

# **Facility Assessment and Fire Station Location Analysis**

for the

## **Concord Township Fire Department**

by

**The Ohio Fire Chiefs' Association**

**March 2017**



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## Executive Summary

The Ohio Fire Chiefs' Association (OFCA) was contracted to conduct a facility assessment and fire station location analysis for Concord Township. The analysis included a community risk assessment and review of the Concord Township Fire Department's (CTFD) service delivery. A written report was provided to the Board of Trustees that described the current operational condition of the CTFD's two fire stations, response performance, and provided recommendations for future fire station sites.

The CTFD is a progressive organization that provides fire suppression response and emergency medical services (EMS). The department operates from two fire stations and has a combination career and part-time staffing model with 52 uniformed personnel. In 2015, the department responded to 2,279 calls for service.

An examination of the fire station facilities revealed that both facilities are aged and in need of extensive renovation to make them operationally more functional and bring them into compliance with building and fire codes. The buildings lacked energy efficiencies and did not provide sufficient space for a modern fire service organization. Storage had been maximized; many items were stored in other buildings and improper storage of certain items was observed in some areas of the buildings.

A community risk assessment was conducted on each "target" hazard within the community. The assessment consisted of evaluating each target hazard property on various elements of fire risk and the potential impact on the community. There were 26 properties identified as presenting significant risk for the department and the community.

The department's fire and EMS response data was reviewed and analyzed from July 1, 2015 through June 30, 2016. The analysis indicated good performance based on baseline performance criteria established by national organizations such as the Commission on Fire Accreditation International. However, some of the turnout time data may not have been accurate, which could affect the total response time. A more detailed analysis was not performed as some of data needed did not contain sufficient detail, primarily due to the interface with the CAD software used by the dispatch center.

After evaluating the department's performance, a fire station location analysis was conducted to strategically site future fire stations to maximize service delivery. Several factors were considered when analyzing fire station sites including travel times, roadway accessibility, and first-due area impact. Utilizing fire analysis software and the latest GIS maps of the township, full-color planning maps were developed to analyze travel times and coverage areas from the existing fire stations and potentially new fire station locations. The planning software provided

several options for township leaders to consider when planning future fire station locations, including two-station and three-station configurations.

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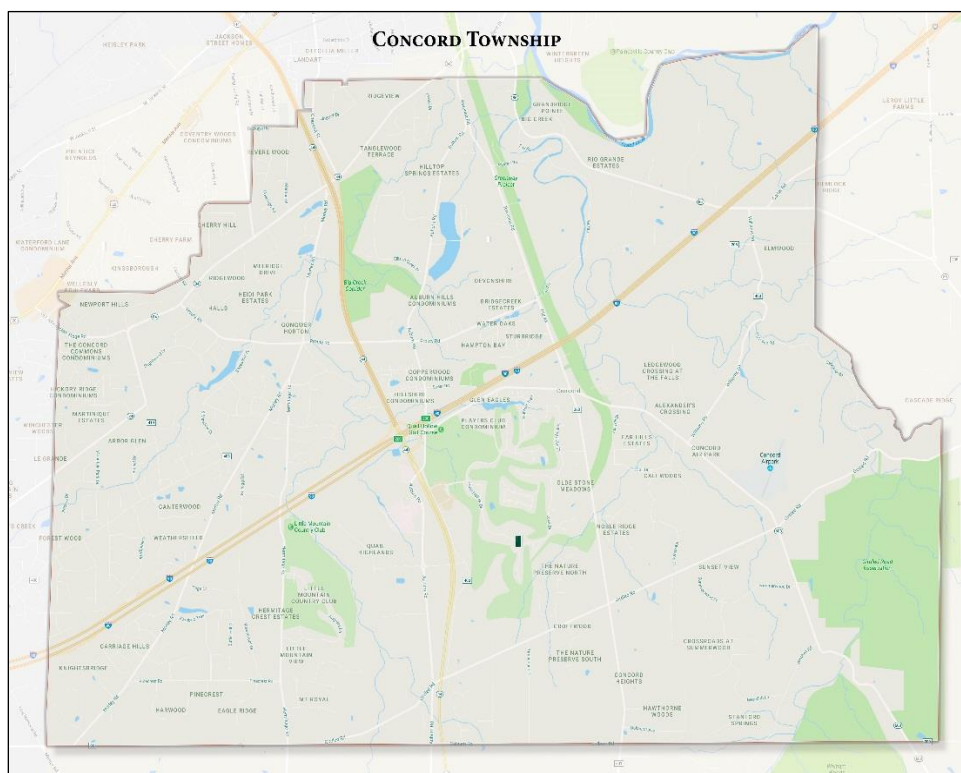
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## Introduction

At the request of the Concord Township Board of Trustees, the Ohio Fire Chiefs' Association (OFCA) was contracted to perform a facility analysis and fire station location analysis to determine optimum locations for future fire station facility construction. This analysis included a risk analysis of the community as well as review of the service delivery and response performance of the Concord Township Fire Department. The project was limited to these specific areas of study.

## Overview

Concord Township is a progressive, semi-rural community of approximately 18,200 residents. The township has an area of 23 square miles and is located 30 miles east of Cleveland in central Lake County and is just five miles from the shores of Lake Erie. It is bordered by the village of Kirtland Hills and the city of Mentor to the west, the city of Painesville and Painesville Township to the north, and Leroy Township to the east. Chardon Township, Geauga County, borders on the south. Figure 1 shows a map of Concord Township.



*Figure 1*

Concord Township is known for its high-quality of life, semi-rural atmosphere and desirable residential opportunities. Many people establish roots in the community and the strong economic base helps provide the amenities expected of modern living. Companies such as Avery Denison, Ricerca, RanPak, B.B. Bradley, Lake Health and University Hospitals' Concord Health Center are some of the township's largest employers.

The township's service area consists of a mix of commercial development, light- and medium-density residential areas, planned communities, and open green spaces. Concord Township is also known for numerous recreational opportunities and park lands located within the township as well as those available due to its close proximity to Lake Erie.

Main roadways in the area include Interstate 90, State Route 44, State Route 84 and Auburn Road. The fire department routinely deals with transportation related issues. Due to the township's growth, heavy traffic flows are regularly encountered on State Route 44 between Interstate-90 and Girdled Road. State Route 84 is another area experiencing rush-hour traffic concerns. The heavy traffic flows could potentially delay an emergency response.

## **Fire & Emergency Services**

The department got its start in 1948 when a volunteer department was formed by local residents to respond to grass fires from a former railroad line. The department started with one engine and continued to grow as the township developed. Continued growth resulted in the department adding a full-time Fire Chief and full-time captain in the early 1970's. In the early 1980's, part-time personnel were added to assure a timely response to emergencies.

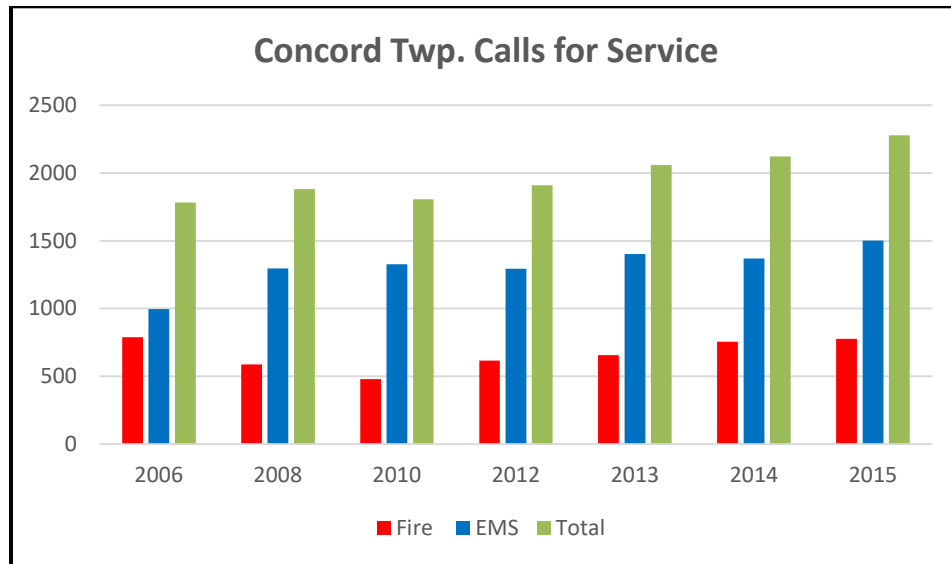
The Concord Township Fire Department (CTFD) has evolved into a modern, progressive organization and enjoys strong community support. The department operates from two fire station facilities:

- Station 1 located at 11600 Concord-Hambden Road
- Station 2 located at 10154 Prouty Road

The department's administrative offices are located at Station 1, which is located adjacent to the township hall and township administrative offices.

The CTFD provides fire suppression response and emergency medical services (EMS). The EMS is an advanced life support level (paramedic level) and transport model. The department has experienced a significant increase in emergency calls for service over the past 10 years. In 2006, the department responded to 1,783 calls for service. By 2015, this number had increased to 2,279, which reflects a 28% increase. This is driven primarily by a 51% increase in EMS responses. Fire calls have remained relatively steady, fluctuating up or down 6%-12% from

year-to-year. Concord Township's calls for service over the past 10 years are displayed graphically in Figure 2.



*Figure 2*

Technical rescue is a term used to describe special response situations including confined space rescue, high-angle rope rescue, trench rescue, fast-water rescue, static-water and ice rescue, and hazardous materials response. Technical rescue incidents are referred to as high-risk, low-frequency events which are dangerous to mitigate and involve a special set of skills, procedures and equipment for each particular rescue situation. It is often very costly to implement and maintain proficiency in each technical response capability. While a formal technical rescue assessment of the township was not performed, the department's response capability in each technical rescue response area was reviewed.

Fast-Water Rescue – these incidents involve the rescue of a victim(s) from fast moving water such as a river or other large stream. Of special concern are low-head dams, which can create dangerous currents, especially when river water levels are elevated or during flood stage. The Grand River and other creeks run through the township to Lake Erie, but there are no low-head dams within the response area.

Static-Water and Ice Rescue – these incidents involve the rescue of a victim(s) from a non-moving body of water such as ponds, quarries or lakes. During winter, these types of incidents could involve surface ice. Each rescue involves a specific set of equipment and operating procedures. CTFD personnel are trained in ice rescue and have the associated response equipment. The department also has operating procedures for response to an ice rescue incident. Mutual-aid departments have static-water rescue capability including dive teams. The mutual-aid departments would be called to assist in a static-water incident.

Confined Space Rescue – includes incidents in which a victim(s) are trapped within an area that qualifies as a confined space. A confined space may be found in agricultural, industrial, and other settings as defined by the Occupational Safety and Health Administration (OSHA). If an incident occurs, the department will call the Lake County Technical Rescue Team for assistance.

Rope Rescue – includes incidents that are high-angle (elevated) or below grade and require the use of rope rescue systems to reach and rescue victims. A rope rescue incident could be part of a confined space incident due to the location of the victim. The department provides response to a Metropark, whose steep terrain could necessitate rope rescue capability to remove an injured person. The department has rope rescue equipment and a written procedure regarding response to these types of incidents. Some of the department’s personnel are trained to the technician level.

Trench Rescue – these incidents are also referred to as trench “cave-in” incidents and involve an excavation trench or underground cave-in that traps a victim. The department has no equipment or training in this specific area. If an incident of this type occurs, the department relies on the Lake County Technical Rescue Team.

Hazardous Materials – all full-time CTFD personnel are trained in hazardous materials response at the technician level. Technician level means that personnel have the training and equipment to undertake defensive type of actions and low-risk offensive operations such as placement of booms and absorbent pads, plugging, patching, diking, and other containment actions that help control or mitigate the incident. They also can take more advanced offensive operations that require the use of level “A” (completely encapsulated protective equipment) or acid splash suits. The Lake County Hazardous Materials Response Team would be called to assist at any significant incident that would require offensive type of operations. Two members of the CTFD are members of the county team.

## **Staffing**

The department utilizes a combination and cross-staffing model. The combination staffing includes full-time career and part-time firefighting and EMS personnel. The department roster currently consists of 52 uniform personnel. This includes the Fire Chief, Deputy Fire Chief, six career lieutenants, nine career firefighters, three part-time lieutenants, 29 part-time firefighters, two part-time inspectors and one part-time educator.

The minimum daily staffing is eight personnel and includes a combination of full-time and part-time personnel. In addition to the eight person minimum, the department’s staffing policy also outlines the following minimum staffing classifications: one full-time officer at Station 1 and one full-time officer or firefighter at Station 2; however, the senior firefighter may sometimes fill the role of acting lieutenant. The Fire Chief and Deputy Chief work a standard 40-hour work week



but are available for recall to emergency incidents after hours. The department also has a full-time administrative assistant.

## **Training**

The department has a monthly training schedule that is developed by the training officer and approved by the Fire Chief. The goal of the department is to train two hours each day, including Saturday and Sunday. The training sessions are conducted by the shift officer with lesson plans and other associated needs provided by the training officer. The monthly topic, which includes demonstrating competency, is repeated as needed to accommodate personnel who may have been off duty and missed the original presentation. The training competencies identified must be completed by all personnel when they are scheduled to work. Other training topics are presented during the month, with the topic selected by the shift officer. The department has budgeted training funds that enable some personnel to attend advanced fire and EMS programs such as Fire Officer I, Incident Safety Officer, etc., offered at off-site training facilities, including regional training and other institutions.

The department requires all personnel to complete the Emergency Vehicle Operator Course (EVOC) biennially. One of the department members is certified as an instructor and the training is offered in-house.

All full-time personnel are cross-trained as an Emergency Medical Technician-Paramedic (EMT-P), with the exception of the Deputy Chief, who is certified as an Emergency Medical Technician-Basic (EMT). Of the current part-time roster, eight personnel are certified as an EMT and 27 are certified as an EMT-P. The department conducts regular in-service training and University Hospitals provide weekly continuing education programs including protocol review, skills assessments and education on new procedures and research. A quality assurance program is conducted in-house in a cooperative effort with the department's medical director and University Hospital. Please see Appendix A for further information on the certification requirements of the state of Ohio.

## **Funding**

The CTFD is funded primarily with levies of millage against real property. There are currently two levies; a 2.7 mill 5-year fire operating levy and a 4.0 mill public safety levy. The 2.7 mill levy will expire at the end of 2017 and will need to be renewed. The 4.0 public safety levy was passed by the voters in November of 2015. This levy combined a previously existing 1.0 mill law enforcement and 2.0 mill fire levy. Revenue from the public safety levy is split between the fire department and law enforcement. Law enforcement services in the township are provided by the Lake County Sheriff's Office via contractual agreement, thus the amount of funds the fire

department receives may fluctuate based on the contract fee. The contract fee in 2016 was \$520,450 with a scheduled increase to \$733,102 in 2017.

The tax levies, grants and EMS billing revenue generated approximately \$4.8 million in 2016. The operating budget for 2016 was approximately \$3.7 million with a \$1.3 million carryover at the beginning of 2017. The carryover funds the sheriff's office contract fee and is used to cover fire department expenses during the first quarter of the following year. The net carryover to fund fire department first quarter 2017 expenses was \$566,900. The township also has a dedicated capital reserve fund to purchase vehicles and other large-ticket items.

## **Risk Assessment**

For a community to appropriately provide for and understand the need for emergency services, a coordinated and comprehensive assessment must be performed. The community risk assessment (CRA) tool was used to assess the property risk within the township response area.

The CRA process involved performing a coordinated survey of every "target hazard" property in the response area. A target hazard is generally described as any large manufacturing or commercial property that typically requires a larger number of resources than is normally deployed for residential and other common types of occupancies. Target hazards also would include buildings of public assembly, schools, hospitals, nursing homes and apartment buildings of 12 units or more.

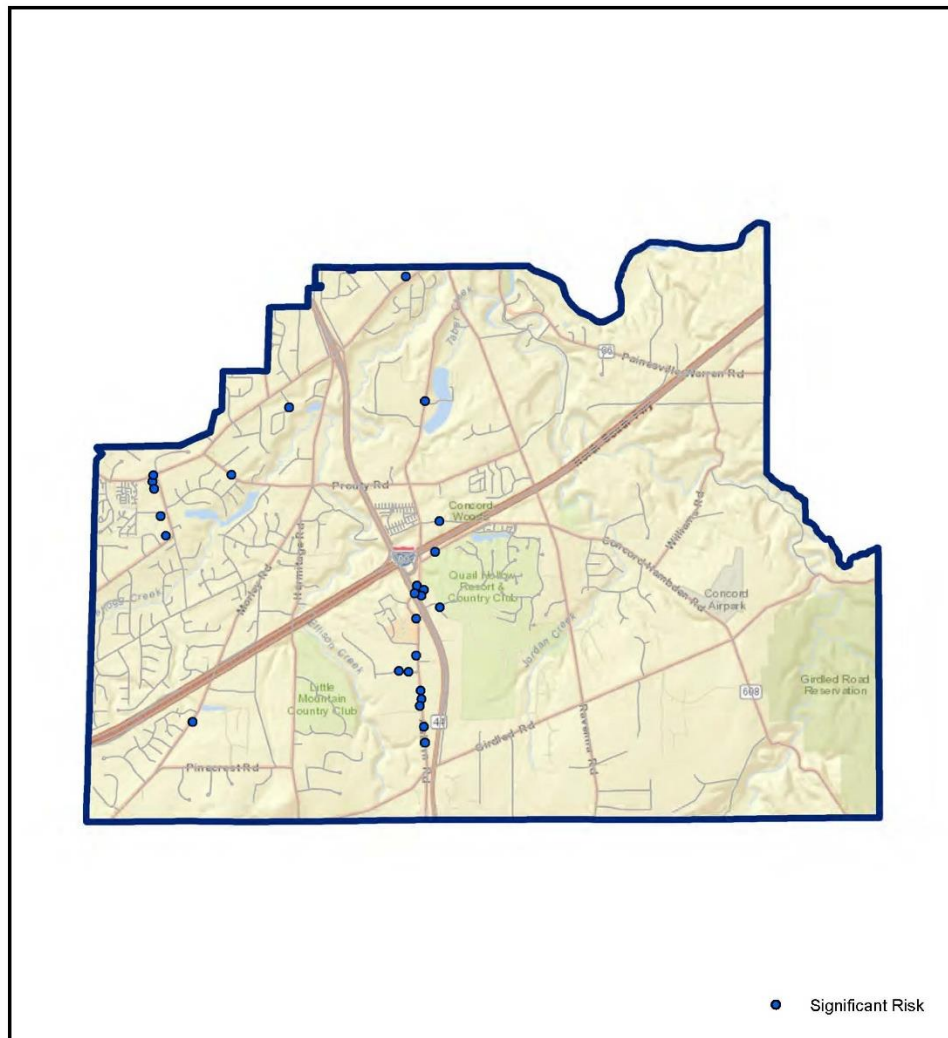
The master target hazard file supplied by the department was used to identify, survey and assess the risk imposed by each property for each of the following elements:

- Life hazard
- Community impact
- Hazard index
- Water supply
- Building usage
- Building construction
- Number of stories
- Square footage

Each of the areas described received a rating score from 1 to 3 with 1 equating to low risk or impact and 3 representing high risk or high impact. There were 65 properties evaluated and each was provided with a final CRA rating from 8 for the lowest risk to 24 for the highest (based on the eight rated categories). The following levels of identified risk were classified:

<u>Risk</u>	<u>CRA Score</u>
Maximum .....	21-24
Significant .....	16-20
Moderate .....	10-15
Low .....	0-9

Each property identified as a significant risk or maximum risk property was plotted on a township map and is displayed in Figure 3. There were 26 significant risk properties identified including two assisted living facilities, two nursing care facilities, five schools and a hospital.



**Figure 3**

One critical resource that must be assessed as part of the community’s ability to fight fire is its water supply. The township is fortunate in that approximately 85% of the township area is served by a water distribution system, including fire hydrants. There are three systems that serve the township; Painesville City, Aqua America (a private company), and the Lake County water

system, which purchases water from Aqua America. The CTFD performs regular hydrant inspections, which includes flushing and pumping each hydrant twice each year. Repairs and larger maintenance items are performed by the entity that owns them.

The Insurance Services Office evaluates the township's water supply system's adequacy for fire suppression. Adequacy is considered the ability of a water system to supply needed fire flows (NFF) at identified locations throughout the township. In other words, available fire flow should equal or exceed NFF for an area of selected commercial, industrial, and residential risks. A water supply evaluation considers three primary components of the water system: a) the supply works capacity, b) the water main capacity, and c) distribution of fire hydrants. Overall, the township has good water distribution coverage, with good water flows reported. In general, the far southeastern portion of the township currently is not served by a water distribution system. (See Insurance Services Office section for additional information)

### **Non-fire risk assessment process**

This section normally contains an analysis of the various non-fire related risks considered within the township. This would include non-fire risks such as flood, tornado, earthquake, drought, etc. Due to the limited scope of the project, this area was not included in the risk assessment analysis.

However, the Perry Nuclear Power Plant is located approximately 15 miles from the township. Extensive pre-emergency planning is conducted by the plant and the Lake County Emergency Management Agency. CTFD personnel are participants in annual route alert and other emergency response drills for local first responders. The plant has a robust public notification procedure in place that is in compliance with federal guidelines.

## **Insurance Services Office**

The Insurance Services Office, Inc. (ISO) is the leading supplier of statistical, underwriting, and actuarial information for the property/casualty insurance industry. 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 published classification is based on a scale of 1 through 10, with 1 being the highest rating and 10 indicating no recognized fire department.

CTFD currently has a PPC rating of 4/4Y, which was published in February 2016. The lower score indicates a more favorable rating which translates into lower insurance premiums for the business owner and homeowner. This lower classification makes the community more attractive from an insurance risk perspective.

How the PPC for each community affects business and homeowners can be somewhat complicated because each insurance underwriter is free to utilize the information as they deem

appropriate. Most underwriters in Ohio utilize what's called in the industry, the "suburban rule." In this case, the split rating identified for CTFD is a 4/4Y. What this means is that most businesses and residents in the township who are located within 1,000' from a fire hydrant and not over five road miles from a fire station receive a rating of 4. Those businesses and residents and businesses who are located more than 1,000' from a fire hydrant but not over five road miles from the fire station receive a rating of 4Y, which previously was an 8B under the former rating system. The reason that the rating is generally not more favorable is due to the lack of a dependable water supply, primarily in the southeastern section of the township. When the ISO field evaluation is conducted on communities, the overall water system, including pumping capacity, storage capacity, distribution system and system maintenance, carries a weight of 40% of the total evaluation. Most underwriters consider properties over five miles from a recognized fire station to receive a 10 PPC and would be subject to higher premium rates for coverage.

## **Fire Station Facilities**

The CTFD utilizes five buildings in their delivery of service to the community. The locations of the buildings are:

- Station 1:11600 Concord-Hambden Road
- Station 2:10154 Prouty Road
- Fire Prevention House:6945 North Meadow Drive
- Red Storage Barn:11593 Concord-Hambden Road
- Pole Storage Building: Township Compound

### **Fire Station 1**

Station 1 is located on a portion of an 11.74 acre, "S" shape tract of land owned by the township. It is a split-level two-story brick structure with a flat roof. The township's general offices and highway department also have buildings on the parcel. The actual fire station site is limited to the immediate east by the adjacent property. The original station was built in 1965 to serve a small volunteer fire department and included a community room. Through the years the building has undergone extensive modifications, remodeling, and expansions to meet the department's needs. The lower level has the apparatus bays, mechanical room, shift commander's dormitory, restroom and office area. Located on the second floor level are the administrative offices, training room, computer room, physical fitness room and living quarters.

The structure is secure at all times and personnel are issued electronic "key" fobs or may use combination locks for access to the facility. A camera system is employed for observation purposes at both the front and rear people access doors. Although the cameras are operational around-the-clock, the images are not recorded and the cameras are only monitored during normal business hours by the administrative assistant. There are mounted, individual smoke detectors in the dormitory rooms that are individually sounded. A detector with a horn/strobe is installed in

the computer room but it is non-functional and disconnected. No alarms are monitored by a common annunciator panel/center. The apparatus bay area has an overhead pipe with valves and hose extensions to permit the refilling of apparatus water tanks. The pipe has several pendent sprinkler heads attached that could be supplied with water in the event of a fire by activation of a manual valve. However, this installation was not designed as a suppression system. There is no rate-of-rise heat detection system for fire notification in the bays.

At the time of the site visit the station was being connected to the county sewer system and the septic system being abandoned. The station is serviced by city water.

### **Apparatus Bays**

The apparatus bay section of the building has concrete block construction with a non-sealed concrete floor. It has four non-drive-thru bays, requiring apparatus to be backed in. The bays are fully occupied with apparatus. The department also utilizes the apparatus bay as a maintenance area; it includes a workbench and storage of equipment necessary for daily operations.

The facility does not have designated storage space for firefighting, EMS, or supplies routinely found in today's fire station. Consequently, every open space within each bay area is occupied with fire and EMS supplies or other equipment. This is a safety concern for employees working in this area performing necessary checks and routine maintenance or when they are preparing to board apparatus for departure to an alarm.



Front of Station 1

All four bays have electrically operated 13' wide x 12' high overhead doors. They are equipped with emergency release levers that will permit manual door operation in the event of a power failure. However, the emergency release cables terminate at the connection point to the operational chain; personnel must use a pike pole to reach and activate the release lever. An emergency release cable for each door should be installed and rerouted to the front of each bay door by rope and positioned in such manner to allow immediate activation by personnel without

the use of any special tools or the need to climb on an apparatus. None of the doors are equipped with electronic door sensors for emergency stopping or reversing direction, nor is there a warning system designed to provide a visual or audible warning that a door has not fully opened. Ceiling height of the bay area is just over 12', leaving minimal space for the overhead bay doors to raise parallel to the ceiling when opened. There are no external bollards installed to protect the building at bay door openings. The size of the bay area is 32' x 34'. Each bay floor has a raised-wheel stop that serves as a striking stop point for each apparatus' left rear tire.



Overhead door emergency releases



South wall and wheel stops

There are three people doors for exiting the bay area. One, located in the east wall, exits directly to the exterior of the building but does not have any posted exit signage. The people door located in the west bay wall at the front of the building has an exit sign on the door, but it is not posted above the door as required by code. This door exits into the vestibule that would permit those desiring to leave the structure to do so through the exterior people door from the vestibule, which is marked as an exit. The third people door, which is located midway in the west bay wall, enters into the restroom/shower of the shift commander's office and would not be classified as an exit.

Fans activated on the corner ceiling-mounted heating units provide minimal air movement in the bays. The department will be installing a diesel exhaust capture and removal system in the apparatus bay area. This is a positive step in personnel safety and should also greatly reduce exhaust by-products and residue that can collect on surface items stored in the bays.

The floor in the bay area is unsealed concrete that is deteriorating due to spalling.



Concrete floor spalling

The bay area is heated by a gas-fired hot water boiler system that is piped from an adjacent room to two ceiling-mounted, resonator-type heaters. Personnel reported that the system is insufficient

to adequately heat the bays during extremely cold weather or provide rapid recovery in the bay area when overhead doors are opened. The boiler has been replaced, but is not sufficient to meet the needs of the bay area. Baseboard heat in the shift commander's area is also furnished from this boiler. There is no special equipment provided that would allow for an exchange of air in the bays unless the overhead bay doors are open.

The apparatus bays have three double-hung windows installed on the east wall and a row of "light" windows in the bay doors that permit the admission of natural lighting. Artificial lighting is furnished by overhead-mounted electrical fluorescent fixtures.

It is department procedure that any fire hose requiring cleaning or reloading be completed at Station 1. Due to the limited space in the bay, any unit requiring a reload of hose must have this task performed outdoors on the station's ramp. This results in delays if rain is encountered and it can be especially disruptive in winter months.

Electrical outlets in the bay area are not marked as a ground fault circuit interrupter (GFCI) or explosion-proof in design, but were installed at least 32" above the floor. The bay floor space has a flammable liquid storage cabinet utilized for the storage of flammable and combustible liquids. A gasoline-powered exhaust fan and portable pump are also stored in the apparatus bay area.

The bays are identified as 1 through 4 and begin with bay 1 at the west wall. The apparatus assigned to these bays are listed as follows:

Bay 1: Squad 1312

Bay 2: Engine 1315

Bay 3: Rescue-Engine 1313

Bay 4: Engine 1323

In addition, a staff command vehicle (Command 1310) is available for the shift commander's use and is parked outside the front entrance. When parked, it is connected to a shoreline in order to keep it "charged" and ready for response.

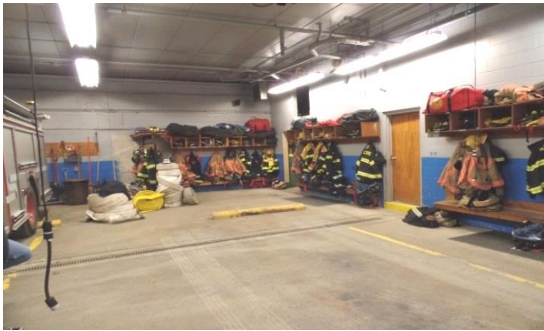
A reserve rescue squad is stored in the township service garage approximately 100 yards from the station. The unit is fully equipped as an ALS unit minus a drug box, which is placed on the unit when it is needed for service. This vehicle is accessed at different times by non-fire department personnel who routinely move it to access highway equipment. It is checked daily by on-duty personnel for readiness of service.

There is no specific storage area for EMS supplies. Exchanges of EMS supplies occur at the hospital.



## West Bay Wall

The west bay wall contains the stairwell to the second floor, the main vestibule entrance to the station and the office/dorm area utilized by the shift commander. Along the exterior wall/floor section of this wall there are two entrance doors into this area which sit on top of a 5” step-up. This is designed to prevent hydrocarbon fumes or bay-floor water from entering the living quarters and administration portion of the building. A third door is located at the south end of this wall that allows access to the boiler and storage room. Firefighter personal protective equipment (PPE) is stored along the wall in individual storage spaces. The PPE is readily accessible to personnel and receives some air flow that would promote drying. The gear as observed did not show any damage from sunlight; however, lighting in this area is predominately provided with fluorescent fixtures, which have shown to degrade the outer shell material over time. The storage location of the PPE also potentially exposes the gear to debris that routinely would enter the station any time bay doors are opened.



Sections of the west bay wall showing lockers and 5” step-up to shift officer’s quarters

The third door, located at the south end of the west wall, opens into two rooms. The department’s three-cylinder cascade oxygen system is located on the south side of the first room, along with portable oxygen cylinders. The cylinders are properly secured and those not in use are capped appropriately. This area also has a fragmental tube previously used for the filling of D- and E-sized portable oxygen cylinders.

The southwest wall of this room has wall shelving that contains an assortment of towels and cleaning rags. The north side of the room has wall-mounted cabinets and half-wall shelving for storage of EMS and other supplies, as well as EMS backboards. Two washing machines are located in this area; one for general purpose cleaning and the other is an extraction unit designed to clean department PPE. Located next to the washing machines are containers of cleaning concentrate pre-plumbed to the extractor and cleaning solution for the general washing machine. Modern electrical conduit and outlets are installed for the washing equipment; however, there is no indication the outlets were GFCI protected.



West wall storage room-oxygen cascade system



West wall storage room-EMS items & washing units

The mechanical room is located behind the oxygen cascade storage room and only accessible by walking through the cascade storage room. Facility operational equipment is located in this room including a residential hot-water heater, boiler for apparatus bay heat, telephone termination punch-down board and telephone control box, computer access terminals, electrical panel, station alert system, clothes dryer and ice machine. The access door into this room is protected by a one-hour-rated fire door. The room also had a step ladder with articles of clothing hanging on it at the time of the inspection. In addition, two sets of PPE and helmets were located in the area as well as a variety of containers. A designated mechanical room is required to be kept clear of storage type items (step ladder, clothing articles, etc.) to ensure the functionality and integrity of the operational space. The dryer and ice machine should be located in a different room than the mechanical room. The dryer discharge was "plumbed" into a residential flex hose with discharge into an external plenum.



Mechanical Room



Mechanical Room

### South Bay Wall

The south or back wall of the apparatus bay has an assortment of cabinetry with a countertop and sink. There is a workbench, roll-around tool box, storage of hand tools and a chemical cleaning dispenser system in this area. Large items stored in this area include a portable pump, stacks of rolled hose and a portable hose loading table. PPE lockers are located on the south and west bay

walls. The automatic transfer switch for the department's emergency standby generator is also located in this area.



South bay (rear) sections of Station 1

### East Wall

This area has a flammable liquid storage cabinet, portable hose rack, portable industrial vise, an 80-gallon general-use air compressor, moveable work bench, and a self-contained breathing apparatus (SCBA) storage cabinet. The workbench had SCBA equipment stored on it and an exit door near the front of the bay is partially blocked by the SCBA storage cabinet. There are three electrical panels located on the east wall and they appear to be properly installed. There are no signs of distress or wear, but some of the circuits are not labeled. This area has three double-hung windows for natural lighting and a bollard on the right side of the interior east bay designed to protect the department's breathing air compressor.



East wall



Air compressor

The breathing air compressor was purchased in 2004 and is an Eagle Air Baron III, 4,500 psi compressor for filling the department's SCBA cylinders. The compressor receives make-up air from exterior atmospheric air through installed piping. Air quality sampling is done biannually and the unit undergoes routine preventive maintenance. The compressor unit has the capacity to fill three cylinders at a time and is considered in good condition. The department fills air cylinders for neighboring agencies including the Auburn Career Center.

The building has a permanently installed Coleman 30 kW natural gas-fired external standby generator located at the southeast corner of the building. It is sized to fully support the electrical needs of the station as well as the networking support for the township's computer servers and telephone system. The system is equipped with an automatic transfer switch that enables the generator to start and transfer the building circuitry to the generator anytime the system senses the loss of normal electrical service.



The generator is professionally serviced twice a year with records retained by the department. The generator is programmed to automatically cycle once a week to exercise the unit, but this exercise does not place a load on the generator. The unit is routinely checked by department personnel.

Generator

Apparatus bay floor drainage was designed around a single 5" trench system that runs perpendicular through the center section of the bays with clean-out boxes. The system does not have a separator system for oils, but a debris collector is accessible and is emptied twice a year or as needed. The bay floors have a slight taper to the center of the bays to facilitate drainage.



Drain system



Drain cleanout

### **Ramp, parking areas, driveway**

The ramp area immediately in front of the apparatus bays is a concrete pad that is approximately 82' long x 42' wide. This includes a section approximately 18' wide to the west of the actual bays where a people door exists and space is available to park the command vehicle used by the on-duty shift commander. The pad extends approximately 8' to the east of the building and the east people-door empties into this portion of the pad. This pad is showing significant signs of deterioration.

There is no parking space available off the ramp designated for general public use, but a motorist would have ample room to pull into the supervisor's section of the ramp, park and access the people door. It was reported that an estimated 90% of the public making contact with the department for the first time come to this door for assistance or access. The people door located at this point is secured but does have an emergency 9-1-1 call box that enables a person picking up the phone to be immediately connected to the fire department's dispatch center. There is also a door bell at this entrance but it is often not recognized by the public, resulting in use of the emergency call box to gain entry. Access through this entrance by department personnel is by the use of a key fob to release the door lock. An installed combination lock does not work and is scheduled to be replaced with a key pad for electronic entry. Although the doors have a remote door lock release for "buzzed-in capability", this control is accessible only in the administrative assistance's office.

The ramp empties onto Concord-Hambden Road which is a 35 MPH roadway. Line of sight from both directions off the ramp is not an issue and normally does not create any safety concerns for apparatus leaving the station on a response. However, there have been several close calls with motorists who were exceeding the speed limit. There are no traffic control devices present for the department's use in accessing the roadway.



Looking west from Station 1 ramp



Looking east from Station 1 ramp

The second level or rear of the station allows access to the upper level of the building from a general parking area that is handicap accessible. However, the entrance is not marked as such nor is it marked as an entrance to the fire department. The rear entrance is locked at all times and is monitored by a surveillance camera; however, the video feed is not recorded. Access by fire department personnel is either by a key fob or combination electronic key pad.

Entrance doors at both the lower and upper levels are showing deterioration due to rust and aging, with the interior floor also showing extensive wear characteristics. The parking lot also is showing signs of deterioration with numerous cracks that may contribute to further deterioration.



Second floor entry



Second floor condition



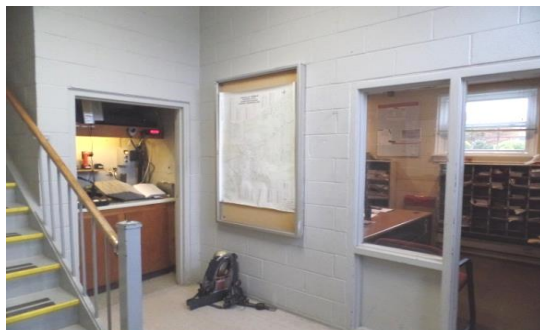
Black top condition

### Administrative Office and Living Area

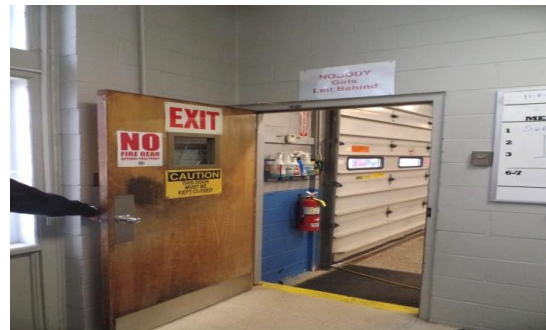
The administrative area of the station is immediately accessed from the rear entrance door from the south parking lot. In addition, the firefighter dormitory, kitchen, dayroom, workout room and restrooms are accessed from the rear entrance door. The shift commander's office and dormitory area, radio room and bay area are immediately accessed from the vestibule entrance at the front of the building.

### Shift Commander's Office and Quarters

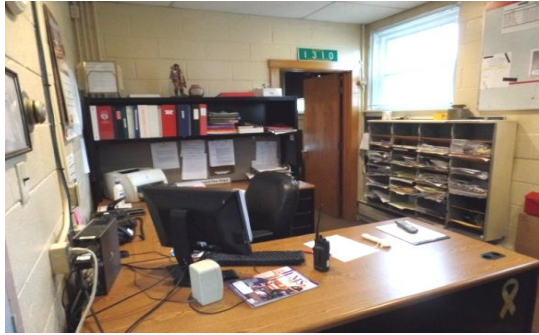
The shift commander's office is located off of the vestibule entrance at the lower level and is shared by the three shift commanders. It is equipped with normal fixtures including an office desk and chair, computer and printer, wall-mounted shelving and an assortment of books, manuals and other office related materials. Immediately behind the office is the dormitory for the shift commander that consists of one bed, three lockers, and a restroom/shower. All spaces are fully utilized and overcrowded. Lighting is provided by fluorescent ceiling fixtures and an exterior window is installed in the office and dormitory. The map and radio room is off the vestibule between the stairwell and shift commander's office.



Vestibule, map room & shift command office



Doorway to apparatus bays



Shift Command Office

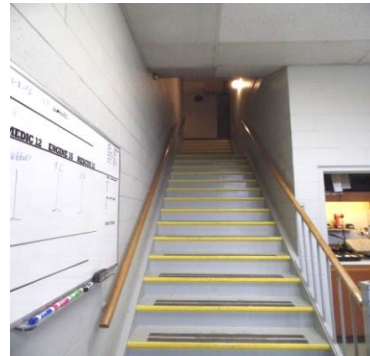


Shift Command Dormitory

Access to the second floor from the apparatus bay area is provided by means of the stairwell in the vestibule. The stairwell is not an enclosed design, which can allow dangerous fumes, gases and potentially fire to enter the dormitory area on the second floor. There are no smoke detection devices in the dormitory hallway area and only one electric-powered carbon monoxide detector, which is mounted midpoint in the hallway at the floor electrical outlet level. Doors leading from the dormitory hallway to the training room and kitchen are not fire-rated. Lighting is provided by recessed ceiling-mounted fluorescent fixtures.



Dorm hallway



Stairwell from vestibule to dorm

## Dormitory and Shower

The dormitory area contains four individual rooms that are approximately 7'x 8' in size. Each room has a single bed, night stand and two-door wood locker available for use by the on-duty crew member. At the end of each shift, personnel are required to remove bedding and any personal effects from the common area so the oncoming shift occupant can use the space. Air circulation in the dormitory rooms is limited and some personnel have elected to use small portable fans. Each room has a smoke detector.

Immediately adjacent to the top of the stairwell hallway there is a men's restroom. There also is a common designated locker room and single shower that can be locked during use.



Individual dorm room



Locker room and shower

### **Kitchen and Dayroom**

The kitchen is accessed from the dormitory hallway through a non-fire-rated door. The kitchen area is approximately 13' x 12' and features counter and wall-mounted cabinets, a dishwasher, microwave, two refrigerators and a gas-fired range. There is a hood system but it does not have a suppression system and the hood reportedly vents into the ceiling space above the range. The range also does not have an automatic shut-down control. The kitchen does not have a rate-of-rise heat detection system. The non-fire-rated-door would not prevent an intense spreading fire from entering the dormitory area.

An archway opens to the east of the kitchen into a combination dining and dayroom. This area is approximately 13' x 20' with four windows on the exterior wall that allow natural lighting to enter the space. The dining section consists of a table that seats six with upholstered roll-around caster-wheeled chairs. The remainder of the room contains furniture including a chair and ottoman, four recliner-type chairs, radio receiver, and wall-mounted television. There were no smoke or rate-of-rise heat detectors in this area. Artificial lighting is provided by recessed ceiling-mounted fluorescent fixtures.



Dining and dayroom

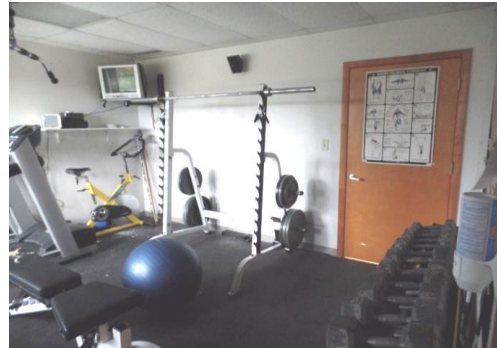


Kitchen and door to dormitory hallway



## Physical Fitness Room

A physical fitness room is located next to the dayroom and is accessible from either the dayroom or training room. The room is approximately 13' x 14' and features a treadmill, exercise bike, Nautilus weight machine, free-standing weights, weight bench and scale. The room is available to all personnel during their shift. However, use during business hours creates a significant noise issue for the administrative offices. Because of the room's limited size and the space required to properly use some of the exercise equipment, the number of personnel that can safely workout at the same time is limited.



Physical Fitness Room

## Training Room

The department has a large training room located off of the dayroom and physical fitness room. It is approximately 24' x 41' and can also be accessed by the rear people door. Four windows allow natural lighting into the room and artificial lighting is provided by recessed ceiling-mounted fluorescent fixtures. The room has an overhead projector for presentations and videos, wall-mounted Smart Board, metal storage and file cabinets, and a small closet with an exterior wall-mounted coat rack. A mobile cart is utilized to store some of the classroom's tables and chairs while others are stacked along a portion of the wall.



Training room



Computer room

Adjacent to the west wall of the training room is an access door to the dormitory and stairs, a common restroom, computer room that also serves as an electrical distribution point, and access to the dayroom. The computer room is a small closet that has been converted for the installation of the department's computer system including a UPS system. Immediately to the east of the training room are the department's administrative offices.

## Fire Chief's Office

The Fire Chief's office is located on the north side of the building and is only accessible through the administrative assistant's office. It is equipped with normal office fixtures including an office desk and chair, credenza with hutch, file cabinet, office chairs, and a closet. Two windows allow for natural light in addition to recessed ceiling fluorescent fixtures. The administrative assistant's office is approximately 12' x 14'. It has typical office fixtures including office desk and chair, credenza, filing cabinets, shelving, and a copier. A wall-mounted monitor for the building's security cameras is also located in this office space.



Fire Chief's office



Administrative Assistant's office

## Deputy Chief's Office and Report Room

Located along the east wall of the training room is a report room and the office of the Deputy Chief. Each room measures approximately 14' x 8'. Both rooms are fully utilized and have limited storage space.



Report room and Deputy Chief's office entrances

## Exterior of Structure

The building's exterior brick has "step-mortar cracking" in various locations. It was reported the station had settlement issues that had just recently been addressed. Some of the mortar cracks also include bricks that have bulged out and could cause a number of bricks to drop out. If bricks are left unrepaired, the chances of potential water damage and the possibility that bricks could drop out is greatly increased. The brick veneer issues should be addressed.

The natural gas lines from the service meter to the building and generator are severely rusted, show signs of deterioration and require paint to restore a layer of protective coating. There are no known roof leaks.

### **Mechanical, Electrical and Plumbing**

The electrical system has undergone periodic updating. There are no GFCI breakers located in electrical service panels and some electrical panel equipment is showing age.

The living quarters and administrative sections of the building are heated and cooled by three roof-mounted HVAC systems that are reported to be more than 15 years of age. They are routinely maintained and have been dependable, although repairs on the units are becoming more prevalent. The boiler for the heating system in the apparatus bays has recently been replaced and is designed to serve ceiling-mounted radiator style units. This system does not adequately heat the bays and a substantial amount of time is required to recover interior temperature anytime a bay door is opened during winter.

The current HVAC system for the living quarters and administrative area of the facility does not provide a positive pressure atmospheric condition with supplemental makeup air. The accepted operating concept for most light commercial structures is to place them under a positive pressure of +.02 inches to +.03 inches water column. Maintaining these slight pressures can make a huge difference in building comfort, efficiency and safety. Positive pressure controls ventilation into a building and keeps air from being pulled in from undesirable locations such as the apparatus bays.

The mechanical, electrical and plumbing systems appear to be in reasonable to good working order.

### **Finishes**

The interior finishes appear to be in good condition. Carpeting showed normal wear but was well-maintained. Floor tile was found to be in fair to good condition in the administrative, dormitory, kitchen and dayroom areas. Tile on the floor in the vestibule as well as the upper entrance area is showing signs of wear around the edges and at the entrance from the outside. Chipped floor tiles were also noted in the training room. Drywall is generally good condition. Some ceiling tiles show signs of water marks from previous and current water issues.

### **Red Storage Barn**

The township owns a locally historic 2½-story barn located approximately 1,000' north of Station 1 on Concord-Hambden Road. The structure is 50' x 32' and contains a loft the fire

department and township community festival group share for storage purposes. The lower level is a concrete block structure with three overhead doors and used primarily by the fire department for storage of an assortment of equipment. Items include a large quantity of miscellaneous fire equipment, hazardous materials supplies, cleaning supplies, physical fitness equipment, snow blower, portable generator, and an ATV (Gator). The second floor is primarily laid out as a simulator floor in which mazes and roof scenarios can be developed for training purposes. This floor has a separate finished room that is used by both the festival committee and fire department for storage. The third level contains storage of fire department records and the remaining area is used as additional training space for simulation activities.

An open area for training purposes exists between the loft floor and the second floor. This area should have a "guard rail" installed to protect foot traffic in the loft when the area is not being used for training. The lower section that is accessible through the east side, north garage door is heated as well as the storage room described on the second floor.

The building is secured at all times but does not have any alarm system for fire or burglary detection. The building is in fair condition and needs siding and soffit repairs. Artificial lighting is provided throughout the structure and consists of a mixture of incandescent and fluorescent lighting.

Storage space is again at an extreme premium forcing the trailer used for hauling the Gator to be stored outside. Attempts should be made to organize similar products into one location, neatly arranged and sorted to maximize the available space.

It is recommended that fire department records be stored within a designated, restricted, secured location designed to protect the records from potential damage due to leaking water, smoke, or fire. This designated area should incorporate the use of fire resistant lockers, files, or cabinets. Consideration should also be given to protecting the designated storage area with the appropriate type of alarm system to provide notification in the event of an emergency.



Barn storage and gator trailer



Barn ground level storage including Gator



Open space from loft to second floor



Third level record

## Fire Station 2

Fire Station 2 is a single-story, 2,400 square foot structure. It has two back-in bays, a brick veneer and vinyl-sided exterior, and a pitched roof. The fire station is located on a .41 acre parcel of land that is fully utilized. Adjacent parcels of land and buildings to the north and west are privately owned residential parcels. The station's service ramp lies to the east of the station and accesses Prouty Road. The adjacent parcel of land to the south abuts a residential parcel of land owned by Concord Township, which is occupied by the fire prevention bureau.

The original building was constructed as a two-bay station in 1966. A 40'x 20' addition was added in 1998 and provides space for a kitchen, dormitory and living space to accommodate a crew of four around-the-clock.



Front of Station 2



Rear of Station 2

The structure is secured at all times and personnel are issued electronic key fobs or may use a combination lock for access to the facility. Smoke detectors were noted on the ceiling just off the kitchen and in each of the four dormitory rooms, and a carbon monoxide detector in the kitchen area of the building. There are no fire detection devices installed in the apparatus bays. The building has illuminated exit signs and emergency egress lighting with battery backup.

The station is connected to city water. The facility is connected to the county sewer system but only after going through a two-step process involving the use of the building's original septic system.

## Apparatus Bays

The apparatus bay section of the station features two non-drive-thru bays with an unsealed concrete floor. The two bays house an engine and rescue squad and are also utilized to store fire and EMS equipment as well as maintenance related equipment and supplies. There are numerous storage cabinets with counter tops, a slop sink that doubles as a work bench and wall-mounted cabinets. A residential-grade washer and dryer, electrical service panel and individual lockers for PPE are located in the bay area. Also stored or installed in this area were backboards, a hot-water tank and two upholstered chairs.

Both bays have electrically operated 13' wide x 12' high overhead doors. The bay door in front of the squad is equipped with electronic door sensors for emergency stopping or reversing direction if resistance is encountered during operation. It is also equipped with an emergency release cable that will permit manual door operation in the event of a power failure. Similar to Station 1, the emergency release mechanism requires the use of a pike pole to activate the release. An emergency release cable should be installed on both doors and routed to the front of the bay door, where it could be positioned to allow immediate activation by personnel to open in the manual mode. There are no exterior bollards installed to protect the building at bay openings.



Bay floors are not sealed and are beginning to show signs of spalling and deterioration. This was especially noted near bay door openings that expose this portion of the bay to the elements.

Concrete floor spalling

The apparatus bay is heated by a natural gas-fired resonator heater that heats the area well. There are three windows in the south wall that allow natural lighting into the bays and each bay door also has a row of windows. Artificial lighting is furnished by overhead-mounted light-emitting diode (LED) fixtures. Ceiling height in the bay area is just over 12', allowing minimal space for the overhead bay doors to raise parallel to the ceiling when opened. The apparatus bay ceiling had some sections of drywall missing and overall appeared to be in a deteriorating condition. Several unprotected penetrations in the bay ceiling and walls were also noted.

Bay floor drainage is designed around a tapered floor drain between the engine and rescue squad bays that had been added after the building was constructed. The current drainage system does not include an oil separator and collector. Access from the north bay into other areas of the building is protected by a 5½” step-up to protect these areas from water and carbon monoxide generated in the bays.

At one time, a make-shift evacuation fan system was constructed and installed on the lower part of the south wall. This was used to prevent the accumulation of exhaust fumes in the bays which would permeate into the living quarters. The use of this system has been discontinued; however, this station is also scheduled for installation of the vehicle diesel exhaust capture and removal system identified previously.

The bays are identified as 1 and 2, with the apparatus assigned as follows:

Bay 1: Squad 1322

Bay 2: Engine 1325

The department is anticipating the addition of a pick-up truck being placed in service for multiple purposes such as a chase vehicle or carrying the department's rope rescue equipment. This vehicle will be assigned to Station 2. Since there is no bay space available, it will be parked outdoors.

### **North Bay Wall**

The north bay wall adjoins the original living area and current kitchen/dayroom entrance and has two distinct people doors for passage. Along the exterior of this wall are wall-mounted PPE lockers, grease board, backboard storage, cleaning equipment, residential grade hot-water tank, and overhead storage. The people door located at the front of the north bay passes directly into the dayroom and office area while the rear door moves through the radio/report room section of the station.



Front of the north bay



Rear of the north bay



Center section of north bay

## West Bay Wall

The west bay wall is the rear of the apparatus bay and features floor cabinets with countertops, wall-mounted cabinets and a slop sink. Also located in this area is a floor air compressor, wall-mounted reel with an air hose, bench-mounted grinder and vise and cleaning supplies. A residential washer and dryer are also located in this area and used for general cleaning needs. An



West wall cabinetry: washer & dryer



West wall; air compressor

exit door from the bay to the exterior is located in this area of the building. It was properly marked with an electric exit sign.

## South Bay Wall

The south bay wall is primarily used for individual PPE lockers as well as wall-mounted electrical panels and a telephone punch-down termination box. The wall has three windows that allow natural lighting into the bay.



PPE lockers on south wall



Electrical panels on south wall

The building does not have a permanently installed standby generator; however, steps have been taken to modify the primary building electrical service to accept power from a portable generator. The generator is stored just below the electrical panels. Upon loss of power to the building, the portable generator is moved to the exterior southeast corner of the building where it can be plugged into a pre-wired electrical connection. The generator can then provide power to



the station through the normal electrical system. However, the unit supplies limited electrical capacity to the station, requiring personnel to limit its use by ensuring numerous electrical devices are turned off or disconnected.



Portable generator



External portable generator connection

### **Ramp and Parking Area**

The ramp area is a concrete pad approximately 93' long x 73' wide at the bay doors, tapering to a width of 43' where the ramp intersects with Prouty Road. Concrete parking space is developed off both sides of the ramp sufficient to hold four or five vehicles on each side. The concrete pad, which was replaced in 2008, has numerous cracks and is beginning to show signs of deterioration.



Concrete pad deterioration

Safety concerns exist for emergency response vehicles exiting the station and the motoring public. There is limited line of site looking south on Prouty Road that makes it difficult to turn north out of the station onto Prouty Road. The speed limit for this section of Prouty Road is 35 MPH and the road is heavily traveled at certain times of the day. During these heavy travel times, the department has experienced situations where the northbound traffic has stacked up near or in front of the station. At times, this has resulted in perilous northbound travel under emergency conditions, especially if the apparatus must travel in the southbound lane due to the

northbound lane being blocked by traffic. Additional traffic issues are encountered when emergency vehicles approach the intersection of Prouty Road and Johnnycake Ridge Road, which is controlled by a traffic light. When approaching this intersection in heavy traffic on Prouty Road, the emergency apparatus can be confronted with a motorist who has turned onto the southbound lane from Johnnycake Ridge Road. Even with due regard to safety and all warning devices fully operational on the emergency apparatus, there have been incidents where evasive action was necessary to avoid striking vehicles. The department has experienced several instances where responding vehicles or the motoring public had to take evasive action to avoid a collision. There also have been witnessed accidents where mailboxes have been struck or two-vehicle accidents have occurred when motorists attempted to avoid an emergency unit. Numerous near misses have been reported that could have resulted in serious accidents. The fire department does have a traffic signal preemption transmitter to activate the traffic light at the intersection of Johnnycake Ridge Road and Prouty Road. However, use of the device has been ineffective during high traffic volumes when traffic is stacked on Prouty Road.

Line of sight distance from the south is questionable as there is a rise in the roadway 1000' from the ramp that obstructs the view of traffic beyond that point in the roadway. The state of Ohio routinely uses the Ohio Department of Transportation's *Location/Design Manual (Vol 1)* for line-of-sight visibility distances and other related matters. Chart 201.6 E "decision sight distance", references 980' to 1,125' of visibility. In snow or ice conditions, an engine attempting to start up the ramp towards the highway entrance may not be able to gain enough traction in a timely manner to safely enter the roadway. However, numerous states' DOT standards suggest a line of sight greater than 1,200' to 1,400' for a heavy, commercial-type vehicle to exit onto a main roadway safely. The department may wish to consider working with the Lake County Engineer or the Ohio Department of Transportation in developing a robust highway egress plan with the goal of improving operational safety for both the motoring public and department personnel.



Line of sight looking north



Line of sight looking south; road rise noted

### **Physical Fitness, Radio/Report Area, Restroom/Shower**

Between the existing north bay and the living area of the station is an area of the original two-

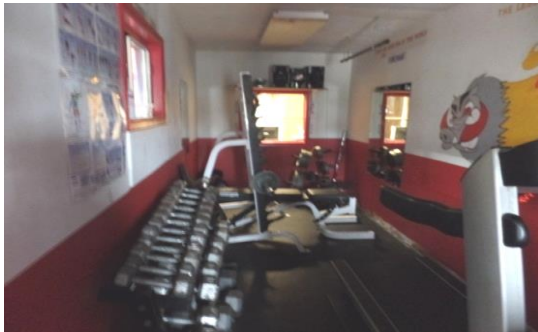
bay building that was built to house fire trucks. When the addition was added to the structure, this area was converted to allow a physical fitness room. In the passage way between the original restroom and physical fitness room, a small space serves as a report writing and radio area.



Old restroom and shower



Radio and report space



Physical Fitness Room



Entrance passageway to addition

Photos depict the area between the north bay and the addition where the report and radio counter and physical fitness room are located. It should be noted the report and radio counter is actually in the passageway between the bays and living area of the station. There are no fire or carbon monoxide detectors within this space. The limited space in the physical fitness room makes it extremely difficult to perform acceptable exercises in the prescribed manner.

### **Dayroom, Kitchen and Office**

A combination dayroom, kitchen and office area is located immediately to the right after entering the front door of the station. This area is approximately 10' wide x 29' long and has four recliner chairs, a computer desk, computer and wall-mounted television. The kitchen and dining area has a small kitchen table that seats three, floor cabinets and wall-mounted cabinets. There also is a residential-grade natural gas range and refrigerator. There is a residential hood system installed above the range that vents into the kitchen. There is no suppression system installed in the hood

and no automatic shut-off for the range. Ceiling-mounted fluorescent fixtures provide lighting to the area as well as two double-hung windows in the east wall.

There is a ceiling-mounted circulation ventilation fan near the west end of this room for the recirculation of air. It was noted the vent must constantly be cleaned and only circulates room air with no exhaust to the outside or makeup air intake. There was a single smoke detector located on the ceiling next to the circulating vent. No carbon monoxide detectors are present.



Dayroom and kitchen area

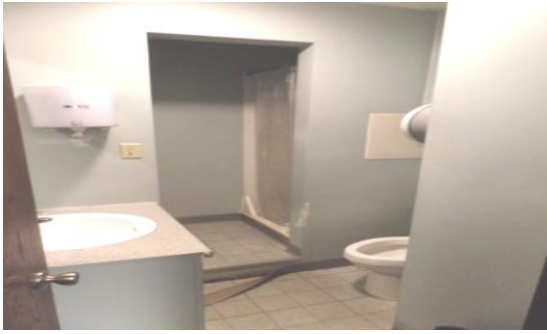


Kitchen area

### **Restrooms and Showers**

There are two restroom/shower areas in this building. One is the original restroom and shower near the north bay area. The second is located in the west side of the building adjacent to the kitchen and dormitory area. Both rooms have a sink, toilet and shower.

In the original restroom area the rubber kick molding is coming off the wall leading into the shower area. Deterioration was noted to the wall just above this point as well as other areas in the room. Although mold was not observed, the lack of an air circulation system along with the presence of moisture creates an environment conducive for mold to grow. Regular cleaning with anti-mold cleansers and solutions is necessary to prevent mold development. There were no lockers available for personnel to use in either restroom area. The restroom/showers were not designated for male or female usage, but the entrance doors have locks that would allow the door to be secured during their use.



Original restroom/shower



Restroom/shower in dorm area

## **Dormitory**

There are four individual dormitory rooms, each measuring approximately 9' x 10'. Each room has a bed, three lockers, a chair, and an end table or small book case. All of the rooms have a single double-hung window for natural lighting and ventilation. Room lighting is provided by surface-mounted ceiling fans. Personnel are required to remove their bedding and personal effects at the conclusion of their shift. Each room has a smoke detector but there was no positive air circulation system.

Heating and cooling to the living areas of the station is furnished by a natural gas-fired HVAC system located on the exterior of the west wall addition. The system appears sufficient in meeting the heating and cooling needs of the living areas. However, it was reported a number of the windows leak air, which causes drafts during the winter months.

## **Exterior of Structure**

The exterior of the building is covered with brick veneer and vinyl siding. The siding was in good condition. However, it was noted the brick mortar is cracking, causing gaps between bricks in different places. This was especially noted in the south wall of the building.



South wall mortar cracking

## **Mechanical, Electrical, Plumbing**

The mechanical, electrical and plumbing systems appear to be in good working order. Electrical installation, for the most part, was within code compliance. However, the ventilation system for air exchange in the kitchen is not sufficient to accomplish proper exchange of environmental air.

Consideration should be given to revamping this system to include the appropriate air exchange in this portion of the building.

### **Fire Prevention Office**

The township obtained the residential property adjacent to the south of Station 2 in 2006. The property is .51 acre of land with a 1,525 sq. ft. ranch house that was built in 1972. The township converted the structure for use by the fire department's fire prevention bureau and as a training facility for public educational purposes. The structure is wood-framed, covered with aluminum and vinyl siding and sits on a crawl space. The house has a two-stall attached garage that is adjacent to a concrete driveway off of North Meadow Drive. A concrete sidewalk has been installed between the front of the house to the ramp in front of the station.



Fire Prevention House



Garage & driveway

The building's existing room structure has not been modified, but room usage has been set up for office utilization, a physical fitness room, training room with tables and chairs and storage areas. Two fire inspectors, a fire educator and EMS coordinator have been assigned spaces in this building. The living area serves as the primary office space for the inspectors. The



Kitchen



Physical fitness & storage room

kitchen is functional and contains kitchen cabinets, range and refrigerator. The enclosed patio has two pieces of workout equipment while one bedroom contains storage of additional workout

equipment. Office areas have desks, chairs, filing cabinets, book cases, and related code and reference books. The house restroom is available for use, but is non-ADA compliant.

The house has a natural gas-fired furnace and central air conditioning that are reported to be functioning properly. The natural gas line from the service meter to the building is severely rusted, shows signs of deterioration and should be painted to restore a layer of protective coating. There is a local burglar alarm system in the structure, but it is not monitored. There is no emergency lighting in the structure or battery backup for the computer system. Department radio traffic is monitored by portable radio.

The exterior of the structure is in good condition. The roof shingles were replaced in 2010 and no noticeable damage to roof shingles was observed. The facility is well-maintained.

## Facility Analysis

### Station 1

Overall, the building is clean and well-maintained. However, the department has clearly outgrown the facility. Storage space throughout the structure is at a premium. As a result, equipment and supplies are not stored properly and a secondary facility is used to handle overflow storage. The limited space in the living and administrative areas of the building, as well as the limited space and size of the apparatus bays significantly restricts the efficiency of the facility in meeting the needs of the department. The current station was designed to meet the dimensions of fire apparatus in use 50 years ago. Modern fire and EMS apparatus have evolved in function and grown significantly in size since that time period. As a result, the extremely limited space in the apparatus bays restricts the type and size of fire apparatus the department can use. This can put the department and the township at a strategic disadvantage in acquiring the most appropriate and up-to-date apparatus and equipment to meet the future needs of the community.

The storage of supplies and equipment on top of lockers, cabinets, or equipment can be hazardous and may result in injury from objects falling and striking personnel. Attempts should be made to alleviate these conditions. A designated storage area with adequate space would permit the department to uniformly store supplies and other fire and EMS items in one location, permitting quick and easy access to the items and allow for efficient review of inventory.

The storage of firefighter PPE is less than ideal. This gear should be stored away from diesel exhaust (even when exhaust systems are installed) and away from chemicals and solvents. Adequate ventilation should be provided to avoid garment deterioration or contamination from potentially carcinogenic fumes, vapors or chemicals. Exposure to ultraviolet light and direct

sunlight should also be avoided. Studies have shown this exposure also leads to material degradation and shortens the life span of the garment. Numerous tools and equipment, such as fire hose, are subjected to the same exposures described for PPE. Although current circumstances limit any corrective actions, steps should be considered to relocate all unessential items from the bays if possible.

No decontamination area was established. National Fire Protection Association (NFPA) 1581, *Standard for Fire Department Infection Control Program*, outlines requirements for providing proper facilities for handling infectious equipment and soiled or contaminated items. Specifically, section A5.7.1 states "...where the fire department provides basic life support or advanced life support emergency medical services, there should be a disinfecting facility in each fire station from which such services are provided." OSHA also outlines similar requirements in their published *Bloodborne Pathogens standard 29 CFR 1920.1030*. This is a critical component in a system developed to prevent the transmission of harmful and deadly diseases and pathogens. Current department policy is to notify the hospital of an exposure and follow their directions. This could include the hospital dispatching a decontamination tent to the incident location or fire station to perform the necessary actions to alleviate potential contamination of personnel or equipment.

There is a dedicated laundry cleaning area just off the apparatus bay that leads to the mechanical room. However, this area is extremely crowded and has a residential washing machine and dryer. The mechanical and laundry areas should have separate and designated areas.

Consideration should be given to upgrading the building's fire and carbon monoxide protection to include detectors in all areas of the building, connected to a central monitoring point and supported with battery backup. This consideration should also include the installation of rate-of-rise heat detectors in the kitchen, mechanical room and apparatus bays.

The area at the top of the stairs at the dormitory hallway entrance should be enclosed according to building code standards for the protection of this area. This should include the installation of fire-rated passages between the dormitory hallway and the training room and from this hallway into the kitchen.

The kitchen range has a standard hood for the exhaust system, but it vents into the ceiling space above the ceiling. There is no kitchen hood suppression system or automatic natural gas shut-off system for the range.

As noted on page 23, the current HVAC system for the living quarters and administrative area of the facility does not provide a positive pressure atmospheric condition with supplemental makeup air. This affects air circulation as well heating and cooling efficiency. It also can allow



vapors and fumes from a variety of sources to seep throughout the building and potentially affect personnel, wall surfaces and electronic components. A portable electrical heater is used to supplement the heat in the office and dormitory area, indicating energy inefficiency in the current windows.

Apparatus bay drainage is through a 5" drain that connects to a clean-out collection point. Drainage should be "T" style with minimum 8" troughs running 85% of a tapered bay length. "T" drains are designed to catch debris off apparatus and retain the debris material in the bottom of the drain until such time it can be shoveled out and disposed of in the appropriate manner. No oil receptacle floor separator system was installed. This should be part of the floor drainage system that permits the scuffing of oil residue off water as it drips from a vehicle. The oil is collected in a separate pit and pumped off as needed.

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*The American with Disabilities Act of 1990 (ADA) prohibits discrimination and ensures equal opportunity for persons with disabilities in employment, state and local government services, public accommodations, and transportation. It is referenced and requirements specified in the Ohio Building Code. [28 CFR Part 35&36]*

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ISO, the agency that establishes insurance rate classifications for local communities, includes in its evaluations the accessibility of emergency apparatus and its security. Currently, the reserve rescue squad is stored in the township highway building approximately 100 yards from the fire station. ISO criteria requires all active apparatus operated by the fire department to be in a structure that is secured and only available to authorized personnel.

Station 1 is not fully compliant with requirements set forth in the Americans with Disabilities Act (ADA) and the Ohio Building Code. The facility is wheelchair accessible at the upper level, but does not have a number of the required items for a fully compliant building. Likewise, building code issues are prevalent, particularly as it relates to fire protection in covering the stairwell, and the absence of fire-rated doors between the kitchen and dayroom and dormitory. The department's computer server and other key equipment have been installed in a non-fire rated room with a fire detection system that is non-functional.

## **Station 2**

Overall, the building is clean and well-maintained. As with Station 1, storage at this station is also at a premium. Firefighting and station equipment are stored on the floor and in available space located throughout the building. The storage of firefighter PPE is less than ideal and similar to the conditions described at Station 1.

With the installation of the apparatus diesel exhaust capture and removal system, the issue of diesel fumes permeating the station should be greatly lessened. However, the location of the PPE storage lockers in the bays still subjects the PPE to potentially contaminated vapors or fumes from chemicals, cleaners, oils, and hydraulic fluids stored in the area that could cause deterioration of the equipment. PPE should be stored in a separate ready-room under positive pressure conditions. Numerous tools and equipment, such as fire hose, are being stored in similar conditions subjecting them to the same exposure as described for the PPE.

There are smoke detectors and a carbon monoxide detector in the dormitory and kitchen areas. However, several areas of the building do not have any detection devices and there is no central monitoring of the existing devices. Consideration should be given to installing a building fire and carbon monoxide protection system to include detectors in all areas of the building, connected to a central monitoring point and supported with battery backup. This should also include the installation of rate-of-rise heat detectors in the kitchen and the apparatus bays. The kitchen range has a residential ductless range hood. There is no hood suppression system or automatic natural gas shut-off system.

The station also lacks a proper decontamination area for soiled and contaminated items and control of bloodborne pathogens. Due to the lack of a proper decontamination area, the local hospital would be called as outlined by current department policy. This was described in detail in the analysis of Station 1.

The facility does not have a permanently installed emergency generator designed to automatically start and supply power to the building in the event of a power outage. The department has a portable gasoline-powered 8 kW generator stored in the station, but its use requires a multiple-step process that may take close to 10 minutes to complete. In addition, due to the limited capacity of the generator, only key electrical devices are supplied with emergency power.

If the electrical service is disrupted, power to the station's alert speakers would also be lost. Personnel could miss notification of an emergency response if they were in bed at the time of outage. Consideration should be given to acquiring a power interruption alarm that alerts personnel anytime normal power is disrupted.

Overall, the department has outgrown both facilities. The age and configuration of the buildings are not conducive to significant alteration or remodel. The facilities also lack critical areas such as proper decontamination areas and proper storage areas for critical and expensive equipment. Fire prevention and public education personnel work from a residential structure obtained by the township, further demonstrating the department's limited office and work space.

The department and the township should be commended for continuing to operate as effectively as possible in buildings that are outdated and lack many of the modern operational and energy efficiencies available. The department and the township should consider development of a facility plan to replace both fire stations.

## **Fire, EMS & Support Apparatus**

The overall impression of the fleet is that it is in good condition and well-maintained, although inadequately housed. Clearance around apparatus at both stations is minimal, restricting working room and complicating turnout. Restricted overhead door clearance is evident. More detailed information concerning the stations is found in the facilities section.

The department operates three engines, one rescue-engine, three ambulance units (referred to as squads), one command vehicle and two SUVs used as chase vehicles. Two vehicles are used by fire prevention and two vehicles are used by the Chief and Deputy Chief. The following is a brief description of each piece of apparatus:

**Engine 1315** - is a 2006 Sutphen pumper. This unit has a standard equipment inventory and also carries ALS EMS equipment. This unit is assigned to Station 1.

**Engine 1313** - is a 1996 KME custom pumper. This unit has a standard equipment inventory, ALS EMS equipment, and extrication equipment for auto accidents and other rescue incidents. This unit is assigned to Station 1.

**Engine 1323** - is a 1997 Ferrara pumper. This unit has a standard equipment inventory and is assigned to Station 1.

**Engine 1325** - is a 2010 Sutphen pumper. This unit has a standard equipment inventory and also carries ALS EMS equipment. This unit is assigned to Station 2.

**Squad 1312** - is a 2011 AEV Type III modular ambulance on an International chassis. This unit is configured and equipped to deliver ALS care and transport service. This unit is assigned to Station 1.

**Squad 1322** - is a 2016 AEV Type III modular ambulance on a Freightliner chassis. This unit is configured and equipped to deliver ALS care and transport service. This unit is assigned to Station 2.

**Squad 1332** - is a 2008 Braun Type III modular ambulance on a Ford E-450 chassis. This unit is configured and equipped to deliver ALS care and transport service. This unit is assigned to Station 1 and stored in the township highway building.

**Command 1310** - is a 2012 Dodge Ram. This unit is used by the shift command officer on duty. It is assigned to Station 1 but stored outside.

**Unit 1337** - is a 2007 Dodge Durango SUV. This unit is used as a chase vehicle and is assigned to Station 1 but stored outside. This unit was scheduled to be replaced in 2016.

**Unit 1327** - is a 2007 Dodge Durango SUV. This unit is used as a chase vehicle and is assigned to Station 2 but stored outside. This unit was scheduled to be replaced in 2016.

As noted previously, two older staff cars are used by the fire prevention bureau and two vehicles are used by the Chief and Deputy Fire Chief. Both chief vehicles are parked outside while the chiefs are on-station and are often used for emergency response. The department also has an all-terrain vehicle (Gator), which is stored off-site with a trailer. It is used for wildland fire incidents and EMS duties at special events or for response into the park areas.

The department does not house an aerial ladder truck. In a unique arrangement, the department shares a ladder truck with the city of Painesville. This aerial ladder apparatus was purchased jointly and is housed in Painesville. Both departments share in maintenance costs and Painesville pays to staff the unit. The ladder truck is automatically sent to building fires in Concord Township, with the exception of the southern area of the township, where a ladder from Chardon responds due to travel distance.

## Response Considerations

In fire suppression as well as EMS, there are a number of recognized safety and response standards and guidelines that are considered when analyzing fire protection services.

OSHA has established a national standard for fire ground staffing as it relates to interior firefighting operation. Although the directive is very detailed, it essentially states that before two properly trained and equipped firefighters can enter a structural fire there must be at least two or more properly trained and equipped firefighters ready to replace, rescue or assist the initial entry firefighters. This standard is often referred to as the “2-in, 2-out” rule. This rule also is listed in the Ohio Administrative Code 4123:1-2, which applies to firefighting operations in Ohio.

Another critical factor in meeting service expectations is assuring that response crews are capable of performing the required tasks on arrival. The dispatching of a specific response with a minimum crew assignment is a concept that is widely supported by fire service literature and industry best practices. The NFPA’s *Fire Protection Handbook* provides a recommendation for a minimum response to various structures. Figure 4 depicts those recommendations.

<p><u>High-hazard occupancies</u></p> <p>Schools, hospitals, nursing homes, explosives plants, refineries, high-rise buildings, and other high life hazard or large fire potential occupancies.</p>	<p>At least 4 pumpers, 2 ladder trucks (or combination apparatus with equivalent capabilities), 2 chief officers, and other specialized apparatus as may be needed to cope with the combustible involved, not fewer than 24 fire fighters and 2 chief officers. One or more safety officers and a rapid intervention team(s) are also necessary.</p>
<p><u>Medium-hazard occupancies</u></p> <p>Apartments, offices, mercantile and industrial occupancies not normally requiring extensive rescue or fire-fighting forces.</p>	<p>At least 3 pumpers, 1 ladder truck (or combination apparatus with equivalent capabilities), 1 chief officer, and other specialized apparatus as may be needed or available; not fewer than 15 fire fighters and 1 chief officer, plus a safety officer and a rapid intervention team.</p>
<p><u>Low-hazard occupancies</u></p> <p>One-, two-, or three-family dwellings and scattered small businesses and industrial occupancies.</p>	<p>At least 2 pumpers, 1 ladder truck (or combination apparatus with equivalent capabilities), 1 chief officer, and other specialized apparatus as may be needed or available; not fewer than 14 fire fighters and 1 chief officer, plus a safety officer and a rapid intervention team.</p>
<p><u>Rural operations</u></p> <p>Scattered dwellings, small businesses, and farm buildings.</p>	<p>At least 1 pumper with a large water tank (500 gal or more), one mobile water supply apparatus (1,000 gal or larger), and such other specialized apparatus as may be necessary to perform effective initial fire-fighting operations; at least 12 fire fighters and 1 chief officer, plus a safety officer and a rapid intervention team.</p>
<p><u>Additional alarms</u></p>	<p>At least the equivalent of that required for rural operations for second alarms. This may involve the immediate use of mutual-aid companies until local forces can be supplemented with additional off-duty personnel.</p>

*Figure 4*

CTFD has developed response guidelines which identifies apparatus response sequence. These response guidelines are entered in the computer-aided dispatch (CAD) system at the Lake County Communications Center and used by the dispatcher on duty to determine appropriate emergency equipment response. The response guidelines are outlined in CTFD operating procedures.

A residential fire response would include one engine from each station and the shift commander from Station 1 in the command vehicle. If the location of the call is in Station 1's response area, three personnel will respond on the engine from Station 1 and the shift officer in the command

vehicle. The engine from Station 2 will have three personnel and the fourth person would respond with a squad.

If the call is in Station 2's response area, four personnel will respond on the engine from Station 2, two personnel on the engine from station 1, one person would respond with the squad and the shift officer would respond in the command vehicle. Automatic aid response would include a ladder company from Painesville City and an engine company from Painesville Township.

If the call is located south of Girdled Road, a ladder from Chardon responds instead of the Painesville ladder. If the call is in in the business corridor area, the ladder from Chardon would be added to the response with the Painesville City ladder. If the call is located in the eastern side of the township, which is generally more rural, two tankers, one each from Leroy Township and Hambden are added to the response.

If needed, the incident commander may call additional resources using the Lake County Mutual Aid Box Alarm System (MABAS). This is a well-established and robust system that can quickly bring additional and special resources to an incident.

ISO makes similar recommendations for fire response as outlined in the *Fire Protection Handbook*. Instead of using an occupancy hazard classification, ISO uses a gallon per minute needed fire flow criteria for determining the minimum appropriate response of personnel and equipment to a call. Simply stated, the larger the needed fire flow – the larger the response requirement. However, the net result is very similar to the NFPA recommendations.

## Response Performance

Response goals are a local decision and are based on a variety of factors. Some of those factors include demographics and size of the response area, risk, demand volume, and public expectation. ISO provides some guidelines, but those are singularly focused on travel distance. There are two national publications that address response performance. One publication is 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*. The standard outlines criteria that address functions and objectives of fire department emergency service delivery, response capabilities, and resources.

Based on NFPA 1720 criteria, the CTFD should meet the following response time objective: for 80% of all fire incidents, the agency should respond to the scene within 10 minutes with at least 10 personnel. Firefighters responding with mutual-aid companies are counted in this 10 person objective.

This response objective begins when the firefighters are notified by the communication center of the emergency. Urban settings have a 9-minute response time standard, suburban communities

are set at 10 minutes and the rural area benchmark is 14 minutes. Concord Township is considered a suburban community based on the township's population of 791 people per square mile. Population density and other information is described in the response standards. Response time benchmarks are described in more detail in the total response time measurement.

The second published criterion is found in the *Standards of Cover*, published by the Commission on Fire Accreditation International (CFAI), which is part of the Center for Public Safety Excellence. CFAI provides both benchmark and baseline criteria. The benchmark for the fire response of suburban departments is 7 minutes, 30 seconds total reflex time or response time for 90% of fire and EMS incidents. The CFAI criterion is more practical when analyzing response performance. It is important to note however, that communities should establish their own response objectives that meet the expectations of its citizens within the context of available resources.

The published response criteria are based on national fire behavior research and data collected on past EMS response in relationship to patient outcomes. This research and other information can be reviewed in Appendix B.

### **Total Response Time Measurement**

The concept of a response time continuum (sometimes referred to as cascade of events) has evolved from the standards set by NFPA and CFAI. The department compiles response data but a total response time continuum and its effect on the services CTFD provides had not been previously evaluated or analyzed. Each component of the total fire response time continuum was reviewed.

### **Call Processing Time**

Call processing time is a component of the communication system. CTFD is served by the Lake County Communications Center, which is operated by the Lake County Sheriff's Office. The communications center serves as a public safety primary answering point (PSAP). A 9-1-1 call goes to the Lake County PSAP and then processed according to the type of emergency. The dispatcher verifies the location, immediate caller information and nature of the emergency. The location of the call and the emergency response information appears on a screen in front of the dispatcher providing the necessary information to notify and dispatch the appropriate emergency response equipment and personnel. This database and software is commonly referred to as a computer-aided dispatch or CAD system.

Determining an acceptable amount of time to process an emergency call can be difficult because communication center systems vary from jurisdiction to jurisdiction. NFPA 1221: *Standard on Emergency Services Communications Systems* establishes the benchmark for call handling at 60-90 seconds. Specifically, Chapter 7 of NFPA 1221 establishes that 95% of emergency call processing and dispatching shall be completed within 60 seconds and 99% of call processing and

dispatching shall be completed within 90 seconds. This call processing criteria is adopted by CFAI. This time segment was not analyzed because the specific data was not available.

### **Turnout Time**

Turnout time is measured from the time personnel are “toned out” or notified for an emergency response to the time the first unit is enroute to the call. Turnout time is a measurement used for personnel who are “in-station”. The turnout time benchmark is 60 to 80 seconds.

### **Travel time**

Travel time is the time it takes for dispatched response units to arrive on scene at the emergency. Travel time is generally considered to encompass the distance and time traveled from the fire station housing the apparatus until it arrives on scene at the location of the emergency. However, several factors can affect travel time. Winter weather conditions as well as localized flooding can affect travel time during certain times of the year. Traffic patterns on heavily traveled roadways, especially during peak travel hours can affect the emergency response. Another problem that can increase travel time and ultimately responder response time is receiving multiple calls for services. When simultaneous emergencies occur and adequate resources are not available to respond, a condition occurs that is referred to as a “stacking effect.” A component to the stacking effect is that at times units may need to respond from adjoining districts in an effort to provide the quickest and most reliable response to the incident. For example, if the Station 1 squad was committed to an emergency and a request for another ambulance or a fire occurs in Station 1’s response district, then the squad from Station 2 may become the primary response unit. In some situations, the closest unit may actually be a mutual-aid company. Clearly, this would lengthen the travel time of the response unit because of the unavailability of the first response units in the district. The travel time benchmark is 5 minutes.

### **Total Reflex Time**

Total reflex time is that time which totally encompasses the response event, from the time the call for service is initially received through the time dispatched units arrive on location. The department receives response time data from the communications center. This information is then copied and entered manually into the CTFD database when incident reports or patient care reports are completed. If the call handling time previously identified is taken into consideration, the total reflex time for fire emergencies should be 7 minutes, 30 seconds.

### **EMS Response Time**

Time requirements for EMS calls are comparable to fire incidents and are based on research conducted on pre-hospital delivery of medical care and patient outcome and survivability. The purpose of a quick response, especially in the most critical situation (cardiac arrest) is that the



brain, devoid of oxygen and circulation, begins to die within four to six minutes. Interventions include early CPR and electrical defibrillation.

For medical emergencies a prompt response is needed to relieve suffering and save lives, but few calls for service are true life or death emergencies. Again, a reasonable service goal is to be on scene soon enough to: 1) assess patients and prioritize to prevent death and disability; 2) intervene successfully in life-threatening emergencies; 3) stabilize patients to prevent additional suffering. The travel time benchmark is 5 minutes and the total response time for suburban departments is 7 minutes, 30 seconds for 90% of the incidents.

## **Analysis**

If all of the criteria and literature is examined as a whole, a reasonable quantitative response time criterion can be determined. Five minutes is the travel time parameter for suburban areas outlined in the *Standards of Cover*, which was previously referenced.

Data generated during the reporting period of July 1, 2015 through June 30, 2016 was utilized for the purpose of examining actual response performance. The data set included 227 fire responses that were compared against the department's performance goals related to call handling and response time. For the same time period a separate data set of 1,480 EMS responses was compared in the same manner as the fire responses. The study only included those calls where actual response times were recorded. Some of the response time data was incomplete or otherwise invalid. For example, many responses were false alarms where the responding units were cancelled before arrival. The study was therefore limited to measurable data. Because of this, the number of responses analyzed is less than the number of responses recorded during the time period.

For the purposes of analysis, fire and EMS response data was evaluated based on the 7 minute, 30 second response guideline, as outlined in the *Standards of Cover* accreditation booklet.

It is common for many organizations to use average response times in determining response performance. However, the use of averages and median measurements does not provide a true indication of performance. One or two "outliers" may adversely affect the response analysis, leading management and citizens to an inaccurate and at times, unfair service expectation. It is understood that no agency can meet a stated performance 100% of the time. Many factors can influence an agency's response including multiple calls, apparatus deployment, training assignments, traffic patterns, weather, human performance and travel distance. Therefore, the NFPA and CFAI have recognized the use of percentiles as the most accurate method to analyze and evaluate response performance. Figure 5 displays graphically the department's response performance for all fire and EMS responses in the township within the time period analyzed. Meeting the benchmark for at least 70% of the responses is often considered the baseline or threshold measurement.

Element	Target	Percentage
EMS Response Time	7:30	96%
Fire Response Time	7:30	86%

*Figure 5*

The analysis of the response data indicates good performance. This is particularly good in light of the traffic congestion in some areas of the township and the existing road structure. However, some of the response data would indicate that some of the recorded response times were not accurate. For example, the turnout time for the fire responses were exceptionally short. Of 228 fire responses, the turnout time recorded for 220 of the responses was less than one minute, including night calls when personnel would normally be expected to be sleeping. With the accuracy of the turnout time questionable, the accuracy of the travel time is also questionable.

A more detailed response data analysis was not completed as the data available from the department's database did not contain sufficient detail or in some instances was not available. This is primarily a function of the reporting software used by the department and the lack of an interface with the CAD software used by the dispatch center. For example, the department has divided the township into four response districts or response zones. Analysis of response data for each of the response districts was not performed due to insufficient data. Any future upgrades to the department's database should address these areas. Note: a description of each specific response district is found in Appendix C.

## Station Location Analysis

Determining the location to build a fire station involves evaluating several factors including: travel times, roadway accessibility, first due-area impact, neighborhood type, and land availability. The factors examined for this study were limited to travel times and first due-area impact, particularly as it relates to the identified risk in the community. It is understood that in the scenarios presented, land may not be available at the exact location identified. The best option for the township would be the closest site to the identified location that has sufficient land area, topography, drainage, etc., and is within fair market values.

The most accurate mapping system available utilizes GIS technology. With this information and the ArcGIS9 Fire Analysis Tool Software, planning maps were developed to visually explain the emergency travel times within the township.

The map in Figure 6 shows the 5-, 6-, and 8-minute travel times throughout the township from the current fire station locations. The coverage of the township is fairly good, considering it's highly likely the current station locations were not developed through an analytical process. Some areas in the southwestern, southeastern and far northeastern areas of the township are

outside the 8-minute travel time. This is not unusual because of the large area covered and road structure.

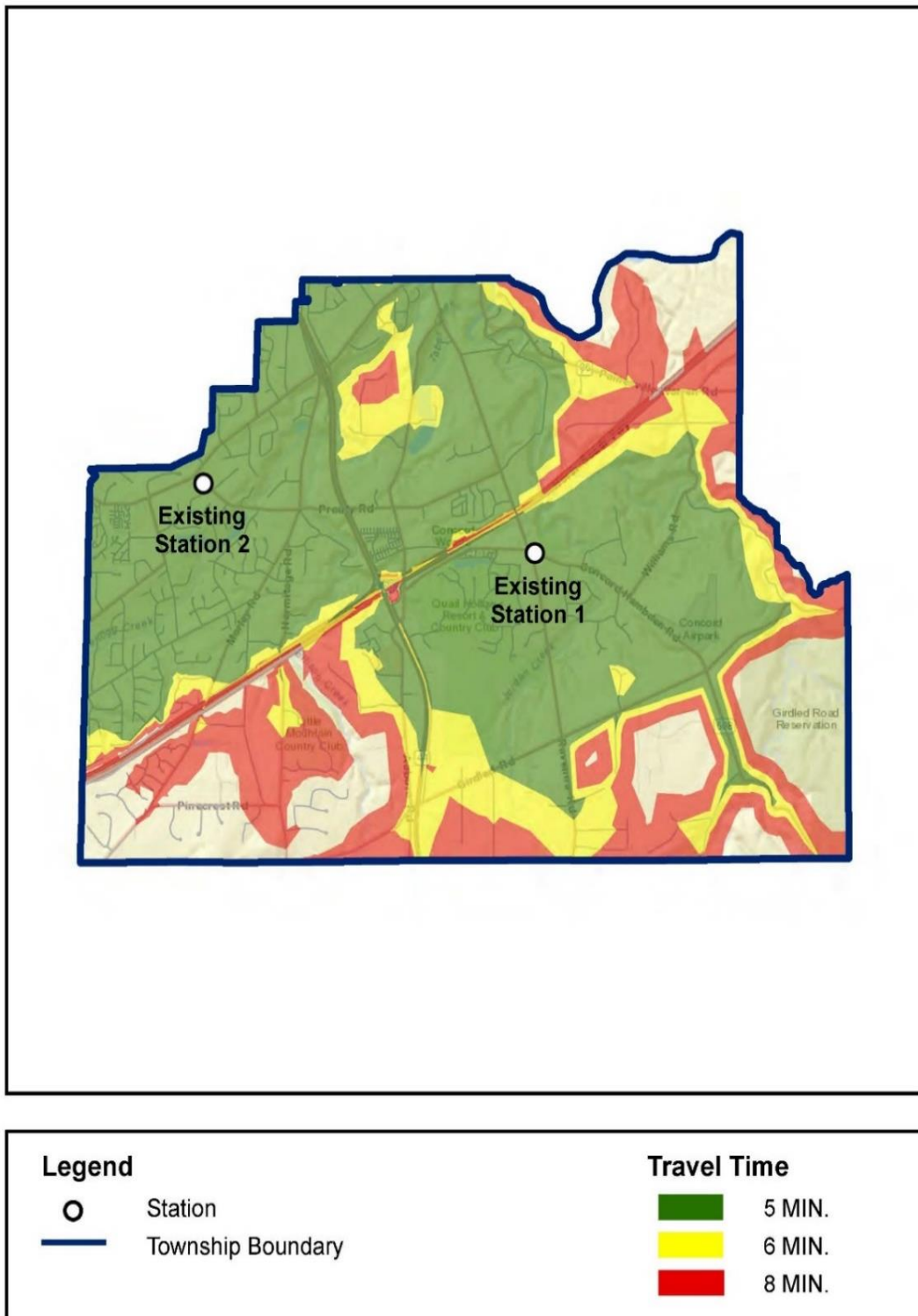


Figure 6

In conducting the fire station location analysis, two scenarios were used: a two-station configuration and a three-station configuration. For the analysis, the assumption was used that both existing fire stations would eventually be replaced with new facilities rather than renovations. Utilizing the fire analysis software, the assessment team was able to determine the most advantageous locations for fire stations in the community.

The map in Figure 7 shows a proposed two-station configuration. Station 1 is shown at its current location on Concord-Hambden Road near Ravenna Road as this consistently provided the best coverage to the eastern portion of township with the computer modeling. The second station is located at the intersection of Prouty Road and Morley Road. Both locations provide good access to north-south and east-west roadways. This configuration would provide travel times similar to those of the existing two stations with improved response coverage to the southwest area generally located just south of I-90 and also improved coverage to the area of LaMuth Middle School in the northern portion of the township. The very southwestern corner of the township would have travel times in the 6 and 8 minute range, while the southeastern corner of the township would virtually remain the same. The southeastern area of the township has parkland, open spaces and undeveloped land. This configuration does not improve response coverage to the area along SR 44, Auburn Road and Girdled Road, which is part of the business corridor and identified as a growth area.

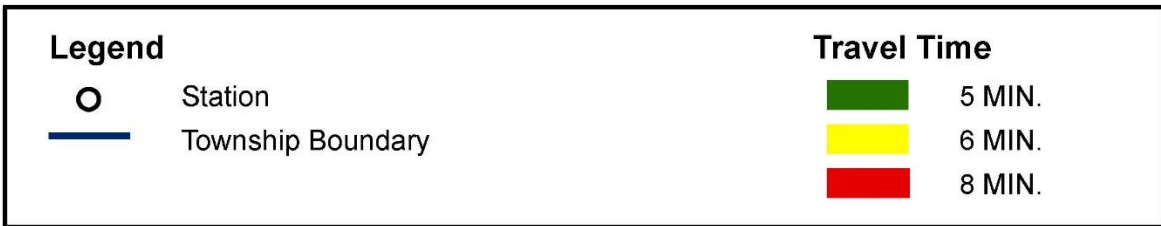
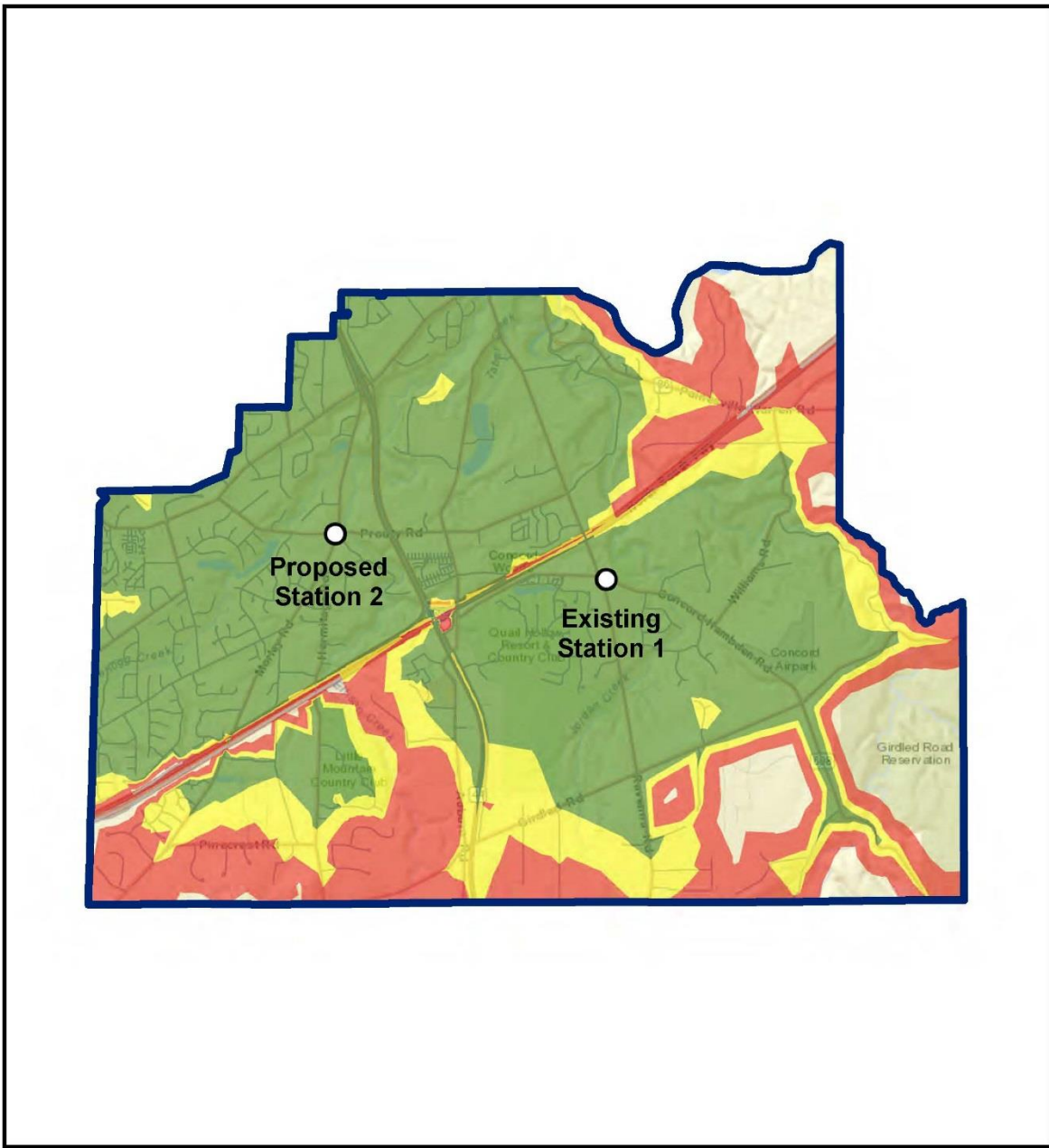


Figure 7

The map in Figure 8 shows the second two-station configuration. Station 1 is shown at its current location on Concord-Hambden Road near Ravenna Road. Station 2 is located at the intersection of Morley Road and Hoose Road, less than a mile from the proposed location in Figure 7. Both locations provide quick access to north-south and east-west roadways. This configuration would provide travel times similar to those of the existing two stations with significantly improved travel times to the southwestern portion of township and the area generally located just south of I-90. The southeastern corner of the township would virtually remain the same. This configuration does not improve response coverage to the area along SR 44, Auburn Road or Girdled Road, which is part of the business corridor and identified as a growth area. The travel times to the area near LaMuth Middle School would remain as they currently exist.

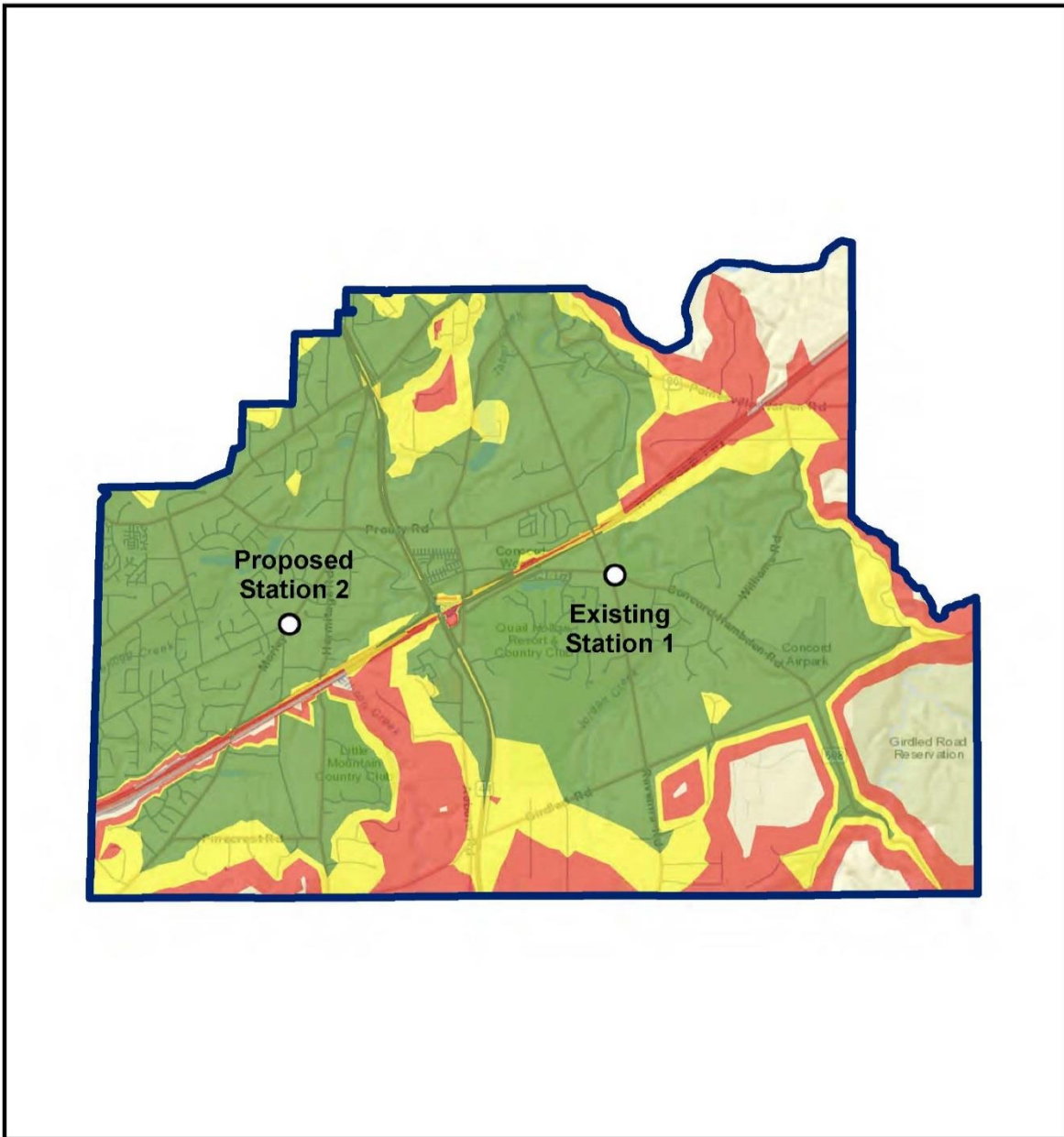


Figure 8

The map in Figure 9 shows a three-station configuration. Station 1 is shown at its current location on Concord-Hambden Road near Ravenna Road. Station 2 is shown at its current location on Prouty Road. A proposed Station 3 is shown at the intersection of Girdled Road and Auburn Road. All three locations provide quick access to north-south and east-west roadways. The travel times to the business corridor along SR 44 and Girdled Road are greatly improved and within the 5-minute travel time. However, the coverage to the far southwestern portion of the township would still have travel times in the 6 to 8 minute range. Coverage to the northeastern and southeastern areas of the township would also remain the same.



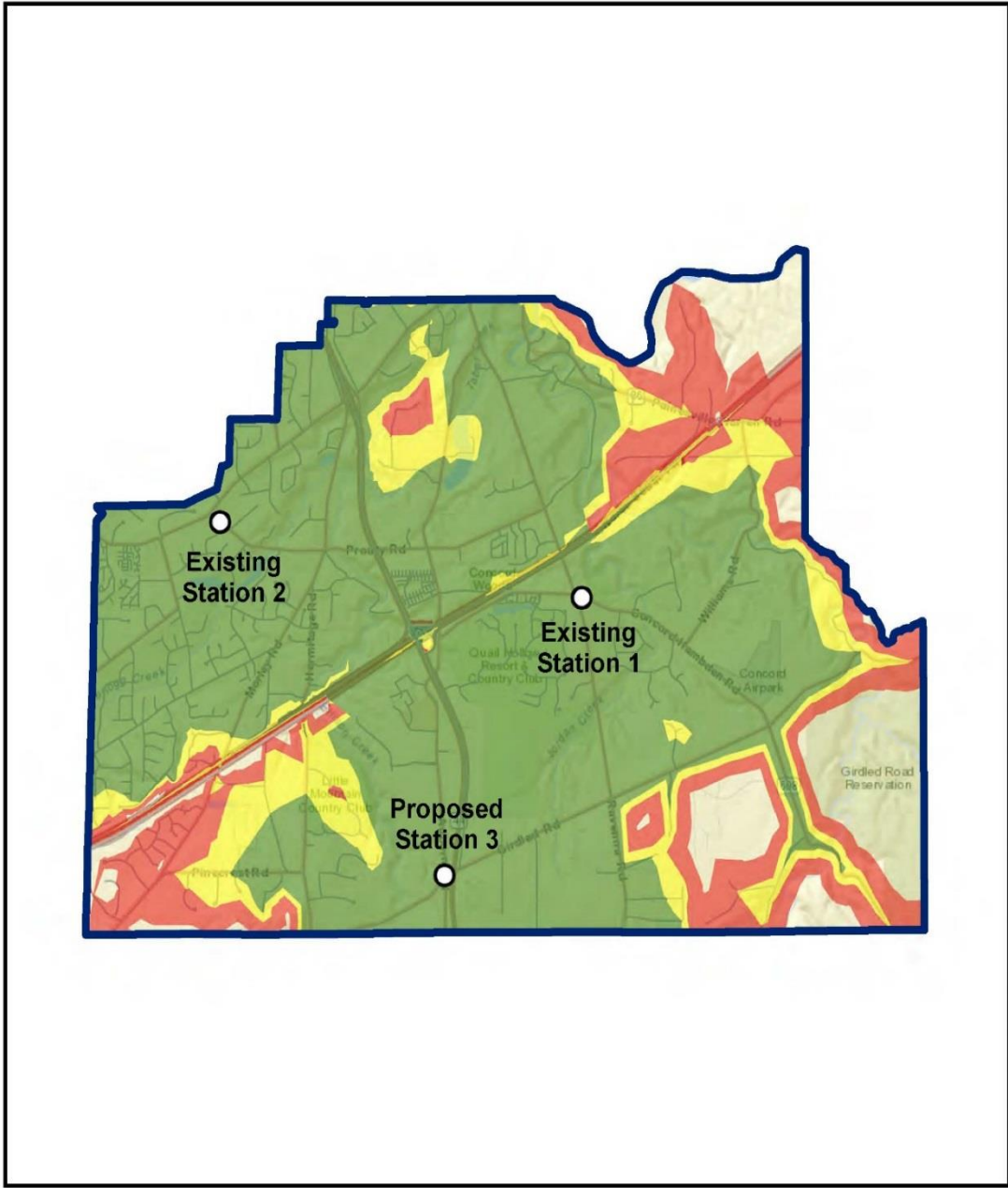


Figure 9

The map in Figure 10 shows a second three-station configuration. Station 1 is shown at its current location on Concord-Hambden Road near Ravenna Road. A proposed Station 2 is shown at the intersection of Morley Road and Hoose Road. A proposed Station 3 is shown at the intersection of Girdled Road and Auburn Road. All three locations provide quick access to north-south and east-west roadways. The travel times to the business corridor along SR 44 and Girdled Road and most of the southwestern portion of the township are within the 5-minute travel time. A small area in the southwestern area is within the 6-minute travel time. Coverage to the northeastern, northern and southeastern areas of the township would remain the same.

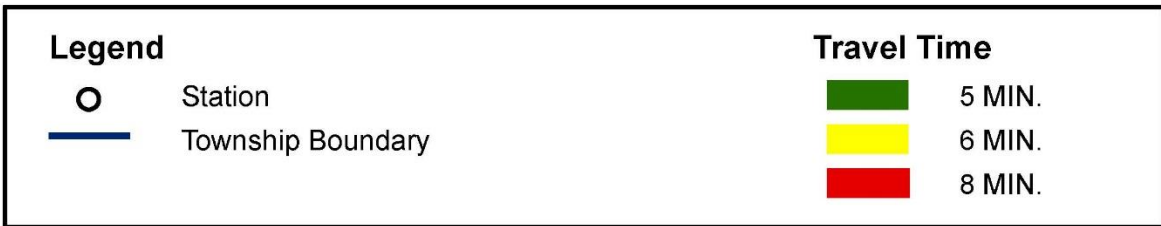
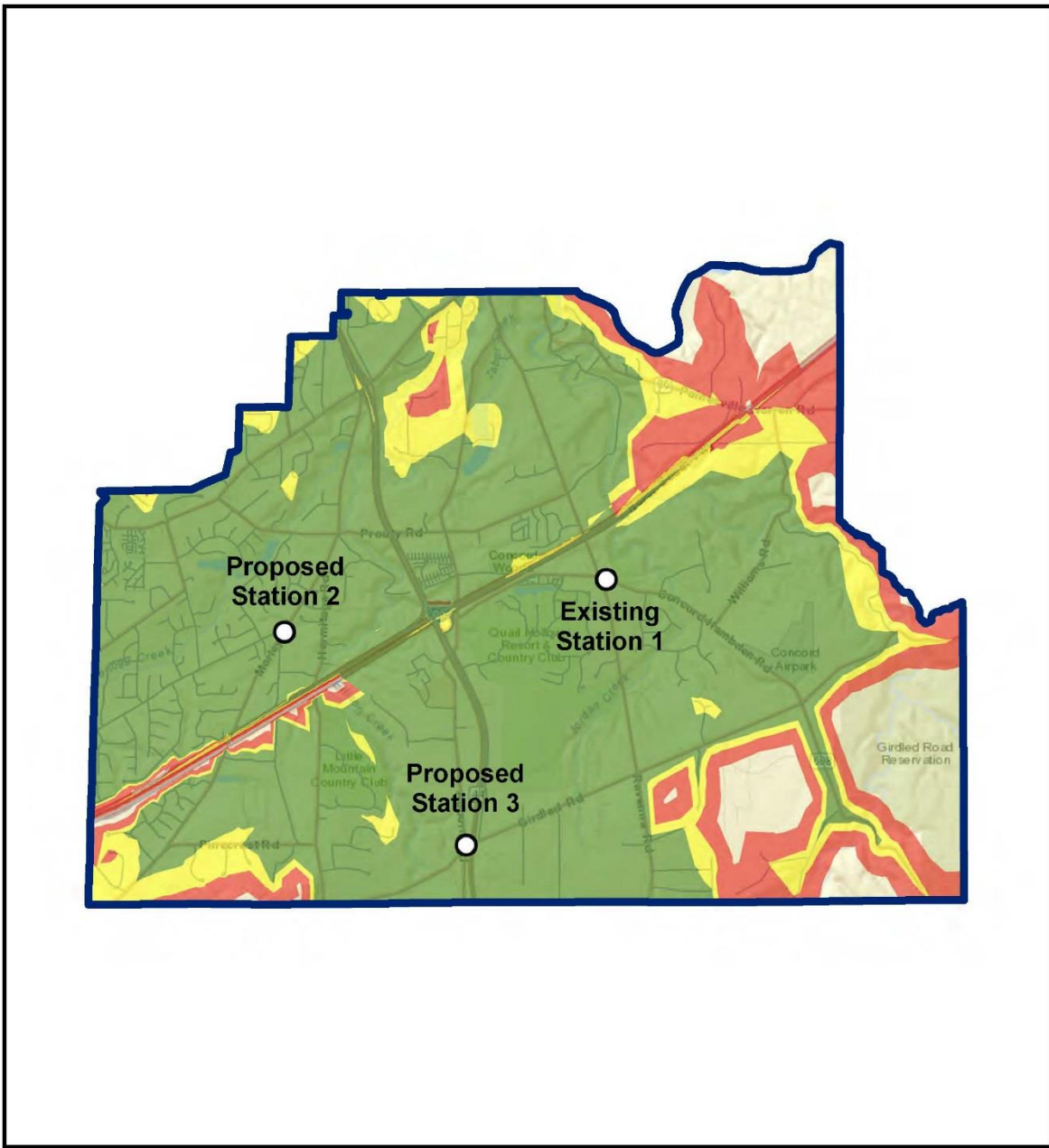


Figure 10

## Strategies

The department and the township are at a key juncture for the future delivery of emergency services. The planning of facility upgrades is a major area of concern and is related to the future staffing model and response expectations of the community.

Department members have a strong sense of pride and satisfaction with helping others and service to the community. However, the current facilities hinder the department's ability to safely and efficiently perform daily and routine duties, as the stations lack many of the basic elements required today for a fire station facility.

The age and configuration of buildings, especially the lack of space in the apparatus bays and storage spaces indicate that significant renovation would not be cost effective. New facilities would be the best option. This would allow for efficient design, incorporating all of the department's current and future space needs as well as modern energy efficiencies.

**Strategy: Planning should be undertaken to develop a facility replacement plan.** The department and township have been served well by the fire station facilities, but the department has clearly outgrown the facilities. After examining the facilities, it was determined that the buildings are lacking many of the basic elements required today for a fire station facility. There are minimal shower or locker room facilities and no building ventilation systems. The facilities lack proper decontamination areas needed for control of bloodborne pathogens. The apparatus floor has limited space for employees to work around and maintain apparatus. Due to age and design, the buildings lack energy efficiency and therefore are costly to heat and maintain.

Station 1 was originally designed for an all-volunteer department with little consideration for EMS services. The department has grown and so have the regulatory demands on the operation of the department. Training, EMS supplies, equipment storage needs, SCBA and PPE care and storage have all dramatically changed over the past 30 years. This places increased demands on fire department personnel and the facilities. All of these items add up to a need for increased work and storage space within the station facility, as well as proper building systems to enable the department to operate efficiently and safely.

Based on the analysis, the three-station configuration described in Figure 10 would provide the best service coverage for the department. The facility replacement plan should include strategic locations for the stations studied in this report. However, the department needs to determine which station configuration works best for the community.

**Strategy: Develop organizational performance goals.** The township is strongly encouraged to participate with the fire department administration in developing and adopting organizational performance goals. An example of an organizational performance goal would be: *the first-due fire department unit will arrive within 8 minutes, 30 seconds total reflex time for 80% of all*

*incidents.* This performance goal then provides the foundation, along with other factors, from which to determine the appropriate level of resources to meet the goal(s). This also provides a method from which to analyze response and other related data and report to the citizens on the agency's performance in a clear and understandable manner.

## Appendix A

In the state of Ohio, the Ohio Division of EMS is responsible for all the laws governing EMS. These laws are listed in section 4765 of the Ohio Revised Code (ORC) [<http://codes.ohio.gov/orc/4765>]. Each level of certification is based on the National EMS Scope of Practice, which has been incorporated into the ORC. This outlines exactly what procedures can be performed by each certification level. A basic EMT requires a minimum of 150 hours of initial training and at least 40 hours of continuing education every three years. An advanced EMT requires an additional 200 hours of training above that of an EMT-Basic and at least 60 hours of continuing education every three years. Advanced EMTs are able to perform many advanced life support (ALS) procedures and administer certain medications to patients. To advance to the paramedic level, a person must possess EMT certification and is required to attend nearly 900 additional hours of clinical and didactic training, which allows them to perform even more life-saving procedures and administer additional medications. Examples of these procedures would be performing cardio-version, heart pacing, heart defibrillation (shocks to the heart) and advanced invasive procedures such as chest decompression and needle cricothyroidotomy. The paramedic must obtain 86 hours of continuing education every three years, which includes maintaining advanced cardiac life support certification offered through the American Heart Association.

In firefighting, training and certification has three distinct levels. Volunteer firefighting is the basic level and is limited by law to 36 hours of initial training. It is the minimum level required to perform the duties of a volunteer firefighter. This level of training is also the minimum required by law to serve as a part-time firefighter unless additional training is required by the local fire agency.

The next level of firefighter training is Firefighter I (FF I). This level requires an additional 104 hours of training beyond the volunteer course level. This level of training also requires the demonstration of competency in several specific areas such as proper use of SCBA. The highest level of training is Firefighter II (FF II). This includes 240 - 260 hours of training in a variety of subject matter and the ability to demonstrate competency in several required areas. Full-time firefighters in Ohio are required by law to achieve certification at this level to work in their position.

## Appendix B

### **The Science of Fire and the Need for Rapid Response to Affect Positive Change**

Because there is such a wide variation in the fire dynamics of each particular fire, it is imperative to find a common reference point, something that is common to all fires regardless of the risk-level of the structure, the material involved or length of time the fire has burned. Such a reference point exists. Regardless of the speed of growth or length of burn time, all fires go through the same stages of growth. One stage in particular emerges as a very significant one because it marks a critical change in conditions; it is called flashover.

The flashover stage of a fire marks a major turning point in fire conditions that increases the challenge to a fire department's resources. How and why this is so is explained in the following descriptions of each stage of fire growth in a structural fire.

#### **Incipient stage**

The smoldering stage is the first stage of any fire. When heat is applied to a combustible material, the heat *oxidizes* the material's surface into combustible gases. The oxidation process is exothermic, meaning that the oxidation process itself produces heat. The heat from the oxidation raises the temperature of other materials, which increases the rate of oxidation and begins a chemical chain reaction of heat-release and burning.

A fire progresses from the smoldering phase immediately or slowly depending upon the fuel, nearby combustibles, and the surrounding air. For example, a wad of newspapers will smolder only a few seconds before progressing to the next stage, but a couch with a burning cigarette may continue smoldering for an hour or more.

#### **Growth stage**

When the temperature gets high enough visible flames can be seen. This stage is called the growth stage or open burning. The visible burning at this stage is still limited to the immediate area of origin. The combustion process continues to release more heat which heats nearby objects to their ignition temperature and they begin burning.

#### **Flashover/fully developed stage**

Not all of the combustible gases are consumed in the growth stage. They rise and form a superheated gas layer on the ceiling that can quickly reach 1,500° F. As the volume of this gas layer increases, it begins to bank down to the floor, heating all combustibles regardless of their proximity to the burning object. The gas layer is mostly carbon monoxide so the absence of oxygen prevents the heated objects from bursting into flame.

Oxygen gets introduced into the space in two ways. There is often enough available oxygen near floor level to start the open burning process when the gas layer reaches that level. Or, the high heat breaks a window and the incoming oxygen allows the burning to begin. It should be noted that the room becomes untenable long before flashover. Even though open flaming may not be present until everything reaches 500°F and oxygen is introduced, the room becomes untenable for human survival at 212°F.

When flashover occurs, everything in the room breaks into open flame at once. This instantaneous eruption into flame generates a tremendous amount of heat, smoke, and pressure with enough force to push beyond the room of origin through doors and windows. The combustion process then speeds up because it has an even greater amount of heat to move to unburned objects.

Flashover is a critical stage of fire growth for two reasons. First, no living thing in the room of origin will survive, so the chance of saving lives drops dramatically. Second, flashover creates a quantum jump in the rate of combustion and a significantly greater amount of water is needed to reduce the burning material below its ignition temperature. A fire that has reached flashover means that it is too late to save anyone in the room of origin, and a significant increase in staffing is required to handle the larger hose streams necessary to extinguish the fire. A post-flashover fire burns hotter and moves faster, compounding the search and rescue problems in the remainder of the structure at the same time that more firefighters are needed for fire attack. See the chart in figure 11.

PRE-FLASHOVER	POST-FLASHOVER
Fire limited to room or area of origin	Fire spreads beyond room or origin
Requires small attack lines	Requires more or larger attack lines
Search and rescue efforts easier	Compounds search and rescue efforts
Requires few resources and can be handled by initial effective response force	Requires additional resources (companies)

*Figure 11*

It has long been known that the real killer in a structural fire is smoke, not the flame or heat. Smoke contains many toxic gases released as by-products of the combustion process. Carbon monoxide is one of these gases and the most prevalent. Test fires in residential structures have



demonstrated the production of carbon monoxide in measurable amounts after 3½ minutes from the ignition of the fire.

The primary objective of fire operations is to provide enough firefighters and equipment in a strategic location so that an effective response force can respond to and reach fire scenes to mitigate the problem before flashover occurs. The “time-temperature curve” standard is based on data from NFPA and ISO, which have established that a typical point source of ignition in a residential house will “flashover” at some time between 5 and 30 minutes after ignition, turning a typical “room and contents” fire into a structural fire of some magnitude. This is illustrated in Figure 12.

### Time-Temperature Curve

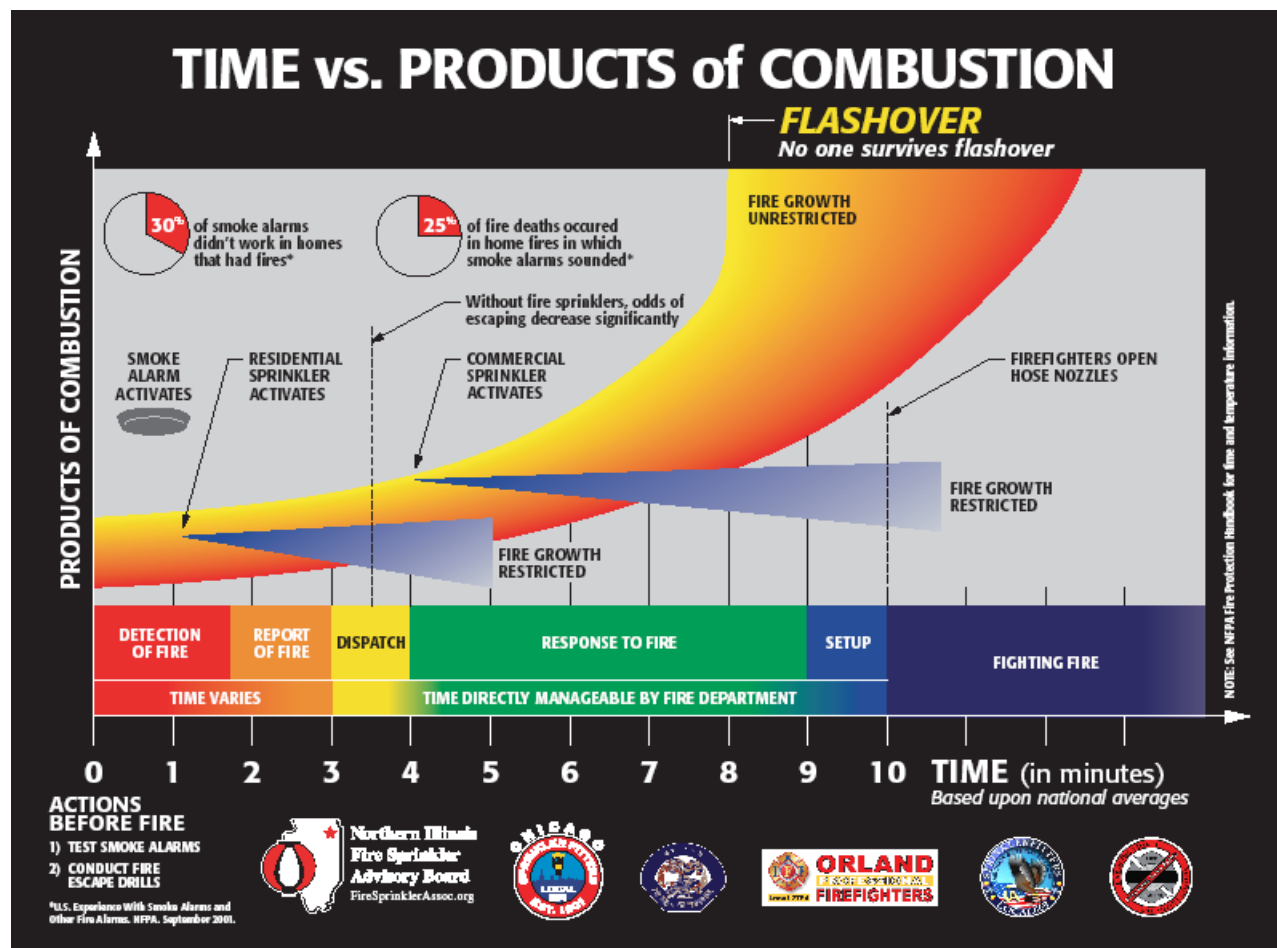


Figure 12

## EMS Performance Goal

Time requirements for EMS calls are comparable to fire incidents. The purpose of a quick response, especially in the most critical situation (cardiac arrest), is that the brain, devoid of oxygen and circulation begins to die within four to six minutes. Brain damage is normally irreversible after ten minutes. Interventions include early cardiopulmonary resuscitation (CPR) and electrical defibrillation. Previous studies show the time to deliver a shock (called defibrillation) to the patient in cardiac arrest to be three to six minutes. Current guidelines from the American Heart Association plus additional guidelines from the American College of Emergency Physicians and the National Highway Traffic Safety Administration suggests a response time interval of not more than five minutes from alarm notification to scene arrival for responders capable of performing CPR and utilizing an automatic external defibrillator (AED). An AED is a portable device that the first responder or trained civilian can use on a patient who is pulseless and not breathing. When the device is connected to the patient, it analyzes the patient's heart rhythm and automatically delivers electric shocks to the patient if needed. Furthermore, guidelines provide for no more than a 10 minute response interval for providers capable of performing ALS level interventions, if that level of service is available. This is displayed graphically in Figure 13.



Survival from Sudden Cardiac Arrest.

*Figure 13*

## Appendix C

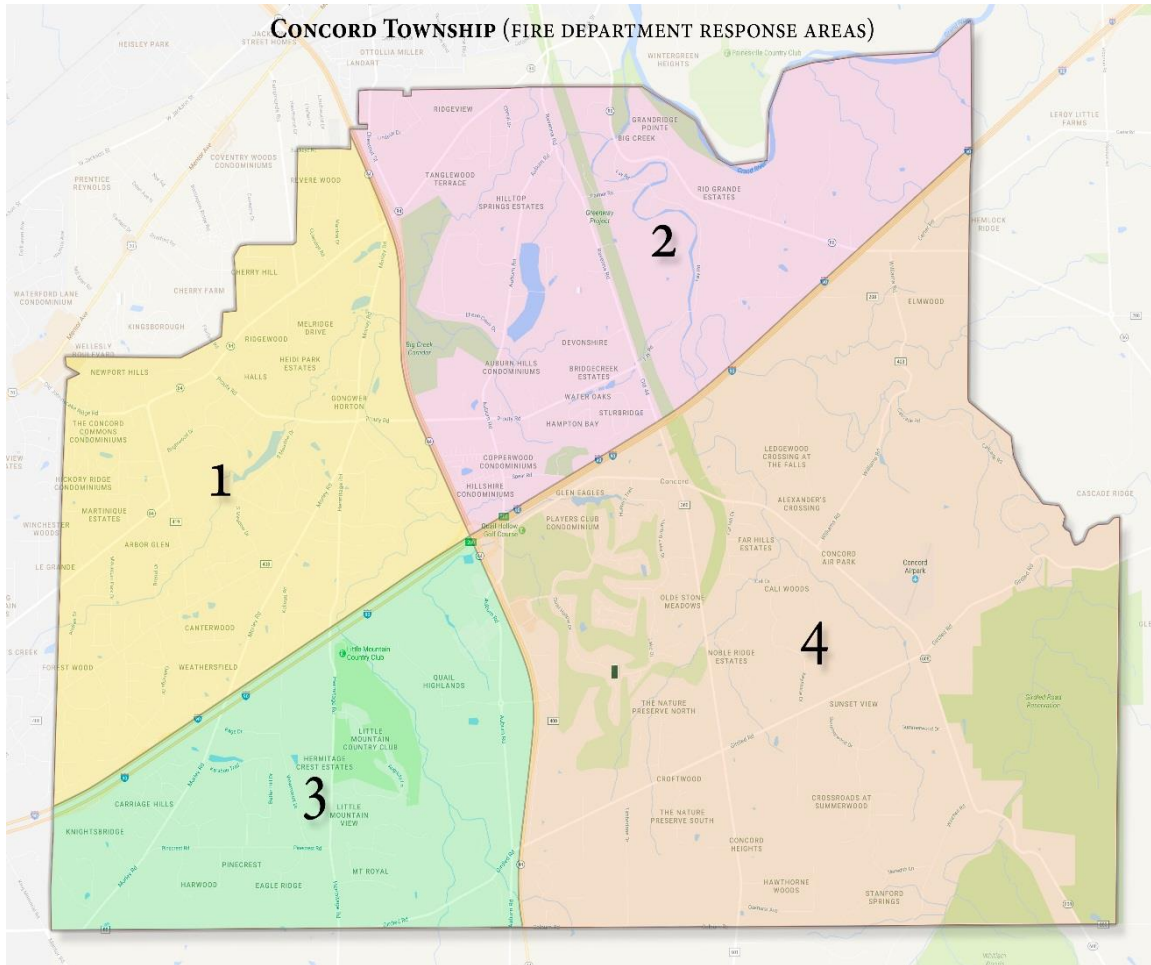
For records management purposes, CTFD has divided the township into four response districts or response zones. The response districts are identified as District 1, District 2, District 3 and District 4.

**District 1** - This response area is the area north of I-90 and west of SR 44 extending to the northern and western township boundaries. The area is 4.49 square miles and has 45 miles of roadway. It consists of medium-density residential development including single-family dwellings and a large number of condominiums. There is commercial activity in the business corridor along SR 84 between Button Road and Old Johnnycake Road. This area is the most heavily developed area of the township and has 3,630 buildings. Major roadways in the area are Prouty Road, SR 84, Morley Road and Hoose Road. Located in this response district are a pre-school and two elementary schools.

**District 2** - This response area is the area north of I-90 and east of SR 44 extending to the northern and eastern township boundaries. The area is 5.03 square miles and has 35 miles of roadway. This area consists primarily of medium-density residential development, park land, farms, and open green spaces. This area has 1,688 buildings. Major roadways in the area include I-90, SR 44, SR 84, SR 86, Auburn Road and Prouty Road. Located in this response district is one middle school.

**District 3** - This response area is the area south of I-90 and west of SR 44 extending to the townships western and southern boundaries. The area is 3.76 square miles and has 24 miles of roadway. This area has light-density residential development, commercial occupancies along the business corridor on Auburn Road and open green spaces. This area has 1,019 buildings including Auburn Career Center, Lake Erie Equestrian Center, Concord Community Center, Comfort Inn Hotel, Little Mountain Country Club, Lake Health Hospital and University Hospital Urgent Care. Major roadways in this area include I-90, SR 44, Girdled Road, Morley Road, Hermitage Road and Auburn Road.

**District 4** - This response area is the area south of I-90 and east of SR 44 to the townships eastern and southern boundaries. This is the largest area with 9.96 square miles and 52 miles of roadway. This area consists of single-family dwelling units and medium-density residential development. There is commercial development in the business corridor along Crile Road, as well as park land, farms, and open green spaces. This area has 2,465 buildings including Quail Hollow Country Club and Resort, the Concord Township Town Hall and the Old Stone School House, a local historical landmark. Major roadways in the area include I-90, SR 600, SR 44, Girdled Road, Crile Road and Ravenna Road. Figure 14 is a map of the response districts.



*Figure 14*

## References

- Bruegman, Randy. (2009). *Fire Administration I*. Upper Saddle River, NJ: Pearson-Prentice Hall.
- Commission on Fire Accreditation International. (2016). *Standards of Cover*. Chantilly, VA: Author.
- Concord Township Fire Department (2015-2016). Fire Incident Run Summary. Electronic Transmission; November, 2016. Concord Township, OH.
- Cummins, R.O. (1991). *Recommended Guidelines for Uniform Reporting of Data from Out-of-Hospital Cardiac Arrest: Ustein Style*. *Annals of Emergency Medicine*.
- Ensuring Effectiveness of Community-Wide Emergency Cardiac Care. *Journal of the American Medical Association*; October 28, 1992. Vol. 268 No. 16.
- Insurance Services Office. (2010). *Concord Township Public Protection Classification Summary*. Marlton, NJ: Author.
- Insurance Services Office. (2003). *Fire Suppression Rating Schedule*. Jersey City, NJ: Author.
- National Fire Protection Association. (2008). *Fire Protection Handbook* (20<sup>th</sup> ed.). Quincy, MA: Author.
- National Fire Protection Association. (2016). *Standard for the Installation, Maintenance, and Use of Emergency Services Communications*. (NFPA 1221). Quincy, MA: Author.
- National Fire Protection Association. (2013). *Standard on Fire Department Occupational Safety and Health*. (NFPA 1500). Quincy, MA: Author.
- National Fire Protection Association. (2015). *Standard on Fire Department Infection Control*. (NFPA 1581). Quincy, MA: Author.
- National Fire Protection Association. (2014). *Standard for Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments*. (NFPA 1720). Quincy, MA: Author.
- National Fire Protection Association. (2014). *Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Firefighting and Proximity Firefighting*. (NFPA 1851). Quincy, MA: Author.
- Ohio Administrative Code. (2015). *Division of Safety and Hygiene, Chapter 4123:1-21. Firefighting*. Columbus, OH.

Ohio Department of Transportation. (2016). *Location and Design Manual*. Volume 1. Columbus, OH: Author.

U.S. Code of Federal Regulations. Title 28, Parts 35 and 36. Revised 2015.

U.S. Code of Federal Regulations. Title 29. Section 1920. 2002.