

**BARNSTABLE, MASSACHUSETTS
FIRE DISTRICT
ORGANIZATIONAL AND STAFFING ANALYSIS**

MARCH 2021

Prepared by:



**Municipal Resources, Inc.
66 Main Street, Suite B
Plymouth, New Hampshire 03264
mrigov.com
Phone 603-279-0352**

TABLE OF CONTENTS



BARNSTABLE, MASSACHUSETTS

FIRE DISTRICT ORGANIZATIONAL AND DEPLOYMENT ANALYSIS

CHAPTER I - PROJECT OVERVIEW, SCOPE, AND METHODOLOGY	6
About MRI.....	7
MRI's Philosophy	8
Objectives	8
Scope of Work	9
Project Methodology.....	11
Acknowledgements	14
CHAPTER II – COMMUNITY OVERVIEW	15
Town of Barnstable	15
Barnstable Fire Department	17
Community Growth and Development	18
Community Risk Profile	20
Recommendations	33
CHAPTER III – ORGANIZATIONAL STRUCTURE	35
Organizational Structure	35
Recommendations	41
CHAPTER IV – RESPONSE METRICS	43
Recommendations	58
CHAPTER V – EMERGENCY OPERATIONS	59
Fire Operations	60
EMS Operations.....	64
Staffing and Critical Tasking.....	70
Mutual and Automatic Aid.....	80
Insurance Services Office (ISO).....	81
Recommendations	86
CHAPTER VI – RESOURCES AND DEPLOYMENT	91
Fire Department Facilities	91
Fire Apparatus and Vehicles.....	94
Deployment of Resources.....	100
Recommendations	104
CHAPTER VII – FIRE DEPARTMENT FINANCIAL OPERATIONS	106
Capital Planning	107
EMS Revenue	109
Grants	109

Sources of Additional Funding.....	111
Recommendations	112
CHAPTER VIII – SUMMARY AND PLANNING FOR THE FUTURE.....	114
Current State of the Fire and EMS Delivery System	114
Strategic Planning (AKA Looking to the Future).....	116
Fire Service Accreditation.....	117
Conclusion.....	118
CHAPTER IX – SUMMARY OF RECOMMENDATIONS.....	120
Chapter II: Community Overview	120
Chapter III: Organizational Structure	120
Chapter IV: Response Metrics.....	122
Chapter V: Emergency Operations.....	122
Chapter VI: Resources and Deployment.....	125
Chapter VII: Fire Department Financial Operations.....	126
CHAPTER X – PROJECT TEAM.....	128

REPORT



CHAPTER I

PROJECT OVERVIEW, SCOPE, AND METHODOLOGY



Municipal Resources, Inc. (MRI) was engaged by the Barnstable, Massachusetts Fire District, to undertake a review and analyze the current resources and staffing, forecast future demands for service, identify any gaps or deficiencies, and make recommendations regarding the future need of current resources, staffing, and rank structure to fulfil the departments. mission. This included a comprehensive analysis of the operations of the Barnstable Fire Department with emphasis on the impact of new development projects including those which have already been completed, projects that are currently ongoing, and projected build-out to ensure that the Barnstable Fire Department is meeting the fire and EMS needs and expectations of the community.

The primary intent and goal of this project was to determine whether the existing organizational structure including levels of staffing, facilities, equipment, and deployment of resources are adequate to provide a level of service within the Barnstable Fire Department, that is in line with generally accepted standards and benchmarks utilized by comparable fire departments in similar communities; and based on standards and best practices for modern-day fire services currently in practice in Massachusetts and the United States.

The study included a comprehensive review of all services provided, resources allocated to each service area, organizational structure, communications, proper manning and staffing levels, and the managerial structure and personnel. A major component of this project was to conduct a staffing needs analysis of the Barnstable Fire Department based upon current and projected future needs. The Fire District will then utilize this information and the accompanying recommendations to assist with managing and operating the fire department efficiently and effectively particularly regarding staffing levels. To these ends, MRI looked to provide information relative to the department's staffing needs:

1. What is the number of on- duty firefighters needed to be considered adequate for current fire department needs?
2. Based on the demographics of the Barnstable Fire District, what is the most effective organizational structure of the fire department, currently and with future personnel?
3. Are additional firefighters needed as a result of the development potential in the District?

4. If additional firefighters are needed, what is the number of firefighters needed, the EMS certification level, the shift assignment/rotation, and projected timetable to implement?

These activities are part of the Barnstable Fire District's ongoing fire and emergency services oversight and planning responsibilities. They are focused on identifying the risks that residents, visitors and firefighters are currently exposed to, as well as the potential future risks, and the development of an appropriate set of responses to those threats in a fiducially responsible manner. Through strategic planning, the project team makes recommendations for both short and long-term success, viability, and stability, together with improved efficiency, operations, and safety for firefighters and citizens today, as well as projecting future needs for the provision of fire and emergency medical services throughout the community. The MRI project team has attempted to produce a report containing recommendations, that will assist the Barnstable Fire District, and Barnstable Fire Department, to set a clear course of action for future service improvements and delivery.

ABOUT MRI

MRI was founded in 1989 by six former municipal and state government managers, with both public and private, professional experience. MRI provides professional, technical, and management support services to municipalities, schools, and non-profit organizations throughout the Northeast. MRI provides technical knowledge and practical experience that others cannot offer because it hires the best in the municipal consulting industry. This is evidenced by a high level of implementation of MRI's recommendations by its clients. MRI's clients have come to expect the organization to provide for whatever they need, and it fulfills their expectations.

MRI's dynamic management staff adapts services to specific client needs. Clients realize that MRI has been in their shoes and has the experience, sensitivity, and desire that it takes to develop and deliver services that specifically meets their needs. The depth of MRI's experience is reflected not only in the experiences of its associates, but in the scope of services it provides its clients, from professional recruitment to organizational and operational assessments of individual municipal departments and school districts; or ongoing contracted services for various municipal government and school business support activities. Municipal Resources has a particularly strong public safety group with nationally recognized expertise in fire and emergency medical services.

MRI's professional staff is always focused on helping its clients solve problems and provide solutions for their future success. They simply work to gain an understanding of past events to build a framework for future success. They do not put forth idealistic, unachievable, or narrowly focused solutions.

MRI'S PHILOSOPHY

Municipal Resources, Inc. is committed to providing innovative and creative solutions to the problems and issues facing local governments and the agencies that serve them.

The purpose of MRI's approach is to supplement the efforts of municipal employees and other personnel and enable them to do their jobs well. MRI is committed to supporting and enhancing positive, sustainable communities through better organization, operations, and communication. This is achieved by:

- Supporting towns, cities, counties, school districts and other community service agencies with management and technical services to facilitate constructive change within client organizations.
- Conducting studies and analyses designed to assist clients in achieving organizational improvement.
- Advocating and advancing cooperation, coordination, and collaboration between government organizations and related community support agencies.
- Maintaining a staff of highly qualified professional, experienced and open-minded life-long learners to serve as consultants and advisors to clients.
- Maintaining awareness and understanding of advances in "best practices" for delivery of all levels of core community services and related professional management.
- Developing and refining techniques for effective community engagement, information dissemination, and constructive change.

OBJECTIVES

1. To help municipalities and agencies obtain maximum value for limited tax dollars.
2. To identify and help communities manage the risks associated with public safety functions.
3. To raise public awareness of the value and professionalism of their municipal resources.
4. To help local leaders develop and execute plans that best meet their community's needs, given available resources.

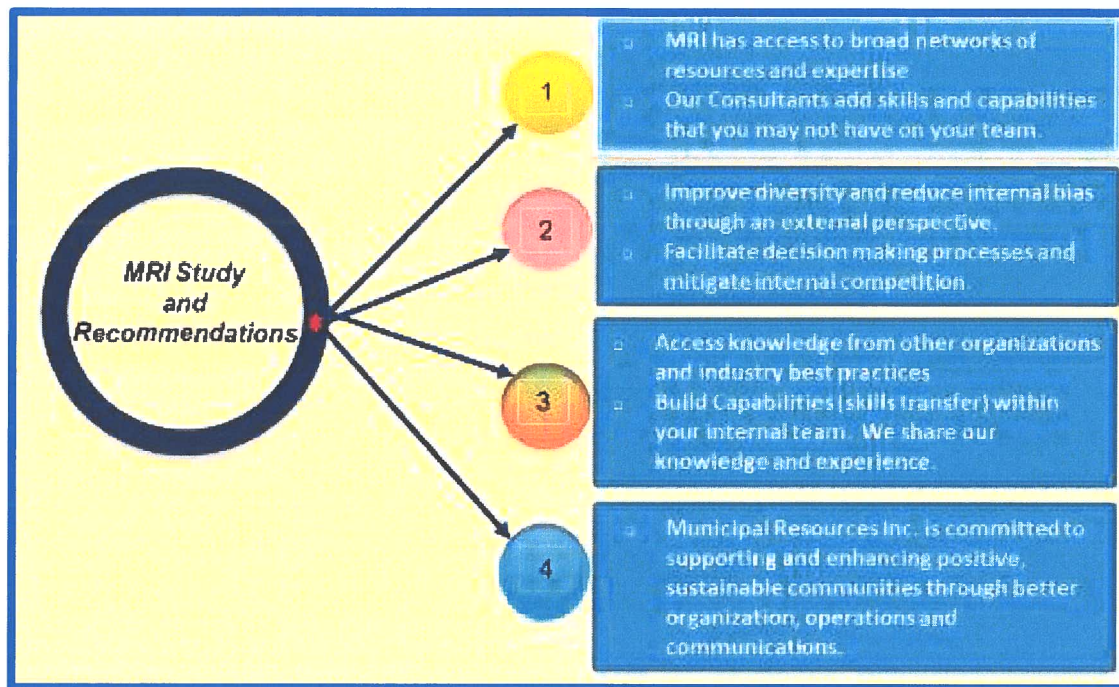


FIGURE I-1: MRI PROJECT IMPLEMENTATION PLAN

SCOPE OF WORK

To be effective, a project of this type requires a thorough assessment to determine a baseline of current operations. Projections for community population growth that can translate into increased requests for service, the need for expanded levels of service, and evolving community expectations were necessary to develop recommendations for the Department's future staffing and operational needs. A thorough review of existing staffing, funding, management practices, and regulatory environment was undertaken to determine whether the department can provide a level of service that is in line with generally accepted standards and benchmarks for a community of like character. An evaluation of the following information and topics were all components of this review:

1. A review of background information that impacts the Barnstable Fire Department including:
 - a. Community population and demographics;
 - b. Residential, commercial, industrial, and municipal features of the community;
 - c. Policies and agreements that may determine staffing levels and practices;
 - d. Municipal ordinances related to fire and EMS delivery;
 - e. Mutual aid agreements and resources;

- f. Historical information as provided;
 - g. Community road system;
 - h. Response statistics;
 - i. Vehicles and staffing/run assignments;
 - j. Fire department management practices;
 - k. Fire department operational plans;
 - l. Annual operating and capital budgets;
 - m. Fire department facilities and equipment;
 - n. Vehicle fleet, replacement plan, and future needs assessment; and
 - o. Current deployment of resources along with a future needs assessment.
2. Input was solicited from a range of stakeholders through personal interviews, including:
- Fire Chief
 - Deputy Fire Chief
 - Fire Department Fire Captains
 - International Association of Firefighters Local 3276 Executive Board
 - Town of Barnstable Police Chief/OEM Coordinator
 - Barnstable Village Association President
 - Barnstable Fire District Prudential Committee

The Town of Barnstable Precinct 1 Town Councilor was invited to speak with an MRI representative regarding this study but declined.

In performing this study MRI focused on identification of the operational service level expected within the Barnstable Fire District. The analysis focused on determining how the organization is meeting the expected service level, along with an evaluation of organization capabilities and identifying any potential operational concerns. Areas that were evaluated include:

- Response Times
- Operational staffing and certification levels
- OSHA Two In/Two Out compliance
- Automatic and mutual aid
- NFPA 1710 analysis
- ISO rating evaluation

At the completion of each key component of the Department's operations, the project team has attempted to provide a status and/or "gap" statement which indicates the current status of that activity, any gaps between that activity and expected performance (as defined by

regulations, standards, industry best practices, or organizational policy), and recommendations that should be implemented to close the “gaps” or correct the deficiency. This includes recommended changes to the organizational structure of the fire department relative to staffing allocation, deployment, and scheduling, with the goal to improve efficiency, effectiveness, and safety.

PROJECT METHODOLOGY

MRI’s project methodology and approach was targeted to fulfill the scope of work in a thorough and comprehensive manner. The assessment employed the following methodologies: a tour of the community; review of the fire department’s facilities, apparatus and equipment, staffing, interviews with key fire service personnel, and interview with the Prudential Committee and Village President. There were also reviews of relevant statistics, and operational data that was furnished by the department.

MRI’s project team utilized an eight-phase process to conduct the assessment of the Barnstable Fire Department and to develop the strategic planning recommendations. The eight phases include:

1. Development of an action plan.
2. Orientation, stakeholder input, data gathering, and identification of significant issues facing the Barnstable Fire District and the Barnstable Fire Department.
3. Information review, inventory, and assessment of the emergency risks and target hazards located within the fire district, and effectiveness and current operational readiness of the Barnstable Fire Department.
4. Development of an assessment and inventory of current fire department operations including the adequacy of current staffing/deployment models and organizational structure. This included an evaluation of the department’s EMS certification levels and needs.
5. Evaluation of the department’s apparatus resources.
6. Evaluation of the overall effectiveness, efficiency, and quality of service of the fire protection and EMS delivery systems within the Barnstable Fire District.
7. Preparation of a final evaluation report including short- and long-term strategic planning recommendations for the Barnstable Fire District and Barnstable Fire Department.

8. Presentation of a final project report to the Barnstable Fire District Prudential Committee and other selected stakeholders.

In conjunction with the on-site visits, the data collected and observations, were subjected to analysis by the project team, both individually and collectively. All recommendations for improvements are based on various administrative regulations promulgated at the federal and state levels, nationally accepted consensus standards developed by ISO (Insurance Services Office), NFPA (National Fire Protection Association), CFAI (Commission on Fire Accreditation International), and CAAS (Commission on Accreditation of Ambulance Services), and industry best practices and procedures. However, since every community has unique characteristics, challenges, and resource limitations, these recommendations are specifically designed to address the needs of the Barnstable Fire District and the Barnstable Fire Department.

The specific areas that the MRI study team evaluated as part of the organizational analysis, includes, but were not limited to:

1. Administration and day-to-day management of the Barnstable Fire Department as well as the management structure of the organization. Areas that were evaluated included, but were not limited to:
 - a. critical issues facing the Barnstable Fire Department;
 - b. challenges of the future;
 - c. budgetary decision-making process;
 - e. resource allocation; and
 - f. incident reporting and records management.
2. Identification and analysis of service levels including:
 - a. Current service level.
 - b. Average response times.
 - c. Desired/expected service level.
3. Review of growth, demographics, and projected development within the Barnstable Fire District including:
 - a. Target hazard analysis
 - b. Best practice strategies; and
 - c. Review of planned development
4. Analysis of the current expenditures and funding, from budget forecasting to day-to-day management, including EMS budget and revenues to project current and future financial needs including:

- a. Current and future funding requirements of service
 - b. Ability of level of service to continue at current projected level of funding and revenues
 - c. identification of financial issues of consideration; and
 - d. identification of potential areas for short- and long-term savings and costs.
- 5. Review operational staffing levels including NFPA 1710 compliance.
 - a. Career staff requirements, recruitment, and retention
 - b. Shift staffing levels
 - c. Personnel certification requirements
 - d. Identify the frequency of multiple calls that exceed the available resources
 - e. recall of off duty personnel
 - f. Automatic and mutual aid practices

Using this review as a basis, the project team made recommendations for improvements that take into consideration the current and future financial ability of the Fire District, appropriate modifications to the delivery systems in order to provide optimum service to the entire community, adequacy of physical facilities and equipment, efficient use of resources, and whether the current organizational and staffing structure is appropriate or should be modified. These recommendations then provide the basis for the development of strategic planning recommendations for the continued effective and efficient provision of the Barnstable Fire Department's fire, rescue, and emergency medical services delivery.

When appropriate, MRI's evaluation and recommendations include multiple options, identify potential implications of options, and suggest what is believed to be the most appropriate option. The project team has attempted to provide a series of short- and long-range recommendations for an organizational structure that can provide a high level of service today, and five to ten years into the future; constrained by anticipated fiscal and economic projections; expand and contract with future needs; and be able to navigate any fiscal constraints of reimbursements from public and private sources, particularly with the unknown long-term implications of the ongoing COVID-19 pandemic.

The final report also includes a suggested plan of implementation relative to the recommendations contained herein. To the extent possible, this plan includes suggestions for:

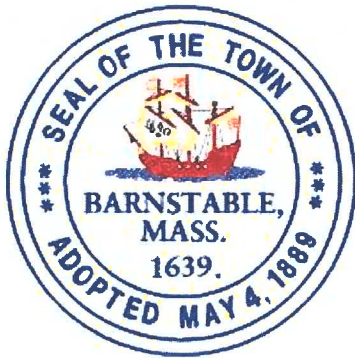
- a. major projects;
- b. responsible parties;
- c. schedule for completion; and
- d. method of evaluating results.

ACKNOWLEDGEMENTS

The MRI project team would like to thank the Barnstable Fire District Prudential Committee members, Barnstable Village Association President Joe Berlandi, Barnstable Police Chief Matthew Sonnabend, Barnstable Fire Department Fire Chief Francis Pulsifer, Deputy Fire Chief Richard Pfautz, and the officers and firefighters of the Barnstable Fire Department who took the time to speak with us, and for their cooperation and assistance in preparing this report. Barnstable is a proud and vibrant community with high expectations for the performance and professionalism of its public servants. It is MRI's goal to provide the fire district and fire department with a road map and template for strengthening the level of fire and emergency medical services available to the community. As with any public safety organization, there is always room for improvement, but **the citizens of the Barnstable Village area and fire district should be proud of the high quality and exemplary performance of the members of the Barnstable Fire Department who provide round-the-clock fire protection and emergency medical care.**

CHAPTER II COMMUNITY OVERVIEW

TOWN OF BARNSTABLE



The Town of Barnstable is located in Barnstable County, on Cape Cod (Figure II-1), approximately 70 miles southeast of Boston. It is located in what is referred to as the mid Cape area and is the county seat of Barnstable County. The Town has an estimated 2019 population of 44,477, a decrease of 1.6% from the 2010 United States Census Bureau population of 45,193. The town covers an area of 76.5 square miles, of which 59.9 square miles is land and 16.5 square miles is water. Barnstable is the largest town on Cape Cod both by population and area. With an overall population density of 742 people per square mile, the town is classified as a suburban community.

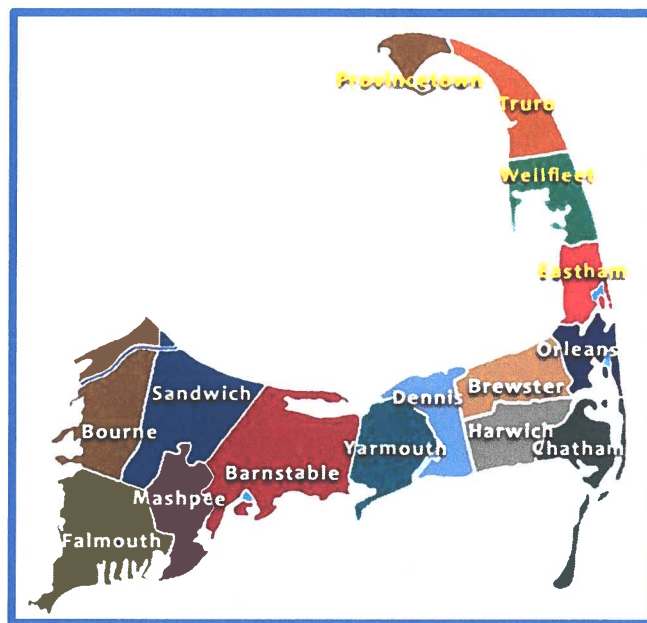


FIGURE II-1: LOCATION OF BARNSTABLE ON CAPE COD

Barnstable is divided into seven neighborhood villages, including Barnstable, Centerville, Cotuit, Hyannis, Marstons Mills, Osterville, and West Barnstable (Figure II-2). The town consists of a diverse mix of residential and commercial occupancies, which are located throughout along with several industrial areas and facilities.

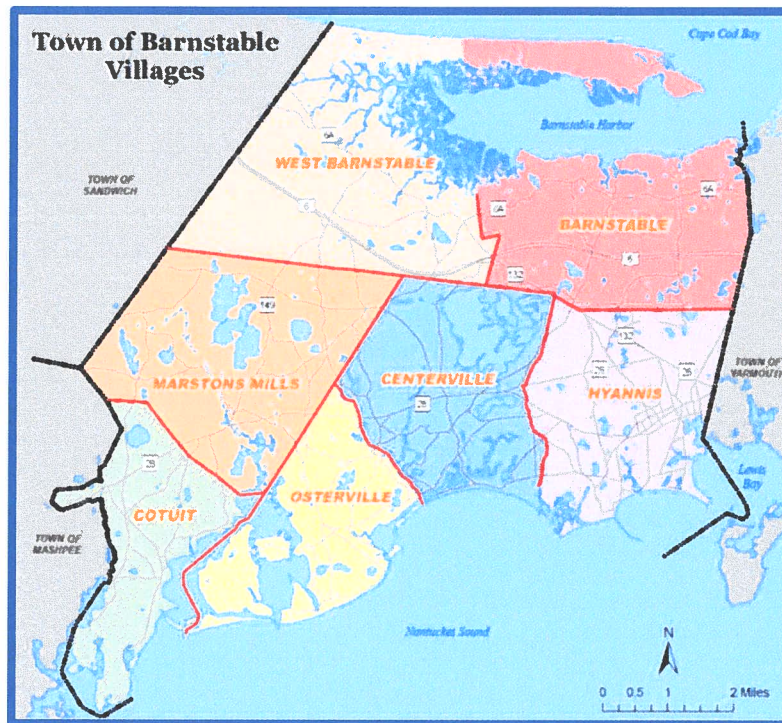


FIGURE II-2: TOWN OF BARNSTABLE VILLAGES

NOTE: THE BARNSTABLE FIRE DISTRICT BOUNDARIES VERY CLOSELY MATCH THE VILLAGE AS ILLUSTRATED IN FIGURE II-2.

Barnstable Village is located on the northeast side of the town, centered along "Old King's Highway" (MA Route 6A), and houses the Barnstable County Complex including three courts, a small business district, and a working harbor. The year-round population of the village is approximately 3,500 residents; however, the population can triple during the warm weather months when large numbers of people vacation in the area. The area around the county complex also experiences an influx of people each workday.

Both U.S. Route 6 and Massachusetts Route 28 pass through the town from west to east, with Route 6 being a four-lane, limited access freeway. Massachusetts Routes 6A, 132, and 149 are also located in town. Route 6A follows an east-west route to the north of Route 6. Both Route 6 and 6A bisect Barnstable Village from east to west.

The town is bordered by Cape Cod Bay on the north, Nantucket Sound on the south, Sandwich and Mashpee on the west, and Yarmouth on the east.

BARNSTABLE FIRE DEPARTMENT



The Barnstable Fire Department is a fully career emergency services organization that delivers fire, rescue, and emergency medical services (EMS) to the Barnstable Village area of the Town of Barnstable (Figure II-2, page 16). The Department is currently authorized a total of nineteen full-time, career firefighters, who perform firefighting, rescue, and emergency medical care duties, and fire prevention functions. The uniformed personnel are assisted by one civilian support person.

The department operates out of a single station located at 3249 Main Street in Barnstable Village, protecting a year-round population of 3,500 in an area of 14 square miles. With a population density of about 250 persons per square mile the district would be considered rural in nature. However, based upon the amount of commercial and industrial occupancies located within the district, along with the significant population increase during the warm weather months, the district's character is more suburban in nature.

The fire headquarters houses all the administrative offices, training areas, living quarters for the on-duty personnel assigned there, and all equipment and apparatus. The Barnstable Fire Department operates two engines, one - 105' aerial ladder, two Advanced Life Support (ALS) ambulances, two command vehicles, two marine units, two service vehicles, and one military surplus, high water vehicle.

During the five-year period from 2016 - 2020, the Barnstable Fire Department responded to a total of 6,843 calls for emergency service, an average of 1,369 per year, or 3.75 per day. In 2020, the department responded to 1,361 incidents which is almost the same as the five-year average. Although a significant percentage of these incidents are emergency medical related, Barnstable's percentage (63.1%) is lower than many other communities. The department's Fiscal Year 2020 annual operating budget is \$2,466,083.

The department provides EMS treatment and transport services to the community at the Advanced Life Support (ALS) level. All Barnstable Fire Department personnel are all required to possess a minimum of Emergency Medical Technician (EMT) training and certification. Eleven of the department's personnel are certified to provide ALS (paramedic) level care.

The Barnstable Fire Department is an all-hazards response agency that responds to a wide range of emergency incidents and requests for assistance each year from within its primary protection area. It also provides automatic and mutual aid to (and receives from) all surrounding Barnstable Fire Districts, as well as, surrounding municipalities. Department

personnel are trained to operate at the hazardous materials operations level, and to mitigate a wide range of specialized types of technical emergencies including various water rescue incidents.

COMMUNITY GROWTH AND DEVELOPMENT

The Town of Barnstable is a vibrant and growing community which has experienced significant growth over the past several decades. It also remains an important tourist and vacation destination during the warm weather months. However, like many other communities located on Cape Cod, it is experiencing an increase in formerly seasonal residents who are now making their vacation homes their primary domicile. The Barnstable Village area is no exception to this trend.

During the site visit to Barnstable and tour of the fire department's response area, the MRI team was made aware of multiple large residential and commercial projects that have been completed or are still in development within the Barnstable Fire Department's first due response area. These include multiple, multi-story apartment buildings, a new headquarters for a financial institution, two parking garages, and other routine commercial development. (Figures II-3 to II-7). The new residential complexes will add nearly 700 new apartments and an estimated 1,800 new residents that the department will be charged with protecting. If completed just these few complexes will increase the district's year-round population by approximately 50%.



FIGURE II-3 (left): CARRIAGE HOUSE, A 3 STORY, 29 UNIT APARTMENT BUILDING LOCATED IN THE INDUSTRIAL PARK AREA. HARBOUR HOUSE AN IDENTICAL BUILDING HAS RECENTLY BEEN COMPLETED.



FIGURE II-4 (right): VILLAGE GREEN APARTMENTS ALSO LOCATED IN THE INDUSTRIAL PARK AREA CONSISTS OF 4 – 3 STORY BUILDING EACH CONTAINING 30 APARTMENTS.



FIGURES II-5 (left) AND II-6 (right); EVERLEIGH, A RECENTLY COMPLETED 4 AND 5 STORY 225 UNIT OVER 55 APARTMENT/CONDOMINIUM BUILDING WITH UNDERGROUND PARKING.



FIGURE II-7: NEW HEADQUARTERS FACILITY OF CAPE COD 5 BANK.

There are several other projects that have been proposed as well. This includes the potential for another mixed-use development on land recently sold to a Boston area developer by Cape Cod Hospital. Preliminary plans indicate the possibility of a big box type retailer and four, three story apartment buildings.

Some of the stakeholders that were interviewed believe that the Barnstable Village area will continue to experience growth over the next five to ten years. There appears to be a likelihood that spot areas throughout the district, particularly in the vicinity of the industrial park, and also the Route 6/Route 132 interchange will continue to see development, both commercial higher density residential. Anticipating and planning for this growth is essential for the fire district and fire department to continue to provide the community with the desired level of emergency services.

Based upon what has been developed, and future potential development, it is reasonable to anticipate that growth will impact the delivery of fire and EMS services in the Barnstable Fire Department's response area.

COMMUNITY RISK PROFILE

Fire and rescue services protecting all communities generally have a common overall mission, the protection of life and property; but different community profiles in which they operate. These dissimilarities create vastly different fire and rescue services operational needs based on a unique community risk profile, service demands, and stakeholder expectations.

A community risk assessment is a comprehensive process to identify the hazards, risks, fire, and life safety problems, and the demographic characteristics of those at risk in a community. In each community, there are numerous hazards and risks to consider. For each hazard, there are many possible scenarios and potential incidents that could be encountered depending on timing, magnitude, and location of the hazard or incident. A thorough risk analysis provides insight into the worst fire and life safety problems and the people who are affected. The analysis results create the foundation for developing risk-reduction and community education programs.

Conducting a community risk analysis is the first step toward deciding which fire or injury problem needs to be addressed. Risk analysis is a planned process that must be ongoing, as communities and people are constantly changing. Too often, an objective and systematic community risk analysis is a step that is overlooked in the community education process. Many emergency service organizations address risks based on a perceived need for service that is not there. This approach can be costly (i.e., misdirected resources, continued property loss, injuries, or deaths). In short, a good community risk assessment will produce a picture of what the hazards and potentials for incidents are, identify who is at risk, and attempt to quantify the expected impacts (Figure II-8).

Understanding the definition of hazards and risks is critical to the risk assessment process. Hazards are physical sources of danger that can create emergency events. Hazards can be items such as buildings, roadways, weather events, fires. Risk relates to the probability of a loss due to exposure to a hazard. People and property can be at risk. Consequences to the community are also factors to consider. Each of these factors is assessed during the community risk process (Figure II-9).

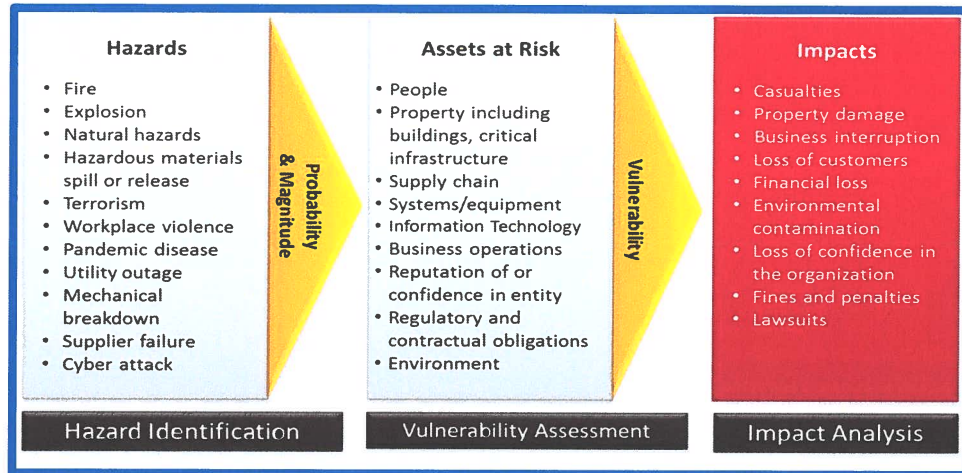


FIGURE II-8: RISK ASSESSMENT PROCESS
Image credit: www.ready.gov/risk-assessment

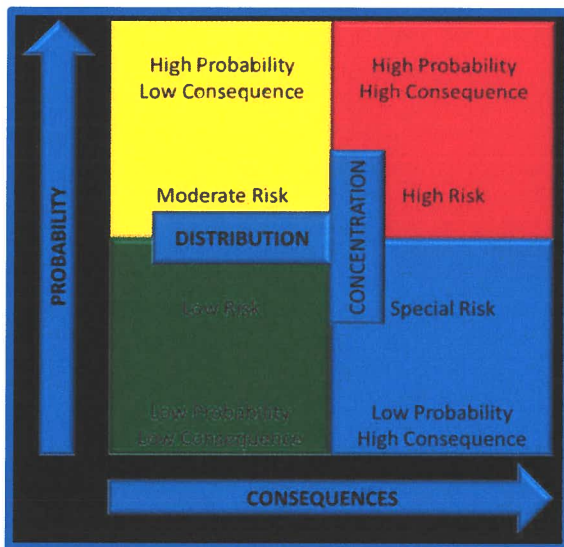


FIGURE II-9: FIRE PROBABILITY AND CONSEQUENCES MATRIX

Image credit: Commission on Fire Accreditation

In performing a risk assessment, a community determines which hazard may occur, how often it is likely to occur, and potential impact from that hazard. Most municipalities hazard mitigation plans address numerous natural hazards, including but not limited to, floods, hurricanes, tornadoes, and winter storms. They also usually cover a wide variety of human-caused hazards such as fire, hazardous materials releases, and transportation incidents. Almost any of the comprehensive list of potential hazards identified in these plans will involve the community's fire and EMS responders, at least during the initial stages.

A more focused community fire risk assessment is performed by assessing such factors as the needed fire flow, probability of an incident,

consequences of an incident, and occupancy risk. The “score” established is then utilized to categorize the area, or even individual properties, as one of low, moderate, or high/maximum risk. This categorization can assist a fire department in establishing fire risk/demand areas or zones. Having this information readily available provides the community and the fire department with a better understanding of how fire stations, response run cards, and staffing patterns can be used to provide a higher concentration of resources for higher-risk scenarios or, conversely, fewer resources for lower levels of risk.¹ The community fire risk assessment may also include determining and defining the differences in fire risk between a detached single-family dwelling, a multi-family dwelling, an industrial building, and a high-rise building by placing each in a separate category.

According to the NFPA *Fire Protection Handbook*, these hazards are defined as:

High-hazard occupancies: Schools, hospitals, nursing homes, high-rise buildings, and other high life-hazard or large fire-potential occupancies.

Medium-hazard occupancies: Apartments, offices, 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 occupancies².

The NFPA also identifies a key element of assessing community vulnerability as fire department operational performance, which is comprised of three elements: resource availability/reliability, department capability, and operational effectiveness³.

Resource availability/reliability: The degree to which the resources are ready and available to respond.

Department capability: The ability of the resources deployed to manage an incident.

Operational effectiveness: The product of availability and capability. It is the outcome achieved by the deployed resources or a measure of the ability to match resources deployed to the risk level to which they are responding.⁴

As with most communities, the greatest fire safety concern in Barnstable is the potential life loss in fires that occur in non-sprinklered, single, and multi-family residential dwellings during

¹ *Fire and Emergency Service Self-Assessment Manual*, Eighth Edition, (Commission on Fire Accreditation International, 2009) p. 49.

² Cote, Grant, Hall & Solomon, eds., *Fire Protection Handbook* (Quincy, MA: National Fire Protection Association, 2008), p. 12.

³ <http://www.nfpa.org/assets/files/pdf/urbanfirevulnerability.pdf>

⁴ National Fire Service Data Summit Proceedings, U.S. Department of Commerce, NIST Tech Note 1698, May 2011.

sleeping hours, which is consistent with national trends. These fires are fueled by new “lightweight” construction and more flammable home contents. The time to escape a house fire has dwindled from about 17 minutes, 20 years ago, to three to five minutes today. This poses a severe risk not only to occupants but also to firefighters as they now have less time to do their job and save residents’ lives and property.

Barnstable presents a unique mix of challenges and hazards that must be protected by its fire department. Although the town is a vacation destination, it is not just a prototypical resort community. It has a moderate density concentration of commercial and even some industrial occupancies. It also has seen an influx of several major multi-family residential developments.

Target hazards are defined as significant hazards; those that can strain the fire department response capability. Target hazards could include hospitals, schools, churches, storage facilities, or manufacturing plants. Some of the target hazards identified in Barnstable include (Figures II-10 to II-16):



FIGURE II-10 (left): SHEPLEYWOOD PRODUCTS, A MAJOR INDUSTRIAL FACILITY WITHIN THE FIRE DISTRICT.



FIGURE II-11 (right): VIEW OF THE BARNSTABLE INDUSTRIAL AREA.



FIGURE II-12 (left) II-13 (right): SAMPLE INDUSTRIAL FACILITIES WITHIN THE BARNSTABLE FIRE DISTRICT. THESE FACILITIES WILL REQUIRE A SIGNIFICANT COMMITMENT OF PERSONNEL AND RESOURCES TO MITIGATE ANY SIGNIFICANT FIRE OR TECHNICAL RESCUE INCIDENT.



FIGURE II-14 (left): A MIXED-USE COMMERCIAL BUILDING WITH MULTIPLE BUSINESS OCCUPANCIES AND OPERATIONS UNDER ONE ROOF.

II-15 (right): TYPICAL COMMERCIAL STRIP SHOPPING CENTER.

THESE FACILITIES WILL ALSO REQUIRE A SIGNIFICANT COMMITMENT OF PERSONNEL AND RESOURCES TO MITIGATE ANY SIGNIFICANT FIRE OR TECHNICAL RESCUE INCIDENT.



FIGURE II-16: BEST WESTERN INN. LOCATIONS WHICH HOUSE A TRANSIENT POPULATION OFTEN GENERATE FREQUENT EMERGENCY REQUESTS FOR ASSISTANCE.

Fortunately, many of these commercial and industrial structures are equipped throughout with complete automatic fire suppression (sprinkler) systems, which considerably reduce the overall risk of these structures. Automatic sprinklers are highly effective elements of total system designs for fire protection in buildings. They save lives and property, producing large reductions in the number of deaths per thousand fires, in average direct property damage per fire, and especially in the likelihood of a fire with large loss of life or large property loss. They do so, much quicker, and often more effectively and with less damage than firefighters do. No fire safety improvement strategy has as much documented life safety effectiveness as fire sprinklers because they actually extinguish the fire, or, at a minimum holds it in check and prevent flashover, until the arrival of the fire department.

The newer multi-family residential/apartment complexes in the district are all fully protected by fire suppression and detection systems. However as noted below, these systems have limitations as they may not protect all areas of the building, or, are not always properly maintained.

In 2007-2011 fires in all types of structures, when sprinklers were present in the fire area of a fire large enough to activate sprinklers in a building not under construction, sprinklers operated 91% of the time⁵. When they operated, they were effective 96% of the time, resulting in a combined performance of operating effectively in 87% of reported fires where sprinklers were present in the fire area and fire was large enough to activate sprinklers⁶. **In homes (including apartments), wet-pipe sprinklers operated effectively 92% of the time. When wet-pipe**

⁵ U. S. Experience with Sprinklers. John R. Hall, Jr. National Fire Protection Association, June 2013.

⁶ U. S. Experience with Sprinklers. John R. Hall, Jr. National Fire Protection Association, June 2013.

sprinklers were present in the fire area in homes that were not under construction, the fire death rate per 1,000 reported structure fires was lower by 82%, and the rate of property damage per reported home structure fire was lower by 68%⁷. In all structures, not just homes, when sprinklers of any type failed to operate, the reason most often given (64% of failures) was shutoff of the system before fire began⁸.

Even with the presence of automatic fire suppression systems, the firefighting and emergency response challenges that may confront firefighters in commercial structures and occupancies are none-the-less much more complex, often require significantly more resources to mitigate, and are potentially more dangerous from a life safety perspective to both occupants and firefighters, than those usually found in single-family dwellings. While built-in fire protection should significantly reduce the spread of fire, it may not completely extinguish the fire. Firefighters still need to complete the extinguishment and perform ventilation, overhaul, and salvage operations.

Although the current codes prohibit municipalities from requiring residential sprinkler systems in all new occupancies, the fire department can approach the developer/builder/owner to discuss the pros and cons of residential sprinkler systems during the approval process for subdivisions and large single-family residences and encourage them to consider the installation of these life safety systems regardless of where they are located. There are several publications that the fire department can use as resources to market the benefits of residential fire suppression systems including NFPA, which has developed the standards for their design and installation.

Buildings more than three stories in height pose a special risk in an emergency. Fire on higher floors may require the use of ladder trucks to provide an exterior standpipe, to be able to deliver water into a building that does not have a system in place. For victims trapped on higher floors, a ladder truck may be their only option for escape (Figure II-17 and II-18). Large area buildings sometimes referred to as horizontal high rises, such as warehouses, malls, and large “big box” stores often require greater volumes of water for firefighting and require more firefighters to advance hose lines, long distances into the building. They also present challenges for ventilation and smoke removal.

⁷ U. S. Experience with Sprinklers. John R. Hall, Jr. National Fire Protection Association, June 2013.

⁸ U. S. Experience with Sprinklers. John R. Hall, Jr. National Fire Protection Association, June 2013.



FIGURES II-17 (left) and II-17 (right): THE EVERLEIGH COMPLEX IS 4 STORIES ON SOME SIDES AND 5 STORIES ON OTHERS TO ACCOMMODATE UNDERGROUND PARKING. THE BUILDING IS ALSO NOT EASILY ACCESSIBLE ON ALL SIDES BY FIRE DEPARTMENT LADDER TRUCKS.

Barnstable also experiences a major influx of people on the weekends and throughout the warm weather months when people vacation in the area. This can create heavy traffic conditions throughout the area. This includes not only the roads around and leading directly to various locations; but on other roads as well, as drivers attempt to avoid the congestion found on the primary highways. These traffic conditions not only create additional incidents such as motor vehicle accidents, they can also significantly, and negatively, impact response times.

The Massachusetts Bay Transportation Authority (MBTA) operates Cape Flyer passenger rail service between Boston and Hyannis on weekends between Memorial Day and Columbus Day. This rail line also passes through Barnstable Village. At other times, the line is used for freight traffic, however hazardous materials are rarely, if ever, transported along it. And while the Hyannis Municipal Airport is not located within the fire district, it is adjacent to it, with flight approach and departure paths within the department's fire due area.

The Barnstable Fire Department is also responsible for protecting Barnstable Harbor which is an arm of Cape Cod Bay (Figure II-19). The harbor and marina are home to a large passenger ferry, as well as, numerous commercial fishing vessels and recreational watercraft. This area presents several potential fire and water rescue challenges for the department.



FIGURE II-19: BARNSTABLE HARBOR AREA PRESENTS THE FIRE DEPARTMENT WITH UNIQUE CHALLENGES.

The Barnstable Fire Department is also responsible for protecting Sandy Neck Beach, an isolated 4,700-acre barrier beach, located approximately one mile north of Barnstable harbor and accessible only by water and four-wheel drive vehicles. In addition to a seven-mile-long beach, Sandy Neck is home to 38 cottages and the Sandy Neck Lighthouse (Figure II-20).



FIGURE II-20: SANDY NECK VIEWED FROM THE OPPOSITE SIDE OF BARNSTABLE HARBOR.

The fire service further assesses the relative risk of properties based on several factors. Properties with high fire and life risk often require greater numbers of personnel and apparatus to mitigate a fire emergency effectively. Staffing and deployment decisions should be made with consideration of the level of risk within each area of the community. The assessment of each factor and hazard as listed below took into consideration the likelihood of the event, the

impact on the fire district itself, and the impact on the Barnstable Fire Department's ability to deliver emergency services, which includes automatic aid capabilities as well. The list is not all-inclusive but includes categories most common; or that may present to the department.

Low Risk:

- Automatic fire/false alarms.
- Single patient/non-life threatening BLS EMS Incidents.
- Minor fire incidents (fire flow less than 250 gallons per minute) with no life safety exposure.
- Minor Flooding with thunderstorms.
- Good Intent/Hazard/Public Service.
- Minor rescues.
- Outside fires such as grass, rubbish, dumpster, vehicle with no structural/life safety exposure.
- Small fuel spills.

Moderate Risk:

- Fires in single-family dwellings and equivalently sized commercial office properties (needed fire flow generally between 250 gallons per minute to 1,000 gallons per minute) where fire and/or smoke is visible indicating a working fire
- Life-threatening ALS medical emergencies
- Motor Vehicle Crash (MVC)
- MVC with entrapment of passengers
- Hazardous materials emergencies requiring specialized skills and equipment but not involving a life hazard
- Technical rescues involving specialized skills and equipment (such as low angle rescue involving ropes and rope rescue equipment and resources)
- Larger brush and outside fires, particularly if structures are exposed.
- Suspicious Substance Investigation involving multiple fire companies and law enforcement agencies
- Surface Water Rescue
- Good Intent/Hazard/Public Service fire incidents with life safety exposure

High Risk:

- Fires in larger commercial properties and target hazards with a sustained attack (fire flows more than 1,000 gallons per minute)
- Cardiac/respiratory arrest

- Multiple patient medical/mass casualty incidents with more than ten but less than 25 patients
- Major releases of hazardous materials that causes exposure to persons or threatens life safety
- High-risk technical rescues
 - ❖ Confined space rescue
 - ❖ Structural collapse involving life safety exposure
 - ❖ High angle rescue involving ropes and rope rescue equipment
 - ❖ Trench rescue

Special Risk:

- Working fire in a structure greater than three (3) floors.
- Fire at an industrial building or complex with hazardous materials.
- Multiple patient medical/mass casualty incidents with more than 25 patients.
- Rail or transportation incident that causes life safety exposure or threatens life safety through the release of hazardous smoke or materials.
- Explosion in a building that causes exposure to persons or threatens life safety or outside of a building that creates exposure to occupied buildings or threatens life safety.

Overall, it is the project team's assessment that the Barnstable Fire Department's current relative basic fire and life risk translates to (Figure II-21):

OCCUPANCY DESCRIPTION	RISK
Single Family Residential (unsprinklered)	Moderate
Multi-family Residential (sprinklered)	Moderate
Multi-family Residential (unsprinklered)	High
Commercial (retail and office) (sprinklered)	Moderate
Commercial (retail and office) (unsprinklered)	High
Industrial	Moderate/High
Open Space	Low
Transportation Incident	Moderate
Water Rescue Incident	Moderate

FIGURE II-21: BARNSTABLE FIRE DEPARTMENT FIRE AND LIFE SAFETY RISK LEVELS

The weather a community experiences can impact the fire department's ability to respond. Snow, ice, and other conditions can slow response. Major storms can create emergency

situations that can overwhelm local emergency response forces. The Barnstable area enjoys a moderate climate typical of the New England region. Thunderstorms, strong windstorms, and significant rain events happen several times in an average year. Tropical storms and hurricanes also occasionally impact the area. Snowfall is experienced annually and occasionally in amounts that paralyzes the region. Although rare, tornadoes have occasionally touched down in Massachusetts. The location of the district on Cape Cod Bay can result in strong tides and occasional major flooding.

Aggressive adoption and enforcement of fire and building codes in both new and existing facilities will continue to be a critical factor in managing risk throughout the Barnstable Fire District. Communications regarding major projects need to be kept open and frequent. Any new development projects that are proposed should continue to be sent to the fire department for review and input on fire protection needs and concerns. In addition, ensuring that existing buildings continue to maintain code compliance is an important component of a community's overall fire protection system.

The implementation of successful community risk reduction strategies after completion of a community risk assessment are linked directly to the prevention of civilian and firefighter line of duty deaths and injuries. In fact, they directly address goals found in firefighter Life Safety Initiatives 14 and 15. Virtually every risk reduction program in the fire and emergency services will have elements of what are called *"The 5 Es of Prevention"*. These include:

Education • Enforcement • Engineering

Economic Incentives • Emergency Response

Understanding and addressing only one element will not lead to a successful program. All five "Es" must be integrated into every program for it to be effective⁹ (Figure II-21). Strong fire prevention codes have been shown to be extremely effective means, to reduce risk in a community. Fire alarm and sprinkler systems mandates for not only commercial buildings; but all occupancies including single family dwellings, dramatically reduce fire risk and increases life safety. Code implementation that doesn't require these creates an increased risk. Strong code provisions

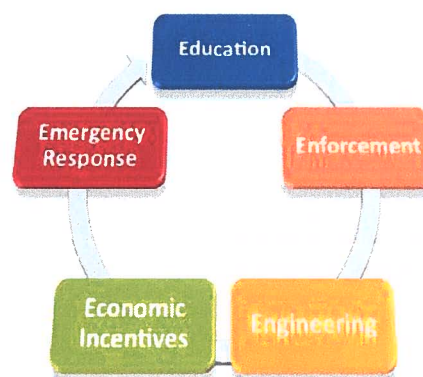


Figure II-21: FIVE ES OF PREVENTION IN A COMMUNITY RISK REDUCTION PROGRAM
Image credit: www.beaherosaveahero.org

⁹ <http://www.beaherosaveahero.org/2013/10/community-risk-reduction-crr-overview/> February 5, 2016

and enforcement have demonstrated a greater ability to decrease fire problems than continuing to acquire more traditional fire department resources.

The Barnstable Fire Department does have an active fire prevention and community risk reduction program in place. These include fire prevention and code enforcement functions, along with an all-hazards risk reduction approach to public education. These activities are carried out under the direction of the Deputy Fire Chief and over the past several years have ranged between 150 and 250 annual inspections. The public education component of the program is managed by a department Captain and generally includes between 50 and 100 presentations annually to a wide range of stakeholders. The public education program presentations include the state sponsored SAFE and senior SAFE programs, Home Forever Program, ALiCE, Stop the Bleed, CPR/AED Child Passenger Safety/Car Seat Installations, Fire Extinguisher Training, and the traditional Fire Safety in Schools Programs. Additional details on these activities can be found in the Barnstable Fire Department 2019 Organizational Analysis. The Barnstable Fire Department's commitment to a comprehensive community risk reduction program should be commended and is considered a **Best Practice**.

Looking ahead, the Barnstable Fire District will continue to experience some steady, although not high, growth and development. While this development will have a definitive impact on the Barnstable Fire Department, the exact amount is difficult to quantitatively and accurately predict. Increased development of any type will mean an increase in the number of people living, working, and traveling within the area. Each of these will reasonably be expected to result in an increased number of requests for services from the fire department. They can also impact response times through increased traffic and congestion.

It is likely the most significant increase in requests for emergency services will be EMS related. More people simply increase the number of medical emergencies that occur. It would not be unreasonable to expect that the increase in EMS incidents would be proportional to the increase in population; however, that is not always the case. Although a number of factors can ultimately impact the requests for service, such as ages or socio-economic status of new residents, or an aging population, it could reasonably be anticipated that an increase in population, along with potential increases in employment from any significant commercial development, would translate into an increase in emergency medical incidents.

It is also important to note that according to data from the Barnstable Fire Department, that approximately 62% of the district's resident population is age 65 or older. This is 17% higher than the statewide average. Persons over the age of 65 are considered in a higher risk group both from the perspective of fire and medical emergencies. An aging population group, along with the potential for the number of senior citizens in the age 65 and over group to increase

with new developments, or with people who turn what was a vacation home into their permanent retirement residence, also suggests that the number of responses will continue to increase.

The above information is intended to provide a community “snapshot” of the Barnstable Fire Department response district. It is not intended to be all-inclusive or comprehensive. For the fire district’s governing body and first responders it serves to put the community, and its associated hazards and risks, into some context as the fire district and the fire department work to carry out the recommendations of this study and implement their long-range plans. Looking ahead, as it develops a more in-depth risk management plan, that assessment should be include:

- clearly identify and classify the district’s current risks,
- place the risks in context with the fire Department’s current operational capabilities and procedures,
- reflect what the Prudential Committee feels is an acceptable level of risk for the Barnstable Fire District,
- implement short- and long-range plans based upon a desire to reduce those risks and/or improve service delivery levels.

RECOMMENDATIONS

- II-1 *The Barnstable Fire Department should make it a priority to complete a comprehensive fire and rescue community risk assessment. This assessment should be done in conjunction with a fire and EMS calls for service demand analysis, including the development of a wide-ranging pre-incident planning program for target and high hazard locations in the district, and take into consideration the fire department’s operational capabilities and preparedness.***
- II-2 *The Barnstable Fire Department should develop a compelling public education program that includes discussing the benefits of installing residential fire sprinklers in new one- and two-family dwellings. Although Massachusetts’s construction codes do not allow residential fire sprinkler systems to be mandated, there is no prohibition for property owners to install them if they determine that it is in their best interest.***
- II-3 *The Barnstable Fire Department should consider the implementation of a company-level inspection program, integrated with a pre-fire/incident planning program as part of its comprehensive community risk reduction program.***

- II-4 *The Barnstable Fire Department should continue, and where possible, enhance/expand, its public education programs as part of its comprehensive community risk reduction program.***
- II-5 *The Barnstable Fire Department should apply annually for a federal Fire Prevention and Safety Grant (FP&S) from the Federal Emergency Management Agency (FEMA) to assist with underwriting the costs of its community risk reduction programs.***

CHAPTER III ORGANIZATIONAL STRUCTURE

ORGANIZATIONAL STRUCTURE

The organizational structure of any organization or entity, whether public or private, establishes and illustrates the important hierarchical relationships between various personnel, supervisors/subordinates, levels, divisions, and bureaus within the organization that allow it to function properly, and operate effectively and efficiently in its daily operations or the pursuit of its mission. It also helps to clearly define the organizational chain of command from top to bottom, an especially important consideration in a quasi-military public safety organization such as a fire department where everyone from the highest rank to the lowest is subject to receiving orders, and with the exception of the lowest rank, also issues them. Effective communications in any organization, but especially public safety agencies, are essential. A cohesive chain of command allows everyone to know exactly who they report to and/or who reports to them.

The Barnstable Fire District was established on August 5, 1927 after a petition by village residents was approved by the Massachusetts Legislature. However, the Barnstable Fire Department was not organized until July 14, 1935. The department remained staffed solely by on-call firefighters until 1985 when the first full time career firefighter was hired. In 1988, the first full time chief was appointed. The department continued to function as a combination fire department utilizing a mix of both career and on-call firefighters until January 2006 when, with few active call members left, the decision was made to disband the on-call force and transition to a fully career fire department.

As is typical with many fire districts in Massachusetts, the Barnstable Fire District is also a water district which provides the water service to district residents. The district is overseen by a three member Prudential Committee who are elected to staggered three year terms by the district's voters. A separate three member group of Water Commissioners oversee the water operation and report to the Prudential Committee. They too are elected to staggered three year terms.

Figure III-1 illustrates the Barnstable Fire District's organizational structure that was in effect in 2020.

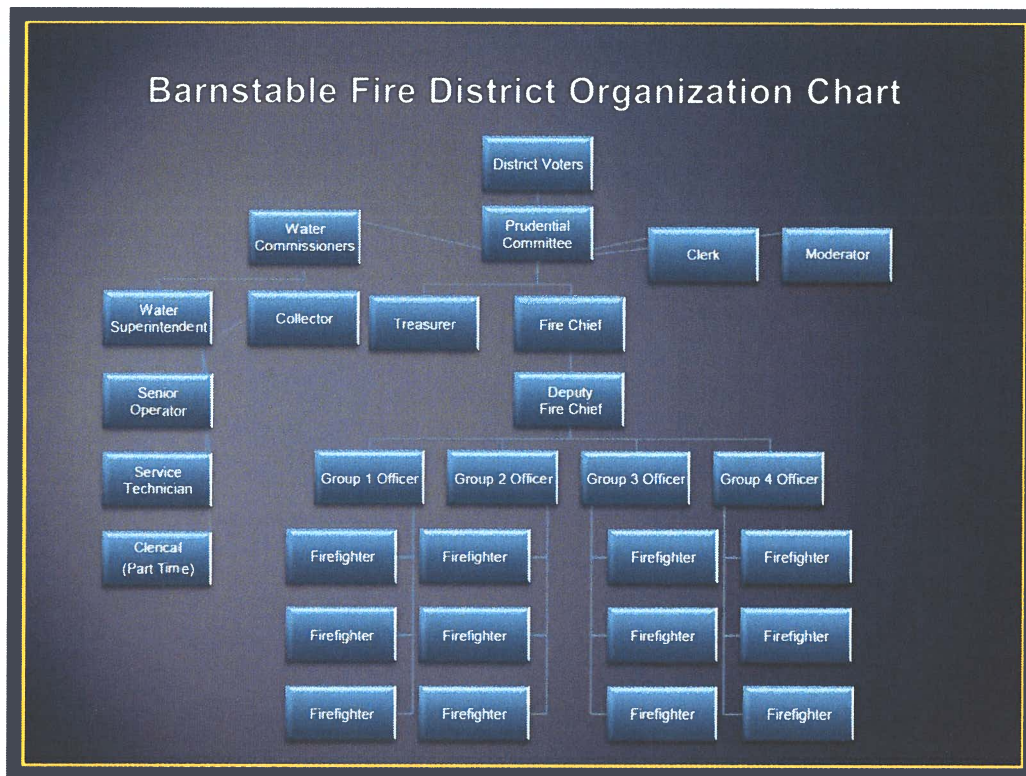


FIGURE III-1: CURRENT BARNSTABLE FIRE DISTRICT ORGANIZATIONAL CHART

At the time of this assessment, the Barnstable Fire Department is authorized a total staffing compliment of nineteen full-time, career personnel), plus one civilian administrative assistant. These personnel include:

- 1 Fire Chief
- 1 Deputy Fire Chief
- 4 Captains
- 1 EMS Coordinator
- 12 Firefighters
- 1 Administrative Assistant (civilian)

The department and its personnel are not a part of the Massachusetts civil service system. As such, the fire district must establish its own specific requirements for recruiting, hiring, promoting, disciplining, and terminating fire department employees.

Fire Chief Frank Pulsifer is the department's highest ranking officer and serves as the administrative and operational head of the department. The Fire Chief is appointed by, and reports to, the Prudential Committee. The chief appears to be an effective advocate for the organization, who is trying to bring the department to a higher level of service and effectiveness. Chief Pulsifer works a straight day work schedule, Monday through Friday.

The Deputy Fire Chief also work straight daywork and serves as the second in command of the Department. He handles the department's day to day emergency operations and fire prevention functions and assumes the chief's duties in his/her absence. Both the Chief and the Deputy Chief are considered to be management and are not a part of the collective bargaining unit. As a management team, they share responsibilities for confidential personnel matters, supervision, handling grievances or potential grievances, administering the collective bargaining agreement, overseeing budgetary expenditures, assisting with the development of policies and procedures, and the myriad of administrative and management tasks that are associated with running a significant sized, modern, full-service emergency services provider. They also appear to form a capable, well respected, and effective command team. Overall, the department appears to work diligently to meet the needs of the community. The chiefs are assisted by a civilian administrative assistant who provides a wide range of administrative and support functions.

The department is authorized a total of four (4) captains who are assigned as supervisors on each of the four (4) platoons/units, and function as the shift commanders. The captains serve as the department's first line supervisors, providing critical direction and direct oversight to the firefighters assigned to that platoon while also providing initial incident command and management. They form an integral part of their company or unit, and it is often necessary for them to assume hands-on involvement in operations while simultaneously providing oversight and direction to their personnel. Captains must be able to focus on the completion of specific tasks that have been assigned to their respective companies, such as interior fire attack, rescue, ventilation and/or water supply. During structure fires and other dangerous technical operations, it is imperative that these officers accompany, and operate with their crew to monitor conditions, provide situation reports, and assess progress toward incident mitigation. During structure fires they must be capable of operating inside of the fire building with their crews, the most dangerous place on the incident scene. Consequently, it is imperative that they are highly qualified and experienced and can command the confidence of their personnel.

According to the current collective bargaining agreement (CBA), when a captain is absent from his assigned shift for five hours or more, his position as the shift commander is filled by a firefighter who is referred to as the "designated firefighter". Although this is an informal position from the perspective that it is not tested, the personnel who fill this role have certain training and education qualifications they must meet, as well as being qualified to drive and operate all department apparatus. The designated firefighter is compensated one hour of

overtime pay for each day tour or night tour, or two hours of pay for a 24-hour shift. Only when a captain is absent for 30 days or more is an “acting” captain required to be appointed.

Although the CBA also identifies the additional formal positions of Senior Private and Lieutenant, neither of these ranks are currently utilized by the department. The former position has not been utilized for at least the past 12 years, if ever, while the latter was previously used prior to the shift commander position being upgraded to the current rank of captain. Some of the department’s stakeholders expressed a desire for the department to implement use of the senior private position and discontinue the position of designated firefighter. This would require additional testing and compensation by the department.

While the current structure maybe somewhat more more cost-effective than promoting four senior privates (one for each shift) as well as not having to host a promotional examination every two years as required by the CBA, there could operational value to doing so. There is also little justification for a department which is currently comprised of just 19 total personnel (with the potential for a small increase based upon the recommendations contained within this report) having the potential for 10, or even 11 personnel to be considered in some type of potential supervisory position. However, those facts notwithstanding, MRI feels that there could be some benefits to revising the process for filling captain vacancies, particularly those that are of short duration, which according to the CBA is those openings less than 30 days in length. Any changes would need to be impact bargained with the union.

Personnel who are on the current promotional eligible list for captain should be given the first opportunity to fill vacancies on their own shift. It is our experience that the opportunity to earn acting pay more frequently for filling in even for short term vacancies may motivate additional members of the department to prepare for the promotional exam and get on the eligible list. The district should also consider negotiating with the union to look at implementing additional requirements for eligibility to test for captain beyond four years of service with the Barnstable Fire Department and not being on probation. Some of the suggested increased requirements for eligibility for this position could include:

- Firefighter II certified.
- Completion of the Massachusetts Fire Academy Pump Operator AND Aerial Operator certification classes, and, approved to operate all department vehicles.
- Advanced EMT or Paramedic certified.
- Obtained a minimum of 20 hours of firefighting tactics training.
- Fire Instructor I or Fire Inspector I certified.
- Upon promotion:
 - ❖ Obtain 20 hours of supervisory training within 2 years of appointment.
 - ❖ Obtain Fire Officer I certification with 2 years of appointment.

It is the MRI study team's opinion that since the captains are responsible for supervising all aspects of their assigned shift's fire and EMS operations that they should be thoroughly versed in all aspects of these actions, thus the recommendation for an advanced level of EMS certification and completion of the apparatus operator courses. Consideration could be given to requiring additional training or certification from the captains rather than the current stipend based voluntary system.

Beyond the position of Captain as shift commander, MRI suggests that consideration be given to replacing/reclassifying the position of designated firefighter and the unused position of senior private as a Senior Firefighter. If there is no one on the current promotional list for captain assigned to a particular shift (or available) the Senior Firefighter should be offered the opportunity to fill the position provided they also meet certain minimum qualifications such as:

- Four years of service with the Barnstable Fire Department.
- Firefighter II certified.
- Completion of the Massachusetts Fire Academy Pump Operator AND Aerial Operator certification classes, and, approved to operate all department vehicles.
- Advanced EMT or Paramedic certified.
- Obtained a minimum of 20 hours of firefighting tactics training.

With the receipt of a Staffing for Effective Fire and Emergency Response (SAFER) grant¹⁰ from the Federal Emergency Management Agency/United States Fire Administration (FEMA/USFA), in late 2020, the department was able to hire one additional firefighter. The new person started work in January 2021. As a result, the department is in the process of making an organizational change by redefining the position of EMS Officer into a full time position. The EMS Officer will handle the day to day oversight of the department's EMS functions including QA, personnel training and certification, infection control, managing inventory and drugs, attending meetings, and serving on committees. As currently proposed, the officer will work a daywork schedule providing an additional member available for response during the day. They will report directly to the on duty shift captain.

Overall the MRI study team believes that the Barnstable Fire District and Barnstable Fire Department should be commended for making this operational change that will result in more effective and efficient emergency medical service delivery by the department. However, we do have concerns regarding how the position will be defined within the organizational structure. If the EMS Coordinator is designated to answer to each of the shift captains, he will in essence have four bosses who may have very different levels of interest in coordination of activities,

¹⁰ The goal of SAFER is to enhance the local fire departments' abilities to comply with staffing, response and operational standards established by the NFPA 1710.

perceptions over roles, and, even degrees of motivation. This could lead to unnecessary friction and lack of productivity and even continuity between the various shifts.

It is MRI's experience that when department's create these positions that they are normally designated at an officer's rank, and as such, are tested for (although in some places although the position has rank, they are designated as a 'staff' officer with no real fireground authority). Other departments designate the EMS coordinator with just that title but compensate them at an officer's pay grade, often lieutenant. The current CBA designates the "EMS Officer" as receiving a 6% stipend over their base pay, however, that assumes that the person filling the position remains on their assigned shift.

While we understand this would also need to be impact bargained with the union (as any change needs to be) it is our opinion that this position would be best designated as a captain's position within the Barnstable Fire Department, reporting directly to the deputy fire chief. Doing this would help to emphasis the importance of the department's EMS mission, allow the EMS coordinator to have an equal peer relationship with the other captains, and allow for the implementation of more department wide continuity of EMS operations.

Each platoon/shift has three (3) firefighters or firefighter paramedics assigned to it. These personnel perform a range of fire, rescue, and EMS duties and responsibilities. A few participate in specialized regional teams and operations and perform various additional duties for the department. Some but not all, of the department's personnel have ancillary duties they have been assigned, that assists with coordinating or managing various aspects of the department's operations.

Captains and firefighters in the Barnstable Fire Department work a four (4) platoon 24 hour shift schedule for an average work week of 42 hours per week. Their schedule consists of 24 hours on duty; followed by 24 hours off duty; then another 24 hour tour on duty, and finally 120 hours off duty. This type of schedule is highly typical for fire departments in the northeastern United States.

The one downside to the 24-hour schedule is that there can be a tendency for continuity and/or progress on projects to be slowed by the fact that, the personnel assigned to or working on them, are only available every third or fifth day. When personnel work weekends and holidays, when the fire chief is not normally working is factored in; communications can be problematic, as the fire chief may go a week or longer without seeing certain personnel who he may need to get updates from and provide direction/instruction to. While there is a wide array of alternative communications mediums available today that can minimize these issues, there is still no form of communication that is as effective as face-to-face communications.

All uniformed personnel, other than the fire chief and the deputy fire chief, are represented in collective bargaining by Barnstable Fire Fighters Local 3276 of the International Association of Fire Firefighters (IAFF). The fire district and bargaining unit reached a new three-year labor agreement in April 2020 that extends until June 30, 2023. The current representation arrangement where rank and file firefighters, and supervisors (captains) are all in the same union – while very common – does have the potential to create problems and conflicts of interest within the department, particularly when it comes to the administration of discipline.

Although limited in scope due to the COVID pandemic, during the teams fieldwork, the Barnstable Fire Department appears to have a positive organizational culture. During the interviews with stakeholders, the MRI study team was informed that labor/management relations are generally good and positive. There was a positive attitude about the changes the department was making and in the past few years, the chief along with all its members were trying to raise the department to an even higher level. The attitude and professionalism that was witnessed during the site visits is not always something that the MRI project team sees during these studies. The project team found members that appeared to be engaged in the department besides just being employees.

Overall, the MRI study team believes that the current Barnstable Fire Department organizational structure is appropriate for department's current needs and operations. While we make several recommendations in this section, they primarily serve to enhance current, and near term, operations rather than indicate a need for major changes. The department should be commended for its emphasis on encouraging personnel to obtain higher levels of training and certification through the generous availability of stipends. As with any organization that continues to grow and evolve based upon the expanding needs of its customers, the Barnstable Fire Department's organizational structure should continue to be evaluated in an ongoing manner to ensure it is still appropriate and meeting the department's needs. If, in the future, revisions are deemed appropriate, they can be considered at that time.

RECOMMENDATIONS

- III-1 *The Barnstable Fire District should consider negotiating for the purpose of implementing additional requirements for eligibility to test for captain beyond four years of service with the Barnstable Fire Department and not being on probation. Some of the suggested increased requirements for eligibility for this position could include:***

➤ ***Firefighter II certified.***

- *Completion of the Massachusetts Fire Academy Pump Operator AND Aerial Operator certification classes, and, approved to operate all department vehicles.*
 - *Advanced EMT or Paramedic certified.*
 - *Obtained a minimum of 20 hours of firefighting tactics training.*
 - *Fire Instructor I or Fire Inspector I certified.*
 - *Upon promotion:*
 - ❖ *Obtain 20 hours of supervisory training within 2 years of appointment.*
 - ❖ *Obtain Fire Officer I certification with 2 years of appointment.*
- III-2** *Personnel who are on the current promotional eligible list for captain should be given the first opportunity to fill vacancies on their own shift.*
- III-3** *The Barnstable Fire Department should consider replacing/reclassifying the position of designated firefighter and the unused position of senior private as a Senior Firefighter.*
- III-4** *If there is no one on the current promotional list for captain assigned to a particular shift (or available) the senior firefighter should be offered the opportunity to fill the position provided they also meet certain minimum qualifications such as:*
- *Four years of service with the Barnstable Fire Department.*
 - *Firefighter II certified.*
 - *Completion of the Massachusetts Fire Academy Pump Operator AND Aerial Operator certification classes, and, approved to operate all department vehicles.*
 - *Advanced EMT or Paramedic certified.*
 - *Obtained a minimum of 20 hours of firefighting tactics training.*
- III-5** *The Barnstable Fire District and Barnstable Fire Department should consider designating the newly full-time position of EMS coordinator as a captain's position which is tested for as part of a promotional process. This position should continue to have the requirement that the person holding it must be a currently certified paramedic and hold that certification for the duration of their time in the position.*
- III-6** *The Barnstable Fire District should continue to evaluate the organizational structure of the Barnstable Fire Department in an ongoing matter to ensure that it meets the needs of the community it services, the expectations of the community, and the department itself.*

CHAPTER IV

RESPONSE METRICS

A community's demand for fire and EMS services are based on that community's demographics, socio-economic factors, the percentage of commercial, industrial, and residential properties, as well as, the district's infrastructure. By reviewing the historical demand for fire and EMS services and the fire department's ability to respond to those needs within the expressed expectations of that community; a fire department can evaluate what types and levels of services that they will need to provide. Though fire and EMS standards are helpful for modeling those services, no two communities are exactly alike. Budgeting and resources often determine what level of service a community expects and can afford. Fire departments, in conjunction with their governing bodies and community political leaders, should work to establish plans that can deliver fire protection and emergency medical services at a point that meets the level of expectation that the community has established.

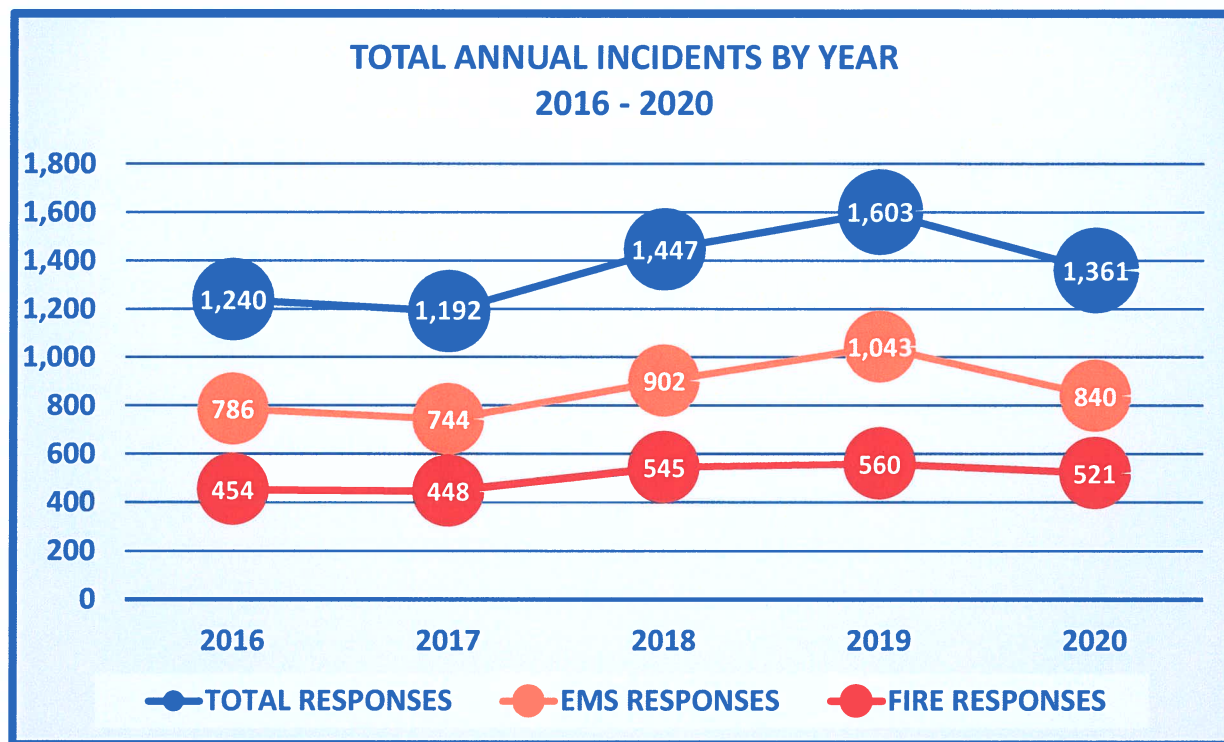
One of the best ways to get a broad overview picture of an emergency services organization is to look at, and analyze, their emergency response/incident statistics. Looking at statistical data that is compiled from incident reports that are generated for each and every emergency response, and /or request of assistance, will assist with determining the adequacy of current operations, as well as, to identify trends in responses (i.e., increasing vs. decreasing volume, changing types of incident requests, increasing or unacceptable response times, frequency of simultaneous incidents). Utilizing current trends to help predict future events, while not an exact science, can be helpful to communities and fire departments. This information can be utilized to plan for future operational needs, such as additional stations. However, as with any other type of statistical analysis, the information that is produced is only as good and/or reliable as the data that was originally entered and provided for evaluation.

The data that was analyzed for this report was provided to the MRI study team by the Barnstable Fire Department. The reports developed were automatically compiled through the report generation features of the Firehouse Software fire records management system, and the Image Trend Software to patient care reporting for EMS, utilized by the Barnstable Fire Department. Each emergency incident that the Barnstable Fire Department responds to results in the generation of a National Fire Incident Reporting System (NFIRS) report. The project team believes that the data that it analyzed is, for the most part, relatively accurate; however, the chief reported that improving data entry has been an ongoing project for the department over several years. While they have made significant progress, this remains a work in progress to improve the accuracy of the data that is available.

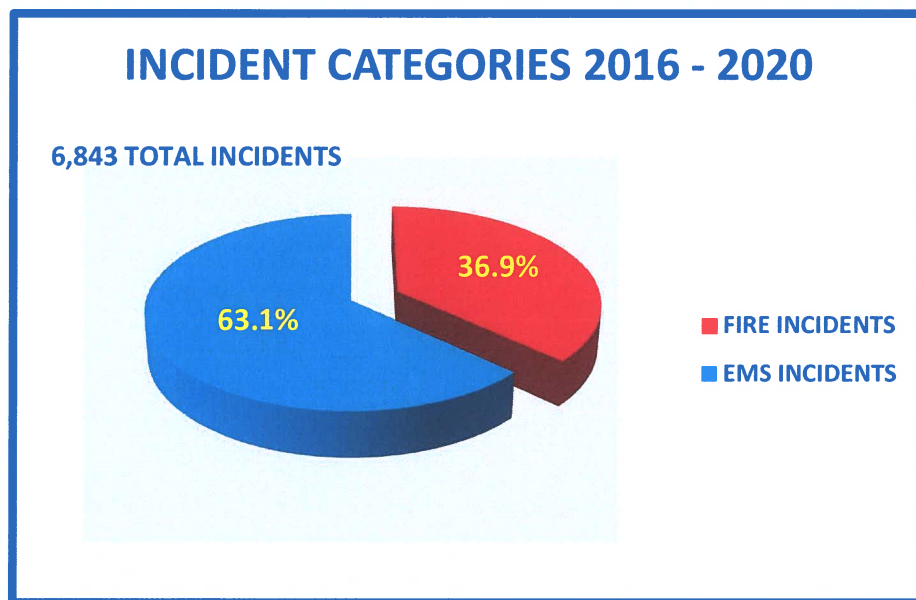
During the five-year period from 2016 - 2020, the Barnstable Fire Department responded to a total of 6,843 calls for emergency service, an average of 1,369 per year, or 3.75 per day (Figure IV-1). In 2020, the department responded to 1,361 incidents which is almost the same as the five-year average. Overall, the Barnstable Fire Department responds to about 63% medical related calls and 37% for fires and other emergencies (Figure IV-2). The yearly percentage of EMS calls compared to total call volume ranged from a low of 61.7% in 2020 to a high of 65.1% the previous year. The percentage of EMS related incidents is lower than in many communities where EMS related calls often account for to 70% to 80% of responses. This indicates that the department needs to remain focused on not only the EMS aspect of its operations, but also its fire suppression mission.

The year-to-year incident statistics showed a fluctuation from year to year instead of a steady upward trajectory as is often observed. The number of incidents decreased by 3.9% from 2016 to 2017 before increasing by 21.4% in 2018 and another 10.8% in 2019 then fell 15.1% in 2020. Much of the increase in 2018 and 2019 can be attributed to the department beginning to respond to Cape Cod Healthcare – Urgent Care in May 2018 which has increased call volume by approximately 200 incidents per year. In 2020, many EMS providers experienced significant declines in the number of responses which is being attributed to the COVID pandemic. They are expected to rise again as the pandemic is eventually brought under control.

It is MRI's experience that nearly every community continues to see annual increases in call volume, and we believe this trend will continue in Barnstable. It is important to note that 2012 was the first year that the Barnstable Fire Department responded to more than 1,000 incidents. Depending upon the year that a comparison is made to, the call volume has increased between 36% and 60% in the ensuing eight years. The five-year average suggests an increase of just under 37%. There is a 34.5% difference in responses between the high and low years in five-year period.

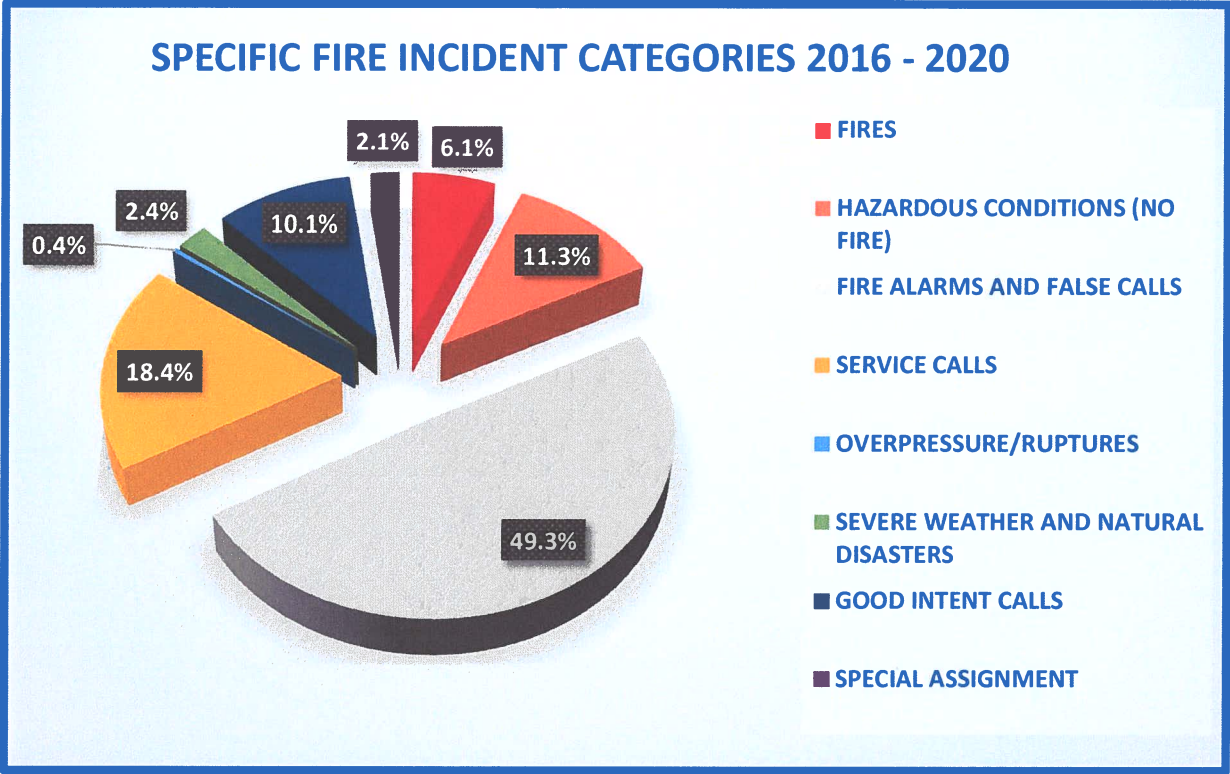


**FIGURE IV-1: BARNSTABLE FIRE DEPARTMENT TOTAL INCIDENT TREND
2016 –2020**



**FIGURE IV-2: BARNSTABLE FIRE DEPARTMENT GENERAL INCIDENT CATEGORIES
2016 – 2020**

Figure IV-3 further breaks down the fire related incidents into more specific categories. For actual fire incidents, the statistical sample is small. Per NFIRS protocols, the category for “Fire Incident” must be an actual fire situation, that in many, but not all situations caused some type of damage. Many of the incidents that are classified under other types of incidents were also probably initially dispatched as some type of fire incident, but ultimately were classified otherwise, for reporting purposes, based upon the situation actually found at the scene. From 2016 through 2020, the department responded to a total of 153 actual fire incidents, an average of 30.6 per year, or about .58 per week. Actual fires accounted for 6.1% of the fire department’s total responses during these years.



**FIGURE IV-3 BARNSTABLE FIRE DEPARTMENT FIRE INCIDENT CATEGORIES
2016 – 2020**

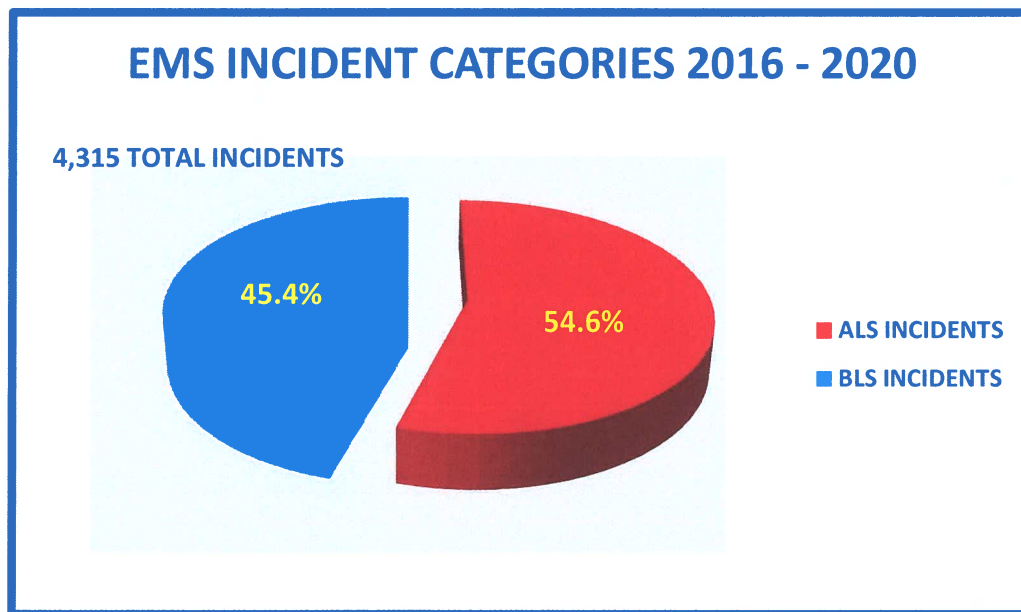
Significant structure fire incidents were a much smaller percentage of the actual fires. In the five-year period analyzed the Barnstable Fire Department experienced just 36 significant structure fires, an average of 7.2 per year.

Fire departments respond to many other types of incidents that may or may not be fire related. These types of incidents frequently constitute the largest number of fire department responses and each must be treated as an emergency. In the case of automatic fire alarm systems, the incident must be treated as a potential actual fire until such time as a trained and qualified



emergency responder arrives on the scene and determines otherwise. These types of responses account for just under 50% of the department's fire related responses. Other incidents, such as fuel or chemical spills create other dangers and hazards to people, property and the environment unless they are properly mitigated.

Figure IV-4 breaks down the Barnstable Fire Department's EMS incidents by whether they were classified as BLS or ALS criterion. The percentage of ALS incidents versus overall EMS incident volume reported by the Barnstable Fire Department is significantly higher than MRI usually encounters. Our experience, which is consistent with national trends, is that about 30% to 35% of EMS incidents meet ALS criterion. While Barnstable may reasonably be expected to have a somewhat higher percentage based upon the high percentage of people over 65 who live in their district, and the number of incidents they now respond to at the Cape Cod Healthcare Urgent Care where it could reasonably be expected patients are being transported to the hospital from a medical facility because they are having an emergent medical issue. However, this is an area that the department should closely monitor to ensure these incidents are being properly classified.



**FIGURE IV-4: BARNSTABLE FIRE DEPARTMENT EMS INCIDENT CATEGORIES
2016 – 2020**

One issue in Barnstable, as with many communities, is either actual or anticipated call volume growth. The five-year incident trend analysis indicated that incidents are generally on an upward trajectory. It is our belief that the decrease in incidents from 2019 to 2020 is an anomaly resulting from the COVID pandemic. Many other departments have experienced similar

declines in responses. Overall experience shows, particularly considering development occurring and proposed in the fire district, that call volume will continue to increase. Looking forward, if this growth in service demand continues, maintaining the current service level will only be possible if the level of resources dedicated to these services increase.

Every emergency services organization periodically experiences simultaneous, or overlapping, incidents. Whether they are handled by that department themselves, or, through automatic/mutual aid provisions need to be made to ensure that these incidents are handled effectively, efficiently and, in a timely manner. However, as the number of simultaneous, or overlapping, incidents increase, that community and/or department can no longer rely on their neighboring communities/departments to handle an ever-increasing percentage of their incidents. This a key benchmark in the need to consider increasing the number of available resources that are in service.

The MRI study team's evaluation found that the number of simultaneous, or overlapping incidents handled by the Barnstable Fire Department is increasing and becoming a significant operational concern. This has added a stress factor to the department as the occurrence of multiple overlapping calls over the five-year period analyzed stands at 20.4%, or about one in every five incidents. This means that 20.4% of the time the department is asked to answer not only one, but two, and occasionally three or more incidents at the same time with their resource set, and the assistance on off duty personnel, automatic, and mutual aid.

In 2018 the department responded to 331 multiple response emergencies (22.9% of incident volume). In 2019, the number increased to 383 incidents (23.9% of incidents, and an average of more than one per day. This produces an average of 31.9 simultaneous calls per month. This is a disturbing trend as while it is not unusual to see total incident volume rise, the rate of simultaneous events indicates that the current resource set of the organization will be unable to maintain the current service level as this statistic expands toward 25% and possibly beyond. Figures IV-5 illustrates the annual frequency of these events for the five-year period. These incident response metrics support the overall need to increase the human resource set provided to the department as will be discussed in detail in the *Staffing and Critical Tasking* section of Chapter V, *Fire and EMS Operations*.

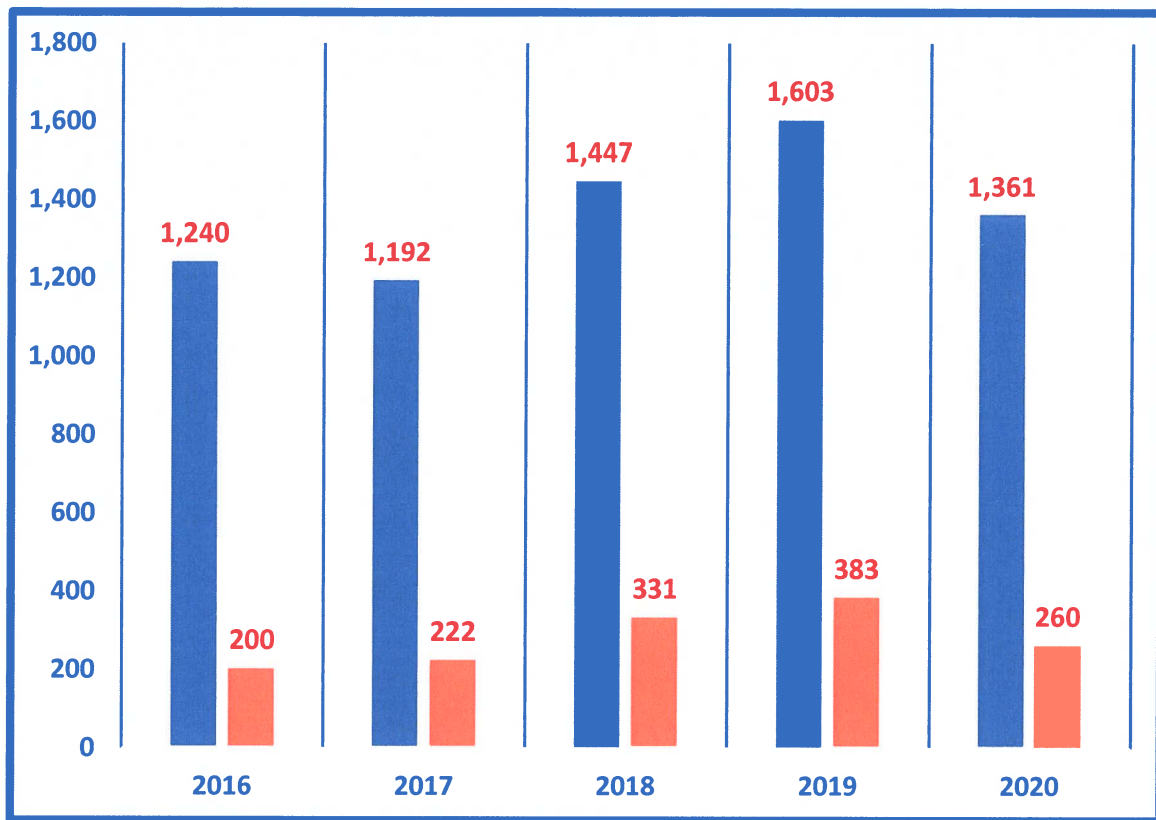


FIGURE IV-5: OVERLAPPING/SIMULTANEOUS INCIDENT VOLUME – 2016 - 2020

The number of incidents that the Barnstable Fire Department responded to each month over the fire year period is consistent with what would be expected of an area that experiences an influx of part-time residents and visitors during the warm weather months. Over the five-year period, incident activity began to increase during in May, peaking in July and August, before beginning to decrease again in October (Figure IV-6).

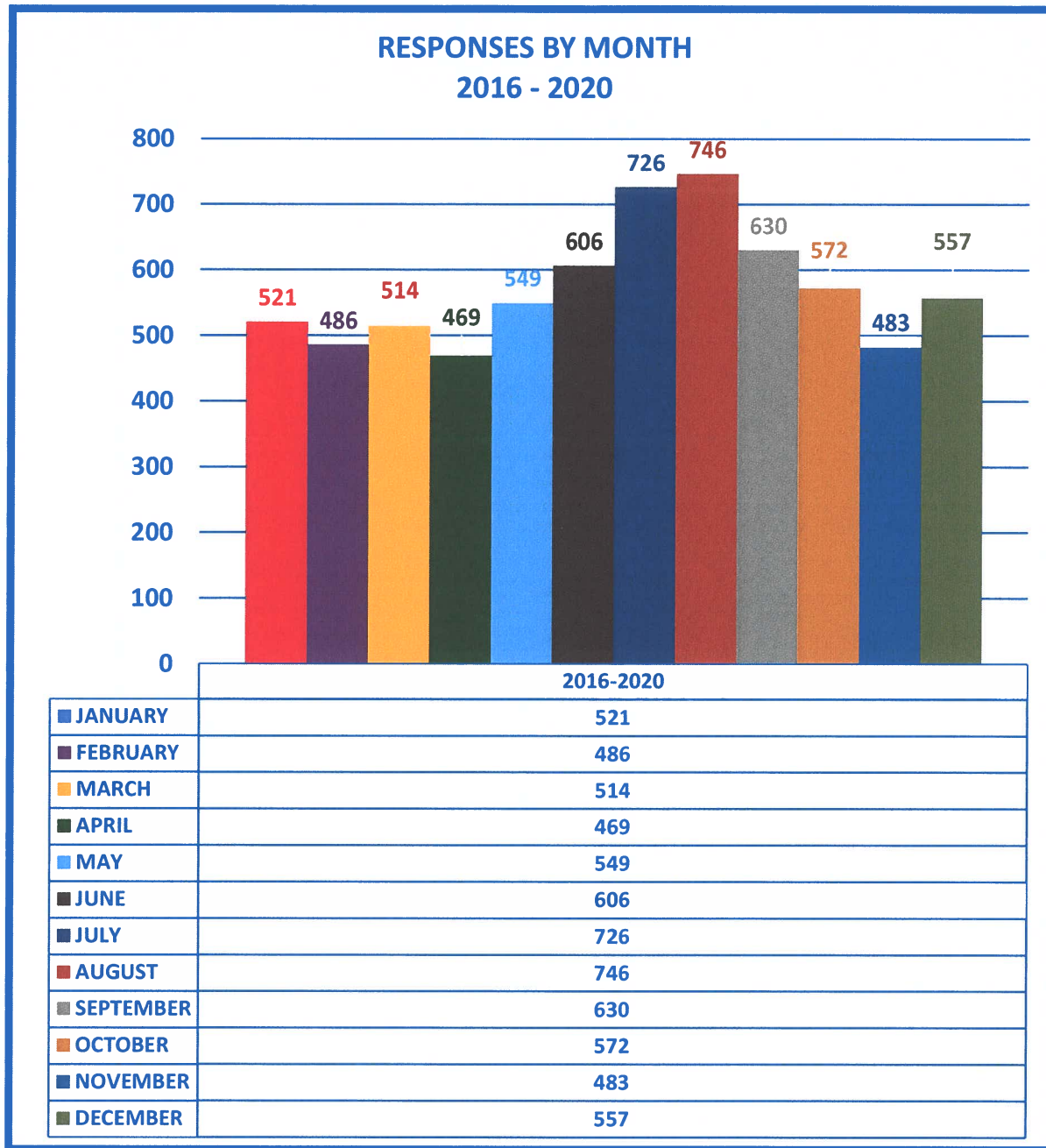


FIGURE IV-6: RESPONSES BY MONTH 2016 - 2020

The number of incidents that the department responded to each day of the work week, Monday through Friday is very consistent with just 35 incidents difference in the five-year period between the slowest day, Wednesdays, and the busiest days, Thursdays and Fridays (Figure IV-7). Surprisingly, the weekends tended to have fewer calls with 155 fewer incidents

on Saturdays than on Thursdays and Fridays, and another 146 fewer on Sundays than Saturdays and 301 less than Fridays and 274 less than on Mondays. With the Barnstable area being vacation and tourist destination during the warm weather months it would be reasonable to expect the weekends to be busier.

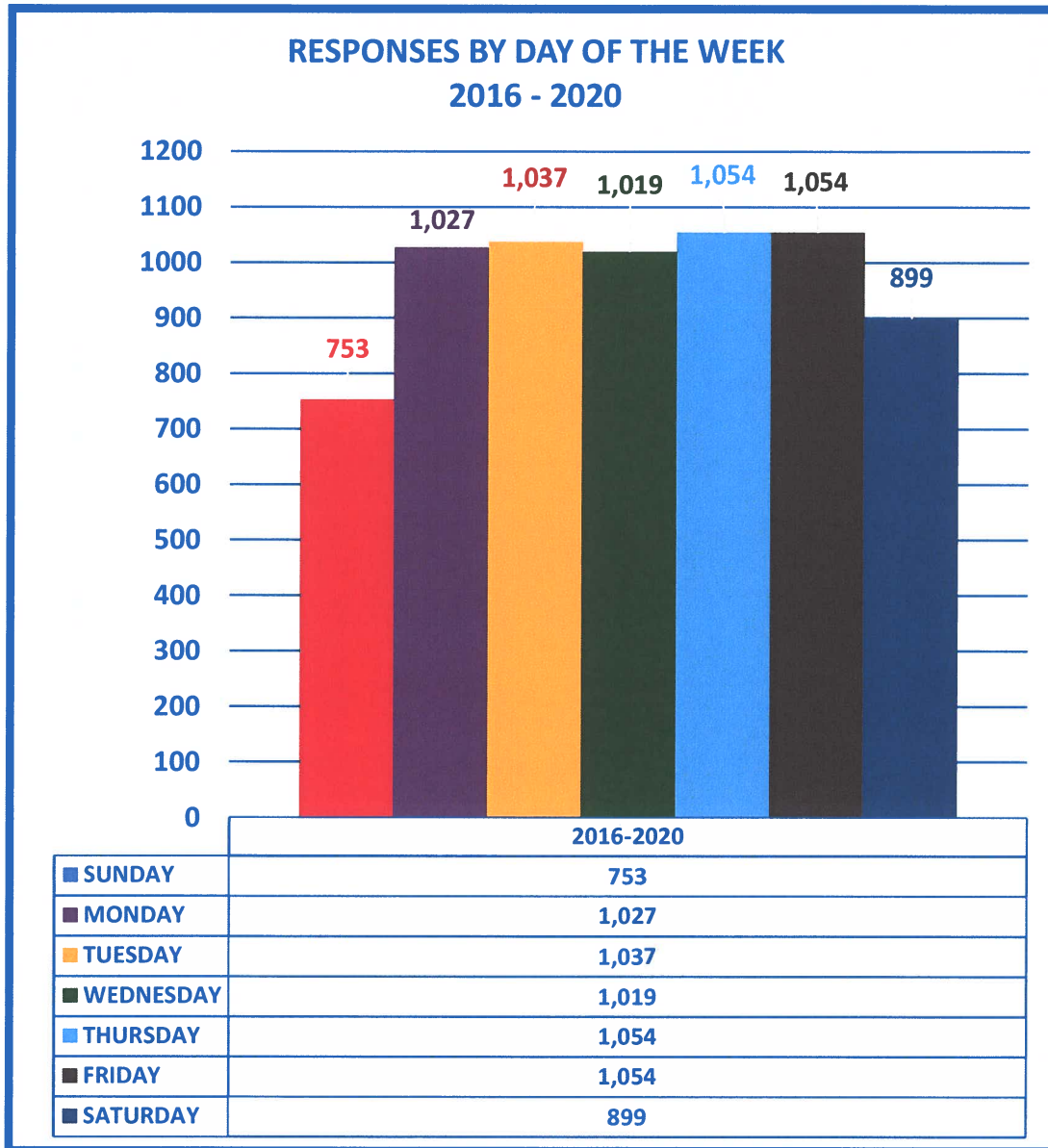


FIGURE IV-7: RESPONSES BY DAY OF THE WEEK 2016 - 2020

Incident activity rose and fell throughout the day depending upon the hour. The busiest hours of the day were between about 0900 hours and 1600 hours, earlier than 1500 hours to 1900 hours we typically see (Figure IV-8).



FIGURE IV-8: RESPONSES BY TIME-OF-DAY 2016 - 2020

Response time is an important measuring instrument to determine how well a fire department is currently performing, to help identify response trends, and to predict future operational needs. Getting emergency assistance to the scene of a 9-1-1 caller in the quickest time possible may be critical to the survival of the patient, and/or successful mitigation of the incident. Achieving the quickest and safest response times possible should be a fundamental goal of every fire department.

Fire departments are being held increasingly accountable for their response times and the consequences of extended or inadequate responses. The performance and effectiveness of fire department operations can be significantly impacted by the time it takes for them to arrive on the scene of an emergency incident. The United States Fire Administration's (USFA) report, *Structure Fire Response Times*, has a useful framework for total emergency incident response time, including definitions and components. The same report notes that about half of structure fires confined to the room of origin (51%) and confined to the floor of origin (51%) had a response time of less than five minutes. More than half of fires confined to the building of origin (54%) and nearly half of fires beyond the building of origin (49%) had a response time of less than six minutes.

Structural firefighting has become far more challenging and dangerous in the last thirty years with the introduction of significant quantities of plastic and foam-based products into homes and businesses (*e.g.*, furnishings, mattresses, bedding, plumbing, electrical components, home and business electronics, decorative materials, insulation, and structural components). These materials ignite, burn quickly, and produce extreme heat and toxic smoke. A fire can easily double in size and intensity every 30 seconds. If firefighters cannot arrive in a timely manner and attack the fire quickly, a strong possibility exists that a dangerous flashover (simultaneous ignition of all combustible materials in a room) will occur. Flashover can occur in as little as five to seven minutes after fire ignition and is one of the most dangerous events that a firefighter can face. When a flashover occurs, initial firefighting forces are generally overwhelmed and will require significantly more resources to affect fire control and extinguishment. Figure IV-9 illustrates the fire development timeline.

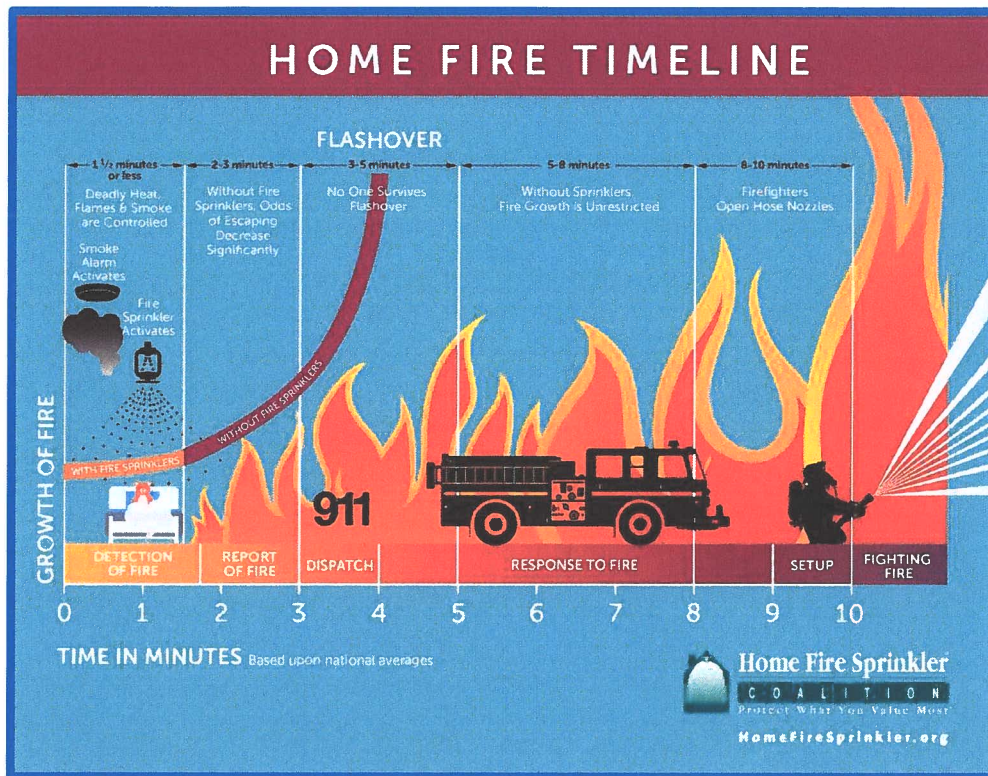
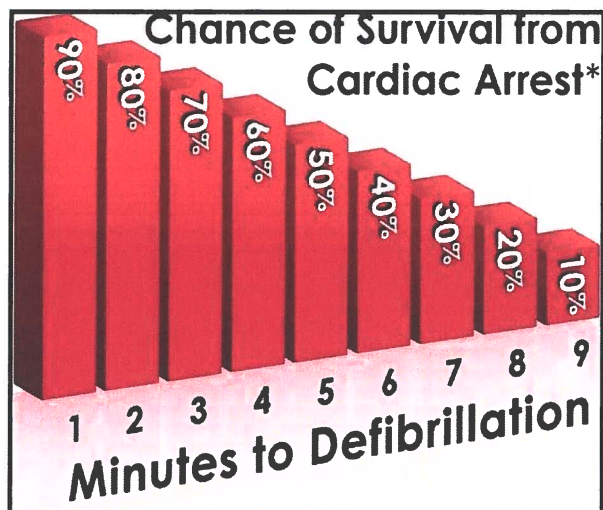


FIGURE IV-9: HOME FIRE TIMELINE CURVE SHOWING ACTIVATION TIMES AND EFFECTIVENESS OF RESIDENTIAL SPRINKLERS (APPROXIMATELY 1 MINUTE), FLASHOVER (3 TO 5 MINUTES) AND FIREFIGHTERS APPLYING FIRST WATER TO THE FIRE AFTER NOTIFICATION, DISPATCH, RESPONSE, AND SET UP (10 MINUTES).

Image credit: Home Fire Sprinkler Coalition



**FIGURE IV-10:
CARDIAC SURVIVAL MATRIX**

Also, as previously noted, 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. Numerous studies have shown that irreversible brain damage can occur if the brain is deprived of oxygen for more than four minutes. In addition, the potential for successful resuscitation during cardiac arrest decreases exponentially with each passing minute that cardio-pulmonary resuscitation (CPR) or cardiac defibrillation is delayed (Figure IV-10).

Since the 1970s, arriving within eight minutes of receipt of an emergency call, 90% of the time, has been the recognized benchmark for determining the quality of an EMS system. Today, the national standard of care benchmark based on stroke and cardiac arrest protocols has evolved to have an emergency response unit on scene at a medical emergency within six minutes of receipt of the call.

NFPA Standard 1710 – Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments (2016 Edition), is the nationally recognized consensus standard on staffing and deployment by career fire departments. It is the benchmark standard that the United States Department of Homeland Security utilizes when evaluating applications for staffing grants under the Staffing for Adequate Fire and Emergency Response (SAFER) grant program. Paragraph 4.1.2.1 of NFPA 1710 states that:

The first arriving engine company shall arrive at the scene of a fire suppression incident within four minutes or less, and/or the entire full first alarm response should arrive on scene within eight minutes. For EMS incidents, a unit with first responder or higher-level trained personnel should arrive within four minutes, and an Advanced Life Support (ALS) unit should arrive on scene within eight minutes.

Paragraph 4.1.2.2 requires the establishment of a 90% performance objective for these response times.

NOTE: The four-minute response time is from when the units are physically moving to the incident. One minute can be added for call processing and dispatch, and one minute can be added for turnout time, that is from when firefighters in the station are notified, until they are actually responding, providing six total minutes from the time the 9-1-1 call is answered until the first unit arrives on location.

Regarding the EMS response benchmark for cardiac events, NFPA 1710 states, ***“This requirement is based on experience, expert consensus, and science. Many studies note the role of time and the delivery of early defibrillation in patient survival due to heart attacks and cardiac arrest, which are the most time-critical, resource-intensive medical emergency events to which fire departments respond.”***

For the purpose of most analysis **Response Time** is a product of three components: Dispatch Time, Turnout Time, and Travel Time.

- **Dispatch time** is the time interval that begins when the alarm is received at the initial public safety answering point (PSAP) or communications center and ends when the

response information begins to be transmitted via voice and/or electronic means to the emergency response facility or emergency response units or personnel in the field.

- **Turnout time** is the time interval that begins when the notification process to emergency response facilities and emergency response personnel and units begins by an audible alarm and/or visual announcement and ends at the beginning point of travel time. The Fire Department has the greatest control over these segments of the total response time.
- **Travel time** is the time interval that initiates when the emergency response unit is actually moving in response to the incident and ends when the unit arrives at the scene.

Response time, also known as **total response time**, is the time interval that begins when the call is received by the primary dispatch center and ends when the dispatched unit(s) arrives on the scene of the incident to initiate action.

The Barnstable Fire Department is dispatched by, and emergency communications are handled by, the Barnstable County Sheriff's Office (BCSO) Department Regional Emergency Communications Center (RECC) which is located at Joint Base Cape Cod. The BCSO RECC handles emergency dispatch for nine communities and coordinates regional mutual aid operations throughout Cape Cod. For this study, and unless otherwise indicated, response times measure the first arriving unit on scene only.

It is also important to note that the data that was provided to the MRI study team only reflects the time from when the Barnstable Fire Department received the call. It does not reflect the alarm processing or dispatch time at the BCSO RECC. In addition, the times reflected the total time from when the department received the call until the first unit arrived on the scene. It does not break these times out into turnout time, and travel time components. Finally, for fire calls, the first arrival unit could be an ambulance or chief officer, not necessarily a fire suppression unit. The department also responds at reduced speed or cold (no lights and sirens) to certain usually minor incidents such as wires down and fluids on the roadway which can extend those times.

According to NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Departments*, 2016 Edition:

- **Alarm processing time or dispatch time** should be less than or equal to 60 seconds 90 percent of the time.
- **Turnout time** should be less than or equal to 60 seconds for EMS incidents, and 80 seconds (1.33 minutes) for fire and special operations 90 percent of the time. As noted

above, turnout time is the segment of total response time that the fire department has the most ability to control.

- **Travel time** shall be less than or equal to 240 seconds for the first arriving fire suppression or EMS unit, 90 percent of the time. The standard further states the initial full first alarm assignment for structure fires should be assembled on scene in 480 seconds, 90 percent of the time.

For this analysis of Barnstable Fire Department response time data from 2016 through 2020 responses with a response time of greater than 20 minutes (56 total incidents) were eliminated as were responses to Sandy Neck, and automatic/mutual aid responses. In total 6,325 responses comprise the data analyzed. The data indicates that 70.3% of incidents have a total response time of five minutes or less from time the incident is dispatched until the first unit arrives on location (Figure IV-11). 29.7% of responses exceed six minutes. This is of concern as most career fire service organizations attempt to establish a goal that not more than 10% of responses will exceed this time frame. This would be in keeping with the NFPA 1710 benchmarks for their response.

A more conservative and stricter measure of total response time is the 90th percentile measurement. Simply explained, for 90 percent of calls, the first unit arrived within a specified time. For Barnstable this is achieved at around the seven-minute mark with 90.2% of incidents have a turnout and travel time of seven minutes or less.

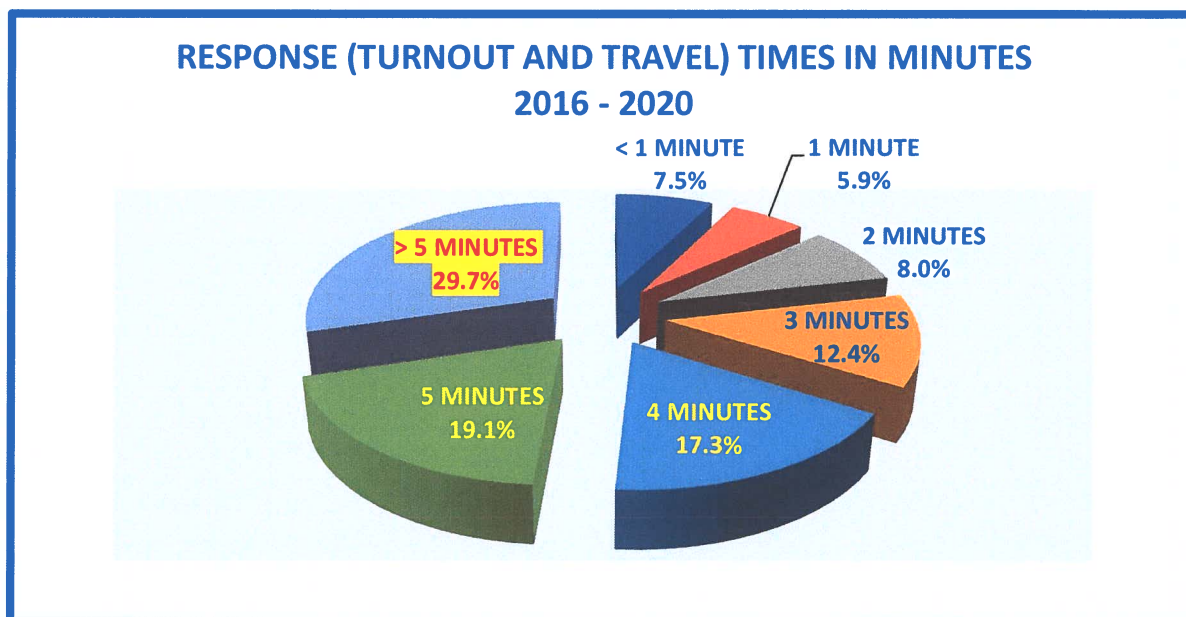


FIGURE IV-11: RESPONSE TIME ANALYSIS 2016 - 2020

RECOMMENDATIONS

- IV-1** *The Barnstable Fire Department should work internally to ensure all EMS related incidents are properly classified as either advanced life support (ALS) or basic life support (BLS) criterion, based upon the actual situation found on scene.*
- IV-2:** *The Barnstable Fire Department should work with the BCSO RECC leadership to identify any potential ways to reduce call processing time (from receipt of the call to dispatch of the incident) with the goal of attempting to achieve a 90th percentile time of not more than 64 seconds as recommended in NFPA 1710. Reducing call processing time can assist with leading to improved overall response times.*
- IV-3:** *The Barnstable Fire Department should further analyze their response time data, and if necessary, work to identify potential ways to reduce incident turnout time with the goal of attempting to achieve a 90th percentile time of not more than 60 seconds for EMS incidents and 80 seconds for fire incidents as recommended in NFPA 1710. Turnout time is the response time component that the agencies have the most direct control over which can lead to reduced overall response times.*
- IV-4** *The Barnstable Fire Department should enhance their data collection and analysis to include 80th and 90th percentile turnout and travel times as recommended in NFPA 1710. Having these more conservative times available will provide a more accurate response assessment and allow for better long- range master planning.*

CHAPTER V

EMERGENCY OPERATIONS

Fire, rescue, and emergency medical system (EMS) incidents and the fire department's ability to respond to, manage, and mitigate them effectively, efficiently, and safely are mission-critical components of the emergency services delivery system. In fact, fire, rescue, and EMS operations provide the primary, and certainly most important basis for the very existence of the fire department. As with many fire departments today, the majority of responses are emergency medical service related. Improved building construction, code enforcement, automatic sprinkler systems, and aggressive public education programs have contributed to a decrease in serious fires in many communities and more importantly, fire deaths among civilians. However, while no longer generating the majority of most departments' responses as they once did, fire-related incidents are still justifiably an extremely high priority for the "fire" department and comprise a significant part of their operational missions.

These trends and improvements in the overall fire protection system notwithstanding, fires still do occur, occur with greater frequency in older, more urban communities, and the largest percentage of those occur in residential occupancies where they place the civilian population at risk. Although they occur with less frequency than they did several decades ago, when they occur today, they grow much quicker and burn more intensely than they did in the past. As will be discussed later in this report, it is imperative that the fire department is able to assemble an **effective response force (ERF)** within a reasonable time period in order to successfully mitigate these incidents with the least amount of loss possible.

NFPA 1710, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations and Special Operations to the Public by Career Fire Departments, 2016 edition (National Fire Protection Association, Quincy, MA) addresses the organization and deployment of fire suppression operations, emergency medical operations, and special operations to the public by career fire departments to protect citizens and the occupational safety and health of fire department employees.¹¹ It is the benchmark standard that the United States Department of Homeland Security utilizes when evaluating applications for staffing grants under the Staffing for Adequate Fire and Emergency Response (SAFER) grant program. The ability to get a sufficient number of personnel, along with appropriate apparatus,

¹¹ NFPA 1710 is a nationally recognized standard, but it has not been adopted as a mandatory regulation by the federal government or the Commonwealth of Massachusetts. It is a valuable resource for establishing and measuring performance objectives in the Barnstable Fire Department but should not be the only determining factor when making local decisions about the department's fire and EMS operations. ***While the NFPA standards are nationally recognized consensus standards, it is still the responsibility of the local jurisdiction to determine the acceptable level of risk and corresponding fire protection/EMS services. When applying any standard, including the NFPA standards, it is important to apply the document in its entirety. One should not selectively extract requirements to the exclusion of others or take a requirement out of context.***

to the scene of a structure fire is critical to operational success and firefighter safety. Accomplishing this within the 8-minute time frame specified in NFPA 1710 is an important operational benchmark.

In addition to structural firefighting and emergency medical services, the fire department is tasked with responding to and managing a broad spectrum of other types of emergencies, including, but not limited to, vehicle crashes, building collapse, water and ice rescue, mass casualty incidents, weather-related emergencies, and natural and technological disasters. These types of incidents require specialized equipment and specialized training. In all types of emergency responses, an incident command system (ICS) should be utilized that conforms to the National Incident Management System (NIMS) guidelines that have been promulgated by the U.S. Department of Homeland Security.¹² Since safety is the primary focus throughout all operations, a formal component of the ICS program includes the consistent assignment of an on-scene safety officer when appropriate.

The strategic and tactical challenges that the various hazards the department protects, need to be identified and planned for through a community risk analysis planning and management process. The community risk and vulnerability assessment evaluates the community as a whole, and regarding property, measures all property and the risks associated with that property, and then segregates the property as either a high-, medium-, or low-hazard, which are further broken down into varying degrees of risk. Community risk assessment and the categorization of hazards were discussed in detail in Chapter II. The development of a community risk and vulnerability assessment should drive many of the key decisions associated with the deployment of resources for fire and medical emergencies.

FIRE OPERATIONS

The Barnstable Fire Department is equipped and staffed to respond to a wide variety of emergency incidents. Although EMS calls are more prevalent, the department must still be prepared to fulfill its core firefighting mission. As with most communities in the United States, the primary focus of firefighting operations is on fires in residential occupancies (single- and two-family dwellings, multi-family units) due to the high potential for loss of life. Firefighting in commercial occupancies is important to the economic well-being of the community, but large commercial occupancies are often equipped with automatic fire suppression systems to reduce risk and damage from fire. Until residential fire sprinkler systems become commonplace as a critical lifesaving feature in homes, the fire department will continue to be the only “front-line” resource available for firefighting and rescue. The fire codes in the Commonwealth of

¹² In order to remain eligible for fire, EMS, law enforcement, and emergency management grants from the U.S. Department of Homeland Security, the Barnstable Fire District must adopt and implement NIMS/ICS for all emergency incidents. ALL personnel who have emergency management and disaster response duties must receive NIMS/ICS training.

Massachusetts do not require residential sprinklers and do not allow communities to mandate them through local codes or ordinances.

Structural firefighting has become far more challenging and dangerous in the last thirty years with the introduction of significant quantities of plastic and foam-based products into homes and businesses (*e.g.*, furnishings, mattresses, bedding, plumbing, electrical components, home and business electronics, decorative materials, insulation, and structural components). These materials ignite, burn quickly, and produce extreme heat and toxic smoke. A fire can easily double in size and intensity every 30 seconds. If firefighters cannot arrive in a timely manner and attack the fire quickly, a strong possibility exists that a dangerous flashover (simultaneous ignition of all combustible materials in a room) will occur. Flashover can occur in as little as five to seven minutes after fire ignition and is one of the most dangerous events that a firefighter can face. When a flashover occurs, initial firefighting forces are generally overwhelmed and will require significantly more resources to affect fire control and extinguishment.

Flashover occurs quicker and more frequently today and is caused at least in part by the introduction of significant quantities of plastic- and foam-based products into homes and businesses (*e.g.*, furnishings, mattresses, bedding, plumbing and electrical components, home and business electronics, decorative materials, insulation, and structural components). These materials ignite and burn quickly and produce extreme heat and toxic smoke.

Figure V-1 illustrates the time progression of a fire from inception through flashover. The time versus products of combustion curve shows activation times and effectiveness of residential sprinklers (approximately one minute), commercial sprinklers (four minutes), flashover (eight to ten minutes), and firefighters applying first water to the fire after notification, dispatch, response, and set up (ten minutes). It also illustrates that the fire department's response time to the fire is one of the only aspects of the timeline that the fire department can exert direct control over. It is also important to keep in mind that once units arrive on the scene, they will need to get set up to commence operations. NFPA recommends that units be able to commence an initial attack within two minutes of arrival, 90% of the time.

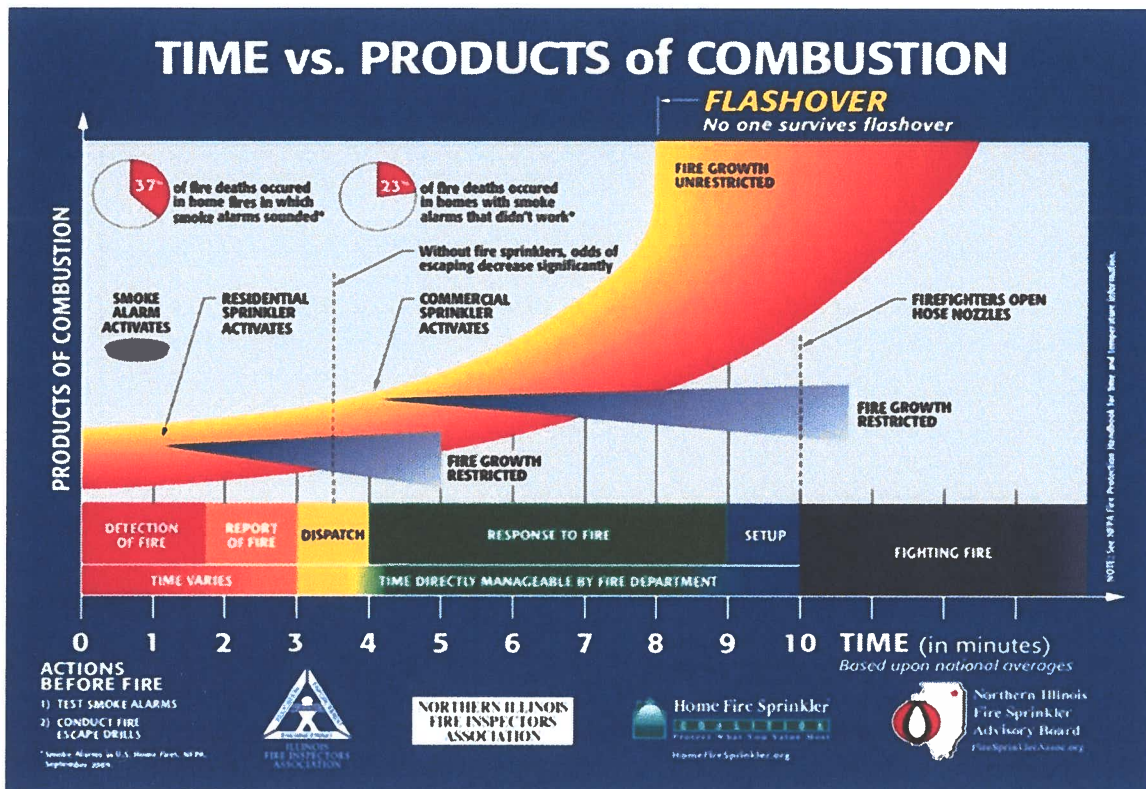


FIGURE V-1:
HOME FIRE TIMELINE CURVE SHOWING ACTIVATION TIMES AND EFFECTIVENESS OF RESIDENTIAL SPRINKLERS (APPROXIMATELY 1 MINUTE), FLASHOVER (3 TO 5 MINUTES) AND FIREFIGHTERS APPLYING FIRST WATER TO THE FIRE AFTER NOTIFICATION, DISPATCH, RESPONSE, AND SET UP (10 MINUTES).
 Image credit: Home Fire Sprinkler Coalition

Interviews that were conducted by the MRI project team revealed that the Department appears well versed in the use of the National Incident Management System (NIMS) and works well with multiple agencies to provide effective and efficient emergency response services to the community. Through discussions with the department’s officers, it appears that though the department has adopted, and is trained, and is aware and understands the importance of using an Incident Command System (ICS), it is sometimes difficult to implement it initially on every incident because of limited staffing.

One of the most effective tools the fire department has to assist them with handling fires and other emergencies in commercial and industrial facilities, are pre-fire plans. The purpose of a fire pre-planning program is to allow firefighters to become familiar with buildings and/or facilities within their response area prior to an emergency, alert them to on-site hazards and risks, and develop a detailed fire response plan for them that includes specific tactics that will

be required to mitigate fires or other emergencies. A comprehensive pre-fire plan includes as much data about the building as possible.

The information contained in pre-fire/incident plans allow firefighters and officers to have a familiarity with the building/facility, its features, characteristics, operations, and hazards, thus enabling them to more effectively, efficiently, and safely, conduct firefighting and other emergency operations. Pre-fire plans should be reviewed and updated regularly. They should be tested and validated by table-top exercises and on-site drills. Lack of an up-to-date pre-fire plan is often attributed to being one of the primary contributing factors in large fire losses.

It was reported to MRI that the Barnstable Fire Department has done limited pre-planning on some of the major target hazards in the district. To derive maximum benefit from the pre-fire plans, the department has implemented a program to make pre-fire plans accessible on mobile data terminals (MDTs) (notebook/laptop computers) on fire apparatus, and in the command vehicle(s) for use in-route to an incident, and while on-scene. The information can also be sent to smart phones. With a cloud-based system all the information would be available in real time.

The department's internal 2019 organizational assessment indicated that a recurring problem for the department was signal drop from the MDTs which causes interruption to data transfer to units responding to or on the scene of an emergency. This is a problem related to the Mobile CAD platform that allows the integration of several records management systems. This problem limits the reliability and value of the system. To address the signal drop with the MDTs experienced by the, the department has evaluated the AT&T First Net network which utilizes mobile hot spots or routers for in vehicle internet accessibility. This is an important safety challenge for the department that should be made a high priority. Part of this process also includes the department evaluating the AWARE module for Mobile CAD which would allow all pre-plan data to be accessed on the MDTs.

Performance improvement for fire suppression will become even more important in the coming years as the fire department command structure evolves from being a group with significant firefighting experience, to a group with stronger EMS experience. Major fire incidents continue to decline because of better fire prevention and building code compliance, the advent of advanced fire detection and suppression systems, and fire-retardant building components and contents. As a result, the fire service will be challenged in the future to maintain the necessary skill sets to properly command and control major fire incidents. Training and performance improvement strategies must be aggressively enhanced in anticipation of this paradigm shift in fire department capabilities and experience.

The point of the performance measures is to identify the community's expectations in a quantifiable way, and to use the measurement of the fire department's performance against these objectives to identify areas, which may need improvement or additional resources. The process should also include a provision for modifying SOGs, training priorities, and equipment as determined by the performance improvement program.

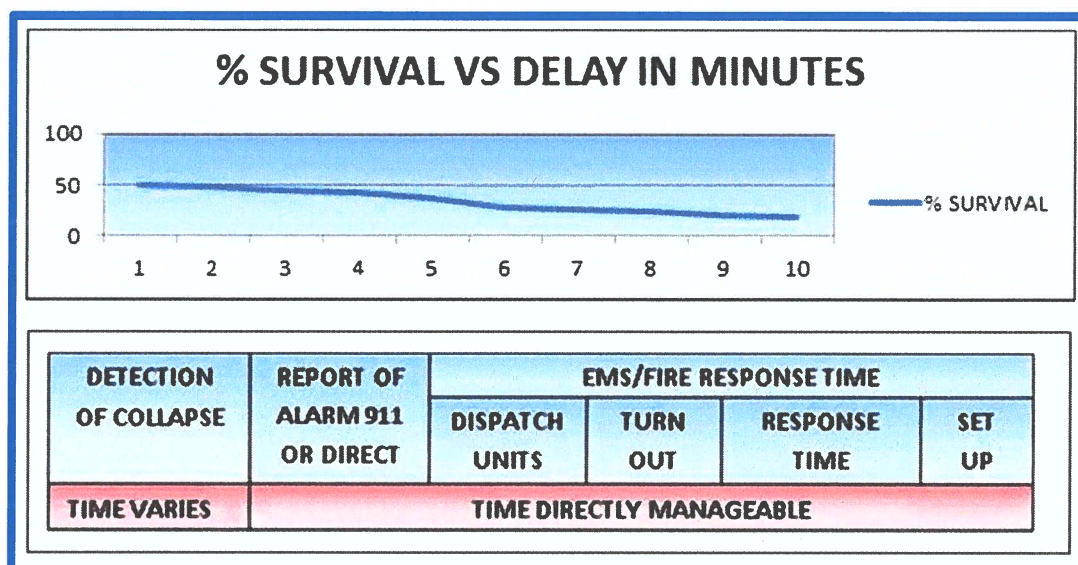
Barnstable Fire Department staffing for fire operations, will be further discussed later in this chapter in the section on *Staffing and Critical Tasking*.

EMS OPERATIONS

Emergency Medical Services (EMS) operations are an important 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 life net. As noted in several chapters of this report, the Barnstable Fire Department like many, if not most fire departments, responds to significantly more emergency medical incidents than actual fires, or other types of emergency incidents.

As a percentage of overall incidents responded to, it could be argued that EMS incidents constitute the greatest number of "true" emergencies, where intervention by trained personnel truly makes a difference, sometimes literally between life and death. Heart attack and stroke victims require rapid intervention, care, and transport to a medical facility (Figure V-2). The longer the time duration without care, the less likely the patient is to fully recover. Numerous studies have shown that irreversible brain damage can occur if the brain is deprived of oxygen for more than four minutes. In addition, the potential for successful resuscitation during cardiac arrest decreases exponentially with each passing minute that cardio-pulmonary resuscitation (CPR), or cardiac defibrillation, is delayed.

- The potential for successful resuscitation during cardiac arrest decreases exponentially, 7% to 10% with each passing minute, that cardio-pulmonary resuscitation (CPR) or cardiac defibrillation and advanced life support intervention is delayed.
- Few attempts at resuscitation after 10 minutes are successful.



**FIGURE V-2:
CARDIAC ARREST SURVIVAL TIMELINE**

The EMS component of the emergency services delivery system is more heavily regulated than the fire side. In addition to NFPA 1710, NFPA 450 *Guidelines for Emergency Medical Services (EMS) and Systems*, (2009 edition), provides a template for local stakeholders to evaluate an EMS system and to make improvements based on that evaluation. The Commission on Accreditation of Ambulance Services (CAAS)¹³ also establishes benchmarks for EMS operations, however, their focus is primarily on ambulance response times which is not a component of this analysis. Massachusetts regulates EMS agencies, and certain federal Medicare regulations are also applicable.

Typically, less than 10% of 9-1-1 patients have time-sensitive ALS needs. However, for those patients who do, time can be a critical issue of morbidity and mortality. For the remainder of those calling 9-1-1 for a medical emergency, though they may not have a medical necessity, this ninety percent, still expects rapid customer service. Response times for patients and their families are often the most important issue regarding the use of the fire department's services and are what is most often referred to when they "rate" their local emergency responders. Regardless of the service delivery model, appropriate response times are more than a clinical issue; they are also a customer service issue.

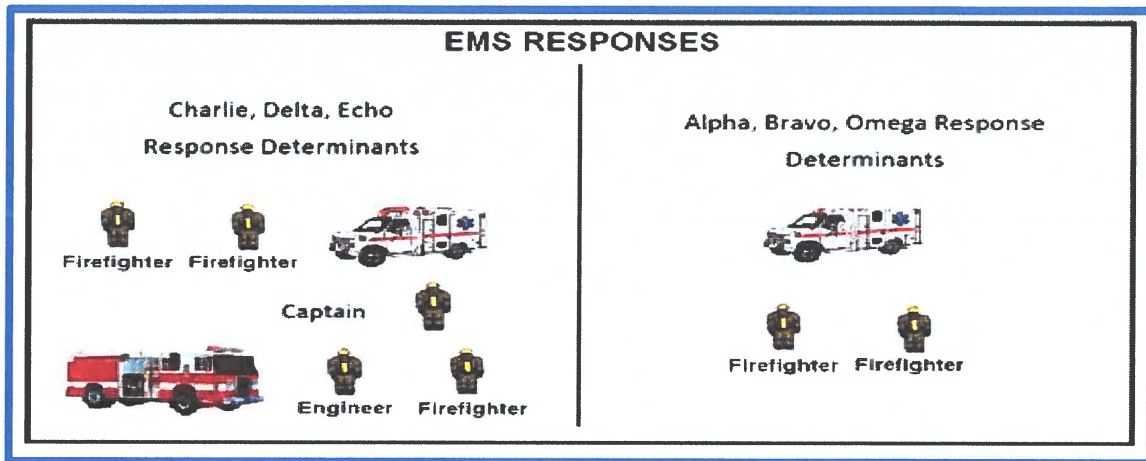
¹³ The Commission on Accreditation of Ambulance Services (CAAS) is an independent commission that established a comprehensive series of standards for the ambulance service industry.

Emergency medical services (EMS) for the Barnstable Fire District are provided at the advanced life support (ALS)/paramedic level by the Barnstable Fire Department. Advanced life support or ALS-level care refers to prehospital interventions that can be brought into the field by paramedics. Typically, this service level includes the ability to bring much of the emergency room capability to the patient. Paramedics can administer intravenous fluids, manage a patient's airway, provide drug therapy, utilize the full capabilities of a 12-lead cardiac monitor, and provide a vital communication link to the medical control physician who can provide specific medical direction based on the situation.

Primary EMS ambulance transport services to the Barnstable Fire District are provided by the Barnstable Fire Department. The department can staff either one or two ambulances depending upon the time of day and staffing levels. It operates under a P/B waiver from the Massachusetts Office of Emergency Medical Services (OEMS) which designates the service a BLS service but allows it to operate at the ALS level, and do so with ambulances staffed with one EMT and one paramedic.

As is the common practice on Cape Cod, the Barnstable Fire Department normally staffs their first out ambulance with three personnel, regardless of the severity of the incident. If shift staffing is at four personnel, the captain will also response in an SUV to supervise and assist. If shift staffing is at three personnel, they all respond on the ambulance. These procedures effectively place the fire suppression function out of service until personnel who have been recalled on overtime report to the station for back-up. When needed, the second ambulance is usually staffed with two personnel. The MRI study team was advised that the department will sometimes send only two personnel to the hospital, and procedural changes to limit exposure to COVID dictate that only two personnel respond on those types of incidents.

The rationale for this procedure is that these additional personnel help the ambulance crew with medical care, carrying equipment, lifting patients, and driving the ambulance to the hospital when the ambulance crew, particularly the paramedic(s) are committed to the care of critically ill patients. Medical calls are generally classified from Alpha (minor/least severe) to Echo (life threatening/most severe). On Cape Cod EMS calls are categorized Priority 1 (most serious) to Priority 3 (non-life threatening). Certain assist type calls are categorized Priority 4. In many locations (not necessarily New England) normal procedures send only an ambulance, with two personnel, the minor nature, Alpha calls, and even on Bravo or Priority 3 level calls unless the arrival of an ambulance will be delayed (Figure V-3).



**FIGURE V-3:
EMS RESPONSE MATRIX**

While we acknowledge that changing this procedure is likely to be met with resistance, we believe the Barnstable Fire Department should consider revising this procedure. The number of incidents is increasing each year, and a significant percentage of these incidents are resulting in overlapping calls. In addition, in large part due to the change in procedure that fills all shift vacancies except for sick or injury related absences with personnel on overtime, shift staffing is reported to be maintained at four personnel about 85% of the time. To that end, the MRI study team suggests the following revision to the EMS response procedures:

- When staffing is at four personnel:
 - ❖ Two personnel respond on the ambulance to Alpha and Bravo, Priority 3 calls. The two personnel remaining are now available for fire duty, or can handle a second ambulance call, if necessary. If they require additional assistance, they can request the engine to respond.
 - ❖ Two personnel respond on the ambulance and two personnel respond on the engine to Charlie, Delta, and Echo, or Priority 1 and 2 calls. If an additional person is needed on the ambulance they can be sent to the hospital with the ambulance crew. The fourth person can return to station with the engine and await the arrival of off duty personnel.
- When staffing is at three personnel:
 - ❖ Two personnel respond on the ambulance to Alpha and Bravo, or Priority 3 calls. If they require additional assistance, they can request the engine to respond. The

remaining firefighter is still available for fire duty, or can handle a second ambulance call, once off duty personnel arrive at the station.

- ❖ All three personnel respond on the ambulance to Charlie, Delta, and Echo, or Priority 1 and 2 calls. Off duty personnel reporting back for duty would now provide fire response, or response to a second ambulance call.

In either scenario suggested above, the current practice of recalling off duty personnel to provide coverage when the ambulance transports to the hospital should be continued.

Following current department practice, the ambulance responds with lights and sirens to every call. Though a medical priority dispatch system is in place that would allow for potential non-emergency response to occur without lights, sirens and within normal traffic flow, there are no protocols or procedures to do so. The MRI team was told that most often all transports with patients to an area hospital is done with lights and sirens in order to get to the hospital as quickly as possible. This is not only done in order to get the patient to the hospital in a timely manner, but also to expedite the time that the ambulance is out of service and unable to respond to another call. These practices are being phased out by most progressive fire departments for safety reasons. It is safer for responding personnel, general citizens, and the patient, to reduce the number of times that red lights and sirens are utilized.

All Barnstable Fire Department personnel possess a minimum of emergency medical technician-basic (EMT-B) certification. The current CBA specifies that the department will have between eight and 12 personnel who are certified at the Advanced Life Support (ALS) level of paramedic. At the time of this study, 11 of the department's personnel possessed paramedic certification. There are a minimum of two paramedics assigned to each shift, with a minimum of one on duty at all times.

Overall, the EMS operations appear to be well-run, and the district is happy with the service that is being provided. There is also reported to be a low level of system abuse in Barnstable which reduces the number of unnecessary responses and contributes to better resource availability for actual medical emergencies.

One question that the MRI study team was asked to provide an opinion on was what the recommended mix of ALS versus BLS trained personnel should be in the Barnstable Fire Department. At the time of this study approximately 50% of the department's personnel possessed ALS/paramedic certification. Ultimately, with the majority of incidents the department responds to being EMS related, having all personnel trained and certified at the ALS level allows the highest level of care to be always available, and on every incident. However, there can be several caveats to that first answer.

The Barnstable Fire Department is a small organization with a relatively low call volume, averaging about 3.75 calls per day, of which 63.1% are EMS related. If 50% of the EMS calls are ALS criterion calls (which is higher than the typical average) that equate to just slightly more than one ALS call per day. One of the concerns that are expressed by some within the EMS community is the difficulty in keeping the ALS skills of personnel sharp when they have only limited opportunities to utilize them. In addition, there is a significant cost factor associated with initial ALS training for personnel, frequent continuing education classes necessary to maintain certification, and a significant pay differential for those who are certified. Finally, many fire department personnel prefer not to be paramedics and a significant number choose to allow their certifications to lapse once they are no longer mandated to maintain them, or so they can get off of the ambulance.

It is MRI's opinion that the Barnstable Fire Department would not be unreasonable if it decided to attempt, long term, to have all personnel certified as paramedics, by requiring all future hires to either possess, or obtain and maintain paramedic certification as a condition of employment. However, we believe a better option would be to maintain around 12-14 paramedics and attempt to have two on duty at all times. By increasing the number of paramedics on duty at all times, one could be assigned to the primary ambulance as is done now, while the second one is assigned to the engine and second ambulance, thus providing both of those units with ALS capability resulting in an increased level of service. If additional personnel wanted to maintain their ALS certifications, the department should attempt to accommodate them and encourage them to do so.

One thing the fire district and fire department will need to monitor very closely are any impacts, the ongoing debates over funding the Affordable Care Act (ACA) may have on their billing and revenues. Over the past several years with the changes in insurance reimbursements brought about by the ACA, a growing number of EMS providers are looking to get out of the ALS business. Increasingly, private insurance companies and the government have reduced (or are considering reductions in) reimbursement rates, and are becoming more reluctant in general, to compensate departments for the full cost of emergency room transportation fees, especially for non-emergency treatment. Communities that provide EMS transport services are therefore facing pressure on their transport revenues.

Mobile Integrated Health Care and Community Paramedic (MIH/CP) present a possible solution to some of these problems. Mobile Integrated Healthcare is defined by the National Association of EMTs (NAEMT) as ***“the provision of healthcare using patient-centered, mobile resources in the out of hospital environment.”*** It can be provided through community paramedicine programs, which are programs that use EMTs and paramedics to provide this out-of-hospital health care. MIH/CP programs help facilitate more appropriate uses of emergency care resources and enhance access to primary care, particularly for underserved populations,

by focusing on chronic disease management, post-discharge follow up, and transport to non-emergency care settings.

The benefits of MIH/CP are therefore two-fold. These programs potentially help provide more appropriate health care to community residents, and if reimbursement arrangements can be agreed upon, also offer a substitute funding stream, separate from emergency transport, for community-based EMS transport programs.

The department noted in its 2019 internal analysis that there are government funds available for implementation of these types of programs, and some recent changes to the Medicare regulations indicate a possibly favorable view on billing for these services. The Foxborough Fire Department obtained a grant to implement this type of program effective as of July 1, 2019. With the addition of a new full-time paramedic was designated a special agent of the board of health, the department implemented a community/public health program to address these types of needs within the town. It is MRI's belief that a program of this type in Barnstable – particularly with its high percentage of residents over the age of 65 - would improve both levels of service offered to the community and EMS revenues generated. This could be another potential duty for the EMS officer to undertake.

STAFFING AND CRITICAL TASKING

The issue of fire department staffing has, over the past three or four decades, become one of the most widely and frequently debated topics in fire service history. This debate has intensified over the past several years as tax collection revenues have declined precipitously in many communities and governmental entities seek to reduce expenses.

Personnel costs account for the largest percentage of the operating budgets of career fire departments. In many cases this one line item is 90% or more of the total budget. The debate becomes intense when the discussion turns to how many firefighters are necessary to provide adequate levels of service, fulfill the department's core mission(s), and how those firefighters are deployed. This is a basic risk assessment and management decision. Ultimately, determining the acceptable level of risk they are willing to assume for the citizens they represent, is a key decision that is made by the Barnstable Fire District Prudential Committee through the district meeting process.

The operations necessary to successfully extinguish a structure fire, and do so effectively, efficiently, and safely, requires a carefully coordinated, and controlled, plan of action, where certain operations, such as venting ahead of the advancing interior hose line(s), must be carried out with a high degree of precision and timing. Multiple operations, frequently where seconds count, such as search and rescue operations and trying to cut off a rapidly advancing fire, must also be conducted simultaneously. If there are not enough personnel on the incident initially to

perform all the critical tasks, some will, out of necessity, be delayed. This can result in an increased risk of serious injury, or death, to building occupants and firefighters, and increased property damage.

There has been much research done by a number of fire departments on the effects of various staffing levels. One constant that has emerged is that company efficiency and effectiveness decrease substantially, while injuries increase, when company/unit staffing falls below four personnel. A 2010 comprehensive yet scientifically conducted, verified, and validated study titled *Multi-Phase Study on Firefighter Safety and the Deployment of Resources*, was performed by the National Institute of Standards and Technology (NIST) and Worcester Polytechnic Institute (WPI), in conjunction with the International Association of Fire Chiefs (IAFC), the International Association of Fire Fighters, and the Center for Public Safety Excellence. This landmark study researched residential fires, where the majority of fire, injuries, and fatalities occur. ***The study concluded that the size of firefighter crews has a substantial effect on the Fire Department's ability to protect lives and property in residential fires and occupancies.***

Several key findings of the study include:

- Four-person firefighting crews were able to complete 22 essential firefighting and rescue tasks in a typical residential structure 30% faster than 2-person crews, and 25% faster than 3-person crews.
- The 4-person crews were able to deliver water to a similar sized fire 15% faster than the 2-person crews, and 6% faster than 3-person crews, steps that help to reduce property damage and reduce danger/risks to firefighters.
- Four-person crews were able to complete critical search and rescue operations 30% faster than 2-person crews, and 5% faster than 3-person crews.

The United State Fire Administration, part of the Federal Emergency Management Agency, in the Department of Homeland Security, recommends that a minimum of four firefighters respond on or with each apparatus. In its respected textbook *Managing Fire Services*, the International City/County Management Association (ICMA) states, “*that at least 4 and often 8 or more firefighters under the supervision of an officer should respond to fire suppression operations*”. They further state, “*If about 16 firefighters are not operating at the scene of a working fire, within the critical time period, then dollar loss and injuries are significantly increased, as is fire spread*”. Many communities continue to struggle to generate a sufficient response.

The current career staffing pattern in the Barnstable Fire Department consists of four work groups that work an average of 42-hours per week. These groups work rotating 24-hour shifts. This schedule provides the community with 24/7 coverage. Presently, each shift is staffed with a captain (shift commander) and three firefighters. The four personnel on shift are supported by the following additional personnel resources:

- Two command officers (chief and deputy chief) that work an administrative schedule and provide an on-call command officer when off duty.
- One EMS Officer.
- Automatic/mutual aid from surrounding communities

The MRI study team was informed that the department does not generally have a sick or injury leave problem. It has \$444,702 budgeted for overtime in a FY 2020 which is high for a department the size of Barnstable. However, to keep on duty shift staffing at four personnel as much as possible, the chief has implemented a policy of filling vacancies on shifts that are created by scheduled leave – such as vacation and personal leave – with personnel called into work on overtime since this expense can be planned and budgeted for. From this perspective the expense is much more reasonable, and funding well invested. The chief should be commended for implementation of this policy which MRI considers to be a **Best Practice**. This has resulted in on duty shift staffing being at four personnel about 85% of the time.

The Department received a SAFER grant in 2020 to hire one additional firefighter. This allowed the department to begin the process of transitioning the EMS officer position into a full-time position daywork to coordinate and oversee the department's overall EMS operations. The MRI study team believes this plan will create benefit to the department and its operations. Consideration should also be given to utilizing the EMS officer to implement a Mobile Integrated Health Care and Community Paramedic (MIH/CP) program within the fire district.

To effectively respond to and mitigate requests for emergency services, an agency must have a thorough understanding of its community's risk factors, both fire and EMS. Once identified and understood, each category or level of risk is associated with the necessary resources and actions required to mitigate it. This is accomplished through a critical task analysis. The exercise of matching operational asset deployments to risk, or critical tasking, considers multiple factors including national standards, performance measures, and the safety of responders.

Critical tasks are those activities that must be conducted in a timely manner by responders at emergency incidents to control the situation and stop loss. Critical tasking for fire operations is the minimum number of personnel needed to perform the tasks required to effectively control a fire. The same is true for EMS as there are specific patient care tasks that must be completed

in succession and often together to support positive prehospital care. The specific number of people required to perform all the critical tasks associated with an identified risk is referred to as an *Effective Response Force* (ERF). The goal is to deliver an ERF within a prescribed time frame. NFPA 1710, as a nationally recognized consensus standard on staffing and deployment for career fire departments, provides a benchmark for ERF.¹⁴

During fire incidents, 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 secondary support functions may be handled by initial response personnel 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 task analysis will provide adequate resources to immediately begin bringing the incident under control.

The NFPA *Fire Protection Handbook*¹⁵ classifies buildings and occupancies by their relative risk and provides recommendations on the minimum ERF that will be needed to handle fire incidents in them. These include:

High-hazard Occupancies: Schools, hospitals, nursing homes, high-rise buildings, and other high life safety-hazard or large fire-potential occupancies.

Operational Response: at least 4 pumpers, 2 ladder trucks (or combination apparatus with equivalent capabilities), 2 chief officers and other specialized apparatus as may be needed to cope with the combustible involved; not less than 24 firefighters and 2 chief officers **plus** a safety officer and a rapid intervention team. The Barnstable Fire District has several of these types of occupancies including schools, a large senior citizen complex, a large lumberyard complex and several other very large warehouses.

Medium-hazard Occupancies: Apartments, offices, and mercantile and industrial occupancies, not normally requiring extensive rescue by firefighting forces. The Barnstable Fire District has a significant (and growing) number of occupancies of these types.

Operational Response: At least 3 pumpers, 1 ladder truck (or combination apparatus with equivalent capabilities such as a quint), 1 chief officer, and other specialized apparatus as may be needed or available; not less than 16 firefighters and 1 chief officer **plus** a safety officer and a rapid intervention team.

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

¹⁴ It is important to note that compliance with NFPA 1710 has not been mandated in the Commonwealth of Massachusetts or by the federal government. It is considered a “best practice” that fire departments strive to achieve.

¹⁵ Cote, Grant, Hall & Solomon, eds., *Fire Protection Handbook* (Quincy, MA: NFPA 2008), 12-3

Operations Response Capability: At least 2 pumpers, 1 ladder truck (or combination apparatus with equivalent capabilities such as a quint), 1 chief officer, and other specialized apparatus as may be needed or available; not less than 12 firefighters and 1 chief officer, **plus** a safety officer, and a rapid intervention team.

At the time of this assessment the Barnstable Fire Department responded with one engine staffed with either three or four personnel to reported working structure fires, provided all on duty members are immediately available. The chief and deputy chief also respond. In addition, West Barnstable responds with an engine and their chief, Hyannis or Yarmouth respond with an engine, a mutual aid ambulance responds, and off duty Barnstable personnel are recalled for staffing the ladder and an additional engine. If sufficient off duty Barnstable personnel (four) respond this response matrix provides about 22 personnel on the incident. However, off duty personnel responding from home back to the station to staff apparatus and then respond will probably cause at least some extension of response times to get all units and personnel on the incident scene. If the incident is determined to be a working fire, additional resources can be requested, and other units are relocated into Barnstable to cover.

NFPA 1710 suggests that the following personnel are needed to safely mitigate a structure fire involving several rooms in a 2,000-square foot dwelling (figure V-4). Obviously, this number dramatically increases based on the extent of involvement, size of the structure, presence of hazardous materials, and use of the occupancy. As an example, a significant fire within a garden style apartment complex or an open-air strip mall commercial requires a minimum of 27/28 personnel based on the potential hazards that could be encountered.

CRITICAL TASK	NEEDED PERSONNEL
Incident Commander	1
Attack engine driver/operator	1
Two handlines with two personnel each	4
Support/back-up firefighter for each handline	2
Search & rescue team	2
Ventilation team	2
Ladder company driver/operator	1
Rapid intervention team (RIT)	2
EFFECTIVE RESPONSE FORCE	14/15

FIGURE V-4: NFPA 1710 MINIMUM STRUCTURE FIRE STAFFING NEEDS

Personnel needs for a fire involving several rooms in a 2,000-square foot, one-family, residential occupancy. These are the proverbial “bread and butter” structural fire incidents that fire departments respond to, and are by far, the most common type of structure fire, accounting for around 70% of those types of incidents.

Figure V-5 illustrates in a different way the critical tasks and resource deployment required on low and moderate-hazard incidents such as residential and small commercial structure fires. Although some people advocate that these types of incidents can be handled with fewer personnel, unless it is a small fire, there is the possibility there will not be sufficient personnel available to perform all the critical tasks necessitating that some be delayed. Ultimately, determining the acceptable level of risk they are willing to assume for the citizens they represent will be a key decision that the Barnstable Fire District Prudential Committee will need to make.

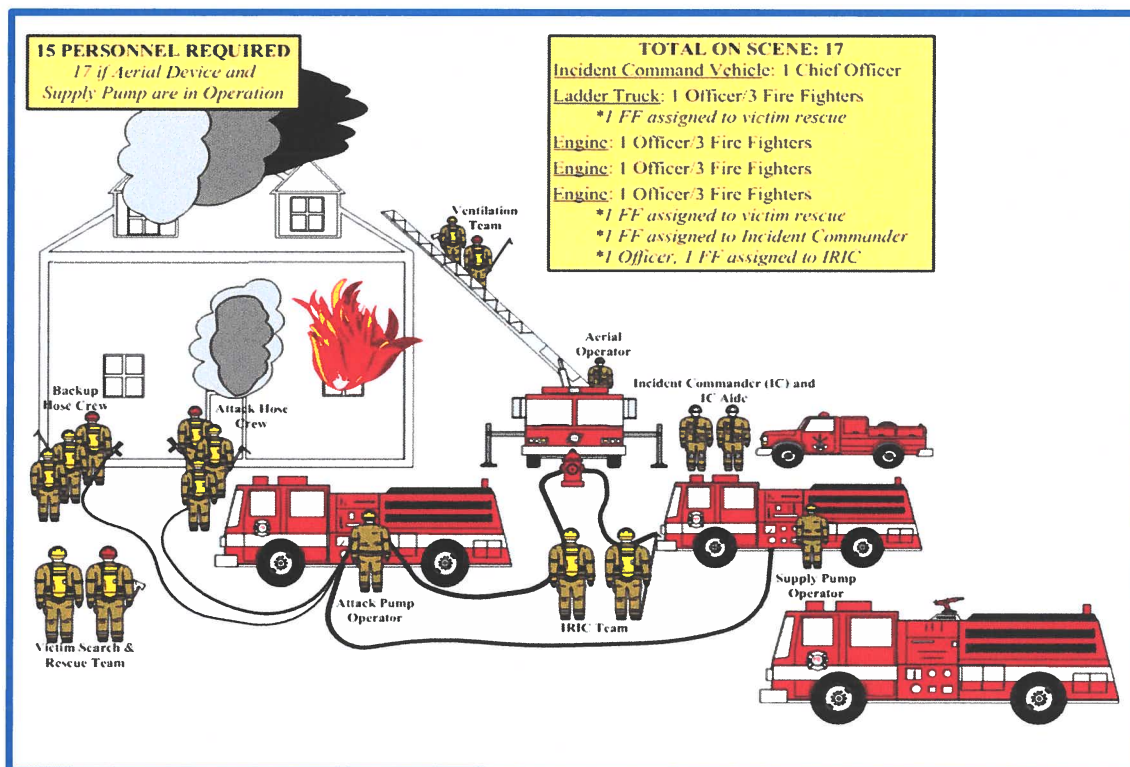


FIGURE V-5: LOW TO MODERATE RISK RESPONSE-INTERIOR FIRE ATTACK

Typical minimum staffing needs career or primarily career fire departments for a fire involving several rooms in a 2,000-square foot, one-family residential occupancy. These are the proverbial “bread and butter” structural fire incidents that fire departments respond to, and are by far, the most common type of structure fire, accounting for around 70% of those types of incidents. The full first alarm assignment should arrive on scene within eight minutes of dispatch.

Image credit: IAFF 266

The ability to get a sufficient number of personnel, along with appropriate apparatus, to the scene of a typical residential structure fire is critical to operational success and firefighter safety. ***Accomplishing this within the eight-minute time frame (to have 14 – 15 personnel on scene) as specified in NFPA 1710 is an important operational benchmark.*** The Barnstable Fire

Department should make achieving this goal its highest priority. Based on conversations with the department's senior officers they understand this and would like to achieve this goal.

The 2016 edition of NFPA 1710 recommends a minimum of 27/28 personnel on the initial response for fires involving moderate hazard garden-style apartments and strip shopping centers (Figure V-6).

CRITICAL TASK	NEEDED PERSONNEL
Incident Command	2
2 – Independent Water Supply Lines/Pump Operators	2
Fire Attack via Three Handlines	6
Support Firefighter for each Handline	3
2 - Search and Rescue Teams	4
2 - Ground Ladders and Ventilation Teams	4
Aerial Operator (if Aerial is Used)	1
Rapid Intervention Team (1 Officer/3 Firefighters)	4
EMS/Medical	2
EFFECTIVE RESPONSE FORCE	27/28

FIGURE V-6: STRUCTURE FIRE – MODERATE RISK

Beyond the NFPA standard(s) which as standards, do not carry the weight of regulation or law, is the Occupational Safety and Health Administration (OSHA) Respiratory Protection Standard, CFR 1910.134, which carries the weight and force of regulation, thus making compliance mandatory. One key provision of the Respiratory Protection Standard that is directly applicable to fire department staffing is known as the *“Two-In/Two-Out”* rule. In brief, this regulation specifies that anytime firefighters operate in an environment/atmosphere that is “immediately dangerous to life and health” (IDLH), whenever two members enter the IDLH area together/as a team, they must maintain visual or voice communication with two additional firefighters who must remain outside of the IDLH atmosphere, prepared to render immediate emergency assistance to those inside (Figure V-7). The OSHA rule does provide an exception however, which states that the rule does not apply in emergency rescue situations where a person is visible and in need of immediate rescue, or there is credible and reasonable information that potentially viable victims are still in need of rescue. It is important to note that the potential for

an IDLH atmosphere to exist is not just limited to structure fires. They can exist on natural gas leaks, carbon monoxide incidents, confined space emergencies, chemical spills, and even automatic fire alarm activations where there is an actual fire in progress.

To comply with the “Two-In/Two-Out” rule, a team of four firefighters must be assembled before an interior fire attack can be made when the fire has progressed beyond the incipient stage, except in an imminent life-threatening situation when immediate action could prevent the loss of life or serious injury, before the team of four firefighters are assembled. The serious concern of the MRI project team is that the OSHA “Two-In/Two-Out” rule permits an exception for life hazard or rescue situations. The reality is that in one of the most serious life hazard fire situations that can be encountered, trapped civilians, a firefighter may need to place himself/herself in extreme danger by entering the structure alone.

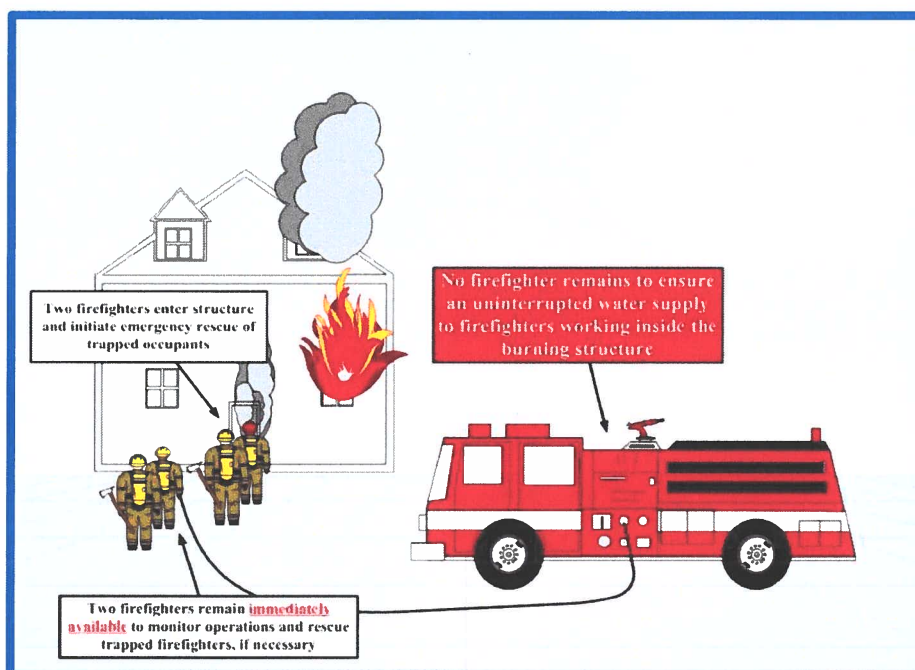


FIGURE V-7: OSHA TWO-IN/TWO-OUT

Image Credit: IAFF 266

One concern that was expressed to the MRI Study team was that normally, the ambulance may initially respond alone to motor vehicle crashes, including on Route 6, when available staffing is at three personnel. In this situation the engine responds with call back personnel. Current industry practice in the fire and emergency services is for a minimum of one engine to respond with the ambulance to every motor vehicle accident, particularly on higher speed, more limited access roads and highways. While the additional personnel can help the ambulance crew by performing hazard evaluation and abatement, as well as patient care (figure V-8) an additional

important consideration is to provide a blocking vehicle to protect the ambulance and personnel operating on the incident scene from being struck by an inattentive motorist.

Highway safety is a major concern not only for motorists, but also for the fire, EMS, and police personnel who respond to unplanned traffic incidents. As the number of responders being struck on the highways and being seriously injured or killed has increased significantly over the past decade, the need for the use of blocking vehicles to help keep them safe has become a much more important necessary and important part of the emergency response system (figure V-9).

CRITICAL TASK	NEEDED PERSONNEL
Incident Command	1
Hazard evaluation/Abatement	2
Patient Evaluation/Care	2-3
EFFECTIVE RESPONSE FORCE	5-6

FIGURE V-8: CRITICAL TASKING – MOTOR VEHICLE CRASH

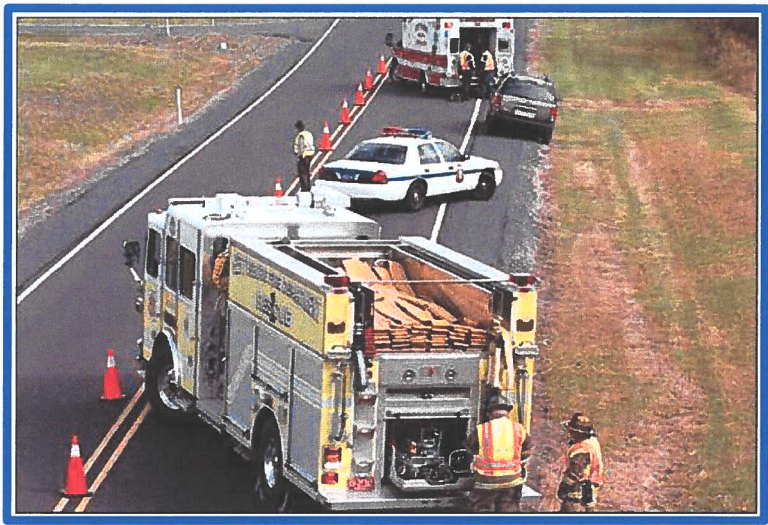


FIGURE V-9: FIRE APPARATUS SERVING AS A BLOCKING VEHICLE ON A ROADWAY INCIDENT

Many communities in the United States (but not necessarily Massachusetts) that are similar sized to Barnstable are protected by combination fire departments comprised of both career and call/volunteer personnel, or, in some instances fully call/volunteer fire departments. The project team is often questioned by municipal leaders if the establishment of a call contingent in their local fire department would be a viable option to supplement the career staffing levels.

Like many communities, Barnstable did have a call force at one time. However, MRI rarely ever believes this would be a feasible option in the 21st century and Barnstable provides no exception. There are several factors that lead to this conclusion, chief among them the time commitment necessary to complete initial training (up to 150 hours or more); no long deep tradition of a call or volunteer fire company in the district that would attract and keep members; and a general steep decline in volunteerism throughout the country. Many chiefs who lead combination departments, report that they invest considerable resources, both time and financial, in training people to be call firefighters only for them to use it as nothing more than a stepping-stone to a career job. These factors are particularly relevant in Massachusetts where the majority of communities have career firefighters and there are a large number of opportunities for those who wish to pursue a career in the fire service.

Based upon the increasing incident volume, and the planned and continued growth within the fire district, the MRI team believes that career staffing within the organization will probably need to be bolstered through an incremental and fiscally realistic process, starting in 2021. Considering the need to maintain personnel to cover short-term and long-term absences, as well as the need to prepare for community growth and increased response demand, the MRI team is recommending the Barnstable Fire Department consider the hiring of two additional firefighters in 2021. Since the department's busiest hours, from an incident volume perspective, are between about 9:00 AM and 5:00 PM, we recommend that these personnel be assigned to provide an additional firefighter on duty during the day, during those hours, seven days per week. To achieve the same 42-hour week that the other firefighters work, a 10.5-hour day from 8:00 AM to 6:30 PM could be considered. Each of these firefighters would work four days on followed by four days off. With the recent addition of the EMS officer position, the Barnstable Fire Department could have up to eight personnel working during the busiest hours of the day.

Looking ahead, as growth and developments continue to occur in the fire district, along with the expected corresponding increase in call volume, the fire district will probably eventually need to hire at least two additional personnel to provide five personnel on duty around the clock. However, we do not believe that time has arrived yet.

Being a tourist and vacation destination, the incident statistics illustrate the Barnstable Fire Department's call volume increases between May and October each year. While it would probably be met with resistance from within the department's membership, similar communities along the New Jersey shore such as Wildwood, North Wildwood, and Cape May bolster their seasonal on duty staffing with part time or per diem personnel. These personnel must meet all the same requirements as the full-time personnel but that are primarily seasonal, although they may be assigned to a specific shift for the entire season. They often move into full-time positions when they become available. This may be something the Barnstable Fire

District would want to explore as way to increase staffing during the busiest months but do so in a more fiscally prudent manner.

MUTUAL AND AUTOMATIC AID

Mutual aid is an essential component of almost every fire department's operations. With the exception of the largest cities, no municipal fire department can, or should, be expected to have adequate resources to respond to safely, effectively and efficiently mitigate large scale complex incidents. Mutual aid is shared between communities when their day-to-day operational fire rescue and EMS capabilities have been exceeded and ensure that the citizens of the community are protected, even when local resources are overwhelmed. Fire department mutual aid is provided without financial charge.

Automatic Aid is assistance that dispatched automatically by agreement between two or more communities or fire districts to all first alarm structural fires. The automatic aid will depend upon the location in the community and the type of equipment that each department can share as well as staff. It is predetermined by each community's fire department so that on the initial notification through 9-1-1 the neighboring department is also notified and responds as long as they are able to. If they are unable to respond because they are not available due to an incident in their own community, Barnstable would rely on the regional mutual aid agreements and go further out to other fire departments.

As a hallmark of fire department operations throughout Massachusetts (and in most other areas of the country as well) the Barnstable Fire Department engages in robust mutual aid relationships with all of its surrounding communities and departments. These departments respond together regularly to a wide range of incidents. The departments operate seamlessly together, even with regard to chief/command level officers responding to and assisting with managing incidents, regardless of which community it is occurring in. In most cases they respond immediately, or simultaneously upon the report of any structure fire. Doing so quickly increases the number of firefighting personnel who are available. This is the case in Barnstable as units from West Barnstable and Hyannis or Yarmouth respond automatically to reported structure fires. NFPA 1710 also recommends that the appropriate number of personnel arrive on scene within eight minutes (480 seconds) travel time.

The use of extensive automatic aid is an exceptional practice utilized in many locations that has served to increase the service level to all participating communities while reducing the cost of individual fire services. In many cases this practice is viewed as a means for "mutual survival" by chief officers. The MRI project team views it as a mechanism to not only enhance operational safety, but a major factor in future operational success.

Like all communities in Massachusetts, Barnstable utilizes a 10-alarm run card to determine responses to various types of incidents. These cards are revised on an annual basis, as necessary. Mutual and automatic is provided reciprocally throughout the municipalities on Cape Cod.

Many organizational assessments suggest that automatic aid practices should be developed further as they reflect an industry best practice. Moving forward, the Barnstable Fire Department should attempt to enter into enhanced automatic aid agreements with surrounding communities to provide for the simultaneous dispatch of additional resources to attempt to better achieve the recommended benchmarks – both personnel and time on location – for each specific type of structure fire. These revised response assignments should be based upon critical staffing needs as identified in this report.

Overall, between 2016 and 2020, the Barnstable Fire Department received automatic aid 19 times and mutual aid 248 times. Conversely, the department provided automatic aid 11 times and mutual aid 363 times. The most frequent automatic/mutual aid partners were the Hyannis, west Barnstable, and Yarmouth Fire Departments which makes sense as their districts are adjacent to the Barnstable Fire District.

INSURANCE SERVICES OFFICE (ISO)

The Insurance Services Office's (ISO) Public Protection Classification (PPC) program evaluates communities according to a uniform set of criteria defined in the Fire Suppression Rating Schedule (FSRS). This criterion incorporates nationally recognized standards developed by the National Fire Protection Association (NFPA) and the American Water Works Association (AWWA). Using the FSRS, ISO evaluates the fire suppression capabilities of a community and assigns a PPC classification; a number rating from 1 to 10. Class 1 represents exemplary fire protection (by ISO's standards), and Class 10 indicates that the area or community's fire suppression program does not meet minimum recognized criteria or standards. In most cases, this means there is no recognized fire department or formal fire protection. Any building more than five road miles from a fire station or outside the boundary of a fire protection area is rated 10. Generally, areas of a community that are more than 1,000 feet from a fire hydrant, but within five road miles from a fire station, are rated Class 9.

The FSRS allocates credit for fire protection by evaluating these three major categories (Figure V-10):

1. **Fire Alarm and Communication System:** This aspect of the evaluation examines a community's facilities and support for handling and dispatching fire alarms. This

includes telephone lines and systems, staffing, dispatching systems, and equipment. This component equates to 10% (10 points) of the evaluation.

2. **Fire Department:** This component of the evaluation, which accounts for 50% of the total classification (50 points), focuses on the Fire Department and its operations. Areas that are examined include the number of engine and ladder/service companies, distribution of fire stations and fire companies, equipment carried on the apparatus, pumping capacity, testing of hose, pumps and ladders, reserve apparatus, department and on-duty staffing, and training.
3. **Water Supply System:** The third component of the evaluation is an analysis of the community's water supply system for fire protection. Chief among the areas that are examined include fire hydrant size, type, flow, and installation. In addition, the condition and frequency of inspection of the hydrants is evaluated. Finally, the overall capabilities of the water supply system are assessed in comparison to the needed fire flow for target hazards in the community. Forty percent of the final rating (40 points) is based on the water supply system.

A relatively new addition to the FSRS, the Community Risk Reduction section offers a maximum of 5.5 points, resulting in 105.5 total points now available in the FSRS. The inclusion of this section for "extra points" allows recognition for those communities that employ effective fire prevention practices, without unduly affecting those who have not yet adopted such measures.

The addition of the Community Risk Reduction section gives incentives to those communities who strive proactively to reduce fire severity through a structured program of fire prevention activities. The areas of community risk reduction evaluated in this section include:

- Fire prevention
- Fire safety education
- Fire investigation



FIGURE V-10: FOUR KEY PARTS OF ISO PPC EVALUATION PROCESS

Source: ISO

Every city, town, or area that provides fire protection services is subject to being graded to establish a PPC. Individual buildings, both residential and commercial, are subject to the community's PPC. When calculating property insurance premiums, insurance companies using the PPC apply a factor that reflects a particular community's PPC. Some individual facilities within a community may also be individually assessed and assigned a specific rating.

Although there may be validity to the argument that this rating is no longer utilized by all insurance companies that issue policies to industrial and commercial facilities within Barnstable, ISO is still recognized as a comparative benchmark of public fire protection. Moreover, within the past several years, ISO has significantly revised its FSRs, and as a result, the PPC to reflect new innovations and technology, and the evolving standards and industry best practices within the fire service. Among these changes are:

- Greater reference to nationally accepted consensus standards; NFPA and AWWA.
- Increased recognition of automatic fire sprinklers.
- Greater reliance on technology-based solutions (e.g., GIS, thermal imaging cameras).
- Increased emphasis on fire training activities.
- New reference to national standard safety requirements.
- New reference to accreditation; focus on master/strategic planning.

According to ISO, the PPC helps measure the effectiveness of fire protection and provides an important advisory evaluation to both insurers and communities. It is applied nationwide, and more than ever incorporates accepted national consensus standards. The PPC is used in marketing, underwriting, and pricing of both homeowners and commercial lines of fire/property insurance. Broadly speaking, the cost of insurance premiums is generally lower with better protection which translates into lower losses; the cost is higher in areas that have lower levels of protection which often translates into higher losses. Many insurers still rely on this information, at least partially, to set their fire insurance rates.

Based on the most recent February 2016 ISO evaluation, the Barnstable Fire Department was awarded 78.65 points out of a possible 100 for a rating of Class 3/10. This placed the Department in the top 10% of fire departments across the country. This is an excellent rating that reflects the overall quality of the department and the systems that have been put into place. However, MRI believes that the Barnstable Fire Department could attain a higher rating of Class 2 during the next rating cycle. Figure V-11, below, provides a graphical representation of the rating distribution across the United States.

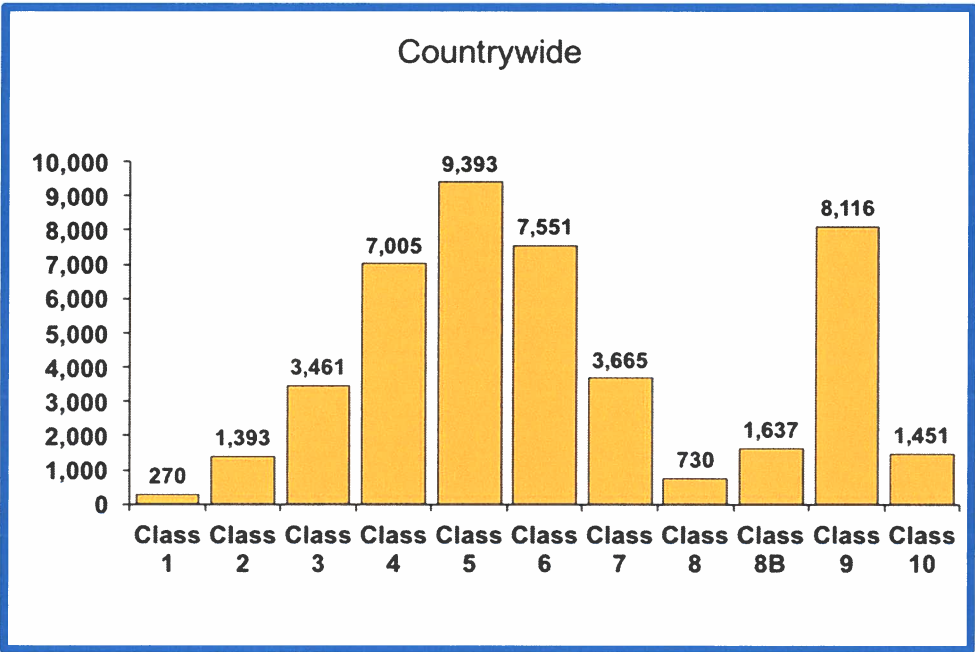


FIGURE V-11: INSURANCE SERVICE OFFICE RATING DISTRIBUTION CHART
Source: ISO

According to ISO, many communities receive split classifications which were revised in 2013 to reflect the risk of loss, more precisely. An example of the split classification is 4/4X. The first number refers to the classification of properties within 5 road miles of a fire station and within



1,000 feet of a creditable water supply. The second number applies to properties within 5 road miles of a fire station, but beyond 1,000 feet of a creditable water supply. ISO generally assigns Class 10 to properties beyond 5 road miles. The X classification replaced the former 9 portions of a split classification, respectively. For example, a community formerly graded as a split 4/9 will change to a split 4/4X.

Looking deeper into the ratings, the Barnstable Fire Department is currently rated with 35.38 out of a possible 50 points; Emergency Communications (E-911, dispatch and communications) – 8.53 points out of a possible 10 points; and water supply is rated at a 33.73 out 40 points (Figure V-12). This means that the most improvement is possible within the areas of the fire department with some additional improvement regarding water supply. The water supply area could be improved with additional inspections of the system where increased fire flow testing alone could earn enough additional points to achieve Class 2 rating. This should be a priority since the Barnstable Fire District is also a water district.

For the 2016 evaluation the areas where Barnstable was the weakest and consequently lost the most points was for company personnel, and training. Based upon the ISO evaluation the department should review their training process and programs and provide the necessary documentation to ISO.

The Community Risk Reduction section of the FSRS offers a maximum of 5.5 points, resulting in 105.5 total points available in the FSRS. The inclusion of this section for “extra points” allows recognition for those communities that employ effective fire prevention practices, without unduly affecting those who have not yet adopted such measures. In 2016, the Barnstable Fire Department received 3.72 points for community risk reduction. This suggests that as indicated in other areas of this report, the Barnstable Fire Department has a well-developed and well managed fire prevention function.

FSRS Feature	Credit Granted to Barnstable	Credit Available
Emergency Communications		
• Phone Service	2.55	3
• Tele-communicators	3.20	4
• Dispatch Circuits	2.78	3
Communications Total	8.53	10
Fire Department		
• Engine companies	5.97	6
• Reserve Pumpers	0.00	0.5
• Pump Capacity	3.00	3
• Ladder Service	3.84	4
• Reserve Ladder, Service Trucks	0.00	0.5
• Deployment analysis	9.12	10
• Company personnel	5.68	15
• Training	5.77	9
• Operational Considerations	2.0	2.0
Fire Department Total	33.73	50
Water Supply		
• Supply System	25.93	35
• Hydrants	3.0	3
• Inspection and flow testing	4.80	7
Water Supply Total	33.73	40
Divergence	-2.71	---
Community Risk Reduction	3.72	5.50
Total FSRS Credit	78.65	105.5

FIGURE V-12: BARNSTABLE FIRE DEPARTMENT ISO FSRS ANALYSIS - 2016

It is MRI's belief that with the implementation of recommendations within this report, and the accompanying strategic plan, along with other changes that the Barnstable Fire Department can implement internally that may not be specifically identified, the district should easily be able to achieve an exception ISO rating of Class 2.

RECOMMENDATIONS

V-1: *The Barnstable Fire Department should enhance its existing pre-fire planning program into a comprehensive one for all structures other than one (1) and two (2) family*

dwelling. This includes every business, commercial and industrial occupancy (including schools, churches, etc.) in the fire district. Pre-planning will improve the firefighters' knowledge of the specific tactics needed to handle a fire or other emergency at a facility and will alert them to on-site hazards and risks. Pre-fire/incident plans should be reviewed regularly and tested by periodic table-top exercises and on-site drills.

- V-2:** *Appropriate pre-planning software – such as the AWARE module for Mobile CAD - should be obtained and installed in apparatus mobile data terminals (MDTs) in all apparatus and command/staff vehicles.*
- V-3:** *The Barnstable Fire Department should continue to pursue the acquisition of mobile data terminals (MDT's) in all frontline apparatus and supply each unit with reliable mobile internet connectivity such as the AT&T FirstNet network which includes mobile hot spots or routers for in vehicle use throughout the district.*
- V-4:** *The Barnstable Fire Department should establish a formal “performance improvement” process for fire suppression operations. The process should include the adoption of performance standards such as NFPA 1710, including on scene performance indicators such as:*
- *On-scene to charged line at the front door of a structure fire: two minutes or less, 90% of the time.*
 - *Water from hydrant to supply engine: three minutes or less, 90% of the time.*
- V-5:** *The Barnstable Fire Department should consider revising their EMS response procedures as follows:*
- *When staffing is at four personnel:*
 - ❖ *Two personnel respond on the ambulance to Alpha and Bravo, or Priority 3 calls. The two personnel remaining are now available for fire duty, or can handle a second ambulance call, if necessary. If they require additional assistance, they can request the engine to respond.*
 - ❖ *Two personnel respond on the ambulance and two personnel respond on the engine to Charlie, Delta, and Echo, or Priority 1 and 2*

calls. If an additional person is needed on the ambulance they can be sent to the hospital with the ambulance crew. The fourth person can return to station with the engine and await the arrival of off duty personnel.

➤ *When staffing is at three personnel:*

- ❖ *Two personnel respond on the ambulance to Alpha and Bravo, or Priority 3 calls. If they require additional assistance, they can request the engine to respond. The remaining is still available for fire duty, or can handle a second ambulance call, once off duty personnel arrive at the station.*
- ❖ *All three personnel respond on the ambulance to Charlie, Delta, and Echo, or Priority 1 and 2 calls. Off duty personnel reporting back for duty would now provide fire response, or response to a second ambulance call.*

- V-6:** *The Barnstable Fire Department should consider a procedure that Alpha level, or Priority 3 EMS calls are responded to without light or sirens. Consideration should also be given to making hospital transport calls that are non-emergent and the patient is stable, without lights and sirens. It is safer for responding personnel, general citizens, and the patient, to reduce the number of times that red lights and sirens are utilized.*
- V-7:** *The Barnstable Fire District and Barnstable Fire Department should actively explore the feasibility of implementing some type of community based mobile integrated health care in an attempt to provide better service to the community, and possibly increase their EMS revenue.*
- V-8:** *The Barnstable Fire Department should strive to have a minimum of 14/15 firefighting personnel on the scene of every single-family residential structure fire within 8 minutes of the time that units are responding. For fires in multi-family residential buildings and commercial occupancies, a minimum of 27/28 personnel should be on scene within 8 minutes of the time that units are responding in order to be able to establish a full effective response force. Even if additional permanent staffing was added the use of automatic aid and mutual aid will need to continue and should be enhanced, based upon the type of occupancy a reported fire is in. This should be the department's highest priority.*

- V-9: *The Barnstable Fire Department should conduct analysis to determine if there are ways to reduce the number of response times that are greater than 5 minutes from call dispatch to first unit on location, and 6 minutes from call receipt to first unit on location. This should be focused toward opportunities for improvement in call processing time (60 seconds for most calls) and/or personnel turnout times (60 to 80 seconds).*
- V-10: *The Barnstable Fire Department should continue its policy of filling vacancies on the shifts that are created by scheduled leave with personnel on overtime. Trying to maintain a minimum of four personnel on duty as much of the time as possible should remain a high priority.*
- V-11: *The Barnstable Fire Department should hire two additional firefighters to enhance daily on duty staffing from 8:00 AM to 6:30 PM which are the busiest hours of the day for emergency incidents. The additional personnel should be on duty seven days per week.*
- V-12: *The Barnstable Fire Department should apply for a federal Staffing for Adequate Fire and Emergency Response (SAFER) grant to fund the two positions recommended in V-11, above, citing an increasing call volume, and a desire to improve overall operational effectiveness, efficiency, and safety.*
- V-13: *The Barnstable Fire Department should maintain a roster of 12-14 paramedics and attempt to have a minimum of two on duty at all times. By increasing the number of paramedics on duty at all times, one could be assigned to the primary ambulance as is done now, while the second one is assigned to the engine and second ambulance, thus providing both of those units with ALS capability resulting in an increased level of service. If additional personnel wanted to maintain their ALS certifications, the department should attempt to accommodate them and encourage them to do so.*
- V-14: *The Barnstable Fire Department should implement an operational procedure to have an engine respond immediately with the ambulance on every motor vehicle crash to provide a blocking vehicle to protect the ambulance and personnel operating on the incident scene from being struck by an inattentive motorist. The need for the use of blocking vehicles to help keep emergency responders safe during highway and roadway incidents has become a much more important necessary and important part of the emergency response system.*
- V-15: *The Barnstable Fire Department should work on correcting the deficiencies noted in the most recent ISO inspection to attempt to achieve a higher, and exceptional, Class 2*

rating. The department should focus on the training and hydrant inspection, testing, and flow testing areas which are the most achievable.

CHAPTER VI RESOURCES AND DEPLOYMENT

FIRE DEPARTMENT FACILITIES

Fire and EMS stations are a critical community asset. The station facilities of a modern fire and EMS department are designed to do much more than simply provide a garage for apparatus and a place for firefighters and EMS personnel to wait for a call. Well-designed fire and EMS facilities enable staff to perform their duties effectively, efficiently, and safely.

A well designed and functional emergency services station should, at a minimum, provide adequate, efficiently designed space for the following functions:

- Housing of fire apparatus, with adequate space for apparatus length and height (and the housing of all other vehicles and equipment, including ambulances and staff, service and support vehicles including trailers)
- On-duty crew quarters, with sufficient toilet/shower/locker room space for both sexes
- Kitchen area
- Training and meeting space
- Administrative offices
- Vehicle maintenance (as necessary)
- Hose drying and storage (as necessary)
- Supply and equipment storage
- Public entrance/reception area

Many communities find that an emergency services station is an ideal place to locate a community meeting room which are frequently made available to community organizations, thus increasing their versatility. However, in today's environment, serious consideration must be given to station security and whether allowing members of the public, who are not members of the department, to utilize these facilities, particularly if there is open or easy access to the operational areas of the facility.

Fire and EMS capital facilities are exposed to some of the most intense and demanding uses of any public local government facility, as they are subject to use (and may be occupied) 24 hours a day. The very nature of fire and rescue operations necessitate that all stations be functional, adequate to fulfill the department's core missions, and be well maintained. Typically, fire stations have an anticipated service life of approximately fifty years, although some newer stations are being designed to remain functional longer.

The Barnstable Fire Department currently operates from a single station located at 3249 Main Street in Barnstable Village (Figures VI-1 and VI-2).



FIGURE VI-1 (left) and VI-2 (right): BARNSTABLE FIRE DEPARTMENT STATION

The building houses the department's administrative offices including the chief's office, deputy chiefs' office, space for the administrative staff, and a small reception area. The department's apparatus and vehicles are stored in five (5) non-drive-through bays that are single unit depth. Since it serves a full-time career fire department, the station has living quarters for the on-duty career personnel. This includes a kitchen with dining area, day room, bunk rooms, a physical fitness area, and bathroom/shower facilities. There is a dedicated area for biohazard decontamination.

The station is outfitted throughout with an automatic fire detection system. It is also equipped with an emergency generator and a source capture vehicle exhaust system. These units are designed to limit the exposure of building occupants to exhaust fumes from hydrocarbon emissions from apparatus that is currently assigned there. Currently industry best practice requires that all these systems be maintained to provide an enhanced level of safety and security.

The station originally dates to 1935, making it approximately 85 years old. Significant renovations and additions to the building were undertaken in 1976, and again in 2000. The station appears well maintained from a maintenance and housekeeping perspective. However, with its most recent significant upgrades being 20 and 45 years ago respectively, station will continue to need preventative maintenance and system upgrades to maintain its viability as an emergency response facility for a modern department.

The MRI study team noted that the apparatus bays of the station are very tight with little room to move around. The ladder truck just barely fits into the station (Figure VI-3). In addition, the firefighters' personal protective equipment is stored on the apparatus floor which is not recommended (Figure VI-4).

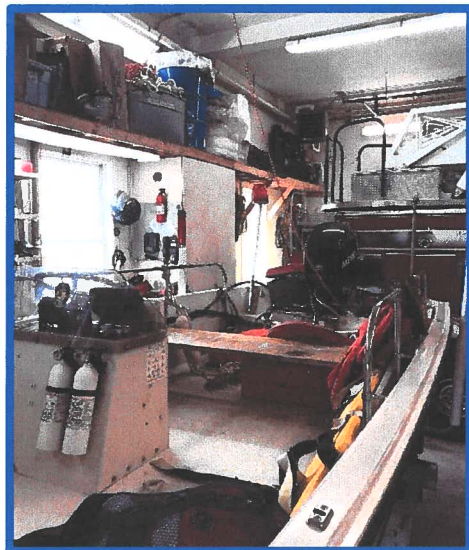


FIGURE VI-3 (left): BARNSTABLE FIRE DEPARTMENT STATION APPARATUS BAYS ARE VERY CROWDED WITH LITTLE ROOM TO MOVE AROUND.



FIGURE VI-4 (right): FIREFIGHTER PPE STORED ON APPARTSUS BAY.

As is the case with many communities, the Barnstable Fire Department's operations have evolved over the past several decades, and as a result, so has its facility and support needs. Looking ahead, consideration should be given to making a capital investment in a new fire department facility. This long-term need was identified in an internal organizational analysis that was conducted in 2019 by Chief Pulsifer. Although additional study is warranted that is beyond the scope of this report, MRI believes that this investment will be necessary for the department to undertake within the next five to ten years.

There is no specific template for fire station design and construction. Each station must be designed to meet the unique needs of the community it will serve. National best practices, such as guidance provided by the National Fire Protection Association (NFPA) and the Federal Emergency Management Agency (FEMA) recommend that among other things the following features be included in modern fire and rescue station capabilities:

- Seismic-resistant construction (based on local risk assessment)
- Flood hazard protection (based on local risk assessment)
- Automatic fire sprinkler system and smoke detection system

- Carbon monoxide detectors
- Vehicle exhaust extraction system
- Capability to decontaminate, launder and dry personal protective equipment, station uniforms and tools and equipment
- Adequate facility security
- Emergency power supply and system redundancy
- Exercise and training area(s)
- Compliance with the Americans with Disabilities Act (ADA)
- Compliance with current fire and building codes
- Adequate storage for supplies and equipment, including emergency medical and disaster supplies
- Adequate parking for on-duty personnel, administrative staff, and visitors
- Capability for future expansion

FIRE APPARATUS AND VEHICLES

The resources that the fire department uses to perform its core mission, and mitigate a wide range of emergency incidents, are generally divided into two major categories: apparatus and tools/equipment. Apparatus generally includes the department's motorized vehicle fleet and includes the major emergency response apparatus such as engines (pumpers), aerial apparatus/tower ladders, rescue vehicles, and ambulances. Specialized apparatus includes emergency units such as marine units, lighting plants, brush trucks, and other off-road vehicles. They also often include trailers for specialized applications such as technical rescue, hazardous materials response/equipment, hazardous material decontamination, structural collapse rescue equipment, breathing air/light support units, foam units/supplies, and mass casualty incident supplies. Support vehicles that are critical to fire department operations, both routine and emergency, include command post and emergency communications units, command/staff vehicles, and maintenance trucks.

The geography, infrastructure, hazards, and construction features within the community all play a major role in determining the composition of each department's unique and individualized apparatus fleet and equipment inventory. Barnstable's environment presents the fire department with a wide variety of strategic and tactical challenges related to emergency response preparedness and mitigation. For many locations or facilities, these challenges may include, but not are limited to, firefighting, emergency medical responses, and complex incidents requiring special operations capabilities such as technical rescue or water rescue emergencies.

Commercial buildings and target hazards present much different hazards and challenges than those required for operations in single-family dwellings. Congestion and access limitations can present different concerns for fire department tactical operations. All these factors, as well as

projected future needs, must be taken into consideration when specifying and purchasing fire apparatus and equipment. Every effort should be made to make new apparatus as versatile and multi-functional/capable as possible and practical.

The MRI project team performed a visual inspection of the Barnstable Fire Department's apparatus and vehicle fleets during our site visits. The team also discussed with staff the maintenance practices and procedures; however, maintenance records were not reviewed. It was apparent to the MRI team that the fleet was well-maintained and appears appropriate in size for fire suppression and special operations incidents.

The current Barnstable Fire Department apparatus fleet consists of:

- Two (2) engine/pumpers
- One (1) 105' rear mount aerial ladder
- Two (2) Advanced Life Support Ambulances
- Two (2) command vehicles
- Two (2) boat/marine units
- Two (2) service vehicles
- One (1) military surplus, high water vehicle

Barnstable is close to national averages regarding the current size and configuration of its apparatus fleet when compared to communities with comparable populations. The average community of the Barnstable Fire District's size has:

- 1.8 pumpers (50% have 2 pumps, while 23% have just 1 and another 23% have either 3 or 4 pumps)
- 2.1 other fire suppression vehicles such as tenders, brush trucks, etc.
- 0.11 aerials (89% do not have an aerial, just 10% have 1)

The age of the major firefighting apparatus currently in-service ranges from nine years old for Engine 202 to 29 years old for Ladder 206 (this unit was refurbished in 2012 and a replacement is currently on order). Engine 205, the department's other front-line engine is 25 years old. In addition to Ladder 206, Engine 205 is probably reaching the end of its serviceable life. The department's two ambulances are seven years and fourteen years old; the latter having been acquired from the West Barnstable Fire District in 2018.

The following summarizes the Barnstable Fire Department's major vehicle fleet (figures VI-5 – VI-10).



**Figure VI-5: Engine 202: 2011 E-One Typhoon pumper
1,500 GPM pump capacity; 730-gallon water tank;
50 gallons foam
Very good condition**



**Figure VI-6: Engine 205: 2003 Pierce Quantum pumper
1,500 GPM pump capacity; 750-gallon water tank;
50 gallons foam
Fair condition**



**Figure VI-7: Ladder 206: 1992 Pierce Arrow Ladder
105' rear mount aerial
Fair condition**



**Figure VI-8: Patrol 200: 2006 Ford F-250
125 GPM pump capacity, 150-gallon water tank
Good condition**



**Figure VI-9: Ambulance 203: 2014 Ford F-550/Lifeline
4 x 4
Excellent condition**



**Figure VI-10: Ambulance 204: 2007 Chevrolet 4500/
Lifeline
Good condition**

The department's command/staff vehicles are as follows:

- Car 201: Fire Chief's vehicle – 2019 Chevrolet Tahoe – Excellent condition
- Car 210: Deputy Chief's vehicle – 2019 Chevrolet Tahoe – Excellent condition
- Car 212: Shift Officers vehicle – 2008 Ford Explorer XLT – Good condition

A fire/rescue pumper or squad combines the functions of an engine (pump, hose, water) with vehicle extrication and possibly other basic special hazards/operations (technical rescue/hazardous materials) tools and equipment. The current Engine 202 is basically set up and functions as a rescue pumper. It is our opinion that this concept of operations should be continued and in fact be the basis of Barnstable's rescue operations which are almost exclusively going to be related to vehicle rescue and extrication operations.

Despite the lack of clear guidance in the various NFPA standards, there is a significant body of knowledge that suggests that fire apparatus definitely has a finite life span. The reasonable serviceable life span of fire apparatus will depend on a number of variables such as the level of use, local environment and operating conditions, and very importantly, the scope of preventative maintenance. It is generally accepted that lower use fire apparatus, such as units serving communities that are suburban in nature, might still be mechanically sound after twenty years or more due to their lower frequency of use. However, after twenty years, technical and functional obsolescence may make the apparatus less desirable to use, even if mechanically sound and serviceable. However, that does not mean that it will still not be serviceable as a spare or reserve apparatus.

A white paper developed by the Fire Apparatus Manufacturer's Association (FAMA) suggests that the front-line life span of active-duty fire apparatus, in a suburban setting, ranges from 16 to 19 years, with the possibility of an additional 9 to 10 years in a reserve, or spare status. The International City/County Management Association (ICMA) suggests that the life span of a fire pumper should be 20 years, and the life span of an aerial ladder should be 25 years.

One common recommended practice is to purchase one major piece of fire apparatus every 5 years. The goal of this strategy is to spread major purchases out over time in an effort to allow the governmental entity to maintain a consistent level of debt service. Regardless, the decision is left to each locality and represents a balancing of numerous factors: fire department activity levels, maintenance costs and history, individual vehicle reliability, funding availability, technological changes, firefighter safety, and vehicle use. Fire apparatus must be replaced before it becomes unreliable, but it must be held in service for as long as practical to maximize the benefit of the large initial investment from the community.

One of the biggest factors that can impact serviceable life of the apparatus is the level of preventative maintenance that it receives. NFPA 1911: Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Automotive Fire Apparatus (2012 edition), provides guidance on this important aspect of fire department support operations. Apparatus manufacturers also identify suggested programs and procedures to be performed at various intervals. As apparatus ages, it is reasonable to expect that parts will wear out and need to be replaced. It follows then that maintenance costs and overall operating expenses will increase. As a result, cost history and projected costs for the future must be considered as a factor in determining when to replace or refurbish a fire apparatus. In addition, reliability of the apparatus must be considered. Experiencing low downtime and high parts availability are critical factors for emergency equipment maintenance and serviceability. A pro-active preventative maintenance program can assist with holding costs to an acceptable level. Each community determines how they will provide maintenance and repairs to their apparatus and vehicle fleet. This is typically based on the size of the department, the size of the fleet, and if the community's repair facility and its mechanics are capable of performing the specialized mechanical repairs that are required with fire apparatus and emergency vehicles.

At the time of this assessment, the Barnstable Fire Department has a firefighter/mechanic who works on duty performing maintenance on the fleet. Hired in 2017, this firefighter is a certified Emergency Vehicle Technician (EVT) with 12 years of previous experience as a call firefighter/EMT with the West Barnstable Fire Department. The hiring of this firefighter has proved to be a tremendous asset to the department as he is able to perform preventative maintenance and many repairs in house which can have multiple benefits to the department in terms of both time and cost. The Barnstable Fire Department should be commended for this endeavor which MRI considers to be a **Best Practice**. The department uses a private vendor and/or the vehicle dealership for more specialized maintenance and repairs, such as is necessary for the fire pumps, aerial ladder, and technical equipment.

As previously noted, Engine 205 is 25 years old, and while refurbished in 2012, Ladder 206 is now 29 years old. While not specifically reported to MRI, it would not seem at all unreasonable that significant breakdowns/maintenance issues could occur at any time with these units, and parts availability may be growing scarce. For that reason, these units are probably near the end of its useful service life and planning should begin for their replacement.

The MRI study team believes that the Barnstable Fire Department having a ladder or aerial device provides important tactical and operational benefits to the department. These benefits will be increased if additional development projects proposed for the fire district progress from ideas to reality. Virtually all new construction, including new housing and apartment/condominium developments, are built using lightweight construction methods and materials that are prone to early failure and collapse during fires. Lightweight construction

creates significantly magnified risks and safety issues for firefighters during emergencies and necessitates firefighting tactical operations to be approached much differently.

The MRI study team believes strongly that a ladder or aerial of some type should respond automatically to every reported structural fire incident including activated fire alarms. Many of these incidents turn out to be minor, however, that fact is not going to be known until qualified fire department personnel arrive on the scene and make an assessment. When there is an actual fire, particularly a significant one, it is not cliché to say that minutes and even seconds can make a difference. The immediate availability of an aerial ladder can play a significant tactical role in the overall successful mitigation of the incident for numerous time critical operations involving rescuing trapped civilians or firefighters, accessing roofs (or chimneys) and conducting coordinated ventilation operations.

After reviewing the apparatus fleet, and considering the information discussed above, we recommend that Engine 205 and Ladder 206 be combined into a single “Quint” which will contribute to what we believe will be an effective and appropriate apparatus set for the department. A quint is a fire service apparatus that serves the dual purpose of an engine and a ladder truck (Figure VI-11). This type of fire apparatus provides the ability to perform five functions: pump, water tank, fire hose, aerial device, and ground ladders. Combining an engine/pumper and aerial ladder into a single unit can satisfy operational needs that cannot be met by staffing two separate pieces of apparatus. Ladder 206 is scheduled to be replaced in 2021 with a new Pierce Ascendant Quint with a 107’ aerial ladder.

Long term, having one of the pumpers and the ladder combined into a quint, Barnstable will have a diverse firefighting resource that provides maximum operational flexibility and options for safe, effective, and efficient options, particularly when operating with minimal staffing levels that would be expected in a small department where personnel perform multiple functions. In addition, by combining the two vehicles into one the department will reduce the size of its apparatus fleet and thus probably reduce its long-term maintenance costs. It will also eliminate the need to replace another vehicle a few years down the road. However, as this does reduce a unit and limits available reserve apparatus, it is important that all units in the primary apparatus set be well equipped, properly maintained and replaced in accordance with a reasonable life expectancy.



FIGURE VI-11: EXAMPLE OF A PIERCE ASCENDANT 107' QUINT

Photo credit: Pierce Manufacturing

DEPLOYMENT OF RESOURCES

The location of a fire station in a community is as important an issue as the functionality of a station. The locations of fire stations in every community are typically based on a historical or anticipated need at the time the station was built, as well as the town's infrastructure at that time. The area of the town that a fire station is in must take into consideration the needs of the community based on its current and future needs and the level of service it is intended to provide. Today, many communities are taking into consideration their master planning documents, regional economic growth patterns, and potential demographic changes when determining the potential future need for new fire station locations.

Getting emergency assistance to the scene of a 9-1-1 caller in the quickest time possible may be critical to the survival of the patient, and/or successful mitigation of the incident. Achieving the quickest and safest response times possible should be a fundamental goal of every fire department.

From the perspective of stations and apparatus, there are three (3) main factors that are used to help determine the deployment of resources: response time, travel distance, and call volume. For most evaluations, response time is the driving factor as time, more so than any other factor, is a critical consideration in emergency incident response, whether the situation involves a fire or an emergency medical event. It is important to remember the four-minute response time is from when the emergency vehicle (fire truck or ambulance) is actually

responding to the incident. There are other times that must be calculated in that will lengthen the actual time it takes from the time the 9-1-1 call is placed until a unit actually arrives on the scene of the incident. Traffic conditions at various times of the day, weather, and call volume can all adversely impact emergency vehicle response times.

As has been discussed previously in this report, but worth mentioning again, the performance and effectiveness of fire department operations can be significantly impacted by the time it takes for them to arrive on the scene of an emergency incident. The United States Fire Administration's (USFA) report, *Structure Fire Response Times*, has a useful framework for total emergency incident response time, including definitions and components. The same report notes that about half of structure fires confined to the room of origin (51%) and confined to the floor of origin (51%) had a response time of less than five minutes. Also, as previously noted, 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. Numerous studies have shown that irreversible brain damage can occur if the brain is deprived of oxygen for more than four minutes. In addition, the potential for successful resuscitation during cardiac arrest decreases exponentially with each passing minute that cardio-pulmonary resuscitation (CPR) or cardiac defibrillation is delayed.

Both NFPA and Insurance Services Office (ISO) have established different indices in determining fire station distribution and thus a basis for a standard of cover. The ISO Fire Suppression Rating Schedule, Section 560, indicates that first-due engine companies should serve areas that are within a 1.5-mile travel distance. The placement of fire stations that achieves this type of separation creates service areas that are approximately 4.5 square miles in size, depending on the road network and other geographical barriers (rivers, lakes, railroads, limited access highways, etc.).

NFPA references the placement of fire stations in an indirect way. It recommends that fire stations be placed in a distribution that achieves the desired minimum response times. NFPA Standard 1710, Section 5.2.4.1.1, suggests an engine placement that achieves a 240-second (four-minute) travel time from the time the unit is actually responding. Using an empirical model called the "piece-wise linear travel time function" the Rand Institute has estimated that the average emergency response speed for fire apparatus is 35 mph. At this speed, the distance a fire engine can travel in four minutes is approximately 1.97 miles.¹⁶ A polygon based on a 1.97-mile travel distance results in a service area that on average is 7.3 square miles.¹⁷ This would incorporate about 52.1% of the district's square mileage. However, fire stations can

¹⁶ University of Tennessee Municipal Technical Advisory Service, *Clinton Fire Location Station Study*, Knoxville, TN, November 2012. p. 8.

¹⁷ University of Tennessee Municipal Technical Advisory Service, *Clinton Fire Location Station Study*, Knoxville, TN, November 2012. p. 9

rarely be located at the exactly optimal location and are still impacted by the road network, traffic, and other physical barriers that may impede or slow down responses.

Figure VI-12 shows the rough outline of the existing Barnstable Fire Department response districts while figure VI-13 shows the number of incidents in each for the five-year period 2016 - 2020. The response districts are as follows:

- District 1: Route 132 to west of the railroad bridge; Route 6, and Shootflying Hill Road
- District 2: Railroad bridge to Mary Dunn Road, north of Route 6. This is the district the existing fire station is located in.
- District 3: Mary Dunn Road to Yarmouth town line
- District 4: Industrial park; south of Route 6
- District 5, which is not shown incorporates the Sandy Neck area.
- District 9 is for out of district responses.

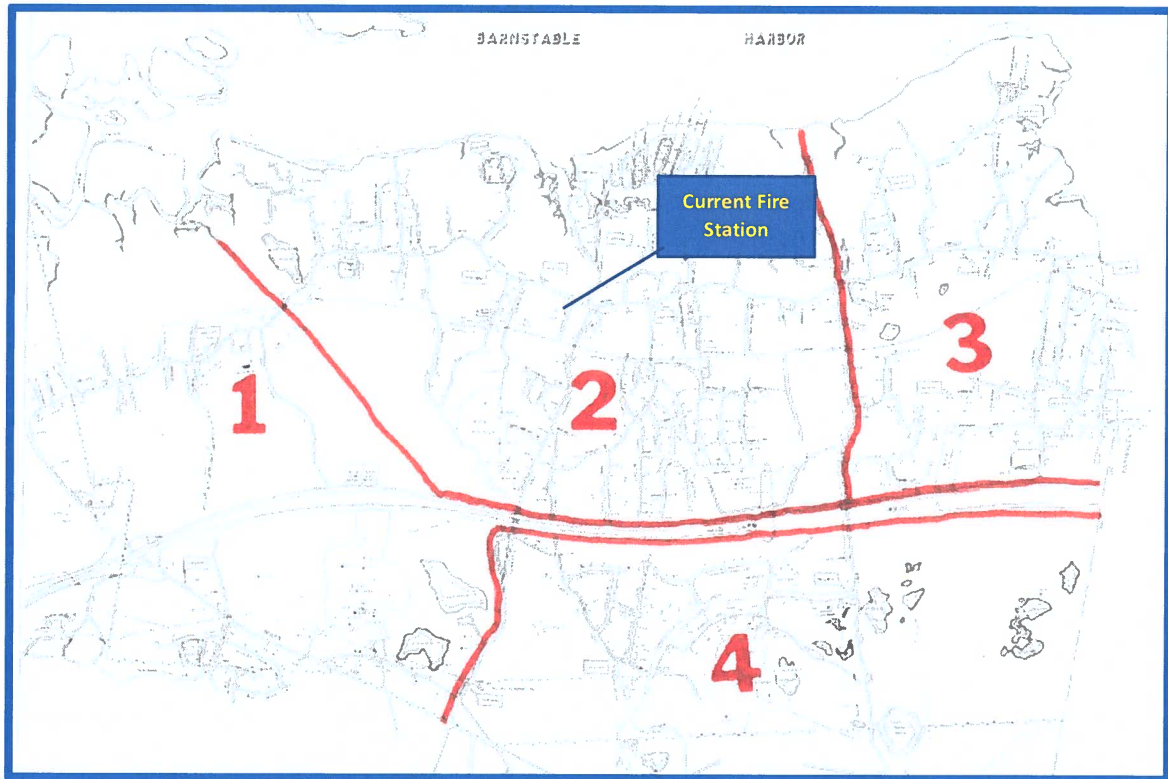


FIGURE VI-12: BARNSTABLE FIRE DEPARTMENT RESPONSE DISTRICT BOUNDARIES

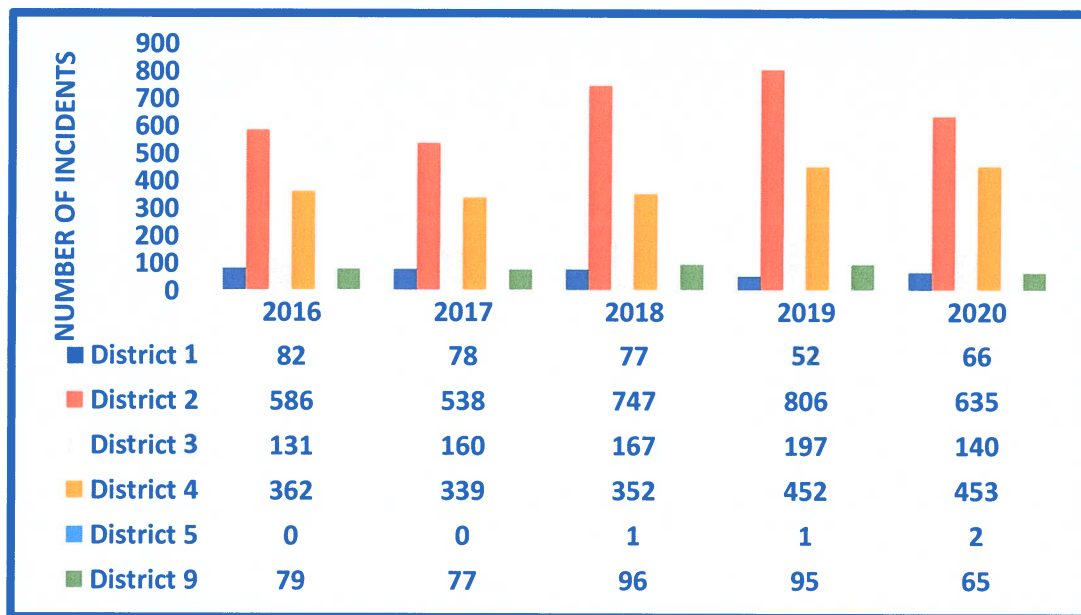


FIGURE VI-13: BARNSTABLE FIRE DEPARTMENT RESPONSE DISTRICT INCIDENTS 2016 - 2020

The percentage of incident in each response district for the five-year period is illustrated in Figure VI-14 below. Note with only 4 total responses to Sandy Neck District 5 during this period, the percentage is negligible at 0.006 % and does not show up on the chart.

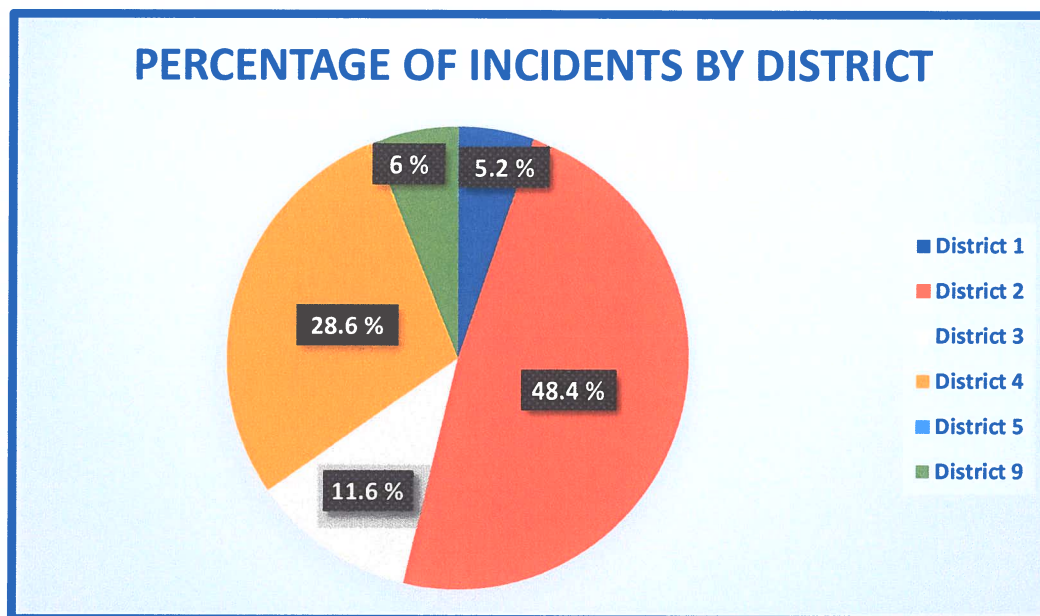


FIGURE VI-14: BARNSTABLE FIRE DEPARTMENT RESPONSE DISTRICT INCIDENT PERCENTAGES 2016 - 2020

These numbers indicate that around 50% of all incidents still occur in District 2. This district experienced a significant increase in the number of incidents in 2018 and 2019 but experienced a significant decline in 2020 along with the overall number of incidents. However, a little over one in four incidents now occurs in District 4, and the data indicates a significant increase there over the previous two years.

There has been some discussion over whether, long term, the department should continue to operate from one station, or should, in the future consider a second station. In terms of industry best practice, it is found that fire departments that respond to more than 3,000 calls per year typically have multiple staffed deployment points, those with fewer calls often do not. The benefit produced by a substation, is that it spreads career forces to two points of immediate deployment and minimizes overall response time. In short, this strategy enables the department to provide a larger high response zone with optimal response times of 4-6 minutes. The development of a substation requires a significant change in deployment strategy, and usually an increase in staffing. The feasibility of establishing additional deployment points is usually both a call volume driven, and fiscal decision, in addition to the evaluation of response times.

In the case of the Barnstable Fire Department at the time this study was conducted, the department's call volume is only slightly more than half of what is frequently a triggering point for the implementation of a second deployment location. The current station, while not located exactly in the center of the district is reasonably positioned, particularly with regard to Districts 2 and 4 where nearly 75% of the incidents occur. While there is room for improvement in response times, the Barnstable Fire Department arrives at 70% of its incidents within five minutes of having received the call (this includes both turnout and travel times), and 90% within seven minutes. GIS mapping included in a 2012 Emergency Services Facility Location Study completed for the district by Emergency Services Consulting International illustrated a significant majority of the Barnstable Fire Department's own first due response area was within a four-minute (240 second) travel time from the existing fire station.

RECOMMENDATIONS

VI-1: *The Barnstable Fire Department should form a committee to begin the process of conducting a fire station needs analysis. Part of this process should be to utilize GPS to plot data points for a five-year period of all incidents, along with actual and projected response times, on maps to determine whether the current location is where the station should remain, or, if evolving needs indicate a different location may better serve the community. This is service that MRI can provide to the district/department.*

VI-2: *The Barnstable Fire Department should strongly consider consolidating the*

replacement of the 1992 Pierce Arrow Ladder 206, which is underway, and the 1996 Pierce Quantum pumper, Engine 205 into the single “quint” that has a 107’ aerial ladder and is configured to also fully function as a fire pumper.

VI-3: *The Barnstable Fire Department should continue to maintain two ambulances. The district/department should attempt to get these vehicles on a regular replacement schedule of purchasing one new unit every five to six years. In that way, each unit will be in front line service for five/six years, with an equal amount of time in second line/reserve status.*

CHAPTER VII

FIRE DEPARTMENT FINANCIAL OPERATIONS

Emergency services budgets are more than the dollar amount allocated for the operation of the various departments. The budgets are the document that reflect the goals and objectives that the fire department and the fire district have established for delivery of services to the community. The budgets should be used as a planning tool by the department and its members and should represent the needs of the department to properly and safely serve the public.

Budget preparation and management must be an ongoing process in every aspect of the departments. Before one budget cycle is completed, the next must already be in process. The fire chief along with his/her other officers must continuously monitor their department and their ongoing needs, as well as anticipate the demands that will be placed upon them in the future. The department must compare their current budget, and the work plan that is driven by that budget, with the upcoming budget allocation. The current and future budgets should be linked directly to the strategic plan and level of service established by the governing body, in this case, the Prudential Committee.

The majority of funds for the fire department budget come from property taxes and the rates charged to property owners. Some funds also come from a variety of fees for services, grants, and other sources. This is particularly true of the EMS part of operations which generates income through EMS third party billing. Some long-term capital funding may be included as part of a bond issue that will be paid back over a number of years. Some departments are using leases and lease purchase programs to assist with replacing undependable or unsafe apparatus and equipment. Contracting to provide shared services, such as for dispatching, has proven to assist with generating funds in some departments, or conversely, reducing expenses by joining another community.

While a comparative study can evaluate the level of effort and ability of residents to fund services, it cannot measure residents' willingness to pay over the long run. Caution should be used if looking for hard and fast answers using statistical comparisons on their face value alone. Every emergency services provider and every government entity has developed creative methods for service delivery and cost labeling based on specific needs. Additionally, the information that might be obtained from various other government agencies could vary to some degree as to how they report expenses such as employee benefits or vehicle maintenance.

The MRI study team reviewed the budget documents provided to us by the Barnstable Fire Department. The department's budget appears to meet the current needs of the department in

order to maintain the existing levels of service. The overall fiscal management of the fire department appears to be very good at the time of this study.

A review of Barnstable Fire Department's annual operating budget shows that it increased from \$2,398,202.73 in fiscal year 2019, to \$2,466,083.33 in fiscal year 2020, an increase of \$67,880.60 (2.8%). The department utilizes a traditional line-item budget to identify and track funding and expenses. Personnel costs account for the greatest portion of the budget costs in most fire departments that are not fully volunteer. In FY 2020, employee compensation accounts for \$2,186,598.57, or 88.7% percent of the Barnstable fire budget. Other than a modest increase for dispatching fees, all the other increases in the budget between FY 2019 and FY 2020 are related to personnel costs.

As is the practice in many New England communities, the Barnstable Fire District holds an annual district meeting, similar to a town meeting, where the district/department's operating and capital budgets are approved.

CAPITAL PLANNING

A Capital Improvement Plan (Program), or CIP, is a plan or varying duration, in government, usually five (5) to ten (10) years in duration, which identifies major (capital) projects and equipment purchases, organizes long term projects, provides a planning schedule and identifies options for financing the plan. The plan serves as a mechanism for decision-making, to identify priorities early to allow for more deliberate planning of financial resources, to provide a link to the Barnstable Fire Department's long range strategic needs, and to communicate those long-range plans and needs to businesses and the community.

Budgetary pressures often divert government resources away from capital renewal. At a time when many governments are challenged by citizen demands for additional or improved services and taxpayer resistance to higher tax levies to pay for these services, the capital budget is often the first to be cut in an effort to balance the budget. Careful planning is required to ensure that capital needs receive the full attention and commitment of government officials. A well-planned capital improvement program is a crucial tool to systematically plan for and manage capital needs. On-going service delivery can be assured only if adequate consideration is given to capital needs. If facilities and infrastructure are not maintained, they will deteriorate until costly maintenance is required, services are threatened, and community growth stagnates or declines.

It does appear that the Barnstable Fire District is in relatively sound financial condition. This is a result of sound financial management, as well as the continued growth and development that the district is still experiencing. However, the long-term financial impacts of the economic

collapse caused by the COVID pandemic are unknown and may be long term. Over the ten-year period from 2008 through 2018 the fire district tax rate increased an average of 3.3% per year which is reasonable. What is even more commendable is that the tax rate was reduced by 8% from FY 2018 to FY 2019 while still maintaining the level of service. Looking ahead, it will be imperative that the district continues to maintain their services and appropriately fund needed capital projects in an ongoing manner.

The Barnstable Fire Department did provide the MRI study team with its long-range capital plan for fiscal years 2021 through 2025 (figure VII-1).

<u>Capitol Planning/ Strategic Financial Planning</u>			
<u>January 2020</u>			
	<u>Age of Equip.</u>	<u>Est. Amount</u>	<u>Possible Funding</u>
<u>Fiscal Year 2021</u>			
Personal Protective Equipment	(10 Years)	\$ 65,000.00	AFG Funding
Station Generator	(25 years)	\$ 30,000.00	
Add One Firefighter	(New)	\$100,000.00	SAFER Grant
400 Mhz Radio Implementation	(New)	\$100,000.00	
<u>Fiscal Year 2022</u>			
E-205 Replacement	(25 years)	\$700,000.00	EMS Account
Ambulance 204 Replacement	(15 Years)	\$350,000.00	
Kitchen/ Bath Station Renovations	(22 Years)	\$ 70,000.00	
Plan one firefighter retirement	(32 Years)	\$ 50,000.00	
<u>Fiscal Year 2023</u>			
SCBA Replacement 20 bottles	(15 Years)	\$ 90,000.00	AFG Funding
SCBA Filling Station Replacement	(28 Years)	\$ 60,000.00	AFG Funding
Plan one Firefighter retirement	(32 Years)	\$ 50,000.00	
<u>Fiscal Year 2024</u>			
Lifepack 15 Replacement	(10 Years)	\$ 50,000.00	EMS Account
SCBA Replacement 20 Bottles	(15 Years)	\$ 90,000.00	AFG Funding
Patrol 200 Replacement	(18 Years)	\$100,000.00	
<u>Fiscal Year 2025</u>			
Lifepack 15 Replacement	(10 Years)	\$ 50,000.00	EMS Account
Personal Protective Equipment	(10 Years)	\$ 80,000.00	
Station Roof Replacement	(25 Years)		

(BFD-Chart 2-1)

(BFD-Chart 2-1)

FIGURE VII-1: BARNSTABLE FIRE DEPARTMENT CAPITAL PLAN 2021 - 2025

After reviewing the Barnstable Fire Department capital plan, we make two recommendations that make adjustments to the capital plan.

1. Eliminate the replacement of Engine 205 in FY 2022. The MRI team has previously recommended that this engine be part of a two for one replacement with the new Quint that is on order.
2. Closely monitor the condition of ambulances on a 15-year replacement cycle. Depending upon their level of use, a 10 to 12 years replacement cycle may be better.

EMS REVENUE

Like most agencies that provide EMS transport services the Barnstable Fire Department bills third party insurance carriers for the cost of providing that service. However, like most services, the department does not aggressively bill to collect unpaid fees. While ambulance billing fees provide funding to offset the cost of providing the service they usually come nowhere close to fully funding the cost of providing the service.

Between 2008 and 2018 the Barnstable Fire Department undertook a number of initiatives to increase the revenue they generated from EMS third party billing. This has largely been successful with revenue steadily increasing and the collection rate exceeding 80% which is excellent. The acquisition of the second ambulance has increased revenue also since incidents that would previously have been handled by mutual aid can now be handled by the Barnstable Fire Department. The significant increase in calls to the Cape Cod Hospital Urgent Care will assist with pushing EMS revenue higher since patients at these types of facilities generally have insurance and/or must agree to pay any outstanding balance due as a result of their treatment.

GRANTS

There are multiple federal, state, and private grants available for fire departments and communities to consider for supplementing their budgets. If successful in receiving a grant award, most departments are able to acquire equipment, training, and programs that they would not be able to achieve through the normal budget process. Though the process can be difficult and time consuming, the outcomes can be greatly beneficial to the fire department.

While the economic challenges of the last decade plus have had an impact on grants from private entities and foundations, fortunately, the federal grant programs targeted to the fire service, the Assistance to Fire Firefighters (AFG) Grants for equipment, the Staffing for Adequate Fire and Emergency Response (SAFER) Grants for personnel, and, the Fire Prevention and Safety (FP&S) Grants for fire prevention and public fire education programs, continue to be funded, although not anywhere near their authorized levels.

The AFG program provides financial assistance directly to fire departments to enhance their capabilities with respect to fire and fire-related hazards. The AFG supports fire departments that lack the tools and resources necessary to more effectively protect the life and safety of the public and their emergency response personnel with respect to fire and all other hazards. Since 2001, AFG has helped firefighters and other first responders to obtain critically needed equipment, protective gear, emergency vehicles, training, and other resources needed to protect the public and emergency personnel from fire and related hazards.

The goal of the SAFER grants is to enhance the fire departments' ability to comply with staffing, response and operational standards established by NFPA and OSHA (NFPA 1720 and OSHA 1910.134). Specifically, SAFER funds assist the fire department to increase their staffing and deployment capabilities in order to respond to emergencies whenever they may occur. SAFER grants are awarded to departments for both hiring of career personnel, and recruitment and retention of volunteer/call personnel.

FP&S grants support projects that enhance the safety of the public and firefighters from fire and related hazards. The primary goal is to target high-risk populations and mitigate high incidences of death and injury.

There are a number of other grants available to fire departments for various purposes. Some grants that may be available to the Barnstable Fire Department are the Fireman's Fund Heritage Grants, Factory Mutual grants for fire investigation, and Wal-Mart community grants. Other large chains, such as Home Depot and Lowes, are frequently willing to provide funding, and/or enter into partnerships for specific projects. The key to success at this level is finding grants for which the department may be eligible, and, ensuring that the application is tailored to the grant program's priorities.

The Barnstable Fire Department has applied for grants in the past that were available to purchase equipment and to enhance staffing and have had a high level of success at obtaining them. In the 2020 grant cycle, the department received an AFG grant in the amount of \$761,904.76 to apply to the purchase of the new Quint. The fire district then provided an overmatch of \$558,095.24 to complete the necessary funding. The department also received a SAFER grant in 2020 in the amount of \$305,225.88 to fund the hiring of an additional firefighter and cover salary and benefits for three years. There is no cost share to the district during this time period. The chief and his staff should be commended for these attempts and continue to pursue these opportunities on an annual basis. Several of the items listed in the department's capital plan target future AFG grants as a potential source of funding. The MRI team has previously recommended that the department seek a SAFER grant to fund the two additional firefighters we recommend adding to the department's roster.

SOURCES OF ADDITIONAL FUNDING

In this era of extremely tight budgets, where every governmental entity is looking for alternative revenue streams to offset declining tax receipts, there are many other sources of potential revenue for the fire department that the Barnstable Fire District may want to explore and consider implementing. Among these are:

- Increased fire prevention business registration, inspection, plans review, system testing, and permit fees.
- Billing insurance companies for response to motor vehicle accidents exclusive of third-party billing for ambulance transport.
- Registration fees for fire alarm systems; and the issuance of penalties for those whose systems generate repeat false alarms.
- Negotiation of a payment in lieu of taxes (PILOT) program with Barnstable County for providing services to the county complex. This can also be applicable to other tax-exempt properties.
- Explore the potential to enter into public/private partnerships with local business who may be interested in assisting the department with funding for specific projects or activities.
- Implement aggressive EMS billing to collect unpaid bills from patients who are not residents of the fire district or the town.
- While often more closely associated with volunteer emergency services providers, consideration of an annual subscription fee where residents of the district pay an annual subscription which entitles them to have any remaining balance for EMS transport fees not paid by their insurance to be waived.
- While Massachusetts law does not permit the imposition of impact fees related to development projects within the community, there is no prohibition on the community, or in this case the fire district, negotiating with the developer to provide “mitigation” funds to assist the emergency services meet the potential increased requests for service generated by the new development.

- The implementation of a community paramedicine program can serve to increase revenue through the negotiation of agreements with various entities.
- Consideration could be given to implementing a fee for response to EMS incidents that do not result in transport to the hospital. This (along with a community paramedicine program) can have the dual benefit of reducing responses to “frequent flyers”, persons who use the EMS system on a regular basis.

RECOMMENDATIONS

In June 2020 Chief Pulsifer conducted an analysis of the Barnstable Fire District’s finances as part of his course requirements in pursuit of his Master’s Degree. He concluded that overall, the district was in fairly good financial condition. However, he cautioned the governing body against complacency related to finances. He noted that post employment benefits and pension liabilities pose two of the greatest risks to the department’s stability. The MRI study team concurs.

Throughout this report, the MRI study team has made several recommendations that could, if adopted, increase expenditures in the Barnstable Fire Department. We believe that these recommendations are essential for the effective, efficient, and safe operation of the fire department. Other recommendations are intended to reduce overall financial risk and liability or will have the effect of smoothing expenditure rates and minimizing one-time spikes in the budget. Ideally, emergency services expenditures should result in programs that are well-justified and cost-effective, and that have measurable outcomes that result in an improved level of safety and protection for the citizens of the Barnstable Fire District and those who are visiting the area.

- VII-1: *The Barnstable Fire District should review all fees on an annual basis for possible increases in accordance with state law.***
- VII-2: *The Barnstable Fire District should explore additional potential ways to generate revenue to offset the fire department’s operating costs. Consideration could be given to billing insurance companies for response to motor vehicle accidents; registration fees for fire alarm systems; the aggressive pursuit of non-residents who have been billed for ambulance transportation; and the implementation of a fee for ambulance responses that do not result in a transport.***
- VII-3: *The Barnstable Fire Department should identify and prioritize its most critical equipment, training and/or operational needs, and continue to apply annually to the Assistance to Firefighters Grant (AFG) program.***

- VII-4:** *The Barnstable Fire Department should identify and prioritize its fire prevention and public fire education needs and apply annually to the Fire Prevention and Safety Grant (FP&SG) program.*
- VII-5:** *The Barnstable Fire Department and the Barnstable Fire District should actively search for other grant opportunities. Grants for fire protection, fire safety, fire prevention, domestic and emergency preparedness, and homeland security may be available from federal, state, corporate, and foundation sources.*
- VII-6:** *The Barnstable Fire Department and the rescue should actively seek out businesses that may be interested in establishing public/private partnerships that could provide, or assist with, funding for various programs, projects, or initiatives.*
- VII-7:** *The Barnstable Fire Department and the Barnstable Fire District should attempt to negotiate for payments in lieu of taxes (PILOT) programs with Barnstable County and other tax- exempt properties for providing emergency services.*
- VII-8:** *The Barnstable Fire Department and the Barnstable Fire District should consider negotiating with the developers of major projects or facilities with the district to provide “mitigation” funds to assist the emergency services meet the potential increased requests for service generated by the new development.*

CHAPTER VIII

SUMMARY AND PLANNING FOR THE FUTURE

CURRENT STATE OF THE FIRE AND EMS DELIVERY SYSTEM

The mission performed by the fire department is one of the fundamental functions of government: to ensure the safety and protection of its residents and visitors. The expectations for the quality and quantity of fire and EMS services must come from its residents and other taxpayers. There is no “right” amount of fire protection and EMS delivery. It is a constantly changing level based on the expressed needs of the community. Each community determines the composition of fire services that residents receive by balancing the level of risk against the cost to provide these critical services. It is the responsibility of elected officials – in this case the Prudential Committee - to translate community needs into reality through direction, oversight and the budgetary process. It is their unenviable task to maximize fire, EMS, and other services within the reality of the community’s ability and willingness to pay, particularly in today’s economic environment.

During this assessment of the Barnstable Fire Department, MRI observed a highly functional fire and EMS organization that strives to provide a high level of service to the community and the region. The Barnstable Fire Department is confronted by many challenges; however, those same challenges are facing fire service organizations across America. These challenges include:

- An increasing all-hazards focus.
- Decreased frequency of serious structure fires.
- Increased pressure to reduce resource consumption.
- Increasing technical expectations
- An increasing focus on documentation, training, and certification of personnel
- A growing expectation to provide advanced level patient care.
- Increased call volume and simultaneous incidents
- Lack of a call force to supplement the career staff.

Specific to the Barnstable Fire Department, and the 2020 response numbers notwithstanding, it is clear that service demand is increasing and that the ability to match resources against the service demand is straining the organization, particularly during the day. As the fire service as a whole has entered into an all-hazards environment, the public has come to expect increased knowledge, skills and abilities from their firefighters. In Barnstable, this trend has increased both training and certification requirements.

The Barnstable Fire Department appears to be an excellent organization that provides a high-level of service to the fire district it serves. However, due to increasing requests for service, a defunct on-call force, and limited on-duty staffing, it is struggling to keep up with meeting the growing needs of the community. The department is led by Chief Francis “Frank” Pulsifer who has been the chief since 2012. Chief Pulsifer is a passionate advocate and energetic leader that is clearly honored to have an exceptional staff and serve his community. Under Chief Pulsifer’s leadership the department is trying to get to the proverbial “next level”. It has also been noted that the department has implemented several **BEST PRACTICES**. These include:

- The Barnstable Fire Department’s commitment to a comprehensive community risk reduction program.
- The Barnstable Fire Department has a firefighter/mechanic who works on duty performing maintenance on the fleet and is a certified Emergency Vehicle Technician (EVT) with 12 years of previous experience as a call firefighter/EMT.
- The backfilling of shifts for scheduled benefit time (except for sick leave) which has reduced sick call outs, improved morale, and provides better operational preparedness.

The officer corps including the deputy chief and captains appear to work as a team to provide critical, and it appears effective, leadership to the department. All members of the department work as a team to produce a high quality, effective, and efficient response that serves the fire district well. Overall, the department works diligently to meet the needs of the community and projects a “can do attitude”. This positive attitude translates into the organization being very highly regarded and respected within the community.

Although we only spoke to a few citizens of the community, they relayed their opinion that the organization being well regarded and respected within the community. This high-level of community support is complemented by a positive internal culture. It is apparent that the Barnstable Fire Department is a well-organized, and well-run organization that strives to provide the best possible services with the resources provided.

However, the numerous positive aspects of the department and its operations notwithstanding, MRI’s evaluation has identified several areas of risk that we believe the Barnstable Fire District will need to address in the coming years. These include:

1. The potential for a diminished level of service based on a shortage of available resources, primarily from a career staffing perspective, particularly as development in the district continues and the annual requests for service continue to increase, coupled

with the absence of a viable call force to provide supplemental staffing during fire incidents and times of high activity.

2. A need to increase the use of automatic aid at the time of dispatch to reported structure fires to attempt to assemble an effective response force within the benchmark time frames.
3. Potentially increasing response times based on a growing number of overlapping calls (20.4% over the five-year period but 23.9% in 2019).
4. The need for a new station to replace one that is probably nearing the end of its serviceable life. The location of a potential replacement station will also need to be evaluated.
5. The financial implications presented by post-employment benefits and under funded pension liabilities as well as the general increasing costs of personnel benefits. The district will need to actively seek additional sources of revenue.

STRATEGIC PLANNING (AKA LOOKING TO THE FUTURE)

Strategic planning is an organization's process of defining its direction, and, making decisions relative to the optimization of limited resources. A strategic plan also contains tools that can guide the implementation of the strategy. Strategic planning became prominent in corporations during the 1960s and remains an important aspect of organizational planning.

Strategy has many definitions, but generally involves setting goals, determining actions to achieve the goals, and mobilizing resources to execute the actions. A strategy describes how the ends (goals) will be achieved by the means (resources). Strategy can be planned (intended) or can be observed as a pattern of activity (emergent) as the organization adapts to its environment or competes. The strategy currently in place in the Barnstable Fire Department is a progressive and forward thinking one. Through this document, it is the goal to assist the Barnstable Fire District and the Barnstable Fire Department in moving forward in a planned or intended strategic manner.

Strategic implementation is analytical in nature and involves identifying how to best reach a goal or desired outcome. The recommendations contained in this document form the framework for action and indicate where change is necessary. The strategic implementation process considers the intricacies of the organizational environment including the following:

- Inputs – information utilized to formulate recommendations.

- Outputs – development of a plan of implementation
- Outcomes – that require evaluation.

Fire and rescue operations and service delivery can be dramatically improved in those departments that commit resources to goal-setting, master planning, risk assessment, and performance measurement. A number of tools and resources are available to guide management in these efforts from organizations such as the US Fire Administration (USFA), National Fire Protection Association (NFPA), International Association of Fire Chiefs (IAFC), International Association of Fire Fighters (IAFF), Center for Public Safety Excellence (CPSE), the Massachusetts Firefighting Academy, U.S. Department of Transportation (USDOT), the Massachusetts State Fire Marshal and, Massachusetts Emergency Medical Services (OEMS). A 2006 Volunteer Fireman's Insurance Service (VFIS) report notes:

***"No business is successful without some type of strategic planning – making sure that the business will survive. The ESO is no different. Strategic Plans in business (and ESOs) lay the ground-work for effective organizational management and performance."*¹⁸**

Performance measures should be easily understood and easily calculated. Suggested performance measures for the fire and rescue services often have a range depending on local factors. The point of the performance measures is to identify the community's expectations in a quantifiable way, and to use the measurement of the fire and rescue's performance against these objectives to identify areas, which may need improvement, or require additional resources.

FIRE SERVICE ACCREDITATION

Accreditation is a comprehensive self-assessment and evaluation model that enables organizations to examine past, current, and future service levels and internal performance and compare them to industry best practices. This process leads to improved service delivery.¹⁹ The Center for Public Safety Excellence's (CPSE) accreditation program, administered by the Commission on Fire Accreditation International (CFAI) allows fire and emergency service agencies to compare their performance to industry best practices in order to:

- Determine community risk and safety needs and develop community-specific Standards of Cover.
- Evaluate the performance of the Department.

¹⁸ <http://www.msfa.org/content/recruit/file/CEO%20MANUAL%20ARIAL%20-%20disc.pdf>

¹⁹ <http://www.publicsafetyexcellence.org/agency-accreditation/about-accreditation-cfai.aspx>

- Establish a method for achieving continuous organizational improvement.²⁰

Particularly for emergency services, local officials need criteria to assess professional performance and efficiency. The CFAI accreditation process provides a well-defined, internationally-recognized benchmark system to measure the quality of fire and emergency services.²¹

The Barnstable Fire Department is operationally and administratively a well-managed and operated, full-service emergency provider. Based upon that premise, at some point in the future (perhaps after construction of a new station), the department with support from the Barnstable Fire District, should consider undertaking the accreditation process. Although time consuming and labor intensive it would allow the department to be recognized for its excellence.

CONCLUSION

The report should be studied in its entirety to gain a complete picture of MRI's recommendations and the rationale behind them. Fire district and fire department leaders may develop their own priorities; modify the recommendations based on the ever-changing needs of the district and the department; and coordinate solutions based on time, personnel, and fiscal realities.

The MRI project team must stress again the citizens of the Barnstable Fire Department should feel confident, and be proud of the fact, that the Barnstable Fire Department is an extremely professional and capable public safety organization that is providing a critical service to the community, day in and day out. The team continues to be impressed with the dedication and commitment of its members.

In order to address the 41 recommendations that have been identified in this report, the Fire District and the Fire Department should:

1. Approach them strategically and systematically.
2. Use them as a roadmap to guide change and improvement within the department focused on service enhancement.

²⁰ <http://www.publicsafetyexcellence.org/agency-accreditation/about-accreditation-cfai.aspx>

²¹ <http://www.publicsafetyexcellence.org/agency-accreditation/about-accreditation-cfai.aspx>

3. Refer to them when making recommendations, check them off as they are accomplished, and most importantly, recognize the positive achievements publicly.

CHAPTER IX SUMMARY OF RECOMMENDATIONS

CHAPTER II: COMMUNITY OVERVIEW

- II-1** *The Barnstable Fire Department should make it a priority to complete a comprehensive fire and rescue community risk assessment. This assessment should be done in conjunction with a fire and EMS calls for service demand analysis, including the development of a wide-ranging pre-incident planning program for target and high hazard locations in the district, and take into consideration the fire department's operational capabilities and preparedness.*
- II-2** *The Barnstable Fire Department should develop a compelling public education program that includes discussing the benefits of installing residential fire sprinklers in new one- and two-family dwellings. Although Massachusetts's construction codes do not allow residential fire sprinkler systems to be mandated, there is no prohibition for property owners to install them if they determine that it is in their best interest.*
- II-3** *The Barnstable Fire Department should consider the implementation of a company-level inspection program, integrated with a pre-fire/incident planning program as part of its comprehensive community risk reduction program.*
- II-4** *The Barnstable Fire Department should continue, and where possible, enhance/expand, its public education programs as part of its comprehensive community risk reduction program.*
- II-5** *The Barnstable Fire Department should apply annually for a federal Fire Prevention and Safety Grant (FP&S) from the Federal Emergency Management Agency (FEMA) to assist with underwriting the costs of its community risk reduction programs.*

CHAPTER III: ORGANIZATIONAL STRUCTURE

- III-1** *The Barnstable Fire District should consider negotiating for the purpose of implementing additional requirements for eligibility to test for captain beyond four years of service with the Barnstable Fire Department and not being on probation. Some of the suggested increased requirements for eligibility for this position could include:*

- *Firefighter II certified.*

- *Completion of the Massachusetts Fire Academy Pump Operator AND Aerial Operator certification classes, and, approved to operate all department vehicles.*
 - *Advanced EMT or Paramedic certified.*
 - *Obtained a minimum of 20 hours of firefighting tactics training.*
 - *Fire Instructor I or Fire Inspector I certified.*
 - *Upon promotion:*
 - ❖ *Obtain 20 hours of supervisory training within 2 years of appointment.*
 - ❖ *Obtain Fire Officer I certification with 2 years of appointment.*
- III-2** *Personnel who are on the current promotional eligible list for captain should be given the first opportunity to fill vacancies on their own shift.*
- III-3** *The Barnstable Fire Department should consider replacing/reclassifying the position of designated firefighter and the unused position of senior private as a Senior Firefighter.*
- III-4** *If there is no one on the current promotional list for captain assigned to a particular shift (or available) the senior firefighter should be offered the opportunity to fill the position provided they also meet certain minimum qualifications such as:*
- *Firefighter II certified.*
 - *Completion of the Massachusetts Fire Academy Pump Operator AND Aerial Operator certification classes, and, approved to operate all department vehicles.*
 - *Advanced EMT or Paramedic certified.*
 - *Obtained a minimum of 20 hours of firefighting tactics training.*
- III-5** *The Barnstable Fire District and Barnstable Fire Department should consider designating the newly full-time position of EMS coordinator as a captain's position which is tested for as part of a promotional process. This position should continue to have the requirement that the person holding it must be a currently certified paramedic and hold that certification for the duration of their time in the position.*
- III-6** *The Barnstable Fire District should continue to evaluate the organizational structure of the Barnstable Fire Department in an ongoing matter to ensure that it meets the needs of the community it services, the expectations of the community, and the department itself.*

CHAPTER IV: RESPONSE METRICS

- IV-1** *The Barnstable Fire Department should work internally to ensure all EMS related incidents are properly classified as either advanced life support (ALS) or basic life support (BLS) criterion, based upon the actual situation found on scene.*
- IV-2:** *The Barnstable Fire Department should work with the BCSO RECC leadership to identify any potential ways to reduce call processing time (from receipt of the call to dispatch of the incident) with the goal of attempting to achieve a 90th percentile time of not more than 64 seconds as recommended in NFPA 1710. Reducing call processing time can assist with leading to improved overall response times.*
- IV-3:** *The Barnstable Fire Department should further analyze their response time data, and if necessary, work to identify potential ways to reduce incident turnout time with the goal of attempting to achieve a 90th percentile time of not more than 60 seconds for EMS incidents and 80 seconds for fire incidents as recommended in NFPA 1710. Turnout time is the response time component that the agencies have the most direct control over which can lead to reduced overall response times.*
- IV-4** *The Barnstable Fire Department should enhance their data collection and analysis to include 80th and 90th percentile turnout and travel times as recommended in NFPA 1710. Having these more conservative times available will provide a more accurate response assessment and allow for better long- range master planning.*

CHAPTER V: EMERGENCY OPERATIONS

- V-1:** *The Barnstable Fire Department should enhance its existing pre-fire planning program into a comprehensive one for all structures other than one (1) and two (2) family dwellings. This includes every business, commercial and industrial occupancy (including schools, churches, etc.) in the fire district. Pre-planning will improve the firefighters' knowledge of the specific tactics needed to handle a fire or other emergency at a facility and will alert them to on-site hazards and risks. Pre-fire/incident plans should be reviewed regularly and tested by periodic table-top exercises and on-site drills.*
- V-2:** *Appropriate pre-planning software – such as the AWARE module for Mobile CAD - should be obtained and installed in apparatus mobile data terminals (MDTs) in all apparatus and command/staff vehicles.*
- V-3:** *The Barnstable Fire Department should continue to pursue the acquisition of mobile data terminals (MDT's) in all frontline apparatus and supply each unit with reliable*

mobile internet connectivity such as the AT&T FirstNet network which includes mobile hot spots or routers for in vehicle use throughout the district.

V-4: *The Barnstable Fire Department should establish a formal “performance “improvement” process for fire suppression operations. The process should include the adoption of performance standards such as NFPA 1710, including on scene performance indicators such as:*

- *On-scene to charged line at the front door of a structure fire: two minutes or less, 90% of the time.*
- *Water from hydrant to supply engine: three minutes or less, 90% of the time.*

V-5: *The Barnstable Fire Department should consider revising their EMS response procedures as follows:*

- *When staffing is at four personnel:*
 - ❖ *Two personnel respond on the ambulance to Alpha and Bravo, or Priority 3 calls. The two personnel remaining are now available for fire duty, or can handle a second ambulance call, if necessary. If they require additional assistance, they can request the engine to respond.*
 - ❖ *Two personnel respond on the ambulance and two personnel respond on the engine to Charlie, Delta, and Echo, or Priority 1 and 2 calls. If an additional person is needed on the ambulance they can be sent to the hospital with the ambulance crew. The fourth person can return to station with the engine and await the arrival of off duty personnel.*
- *When staffing is at three personnel:*
 - ❖ *Two personnel respond on the ambulance to Alpha and Bravo, or Priority 3 calls. If they require additional assistance, they can request the engine to respond. The remaining is still available for fire duty, or can handle a second ambulance call, once off duty personnel arrive at the station.*

- ❖ *All three personnel respond on the ambulance to Charlie, Delta, and Echo, or Priority 1 and 2 calls. Off duty personnel reporting back for duty would now provide fire response, or response to a second ambulance call.*

- V-6:** *The Barnstable Fire Department should consider a procedure that Alpha level, or Priority 3 EMS calls are responded to without light or sirens. Consideration should also be given to making hospital transport calls that are non-emergent and the patient is stable, without lights and sirens. It is safer for responding personnel, general citizens, and the patient, to reduce the number of times that red lights and sirens are utilized.*
- V-7:** *The Barnstable Fire District and Barnstable Fire Department should actively explore the feasibility of implementing some type of community based mobile integrated health care in an attempt to provide better service to the community, and possibly increase their EMS revenue.*
- V-8:** *The Barnstable Fire Department should strive to have a minimum of 14/15 firefighting personnel on the scene of every single-family residential structure fire within 8 minutes of the time that units are responding. For fires in multi-family residential buildings and commercial occupancies, a minimum of 27/28 personnel should be on scene within 8 minutes of the time that units are responding in order to be able to establish a full effective response force. Even if additional permanent staffing was added the use of automatic aid and mutual aid will need to continue and should be enhanced, based upon the type of occupancy a reported fire is in. This should be the department's highest priority.*
- V-9:** *The Barnstable Fire Department should conduct analysis to determine if there are ways to reduce the number of response times that are greater than 5 minutes from call dispatch to first unit on location, and 6 minutes from call receipt to first unit on location. This should be focused toward opportunities for improvement in call processing time (60 seconds for most calls) and/or personnel turnout times (60 to 80 seconds).*
- V-10:** *The Barnstable Fire Department should continue its policy of filling vacancies on the shifts that are created by scheduled leave with personnel on overtime. Trying to maintain a minimum of four personnel on duty as much of the time as possible should remain a high priority.*
- V-11:** *The Barnstable Fire Department should hire two additional firefighters to enhance daily on duty staffing from 8:00 AM to 6:30 PM which are the busiest hours of the day*

for emergency incidents. The additional personnel should be on duty seven days per week.

- V-12:** *The Barnstable Fire Department should apply for a federal Staffing for Adequate Fire and Emergency Response (SAFER) grant to fund the two positions recommended in V-11, above, citing an increasing call volume, and a desire to improve overall operational effectiveness, efficiency, and safety.*
- V-13:** *The Barnstable Fire Department should maintain a roster of 12-14 paramedics and attempt to have a minimum of two on duty at all times. By increasing the number of paramedics on duty at all times, one could be assigned to the primary ambulance as is done now, while the second one is assigned to the engine and second ambulance, thus providing both of those units with ALS capability resulting in an increased level of service. If additional personnel wanted to maintain their ALS certifications, the department should attempt to accommodate them and encourage them to do so.*
- V-14:** *The Barnstable Fire Department should implement an operational procedure to have an engine respond with the ambulance on every motor vehicle crash to provide a blocking vehicle to protect the ambulance and personnel operating on the incident scene from being struck by an inattentive motorist. The need for the use of blocking vehicles to help keep emergency responders safe during highway and roadway incidents has become a much more important necessary and important part of the emergency response system.*
- V-15:** *The Barnstable Fire Department should work on correcting the deficiencies noted in the most recent ISO inspection to attempt to achieve a higher, and exceptional, Class 2 rating. The department should focus on the training and hydrant inspection, testing, and flow testing areas which are the most achievable.*

CHAPTER VI: RESOURCES AND DEPLOYMENT

- VI-1:** *The Barnstable Fire Department should form a committee to begin the process of conducting a fire station needs analysis. Part of this process should be to utilize GPS to plot data points for a five-year period of all incidents, along with actual and projected response times, on maps to determine whether the current location is where the station should remain, or, if evolving needs indicate a different location may better serve the community. This is service that MRI can provide to the district/department.*
- VI-2:** *The Barnstable Fire Department should strongly consider consolidating the*

replacement of the 1992 Pierce Arrow Ladder 206, which is underway, and the 1996 Pierce Quantum pumper, Engine 205 into the single “quint” that has a 107’ aerial ladder and is configured to also fully function as a fire pumper.

- VI-3:** *The Barnstable Fire Department should continue to maintain two ambulances. The district/department should attempt to get these vehicles on a regular replacement schedule of purchasing one new unit every five to six years. In that way, each unit will be in front line service for five/six years, with an equal amount of time in second line/reserve status.*

CHAPTER VII: FIRE DEPARTMENT FINANCIAL OPERATIONS

- VII-1:** *The Barnstable Fire District should review all fees on an annual basis for possible increases in accordance with state law.*
- VII-2:** *The Barnstable Fire District should explore additional potential ways to generate revenue to offset the fire department’s operating costs. Consideration could be given to billing insurance companies for response to motor vehicle accidents; registration fees for fire alarm systems; the aggressive pursuit of non-residents who have been billed for ambulance transportation; and the implementation of a fee for ambulance responses that do not result in a transport.*
- VII-3:** *The Barnstable Fire Department should identify and prioritize its most critical equipment, training and/or operational needs, and continue to apply annually to the Assistance to Firefighters Grant (AFG) program.*
- VII-4:** *The Barnstable Fire Department should identify and prioritize its fire prevention and public fire education needs and apply annually to the Fire Prevention and Safety Grant (FP&SG) program.*
- VII-5:** *The Barnstable Fire Department and the Barnstable Fire District should actively search for other grant opportunities. Grants for fire protection, fire safety, fire prevention, domestic and emergency preparedness, and homeland security may be available from federal, state, corporate, and foundation sources.*
- VII-6:** *The Barnstable Fire Department and the rescue should actively seek out businesses that may be interested in establishing public/private partnerships that could provide, or assist with, funding for various programs, projects, or initiatives.*

- VII-7: *The Barnstable Fire Department and the Barnstable Fire District should attempt to negotiate for payments in lieu of taxes (PILOT) programs with Barnstable County and other tax- exempt properties for providing emergency services.***
- VII-8: *The Barnstable Fire Department and the Barnstable Fire District should consider negotiating with the developers of major projects or facilities with the district to provide “mitigation” funds to assist the emergency services meet the potential increased requests for service generated by the new development.***

CHAPTER X

PROJECT TEAM

Peter J. Finley, Jr., Senior Consultant and Project Manager, Fire and EMS, most recently served as Chief of the Winslow Township, NJ Fire Department, which protects a large suburban township where he was responsible for the planning, establishment, and initial deployment of the career component of the department as the community transitioned to a combination fire department. He previously served for 4 ½ years as the Chief of Department for the City of Vineland, New Jersey Fire Department, also a combination fire department where he initiated significant changes within the department including updating and modernizing equipment, providing the department's first ever formal officer training, and significantly increasing the capabilities of the regional hazardous materials response team. During his tenure, the department received more than one million dollars in various grants. He formerly commanded the Vineland Rescue Squad gaining significant EMS operations and command experience, as well as completing an overhaul of that organization's operations. Chief Finley serves as program coordinator and professor in the Fire Science Program at Camden County College. Chief Finley received his Associate in Applied Science degree from Atlantic Community College in New Jersey and earned his Bachelor of Science degree in Fire Science/Administration from the University of Maryland. He is a graduate of the National Fire Academy's Executive Fire Officer Program, earning perfect scores on three of his four Applied Research Projects. He was awarded an Outstanding Research Award for his 2002 paper titled, "Residential Fire Alarm Systems: The Verification and Response Dilemma". Chief Finley holds nearly two dozen state and national certifications and is a member of multiple fire service organizations, including achieving the prestigious Chief Fire Officer designation from the Center for Public Safety Excellence. He is a member of multiple fire service organizations and in November 2009 completed a two-year term as President of the New Jersey Career Fire Chiefs Association where he has been involved in the development and administration of fire service promotional examinations. From 2003-2005 he served on the Training and Education Committee of the Governor's Fire Service and Safety Task Force.

Brian P. Duggan, Director, Fire and EMS Group recently retired as the fire chief in Northampton, Massachusetts, where he instituted substantial changes to modernize and restructure the entire department including equipment, facilities, personnel, and training. In conjunction with his staff, Brian has created a regional Advanced Life Support Program that currently serves eighteen communities within the Northampton Area. He formerly commanded the Northborough, Massachusetts, Fire Department, a combination fire department and has significant experience with the Massachusetts Department of Fire Services where he held several key positions. Mr. Duggan developed and directed the Graduate and Undergraduate Fire Science Programs at Anna Maria College in Paxton Massachusetts from 1995 - 2003. Mr.

Duggan has a Business Management/Fire Science degree from Providence College and a Master's Degree of Business Administration (MBA) from Nichols College in Dudley, Massachusetts. He is also a graduate of the National Fire Academy Executive Fire Officer Program and the Senior Executive Program for State and Local Leaders at Harvard University. In December 2012, Mr. Duggan received a second Master's Degree in Homeland Security through the Naval Post Graduate School based in Monterey, California, where his thesis entitled *"Enhancing Decision-making during the First Operational Period of Surge Events"* was selected as an outstanding thesis. He is one of only a few fire service professionals to be designated as a Chief Fire Officer by the Commission on Fire Accreditation International. He leads the Massachusetts fire service through his affiliation as Chairman of the Fire Chief Association of Massachusetts Technology Committee and as a Regional Director on the Massachusetts State Fire Mobilization Committee. Mr. Duggan has authored several publications, inclusive of writing Section 7, Chapter 3, Fire Department Information Systems, in the Nineteenth and Twentieth Editions of the National Fire Protection Association's Fire Protection Handbook. Chief Duggan has served as a subject advisor to MRI since 2002 and will occasionally work on a project team.