Resources

In the course of examining staffing and deployment of a fire department, it is prudent to design an operational strategy around the actual circumstances that exist in the community and the fire and risk problems that are identified. The strategic and tactical challenges presented by the widely varied hazards that a department protects against need to be identified and planned for through a community risk analysis planning and management process as completed in this

report. It is ultimately the responsibility of elected officials to decide the level of risk that is acceptable to their community. ***Once the acceptable level of risk has been decided, then operational service goals can be established. Whether looking at acceptable risk, or level of service goals, it would be imprudent, and probably very costly, to build a deployment strategy that is based solely on response times and emotion.***

The staffing of fire and EMS companies is a never-ending focus of attention among fire service and governmental leadership. While NFPA 1710 and OSHA provide guidelines (and to some extent the law, specifically OSHA federal OSHA states) as to the level of staffing and response of personnel, the adoption of these documents varies from state to state and department to department. NFPA 1710 addresses the recommended staffing in terms of specific types of occupancies and risks. The needed staffing to conduct the critical tasks for each specific occupancy and risk are determined to be the Effective Response Force (ERF). The ERF for each of these occupancies is detailed in NFPA 1710 (2020 edition), section 5.2.4, Deployment.

The fire service has experienced tremendous technological advances in equipment, procedures, and training over the past 50 years. Better personal protective equipment (PPE), the widespread use of self-contained breathing apparatus (SCBA), large diameter hose, better and lighter hand lines and nozzles, and thermal imaging cameras are just a few of the numerous advances in equipment and procedures that have allowed firefighters to perform their duties more effectively, efficiently, safely, and with fewer personnel. However, the fact remains that the emergency scene in general, and the fireground involving a structure fire, is a dynamic, dangerous, frequently unpredictable, and rapidly changing environment where conditions can deteriorate very quickly and can place firefighters in extreme personal danger, particularly if there are not enough on scene to handle all the critical tasks.

Even with the many advances in technology and equipment, the fireground is an unforgiving and dynamic environment where firefighters must complete critical tasks simultaneously. Lightweight wood construction, truss roofs, dwellings and buildings with basements, increased setbacks making accessibility to the building difficult, and large footprint commercial buildings and estate homes are examples of the challenges that firefighting forces are met with when mitigating structural fires. Newly constructed homes are larger than much of the older home stock in a community. Newer homes tend to incorporate open floor plans, with large spaces that contribute to rapid fire spread. The challenge of rapid fire spread is exacerbated by the use of lightweight roof trusses, vinyl siding, and combustible sheathing.

Additionally, there is a growing trend in many communities to grow vertically, which presents even greater challenges for firefighters battling fires or even cold smoke conditions on upper floors of a multi-story residential building. Another trend is mixed use buildings where residential is placed on upper floors of commercial occupancies or parking garages. Fires and even EMS responses in these occupancies extend the time to reach the emergency once the Fire and EMS department arrives on the scene.   The result of all of these factors is that more personnel are required to mitigate the incidents safely and effectively in these structures. Providing adequate staffing through an Effective Response Force for these environments depends on many factors.

Staffing and deployment of fire services is not an exact science. While there are many benchmarks that communities and management utilize in justifying certain staffing levels, there are certain considerations that are data driven and reached through national consensus. CPSM has developed metrics it follows and recommends that communities consider when making recommendations regarding staffing and deployment of fire resources.

Staffing is one component and the type of apparatus the personnel are deployed on and from where (station locations) are the other two components that determine how fire and EMS

services are delivered. Linked to these components of staffing and deployment are eleven critical factors that drive various levels and models from which fire and EMS departments staff and deploy. These factors are discussed below.

While each component presents its own metrics of data, consensus opinion, and/or discussion points, aggregately they form the foundation for informed decision-making geared toward the implementation of sustainable, data- and theory-supported, effective fire and EMS staffing and deployment models that fit the community's profile, risk, and expectations.

Fire Risk and Vulnerability of the Community: The community risk and vulnerability profile are used to evaluate the community. With regard to individual property, this profile is used to measure all property and the risk associated with that property and then segregate the property as either a high, medium, or low hazard depending on factors such as the life and building content hazard, the potential fire flow, and the staffing and apparatus types required to mitigate an emergency in the specific property. Included in this profile should be both a structural and nonstructural (weather, wildland-urban interface, transportation routes, etc.) analysis.

Population, Demographics, and Socioeconomics of a Community: Population and population density drive calls for local government service, particularly public safety. The risk from fire is not the same for everyone, with studies telling us age, gender, race, economic factors, and what region in the country one might live all contribute to the risk of death from fire. Studies also tell us these same factors affect demand for EMS, particularly population increase and the use of hospital emergency departments. Many uninsured or underinsured patients rely on emergency departments for their primary and emergency care, utilizing pre-hospital EMS transport systems as their entry point.

Call Demand: Demand is made up of the types of calls to which units are responding and the location of the calls. This drives workload and station staffing considerations. *Higher population centers with increased demand require greater resources.*

Workload of Units: The types of calls to which units are responding and the workload of each unit in the deployment model. This tells us what resources are needed and where; it links to demand and station location, or in a dynamic deployed system, the area(s) in which to post units.

Travel Times from Fire Stations: Looks at the ability to cover the response area in a reasonable and acceptable travel time when measured against national benchmarks. Links to demand and risk assessment.

NFPA Standards, ISO, OSHA Requirements (and other national benchmarking). CPSM considers national benchmarks, standards, and applicable laws when making recommendations or alternatives regarding the staffing and deployment of fire and EMS resources.

EMS Demand: Community demand; demand on available units and crews; demand on non-EMS units responding to calls for service (fire/police units); availability of crews in departments that utilize cross-trained EMS staff to perform fire suppression.

Critical Tasking: The ability of a fire and EMS department to collect an effective response force as benchmarked against national standards when confronted with the need to perform required critical tasks on a fire or EMS incident scene defines its capability to provide adequate resources to mitigate each event. Department-developed and measured against national benchmarks. Links to risk and vulnerability analysis.

Innovations in Staffing and Deployable Apparatus: The fire department's ability and willingness to develop and deploy innovative apparatus, such as compressed air foam systems, or deploying quick response vehicles (light vehicles equipped with medical equipment and some light fire suppression capabilities) on those calls (typically the largest percentage) that do not require heavy fire apparatus.

Community Expectations: Measuring, understanding, and meeting community expectations.

Ability to Fund: The community's ability and willingness to fund all local government services and understanding how the revenues are divided up to meet the community's expectations.

While each component presents its own metrics of data, consensus opinion, and/or discussion points, aggregately they form the foundation for informed decision making geared toward the implementation of sustainable, data- and theory-supported, effective fire and EMS staffing and deployment models that fit the community's profile, risk, and expectations.

KBFR responds with fire suppression apparatus and EMS transport units with crews from one fire station location as noted above. The central station houses 24/7/365 career firefighters. KBFR relies heavily on auto/mutual aid companies from the City of Miami for Fire and EMS service delivery, particularly to collect the appropriate effective response force for single family, multifamily, vertically dense, commercial, and other building types. KBFR emergency response units include:

Engine Company, which is primarily designed for firefighting operations, the transport of crew members, hose (fire attack and larger supply), tank water, ground ladders, self-contained breathing apparatus, and storage of an assortment of hand tools used for a broad spectrum of fire operational tasks. As engines are often utilized as first response units on EMS calls, they also carry an assortment of EMS gear to treat patients and provide life-saving measures prior to the arrival of EMS transport units. The KBFR engines are set up for this as well and are staffed with Paramedics. Staffing complements for engine apparatus are discussed below.

KBFR responds to emergencies with an inventory of one staffed engine. On specific fire incidents, the City of Miami provides additional engine company resources and staffing.

Ladder Company, which is also primarily designed for firefighting operations but differs from engines in that it also has a hydraulically operated aerial device designed to reach above the ground floor to transport crew members, effect rescues, and provide an elevated water stream. Ladder trucks also transport crew members, ground ladders, self-contained breathing apparatus, various forcible entry tools, ventilation equipment, and hydraulic rescue tools as well as other equipment to deal with an assortment of fires and technical rescues. KBFR utilizes a Quint apparatus that is capable of engine apparatus work in that is carries water and hose for fire attack capabilities.

KBFR currently responds to emergencies with an inventory of one ladder truck. When needed, the unit responds with a crew capable of performing ladder company functions such as ventilation, utility control, above-grade firefighting tasks, and elevated master stream application. KBFR may use this apparatus in the engine company platform as well. On specific

fire incidents, the City of Miami provides additional engine and ladder company resources and staffing.

Squad Company, which is also primarily designed for firefighting operations and transports crew members, self-contained breathing apparatus, various hand and forcible entry tools, ventilation equipment, hydraulic rescue tools as well as other specialty equipment such as rope and rope equipment, vehicle stabilization devices, various mechanical cutting and burning tools, water rescue, and other specialty tools and equipment to deal with an assortment of fire and technical rescue incidents.

On specific fire incidents, the City of Miami provides Squad/Special Operations company resources and staffing.

EMS Ground Transport Units, which are primarily designed to respond to EMS calls for service with crew members and provide on-scene treatment and then transport while continuing care to the hospital emergency department. Equipment includes both basic and advanced life support targeted at timely intervention and patient stabilization.

KBFR currently responds to emergencies with an inventory of two cross-staffed ambulances with. All are staffed with Paramedics. The City of Miami and Miami-Dade County may provide additional EMS ground transport units as necessary.

Command Vehicles, which are typically SUV-type vehicles or pickup trucks with enclosed cargo beds, and which typically include command centers are designed to carry a command level officer to the scene and equipped with radio and command boards as well scene personnel-tracking equipment and associated gear.

KBFR has one command vehicle that can be utilized by the shift Captain. The Fire Chief, and the Deputy Chiefs also have vehicles capable of establishing command.

KBFR has three shifts, A, B, and C. The work schedule for operations firefighters is 24 hours on, then 48 hours off. All shifts are staffed daily with a minimum of 8 members who are assigned to apparatus in accordance with department policy. When fully staffed (no or minimal leave taken), the shifts would have 11 (A-Shift) or 12 (B and C Shifts).

The next table outlines KBFR staffing and deployment matrix.

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TABLE 4: KBFR Shift Matrix, Central Station Minimum Staffing & Assignments

Apparatus	Staffing	Total Staff
Engine	☐ Officer in Charge (OIC)-Lieutenant ☐ Engineer ☐ Firefighter or Firefighter Paramedic ☐ Firefighter or Firefighter Paramedic	**4**
Quint	☐ Officer in Charge (OIC)-Captain ☐ Engineer ☐ Firefighter or Firefighter Paramedic ☐ Firefighter or Firefighter Paramedic	**4**
Rescue–First Out	☐ Officer in Charge (OIC)-Lieutenant ☐ Firefighter or Firefighter Paramedic (Driver) ☐ Firefighter or Firefighter Paramedic (Technician)	**3** ***Cross Staffed with Engine crew members***
Rescue–Second Out	☐ Officer in Charge (OIC)-Lieutenant ☐ Firefighter or Firefighter Paramedic (Driver) ☐ Firefighter or Firefighter Paramedic (Technician)	**3** ***Cross Staffed with Quint crew members***

Additional staffing matrix scenarios include:

■ When minimally staffed and after the first "Rescue-Out" occurs, the remaining firefighter or engineer from the Engine stays back and staffs the Quint if a fire incident occurs. In this scenario the Captain may respond in a command unit.

■ If a second "Rescue-Out" occurs, the remaining the remaining firefighter or engineer and Captain stays back and staffs command vehicle and responds to the next incident either Fire or EMS.

■ If there is staffing above the minimum, depending on the number, the on-duty Captain will make the decision on how units are staffed when overlapping calls are received.

NFPA 1710

National Fire Protection Association (NFPA) standards are consensus standards and are not mandated nor are they the law. Many cites and countries strive to achieve these standards to the extent possible without an adverse fiscal impact to the community. Cities and communities must decide on the level of service they can deliver based on several factors as discussed herein, including budgetary considerations. ***Questions of legal responsibilities are often***

discussed in terms of compliance with NFPA Standards. Again, these are national consensus standards, representing best practices and applied science and research.

NFPA 1710 outlines organization and deployment of operations by career, and primarily career fire and rescue organizations.[1] It serves as a benchmark to measure staffing and deployment of resources to certain structures and emergencies.

NFPA 1710 was the first organized approach to defining levels of service, deployment capabilities, and staffing levels for substantially career departments. Research work and empirical studies in North America were used by NFPA committees as the basis for developing response times and resource capabilities for those services as identified by the fire department.[2]

According to NFPA 1710, fire departments should base their capabilities on a formal all-hazards community risk assessment, as discussed earlier in this report, and taking into consideration:[3]

- Life hazard to the population protected.

- Provisions for safe and effective firefighting performance conditions for the firefighters.

- Potential property loss.

- Nature, configuration, hazards, and internal protection of the properties involved.

- Types of fireground tactics and evolutions employed as standard procedure, type of apparatus used, and results expected to be obtained at the fire scene.

Moreover, the fire department's ability to assemble an Effective Response Force (ERF) to complete the critical tasks required to safely mitigate the incident is paramount for successful operations.

Effective Response Force and Critical Tasking

Critical tasks are those activities that must be conducted on time by responders at emergency incidents to control the situation and stop loss. Critical tasking for fire and EMS operations involves the minimum number of personnel needed to perform the tasks needed to effectively control and mitigate a fire or other emergency. To be effective, critical tasking must assign enough personnel so that all identified functions can be performed simultaneously. However, it is important to note that initial response personnel may manage secondary support functions once they have completed their primary assignment. Thus, while an incident may end up requiring a greater commitment of resources or a specialized response, a properly executed critical tasking assignment will provide adequate resources to immediately begin bringing the incident under control.

The specific number of people required to perform all the critical tasks associated with an identified risk or incident type is referred to as an *Effective Response Force* (ERF). The goal is to deliver an ERF within a prescribed period. NFPA 1710 provides the benchmarks for the assembling of an ERF. NFPA 1710 allows mutual and automatic aid to fulfill the benchmarks articulated in the standard when contemplating assembling an ERF.

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1. NFPA 1710 is a nationally recognized standard, but it has not been adopted as a mandatory regulation by the federal government or the State of Florida.
2. NFPA, Origin and Development of the NFPA 1710, 1710-1.
3. NFPA 1710, 5.2.1.1, 5.2.2.2

Automatic and Mutual Aid

Automatic aid is a system whereby fire, rescue, and EMS units respond automatically to another community through agreement based on closeness of resources. Mutual aid is a system whereby surrounding communities provide fire, rescue, and EMS resources to another community through agreement and specific request (not automatically). In an automatic aid scenario, resources from neighboring jurisdictions are built into run cards in the home jurisdiction for again, an automatic response; this aid is designed to supplement and bolster the Effective Response Force of the home jurisdiction.

The Village has a robust automatic aid agreement with the City of Miami for emergency response that includes:

- Automatic Dispatch of appropriate equipment and personnel for fire suppression purposes.
- Automatic Dispatch of appropriate equipment and personnel for EMS purposes.
- Material and maintenance for Computer Aided Dispatch System utilized by the Village and KBFR-includes communications equipment utilized by KBFR personnel.
- Material and personnel for command and control of incidents involving Miami Fire-Rescue Department units.

The Village is also participatory in a mutual aid compact with Miami-Dade County. This compact agreement with the county also includes the City of Miami, City of Coral Gables, City of Hialeah, and the City of Miami Beach. Under this agreement, aid is not automatic and is requested by the Fire Chief (or acting Fire Chief) of the jurisdiction in need of aid.

The next figure illustrates the location of Miami Fire Rescue Department automatic aid stations, and a Miami-Dade County Fire Rescue Department EMS asset that is available for mutual aid responses.

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Figure 9: KBFR Automatic and Mutual Aid Stations
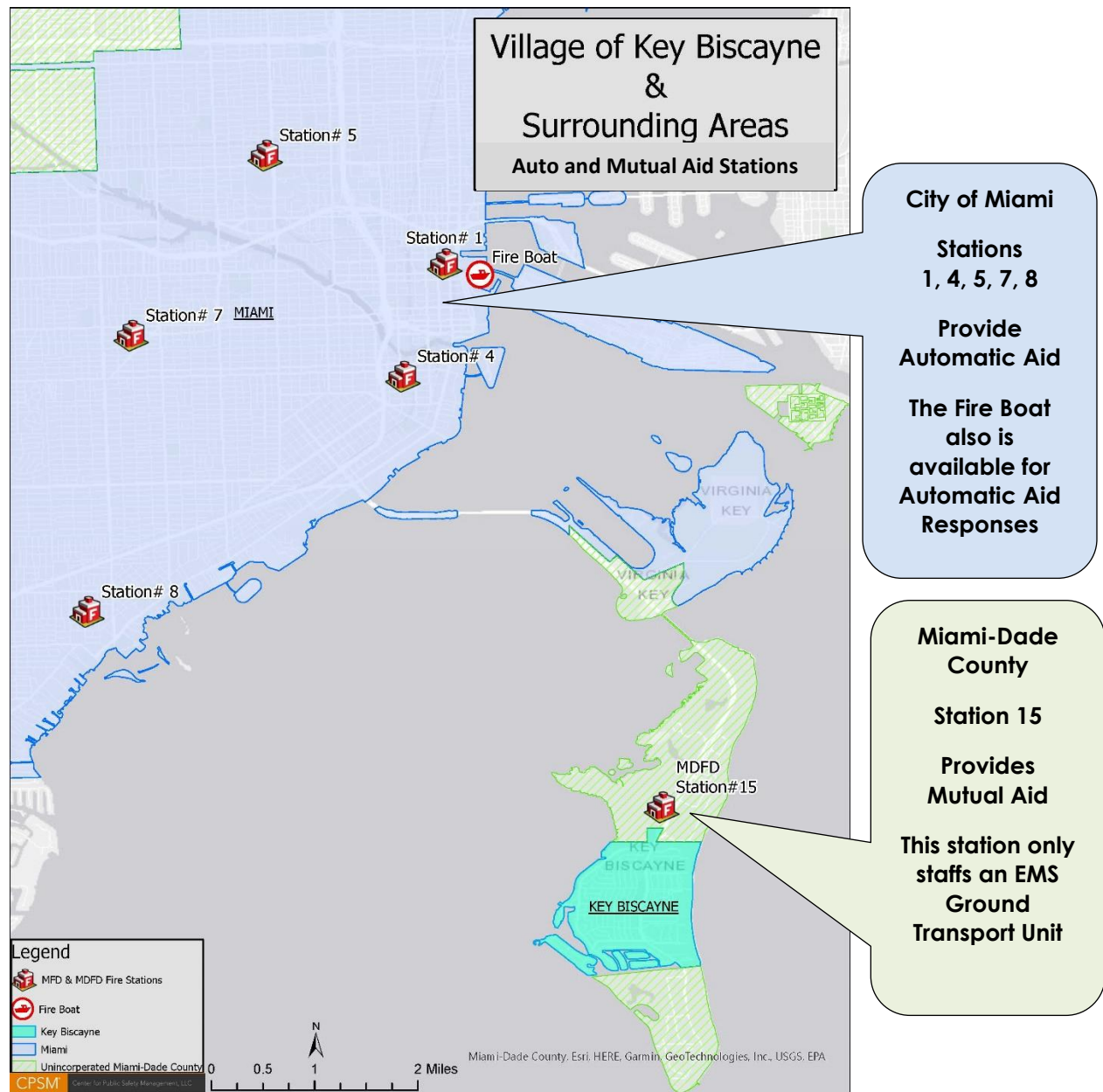
The following discussion and tables will outline how critical tasking and assembling an effective response force is first measured in NFPA 1710, and how the KBFR is benchmarked against this standard for the building types existing in Key Biscayne. This discussion will cover single-family dwelling buildings, open-air strip mall buildings, condos/apartment buildings, and high rise residential as outlined in the NFPA standard. As mentioned already above, the KBFR relies on automatic from the City of Miami to assemble an Effective Response Force.

First it is important to outline the building types/risks in the village. These are as outlined in the next table.

Table 5: Key Biscayne Building Types and Count

Building Type	Count
Single Family Dwellings	1,200
Condo Buildings	
1-4 floors	23
5-7 floors	18
Over 7 floors	30
Apartment Buildings	
1-4 floors	4
Commercial/Industrial Buildings	15
Strip Malls	8
High Rise-Residential (75' in height or greater)	30

When evaluating the community's risk, specifically buildings, buildings and the risks associated with each property classified as either a high, medium, or low hazard depending on factors such as the life and building content hazard and the potential fire flow and staffing required to mitigate an emergency in the specific property. According to the NFPA *Fire Protection Handbook*, these hazards are defined as:

High-hazard occupancies: Schools, hospitals, nursing homes, explosives plants, refineries, high-rise buildings, and other high life-hazard (vulnerable population) or large fire-potential occupancies.

Medium-hazard occupancies: Apartments (includes townhomes, condos, residential over commercial), offices, and mercantile and industrial occupancies not normally requiring extensive rescue by firefighting forces.

Low-hazard occupancies: One, two, or three-family dwellings and scattered small business and industrial occupancies.[4]

There is a mix of building risk in Key Biscayne with the greatest concentration being of low risk (single family dwellings). However, single family dwellings in excess of 2,000 square feet should be approached as a moderate risk due to the size, construction type, and complexity of interior layouts these structures present. Moderate and high risk buildings are numerous as outlined in the table above and include 78 residential buildings in excess of 5 floors.

The next figure illustrates by parcel type where these buildings are or would be located based on zoning.

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4. Cote, Grant, Hall & Solomon, eds., *Fire Protection Handbook* (Quincy, MA: National Fire Protection Association, 2008), 12.

Figure 10: Village of Key Biscayne Parcel Types
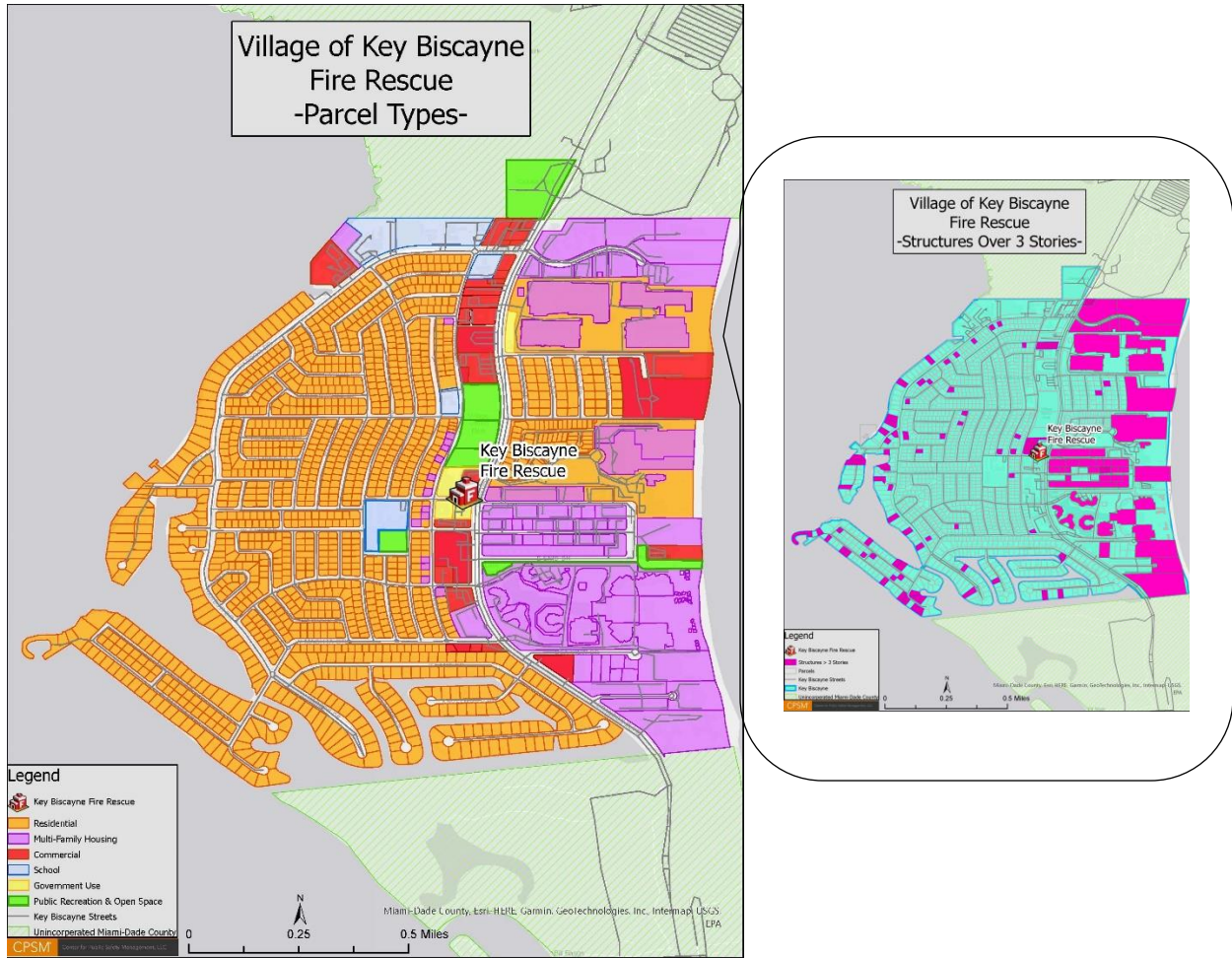
The next set of tables outlines the critical tasking for specific building risks and the number of firefighters required on scene to complete the tasks (Effective Response Force). We also include EMS critical tasking and the required Effective Response Force suggested to handle these responses. In all, automatic aid is not only acceptable when benchmarking against the NFPA 1710 standard but is also considered when the Insurance Services Office conducts their community public protection classification review.

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Single-Family Dwelling ERF: NFPA 1710, 5.2.4.1

The initial full alarm assignment (ERF) to a structural fire in a typical 2,000 square-foot, two-story, single-family dwelling without a basement and with no exposures must provide for a minimum of 16 members (17 if an aerial device is used). The following figure illustrates this, and the subsequent table outlines the critical task matrix.

TABLE 6: NFPA 1710 Effective Response Force for Single-Family Dwelling Fire

Critical Tasks	Personnel
Incident Command	1
Continuous Water Supply	1
Fire Attack via Two Handlines	4
Hydrant Hook-up / Forcible Entry / Utilities	2
Primary Search and Rescue	2
Ground Ladders and Ventilation	2
Aerial Operator if Aerial is Used	1
Establishment of IRIC (Initial Rapid Intervention Crew)	4
Total Effective Response Force	**16 (17) If Aerial is Used**

Note: Single-family dwellings in Key Biscayne greater than 2,000 square feet should be considered a more moderate risk, particularly if built with lightweight wood-frame construction.
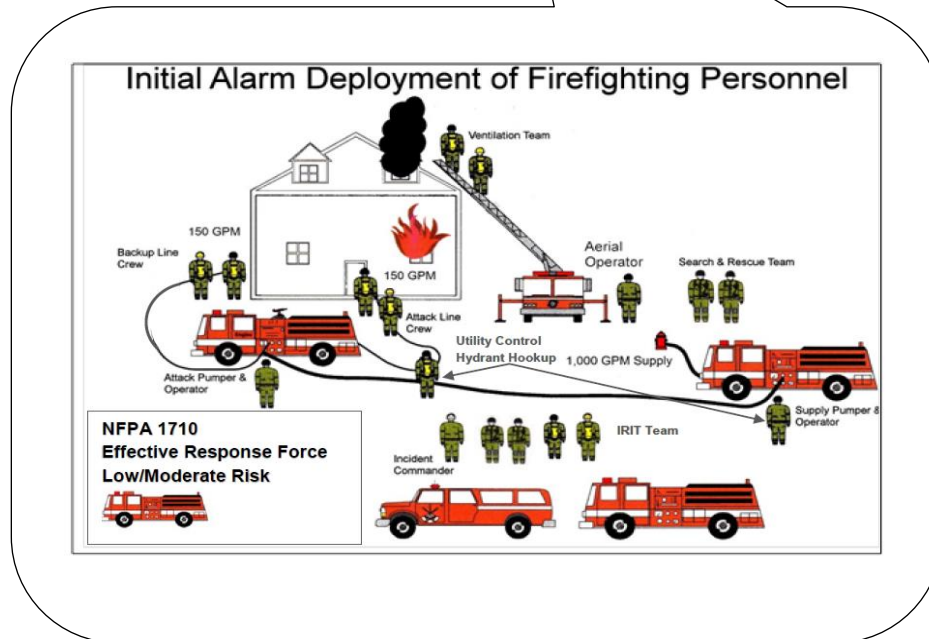
The next table outlines how KBFR's response matrix for a single-family dwelling fire (considered a structural fire response in the KBFR response matrix).

TABLE 7: KBFR Effective Response Force for Single-Family Dwelling Fire

KBFR Response Matrix	Personnel
KBFR Engine	4
KBFR Quint	4
Automatic Aid Engine	4
Automatic Aid Ladder	4
Automatic Aid Rescues (3)	9
Total ERF for KBFR	**25**

Open-Air Strip Mall/Commercial Building ERF: NFPA 1710 5.2.4.2

The initial full alarm assignment to a structural fire in a typical open-air strip mall/commercial building ranging from 13,000 square feet to 196,000 square feet in size must provide for a minimum of 27 members (28 if an aerial device is used). The next table outlines the critical tasking matrix for this type of building.

TABLE 8: NFPA 1710 Effective Response Force for Open-Air Strip Mall / Commercial Building Fire

Critical Tasks	Personnel
Incident Command	2
Continuous Water Supply	2
Fire Attack via Two Handlines	6
Hydrant Hook-up / Forcible Entry / Utilities	3
Primary Search and Rescue	4
Ground Ladders and Ventilation	4
Aerial Operator if Aerial is Used	1
Establishment of IRIC (Initial Rapid Intervention Crew)	4
Medical Care Team	2
Total Effective Response Force	**27 (28) If Aerial is Used**

The next table outlines the KBFR's response matrix for an open-air strip mall or commercial building fire (considered a structural fire response in the KBFR response matrix).

TABLE 9: KBFR Effective Response Force for Open-Air Strip Mall / Commercial Building Fire

KBFR Response Matrix	Personnel
KBFR Engine	4
KBFR Quint	4
Automatic Aid Engine	4
Automatic Aid Ladder	4
Automatic Aid Rescues (3)	9
Total ERF for KBFR	**25**

Apartment Building ERF: NFPA 1710 5.2.4.3

The initial full alarm assignment to a structural fire in a typical 1,200 square-foot apartment within a three-story, garden-style apartment building must provide for a minimum of 27 members (28 if an aerial device is used). The next table outlines the critical tasking matrix for this type of building fire, which would include renovated mill buildings located in Key Biscayne.

TABLE 10: NFPA 1710 Effective Response Force for Apartment Building Fire

Critical Tasks	Personnel
Incident Command	2
Continuous Water Supply	2
Fire Attack via Two Handlines	6
Hydrant Hook-up / Forcible Entry / Utilities	3
Primary Search and Rescue	4
Ground Ladders and Ventilation	4
Aerial Operator if Aerial is Used	1
Establishment of IRIC (Initial Rapid Intervention Crew)	4
Medical Care Team	2
Total Effective Response Force	**27 (28) If Aerial is Used**

The next table outlines the KBFR's response matrix for an apartment building fire (considered a structural fire response in the KBFR response matrix).

TABLE 11: KBFR Effective Response Force for Apartment Building Fire

KBFR Response Matrix	Personnel
KBFR Engine	4
KBFR Quint	4
Automatic Aid Engine	4
Automatic Aid Ladder	4
Automatic Aid Rescues (3)	9
Total ERF for KBFR	**25**

The next table outlines an effective response force for a special risk/high-rise building fire response.

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TABLE 12: NFPA 1710 Effective Response Force for Special Risk/High-Rise Fire

Critical Tasks	Personnel
Incident Command	2
Continuous Water Supply	1/1- 1 FF for continuous water. If fire pump exists an additional FF will be required for a total of 2.
Fire Attack via Two Handlines	4
One Handline above the Fire Floor	2
Establishment of IRIC (Initial Rapid Intervention Crew)	4
Primary Search and Rescue Teams	4
Entry Level Officer with Aide near Entry Point of Fire Floor	2
Entry Level Officer with Aide near the Entry Point above the Fire Floor	2
Two Evacuation Teams	4
Elevation Operations	1
Safety Officer	1
FF Two floors below Fire to Coordinate Staging	1
Rehabilitation Management	2
Officer and FFs to Manage Vertical Ventilation	4
Lobby Operations	1
Transportation of Equipment below Fire Floor	2
Officer to Manage Base Operations	1
Two ALS Medical Care Teams	4
Total Effective Response Force	**42 (43) If building is Equipped with Pump**

The next table outlines the KBFR's response matrix for a high rise/special risk fire (considered a structural fire response in the KBFR response matrix).

TABLE 13: KBFR Effective Response Force for High Rise/High Risk Building Fire

KBFR Response Matrix	Personnel
KBFR Engine	4
KBFR Quint	4
Automatic Aid Engine	4
Automatic Aid Ladder	4
Automatic Aid Rescues (3)	9
Total ERF for KBFR	**25**

When considering critical tasking for the deployment of an ERF for fire suppression operations, the KBFR will not be able to handle structure fire incidents with just its own resources, which makes automatic aid and the partnership with the City of Miami that much more significant for the Village. For larger, more significant, or complex incidents, the KBFR directly relies on resources from the City of Miami. As the KBFR is typically staffed with eight personnel on a daily basis, this will ultimately present operational challenges (as it does in many other communities that utilize similar staffing models) regarding the initial response to building fire incidents.

When considering assembling an Effective Response Force for building fires in Key Biscayne as discussed above, Miami Fire-Rescue due to distance, will not meet the NFPA Standard of 480 seconds (8 minutes) response time when assisting KBFR on building fires, or 610 seconds on high-rise fires. The next figures illustrate the extent Miami Fire-Rescue can meet this standard. The travel time to Key Biscayne from Miami stations 1, 4, and 8 is closer to ten-twelve minutes when these units are in station.

Figure 11: City of Miami Automatic Aid Travel Time Bleeds
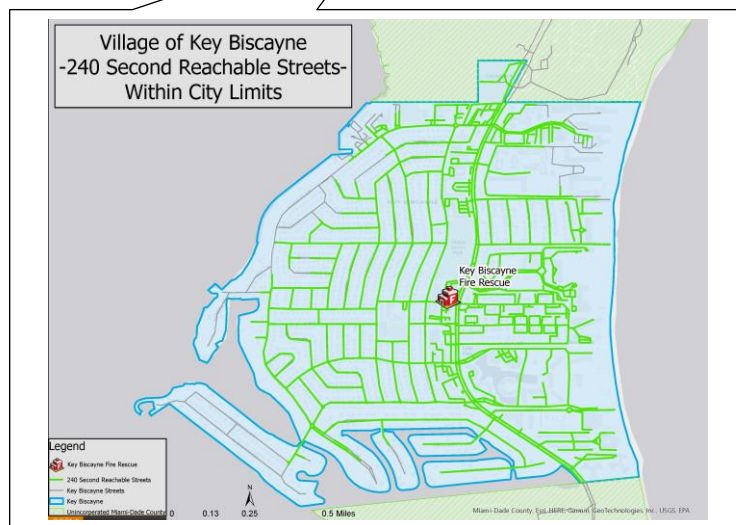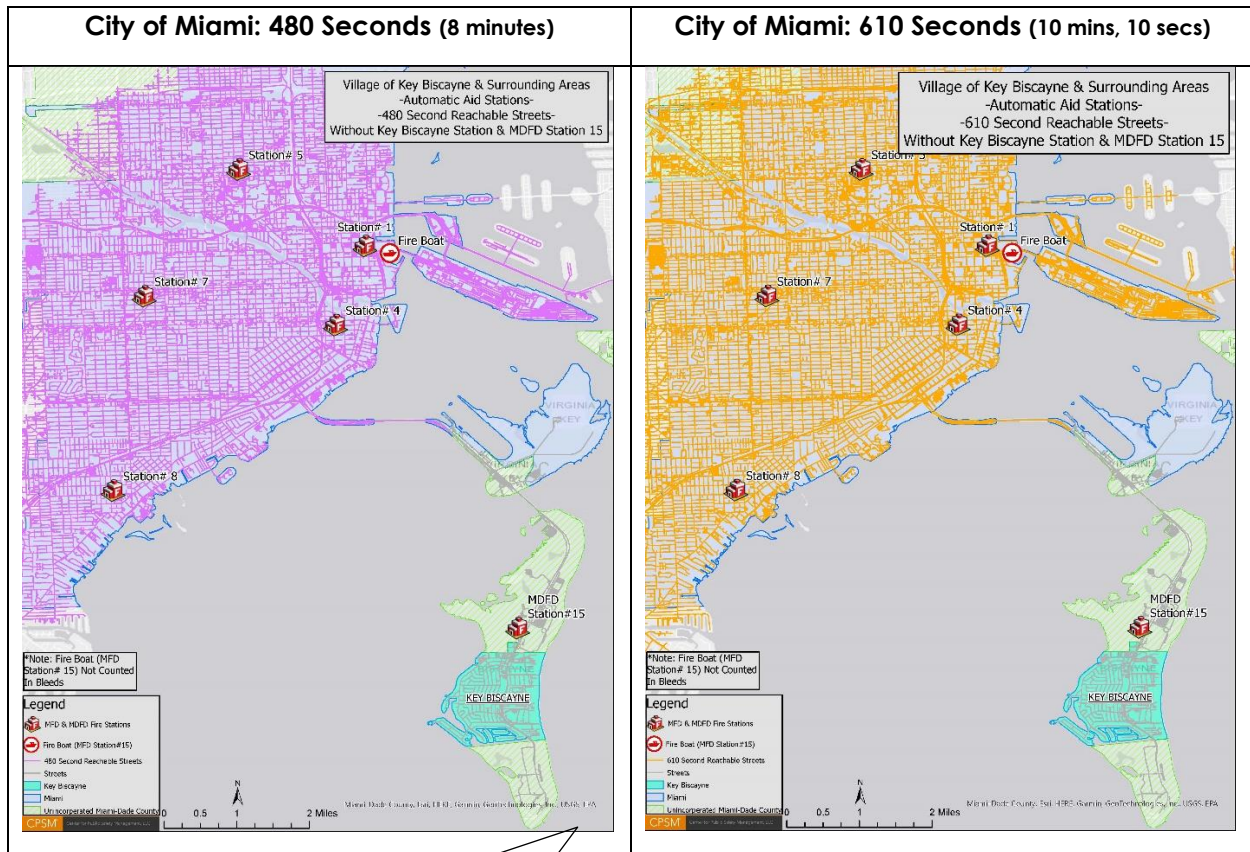
EMS Critical Tasking

EMS is a vital component of the comprehensive emergency services delivery system in any community. Together with the delivery of police and fire services, it forms the backbone of the community's overall public safety net.

In terms of overall incidents responded to by the emergency agencies in most communities, it could be argued that EMS incidents constitute the greatest number of "true" emergencies, where intervention by trained personnel makes a difference, sometimes literally between life and death. Heart attack and stroke victims require rapid intervention, care, and transport to a medical facility. The longer the time duration without care, the less likely the patient is to fully recover. Contemporary pre-hospital clinical care deploys many clinical treatments one will receive in the Emergency Department, truly matching the long-time EMS saying, "we bring the Emergency Room to you."

Critical tasks by specific call type in EMS-only agencies assisted by fire departments are not as well-defined as critical tasks in the fire discipline. Notwithstanding, critical tasking in EMS is typical of that in the fire service in that there are certain critical tasks that need to be completed either in succession or simultaneously. EMS on-scene service delivery is based primarily on a focused scene assessment, patient assessment, and then followed by the appropriate basic and advanced clinical care through established medical protocols. Thus, EMS critical tasking is typically developed (in fire-based EMS Standards of Cover documents) in accord with the U.S. Department of Health and Human Services, Centers for Medicare & Medicaid Services (CMS) as:

- Basic Life Support (BLS), which is an emergency response by a ground transport unit (and crew) and the provision of medically necessary supplies and services.

- Advanced Life Support, Level 1 (ALS1), which is the transportation by ground ambulance vehicle and the provision of medically necessary supplies and services including the provision of an ALS assessment or at least <u>one</u> ALS intervention.

- Advanced Life Support, Level 2 (ALS2), which is the transportation by ground ambulance vehicle and the provision of medically necessary supplies and services including:

  (1) at least three separate administrations of one or more medications by intravenous push/bolus or by continuous infusion (excluding crystalloid fluids), or

  (2) ground ambulance transport, medically necessary supplies and services, and the provision of at least one of the ALS2 procedures listed below:

    a. Manual defibrillation/cardioversion.

    b. Endotracheal intubation.

    c. Central venous line.

    d. Cardiac pacing.

    e. Chest decompression.

    f. Surgical airway.

    g. Intraosseous line.

The next set of tables provides recommended critical tasking for the KBFR continuum of care. As indicated above, this critical tasking is based on the current CMS ground transport definition of ambulances services and follows KBFR deployment model.

TABLE 14: BLS Critical Tasking-KBFR

Critical Task	# Responders
Incident Command	1
Primary Patient Care Incident Command	1
Secondary Patient Care Vehicle Operations	1
Effective Response Force	**3**

Resource Deployment: 1 Transport Ambulance

TABLE 15: ALS1 Critical Tasking-KBFR

Critical Task	# Responders
Incident Command	1
Primary Patient Care	1
Secondary Patient Care	1
Effective Response Force	**3**

Resource Deployment: 1 Transport Ambulance

TABLE 16: ALS1 Critical Tasking KBFR Single Unit Response

Critical Task	# Responders
Incident Command	1
Primary Patient Care	1
Secondary Patient Care	1
Effective Response Force	**3**

Resource Deployment: 1 Transport Ambulance

TABLE 17: ALS2 Critical Tasking KBFR Dual Unit Response

Critical Task	# Responders
Incident Command	1
Primary Patient Care	1
Secondary Patient Care	1
Tertiary Patient Care	2
Vehicle Operations	2
Effective Response Force	**7**

Resource Deployment: 1 Transport Ambulance 1 KBFR Fire Unit

TABLE 18: Pulseless/Non-Breathing Critical Tasking

Critical Task	# Responders
Incident Command	1
Primary Patient Care	1
Secondary Patient Care	1
Tertiary Patient Care	2
Vehicle Operations	1
Effective Response Force	**7**

Resource Deployment:
1 Transport Ambulance
1 KBFR Fire Unit
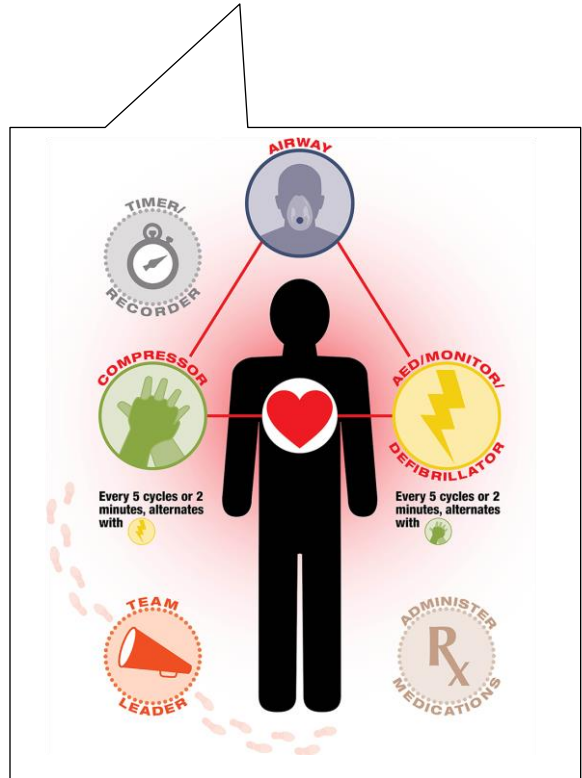
Resiliency and Resource Deployment

As noted herein, the KBFR provides advanced and basic life support EMS ground transportation in the Village and to a high level. The KBFR can staff two ambulances around the clock, dependent on staffing availability (if one or more fire suppression units are committed to a call, KBFR may only be able to staff one or two ambulances if overlapping calls occur).

The next tables and figures illustrate overlapping calls, number of units that responded to calls for service during, and auto aid received from the City of Miami, which CPSM analyzed.

TABLE 19: Frequency of Overlapping Calls Within KBFR's Fire District

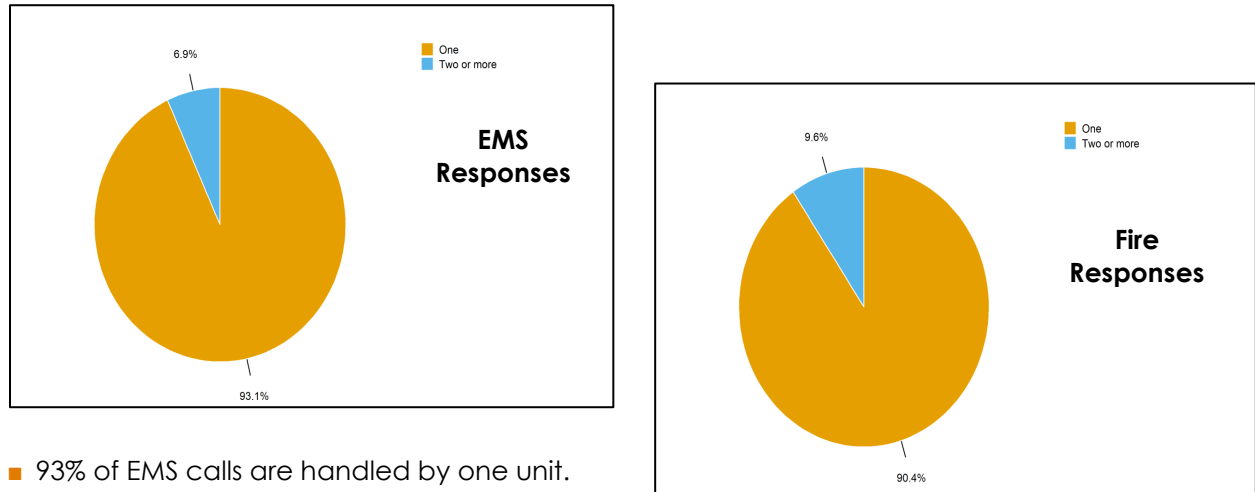| Scenario	Number of Calls	Percent of All Calls	Total Hours
No overlapped call	1,744	88.1	977.4
Overlapped with one call	221	**12%** 1 or more overlapping calls	11.2	63.5
Overlapped with two calls	14	0.7	3.5
Overlapped with three calls	1	0.1	0.0

> 88% of the time there are no overlapping calls.

Figure 12: KBFR Response Matrix: Number of Units Arriving on Fire and EMS Calls

■ 93% of EMS calls are handled by one unit.

■ 90% of Fire calls are handled by one unit.

The response system the KBFR has in place is very efficient. The use of three personnel on the Rescues limits fire suppression unit responses to only those requiring additional assistance, or those with hazards such as motor vehicle accidents. With the exception of fire alarms and structure fire responses, the greatest majority of KBFR fire suppression responses are handled by a single unit. This efficiency increases KBFR's resiliency and better positions the department to handle overlapping calls for service.

As discussed above, when needed and through an automatic aid agreement, the City of Miami provided Fire and EMS resources to KBFR. This aid is predominately for multi-unit fire calls. The next table shows the aid given by Miami Fire-Rescue during the data study period.

TABLE 20: Miami Fire Rescue Calls, by Type

Grand Call Type	Number of Calls	Calls per Day	Call Percentage
EMS	26	0.1	27.7
Fire	60	0.2	63.8
Other	8	0.0	8.5
Total	**94**	**0.3**	**100.0**

The next table shows the aggregate of KBFR and auto aid from the City of Miami, and Miami-Dade County.

TABLE 21: Calls by Responding Agency and Call Type

Responding Agency	Number of Calls				Percent Calls
	EMS	Fire	Other	Total	
KBFR Only	975	899	31	1,905	95.3
MFR and MDCFR Only	5	11	4	20	1.0
KBFR, MFR, and MDCFR	21	49	5	75	3.8
Total	**1,001**	**959**	**40**	**2,000**	**100.0**

Note: Out of 20 calls responded to by MFR and MDCFR only, MFR responded to 19 calls and MDCFR responded to one call. Out of 75 calls that were jointly responded to by KBFR and other agencies, MFR responded to 74 calls and MDCFR responded to one call. We received a record of 126 calls responded to by MFR and removed 32 of them that lacked both en route and arriving units (presumed canceled prior to responding).

Staffing Factor

It is not atypical for fire departments to staff operational shifts with additional personnel to cover scheduled and unscheduled leave. In some departments this is done on a large scale, such as one additional firefighter per engine per shift. These personnel are utilized to cover both short- and longer-term vacancies, thus reducing overtime expenses.

To determine the number of additional personnel needed to cover vacated positions due to leave or because of a vacancy through separation, an operational staffing factor should be established. The following calculations show how this would apply to KBFR.

KBFR employs thirty-five full time staffing positions assigned to one of three shifts to cross-staff the two fire suppression apparatus and the two EMS apparatus. Each shift is scheduled as a 24-hour shift. A-shift has eleven personnel assigned, and B & C shifts have 12 personnel assigned. Each shift works on average ten 24-hour shifts per month. The standard rotation is 24 hours on and 48 hours off. Every seven shifts operational shift work staff is scheduled off for 24-hours (Kelly Day) to reduce the hours worked during the scheduled work period to keep them under the FLSA overtime threshold (FLSA 207k exemption rule). This results in operational shift employees working 144 hours in a 21-day work period, or 2,496 hours in a year.

Minimum staffing on each shift is eight. Additional personnel on each shift as outlined above are utilized daily to cover employees on scheduled and unscheduled leave. This staffing method is considered an overstaffing model and is utilized to sustain minimum staffing with scheduled employees. Further, this model reduces overtime and when vacant positions are minimal on a shift, deployable staff is increased.

The use of a staffing factor allows any department in a municipality that requires a level of minimum staffing, to better plan the fiscal impacts of maintaining minimum staffing through full time employees or overtime funding to fill minimum staff positions.

Staffing factor calculation: **staffing factor** $= \frac{\textbf{hours per year per employee}}{E}$

$E = P - A$

      E = the number of effective hours per employee per year or hours scheduled
      P = the number of paid hours per employee per year
      A = the average number of hours of paid absences per year per employee

KBFR utilizes thirty-five full-time career positions assigned to shift operations. The number of paid hours each employee was scheduled to work was 2,496. This totals 87,360 hours for the thirty-five employees. During this same period, shift operations personnel aggregately utilized 30,790 hours of leave (personal, vacation, sick, medical, FMLA, bereavement, Kelly Day etc.). Utilizing the staffing factor formula above:[5]

P = 2,496
A = 880 (average of 30,790/35)
$P - A$ = 1,616
E = 1,616

$$\textbf{staffing factor} = \frac{2,496}{1,616} = \textbf{1.54}$$

Therefore, it would take <u>one</u> full-time and 0.54 of a full-time employee to fill each position per 24-hour shift, or aggregately 4.32 (0.54 x 8) of full-time equivalent employees per 24-hour shift to manage the leave and financial aspects of minimum staffing of eight per shift (firefighters, engineers, Captains). To achieve the additional 4.32 aggregate staffing factor per shift, the department operates already with additional staffing each shift as follows:

- A-shift: 3 additional personnel (11 total; 8 minimum staffing)

- B-Shift: 4 additional personnel (12 total; 8 minimum staffing)

- C-Shift: 4 additional personnel (12 total; 8 minimum staffing)

From a budgeting standpoint, it would be prudent then for KBFR to budget:

- 1.32 FTE equivalent in overtime to cover vacancies created by scheduled and unscheduled leave for A-Shift.

- .32 FTE equivalent in overtime to cover vacancies created by scheduled and unscheduled leave for B-Shift.

- .32 FTE equivalent in overtime to cover vacancies created by scheduled and unscheduled leave for C-Shift.

By utilizing a staffing factor formula annually during budget preparations, KBFR can continue to manage the funding of operational staff and overtime to fill vacant positions created by leave (scheduled and unscheduled).

Table 22: 2022 Leave Hours

Leave Type	Leave Type
Vacation: 3,182 hours	Holiday: 25 hours
Union Time: 97 hours	Compensatory Leave: 1,328 hours
Training: 1,836 hours	Injury/Disability: 2,537 hours
Personal: 889 hours	Light Duty: 2,256 hours
Illness: 4,360 hours	Kelly Day: 14,280 hours

30,790 total leave hours utilized in CY 2022

46% Kelly Day Leave

16% Injury/Disability Leave or Light Duty

14% Personal Illness Leave

13% Vacation or Personal Leave

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[5]. Ammons, D., Tools for Decision Making,2nd edition, (Washington, DC: CQ Press, 2009), 229-230.

SECTION 4. KBFR SERVICES AND PROGRAMS

Community Risk Reduction

Community Risk Reduction activities are important undertakings of a modern-day local government and fire department. A comprehensive fire protection system in every jurisdiction should include, at a minimum, the key functions of fire prevention activities, fire code enforcement inspections, fire protection building plan reviews, permitting in accordance with the fire code and local ordinances, and public education. Preventing fires before they occur, and limiting the impact of those that do, should be priority objectives of every fire department.

Fire investigation is a mission-important function of fire departments, as this function serves to determine how a fire started and why the fire behaved the way it did, providing information that plays a significant role in future fire prevention efforts.

Educating the public about fire safety and teaching them appropriate behaviors on how to react should they be confronted with a fire is also an important life-safety responsibility of the fire department.

Fire suppression and response, although necessary to protect property, have negligible impact on preventing fire. Rather, it is public fire education, fire prevention, and built-in fire protection systems that are essential elements in protecting citizens from death and injury due to fire, smoke inhalation, and carbon monoxide poisoning. The fire prevention mission is of utmost importance, as it is the only area of service delivery that dedicates 100 percent of its effort to the reduction of the incidence of fire.

Fire prevention should be approached in a systematic manner, and many community stakeholders have a personal stake and/or responsibility in these endeavors. It has been estimated that a significant percentage of all the requirements found in building construction and related codes are related in some way to fire protection and safety.

The Fire Marshal's Office in Key Biscayne is staffed by the Deputy Chief-Administration who serves as the Fire Marshal, an Assistant Fire Marshal, and one full-time Fire Inspector. Together this team administers the fire code inspection program, fire permitting functions, plan review, and conducts initial fire origin and cause investigations.

The Fire Marshal's Office has a two-pronged role in terms of services: first, in a community capacity, as the entity responsible for assisting businesses and residents to successfully occupy and continue to provide business services or maintain a residence in buildings safely in accordance with established fire safety codes, and second, as the enforcement agency responsible for compliance with fire safety-related legislation.

The Fire Marshal's Office team members maintain required certifications and training to perform their assigned functions and tasks.

At the time of this analysis the Key Biscayne Fire Marshal's Office was utilizing the following Building and Fire Codes:

- Florida Fire Prevention Code (as defined in Chapter 69A-60 of the Florida Administrative Code)
- Florida Building Code

There are 112 inspectable properties in Key Biscayne. Many properties, however, have many suites or units that require inspections. Annualized inspections are required pursuant to the State Fire Prevention Code and State Statutes for certain public assembly, institutional, educational, and residential occupancies. Article 5, Sections 1, 2, and 3 of the KBFR Administrative Policies and Procedures Manual provide procedures for school fire drills, fire pump testing in buildings, and annual inspection and fire code enforcement procedures.

In addition to the staff in the Fire Marshal's Office, KBFR also has implemented an engine company fire inspection program. This is allowable under 633.216(3) of the State Statutes:

A firefighter certified pursuant to s. 633.408 may conduct fire safety inspections, under the supervision of a certified fire safety inspector, while on duty as a member of a fire department company conducting in-service fire safety inspections without being certified as a fire safety inspector, if such firefighter has satisfactorily completed an in-service fire department company inspector training program of at least 24 hours' duration as provided by rule of the department.

Under this program, fire suppression personnel conduct fire safety inspections in multi-residential buildings in Key Biscayne as well as existing business and mercantile occupancies. ***This is a best practice*** as it not only benefits the fire prevention and public education function, but also gets fire suppression in these buildings where they can also conduct pre-fire planning and building familiarization training. Fire suppression level inspections are reviewed by Fire Marshal's Office staff for quality assurance, and to assist with follow-up inspections if required.

Additionally, and to expedite fire code enforcement inspections conducted by Fire Marshal's Office staff, KBFR has also implemented a self-inspection program that is utilized to prepare scheduled occupants for an upcoming fire code inspection.

KBFR inspection data provided to CPSM includes:

TABLE 23: Fire Marshal's Office Fire Inspections Completed

2019	2020	2021
1135	847	1135

The investigation of the cause and origin of fires is also an important part of a comprehensive fire prevention system. Determining the cause of fires can help with future prevention efforts. Officers on scene initiate the fire origin and cause determination process. When needed, particularly when the on-scene officers cannot determine the origin and cause of the fire, or they believe a crime has been committed, the Fire Marshal may respond to conduct the fire and arson investigation. The State Fire Marshal's Office is also available to respond to assist in the origin and cause of fires and arson investigations, and as well through the already mentioned automatic aid agreement with the City of Miami, Miami Fire Rescue is available through automatic aid to assist with fire investigations. Article 4 of the KBFR Emergency Operations Manual outlines origin and cause determination, suspected arson fires, and fire investigator request procedures.

KBFR fire investigation data provided to CPSM includes:

TABLE 24: Fire Marshal's Office Fire Investigations Completed

2019	2020	2021
2	1	3

KBFR fire protection plan reviews data provided to CPSM includes:

TABLE 25: Fire Marshal's Office Plan Reviews

2019	2020	2021
1140	774	1386

*The Fire Marshal's Office reports 90% turn-around in 24 hours for plans review conducted by their office. Large/complex plans review are contracted out to an external vendor who specializes in fire protection plans review.

It should be noted that many plan reviews, particularly those involving fire protection systems, site plan review, and fire department ingress and egress require a final fire inspection, which are coordinated and conducted by the Fire Marshal's Office as well and are noted in the fire inspection table above.

The Fire Marshal's Office in Key Biscayne is a busy unit conducting regular fire code inspections and re-inspections, plans review and plans review inspections, reviewing fire suppression level inspections, issuing permits, and conducting inspections on same when required, managing special events and permits associated with these events, food truck inspections, and the occasional fire investigation. According to the Fire Marshal, not all occupancies in Key Biscayne are inspected annually. While a goal of the Fire Marshal's Office, this is not required under the Fire Prevention Code. Those that are, as discussed earlier, should be, and a schedule developed for all others that may identify certain occupancy types to be inspected bi-annually, and others tri-annually.

The workload in the Fire Marshal's Office leaves little time for public life safety education. Educating the public about fire safety and teaching them appropriate behaviors on how to react should they be confronted with a fire is also an important life-safety responsibility of the fire department. An effort should be made to advance this program through a combined effort of the Fire Marshal's Office and fire suppression companies.

Emergency Management

Chapter 9, Section 9-3(a) of the Code of Key Biscayne designates the Village Manager as the Director of Emergency Management. Section 9-3(b) stipulates that the Village Manager of the Village Manager's *designee shall plan for the coordination of those actions necessary for the creation and maintenance of an effective emergency response capability to prepare for and manage emergency conditions.* Currently the Fire Chief performs many of the day-to-day planning and response functions of emergency management as the Village Manager's designee, which pursuant to Chapter 9-3(b) of the Code of Key Biscayne.

The emergency management community consists of many organizations (local, state, military, nonprofit, federal, and private). Examples of organizations that interact with a local Emergency Management office include: the Federal Emergency Management Agency (FEMA), local fire and EMS agencies, local public works departments, emergency communications centers (i.e., 911-dispatch), emergency management agencies at the city, county, and state level, public health agencies, Coast Guard, National Guard, local and state law enforcement, public works, non-profits, and the American Red Cross.

Since 2003 Miami-Dade County, which includes the Village of Key Biscayne has participated in nine federal declarations for major disasters and six emergency declarations:

- FEMA DR-4680 Hurricane Nicole; 2022: Public Assistance.

- FEMA DR-4673 Hurricane Ian; 2022: Public Assistance.

- FEMA DR-3561 Tropical Storm Elsa; 2021: Public Assistance.

- FEMA DR-3533 Hurricane Isaias; 2020: Public Assistance.

- FEMA DR-4486 COVID 19; 2020: Individual and Public Assistance.

- FEMA DR-3419 Hurricane Dorian; 2019: Public Assistance.

- FEMA DR-4337 Hurricane Irma; 2018: Individual and Public Assistance.

- FEMA DR-3377 Hurricane Matthew; 2016: Public Assistance.

- FEMA DR-3288 Tropical Storm Fay; 2008: Public Assistance.

- FEMA DR-1609 Hurricane Wilma; 2005: Individual and Public Assistance.

- FEMA DR-1602 Hurricane Katrina; 2005: Public Assistance.

- FEMA DR-3259 Tropical Storm Rita; 2005: Public Assistance

- FEMA DR-1561 Hurricane Jeanne; 2004: Public Assistance.

- FEMA DR-1545 Hurricane Frances; 2004: Individual and Public Assistance.

- FEMA DR-1539 Hurricane Charley and Tropical Storm Bonnie; 2004: Public Assistance.

Emergency Management Planning

In 2022, the Village of Key Biscayne updated their Comprehensive Emergency Management Plan (CEMP). A CEMP is designed to serve as a planning document that is an all-hazards plan developed to identify and address the natural and human-caused hazards that threaten a community. A CEMP describes the system (Emergency Support Functions) that a community will use to prevent, prepare for, respond to, and recover from an emergency or disaster event. A CEMP also identifies triggers for activating the community's Emergency Operations Center (EOC) and assigns specific areas of responsibility for coordinating resources to support the response to an emergency or disaster. In addition to the Village CEPP, Miami-Dade County has an extensive CEMP the Village may reference as well, specifically the Hazard Analysis, which identifies hazards and risks prevalent in the county, and the Concept of Operations, which the Village may be a part of or in direct contact with the County on.

Identified Hazards in both the Village CEMP and Miami-Dade County CEMP that may impact Key Biscayne include:

- Natural Hazards

  o Hurricanes and Tropical Storms/Systems

  o Tornadoes, Thunderstorms, Lightning Storms, Flooding

  o Drought, Hot and Cold Weather, Contaminated Water Supply

  o Public Health Hazards

  o Epidemic, Disease, Exotic Pests

  o Climate Change

- Technological hazards

  o Hazardous Materials Incidents

  o Nuclear Power Plant Emergency

  o Coastal Oil Spills

- Human-Caused Hazards

  o Mass Casualty Incident

  o Civil Disturbance

  o Mass Migration

  o Terrorism Event

  o National Security Event

The Village utilizes space in Fire Administration as the EOC when this activation is required. To the extent possible and feasible, during an emergency, particularly one that involves multiple agencies and where a central command and control is established and implemented, a functional area (operations room) should be readied for the assembling of the essential Emergency Support Function (ESF) personnel. This area should have enough room so that individual ESFs can plan and direct their sections and includes communication via telephone and computer software available at each ESF, functioning utilities with uninterrupted power supply and emergency generator, and located in a facility that is accessible to staff and with adequate parking. Ideally an EOC can be set up and functional at a moment's notice. Additional areas for consideration include planning areas, facilities to include areas to rest for 24-hour operations, and a break area away from the operations room for nourishment.

If the City of Miami activates their EOC, KBFR will send a liaison representing the Village to ensure constant communication regarding planning, response, and mitigation are communicated to and from the Village EOC. During a significant coastal event, and particularly when evacuation of the Village occurs, the Village utilizes the City of Miami's Emergency Operations Center to coordinate Emergency Management response and mitigation functions. For this reason, KBFR staff maintains awareness of the City of Miami's CEMP as well.

As well, the KBFR has a comprehensive Emergency Operations Manual (EOM). The EOM outlines the departments' responsibilities, guidelines, and operational compliance with National Standards to include Comprehensive Planning Guide 101 v 2.0, National Incident Management System (NIMS). Components of the EOM include:

- Article 1: Command System SOPS

- Article 2: Communications & Notification

- Article 3: Incident Procedures

- ARTICLE 4 Investigations, Inspections, & Media

In addition to the KBFR EOM, and Village CEMP, CPSM recommends the Village develop a basic Emergency Management Response Plan that is applicable to all Village departments and employees, and one that extracts pertinent information from the Village CEMP regarding response and Emergency Support Function (ESF) roles, and that assigns specific ESF roles to Village employees by position, and not in general by department, and that includes specific roles and responsibilities of each assignment. CPSM further recommends that once these ESF

roles are specifically assigned, future training exercises should focus on ESF responsibilities and execution of these important duties.

National Incident Management System (NIMS)

It is important that Village employees who may be tasked with participating in the planning, response, mitigation, and recovery efforts of an emergency or disaster be trained in the National Incident Management System (NIMS) training components. This is a must for employees with response and/or EOC assignments. The primary components of this training include Fundamentals and Concepts, Resource Management, Command and Coordination and Communications and Information Management. NIMS guides all levels of government, nongovernmental organizations, and the private sector to work together to prevent, protect against, mitigate, respond to, and recover from incidents.[6]

NIMS provides stakeholders across the entire community with the shared vocabulary, systems, and processes to successfully deliver the capabilities described in the National Preparedness System. In addition to the benefits of a coordinated response as outlined above, federal preparedness and other federal grants (including state pass-through in some instances) to a local entity is contingent on that entity being NIMS compliant.

The NIMS training classes listed below are designed to educate response personnel in the fundamentals of incident management, as well as the application of the NIMS components in the Village. CPSM recommends essential personnel assigned to the Village, City of Miami, or County EOC, and who have response assignments during an emergency or disaster, be trained to the appropriate NIMS level as outlined here.

- NIMS ISC-100: Introduction to Incident Command System

  o All Village employees with response and/or EOC assignments.

  o Independent study program offered through FEMA's Emergency Management Institute. http://training.fema.gov.nims

- NIMS ISC-200: ICS for Single Resources and Initial Action Incidents

  o All Village employees with response and/or EOC assignments.

  o Independent study program offered through FEMA's Emergency Management Institute. http://training.fema.gov.nims

- NIMS ICS-300: Intermediate Incident Command System for Expanding Incidents

  o Village employees who are decision makers, serve on respective agency unified command, and or may staff state or local emergency operations center.

  o In-class multi-day course. Courses are offered through local Emergency Management agencies.

- NIMS ICS-400: Advanced Incident Command System for Complex Incidents

  o Village employees who are decision makers, serve on respective agency unified command, and or may staff state or local emergency operations center.

  o In-class multi-day course. Courses are offered through local Emergency Management agencies.

[6]. National Incident Management System | FEMA.gov

- NIMS ISC-700: National Incident Management System, An Introduction

  o All Village employees with response and/or EOC assignments.

  o Independent study program offered through FEMA's Emergency Management Institute. http://training.fema.gov.nims

- NIMS ISC-800: National Response Framework, An Introduction

  o All Village employees with response and/or EOC assignments.

  o Independent study program offered through FEMA's Emergency Management Institute. http://training.fema.gov.nims

Continuity of Operations Plan (COOP)

Another important document the Village should continue to maintain is a Continuity of Operations Plan (COOP). A COOP is important to any organization, especially local governments that operate financial and human resources systems, facilities, public operations, and vital community services. A COOP is developed to serve as a roadmap that builds the organization's plan to prepare for, react to, and respond to any event that disrupts one or more operation, facility, service, or line of succession. COOP planning includes:

- Essential Functions – The critical activities performed by organizations, especially after a disruption of normal activities.

- Orders of Succession – Provisions for the assumption of senior agency offices during an emergency if any of those officials are unavailable to execute their duties.

- Delegations of Authority – Identification, by position, of the authorities for making policy determinations and decisions at the executive, middle management, and operational levels, and all other organizational locations. Generally, pre-determined delegations of authority will take effect when normal channels of direction have been disrupted and will lapse when these channels have been reestablished.

- Continuity of Facilities – Locations, other than the primary facility, used to carry out essential functions, particularly in a continuity event. Continuity Facilities, or "Alternate facilities," refers to not only other locations, but also nontraditional options such as working at home, ("teleworking"), telecommuting, and mobile-office concepts.

- Continuity of Communications – Communications that provide the capability to perform essential functions, in conjunction with other agencies, under all conditions.

- Vital Records Management – The identification, protection, and ready availability of electronic and hard-copy documents, references, records, information systems, and data management software and equipment needed to support essential functions during a continuity situation.

- Human Capital – During a continuity event, emergency employees and other special categories of employees are activated by an agency to perform assigned response duties.

- Devolution of Control and Direction – Capability to transfer statutory authority and responsibility for essential functions from an agency's primary operating staff and facilities to other agency employees and facilities.

■ Reconstitution – The process by which agency personnel resume normal agency operations from the original or replacement primary operating facility.[7]
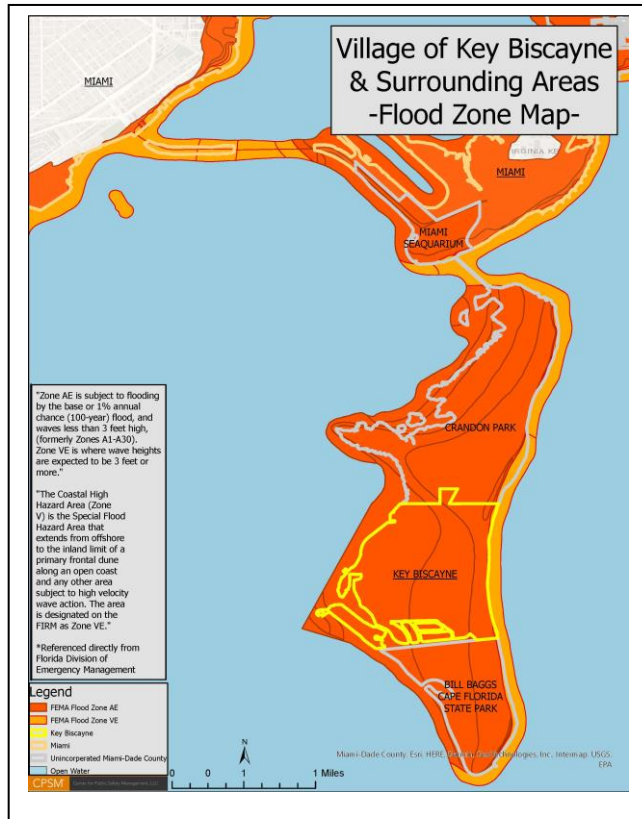
The emergency management function is an essential operation for all communities, particularly coastal communities that are vulnerable to tropical events.

As reviewed herein, the Village will benefit from a Basic Response Plan, coordinated emergency management training, sustainment of a COOP, and management and coordination of a Village EOC.

In smaller communities this may not be a full-time position, however the required planning and sustainment of emergency management functions as described herein require at a minimum, a member of the KBFR staff to be assigned the responsibility of emergency management planning and provided the resources to successfully carry out the objective of this role.

Training and Education

Training is, without question, one of the most essential functions that a fire department should be performing on a regular basis. One could even make a credible argument that training is, in some ways, as important as emergency responses because a department that is not well trained, prepared, and operationally ready will be unable to fulfill its emergency response obligations and mission. Education and training are vital at all levels of fire service operations to ensure that all necessary functions are completed correctly, safely, and effectively. A comprehensive, diverse, and ongoing training program is critical to the fire department's level of success.

An effective fire department training program must cover all the essential elements of that department's core missions and responsibilities. The level of training or education required for a set of tasks varies with the jobs to be performed. The program must include an appropriate combination of technical/classroom training, manipulative or hands-on/practical evolutions, and training assessment to gauge the effectiveness of these efforts. Much of the training, and particularly the practical, standardized, hands-on training evolutions should be developed based upon the department's own operating procedures and operations while remaining

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[7]. coop_brochure.pdf (fema.gov)

cognizant of widely accepted practices and standards that could be used as a benchmark to judge the department's operations for any number of reasons.

The training function is handled primarily by the Deputy Chief of Operations and the shift Captains. Training for operational staff occurs at the KBFR station (didactic and practical), with practical drills/training occurring offsite as well at various Village locations. Practical training also occurs at the Miami Fire-Rescue training center. Instructors for this training include on-duty staff (primarily on-duty shift officers). For specialty training, KBFR will bring in outside vendors. Additionally, KBFR participates in multi-company drills with Miami Fire-Rescue units that regularly respond to Key Biscayne.

KBFR hires certified firefighters (Florida Firefighter Certificate of Compliance and Florida Certified Paramedic). Those that are not certified attend recruit training at the Miami Fire-Rescue training facility. When KBFR assigned recruits to the Miami recruit academy, KBFR also provides instructors to assist. KBFR also outlines the probationary firefighter study and drill training in Article 1, Section 1 of the KBFR Administrative Policies and Procedures Manual. This is a comprehensive policy that monitors the probationary employee's progress through a variety of daily drills and daily activities over the course of their probationary period. Performance on the fireground, with station duties, and during drills and training are recorded as well for review by the Captain and command staff.

KBFR does not have a dedicated training and education position and does not include training and education (other than probationary training) in the department's Administrative Policies and Procedures Manual. CPSM recommends the training and education function, to include state certification compliance be assigned to appropriate personnel who can give this important fire-rescue department function consistent attention. CPSM also recommends KBFR develop and training and education committee whose focus is on developing training and education policies and guidelines that are linked to local, state, and national standards, and as well links to the department's accreditation, strategic planning, and the ISO-PPC requirements.

Health, Safety, and Wellness

The prevention and reduction of accidents, injuries and occupational illnesses should be established goals of any fire-rescue department and should be primary considerations at all times (emergency and non-emergency activities). This concern for safety and health must apply to all members of the fire-rescue department and should include others who may be involved in fire department activities.

KBFR should strive to make every reasonable effort to provide a safe and healthy work environment, recognizing the dangers involved in the types of service fire-rescue departments deliver. Included in this effort should be appropriate and continuous training, supervision, procedures, program support and review to achieve department health and safety objectives in all department functions and activities.

Firefighting and to some degree EMS service delivery are inherently dangerous activities occurring in environments over which the participants have no engineering control. NFPA 1500, *Standard on Fire Department Occupational Safety and Wellness Programs* was developed to provide a "consensus standard for an occupational safety and health program for the fire service." NFPA 1500 is intended to be an umbrella document, establishing the basic framework for a comprehensive safety and health program, and providing for its implementation and management.

The Health and Safety function in KBFR is handled primarily by the Deputy Chief of Operations and the shift Captains. The following KBFR policies and or procedures address health and safety:

- Article 2 of the KBFR Administrative Policies and Procedures Manual addresses sick, injury, and exposure procedures.

- Article 4, Section 3 addresses safe vehicle operations.

- Article 1, of the KBFR Emergency Operations Manual addresses the Incident Command System and includes:

    o Section 4: Rapid Intervention Teams

    o Section 5: Incident Scene Safety Officer

    o Section 7: Personnel Accountability Reporting

    o Section 9: Lost, Missing, or Trapped Firefighters

    o Section 10: Passport Accountability

- Article 2, Section 1 of the KBFR Emergency Operations Manual addresses the Incident Command System and includes:

    o Emergency Radio Operations and Procedures

- Article 3 of the KBFR Emergency Operations Manual addresses the Incident Command System and includes:

    o Incident Procedures: Operating Guidelines for various Emergency Incidents

In 2021, the NFPA produced *The Fifth Needs Assessment of the U.S. Fire Service* and revealed the following:

- 72 percent of departments lack a program to maintain basic firefighting fitness and health.

- 61 percent of departments don't provide medical and physical evaluations for all firefighters that comply with *NFPA 1582: Standard on Comprehensive Occupational Medical Program for Fire Departments.*

- 73 percent of departments lack a behavioral health program (larger departments are much more likely to have such a program).

- 56 percent of fire stations aren't equipped for exhaust emissions control; this number rises to 82 percent in the smallest communities.

- Many departments don't engage in cancer prevention best practices.[8]

A successful health, safety, and wellness program requires:

- Senior Management buy-in.

- The establishment of a Health & Wellness Committee.

- A department needs assessment.

- The establishment of obtainable goals and objectives.

- The establishment of a budget for health, safety, and wellness.

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8. Creating a Health & Wellness Program for Your Department, Firehouse Magazine, October 2022.

- Implementation.
- Evaluation.[9]

Primary goals of a comprehensive health, safety, and wellness should include:

- Reducing injury leave and light duty due to on-the-job injuries (8% of KBFR leave in 2022).
- Potentially lowering workers' compensation and employee health care costs.
- Reduction of injuries.[10]

Firefighter injuries and deaths are devastating to families, fellow responders, local governments, and the community. The National Institute for Occupational Safety and Health (NIOSH) has studied firefighter fatality root causes, and found five key factors, which are commonly referred to as the NIOSH 5:

- Lack of fireground firefighter accountability.
- Lack of fireground communication methods.
- Lack of standard operating procedures related to response and fireground operations.
- Lack of incident management/command.
- Lack of appropriate risk assessment of the incident as whole, the building, the emergency scene, and basic fireground knowledge to understand the risk.

These five fireground factors should be etched in every firefighter's brain. A fire department training regimen, equipment, guidelines, and culture should center on these five factors. A lack of understanding of these five factors leads to sloppy, ineffective, and unsafe fireground operations. ***They should be taken seriously.***

Currently health, safety, and wellness are the responsibility of the Fire Chief and Deputy Chief of Operations, and to some degree the shift Captains. Managing the health, safety, and wellness components of a fire-rescue department are as important as any other, as the concepts of health, safety, and wellness apply to both emergency and non-emergency activities. For KBFR this will take dedicated staff hours and oversight from a command and station level. CPSM recommends KBFR develop a health, safety, and wellness committee, which includes the Village Human Resources Department, and develop a comprehensive health, safety, and wellness initiative program that aligns with NFPA 1500, *Standard on Fire Department Occupational Safety and Wellness Programs, 2021 edition. CPSM further recommends the Deputy Chief of Operations have department health, safety, and wellness oversight as the department Health and Safety Officer.*

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9. ibid
10. ibid

An available best practice that involves a comprehensive assessment of a fire services agency is the accreditation program managed by the Center for Public Safety Excellence (CPSE). The Commission of Fire Accreditation International (CFAI) provides an analytical self-assessment process to evaluate eleven categories of a fire agency's performance. During this process, the department self-examines 250 separate performance indicators, many of which are considered core or required competencies of a fire services agency. The eleven categories include:

1. Governance and Administration
2. Assessment and Planning
3. Goals and Objectives
4. Financial Resources
5. Community Risk Reduction Programs
6. Physical Resources
7. Human Resources
8. Training and Competency
9. Essential Resources
10. External System Relationship
11. Health and Safety

The accreditation and subsequent re-accreditation process provides the individual department with the benefit of a critical self-analysis of its performance at varying levels to ensure continuous self-improvement. It is an extremely comprehensive review that is conducted over an agency scheduled and controlled process, and requires reaccreditation every five years, which helps to ensure that the standards are being maintained.

There are currently 301 accredited fire departments in the United States and Canada. KBFR is an accredited agency and is 1 of 26 in the State of Florida.

The CFAI fire accreditation process provides a well-defined, internationally recognized benchmark system to measure fire and emergency services. As a best practice, the accreditation process includes a comprehensive agency self-assessment, involves the community in the strategic planning phase, raises the internal bar of the organization as they explore opportunities to improve, exhibits international achievement for the agency and local government, and assists local governments justifying their expenditures by demonstrating a direct link to services, particularly for emergency services, where local officials desire criteria to assess performance and efficiency.[11]

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11. Accreditation Overview - Center for Public Safety Excellence (cpse.org)

In 2019, the Village of Key Biscayne received a Class 2 Public Protection Classification (PPC) rating from the Insurance Services Office (ISO), a subsidiary of Verisk Analytics. The Verisk hazard mitigation team collects and evaluates information from communities across the United States regarding their capabilities to provide municipal fire protection. This information is analyzed utilizing the Fire Suppression Rating System from which individual section credits and points are tabulated and a Public Protection Classification for the community is assigned. Classifications range from 1 through 10, with one being the highest rating a community can achieve.[12]

It is important to understand the PPC is not just a fire department classification, but a compilation of community services that include the fire department, the emergency communications systems, the water supply system that includes an evaluation of available water matched to the amount needed to suppress fires (referred to as fire flow), and community efforts to reduce the risk of fire, including fire prevention codes and enforcement, public fire safety education, and fire investigation programs.[13]

A lower PPC does not always guarantee a lower property insurance rating as many factors feed into the formulas insurance companies utilize to determine rates. This is true for coastal communities Florida, who are or may be prone to tropical systems. However, a PPC rating of 1, 2, or 3 alerts the property insurance underwriter that the service area of that fire department is well-equipped, positioned, and staffed to extinguish, mitigate, and prevent fires. Additionally, although insurance companies may use the Verisk-ISO-PPC information when deciding property insurance premiums, Verisk-ISO has nothing to do with insurance premium pricing.

A community's PPC grade depends on:

- **Needed Fire Flows** (building locations used to determine the theoretical amount of water necessary for fire suppression purposes).
- **Emergency Communications** (10 percent of the evaluation).
- **Fire Department** (50 percent of the evaluation).
- **Water Supply** (40 percent of the evaluation).
- **Community Risk Reduction** (Additional credits received for Fire Prevention/Inspection, Public Education, and Fire Investigation activities)

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12. Verisk's Community Hazard Mitigation Services (isomitigation.com)
13. ibid

Florida ISO-PPC
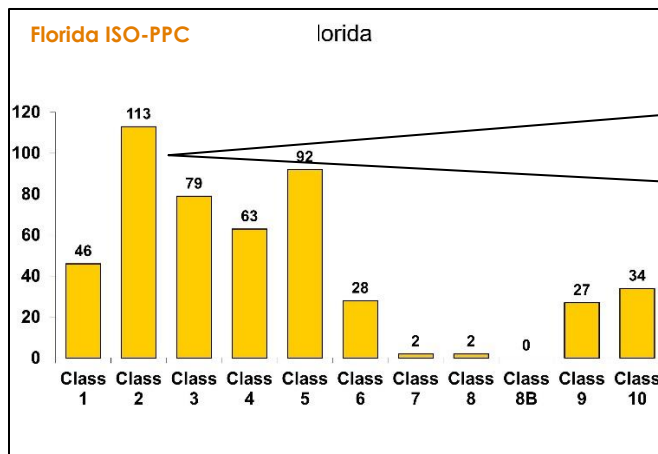
As of the date of this report, there are 113 Class 2-PPC rated communities in Florida

TABLE 26: Key Biscayne Earned Credit Overview

FSRS Component	Earned Credit	Credit Available
414. Credit for Emergency Reporting	3.00	3
422. Credit for Telecommunicators	4.00	4
4.32. Credit for Dispatch Circuits	2.40	3
440. Credit for Emergency Communications	**9.40**	**10**
513. Credit for Engine Companies	5.97	6
523. Credit for Reserve Pumpers	0.00	0.50
532. Credit for Pump Capacity	3.00	3
549. Credit for Ladder Service	3.60	4
553. Credit for Reserve Ladder and Service Trucks	0.00	0.50
561. Credit for Deployment Analysis	9.57	10
571. Credit for Company Personnel	10.00	15
581. Credit for Training	5.36	9
730. Credit for Operational Considerations	2.00	2
590. Credit for Fire Department	**39.50**	**50**
616. Credit for Supply System	24.13	30
621. Credit for Fire Hydrants	3.00	3
631. Credit for Inspection and Flow Testing	4.00	7
640. Credit for Water Supply	**31.13**	**40**
Divergence	**-0.24**	-
1050. Community Risk Reduction	**4.86**	5.50
Total Credit	**84.65**	**105.50**

The review processes for re-accreditation and ISO-PPC are extensive. Additionally, there are compliance measures that must be monitored to ensure a successful and positive review of both. These include department performance objectives established in the Standards of Cover, Strategic Plan, and self-assessment manual accreditation documents.

For the ISO-PPC review, there are annual operational training and pre-planning hours that must be met for full credit in these categories, as well as compliance with certifications and training in the Fire Marshal's Office.

Additionally, there are water system compliance measures regarding inspecting and flow testing fire hydrants in the ISO-PPC review. Coordinating the review processes and monitoring for re-accreditation and the ISO-PPC and ensuring compliance with accreditation and the ISO-PPC as discussed herein requires dedicated KBFR staff hours.

While not a full-time employee, at a minimum a KBFR employee assigned these tasks to ensure compliance as outlined when KBFR was designated as a fully accredited fire agency, and to ensure compliance with all components of the ISO-PPC Fire Suppression Rating System to receive maximum credits in each.

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SECTION 5. CONCLUSION AND RECOMMENDATIONS

This analysis contains illustrative and descriptive material, specific operational and administrative observations, and suggestions regarding the delivery of fire protection, emergency medical services, emergency management, and community risk reduction programs and services by KBFR. Included in this analysis are several components that create the foundation of effective fire-rescue services to include administrative oversight and accountability; training and education; community risk; health, safety, and wellness of the workforce; and fire department performance and benchmarking against national standards.

During the course of this analysis the CPSM project team met with public officials and officers and members of KBFR. A site visit was conducted in late October 2022 to obtain a better understanding of the workforce, service delivery, programs, and observe the infrastructure KBFR operates in and with. The project team operated independently at all times to maintain an unbiased approach to the project's content and recommendations.

The project team worked from the scope of work prepared for the Village in the initial proposal, which was to conduct a workforce assessment of the Village's fire-rescue department, analyzing each function of the department and subsequently provide findings and recommendations for improvement. The project team conducted the analysis without any preconceived concepts or bias. This analysis contains a number of observations and recommendations that CPSM believes will achieve greater operating efficiencies and effectiveness of overall fire, rescue, and emergency management services in the Village.

CPSM found KBFR to be open and transparent about its operations. Officers and members with whom the project team interacted were passionate about their service to the community. In fact, CPSM did not encounter a single member who was not passionate about what they do with regards to KBFR and the community.

The observations and recommendations of this analysis should be viewed as opportunities to make KBFR stronger, more efficient, and more effective in how it provides assigned public safety services in the Village.

To the credit of the Village Manager and Village Council, this body wanted to understand more about how contemporary fire-rescue departments operate and should be structured, and what was needed to ensure KBFR was operating efficiently and effectively and has the right infrastructure to provide key public safety services in the Village such as: fire protection; EMS; emergency management; community risk reduction, and associated programs that support these primary service deliverables.

The principal observations and recommendations include:

- Over the next 24-30 months, KBFR will be transitioning out through normal retirement, all senior and middle management leadership staff. This will create a void in institutional knowledge but will also create an opportunity to re-imagine current organizational roles and responsibilities.

- Ideally, even in a compact organization such as KBFR, it is critical that the appropriate time be spent at the appropriate level in the organization to continuously operate the system, make improvements, and create the future. Given this, *CPSM recommends that KBFR organize the department so as to optimize and empower subordinate officers to the Fire Chief to include senior level chief officers and company officers within the leadership and management of all*

department operations. This includes the concepts of a Functional Organizational Chart, the Time Allocation Model and proposed organizational chart below to ensure a more efficient alignment of organizational resources, and the effective use of all members of the organization in order to achieve the organization's mission and core values.

■ During our analysis, CPSM was advised of impending retirements of middle and command staff level officers in the near term. One important organizational concept, which is experiencing turnover of personnel at management and leadership ranks, is to implement programs that identify the future leaders of the organization; that is, programs that go beyond the technical courses for career advancement preparation. A key to this is to develop and implement a formal succession plan, focused on developing potential successors to ensure organizational leadership stability, and also serve as a retention plan. ***CPSM recommends KBFR work with the collective bargaining unit and the city's Human Resources Director to develop a succession plan that is diverse, includes the entire organization, and has a focus on preparing current and future members to take on additional roles and responsibilities, and as well as prepares members for advancement and promotion into key roles in the organization. To ensure succession and continuity at the senior level, CPSM recommends the Village consider double-slotting the Deputy Chief of Operations position for a period of 6-9 months prior to the current Deputy Chief of Operations' retirement date.***

■ The response system the KBFR has in place is very efficient. The use of three personnel on the Rescues limits fire suppression unit responses to only those requiring additional assistance, or those with hazards such as motor vehicle accidents. With the exception of fire alarms and structure fire responses, the greatest majority of KBFR fire suppression responses are handled by a single unit. This efficiency increases KBFR's resiliency and better positions the department to handle overlapping calls for service.

CPSM conducted a staffing factor exercise to determine the number of additional operational personnel needed to cover vacated positions due to leave or because of a vacancy through separation. CPSM found through this analysis and based on 2022 leave usage to include Kelly days, it would take one full-time and 0.54 of a full-time employee to fill each position per 24-hour shift, or aggregately 4.32 (0.54 x 8) of full-time equivalent employees per 24-hour shift to manage the leave and financial aspects of minimum staffing of eight per shift (firefighters, engineers, Captains). To achieve the additional 4.32 aggregate staffing factor per shift, the department operates already with additional staffing each shift as follows:

- A-shift: 3 additional personnel (11 total; 8 minimum staffing)

- B-Shift: 4 additional personnel (12 total; 8 minimum staffing)

- C-Shift: 4 additional personnel (12 total; 8 minimum staffing)

The staffing factor exercise therefore validates the current total staffing matrix KBFR has implemented where there is an established minimum of eight personnel per operational shift, and three of four (dependent on the shift) additional personnel to backfill shift vacancies created by scheduled and unscheduled leave.

From a budgeting standpoint, it would be prudent and recommended that KBFR budget:

■ 1.32 FTE equivalent in overtime to cover vacancies created by scheduled and unscheduled leave for A-Shift.

■ .32 FTE equivalent in overtime to cover vacancies created by scheduled and unscheduled leave for B-Shift.

- .32 FTE equivalent in overtime to cover vacancies created by scheduled and unscheduled leave for C-Shift.

By utilizing a staffing factor formula annually during budget preparations, KBFR can continue to manage the funding of operational staff and overtime to fill vacant positions created by leave (scheduled and unscheduled).

An additional consideration over the longer term would add one FTE to A-shift, which would balance the staffing to twelve on each shift. Overtime budgeting would then be for the fractional FTE equivalent (i.e., .32) as described above.

- The Fire Marshal's Office in Key Biscayne is a busy unit conducting regular fire code inspections and re-inspections, plans review and plans review inspections, reviewing fire suppression level inspections, issuing permits, and conducting inspections on same when required, managing special events and permits associated with these events, food truck inspections, and the occasional fire investigation. According to the Fire Marshal, not all occupancies in Key Biscayne are inspected annually. While a goal of the Fire Marshal's Office, this is not required under the Fire Prevention Code. Those that are, as discussed earlier, should be, and a schedule developed for all others that may identify certain occupancy types to be inspected bi-annually, and others tri-annually. *CPSM recommends maintaining the current number of staffing in the Fire Marshal's Office to include alternatives outlined in the later in this section of this report, with this staff focusing on required inspections (annual, permitting, special event, food truck, plan review inspections, and non-annual occupancies that the Fire Marshal directs to be inspected). CPSM further recommends that the plan review function continue to be contracted out, with this service being expanded to handle even those plan reviews that are not currently contracted out to free up staff time to concentrate on fire code enforcement. CPSM also recommends that the fire suppression fire safety inspection program continue as designed.*

The workload in the Fire Marshal's Office leaves little time for public life safety education. Educating the public about fire safety and teaching them appropriate behaviors on how to react should they be confronted with a fire is also an important life-safety responsibility of the fire department. *CPSM recommends a greater effort should be made to advance the public life safety education program through a combined effort of the Fire Marshal's Office and fire suppression companies.*

- As emergency management is an important local government function, and as the Village has a Comprehensive Emergency Management Plan, *CPSM recommends the Village develop a basic Emergency Management Response Plan that is applicable to all Village departments and employees, and one that extracts pertinent information from the Village CEMP regarding response and Emergency Support Function (ESF) roles; and that assigns specific ESF roles to Village employees by position, and not in general by department, and that includes specific roles and responsibilities of each assignment. CPSM further recommends that once these ESF roles are specifically assigned, future training exercises focus on ESF responsibilities and execution of these important duties.*

- The NIMS training classes outlined in this assessment are designed to educate response personnel in the fundamentals of incident management, as well as the application of the NIMS components in the Village. *CPSM recommends essential personnel assigned to the Village, City of Miami, or County EOC, and who have response assignments during an emergency or disaster, be trained to the appropriate NIMS level as outlined herein.*

- Another important document the Village should maintain is a Continuity of Operations Plan (COOP). A COOP is important to any organization, especially local governments that operate

financial and human resources systems, facilities, public operations, and vital community services. A COOP is developed to serve as a roadmap that builds the organization's plan to prepare for, react to, and respond to any event that disrupts one or more operation, facility, service, or line of succession. As the Village has a COOP in place, *CPSM recommends the Village maintains an up to date COOP that is all-hazards and that has the ability to ensure the effects of any interruption in a Village office, system, operation, and staffing before or during an event are successfully managed and the Village is able to perform all essential functions.*

The emergency management function is an essential operation for all communities, particularly coastal communities that are vulnerable to tropical events. As reviewed herein, the Village will benefit from a Basic Emergency Management Response Plan specific to all employees and departments, coordinated emergency management training, sustainment of a COOP, and management and coordination of a Village EOC.

In smaller communities this may not be a full-time position, however and due to the required planning and sustainment of emergency management functions as described herein, *CPSM recommends at a minimum, a member of the KBFR staff to be assigned the responsibility of emergency management planning and provided the resources to successfully carry out the objective of this role.*

■ KBFR does not have a dedicated training and education position and does not include training and education (other than probationary training) in the department's Administrative Policies and Procedures Manual. *CPSM recommends the training and education function, to include state certification compliance be assigned to the appropriate staff member and personnel who can give this important fire-rescue department function consistent attention. CPSM also recommends KBFR develop a training and education committee whose focus is on developing training and education policies and guidelines that are linked to local, state, and national standards, and as well links to the department's accreditation, strategic planning, and the ISO-PPC requirements.*

■ Currently health, safety, and wellness are the responsibility of the Fire Chief and Deputy Chief of Operations, and to some degree the shift Captains. Managing the health, safety, and wellness components of a fire-rescue department are as important as any other, as the concepts of health, safety, and wellness apply to both emergency and non-emergency activities. For KBFR this will take dedicated staff hours and oversight from a command and station level. *CPSM recommends KBFR develop a health, safety, and wellness committee, which includes the Village Human Resources Department, whose primary mission is to develop and implement a comprehensive health, safety, and wellness initiative program that aligns with NFPA 1500, Standard on Fire Department Occupational Safety and Wellness Programs, 2021 edition. CPSM further recommends the Deputy Chief of Operations have department health, safety, and wellness oversight as the department Health and Safety Officer.*

■ The review processes for re-accreditation and ISO-PPC are extensive. Additionally, there are compliance measures that must be monitored to ensure a successful and positive review of both. These include department performance objectives established in the Standards of Cover, Strategic Plan, and self-assessment manual accreditation documents.

For the ISO-PPC review, there are annual operational training and pre-planning hours that must be met for full credit in these categories, as well as compliance with certifications and training in the Fire Marshal's Office. Additionally, there are water system compliance measures regarding inspecting and flow testing fire hydrants in the ISO-PPC review. Coordinating the review processes and monitoring for re-accreditation and the ISO-PPC and ensuring compliance with accreditation and the ISO-PPC as discussed herein requires dedicated KBFR staff hours.

While not a full-time employee, at a minimum *CPSM recommends a KBFR employee be assigned accreditation and ISO-PPC review programs to ensure compliance with accreditation components when KBFR was designated as a fully accredited fire agency, and to ensure compliance with all components of the ISO-PPC Fire Suppression Rating System to receive maximum credits in each.*

The approaching retirements of all KBFR senior management (Fire Chief, 2-Deputy Chiefs) and middle management (3 Captains) and identified gaps in program management such as emergency management, training and education, compliance, accreditation, ISO-PPC, and health, safety and wellness oversight provide opportunity to re-visit the KBFR organizational chart.

An organizational chart CPSM recommends for consideration is illustrated in the next figure.

Figure 13: Proposed Organizational Chart
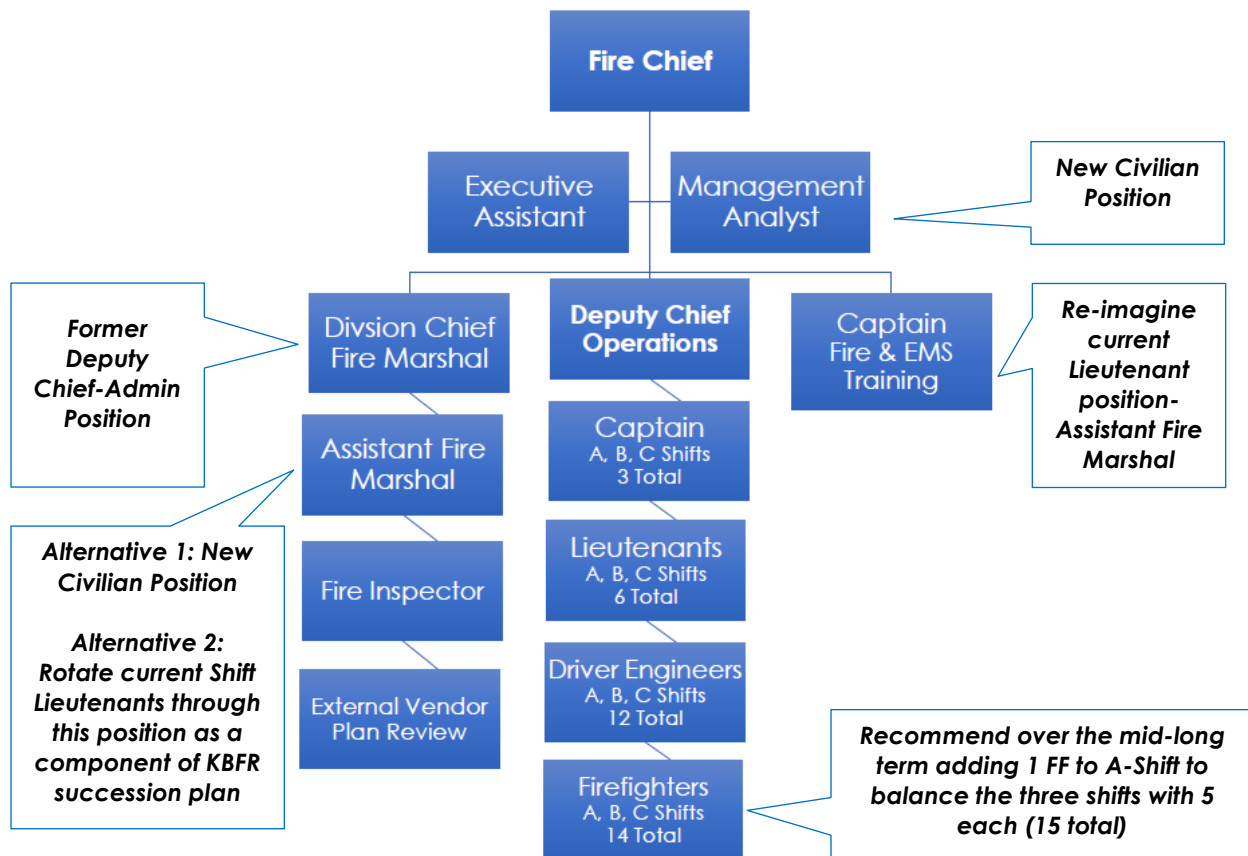
In the proposed organizational chart, CPSM is also outlining the following leadership and management positions as they link to key organizational functions.

- ■ **Fire Chief**
  - o Department Director.
  - o Overarching leadership and management of KBFR.
  - o Provides overarching strategic and programmatic planning, direction, and guidance.

- Emergency Management Director (designee) pursuant to Chapter 9-3(b) of the Code of Key Biscayne.

■ **Deputy Fire Chief**

- Deputy Department Director.

- Overarching leadership and management of all KBFR Emergency Operations to include: preparedness; response; mitigation; programs; and infrastructure.

- Department Health & Safety Officer.

- Provides direct supervision to Station Captains.

■ **Division Chief: Fire Marshal**

- Third in command--KBFR (continuity of operations).

- Overarching leadership and management of Community Risk Reduction programs and services to include fire code enforcement; fire investigation; public life safety education; fire suppression fire safety inspections; permitting; and associated Community Risk Reduction programs.

- Manages plan review vendor and contract.

- Provides direct supervision to Community Risk Reduction staff.

■ **Station Captain: Shift Commander**

- Overarching leadership and management of assigned shift to include assigned personnel, non-emergency station duties and training, emergency operations, and undertaking assigned ancillary duties during Village business hours.

- Serves as incident commander. May respond to incidents in command vehicle.

- Serves as the shift Health & Safety Officer.

- Serves as the shift Training Officer.

- Manages assigned ancillary duties that may include: fleet services; facility maintenance; uniforms; personal protective gear; self-contained breathing apparatus; EMS supplies; operational supply chain; and fire apparatus equipment and supplies.

- Provides direct supervision to shift Lieutenants.

■ **Captain: Fire and EMS Training**

- Manages department EMS training and compliance with state statutes.

- Manages department Fire training and compliance with accreditation and ISO-PPC standards.

- Liaison with department Medical Director.

- Works with Medical Director regarding EMS QA/QI program.

- Manages department COPCN process and all EMS licensing.

■ **Lieutenant: Assistant Shift Commander**

- Assists the Station Captain with overall day-to-day leadership and management of assigned shift to include assigned personnel, non-emergency station duties and training, and emergency operations.

- o Serves as incident commander when operating on EMS unit; as necessary on other incidents.

- o Assists the Station Captain with shift health, safety, and wellness initiatives.

- o Assists the Station Captain with shift Fire and EMS training as assigned.

- o Assists Station Captain with assigned shift ancillary duties.

- o Provides direct supervision to Driver Engineers and Firefighters.

- **Management Analyst**

  - o Manages the department budget and all fiscal matters.

  - o Manages all department human resource functions in conjunction with Village human resources department.

  - o Assist the Fire Chief in all Emergency Management program functions to include Emergency Management Planning, Preparedness, Response, and Mitigation efforts.

  - o Maintains Village Continuity of Operations Plan.

  - o KBFR Public Affairs Officer.

  - o KBFR Accreditation Manager

  - o KBFR ISO-PPC Manager.

The Management analyst is proposed as a new KBFR full time equivalent position. The position is proposed and recommended by CPSM due to the gaps in program work that exist and that have been outlined in this workforce assessment, particularly program work in Emergency Management, which is a Village-wide program; KBFR public affairs; and overall accreditation and ISO-PPC planning and compliance.

CPSM also proposes the Lieutenant position in the Community Risk Reduction division be re-imagined and upgraded to the Fire and EMS Training and Compliance Captain position. CPSM proposes this as the components identified this position will manage are currently deficient in KBFR. Community Risk Reduction maintains the benefit of two full-time positions and the fire suppression fire-safety inspection program. To offset this movement of position, CPSM also proposes two alternatives for the Community Risk Reduction division:

1. Create a civilian Assistant Fire Marshal position (will add one additional FTE to the KBFR count).

2. Utilize this position as a part of the KBFR succession plan by rotating operational shift Lieutenants through the Community Risk Reduction division fulfilling defined roles based on certification, knowledge, and experience in fire prevention and public life safety education. While this is occurring, driver engineers can move up to the vacated shift Lieutenant position as acting Lieutenant on a rotational basis as a part of the succession plan as well.

If KBFR adopts the proposed organizational chart and links the functional aspects as outlined above, it is likely Fire and EMS program gaps will close, planning and implementation will increase, and the organization can better shape the future and move to one that is pro-active rather than reactive. This includes:

- Funding the Management Analyst position and placing the best and brightest person in the position who has the knowledge, skills, and abilities to perform the wide variety of tasks outlined for this position.

- Maintaining the Lieutenant position that is currently assigned to the Community Risk Reduction division and upgrading this position to Captain level (position responsibility and authority) and changing the position duties to Fire and EMS training and compliance.

- Re-imagining the Station Captain position as one of middle management and expanding assignments to this position, to include the response to incidents in an incident command vehicle. Over the mid-longer term, this position and the Training Captain position should transition to that of Battalion Chief. All Captains transition to Battalion Chief title.

- Ensuring a smooth transition of new and promoted employees through a succession/hiring plan that places the right people, in the right positions at the appropriate time in the future when filling the Fire Chief, Deputy Fire Chief, Fire Marshal, and three Station Captain positions, all of which will occur over the next 24-30 months.

To close, this workforce assessment is intended to assist the Village and KBFR in the near and midterms due to the imminent retirement of key leadership positions. While there are some longer term recommendations, it is important the KBFR and Village revisit this assessment in 36 months, which is after the transition out of long-term and key employees, and after the new Fire Chief and staff have been seated. There may be the potential need to increase operational staffing over the longer term, at a minimum of one per shift (3 total) as Fire and EMS demand will likely increase, and re-imagined positions such as the Station Captain (potentially Battalion Chief) takes on more duties and incident command roles.

End of Workforce Assessment

APPENDIX A. DATA ANALYSIS

Introduction

This data analysis was prepared as a key component of the study of the Key Biscayne Fire Rescue (KBFR), which was conducted by the Center for Public Safety Management, LLC (CPSM). This analysis examines all calls for service between June 1, 2021, and May 31, 2022, as recorded in the KBFR's Computer-Aided Dispatch (CAD) system and National Fire Incident Reporting System (NFIRS).

This analysis is made up of four parts. The first part focuses on call types and dispatches. The second part explores the time spent and the workload of individual units. The third part presents an analysis of the busiest hours in the year studied. The fourth part provides a response time analysis of KBFR units. The fifth and final part is an analysis of unit transport.

Between June 1, 2021, and May 31, 2022, the Key Biscayne Fire Rescue responded to 1,980 calls, of which 50 percent were EMS calls. The total combined workload (deployed time) for KBFR units was 1,159.8 hours. The average dispatch time was 1.6 minutes, and the average total response time was 6.0 minutes. The 90th percentile dispatch time was 2.9 minutes and the 90th percentile total response time was 8.4 minutes.

Methodology

In this report, CPSM analyzes calls and runs. A call is an emergency service request or incident. A run is a dispatch of a unit (i.e., a unit responding to a call). Thus, a call may include multiple runs.

We received CAD data and Firehouse NFIRS data for the Key Biscayne Fire Rescue. We first matched the NFIRS and CAD data based on the incident numbers provided. Then, we classified the calls into a series of steps. We first used the NFIRS incident type to identify canceled calls and to assign emergency medical service (EMS), motor vehicle accident (MVA), and fire category call types. EMS calls were then assigned detailed categories based on their Medical Priority Dispatch System (MPDS) codes. The method to categorize incident types is shown in Attachment IV.

We received records for 2,097 total calls that were made between June 1, 2021, and May 31, 2022. We removed 50 calls lacking a responding KBFR unit and 47 calls to which a unit was dispatched but did not go en route or arrive on scene.

SUMMARY OF CALLS AND WORKLOAD

In this report, we separated the workload of Key Biscayne Fire Rescue (KBFR), Miami Fire Rescue (MFR), and Miami Dade Cunty Fire Rescue (MDCFR). Tables 1 and 2 summarize the number of calls and the corresponding workload, broken out by responding agencies and grand call type.

The main analysis includes the 1,980 calls responded to by KBFR units. The workload of the 94 calls responded to by MFR is presented in Attachment III.

TABLE 2: Calls by Responding Agency and Call Type

Responding Agency	Number of Calls				Percent Calls
	EMS	Fire	Other	Total	
KBFR Only	975	899	31	1,905	95.3
MFR and MDCFR Only	5	11	4	20	1.0
KBFR, MFR, and MDCFR	21	49	5	75	3.8
Total	**1,001**	**959**	**40**	**2,000**	**100.0**

Note: Out of 20 calls responded to by MFR and MDCFR only, MFR responded to 20 calls and MDCFR responded to one call. Out of 75 calls that were jointly responded to by KBFR and other agencies, MFR responded to 74 calls and MDCFR responded to one call. We received a record of 126 calls responded to by MFR and removed 32 of them that lacked both en route and arriving units.

TABLE 3: Runs by Responding Agency and Call Type

Responding Agency	Number of Runs				Work Hours			
	EMS	Fire	Other	Total	EMS	Fire	Other	Total
KBFR	1,079	1,053	37	2,169	858.6	294.6	6.6	1,159.8
MFR	28	219	15	262	12.0	40.1	3.5	55.6
MDCFR	1	0	1	2	1.0	0.0	0.0	1.0
Total	**1,108**	**1,272**	**53**	**2,433**	**871.6**	**334.7**	**10.1**	**1,216.4**

Note: **KBFR=Key Biscayne Fire Rescue; **MFR=Miami Fire Rescue; ***MDCFR=Miami Dade County Fire Rescue.

Observations:

■ Key Biscayne made 2,169 runs (89.1 percent of total runs).

■ Miami Fire Rescue made 262 runs (10.8 percent of total runs).

■ Miami Dade County Fire Rescue made two runs (0.1 percent of total runs).

AGGREGATE CALL TOTALS

Between June 1, 2021, and May 31, 2022, KBFR responded to 1,980 calls, of which 11 were structure fire calls and 11 were outside fire calls.

CALLS BY TYPE

Table 3, Figure 1, and Figure 2 show the number of calls by call type, average calls per day, and the percentage of calls that fall into each call type category for the 12 months studied.

TABLE 4: Call Types

Call Type	Total Calls	Calls per Day	Call Percentage
Breathing difficulty	62	0.2	3.1
Cardiac and stroke	141	0.4	7.1
Fall and injury	243	0.7	12.3
Illness and other	359	1.0	18.1
MVA	30	0.1	1.5
Overdose and psychiatric	32	0.1	1.6
Seizure and unconsciousness	129	0.4	6.5
EMS Subtotal	**996**	**2.7**	**50.3**
False alarm	654	1.8	33.0
Good intent	11	0.0	0.6
Hazard	55	0.2	2.8
Outside fire	11	0.0	0.6
Public service	206	0.6	10.4
Structure fire	11	0.0	0.6
Fire Subtotal	**948**	**2.6**	**47.9**
Canceled	25	0.1	1.3
Aid given	11	0.0	0.6
Total	**1,980**	**5.4**	**100.0**

Note: One mutual aid call was canceled.

FIGURE 1: EMS Calls by Type

Legend:
- Breathing difficulty
- Cardiac and stroke
- Fall and injury
- Illness and other
- MVA
- Overdose and psychiatric
- Seizure and unconsciousness

6.2%
14.2%
24.4%
36.0%
3.0%
3.2%
13.0%
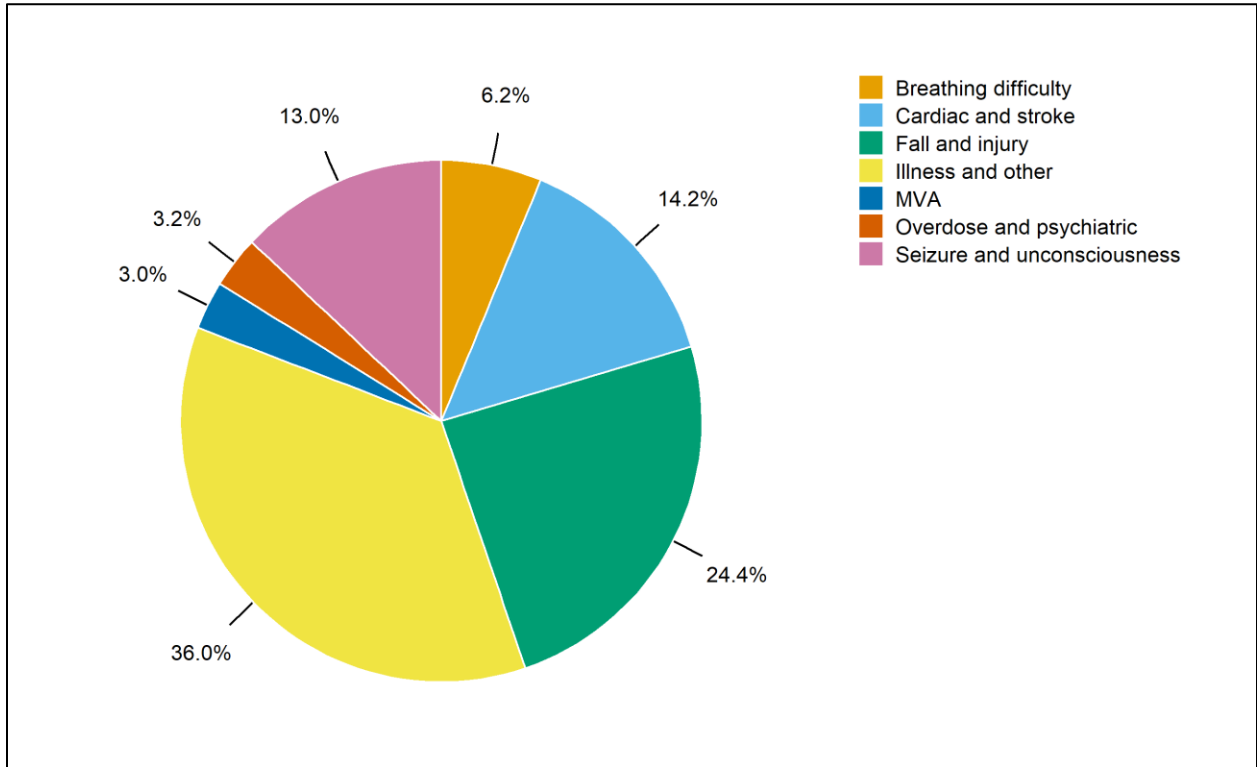
FIGURE 2: Fire Calls by Type

Legend:
- False alarm
- Good intent
- Hazard
- Outside fire
- Public service
- Structure fire

1.2%
21.7%
1.2%
5.8%
1.2%
69.0%
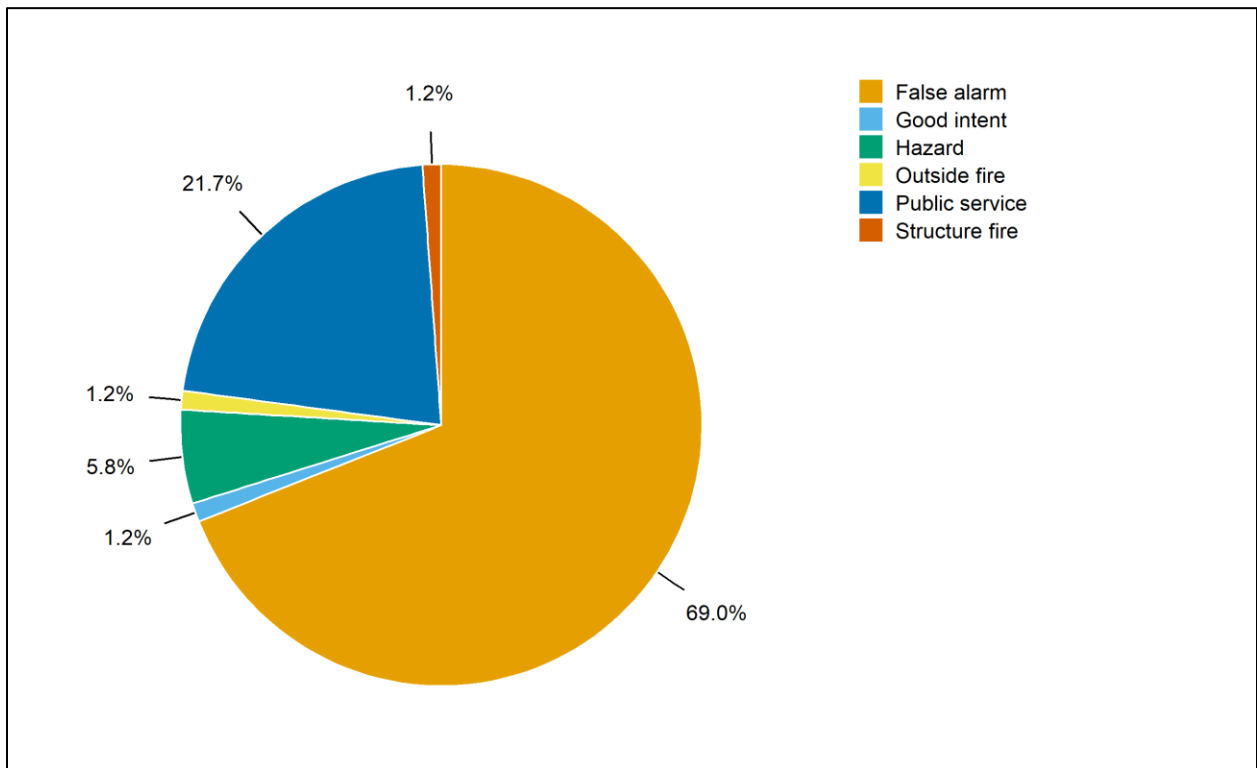
Observations:

Overall

- The department received an average of 5.4 calls, including 0.07 canceled calls, per day.

EMS

- EMS calls for the year totaled 996 (50 percent of all calls), an average of 2.7 calls per day.

- Illness and other calls were the largest category of EMS calls at 36 percent of EMS calls, an average of 1.0 calls per day.

- Cardiac and stroke calls made up 14 percent of EMS calls, an average of 0.4 calls per day.

- Motor vehicle accidents made up 3 percent of EMS calls, an average of 0.08 calls per day.

Fire

- Fire calls for the year totaled 948 (48 percent of all calls), an average of 2.6 per day.

- False alarm calls were the largest category of fire calls at 69 percent of fire calls, an average of 1.8 calls per day

- Structure and outside fire calls combined made up two percent of fire calls, an average of 0.06 calls per day, or one call every 17 days.

CALLS BY TYPE AND DURATION

Table 4 shows the duration of calls by type using four duration categories: less than 30 minutes, 30 minutes to one hour, one to two hours, and more than two hours.

TABLE 5: Calls by Type and Duration

Call Type	Less than 30 Minutes	30 Minutes to One Hour	One to Two Hours	Two or More Hours	Total
Breathing difficulty	19	20	22	1	62
Cardiac and stroke	37	41	60	3	141
Fall and injury	96	69	76	2	243
Illness and other	125	108	119	7	359
MVA	15	6	9	0	30
Overdose and psychiatric	13	7	12	0	32
Seizure and unconsciousness	34	30	63	2	129
EMS Subtotal	**339**	**281**	**361**	**15**	**996**
False alarm	625	28	1	0	654
Good intent	9	2	0	0	11
Hazard	32	13	8	2	55
Outside fire	6	2	2	1	11
Public service	181	22	2	1	206
Structure fire	4	3	3	1	11
Fire Subtotal	**857**	**70**	**16**	**5**	**948**
Canceled	**24**	**1**	**0**	**0**	**25**
Aid given	**8**	**2**	1	**0**	11
Total	**1,228**	**354**	**378**	**20**	**1,980**

Observations:

EMS

- On average, there were 1.0 EMS calls per day that lasted more than one hour.

- A total of 620 EMS calls (62 percent) lasted less than one hour, 361 EMS calls (36 percent) lasted one to two hours, and 15 EMS calls (two percent) lasted two or more hours.

Fire

- On average, there were 0.1 fire calls per day that lasted more than one hour.

- A total of 927 fire calls (98 percent) lasted less than one hour, 16 fire calls (two percent) lasted one to two hours, and five fire calls (one percent) lasted two or more hours.

- A total of eight outside fire calls (73 percent) lasted less than one hour, two outside fire calls (18 percent) lasted one to two hours, and one outside fire call (nine percent) lasted two or more hours.

- A total of seven structure fire calls (64 percent) lasted less than one hour, three structure fire calls (27 percent) lasted one to two hours, and one structure fire call (nine percent) lasted two or more hours.

CALLS BY MONTH AND HOUR OF DAY

Figure 3 shows the monthly variation in the average daily number of calls handled by the KBFR from June 1, 2021, to May 31, 2022. Similarly, Figure 4 illustrates the average number of calls received each hour of the day over the year.

FIGURE 3: Calls by Month
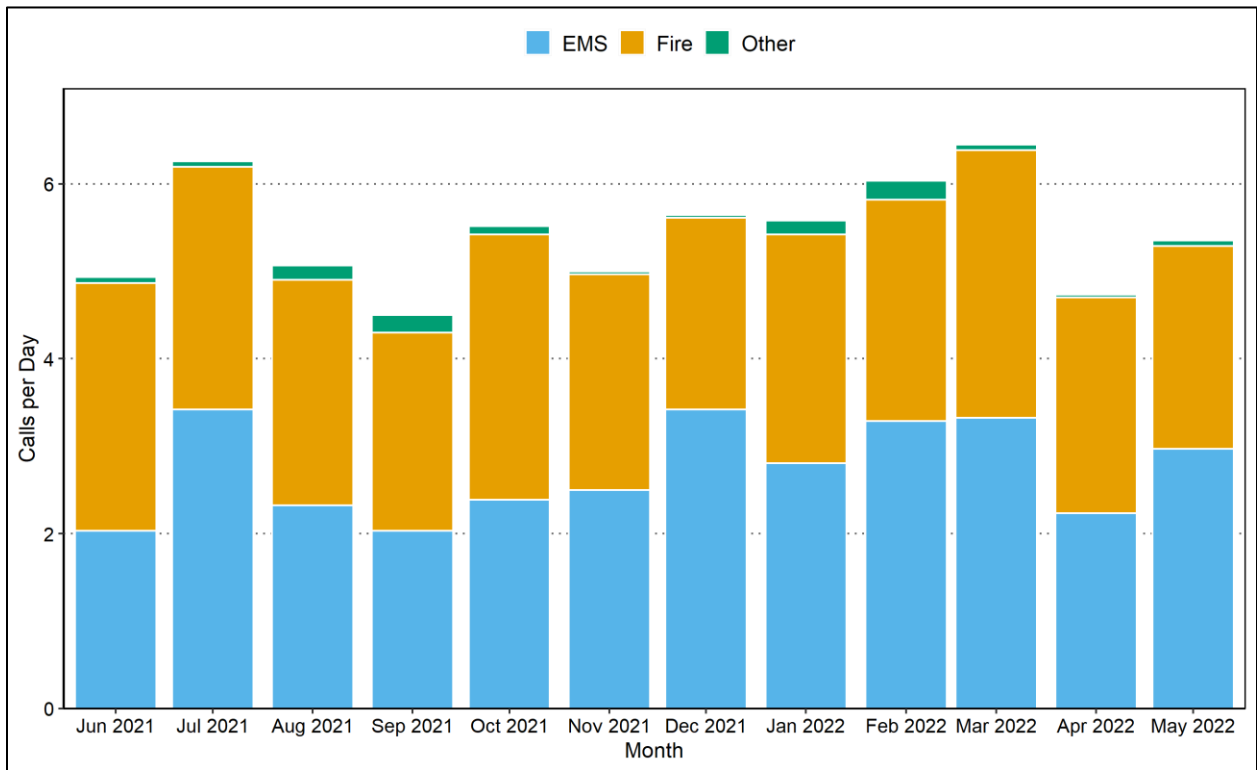
Observations:

- Average EMS calls per day ranged from 2.0 in both June and September 2021 to 3.4 in both July and December 2021.

- Average fire calls per day ranged from 2.2 in December 2021 to 3.1 in March 2022.

- Average calls per day overall ranged from 4.5 in September 2021 to 6.5 in March 2022.

FIGURE 4: Calls by Hour of Day
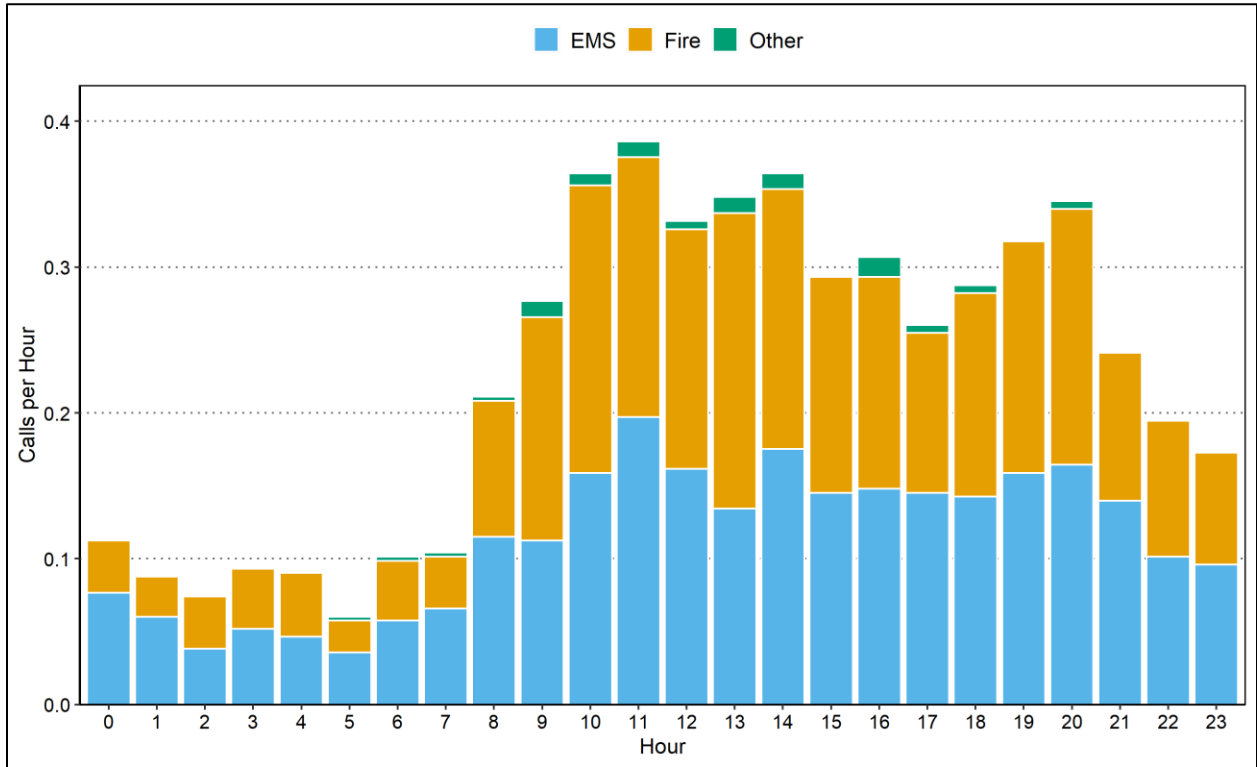
Observations:

- Average EMS calls per hour ranged from 0.04 between 5:00 a.m. and 6:00 a.m. to 0.20 between 11:00 a.m. and noon.

- Average fire calls per hour ranged from 0.02 between 5:00 a.m. and 6:00 a.m. to 0.20 between 1:00 p.m. and 2:00 p.m.

- Average calls per hour overall ranged from 0.06 between 5:00 a.m. and 6:00 a.m. to 0.39 between 11:00 a.m. and noon.

UNITS ARRIVED AT CALLS

Table 5, along with Figures 5 and 6, detail the number of calls with one and two or more units arriving at a call, broken down by call type. In this section, we limit ourselves to calls where a KBFR unit arrives.

TABLE 6: Calls by Call Type and Number of Arriving Units

Call Type	Number of Units		Total Calls
	One	Two or More	
Breathing difficulty	59	3	62
Cardiac and stroke	127	14	141
Fall and injury	228	15	243
Illness and other	341	17	358
MVA	26	4	30
Overdose and psychiatric	31	1	32
Seizure and unconsciousness	113	15	128
EMS Subtotal	**925**	**69**	**994**
False alarm	584	67	651
Good intent	10	1	11
Hazard	47	8	55
Outside fire	9	2	11
Public service	204	2	206
Structure fire	0	11	11
Fire Subtotal	**854**	**91**	**945**
Canceled	17	0	17
Aid given	11	0	11
Total	**1,807**	**160**	**1,967**
Percentage	**91.9**	**8.1**	**100.0**

Note: Only calls with arriving units were considered. There were 13 calls where a KBFR unit recorded an en route time but no unit recorded an arrival time. This included eight canceled calls, three false alarm calls, one illness and other call, and one seizure and unconsciousness call.

FIGURE 5: Calls by Number of Units Arriving – EMS

6.9%

One
Two or more

93.1%
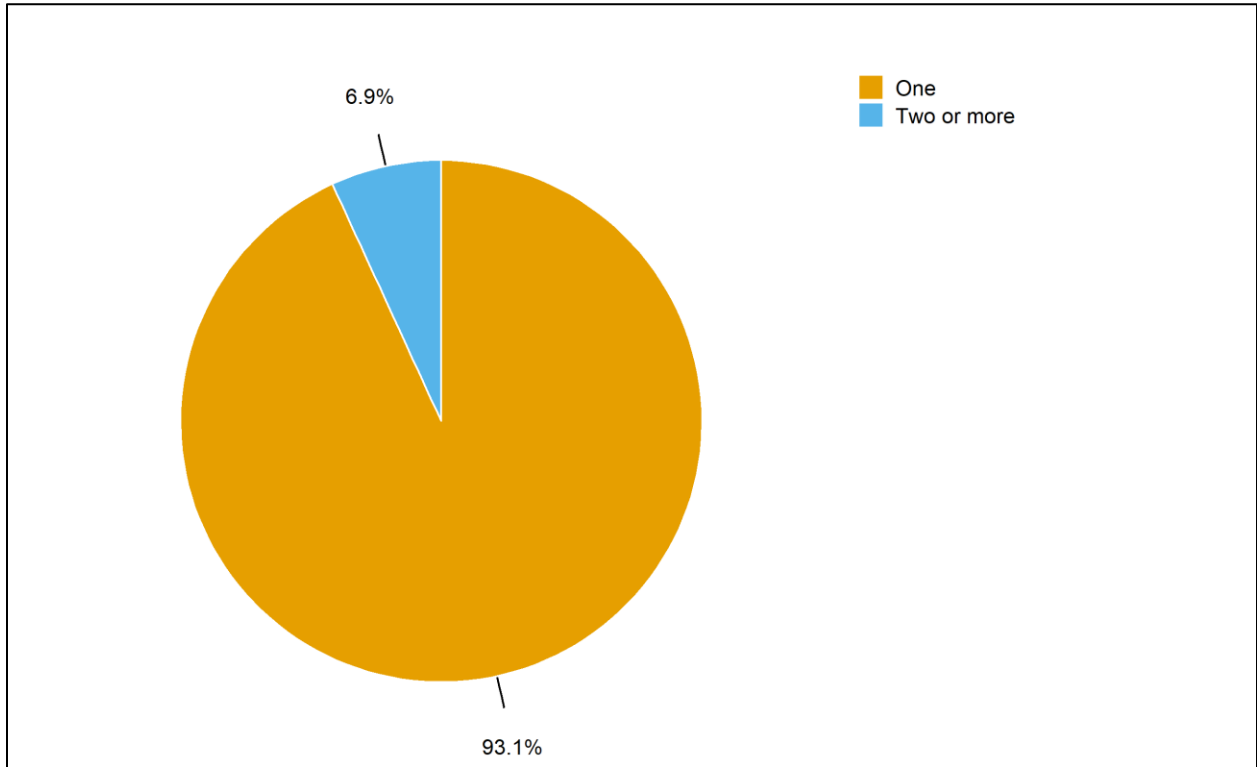
FIGURE 6: Calls by Number of Units Arriving – Fire

9.6%

One
Two or more

90.4%
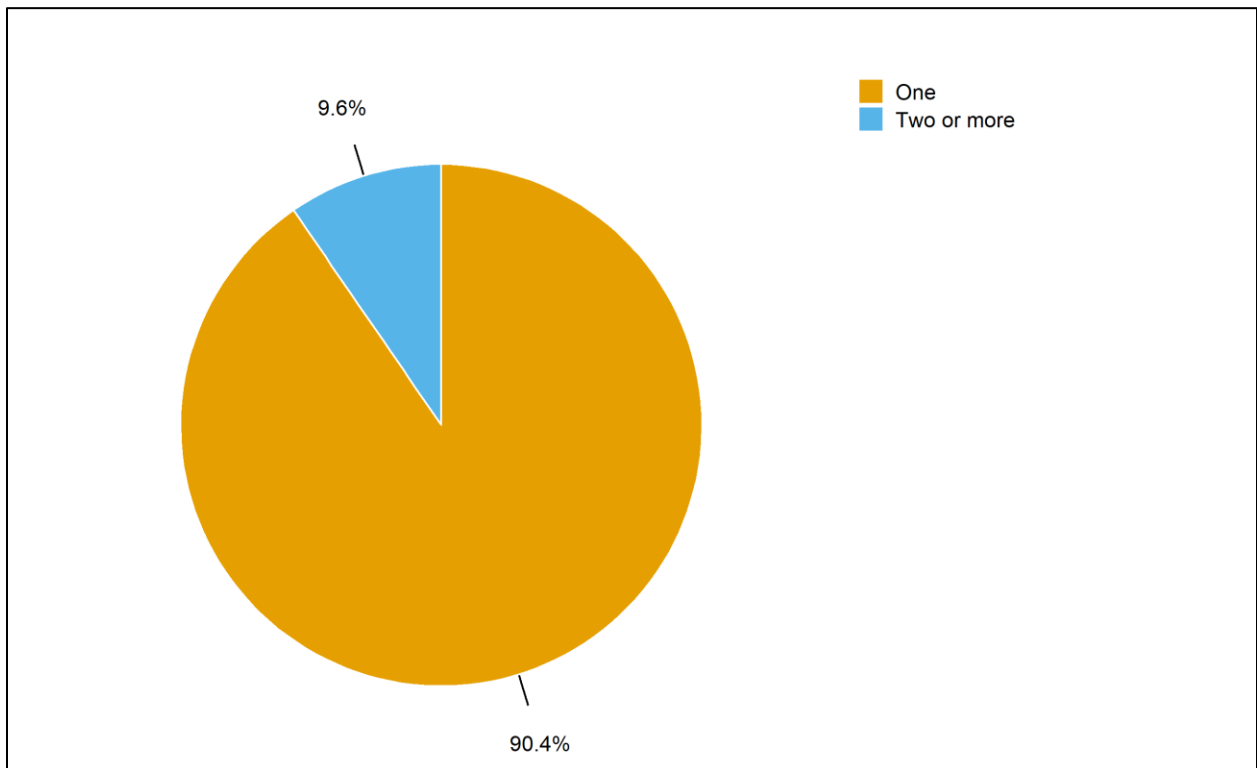
Observations:

Overall
- On average, 1.1 KBFR units arrived at all calls; for 92 percent of calls, only one unit arrived.
- Overall, two or more KBFR units arrived at eight percent of calls.

EMS
- On average, 1.1 KBFR units arrived per EMS call.
- For EMS calls, one unit arrived 93 percent of the time and two or more units arrived seven percent of the time.

Fire
- On average, 1.1 KBFR units arrived per fire call.
- For fire calls, one unit arrived 90 percent of the time and two or more units arrived 10 percent of the time.
- For outside fire calls, two or more units arrived 18 percent of the time.
- For structure fire calls, two or more units arrived all the time.

WORKLOAD: RUNS AND TOTAL TIME SPENT

The workload of each unit is measured in two ways: runs and deployed time. The deployed time of a run is measured from the time a unit is dispatched through the time the unit is cleared. Because multiple units respond to some calls, there are more runs (2,169) than calls (1,980) and the average deployed time per run varies from the total duration of calls.

RUNS AND DEPLOYED TIME – ALL UNITS

Deployed time, also referred to as deployed hours, is the total deployment time of all units deployed on all runs. Table 6 shows the total deployed time, both overall and broken down by type of run, for KBFR units between June 1, 2021, and May 31, 2022. Table 7 and Figure 7 present the average deployed minutes by hour of day.

TABLE 7: Annual Runs and Deployed Time by Run Type

Run Type	Minutes per Run	Annual Hours	Percent of Hours	Minutes per Day	Annual Runs	Runs per Day
Breathing difficulty	50.6	55.7	4.8	9.2	66	0.2
Cardiac and stroke	50.8	133.8	11.5	22.0	158	0.4
Fall and injury	44.0	191.5	16.5	31.5	261	0.7
Illness and other	47.5	301.6	26.0	49.6	381	1.0
MVA	37.6	22.6	1.9	3.7	36	0.1
Overdose and psychiatric	46.6	25.7	2.2	4.2	33	0.1
Seizure and unconsciousness	53.2	127.6	11.0	21.0	144	0.4
EMS Subtotal	**47.7**	**858.6**	**74.0**	**141.1**	**1,079**	**3.0**
False alarm	14.3	173.6	15.0	28.5	729	2.0
Good intent	17.5	3.5	0.3	0.6	12	0.0
Hazard	33.1	34.8	3.0	5.7	63	0.2
Outside fire	35.8	9.0	0.8	1.5	15	0.0
Public service	16.8	58.9	5.1	9.7	210	0.6
Structure fire	37.3	14.9	1.3	2.5	24	0.1
Fire Subtotal	**16.8**	**294.6**	**25.4**	**48.4**	**1,053**	**2.9**
Canceled	6.9	3.0	0.3	0.5	26	0.1
Aid given	19.5	3.6	0.3	0.6	11	0.0
Other Subtotal	**10.6**	**6.6**	**0.6**	**1.1**	**37**	**0.1**
Total	**32.1**	**1,159.8**	**100.0**	**190.6**	**2,169**	**5.9**

Observations:

Overall

- The total deployed time for the year was 1,159.8 hours. The daily average was 190.6 minutes for all units combined.

- There were 2,169 runs, including 26 runs dispatched for canceled and 11 runs dispatched for aid-given calls. The daily average was 5.9 runs.

EMS

- EMS runs accounted for 74 percent of the total workload.

- The average deployed time for EMS runs was 47.7 minutes. The deployed time for all EMS runs averaged 141.1 minutes per day.

Fire

- Fire runs accounted for 25 percent of the total workload.

- The average deployed time for fire runs was 16.8 minutes. The deployed time for all fire runs averaged 48.4 minutes per day.

- There were 39 runs for structure and outside fire calls combined, with a total workload of 23.9 hours. This accounted for two percent of the total workload.

- The average deployed time for outside fire runs was 35.8 minutes per run, and the average deployed time for structure fire runs was 37.3 minutes per run.

TABLE 8: Average Deployed Minutes by Hour of Day

Hour	EMS	Fire	Other	Total
0	4.4	0.8	0.0	5.3
1	3.1	0.9	0.0	4.0
2	2.6	1.1	0.0	3.6
3	2.6	1.1	0.0	3.7
4	2.9	0.8	0.0	3.8
5	2.3	0.8	0.1	3.2
6	1.9	0.7	0.1	2.7
7	3.1	0.5	0.0	3.5
8	5.4	1.5	0.0	6.9
9	6.2	2.8	0.0	9.1
10	6.8	3.0	0.0	9.8
11	10.5	2.9	0.1	13.5
12	8.6	2.7	0.0	11.4
13	6.6	3.6	0.1	10.4
14	8.0	3.3	0.2	11.6
15	8.9	2.3	0.0	11.3
16	7.1	2.7	0.2	10.1
17	6.8	2.6	0.0	9.4
18	8.9	2.6	0.0	11.5
19	7.7	2.9	0.0	10.6
20	8.1	2.3	0.0	10.5
21	8.1	1.9	0.0	10.0
22	5.4	2.1	0.0	7.5
23	5.0	2.6	0.0	7.5
Daily Avg.	**141.1**	**48.4**	**1.1**	**190.6**

FIGURE 7: Average Deployed Minutes by Hour of Day
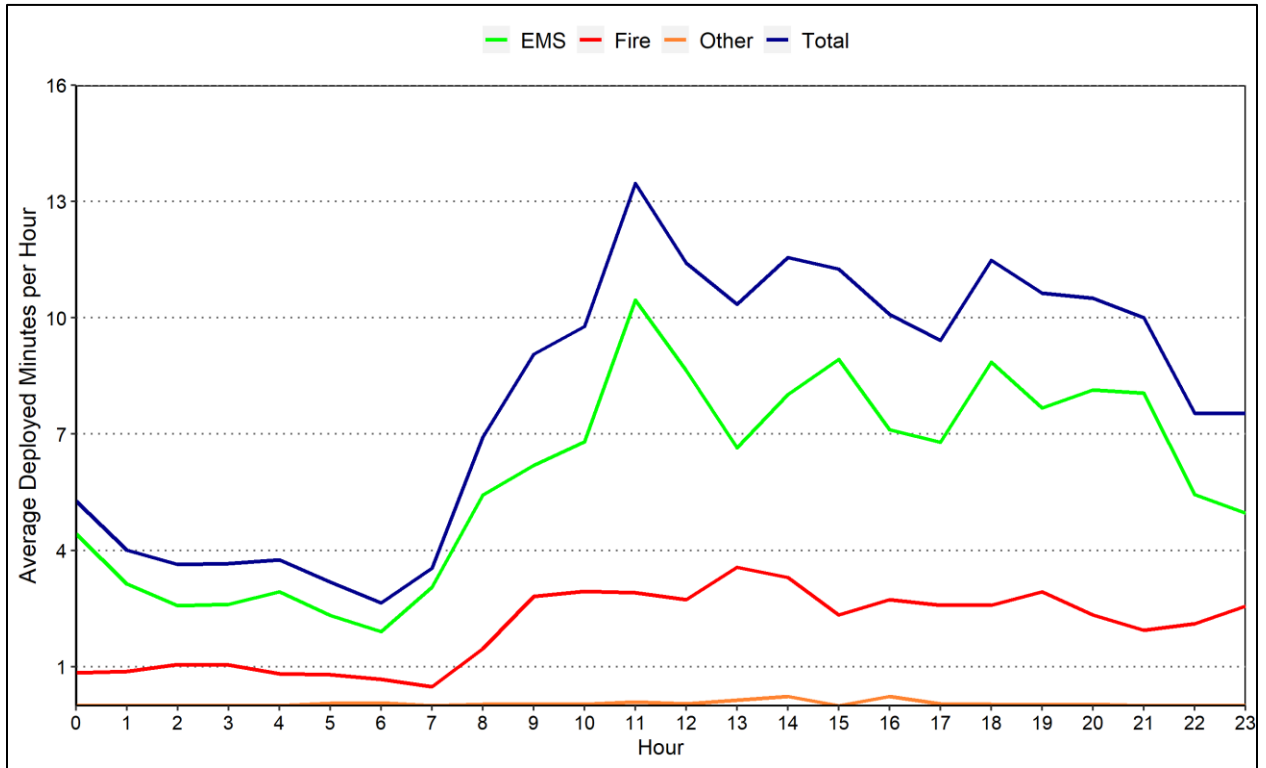
Observations:

■ The hourly deployed time was highest during the day from 10:00 a.m. to 10:00 p.m., averaging from 9.4 to 13.5 minutes.

■ Average deployed time peaked between 11:00 a.m. and noon, averaging 13.5 minutes.

■ Average deployed time was the lowest between 6:00 a.m. and 7:00 a.m., averaging 2.7 minutes.

WORKLOAD BY UNIT

Table 8 summarizes the annual workload of KBFR's units. Tables 9 and 10 provide a more detailed view of the workload for each unit, showing each unit's runs (Table 9) and the resulting daily average deployed time (Table 10) by run type.

TABLE 9: Annual Workload by KBFR Units

Unit	Unit Type	Minutes per Run	Total Hours	Total Percent	Minutes per Day	Total Runs	Runs per Day
KE2	Engine	16.5	51.0	4.4	8.4	185	0.5
KQ1	Quint	17.0	260.3	22.4	42.8	920	2.5
KR1	Rescue	47.6	377.9	32.6	62.1	476	1.3
KR2	Rescue	49.1	465.5	40.1	76.5	569	1.6
KS1	Squad	16.2	5.1	0.4	0.8	19	0.1
Total		**32.1**	**1,159.8**	**100.0**	**190.6**	**2,169**	**5.9**

TABLE 10: Annual Runs by Run Type and Unit

Unit	Unit Type	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Aid Given	Cancel	Total
KE2	Engine	9	127	1	11	3	22	10	0	2	185
KQ1	Quint	59	595	10	48	12	168	11	4	13	920
KR1	Rescue	462	2	0	2	0	4	2	2	2	476
KR2	Rescue	539	4	1	2	0	8	1	5	9	569
KS1	Squad	10	1	0	0	0	8	0	0	0	19
Total		**1,079**	**729**	**12**	**63**	**15**	**210**	**24**	**11**	**26**	**2,169**

TABLE 11: Deployed Minutes per Day by Run Type and Unit

Unit	Unit Type	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Aid Given	Cancel	Total
KE2	Engine	0.6	4.7	0.1	0.6	0.5	1.1	0.8	0.0	0.0	8.4
KQ1	Quint	3.5	23.6	0.5	4.8	1.0	7.5	1.3	0.2	0.3	42.8
KR1	Rescue	61.4	0.1	0.0	0.1	0.0	0.2	0.3	0.1	0.0	62.1
KR2	Rescue	75.0	0.1	0.0	0.1	0.0	0.7	0.0	0.3	0.2	76.5
KS1	Squad	0.6	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.8
Total		**141.1**	**28.5**	**0.6**	**5.7**	**1.5**	**9.7**	**2.5**	**0.6**	**0.5**	**190.6**

AID GIVEN WORKLOAD

Table 11 details the information on 11 aid given calls, including the number of runs and deployed minutes for each call.

TABLE 12: Aid Given Runs and Deployed Minutes

Alarm Number	Incident Date	Address	MPDS Description	Response Unit	Deployed Minutes
67309	8/9/2021	Crandon Park; Wooded Area	Smoke investigation	1 (KQ1)	10.5
73799	8/30/2021	7300 Crandon Blvd	Vehicle fire	1 (KQ1)	32.0
79450	9/19/2021	2 Crandon Blvd	Sick person	1 (KR2)	8.9
79453	9/19/2021	2 Crandon Blvd	Traumatic INJ	1 (KR2)	5.8
81164	9/25/2021	2 Crandon Blvd	Traumatic INJ	1 (KR2)	4.7
89560	10/24/2021	4000 Crandon Blvd; S. end of beach	Diabetic problem	1 (KR2)	31.5
104060	12/15/2021	7300 Crandon Blvd; Tennis Center	COMM/DUST ALM	1 (KQ1)	12.0
15417	2/21/2022	Bill Baggs; Harbor Restaurant	Falls	1 (KR1)	28.7
16620	2/25/2022	Crandon Park; N Side Near Hotel	Ocean water rescue	1 (KR1)	6.3
35703	5/4/2022	4000 Crandon Blvd; Crandon Park	Unconsciousness	1 (KR2)	64.9
41269	5/23/2022	7300 Crandon Blvd; Tennis Center	COMM/DUST ALM	1 (KQ1)	9.0
Total				**11**	**214.3**

Note: we received a record of 17 aid calls. Two calls (alarm numbers 36348 and 41294) were removed because they lacked en route and arrival times. Another four calls (alarm numbers 23674, 56287, 77251, and 77596) were removed because they only involved Miami Fire Rescue units.

ANALYSIS OF BUSIEST HOURS

There is significant variability in the number of calls from hour to hour. One special concern relates to the resources available for hours with the heaviest workload. We tabulated the data for each of the 8,760 hours in the year. Table 12 shows the number of hours in the year in which there were zero to three or more calls during the hour. Table 13 shows the 10 one-hour intervals which had the most calls during the year. Table 14 examines the number of times a call within KBFR's first due area overlapped with another call within the same area.

TABLE 13: Frequency Distribution of the Number of Calls

Calls in an Hour	Frequency	Percentage
0	7,026	80.2
1	1,513	17.3
2	198	2.3
3+	23	0.3
Total	**8,760**	**100.0**

TABLE 14: Top 10 Hours with the Most Calls Received

Hour	Number of Calls	Number of Runs	Deployed Hours
12/31/2021 11:00 p.m. to midnight	4	8	2.3
12/7/2021 3:00 p.m. to 4:00 p.m.	4	7	2.3
3/26/2022 7:00 p.m. to 8:00 p.m.	3	10	0.8
5/13/2022 1:00 a.m. to 2:00 a.m.	3	5	2.0
10/15/2021 noon to 1:00 p.m.	3	5	1.7
1/6/2022 11:00 p.m. to midnight	3	5	1.2
7/3/2021 4:00 p.m. to 5:00 p.m.	3	4	2.8
7/26/2021 noon to 1:00 p.m.	3	4	2.7
9/29/2021 10:00 p.m. to 11:00 p.m.	3	4	2.7
7/20/2021 noon to 1:00 p.m.	3	4	2.2

Note: Total deployed hours are a measure of the total time spent responding to calls received in the hour and may extend into the next hour or hours. The number of runs and deployed hours only includes KBFR units.

TABLE 15: Frequency of Overlapping Calls Within KBFR's Fire District

Scenario	Number of Calls	Percent of All Calls	Total Hours
No overlapped call	1,744	88.1	977.4
Overlapped with one call	221	11.2	63.5
Overlapped with two calls	14	0.7	3.5
Overlapped with three calls	1	0.1	0.0

Observations:

- During 23 hours (0.3 percent of all hours), eleven or more calls occurred; in other words, the department responded to three or more calls in an hour roughly once every 16 days.

- The highest number of calls to occur in an hour was four, which happened twice.

- The hour with the most calls was 11:00 p.m. to midnight on December 31, 2021. The hour's four calls involved eight individual dispatches resulting in 2.3 hours of deployed time. These four calls included two fall and injury calls, and two false alarm calls.

- Another hour with the most calls was 3:00 p.m. to 4:00 p.m. on December 7, 2021. The hour's four calls involved seven individual dispatches resulting in 2.3 hours of deployed time. These four calls included two illness and other calls, one fall and injury call, and one false alarm call.

- The total overlapped hours during the 12 months were 66.9 hours.

RESPONSE TIME

In this part of the analysis, we present response time statistics for different call types. We separate response time into its identifiable components. *Dispatch time* is the difference between the time a call is received and the time a unit is dispatched. Dispatch time includes call processing time, which is the time required to determine the nature of the emergency and the types of resources to dispatch. *Turnout time* is the difference between dispatch time and the time a unit is en route to a call's location. *Travel time* is the difference between the time en route and arrival on scene. *Response time* is the total time elapsed between receiving a call to arriving on scene.

In this analysis, we included all calls responded to by Key Biscayne Fire Rescue to which at least one non-administrative from KBFR arrived while excluding canceled and aid given calls. In addition, calls with a total response time of more than 30 minutes were excluded. Finally, we focused on units that had complete time stamps, that is, units with all components recorded, so that we could calculate each segment of response time. Since most calls responded to by KBFR involved response with lights and sirens, we identified all calls as emergency calls.

Based on the methodology above, for 1,980 calls, we excluded 25 canceled calls, 11 aid-given calls, 12 calls where no units recorded a valid on-scene time, two calls with a total response time exceeding 30 minutes, and 275 calls where one or more segments of the first arriving unit's response time could not be calculated due to missing or faulty data. As a result, in this section, a total of 1,655 calls are included in the analysis.

RESPONSE TIME BY TYPE OF CALL

Table 15 breaks down the average and 90th percentile dispatch, turnout, travel, and total response times by call type. A 90th percentile means that 90 percent of calls had response times at or below that number. For example, Table 15 shows an overall 90th percentile response time of 8.4 minutes, which means that 90 percent of the time, a call had a response time of no more than 8.4 minutes. Figures 8 and 9 illustrate the same information.

TABLE 16: Average and 90th Percentile Response Time of First Arriving Unit, by Call Type (Minutes)

Call Type	Average Response Time				90th Percentile Response Time				Call Count
	Dispatch	Turnout	Travel	Total	Dispatch	Turnout	Travel	Total	
Breathing difficulty	1.7	2.3	2.2	6.2	2.6	3.6	3.6	7.8	54
Cardiac and stroke	1.6	2.1	2.3	6.0	2.8	3.0	3.4	8.3	113
Fall and injury	1.6	2.0	2.4	6.0	2.9	2.9	3.6	8.3	196
Illness and other	1.5	2.1	2.1	5.8	2.8	3.1	3.4	7.9	292
MVA	1.0	2.1	1.4	4.5	1.9	3.2	2.5	6.6	24
OD*	1.7	2.6	2.1	6.5	3.2	3.4	2.8	8.5	30
Seizure and UNC**	1.7	2.2	2.2	6.1	2.8	3.0	3.8	8.4	114
EMS Subtotal	**1.6**	**2.1**	**2.2**	**5.9**	**2.8**	**3.2**	**3.5**	**8.1**	**823**
False alarm	1.6	2.2	2.3	6.1	3.8	3.0	3.4	9.5	607
Good intent	1.7	2.4	2.8	6.9	2.6	3.3	6.1	9.2	4
Hazard	1.2	2.2	2.4	5.8	2.0	3.2	3.8	8.3	42
Outside fire	1.0	2.6	2.6	6.1	2.0	3.3	5.7	8.2	9
Public service	1.6	2.3	2.1	6.0	3.3	3.4	3.3	8.8	159
Structure fire	0.9	2.4	1.4	4.7	1.4	3.4	2.7	6.1	11
Fire Subtotal	**1.6**	**2.2**	**2.2**	**6.1**	**3.3**	**3.1**	**3.5**	**9.1**	**832**
Total	**1.6**	**2.2**	**2.2**	**6.0**	**2.9**	**3.1**	**3.5**	**8.4**	**1,655**

Note: *OD= Overdose and psychiatric; **UNC=Unconsciousness.

FIGURE 8: Average Response Time of First Arriving Unit, by Call Type – EMS
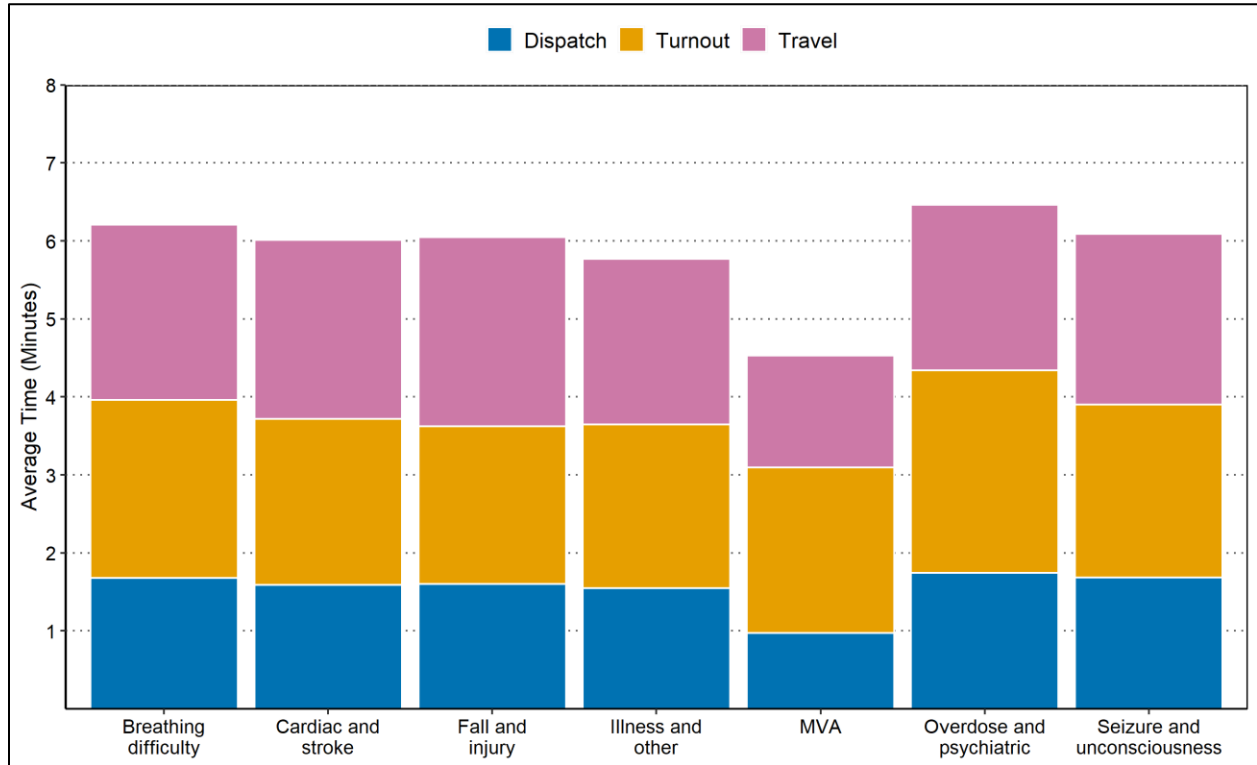
FIGURE 9: Average Response Time of First Arriving Unit, by Call Type – Fire
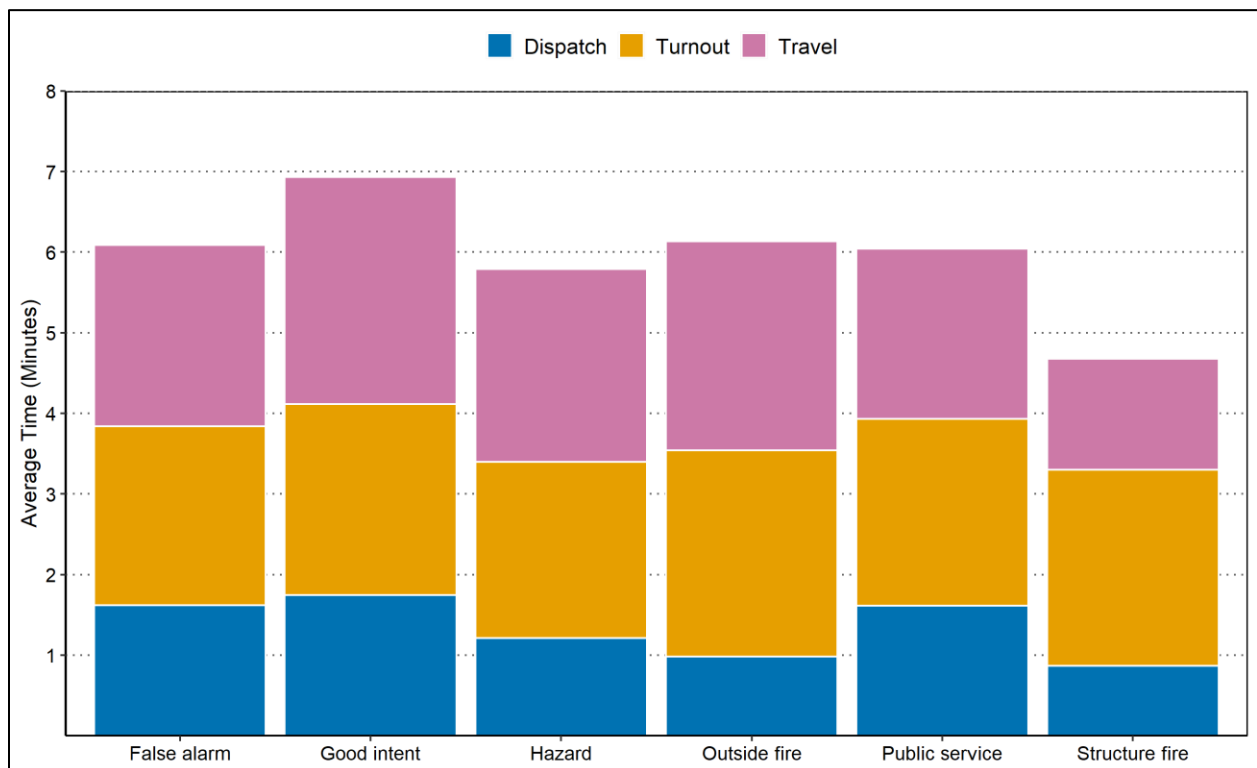
Observations:

- The average dispatch time was 1.6 minutes.
- The average turnout time was 2.2 minutes.
- The average travel time was 2.2 minutes.
- The average total response time was 6.0 minutes.
- The average response time was 5.9 minutes for EMS calls and 6.1 minutes for fire calls.
- The average response time was 6.1 minutes for outside fires and 4.7 minutes for structure fires.
- The 90th percentile dispatch time was 2.9 minutes.
- The 90th percentile turnout time was 3.1 minutes.
- The 90th percentile travel time was 3.5 minutes.
- The 90th percentile total response time was 8.4 minutes.
- The 90th percentile response time was 8.1 minutes for EMS calls and 9.1 minutes for fire calls.
- The 90th percentile response time was 8.2 minutes for outside fires and 6.1 minutes for structure fires.

RESPONSE TIME BY HOUR

Table 16 shows the average response time by the time of day. The table also shows 90th percentile response times. Figure 10 shows the average response time by the time of day.

TABLE 17: Average and 90th Percentile Response Time of First Arriving Unit, by Hour of Day

Hour	Dispatch	Turnout	Travel	Response Time	90th Percentile Response Time	Number of Calls
0	1.2	3.0	2.2	6.4	8.6	36
1	1.7	3.0	2.1	6.8	9.8	29
2	1.5	3.0	2.0	6.6	9.3	25
3	1.9	3.1	2.4	7.4	9.4	30
4	1.3	3.0	2.5	6.8	8.4	32
5	1.5	2.7	2.3	6.4	9.2	20
6	1.4	2.6	1.6	5.6	7.4	33
7	1.4	2.4	1.9	5.7	7.6	28
8	1.7	1.9	2.4	6.0	8.3	64
9	1.8	1.9	2.6	6.3	9.8	84
10	1.5	1.8	2.3	5.7	8.5	116
11	1.5	1.9	2.5	5.9	8.1	111
12	2.3	2.0	2.1	6.3	9.4	91
13	1.3	2.0	2.2	5.6	7.8	105
14	1.6	2.1	2.1	5.8	8.5	107
15	1.3	2.1	2.1	5.5	8.3	89
6	1.4	2.0	2.5	5.9	8.0	81
17	1.9	2.2	2.3	6.4	9.8	77
18	1.5	2.0	1.8	5.3	6.8	87
19	1.7	2.2	2.1	6.0	7.8	102
20	1.4	2.2	2.3	5.8	8.7	114
21	1.4	2.3	2.2	5.9	8.6	75
22	1.5	2.5	2.0	6.1	7.8	62
23	2.1	2.7	2.0	6.8	9.1	57
Total	**1.6**	**2.2**	**2.2**	**6.0**	**8.4**	**1,655**

FIGURE 10: Average Response Time of First Arriving Unit at Key Biscayne, by Hour of Day
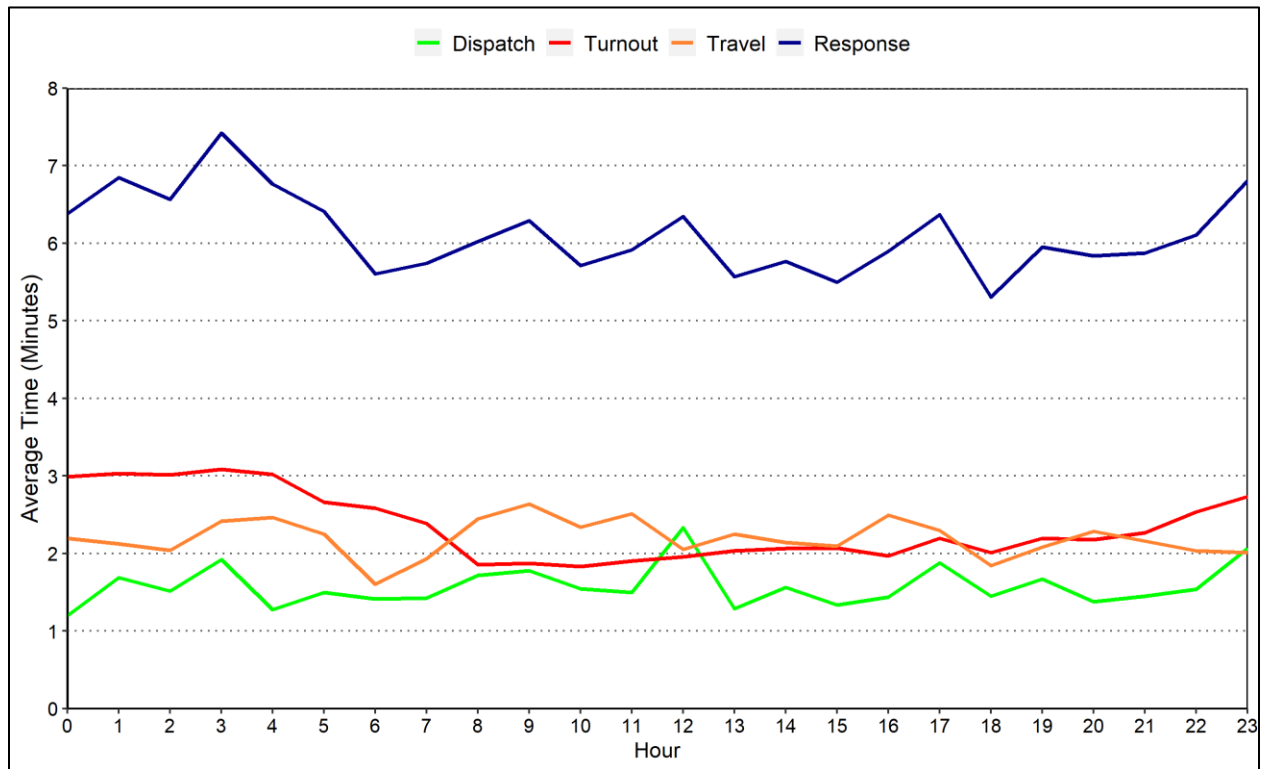
Observations:

- Average dispatch time was between 1.2 minutes (midnight to 1:00 a.m.) and 2.3 minutes (noon to 1:00 p.m.).

- Average turnout time was between 1.8 minutes (10:00 a.m. to 11:00 a.m.) and 3.1 minutes (3:00 a.m. to 4:00 a.m.).

- Average travel time was between 1.6 minutes (6:00 a.m. to 7:00 a.m.) and 2.6 minutes (9:00 a.m. to 10:00 a.m.).

- Average response time was between 5.3 minutes (6:00 p.m. to 7:00 p.m.) and 7.4 minutes (3:00 a.m. to 4:00 a.m.).

- The 90th percentile response time was between 6.8 minutes (6:00 p.m. to 7:00 p.m.) and 9.8 minutes (9:00 a.m. to 10:00 a.m.).

RESPONSE TIME DISTRIBUTION

Here, we present a more detailed look at how response times to calls are distributed. The cumulative distribution of total response time for the first arriving unit to EMS calls is shown in Figure 11 and Table 17. Figure 11 shows response times for the first arriving unit to EMS calls as a frequency distribution in whole-minute increments, and Figure 12 shows the same for the first arriving unit to outside and structure fire calls.

The cumulative percentages here are read in the same way as a percentile. In Figure 11, the 90th percentile of 8.1 minutes means that 90 percent of EMS calls had a response time of 8.1 minutes or less. In Table 17, the cumulative percentage of 89.4, for example, means that 89.4 percent of EMS calls had a response time under 8 minutes.

FIGURE 11: Cumulative Distribution of Response Time – First Arriving Unit – EMS
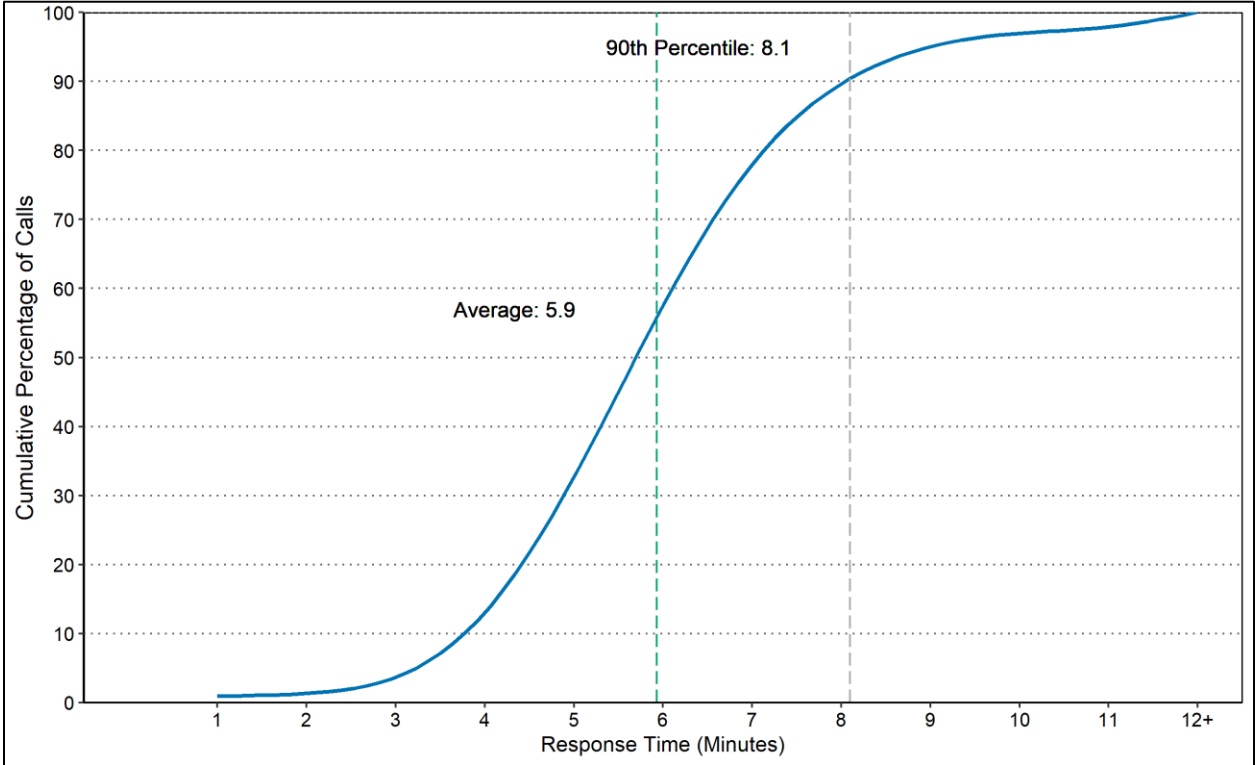
FIGURE 12: Cumulative Distribution of Response Time – First Arriving Unit – Outside and Structure Fires
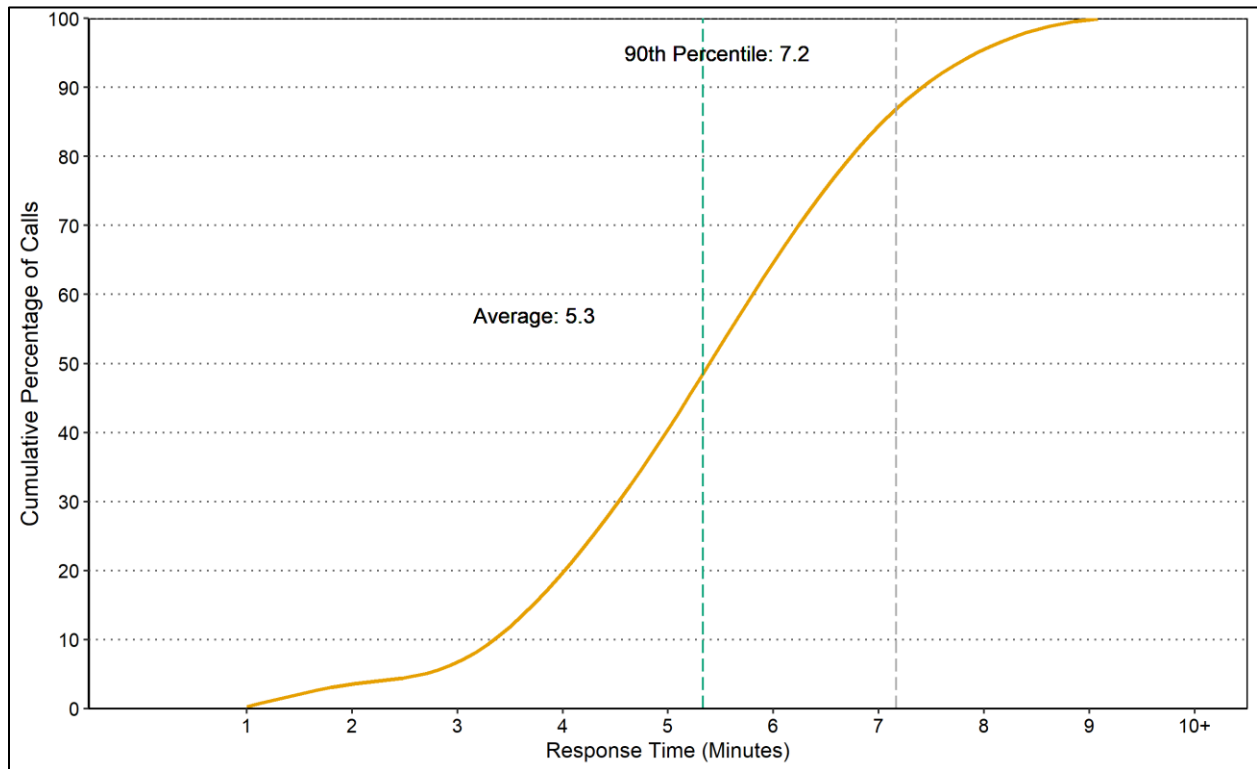
TABLE 18: Cumulative Distribution of Response Time – First Arriving Unit – EMS

Response Time (minute)	Frequency	Cumulative Percentage
1	8	1.0
2	2	1.2
3	23	4.0
4	69	12.4
5	170	33.0
6	199	57.2
7	175	78.5
8	90	89.4
9	47	95.1
10	15	97.0
11	7	97.8
12+	18	100.0

TABLE 19: Cumulative Distribution of Response Time – First Arriving Unit – Outside and Structure Fires

Response Time (minute)	Frequency	Cumulative Percentage
1	0	0
2	1	5
3	0	5
4	3	20
5	4	40
6	5	65
7	4	85
8	2	95
9+	1	100

Observations:

■ For 89 percent of EMS calls, the response time of the first arriving unit was less than 8 minutes.

■ For 95 percent of outside and structure fire calls, the response time of the first arriving unit was less than 8 minutes.

TRANSPORT CALL ANALYSIS

In this section, we present an analysis of the medical unit's activity that involved transporting patients, the variations by hour of day, and the average time for each stage of transport service. We identified transport calls by requiring that at least one responding medical unit had recorded both a "beginning to transport" time and an "arriving at the hospital" time. Based on these criteria, we note that one non-EMS (fire & other) call that resulted in transport is included in this analysis. This section also includes 20 calls to which only Miami Fire Rescue units responded as they occasionally transported patients as well.

TRANSPORT CALLS BY TYPE

Table 19 shows the number of calls by call type broken out by transport and non-transport calls.

TABLE 20: Transport Calls by Call Type

Call Type	Number of Calls			Conversion Rate
	Non-transport	Transport	Total	
Breathing difficulty	28	34	62	54.8
Cardiac and stroke	54	87	141	61.7
Fall and injury	121	124	245	50.6
Illness and other	169	191	360	53.1
MVA	19	12	31	38.7
Overdose and psychiatric	15	17	32	53.1
Seizure and unconsciousness	56	74	130	56.9
EMS Subtotal	**462**	**539**	**1,001**	**53.8**
Fire & Other Subtotal	**998**	**1**	**999**	**0.1**
Total	**1,460**	**540**	**2,000**	**27.0**

Observations:

- 54 percent of EMS calls involved transporting one or more patients.

- On average, 1.5 EMS calls per day involved transporting one or more patients.

TRANSPORT CALLS PER HOUR

Table 20 and Figure 13 show the average number of EMS calls received each hour of the day over the studied period. In Table 20, the conversion rate measures the percentage of EMS calls that transported one or more patients.

TABLE 21: EMS Transport Calls per Hour, by Time of Day

Hour	EMS Calls	Transports	EMS Calls per Day	Transports per Day	Conversion Rate
0	28	14	0.1	0.0	50.0
1	22	12	0.1	0.0	54.5
2	14	8	0.0	0.0	57.1
3	19	10	0.1	0.0	52.6
4	17	12	0.0	0.0	70.6
5	13	7	0.0	0.0	53.8
6	21	7	0.1	0.0	33.3
7	24	17	0.1	0.0	70.8
8	42	25	0.1	0.1	59.5
9	41	20	0.1	0.1	48.8
10	58	41	0.2	0.1	70.7
11	72	39	0.2	0.1	54.2
12	60	28	0.2	0.1	46.7
13	49	26	0.1	0.1	53.1
14	64	37	0.2	0.1	57.8
15	53	30	0.1	0.1	56.6
16	55	24	0.2	0.1	43.6
17	54	27	0.1	0.1	50.0
18	52	28	0.1	0.1	53.8
19	59	32	0.2	0.1	54.2
20	61	34	0.2	0.1	55.7
21	51	22	0.1	0.1	43.1
22	37	20	0.1	0.1	54.1
23	35	19	0.1	0.1	54.3
Total	**1,001**	**539**	**2.7**	**1.5**	**53.8**

Note: The conversion rate is measured by dividing the number of EMS transports by the number of EMS calls. For example, between midnight and 1:00 a.m., there were 14 EMS transports out of 28 EMS calls. This gives a conversion rate of 14 / 28 = 0.5, or 50.0 percent.

FIGURE 13: Average Transport Calls by Hour
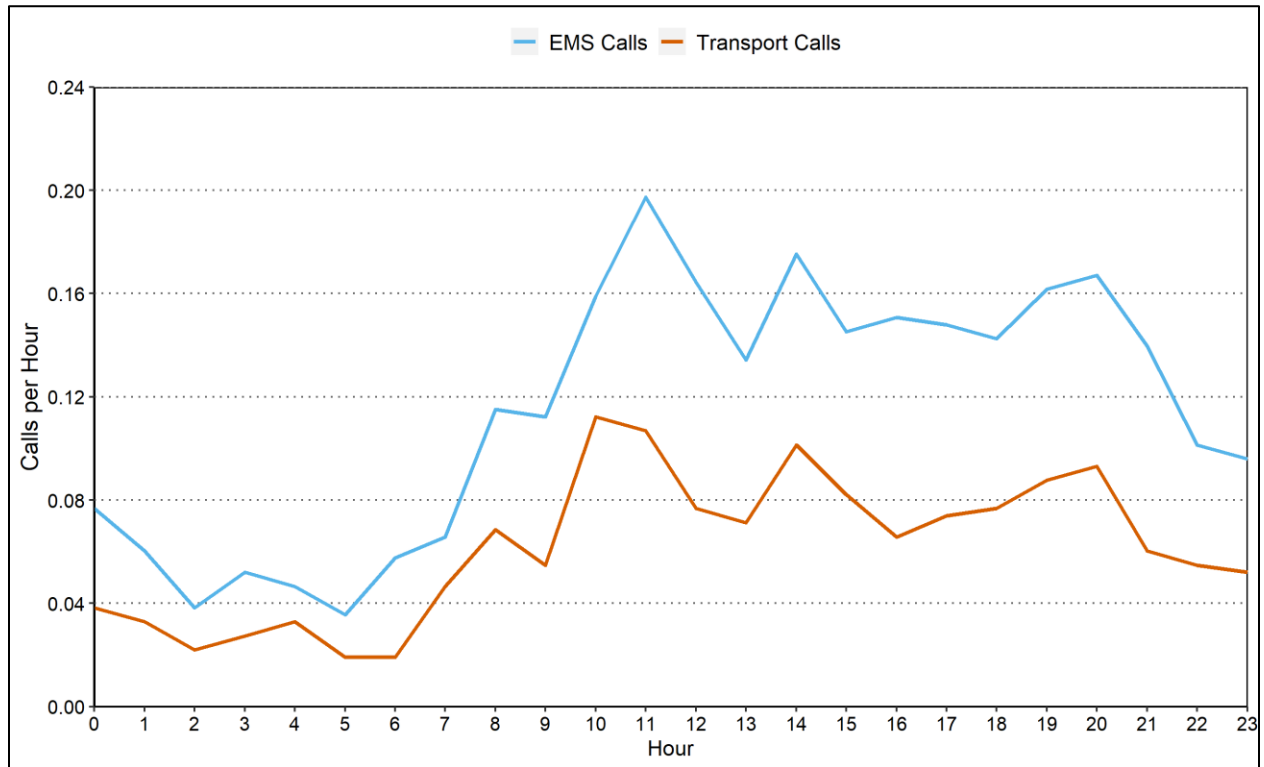
Observations:

- EMS calls per hour were highest during the day from 10:00 a.m. to 10:00 p.m., averaging between 0.13 calls and 0.20 calls per hour.

- EMS calls peaked between 11:00 a.m. and noon, averaging 0.20 calls per hour.

- EMS calls were lowest between 5:00 a.m. and 6:00 a.m., averaging 0.04 calls per hour.

- EMS transport calls were highest during the day from 10:00 a.m. to 10:00 p.m., averaging between 0.07 calls and 0.11 calls per hour.

- EMS transport calls peaked between 10:00 a.m. and 11:00 a.m., averaging 0.11 calls per hour.

- EMS transport calls were lowest between 5:00 a.m. and 7:00 a.m., averaging 0.02 calls per hour.

- The transport conversion rate peaked between 7:00 a.m. and 8:00 a.m. at 71 percent.

- The transport conversion rate was lowest between 6:00 a.m. and 7:00 a.m. at 33 percent.

CALLS BY TRANSPORT, TYPE, AND DURATION

Table 21 shows the average duration of transport and non-transport EMS calls by call type.

TABLE 22: Call Duration by Call Type and Transport (in Minutes)

Call Type	Non-transport		Transport	
	Average Duration	Number of Calls	Average Duration	Number of Calls
Breathing difficulty	29.0	28	72.3	34
Cardiac and stroke	27.6	54	71.7	87
Fall and injury	24.3	121	67.9	124
Illness and other	24.6	169	71.9	191
MVA	23.7	19	69.6	12
Overdose and psychiatric	23.6	15	68.9	17
Seizure and unconsciousness	27.5	56	77.7	74
EMS Subtotal	**25.4**	**462**	**71.6**	**539**
Fire & Other Subtotal	**17.0**	**998**	**64.9**	**1**
Total	**19.7**	**1,460**	**71.6**	**540**

Note: The duration of a call is defined as the longest deployed time of any of the units responding to the same call.

Observations:

■ The average duration was 25.4 minutes for non-transport EMS calls.

■ The average duration was 71.6 minutes for EMS calls where one or more patients were transported to a hospital.

TRANSPORT TIME COMPONENTS

Table 22 gives the average deployed time for a rescue unit on a transport call, along with three major components of the deployed time: on-scene time, travel to hospital time, and at-hospital time.

The on-scene time is the interval from the unit arriving on-scene time through the time the unit departs the scene for the hospital. Travel to hospital time is the interval from the time the unit departs the scene to travel to the hospital through the time the unit arrives at the hospital. At-hospital time is the time it takes for patient turnover at the hospital.

This table analyzes times by run. Normally, the number of runs will exceed the number of calls as a call may have multiple runs. In addition, average times may differ slightly from similar averages measured per call.

TABLE 23: Time Component Analysis for Transport Runs by Call Type (in Minutes)

Call Type	Average Time Spent per Run				Number of Runs
	On Scene	Traveling to Hospital	At Hospital	Deployed	
Breathing difficulty	21.8	16.4	28.4	70.9	34
Cardiac and stroke	23.3	16.6	27.5	71.3	87
Fall and injury	19.6	16.7	26.8	67.2	125
Illness and other	22.0	16.7	28.6	71.2	191
MVA	18.9	13.7	32.5	68.8	13
Overdose and psychiatric	21.5	16.6	26.2	68.9	17
Seizure and unconsciousness	25.8	17.5	30.2	77.7	74
EMS Subtotal	**22.1**	**16.7**	**28.2**	**71.0**	**541**
Fire & Other Subtotal	**15.1**	**10.3**	**31.7**	**64.9**	**1**
Total	**22.1**	**16.7**	**28.2**	**71.0**	**542**

Note: Average unit deployed time per run is lower than the average call duration for some call types because call duration is based on the longest deployed time of any of the units responding to the same call, which may include an engine or ladder. Total deployed time is greater than the combination of on-scene, transport, and hospital wait times as it includes turnout, initial travel, and hospital return times.

Observations:

- The average time spent on-scene for a transport EMS call was 22.1 minutes.

- The average travel time from the scene of the EMS call to the hospital was 16.7 minutes.

- The average deployed time spent on transport EMS calls was 71.0 minutes.

- The average deployed time at the hospital was 28.2 minutes, which accounts for approximately 40 percent of the average total deployed time for a transport EMS call.

TRANSPORT DESTINATION

Table 23 shows the number of transports (runs) that KBFR's rescue units made, broken out by destination.

TABLE 24: Transport Runs by Destination

Destination Code	Destination Name	Transport	Percentage
MER	Mercy Hospital	332	61.3
JMH	Jackson Memorial Hospital	98	18.1
DOC	Doctors Hospital	28	5.2
UMH	University of Miami Hospital	28	5.2
NCH	Nicholas Children's Hospital	15	2.8
JMP	Jackson Memorial Pediatrics	14	2.6
MTS	Mount Sinai Medical Center	7	1.3
SMH	South Miami Hospital	12	2.2
RYD	Ryder Trauma Center	4	0.7
BAS	Bascom Palmer Eye	2	0.4
VET	VA Hospital	1	0.2
XXX	Unavailable	1	0.2
Total		**542**	**100.0**

ATTACHMENT I: ACTIONS TAKEN

TABLE 25: Actions Taken Analysis for Structure and Outside Fire Calls

Action Taken	Number of Calls	
	Outside Fire	Structure Fire
extinguishment by fire service personnel	3	2
fire control or extinguishment, other	2	2
fires, rescues & hazardous conditions, other	1	0
forcible entry	0	1
investigate	2	1
investigate fire out on arrival	1	5
notify other agencies.	3	0
salvage & overhaul	0	1
search	0	1
ventilate	0	4

Note: Totals are higher than the total number of structure and outside fire calls because some calls recorded multiple actions taken.

Observations:

■ Out of 11 outside fires, three were extinguished by fire service personnel, which accounted for 27 percent of outside fires.

■ Out of 11 structure fires, two were extinguished by fire service personnel, which accounted for 18 percent of structure fires.

ATTACHMENT II: FIRE LOSS

TABLE 26: Total Fire Loss Above and Below $25,000

Call Type	No Loss	Under $25,000	$25,000 plus	Total
Outside fire	8	2	1	11
Structure fire	5	6	0	11
Total	**13**	**8**	**1**	**22**

TABLE 27: Content and Property Loss – Structure and Outside Fires

Call Type	Property Loss		Content Loss	
	Loss Value	**Number of Calls**	**Loss Value**	**Number of Calls**
Outside fire	$27,500	3	$100	1
Structure fire	$9,000	4	$4,700	5
Total	**$36,500**	**7**	**$4,800**	**6**

Note: The table includes only fire calls with a recorded loss greater than 0.

Observations:

- Eight outside fires and five structure fires had no recorded losses.

- One outside fire had $25,000 or more in recorded losses.

- Structure fires:

  □ The highest total loss for a structure fire was $6,000.

  □ The average total loss for all structure fires was $1,245.

  □ Five structure fires recorded content losses with a combined $4,700 in losses.

  □ Out of 11 structure fires, four had recorded property losses, with a combined $9,000 in losses.

- Outside fires:

  □ The highest total loss for an outside fire was $27,000.

  □ The average total loss for all outside fires was $2,509.

  □ One outside fire recorded content loss with a combined $100 in losses.

  □ Out of 11 outside fires, three had recorded property losses, with a combined $27,500 in losses.

ATTACHMENT III: MIAMI FIRE RESCUE'S RESPONSE AND WORKLOAD

Between June 1, 2021, and May 31, 2022, Miami Fire Rescue (MFR) responded to 94 calls in KBFR's response district, of which 20 calls were responded to by MFR independently and 74 calls were jointly responded to by both MFR and KBFR (Table 1).

MIAMI FIRE RESCUE CALLS BY TYPE

Table 27 shows the number of calls responded to by MFR, broken down by grand call type. Figures 14 shows the percentage of calls that fall into each grand call type category.

TABLE 28: Miami Fire Rescue Calls, by Type

Grand Call Type	Number of Calls	Calls per Day	Call Percentage
EMS	26	0.1	27.7
Fire	60	0.2	63.8
Other	8	0.0	8.5
Total	**94**	**0.3**	**100.0**

Note: MFR responded to seven outside fires and six structure fires inside Key Biscayne, respectively.

FIGURE 14: Percentage of Miami Fire Rescue Calls by Type
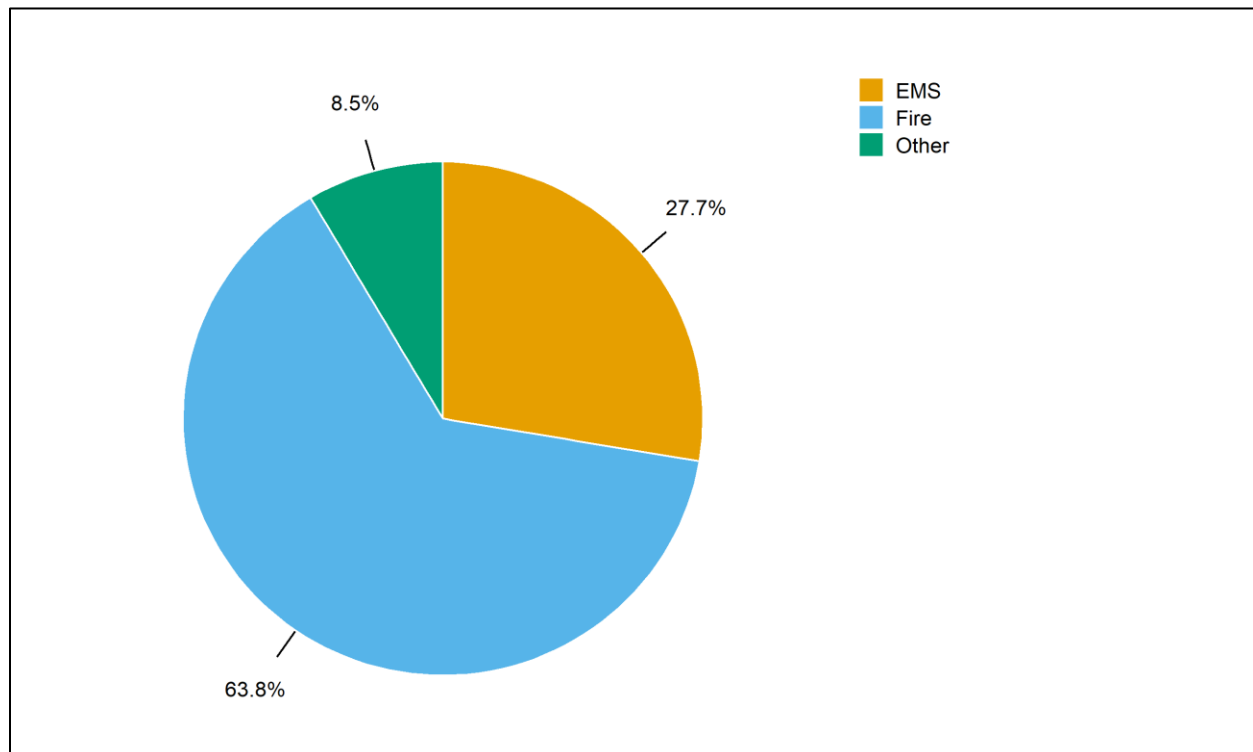
MIAMI FIRE RESCUE RUNS AND DEPLOYED TIME

Table 28 shows the total deployed time of Miami Fire Rescue, both overall and broken down by type of run. Table 29 details the workload of the responding MFR units.

TABLE 29: Miami Fire Rescue Runs and Deployed Time by Run Type

Run Type	Minutes per Run	Annual Hours	Percent of Hours	Minutes per Day	Annual Runs	Runs per Day
EMS Subtotal	**25.7**	**12.0**	**21.6**	**2.0**	**28**	**0.1**
Outside fire	12.5	2.1	3.7	0.4	10	0.0
Structure fire	12.4	14.3	25.7	2.4	69	0.2
Other fire	10.2	23.8	42.8	4.1	140	0.4
Fire Subtotal	**11.0**	**40.1**	**72.2**	**6.8**	**219**	**0.6**
Other Subtotal	**13.9**	**3.5**	**6.2**	**0.6**	**15**	**0.0**
Total	**12.7**	**55.6**	**100.0**	**9.5**	**262**	**0.7**

TABLE 30: Total Annual Workload by Miami Fire Rescue Units

Unit	Unit Type	Minutes per Run	Annual Hours	Percent of Hours	Minutes per Day	Annual Runs	Runs per Day
A4	Aerial	14.3	7.4	13.3	1.3	31	0.1
C1	Chief	10.6	3.4	6.0	0.6	19	0.1
C4	Chief	12.8	3.0	5.4	0.5	14	0.0
E4	Engine	11.1	6.8	12.3	1.2	37	0.1
E8	Engine	7.6	1.3	2.3	0.2	10	0.0
EMS3	EMS Captain	21.2	2.1	3.8	0.4	6	0.0
FB15	Fire Boat	19.0	0.9	1.7	0.2	3	0.0
FB25	Fire Boat	27.0	4.1	7.3	0.7	9	0.0
HM1	Hazmat	21.8	1.8	3.3	0.3	5	0.0
HR6	Heavy Rescue	8.9	1.2	2.1	0.2	8	0.0
Q8	Quint	13.5	2.5	4.5	0.4	11	0.0
R1	Rescue	13.4	0.9	1.6	0.2	4	0.0
R4	Rescue	12.9	6.6	12.0	1.1	31	0.1
R8	Rescue	10.8	1.4	2.6	0.2	8	0.0
R16	Rescue	11.4	4.2	7.5	0.7	22	0.1
R24	Rescue	10.7	4.5	8.0	0.8	25	0.1
R28	Rescue	15.1	2.0	3.6	0.3	8	0.0
Other*	Other	8.3	1.5	2.7	0.3	11	0.0
Total		**12.7**	**55.6**	**100.0**	**9.5**	**262**	**0.7**

Note: *Other includes MFR units with less than 3 annual runs each.

Observations:

■ MFR units responded to 94 calls, involving 262 runs, including 55.6 hours of work.

■ MFR arriving units responded to 36 calls (38 percent of total), involving 47 runs (18 percent of total), including 25.4 hours of work (46 percent of total).

ATTACHMENT IV: CALL TYPE IDENTIFICATION

When available, NFIRS data serves as our primary source for assigning call categories. For 881 of the 2,000 calls, NFIRS incident type codes were used to assign call types for canceled and fire calls (Table 30). For 1,104 EMS and fire calls that do not have NFIRS incident types, we instead used the Medical Priority Dispatch System (MPDS) code to assign call categories (Table 31). Aid-given calls were not included.

TABLE 31: Call Type by NFIRS Incident Type Code and Description

Call Type	Incident Type	Incident Type Description	Frequency
Canceled	611	Dispatched and canceled en route	16
	622	No incident found on arrival at dispatch address	9
False Alarm	700	False alarm or false call, other	17
	715	Local alarm system, malicious false alarm	1
	730	System or detector malfunction, other	4
	733	Smoke detector activation due to malfunction	15
	734	Heat detector activation due to malfunction	1
	735	Alarm system sounded due to malfunction	8
	736	CO detector activation due to malfunction	1
	740	Unintentional transmission of alarm, other	81
	741	Sprinkler activation, no fire - unintentional	5
	743	Smoke detector activation, no fire - unintentional	112
	744	Detector activation, no fire - unintentional	50
	745	Alarm system activation (no fire) - unintentional	284
	746	Carbon monoxide detector activation (no CO)	5
Good Intent	600	Good intent call, other	8
	632	Prescribed fire	1
	641	Vicinity alarm (incident in other location)	1
	650	Steam, other gas mistaken for smoke, other	1
Hazard	240	Explosion (no fire), other	1
	251	Excessive heat, scorch burns with no ignition	1
	400	Hazardous condition (no fire), other	3
	410	Combustible and flammable gas or liquid spills/leaks	1
	411	Gasoline or other flammable liquid spill	1
	412	Gas leak (natural gas or LPG)	5
	420	Toxic chemical condition, other	1
	421	Chemical hazard (no spill or leak)	1
	422	Chemical spill or leak	2
	424	Carbon monoxide incident	2
	440	Electrical wiring/equipment problem, other	8

Call Type	Incident Type	Incident Type Description	Frequency
	444	Power line down	10
	445	Arcing, shorted electrical equipment	12
	460	Accident, potential accident, other	1
Outside Fire	100	Fire, other	2*
	130	Mobile property (vehicle) fire, other	1
	140	Natural vegetation fire, other	4
	142	Brush or brush-and-grass mixture fire	1
	151	Outside rubbish, trash, or waste fire	1
Public Service	331	Lock-in	4
	353	Removal of victim(s) from stalled elevator	56
	360	Water and ice-related rescue, other	1
	500	Service call, other	14
	510	Person in distress, other	16
	511	Lock-out	32
	520	Water problem, other	9
	522	Water or steam leak	5
	531	Smoke or odor removal	3
	540	Animal problem or rescue, other	1
	541	Animal problem	1
	551	Assist police or other governmental agency	1
	553	Public service	20
	554	Assist invalid	16
	555	Defective elevator, no occupants	14
Structure Fire	100	Fire, other	5**
	111	Building fire	2
	113	Cooking fire	2
	118	Trash or rubbish fire in a structure	1
Total			**881**

Note: *MPDS codes 67 (outside fire) and 71 (vehicle fire); **MPDS code 69 (structure fire).

TABLE 32: Call Type by MPDS Code and Description

Call Type	MPDS Code	MPDS Description	Calls
Breathing Difficulty	06	Breathing Difficulty	50
	11	Choking	12
Cardiac and Stroke	09	Cardiac Arrest	13
	10	Chest Pain	70
	19	Heart Problem	31
	28	Stroke	27
Fall and Injury	04	Assault	8
	07	Burn Subject	4
	14	Drowning	2
	17	Falls	118

Call Type	MPDS Code	MPDS Description	Calls
	21	Hemorrhage	32
	27	Stab/Gunshot/Penetrating Trauma	2
	30	Traumatic Injury	79
False Alarm	52	False Alarm	74
Hazard	55	Electrical Hazard	6
Illness and Other	01	Abdominal Pain	27
	02	Allergic Reaction	27
	03	Animal Bites	3
	05	Back Pain	8
	13	Diabetic Problems	11
	16	Eye Problem	4
	18	Headache	9
	20	Environmental Exposure	1
	24	Pregnancy	3
	26	Sick Call	197
	32	Medical Nature Unknown	47
	36	Pandemic Flu	14
	52	False Alarm	4
	53	Service Call	5
MVA	29	Traffic Collision	30
	30	Traumatic Injury	1
Outside Fire	67	Outside Fire	2
Overdose and Psychiatric	23	Overdose	20
	25	Psychiatric Problem	12
Public Service	53	Service Call	6
	56	Elevator Incident	9
Seizure And Unconsciousness	12	Seizures	28
	31	Subject Unconscious	102
Structure Fire	69	Structure Fire	1
Technical Rescue	72	Water / Ice / Mud Rescue	2
	73	Watercraft Incident	3
Total			**1,104**

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