CENTER FOR PUBLIC SAFETY MANAGEMENT, LLC

Fire and Emergency Medical Services Analysis

Haverford, PA

Final Report-September 2023

Haverford Township
County of Delaware, PA

CPSM®

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Exclusive Provider of Public Safety Technical Services for
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THE ASSOCIATION & THE COMPANY

The International City/County Management Association is a 109-year old, nonprofit professional association of local government administrators and managers, with approximately 13,000 members located in 32 countries.

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

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

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

The Center for Public Safety Management, LLC, maintains the same team of individuals performing the same level of service as when it was a component of ICMA. CPSM's local government technical assistance experience includes workload and deployment analysis using our unique methodology and subject matter experts to examine department organizational structure and culture, identify workload and staffing needs, and align department operations with industry best practices. We have conducted over 400 such studies in 46 states and provinces in over 300 communities ranging in population from 3,300 (Lewes, DE) to 800,000 (Indianapolis, Ind.).

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SECTION 1. INTRODUCTION

The Center for Public Safety Management (CPSM) was retained by Haverford Township, PA to complete an analysis of the township's fire services and contracted private emergency medical services (EMS). This analysis is designed to provide the township with a thorough and unbiased review of the elements of fire protection and EMS services. This report documents this analysis, and includes our findings and observations, a comprehensive response and workload analysis, and recommendations structured to enhance programs and services, and improve internal and external service deliverables each discipline provides.

During our study, we analyzed operational, administrative, and performance data provided by each of the five fire companies, which includes:

- Bon Air Fire Company
- Brookline Fire Company
- Llanerch Fire Company
- Manoa Fire Company
- Oakmont Fire Company

We also received numerous documents and data from ***Narberth Ambulance***, and the township Director of EMS, which assisted our efforts in analyzing EMS ground transport services in the township.

During our site visit in December 2022, we examined first-hand the fire companies and Narberth Ambulance's operations. CPSM found the fire companies and Narberth Ambulance to be open and transparent about their respective operations, program gaps, and what they do great.

The project team conducted the on-site visit for the purpose of connecting with each fire company, township EMS and Narberth Ambulance to review agency-connected supportive operations; interviewing key fire and EMS staff and members; examining the township's building and other risks; and reviewing Fire and EMS operations. Virtual and phone meetings were held throughout the study with senior EMS staff and the Township Manager and Deputy Director of Code Enforcement, where CPSM project staff could affirm project information and elicit further discussion regarding the Fire and EMS analysis.

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

Overall, CPSM found the Fire and EMS deployment model in Haverford for Fire and EMS to be in-line with other such models in the region, and those that CPSM has analyzed across the country. While the current model works in Haverford, there are areas where improvement can be made as discussed in the report, and which include the following key findings:

- Standardization and compliance with training for entry level and incumbent firefighters and fire officers.
- Standardization of the fire fleet and the creation of a more efficient fleet of heavy fire apparatus.

- Standardization amongst the five fire companies of fire structural firefighting ensemble.
- An emphasis on the health, safety, and wellness of volunteer firefighters.
- An emphasis on improving deficiencies in the fire department section of the current Insurance Services Office-Public Protection Classification report.
- Standardization amongst the five fire companies regarding resource deployment to calls for service.
- Standardization and consistency in operational policies and procedures amongst the five fire companies.
- The establishment of automatic aid agreements with contiguous jurisdictions that have fire stations and deployable assets in proximity to certain areas of Haverford.
- The implementation of a full-time Fire Administrator to ensure consistent administrative and operational functions, practices, and programs amongst the five volunteer fire companies.
- A restructure of the current agreement with Narberth Ambulance to a ***level of performance*** agreement that outlines specific response criteria as opposed to a number of ambulances serving the township.
- A need to enhance dialogue and collaboration between the Haverford Director of EMS and Narberth Ambulance.
- The addition of one ambulance to the current ambulance fleet of 2 ambulances so the Fleet Manager has the ability to extend the life of all ambulances by routinely cycling one ambulance out of the front-line for a given period of time.
- Evaluating further the efficiency CPSM found in deploying the two Narberth Ambulances from a single, central location (Quatrani Building site).
- The potential to reduce township ambulance responses through a Mobile Integrated Healthcare or Community Paramedicine program.

In the conclusion section of this analysis, CPSM expands on areas the CPSM project team has identified that need to be addressed by the township, fire companies, and Narberth EMS, as well as recommendations on programs and operational concepts each should consider addressing. Recommendations are included here that correspond with key findings and improvement areas identified.

Recommendations include:

1. CPSM recommends that each fire company and Bureau of Fire maintain and ensure training compliance whereby each combat firefighter receives initial and continuous training for all types of firefighting, with training specific to interior firefighting. CPSM recommends this training be of high level, documented, and that it complies at minimum with the Commonwealth of Pennsylvania Firefighter 1 curriculum.
    - CPSM further recommends the five fire companies through the Bureau of Fire, jointly establish, and deliver officer training courses and training opportunities for incumbent members who are or aspire to be officers in their respective companies. CPSM recommends this training be of a high level, documented and that it complies at minimum with the Commonwealth of Pennsylvania Officer 1 curriculum.
    - CPSM also recommends that annually, on or about January 15, each Fire Chief provide the Township Manager an updated list of combat personnel (firefighter and officer) who have completed firefighter training that aligns with Commonwealth of Pennsylvania

Firefighter 1 curriculum, and officer level training that aligns with Commonwealth of Pennsylvania Officer 1 curriculum. Each report should also list those who do not have this training and a schedule for completion.

2. Based on CPSM's operational analysis, and considering the risk in the township as outlined previously in this report, and through discussion with the five Fire Chiefs, our conclusion and recommendation is the township should maintain the following heavy fire apparatus:

   - Two ladder trucks (one at Oakmont and one at Brookline). These ladder trucks should be diverse in size and aerial device type.
   - One reserve ladder truck so that two are maintained in service at all times.
   - One heavy rescue apparatus (Manoa).
   - Two squad-engine apparatus (Oakmont and Manoa).
   - One foam engine (Brookline).
   - Three frontline engine apparatus (Bon Air, Brookline, Llanerch). These engines should be diverse in pump and tank capacity and equipment carried, but specific to the fire district they serve.
   - Two reserve engines to be used by any company to maintain a minimum of five engines in service at all times.
   - CPSM further recommends:
     - Manoa maintains the marine rescue capabilities and associated assets as they are a benefit to the town.
     - Oakmont maintains the medium duty rescue vehicle and capabilities.
   - The Town should consider replacement plan for fire apparatus as recommended by CPSM, while considering the NFPA 1901 standard for service life and refurbishment, and not allow any heavy fire apparatus to be utilized in front-line or reserve status once it reaches its 25th year, unless refurbished to NFPA 1912 standards. The recommended fleet replacement plan includes:
     - **2024**: Replace Tower 34 with a straight Ladder-Quint to be placed at Brookline. Brookline Ladder then becomes revere Ladder.
     - **2024/2025**: Purchase 1 new ambulance (use as a reserve)
     - **2024/2025/2026**: Refurbish (if warranted): Bon Air Squad 58 (recommended Engine designation); Brookline Engine 35; Llanerch Engine 34
     - **2027**: Nothing Scheduled
     - **2028:** Replace Brookline Ladder 35 (which is BOF Ladder Reserve). The new Ladder goes to Oakmont. Oakmont Ladder becomes reserve.
     - **2029**: Replace (if warranted) Manoa Heavy Rescue 56
     - **2029-2032**: Refurbish (if warranted) Manoa Engine 56
     - **2030/2031**: 2 new ambulances
     - **2030-2033**: Refurbish (if warranted) Oakmont Engine 38 and Oakmont Ladder 38 (should now be BOF reserve Ladder)

- **2031-2034**: Replace Bon Air Sq. Engine 58 (if not refurbished); Replace Llanerch Engine 34 (should be BOF reserve at this time) if not refurbished
- **2037-2040**: Replace Manoa Engie 56 (should be BOF reserve at this time) if not refurbished.
- **2038-2041**: Replace Oakmont Engine (should be Sq. 38 at this time) and Ladder 38 (should be BOF reserve Ladder at this time) if not refurbished. The new Ladder goes to Brookline, Brookline Ladder becomes reserve.

- CPSM further recommends that when appropriate, and when an apparatus meets the mechanical feasibility and NFPA 1901 and 1912 criterion for refurbishment, the township consider the refurbishment alternative when scheduling replacement.
- CPSM also recommends the township consider standardizing the fleet by manufacturer, motor, drivetrain, fire pump, aerial device, chassis, electrical systems, and other consistencies as recommended by the township Fleet Manager.
- In an effort to reduce down-time and for efficiencies, CPSM also recommends the Fleet Manager or designated fleet mechanic/specialist become certified in fire pump maintenance and testing, as well as aerial device system maintenance and testing.

3. As there is not consistency between the five fire companies regarding the purchase and implementation of structural firefighting ensemble components, CPSM recommends the five volunteer fire companies collectively participate in a testing and selection process for structural firefighting ensemble components and then establish common ensemble components for future purchases. The common testing and selection will offer economy of scale procurement (a single vendor contract) and will also result in a cache of structural firefighting ensemble components that is interchangeable between companies when needed for new and incumbent members.
4. For member health and safety, and to the extent possible of township funding, CPSM recommends the issuance of self-contained breathing apparatus masks to all qualifying combat fire personnel. This recommendation links to the required annual mask fit testing required and recommended.
5. For member health and safety, and to the extent possible of township funding, CPSM recommends annualized medical physicals for all combat personnel and command officers. If implemented, CPSM recommends each volunteer Fire Chief have available a report to share with the Township Manager annually, on or about January 15, that outlines member compliance with this important health and safety component.
6. CPSM recommends the township participate in the next available FEMA Assistance to Firefighters Grant process for the upgrade of self-contained breathing apparatus (SCBA) frame & harness components and cylinders (replacement of those needed to reach the most contemporary model at the time). The purposes of this upgrade/replacement effort are to establish a procurement cycle for all SCBA frame & harness components and cylinders, to establish frame & harness model consistency between all five companies, and to establish economy of scale procurement (a single vendor contract) for these components. The grant should also include upgrade/replacement of SCBA masks as applicable and should ensure there are adequate numbers of each size of mask to issue to all incumbent and new members.

7. CPSM recommends the five fire companies continue to document annual mask fit testing and entry medical physicals of members to ensure 100 percent compliance. CPSM further recommends each volunteer Fire Chief have available a report to share with the Township Manager annually, on or about January 15, that outlines member compliance with these two important health and safety programs.

8. CPSM recommends the five fire companies review and address, to the extent possible, deficiencies in the Fire Department section of the current ISO-PPC report as outlined in this analysis. Special attention should be given to developing methods and opportunities for members to achieve the training as required in the ISO analysis, as it is focused on firefighter safety, improved competencies, and overall improved fireground effectiveness and functionality. This includes, live structural fire facility training, company level training, multi-company drills, and existing driver/operator training. Additionally, and given the identified building risks in the township, ensuring company personnel conduct (and document for future ISO reviews) some level of commercial, industrial, institutional, and other similar type building familiarization and pre-plan information gathering; and developing an officer training program targeted at ensuring officers have opportunities for the various levels of officer certification and that they receive structured annualized officer training.

9. CPSM recommends the five fire companies meet and confer regarding the district response to building structural fires beyond that of a low risk (one, two, or three-family dwellings and scattered small business and industrial occupancies), and consider adding resources on the initial alarm from the other fire companies, regardless of the hour of the day, for medium- and high-risk occupancies (buildings) to ensure adequate resources and staffing are available to fill all the critical tasking necessary to mitigate the incident.

10. CPSM recommends the following baseline performance objectives for the five fire companies:

    - Meet fire company and NFPA 1720 staffing parameters for an on-scene Effective Response Force for structure fires in the urban response areas in 9 minutes, 90 percent of the time.
        - This should be announced by the incident commander over the radio and measured through the computer-aided dispatch (CAD) system after the arrival of the initial arriving members, companies, and response teams.
    - Meet staffing parameters for an on-scene Effective Response Force for technical rescue, hazardous materials, water rescue, rapid intervention team, and/or other specialty response incidents in all response areas in 10 minutes, 90 percent of the time.
    - Meet staffing parameters for an on-scene Effective Response Force for all non-structural fire, fire-related incidents (fire alarms, outside fires, public assist, good intent, hazards, technical rescue) in all response areas in 10 minutes, 80 percent of the time.

11. CPSM recommends the township consider appointing a Fire Services Administrator to oversee administrative and operational functions for volunteer fire companies such as township budget development and implementation; fire company liaison with the Township Manager and Board of Commissioners; ensuring the training and education of all members; monitoring fire company turnout and emergency response force; consistent fire ground response and operations; health and safety of all members; apparatus replacement; understanding the ISO-PPC report and devising a plan to correct deficiencies; personnel guidance to include recruitment and retention of volunteer membership; equipment consistencies, and grant development and implementation if awarded. CPSM further recommends this position report directly to the Township Manager, be an official member of

the Bureau of Fire, and serve as the single leader of fire protection in and for the Township of Haverford. The Fire Services Administrator should not be affiliated with any of the five fire companies to prevent perceived bias.

12. While the township contemplates a Fire Services Administrator, CPSM recommends the Bureau of Fire undertake, develop, and implement consistent operational policies and procedures that are applicable to all fire companies and that cover at a minimum:
    - Common and consistent response matrix for all structure fire and fire-related calls for service.
    - Formal incident command procedures that include:
        - Consistent fireground operations between all companies.
        - Use of a common fireground accountability system that ensures no freelancing of members.
        - Ensuring all teams operating on the fireground have radio communication.
        - Establishing a Rapid Intervention Team.
        - Appropriate risk assessment of the building and/or incident.
    - Critical task development for fire incidents involving: single family dwellings; commercial and strip mall buildings; apartments, townhomes, and condos; multi-use buildings (residential over commercial); multi-story residential buildings; technical rescue; water rescue; motor vehicle accidents with entrapment; and basic single engine fire-related calls for service.
13. As the township is not a regular recipient of automatic aid, and because there are areas of the township that have longer response times than those in and around the core density of the township, and where the Haverford fire stations are generally located, the community may benefit from automatic response from contiguous jurisdictions that have fire stations and deployable assets closer to these areas in Haverford. Therefore, CPSM recommends that Haverford Township engage discussions regarding reciprocal automatic aid with Lower Merion Township, Marple Township, and Upper Darby Township.
14. CPSM recommends the township engage Narberth Ambulance and the Medical Director and develop EMS ***level of performance*** criterion that includes:
    - Turnout/Chute time criterion.
    - Response times to high acuity call criterion.
        - As determined by medical direction.
    - Response times to moderate acuity call criterion.
        - As determined by medical direction.
    - Response times to low acuity call criterion.
        - As determined by medical direction.
    - Clinical performance for Ischemic Stroke, S-T Elevation Myocardial Infarction, and trauma patients.
        - As determined by medical direction.

- CPSM further recommends once these response time levels of performance are implemented, Narberth Ambulance provide monthly reports to the township Director of EMS for review and reporting to the Township Manager.
- The township may consider adjusting the current agreement for EMS service with Narberth Ambulance from a level of effort to a level of performance, which specifies desired clinical, experiential, and response time performance levels, and as well provides for evaluation that offer the township ample notice in the event conditions may cause service delivery challenges.
- Because EMS 911 call-taking and dispatch, which is managed by Delaware County Emergency Communications currently ***does not*** use the Priority Solutions® Medical Priority Dispatch System® (MPDS) for Emergency Medical Dispatch (EMD), CPSM recommends township and Narberth Ambulance lead a discussion with Delaware County Emergency Communication center leadership regarding evidence-based clinical protocols and call taking processes to assign a response determinant to the EMS call for service. These response determinants are alpha-numeric codes that inform the responding units specifically what type of medical call they are responding to, and link back to level of performance criterion.

15. CPSM recommends the township and Narberth Ambulance enhance the current relationship on a solid, explicit framework, while striving for collaboration and partnership in practice. To accomplish this, CPSM recommends the township Director of EMS and Narberth Ambulance administration/leadership meet monthly to discuss specific expectations that are mutually acceptable, to review performance, and to discuss challenges or opportunities. The results of this meeting should be documented and reported to the Township Manager by the township Director of EMS.
16. Because of age and use of the current ambulances, and the current length of production time for ambulance chassis and patient compartments (estimated to be 20-24 months), CPSM recommends the township continue with the FY 23 chassis replacement process of the two current ambulances to coincide with the agreed upon 7-year replacement schedule. CPSM further recommends the town consider in the FY 24-FY 25 period, the township procure a third ambulance so that there will be a township spare ambulance, and so the Fleet Manager has the ability to extend the life of all ambulances by routinely cycling one ambulance out of front-line for a given period of time. CPSM also recommends that after the initial 7-year re-chassis cycle, the ambulance be replaced with a new chassis and patient compartment.
17. Based on our analysis of response travel time coverage from the *Quatrani Building*, and for efficiency/cost reasons, CPSM recommends the township and Narberth Ambulance consider combining both Haverford EMS units out of the Quatrani building location. It is assessed there is no significant risk to EMS response times, shows value in effective critical staffing, and serves as a staff satisfier.
18. CPSM recommends the Township continue to monitor the number of times Haverford Township assigned ambulances are dispatched for calls for service outside of Haverford Township boundaries. CPSM further recommends the Township monitor the number of times an external agency or non-Haverford assigned Narberth ambulance responds into Haverford Township. Responses by Narberth ambulances outside of the Township and responses of any non-Haverford assigned ambulances into the Township should be included in any monthly reporting by Narberth ambulances to include details for said responses.

19. During our review, Narberth Ambulance expressed the desire to initiate and participate in healthcare initiatives such as Mobile Integrated Healthcare (MIH) or Community Paramedicine (CP). Narberth leadership indicated a lack of healthcare partnerships for such initiatives. An MIH or CP program can be a value added service line for patients, the community, and the healthcare system, but should only be utilized if the basic, essential EMS response reliability can be achieved and maintained. Therefore, CPSM recommends the township Director of EMS and Narberth Ambulance should work with their Medical Directors and other community stakeholders to determine the benefits that a Mobile Integrated Health program or Community Paramedicine program would bring to the EMS system in Haverford regarding high utilizers of the system and other community health care challenges.

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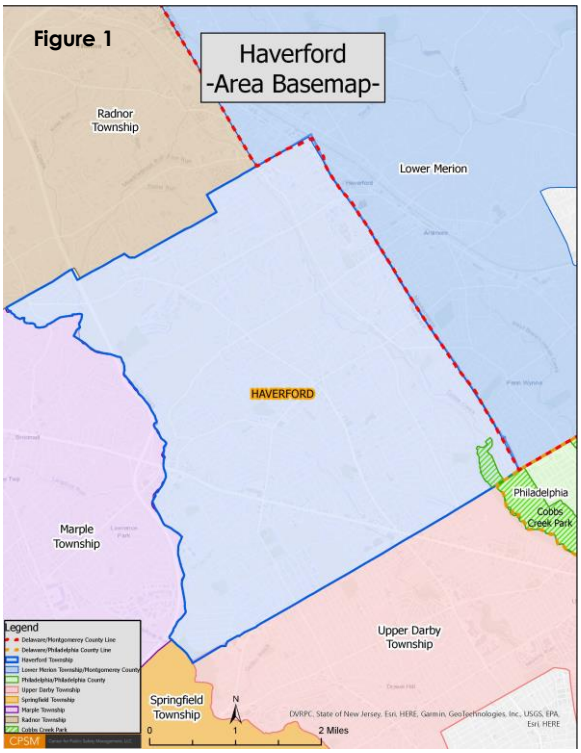
SECTION 2. FIRE AND EMS CHARACTERISTICS

Haverford Township Overview



Haverford Township is located in Delaware County, PA, and is made up of 9.95 square miles of urban/suburban area. According to the U.S. Census Bureau, the 2020 biennial census population of the township is 50,431. The population per square mile is 4,876.

Haverford Township also includes portions of the unincorporated communities of Haverford, Ardmore and Wynnewood, and the entire unincorporated community of Havertown. A portion of Bryn Mawr as well, a census designated place lies in Haverford.

Haverford Township is bordered by Lower Merion Township to the northeast; City of Philadelphia to the east; Upper Darby Township to the south; Springfield Township to the southwest; Marple Township to the west; and Radnor Township to the northwest.

Emergency services in Haverford Township include law enforcement services provided by the Haverford Township Police Department and is led by an appointed Police Chief; fire services provided by five separate, volunteer fire companies each led by an elected Fire Chief; emergency medical services (EMS) provided by Narberth Ambulance Service; fire code enforcement and fire plans review services are provided by the township through the Code Enforcement Department; and 911-dispatch services are provided by the Emergency Services Department of Delaware County.

The purpose of this study is to provide analysis of the five volunteer fire companies and emergency medical services, which are provided by a private service.

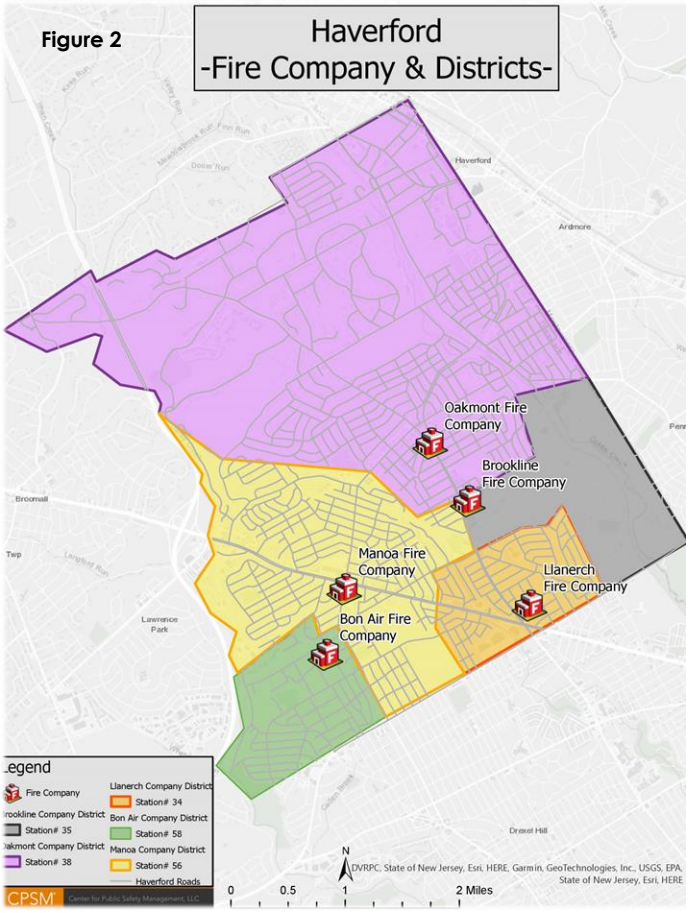
Fire Services Overview

Fire services in the township are provided by: the Bon-Air Fire Company; Brookline Fire Company; Llanerch Fire Company; Manoa Fire Company, and Oakmont Fie Company.

The **Bon Air Fire Company** (BAFC) was established in 1918. The BAFC is 100-percent volunteer, including operational, business members, life members, and Board of Directors. It responds out of one fire station located at 541 Royal Avenue. The BAFC has an established first-due fire management zone (district) which it services with one squad-engine, one engine, one rescue truck, and a command car.

The **Brookline Fire Company** (BFC) was established in 1914. The BFC is 100-percent volunteer, including operational and administrative members and an administrative oversight board. The BFC responds out of one fire station located at 1315 Darby Road. The BFC has an established first-due fire management zone (district) which it services with one engine, one foam engine, one aerial ladder (Quint[1]), one spill unit, one command vehicle.

Figure 2



The **Llanerch Fire Company** (LFC) was established in 1913. The LFC is 100-percent volunteer, including operational, administrative and life members, and a Board of Directors. The LFC also has a fire-police program with two members. The LFC responds out of one fire station located at 107 West Chester Pike. The LFC has an established first-due fire management zone (district) which it services with two engines, one tower ladder, and one mass casualty/rehab unit.

The **Manoa Fire Company** (MFC) was established in 1925. The MFC is 100-percent volunteer, including operational, administrative and life members, and a Board of Directors. The MFC also has an active Ladies Auxiliary. The MFC responds out of one fire station located at 115 South Eagle Road. The MFC has an established first-due fire management zone (district) which it services with one engine, one squad engine, one rescue, one special operations unit, two marine units, a command and utility vehicle.

The **Oakmont Fire Company** (OFC) was established in1912 making the OFC the first organized fire company in Haverford. The OFC is 100-percent volunteer, including operational, administrative and life members, and a Board of Directors. The OFC also has a fire-police program with one member. The OFC responds out of one fire station located at 25 West Benedict Avenue. The OFC has an established first-due fire management zone (district) which it services with one engine, one squad engine, one aerial apparatus (Quint), one light rescue unit, and one command vehicle.

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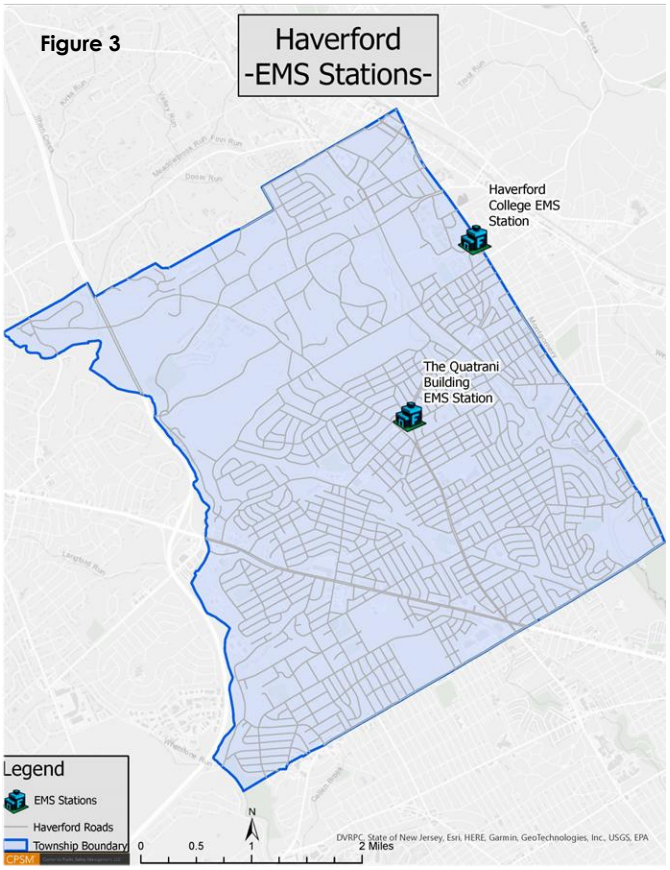
1. A Quint is a fire apparatus that includes an aerial device, fire pump, water tank, fire hose, and engine/ladder equipment and tools.

Emergency Medical Services Overview



Since 2016, Emergency Medical Services (EMS) ground transport in Haverford Township has been provided by Narberth Ambulance. Narberth Ambulance provides advanced life support (ALS) EMS ground transport services to not only Haverford Township, but also Lower Merion Township, Borough of Narberth, Borough of Conshohocken, and the Borough of West Conshohocken.

Narberth Ambulances utilizes full and part time personnel, as well as volunteers to staff their units. In Haverford, the service is provided by 100% career personnel from two stations.

Narberth Ambulance has operational and administrative leadership and command staff, operational medical direction from a primary medical director and two assistant medical directors, as well as a Board of Directors and an Advisory Board.[2]

The township also maintains its own Pennsylvania Department of Health Advanced Life Support License, which allows township staff to respond and provide patient care and EMS incident command as/when needed. Township EMS staff includes an EMS Director and Deputy Director. The Deputy Director, at the time of this report, was assigned to Narberth Ambulance as an ALS provider. Through the township's ALS license, the EMS Director leads a team of tactical paramedics who respond with and integrate into HTPD operations during specific incidents where this asset is needed. Further roles of the EMS Director include liaison with Narberth Ambulance regarding issues, complaints, and other specific EMS operational matters.[3]

911 Services Overview

Fire and EMS 911-dispatch services for Haverford Township are handled through the Delaware County Emergency Services Department 911-Center. Delaware County 911 Center provides Public Safety Answering Point (PSAP) and dispatch services for over forty law enforcement agencies, sixty-five fire departments, and thirty-one Emergency Medical Services agencies. Delaware County Emergency Services provided CPSM with fire and EMS Computer Aided Dispatch (CAD) data to complete the response time and workload analysis for this study.

2. https://www.narberthambulance.org/
3. Haverford Township EMS Provider EMS Providers | The Township of Haverford, PA (haverfordtownship.org)

Fire and EMS Governance Overview

The legislative body for Haverford Township is the Board of Commissioners (Board). *All legislative powers and duties of the township are exclusively vested in and exercised by the Board.*[4] Article III § 4-302 of the Municipal Code of Haverford (Code) establishes the position of the Township Manager. The Township Manager *serves as the chief executive officer and secretary of the township and carries out and executes the policies established by the Board.* The Township Manager is further responsible for *the proper administration of all affairs of the township in his charge.*[5]

Article VIII of the Code establishes a Department of Paramedics and Emergency Medical Services. Pursuant to the Code this *department shall provide advanced and basic life support to sick or injured persons, including transport to a hospital or emergent care facility.* The department director *shall oversee and is responsible for the provision of emergency medical services within Haverford Township and including compliance with the provisions of the commonwealth and collaborative work with other medical resources.* Under the current arrangement for the provision of EMS ground transportation in the township (Narberth Ambulance), a primary duty of the director pursuant to the Code is *Administer service contracts with EMS resources.*[6]

Article XXVI of the Code establishes a Bureau of Fire. Pursuant to the Code, *The Bureau of Fire shall meet each month to discuss the development and implementation of plans, programs, and policies necessary to ensure the adequacy of fire protection in the Township.*

Part D of Article XXVI further stipulates the overall governance of fire protection in the township as *nothing contained herein shall alter the authority of the Board of Commissioners to make regulations within the Township or within such limits as may be deemed proper, relative to the cause and management of fire and the prevention thereof, nor to purchase or contribute to the purchase of fire engines and fire apparatus for the use of the Township and to appropriate money to fire companies for the operation and maintenance thereof and for the construction, repair and maintenance of fire company houses. The Board of Commissioners shall reserve the right to ordain rules and regulations for the government of such fire companies and their officers and to regulate the method to be followed by the extinguishment of fires.*[7]

Membership of the Bureau of Fire includes (Article XXVI § 4-702(B)):

The Chiefs of the Volunteer Fire Companies: Oakmont Fire Company; Llanerch Fire Company; Brookline Fire Company; Manoa Fire Company; Bon Air Fire Company

- The Township Manager or designee
- A member of the Board of Commissioners
- The Chief of Police
- Emergency Management Coordinator
- Director of Paramedics and Emergency Medical Services

4. Article II § C-218, Township of Haverford Charter.
5. Article V, § C-503, Township of Haverford, Charter.
6. Article VIII, § 4-413, 4-414, 4-415, Municipal Code of the Township of Haverford.
7. Article XXVI, § 4-702(A, C, D), Municipal Code of the Township of Haverford.

Fiscal Resources for Fire and Emergency Medical Services

Supporting active and responsive volunteer fire companies is essential in communities that receive the benefit of a professional service without the cost of full-time salaries. A volunteer force not only reduces property loss and saves lives, but it also can save a community a considerable amount of tax dollars. Salaries, benefits, and operational staffing maintenance for the Town would reach several million dollars annually to staff three to five apparatus on a 24/7/365 basis along with support staff to manage the operation and provide ongoing training. Recognizing this, the township provides substantial financial support to the five volunteer fire companies. This includes:

Subsidies to each volunteer fire company.

Procurement of heavy fire and rescue apparatus.

Fuel, maintenance, insurance of heavy fire and rescue apparatus.

Small equipment and radio maintenance

Recruitment and retention of volunteer members.

Medical Physicals for entry level volunteer members.

The next table provides a historical perspective of the financial support (operating funds) the township provides and has provided to the volunteer fire companies.

Table 1: Haverford Township General Fund Expenditures: Fire Protection

Fiscal Year	Adopted Budget
FY 2019	$990,450
FY 2020	$952,310
FY 2021	$960,137
FY 2022	$967,743
FY 2023	$1,044,280

The Volunteer Fire Companies also conduct fund drives and fund raising events to assist with operating expenses.

The next table outlines a historical perspective of the subsidies the township has provided to the fire companies to be utilized for fire company general expenses.

Table 2: Haverford Township General Fund Expenditures: Fire Company Subsidies

Fire Company	FY 2019	FY2020	FY2021	FY 2022	FY 2023
Oakmont FC	$63,000	$63,000	$68,000	$65,000	$66,950
Manoa FC	$63,000	$63,000	$63,000	$70,000	$66,950
Llanerch FC	$68,000	$63,000	$63,000	$65,000	$71,950
Bon Air FC	$63,000	$68,000	$63,000	$65,000	$66,950
Brookline FC	$63,000	$63,000	$63,000	$65,000	$66,950

Each year one fire company gets an additional supplement to their subsidy. This additional supplement is rotated from year to year.

As noted above, the township also procures heavy fire apparatus for the volunteer fire companies. Historically this has included:

Table 3: Haverford Township Capital Fund Budget: Fire

Fiscal Year	Adopted Budget
FY 2019	$0.00
FY 2020	Repairs: Fire Training Center $65,000 Foam Engine: Brookline $200,000
FY 2021	$0.00
FY 2022	Engine: Bon Air $500,000 Tower Ladder: Llanerch $1,800,000 Rescue Engine: Manoa $680,000 Bon Air: Air System Upgrade Sq. 58 $10,000 Bon Air: Replace Light Tower on township vehicle $10,000
FY 2023	2 Ambulance Chassis replacement/Patient Care Box Remount.

It is not atypical for communities who contract with private ambulance service providers to supplement the service either indirectly through an annual subsidy, or directly through the procurement and ownership of the fleet and associated equipment, and the facilities from which the EMS units are deployed. Haverford Township utilizes the latter model and budgets for:

Ambulance fleet

Ambulance equipment

Ambulance fuel, maintenance, insurance

Facility upkeep, furniture, fixtures, and equipment

Narberth Ambulance provides the staffing and all staffing costs.

The next table provides a historical perspective of the financial support (operating funds) the township provides and has provided to supplement EMS ground transport and support the EMS Administration.

Table 4: Haverford Township General Fund Expenditures: EMS

Fiscal Year	Adopted Budget
FY 2019	$440,880
FY 2020	$521,339
FY 2021	$571,382
FY 2022	$574,077
FY 2023	$561,457

Capital Budgets: EMS

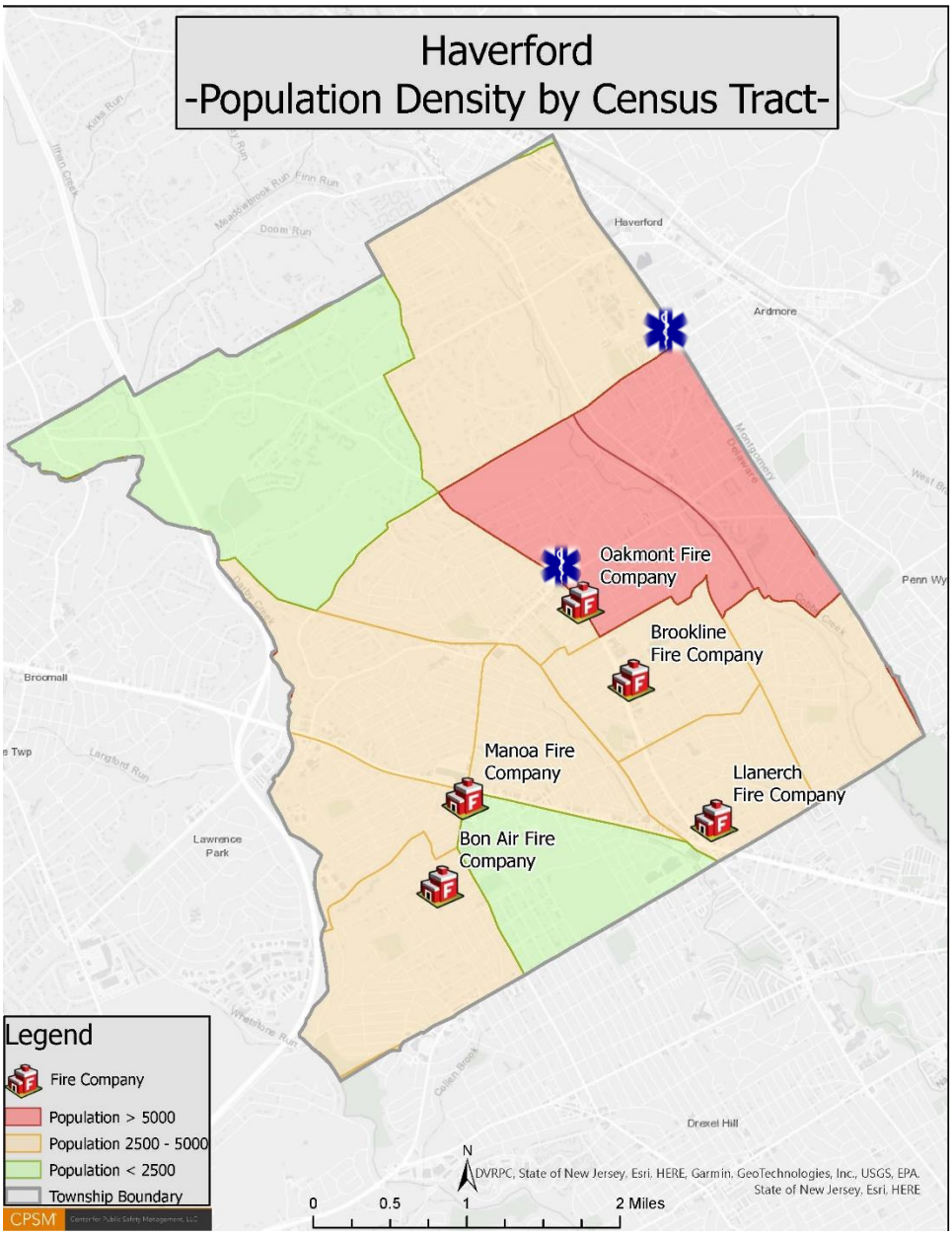
FY 2020: Replace EMS Chief Vehicle: $50,000

SECTION 3. COMMUNITY RISK PROFILE

Population and Demographics

The U.S. Census Bureau indicates the decennial population of Haverford in 2020 was 50,431. This is just under a 4.25 percent increase in population since the 2010 Census population of 48,491. The Town is just under ten square miles (9.95) square miles in area and has a population density of 4,876 people per square mile. This is a slight increase in people per square mile over the 2010 Census numbers.

Figure 4: Population Density: Haverford Township



In terms of fire and EMS risk, the age and socio-economic profiles of a population can have an impact on the number of requests for fire and EMS services. Evaluation of the number of seniors and children by fire management zones can provide insight into trends in service delivery and quantitate the probability of future service requests. In a 2021 National Fire Protection Association (NFPA) report on residential fires, the following key findings were identified for the period 2015–2019:[8]

- Males were more likely to be killed or injured in home fires than females and accounted for larger percentages of victims (57 percent of the deaths and 55 percent of the injuries).
- The largest number of deaths (19 percent) in a single age group was among people ages 55 to 65.
- 59 percent of the victims of fatal home fires were between the ages of 39 and 74, and three of every five (62 percent) of the non-fatally injured were between the ages of 25 and 64.
- Slightly over one-third (36 percent) of the fatalities were aged 65 or older; only 17 percent of the non-fatally injured were in that age group.
- Children under the age of 15 accounted for 11 percent of the home fire fatalities and 10 percent of the injuries. Children under the age of 5 accounted for 5 percent of the deaths and 4 percent of the injuries.
- Adults of all ages had higher rates of non-fatal fire injuries than children.
- Smoking materials were the leading cause of home fire deaths overall (23 percent) with cooking ranking a close second (20 percent).
- The highest percentage of fire fatalities occurred while the person was asleep or physically disabled and not in the area of fire origin, key factors to vulnerable populations.

In Haverford, the following age and socioeconomic factors are considered herein when assessing and determining risk for fire and EMS preparedness and response:[9]

- Children under the age of five represent 6.6 percent of the population.
- Persons under the age of 18 represent 23.3 percent of the population.
- Persons over the age of 65 represent 18.7 percent of the population.
- Male persons represent 49.3 percent of the population.
- There are 2.67 persons per household in Haverford.
- The median household income in 2020 dollars was $114,554.
- Persons living in poverty make up 3.3 percent of the population.

Black or African American alone represents 2.9 percent of the population. The remaining percentage of population by race includes White alone at 88.3 percent, American Indian or Alaska Native alone at 0.0 percent, Asian alone at 4.2 percent, two or more races at 4.2 percent, and Hispanic or Latino at 2.7 percent.

8. M. Ahrens, R. Maheshwari "Home Fire Victims by Age and Gender," Quincy, MA: NFPA, 2021.
9. U.S. Census Bureau QuickFacts: Haverford Township, PA

The demographics in Haverford overall do not pose a high risk in totality; however, a single call involving vulnerable population (fire or EMS) will pose a higher risk on that particular response. Through pre-fire planning and response district knowledge of residential and other structures housing vulnerable population as identified above, the Haverford emergency services departments will have the necessary situational awareness and will be better prepared on arrival at the incident.

Environmental Factors

Haverford Township is prone to and will continue to be exposed to certain environmental hazards that will have an impact on the community. The most common natural hazards prevalent to the region, and specific to Haverford according to the Delaware County Hazard Mitigation Plan 2022 are outlined in the next table.

Table 5: Environmental Hazard Assessment: Haverford Township

Hazard	Risk Factor
Flooding	High
Winter Storm	High
Drought	High
Hail	High
Extreme Temperatures	Moderate
Lightening	Moderate
Tornado	Moderate
Wildfires	Moderate
Radon	Moderate
Dam Failure	Low
Levee Failure	Low
Subsidence/Sink Holes	Low

Municipality	Civil Disturbance	Dam Failure	Drought	Earthquake	Env Haz - HAZMAT	Env Haz - Pipeline	Extreme Temp	Flood	Hail	Hurricane/Tropical Storm	Landslide	Levee	Lightning	Pandemic	Radon	Subsidence	Terrorism	Tornado	Transportation	Urban Fire	Utility	Wildfires	Winter Storm
	1.4	1.7	2.9	1.3	2.8	2.2	2.4	3.5	2.5	2	1.4	1.2	2.2	2.3	2.4	1.6	1.5	2.4	2.2	1.9	2.8	2.1	3
Haverford (Twp)	=	<	=	=	=	=	=	=	=	=	=	<	=	=	>	=	<	<	=	=	=	>	=

Notes: < Indicates the risk is lower than the risks factor assigned to the county.
> Indicates the risk is greater than the risk factor assigned to the county.
= Indicates the risk is equal to the risk assigned to the county.

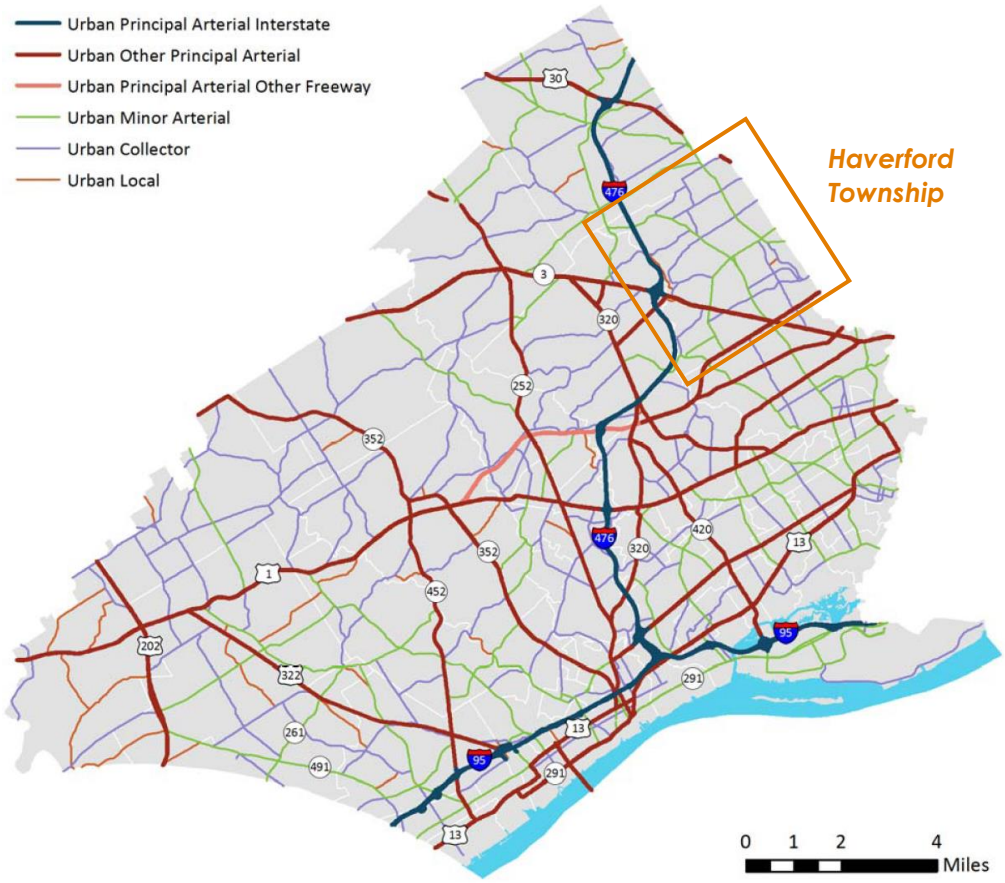
For Haverford, environmental risks identified in Table 5 above are predominantly equal to the risk assigned to the county. Dam and levee failure risks are lower than the risks factor assigned to the county. Radon and Wildfires are greater than the risk factor assigned to the county.

Transportation Factors

Haverford has several transportation risks that include the township's current local road network, a major U.S. road, public bus transporttion, and commuter rail with several stops in the township.

The current road network in Haverford includes arterial roads, which carry high volumes of traffic with synchronized signals (U.S. Route 1 and PA Route 3); collector streets, which provide connection to arterial roads and public local street networks as well as residential and commercial land uses; and public and private local streets, which provide a direct road network to property and move traffic through neighborhoods. Interstate 476 runs north-south through a small area of the northwest part of the township but there are no on-off ramp interchanges in the township.

Figure 5: Haverford Principal Road Network

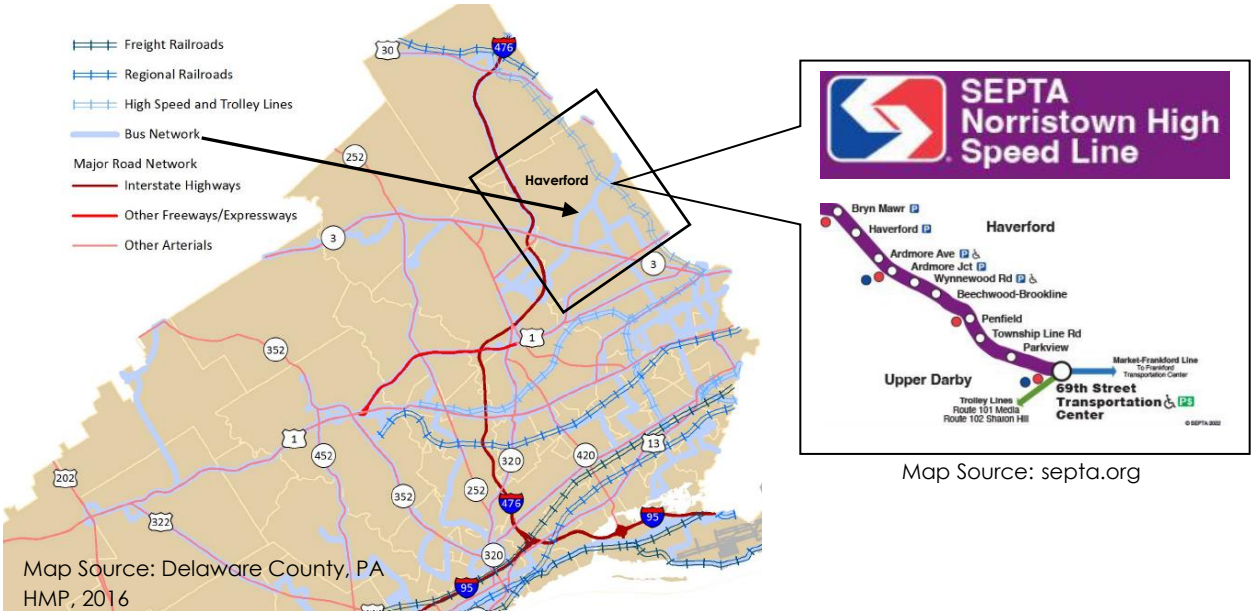


Map Source: Delaware County, PA 2025-Transportation Plan

Southeastern Pennsylvania Transportation Authority (SEPTA) provides commuter rail mass transportation to and through Haverford Township. The SEPTA Norristown High Speed Line rail runs north-south on the eastern side of the township and includes several commuter stations in or near the township. SEPTA also services the township with fixed route public bus transportation that includes several routes and stops.

The next figure illustrates the major transportation components in Haverford Township.

Figure 6: Major Transportation Components



Map Source: Delaware County, PA HMP, 2016

Map Source: septa.org

The road and transportation network described herein poses risks for a vehicular accident, some at medium to high/very high speeds, as well as vehicular-versus-pedestrian-bicycle risks. There are additional transportation risks since tractor-trailer and other commercial vehicles navigate the roadways of Haverford to deliver mixed commodities to business locations either in the township or passing through to other locations. Fires or releases of product involving these products can produce vapors, smoke, and other products of combustion that may be hazardous to health. Additionally, there is risk for a mass casualty incident involving mass-transit passenger rail and buses either on specific bus routes/roads in the town or utilizing the road and rail network in the town for stops outside of Haverford.

Building and Target Hazard Risks

A community risk profile evaluates the community, and regarding buildings, it will review all buildings and the risks associated with each property and then classify the property as either a high, medium, or low hazard depending on factors such as the life and building content hazard, and the potential fire flow and staffing required to mitigate an emergency in the specific property. According to the NFPA *Fire Protection Handbook*, these hazards are defined as:

High-hazard occupancies: Schools, hospitals, nursing homes, explosives plants, refineries, certain storage buildings, high-rise buildings (with higher hazard when occupied or used as residential), and other high life-hazard (vulnerable population) or large fire-potential occupancies.

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

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

Haverford has the following building types:

- Single-family housing units

  16,762 single-family dwellings (Type V construction)

- Multufamily/Townhomes

  198 units (Type III-B construction)

  50 Duplexes (Type III-B and Type V construction)

  20 Tri-Plexes (Type III-B and Type V construction)

  16 Quad Plexes (Type III-B construction)

- Apartment/Condo

  8- single building: 300 units (Type II-B and Type III-B construction)

  3- four building complex: 202 units (Type II-B and Type III-B construction)

  1-six building complex: 67 units (Type II-B construction)

  1-nine building complex: 108 units (Type II-B construction)

  1-six building complex: 180 units Type I-B construction)

  1-eleven building complex: 277 units (Type II-B construction)

- Hospital/Assisted Living/Nursing Homes

  1-Hospital

  3-nursing/rehab centers

  1-assisted living

  1-assisted living complex: 7 independent living buildings

  1-assisted living with skilled nursing building and 1-memory care building

- Commercial/industrial structures

  609 total buildings (Type II-B and Type III-B construction)

  2 industrial centers: 32 businesses (Type II-B construction)

  24 office buildings: 172 suites (Types I-B, II-A, II-B construction)

- Strip malls/shopping centers

  58 storefronts (Type II-B construction)

- High-Rise: *there are no current high-rise structures*

  2-five story apartment buildings (Type II-B and Type III-B construction)

  6-five story apartment buildings (Type II-B construction)

Educational Buildings

  1-High School

  1-Middle School

Building Construction Types

Type I: Fire Resistive
All the materials used in construction must be noncombustible (such as concrete or steel) and meet the very highest fire-resistance standards.

Type II: Non-Combustible
All the structural elements in Type II buildings must be made of non-combustible materials however it is not necessary to treat them with fire-resistive coatings or otherwise protect them.

Type III: Ordinary Construction
Type III-A buildings are also called "protected combustible" structures. Their exterior walls are of noncombustible materials, often brick, while internal floors and roofs may be of combustible materials (like wood) that have been rated as fire resistant for up to one hour.

Type III-B buildings, or "unprotected combustible" buildings have noncombustible exterior walls, while the floors and roofs may be of wood that has not been rated as fire resistant. This type of construction is found in many older warehouses.

Type V: Wood Frame Construction

Type VA buildings are known as "protected frame" constructions and include many newer, small apartment buildings. With these the exterior walls, structural frame, and floors, ceilings, and roofs must be fire-rated for up to one hour.

Type VB covers most single-family homes and garages and is known as "unprotected frame." With these structures both the exterior walls and the supports can be made of any materials, including combustible ones, permitted by the IBC.

9-Elementarty Schools

1-University with dorms (Haverford College)

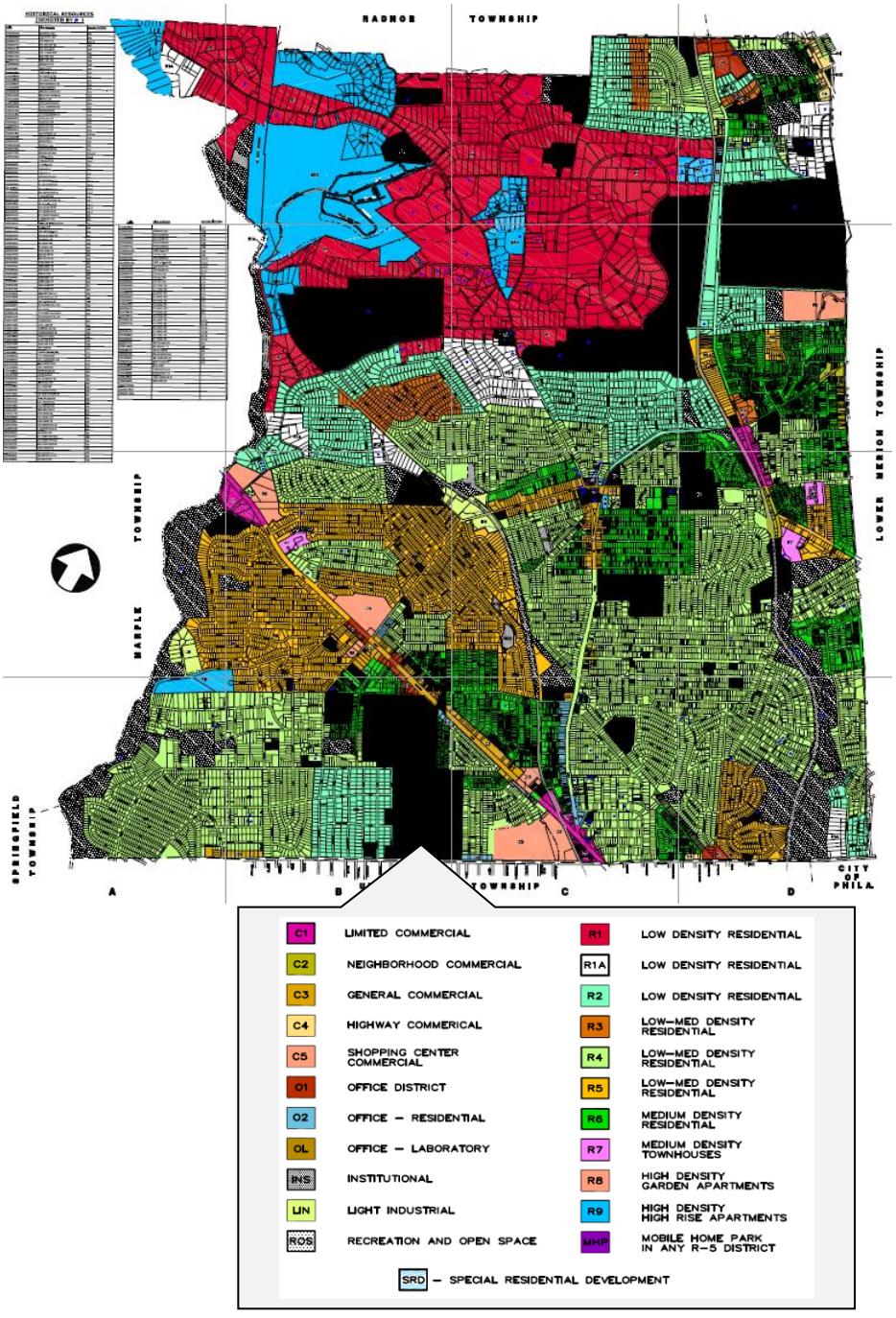
18-pre-schools/daycare centers (Institutional Occupancy Classification)

Places of Worship (Public Assembly Occupancy Classification)

25-places of worship

The following figure illustates the general location these buildings.

Figure 7: Haverford Township Zoning Map



In terms of identifying target hazards, consideration must be given to the activities that take place (public assembly, life-safety vulnerability, manufacturing, processing, etc.), the number and types of occupants (elderly, youth, handicapped etc.), and other specific aspects related to the construction of the structure.

Haverford has a variety of target hazards that include:

High Hazard

- Hospital
- Assisted living/nursing facilities
- Educational facilities
- Residential buildings with vulnerable population
- Public assembly buildings when occupied
- Mutistory residential buildings

Medium Hazard

- Multifamily dwelling buildings (multistory townhomes, condos, and apartment buildings)
- Multiunit dormitory buildings
- Residential over commercial buildings of multistory
- Commercial and industrial facilities and sites
- Large square footage single-family homes
- Critical infrastructure due to type and storage/use of hazardous materials

The greatest building risk by number of buildings in Haverford is of a low to moderate hazard. Single-family dwellings of predominately wood frame construction are low hazard; those single-family dwellings in excess of 2,000 square feet with or without a basement and of lightweight wood construction should be considered moderate hazards. Haverford does have high-risk/vulnerable population risks (nursing/assisted living facilities), schools, and multifamily, multistory residential structures (apartments/condos). All of these building risks present the five fire companies with life-safety concerns and challenges of direct access. The industrial and mercantile building risk, while a lower life safety risk, is generally a moderate- to higher-hazard risk based on processes, storage, and overall occupancy type.

Fire and Fire Related Risk

An indication of the community's fire risk is the type and number of fire-related incidents the fire companies respond to. CPSM conducted a data analysis for this project that analyzed the incident responses and workload of the five fire companies.

The following table details the call types and call type totals for these types of fire-related risks between July 1, 2021, and June 30, 2022.

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Table 6: Fire Related Calls

Call Type	Total Calls	Calls per Day
False alarm	287	0.8
Good intent	45	0.1
Hazard	116	0.3
Outside fire	34	0.1
Public service	11	0.0
Structure fire	64	0.2
Technical rescue	13	0.0
Fire Subtotal	**570**	**1.6**
Aid given*	150	0.4
Canceled	38	0.1
Total	**758**	**2.1**

Structure Fire Breakdown

Building Fire: 11

Cooking Fire, Confined to Container: 42

Chimney or Flue Fire: 3

Fuel Burner/boiler malfunction: 4

Trash or Rubbish Fire Contained: 3

Fire-other: 1

This table tells us that:

- The township had a low building fire total for the study period (11).
- False alarms (typically automatic fire alarms) represent the highest call response (38 percent of all fire and fire-related calls).
- Aggregately the next highest number of calls are good intent and hazard calls (21 percent of all fire and fire-related calls). These call types typically represent low acuity responses such as lockouts, steam mistaken for smoke, smoke scare or odor of smoke, gas leaks, odor of gas, caron monoxide incidents, electrical wiring problems, and fuel/hazard spills.

Fire loss is an estimation of the total loss from a fire to the structure and contents in terms of replacement cost. Fire loss includes contents damaged by fire, smoke, water, and overhaul. Fire loss does not include indirect loss, such as business interruption.

In a 2021 report published by the National Fire Protection Association on trends and patterns of U.S. fire losses, it was determined that home fires still cause the majority of all civilian fire deaths, civilian injuries, and property loss due to fire. Key findings from this report include:[10]

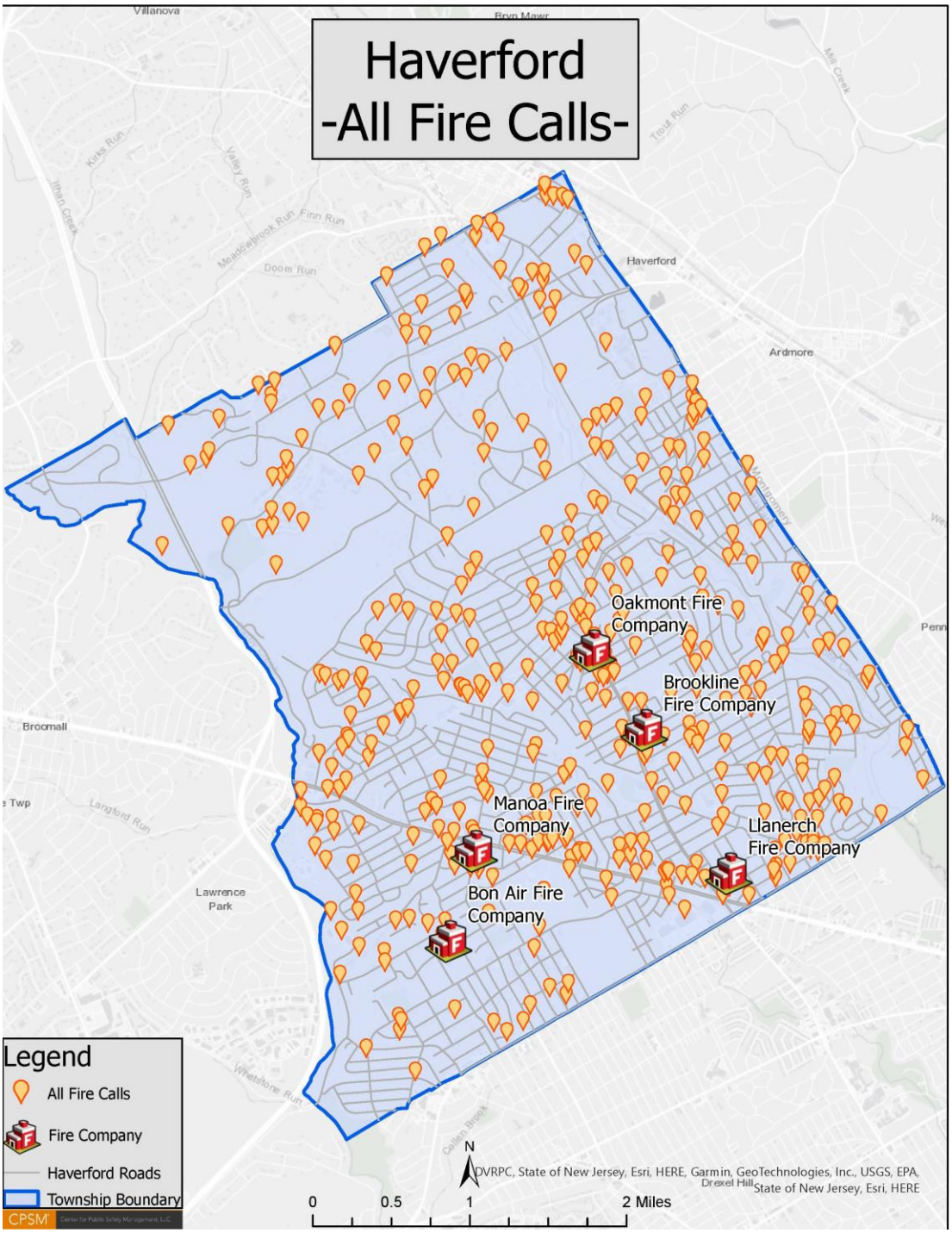
- Public fire departments responded to 1,338,500 fires in 2020, a 7.5 percent increase from the previous year.
- 490,500 fires occurred in structures (37 percent). Of these fires, 379,500 occurred in residential structures and 86,000 occurred in apartments or multifamily structures.
- 2,230 civilian fire deaths occurred in residential fires, and 350 deaths occurred in apartments or multifamily structures.
- Home fires were responsible for 11,500 civilian injuries.

For the data analysis study period, $70,000 was reported as property and content loss in Haverford from structure and outside fires.

10. *Fire Loss in the United States During 2020*, National Fire Protection Association.

Analyzing where the fire incidents occur, and the demand density of these incidents, helps to determine adequate fire management zone resource assignment and deployment. The next figure illustrates where fire related calls for service occurred in Haverford.

Figure 8: Fire Related Call Demand



EMS Risk

As with fire related calls for service, an indication of the community's EMS risk is the type and number of EMS-related incidents the EMS ground transport agency responds to. As we did for fire responses, CPSM conducted a data analysis that analyzed the incident responses and workload of the Narberth Ambulance service in Haverford.

The following table details the call types and call type totals for these types of fire-related risks between July 1, 2021, and June 30, 2022.

Table 7: EMS Calls: Narberth Ambulance

Call Type	Total Calls	Calls per Day	Call Percentage
Breathing difficulty	405	1.1	11.8
Cardiac and stroke	404	1.1	11.8
Fall and injury	831	2.3	24.2
Illness and other	826	2.3	24.1
MVA	155	0.4	4.5
Overdose and psychiatric	302	0.8	8.8
Seizure and unconsciousness	405	1.1	11.8
EMS Subtotal	**3,328**	**9.1**	**97.1**
Non-EMS Subtotal	**101**	**0.3**	**2.9**
Total	**3,429**	**9.4**	**100.0**

This table tells us:

- Lower acuity calls (by call determinant) such as fall and injury, and illness and other made up the highest call count 1,657 (48 percent).
- Higher acuity calls (by call determinant) such as breathing difficulty, cardiac and stroke, and seizure and unconscious made up the next highest call count 1,212 (35 percent).
- Motor vehicle accidents (MVA) made up 4.5 percent (155 total count) of all EMS calls.

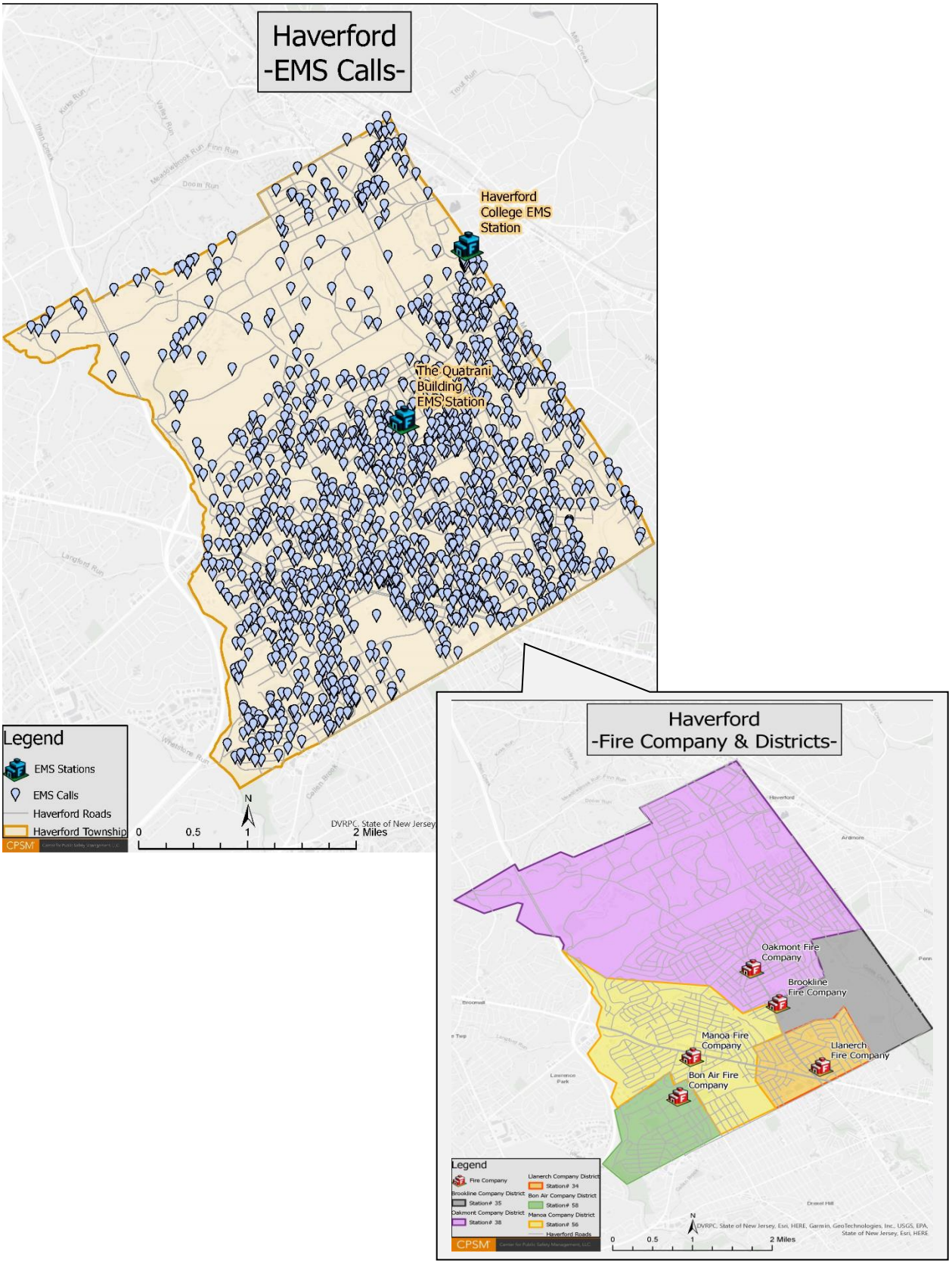
The next table depicts where the EMS demand occurs by fire company district.

TABLE 8: EMS Workload by Fire District

Fire District	Calls	Pct. Calls
Llanerch	323	9.4
Brookline	386	11.3
Oakmont	1,638	47.8
Manoa	835	24.4
Bon Air	247	7.2
Total	**3,429**	**100.0**

As with fire related calls, analyzing where EMS incidents occur, and the demand density of these incidents, helps to determine adequate EMS resource assignment and deployment. The next figure illustrates where EMS related calls for service occurred in Haverford.

Figure 9: Fire Related Call Demand



Resiliency

Resiliency is an organization's ability to quickly recover from an incident or event, or to adjust easily to changing needs or requirements. Greater resiliency can be achieved by constant review and analysis of the response system and focuses on three key components:

- Resistance: The ability to deploy only resources necessary to control an incident and bring it to termination safely and effectively.
- Absorption: The ability of the agency (in this case a single fire company or the five township fire companies together) to quickly add or duplicate resources necessary to maintain service levels during heavy call volume or incidents of high resource demand.
- Restoration: The agency's ability to quickly return to a state of normalcy.

Resistance is controlled by the fire or EMS company through available staffing and response protocol, and with each fire or EMS company's resources (independently and aggregately) dependent on the level of staffing and units available at the time of the alarm.

Absorption is accomplished through availability to respond by the five fire companies' units and through regional mutual aid resources. For Narberth this is the availability of units within their system, or whom they may seek mutual aid during busy times.

Restoration is managed by fire or EMS company unit availability as simultaneous calls occur, the availability of regional mutual aid resources, response of firefighters to fire related incidents during campaign events, and backfilling stations when needed through mutual aid.

The following tables analyze fire company and EMS service resiliency. In this analysis, CPSM included all calls that occurred inside the Town as recorded during the study period. Calls are individual incident dispatches. Runs are responses to individual incidents with all units counted.

Table 9: Frequency of Overlapping Calls by Fire District

District	Scenario	Number of Calls	Percent of All Calls
Llanerch	No overlapped call	86	98.9
	Overlapped with one call	1	1.1
Brookline	No overlapped call	88	100.0
Oakmont	No overlapped call	258	99.2
	Overlapped with one call	2	0.8
Manoa	No overlapped call	159	98.1
	Overlapped with one call	3	1.9
Bon Air	No overlapped call	28	100.0
Out of Town on Calls	No overlapped call	130	86.7
	Overlapped with one call	19	12.7
	Overlapped with two calls	1	0.7

Aggregately, only 3.8% of the time did a Fire Company experience an overlapping call while all units were in the station.

While on a call out of town, 13.4% of the time a Fire Company experienced an overlapping call

Calls in an Hour	Frequency	Percentage
0	8,060	92.0
1	633	7.2
2+	67	0.8

Table 10: Frequency of Overlapping Narberth Calls

Scenario	Number of Calls	Percent of All Calls
No overlapped call	2,523	73.6
Overlapped with one call	890	26.0
Overlapped with two calls	16	0.5

Narberth Positions 2-Units in Haverford 24/7.

Only .5% of the time a call was overlapped with two calls.

Table 11: Fire Company Availability to Respond to Calls

Fire District	Calls in Area	Company Responded	Percent Responded	Company Arrived	Percent Arrived	Company First	Percent First
Llanerch	80	80	100.0	76	95.0	67	83.8
Brookline	79	79	100.0	78	98.7	75	94.9
Oakmont	219	218	99.5	218	99.5	216	98.6
Manoa	149	148	99.3	147	98.7	139	93.3
Bon Air	26	26	100.0	26	100.0	25	96.2
Total	**553**	**551**	**99.6**	**545**	**98.6**	**522**	**94.4**

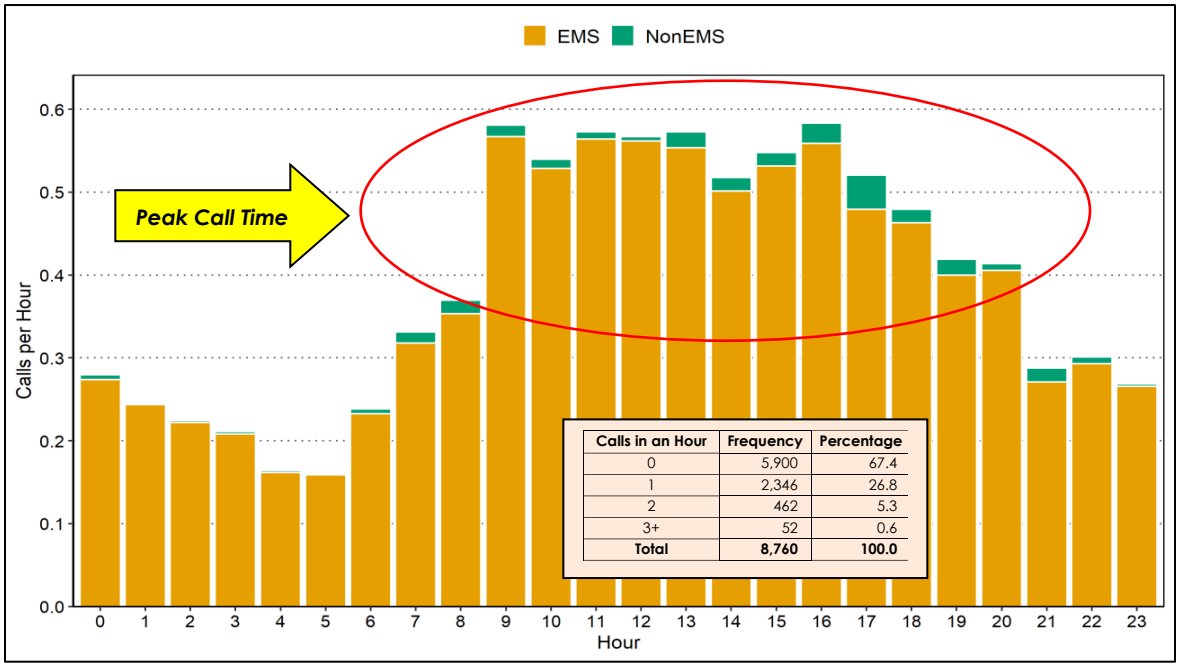
Aggregately by company-companies respond to calls when dispatched (99.6 % of time); companies arrive (98.6% of the time); and companies arrive in their districts (94.4% of the time. This data tells us there are no response issues with the five fire companies.

Table 12: Time Component Analysis for Ambulance Transport (Minutes)

Call Type	Average Time Spent per Run			
	On Scene	Traveling to Hospital	At Hospital	Deployed
Breathing difficulty	18.3	8.1	28.1	61.0
Cardiac and stroke	18.2	8.0	27.4	59.7
Fall and injury	16.7	9.0	24.9	56.8
Illness and other	16.1	8.0	23.6	53.7
MVA	13.1	8.9	20.6	47.2
Overdose and psychiatric	17.7	7.9	23.8	55.6
Seizure and unconsciousness	17.8	8.7	29.0	61.7
EMS Subtotal	**17.1**	**8.3**	**25.6**	**57.2**
Non-EMS Subtotal	**27.1**	**7.9**	**30.2**	**72.7**
Total	**17.2**	**8.3**	**25.7**	**57.3**

For EMS calls, Narberth averages less than 60 minutes once on scene, which is efficient and build resiliency. Non-EMS calls include fire related responses where EMS units stand-by. This included 13 responses during the CPSM study period. This practice should be monitored during busy EMS periods so that resiliency is not impacted.

Figure 10: Peak Time Workload: Narberth Ambulance



Calls in an Hour	Frequency	Percentage
0	5,900	67.4
1	2,346	26.8
2	462	5.3
3+	52	0.6
Total	**8,760**	**100.0**

As illustrated above, the peak call time for Narberth Ambulance is between 9:00 am and 8:00 pm. This is when Narberth is the most vulnerable to overlapping calls.

Aggregately, the five fire companies do not have a resiliency issue. This is due to the robust and dedicated membership each fire company has, multiple and diverse units in each station, and the ability to assemble members for one or multiple calls for service at all times of the day.

The five fire companies' ability to absorb multiple calls and restore response capabilities to a state of normal can be challenging at certain times and during certain environmental conditions; however, the data does not demonstrate that this impacts each company's response capabilities.

Narberth Ambulance does not have a resiliency issue either, although Narberth does have a higher possibility of resiliency challenges as EMS has a higher workload than the fire companies and wait times at the hospital may also increase how long an ambulance is dedicated to a call. Narberth does have the ability to move their units around (absorption), and may do this during high peak call times, and when experiencing long wait times at the hospital.

Risk Categorization

A comprehensive risk assessment is a critical aspect of creating standards of cover and can assist the five fire companies in quantifying the risks that they potentially may face. Once these risks are known, the companies are better equipped to determine if the current response resources are sufficiently staffed, equipped, trained, and positioned.

In this component, the factors that drive the service needs are examined and then link directly to discussions regarding the assembling of an *Effective Response Force* (ERF) and when contemplating the response capabilities needed to adequately address the existing risks, which encompasses the component of critical tasking.

The risks that the emergency services agencies face can be natural or manufactured and may be affected by the changing demographics of the community served. With the information available from the CPSM data and operational analysis, the fire companies, the township, and public research, the fire companies can begin an analysis of the township risks and can begin working towards recommendations and strategies to mitigate and minimize their effects. This section contains an analysis of the various risks considered within the five fire company service areas.

Risk is often categorized in three ways: the probability the event will occur in the community, consequence of the event on the community, and the impact on the fire companies. The following three tables look at the probability of the event occurring, which ranges from unlikely to frequent; the impact to the organizations, which ranges from insignificant to catastrophic; and consequence to the community, which is categorized as ranging from insignificant to catastrophic.

TABLE 13: Event Probability Matrix

Probability	Chance of Occurrence	Description	Risk Score
Unlikely	2%-25%	Event may occur only in exceptional circumstances.	**2**
Possible	26%-50%	Event could occur at some time and/or no recorded incidents. Little opportunity, reason, or means to occur.	**4**
Probable	51%-75%	Event should occur at some time and/or few, infrequent, random recorded incidents, or little anecdotal evidence. Some opportunity, reason, or means to occur; may occur.	**6**
Highly Probable	76%-90%	Event will probably occur and/or regular recorded incidents and strong anecdotal evidence. Considerable opportunity, means, reason to occur.	**8**
Frequent	90%-100%	Event is expected to occur. High level of recorded incidents and/or very strong anecdotal evidence.	**10**

TABLE 14: Impact on Fire and EMS Matrix

Impact	Impact Categories	Description	Risk Score
Insignificant	Personnel and Resources	One apparatus out of service for period not to exceed one hour.	**2**
Minor	Personnel and Resources	More than one but not more than two apparatus out of service for a period not to exceed one hour.	**4**
Moderate	Personnel and Resources	More than 50 percent of available resources committed to incident for over 30 minutes.	**6**
Significant	Personnel and Resources	More than 75 percent of available resources committed to an incident for over 30 minutes.	**8**
Catastrophic	Personnel, Resources, and Facilities	More than 90 percent of available resources committed to an incident for more than two hours or event which limits the ability of resources to respond.	**10**

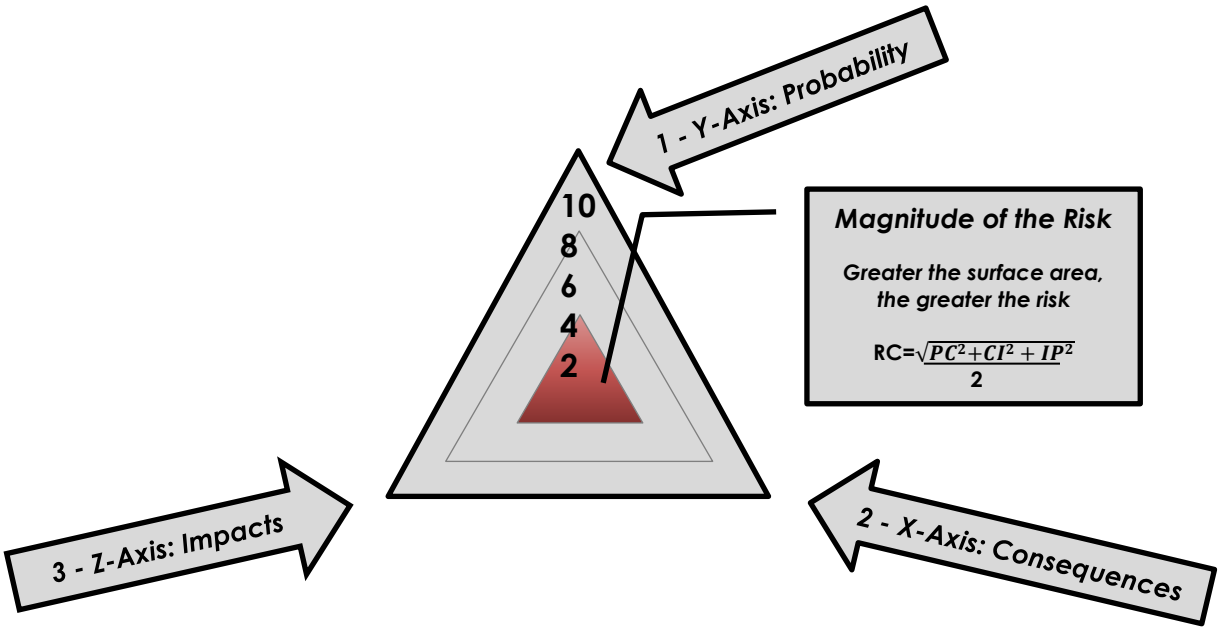
TABLE 15: Consequence to Community Matrix

Impact	Consequence Categories	Description	Risk Score
Insignificant	Life Safety	1 or 2 people affected, minor injuries, minor property damage, and no environmental impact.	**2**
Minor	Life Safety Economic and Infrastructure Environmental	A small number of people affected, no fatalities, and small number of minor injuries with first aid treatment. Minor displacement of people for <6 hours and minor personal support required. Minor localized disruption to community services or infrastructure for <6 hours. Minor impact on environment with no lasting effects.	**4**
Moderate	Life Safety Economic and Infrastructure Environmental	Limited number of people affected (11 to 25), no fatalities, but some hospitalization and medical treatment required. Localized displacement of small number of people for 6 to 24 hours. Personal support satisfied through local arrangements. Localized damage is rectified by routine arrangements. Normal community functioning with some inconvenience. Some impact on environment with short-term effects or small impact on environment with long-term effects.	**6**
Significant	Life Safety Economic and Infrastructure Environmental	Significant number of people (>25) in affected area impacted with multiple fatalities, multiple serious or extensive injuries, and significant hospitalization. A large number of people displaced for 6 to 24 hours or beyond. External resources required for personal support. Significant damage that requires external resources. Community only partially functioning, some services unavailable. Significant impact on environment with medium- to long-term effects.	**8**
Catastrophic	Life Safety Economic and Infrastructure Environmental	A very large number of people in affected area(s) impacted with significant numbers of fatalities, large number of people requiring hospitalization; serious injuries with long-term effects. General and widespread displacement for prolonged duration; extensive personal support required. Extensive damage to properties in affected area requiring major demolition. Serious damage to infrastructure. Significant disruption to, or loss of, key services for a prolonged period. Community unable to function without significant support. Significant long-term impact on environment and/or permanent damage.	**10**

This section also contains an analysis of the various risks considered in the township. In this analysis, information presented and reviewed in this section (Risk Profile) has been considered. Risk is categorized as low, moderate, high, or special.

Prior risk analysis has only attempted to evaluate two factors of risk: probability and consequence. Contemporary risk analysis considers the impact of each risk to the organization, thus creating a three-axis approach to evaluating risk as depicted in the following figure. A contemporary risk analysis now includes probability, consequences to the community, and impact on the organization, in this case the five fire companies.

FIGURE 11: Three-Axis Risk Calculation



The following factors/hazards were identified and considered:

Demographic factors such as age, socio-economic, vulnerability.

Environmental/natural hazards such as flooding, wind events, winter storms, wildland fires.

Manufactured hazards such as rail lines, roads and intersections, target hazards.

Structural/building risks.

Fire, rescue, and fire-related incident numbers and density.

Resiliency.

The assessment of each factor and hazard as listed below took into consideration the likelihood of the event, the impact on the township itself, and the impact on the fire companies' ability to deliver emergency services, which includes their resiliency as well. The list is not all inclusive but includes categories most common or that may present to the township and the five fire companies.

Low Risk

Automatic fire/false alarms.

Low-acuity EMS Incidents.

Low-risk environmental event.

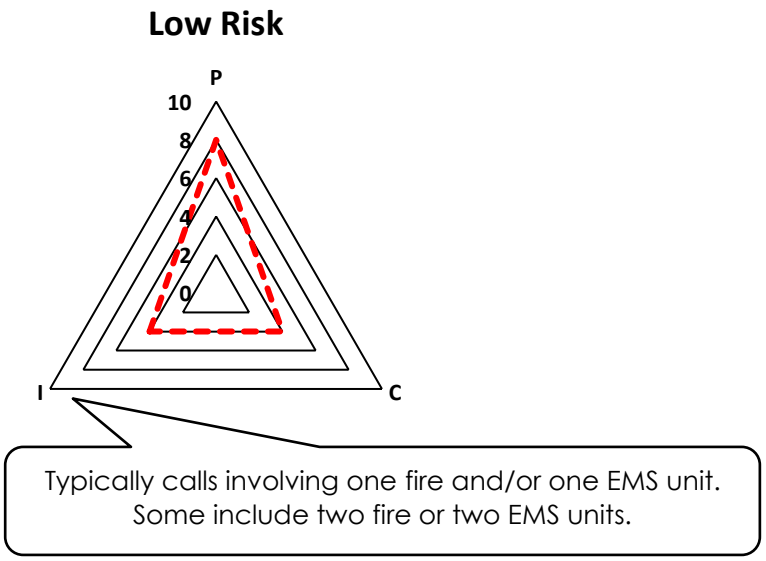
Motor vehicle accident (MVA); no entrapment or Mass Casualty Incident (MCI).

Good intent/hazard/public service fire incidents with no life-safety exposure.

Outside fires such as grass, rubbish, dumpster, vehicle with no structural/life-safety exposure.

Low acuity marine or water incident.

FIGURE 12: Low Risk



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Moderate Risk

Fire incident in a single-family dwelling where fire and smoke or smoke is visible, indicating a working fire.

Suspicious substance investigation involving multiple fire companies and law enforcement agencies.

Environmental event with moderate conditions requiring fire and rescue mitigation.

MVA with entrapment of passengers.

Grass/brush fire with structural endangerment/exposure.

Low-angle rescue involving ropes and rope rescue equipment and resources.

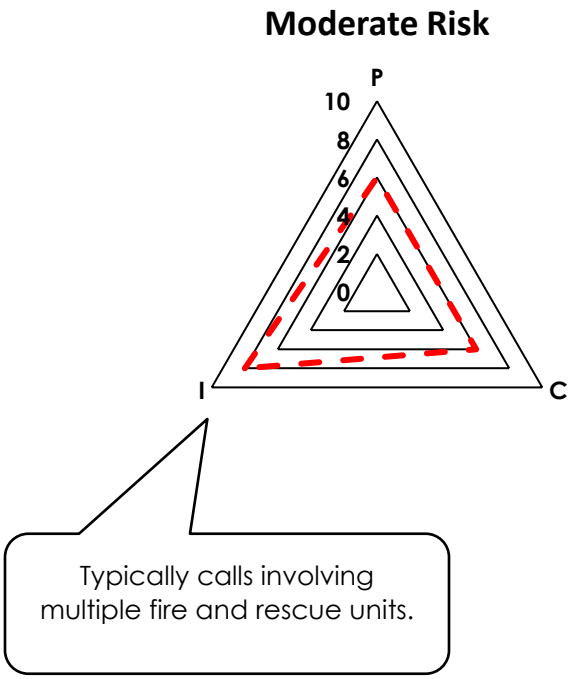
Surface water rescue.

Good intent/hazard/public service fire incidents with life-safety exposure.

Rail or bus event with no threat to life safety but requiring multiple transports of minor injuries.

ALS1 response/moderate acuity EMS response.

FIGURE 13: Moderate Risk



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High Risk

Working fire in a target hazard.

Water incident with significant life safety exposure.

MCI of more than 10 patients but fewer than 25 patients.

Confined space rescue.

Structural collapse involving life-safety exposure.

High-angle rescue involving ropes and rope rescue equipment.

Trench rescue.

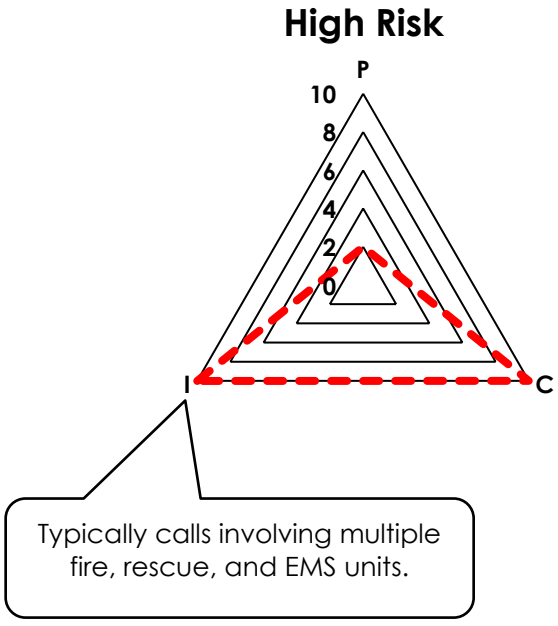
Suspicious substance incident with multiple injuries.

Industrial leak of hazardous materials that causes exposure to persons or threatens life safety.

Weather events that create widespread flooding, heavy winds, building damage, significant snow/ice, and/or life-safety exposure.

ALS2 response/high acuity EMS response requiring multiple assets.

FIGURE 14: High Risk



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Special Risk

Working fire in a structure of more than three floors or multiple buildings.

Fire at an industrial building or complex with hazardous materials.

Fire in an occupied targeted hazard with special life-safety risks such as age, medical condition, or other identified vulnerabilities.

Wildland fire during a drought, high wind event encroaching more than one built upon area on several fronts.

Mass casualty incident of more than 25 patients.

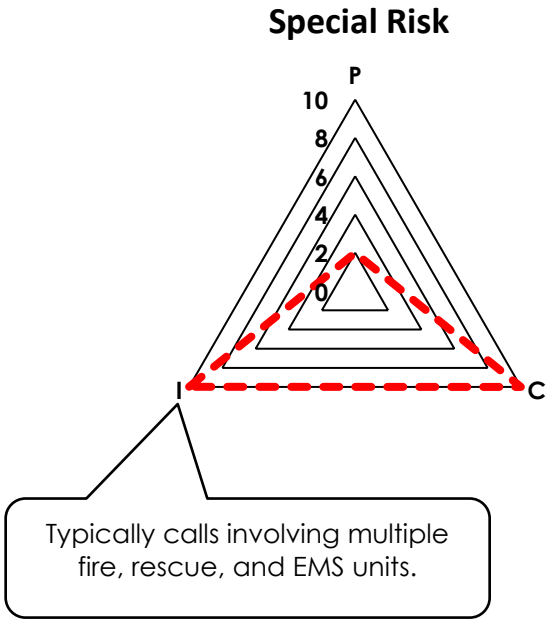
Rail or transportation incident that causes life-safety exposure or threatens life safety through the release of hazardous smoke or materials and evacuation of residential and business occupancies.

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.

High-impact environmental events such as an earthquake, epidemic, or pandemic.

Mass gathering with threat of fire and threat to life safety or other civil unrest, weapons of mass destruction release.

FIGURE 15: Special Risk



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SECTION 4. FIRE PROTECTION

Township Fire Companies

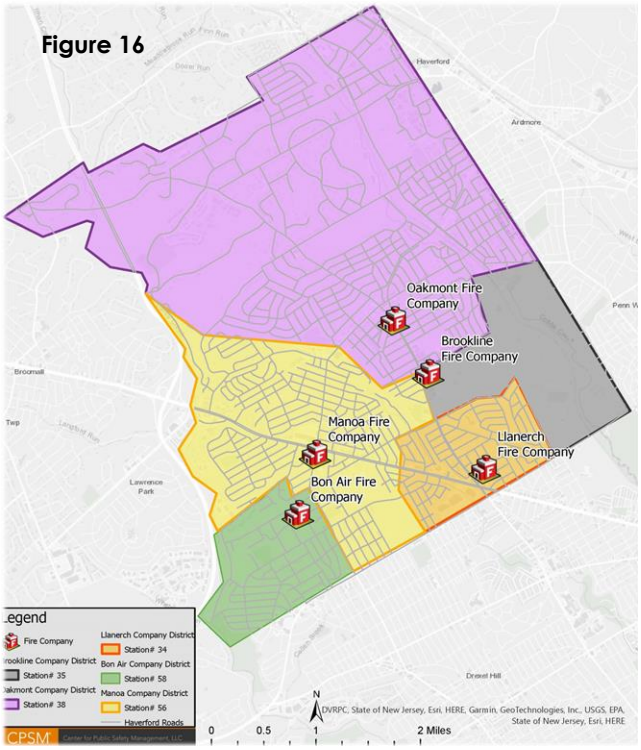

Figure 16

As discussed previously, fire services in Haverford Township are provided by five 100-percent volunteer fire companies. The five fire companies (Bon Air, Brookline, Llanerch, Manoa, Oakmont) are independent of each other in terms of having defined fire districts and separate organizations. However, these fire companies come together to provide fire services to the community.

Fire services are provided from five locations which are located in and around the areas of the township where each fire company started. Each fire company was created as the township grew in size and as neighborhoods and communities were formed. Over the years, there has been no substantial relocation based on the current size and makeup of the township. Each fire company has a Fire Chief who leads the operational component and a President who manages the administrative affairs. The remaining organizational charts are populated by subordinate operational and administrative officers, and operational and administrative members, which is typical across the country.

The backbone of these organizations is the membership, which is made up of community members who dedicate their time, knowledge, and skills to each company and the community. Each company reports strong membership numbers, although each also reports recruitment is not as robust as it was in the past. This is common across the country in all volunteer organizations. Each company reports good retention efforts, which are focused on inclusionary activities internal to each company, as well as family-focused activities and involvement in community events. It is important in any volunteer agency to manage volunteer membership expectations and recognize the value each volunteer member brings to the organization. Every volunteer member CPSM spoke to during our on-site visit spoke highly of their company and felt appreciated and valued by their fire company. All openly spoke to CPSM staff about their company and how proud they are to serve their community.

One recruitment and retention program fire companies may participate in "junior or cadet membership" classification. This program is open to young adults ages 16 to 18. Through this program young adults enter the fire service, receive training, and are exposed to emergency response, although their participation on scene is restricted to support roles. This program offers young adults the opportunity to explore the fire service, if appealing to them they can continue to full membership of their company. Some even make the fire service their career.

Policies and Procedures

Each of the five Haverford Township's fire companies have some level of operating guidelines and procedures that primarily govern the operational response components of the fire company. The current guidelines and procedures may have various dates when the original was produced and/or revisions made. Typically fire department guidelines are numbered and further separated as operational and administrative in the title. This template is not used consistently by each fire company nor is there consistency amongst fire companies regarding policies, procedures, and guidelines.

Individual fire company operational and administrative SOG/SOP's, which were provided to CPSM during the document request phase, are described in the following table:

Table 16: Fire Operational Standard Operating Guidelines/Procedures

Policy/Guideline	Bon Air	Llanerch	Brookline	Manoa	Oakmont
Alarm Cards	Yes	Yes			Yes
Driving Apparatus	Yes			Yes	Yes
Blue/Red Light Use	Yes		Yes		
SCBA	Yes	Yes	Yes		Yes
Riding Apparatus	Yes		Yes		Yes
Crew Room	Yes	Yes			
Photos at Incidents			Yes		
Equipment on Apparatus	Yes				Yes
C.O./Gas Leak Operations	Yes	Yes	Yes		
Evacuation Alarm	Yes				
Apparatus/Equipment Check Sheets	Yes				Yes
Driver Training	Yes	Yes			Yes
Yearly Skills Review	Yes	Yes		Yes	
Apparatus Crew Assignments	Yes	Yes			Yes
Fire Tower Training Use	Yes	Yes			
Probationary Fire Crew Member	Yes	Yes		Yes	Yes

Policy/Guideline	Bon Air	Llanerch	Brookline	Manoa	Oakmont
Training	Yes	Yes	Yes	Yes	Yes
Response Order	Yes	Yes	Yes	Yes	Yes
Fire Company Organization		Yes		Yes	Yes
Chain of Command		Yes			Yes
Safety/Health Program		Yes		Yes	
Job Descriptions		Yes	Yes	Yes	
Risk Management Plan		Yes			
Occupational Safety and Health Committee		Yes			
Record Keeping		Yes	Yes		
Work Related Injuries		Yes			
Uniforms		Yes	Yes		
Vehicle Usage		Yes			
Personal Tracking System		Yes			
Backing up Apparatus		Yes			
RIT Operations		Yes			
Use of Non-Standard Gear		Yes			
Junior Program			Yes	Yes	
Visitor to Station			Yes		
Internet Policy			Yes		
Power Saws			Yes		
Duty Crews			Yes		
Radio Designations			Yes		

Policy/Guideline	Bon Air	Llanerch	Brookline	Manoa	Oakmont
Returning to Station			Yes		
SEPTA High Speed Rail			Yes		
Mayday Procedures			Yes		
Seat Belts			Yes		
Radio Terminology				Yes	
Water Rescue				Yes	
Anti-Harassment				Yes	

Companies may have additional policies-the above policies represent what was provided to CPSM and/or discussed with individual companies.

Training and Education

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

An effective fire department training program must cover all the essential elements of that department's core missions and responsibilities. The level of training or education required for a set of tasks varies with the jobs to be performed. The program must include an appropriate combination of technical/didactic training, manipulative or hands-on/practical evolutions, and training assessment to gauge the effectiveness of these efforts. Most of the training, but particularly the practical, standardized, hands-on training evolutions should be developed based upon the fire department's own operating procedures and operations while remaining cognizant of widely accepted practices and standards that could be used as a benchmark to judge the department's operations for any number of reasons.

It is incumbent on the leadership of each of the fire companies that combat firefighters and officers achieve and maintain the basic-level firefighting and officer certifications. This is critical to ensure the safety of each fire company member and the citizens of the township. Operating in immediately dangerous to life and health (IDLH) environments with zero visibility, or on the perimeter of a fast-moving brush fire, requires formal classroom training that teaches the behavior of fire and the fundamental aspects of an IDLH environment. When followed up with initial and continuous hands-on practical application through certification courses, this breadth of training ensures a firefighter and fire officer has acquired the fundamentals of the profession, from which it becomes his/her responsibility to continuously learn and master.

Because so much depends upon the ability of the emergency responder to effectively deal with an emergency, education and training must have a prominent position within an emergency

responder's schedule of activities. Education and training programs also help to create the character of a fire service organization. Agencies that place a real emphasis on their training tend to be more proficient in carrying out emergency incident duties. The prioritization of training also fosters an image of professionalism and instills pride in the organization.

Each fire company organizes and administers their organizational training programs. This includes new members, incumbent, specialized, and officer training. While there are some inconsistencies between the fire companies, each maintains an individual approach to remain consistent in their respective fire company. The fire companies reported that training occurs at or through:

- Haverford Township Fire Training Site
- Fire Company Stations
- Delaware Co. Emergency Services
- Montgomery County Fire Academy
- Bucks County Fire Training Center
- PECO Fire Training
- National Fire Academy
- Fairfax County Fire Academy
- Second Alarm Consultants
- Training Specialties Inc.
- Dragon Rescue Management
- Bucks County Community College

The next table outlines each fire company's training as reported by each fire company to CPSM.

Table 17: Fire Company Training Programs

Fire Company	Requirements
Bon Air Fire Company	Rookie FF Program: 18 years of age, complete accepted basic FF training program, all tasks signed off by Lieutenant, complete yearly competency test. Firefighter: PA FF 1 cert, Haz Mat Awareness and Ops, Building Construction, Fire Dynamics, ICS 100, ICS 700. Officers: Each rank above FF has different requirements and options depending on the rank.
Llanerch Fire Company	Probationary: Must complete SOG manual and new member handbook, will be assigned to a senior member, must attend 75% of weekly training sessions, must complete progress list and equipment knowledge tests. Firefighter: 18 years of age, PA FF 1 cert. within one year, First Aid/CPR/AED, Haz Mat awareness, Blood Borne Pathogens. Must attend 50% of the weekly training sessions.

Fire Company	Requirements
Brookline Fire Company	Probationary: Each new member must complete a probationary training sheet; new members will be trained in the use of power saws. Firefighter: Basic PA FF 1 must be completed within one year; Brookline Fire Company training sheet must be completed within 6 months. As members move up in rank, there are years of service required along with appropriate courses related to their specific position.
Manoa Fire Company	Probationary: Must complete NFPA physical, background check, remain probation for one year and until complete requirements for their position in the company. Firefighter: PA FF 1 cert., Haz Mat Awareness, ICS 100, ICS 700, Haz Mat Ops. CPR cert. Must attend 20% of fire calls, attend 50% of weekly training sessions. Encouraged to complete RIT training, Vehicle Rescue training, FF 2, Water Rescue through PA Fish and Boat Commission. Drivers must complete Emergency Vehicle Operator training.
Oakmont Fire Company	Probationary: CPR/AED/First Aid, In house training, Company Drills. Firefighter: PA FF 1, Haz Mat Awareness/Ops, NIMS 100, NIMS 700, CPR/AED/First Aid. Encouraged to complete RIT training, Mayday training, structural burn session, Vent-Enter-Isolate-Search.

Training information recorded here as provided or discussed by/with each company.

Each of the fire companies hold incumbent training programs that include fire suppression operations and extinguishment, apparatus and equipment operations, self-contained breathing apparatus, radio communications, and training specific to the company's equipment and responses such as water rescue, RIT, heavy rescue, and aerial operations. Each fire company requires that its members attend scheduled training events as outlined above at certain activity levels. Scheduled training is generally conducted in the fire station or at the township fire training site. Additional training that is voluntary is/can be conducted any time throughout the month based on each fire company's needs/requirements. Active combat fire company members also receive one credit hour for every hour of training received and documented, and which then applies to the 200 credit minimum to receive a Township Tax Credit (Township Ordinance 2841-2018).

Each of the fire companies also have guidelines requiring that combat firefighters receive specific training and certifications. There are also requirements for the Junior members as well as the officers, up to Fire Chief.

Much work must be done however, to ensure fire company combat firefighters and officers achieve and maintain the basic-level firefighting and officer certifications. ***This is noted in the current ISO-PPC report.*** This is critical to ensure the safety of each fire company member and the citizens of the township. Operating in Immediately Dangerous to Life and Health (IDLH) environments with zero visibility requires formal classroom training that teaches the behavior of fire and the fundamental aspects of an IDLH environment. When followed up with initial and

continuous hands-on practical application through certification courses, this breadth of training ensures a firefighter and fire officer has acquired the fundamentals of the profession, from which it becomes his/her responsibility to continuously learn and master.

Fleet

The provision of an operationally ready and strategically located fleet of mission-essential fire vehicles is fundamental to the ability of a fire department to deliver reliable and efficient public safety within a community.

The procurement, maintenance, and eventual replacement of response vehicles is one of the largest expenses incurred in sustaining a community's fire department. While it is the personnel of the five fire companies who provide emergency services within the community, each fire company's fleet of response vehicles is essential to operational success. Modern, reliable vehicles are needed to deliver responders and the equipment/materials they employ to the scene of dispatched emergencies within the township.

Apparatus maintenance is performed in-house and managed by Township's Fleet Manager, who does an outstanding job keeping Fire and EMS fleet in-service. This includes apparatus-specific work and annual preventive maintenance. There are times when a private vendor that specializes in heavy fire apparatus may be used. This combination of maintenance and repair work is common practice across the country in volunteer fire departments. The intricacies and scope of fire pumps and fire pump controls, aerial ladder hydraulic systems and controls, and apparatus electrical control systems (the main components outside of the motor, chassis, and drive train) are best left in the hands of specialists for diagnosis, maintenance, and repair.

The township procures the heavy fire apparatus described herein. Replacement of such is discussed later in this section. One discussion point regarding fleet maintenance here is there is no consistency in fire apparatus manufacturer, and to some degree, pumps, motors, drivetrains, and chassis components. There has been some progress made in consistency of motors and drive trains, however overall, each company may utilize a certain manufacturer, or a combination of manufacturers for heavy apparatus. Overall consistency is important, particularly with the major components such as motor, drive train, chassis components, electrical systems, fire pumps, and aerial devices as these are the central components of the apparatus. The township should strive to be more consistent with heavy apparatus from an efficiency standpoint regarding fleet maintenance and interoperability apparatus from company to company.

The five fire company's heavy operational apparatus are outlined in the next table, with the remaining apparatus in the following table.

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Table 18: Profile of Fire Company Heavy Fleet

Agency	Unit	Unit Type
Llanerch FD (STA 34)	ENG 34	Engine
	ENG 34-1	Engine
	TW 34	Tower Ladder
Brookline FD (STA 35)	ENG 35	Engine
	FO 35	Foam Engine
	LA 35	Ladder
Oakmont FD (STA 38)	ENG 38	Engine
	LA 38	Ladder
	RE 38	Rescue-Medium Duty
	SD 38	Squad-Engine
Manoa FD (STA 56)	ENG 56	Engine
	RE 56	Heavy Rescue
	SD 56 (Engine)	Squad-Engine
	Spec. Ops 56	Rescue-Medium Duty
Bon Air FD (STA 58)	PL 58	Engine
	RE 58	Rescue, Light & Air
	SD 58	Squad-Engine

Aggregate Township Response Fleet

Engines: 6

Foam Engine: 1

Squad Engine: 3

Total Engines (10)

Ladder Trucks: 3

Heavy Rescue: 1
Rescue, Light & Air: 1

Medium Rescues: 2

The five fire companies also have an array of light road and water vehicles to include: command SUVs; utility vehicles; a haz-mat spill unit; and watercraft for surface water rescue.

The aggregate fleet of the five companies offers the Township a diverse complement of fire apparatus. For instance, each ladder is different by ladder length, ladder mount, and one is a tower ladder. There are two heavy rescues and two medium duty rescues. Engines are diverse as well, carrying different equipment for firefighting and vehicle/technical rescue, and are of varying sizes, with varying pump capacities, hose compliments, and water tanks. This includes one foam engine, which is set up for chemical/hazardous material fires, and which can be used on certain Class A materials due to foam's ability to penetrate these materials, suppress oxygen, and cool. This diversity is important and serves the township well considering the varying building risks, underpasses, street sizes, building setbacks, longer driveways to some structures, and areas where fire hydrants are of a considerable distance to the fire.

Based on the risk profile of the town, and the demand for service, CPSM recommends, however, a more efficient fleet profile as outlined in the next table.

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Table 19: Recommended Fire Fleet Profile

3 Frontline Engines ■ Bon Air ■ Brookline ■ Llanerch	**1 Heavy Rescue** ■ Manoa
1 Foam Engine *(Company Owned-Brookline)*	**2 Quint Ladders** ■ Brookline ■ Oakmont
2 Squad Engines ■ Manoa ■ Oakmont	**1 Reserve Ladder** **Bureau of Fire** **Station Location TBD** **by Township**
2 Reserve Engines **Bureau of Fire** ■ Bon Air ■ Llanerch	

Replacement of fire response vehicles is a necessary, albeit expensive, element of fire department budgeting that should reflect careful planning. A well-planned and documented emergency vehicle replacement plan ensures ongoing preservation of a safe, dependable, and operationally capable response fleet. A plan must also include a schedule for future capital outlay that is affordable to the community.

NFPA 1901, *Standard for Automotive Fire Apparatus*, serves as a guide to the manufacturers that build fire apparatus and the fire departments that purchase them. This document is updated every five to eight years (or shorter time periods) using input from the public and industry stakeholders through a formal review process. The committee membership is made up of representatives from the fire service, manufacturers, consultants, and special interest groups. The committee monitors various issues and problems that occur with fire apparatus and attempts to develop standards that address those issues.

Many departments use a 10-5 rule (10 years frontline service, then 5 years of reserve service) when programming replacement of fire apparatus such as engines, ladders, water tenders, heavy rescues, and heavy squad type haz-mat vehicles. ***This is a standards recommendation only for the reasons stated herein. Dependent on wear and tear, some departments utilize a 15-24 year service life of heavy apparatus.***

The Annex Material in NFPA 1901 (2016) contains recommendations and work sheets to assist in decision making in vehicle purchasing. With respect to recommended vehicle service life, the following excerpt is noteworthy:

> *"It is recommended that apparatus greater than 15 years old that have been properly maintained and that are still in serviceable condition be placed in reserve status and upgraded in accordance with NFPA 1912, Standard for Fire Apparatus Refurbishing (2016), to incorporate as many features as possible of the current fire apparatus standard. This will ensure that, while the apparatus might not totally comply with the*

current edition of the automotive fire apparatus standards, many improvements and upgrades required by the recent versions of the standards are available to the firefighters who use the apparatus."

The impetus for these recommended service life thresholds is the continual industry advances in vehicle and occupant safety. Despite good stewardship and maintenance of emergency vehicles in sound operating condition, there are many advances in occupant and vehicle component safety, such as fully enclosed cabs, enhanced rollover protection and air bags, three-point restraints, antilock brakes, increased visibility, cab noise abatement/hearing protection, a clean cab free from carbon products, and a host of other improvements as reflected in each revision of NFPA 1901. These improvements provide safer response vehicles for those providing emergency services within the community, as well those "sharing the road" with these responders.

Annex D of the current NFPA 1912 edition states:

> *To maximize fire fighter capabilities and minimize risk of injuries, it is important that fire apparatus be equipped with the latest safety features and operating capabilities. In the last 10 to 15 years, much progress has been made in upgrading functional capabilities and improving the safety features of fire apparatus. Apparatus more than 15 years old might include only a few of the safety upgrades required by the recent editions of the NFPA fire department apparatus standards or the equivalent Underwriters Laboratories of Canada (ULC) standards. Because the changes, upgrades, and fine tuning to NFPA 1901, Standard for Automotive Fire Apparatus have been truly significant, especially in the area of safety, fire departments should seriously consider the value (or risk) to fire fighters of keeping fire apparatus more than 15 years old in first-line service.*

Under the NFPA1912 standard there are two types of refurbishments a fire department can choose. These are Level 1 and Level 2 refurbishments. According to NFPA 1912, a Level 1 refurbishment includes *the assembly of a new fire apparatus by the use of a new chassis frame, driving and crew compartment, front axle, steering and suspension components, and the use of either new components or components from existing apparatus for the remainder of the of the apparatus.* A Level 2 refurbishment includes *the upgrade of major components or systems of a fire apparatus with components or systems of a fire apparatus that comply with the applicable standards in effect at the time the original apparatus was manufactured.*

A few important points to note regarding the NFPA 1912 standard regarding the refurbishment of heavy fire apparatus. These are:[11]

- Apparatus that was not manufactured to applicable NFPA fire apparatus standards or that is 25 years old should be replaced.
- A vehicle that undergoes a Level 1 refurbishing receives a new make and model designation and a new Certificate of Origin for the current calendar year. Apparatus receiving a Level 1 refurbishing are intended to meet the current edition of the NFPA automotive fire apparatus standard. *This is the optimal level of refurbishing*.
- A vehicle that has undergone a Level 2 refurbishing retains its original make and model identification as well as its original title and year of manufacture designation. Apparatus receiving Level 2 refurbishing are intended to meet the NFPA automotive fire apparatus standard in effect when the apparatus was manufactured.

11. NFPA 1912 Standard for Fire Apparatus Refurbishing, 2016 Edition.

One method to reduce the replacement costs of heavy apparatus is to consider the refurbishment process. Refurbishing engine and ladder apparatus typically costs much less than a new apparatus, depending of course on the type of apparatus (engine or ladder) and the components (motor, drive train, chassis, pump, paint, steering etc.) that must be refurbished.

As each fire company maintains their fleet in excellent shape, this alternative should be considered when an apparatus meets the mechanical and the criterion as outlined in NFPA 1901 and 1912, above.

Either new or refurbishment, the township in concert with the fire companies should establish a heavy fire apparatus replacement plan that establishes at a minimum, that no heavy fire apparatus is in service greater than 25-years of original manufacture date, that refurbishment is an option if the apparatus meets NFPA 1912 criteria, and that consistency in manufacturer township-wide is a first option.

For consideration, CPSM recommends the following replacement plan for heavy fire apparatus the township owns and insures.

Table 20: Recommended Heavy Fire Apparatus Fleet Replacement Plan Township Owned

Type	Company	Year In Service	Year of Replacement
Engine	Bon Air: Squad 58 Recommend Re-number: E58	2011	Consider Refurb at the 12-15 year mark **(2023-2026).** If not refurbished replace at the 20-23 year mark with a straight Engine **(2021-2034).**
Engine	Bon Air: E58	1995	**Retire Now**
Heavy Rescue	Bon Air: R58	2002	**Retire at 25 years (2027).** Do not recommend replacement. ***BOF Heavy Rescue Reserve Until Retirement.***
Engine	Brookline: E35	2011	Consider Refurb at the 12-15 year mark **(2023-2026).** If not refurbished replace at the 23 year mark with a straight Engine **(2031-2034).**
Ladder (Quint)	Brookline: L35	2005	Budget replacement at the 23 year mark **(2028)**

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Type	Company	Year In Service	Year of Replacement
Reserve Engine	Llanerch: 34-1 BOF Reserve Engine stored/maintained at Llanerch.	2006	Budget replacement at the 20-23 year mark **(2026-2029)** New Engine becomes Llanerch primary Engine.
Engine	Llanerch: E34	2011	Consider Refurb at the 12-15 year mark **(2023-2026).** If not refurbished replace at the 20-23 year mark with a straight Engine **(2031-2034).** Becomes BOF reserve Engine when Llanerch 2006 Engine 34-1 is replaced.
Reserve Ladder	Llanerch: Tower 34 BOF Reserve Ladder Location TBD by Township	2001	Replace at the 23-year mark with a straight Ladder (Quint) for Brookline **(2024).** Brookline Ladder becomes BOF reserve.
Engine	Manoa: E 56 BOF Reserve Engine stored/maintained at Bon Air.	2017	Consider Refurb at the 12-15 year mark **(2029-2032).** If not refurbished replace at the 20-23 year mark with a straight Engine **(2037-2040).**
Squad Engine	Manoa: Sq. 56	2001	Budgeted for replacement in FY 2023. Estimated in service date 2025. Consider Refurb at the 12-15 year mark **(2037-2040).** If not refurbished replace at the 20-23 year mark with a straight Engine **(2045-2048).**
Heavy Rescue	Manoa: R56	2006	Replace at the 23 year mark **(2029).**

Reserve Engines at Llanerch and Bon Air and the reserve ladder can and should be utilized by the companies where these apparatuses are stored and maintained as additional response capabilities as needed, and as made available to respond by members.

Type	Company	Year In Service	Year of Replacement
Engine	Oakmont: E38 Recommend Re-number Squad 38	2018	Consider Refurb at the 12-15 year mark **(2030-2033).** If not refurbished replace at the 23 year mark with a straight Engine **(2038-2041).**
Ladder (Quint)	Oakmont: L38	2018	Consider Refurb at the 12-15 year mark **(2030-2033).** If not refurbished replace at the 23 year mark with a aerial ladder (Quint) **(2038-2041).**
Squad Engine	Oakmont: Sq. 38	1999	**Retire at 25 years (2024)**

Protective Equipment

Two of the most important components of firefighter safety are the structural firefighting protective ensemble (turnout or bunker gear as it is commonly referred to) and self-contained breathing apparatus (SCBA). Each on its own and together are designed to keep firefighters safe from the environment they are working in, which can include thermal, mechanical, and atmospheric hazards that can potentially harm them. Each of the fire companies provides members with this equipment either directly or makes a component available for use.

Our review of the equipment provided shows that while each fire company provides protective equipment, there are improvements that can be made. Currently there is no consistency in the procurement and implementation of structural firefighting gear between the fire companies, which minimizes procurement cost savings and the availability of like gear to share between fire companies. One important improvement the five fire companies could make, especially through the township, is to work together to test, select, procure, and issue structural firefighting ensemble components that are the same. This action would offer economy of scale procurement (a single vendor contract) and would result in a cache of structural firefighting ensemble components that are interchangeable between fire companies when needed for new and incumbent members.

Another improvement that can be made, and which is recommended, is the issuance of SCBA masks on an individual basis. As respiratory protection is paramount, SCBA masks require annualized mask fit testing to a specific mask, and as the SCBA masks require regular cleaning and care, it is sensible to issue each combat firefighting member an individual mask. Although costly, each fire company has issued some of their members an individual mask. An improvement could also be made in the purchase of consistent SCBA frame and harness systems and cylinders. The benefit here is the same as with structural firefighting ensemble components, which is the benefit of economy of scale procurement (a single vendor contract). An additional improvement would be a single upgrade of all SCBA frame and harness systems and cylinders (all five companies aggregately). This would establish a procurement cycle for all

SCBA frames & harness systems and cylinders and would establish frame & harness model consistency between all five fire companies.

The Federal Emergency Management Agency (FEMA) with the United States Fire Administration annually makes funding available for upgrade programs such as this. For the FY 21 funding cycle, FEMA made available $414 million through the Assistance to Firefighters Grant to fire departments to enhance their response capabilities and to protect the health and safety of the public and emergency personnel more effectively. Many fire departments in Pennsylvania (volunteer and career) have received substantial funding through this grant program.

Health and Safety

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

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

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

The Health and Safety function for fire companies is handled primarily by officers in each company. Fire companies that have health, safety, and wellness guidelines, or operational guidelines that contemplate health and safety are noted above in Table 13.

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

- 72 percent of departments lack a program to maintain basic firefighting fitness and health.
- 61 percent of departments don't provide medical and physical evaluations for all firefighters that comply with *NFPA 1582: Standard on Comprehensive Occupational Medical Program for Fire Departments.*
- 73 percent of departments lack a behavioral health program (larger departments are much more likely to have such a program).
- 56 percent of fire stations aren't equipped for exhaust emissions control; this number rises to 82 percent in the smallest communities.
- Many departments don't engage in cancer prevention best practices.[12]

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

A successful health, safety, and wellness program requires:

- Senior Management buy-in.
- The establishment of a Health & Wellness Committee.
- A department needs assessment.
- The establishment of obtainable goals and objectives.
- The establishment of a budget for health, safety, and wellness.
- Implementation.
- Evaluation.[13]

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

- Reducing injury leave and light duty due to on-the-job injuries.
- Potentially lowering workers' compensation and employee health care costs.
- Reduction of injuries.[14]

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

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

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

An important component for firefighter health and safety as well includes entry medical physicals and annualized SCBA mask fit testing. Annualized fit testing and annualized medical physicals go hand-in-hand. OSHA 1910.134 and NFPA 1500 both require annualized fit-testing of SCBA masks. As part of a township/volunteer fire company respiratory protection program, and in accord with OSHA 1910.134, NFPA 1500, and NFPA 1582 *Standard on Comprehensive Occupational Medical Program for Fire Departments,* medical physicals are and should be required prior to the initial mask fit test and annualized thereafter, when new respiratory protective masks are introduced, or when a member has undergone physical changes that may affect the previous mask fit test and assigned mask size.

13. ibid
14. ibid

Currently the township budgets for and provides entry level medical physicals. ***This is a best practice.*** This practice should be continued, and the township, working with the fire companies, should develop a plan that ensures all combat fire members receive at a minimum, an annual basic respiratory fit-test medical physical to ensure combat members are medically fit to don and wear self-contained breathing apparatus (SCBA), and that all combat members receive an annual SCBA mask fit test on an annual basis.

ISO-PPC Community Rating

The ISO is a national, not-for-profit organization that collects and evaluates information from communities across the United States regarding their capabilities to combat building fires.

ISO conducts field evaluations in an effort to rate communities and their relative ability to provide fire protection and mitigate fire risk. This evaluation allows ISO to determine and publish the Public Protection Classification (PPC). The data collected from a community is analyzed and applied to ISO's Fire Suppression Rating Schedule (FSRS) from which a Public Protection Classification (PPC) grade is assigned to a community (score from 1 to 10). This is an analysis of the structural fire suppression delivery system in a community.

Class 1 (highest classification/lowest numerical score) represents an exemplary community fire suppression program that includes all of the components outlined below. A Class 10 indicates that the community's fire suppression program does not meet ISO's minimum criteria. It is important to understand the PPC is not just a fire department classification, but a compilation of community services that include the fire department, the emergency communications center, and the community's potable water supply system operator.[15]

A favorable PPC numerical rating potentially may translate into lower insurance premiums for business owners and homeowners. This more favorable classification makes the community more attractive from an insurance risk perspective. How the PPC for each community affects business and homeowners can be complicated because each insurance underwriter is free to utilize the information as they deem appropriate. Overall, many factors feed into the compilation of an insurance premium, not just the PPC.

Haverford Township has an ISO-PPC rating of ***Class 04/4X.*** The first number indicates a fire suppression system is present that includes a creditable dispatch center, fire department, and water supply (fire hydrants). The second number is the class that applies to properties within five road miles of a fire station but beyond 1,000 feet of a creditable water supply (fire hydrant). The township's ISO rating was effective May 1, 2018.

The Haverford Township's 2018 report included the following credit points by major category:

Emergency Communications: 8.38 earned credit points/10.00 credit points available.

Fire Department: 27.53 earned credit points/50.00 credit points available.

Water Supply: 37.36 earned credit points/40.00 credit points available.

Community Risk Reduction (Fire Prevention/Inspection, Public Education, and Fire Investigation activities): 3.30 earned credit points/5.50 credit points available.

Overall, the ISO-PPC community rating Haverford Township yielded 68.90 earned credit points/105.50 credit points available. There was a -7.67 point diversion reduction assessed as

15. Haverford Township ISO-PPC report Effective May 1, 2018.

well, which is automatically calculated based on the relative difference between the fire department and water supply scores. 60.00 points or more qualify a community for a rating of 4.

The next table outlines the scoring for the ISO-FSRS components.

Table 21: Haverford Township ISO Earned Credit Overview

FSRS Component	Earned Credit	Credit Available
414. Credit for Emergency Reporting	1.80	3
422. Credit for Telecommunicators	3.58	4
4.32. Credit for Dispatch Circuits	3.00	3
440. Credit for Emergency Communications	**8.38**	**10**
513. Credit for Engine Companies	5.56	6
523. Credit for Reserve Pumpers	0.48	0.50
532. Credit for Pump Capacity	3.00	3
549. Credit for Ladder Service	4.00	4
553. Credit for Reserve Ladder and Service Trucks	0.00	0.50
561. Credit for Deployment Analysis	8.23	10
571. Credit for Company Personnel	1.25	15
581. Credit for Training	3.01	9
730. Credit for Operational Considerations	2.00	2
590. Credit for Fire Department	**27.53**	**50**
616. Credit for Supply System	28.76	30
621. Credit for Fire Hydrants	3.0	3
631. Credit for Inspection and Flow Testing	5.60	7
640. Credit for Water Supply	**37.36**	**40**
Divergence	**-7.67**	-
1050. Community Risk Reduction	**3.30**	5.50
Total Credit	**68.90**	**105.50**

Areas of scoring that should be reviewed further internally by the township and the five fire companies, and which can have the most impact on individual areas evaluated and scored that connect to total section scoring include:[16]

- Credit for Company Personnel: #571 (1.25/15 points).

This category reviews the average number of existing firefighters and company officers available to respond to first alarm structure fires. Because the five companies in the town are volunteer and are not always at the station (have restricted availability), the ISO-FSRS grading schedule credits three volunteers as equivalent to one career firefighter. The five companies aggregately received credit for 0.00 on-duty personnel and 12.00 on-call personnel responding to first alarm structure fires. ***The number of people responding by fire district and company is not consistent with CPSM data. This could be an information recording issue that should be better analyzed and documented at the company level so that credit in this category can be improved.*** For the time

16. Public Protection Classification Summary Report, Haverford Township 2018.

that the volunteers are on duty at the station, ISO will consider them as equivalent to on-duty firefighters; however, this information has to be recorded.

- Item 581 - Credit for Training (3.01/9.00 points)
  - Training: #581 (A) Facilities and Use (**12.40/35 credits**).

For maximum credit, each firefighter should receive 18 hours per year in structure fire-related subjects as outlined in the NFPA 1001 standard at a training facility where props and fire simulation buildings can be used. ***The five fire companies are not meeting this section and utilizing the township fire training grounds to their fullest potential.***

  - Training: #581 (B) Company Training (**2.37/25 credits**).

For maximum credit, each firefighter should receive 16 hours per month in structure fire-related subjects as outlined in the NFPA 1001 standard. ***The five companies are not meeting this section to their fullest potential.***

- Training: #581 (C) Classes for Officers (**3.68/12 credits**).

For maximum credit, each officer should be certified in accordance with the general criteria of NFPA 1021 *Standard for Fire Officer Professional Qualifications*. In addition to this benchmark, each officer should receive 12 hours of continuing education on or off-site annually. ***The five companies are not meeting this section to their fullest potential.***

- Training: #581 (E) Existing Driver and Operator Training (**2.50/5.00 Credits**).

For maximum credit, each existing driver/operator should receive 12 hours of driver/operator training per year in accordance with NFPA 1002 *Standard for Fire Apparatus Driver/Operator Professional Qualifications* and NFPA 1451 Standard *for a Fire and Emergency Service Vehicle*. ***The five companies are not meeting this section to their fullest potential.***

- Training: #581(H) Pre-Fire Planning Inspections (1.65/12 credits).

For maximum credit, company members should annually make pre-fire planning inspections of each commercial, industrial, institutional, and other similar type building (all buildings except one- to four-family dwellings). Pre-fire planning inspections are company-level walk- throughs of multi-family residential, vertical residential, commercial, industrial, institutional, hotels/motels, and larger footprint buildings to become familiar with floor plans, hose connections, means of egress, concentrations of population, hazardous materials storage, and the like. Typically, fire departments have templates they fill in while conducting these pre-fire plan inspections that include pertinent owner/occupant information, sketched floor plans, hydrant locations, fire department connections, elevator locations, hazardous storage, or process locations in the building, etc. Another purpose of a pre-fire plan is its use when an actual incident is occurring at the target hazard site or building. In this case the incident commander has at his/her disposal vital information that he/she can reference when making incident decisions. A record of inspections is important as well to gain appropriate credits. The five fire companies are not completing pre-fire plans on targeted hazard buildings that are commercial, industrial, institutional, and other similar types to their fullest potential. ***The five companies are not meeting this section to their fullest potential.***

The five fire companies did receive maximum or near maximum credit points for:

- Engine Companies
- Reserve Pumpers
- Pumper Capacity

- Ladder Service
- Deployment analysis
- Operational Considerations (operational guidelines)
- New Driver/Operator Training
- Training on Hazardous Materials
- Recruit Training

NFPA 1720 Standard for Fire Response

Emergency events occur at all hours, on all days, and under all conditions. Emergencies are like lightning strikes—they can occur anytime, anywhere. The fire and EMS service's response to these unpredictable conditions has been to develop a methodology for being prepared to respond and deploy adequate resources in a timely fashion when they occur.

The rapid and effective performance of highly coordinated assigned tasks is the hallmark of a successful emergency response force whether it be fire or EMS or combined. Time and on-scene performance expectations are the target indicators established for measuring the operational elements (individuals, crews, and work units) that comprise response-ready resources.

Critical tasks are those activities that must be conducted on time and preferably simultaneously by responders at emergency incidents to control the situation and minimize/stop loss (property and life-safety).

Critical tasking for fire operations is the minimum number of personnel needed to perform the tasks needed to effectively control and mitigate a fire or other emergency.

Critical tasking for EMS operations is those activities (clinical and operational) that must be conducted, some in succession, and some simultaneously to rapidly assesses the patient, determine the level of intervention needed, if any, and connect the patient with the appropriate level of pre-hospital clinical care.

To be effective, critical tasking must assign enough personnel so that all identified functions can be performed as described above. However, it is important to note that initial response personnel may manage secondary support functions once they have completed their primary assignment. Thus, while an incident may end up requiring a greater commitment of resources or a specialized response, a properly executed critical tasking assignment will provide adequate resources to immediately begin bringing the incident under control.

The specific number of people required to perform all the critical tasks associated with an identified risk or incident type (Fire, EMS, and Fire/EMS) is referred to as an ***Effective Response Force*** (ERF). The goal is to deliver an ERF within a prescribed period. NFPA 1720 provides the benchmarks for effective response forces for the five companies. There are no established critical tasks for all EMS incidents per se, however, a Standards of Cover will provide critical tasking for incidents that EMS units typically respond to.

NFPA 1720, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations and Special Operations to the Public by Volunteer Fire Departments*, 2020 edition (National Fire Protection Association, Quincy, Mass.), outlines organization and deployment of operations by volunteer and combination (a fire department having emergency service personnel comprising less than 85 percent majority of either volunteer

or career membership) fire and rescue organizations.[17] It serves as a benchmark to measure staffing and deployment of resources to certain fire incidents and emergencies.

According to NFPA 1720, fire departments should base their specific role on a formal community risk management plan, as discussed earlier in this analysis, and taking into consideration:[18]

- Life hazard to the population protected. The number and type of units assigned to respond to a reported incident shall be determined by risk analysis and/or pre-fire planning.
- Fire suppression operations shall be organized to ensure that the fire department's fire suppression capability includes personnel, equipment, and other resources to deploy fire suppression resources in such a manner that the needs of the organization are met.
- The Authority Having Jurisdiction shall promulgate the fire department's organizational, operational, and deployment procedures by issuing written administrative regulations, standard operating procedures, and departmental orders.
- The number of members that are available to operate on an incident is sufficient and able to meet the needs of the department.
- Provisions for safe and effective firefighting performance conditions for the firefighters.
- Personnel responding to fires and other emergencies shall be organized into company units or response teams and have the required apparatus and equipment to respond.
- Initial firefighting operations shall be organized to ensure that at least four members are assembled before interior fire suppression operations are initiated in a hazardous area.
- The capability to sustain operations shall include the personnel, equipment, and resources to conduct incident specific operations.

It is understood that volunteers typically respond to incidents from home or work, so for a minimum-level Effective Response Force to begin fire suppression efforts, NFPA 1720 establishes the minimum response staffing for a predominately volunteer department for low-hazard structural firefighting incidents (to include out buildings and up to a 2,000 square-foot, one- to two-story, single-family dwelling without a basement and no exposures) for specific demand zones.

Each demand zone takes into consideration certain risk elements such as population density, exposed occupied buildings (more predominant in urban and suburban demand zones), water supply, and proximity to responding apparatus and members (incident and fire station).

Fire Company Response Staffing

Amongst the fire companies, there is not a standardized staffing model for apparatus, meaning, an apparatus may respond with a company specific qualified staffing number, or may not respond with a fire company established minimum number of qualified members dependent on the call and/or when multiple companies have been dispatched. When fire companies are toned out for an incident, typically Command or Chief officers respond to the scene and members respond to the station to staff and respond the appropriate apparatus. Some

17. NFPA 1720 is a nationally recognized standard, but it has not been adopted as a mandatory regulation by the federal government or the Commonwealth of Pennsylvania. It is a valuable resource for establishing and measuring performance objectives for Haverford Township but should not be the only determining factor when making local decisions about the township's fire services.
18. NFPA 1710, 5.2.1.1, 5.2.2.2

companies stipulate if a member is passing the scene to go to the station to staff an apparatus, then they may go directly to the scene and render assistance.

There are several factors in any volunteer fire department staffing and deployment model, or for that matter, any fire department career of volunteer that must be considered to ensure effective use of resources and the safety of the public and firefighters. These include:

Accountability of responding and on-scene resources, and in the case of firefighters responding in personal vehicles, their ability to arrive safely and function safely prior to the initial arriving fire apparatus. In the case of responding apparatus with a single driver, the ability to arrive and position the apparatus (forward and reverse) effectively and safely.

Meeting the intent of NFPA 1720 standards, in particular ensuring personnel responding to fires and other emergencies are organized into company units or response teams consisting of a team of at least two.

The avoidance of freelancing on the fireground, particularly early arriving volunteer firefighters to an incident in personal vehicles.

Organizing initial firefighting operations, ensuring that at least four members are assembled before interior fire suppression operations are initiated in a hazardous area.

It is of the highest importance that firefighters are trained and disciplined not to freelance or enter a hazardous area or building on fire without the proper equipment beyond their issued personal protective clothing if they arrive to an emergency scene prior to responding fire apparatus.

Ensuring assembled personnel have radio communication with Incident Command at all times so that they may transmit urgent messages, critical task progress, incident updates, their own and/or team's location, accountability of their actions, and receive from Incident Command and/or other teams operating at the scene urgent messages, updates, critical task progress, other team locations, and receive new assignments.

Fire companies in Haverford collectively utilize Active911, a software app that links responding apparatus and responding volunteers to the CAD system, which alerts responding members, apparatus, and command officers who and what apparatus are responding to an incident or the station to respond with apparatus. The features of this software include:

- Members can receive call notifications through the communications system (CAD) to their smartphone.
- When a member utilizes the response functions, the member can alert command officers and apparatus driver/operators they are responding to the scene or the station. Active911 is linked to the apparatus mobile data computer.
- The Active911 App provides a map display of the incident location, directions to the scene, and the live location of responding members and apparatus (as long as members and apparatus are using the system). Through this system, command officers have initial accountability of responding members and where they are responding to (scene or station).
- When members are responding to the station their live locations are displayed, which alerts command officers and apparatus driver/operators where they are, assisting driver/operators in determining whether to wait on a member prior to rolling apparatus.

NFPA 1720 calls attention to additional staffing/response requirements worth noting here:

- The fire department shall identify minimum staffing requirements to ensure that the number of members that are available to operate are able to meet the needs of the department.
- For the volunteer component this can include scheduled staffing at predetermined stations or pre-determined staff responding to stations to assemble and response apparatus.
- Where staffed stations are provided, when determined by the authority having jurisdiction, they shall have a turnout time of 90 seconds for fire and special operations and 60 seconds for EMS incidents, 90 percent of the time.
    - This should be measured at volunteer staffed stations.
- Upon assembling the necessary resources at the emergency scene, the fire department shall have the capability to safety commence an initial attack within 2 minutes 90 percent of the time.
    - This should be announced by the incident commander over the radio and measured through the computer-aided dispatch (CAD) system after the arrival of the initial arriving members, companies, and response teams.
- Personnel responding to fires and other emergencies shall be organized into company units or response teams and have the required apparatus and equipment.
    - This avoids freelancing by personnel before and after the arrival of the fire suppression units; enables the incident commander to size-up available on-scene resources, ensures fireground accountability, and ensures a coordinated assignment of critical tasks.

Fire Critical Tasking

As volunteer agencies, the five fire companies align with NFPA 1720, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations and Special Operations to the Public by Volunteer Fire Departments, 2020 edition (National Fire Protection Association, Quincy, Mass.). This standard outlines organization and deployment of operations by volunteer and combination (a fire department having emergency service personnel comprising less than 85 percent majority of either volunteer or career membership) fire and rescue organizations. It serves as a benchmark to measure staffing and deployment of resources to certain fire incidents and emergencies.

According to NFPA 1720, fire departments should base their specific role on a formal community risk management plan, as discussed earlier in this analysis, and taking into consideration:[19]

- Life hazard to the population protected. The number and type of units assigned to respond to a reported incident shall be determined by risk analysis and/or pre-fire planning.
- Fire suppression operations shall be organized to ensure that the fire department's fire suppression capability includes personnel, equipment, and other resources to deploy fire suppression resources in such a manner that the needs of the organization are met.
- The Authority Having Jurisdiction shall promulgate the fire department's organizational, operational, and deployment procedures by issuing written administrative regulations, standard operating procedures, and departmental orders.

19. NFPA 1710, 5.2.1.1, 5.2.2.2

- The number of members that are available to operate on an incident is sufficient and able to meet the needs of the department.
- Provisions for safe and effective firefighting performance conditions for the firefighters.
- Personnel responding to fires and other emergencies shall be organized into company units or response teams and have the required apparatus and equipment to respond.
- Initial firefighting operations shall be organized to ensure that at least four members are assembled before interior fire suppression operations are initiated in a hazardous area.
- The capability to sustain operations shall include the personnel, equipment, and resources to conduct incident specific operations. Fire and rescue work are task-oriented and labor intensive, performed by personnel wearing heavy, bulky personal protective equipment (PPE). Many critical fireground tasks require the skillful operation and maneuvering of heavy equipment.
- The speed, efficiency, and safety of fireground operations are dependent upon the number of firefighters performing the tasks. If fewer firefighters are available to complete critical fireground tasks, those tasks will require more time to complete. This increased time is associated with elevated risk to both firefighters and civilians.

To ensure civilian and firefighter safety, fireground tasks must be coordinated and performed in rapid sequence. Assembling an Effective Response Force (ERF) is essential to accomplish on-scene goals and objectives safely and efficiently. Without adequate resources to control a building fire, the building and its contents continue to burn. This increases the likelihood of a sudden change in fire conditions, and thus the potential for failure of structural components leading to collapse. An inadequate ERF limits firefighters' ability to successfully perform a search and potential rescue of any occupants.

As a fire grows and leaves the room and then floor of origin, or extends beyond the building of origin, it is most probable that additional personnel and equipment will be needed, as initial response personnel will be taxed beyond their available resources. From this perspective it is critical that the fire company units respond quickly and initiate extinguishment efforts as rapidly as possible after notification of an incident. It is, however, difficult to determine in every case the effectiveness of the initial response in limiting the fire spread and fire damage. Many variables will impact these outcomes, including:

- The time of detection, notification, and response of fire units.
- The age and type of construction of the structure.
- The presence of any built-in protection (automatic fire sprinklers) or fire detection systems.
- The contents that are stored in the structure and its flammability.
- The presence of any flammable liquids, explosives, or compressed gas canisters.
- Weather conditions and the availability of water for extinguishment.

Subsequently, in those situations in which there are extended delays in the extinguishment effort, or the fire has progressed sufficiently upon arrival of fire units, there is actually very little that can be done to limit the extent of damage to the entire structure and its contents. In these situations, suppression efforts may need to focus on the protection of nearby or adjacent structures (exterior exposures) with the goal being to limit the spread of the fire beyond the building of origin, and sometimes the exposed building. This is often termed ***protecting exposures***. When the scope of damage is extensive, and the building becomes unstable, firefighting tactics typically move to what is called a ***defensive attack***, or one in which hose lines and more importantly

personnel are on the outside of the structure and their focus is to merely discharge large volumes of water until the fire goes out. In these situations, the ability to enter the building is extremely limited and if victims are trapped in the structure, there are very few safe options for making entry.

Today's fire service is actively debating the options of interior firefighting vs. exterior firefighting. These terms are self-descriptive in that an ***interior fire attack*** is one in which firefighters enter a burning building in an attempt to find the seat of the fire and from this interior position extinguish the fire with limited amounts of water. An ***exterior fire attack***, also sometimes referred to as a ***transitional attack***, is a tactic in which firefighters initially discharge water from the exterior of the building, either through a window or door and knock down the fire before entry in the building is made. The concept is to introduce larger volumes of water initially from the outside of the building, cool the interior temperatures, and reduce the intensity of the fire before firefighters enter the building.

A transitional attack is most applicable in smaller structures, typically single-family, one-story detached units that are smaller than 2,500 square feet in total floor area. For fires in larger structures, the defensive-type, exterior attacks involve the use of master streams, typically from an elevated aerial device, and capable of delivering large volumes of water for an extended period of time.

The exterior attack limits the firefighter from making entry into those super-heated structures that may be susceptible to collapse. From CPSM's perspective, there is the probability, depending on the time of day, a Haverford response crew of a limited number of personnel on the initial response will encounter a significant and rapidly developing fire situation. ***It is prudent, therefore, that the five companies build at least one component of their training and operating procedures around the tactical concept of this occurring.***

The variables of how and where personnel and companies are located, and how quickly they can arrive on scene, play major roles in controlling and mitigating emergencies. ***The reality is that the five companies rely on volunteer response from home or work to make up the teams and crews of the Effective Response Force.*** The five companies' volunteer member availability at any time of the day may have an impact on assembling enough personnel and resources on the scene. This factor has to be considered at all times by those responding to the scene, those responding to the station to pick up apparatus, and command officers responding who must manage and coordinate available responding and on-scene resources.

NFPA 1720 establishes the minimum response staffing for a predominately volunteer department for low-hazard structural firefighting incidents (to include out buildings and up to a 2,000 square-foot, one- to two-story, single-family dwelling without a basement and no exposures) for specific demand zones as shown in the following table.

Each demand zone takes into consideration certain risk elements such as population density, exposed occupied buildings (more predominant in urban and suburban demand zones), water supply, and proximity to responding apparatus and members (incident and fire station).

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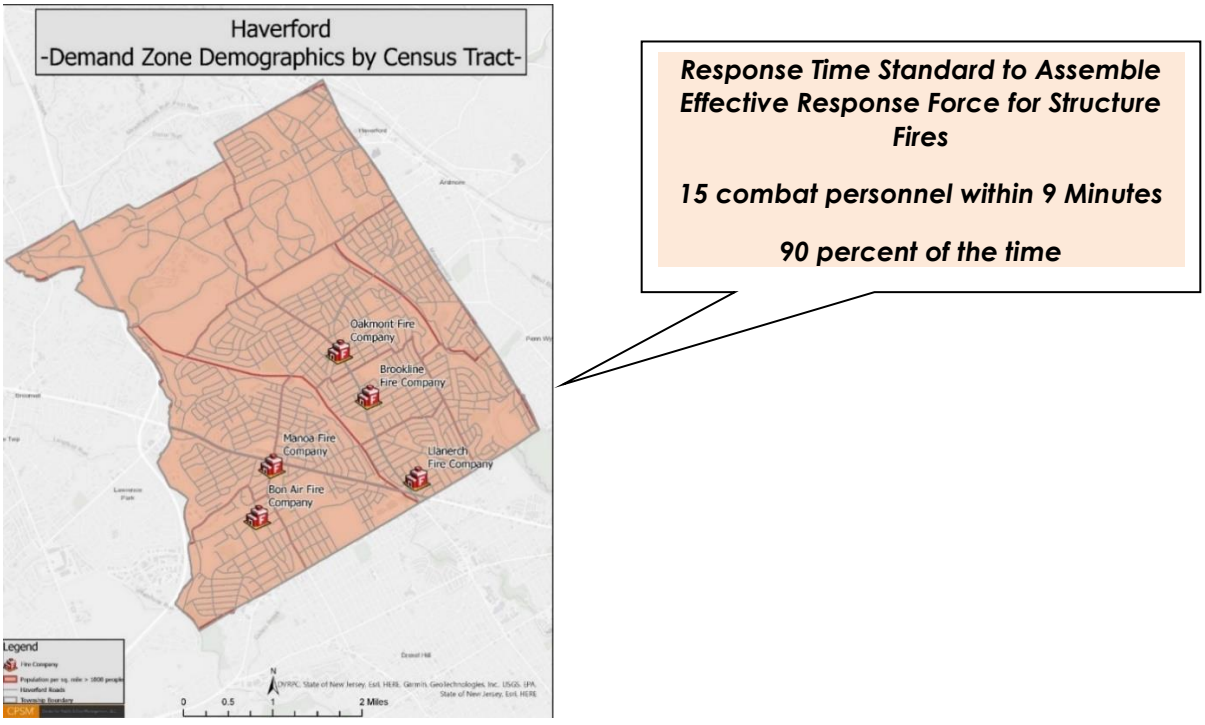
Table 22: NFPA 1720 Staffing for Effective Response Force Residential Structure, by Demand Zone

Demand Zone	Demographics	Minimum Staff to Respond to Scene*	Response Time Standard
Urban Area	>1000 people/mi²	15	Within 9 minutes 90 percent of the time
Suburban Area	500-1000 people/mi²	10	Within 10 minutes 80 percent of the time
Rural Area	<500 people/mi²	6	Within 14 minutes 80 percent of the time
Remote Area	Travel Distance ≥ 8 miles	4	Directly dependent on travel distance, determined by AHJ, 90 percent of the time

Note: *Minimum staff responding includes automatic and mutual aid. Minimum staff responding to scene by apparatus and personal owned vehicle.

The next figure shows Haverford Township as an urban response zone (utilizing NFPA 1720 population benchmark of > 1000 people/mi² . The purpose of this map is to identify the applicable NFPA 1720 demand zone and how this links to the Effective Response Force the departments should strive to assemble for building fires.

Figure 17: Haverford NFPA 1720 Demand Zones (100% Urban)



The next table provides the NFPA 1720 critical tasking for structure fires in an urban demand zone. As indicated above, the urban demand zone stipulates the largest minimum staffing and

more closely aligns with the NFPA 1710 Effective Response Force. In the urban demand zone, when the minimum staffing assembles, critical tasks are completed simultaneously.

Table 23: Critical Tasking in an Urban Demand Zone, Single-Family Dwelling

Critical Task	# of Responders Assigned to Task
Attack Line	2
Backup/Second Line	2
Ventilation	2
Search and Rescue	2
Rapid Intervention	2
Attack Engine Pump Operator	1
Water Source Engine Pump Operator	1
Outside Crew for: utility control, hose management, potential exposure line or additional fire suppression line	2
Incident Commander	1
Total Minimum Response for Urban Demand Zone	**15**

To assemble an Effective Response Force on structural fires and other structural type *box alarms,* each fire company has guidelines that outline the response of apparatus. As noted above, in each fire company, members respond to the station (other than chief officers or members strategically close to the incident), staff up the apparatus, then respond. The minimum staffing is four to six per apparatus, although there are times when staffing may be less. In these cases, the responding apparatus must announce their staffing. This staffing model ensures accountability of responding crews, establishes a leadership presence on each apparatus, and minimizes freelancing through responding staff in personal vehicles. ***This response protocol is a best practice.***

In-district responses have a company-specific response matrix for various call types, to include structural and structural type *box alarms*. Typical response for single family dwellings includes a minimum of two engine types, one rescue, at least one ladder, and some other units based on the district. This response pattern typically yields 15 personnel on the response apparatus, along with officers responding in vehicles. ***Consistency across all companies is important.***

For second or general alarms (incidents requiring additional apparatus and staffing beyond the initial alarm assignment in a district) each company has response protocols and procedures. This response protocol typically yields thirty or more staff.

Lastly, for commercial responses, each company has added two to three additional units including additional aerials, bringing the total possible on scene personnel to twenty-four plus members.

The next table summarizes the number of fire suppression personnel (firefighters) responding to fire calls that occurred within each fire company's first due area, broken down by fire call type as measured by CPSM from fire company fire incident reporting.

As a note to this table, the fire incident reporting CPSM analyzed did not differentiate members who responded to the scene from those who responded to the station to stand-by. Regardless, it measures the availability of responding members for all fire-related call types. Additionally, and

because the fire companies do not announce and benchmark when they have fifteen personnel on the scene of a structure fire, CPSM cannot analyze how the companies benchmark against the NFPA 1720 response time standard.

Table 24: Number of Fire Suppression Personnel Arriving at Fire Calls by District

Fire Call Type	Fire District					Overall Average
	Llanerch	Brookline	Oakmont	Manoa	Bon Air	
False alarm	17.6	15.3	NA	24.1	17.5	20.1
Good intent	16.6	27.0	31.0	14.0	NA	17.2
Hazard	13.7	23.5	10.5	15.7	12.7	15.6
Outside fire	13.1	10.4	18.5	13.5	9.0	14.7
Public service	6.0	NA	NA	9.0	13.0	8.7
Structure fire	***42.0***	***33.3***	***22.4***	***37.9***	***24.7***	***28.4***
Technical rescue	NA	NA	NA	10.0	NA	10.0
Total	**17.5**	**19.2**	**20.7**	**21.3**	**17.1**	**18.3**

Overall, all fire companies have a very good turnout for all alarm types. N/A means the fire company did not record these incident types.

NFPA 1500 and Two-In-Two Out

Another consideration, and one that links to critical tasking and assembling an Effective Response Force, is that of two-in/two-out. Prior to initiating any fire attack in an immediately dangerous to life and health (IDLH) environment (and with no confirmed rescue in progress), the initial two-person entry team shall ensure that there are sufficient resources on-scene to establish a two-person initial rapid intervention team (IRIT) located outside of the building.

One standard that addresses this is NFPA 1500, *Standard on Fire Department Occupational Health, Safety, and Wellness*, 2018 Edition. NFPA 1500 addresses the issue of two-in/two-out by stating during the initial stages of the incident where only one crew is operating in the hazardous area of a working structural fire. By this standard, a minimum of four individuals shall be required consisting of two members working as a crew in the hazardous area and two standby members present outside this hazard area available for assistance or rescue at emergency operations where entry into the danger area is required.[20]

NFPA 1500 also speaks to the utilization of the two-out personnel in the context of the health and safety of the firefighters working at the incident. *The assignment of any personnel including the incident commander, the safety officer, or operations of fire apparatus, shall not be permitted as standby personnel if by abandoning their critical task(s) to assist, or if necessary, perform rescue, the clearly jeopardize the safety and health of any firefighter working at the incident.*[21]

As is common with many volunteer/combination fire departments, the fire companies do not respond to structural fires with a pre-determined staffing regimen or a guaranteed command officer on the initial alarm dispatch. Under this response model, each fire company may or may not have the minimum number of firefighters on the initial response in order to comply with CFR 1910.134(g)(4), regarding two-in/two-out rules and initial rapid intervention team (IRIT).

20. NFPA 1500, 2018, 8.8.2.
21. NFPA 1500, 2018, 8.8.2.5.

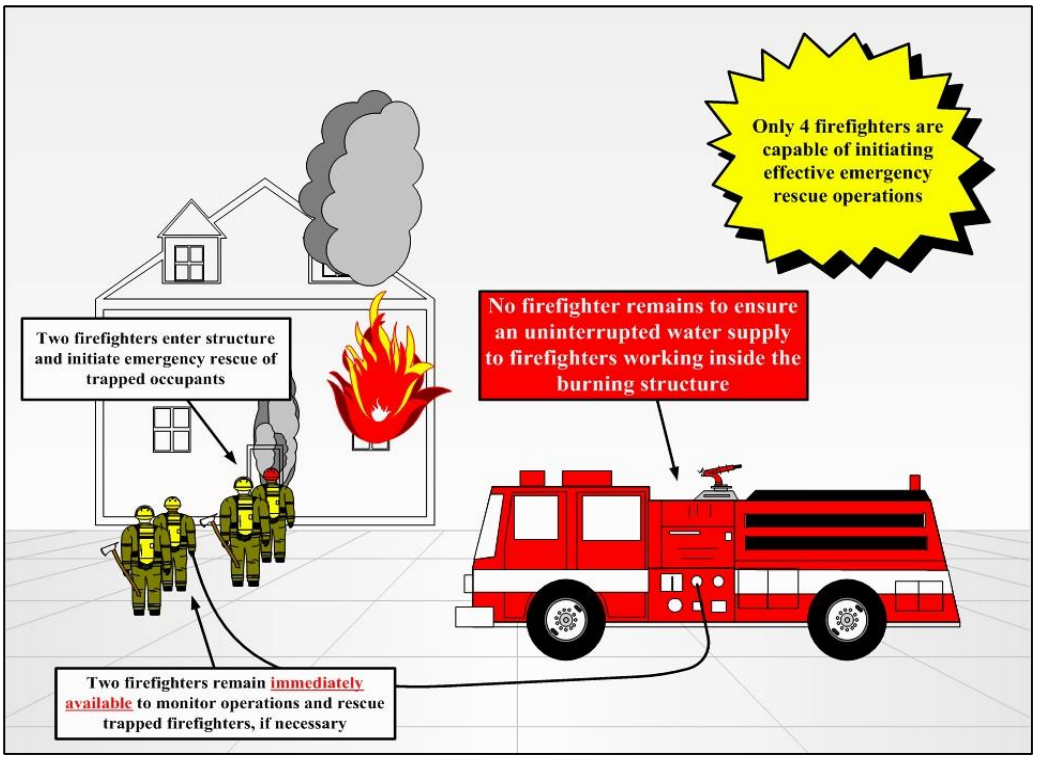
Responding members must be mindful of who and what apparatus is on scene and the Two-In/Two-Out concept.

In order to meet the intent of NFPA 1500, fire companies must utilize two personnel to commit to interior fire attack while two firefighters remain out of the hazardous area or immediately dangerous to life and health (IDLH) area to form the IRIT, while attack lines are charged, and a continuous water supply is established.

NFPA 1500 does allow for fewer than four personnel under specific circumstances. It states, Initial attack operations shall be organized to ensure that if on arrival at the emergency scene, initial attack personnel find an imminent life-threatening situation where immediate action could prevent the loss of life or serious injury, such action shall be permitted with fewer than four personnel.[22]

In the end, the ability to assemble adequate personnel, along with appropriate apparatus to the scene of a structure fire, is critical to operational success and firefighter safety. NFPA 1720 addresses this through the minimum staff to respond matrix this standard promulgates.

Figure 18: Two-In/Two-Out Interior Firefighting Model



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22. NFPA 1500, 2018 8.8.2.10.

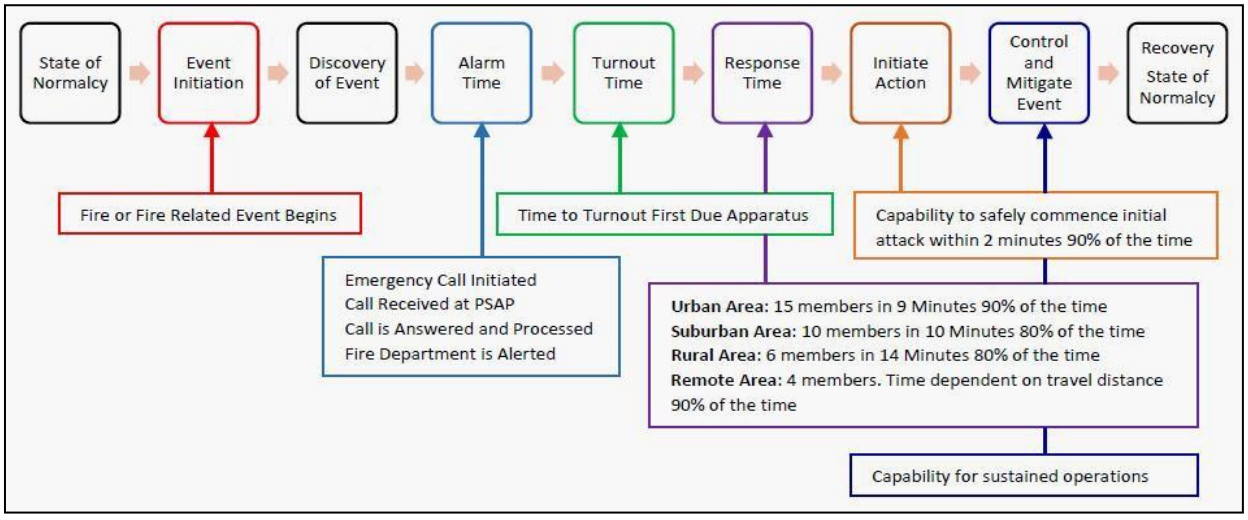
Response Time Performance

Fire agencies develop and review performance goals with an aim to limit the risk to their communities, citizens, and visitors from fire, injury, death, and property damage associated with fire, accidents, illness, explosions, hazardous materials incidents, and other natural or manufactured emergencies through prevention and response. Performance Level Objectives outline the commitment of fire agencies to meet pre-established objectives regarding the timeliness of response to specific incident types and risks.

Most fire incident/response performance goals are developed based on industry and national standards. Fire agencies utilize applicable NFPA, ISO, OSHA, and Center for Public Safety Excellence (CPSE) accreditation standards.

In the fire discipline the cascade of events and the associated response time benchmarks and goals serve as performance benchmarks as illustrated in the next figure.

FIGURE 19: NFPA 1720 Response Time Performance



The ability to quickly deploy adequate fire staff prior to flashover limits a fire's extension beyond the room or area of origin. Regarding the risk of flashover, the authors of an IAFF report conclude: *Clearly, an early aggressive and offensive initial interior attack on a working structural fire results in greatly reduced loss of life and property damage. Consequently, given that the progression of a structural fire to the point of "flashover" (the very rapid spreading of the fire due to super-heating of room contents and other combustibles) generally occurs in less than ten minutes, two of the most important elements in limiting fire spread are the quick arrival of sufficient numbers of personnel and equipment to attack and extinguish the fire as close to the point of its origin as possible.*[23]

A crucial factor in the whole response time question is what we term "**detection time**." This is the time it takes to detect a fire or a medical situation and notify 911 to initiate the response. In many instances, particularly at night or when automatic detection systems (fire sprinklers and smoke detectors) are not present or inoperable, the fire detection process can be extended.

23. *Safe Fire Fighter Staffing: Critical Considerations*, 2nd ed. (Washington, DC: IAFF, 1995), 5.

The same holds true for EMS incidents. Many medical emergencies are often thought to be something minor by the patient, treated with home remedies, and the true emergency goes undetected until signs and symptoms are more severe. When the fire-EMS department responds, they often find these patients in acute states. Fires that go undetected and are allowed to expand in size become more destructive, are difficult to extinguish, and require more resources for longer periods of time.

Dispatch time is the difference between the time a call is received and the earliest time an agency is dispatched. Dispatch time includes call processing time, which is the time required to determine the nature of the emergency and the types of resources to dispatch. The NFPA 1221 standard for this component of response times is the most utilized benchmark. Benchmark times include:

- ≤ 15 seconds 90 percent of the time to answer incoming emergency lines.
- ≤ 20 seconds 95 percent of the time to answer incoming emergency lines.
- ≤ 60 seconds 90 percent of the time for the highest priority level of emergency calls.

The next component of response time is **turnout time**, an aspect of response which is controlled by the responding Fire agency.

The last component of response time is **travel time**, an aspect of response time that is affected by factors such as station location, road conditions, weather, and traffic control systems.

As a benchmark, for a volunteer or predominately volunteer fire department/paid-per-call department such as those in Haverford, NFPA 1720 recommends the entire initial effective response force of 15 personnel in an urban demand zone be on scene within 9 of dispatch. It is also important to keep in mind that once units arrive on scene there is a time lag before water reaches the fire as crews and responding units have several tasks to complete in the initiating action period immediately after arrival at the scene.

NFPA 1720 calls attention to additional requirements worth noting here:

- The fire department shall identify minimum staffing requirements to ensure that the number of members that are available to operate are able to meet the needs of the department.
  - The five companies have implemented policies wherein members respond to the station, dress out, and then respond on apparatus to the scene.
- Upon assembling the necessary resources at the emergency scene, the fire department shall have the capability to safety commence an initial attack within 2 minutes 90 percent of the time.
  - This should be announced by the incident commander over the radio and measured through the computer-aided dispatch (CAD) system after the arrival of the initial arriving companies and response teams.
- Personnel responding to fires and other emergencies shall be organized into company units or response teams and have the required apparatus and equipment.
  - This avoids freelancing by personnel before and after the arrival of the fire suppression units; enables the incident commander to size-up available on-scene resources, ensures fireground accountability, and ensures a coordinated assignment of critical tasks.

To review, the next table shows the response time and minimum staffing level for low-hazard structural firefighting incidents (to include out-buildings and up to a 2,000 square-foot, one- to

two-story, single-family dwelling without a basement and no exposures) in an urban demand zone as defined by NFPA 1720. This table reflects the minimum staffing and response time in minutes to assemble the minimum staffing in this demand zone. The minimum staffing represents the response force necessary to combat or begin to combat a structural type of fire as described above. All of Haverford Township is considered an urban demand zone utilizing the NFPA 1720 population density benchmark.

Urban demand zones differ as these demand zones have a higher population density, and have a higher percentage of multifamily, townhouse, condominium, and multistory apartment building structures, which require a greater response force to complete the critical tasking necessary to mitigate the fire and life-safety emergency. This is the case in Haverford.

Table 25: NFPA 1720 Staffing and Response Times, Low-Hazard Structural Fire

Demand Zone	Demographics	Minimum Staff to Respond	Response Time in Minutes	Meets Objective Percentile
Urban Area	>1000 people/mi	15	9	90%

Aggregate response times for the ***first arriving fire suppression unit*** for all calls for the five companies at the 90th percentile (NFPA 1720 urban areas) is outlined in the next table. The NFPA 1720 standard is benchmarked against structure fires.

Table 26: 90th Percentile Response Times of First Arriving Fire Unit, by Fire Call Type (Minutes)

Call Type	90th Percentile Response Time			
	Dispatch	Turnout	Travel	Total
False alarm	4.9	5.0	5.0	10.0
Good intent	5.1	5.5	4.9	10.5
Hazard	5.9	4.9	5.2	10.8
Outside fire	6.4	4.9	5.7	11.5
Public service	5.9	0.9	5.6	10.3
Structure fire	3.6	5.0	5.4	10.3
Technical rescue	6.4	4.4	3.6	10.7
Fire Total	**5.2**	**5.0**	**5.2**	**10.4**

Aggregately, turnout and travel times for the five departments at the 90th percentile for structure fires are very good.

Fire District	90th Percentile Response Time			
	Dispatch	Turnout	Travel	Total
Llanerch	4.3	6.0	4.4	9.0
Brookline	4.6	4.3	3.7	8.0
Oakmont	4.6	5.1	6.0	11.2
Manoa	6.5	4.2	3.6	9.4
Bon Air	7.7	1.8	3.0	11.1

Many fire departments measure and report the average response time standard. The next table depicts fire related average response times for the five fire companies.

Table 27: Average Response Time of First Arriving Fire Unit, by Fire Call Type (Minutes)

Call Type	Dispatch	Turnout	Travel	Total Response
False alarm	2.3	1.8	2.8	6.9
Good intent	2.4	2.1	2.8	7.2
Hazard	2.8	1.5	3.0	7.3
Outside fire	3.6	1.5	2.7	7.8
Public service	4.0	0.5	3.5	8.1
Structure fire	1.9	1.9	3.2	7.1
Technical rescue	3.8	1.0	2.3	7.0
Fire Total	**2.5**	**1.7**	**2.9**	**7.1**

Fire District	Dispatch	Turnout	Travel	Total Response
Llanerch	2.2	2.7	2.6	7.5
Brookline	2.7	1.3	2.3	6.3
Oakmont	2.4	1.9	3.7	8.0
Manoa	3.2	1.3	2.1	6.6
Bon Air	4.9	0.5	1.9	7.3
Total	**2.7**	**1.7**	**2.9**	**7.3**

Mutual Aid

Haverford Township currently is not signatory to specific automatic aid agreements with any of the surrounding fire departments. Automatic aid involves an agreement whereby fire, rescue and EMS units respond automatically into another jurisdiction based on closeness of resources. Mutual aid involves an agreement whereby adjacent or surrounding communities provide fire, rescue, and EMS resources to a community upon a specific request (not automatically). In an automatic aid scenario, resources from neighboring jurisdictions are built into run cards in the home jurisdiction for an automatic response; these response resources are intended to supplement and bolster the effective response force of the home jurisdiction.

Haverford Township is currently signatory to the Southeastern Pennsylvania Mutual Aid and Intergovernmental Cooperation Agreement that includes Delaware County, Montgomery County, Chester County, Bucks County, and the City of Philadelphia. Haverford Township is also a participating entity (as it has not opted out) in the Commonwealth of Pennsylvania Intrastate Mutual Aid statute (Title 35). The purpose of both mutual aid compacts is to share resources when needed for the protection of lives and property.

- Manoa Fire Company also provides automatic/mutual aid as described below:
- Marple Township – automatic aid on structure fire responses.

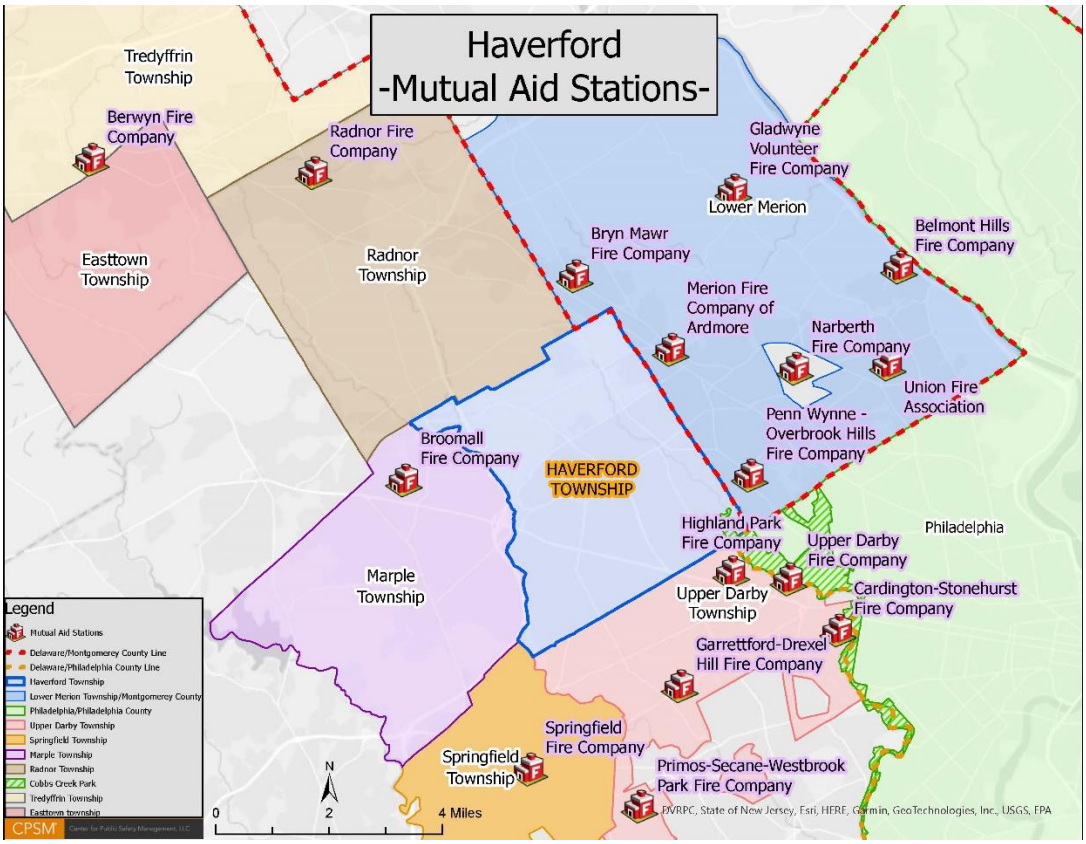
- Springfield Township – automatic aid for Rapid Intervention Team on structure fire responses.
- Darby Borough – mutual aid for Rapid Intervention Team on the working fire dispatch for structure fire responses.
- Lansdowne Borough – mutual aid for Rapid Intervention Team on the working fire dispatch for structure fire responses.
- Newtown Township – mutual aid for Rapid Intervention Team on the working fire dispatch for structure fire responses.
- Upper Darby Township – mutual aid for Rapid Intervention Team on the working fire dispatch for structure fire responses; mutual aid for Swiftwater Rescue incidents.
- Yeadon Borough – mutual aid for Rapid Intervention Team on the working fire dispatch for structure fire responses.

During the CPSM data analysis study period, the five fire companies participated in mutual as outlined here:

- Mutual Aid provided: 108 call requests (does not count cancelled calls)
  - The greatest percentage of mutual aid provided occurred in Broomhall (31), Upper Darby (26), Darby (13), Chester City (11), Springfield (10), and Yeadon (10).
- Mutual Aid received: 255 calls (NFIRS records)

The next figure illustrates available mutual aid companies in the surrounding jurisdictions.

Figure 20: Mutual Aid Fire Companies in Contiguous Jurisdictions



There is opportunity to enhance fire protection in certain areas of Haverford through automatic aid agreements with Lower Merion Township (in northwest and southeast Haverford Township), Upper Darby Township (in southeast Haverford Township), and Broomall Township (in northwest Haverford Township)

Regional Fire Department Benchmarking

The following information serves to provide a regional benchmark of township fire departments as compared to Haverford.

The provision of fire protection services remains a decision of the local jurisdiction (authority having jurisdiction-AHJ), and is driven by many factors, of which are presented in this report. These include community risk, ability of the fire department(s) in the community to deliver measured and reliable service, and the ability of the local jurisdiction to support and sustain these services. As service deliverable levels and assets are a local decision, benchmarking against other communities provides decision-makers an additional level information.

This report section provides information extracted from the January 2022, *National Fire Department Registry Summary*, which is provided through the U.S. Fire Administration (USFA). This foundational information is followed by tables that include benchmarking of regional township fire departments.

Fire Departments in the United States and U.S. Territories

Currently the USFA lists 27,190 registered fire departments, which constitute about 91% of the departments estimated to be in the United States.[24] The registered fire departments are further broken down as:

- 70.2% are volunteer
- 15.7% are mostly volunteer
- 9.3 % are career
- And 4.9% are mostly volunteer

Personnel

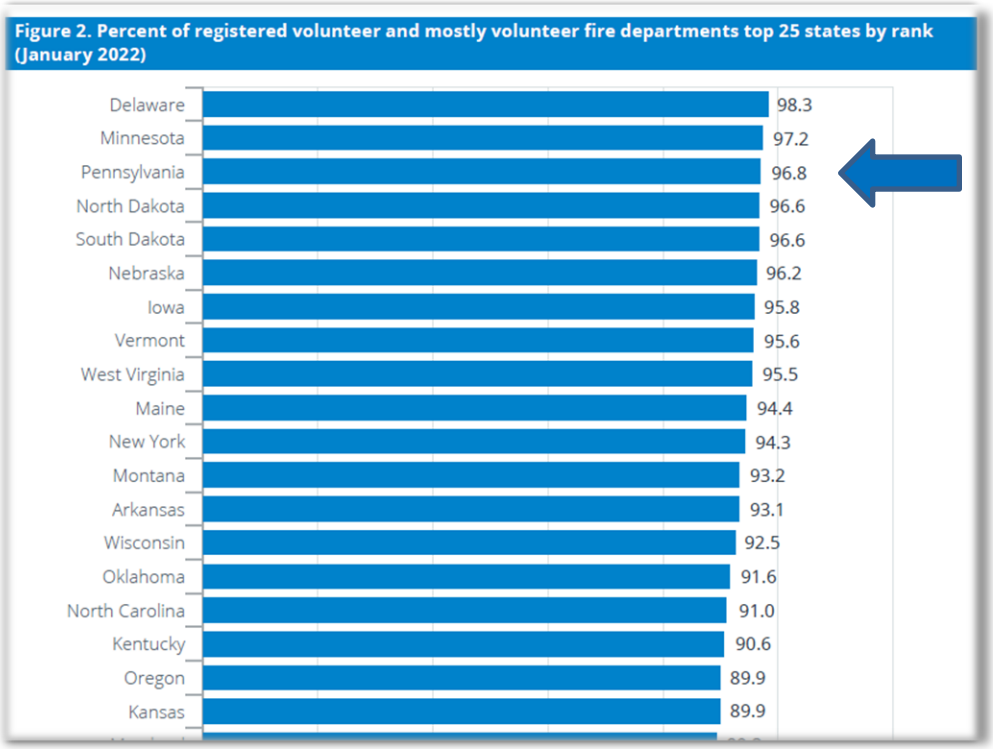
The registered fire departments are staffed by 1,215,700 personnel (as reported). This figure includes career, volunteer and paid-per-call firefighters, as well as civilian staff and nonfirefighting personnel. There are a total of 1,063,900 active career, volunteer and paid-per-call firefighters representing 88% of the registered departments' personnel. Of the active firefighting personnel:

- 54% were volunteer firefighters.
- 34% were career firefighters.
- 12% were paid-per-call firefighters.

Pennsylvania has the third most registered volunteer fire departments in the U.S. and U.S. territories as illustrated in the next figure.

24 The U.S. Fire Administration's National Fire Department Registry is a voluntary program, and it does not include all fire departments in the U.S. or its territories.

Figure 21: Percent of Volunteer or Mostly Volunteer Fire Departments



The next table benchmarks Pennsylvania fire department types against the national average.[25] USFA *National Fire Department Registry Summary* the following data was collected comparing the State of Pennsylvania with the national average.

Table 28: Pennsylvania Fire Department Type: Compared Against National Data

	Volunteer	Mostly Volunteer	Mostly Career	Career
Pennsylvania	**90.1%**	**6.7%**	**0.7%**	**2.6%**
National Average	**70.2%**	**15.7%**	**4.9%**	**9.3%**

The next set of tables and figures benchmarks community population against apparatus deployment (engines and ladders) as reported by the *National Fire Protection Agency's Survey of Fire Departments for U.S. Fire Experience, 2020* report. Current Haverford deployment is noted in each.

25. USFA *National Fire Department Registry Summary*

Figure 22: Pumpers (engines) by Community Size 2018-2020

Table 16. Pumpers (1,000 gpm or greater) by Community Size, 2018–2020

Population Protected	Percentage of US Fire Departments With						
	No Pumpers	1–5 Pumpers	6–9 Pumpers	10–19 Pumpers	20–39 Pumpers	40 or More Pumpers	Total
1,000,000 or more	0%	0%	0%	6%	22%	72%	100%
500,000 to 999,999	2%	0%	2%	2%	64%	30%	100%
250,000 to 499,999	0%	0%	6%	59%	34%	1%	100%
100,000 to 249,999	1%	21%	41%	32%	5%	0%	100%

Population Protected	Percentage of US Fire Departments With					
	No Pumpers	1 Pumper	2 Pumpers	3–4 Pumpers	5 or More Pumpers	Total
50,000 to 99,999	1%	2%	10%	34%	53%	100%
25,000 to 49,999	1%	6%	23%	46%	23%	100%
10,000 to 24,999	1%	9%	34%	46%	10%	100%
5,000 to 9,999	1%	14%	45%	36%	3%	100%
2,500 to 4,999	2%	23%	50%	24%	1%	100%
Under 2,500	11%	41%	39%	9%	0%	100%

Note that pumpers reported above had a capability of 1,000 gpm or greater. Note that many departments reported other fire suppression vehicles including apparatus with pumps less than 1,000 gpm, hose wagons, brush fire vehicles, tankers, etc.

Sums may not equal totals due to rounding errors.

Source: NFPA *Fire Service Survey, 2018–2020.*

Figure 23: Aerial Apparatus by Community Size 2018-2020

Table 18. Aerial Apparatus by Community Size, 2018–2020

Population Protected	Percentage of US Fire Departments with					
	No Aerial Apparatus	1–5 Aerial Apparatus	6–9 Aerial Apparatus	10–19 Aerial Apparatus	20 or More Aerial Apparatus	Total
1,000,000 or more	6%	11%	11%	28%	44%	100%
500,000 to 999,999	9%	32%	23%	25%	11%	100%
250,000 to 499,999	11%	59%	20%	10%	0%	100%

Population Protected	Percentage of US Fire Departments with					
	No Aerial Apparatus	1 Aerial Apparatus	2 Aerial Apparatus	3–4 Aerial Apparatus	5 or More Aerial Apparatus	Total
100,000 to 249,999	17%	27%	28%	19%	9%	100%
50,000 to 99,999	29%	42%	22%	7%	0%	100%
25,000 to 49,999	36%	51%	12%	1%	0%	100%
10,000 to 24,999	49%	47%	3%	0%	0%	100%
5,000 to 9,999	73%	26%	1%	0%	0%	100%
2,500 to 4,999	89%	10%	0%	0%	0%	100%
Under 2,500	96%	4%	0%	0%	0%	100%

Sums may not equal totals due to rounding errors.

Source: NFPA *Fire Service Survey, 2018–2020.*

At the time of this report, Haverford currently has 3 ladder trucks in service.

The following tables and data are provided as an information resource for Haverford. Data collected for benchmarking included seven townships within proximity to Haverford. These include townships in Delaware County, Montgomery County, and Bucks County.

Fire companies in this part of Pennsylvania may serve more than one township based on their location and pursuant to mutual aid agreements. In the data provided, the only fire companies counted for each township was based on physical location within the township and not their service area.

Table 29: Regional Benchmark: Demographics and Characteristics

County	Township	Population	Square Miles	Population Density/sq. mile	# of Fire Stations	Career, Volunteer, Combination
Delaware	**Haverford**	**50,425**	**9.95**	**5,071**	**5**	**Volunteer**
Delaware	Ridley	30,975	5.12	6,071	6	Volunteer
Montgomery	Lower Merion	63,530	23.61	2,695	6*	Combination
Montgomery	Cheltenham	37,452	9.03	4,148	4	Volunteer
Montgomery	Abington	58,471	15.52	3,767	5	Volunteer
Bucks	Middletown	45,846	18.89	2,427	5	Volunteer
Montgomery	Springfield	20,771	6.73	3,086	3	Volunteer

*Does not count Narberth Borough Fire Department

Table 30: Regional Benchmark: Fire Protection Characteristics

County	Township	Fire Stations/ sq. mile	Fire Stations/ Population	Career Chief or Career Coordinator	# of Engines	# of Aerials	# of Heavy Rescues
Delaware	**Haverford**	**1.99**	**10,085**	**No**	**10**	**3**	**2**
Delaware	Ridley	0.85	5,163	Coordinator	11	3	3
Montgomery	Lower Merion	3.94	10,588	Career	10	6	2
Montgomery	Cheltenham	2.26	9,363	No	5	3	1
Montgomery	Abington	3.10	11,694	No	10	3	1
Bucks	Middletown	3.78	9,169	No	7	2	2
Montgomery	Springfield	2.24	6,924	No	6	1	1

*Does not count Narberth Borough Fire Department

Our benchmarking exercise tells us that Haverford aligns with townships of similar population and population density/square mile in terms of the number of fire stations, engines, and ladder trucks. Two communities (Lower Merion and Ridley) have a central coordinator for fire protection. Lower Merion utilizes the career Fire Chief model.

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Fire Performance Objectives

CPSM recommends the following baseline performance objectives for the five fire companies:

- Meet company and NFPA 1720 staffing parameters for an on-scene Effective Response Force (15 members) for structure fires in the urban response areas in 9 minutes, 90 percent of the time.
    - This should be announced by the incident commander over the radio and measured through the computer-aided dispatch (CAD) system after the arrival of the initial arriving members, companies, and response teams.
- Meet staffing parameters for an on-scene Effective Response Force for technical rescue, hazardous materials, water rescue, rapid intervention team, and/or other specialty response incidents in all response areas in 10 minutes, 90 percent of the time.
- Meet staffing parameters for an on-scene Effective Response Force for all non-structural fire, fire-related incidents (fire alarms, outside fires, public assist, good intent, hazards, technical rescue) in all response areas in 10 minutes, 80 percent of the time.

Considering the five companies are volunteers, the turnout times shown in the tables above are not alarmingly long for the initial unit. There are some considerations, however, each company may choose to implement to reduce turnout times and thereby reduce overall response times. These include:

- For nights only (Sunday-Saturday) when volunteer members are able to commit more readily based on work hours, assign a crew of four to a station to immediately respond in one apparatus. All other members respond to the station to staff and respond in other apparatus assigned to the incident. Typical hours are 6:00 p.m. to 6:00 a.m.
- Another more aggressive model is night and weekend crews when volunteer members are able to commit more readily based on work hours. Under this model a department would assign a crew of four to a station to immediately respond in one apparatus. All other members respond to the station to staff and respond in other apparatus assigned to the incident. Typical crew assignment commitment times are 6:00 a.m. to 6:00 p.m. and 6:00 p.m. to 6:00 a.m. This of course requires bunking areas and other living accommodations.

NFPA 1720 calls attention to additional staffing/response requirements worth noting here:

- The fire department shall identify minimum staffing requirements to ensure that the number of members that are available to operate are able to meet the needs of the department.
    - For the volunteer component this can include scheduled staffing at predetermined stations or pre-determined staff responding to stations to assemble and response apparatus such as what the five companies in the township currently do.
- Where staffed stations are provided, when determined by the authority having jurisdiction, they shall have a turnout time of 90 seconds for fire and special operations and 60 seconds for EMS incidents, 90 percent of the time.
    - This should be measured at volunteer staffed stations.
- Upon assembling the necessary resources at the emergency scene, the fire department shall have the capability to safety commence an initial attack within 2 minutes 90 percent of the time.

- This should be announced by the incident commander over the radio and measured through the computer-aided dispatch (CAD) system after the arrival of the initial arriving members, companies, and response teams.

- Personnel responding to fires and other emergencies shall be organized into company units or response teams and have the required apparatus and equipment.
  - This avoids freelancing by personnel before and after the arrival of the fire suppression units; enables the incident commander to size-up available on-scene resources, ensures fireground accountability, and ensures a coordinated assignment of critical tasks.
- The five fire companies communicated they have an established fireground accountability process and procedure. This system, when utilized correctly, accounts for those members operating in and around the emergency scene or fire buildings. As a performance objective, an accountability system should be implemented and utilized on all responses.

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SECTION 5. EMERGENCY MEDICAL SERVICES

Narberth Ambulance Agreement

Haverford township residents and visitors are provided EMS Services by Volunteer Medical Services Corps of Lower Merion and Narberth, a Pennsylvania-based not-for-profit corporation d/b/a Narberth Ambulance.

EMS agencies are promulgated Under 28 Pa. Code §§ 1005.10(c) and 1007.7(c) (relating to licensure and general operating standards; and licensure and general operating requirements). Local EMS oversight is provided by the Delaware County EHS Council.

Narberth Ambulance is a Licensed EMS Provider by the Pennsylvania State Department of Health, Bureau of Emergency Medical Services, and is an authorized Basic & Advanced Life Support Agency in Good Standing.

EMS operations for Haverford Township are contractually awarded on a competitive bid process. Narberth ambulance has been providing contracted EMS services to Haverford Township Since 2016. Pursuant to the current agreement between the township and Narberth Ambulance, the term of the current agreement automatically renews for additional one-year terms on an annual basis unless either party gives written notice of its intent to terminate the agreement, as modified by the first amendment, at least sixty (60) days prior to the expiration of the current term.

Under the current EMS Service agreement between Haverford Township and Narberth Ambulance, ***as amended and implemented on February 28, 2019***, (first amendment to the 2016 original agreement), the township provides:

- The cost of one full-time paramedic employee, inclusive of salary, benefits, and all necessary insurance coverage. This currently is the township Deputy Director of EMS. Under the terms of the current agreement, Narberth Ambulance may discontinue its relationship with the current provided township employee at which time the township can either provide an acceptable substitute full-time township paramedic employee to Narberth Ambulance, or provide funding to Narberth Ambulance in an amount not to exceed $120,000 to be utilized to offset the cost of a Narberth Ambulance full-time paramedic employee of comparable skill and experience as the township employee noted herein.
- $8,000 for Narberth Medical Director direction and clinical oversight of the Haverford Township EMS Department.
- Two ambulances for Narberth Ambulance to deploy in Haverford Township. The township is also responsible for replacing these ambulances at or about the expected life span of seven years, or before if an ambulance is inoperable for any reason.
- One quick response vehicle assigned to the township Deputy Director of EMS, and which can be utilized by Narberth Ambulance at the direction of the Narberth Ambulance Chief of Operations.
- Vehicle insurance and repairs for vehicles the township provides to Narberth Ambulance as described in the agreement.

- Suitable housing at two locations within the township as mutually agreed upon between the township and Narberth Ambulance. The agreement further defines what 'suitable' housing includes. The township is responsible for facility repairs and maintenance as well as the provision of IT services and maintenance of computer equipment.

Under the current EMS Service agreement as **amended and implemented on February 28, 2019**, (first amendment to the 2016 original agreement) between Haverford Township and Narberth Ambulance, Narberth Ambulance provides:

- Monthly 'Chiefs Report' to the township EMS Director and the Township Manager. Narberth is also required to provide a quarterly report that focuses on specific metrics and data applicable to Haverford EMS.
- Vehicle insurance and repairs for vehicles Narberth ambulance owns and operates regardless of who is operating the vehicle.

Pursuant to the **October 2016 agreement**, operationally the township will provide:

- Two ambulances on implementation of the agreement, with subsequent replacement in 2017. The township is required to replace an ambulance if rendered permanently inoperable.
- On quick response vehicle primarily utilized by a township employee, but available for use by Narberth Ambulance.
- Vehicle repair, fuel, maintenance, and maintenance of all equipment.
- Suitable housing for crews.
- Certain EMS-ambulance equipment as specified in the agreement.
- Addition of Narberth Ambulance's Chief of Operations to the township emergency management team. Allowance to apply for local, state, federal, and private grants to help support Narberth EMS operations in Haverford.

Pursuant to the **October 2016 agreement**, operationally Narberth Ambulance will provide:

- Staffing for two Advanced Life Support (ALS) ambulances (24/7/365 through qualified and sufficient staffing.
  - Includes uniforms and staff equipment.
  - The Pennsylvania Department of Health must license all Narberth personnel.
  - Maintain ALS provider license issued by the Pennsylvania Department of Health.
  - Provide EMS providers with on-going continuing education at no expense to expense to EMS providers.
  - Provide Township Director of EMS with advance notice prior to hiring and new employee and consider any objection raised by the director.
- Ambulances must be solely dedicated to Haverford with the exception of mutual aid calls/and or temporary relocation assignments as dispatched by Delaware County.
- All responses will be provided in a safe and timely manner in accordance with Delaware County Department of Health EMS Guidelines.
- After initial stocking of ambulances, Narberth is responsible for restocking of consumables including medications thereafter.

- Provide back-up ambulance or equipment whenever possible to the township designated ambulances and as needed. Should the back-up go beyond seven days and require a rental, the township will reimburse Narberth Ambulance.
- Provide monthly and periodic reports to the Township EMS Director and Township Manager.
- Provide assistance for township special events as outlined in the agreement.
- Narberth cannot solicit general annual membership/subscription fund drive for the residents and businesses in the township without express approval of the Township Board of Commissioners. Targeted private donations from supporters are allowable once approval is granted by the Township Manager.
- Narberth is entitled to bill and collect all patient treatment and transport associated with the agreement.

The agreement as outlined above is not atypical of agreements CPSM has reviewed during past analyses. Communities contracting with private firms for EMS ground transport services either provide a direct subsidy to ensure the level of effort or level of performance established in an agreement can be met, or has a greater chance of being met, or they provide direct assets to offset costs for the private firm. In most cases, EMS ground transport revenues cannot support an EMS system entirely to perform at a high level of response time performance, and/or established and agreed upon level of effort.

In the case of Haverford, the level of funding or asset contribution in terms of staff, ambulances, crew housing, equipment, compensation for medical direction and other such contributions outlined in the agreement and amended agreement offsets and contributes to Narberth's ability to maintain two staffed ALS units in Haverford. This is typical in a prescribed level of effort or level of performance agreement. Haverford does this in lieu of a direct subsidy, which communities do as well across the country, again, to ensure a high success rate of meeting a level or performance or maintaining an established level of effort.

Narberth ambulance is currently operating under a ***'Level of Effort'*** contract with Haverford Township, contracting for a specified number of ambulance units. The agreement does not specify any performance levels such as response time benchmarks. The agreement requires Narberth to submit *quarterly reports focusing on response metrics applicable to the township. The form of the quarterly reports and the metrics included within it will be agreed upon by the Township Director of EMS and Narberth's Chief of Operations.* We assess that these requirements for reporting are not accompanied by specific measurable goals, or outcomes of performance that have been mutually established and agreed upon. This represents an opportunity for system enhancement and serves as our recommendation to establish mutually agreeable performance goals and metrics (level of performance), and the method and frequency of reporting. This recommendation coincides with the recommendation to establish regular, and routine lines of communication between parties.

It is more common for ambulance providers and jurisdictions to operate under a 'Performance-Based or Level of Performance' agreement, which would specify a desired performance levels for key clinical, experiential, and response time metrics.

Additionally, at the time of this evaluation, concerns regarding vehicle replacement were noted as a potential vulnerability. Increasing fleet size to accompany appropriate replacement cycles and effective continuity of operations during fleet downtime for repairs and maintenance is discussed in more detail later in this report.

Lastly, under the terms of the contractual service agreement, again, there is no direct subsidy paid to Narberth Ambulance. All direct payments are for service. Under the agreement

Narberth Ambulance bills transported patients for all related services and recovers those fees in accordance with local, state, and federal regulations. Additionally, the contract restricts Narberth Ambulance from conducting any annual membership fundraising without prior approval from the Township Board of Commissioners.

Medical Direction

Current EMS clinical treatment is authorized and directed by an Agency/Board appointed physician who is the Primary Medical Director and is assisted by four Assistant Medical Directors. This physician group provides dedicated EMS Specialized medical direction, clinical oversight, EMS Education, and various other EMS-related projects that are consistent with industry best practices for a valued EMS system such as Narberth Ambulance.

The Primary Medical Director at the time of this report is Dr. Joseph Bushra, MD, FAAEM, NREMT-P. Dr. Bushra is an experienced EMS Medical Director who also serves as an attending physician and Director of the Emergency Department for Lankenau Hospital.

In addition to serving as the EMS Medical Director for Narberth Ambulance, Dr. Bushra also serves on the Board of Directors. These intersections provide for a high level of EMS Physician involvement in addition to medical direction, clinical oversight, and training.

This high level of engagement was evident by a documented and outlined robust training program, QA/QI monitoring, staff/physician engagement, and protocol development.

It is assessed, Narberth Ambulance's Medical Direction program /practices are consistent with current EMS best practices for EMS Physician engagement, clinical oversight, and program development.

As previously mentioned, the current Medical Direction program at Narberth Ambulance includes four (4) assistant medical directors. It is noteworthy to report that the assistant medical directors are also highly experienced in EMS, also have Board involvement, and are equally engaged.

It is assessed at the time of this report that Narberth Ambulance's EMS Medical Direction is well supported by a team of experienced, dedicated, and fully engaged in all areas that are consistent with industry best practices.

Staffing

Despite the impact of the national EMS worker shortage, and economic challenges faced by many EMS agencies, Narberth Ambulance continues to provide reliable service to the residents and visitors of Haverford Township, Delaware County, PA. However, like many communities, Narberth Ambulance will need to address and forecast EMS delivery challenges for Narberth Ambulance to continue providing the level of service the community enjoys.

The staff of Narberth Ambulance includes over 30 full time and 40 part time employees and over 70 volunteers. They respond to over 10,000 annual calls to the residents of Lower Merion, Narberth, Haverford, Conshohocken & West Conshohocken.

At the time of this review, it is reported that Narberth provides a complement of 16 FTE's & Supervision to support Haverford Township EMS Operations.

Currently, both ALS Stations operate on a rotating 12 Hour Operating Shift, providing 24 HR Coverage.

During our meetings with Narberth ambulance, it was reported they were currently 99% staffed, with only One (1) Full-Time Night Position open.

Additionally, Narberth Ambulance reports that Haverford Operations are staffed 100%, and Narberth Ambulance adjusts staffing as needed to ensure Haverford Township is always staffed 27/7/365.

Haverford Township's EMS Director operates an ALS Responder (SUV) vehicle, to provide incident command at large events, catastrophes and a host of other situations that can stress our emergency resources. ***This serves as a valuable primary and back-up response level of service.***

At the time of our review, we assess that Narberth Ambulance is actively monitoring and addressing staffing, recruitment and retention that involves employee engagement. As a result of a 2021 Employee engagement survey to elicit anonymous feedback from staff, Narberth Ambulance has taken actions to address areas involving compensation, incentives, staff engagement, staff development, leadership, communications, and the work environment.

Although the EMS service industry is facing increased challenges to staffing, Narberth's current operational strategy, staff engagement and investment have had a positive impact on current staffing levels.

While the Township currently contracts Narberth Ambulance Corps for day-to-day 911 EMS services it also maintains its own Pennsylvania Department of Health Advanced Life Support License. This license allows for the Township's EMS Director and Deputy Director to operate ALS Responder (SUV) vehicles and provide incident command at large events, catastrophes, and a host of other situations that stress our emergency resources. This license also allows for the Township's core group of Tactical Paramedics to integrate with the Township's police department and other law enforcement agencies.

EMS Critical Tasking

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

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

Critical tasks by specific call type in EMS-only agencies assisted by fire companies are not as well-defined as critical tasks in the fire discipline. Notwithstanding, critical tasking in EMS is typical of that in the fire service in that there are certain critical tasks that need to be completed either in succession or simultaneously.

EMS on-scene service delivery is based primarily on a focused scene assessment, and patient assessment, and then followed by the appropriate basic and advanced clinical care through established medical protocols. Thus, EMS critical tasking is typically developed in accordance with the U.S. Department of Health and Human Services, Centers for Medicare & Medicaid Services (CMS) as:

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

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

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

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

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

- Manual defibrillation/cardioversion
- Endotracheal intubation
- Central venous line
- Cardiac pacing
- Chest decompression
- Surgical airway
- Intraosseous line

The next set of tables provides recommended critical tasking for the Narberth Ambulance continuum of care. As indicated above, this critical tasking is based on the current CMS ground transport definition of ambulance services.

TABLE 31: BLS Critical Tasking

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

Resource Deployment

1 Transport Ambulance/Crew

TABLE 32: ALS1 Critical Tasking

Critical Task	# Responders
Incident Command	1
Primary Patient Care	1
Secondary Patient Care Vehicle Operations	2 1
Effective Response Force	**5**

Resource Deployment

1 Transport Ambulance
1 Additional EMS Support

TABLE 33: ALS2 Critical Tasking

Critical Task	# Responders
Incident Command	**1**
Primary Patient Care	**1**
Secondary Patient Care	**1**
Tertiary Patient Care Provider	**2**
Vehicle Operations	**1**
Effective Response Force	**6**

Resource Deployment

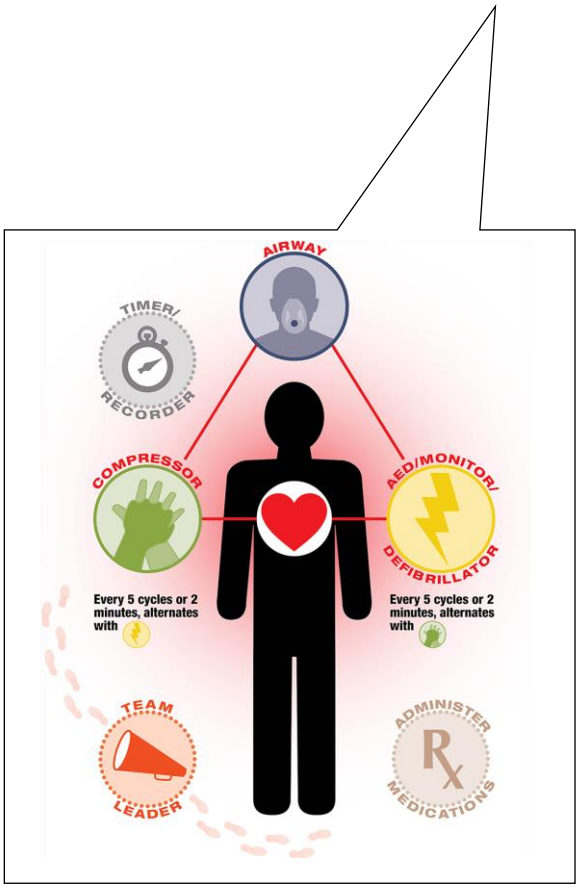
1 Transport Ambulance
1 EMS Supervisor
1 EMS Crew

TABLE 34: Pulseless/Non-Breathing Critical Tasking

Critical Task	# Responders
Incident Command	**1**
Primary Patient Care	**1**
Secondary Patient Care	**1**
Tertiary Patient Care Provider	**2**
Vehicle Operations	**1**
Effective Response Force	**6**

Resource Deployment

1 Transport Ambulance
1 EMS Supervisor
1 Fire or EMS Crew or
Equipment augmentation
(CPR DEVICE, VENTILATOR)



EMS Deployment Model and Response Times

There are numerous deployment models that can be utilized and integrated into an EMS agency's operational needs. Each has its own positives and negatives and must be balanced with the key elements of service deliverables, response time performance, and funding. In terms of efficient and effective deployment in Haverford Township within the context of this report, Narberth Ambulance must meet all operational needs and performance criteria that support the EMS transport functions, while taking into consideration community expectations. In addition to meeting these key elements, the Narberth deployment model must also be operated in a fiscally sustainable fashion, both short and long term.

Narberth Ambulance is generally the sole responder to EMS requests in Haverford. While this is typically adequate for most EMS calls, there are some EMS response types that are time-life critical, such as a cardiac arrest or severe airway compromise. When these calls occur, due to the limited first response resources, Narberth relies on their overall agency resources that can be leveraged when resources are stretched.

The current deployment model is station based static deployment, whereby units return to their base of operations after returning to service from a response. Based upon a detailed data analysis, we assess a *Static Deployment Model* is consistent with current system needs as evident by the response performance analysis provided in this report.

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

That said, there are no national response time benchmarks for EMS. EMS response times are typically established by the local jurisdiction. Narberth response time are outlined in the next two tables.

TABLE 35: Average Response Time of First Arriving Narberth Unit (minutes)

Call Type	Dispatch	Turnout	Travel	Total Response
Breathing difficulty	0.8	1.4	5.1	7.3
Cardiac and stroke	0.7	1.4	5.0	7.1
Fall and injury	1.2	1.0	5.2	7.4
Illness and other	1.3	0.9	5.3	7.5
MVA	1.6	0.6	4.3	6.6
Overdose and psychiatric	1.1	1.3	5.1	7.4
Seizure and unconsciousness	0.8	1.3	5.2	7.2
EMS Total	**1.1**	**1.1**	**5.1**	**7.3**

TABLE 36: 90th Percentile Response Times of First Arriving Narberth Unit (minutes)

Call Type	Dispatch	Turnout	Travel	Total Response
Breathing difficulty	2.4	2.5	8.1	10.4
Cardiac and stroke	2.0	2.7	7.8	10.3
Fall and injury	2.6	2.4	8.0	10.5
Illness and other	2.8	2.3	8.1	10.8
MVA	3.0	1.7	7.2	9.5
Overdose and psychiatric	2.8	2.6	8.1	10.9
Seizure and unconsciousness	2.1	2.5	8.4	10.5
EMS Total	**2.6**	**2.5**	**8.1**	**10.6**

In analysis of response times, travel times at both the average and 90th percentile are good overall. Dispatch time at the 90h percentile does, if benchmarking against the NFPA 1221 standard *(Standard for the Installation, Maintenance, and Use of Emergency Services Communication Systems, 2019)* need improvement. Under this standard, call processing (dispatch time) for the highest priority of EMS calls (trauma, stroke, seizure, cardiac related event, unconscious/unresponsive, allergic reactions, patient not breathing, choking) should be processed in 60 seconds or less 90 percent of the time. A disadvantage to the static (Station based) Deployment model can be seen in extended chute times. We assess this is an area of opportunity for response time improvement. At the time of our review, we assess chute times have been noted more than 2 minutes at the 90th percentile.

One component that may affect overall Narberth Ambulance response capabilities in the Township is when one or both Haverford assigned Narberth ambulances are committed outside of the Township, and the unit or units are then needed for a response in the Township. As a note here, it is not uncommon across the country for EMS ground transport units to respond outside of their assigned district and jurisdiction as EMS demand is outpacing staffed EMS ground transport units everywhere.

The next table examines the number of times a Haverford assigned Narberth ambulance responded outside of the Township.

TABLE 37: Calls Responded to by Narberth Ambulances Outside of Haverford

Call Type	Total Calls	Calls per Day	Call Percentage
Breathing difficulty	106	0.3	15.8
Cardiac and stroke	94	0.3	14.0
Fall and injury	149	0.4	22.2
Illness and other	159	0.4	23.7
MVA	6	0.0	0.9
Overdose and psychiatric	55	0.2	8.2
Seizure and unconsciousness	102	0.3	15.2
Total	**671**	**1.8**	**100.0**

Narberth Ambulances leave Haverford Township 1.8 times/day

671 times during a one-year analysis period

The next table examines where Haverford assigned Narberth ambulances respond to outside of the Township.

TABLE 18: Narberth Ambulance Responses External of Haverford by Location

Location	Calls	Pct. Calls	Minutes Per Run	Annual Hours	Pct. Work	Minutes Per Day
Clifton Heights	1	0.0	31.4	1.0	0.0	0.2
Concord	1	0.0	0.1	0.0	0.0	0.0
East Lansdowne	1	0.0	51.3	1.7	0.0	0.3
Lower Merion	332	8.1	47.6	390.1	6.1	64.1
Marple	128	3.1	42.4	125.9	2.0	20.7
Middletown	3	0.1	0.7	0.0	0.0	0.0
Millbourne	1	0.0	60.3	1.0	0.0	0.2
Nether Providence	1	0.0	0.0	0.0	0.0	0.0
Newtown	21	0.5	48.1	23.3	0.4	3.8
Radnor	36	0.9	33.5	32.3	0.5	5.3
Ridley Park	1	0.0	2.3	0.0	0.0	0.0
Ridley Twp	1	0.0	12.0	0.4	0.0	0.1
Springfield	11	0.3	49.8	18.2	0.3	3.0
Swarthmore	1	0.0	0.1	0.0	0.0	0.0
Upper Darby	132	3.2	30.5	125.6	2.0	20.7
Outside Haverford Subtotal	**671**	**16.4**	**41.4**	**719.8**	**11.3**	**118.3**
Inside Haverford Subtotal	**3,429**	**83.6**	**42.1**	**5,655.8**	**88.7**	**929.7**
Total	**4,100**	**100.0**	**42.1**	**6,375.6**	**100.0**	**1,048.0**

88.7% of the call workload for Haverford assigned Narberth Ambulances occurs inside of Haverford Township. On average, Haverford assigned Narberth Ambulances spend 118 minutes or just less than two hours/day outside of Haverford Township (8% of a 24/hr. period).

CPSM also analyzed when an ambulance came into Haverford Township when both Narberth ambulances were committed to another incident and unable to respond. As depicted in the next table, this occurred 196 times during the one-year CPSM workload analysis.

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TABLE 39: Calls Responded to by External Agencies Inside Haverford

Call Type	Total Calls	Calls per Day	Call Percentage
Breathing difficulty	19	0.1	9.7
Cardiac and stroke	28	0.1	14.3
Fall and injury	48	0.1	24.5
Illness and other	50	0.1	25.5
MVA	3	0.0	1.5
Overdose and psychiatric	21	0.1	10.7
Seizure and unconsciousness	24	0.1	12.2
EMS Subtotal	**196**	**0.5**	**100.0**
Non EMS	**3**	**0.0**	**1.5**
Total	**196**	**0.5**	**100.0**

The following agencies/jurisdictions responded into Haverford with either one or more units for a single call, which CPSM refers to as a run (credit given to each responding unit to a single call).

TABLE 40: External Agency's Workload Inside Haverford Township

Agency	Minutes per Run	Total Hours	Total Percent	Minutes per Day	Total Runs	Runs per Day
Brookhaven	13.7	1.1	0.5	0.2	5	0.0
Crozer	45.1	26.3	12.5	4.3	35	0.1
Darby	0.1	0.0	0.0	0.0	1	0.0
Lansdowne	12.8	0.4	0.2	0.1	2	0.0
Marple	48.4	76.6	36.5	12.6	95	0.3
Media	63.4	1.1	0.5	0.2	1	0.0
Narbreth*	46.2	80.1	38.2	13.2	104	0.3
Primos-Secane	0.1	0.0	0.0	0.0	1	0.0
Radnor	41.7	18.1	8.6	3.0	26	0.1
Riddle	50.6	4.2	2.0	0.7	5	0.0
Springfield	1.7	0.1	0.0	0.0	2	0.0
Upper Chichester	0.1	0.0	0.0	0.0	1	0.0
Yeadon	0.1	0.0	0.0	0.0	1	0.0
Other	101.5	1.7	0.8	0.3	1	0.0
Total	**44.9**	**209.6**	**100.0**	**34.5**	**280**	**0.8**

Note: *Non-Haverford Narberth units.

The table above tells us:

- Narberth Ambulance (non-Haverford assigned units) responded into Haverford the greatest number of times: 104.
- Marple Township responded the next greatest number of times: 95.

One of the fastest-growing value-added service enhancements in EMS is that of Mobile Integrated Healthcare/Community Paramedicine (MIH/CP) programs. An MIH/CP program is comprised of a suite of potential services that EMS could provide to fill gaps in the local healthcare delivery system. In essence, such a service is intended as a way to better manage the increasing EMS call volume and better align the types of care being provided with the needs of the patient. To be effective, an MIH/CP program is commonly accomplished through a collaborative approach with healthcare and social service agencies within the community.

In 2009, there were four such programs in the country, but a recent survey by the National Association of EMTs identified more than 250 active MIH/CP programs operating across the U.S.[26]

Narberth Ambulance Service is currently not providing any population health-driven initiatives such as Mobile Integrated Healthcare, and alternative transport/treatment and release programs within their current operational posture. During meetings with the Narberth administration, we learned of Narberth's desire to initiate and participate in these types of healthcare initiatives but indicated a lack of healthcare interest or partnership in establishing such programs.

An MIH or CP program can be an exceptionally valuable added service for patients, the community, and the healthcare system, but should only be utilized if the basic, essential EMS response reliability can be achieved and maintained. An example of significant operational value would be the dispatch of a CP unit as the sole EMS response unit to specific types of calls, such as low-acuity medical calls with a low ambulance transport ratio, or as the sole EMS unit to behavioral health response that might be able to be managed without the need for an ambulance response. Under this type of response plan, ambulance resource capacity would be preserved for other types of responses, improving overall response efficiency.

- Contemporary EMS delivery and service options to augment ground transportation include:
- Community paramedic – assess, treat, and release.
- Community paramedic – alternate destinations.
- Community paramedic – frequent user case management, including non-compliant user case management.
- Community paramedic – chronic disease patient care if system and scope is feasible.
- Community paramedic – post hospital discharge patient care if system and scope is feasible.
- Community paramedic – community health services (e.g., immunizations) if system and scope is feasible.
- Integration of mid-level practitioners (nurse practitioners and physician's assistants) into the EMS system.
- Registered Nurse call referral at communications center models.
- Integration into comprehensive medical and health data sharing infrastructure, which allows access to a patient's electronic medical record to any EMS, ED or other organization evaluating or treating an EMS patient.

As previously mentioned, there is not one perfect system model, but rather a whole host of local factors that determine the right delivery method for a community.

26. http://www.naemt.org/docs/default-source/2017-publication-docs/mih-cp-survey-2018-04-12-2018-web-links-1.pdf?Status=Temp&sfvrsn=a741cb92_2

Equipment, Materials, and Facilities

Current equipment for each ambulance includes Powerload Stryker Stretcher Systems, LifePack (LP) cardiac monitors/defibrillators (LP15 V4.0), advanced airway management equipment; and other equipment and fixtures a contemporary ambulance would have. Routine medical supplies and pharmaceuticals are replaced by Narberth Ambulance. We determined that Narberth EMS equipment & materials are consistent with other EMS agency equipment profiles.

EMS facilities reflect the value that the community places on the delivery of EMS, and, more importantly, their EMS providers. Facilities and stations that are less than adequate, or worse yet, dilapidated or in a severe state of disrepair, send a message to the EMS workers that they are not valued.

The following are the current EMS Static Deployment Locations:

Station 1 - The Quatrani Building, 2325 Darby Road, Haverford PA 1908

This is a dedicated facility in a strategic location in relation to response volume patterns.

Although well located, the condition of the facility has been a source of staff dissatisfaction in previous staff surveys and reported by Narberth Leadership as a re-occurring issue amongst staff.

Station 2 - Haverford College, 370 Lancaster Ave, Haverford PA 1904

The facility is reported to have frequent maintenance issues.

Positioning EMS stations considers response time and demand, much the same as with fire stations. The next two tables show Narberth response times by call type at the average and 90th percentile.

The overall staff sentiment provided by Narberth leadership and staff is to combine the two Haverford units and staff with Station 1, The Quatrani Building.

The following figure shows no significant impact to travel times on response posture, based on combining the current crews and ambulances from the college station with the downtown location. Under this model, two ambulances and two crews would respond from the Quatrani Building location and service the entire township. This configuration has merit as there are no new response time impacts, and there is efficiency in facility expenditures.

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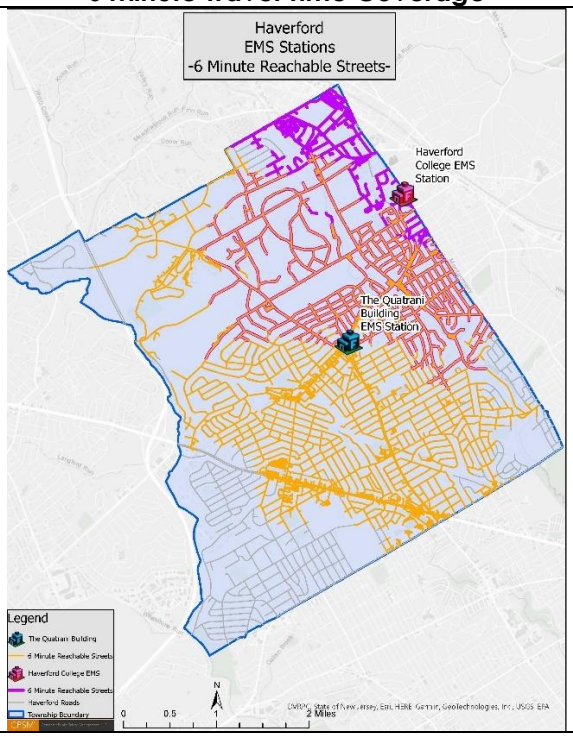
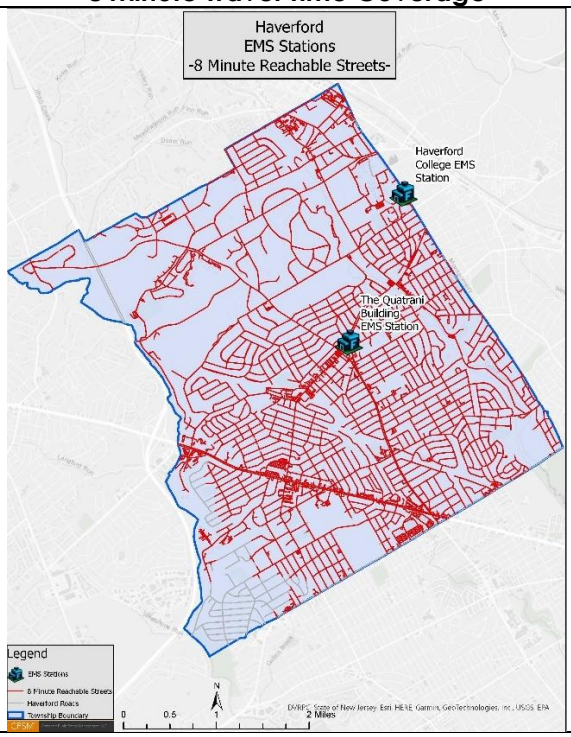
Figure 24: Travel Time Coverage: Haverford EMS Stations

Current Station Configuration: 6 Minute Travel Time Coverage	Current Station Configuration: 8 Minute Travel Time Coverage
	

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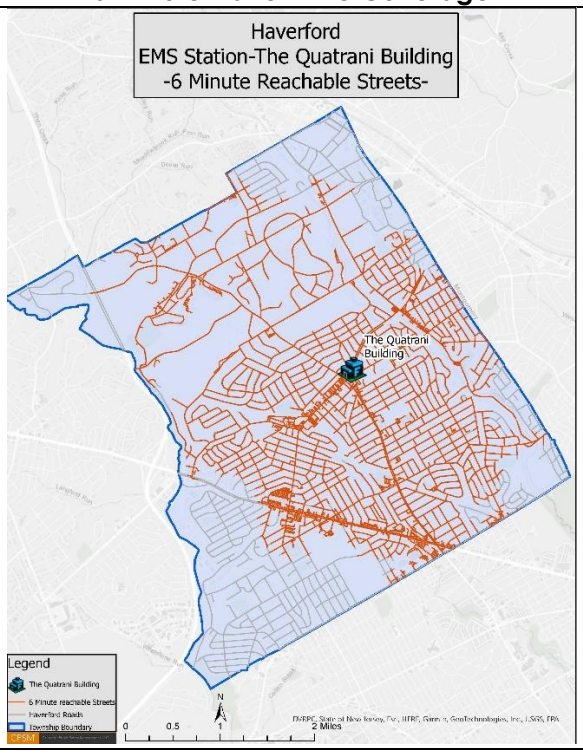
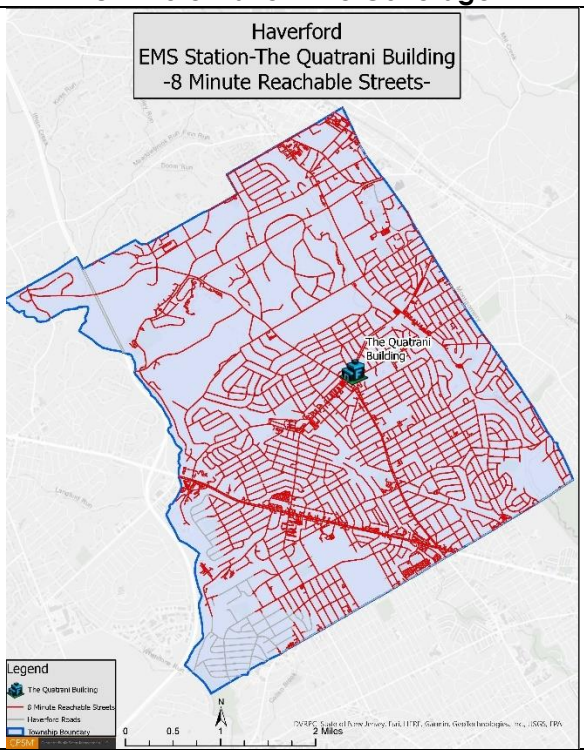
Single Station Configuration: 6 Minute Travel Time Coverage	Single Station Configuration: 8 Minute Travel Time Coverage
	

Training and Quality Improvement

Training and quality improvement are essential hallmarks for liability prevention and risk management. For instance, ambulance-related vehicle accidents are a common risk area. Well-run driver training is essential, as are periodic updates and training refreshers. Becoming familiar with your response area can help avoid response delays, wrong turns and last-minute maneuvers that can create risk. In addition, individual providers can help themselves by doing their "homework"—knowing their system's protocols and avoiding unjustified protocol deviations can help keep them out of hot water with their employer, medical director, and state EMS office.

Our review of Narberth Ambulance Service reveals a dedicated training division, coupled with a Quality Committee that drives education initiatives. Current training is provided on a routine basis and addresses both BLS and ALS specific training opportunities.

Narberth Ambulances Clinical Committee ensures yearly skills review and is engaged in all levels of EMS education for Narberth providers.

During our meetings with Narberth Ambulance, they express the ongoing desire to collaborate with fire companies on *Mutual Beneficial Training*, and Narberth historically provides CPR, First Aid and AED training for fire company personnel.

Narberth Ambulance Services training program ensures regular, routine and validation-based training. The leadership of Narberth Ambulance has made training a priority and part of the culture at Narberth.

EMS Fleet

Assuring a reliable ambulance fleet is essential to quality patient care and helps assure community and employee trust. Like EMS Stations, maintenance of an attractive and reliable ambulance fleet can serve as an excellent recruitment and retention strategy.

Currently, under the contracted services agreement between Haverford Township and Narberth Ambulance, Haverford Township provides two 2017 Type 1 Ford F-550 4X4 Lifeline Ambulances for EMS operations. This arrangement includes fuel, maintenance, service repair, and fleet replacement.

Haverford Township currently maintains a fleet of 2 ambulances and 1 Quick response vehicle. Industry-standard practice is to maintain a 35% reserve ambulance fleet. For Narberth Ambulance, under the current contractual obligation with a staffing goal of 2 ambulances, this would result in 3 ambulances on hand and available to be used in primary ambulance response. With the current number of available ambulance perspectives, Narberth Ambulance is limited in adequate response posture, due in part to the number of available ambulance assets owned by the Township.

Under the current service agreement, Narberth ambulance is required to provide any needed backup equipment, at Narberth's costs minus fuel, if the need extends beyond seven (7) days, in which case Haverford Township is required to reimburse for rental expenses.

Additionally, industry-standard is that in-service ambulances should be retired from primary, front-line service once an ambulance chassis reaches 5 years or 250,000 miles. The average mileage of the current ambulance fleet is over 100K Miles.

At the time of this review, Narberth administrative staff voiced concerns over a fleet that operates on a continuous 24/7/365 without rotation, which leads to an accelerated replacement cycle and increases costs for repairs and maintenance. The supply chain for ambulances is currently significantly impacted by vehicle microchip and production challenges. EMS industry fleet managers and ambulance manufacturers are advising ambulance agencies that vehicles ordered today will have at least a two-year delivery time. Delays in replacement based on current national supply chain disruptions and national backlogs on new ambulance equipment are expected to continue to be problematic over the next several years.

EMS Performance

Units of local governments make substantial annual investments in their emergency medical service (EMS) systems. That investment is typically divided up between the 9-1-1 communications center, the fire department's non-transport medical first response efforts, and EMS.

In evaluating the current performance of EMS in Haverford, it is important to understand the evolution of EMS since its modern application spans several decades. The need for increased coordination in patient care and higher quality care at lower costs has made it essential for EMS agencies to have in-place quality control or quality improvement programs that rely on key performance indicators to continuously monitor the system's overall performance and the effectiveness of the different prehospital measurements.

For this systematic review, we can place performance into two categories of Clinical and Operations. Each area of performance is related to primarily an operational element of performance, while the other clinical category focuses on areas of performance that impact patient outcomes.

Clinical Review

- Medical Direction / Oversight

  EMS Medical Direction is supported by the agency/organization's Medical Director(s) who are directly responsible for protecting the public and have the authority to grant or suspend medical credentials for all EMS providers in the system. Oversight of the patient care aspects of an EMS system by the Medical Director is called medical direction. Off-line protocols and standards of care are developed by the Medical Director, but the term for general oversight offered by the Medical Director is medical direction. EMS medical directors support EMS personnel and first responders through training, protocol development, and resource deployment advice.

- Medical Protocols

  EMS protocols are the recognized clinical operating procedures/guidelines and standards that all emergency medical services professionals, such as paramedics and emergency medical technicians (EMTs) must follow for patient assessment, treatment, transportation, and delivery to definitive care. Medical Protocols are typically created by Medical Direction in accordance with state and local regional EMS boards and are based on industry best practices of evidence-based best prehospital care.

- CQI Programming

  The Continuous Quality Improvement (CQI) Program is an ongoing, continuous evaluation of system performance to determine how the system, and providers within the system, are functioning. This insight allows Medical Direction and EMS providers to improve operational performance, and most importantly, patient outcomes. Continuous Quality Improvement is a never-ending process in which all levels of healthcare workers are encouraged to team together to develop and enhance the system within which they work. Based on EMS community collaboration and a shared commitment to excellence, the CQI process identifies areas for improvement within the EMS System. The CQI process identifies training opportunities, highlights outstanding clinical performance, audits compliance with treatment protocols and reviews specific illnesses or injuries along with their associated treatments.

- Training

  Training, also known as continuing education, is required for workers to stay current with the latest developments, skills, and new technologies required for their EMS certifications. Continuing education is required to comply with laws, remain licensed or certified, or maintain membership in an association or licensing body.

- Credentialling

  Credentialing in EMS is the process of professional certification that provides a mechanism for individuals or agencies to demonstrate that they possess the knowledge and skills necessary to lead various levels of an EMS organization. This proficiency is demonstrated through education and experience that is validated through an independent evaluation process. Examples of Accreditation include The Commission on Ambulance Accreditation (CAAS) and the Center for Public Safety Excellence (CPSE).

- QA/QI Program

  EMS agencies have an obligation to maintain a Quality Improvement (QI) or Quality Assurance (QA) program. Medical direction generally requires this program and identified process. These programs are linked to patient-care report reviews for compliance with protocols and policies. Both QA and QI are used to assess the current quality and to

develop, implement and measure an improvement process. A QA/QI program focuses on desired health outcomes for patients and is utilized to improve outcomes based on process and evidence.

- Medical Equipment Capabilities

  EMS equipment is typically regulated through a state level office of Emergency Medical Services or Department of Public Health and is required to comply with stated regulations before an ambulance can be licensed and continued to be licensed to operate. Spot inspections throughout the state may occur, and equipment shall be in working order. A failure to comply can result in loss of licensure, penalties, fees, etc.

Operational Review

- Staffing Model

  EMS Staffing Models are based on the needs of the communities in which services are provided and may be based on call demand, time of day/night calls for service are occurring, response time, coverage area(s) and Unit Hour Utilization (UHU).

- Response Times

  Response Time is defined as "beginning with the initial receipt of an emergency ambulance call … and ending when the ambulance arrives at the location." Ambulance services are measured on the time it takes from receiving a 911 call to the vehicle arriving at the patient's location. As discussed above, EMS response times are measured differently than fire service response times. Where the fire service uses NFPA 1710 and 1720 as response time benchmarking documents, EMS' focus is and should be directed to the evidence-based research relationship between clinical outcomes and response times. Communities often work with Medical Direction and establish community based response time performance goals.

- Deployment Models

  The Static deployment model is where dispatched ambulances leave a coverage gap until they return to their home base after service. The dynamic deployment model redeploys idle ambulances to different locations in a community based on historical demand data. System Status Management (SSM) is the process and implementation of strategically positioning ambulances in geographic locations during various times of the day based on historical data that can aid in predicting operational demands. The goal of system status management is to: minimize response times by deploying EMS resources strategically. SSM is utilized more commonly in high-performance systems that have more than two ambulance operations.

- Emergency Communications

  EMS Emergency Communication falls under three categories. In the United States, there is Medical Priority Dispatch System (MPDS), Criterion-Based Dispatch, and Computer-Aided Call Handling (CACH).

- Logistics and Supply Chian

  Logistics is the process of planning, managing, and controlling the efficient flows of relief, information, and services from the origin to the destination to meet the urgent needs of affected people under emergency conditions. Increasingly, health emergencies are driving unprecedented demand for effective supply chains to support emergency response. Under the current situation with our nationwide issue involving logistics and the supply chain, it is imperative to plan and prepare for alternative solutions to needs.

- Fleet

  A safe and well-functioning fleet is critical to ensure the safety and well-being of clinicians in the field as well as providing reliable and consistent service to the patients, facilities, and communities served. Fleet maintenance and replacement cycles are determined by the agency/organization itself unless otherwise specified by local, state, or national regulations. Many communities follow industry standards for EMS fleet as outlined in this report.

- Administrative

  EMS Administration manages teams, optimizes operations, and facilitates communications. Administratively, they are responsible for the organization's standard operating procedures or standard operating guidelines inside and out. In addition, they are responsible for knowing EMS policy and practice at the federal, state, and local levels.

While these categories are broad in the description, they encapsulate multiple functions and operational layers that all contribute to the overall performance of an EMS System of operations.

Clinical Performance

In reviewing the Narberth Ambulance EMS System of operations in Haverford, the key areas listed were reviewed for current EMS performance.

This review finds that EMS services to the Town of Haverford being provided by Narberth Ambulance in the review of clinical performance meet best practices for *High-Value Performance EMS Operations.*

Narberth Ambulance provides excellent medical direction, which is operationally engaged, accountable, and fully integrated into its administrative structure. This is evident by many established practices as not only part of the policy, but also involves Medical Protocols which are value-based, evidence-Led, and outcome-focused, which meet the best current clinical practice for pre-hospital medicine.

Narberth Ambulance maintains robust credentialing, onboarding, and re-occurring training and competency requirements that help ensure personnel reduces skill fatigue, by using multiple platforms of training which include:

- Skill Fairs
- Recertification Courses
- Specialty Training for Promotions
- Training by Request
- Classroom Education w/ Simulation Lab
- Video-Based Education

In addition to a notable training program, Narberth Ambulance provides excellent clinical oversight with an established QA/QI program.

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Strengths & Weaknesses of the Current EMS Model

EMS delivery services are vulnerable to economic and other forces and the community must address the reality that, they are expensive to maintain and if not committed, the system can be left inadequate to meet the growing healthcare needs of the citizenry being served.

Strengths

Narberth Ambulance Service has been incorporated Since 1944. This rich history and experience afford Narberth Ambulance, and Haverford Township, an EMS System that has many strengths. The current Medical Direction is engaged and blended into agency administration for strategic alignment.

Haverford EMS Operations are enhanced by a dedicated EMS field supervisor (designated township liaison), administrative staff available 24/7 in addition to the township EMS Director, who has an assigned quick response vehicle, equipped to respond as needed. These assets combined with clinical oversight, training and quality review committees provide an adequate span of control for normal, and to some extent expanded incidents. At the time of this review, we assess Haverford Townships 24/7/365 ALS Standard of Cover is the exception to most other area municipalities. This serves as a position of operational and clinical strength.

Haverford Township's EMS service capability is also strengthened by Narberth Ambulance's size and scope. At the time of our review, Narberth reports an agency that has four stations, nine ambulances, three responder vehicles and one Mass Casualty / Rehab bus. Narberth Ambulance now has a staffing roster that includes over 30 full time and 40 part time employees and over 70 volunteers. This provides for operational flexibility to mitigate a sudden system surge in demand.

Narberth Ambulance has a history and culture of community outreach & education. During our review and meetings with Narberth Ambulance administration, it was evident that Narberth has a deep community connection and as part of normal practice participates in numerous community events.

Across the nation, EMS systems struggle to attract and retain quality team members, this is an area of strength for current EMS operations provided to Haverford Township. We assess at the time of this review, Narberth has an engaged and invested workforce, some of which have direct ties to the Haverford community. This is an area of noted strength, as the documented benefits of an engaged workforce, which is empowered to make a meaningful impact, has tremendous benefits in providing value-based EMS.

Weaknesses

Currently, All EMS Calls for Service are dispatched by Delaware County Emergency Communications Center, which also serves as Haverford's Primary Service Answering Point (PSAP). At the time of our review, we learned Delaware County PSAP does not utilize Priority Solutions® Medical Priority Dispatch System® (MPDS) for Emergency Medical Dispatch (EMD), or any other emergency medical dispatch system.

The MPDS system is a highly respected EMD system and is used by progressive EMS dispatch agencies. In a smaller EMS Operational System with limited resources, having the ability to prioritize resources becomes highly valuable. It is noteworthy, that at the time of this review it was reported that the county operates under a policy of "*No Stacking*", in other words, all calls are essentially treated as a priority and a resource is immediately sent without screening.

During our assessment it was reported that while Narberth Ambulance has a strong desire to expand into innovative service delivery, there is a lack of interest expressed by local healthcare systems. One such solution involves mobile integrated health (MIH), a patient-centered model conducted outside the boundaries of a traditional hospital campus that integrates in-person and digital resources. This is an emerging care-delivery platform — which offers resource coordination among hospitals, first-responders, providers, and other medical stakeholders. While we support these patient center community focused programs, these initiatives should not take priority or be confused with normal EMS operations.

During our review and meetings with Narberth and township EMS officials, we assess the current number of operational units creates a potential operational risk. The current allotted fleet size of two does not allow normal rotation. These units therefore acquire engine hours and mileage at an accelerated rate which increases the replacement cycle and can add to overall maintenance and repair costs. Additionally, reliance on Narberth to provide equipment is not a sustainable practice. Coupled with current supply chain disruptions and current build time for new ambulances, time is critical in making fleet replacement decisions to reduce the impact on delays.

In conducting interviews with Narberth Administration, Haverford Township EMS leadership and reviewing documents, we determine a need to enhance and foster routine, collaborative lines of communication. We further assess there is an opportunity for both parties to strategically engage on mutually agreeable performance metrics that are consistent with industry best practices and suit the needs of the community.

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SECTION 6. CONCLUSION

This analysis contains illustrative and descriptive material, specific operational and administrative findings, and recommendations regarding the delivery of fire protective emergency medical services (EMS) in Haverford Township. Included in this analysis are several components that review and analyze the foundation of effective fire protection and EMS to include governance and administrative oversight and accountability; training and education; community risk; benchmarks, policies, and guidelines; infrastructure such as fleet, facilities, and equipment; township allotted funds to operate fire and emergency medical service; and fire and EMS performance and benchmarking against national standards where applicable.

During the course of this analysis the CPSM project team met with Haverford public officials, officers, and members of the five Haverford Township fire companies (Bon Air, Brookline, Llanerch, Manoa, Oakmont), and Narberth Ambulance. A site visit was conducted in late December 2022 to obtain a better understanding of the community risk, service demands, and observe the infrastructure the fire and EMS operates in and with. The project team operated independently at all times to maintain an unbiased approach to the project's content and recommendations.

The project team worked from the scope of work prepared by the township, which was to conduct an operational and administrative analysis of the township's fire companies and EMS service delivery, analyzing each and subsequently provide findings and recommendations for improvement. The project team conducted the analysis without any preconceived concepts or bias. This analysis contains a number of findings and recommendations that CPSM believes will achieve greater operating efficiencies and effectiveness of overall fire protective and EMS services in the township.

CPSM found the five fire companies and Narberth Ambulance to be open and transparent about their operations. Officers and members of the fire companies with whom the project team interacted were passionate about their volunteer service to the community. CPSM found the same with Narberth Ambulance's senior leadership and middle management. In fact, CPSM did not encounter a single member who was not passionate about what they do with regards within their respective organizations and the Haverford community. All fire company members are to be commended for their volunteer service and their commitment to the citizens of their community. Narberth Ambulance staff are to be commended for continuing to work within the current pre-hospital work environment where recruitment and retention is at times challenging.

The recommendations presented in this report should be viewed as opportunities to make the fire and EMS services in Haverford stronger, more efficient, and more effective in how they provide fire protective and EMS services in the township.

Whether volunteer or career, fire protective and EMS services operate under national standards, local government ordinances, and state statutes. It is imperative that organizational leadership in each fire company and Narberth Ambulance understand and stay abreast of these standards and act accordingly to implement processes, guidelines, funding plans, training, and education of their members, and deploy overall organizational management of contemporary fire and EMS services concepts.

To note her, firefighter injuries and deaths are devastating to families, fellow responders, local governments, and the community. The National Institute for Occupational Safety and Health

(NIOSH) has studied firefighter fatality root causes, and found five key factors, which are commonly referred to as the NIOSH 5:

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

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

To the credit of the current Township Manager and Township Commissioners, this body wanted to understand more about how contemporary fire and EMS agencies operate, and what was needed to ensure the fire companies and Narberth Ambulance are operating efficiently and effectively, have the right equipment and infrastructure to provide services to a township of 50,000+ residents, and understand more about what was needed to position the fire companies and Narberth Ambulance to provide contemporary fire and EMS services.

Throughout the course of the project, and during our site visit, CPSM received and analyzed stakeholder input from Narberth Ambulance. Strengths and weaknesses are detailed in the body of this report in the EMS section. Here we capture the strengths and weaknesses in the next table.

Table 41: Haverford EMS Strengths and Weaknesses

Strengths	Weaknesses
■ Active / Engaged Medical Direction. ■ Good operational span of control. ■ Dedicated ALS service coverage 24/7/365. ■ Access to additional resources for surge capabilities. ■ Community engagement. ■ Dedicated / Engaged Staff. ■ Dedicated Township EMS Director. who also responds to incidents.	■ Primary EMS dispatch Delaware. County PSAP has no Priority Medical Dispatch Program in place. ■ No current community-based health Initiatives (MIH / CP / ET3 / Nurse Triage). ■ Fleet Size / Replacement. ■ Effective / Collaborative communication at leadership level. ■ Minimal performance standards for response within Haverford.

During the site visit in December 2022, CPSM attended organized stakeholder sessions with each of the five fire companies. These discussions produced a vast amount of input that centered on current township fire operations as a whole; individual company operations; fleet; leadership; company needs; township needs regarding fire services; the Bureau of Fire; and the past and the future. ***The most common theme was the need for centralized fire services leadership. A position in the township that provides leadership, guidance, ensures fire company consistency, and one that administrates the overall integrated fire services system for the township.***

The next table captures the common themes from the five company meetings in terms of strengths, weaknesses, and needs of the five fire companies.

Table 42: Volunteer Fire Company Stakeholder Input

Strengths	Weakness	Needs
Young active crew. Teamwork and cooperation with the other 4 companies. Education and regular training. Career firefighters are part of company-bringing experience. Respect each other's limitations. Strong community support. Stability. During the day, we know who is available. Use Active 911call alerting and incident tracking. The people and their dedication to this company. Highly dedicated crew. Open to change and cooperation. We bring people from a diverse background. On fireground members are willing to do whatever is needed to mitigate the emergency.	Staffing, trouble recruiting. Recruiting new people is hard because people are too busy in their life. Leadership is aging. Standardization among all five companies. The 5 companies do not train together very often. Communications/radios/current radio frequency is a problem. Fit testing for SCBA masks. Misinformation from Township. Do not have their own masks but get annual fit testing. The township does not provide vaccinations or annual physicals. Not sure how many people are coming to a call and how long to wait. The Bureau of Fire does not provide relevant guidance and policies. Waste of time. Lack of a central command and control of fire companies. Lack of central response cards/protocols and parameters.	More funding. Radio system upgrades. Standardized apparatus replacement. Membership. Provide metrics for performance to the companies so they can get better. The township needs to start coordinating or stabilizing the five companies, there needs to be a structure at Township level to standardize all five companies. Purchasing supplies, tools, trucks need to be standardized, come from one person not five companies. We need to utilize a system that can show who is coming. Standard SOP's shared with all companies. Standardized training for all companies. Standardized operations, response, mutual aid.

Contemporary Fire Service Leadership

Leading and managing fire services, in a community of 50,000+, with the community risks Haverford has, requires a well-versed and experienced chief officer/administrator. The role includes program oversight such as training and education of members, fleet maintenance and replacement, facility maintenance, understanding the ISO report and devising a plan to correct deficiencies, personnel management to include member relations, recruitment, and retention, emergency operational response, logistical support, and other functions.

The role of today's Fire Chief is complex and multifaceted. It is no longer simply about organizing and commanding a reactionary force to suppress fires. Today's Fire Chief must fill these many roles:

Community Ambassador. Community ambassadors work with their community. They begin by getting to know the community and the community knowing them. They represent fire and emergency services to the community, serve as spokespersons, share information, and are the symbolic leader to represent the department in the community.

Futurist. Futurists have their eyes on the horizon. They anticipate policy and political issues and keep abreast of industry innovations, NFPA standards, and industry best practices in the fire service. They anticipate change and plan for it.

Strategist. Strategists work with appointed and elected officials, and community leaders. They move the department to a strategic deployment and operation level rather than a reactionary service. Strategists can articulate the needs of the department based on facts and not emotion.

Negotiator. The contemporary chief negotiates and represents the department with other agencies, within the jurisdictional entities, and with members. Negotiators must be willing and able to be a part of a negotiating team, articulate and argue a point of view, seek a middle ground, and sell agreement to others, particularly their members. Negotiators are not everyone's friends but rather they are their leader.

Lobbyist. A contemporary chief must be a lobbyist with their local government, state, and various other entities that affect the department. Examples may be the through State Chief's Associations, International Association of Fire Chiefs, National Fire Protection Agency, the National Volunteer Fire Council, accrediting bodies, and funding organizations such as the Federal Emergency Management Agency.

Navigator. Navigators first help others focus on the end results and desired outcomes and then guide the organization through obstacles at the department level, community level, chief administrative officer level, and the elected body level. Navigators get out ahead of issues and develop plans in advance rather than at the last minute.

Champion. Champions are boosters of the fire and emergency services. They look at ways to get others to believe in the department and inspire others to act in support of its mission. They make the department desirable for new membership and retaining current members.

The next section includes recommendations CPSM believes will assist the township in moving forward to ensure safe, effective, and efficient Fire and EMS services.

Recommendations

1. CPSM recommends that each fire company and Bureau of Fire maintain and ensure training compliance whereby each combat firefighter receives initial and continuous training for all types of firefighting, with training specific to interior firefighting. CPSM recommends this training be of high level, documented, and that it complies at minimum with the Commonwealth of Pennsylvania Firefighter 1 curriculum.
    - CPSM further recommends the five fire companies through the Bureau of Fire, jointly establish, and deliver officer training courses and training opportunities for incumbent members who are or aspire to be officers in their respective companies. CPSM recommends this training be of a high level, documented and that it complies at minimum with the Commonwealth of Pennsylvania Officer 1 curriculum.
    - CPSM also recommends that annually, on or about January 15, each Fire Chief provide the Township Manager an updated list of combat personnel (firefighter and officer) who have completed firefighter training that aligns with Commonwealth of Pennsylvania Firefighter 1 curriculum, and officer level training that aligns with Commonwealth of Pennsylvania Officer 1 curriculum. Each report should also list those who do not have this training and a schedule for completion.
2. Based on CPSM's operational analysis, and considering the risk in the township as outlined previously in this report, and through discussion with the five Fire Chiefs, our conclusion and recommendation is the township should maintain the following heavy fire apparatus:
    - Two ladder trucks (one at Oakmont and one at Brookline). These ladder trucks should be diverse in size and aerial device type.
    - One reserve ladder truck so that two are maintained in service at all times.
    - One heavy rescue apparatus (Manoa).
    - Two squad-engine apparatus (Oakmont and Manoa).
    - One foam engine (Brookline).
    - Three frontline engine apparatus (Bon Air, Brookline, Llanerch). These engines should be diverse in pump and tank capacity and equipment carried, but specific to the fire district they serve.
    - Two reserve engines to be used by any company to maintain a minimum of five engines in service at all times.
    - CPSM further recommends:
        - Manoa maintains the marine rescue capabilities and associated assets as they are a benefit to the town.
        - Oakmont maintains the medium duty rescue vehicle and capabilities.
    - The Town should consider replacement plan for fire apparatus as recommended by CPSM, while considering the NFPA 1901 standard for service life and refurbishment, and not allow any heavy fire apparatus to be utilized in front-line or reserve status once it reaches its 25th year, unless refurbished to NFPA 1912 standards. The recommended fleet replacement plan includes:
        - **2024**: Replace Tower 34 with a straight Ladder-Quint to be placed at Brookline. Brookline Ladder then becomes revere Ladder.

- **2024/2025**: Purchase 1 new ambulance (use as a reserve)
- **2024/2025/2026**: Refurbish (if warranted): Bon Air Squad 58 (recommended Engine designation); Brookline Engine 35; Llanerch Engine 34
- **2027**: Nothing Scheduled
- **2028:** Replace Brookline Ladder 35 (which is BOF Ladder Reserve). The new Ladder goes to Oakmont. Oakmont Ladder becomes reserve.
- **2029**: Replace (if warranted) Manoa Heavy Rescue 56
- **2029-2032**: Refurbish (if warranted) Manoa Engine 56
- **2030/2031**: 2 new ambulances
- **2030-2033**: Refurbish (if warranted) Oakmont Engine 38 and Oakmont Ladder 38 (should now be BOF reserve Ladder)
- **2031-2034**: Replace Bon Air Sq. Engine 58 (if not refurbished); Replace Llanerch Engine 34 (should be BOF reserve at this time) if not refurbished
- **2037-2040**: Replace Manoa Engie 56 (should be BOF reserve at this time) if not refurbished.
- **2038-2041**: Replace Oakmont Engine (should be Sq. 38 at this time) and Ladder 38 (should be BOF reserve Ladder at this time) if not refurbished. The new Ladder goes to Brookline, Brookline Ladder becomes reserve.

- CPSM further recommends that when appropriate, and when an apparatus meets the mechanical feasibility and NFPA 1901 and 1912 criterion for refurbishment, the township consider the refurbishment alternative when scheduling replacement.
- CPSM also recommends the township consider standardizing the fleet by manufacturer, motor, drivetrain, fire pump, aerial device, chassis, electrical systems, and other consistencies as recommended by the township Fleet Manager.
- In an effort to reduce down-time and for efficiencies, CPSM also recommends the Fleet Manager or designated fleet mechanic/specialist become certified in fire pump maintenance and testing, as well as aerial device system maintenance and testing.

3. As there is not consistency between the five fire companies regarding the purchase and implementation of structural firefighting ensemble components, CPSM recommends the five volunteer fire companies collectively participate in a testing and selection process for structural firefighting ensemble components and then establish common ensemble components for future purchases. The common testing and selection will offer economy of scale procurement (a single vendor contract) and will also result in a cache of structural firefighting ensemble components that is interchangeable between companies when needed for new and incumbent members.
4. For member health and safety, and to the extent possible of township funding, CPSM recommends the issuance of self-contained breathing apparatus masks to all qualifying combat fire personnel. This recommendation links to the required annual mask fit testing required and recommended.
5. For member health and safety, and to the extent possible of township funding, CPSM recommends annualized medical physicals for all combat personnel and command officers.

If implemented, CPSM recommends each volunteer Fire Chief have available a report to share with the Township Manager annually, on or about January 15, that outlines member compliance with this important health and safety component.

6. CPSM recommends the township participate in the next available FEMA Assistance to Firefighters Grant process for the upgrade of self-contained breathing apparatus (SCBA) frame & harness components and cylinders (replacement of those needed to reach the most contemporary model at the time). The purposes of this upgrade/replacement effort are to establish a procurement cycle for all SCBA frame & harness components and cylinders, to establish frame & harness model consistency between all five companies, and to establish economy of scale procurement (a single vendor contract) for these components. The grant should also include upgrade/replacement of SCBA masks as applicable and should ensure there are adequate numbers of each size of mask to issue to all incumbent and new members.
7. CPSM recommends the five fire companies continue to document annual mask fit testing and entry medical physicals of members to ensure 100 percent compliance. CPSM further recommends each volunteer Fire Chief have available a report to share with the Township Manager annually, on or about January 15, that outlines member compliance with these two important health and safety programs.
8. CPSM recommends the five fire companies review and address, to the extent possible, deficiencies in the Fire Department section of the current ISO-PPC report as outlined in this analysis. Special attention should be given to developing methods and opportunities for members to achieve the training as required in the ISO analysis, as it is focused on firefighter safety, improved competencies, and overall improved fireground effectiveness and functionality. This includes, live structural fire facility training, company level training, multi-company drills, and existing driver/operator training. Additionally, and given the identified building risks in the township, ensuring company personnel conduct (and document for future ISO reviews) some level of commercial, industrial, institutional, and other similar type building familiarization and pre-plan information gathering; and developing an officer training program targeted at ensuring officers have opportunities for the various levels of officer certification and that they receive structured annualized officer training.
9. CPSM recommends the five fire companies meet and confer regarding the district response to building structural fires beyond that of a low risk (one, two, or three-family dwellings and scattered small business and industrial occupancies), and consider adding resources on the initial alarm from the other fire companies, regardless of the hour of the day, for medium- and high-risk occupancies (buildings) to ensure adequate resources and staffing are available to fill all the critical tasking necessary to mitigate the incident.
10. CPSM recommends the following baseline performance objectives for the five fire companies:

    - Meet fire company and NFPA 1720 staffing parameters for an on-scene Effective Response Force for structure fires in the urban response areas in 9 minutes, 90 percent of the time.
        - This should be announced by the incident commander over the radio and measured through the computer-aided dispatch (CAD) system after the arrival of the initial arriving members, companies, and response teams.
    - Meet staffing parameters for an on-scene Effective Response Force for technical rescue, hazardous materials, water rescue, rapid intervention team, and/or other specialty response incidents in all response areas in 10 minutes, 90 percent of the time.

- Meet staffing parameters for an on-scene Effective Response Force for all non-structural fire, fire-related incidents (fire alarms, outside fires, public assist, good intent, hazards, technical rescue) in all response areas in 10 minutes, 80 percent of the time.

11. CPSM recommends the township consider appointing a Fire Services Administrator to oversee administrative and operational functions for volunteer fire companies such as township budget development and implementation; fire company liaison with the Township Manager and Board of Commissioners; ensuring the training and education of all members; monitoring fire company turnout and emergency response force; consistent fire ground response and operations; health and safety of all members; apparatus replacement; understanding the ISO-PPC report and devising a plan to correct deficiencies; personnel guidance to include recruitment and retention of volunteer membership; equipment consistencies, and grant development and implementation if awarded. CPSM further recommends this position report directly to the Township Manager, be an official member of the Bureau of Fire, and serve as the single leader of fire protection in and for the Township of Haverford. The Fire Services Administrator should not be affiliated with any of the five fire companies to prevent perceived bias.
12. While the township contemplates a Fire Services Administrator, CPSM recommends the Bureau of Fire undertake, develop, and implement consistent operational policies and procedures that are applicable to all fire companies and that cover at a minimum:
    - Common and consistent response matrix for all structure fire and fire-related calls for service.
    - Formal incident command procedures that include:
        - Consistent fireground operations between all companies.
        - Use of a common fireground accountability system that ensures no freelancing of members.
        - Ensuring all teams operating on the fireground have radio communication.
        - Establishing a Rapid Intervention Team.
        - Appropriate risk assessment of the building and/or incident.
    - Critical task development for fire incidents involving: single family dwellings; commercial and strip mall buildings; apartments, townhomes, and condos; multi-use buildings (residential over commercial); multi-story residential buildings; technical rescue; water rescue; motor vehicle accidents with entrapment; and basic single engine fire-related calls for service.
13. As the township is not a regular recipient of automatic aid, and because there are areas of the township that have longer response times than those in and around the core density of the township, and where the Haverford fire stations are generally located, the community may benefit from automatic response from contiguous jurisdictions that have fire stations and deployable assets closer to these areas in Haverford. Therefore, CPSM recommends that Haverford Township engage discussions regarding reciprocal automatic aid with Lower Merion Township, Marple Township, and Upper Darby Township.
14. CPSM recommends the township engage Narberth Ambulance and the Medical Director and develop EMS ***level of performance*** criterion that includes:
    - Turnout/Chute time criterion.
    - Response times to high acuity call criterion.

- As determined by medical direction.

- Response times to moderate acuity call criterion.
  - As determined by medical direction

- Response times to low acuity call criterion.
  - As determined by medical direction

- Clinical performance for Ischemic Stroke, S-T Elevation Myocardial Infarction, and trauma patients.
  - As determined by medical direction.

- CPSM further recommends once these response time levels of performance are implemented, Narberth Ambulance provide monthly reports to the township Director of EMS for review and reporting to the Township Manager.

- The township may consider adjusting the current agreement for EMS service with Narberth Ambulance from a level of effort to a level of performance, which specifies desired clinical, experiential, and response time performance levels, and as well provides for evaluation that offer the township ample notice in the event conditions may cause service delivery challenges.

- Because EMS 911 call-taking and dispatch, which is managed by Delaware County Emergency Communications currently ***does not*** use the Priority Solutions® Medical Priority Dispatch System® (MPDS) for Emergency Medical Dispatch (EMD), CPSM recommends township and Narberth Ambulance lead a discussion with Delaware County Emergency Communication center leadership regarding evidence-based clinical protocols and call taking processes to assign a response determinant to the EMS call for service. These response determinants are alpha-numeric codes that inform the responding units specifically what type of medical call they are responding to, and link back to level of performance criterion.

15. CPSM recommends the township and Narberth Ambulance enhance the current relationship on a solid, explicit framework, while striving for collaboration and partnership in practice. To accomplish this, CPSM recommends the township Director of EMS and Narberth Ambulance administration/leadership meet monthly to discuss specific expectations that are mutually acceptable, to review performance, and to discuss challenges or opportunities. The results of this meeting should be documented and reported to the Township Manager by the township Director of EMS.

16. Because of age and use of the current ambulances, and the current length of production time for ambulance chassis and patient compartments (estimated to be 20-24 months), CPSM recommends the township continue with the FY 23 chassis replacement process of the two current ambulances to coincide with the agreed upon 7-year replacement schedule. CPSM further recommends the town consider in the FY 24-FY 25 period, the township procure a third ambulance so that there will be a township spare ambulance, and so the Fleet Manager has the ability to extend the life of all ambulances by routinely cycling one ambulance out of front-line for a given period of time. CPSM also recommends that after the initial 7-year re-chassis cycle, the ambulance be replaced with a new chassis and patient compartment.

Type	Company	Year In Service	Year of Replacement
Ambulance x 2 (Current Fleet)	EMS Township Wide	Chassis ordered: FY 2023 Patient Compartment Re-Chassis	Replace entire ambulance (chassis and patient compartment). **2030-2031** Recommend every other re-chassis is a total ambulance replacement (chassis and patient compartment).
Type	**Company**	**Year In Service**	**Year of Replacement**
Ambulance Recommended New	EMS Township Wide	TBD Recommend FY 2024/2025	7-years from purchase: Patient Compartment Re-Chassis Recommend every other re-chassis is a total ambulance replacement (chassis and patient compartment).

17. Based on our analysis of response travel time coverage from the *Quatrani Building*, and for efficiency/cost reasons, CPSM recommends the township and Narberth Ambulance consider combining both Haverford EMS units out of the Quatrani building location. It is assessed there is no significant risk to EMS response times, shows value in effective critical staffing, and serves as a staff satisfier.
18. CPSM recommends the Township continue to monitor the number of times Haverford Township assigned ambulances are dispatched for calls for service outside of Haverford Township boundaries. CPSM further recommends the Township monitor the number of times an external agency or non-Haverford assigned Narberth ambulance responds into Haverford Township. Responses by Narberth ambulances outside of the Township and responses of any non-Haverford assigned ambulances into the Township should be included in any monthly reporting by Narberth ambulances to include details for said responses.
19. During our review, Narberth Ambulance expressed the desire to initiate and participate in healthcare initiatives such as Mobile Integrated Healthcare (MIH) or Community Paramedicine (CP). Narberth leadership indicated a lack of healthcare partnerships for such initiatives. An MIH or CP program can be a value added service line for patients, the community, and the healthcare system, but should only be utilized if the basic, essential EMS response reliability can be achieved and maintained. Therefore, CPSM recommends the township Director of EMS and Narberth Ambulance should work with their Medical Directors and other community stakeholders to determine the benefits that a Mobile Integrated Health program or Community Paramedicine program would bring to the EMS system in Haverford regarding high utilizers of the system and other community health care challenges.

Future Staffing Considerations

One of the weaknesses communicated to CPSM during fire company stakeholder meetings is the difficulty they are having recruiting new volunteers. The volunteer firefighter recruitment challenge is not just germane to Haverford and is occurring across the country. Reasons include the amount of training required to transition into the combat firefighting role, and some who may be interested look at the role as an additional fulltime job. Both of these reasons circle back to the commitment of time required to volunteer in the fire service. Additionally, there are

many instances where volunteering is not appealing to residents in the community, and those it may be appealing to, cannot afford to live in the community that has a volunteer fire company.

Retaining volunteer firefighters can be difficult as well. According to a National Volunteer Fire Council 2020 report, the top three reasons volunteer firefighters stop volunteering are due to leadership and overall company failures; fire company cliques; and training requirements. An eventuality also is age. Many volunteer firefighters just simply age out of the service, much the same as career firefighters, and recruiting challenges prevent backfilling their retirement.

This said, Haverford is an urban/suburban city of over 50,000 residents. Future growth and densification will continue to increase fire incident demand, and response to these incidents will become more demanding on the future volunteer fire force. As demand continues to grow, and through measuring performance of response time and the ability to assemble an Effective Response Force as outlined in this report, the township may identify response gaps that need to be filled by career members at certain times of the day in certain locations in the township at some point in the future. It is the advice of CPSM that the township not loose sight of this realization and implement and monitor the response performance recommended on Page 73, so that the township can proactively monitor, plan for, and address any response issues.

End of Technical Report

APPENDIX A. DATA ANALYSIS

This data analysis was conducted by the Center for Public Safety Management, LLC (CPSM). It was prepared as a key component of the study of the five volunteer fire companies and the two Narberth Ambulance stations inside the Township of Haverford. This analysis examines all fire and EMS calls for service between July 1, 2021, and June 30, 2022, as recorded in the Delaware County 911 Center's Computer-Aided Dispatch (CAD) system, and the Firehouse Incident Reporting System (NFIRS).

This analysis is made up of two independent parts. The first part focuses on the fire protection service provided by the five volunteer fire companies in the township. The second part studies the emergency medical services (EMS) provided by the two Narberth Ambulance stations located in Haverford Township.

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

Between July 1, 2021, and June 30, 2022, the five fire companies responded to a combined total of 775 calls and made 2,918 total runs. The total combined workload (deployed time) for all units was 945.6 hours. The average dispatch time was 2.7 minutes, and the average total response time was 7.3 minutes. The 80th percentile dispatch time was 4.2 minutes and the 80th percentile total response time was 9.1 minutes. The 90th percentile dispatch time was 5.4 minutes and the 90th percentile total response time was 10.6 minutes.

Within the same period, the two Narberth Ambulance stations responded to 3,429 calls and made 8,053 total runs inside the Township of Haverford. The total combined workload for all units was 5,655.8 hours. The average dispatch time was 1.1 minutes, and the average total response time was 7.4 minutes. The 90th percentile dispatch time was 2.6 minutes and the 90th percentile total response time was 10.6 minutes.

PART 1. FIRE PROTECTION AND RESCUE

In this part, we examine the response and workload of the five fire companies. We linked the CAD and the Firehouse NFIRS data sets. Then, we used the NFIRS incident type to identify canceled calls, EMS calls, motor vehicle accidents (MVA), and fire category call types. For calls that do not have specific NFIRS incident types, we instead used the incident nature description from the CAD data to assign a call category. We describe the method of call categorization in Attachment IV.

We received records for 1,059 total fire calls that were made between July 1, 2021, and June 30, 2022. We removed five test calls, 14 fire information calls, and 265 calls that were received by different companies but lacked a responding unit (The information on these 265 calls is detailed in Attachment V).

This part of the analysis includes four sections. The first section focuses on call types and dispatches. The second section explores the time spent and the workload of the individual units utilized by each fire company. The third section presents an analysis of the busiest hours in the year studied. The fourth section provides a response time analysis of the studied fire companies' units.

FIRE COMPANIES CALL TOTALS AND RUNS

Between July 1, 2021, and June 30, 2022, the Llanerch, Brookline, Oakmont, Manoa, and Bon Air Fire Companies responded to a total of 775 calls, of which, 625 and 150 calls were inside and outside the Township of Haverford, respectively. During the studied period, there were 34 outside fire calls and 64 structure fire calls, respectively.

FIRE COMPANIES CALLS, BY TYPE

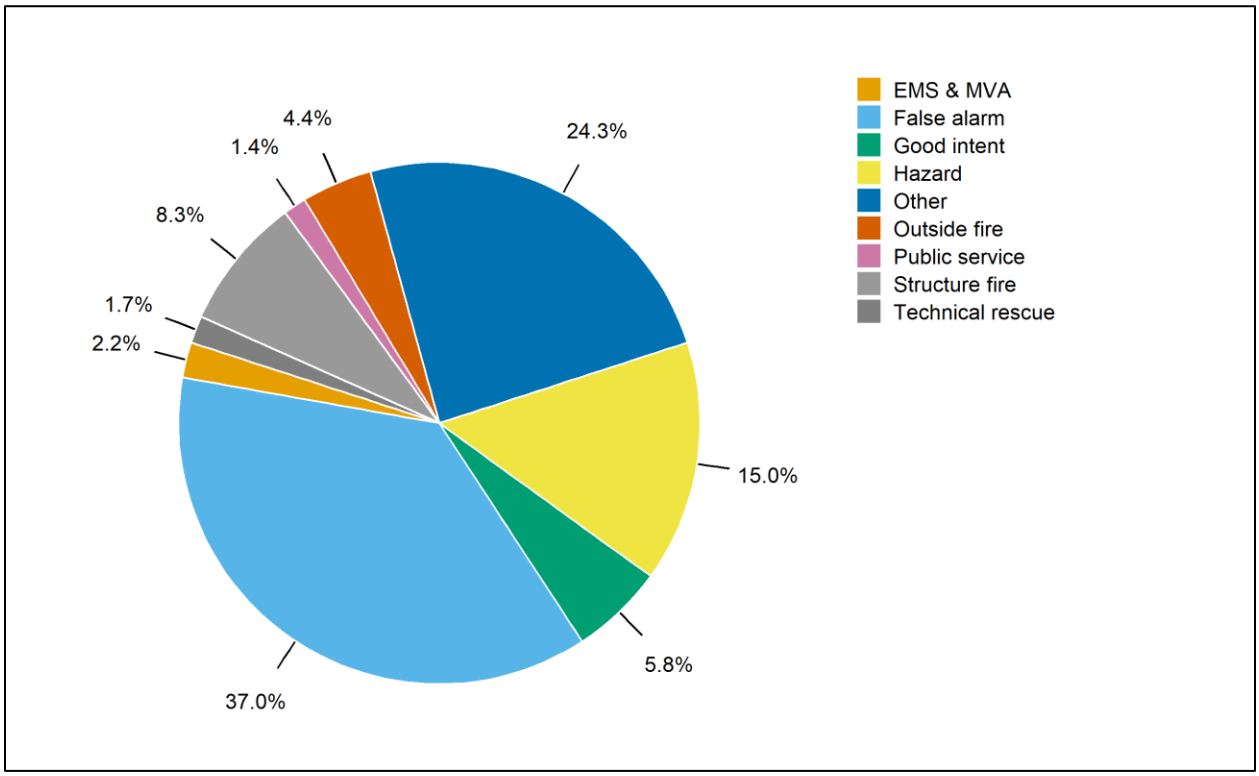
Table 1 and Figure 1 show the number of calls by call type, average calls per day, and the percentage of calls that fall into each call type category for the 12 months studied. Table 2 shows the number of calls by the primary service area of each fire company, call type, average calls per day, and the percentage of calls that fall into each category. Figure 2 illustrates the percentage of calls that occurred in the district of each fire company.

TABLE 2: Fire Companies Calls, by Type

Call Type	Total Calls	Calls per Day	Call Percentage
EMS assist	9	0.0	1.2
MVA	8	0.0	1.0
EMS Subtotal	**17**	**0.0**	**2.2**
False alarm	287	0.8	37.0
Good intent	45	0.1	5.8
Hazard	116	0.3	15.0
Outside fire	34	0.1	4.4
Public service	11	0.0	1.4
Structure fire	64	0.2	8.3
Technical rescue	13	0.0	1.7
Fire Subtotal	**570**	**1.6**	**73.5**
Aid given*	150	0.4	19.4
Canceled	38	0.1	4.9
Total	**775**	**2.1**	**100.0**

Note: *Calls that occurred outside the emergency service zones (ESZ) 34, 35, 38, 56, and 58 were labeled as aid given. 42 aid given calls were canceled.

FIGURE 1: Calls Responded to by Fire Companies, by Type



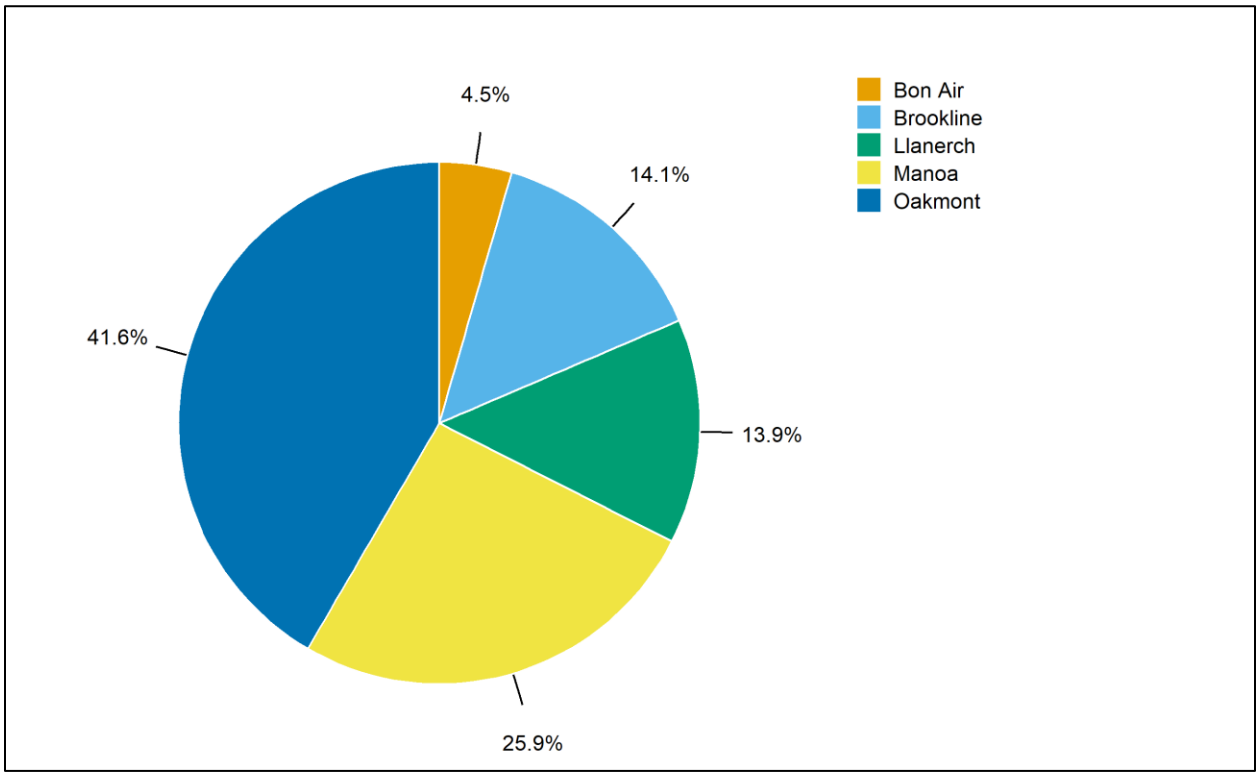
Note: Other includes aid given (19.4 percent) and canceled (4.9 percent) calls.

TABLE 3: Calls by Type and Fire District Inside the Township of Haverford

Call Type	Fire District					
	Llanerch	Brookline	Oakmont	Manoa	Bon Air	Total
EMS assist	1	1	3	2	2	9
MVA	0	0	2	4	2	8
EMS Subtotal	**1**	**1**	**5**	**6**	**4**	**17**
False alarm	48	42	111	77	9	287
Good intent	5	6	14	17	3	45
Hazard	14	17	46	32	7	116
Outside fire	9	5	13	6	1	34
Public service	2	0	5	3	1	11
Structure fire	5	11	35	10	3	64
Technical rescue	1	0	4	8	0	13
Fire Subtotal	**84**	**81**	**238**	**153**	**24**	**570**
Canceled	2	6	27	3	0	38
Total	**87**	**88**	**260**	**162**	**28**	**625**
Total Percent	**13.9**	**14.1**	**41.6**	**25.9**	**4.5**	**100.0**

Note: The 150 aid given calls that occurred outside the Township of Haverford were not included.
The term "fire district" refers to the primary response area of a specific fire company within Haverford.

FIGURE 2: Calls by Fire District



Observations:

Overall

- There was an average of 2.1 calls per day, including 0.4 aid given and 0.1 canceled calls per day.
- Fire calls totaled 570 (74 percent of all calls), or an average of 1.6 calls per day.
  1. False alarm calls were 37 percent of total calls (50 percent of fire calls).
  2. Outside and structure fire calls totaled 98 and constituted 13 percent of total calls (17 percent of fire calls).

Inside Haverford Township

- 625 calls occurred inside Haverford.
- 87 calls (14 percent of calls in Haverford) were in the Llanerch fire company's district.
- 88 calls (14 percent of calls in Haverford) were in the Brookline fire company's district.
- 260 calls (42 percent of calls in Haverford) were in the Oakmont fire company's district.
- 162 calls (26 percent of calls in Haverford) were in the Manoa fire company's district.
- 28 calls (four percent of calls in Haverford) were in the Bon Air fire company's district.

FIRE COMPANIES CALLS, BY TYPE AND DURATION

Table 3 shows the duration of calls by type using four duration categories: less than 30 minutes, 30 minutes to one hour, one to two hours, and two or more hours.

TABLE 4: Fire Companies, by Type and Duration

Call Type	Less than 30 Minutes	30 Minutes to One Hour	One to Two Hours	Two or More Hours	Total
EMS assist	8	1	0	0	9
MVA	6	2	0	0	8
EMS Subtotal	**14**	**3**	**0**	**0**	**17**
False alarm	265	17	5	0	287
Good intent	41	4	0	0	45
Hazard	79	27	9	1	116
Outside fire	24	6	3	1	34
Public service	7	4	0	0	11
Structure fire	46	10	6	2	64
Technical rescue	11	0	2	0	13
Fire Subtotal	**473**	**68**	**25**	**4**	**570**
Aid given	70	27	28	25	150
Canceled	37	1	0	0	38
Total	**594**	**99**	**53**	**29**	**775**

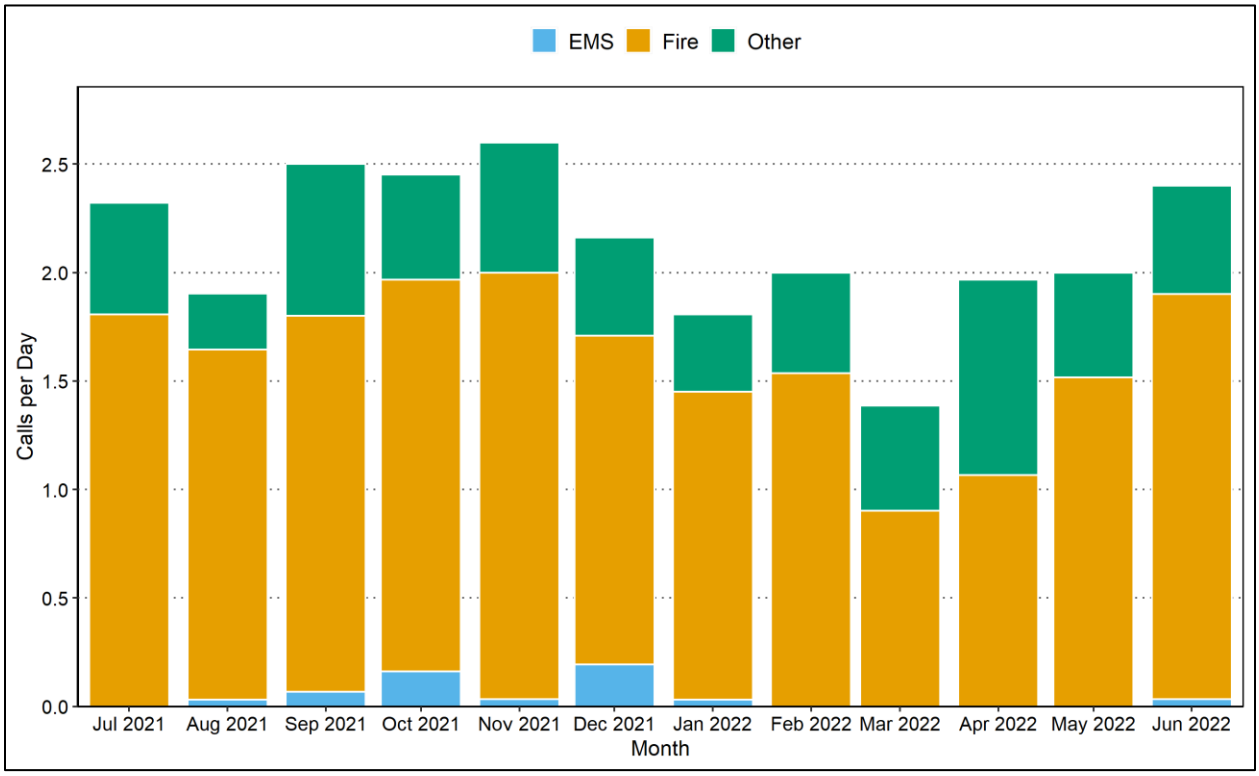
Observations:

- A total of 541 fire calls (95 percent) lasted less than one hour, 25 fire calls (four percent) lasted one to two hours, and four fire calls (one percent) lasted two or more hours.
- A total of 30 outside fire calls (88 percent) lasted less than one hour, three outside fire calls (nine percent) lasted one to two hours, and one outside fire call (three percent) lasted two or more hours.
- A total of 56 structure fire calls (88 percent) lasted less than one hour, six structure fire calls (nine percent) lasted one to two hours, and two structure fire calls (three percent) lasted two or more hours.

AVERAGE FIRE COMPANIES CALLS, BY MONTH AND HOUR OF DAY

Figure 3 shows the monthly variation in the combined daily number of calls handled by the five fire companies in the Township of Haverford. Similarly, Figure 4 illustrates the average number of calls received each hour of the day.

FIGURE 3: Average Fire Companies Calls by Month

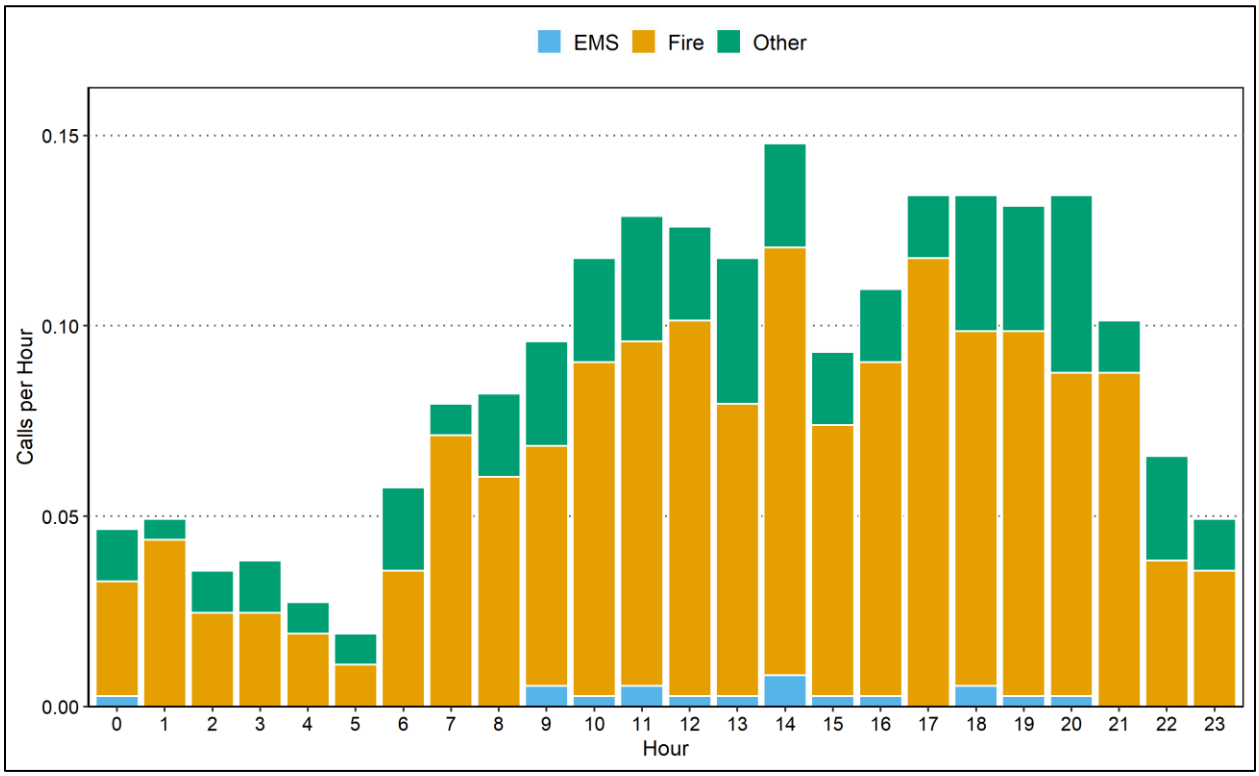


Observations:

Average fire calls per day ranged from 0.9 in March 2022 to 2.0 in November 2021.

Average calls per day overall ranged from 1.4 in March 2022 to 2.6 in November 2021.

FIGURE 4: Average Fire Companies Calls by Hour of Day



Observations:

Average fire calls per hour ranged from 0.01 between 5:00 a.m. and 6:00 a.m. to 0.12 between 5:00 p.m. and 6:00 p.m.

Average calls per hour overall ranged from 0.02 between 5:00 a.m. and 6:00 a.m. to 0.15 between 2:00 p.m. and 3:00 p.m.

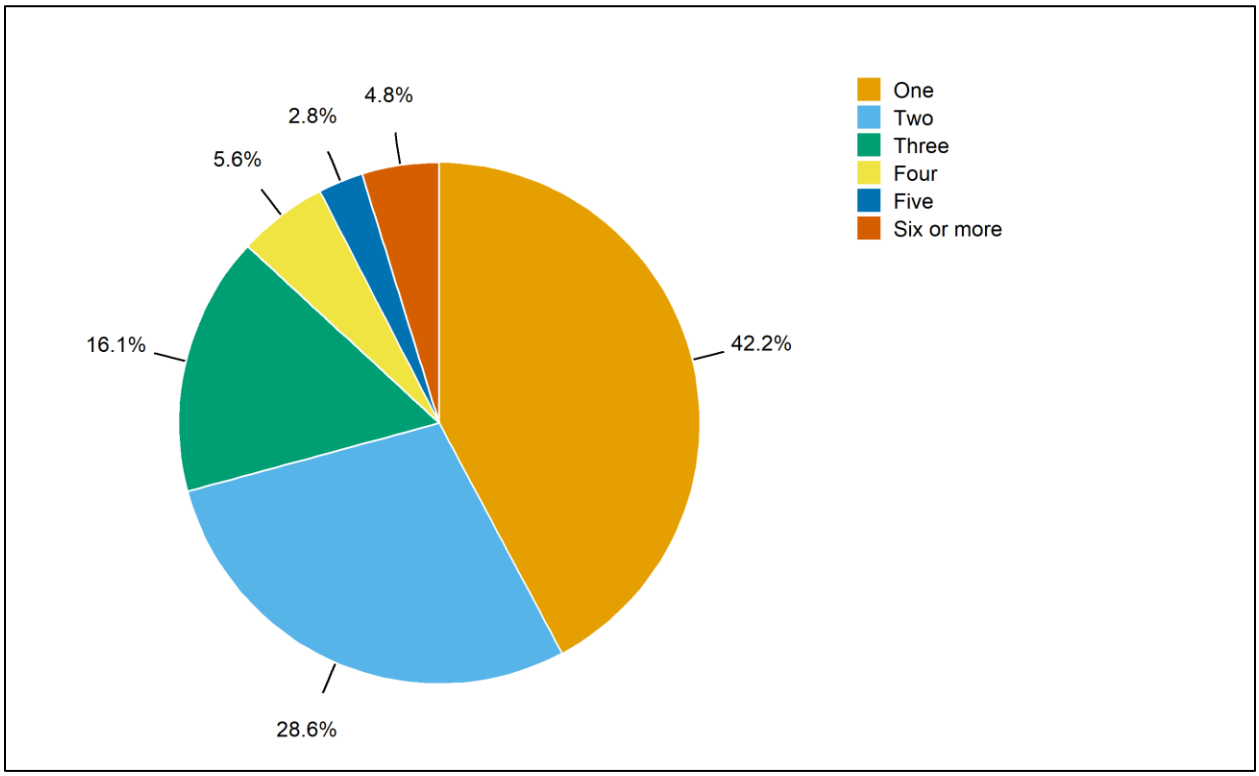
ARRIVING FIRE COMPANIES UNITS

Table 4, along with Figure 5, detail the number of calls with one, two, three, four, five, and six or more arriving units by call type. This analysis includes all arriving units from the five studied fire companies. Out of 775 total calls, there were no arriving units at 128 calls (17 percent).

TABLE 5: Fire Companies Calls by Call Type and Number of Arriving Units

Call Type	Number of Units						Total Calls
	One	Two	Three	Four	Five	Six or more	
EMS assist	7	2	0	0	0	0	9
MVA	2	3	2	0	0	0	7
EMS Subtotal	**9**	**5**	**2**	**0**	**0**	**0**	**16**
False alarm	107	74	48	15	9	8	261
Good intent	17	12	8	4	2	0	43
Hazard	32	35	25	5	2	12	111
Outside fire	12	14	5	0	0	1	32
Public service	3	3	2	2	0	0	10
Structure fire	19	16	7	4	5	9	60
Technical rescue	7	4	1	0	0	0	12
Fire Subtotal	**197**	**158**	**96**	**30**	**18**	**30**	**529**
Aid given	64	19	5	6	0	0	94
Canceled	3	3	1	0	0	1	8
Total	**273**	**185**	**104**	**36**	**18**	**31**	**647**
Percentage	**42.2**	**28.6**	**16.1**	**5.6**	**2.8**	**4.8**	**100.0**

FIGURE 5: Percentage of Fire Companies Calls by Number of Arriving Units



Observations:

Overall

On average, 2.2 units arrived per call; for 42 percent of calls, only one unit arrived.

Overall, three or more units arrived at 29 percent of calls.

On average, 2.2 units arrived per fire call.

For fire calls, one unit arrived 42 percent of the time, two units arrived 29 percent of the time, three units arrived 16 percent of the time, four units arrived six percent of the time, five units arrived three percent of the time, and six or more units arrived five percent of the time.

For outside fire calls, three or more units arrived 19 percent of the time.

For structure fire calls, three or more units arrived 42 percent of the time.

FIRE UNIT WORKLOAD: RUNS AND TOTAL TIME SPENT

The workload of the five fire companies' units is measured in two ways: runs and deployed time. The deployed time of a run is measured from the time a unit is dispatched through the time the unit is cleared. Because multiple units respond to some calls, there are more runs (2,918) than calls (775) and the average deployed time per run varies from the total duration of calls.

RUNS AND DEPLOYED TIME – ALL FIRE UNITS

Deployed time, also referred to as deployed hours, is the total workload of the five companies' units deployed on all runs. Table 5 shows the total deployed time, both overall and broken down by type of run, for all units in the study period. Table 6 and Figure 6 present the average deployed minutes of the five fire companies by hour of day.

TABLE 6: Fire Unit Runs and Deployed Time by Run Type

Run Type	Minutes per Run	Total Hours	Percent of Hours	Minutes per Day	Total Runs	Runs per Day
EMS assist	16.3	5.4	0.6	0.9	20	0.1
MVA	17.6	10.6	1.1	1.7	36	0.1
EMS Subtotal	**17.1**	**16.0**	**1.7**	**2.6**	**56**	**0.2**
False alarm	11.1	255.5	27.0	42.0	1,378	3.8
Good intent	13.0	36.4	3.8	6.0	168	0.5
Hazard	21.9	159.8	16.9	26.3	437	1.2
Outside fire	23.2	39.0	4.1	6.4	101	0.3
Public service	22.7	13.6	1.4	2.2	36	0.1
Structure fire	24.9	144.6	15.3	23.8	349	1.0
Technical rescue	17.6	10.6	1.1	1.7	36	0.1
Fire Subtotal	**15.8**	**659.5**	**69.7**	**108.4**	**2,505**	**6.9**
Aid given	59.9	259.5	27.4	42.7	260	0.7
Canceled	6.6	10.6	1.1	1.7	97	0.3
Other Subtotal	**45.4**	**270.1**	**28.6**	**44.4**	**357**	**1.0**
Total	**19.4**	**945.6**	**100.0**	**155.4**	**2,918**	**8.0**

Observations:

Overall

The total deployed time for the year was 945.6 hours. The daily average was 155 minutes (2.6 hours) for all the fire companies' units combined.

There were 2,918 runs including 260 runs for aid given calls and 97 runs for canceled calls. The daily average was 8.0 runs.

Runs for EMS calls accounted for two percent of the total workload.

The average deployed time for EMS runs was 17.1 minutes. The deployed time for all EMS runs averaged 2.6 minutes per day.

Fire runs accounted for 70 percent of the total workload.

The average deployed time for fire runs was 15.8 minutes. The deployed time for all fire runs averaged 108.4 minutes per day.

There were 450 runs for outside and structure fire calls combined, with a total workload of 183.7 hours. This accounted for 19 percent of the total workload.

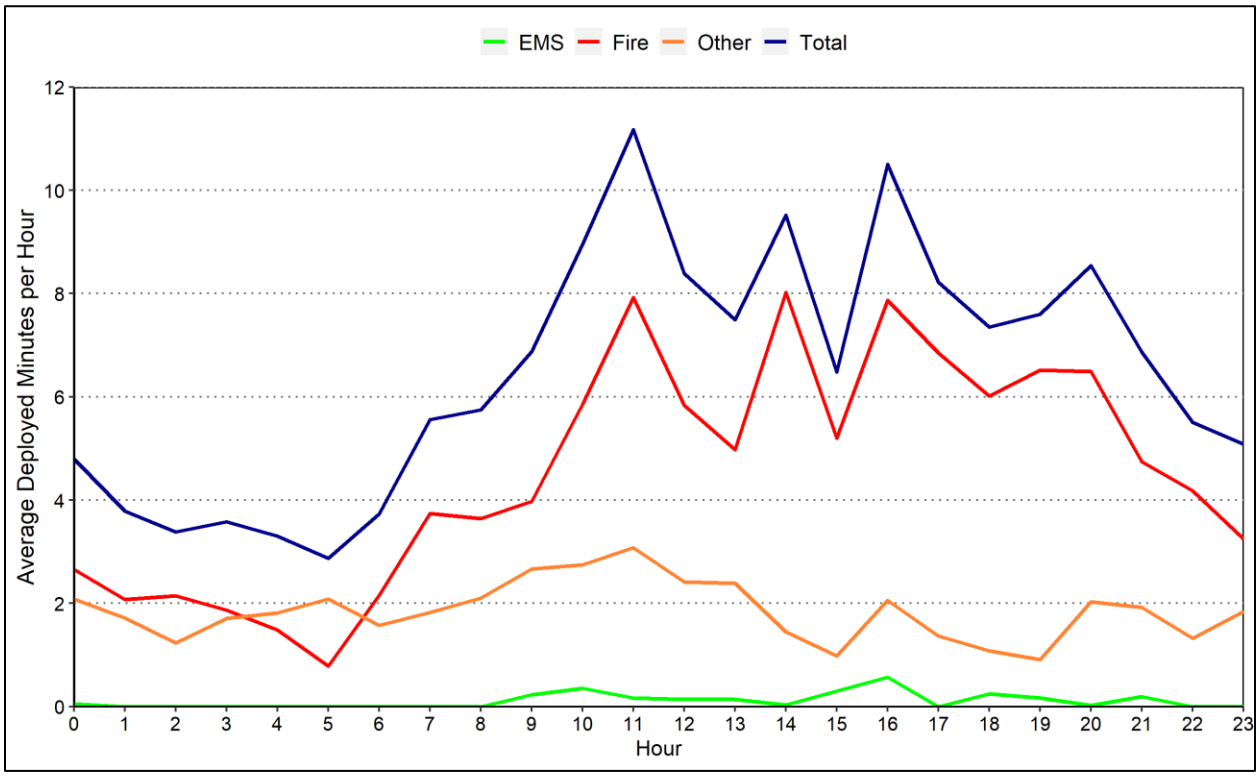
The average deployed time for outside fire runs was 23.2 minutes.

The average deployed time for structure fire runs was 24.9 minutes.

TABLE 7: Fire Unit Deployed Minutes by Hour of Day

Hour	EMS	Fire	Other	Total
0	0.1	2.7	2.1	4.8
1	0.0	2.1	1.7	3.8
2	0.0	2.2	1.2	3.4
3	0.0	1.9	1.7	3.6
4	0.0	1.5	1.8	3.3
5	0.0	0.8	2.1	2.9
6	0.0	2.2	1.6	3.7
7	0.0	3.7	1.8	5.6
8	0.0	3.6	2.1	5.7
9	0.2	4.0	2.7	6.9
10	0.4	5.9	2.7	9.0
11	0.2	7.9	3.1	11.2
12	0.1	5.8	2.4	8.4
13	0.1	5.0	2.4	7.5
14	0.0	8.0	1.5	9.5
15	0.3	5.2	1.0	6.5
16	0.6	7.9	2.1	10.5
17	0.0	6.9	1.4	8.2
18	0.2	6.0	1.1	7.3
19	0.2	6.5	0.9	7.6
20	0.0	6.5	2.0	8.5
21	0.2	4.7	1.9	6.9
22	0.0	4.2	1.3	5.5
23	0.0	3.2	1.8	5.1
Daily Avg.	**2.6**	**108.4**	**44.4**	**155.4**

FIGURE 6: Average Deployed Minutes of Fire Units by Hour of Day



Observations:

Hourly deployed time was highest during the day from 10:00 a.m. to 10:00 p.m., averaging between 6.5 minutes and 11.2 minutes.

Average deployed time peaked between 11:00 a.m. and noon, averaging 11.2 minutes.

Average deployed time was lowest between 5:00 a.m. and 6:00 a.m., averaging 2.9 minutes.

WORKLOAD BY FIRE COMPANY

This section examines the unit workload for each fire company. We grouped the units into two types, i.e., (1) the fire suppression and rescue units and (2) the administrative units. Table 7 provides a summary of each type of unit's workload for each fire company. Tables 8 and 9 present each type of unit's runs broken out by run type (Table 8) and the corresponding daily average deployed time by run type (Table 9).

Tables 10 and 11 detail the workload of each fire suppression and rescue unit (Table 10) and each administrative unit (Table 11). Tables 12 to 15 provide a more detailed view of workload, showing each unit's runs broken out by run type (Table 12 for fire suppression and rescue units and Table 13 for administrative units) and its daily average deployed time by run type (Table 14 for fire suppression and rescue units and Table 15 for administrative units).

TABLE 8: Overall Workload by Type of Unit Type and Fire Company

Company	Unit Type	Minutes per Run	Total Hours	Total Percent	Minutes per Day	Total Runs	Runs per Day
Llanerch (Station 34)	Fire suppression & rescue	17.2	131.5	13.9	21.6	460	1.3
	Administrative	17.5	19.3	2.0	3.2	66	0.2
	Subtotal	**17.2**	**150.8**	**15.9**	**24.8**	**526**	**1.4**
Brookline (Station 35)	Fire suppression & rescue	19.5	169.7	17.9	27.9	523	1.4
	Administrative	16.3	19.8	2.1	3.3	73	0.2
	Subtotal	**19.1**	**189.5**	**20.0**	**31.2**	**596**	**1.6**
Oakmont (Station 38)	Fire suppression & rescue	18.4	148.8	15.7	24.5	484	1.3
	Administrative	16.3	45.0	4.8	7.4	166	0.5
	Subtotal	**17.9**	**193.8**	**20.5**	**31.9**	**650**	**1.8**
Manoa (Station 56)	Fire suppression & rescue	23.7	300.7	31.8	49.4	760	2.1
	Administrative	15.1	27.3	2.9	4.5	108	0.3
	Subtotal	**22.7**	**327.9**	**34.7**	**53.9**	**868**	**2.4**
Bon Air (Station 58)	Fire suppression & rescue	18.0	77.8	8.2	12.8	259	0.7
	Administrative	17.7	5.6	0.6	0.9	19	0.1
	Subtotal	**18.0**	**83.5**	**8.8**	**13.7**	**278**	**0.8**
Total		**19.4**	**945.6**	**100.0**	**155.4**	**2,918**	**8.0**

TABLE 9: Annual Runs by Type, Unit Type, and Fire Company

Company	Unit Type	EMS	Outside Fire	Structure Fire	Other Fire	Aid Given	Cancel	Total
Llanerch (Station 34)	Fire suppression & rescue	2	13	46	363	27	9	460
	Administrative	1	8	4	51	1	1	66
	Subtotal	**3**	**21**	**50**	**414**	**28**	**10**	**526**
Brookline (Station 35)	Fire suppression & rescue	2	17	75	373	40	16	523
	Administrative	1	3	12	52	2	3	73
	Subtotal	**3**	**20**	**87**	**425**	**42**	**19**	**596**
Oakmont (Station 38)	Fire suppression & rescue	17	25	79	317	7	39	484
	Administrative	3	7	24	119	3	10	166
	Subtotal	**20**	**32**	**103**	**436**	**10**	**49**	**650**
Manoa (Station 56)	Fire suppression & rescue	14	22	73	476	160	15	760
	Administrative	4	3	7	92	2	0	108
	Subtotal	**18**	**25**	**80**	**568**	**162**	**15**	**868**
Bon Air (Station 58)	Fire suppression & rescue	9	3	25	200	18	4	259
	Administrative	3	0	4	12	0	0	19
	Subtotal	**12**	**3**	**29**	**212**	**18**	**4**	**278**
Total		**56**	**101**	**349**	**2,055**	**260**	**97**	**2,918**

TABLE 10: Deployed Minutes Per Day by Type, Unit Type, and Fire Company

Company	Unit Type	EMS	Outside Fire	Structure Fire	Other Fire	Aid Given	Cancel	Total
Llanerch (Station 34)	Fire suppression & rescue	0.0	0.8	3.0	11.9	5.7	0.1	21.6
	Administrative	0.0	0.5	0.3	2.3	0.0	0.0	3.2
	Subtotal	**0.1**	**1.3**	**3.3**	**14.3**	**5.7**	**0.1**	**24.8**
Brookline (Station 35)	Fire suppression & rescue	0.1	0.9	5.9	13.8	7.0	0.2	27.9
	Administrative	0.1	0.1	0.8	1.7	0.5	0.1	3.3
	Subtotal	**0.2**	**1.0**	**6.7**	**15.5**	**7.5**	**0.3**	**31.2**
Oakmont (Station 38)	Fire suppression & rescue	0.5	1.4	5.2	15.2	1.4	0.8	24.5
	Administrative	0.2	0.8	1.3	4.7	0.0	0.3	7.4
	Subtotal	**0.8**	**2.3**	**6.5**	**19.8**	**1.4**	**1.1**	**31.9**
Manoa (Station 56)	Fire suppression & rescue	0.4	1.6	4.8	18.3	24.1	0.2	49.4
	Administrative	0.1	0.1	0.2	3.9	0.1	0.0	4.5
	Subtotal	**0.5**	**1.7**	**5.1**	**22.2**	**24.2**	**0.2**	**53.9**
Bon Air (Station 58)	Fire suppression & rescue	0.7	0.1	2.1	6.0	3.8	0.0	12.8
	Administrative	0.4	0.0	0.1	0.4	0.0	0.0	0.9
	Subtotal	**1.1**	**0.1**	**2.2**	**6.5**	**3.8**	**0.0**	**13.7**
Total		**2.6**	**6.4**	**23.8**	**78.2**	**42.7**	**1.7**	**155.4**

TABLE 11: Workload of Fire Suppression and Rescue Units by Fire Company

Company	Unit	Unit Type	Minutes per Run	Total Hours	Total Percent	Minutes per Day	Total Runs	Runs per Day
Llanerch (Station 34)	ENG34	Engine	17.8	59.8	7.2	9.8	202	0.6
	ENG34-1	Engine	13.7	32.8	4.0	5.4	144	0.4
	TW34	Tower	20.3	37.8	4.6	6.2	112	0.3
	UT34	Utility	31.7	1.1	0.1	0.2	2	0.0
	Subtotal		**17.2**	**131.5**	**15.9**	**21.6**	**460**	**1.3**
Brookline (Station 35)	ENG35	Engine	16.8	47.3	5.7	7.8	169	0.5
	FO35	Foam Engine	19.7	36.5	4.4	6.0	111	0.3
	LA35	Ladder	20.1	79.0	9.5	13.0	236	0.6
	SP35	Spill	59.2	6.9	0.8	1.1	7	0.0
	Subtotal		**19.5**	**169.7**	**20.5**	**27.9**	**523**	**1.4**
Oakmont (Station 38)	ENG38	Engine	19.2	80.8	9.7	13.3	252	0.7
	LA38	Ladder	18.3	43.3	5.2	7.1	142	0.4
	RE38	Rescue	13.7	8.5	1.0	1.4	37	0.1
	RIT38	RIT	24.3	0.4	0.0	0.1	1	0.0
	SD38	Squad	18.3	15.9	1.9	2.6	52	0.1
	Subtotal		**18.4**	**148.8**	**18.0**	**24.5**	**484**	**1.3**
Manoa (Station 56)	ENG56	Engine	17.6	80.7	9.7	13.3	275	0.8
	MR56	Water Rescue	114.1	19.0	2.3	3.1	10	0.0
	RE56	Rescue	20.7	71.2	8.6	11.7	206	0.6
	RIT56	RIT	36.1	44.6	5.4	7.3	74	0.2
	SD56	Squad	24.8	79.0	9.5	13.0	191	0.5
	UT56	Utility	94.2	6.3	0.8	1.0	4	0.0
	Subtotal		**23.7**	**300.7**	**36.3**	**49.4**	**760**	**2.1**
Bon Air (Station 58)	AU58	Air Unit	110.0	5.5	0.7	0.9	3	0.0
	PL58	Pipeline Pumper	14.3	21.5	2.6	3.5	90	0.2
	RE58	Rescue	18.0	21.6	2.6	3.6	72	0.2
	SD58	Squad	18.6	29.2	3.5	4.8	94	0.3
	Subtotal		**18.0**	**77.8**	**9.4**	**12.8**	**259**	**0.7**
Total			**20.0**	**828.6**	**100.0**	**136.2**	**2,486**	**6.8**

TABLE 12: Workload of Administrative Units by Fire Company

Company	Unit	Unit Type	Minutes per Run	Total Hours	Total Percent	Minutes per Day	Total Runs	Runs per Day
Llanerch (Station 34)	CH34	Chief	17.9	18.5	15.8	3.0	62	0.2
	DC34	Deputy Chief	11.9	0.8	0.7	0.1	4	0.0
	Subtotal		**17.5**	**19.3**	**16.5**	**3.2**	**66**	**0.2**
Brookline (Station 35)	AC35	Chief	11.2	1.5	1.3	0.2	8	0.0
	CH35	Chief	17.1	18.2	15.6	3.0	64	0.2
	DC35	Deputy chief	6.9	0.1	0.1	0.0	1	0.0
	Subtotal		**16.3**	**19.8**	**17.0**	**3.3**	**73**	**0.2**
Oakmont (Station 38)	AC38	Chief	13.3	11.3	9.6	1.9	51	0.1
	CH38	Chief	18.1	29.9	25.6	4.9	99	0.3
	DC38	Deputy chief	14.4	3.8	3.3	0.6	16	0.0
	Subtotal		**16.3**	**45.0**	**38.5**	**7.4**	**166**	**0.5**
Manoa (Station 56)	AC56	Chief	8.7	3.0	2.6	0.5	21	0.1
	CH56	Chief	18.4	13.5	11.5	2.2	44	0.1
	DC56	Deputy chief	15.0	10.7	9.2	1.8	43	0.1
	Subtotal		**15.1**	**27.3**	**23.3**	**4.5**	**108**	**0.3**
Bon Air (Station 58)	AC58	Chief	19.6	3.9	3.4	0.6	12	0.0
	CH58	Chief	26.2	1.3	1.1	0.2	3	0.0
	DC58	Deputy chief	5.7	0.4	0.3	0.1	4	0.0
	Subtotal		**17.7**	**5.6**	**4.8**	**0.9**	**19**	**0.1**
Total			**16.2**	**117.0**	**100.0**	**19.2**	**432**	**1.2**

TABLE 13: Runs by Fire Suppression and Rescue Units by Type and Fire Company

Company	Unit	Unit Type	EMS	Outside Fire	Structure Fire	Other Fire	Aid Given	Cancel	Total
Llanerch (Station 34)	ENG34	Engine	2	10	21	155	9	5	202
	ENG34-1	Engine	0	2	11	125	3	3	144
	TW34	Tower	0	1	12	83	15	1	112
	UT34	Utility	0	0	2	0	0	0	2
	Subtotal		**2**	**13**	**46**	**363**	**27**	**9**	**460**
Brookline (Station 35)	ENG35	Engine	1	9	26	119	5	9	169
	FO35	Foam Engine	1	5	22	73	6	4	111
	LA35	Ladder	0	3	25	178	27	3	236
	SP35	Spill	0	0	2	3	2	0	7
	Subtotal		**2**	**17**	**75**	**373**	**40**	**16**	**523**
Oakmont (Station 38)	ENG38	Engine	4	13	36	176	0	23	252
	LA38	Ladder	1	2	23	106	6	4	142
	RE38	Rescue	7	2	9	13	1	5	37
	RIT38	RIT	0	0	1	0	0	0	1
	SD38	Squad	5	8	10	22	0	7	52
	Subtotal		**17**	**25**	**79**	**317**	**7**	**39**	**484**
Manoa (Station 56)	ENG56	Engine	5	10	28	184	44	4	275
	MR56	Water Rescue	0	0	0	0	10	0	10
	RE56	Rescue	7	2	11	135	43	8	206
	RIT56	RIT	0	2	19	14	37	2	74
	SD56	Squad	2	8	15	142	23	1	191
	UT56	Utility	0	0	0	1	3	0	4
	Subtotal		**14**	**22**	**73**	**476**	**160**	**15**	**760**
Bon Air (Station 58)	AU58	Air Unit	0	0	0	0	3	0	3
	PL58	Pipeline Pumper	4	1	9	68	6	2	90
	RE58	Rescue	1	1	7	60	3	0	72
	SD58	Squad	4	1	9	72	6	2	94
	Subtotal		**9**	**3**	**25**	**200**	**18**	**4**	**259**
Total			**44**	**80**	**298**	**1,729**	**252**	**83**	**2,486**

TABLE 14: Administrative Unit Runs by Type and Fire Company

Company	Unit	Unit Type	EMS	Outside Fire	Structure Fire	Other Fire	Aid Given	Cancel	Total
Llanerch (Station 34)	CH34	Chief	1	7	4	49	1	0	62
	DC34	Deputy Chief	0	1	0	2	0	1	4
	Subtotal		**1**	**8**	**4**	**51**	**1**	**1**	**66**
Brookline (Station 35)	AC35	Chief	0	1	3	4	0	0	8
	CH35	Chief	1	2	9	47	2	3	64
	DC35	Deputy chief	0	0	0	1	0	0	1
	Subtotal		**1**	**3**	**12**	**52**	**2**	**3**	**73**
Oakmont (Station 38)	AC38	Chief	1	2	8	36	1	3	51
	CH38	Chief	1	5	14	72	1	6	99
	DC38	Deputy chief	1	0	2	11	1	1	16
	Subtotal		**3**	**7**	**24**	**119**	**3**	**10**	**166**
Manoa (Station 56)	AC56	Chief	0	0	2	19	0	0	21
	CH56	Chief	3	2	1	37	1	0	44
	DC56	Deputy chief	1	1	4	36	1	0	43
	Subtotal		**4**	**3**	**7**	**92**	**2**	**0**	**108**
Bon Air (Station 58)	AC58	Chief	2	0	3	7	0	0	12
	CH58	Chief	1	0	1	1	0	0	3
	DC58	Deputy chief	0	0	0	4	0	0	4
	Subtotal		**3**	**0**	**4**	**12**	**0**	**0**	**19**
Total			**12**	**21**	**51**	**326**	**8**	**14**	**432**

TABLE 15: Average Deployed Minutes of Fire Suppression and Rescue Units by Type and Fire Company

Company	Unit	Unit Type	EMS	Outside Fire	Structure Fire	Other Fire	Aid Given	Cancel	Total
Llanerch (Station 34)	ENG34	Engine	0.0	0.7	1.6	5.6	1.9	0.1	9.8
	ENG34-1	Engine	0.0	0.1	0.6	3.6	1.1	0.0	5.4
	TW34	Tower	0.0	0.1	0.7	2.7	2.7	0.0	6.2
	UT34	Utility	0.0	0.0	0.2	0.0	0.0	0.0	0.2
	Subtotal		**0.0**	**0.8**	**3.0**	**11.9**	**5.7**	**0.1**	**21.6**
Brookline (Station 35)	ENG35	Engine	0.1	0.5	1.6	4.6	0.9	0.1	7.8
	FO35	Foam Engine	0.1	0.3	1.6	3.1	0.9	0.1	6.0
	LA35	Ladder	0.0	0.1	2.3	5.9	4.6	0.0	13.0
	SP35	Spill	0.0	0.0	0.3	0.2	0.6	0.0	1.1
	Subtotal		**0.1**	**0.9**	**5.9**	**13.8**	**7.0**	**0.2**	**27.9**
Oakmont (Station 38)	ENG38	Engine	0.3	0.8	1.9	9.8	0.0	0.4	13.3
	LA38	Ladder	0.0	0.1	1.6	3.9	1.4	0.1	7.1
	RE38	Rescue	0.1	0.1	0.7	0.4	0.0	0.1	1.4
	RIT38	RIT	0.0	0.0	0.1	0.0	0.0	0.0	0.1
	SD38	Squad	0.1	0.4	0.9	1.1	0.0	0.1	2.6
	Subtotal		**0.5**	**1.4**	**5.2**	**15.2**	**1.4**	**0.8**	**24.5**
Manoa (Station 56)	ENG56	Engine	0.2	0.7	1.8	6.7	3.9	0.1	13.3
	MR56	Water Rescue	0.0	0.0	0.0	0.0	3.1	0.0	3.1
	RE56	Rescue	0.2	0.3	0.9	4.3	6.0	0.1	11.7
	RIT56	RIT	0.0	0.1	1.1	0.6	5.6	0.1	7.3
	SD56	Squad	0.0	0.6	1.1	6.7	4.5	0.0	13.0
	UT56	Utility	0.0	0.0	0.0	0.0	1.0	0.0	1.0
	Subtotal		**0.4**	**1.6**	**4.8**	**18.3**	**24.1**	**0.2**	**49.4**
Bon Air (Station 58)	AU58	Air Unit	0.0	0.0	0.0	0.0	0.9	0.0	0.9
	PL58	Pipeline Pumper	0.3	0.0	0.5	2.0	0.6	0.0	3.5
	RE58	Rescue	0.1	0.0	0.8	1.6	1.0	0.0	3.6
	SD58	Squad	0.3	0.0	0.8	2.4	1.3	0.0	4.8
	Subtotal		**0.7**	**0.1**	**2.1**	**6.0**	**3.8**	**0.0**	**12.8**
Total			**1.8**	**4.9**	**20.9**	**65.2**	**42.0**	**1.3**	**136.2**

TABLE 16: Average Deployed Minutes of Administrative Units by Type and Fire Company

Company	Unit	Unit Type	EMS	Outside Fire	Structure Fire	Other Fire	Aid Given	Cancel	Total
Llanerch (Station 34)	CH34	Chief	0.0	0.4	0.3	2.2	0.0	0.0	3.0
	DC34	Deputy Chief	0.0	0.0	0.0	0.1	0.0	0.0	0.1
	Subtotal		**0.0**	**0.5**	**0.3**	**2.3**	**0.0**	**0.0**	**3.2**
Brookline (Station 35)	AC35	Chief	0.0	0.0	0.1	0.1	0.0	0.0	0.2
	CH35	Chief	0.1	0.1	0.7	1.6	0.5	0.1	3.0
	DC35	Deputy chief	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Subtotal		**0.1**	**0.1**	**0.8**	**1.7**	**0.5**	**0.1**	**3.3**
Oakmont (Station 38)	AC38	Chief	0.1	0.1	0.4	1.1	0.0	0.1	1.9
	CH38	Chief	0.1	0.7	0.9	3.0	0.0	0.2	4.9
	DC38	Deputy chief	0.0	0.0	0.0	0.5	0.0	0.0	0.6
	Subtotal		**0.2**	**0.8**	**1.3**	**4.7**	**0.0**	**0.3**	**7.4**
Manoa (Station 56)	AC56	Chief	0.0	0.0	0.1	0.4	0.0	0.0	0.5
	CH56	Chief	0.1	0.1	0.0	1.9	0.1	0.0	2.2
	DC56	Deputy chief	0.1	0.0	0.1	1.5	0.0	0.0	1.8
	Subtotal		**0.1**	**0.1**	**0.2**	**3.9**	**0.1**	**0.0**	**4.5**
Bon Air (Station 58)	AC58	Chief	0.3	0.0	0.1	0.3	0.0	0.0	0.6
	CH58	Chief	0.1	0.0	0.0	0.1	0.0	0.0	0.2
	DC58	Deputy chief	0.0	0.0	0.0	0.1	0.0	0.0	0.1
	Subtotal		**0.4**	**0.0**	**0.1**	**0.4**	**0.0**	**0.0**	**0.9**
Total			**0.8**	**1.5**	**2.8**	**13.0**	**0.6**	**0.4**	**19.2**

Observations:

- The fire suppression and rescue apparatus of the Manoa Fire Company made the most runs (760 or an average of 2.1 runs per day) and had the highest total annual deployed time (300.7 hours or an average of 49.4 minutes per day).

  3. Outside and structure fire calls accounted for 13 percent of runs and 13 percent of total deployed time.

- The fire suppression and rescue apparatus of the Brookline Fire Company made the second most runs (523 or an average of 1.4 runs per day) and had the second highest total annual deployed time (169.7 hours or an average of 27.9 minutes per day).

  4. Outside and structure fire calls accounted for 18 percent of runs and 24 percent of total deployed time.

- Among all fire suppression units, ENG56 made the most runs (275 or an average of 0.8 runs per day) and had the second highest total annual deployed time (80.7 hours or an average of 13.3 minutes per day).

  5. Outside, and structure fire calls accounted for 14 percent of runs and 19 percent of total deployed time.

- Among all fire suppression units, ENG38 made the second-most runs (252 or an average of 0.7 runs per day) and had the highest total annual deployed time (80.8 hours or an average of 13.3 minutes per day).

  6. Outside, and structure fire calls accounted for 19 percent of runs and 20 percent of total deployed time.

WORKLOAD BY LOCATION

Table 16 breaks down the workload by call location. Table 17 provides further detail on the workload associated with structure and outside fire calls, also broken down by location.

TABLE 17: Annual Workload by Location

Location	Calls	Pct. Calls	Runs	Runs Per Day	Minutes Per Run	Annual Hours	Pct. Work	Minutes Per Day
Haverford	625	80.6	2,658	7.3	15.5	686.1	72.6	112.8
Broomall	31	4.0	58	0.2	47.7	46.1	4.9	7.6
Upper Darby	26	3.4	47	0.1	58.2	45.6	4.8	7.5
Darby	13	1.7	23	0.1	67.1	25.7	2.7	4.2
Chester City	11	1.4	15	0.0	66.2	16.6	1.8	2.7
Springfield	10	1.3	30	0.1	25.3	12.6	1.3	2.1
Yeadon	10	1.3	15	0.0	44.8	11.2	1.2	1.8
Boothwyn	4	0.5	4	0.0	141.1	9.4	1.0	1.5
Lansdowne	4	0.5	5	0.0	28.0	2.3	0.2	0.4
Narberth	4	0.5	6	0.0	62.8	6.3	0.7	1.0
Newtown	4	0.5	8	0.0	52.6	7.0	0.7	1.2
Wynnewood	4	0.5	4	0.0	125.1	8.3	0.9	1.4
Media	3	0.4	3	0.0	12.5	0.6	0.1	0.1
Bethel	2	0.3	2	0.0	32.1	1.1	0.1	0.2
Bryn Mawr	2	0.3	2	0.0	50.7	1.7	0.2	0.3
Concord	2	0.3	3	0.0	64.9	3.2	0.3	0.5
East Lansdowne	2	0.3	3	0.0	67.9	3.4	0.4	0.6
Prospect Park	2	0.3	4	0.0	121.2	8.1	0.9	1.3
Ridley Park	2	0.3	3	0.0	154.3	7.7	0.8	1.3
Wayne	2	0.3	3	0.0	127.2	6.4	0.7	1.0
Aldan	1	0.1	1	0.0	7.4	0.1	0.0	0.0
Aston	1	0.1	1	0.0	280.4	4.7	0.5	0.8
Bridgeport	1	0.1	3	0.0	212.3	10.6	1.1	1.7
Chadds Ford	1	0.1	2	0.0	30.3	1.0	0.1	0.2
Clifton Heights	1	0.1	5	0.0	148.9	12.4	1.3	2.0
Collingdale	1	0.1	1	0.0	2.1	0.0	0.0	0.0
Downingtown	1	0.1	2	0.0	176.1	5.9	0.6	1.0
Marcus Hook	1	0.1	1	0.0	2.4	0.0	0.0	0.0
Millbourne	1	0.1	2	0.0	18.6	0.6	0.1	0.1
Morton	1	0.1	1	0.0	0.6	0.0	0.0	0.0
Radnor	1	0.1	1	0.0	1.0	0.0	0.0	0.0
Swarthmore	1	0.1	2	0.0	21.9	0.7	0.1	0.1
Total	**775**	**100.0**	**2,918**	**8.0**	**19.4**	**945.6**	**100.0**	**155.4**

Note: Bridgeport and Narberth are in Montgomery County; Downingtown is in Chester County. The rest are in Delaware County.

TABLE 18: Structure and Outside Fire Runs by Location

Location	Outside Fire Runs	Outside Fire Minutes per Run	Structure Fire Runs	Structure Fire Minutes per Run	Total Hours	Pct. Work
Haverford	349	24.9	101	23.2	183.7	59.4
Upper Darby	25	62.0	0	NA	25.8	8.3
Broomall	22	72.4	5	13.4	27.6	8.9
Darby	16	90.3	0	NA	24.1	7.8
Springfield	12	32.7	0	NA	6.5	2.1
Yeadon	11	49.9	0	NA	9.1	2.9
Clifton Heights	5	148.9	0	NA	12.4	4.0
East Lansdowne	3	67.9	0	NA	3.4	1.1
Lansdowne	2	58.5	0	NA	2.0	0.6
Ridley Park	2	228.8	0	NA	7.6	2.5
Bryn Mawr	1	81.3	0	NA	1.4	0.5
Wynnewood	1	341.5	0	NA	5.7	1.8
Total	**449**	**36.0**	**106**	**22.7**	**309.3**	**100.0**

Observations:

Inside Haverford Township

- There were 2,658 runs, including 97 runs dispatched for canceled calls. The daily average was 7.3 runs.
- Total deployed time for the year was 686.1 hours or 73 percent of the annual workload. The daily average was 112.8 minutes for all units combined.

Outside Haverford Township

- There were 260 runs for aid given, including 58 runs dispatched for canceled calls. The daily average was 0.7 runs.
- Total deployed time for the year was 259.5 hours or 27 percent of the annual workload. The daily average was 42.6 minutes for all units combined.

WORKLOAD INSIDE HAVERFORD TOWNSHIP BY DISTRICT

Here we focus on the areas within Haverford Township and examine the distribution of calls and the corresponding workload in each fire company's primary service area. Table 18 breaks down the workload by company fire district. Table 19 details the workload associated with structure and outside fire calls, also broken down by district.

TABLE 19: Annual Workload Inside Haverford by District

District	Calls	Pct. Calls	Runs	Runs Per Day	Minutes Per Run	Annual Hours	Pct. Work	Minutes Per Day
Llanerch	87	13.9	440	1.2	14.9	109.0	15.9	17.9
Brookline	88	14.1	515	1.4	14.2	121.9	17.8	20.0
Oakmont	260	41.6	672	1.8	18.2	203.3	29.6	33.4
Manoa	162	25.9	903	2.5	14.7	221.8	32.3	36.5
Bon Air	28	4.5	128	0.4	14.1	30.1	4.4	4.9
Total	**625**	**100.0**	**2,658**	**7.3**	**15.5**	**686.1**	**100.0**	**112.8**

TABLE 20: Structure and Outside Fire Runs Inside Haverford by District

District	Outside Fire Runs	Outside Fire Minutes per Run	Structure Fire Runs	Structure Fire Minutes per Run	Total Hours	Pct. Work
Llanerch	25	25.1	38	24.7	26.1	14.2
Brookline	14	21.7	78	21.8	33.4	18.2
Oakmont	40	23.2	135	24.3	70.3	38.3
Manoa	20	23.1	79	32.4	50.3	27.4
Bon Air	2	9.7	19	10.1	3.5	1.9
Total	**101**	**23.2**	**349**	**24.9**	**183.7**	**100.0**

Observations:

Llanerch (Station 34) District

- There were 440 runs, including seven runs dispatched for canceled calls. The daily average was 1.2 runs.
- Total deployed time for the year was 109.0 hours or 18 percent of the annual workload inside Haverford Township. The daily average was 17.9 minutes for all units combined.

Brookline (Station 35) District

- There were 515 runs, including 20 runs dispatched for canceled calls. The daily average was 1.4 runs.
- Total deployed time for the year was 121.9 hours or 18 percent of the annual workload inside Haverford Township. The daily average was 20.0 minutes for all units combined.

Oakmont (Station 38) District

- There were 672 runs, including 54 runs dispatched for canceled calls. The daily average was 1.8 runs.
- Total deployed time for the year was 203.3 hours or 30 percent of the annual workload inside Haverford Township. The daily average was 33.4 minutes for all units combined.

Manoa (Station 56) District

- There were 903 runs, including 16 runs dispatched for canceled calls. The daily average was 2.5 runs.
- Total deployed time for the year was 221.8 hours or 32 percent of the annual workload inside Haverford Township. The daily average was 36.5 minutes for all units combined.

Bon Air (Station 58) District

- There were 128 runs. The daily average was 0.4 runs.
- Total deployed time for the year was 30.1 hours or four percent of the annual workload inside Haverford Township. The daily average was 4.9 minutes for all units combined.

AID GIVEN CALLS OUTSIDE HAVERFORD TOWNSHIP

Table 20 details the aid given calls that occurred outside Haverford Township, broken out by location and grand call type.

TABLE 21: Aid Given Calls by Grand Call Type

Location	EMS	Fire	Canceled	Call Count	Pct. Calls
Broomall	2	15	14	31	20.7
Upper Darby	0	22	4	26	17.3
Darby	1	8	4	13	8.7
Chester City	0	9	2	11	7.3
Springfield	1	6	3	10	6.7
Yeadon	0	9	1	10	6.7
Boothwyn	0	2	2	4	2.7
Lansdowne	0	1	3	4	2.7
Narberth	0	3	1	4	2.7
Newtown	0	4	0	4	2.7
Wynnewood	0	4	0	4	2.7
Media	1	1	1	3	2.0
Bethel	0	1	1	2	1.3
Bryn Mawr	0	2	0	2	1.3
Concord	0	2	0	2	1.3
East Lansdowne	0	2	0	2	1.3
Prospect Park	0	2	0	2	1.3
Ridley Park	0	1	1	2	1.3
Wayne	0	2	0	2	1.3
Aldan	1	0	0	1	0.7
Aston	0	1	0	1	0.7
Bridgeport	0	1	0	1	0.7
Chadds Ford	0	0	1	1	0.7
Clifton Heights	0	1	0	1	0.7
Collingdale	0	0	1	1	0.7
Downingtown	0	1	0	1	0.7
Marcus Hook	0	1	0	1	0.7
Millbourne	0	0	1	1	0.7
Morton	1	0	0	1	0.7
Radnor	0	0	1	1	0.7
Swarthmore	0	0	1	1	0.7
Total	**7**	**101**	**42**	**150**	**100**

Note: Bridgeport and Narberth are in Montgomery County; Downingtown is in Chester County. The rest are all in Delaware County.

WORKLOAD BY FIRE COMPANY AND DISTRICT

In service, each fire company responds to calls in both its primary service district and the districts of other fire companies. Table 21 summarizes the number of calls, runs, and deployed hours of each company in responding to calls that occurred in different districts.

TABLE 22: Workload by Fire Company and District

Company	District	Calls	Runs	Work	Pct Work
Llanerch (Station 34)	Llanerch	87	250	70.5	46.7
	Brookline	57	110	21.1	14.0
	Oakmont	2	2	1.7	1.2
	Manoa	69	125	21.2	14.0
	Bon Air	11	11	1.5	1.0
	Other*	25	28	34.8	23.1
	Subtotal	**251**	**526**	**150.8**	**100.0**
Brookline (Station 35)	Llanerch	54	116	24.6	13.0
	Brookline	88	288	78.6	41.4
	Oakmont	19	41	15.7	8.3
	Manoa	97	105	24.9	13.1
	Bon Air	4	4	0.5	0.3
	Other*	36	42	45.4	23.9
	Subtotal	**298**	**596**	**189.5**	**100.0**
Oakmont (Station 38)	Llanerch	13	15	2.8	1.5
	Brookline	5	6	1.1	0.6
	Oakmont	259	592	173.1	89.3
	Manoa	18	22	7.6	3.9
	Bon Air	3	5	0.7	0.3
	Other*	10	10	8.5	4.4
	Subtotal	**308**	**650**	**193.8**	**100.0**
Manoa (Station 56)	Llanerch	6	8	2.2	0.7
	Brookline	59	106	20.0	6.1
	Oakmont	19	36	11.2	3.4
	Manoa	160	524	142.1	43.3
	Bon Air	16	32	5.0	1.5
	Other*	108	162	147.4	44.9
	Subtotal	**368**	**868**	**327.9**	**100.0**
Bon Air (Station 58)	Llanerch	51	51	8.9	10.7
	Brookline	5	5	1.1	1.4
	Oakmont	1	1	1.6	1.9
	Manoa	62	127	26.0	31.1
	Bon Air	28	76	22.4	26.9
	Other*	11	18	23.4	28.0
	Subtotal	**158**	**278**	**83.5**	**100.0**

Note: *Other=all districts out of Haverford; As multiple companies may respond to the same call, adding up the number of calls for each company will exceed the total number of calls (775).

ANALYSIS OF BUSIEST HOURS FOR FIRE UNITS

In this section, we examine the busiest hours of calls, the number of times a call overlapped with another call, and the service availability of each fire company to respond to calls. We included all 775 calls that were responded to by the five fire companies between July 1, 2021, and June 30, 2022.

BUSIEST HOURS OF CALLS RESPONDED TO BY FIRE COMPANIES

For all calls that were responded to by the fire companies, there is significant variability in the number of calls from hour to hour. One special concern relates to the resources available for hours with the heaviest workload. We tabulated the data for each of the 8,760 hours in the year. Table 22 shows the number of hours in the year in which there were zero to two or more calls during the hour. Table 23 shows the ten one-hour intervals which had the most calls during the year. Table 24 examines the number of times a call overlapped with another call in each company's service area in the studied period.

TABLE 23: Frequency Distribution of the Number of Calls Responded to by Fire Companies

Calls in an Hour	Frequency	Percentage
0	8,060	92.0
1	633	7.2
2+	67	0.8
Total	**8,760**	**100.0**

TABLE 24: Top Ten Hours with the Most Calls Received by Fire Companies

Hour	Number of Calls	Number of Runs	Total Deployed Hours
6/16/2022 7:00 a.m. to 8:00 a.m.	3	22	3.6
9/4/2021 7:00 p.m. to 8:00 p.m.	3	11	5.5
2/18/2022 8:00 a.m. to 9:00 a.m.	3	9	6.3
9/1/2021 8:00 p.m. to 9:00 p.m.	3	6	8.5
5/12/2022 11:00 a.m. to noon	3	6	1.9
7/22/2021 7:00 a.m. to 8:00 a.m.	3	6	0.4
4/11/2022 1:00 p.m. to 2:00 p.m.	3	5	5.2
6/10/2022 9:00 p.m. to 10:00 p.m.	3	3	1.5
11/8/2021 10:00 a.m. to 11:00 a.m.	2	14	20.9
11/11/2021 6:00 p.m. to 7:00 p.m.	2	14	1.9

Note: Total deployed hours are a measure of the total time spent responding to calls received in the hour. The deployed time from these calls may extend into the next hour or hours. The number of runs and deployed hours includes all units from the five fire companies.

TABLE 25: Frequency of Overlapping Calls by Fire District

District	Scenario	Number of Calls	Percent of All Calls	Total Hours
Llanerch	No overlapped call	86	98.9	29.3
	Overlapped with one call	1	1.1	0.1
Brookline	No overlapped call	88	100.0	30.8
Oakmont	No overlapped call	258	99.2	89.8
	Overlapped with one call	2	0.8	0.1
Manoa	No overlapped call	159	98.1	57.0
	Overlapped with one call	3	1.9	0.4
Bon Air	No overlapped call	28	100.0	0.2
Out of Town	No overlapped call	130	86.7	124.7
	Overlapped with one call	19	12.7	17.3
	Overlapped with two calls	1	0.7	0.2

Observations:

During 67 hours (0.8 percent of all hours), two or more calls occurred; in other words, the five fire companies in the township responded to two or more calls in an hour roughly once every five days.

The highest number of calls to occur in an hour was 3, which happened eight times.

The total overlapped hours during the year were 18.0 hours.

FIRE COMPANY'S SERVICE AVAILABILITY

Table 25 examines each fire company's availability to respond to calls within its first due area. In this analysis, we focus on calls where at least one unit eventually arrived and ignore calls where no unit arrived. Out of 625 total calls that are not aid given (Table 1), 553 calls (or 88 percent) had arriving units.

TABLE 26: Fire Company Availability to Respond to Calls

Fire District	Calls in Area	Company Responded	Percent Responded	Company Arrived	Percent Arrived	Company First	Percent First
Llanerch	80	80	100.0	76	95.0	67	83.8
Brookline	79	79	100.0	78	98.7	75	94.9
Oakmont	219	218	99.5	218	99.5	216	98.6
Manoa	149	148	99.3	147	98.7	139	93.3
Bon Air	26	26	100.0	26	100.0	25	96.2
Total	**553**	**551**	**99.6**	**545**	**98.6**	**522**	**94.4**

Note: For each fire company, we count the number of calls occurring within its district. Then, we count the number of calls where at least one unit arrived. Next, we focus on units from the primary fire company to see if any of its units responded, arrived, or arrived first.

Table 26 examines the number of dispatches, responses, and arrivals that each fire company made in responding to calls. Again, this analysis focuses on the dispatches for calls where at least one unit eventually arrived and ignores the dispatches for calls where no unit arrived. Out of 2,918 total dispatches (or total runs, Table 5), 2,649 dispatches (or 91 percent) were made for calls with arriving units. At the same time, Table 26 includes all responses of a fire company to the areas inside and outside its first due area.

TABLE 27: Number of Dispatches, Responses, and Arrival by Fire Company

Fire Company	Dispatch	Response	Percent Response	Arrival	Percent Arrival
Llanerch	479	287	59.9	208	43.4
Brookline	548	361	65.9	288	52.6
Oakmont	586	506	86.3	420	71.7
Manoa	775	496	64.0	389	50.2
Bon Air	261	165	63.2	102	39.1
Total	**2,649**	**1,815**	**68.5**	**1,407**	**53.1**

Note: For each company, based on all calls where at least one unit arrived, we count the number of dispatches of its units and then examine if any of its units responded (either went en route or arrived) and arrived.

RESPONSE TIME OF FIRE UNITS

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

In the following analysis, we included all emergency calls (priority level 1) within the Township of Haverford to which at least one non-administrative unit arrived. Aid given and canceled calls were excluded. Calls with a total response time exceeding 30 minutes were excluded. Also, we focused on units that had complete time stamps, that is, units with all components recorded, so that we could calculate each segment of response time.

Based on the methodology above, for 775 total calls, we excluded 150 aid given calls, 38 canceled calls, four non-emergency calls, 42 calls where no units recorded a valid on-scene time, two calls with a total response time exceeding 30 minutes, and 68 calls where one or more segments of the first arriving unit's response time could not be calculated due to missing or faulty data. As a result, a total of 471 calls are included in the section's analysis.

RESPONSE TIME BY TYPE OF CALLS RESPONDED TO BY FIRE COMPANIES

Tables 27 and 28 break down the average, 80th percentile, and 90th percentile response times by call type. The five volunteer fire companies follow the NFPA 1720 standard that benchmarks 80th percentile response time. An 80th or 90th percentile means that 80 or 90 percent of calls had response times at or below that number, respectively. For example, Table 28 shows an overall 80th percentile response time of 9.1 minutes, which means that 80 percent of the time a call had a response time of no more than 9.1 minutes. Figure 7 shows the components of the average response time by fire call type.

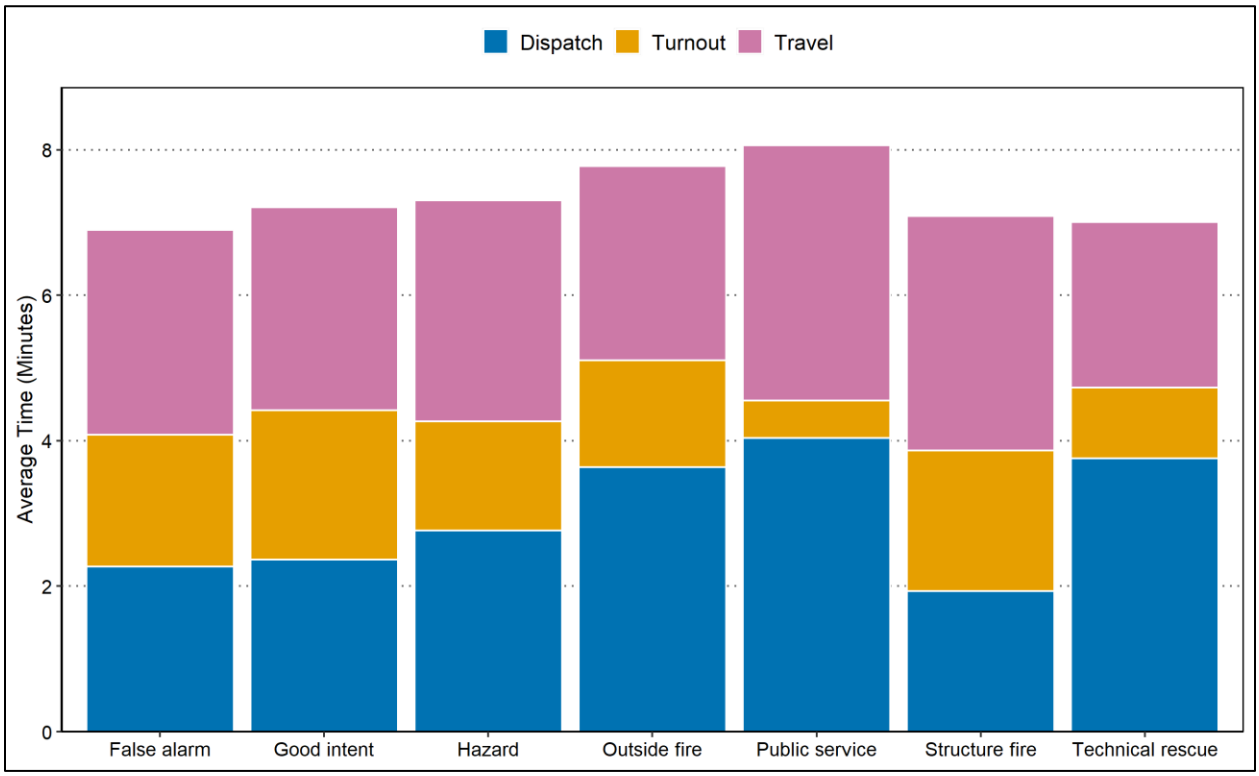
TABLE 28: Average Response Time of First Arriving Fire Unit, by Call Type (Minutes)

Call Type	Dispatch	Turnout	Travel	Total Response	Number of Calls
EMS assist	16.8	2.2	2.8	21.8	7
MVA	2.7	0.5	1.7	5.0	5
EMS Subtotal	**10.9**	**1.5**	**2.4**	**14.8**	**12**
False alarm	2.3	1.8	2.8	6.9	230
Good intent	2.4	2.1	2.8	7.2	38
Hazard	2.8	1.5	3.0	7.3	92
Outside fire	3.6	1.5	2.7	7.8	27
Public service	4.0	0.5	3.5	8.1	9
Structure fire	1.9	1.9	3.2	7.1	51
Technical rescue	3.8	1.0	2.3	7.0	12
Fire Subtotal	**2.5**	**1.7**	**2.9**	**7.1**	**459**
Total	**2.7**	**1.7**	**2.9**	**7.3**	**471**

TABLE 29: 80th and 90th Percentile Response Times of First Arriving Fire Unit, by Call Type (Minutes)

Call Type	80th Percentile Response Time				90th Percentile Response Time				Number of Calls
	Dispatch	Turnout	Travel	Total	Dispatch	Turnout	Travel	Total	
EMS assist	20.7	4.7	3.8	26.1	21.1	5.3	4.2	27.1	7
MVA	3.5	0.5	2.2	6.9	4.5	1.6	3.0	6.9	5
EMS Subtotal	**19.0**	**4.2**	**3.7**	**24.1**	**20.9**	**4.7**	**4.0**	**26.3**	**12**
False alarm	4.0	4.3	4.4	8.8	4.9	5.0	5.0	10.0	230
Good intent	3.8	4.8	3.8	9.2	5.1	5.5	4.9	10.5	38
Hazard	4.7	4.0	4.6	9.2	5.9	4.9	5.2	10.8	92
Outside fire	4.6	4.4	4.8	10.1	6.4	4.9	5.7	11.5	27
Public service	5.0	0.0	4.8	10.0	5.9	0.9	5.6	10.3	9
Structure fire	3.0	4.4	4.5	9.1	3.6	5.0	5.4	10.3	51
Technical rescue	5.4	1.1	3.2	9.8	6.4	4.4	3.6	10.7	12
Fire Subtotal	**4.2**	**4.3**	**4.4**	**9.0**	**5.2**	**5.0**	**5.2**	**10.4**	**459**
Total	**4.2**	**4.3**	**4.4**	**9.1**	**5.4**	**5.0**	**5.2**	**10.6**	**471**

FIGURE 7: Average Response Time of First Arriving Fire Unit, by Call Type



Observations:

- The average dispatch time was 2.7 minutes.
- The average turnout time was 1.7 minutes.
- The average travel time was 2.9 minutes.
- The average total response time was 7.3 minutes.
- The average response time was 7.8 minutes for outside fires and 7.1 minutes for structure fires.
- The 80th percentile dispatch time was 4.2 minutes.
- The 80th percentile turnout time was 4.3 minutes.
- The 80th percentile travel time was 4.4 minutes.
- The 80th percentile total response time was 9.1 minutes.
- The 80th percentile response time was 10.1 minutes for outside fires and 9.1 minutes for structure fires.
- The 90th percentile dispatch time was 5.4 minutes.
- The 90th percentile turnout time was 5.0 minutes.
- The 90th percentile travel time was 5.2 minutes.
- The 90th percentile total response time was 10.6 minutes.
- The 90th percentile response time was 11.5 minutes for outside fires and 10.3 minutes for structure fires.

RESPONSE TIME BY FIRE DISTRICT

Tables 29 and 30 examine the average, 80th percentile, and 90th percentile response times of the first arriving unit at calls in the Llanerch, Brookline, Oakmont, Manoa, and Bon Air fire districts.

TABLE 30: Average Response Times of First Arriving Fire Unit, by Fire District (Minutes)

Fire District	Dispatch	Turnout	Travel	Total Response	Number of Calls
Llanerch	2.2	2.7	2.6	7.5	75
Brookline	2.7	1.3	2.3	6.3	69
Oakmont	2.4	1.9	3.7	8.0	196
Manoa	3.2	1.3	2.1	6.6	113
Bon Air	4.9	0.5	1.9	7.3	18
Total	**2.7**	**1.7**	**2.9**	**7.3**	**471**

TABLE 31: 80th Percentile and 90th Percentile Response Times of First Arriving Fire Unit, by Fire District (Minutes)

Fire District	80th Percentile Response Time				90th Percentile Response Time				Number of Calls
	Dispatch	Turnout	Travel	Total	Dispatch	Turnout	Travel	Total	
Llanerch	3.5	5.1	3.6	8.1	4.3	6.0	4.4	9.0	75
Brookline	4.2	3.9	3.4	7.4	4.6	4.3	3.7	8.0	69
Oakmont	3.8	4.5	5.2	10.3	4.6	5.1	6.0	11.2	196
Manoa	5.3	3.5	2.9	8.1	6.5	4.2	3.6	9.4	113
Bon Air	6.5	0.0	2.6	8.4	7.7	1.8	3.0	11.1	18
Total	**4.2**	**4.3**	**4.4**	**9.1**	**5.4**	**5.0**	**5.2**	**10.6**	**471**

Observations:

- The response to calls that occurred in the Brookline service district was the shortest. The average, 80th, and 90th percentile response times were 6.3, 7.4, and 8.0 minutes, respectively.
- The response to calls that occurred in the Oakmont service district was the longest. The average, 80th, and 90th percentile response times were 8.0, 10.3, and 11.2 minutes, respectively.

RESPONSE TIME OF FIRST ARRIVING FIRE UNIT BY HOUR OF DAY

For all calls in the Township of Haverford, Tables 31 through 33 examine the average, 80th, and 90th response times of the first arriving units by the time of day (in four-hour intervals).

TABLE 32: Average Response Time of First Arriving Fire Unit, by Time of Day (Minutes)

Time of Day	Dispatch	Turnout	Travel	Response Time	Number of Calls
0:00 - 3:59	3.8	1.7	3.4	8.9	38
4:00 - 7:59	3.5	1.4	2.9	7.8	39
8:00 - 11:59	2.5	1.9	3.0	7.3	102
12:00 - 15:59	2.9	1.7	2.5	7.2	102
16:00-19:59	2.1	1.9	2.8	6.8	116
20:00-23:59	2.6	1.3	3.2	7.0	74
Total	**2.7**	**1.7**	**2.9**	**7.3**	**471**

TABLE 33: 80th Percentile Response Time of First Arriving Fire Unit, by Time of Day (Minutes)

Time of Day	Dispatch	Turnout	Travel	Response Time	Number of Calls
0:00 - 3:59	4.7	5.2	5.0	9.9	38
4:00 - 7:59	5.2	3.8	4.3	9.8	39
8:00 - 11:59	3.8	4.4	4.6	9.5	102
12:00 - 15:59	4.2	4.3	4.0	8.9	102
16:00-19:59	3.4	4.2	4.1	8.6	116
20:00-23:59	3.9	4.1	4.5	8.5	74
Total	**4.2**	**4.3**	**4.4**	**9.1**	**471**

TABLE 34: 90th Percentile Response Time of First Arriving Fire Unit, by Time of Day (Minutes)

Time of Day	Dispatch	Turnout	Travel	Response Time	Number of Calls
0:00 - 3:59	6.8	6.3	5.8	10.9	38
4:00 - 7:59	6.0	4.9	4.8	12.1	39
8:00 - 11:59	5.6	4.8	5.4	10.4	102
12:00 - 15:59	5.7	5.0	4.8	10.4	102
16:00-19:59	4.7	5.0	5.1	10.0	116
20:00-23:59	5.1	4.6	5.4	10.5	74
Total	**5.4**	**5.0**	**5.2**	**10.6**	**471**

Observations:

- Average dispatch time was between 2.1 minutes (4:00 p.m. to 8:00 p.m.) and 3.8 minutes (midnight to 4:00 a.m.).
- Average turnout time was between 1.3 minutes (8:00 p.m. to midnight) and 1.9 minutes (4:00 p.m. to 8:00 p.m.).
- Average travel time was between 2.5 minutes (noon to 4:00 p.m.) and 3.4 minutes (midnight to 4:00 a.m.).
- Average response time was between 6.8 minutes (4:00 p.m. to 8:00 p.m.) and 8.9 minutes (midnight to 4:00 a.m.).
- The 80th percentile response time was between 8.5 minutes (8:00 p.m. to midnight) and 9.9 minutes (midnight to 4:00 a.m.).
- The 90th percentile response time was between 10.0 minutes (4:00 p.m. to 8:00 p.m.) and 12.1 minutes (4:00 a.m. to 8:00 a.m.).

FIRE RESPONSE TIME DISTRIBUTION

Here, we present a more detailed look at how response times to calls are distributed. The cumulative distribution of total response time for the first arriving unit to outside and structure fire calls is shown in Figure 8 and Table 34. Figure 8 shows response times for the first arriving unit from the five fire companies to outside and structure fire calls as a frequency distribution in whole-minute increments. The cumulative percentages here are read in the same way as a percentile. In Figure 8, the 80th percentile of 9.3 minutes means that 80 percent of outside and structure fire calls had a response time of 9.3 minutes or less. In Table 34, the cumulative percentage of 66.7, for example, means that 66.7 percent of outside and structure fire calls had a response time under 8 minutes.

FIGURE 8: Cumulative Distribution of Response Time – First Arriving Fire Unit – Outside and Structure Fires

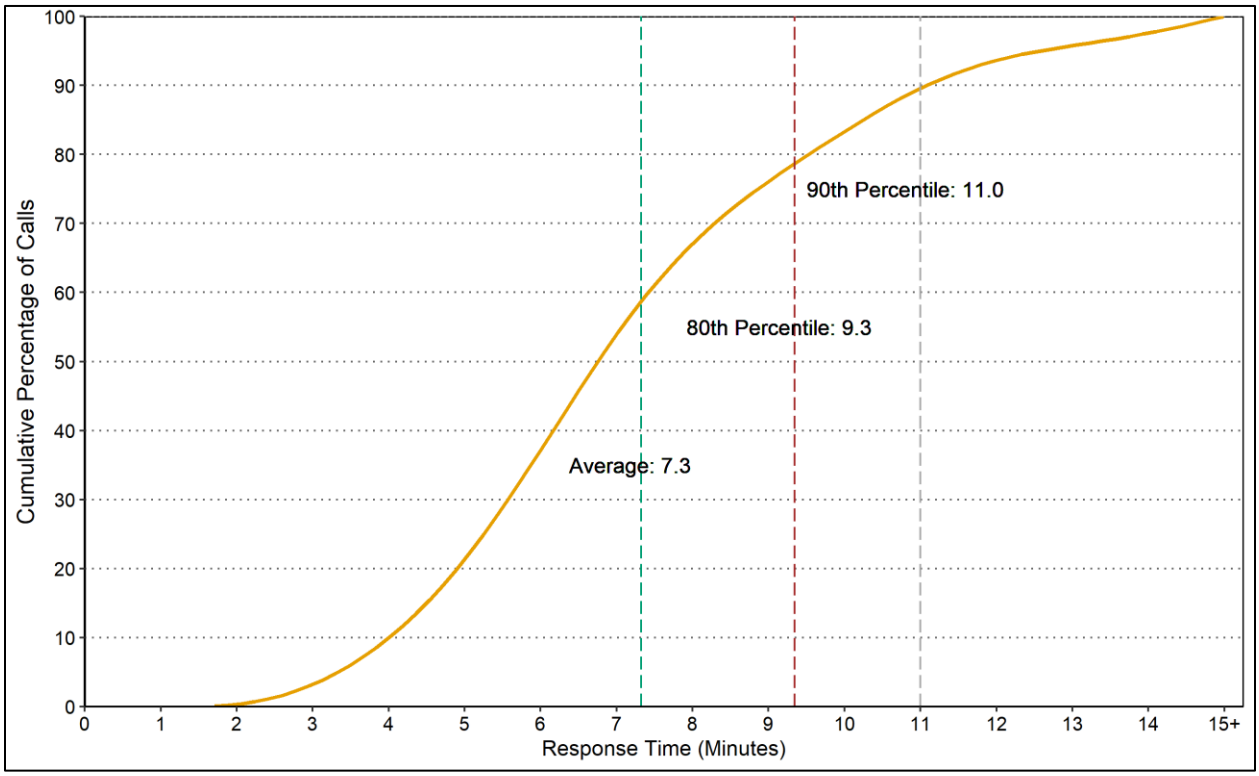


TABLE 35: Cumulative Distribution of Response Time – First Arriving Fire Unit – Outside and Structure Fires

Response Time (minute)	Frequency	Cumulative Percentage
1	0	0.0
2	0	0.0
3	2	2.6
4	7	11.5
5	5	17.9
6	16	38.5
7	13	55.1
8	9	66.7
9	8	76.9
10	4	82.1
11	6	89.7
12	4	94.9
13	0	94.9
14	2	97.4
15+	2	100.0

Observations:

- For 67 percent of outside and structure fire calls, the response time of the first arriving unit was less than 8 minutes.

ATTACHMENT I: ACTIONS TAKEN

TABLE 36: Actions Taken Analysis for Structure and Outside Fire Calls

Action Taken	Number of Calls	
	Outside Fire	Structure Fire
Extinguishment by fire service personnel	23	12
Fire control or extinguishment, other	2	2
Investigate	6	42
Investigate fire out on arrival	4	6
Notify other agencies.	4	1
Salvage & overhaul	5	7
Shut down system	0	2
Ventilate	2	19

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

Observations:

- Out of 34 outside fires, 23 were extinguished by fire service personnel, which accounted for 68 percent of outside fires.
- Out of 64 structure fires, 12 were extinguished by fire service personnel, which accounted for 19 percent of structure fires.

ATTACHMENT II: FIRE LOSS

Table 36 presents the number of outside and structure fires, broken out by levels of fire loss. Table 37 shows the amount of property and content loss for outside and structure fires inside the Township of Haverford Between July 1, 2021, and June 30, 2022.

TABLE 37: Total Fire Loss Above and Below $25,000

Call Type	No Loss	Under $25,000	$25,000 plus	Total
Outside fire	34	0	0	34
Structure fire	63	0	1	64
Total	**97**	**0**	**1**	**98**

TABLE 38: Content and Property Loss

Call Type	Property Loss		Content Loss	
	Loss Value	Number of Calls	Loss Value	Number of Calls
Structure fire	$65,000	1	$5,000	1

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

Observations:

- Between July 1, 2021, and June 30, 2022, the five studied companies responded to 34 outside fire and 64 structure fire calls.
- Out of these fires, only one structure fire had recorded loss.
  7. The structure fire had a $5,000 content loss.
  8. The structure fire had a $65,000 property loss.

ATTACHMENT III: AVERAGE NUMBER OF PERSONNEL RESPONDING TO CALLS

Table 38 summarizes the average number of personnel responding to calls that occurred within each fire company's first due area, broken down by call type.

TABLE 39: Average Number of Personnel Arriving at Calls by Call Type and District

Fire Call Type	Fire District					Overall Average
	Llanerch	Brookline	Oakmont	Manoa	Bon Air	
Canceled	20	17	17	29	NA	18
EMS	NA	10	18	27	29	24
False alarm	25	26	12	30	27	22
Good intent	20	22	16	18	12	18
Hazard	21	18	17	20	16	19
Outside fire	14	11	19	14	9	15
Public service	12	NA	15	9	33	15
Structure fire	42	34	24	39	25	29
Technical rescue	2	NA	20	16	NA	16
Total	**23**	**24**	**16**	**26**	**22**	**20**

Note: NA = No call in the fire district.

Observations:

- The overall average number of personnel responding to an outside fire call in Haverford Township is 15.
- The overall average number of personnel responding to a structure fire call in Haverford Township is 29.

ATTACHMENT IV: CALL TYPE IDENTIFICATION

When available, NFIRS data serves as our primary source for assigning call categories. For 620 of the 625 calls that the five fire companies responded to in the Township of Haverford, NFIRS incident type codes were used to assign call types for EMS assist, fire, MVA, and canceled calls. For five calls that do not have specific NFIRS incident types, we instead used the incident nature description from the computer-aided dispatch (CAD) data to assign a call category. Table 39 shows the methods used to identify the category of all 625 calls.

TABLE 40: Fire Call Type by NFIRS Incident Type Code and Description

Call Type	Incident Type Code	Incident Type Description	Calls
Canceled	611	Dispatched and cancelled en route	32
	622	No incident found on arrival at dispatch address	6
EMS Assist	311	Ems Assist	7
	320	Emergency medical service incident, other	1
	NA*	FD TO ASSIST EMS	1
False Alarm	700	False alarm or false call, other	90
	711	Municipal alarm system, malicious false alarm	1
	730	System malfunction, other	4
	732	Extinguishing system activation due to malfunction	1
	733	Smoke detector activation due to malfunction	18
	734	Heat detector activation due to malfunction	1
	735	Alarm system sounded due to malfunction	9
	736	CO detector activation due to malfunction	13
	740	Unintentional transmission of alarm, other	5
	741	Sprinkler activation, no fire - unintentional	3
	743	Smoke detector activation, no fire - unintentional	43
	744	Detector activation, no fire - unintentional	45
	745	Alarm system activation, no fire - unintentional	27
	746	Carbon monoxide detector activation, no CO	23
	NA*	AUTOMATIC FIRE ALARM	4
Good Intent	600	Good intent call, other	4
	631	Authorized controlled burning	3
	650	Steam, other gas mistaken for smoke, other	1
	651	Smoke scare, odor of smoke	12
	652	Steam, vapor, fog, or dust thought to be smoke	3
	653	Smoke from barbecue or tar kettle	2
	671	HazMat release investigation w/no HazMat	20
Hazard	251	Excessive heat, overheat scorch burns with no ignition	5
	411	Gasoline or other flammable liquid spill	13
	412	Gas leak (natural gas or LPG)	47
	413	Oil or other combustible liquid spill	7
	421	Chemical hazard (no spill or leak)	1

Call Type	Incident Type Code	Incident Type Description	Calls
	423	Refrigeration leak. Includes ammonia	1
	424	Carbon monoxide incident	12
	440	Electrical wiring/equipment problem, other	10
	441	Heat from short circuit, defective or worn insulation	1
	442	Overheated motor	8
	443	Breakdown of light ballast	1
	444	Power line down	5
	445	Arcing, shorted electrical equipment	4
	463	Vehicle accident, general cleanup	1
MVA**	322	Motor vehicle accident with injuries	6
	324	Motor vehicle accident with no injuries	2
Outside Fire	131	Passenger vehicle fire	6
	132	Road freight or transport vehicle fire	1
	133	Rail vehicle fire	2
	142	Brush or brush-and-grass mixture fire	15
	143	Grass fire	1
	150	Outside rubbish fire, other	1
	151	Outside rubbish, trash, or waste fire	3
	153	Construction or demolition landfill fire	1
	154	Dumpster or other outside trash receptacle fire	3
	160	Special outside fire, other	1
Public Service	511	Lock-out	1
	520	Water problem, other	1
	522	Water or steam leak	3
	531	Smoke or odor removal	3
	551	Assist police or other governmental agency	1
	552	Police matter	1
	571	Cover assignment, standby, move up	1
Structure Fire	100	Fire, other[5]	1
	111	Building fire	11
	113	Cooking fire, confined to container	42
	114	Chimney or flue fire, confined to chimney or flue	3
	116	Fuel burner/boiler, delayed ignition, or malfunction	4
	118	Trash or rubbish fire, contained	3
Technical Rescue	350	Extrication, rescue, other	1
	352	Extrication of victim(s) from vehicle	2
	353	Removal of victim(s) from stalled elevator	7
	363	Swift-water rescue	3
Total			**625**

Note: *Calls that do not have specific NFIRS incident types were categorized based on their incident nature descriptions in CAD data; **MVA=Motor Vehicle Accident.

ATTACHMENT V: FIRE CALLS WITHOUT UNITS

TABLE 41: Information on Fire Companies Calls Without Responding Units

Call Type	SUB-ENG	NFIRS Type	City	Calls
Aid Given	AUTOMATIC FIRE ALARM	611	Lester	1
	STREET CLOSED	NA	Upper Darby	4
	WITH INJURY REPORTED	611	Newtown	1
False Alarm	AUTOMATIC FIRE ALARM	NA	Haverford	1
	CARBON MONOXIDE ALARM	NA	Haverford	1
Good Intent	FD INVESTIGATION	651	Haverford	1
Hazard	WIRES/TRANSFORMER, W/HAZARDS	NA	Haverford	57
Public Service	COVER ASSIGNMENT	571	Haverford	1
	COVER ASSIGNMENT	NA	Haverford	5
	FIRE HYDRANT, IN-SERVICE	NA	Haverford	6
	FIRE HYDRANT, OUT OF SERVICE	NA	Haverford	6
	STREET CLOSED	NA	Haverford	158
	STREET OPEN	NA	Haverford	23
Total				**265**

PART 2. EMERGENCY MEDICAL SERVICE

In this part, we examine the response and workload of the two Narberth Ambulance Stations in Haverford Township. We used the incident nature description from the CAD data to assign a call category. We describe the method of call categorization in Attachment VI.

We received records for 3,623 EMS calls that were made inside Haverford Township between July 1, 2021, and June 30, 2022. We removed 194 calls that were assigned to Narberth EMS but lacked a responding unit. The information on these 194 calls is detailed in Attachment VII. Therefore, Narberth EMS responded to 3,429 total calls inside Haverford during the 12-month period.

These calls included 19 EMS and 100 non-EMS calls jointly responded to by Narberth EMS and fire company units. Table 1 shows that fire company units responded to 17 EMS calls. Narberth EMS responded to two other EMS calls that were labeled as canceled by the fire companies in Table 1.

This part of the analysis includes five sections. The first section focuses on call types and dispatches. The second section explores the time spent and the workload of individual units. The third section presents an analysis of the busiest hours in the year studied. The fourth section provides a response time analysis of the studied Narberth units. The fifth and final section is an analysis of ambulance transport.

NARBERTH EMS CALL TOTALS AND RUNS

Between July 1, 2021, and June 30, 2022, the two Narberth Ambulance Stations in Haverford responded to a total of 3,429 calls, of which 97 percent were EMS calls.

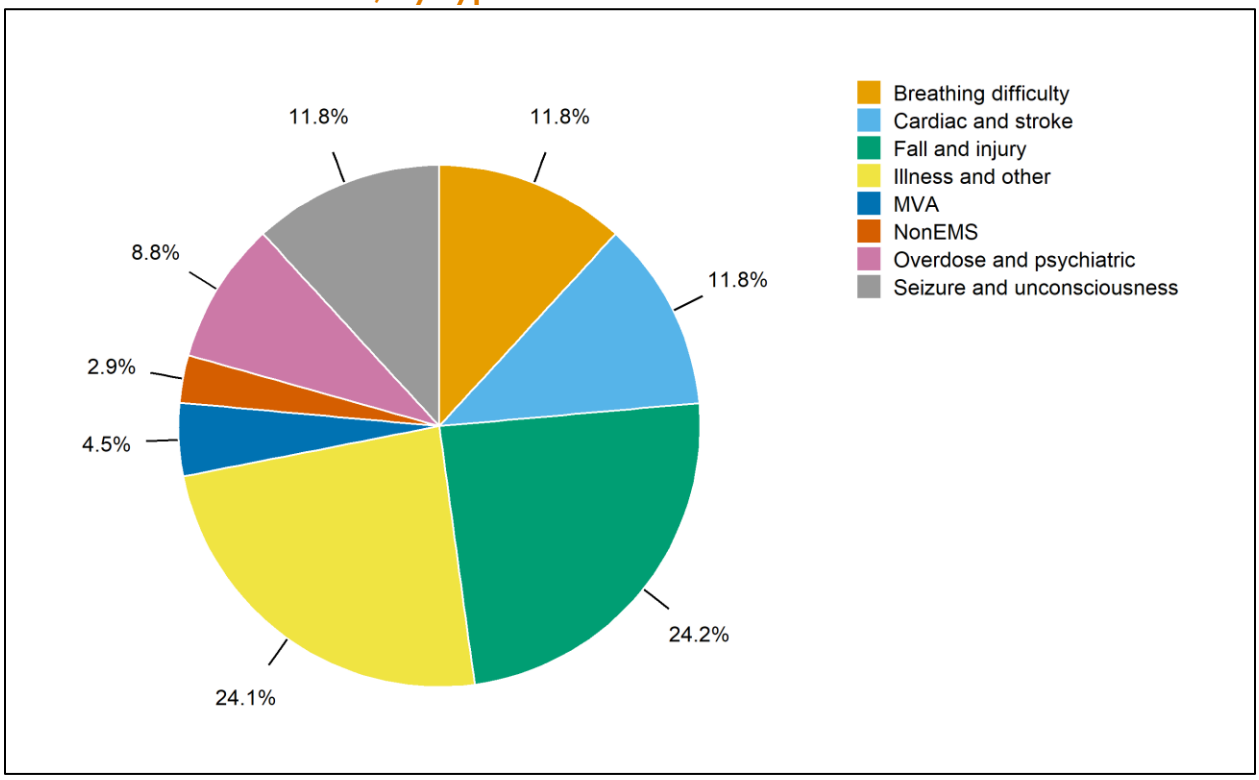
NARBERTH CALLS, BY TYPE

Table 41 and Figure 9 show the number of Narberth calls by call type, average calls per day, and the percentage of calls that fall into each call type category for the 12 months studied.

TABLE 42: Narberth Calls, by Type

Call Type	Total Calls	Calls per Day	Call Percentage
Breathing difficulty	405	1.1	11.8
Cardiac and stroke	404	1.1	11.8
Fall and injury	831	2.3	24.2
Illness and other	826	2.3	24.1
MVA	155	0.4	4.5
Overdose and psychiatric	302	0.8	8.8
Seizure and unconsciousness	405	1.1	11.8
EMS Subtotal	**3,328**	**9.1**	**97.1**
Non-EMS Subtotal	**101**	**0.3**	**2.9**
Total	**3,429**	**9.4**	**100.0**

FIGURE 9: Narberth Calls, by Type



Observations:

- EMS calls for the year totaled 3,328.
- There was an average of 9.4 calls per day, including 0.3 non-EMS calls per day.
- Fall and injury calls and illness and other calls were the largest categories of calls at 24 percent of calls, an average of 2.3 calls per day.
- Cardiac and stroke calls made up 12 percent of calls, an average of 1.1 calls per day.
- Motor vehicle accidents made up five percent of calls, an average of 0.4 calls per day.

NARBERTH CALLS BY TYPE AND DURATION

Table 42 shows the duration of calls by type using four duration categories: less than 30 minutes, 30 minutes to one hour, one to two hours, and two or more hours.

TABLE 43: Narberth Calls, by Type and Duration

Call Type	Less than 30 Minutes	30 Minutes to One Hour	One to Two Hours	Two or More Hours	Total
Breathing difficulty	42	216	134	13	405
Cardiac and stroke	21	243	124	16	404
Fall and injury	203	417	196	15	831
Illness and other	217	435	159	15	826
MVA	62	74	19	0	155
Overdose and psychiatric	41	185	68	8	302
Seizure and unconsciousness	97	200	95	13	405
EMS Subtotal	**683**	**1,770**	**795**	**80**	**3,328**
Non-EMS Subtotal	**82**	**11**	**7**	**1**	**101**
Total	**765**	**1,781**	**802**	**81**	**3,429**

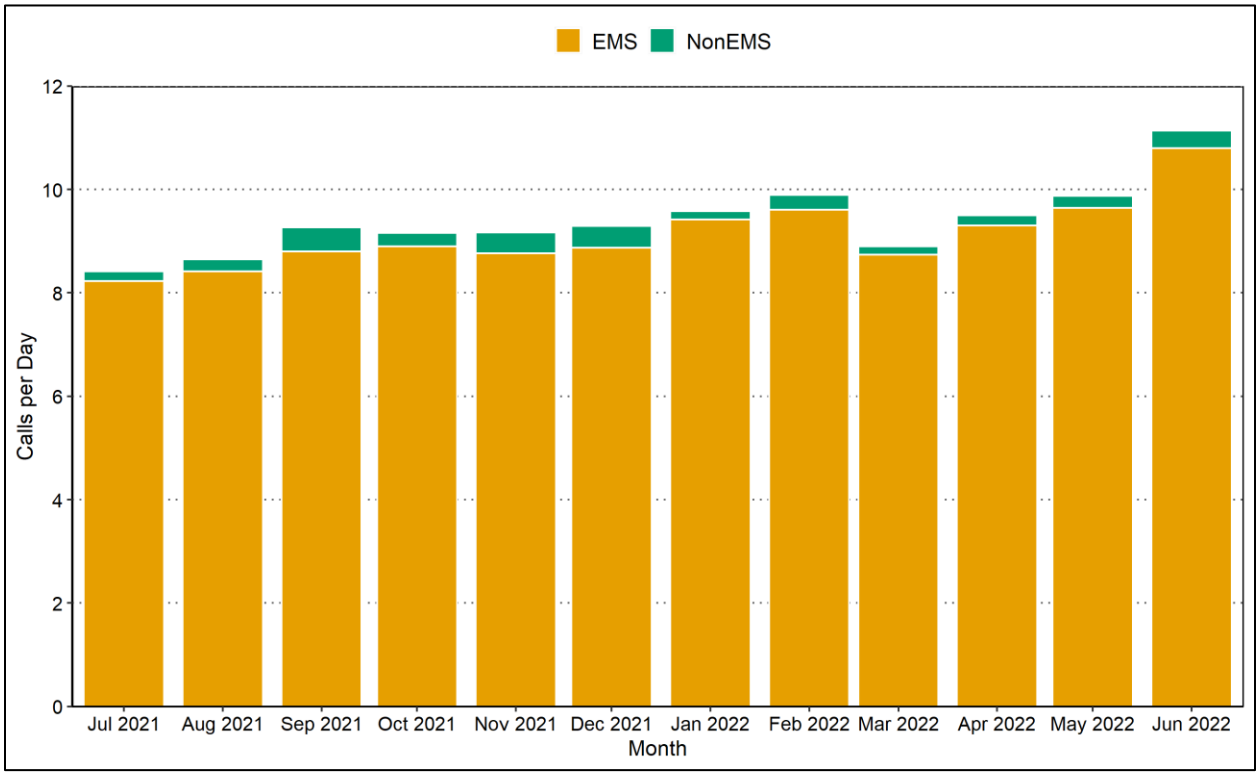
Observations:

- On average, there were 2.4 EMS calls per day that lasted more than one hour.
- A total of 2,453 EMS calls (74 percent) lasted less than one hour, 795 EMS calls (24 percent) lasted one to two hours, and 80 EMS calls (two percent) lasted two or more hours.
- A total of 264 cardiac and stroke calls (65 percent) lasted less than one hour, 124 cardiac and stroke calls (31 percent) lasted one to two hours, and 16 cardiac and stroke calls (four percent) lasted two or more hours.
- A total of 136 motor vehicle accidents (88 percent) lasted less than one hour, and 19 motor vehicle accidents (12 percent) lasted one to two hours.

AVERAGE NARBERTH CALLS BY MONTH AND HOUR OF DAY

Figure 10 shows the monthly variation in the combined daily number of calls handled by Narberth Ambulance in Haverford. Similarly, Figure 11 illustrates the average number of calls received each hour of the day.

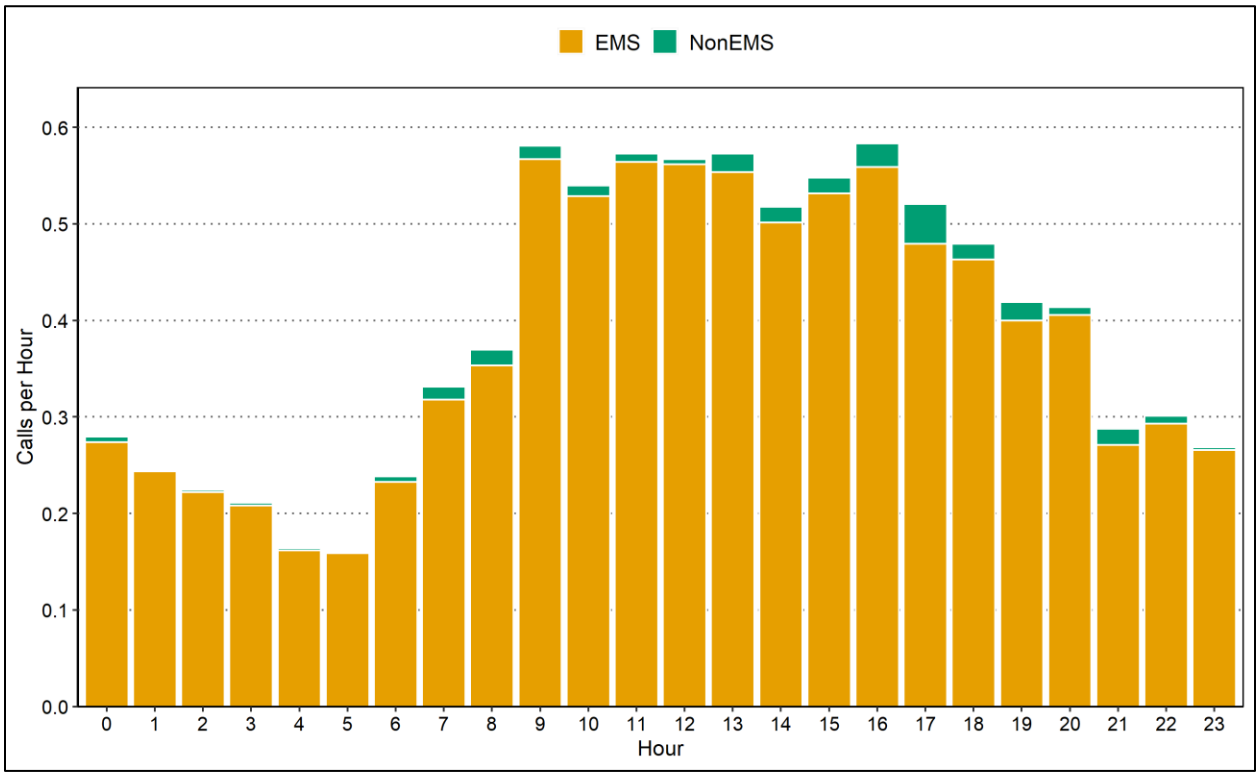
FIGURE 10: Average Narberth Calls by Month



Observations:

- Average EMS calls per day ranged from 8.2 in July 2021 to 10.8 in June 2022.
- Average calls per day ranged from 8.4 in July 2021 to 11.1 in June 2022.

FIGURE 11: Average Narberth Calls by Hour of Day



Observations:

- Average total calls per hour ranged from 0.16 between 4:00 a.m. and 6:00 a.m. to 0.58 between 9:00 a.m. and 10:00 a.m. and between 4:00 p.m. and 5:00 p.m.

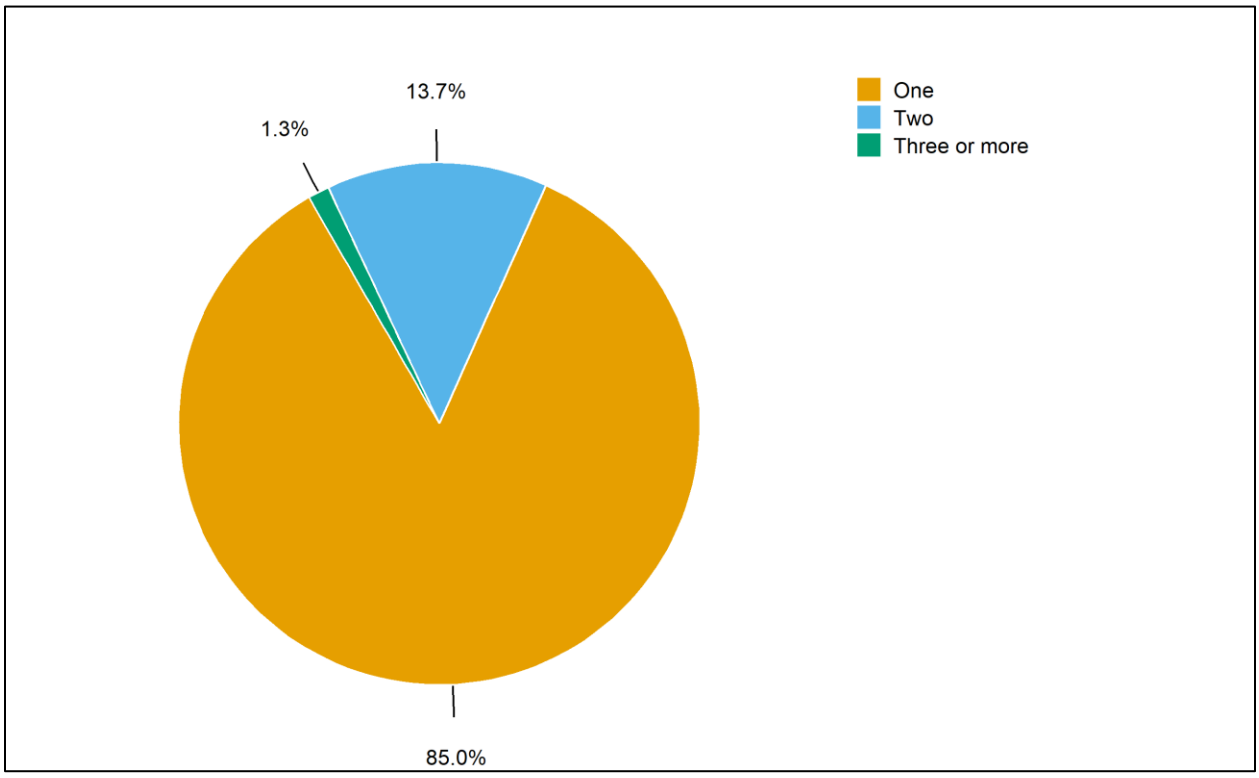
ARRIVING NARBERTH UNITS

Table 43, along with Figure 12, detail the number of calls with one, two, and three or more arriving Narberth units by call type. Out of 3,429 total calls, 204 calls lacked an arriving unit (six percent).

TABLE 44: Narberth Calls by Call Type and Number of Arriving Units

Call Type	Number of Units			Total Calls
	One	Two	Three or more	
Breathing difficulty	347	44	4	395
Cardiac and stroke	311	76	10	397
Fall and injury	683	106	5	794
Illness and other	671	88	7	766
MVA	101	32	4	137
Overdose and psychiatric	261	28	4	293
Seizure and unconsciousness	319	56	5	380
EMS Subtotal	**2,693**	**430**	**39**	**3,162**
Non-EMS Subtotal	**47**	**12**	**4**	**63**
Total	**2,740**	**442**	**43**	**3,225**
Total Percentage	**85.0**	**13.7**	**1.3**	**100.0**

FIGURE 12: Percentage of Narberth Calls by Number of Arriving Units



Observations:

- Narberth units arrived at 3,225 calls (94 percent of total EMS calls).
- On average, 1.2 Narberth units arrived per call; for 85 percent of calls, only one Narberth unit arrived.
- On average, two Narberth units arrived at 14 percent of calls.
- On average, three or more Narberth units arrived at one percent of calls.

NARBERTH EMS WORKLOAD: RUNS AND TOTAL TIME SPENT

The workload of the Narberth units is measured in two ways: runs and deployed time. The deployed time of a run is measured from the time a unit is dispatched through the time the unit is cleared. Because multiple units respond to some calls, there are more runs (8,053) than calls (3,429) and the average deployed time per run varies from the total duration of calls.

NARBERTH RUNS AND DEPLOYED TIME – ALL UNITS

Deployed time, also referred to as deployed hours, is the total workload of the Narberth units deployed on all runs. Table 44 shows the total deployed time, both overall and broken down by type of run, for all units in the study period. Table 45 and Figure 13 present the average deployed minutes of Narberth units by hour of day.

TABLE 45: Narberth Runs and Deployed Time by Run Type

Run Type	Minutes per Run	Total Hours	Percent of Hours	Minutes per Day	Total Runs	Runs per Day
Breathing difficulty	49.8	784.6	13.9	129.0	946	2.6
Cardiac and stroke	50.1	841.3	14.9	138.3	1,008	2.8
Fall and injury	41.4	1,314.6	23.2	216.1	1,904	5.2
Illness and other	38.8	1,221.4	21.6	200.8	1,887	5.2
MVA	30.4	199.6	3.5	32.8	394	1.1
Overdose and psychiatric	44.2	520.7	9.2	85.6	707	1.9
Seizure and unconsciousness	42.9	688.9	12.2	113.2	964	2.6
EMS Subtotal	**42.8**	**5,571.1**	**98.5**	**915.8**	**7,810**	**21.4**
Non-EMS Subtotal	**20.9**	**84.7**	**1.5**	**13.9**	**243**	**0.7**
Total	**42.1**	**5,655.8**	**100.0**	**929.7**	**8,053**	**22.1**

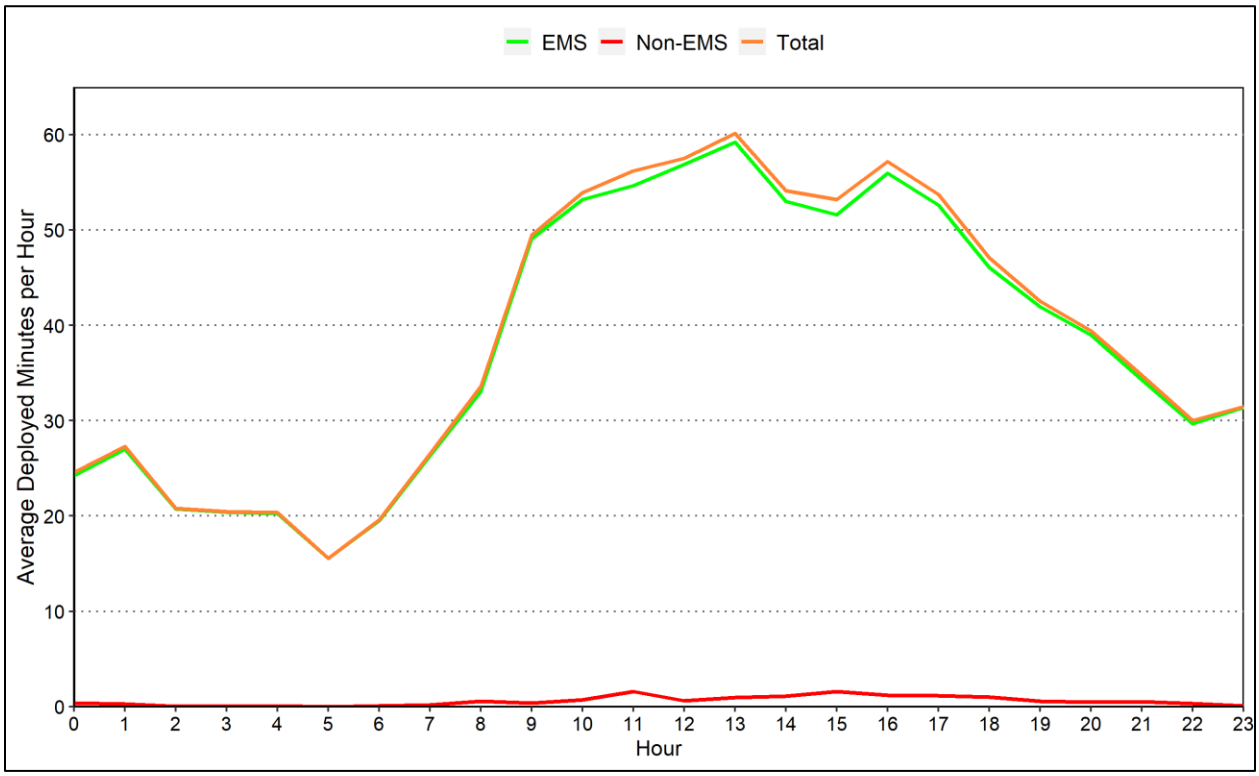
Observations:

- The total deployed time for the year was 5,655.8 hours. The daily average was 15.5 hours for all units combined.
- There were 8,053 runs (including 243 runs for non-EMS calls). The daily average was 22.1 runs.
- The average deployed time for EMS runs was 42.8 minutes.
- The average deployed time for non-EMS runs was 20.9 minutes.

TABLE 46: Deployed Minutes by Hour of Day

Hour	EMS	Non-EMS	Total
0	24.2	0.4	24.6
1	27.0	0.3	27.3
2	20.8	0.0	20.8
3	20.4	0.1	20.4
4	20.2	0.1	20.3
5	15.5	0.0	15.5
6	19.5	0.1	19.6
7	26.3	0.2	26.5
8	33.0	0.6	33.6
9	49.1	0.4	49.4
10	53.2	0.7	53.9
11	54.6	1.6	56.2
12	56.9	0.6	57.5
13	59.2	1.0	60.2
14	53.0	1.1	54.1
15	51.6	1.6	53.2
16	56.0	1.2	57.2
17	52.6	1.2	53.8
18	46.1	1.0	47.1
19	42.0	0.6	42.5
20	39.0	0.5	39.4
21	34.3	0.5	34.8
22	29.7	0.3	30.0
23	31.4	0.1	31.5
Daily Avg.	**915.8**	**13.9**	**929.7**

FIGURE 13: Average Deployed Minutes by Hour of Day



Observations:

- Hourly deployed time was highest during the day from 10:00 a.m. to 6:00 p.m., averaging between 53.2 minutes and 60.2 minutes.
- Average deployed time peaked between 1:00 p.m. and 2:00 p.m., averaging 60.2 minutes.
- Average deployed time was lowest between 5:00 a.m. and 6:00 a.m., averaging 15.5 minutes.

WORKLOAD BY UNIT

Table 46 provides a summary of each Narberth unit's workload overall. Tables 47 and 48 provide a more detailed view of workload, showing each unit's runs broken out by run type (Table 47) and the resulting daily average deployed time by run type (Table 48).

TABLE 47: Narberth Workload by Unit

Unit	Unit Type	Minutes per Run	Total Hours	Total Percent	Minutes per Day	Total Runs	Runs per Day
AMB108	ALS Ambulance	39.2	1,324.9	23.4	217.8	2,028	5.6
AMB108A	ALS Ambulance	45.5	1,514.1	26.8	248.9	1,997	5.5
MIC108	ALS Ambulance	39.2	1,294.6	22.9	212.8	1,984	5.4
MIC108A	ALS Ambulance	45.0	1,488.0	26.3	244.6	1,983	5.4
CH108	EMS Chief	37.8	20.8	0.4	3.4	33	0.1
DC108	Deputy Chief	28.8	13.4	0.2	2.2	28	0.1
Total		**42.1**	**5,655.8**	**100.0**	**929.7**	**8,053**	**22.1**

TABLE 48: Annual Runs by Run Type and Narberth Unit

Unit	Breathing Difficulty	Cardiac and Stroke	Fall and Injury	Illness and Other	MVA	OD	Seizure and UNC	Non-EMS	Total
AMB108	240	235	512	503	91	193	214	40	2,028
AMB108A	230	256	456	456	106	161	263	69	1,997
MIC108	242	238	484	477	80	193	217	53	1,984
MIC108A	233	262	447	445	104	157	263	72	1,983
CH108	0	11	4	4	7	1	2	4	33
DC108	1	6	1	2	6	2	5	5	28
Total	**946**	**1,008**	**1,904**	**1,887**	**394**	**707**	**964**	**243**	**8,053**

Note: OD=Overdose and Psychiatric; UNC=Unconsciousness; See Table 46 for unit type.

TABLE 49: Daily Average Deployed Minutes by Run Type and Narberth Unit

Unit	Breathing Difficulty	Cardiac and Stroke	Fall and Injury	Illness and Other	MVA	OD	Seizure and UNC	Non-EMS	Total
AMB108	28.9	27.4	56.0	49.6	7.1	23.0	23.2	2.6	217.8
AMB108A	35.9	41.2	52.9	52.0	9.2	20.2	33.6	3.8	248.9
MIC108	28.5	27.1	54.6	48.0	6.6	22.5	22.7	2.8	212.8
MIC108A	35.7	40.5	51.9	50.6	8.8	19.8	33.4	3.9	244.6
CH108	0.0	1.2	0.6	0.4	0.4	0.0	0.1	0.6	3.4
DC108	0.0	0.9	0.0	0.1	0.7	0.0	0.2	0.2	2.2
Total	**129.0**	**138.3**	**216.1**	**200.8**	**32.8**	**85.6**	**113.2**	**13.9**	**929.7**

Note: OD=Overdose and Psychiatric; UNC=Unconsciousness; See Table 46 for unit type.

NARBERTH EMS WORKLOAD BY FIRE DISTRICT

Table 49 breaks down the Narberth units' workload within the five fire districts inside Haverford Township.

TABLE 50: Narberth Workload by Fire District Inside Haverford Township

Fire District	Calls	Pct. Calls	Runs	Runs Per Day	Minutes Per Run	Annual Hours	Pct. Work	Minutes Per Day
Llanerch	323	9.4	710	1.9	41.4	489.5	8.7	80.5
Brookline	386	11.3	1,138	3.1	32.4	614.2	10.9	101.0
Oakmont	1,638	47.8	3,792	10.4	43.1	2,721.4	48.1	447.4
Manoa	835	24.4	1,876	5.1	43.9	1,373.4	24.3	225.8
Bon Air	247	7.2	537	1.5	51.1	457.4	8.1	75.2
Total	**3,429**	**100.0**	**8,053**	**22.1**	**42.1**	**5,655.8**	**100.0**	**929.7**

Observations:

Oakmont (Station 38) District

- There were 3,792 runs. The daily average was 10.4 runs.
- Total deployed time for the year was 2,721.4 hours or 48 percent of the annual workload. The daily average was 7.5 hours for all units combined.

Manoa (Station 56) District

- There were 1,876 runs. The daily average was 5.1 runs.
- Total deployed time for the year was 1,373.4 hours or 24 percent of the annual workload. The daily average was 3.8 hours for all units combined.

Brookline (Station 35) District

- There were 1,138 runs. The daily average was 3.1 runs.
- Total deployed time for the year was 614.2 hours or 11 percent of the annual. The daily average was 1.7 hours for all units combined.

Llanerch (Station 34) District

- There were 710 runs. The daily average was 1.9 runs.
- Total deployed time for the year was 489.5 hours or nine percent of the annual workload. The daily average was 1.3 hours for all units combined.

Bon Air (Station 58) District

- There were 537 runs. The daily average was 1.5 runs.
- Total deployed time for the year was 457.4 hours or eight percent of the annual workload. The daily average was 1.3 hours for all units combined.

ANALYSIS OF BUSIEST HOURS FOR NARBERTH EMS UNITS

There is significant variability in the number of calls from hour to hour. One special concern relates to the resources available for hours with the heaviest workload. We tabulated the data for each of the 8,760 hours in the year. Table 50 shows the number of hours in the year in which there were zero to three or more calls that were responded to by Narberth units during the hour. Table 51 shows the ten one-hour intervals which had the most calls during the year. Table 52 examines the number of times a Narberth call overlapped with another Narberth call in Haverford.

TABLE 51: Frequency Distribution of the Number of Narberth Calls In An Hour

Calls in an Hour	Frequency	Percentage
0	5,900	67.4
1	2,346	26.8
2	462	5.3
3+	52	0.6
Total	**8,760**	**100.0**

TABLE 52: Top Ten Hours with the Most EMS Calls Received

Hour	Number of Calls	Number of Runs	Total Deployed Hours
10/13/2021 2:00 p.m. to 3:00 p.m.	4	11	5.1
1/8/2022 1:00 p.m. to 2:00 p.m.	4	8	4.7
6/1/2022 2:00 p.m. to 3:00 p.m.	4	8	4.0
7/22/2021 9:00 p.m. to 10:00 p.m.	3	10	5.5
9/1/2021 6:00 p.m. to 7:00 p.m.	3	10	0.8
2/4/2022 1:00 p.m. to 2:00 p.m.	3	9	4.5
8/2/2021 4:00 p.m. to 5:00 p.m.	3	9	4.3
12/20/2021 6:00 p.m. to 7:00 p.m.	3	9	2.0
6/29/2022 11:00 a.m. to noon	3	8	7.1
11/17/2021 7:00 p.m. to 8:00 p.m.	3	8	5.0

Note: Total deployed hours are a measure of the total time spent responding to calls received in the hour. The deployed time from these calls may extend into the next hour or hours. All Narberth units were included.

TABLE 53: Frequency of Overlapping Narberth Calls

Scenario	Number of Calls	Percent of All Calls	Total Hours
No overlapped call	2,523	73.6	2,106.0
Overlapped with one call	890	26.0	336.8
Overlapped with two calls	16	0.5	2.9

Observations:

- During 52 hours (0.6 percent of all hours), three or more calls occurred; in other words, Narberth Ambulance responded to three or more calls in an hour roughly once every seven days.
- The highest number of calls to occur in an hour was four, which happened three times.

RESPONSE TIME OF NARBERTH EMS UNITS

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

In the following analysis, we included all emergency (priority level 1) calls within the Township of Haverford to which at least one Narberth unit arrived. Calls with a total response time exceeding 30 minutes were excluded. Also, we focused on units that had complete time stamps, that is, units with all components recorded, so that we could calculate each segment of response time.

Based on the methodology above, for 3,429 total calls, we excluded one non-emergency call, 205 calls where no units recorded a valid on-scene time, six calls with a total response time exceeding 30 minutes, and 131 calls where one or more segments of the first arriving unit's response time could not be calculated due to missing or faulty data. As a result, a total of 3,086 EMS calls are included in the section's analysis.

NARBERTH RESPONSE TIME BY TYPE OF CALL

Tables 53 and 54 break down the average and 90th percentile response times by call type. A 90th percentile means that 90 percent of calls had response times at or below that number. For example, Table 54 shows an overall 90th percentile response time of 10.6 minutes, which means that 90 percent of the time a call had a response time of no more than 10.6 minutes. Figure 14 shows the components of the average response time by EMS call type.

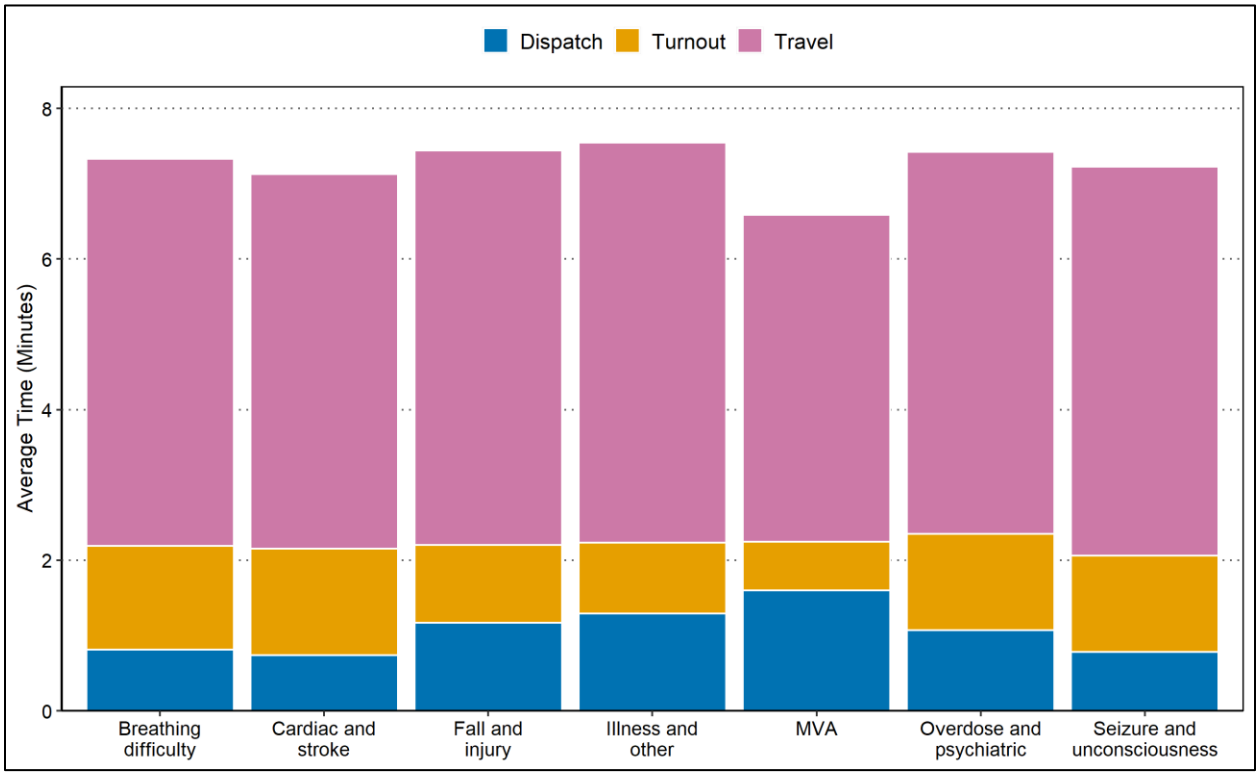
TABLE 54: Average Response Time of First Arriving Narberth Unit, by Call Type (Minutes)

Call Type	Dispatch	Turnout	Travel	Total Response	Number of Calls
Breathing difficulty	0.8	1.4	5.1	7.3	378
Cardiac and stroke	0.7	1.4	5.0	7.1	375
Fall and injury	1.2	1.0	5.2	7.4	770
Illness and other	1.3	0.9	5.3	7.5	734
MVA	1.6	0.6	4.3	6.6	130
Overdose and psychiatric	1.1	1.3	5.1	7.4	278
Seizure and unconsciousness	0.8	1.3	5.2	7.2	361
EMS Subtotal	**1.1**	**1.1**	**5.1**	**7.3**	**3,026**
Non-EMS Subtotal	**2.2**	**1.3**	**5.1**	**8.7**	**60**
Total	**1.1**	**1.1**	**5.1**	**7.4**	**3,086**

TABLE 55: 90th Percentile Response Times of First Arriving Narberth Unit, by Call Type (Minutes)

Call Type	Dispatch	Turnout	Travel	Total Response	Number of Calls
Breathing difficulty	2.4	2.5	8.1	10.4	378
Cardiac and stroke	2.0	2.7	7.8	10.3	375
Fall and injury	2.6	2.4	8.0	10.5	770
Illness and other	2.8	2.3	8.1	10.8	734
MVA	3.0	1.7	7.2	9.5	130
Overdose and psychiatric	2.8	2.6	8.1	10.9	278
Seizure and unconsciousness	2.1	2.5	8.4	10.5	361
EMS Subtotal	**2.6**	**2.5**	**8.1**	**10.6**	**3,026**
Non-EMS Subtotal	**4.0**	**2.4**	**7.8**	**13.2**	**60**
Total	**2.6**	**2.5**	**8.1**	**10.6**	**3,086**

FIGURE 14: Average Response Time of First Arriving Narberth Unit, by EMS Call Type



Observations:

- The average dispatch time was 1.1 minutes.
- The average turnout time was 1.1 minutes.
- The average travel time was 5.1 minutes.
- The average total response time was 7.4 minutes.
- The 90th percentile dispatch time was 2.6 minutes.
- The 90th percentile turnout time was 2.5 minutes.
- The 90th percentile travel time was 8.1 minutes.
- The 90th percentile total response time was 10.6 minutes.

NARBERTH RESPONSE TIME BY FIRE DISTRICT

Tables 55 and 56 examine the average and 90th percentile response times of the first arriving Narberth unit in the Llanerch, Brookline, Oakmont, Manoa, and Bon Air fire districts inside Haverford.

TABLE 56: Average Response Time of First Arriving Narberth unit, by Fire District (Minutes)

Fire District	Dispatch	Turnout	Travel	Total Response	Number of Calls
Llanerch	0.9	1.3	5.0	7.2	279
Brookline	1.6	0.7	5.2	7.5	341
Oakmont	1.1	1.2	5.1	7.3	1,508
Manoa	0.9	1.3	5.0	7.2	734
Bon Air	1.1	1.1	6.1	8.3	224
Total	**1.1**	**1.1**	**5.1**	**7.4**	**3,086**

TABLE 57: 90th Percentile Response Time of First Arriving Narberth unit, by Fire District (Minutes)

Fire District	Dispatch	Turnout	Travel	Total Response	Number of Calls
Llanerch	2.3	2.6	7.8	10.2	279
Brookline	3.3	2.1	7.9	10.5	341
Oakmont	2.6	2.4	8.1	10.6	1,508
Manoa	2.2	2.5	7.9	10.4	734
Bon Air	2.6	2.5	9.9	12.3	224
Total	**2.6**	**2.5**	**8.1**	**10.6**	**3,086**

Observations:

- On average, Narberth's response to calls that occurred in the Llanerch fire district was the shortest. The average and 90th percentile response times were 7.2 and 10.2 minutes, respectively.
- On average, Narberth's response to calls that occurred in the Bon Air fire district was the longest. The average and 90th percentile response times were 8.3 and 12.3 minutes, respectively.

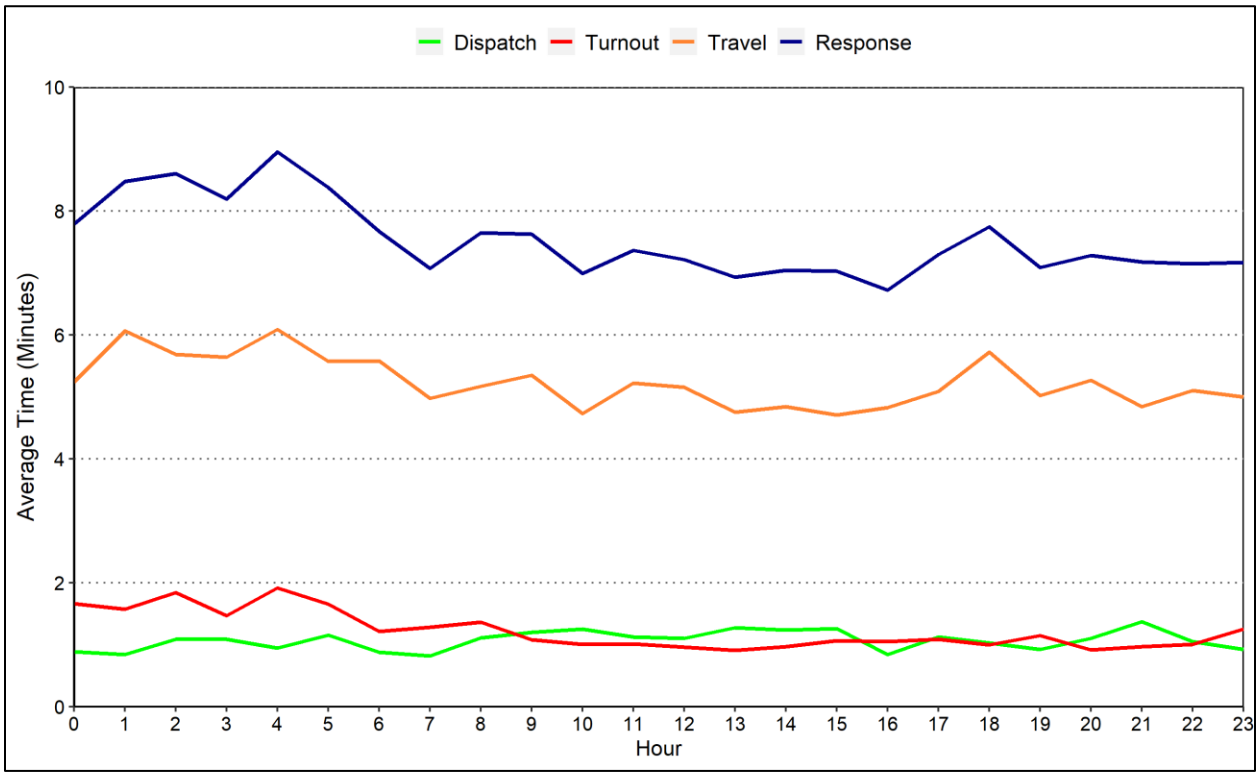
NARBERTH RESPONSE TIME BY HOUR OF DAY

The average dispatch, turnout, travel, and total response time of the first arriving Narberth unit by hour of day are shown in Table 57 and Figure 15. The table also shows 90th percentile response times.

TABLE 58: Average and 90th Percentile Response Time of First Arriving Narberth Unit, by Hour of Day

Hour	Dispatch	Turnout	Travel	Response Time	90th Percentile Response Time	Number of Calls
0	0.9	1.7	5.2	7.8	10.6	94
1	0.8	1.6	6.1	8.5	11.1	83
2	1.1	1.8	5.7	8.6	11.3	79
3	1.1	1.5	5.6	8.2	10.6	70
4	0.9	1.9	6.1	9.0	12.2	54
5	1.2	1.7	5.6	8.4	11.1	53
6	0.9	1.2	5.6	7.7	9.9	84
7	0.8	1.3	5.0	7.1	10.8	109
8	1.1	1.4	5.2	7.6	11.2	120
9	1.2	1.1	5.3	7.6	11.0	193
10	1.3	1.0	4.7	7.0	10.6	179
11	1.1	1.0	5.2	7.4	10.2	191
12	1.1	1.0	5.2	7.2	11.0	187
13	1.3	0.9	4.7	6.9	10.6	184
14	1.2	1.0	4.8	7.0	10.3	172
15	1.3	1.1	4.7	7.0	10.2	171
16	0.8	1.1	4.8	6.7	9.5	196
17	1.1	1.1	5.1	7.3	11.0	163
18	1.0	1.0	5.7	7.7	10.6	150
19	0.9	1.1	5.0	7.1	9.8	137
20	1.1	0.9	5.3	7.3	10.5	139
21	1.4	1.0	4.8	7.2	10.2	89
22	1.0	1.0	5.1	7.1	10.4	99
23	0.9	1.2	5.0	7.2	9.9	90
Total	**1.1**	**1.1**	**5.1**	**7.4**	**10.6**	**3,086**

FIGURE 15: Average Response Time of First Arriving Fire Unit, by Hour of Day



Observations:

- Average dispatch time was between 0.8 minutes (7:00 a.m. to 8:00 a.m.) and 1.4 minutes (9:00 p.m. to 10:00 p.m.).
- Average turnout time was between 0.9 minutes (1:00 p.m. to 2:00 p.m.) and 1.9 minutes (4:00 a.m. to 5:00 a.m.).
- Average travel time was between 4.7 minutes (3:00 p.m. to 4:00 p.m.) and 6.1 minutes (4:00 a.m. to 5:00 a.m.).
- Average response time was between 6.7 minutes (4:00 p.m. to 5:00 p.m.) and 9.0 minutes (4:00 a.m. to 5:00 a.m.).
- The 90th percentile response time was between 9.5 minutes (4:00 p.m. to 5:00 p.m.) and 12.2 minutes (4:00 a.m. to 5:00 a.m.).

NARBERTH RESPONSE TIME DISTRIBUTION

Here, we present a more detailed look at how response times to EMS calls are distributed. The cumulative distribution of total response time for the first arriving Narberth unit to EMS calls is shown in Figure 16 and Table 58. Figure 16 shows the response times for the first arriving Narberth unit to EMS calls as a frequency distribution in whole-minute increments. The cumulative percentages here are read in the same way as a percentile. In Figure 16, the 90th percentile of 10.6 minutes means that 90 percent of EMS calls had a response time of 10.6 minutes or less. In Table 58, the cumulative percentage of 62.2, for example, means that 62.2 percent of EMS calls had a response time under 8 minutes.

FIGURE 16: Cumulative Distribution of Response Time – First Arriving Narberth Unit for EMS Calls

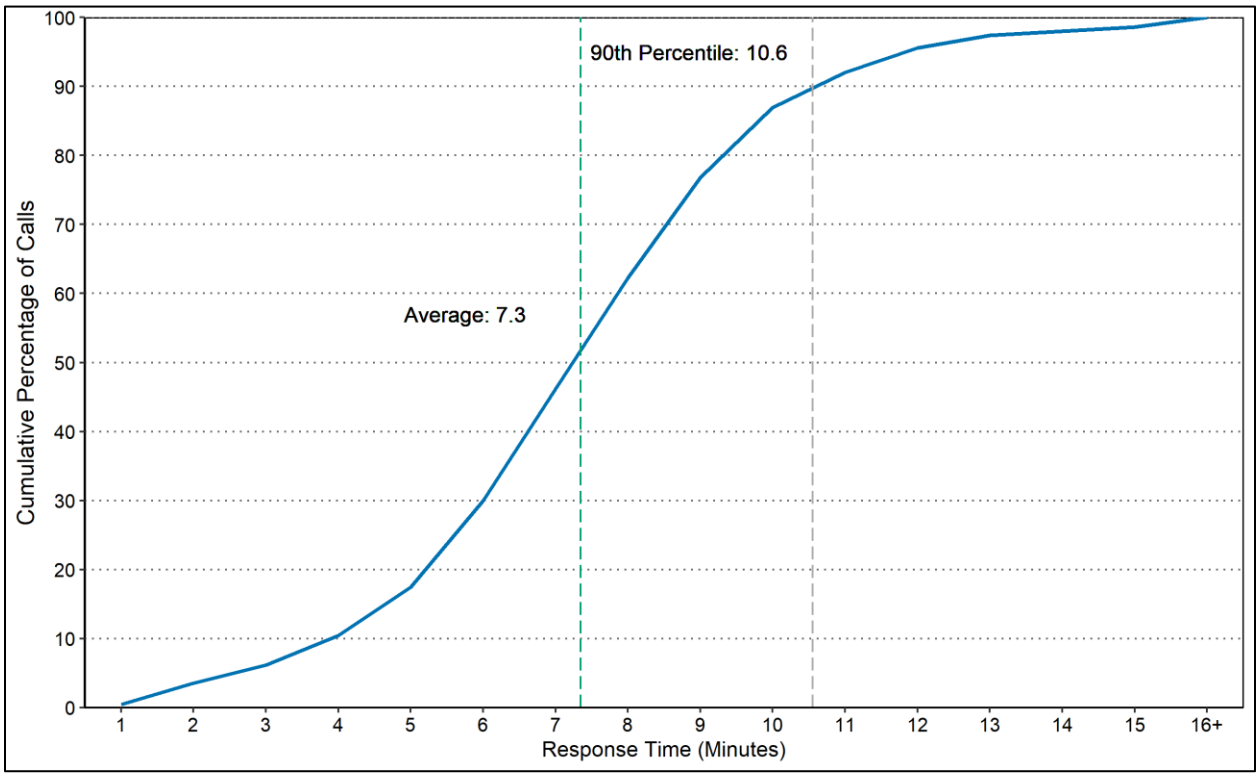


TABLE 59: Cumulative Distribution of EMS Response Time – First Arriving Narberth Unit

Response Time (minute)	Frequency	Cumulative Percentage
1	14	0.5
2	92	3.5
3	81	6.2
4	129	10.4
5	212	17.4
6	378	29.9
7	492	46.2
8	485	62.2
9	441	76.8
10	306	86.9
11	156	92.1
12	107	95.6
13	55	97.4
14	18	98.0
15	19	98.6
16+	41	100.0

Observations:

- For 62 percent of calls, the response time of the first arriving unit was less than 8 minutes.

NARBERTH EMS TRANSPORT CALL ANALYSIS

In this section, we present an analysis of Narberth Ambulance's activities that involved transporting patients, the variations by hour of day, and the average time for each stage of transport service. We identified transport calls by requiring that at least one responding medical unit had recorded both a "beginning to transport" time and an "arriving at the hospital" time. Based on these criteria, we note that 10 non-EMS calls resulted in transport and are included in this analysis.

TRANSPORT CALLS BY TYPE

Table 59 shows the number of calls by call type broken out by transport and non-transport calls.

TABLE 60: Transport Calls by Call Type

Call Type	Number of Calls			Conversion Rate
	Non-transport	Transport	Total	
Breathing difficulty	50	355	405	87.7
Cardiac and stroke	61	343	404	84.9
Fall and injury	243	588	831	70.8
Illness and other	284	542	826	65.6
MVA	71	84	155	54.2
Overdose and psychiatric	51	251	302	83.1
Seizure and unconsciousness	120	285	405	70.4
EMS Subtotal	**880**	**2,448**	**3,328**	**73.6**
Non-EMS Subtotal	**91**	**10**	**101**	**9.9**
Total	**971**	**2,458**	**3,429**	**71.7**

Observations:

- 74 percent of EMS calls involved transporting one or more patients.
- On average, 6.7 EMS calls per day involved transporting one or more patients.

AVERAGE TRANSPORT CALLS PER HOUR

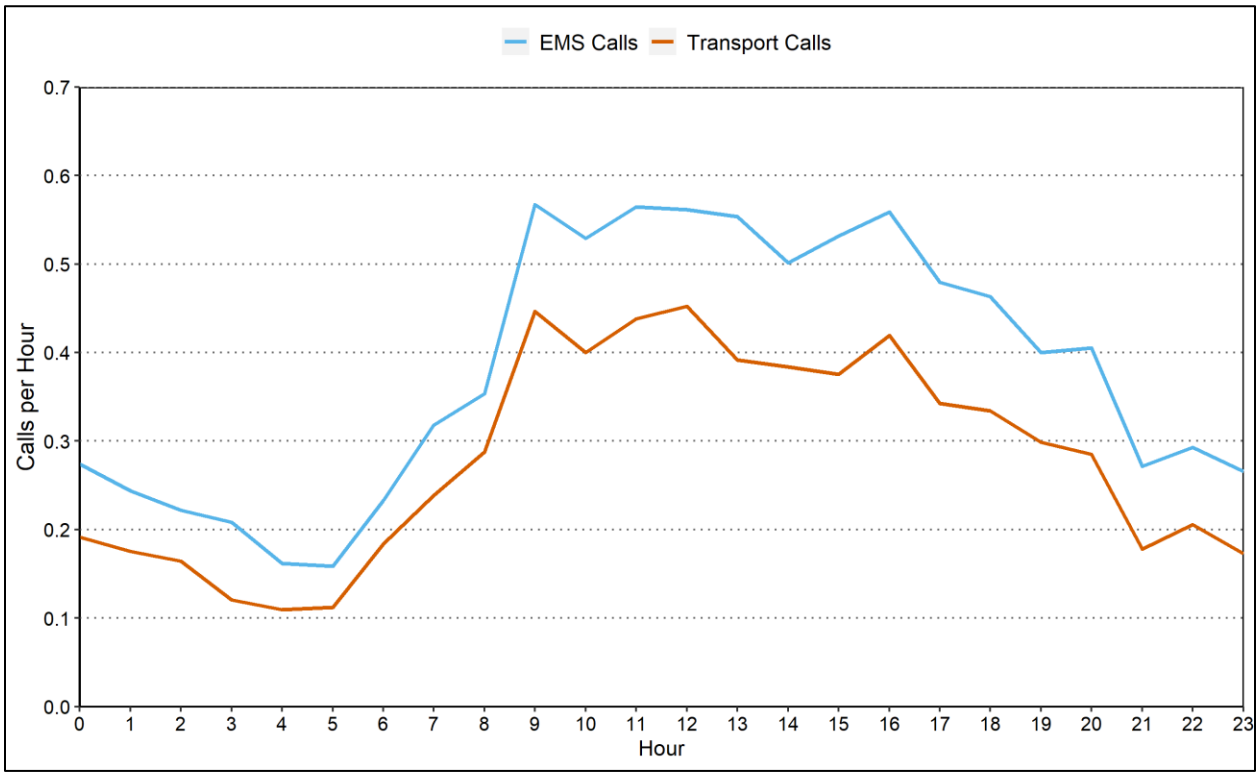
Table 60 and Figure 17 show the average number of EMS and transport calls received each hour of the day over the studied period. In Table 60, the conversion rate measures the percent of EMS calls that transported one or more patients.

TABLE 61: EMS Transport Calls per Hour, by Time of Day

Hour	Calls	Transport	Calls per Day	Transport per Day	Conversion Rate
0	100	70	0.3	0.2	70.0
1	89	64	0.2	0.2	71.9
2	81	60	0.2	0.2	74.1
3	76	44	0.2	0.1	57.9
4	59	40	0.2	0.1	67.8
5	58	41	0.2	0.1	70.7
6	85	67	0.2	0.2	78.8
7	116	87	0.3	0.2	75.0
8	129	105	0.4	0.3	81.4
9	207	163	0.6	0.4	78.7
10	193	146	0.5	0.4	75.6
11	206	160	0.6	0.4	77.7
12	205	165	0.6	0.5	80.5
13	202	143	0.6	0.4	70.8
14	183	140	0.5	0.4	76.5
15	194	137	0.5	0.4	70.6
16	204	153	0.6	0.4	75.0
17	175	125	0.5	0.3	71.4
18	169	122	0.5	0.3	72.2
19	146	109	0.4	0.3	74.7
20	148	104	0.4	0.3	70.3
21	99	65	0.3	0.2	65.7
22	107	75	0.3	0.2	70.1
23	97	63	0.3	0.2	64.9
Total	**3,328**	**2,448**	**9.1**	**6.7**	**73.6**

Note: The conversion rate is measured by dividing the number of EMS transports by the number of EMS calls. For example, between midnight and 1:00 a.m., there were 70 EMS transports out of 100 EMS calls. This gives a conversion rate of 0.7, or 70.0 percent.

FIGURE 17: Average Transport Calls by Hour



Observations:

- EMS calls per hour were highest during the day from 9:00 a.m. to 6:00 p.m., averaging between 0.5 calls per day and 0.6 calls per day.
- EMS calls per hour peaked between 9:00 a.m. and 10:00 a.m., averaging 0.57 calls per day.
- EMS calls per hour were lowest between 4:00 a.m. and 6:00 a.m., averaging 0.16 calls per day.
- Transport calls per hour were highest during the day from 9:00 a.m. to 5:00 p.m., averaging between 0.4 calls per day and 0.5 calls per day.
- Transport calls per hour peaked between noon and 1:00 p.m., averaging 0.45 calls per day.
- Transport calls per hour were lowest between 4:00 a.m. and 6:00 a.m., averaging 0.11 calls per day.
- The hourly transport conversion rate was highest between 8:00 a.m. and 9:00 a.m. at 81 percent of calls.
- The hourly transport conversion rate was lowest between 3:00 a.m. and 4:00 a.m., at 58 percent of calls.

CALLS BY TRANSPORT, TYPE, AND DURATION

Table 61 shows the average duration of transport and non-transport calls by call type.

TABLE 62: Call Duration by Call Type and Transport (in Minutes)

Call Type	Non-transport		Transport	
	Average Duration	Number of Calls	Average Duration	Number of Calls
Breathing difficulty	24.2	50	62.2	355
Cardiac and stroke	44.5	61	61.0	343
Fall and injury	21.2	243	58.6	588
Illness and other	24.1	284	55.6	542
MVA	18.6	71	50.1	84
Overdose and psychiatric	23.4	51	57.2	251
Seizure and unconsciousness	20.7	120	63.0	285
EMS Subtotal	**23.8**	**880**	**58.9**	**2,448**
Non-EMS Subtotal	**15.3**	**91**	**85.6**	**10**
Total	**23.0**	**971**	**59.0**	**2,458**

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

Observations:

- The average duration was 23.8 minutes for non-transport EMS calls.
- The average duration was 58.9 minutes for EMS calls where one or more patients were transported to a hospital.

TRANSPORT TIME COMPONENTS

Table 62 gives the average deployed time for an ambulance on a transport call, along with three major components of the deployed time: on-scene time, travel to hospital time, and at-hospital time.

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

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

TABLE 63: Time Component Analysis for Ambulance Transport Runs by Call Type (in Minutes)

Call Type	Average Time Spent per Run				Number of Runs
	On Scene	Traveling to Hospital	At Hospital	Deployed	
Breathing difficulty	18.3	8.1	28.1	61.0	382
Cardiac and stroke	18.2	8.0	27.4	59.7	378
Fall and injury	16.7	9.0	24.9	56.8	616
Illness and other	16.1	8.0	23.6	53.7	574
MVA	13.1	8.9	20.6	47.2	102
Overdose and psychiatric	17.7	7.9	23.8	55.6	265
Seizure and unconsciousness	17.8	8.7	29.0	61.7	308
EMS Subtotal	**17.1**	**8.3**	**25.6**	**57.2**	**2,625**
Non-EMS Subtotal	**27.1**	**7.9**	**30.2**	**72.7**	**13**
Total	**17.2**	**8.3**	**25.7**	**57.3**	**2,638**

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

Observations:

- The average time spent on-scene for a transport call was 17.2 minutes.
- The average travel time from the scene of the call to the hospital was 8.3 minutes.
- The average deployed time spent on transport was 57.3 minutes.
- The average time at the hospital was 25.7 minutes, which accounts for approximately 45 percent of the average total deployed time for a transport call.

TRANSPORT DESTINATION

Table 63 shows the number of transports (runs) that Narberth ambulances made, broken out by destination.

TABLE 64: Transport Runs by Destination

Destination	Transport	Percentage
Bryn Mawr Hospital	1,584	60.0
Lankenau Hospital	903	34.2
Delaware County Memorial Hospital	123	4.7
Children's Hospital of Philadelphia	9	0.3
Crozer-Chester Medical Center	4	0.2
Fitzgerald Mercy Hospital	4	0.2
Hospital of the University of Pennsylvania	4	0.2
Riddle Hospital	3	0.1
Penn Presbyterian Medical Center	2	0.1
Children's Hospital of KOP	1	0.0
Private Address	1	0.0
Total	**2,638**	**100.0**

ATTACHMENT VI: EMS CALL TYPE IDENTIFICATION

In this analysis, a call category was identified by the incident nature description (type code and subtype description) from the computer-aided dispatch (CAD) data. Table 64 shows the method used to identify the category of all calls responded to by Narberth EMS.

TABLE 65: EMS Call Type by CAD Incident Type Code and Description

Call Type	Type Code	Subtype Description	Calls
Breathing Difficulty	ALS-EMS	Respiratory Difficulty	396
		Subject Choking	9
Cardiac And Stroke	ALS-EMS	Bradycardia	5
		Cardiac Arrest	65
		Cardiac Emergency	144
		Cerebro Vascular Accident	90
		Congestive Heart Failure	7
		Heart Attack	51
		Tachycardia	42
Fall And Injury	ALS-EMS	Amputation	2
		Assault Victim	17
		Burn Patient	3
		Fall W/Trauma	20
		Gun Shot Victim	3
		Head Injury	256
		Hemorrhage-Bleeding	113
		Subject Down	50
	BLS-EMS	Assault Victim	8
		Fall	236
		Fracture(S)	22
		Injured Person	84
		Laceration	17
Illness And Other	ALARM	Medical Alarm	64
	ALS-EMS	Allergic Reaction	23
		Animal Bite	4
		Diabetic Emergency	37
		Hypertension	35
		Hyperthermia	5
		Hypotension	27
		Hypothermia	1
		Maternity-Childbirth	3
		Nature Unknown	41
		Obstetrics Emergency	6

Call Type	Type Code	Subtype Description	Calls
		Other Als Emergency	5
		Pediatric Emergency	41
		Possible Dead On Arrival	29
		Reaction To Medication	13
	BLS-EMS	Abdominal-Stomach Pain	95
		Animal Bite	1
		Back Pain/Injury	58
		Extremity Pain	55
		Other Bls Emergency	71
		Sick Person	201
	TRANSFER	To Montgomery County	11
Motor Vehicle Accident	ACC	With Entrapment	12
		With Injury Reported	126
		With Injury/Fire	1
	ALS-EMS	Pedestrian Struck	16
Overdose And Psychiatric	ALS-EMS	Change In Mental Status	178
		Overdose	77
		Suicide Attempt	11
	BLS-EMS	Psychiatric Emergency	36
Seizure And Unconsciousness	ALS-EMS	Seizures	70
		Semi-Concious Person	58
		Syncopal Episode	150
		Unconscious Person	127
Non-EMS	ALARM	Carbon Monoxide Alarm	8
	ASSIST	FD To Assist Ems	7
		FD To Assist Police	1
	FIRE-BLD	Building Fire, Commercial Bldg	12
		Building Fire, Investigation	9
		Building Fire, Res/Dwelling	31
		Building Fire, With Entrapment	2
	FIRE-HAZMAT	Fuel Spill	3
		Natural Gas Leak, Inside	18
	FIRE-NON	Brush / Woods	1
	FIRE-RES	Elevator Rescue	2
		Industrial/Residential/Other	2
		Water Rescue (Non-Waterway)	4
	STREET	Street Closed	1
Total			**3,429**

ATTACHMENT VII: EMS CALLS WITHOUT UNITS

TABLE 66: Information of Narberth EMS Calls Without Responding Units

Call Type	Type Code	Subtype Description	Calls
Breathing Difficulty	ALS-EMS	Respiratory Difficulty	13
Cardiac and Stroke	ALS-EMS	Cardiac Arrest	2
	ALS-EMS	Cardiac Emergency	5
	ALS-EMS	Cerebrovascular Accident	5
	ALS-EMS	Congestive Heart Failure	3
	ALS-EMS	Heart Attack	3
	ALS-EMS	Tachycardia	1
Fall and Injury	ALS-EMS	Fall W/Trauma	2
	ALS-EMS	Head Injury	13
	ALS-EMS	Hemorrhage-Bleeding	5
	ALS-EMS	Subject Down	2
	BLS-EMS	Fall	11
	BLS-EMS	Injured Person	8
Illness and Other	ALARM	Medical Alarm	3
	ALS-EMS	Diabetic Emergency	2
	ALS-EMS	Hypertension/Hypotension	9
	ALS-EMS	Nature Unknown	1
	ALS-EMS	Pediatric Emergency	2
	ALS-EMS	Possible Dead On Arrival	3
	BLS-EMS	Abdominal-Stomach Pain	3
	BLS-EMS	Back Pain/Injury	6
	BLS-EMS	Extremity Pain	3
	BLS-EMS	Sick Person	17
Motor Vehicle Accident	ACC	With Injury Reported	2
	ACC	With Injury/Fire	1
	ALS-EMS	Pedestrian Struck	1
Overdose and Psychiatric	ALS-EMS	Change In Mental Status	11
	ALS-EMS	Overdose	3
Seizure and Unconsciousness	ALS-EMS	Seizures	3
	ALS-EMS	Semi-Conscious Person	4
	ALS-EMS	Syncopal Episode	6
	ALS-EMS	Unconscious Person	7
Non-EMS	ASSIST	FD To Assist Ems	1
	FIRE-BLD	Building Fire, Commercial BLDG	1
	FIRE-RES	Elevator Rescue	1
	FIRE-RES	Water Rescue (Non-Waterway)	1
	STREET	Street Closed/Open	30
Total			**194**