FIRE STATION NEEDS ASSESSMENT
MANAGEMENT LETTER

ACTON, MA

MAY 2017

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Municipal Resources

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May 17, 2017

Steven Ledoux, Town Manager
Town of Acton
472 Main Street
Acton, MA 01720

RE: **Fire Station Needs Assessment Management Letter**

Dear Mr. Ledoux:

MRI (Municipal Resources, Inc.) was engaged by the Town of Acton, Massachusetts, to conduct a service demand study of the Action Fire Department. The town will then utilize this information to assist in determining if there is an operational need for an additional fire station in the North Acton area. The study also assessed the current adequacy of the existing Acton fire stations and makes recommendations regarding upgrades to better meet the needs of the department. Finally, it considered the feasibility of maintaining a three-station model by utilizing a revised deployment configuration.

MRI is a firm dedicated to providing professional, technical, and management support services to municipalities and schools throughout New England and the northeast. We are an established New Hampshire corporation and provide local government management consulting, recruitment, and selection services to municipal governments, fire departments, police departments, public works departments, libraries, schools, and other government agencies. Among the areas of expertise available are department assessments, organizational studies, personnel recruitment, personnel administration, collective bargaining, community and economic development, budget/finance, and general management. MRI has a particularly strong public safety group with nationally recognized expertise in police, fire, and emergency services.

We are a New Hampshire corporation operating from a primary office in Meredith, New Hampshire, with a field office in Northampton, Massachusetts. We are registered to do business in Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island New Jersey, New York, and

Pennsylvania. However, our market focus and expertise is New England based. We are intimately familiar with New England local government forms, culture, and issues, and pride ourselves on our ability to place our recommendations for change in a context appropriate to New England local government.

Our philosophy is to help our clients solve problems and provide realistic solutions for future success. We do not put forth idealistic, unachievable, or narrowly focused solutions.

Our objectives are always:

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

I. SCOPE & METHODOLOGY

The locations of fire stations in every community are typically based on a historical need at the time the station was built, as well as, the town's infrastructure at that time. Today, communities are taking into consideration their master planning documents, regional economic growth patterns, and potential demographic changes when determining fire station locations. Changes in a community often require a station to be replaced and/or relocated, or additional stations constructed.

In order to provide effective fire suppression service, a community must deploy its fire apparatus in such a manner that a sufficient number of apparatus, staffed with sufficient resources (firefighters), respond and arrive at reported fires within an acceptable period of time. The MRI study team evaluated the number and locations of Acton's fire stations and has analyzed the effectiveness of the current staffing patterns and apparatus placement. We reviewed fire department incident patterns, including the mapping of location of all incidents, actual fire incidents, and fire and EMS incident "hotspots" for the five-year period from December 7, 2011, through December 7, 2016, based upon statistical data obtained from the Acton fire incident reporting system. Hotspots indicate frequent calls for service. The team also analyzed and mapped out response times through the use of what are referred to as "heat" or "bleed" maps. Finally, we evaluated various scenarios that include the coverage provided by the

existing fire stations, including a deployment model that envisions the addition of a fourth station in North Acton, as well as the potential reconfiguration and/or relocation of an of an existing station to retain a three-station system.

To that end, this service demand study of the Acton Fire Department included the following aspects:

1. Comprehensive analysis of current and proposed station locations.

2. Evaluation of response times from the time of alarm through the first unit arriving on location.

3. Evaluation of the Acton Fire Department's automatic and mutual aid procedures.

4. Evaluation of the condition and adequacy of the existing Acton fire station facilities and the need for potential upgrades, renovations, and/or expansion.

5. Provided Town of Acton GIS personnel with an overview of what response time and incident heat maps were needed.

6. Development and analysis of GIS mapping generated in partnership with CAI Technologies and the Town of Acton relative to station locations, incident locations, and response times.

7. Developed a management letter that includes recommendations for future deployment models for the Acton Fire Department, including the need for a potential fourth fire station in the North Acton area, and considering the relocation/consolidation of one of the existing stations to provide coverage.

The tasks that were incorporated into the completion of this project include:

- A site visit to the town;

- Tour of the community;

- Coordination with personnel from the town's geographic information system provider to develop a series of illustrative maps based upon statistical data provided by the Acton Fire Department;

- Review of target hazards located within the town;
- Tour and inspection of the existing Acton fire stations;
- Interviews with members of the town administration and the fire department;
- Statistical review and analysis;
- Evaluation of potential locations for a fourth station in North Acton; and
- Development of a management letter with recommendations.

II. COMMUNITY PROFILE: BACKGROUND AND LOCAL INFORMATION

TOWN OF ACTON

The Town of Acton is located in **Middlesex County,** approximately 21 miles west-northwest of **Boston,** and about 10 miles southwest of **Lowell**. According to the United States Census Bureau, the town had a 2010 population of 21,929, an increase of 7.8% from 2000. The town has a total area of 20.3 square miles, of which 20.0 square miles is land and 0.3 square miles is water. Although one would not perceive it by touring the community, with a population density of 1,080.5 residents per square mile, Acton is classified as an urban community by the census bureau.

The town is primarily residential in character with businesses and small commercial areas interspersed throughout. There are also a few scattered light industries in the town. Although much of it has been cleared for residential and commercial use, Acton was traditionally heavily forested and still retains significant wooded tracts of land. The town consists of five "villages" around which much of the community's growth occurred. The villages are Acton Center, East Acton, North Acton, South Acton, and West Acton. The town is bisected by Massachusetts Routes 2, 2A, 27, 62, 111, and 119. South Acton has a station on the MBTA commuter rail, the Fitchburg line. Acton is bordered on the north by the Towns of **Westford** and **Littleton;** to the east by **Concord** and **Carlisle; to the south by Stowe**, **Maynard**, and **Sudbury;** and to the west by **Boxborough**.

Acton is ranked 35th on the list of highest income places to live in the United States with a population of at least 10,000. It was named the 11th *"Best Place to Live"* among small towns in the country by **Money Magazine** in 2015, and the 16th best in 2009 and in 2011.

The Acton Fire Department provides fire, rescue, and emergency medical services, at the advanced life support (ALS) level with forty-three sworn full time personnel operating from three stations. These personnel operate four engines, one ladder, one rescue, and one brush unit. The department's administrative offices are located in the town's public safety building at 371 Main Street; however, there no emergency response units or personnel assigned to, or operating out of, this location.

III. FIRE DEPARTMENT FACILITIES OVERVIEW

Fire stations are a critical community asset. The fire station facilities of a modern fire department are designed to do much more than simply provide a garage for apparatus and a place for firefighters to wait for a call. Well-designed fire and EMS facilities enable staff to perform their duties effectively, efficiently, and safely. A fire station should, at a minimum, provide adequate, efficiently designed space for the following functions:

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

Fire stations are unique facilities in that they must accommodate extremely diverse functions, including living quarters, recreation, administration, training, community education, equipment and vehicle storage, equipment and vehicle maintenance, and hazardous materials storage. While it is usually only occupied by fire department

personnel, the facility may also need to accommodate the members of the public who visit for station tours, public education presentations, and to discuss building projects or apply for permits. Many communities find that a fire station is an ideal place to locate the community's emergency operations center (a large room, such as a training classroom, can be designed to serve as the EOC when needed). Meeting rooms are also frequently made available to community organizations, thus increasing their versatility. However, in today's environment, serious consideration must be given to station security and whether allowing members of the public who are not members of the department to utilize these facilities, particularly if there is open, or easy, access to the operational areas of the facility.

Fire department capital facilities are exposed to some of the most intense and demanding uses of any public local government facility. Many fire stations are occupied twenty-four hours a day, seven days a week, by on-duty personnel standing by to respond to emergency incidents. The very nature of the fire department's operations necessitate that all stations be functional, adequate to fulfill the department's core missions, and be well maintained.

The adequacy, quality, and appearance of fire station facilities have a significant impact on the performance of the department as a whole. Fire stations support the needs of the fire department and the community in which they are located. Fire stations that meet those needs now and in the future, are built and maintained with quality products and systems. An attractive, well-maintained, functional, clean, and well-designed fire station, can contribute to the morale, productivity, and operational effectiveness of the fire department. Most citizens have little contact with the fire service and often make judgments that are, at least partially, based upon their impression of fire station facilities. It follows then, that a good image of the department must be maintained not only by proper deportment of the individual officers and firefighters, but also by the appearance of their physical surroundings.

It is important the existing fire stations are properly maintained, and any future stations are designed and constructed in such a manner that employees can perform their duties efficiently and effectively. Fire stations have an anticipated useful life of 50 to 75 years, depending upon the patterns of the community. As a facility ages, it may no longer meet the needs of an evolving department and/or community, thus negatively affecting morale, efficiency, safety, security, technology, and overall efforts to provide quality fire, rescue, and emergency medical services. It may also hamper the ability of the department to keep pace with increasing and/or expanded requests for, and/or levels of, service. Older and/or obsolete facilities are also expensive to maintain due to inefficient energy systems. When these conditions occur, typical remedies include expanding, renovating, and/or replacing the existing facilities.

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

- Seismic-resistant construction (based on local risk assessment)
- Flood hazard protection (based on local risk assessment)
- Automatic fire sprinkler system and smoke detection system
- Carbon monoxide detectors
- Vehicle exhaust extraction system
- Capability to decontaminate, launder, and dry personal protective equipment and station uniforms
- Facility security
- Emergency power supply
- Exercise and training area(s)
- Compliance with the Americans with Disabilities Act (ADA)
- Compliance with current fire and building codes
- Adequate storage for supplies and equipment, including emergency medical and disaster supplies
- Adequate parking for on-duty personnel, administrative staff, and visitors
- Capability for future expansion

Fire station facilities should be an important component of a municipal capital improvement plan (CIP). A long-term plan should be in place that takes into consideration the expected life expectancy of a facility, space needs, technology needs, and location requirements, based on response times, travel distance, changes in community development patterns, and regional fire protection capabilities. The

construction or renovation of fire stations is a costly proposition that should be planned well in advance in order to balance other community needs for capital projects.

IV. EVALUATION OF EXISTING FIRE STATION FACILITIES

The Acton Fire Department currently operates from three stations. All of the stations are at least minimally adequate for the current staffing, apparatus, and equipment. However, they may not allow for the best deployment of various department resources. The MRI team found the stations to be relatively well-maintained from a housekeeping and general maintenance perspective. However, each station has some code compliance and capital improvement concerns that were identified. Routine daily maintenance and housekeeping is conducted by on-duty fire personnel. This is typical of most fire departments. Major projects are budgeted for, and overseen by the town. The priorities for these projects are based on input from the fire chief, safety inspections, and budgetary constraints. The MRI team is unaware of a written fire department facility capital improvement plan.

ACTON CENTRAL FIRE STATION
STATION 1



Figure 1
Acton Central Fire Station (Station 1)

The Acton Central Fire Station, also known as Station 1, is located at 3 Concord Road, just off Route 27, and across from the town square (Figure 1). The station is primarily built utilizing Type 2, non-combustible construction; however, the interior is wood frame. It was constructed in 1951 and is the oldest station. Engine 22, Engine 23, and Rescue 33 respond from this station.

The station consists of three single depth apparatus bays, one of which is a drive through. The apparatus bays have an unusually low ceiling, which limits what can be

done with, or on, apparatus while they are still parked in the station (Figure 2). The station is equipped with an emergency generator, source capture vehicle exhaust extraction system, and air and electric shore lines for apparatus. There is little storage space available in the station, necessitating that a significant amount of equipment is stored in the apparatus bays. There is no separate gear room for personnel to store their personal protective equipment (PPE) when off duty, so all of this gear is stored in racks in the apparatus bays (Figure 3). The first floor also has an old alarm room from when dispatch operations were handled internally by the fire department. It still contains many of the old master box circuits.





Figure 2 (left)
Station 1 has extremely low ceilings for a fire station which limits the activities and operations that can occur inside the station. It also precludes the department's ladder truck from being assigned to this station, which is more centrally located than Station 2.

Figure 3 (right)
Personal protective equipment of personnel stored on hooks on the apparatus bays. This is a concern in all three stations.

The second floor of the station contains offices for the on-duty lieutenant, the advanced life support (ALS) coordinator, and the crew living quarters. The crew quarters consist of a combination day room/eating area, a small kitchen with an exit to an exterior fire escape, and a small bunk room. The bathroom and shower for the on-duty personnel is located directly off the kitchen area (Figure 4).





Figure 4 (left)
The 2nd floor shower and bathrooms for on-duty personnel are literally located right off of the kitchen. The photo was taken from the kitchen.
Figure 5 (right)
Rear of the station showing the fire escape from the second floor kitchen area.

The station is equipped with a combination of battery and electric smoke detectors, and battery operated carbon monoxide detectors. It does not have a sprinkler system. It was reported to the MRI study team that the boiler is very old and in need of replacement. Cooling of the station during the warm weather months is provided by window mounted air conditioners. It was noted that the building still utilizes single pane, wooden windows, which are extremely poor for energy efficiency.

Since the station is located near the intersection of Concord Road and Route 27, both of which are primary traffic arteries through the town, the station is well positioned for good response routes. However, the station's size constraints limit the apparatus that can be assigned here, resulting in less than an optimal deployment of resources. Specifically, the department's ladder truck responds from the South Acton station rather than this one simply because it will not fit in this facility.

Specific concerns of the MRI study team regarding this station are:

- Considering its age, overall this station is not in bad condition. However, it does have some issues that should be addressed. Consideration should also be given to enlarging the station to allow for more versatility in the deployment of the department's apparatus resources. It is unknown whether in the long run it would be more cost effective to replace rather than extensively renovate and enlarge the existing building.

- The facility is not in full compliance with the requirements and recommendations of **NFPA 1500:** *Standard on Fire Department Occupational Safety and Health Program* (National Fire Protection Association; Quincy, MA; 2013 edition) which provides requirements for facility safety, maintenance, and inspections.

- The facility is not in compliance with the requirements and recommendations of **NFPA 1581:** *Standard on Fire Department Infection Control Program* (National Fire Protection Association; Quincy, MA) which has requirements to provide minimum criteria for infection control in the fire station, in the fire apparatus, during procedures at an incident scene, and at any other location where fire department members are involved in routine or emergency operations.

- The facility is not in compliance with the requirements and recommendations of **NFPA 1851:** *Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting* (National Fire Protection Association; Quincy, MA). This standard provides safety requirements for storage and cleaning of personal protective equipment.

- The apparatus bays are very small for a modern fire station. This limits the types of apparatus and/or equipment that can be stored in the station. In addition, hose and equipment cannot be efficiently loaded/unloaded inside during cold or inclement weather, nor can equipment be removed from the apparatus and set up for training and maintenance activities.

- Crew quarters, including the sleeping area, are located on the second floor. The crew quarters are marginally adequate, at best. In particular, the bunk room is in poor condition. Most of the furnishings appeared to be used furniture that was donated to the station.

- The station is not equipped with an automatic fire alarm and/or fire suppression system. It is equipped with limited smoke and carbon monoxide detection capabilities.

- There is no fire protection system over the stove in the kitchen.

SOUTH ACTON STATION
(Station 2)

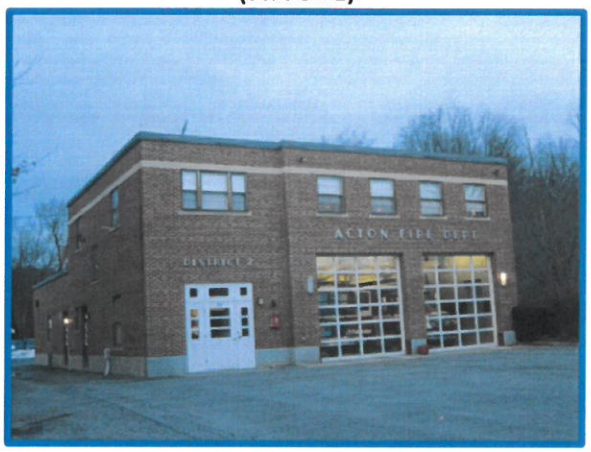


Figure 6
South Acton Fire Station (Station 2)

The South Acton station, Station 2, is located at 52 School Street, in the southern part of the town (Figure 6). The station is built of Type 2, non-combustible construction, with a concrete deck supported by steel. Stations 2 and 3 are very similar to each other in design and construction. Station 2 has about 10 feet more depth than Station 3. Station 2 was built in 1961. The width of the station lot is fairly narrow; however, there is space available in both the front and rear of the station. Engine 24, Ladder 28, Brush 25, and Rescue 43 are assigned to this station. A hazardous materials response trailer and fire safety house are also kept at this station. However, there is not sufficient room in the station, so they are parked outside, which continually exposes them to the elements.

The station consists of two double depth apparatus bays. The bays are of the drive out, back in configurations, not the drive through type. The apparatus bay drains were reported to be very inadequate for their intended purpose. The station is equipped with an emergency generator, source capture vehicle exhaust extraction system, and air and electric shore lines for apparatus. There is little storage space available in the station, necessitating that a significant amount of equipment is stored in the apparatus bays. There is no separate gear room for personnel to store their personal protective equipment (PPE) when off duty, so all of this gear is stored in racks in the apparatus bays.

The station is outfitted with an extractor (a large industrial type washing machine for firefighters to use to wash their PPE). It also has an older model hose drying oven, but it was reported that the heat mechanism, which is key to the drying process, does not work.

The second floor of the station contains an office and the crew living quarters. The crew quarters consist of a day room, a kitchen, and two separate bunk rooms with additional bunks. There are also bathroom and shower facilities for the on-duty personnel. The second floor does have lighted exit signs and an exterior fire escape for emergency egress from the second floor.

The station is equipped with a combination of battery and electric smoke detectors, and battery operated carbon monoxide detectors. It does not have a sprinkler system. It was reported to the MRI study team that the boiler is very old and in need of replacement. Cooling of the station during the warm weather months is provided by window mounted air conditioners.

This station underwent some significant upgrades, including the installation of thermal insulation, after the department's ladder truck caught fire in the station in December 2015, causing extensive smoke damage to the entire building.

Specific concerns of the MRI study team for this station are:

- The facility is not in full compliance with the requirements and recommendations of **NFPA 1500:** *Standard on Fire Department Occupational Safety and Health Program* (National Fire Protection Association; Quincy, MA; 2013 edition) which provides requirements for facility safety, maintenance, and inspections.

- The facility is not in compliance with the requirements and recommendations of **NFPA 1581:** *Standard on Fire Department Infection Control Program* (National Fire Protection Association; Quincy, MA) which has requirements to provide minimum criteria for infection control in the fire station, in the fire apparatus, during procedures at an incident scene, and at any other location where fire department members are involved in routine or emergency operations.

- The facility is not in compliance with the requirements and recommendations of **NFPA 1851:** *Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting* (National Fire Protection Association; Quincy, MA). This standard provides safety requirements for storage and cleaning of personal protective equipment.

- The station is not equipped with an automatic fire alarm and/or fire suppression system. It is equipped with limited smoke and carbon

monoxide detection capabilities; however, there are no smoke detectors located inside the individual sleeping areas.

- There is no fire protection system over the stove in the kitchen.

WEST ACTON STATION



Figure 7
West Acton Fire Station (Station 3)

The West Acton station, also known as Station 3, is located at 258 Central Street, near Pearl Street, in the West Acton Village area (Figure 7). Prior to the town constructing the new public safety building on Main Street, this station served as the Acton Fire Department's headquarters. The on-duty shift commander still responds from this station. Other units that respond from this station are Engine 21 and Rescue 29.

The station is nominally built of Type 2, non-combustible construction; however, it does have wooden floors supported by steel. As previously noted, Stations 2 and 3 are very similar to each other in design and construction. The station was constructed in 1958.

Station 3 consists of two double depth, drive through apparatus bays. The apparatus bays are small for a modern fire station. This limits the types of apparatus that can be assigned to the station. Specifically, the ladder truck will not fit. The first floor also has an old alarm room from when dispatch operations were handled internally by the fire department.

It is equipped with a newer emergency generator, source capture vehicle exhaust extraction system, and air and electric shore lines for apparatus. There is little storage space available in the station, necessitating that a significant amount of equipment is stored in the apparatus bays (Figure 8). There is also storage under the stairway leading to the second floor (Figure 9). There is no separate gear room for personnel to store their personal protective equipment (PPE) when off duty, so all of this gear is stored in racks in the apparatus bays.





Figure 8 (left)
Storage in the apparatus bays makes getting around the apparatus and even getting into them difficult.
Figure 9 (right)
Storage under the stairway leading to the second floor caused by a lack of storage areas in the station.

The station does have a small maintenance area in the rear of the station that is also used for storage. It was noted by the study team that fire investigation tools were stored in this area, in close proximity to flammable liquid storage. There is also an air compressor located in this area.

The second floor of the station contains several offices, one for the on-duty captain (shift commander) and one for the union. It was noted that the offices still have paneling on the walls. The crew quarters, which are also on the second floor, consist of a day room, a kitchen, and a bunk room with three bunks and lockers. There are also bathroom and shower facilities for the on-duty personnel. A washer and dryer are located in the bathroom area. The second floor is equipped with very old lighted exit signs and an exterior fire escape for emergency egress from the second floor.

The station is equipped with a combination of battery and electric smoke detectors, and battery operated carbon monoxide detectors. It does not have a sprinkler system. It was reported to the MRI study team that the boiler is old and in need of replacement. Cooling of the station during the warm weather months is provided by window mounted air conditioners. The station contains asbestos tile, which has reportedly been encapsulated. Cracks in the masonry joints were also noted in the stairway (Figure 10). These probably warrant additional evaluation.

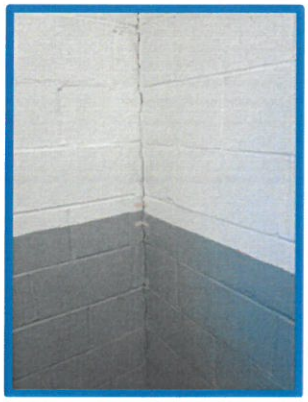


Figure 10
Cracks in the corner masonry joints in stairway to second floor.

Specific concerns of the MRI study team regarding this station are:

- The facility is not in full compliance with the requirements and recommendations of **NFPA 1500:** *Standard on Fire Department Occupational Safety and Health Program* (National Fire Protection Association; Quincy, MA; 2013 edition) which provides requirements for facility safety, maintenance, and inspections.

- The facility is not in compliance with the requirements and recommendations of **NFPA 1581:** *Standard on Fire Department Infection Control Program* (National Fire Protection Association; Quincy, MA) which has requirements to provide minimum criteria for infection control in the fire station, in the fire apparatus, during procedures at an incident scene, and at any other location where fire department members are involved in routine or emergency operations.

- The facility is not in compliance with the requirements and recommendations of **NFPA 1851:** *Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting* (National Fire Protection Association; Quincy, MA). This standard provides safety requirements for storage and cleaning of personal protective equipment.

- The apparatus bays are very small for a modern fire station. This limits the types of apparatus and/or equipment that can be stored in the station.

- Crew quarters, including the sleeping area, are located on the second floor and are marginally adequate, at best.

- The station is not equipped with an automatic fire alarm and/or fire suppression system. It is equipped with limited smoke and carbon monoxide detection capabilities.

- There is no fire protection system over the stove in the kitchen.

The MRI study team recognizes that the implementation of recommendations concerning facilities is a costly proposition. However, the town needs to maintain a safe and healthy work environment, as well as ensuring the fire department can operate as effectively and efficiently as possible. This includes being able to deploy various types of apparatus to provide maximum benefit to the community within recommended response times and travel distance.

RECOMMENDATIONS

The Acton Fire Department, in conjunction with the town leadership, should develop a long-term capital improvement plan for all of the fire department's existing facilities, including possible significant upgrades and expansion, or replacement, of the Acton Central Fire Station.

The Town of Acton should install automatic fire alarm systems with heat, smoke, and carbon monoxide detection in all existing fire stations. These systems should be equipped with both audible and visible warning devices and should automatically transmit an alarm to the fire dispatch center.

The Town of Acton should give serious consideration to equipping all existing fire stations with complete, automatic fire sprinkler systems for the protection of the occupants, buildings, and equipment. The town should explore the availability of federal grant funds for this purpose under the FEMA Assistance to Firefighters Grant (AFG) program.

The Town of Acton should install fire protection systems and exhaust hoods over all stoves in each fire station. In addition, disconnect switches should be installed on all kitchen stoves which are interfaced with the station alarm notification systems to automatically shut them off to prevent possible kitchen fires during responses to alarms.

The Town of Acton should give consideration to conducting an energy audit of all existing fire stations to determine possible cost effective improvements related to energy conservation (such as window replacements).

The Town of Acton should give consideration to upgrading locker rooms and sleeping quarters in all existing fire stations to provide increased privacy including individual dorm rooms for female personnel.

The Town of Acton should consider having additional engineering analysis performed regarding the cracks in the masonry corner joints in the Station 3 stairway to determine if they present any structural stability issues with this facility.

V. RESOURCE DEPLOYMENT AND INCIDENT RESPONSE OVERVIEW

The mission performed by the fire department is one of the fundamental functions of government: to ensure the safety and protection of its residents and visitors. The expectations for the quality and quantity of fire and emergency medical services must come from its residents and other taxpayers. There is no "right" amount of fire protection and EMS delivery. It is a constantly changing level based on the expressed needs of the community. It is the responsibility of elected officials to translate community needs into reality through direction, oversight, and the budgetary process. It is their unenviable task to maximize fire, EMS, and other services within the reality of the community's ability and willingness to pay, particularly in today's economic environment.

From an operational perspective, the appropriate deployment of resources is critical to the ability of any fire department to effectively, efficiently, and safely fulfill its core public safety, emergency medical response, and fire protection missions. In determining an acceptable level of risk, elected officials in every community must ask questions about the fire and EMS resources, such as: 1) how much do we need; 2) how much can we afford; and 3) how should those resources be positioned and deployed to provide maximum benefit to the community? These are never easy decisions especially when one considers the fact that virtually any decisions on emergency service deployment that involve moving and/or relocating a resource, even for the considerable benefit of the community as a whole, may have a negative effect on at least a small percentage of the population.

From the perspective of stations and apparatus, there are three main factors that are used to help determine the deployment of resources: response time, travel distance, and call volume. A traditional, and long used, method of determining the appropriate deployment of resources is the fire company travel distance model employed by the Insurance Services Office (ISO) to assist them with determining the Public Protection

Classification (PPC) rating that is utilized for determining fire insurance rates by participating insurance companies. Under the ISO deployment and coverage model, in order to obtain maximum point value for this component of an evaluation, the first due engine company should be within 1.5 miles travel distance of every location within their first due response area. The first due ladder company should have a travel distance of no more than 2.5 miles. Travel distance is one of several factors that can have an impact on response time and is usually the most significant.

Today, for most evaluations, response time is the most critical factor for both fires and emergency medical incidents. It is not just a cliché that during critical life threatening situations, minutes and even seconds truly do count. Even ISO, which traditionally used a travel distance model, relies more heavily on response time statistics rather than strictly a distance based evaluation.

NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations and Special Operations to the Public by Career Fire Departments*[1], 2016 edition (National Fire Protection Association; Quincy, MA) addresses the organization and deployment of fire suppression operations, emergency medical operations, and special operations to the public by career fire departments. It is the benchmark standard that the United States Department of Homeland Security utilizes when evaluating applications for staffing grants under the Staffing for Adequate Fire and Emergency Response (SAFER) grant program.

Paragraph 4.1.2.1 of NFPA 1710 states that the first arriving engine company shall arrive at the scene of a fire suppression incident within four minutes (240 seconds) or less, and/or the entire full first alarm response should arrive on scene within eight minutes (480 seconds). For EMS incidents, a unit with first responder or higher-level trained personnel should arrive within four minutes (240 seconds), and an Advanced Life Support (ALS) unit should arrive on scene within eight minutes (480 seconds). Paragraph 4.1.2.2 requires the establishment of a 90% performance objective for these response times.

The four-minute response time is from when the units are physically moving to the incident. One minute can be added for call processing and dispatch, and one minute can be added for turnout time, that is from when firefighters in the station are notified until they are actually responding, providing six total minutes (360 seconds) from the time the 9-1-1 call is answered, until the first unit arrives on location.

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[1] NFPA 1710 is a nationally recognized standard, but it has not been adopted as a mandatory regulation by the federal government or the Commonwealth of Massachusetts. It is a valuable resource for establishing and measuring performance objectives in the Acton Fire Department but should not be the only determining factor when making local decisions about the town's fire and EMS operations.

The EMS component of the emergency services delivery system is more heavily regulated than the fire side. In addition to NFPA 1710, NFPA 450 *Guidelines for Emergency Medical Services (EMS) and Systems*, 2009 edition (National Fire Protection Association; Quincy, MA) provides a template for local stakeholders to evaluate an EMS system and to make improvements based on that evaluation. The Commission on Accreditation of Ambulance Services (CAAS)[2] also promulgates standards that are applicable to their accreditation process for ambulance services. CAAS recommends that an ambulance arrives on scene within eight minutes, fifty-nine seconds (8:59) of dispatch. The Commonwealth of Massachusetts regulates EMS agencies, and certain federal Medicare regulations are also applicable.

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

Structure fires are the incident type that many of the regulations and standards pertaining to firefighters are primarily focused on. They are generally most hazardous type of incidents for both firefighters and civilians. Structural firefighting has become far more challenging and dangerous in the last thirty years with the introduction of significant quantities of plastic and foam based products into homes and businesses (*e.g.*, furnishings, mattresses, bedding, plumbing and electrical components, home and business electronics, decorative materials, insulation, and structural components). These materials ignite and burn quickly, and produce extreme heat and toxic smoke. If firefighters cannot arrive in a timely manner and attack the fire quickly, a strong possibility exists that a dangerous flashover (simultaneous ignition of the combustible materials in a room) will occur. Flashover can occur within five to seven minutes of fire ignition, and is one of the most dangerous events that a firefighter can face. When a flashover occurs, initial firefighting forces are generally overwhelmed and will require significantly more resources to affect fire control and extinguishment.

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

VI. CURRENT RESOURCE DEPLOYMENT AND INCIDENT ANALYSIS

As has previously been mentioned, the Acton Fire Department currently operates from three stations located in Acton Center (Station 1), South Acton (Station 2), and West Acton (Station 3). Figure 11, below, illustrates the existing fire station locations and fire district boundaries.

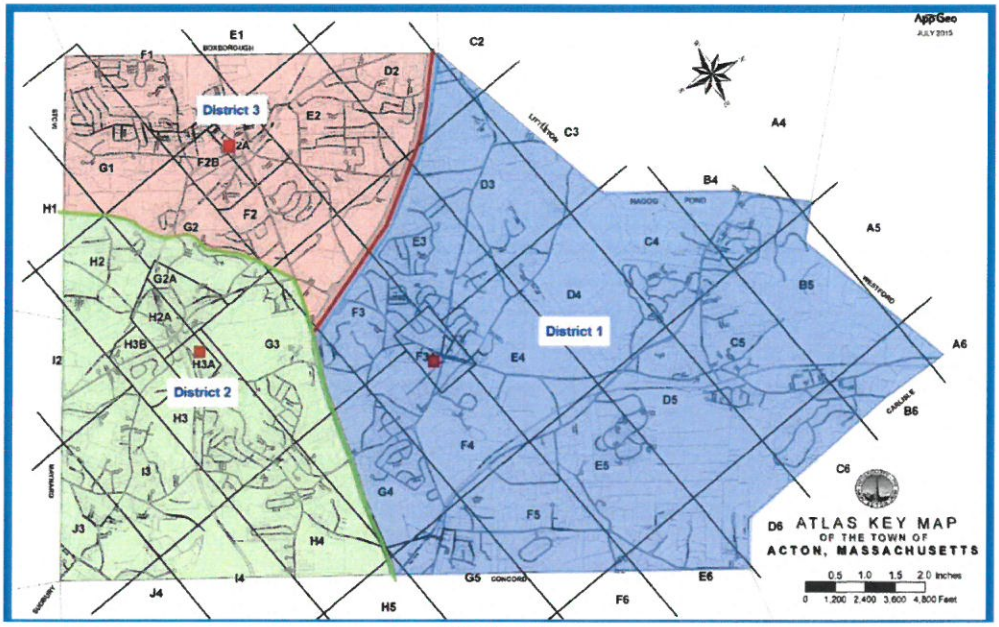


FIGURE 11
EXISTING FIRE DISTRICTS AND FIRE STATION LOCATIONS

When analyzing the locations of Acton's current fire stations, it is easy to see that they were apparently constructed to protect what was then the developed areas of the town. As the town has continued to develop and expand its fire protection system, it has not made the adjustments necessary to keep up with that growth and expansion. It is also important to keep in mind that early fire stations were constructed much closer together, as is evidenced by the close proximity of the three existing stations. Advances in technology and equipment have made it possible for stations to be located much farther apart and still provide appropriate levels of protection.

This Acton Fire Department's deployment model, at least from the perspective of station locations, is basically unchanged since the early 1960s. However, over the past 50 years, the town has grown significantly with much of that development occurring in the North Acton area. As figure 11 illustrates, fire district 1, which is serviced by units responding from station 1, is by far, the largest district, area wise, in the town encompassing everything north of Acton Center. Units from Station 1 must respond into

North Acton, which is currently lacking any fire and EMS facility, for emergency incidents. Station 1 is located in the southern portion of its current response area.

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

The data that was analyzed for this report was provided to the MRI study team by the Acton Fire Department. The statistical reports were automatically compiled through report generation features of the Pamet public safety records management system. We were informed during our analysis (as we have been during other studies in communities that utilize this software) that it is not particularly user friendly, does not utilize the most up to date technology, and is police centric which means it generally does not fully meet the needs of fire and EMS providers. Those concerns notwithstanding, each and every emergency incident that the Acton Fire Department responds to results in the generation of an NFIRS incident report.

The MRI study team evaluated Acton Fire Department incident response data for a five-year period covering December 7, 2011, through December 7, 2016. Like many, if not most, fire departments today, the Acton Fire Department responds to more emergency medical incidents than actual fires, or fire and other types of emergency incidents. While we believe that the data that we analyzed is, for the most part, relatively accurate as to the overall incident numbers, and general classification of incident found types, we also believe there is need for some quality control processes to be implemented to improve the accuracy of the data that is available. We discovered a number of incidents where the response time was entered as a negative number. These types of errors can skew response time statistical analysis. There were also incidents were no "incident reported as" entry was made which creates a numerical discrepancy in comparing data sets for analysis. Finally, the Acton Fire Department includes non-emergency activity such as fire inspections, fire alarm tests, and training as 'incidents", and these were included in the incident data that was received by both MRI and CAI Technologies. While the merits and appropriateness of this practice is certainly debatable, for an analysis of this type, related to the need for an additional facility for emergency response, it can

skew the data, and include a lot of non-relevant data points. For instance, while the location from which a response is made, and the resulting travel distance and response time are important for an activated fire alarm, those same concerns are not applicable for a fire alarm system inspection or test. Although we fully support the reporting of these non-emergency activities or "tasks" to document productivity, they should not be reported as "incidents". As a result of these factors, and although we provide an analysis of the data we had to work with, the reader should consider the reliability of the data that was provided.

RECOMMENDATIONS

Working in conjunction with the town's IT personnel, the Acton Fire Department should give serious consideration to purchasing and transitioning to the use of a fire and EMS based records management system. The needs of the fire department are unique and not typically met with police centric software systems. Working with the IT personnel, they should explore a customizable, fire-based software solution that addresses all fire department needs.

Working in conjunction with the town's IT personnel and the dispatch center personnel, the Acton Fire Department should implement a quality control monitoring procedure to ensure that all response times and statistics are fully accurate, and present a valid and reliable portrait of the department's response performance.

The Acton Fire Department should discontinue the practice of counting routine fire department activities such as fire inspections, fire alarm tests, and training, as "incidents". Although these activities should definitely be reported to show overall department activity or productivity, this should be done elsewhere, rather than as an "incident".

During the five-year period from December 7, 2011, through December 7, 2016, the Acton Fire Department responded to a total of 12,494 emergency requests for assistance, an average of 2,499 per year, or 6.8 per day. Of these, 305 were actual fire incidents, an average of 61 per year, or a little more than 1 per week. During this time, there were a total of 1,345 reported possible structure fires, an average of 269 per year. A total of 160 of these incidents, an average of 32 per year, were ultimately classified as a fire in a structure for National Fire Incident Reporting System (NFIRS) purposes.

A small statistical sample for actual fires and structure fires would not be unexpected in a smaller community such as Acton. It is very important to note that per NFIRS protocols, the category for "Fire Incident" must be an actual fire situation that in many, but not all, situations caused some type of damage. Many of the incidents that are classified as other types of incidents were most likely dispatched as some type of fire

incident, but ultimately were classified otherwise, for reporting purposes, based upon the situation actually found at the scene. This fact is illustrated by the fact than during this time frame 1,345 incidents (average of 269 per year) were initially dispatched as building fires, but many were later classified otherwise once emergency response personnel arrived on the scene and determined the actual situation. Examples of incidents that would be classified like this, include, but are certainly not limited to:

- Automatic fire alarm and/or sprinkler system activations with no fire
- Carbon monoxide alarms
- Gas leaks

	NUMBER OF EMERGENCY INCIDENTS	NUMBER OF REPORTED FIRE INCIDENTS	NUMBER OF ACTUAL FIRE INCIDENTS	NUMBER OF REPORTED STRUCTURE FIRE INCIDENTS*	NUMBER OF ACTUAL STRUCTURE FIRES **
DISTRICT 1	6,559	981	142	762	77
DISTRICT 2	2,644	398	79	285	33
DISTRICT 3	3,267	425	81	294	49
ACTON TOTAL***	12,494	1,810	305	1,345	160

FIGURE 12
ACTON FIRE INCIDENTS: DECEMBER 7, 2011 – DECEMBER 7, 2016

* NFIRS category 111 reported structure fire.
** Includes NFIRS categories 111 thru 118 for various types of fires in structures. NFIRS category 111, significant structure fires totals 44 incidents during the time period analyzed.
*** Acton total is slightly higher in some categories than the sum of the three districts. This is most likely the result of a few incidents, for instance one structure fire, not having a district classification in the data that was supplied.

Figure 13 plots the location of all fire and EMS incidents that have occurred in Acton from December 7, 2011, through December 7, 2016[3]. This map illustrates the incident locations by frequency, which range from a single response to locations that have generated more than 101 responses during this time frame. In the lower right hand corner is an inset map that identifies incident high incident density, or "hot spot" areas; locations which generate a significant number of emergency responses. It is important

[3] It should be noted this plotting includes all activities that the Acton Fire Department considered to be an "incident", including inspections, investigations, and training, not just emergency responses. There are a total of 22,999 "incidents".

to note that the length of the Route 2A/119 corridor in North Acton is an almost continuous high density "hot spot" area. The other significant "hot spot" area is in the vicinity of the intersection of Routes 27 and 111. This area is very close to the convergence of the three existing fire districts whereas the Route 2A/119 area is north of all three current fire stations, which results in longer travel distances and most probably response times.

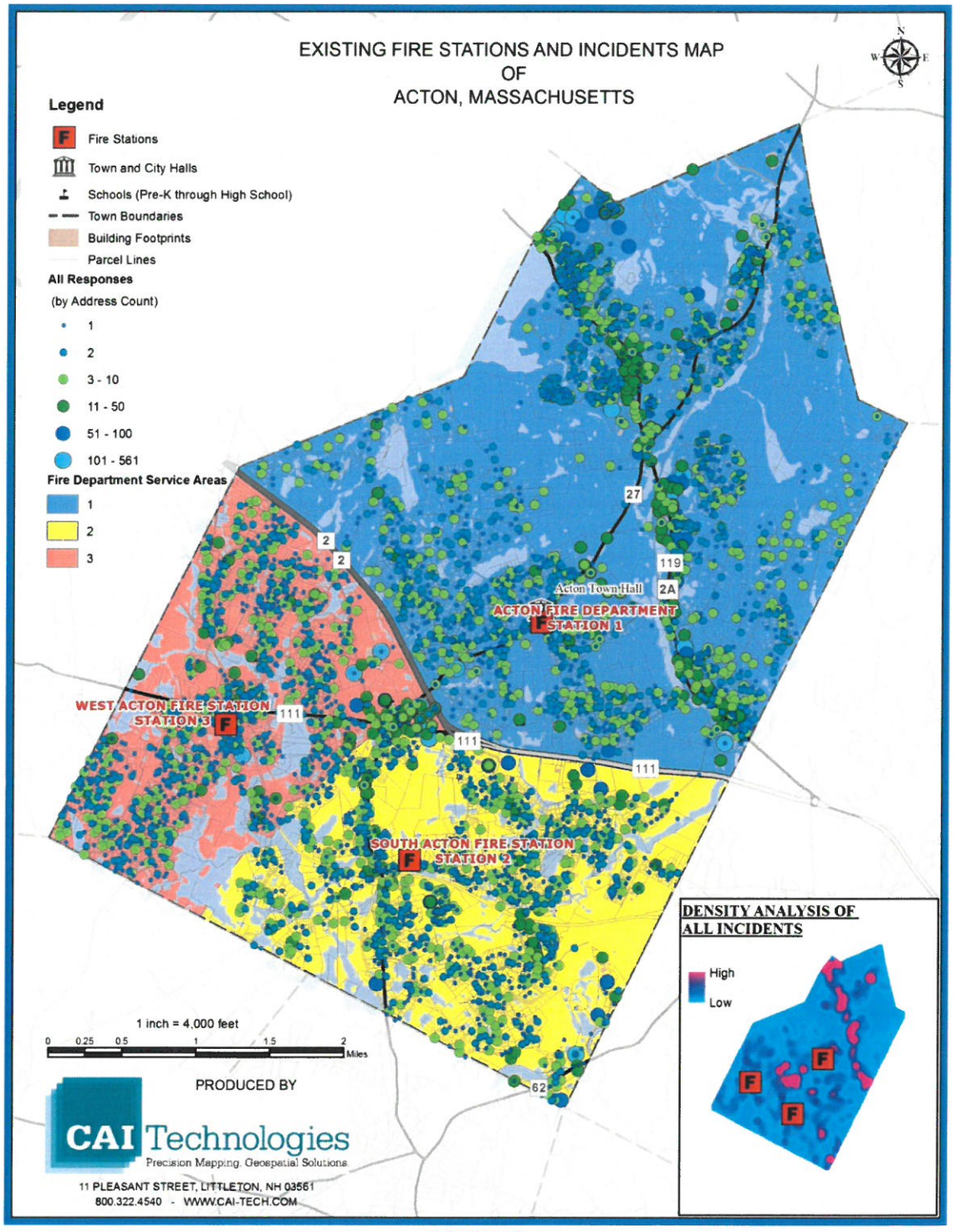


FIGURE 13
ALL ACTON FIRE DEPARTMENT INCIDENTS: DECEMBER 7, 2011 – DECEMBER 7, 2016

Note: A total of 22,999 incidents are plotted including inspections, investigations and training.
Note: High density or "hot spot" areas in the map on the lower right.

Municipal Resources

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

The response time figures utilized for this report are analyzed are based upon the 12,494 emergency responses from Figure 12. Non-emergency responses have been filtered out. These response times are calculated from the time the 9-1-1 call is received at the dispatch center until the first fire department unit arrives on location. Figure 14 provides the average response times overall for these incidents, as well as, by district. The time for District 1 is the highest of the three, nearly 20 seconds more than the average, and more than a minute longer than District 3.

	AVERAGE RESPONSE TIME (MINUTES)	AVERAGE RESPONSE TIME (SECONDS)
DISTRICT 1	4 minutes, 27.4 seconds (00:04:27.4)	267.4 seconds
DISTRICT 2	4 minutes, 10.7 seconds (00:04:10.7)	250.7 seconds
DISTRICT 3	3 minutes, 24.7 seconds (00:03:24.7)	204.7 seconds
ACTON AVERAGE	4 minutes, 7.7 seconds (00:04:07.7)	247.7 seconds

FIGURE 14
CURRENT AVERAGE FIRST UNIT RESPONSE TIME

Of the response times for these five years, overall, 83.1% have a response time of six minutes or under (including a one minute call receipt and processing time and a one minute turnout time) (Figure 14). This percentage is slightly under the NFPA 1710 compliance target of 90%. A significant portion of this lack of ability to comply with the NFPA response time standard is probably due to extended travel distances to incidents in the northern portion of the town. On the other end of the spectrum, 20.1% (slightly more than 1 in 5 incidents) show a response time of less than one minute, which is a very high percentage considering the one minute for call processing and one minute for turnout time.

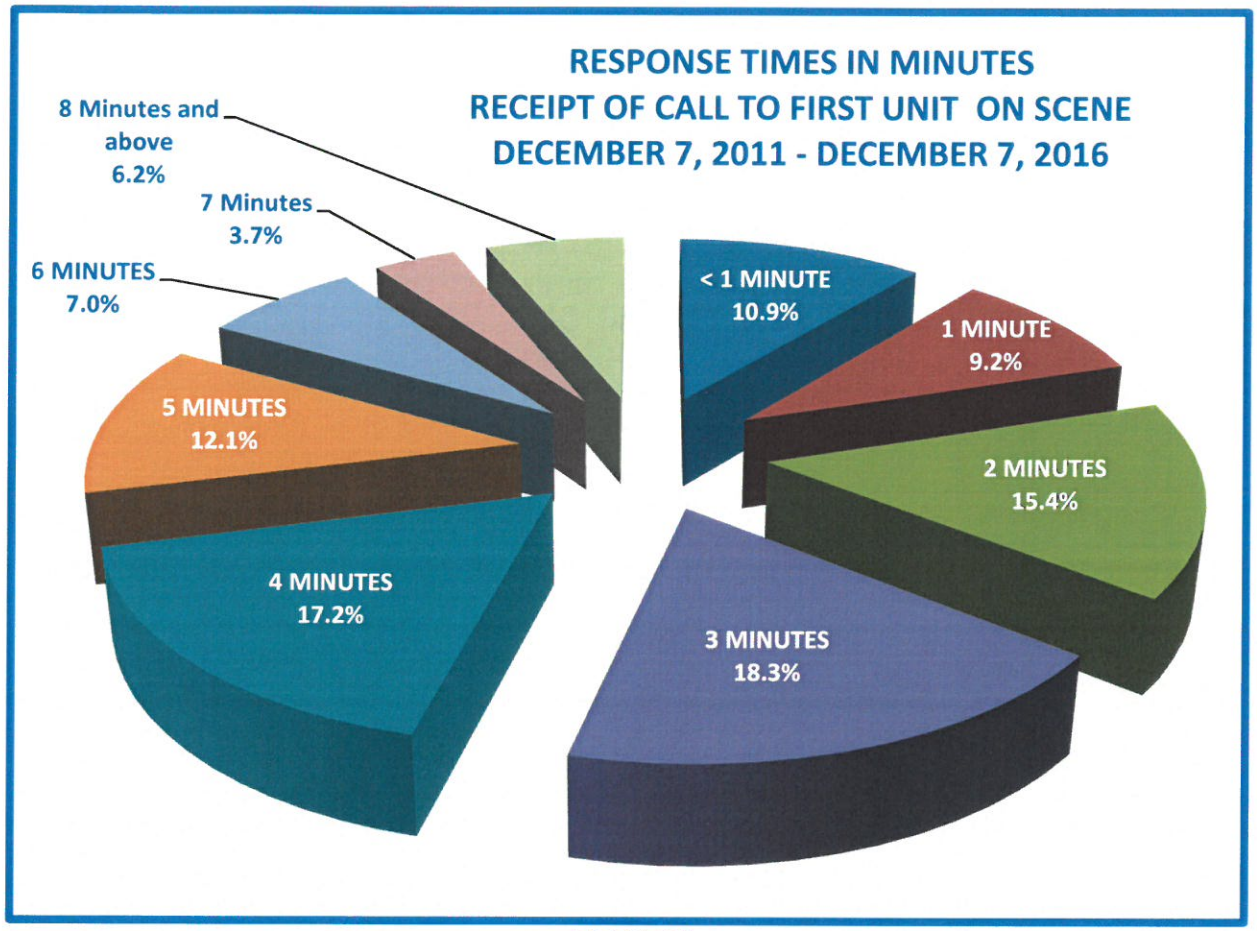


FIGURE 15

The maps on the following pages (Figures 16, 17, and 18) are "heat" or "bleed" maps that model, or illustrate, with colors, response times (from receipt of call through first fire unit on the scene) to various types of incidents. Figure 15 is all incidents (22,990); Figure 16 is all reported fire incidents (1,810); and Figure 17 is all reported structure fire incidents (1,345). The orange and red colors indicate a high density of incidents or a "hot spot". The reason the modeled response time surfaces (heat areas) do not stretch to the town boundary because there were no incidents beyond the envelope of the modeled area.

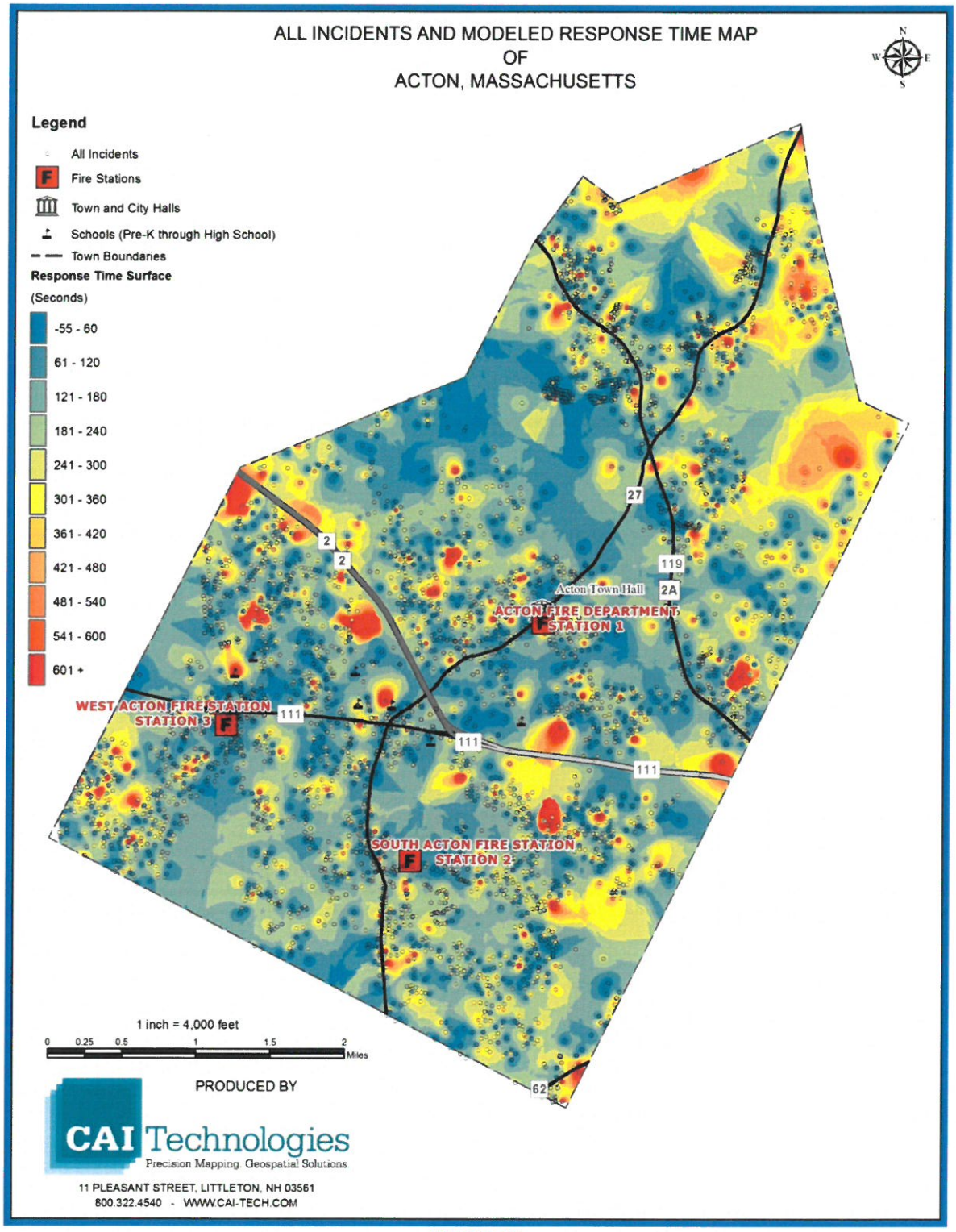


FIGURE 16

Municipal Resources

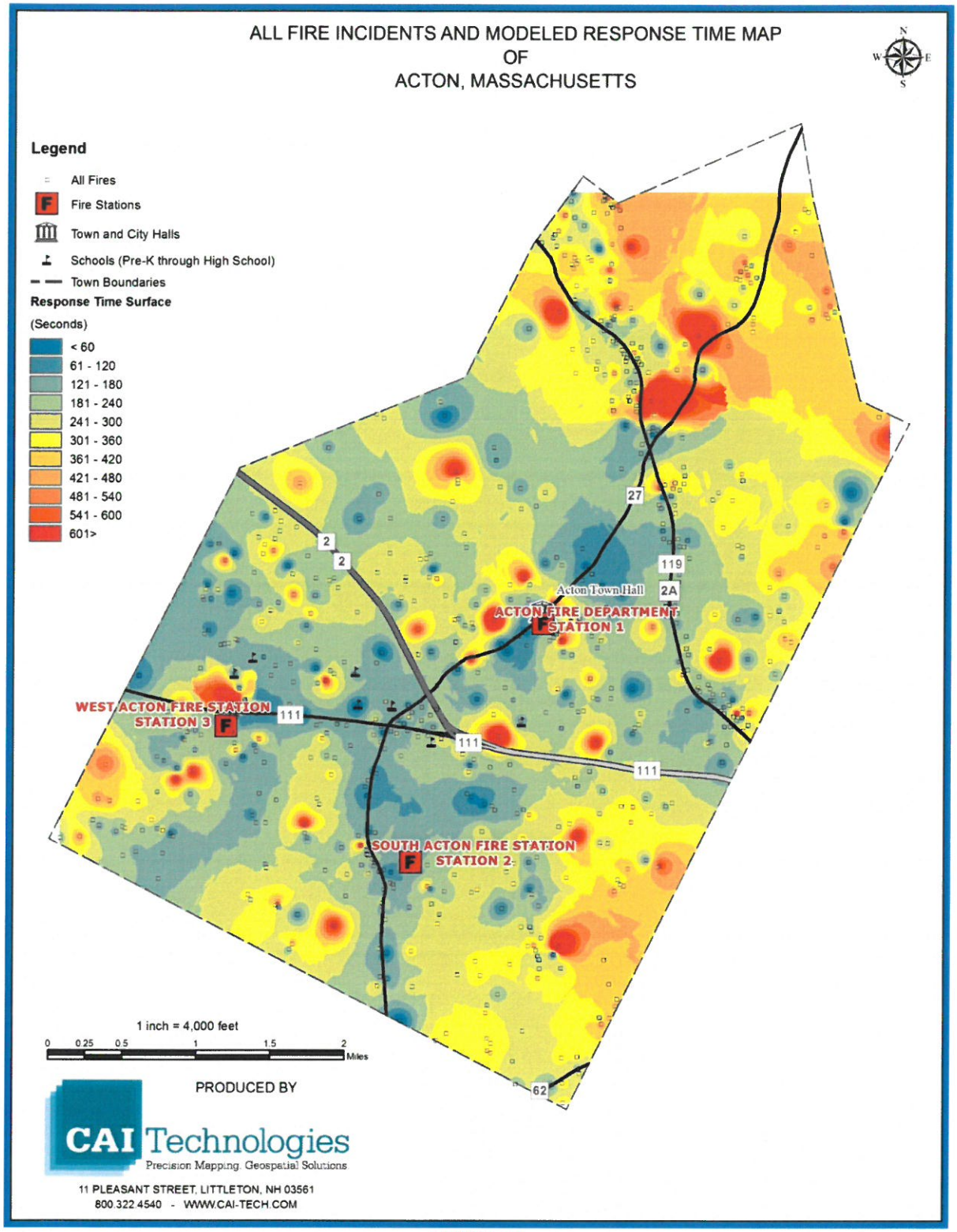


FIGURE 17

Municipal Resources

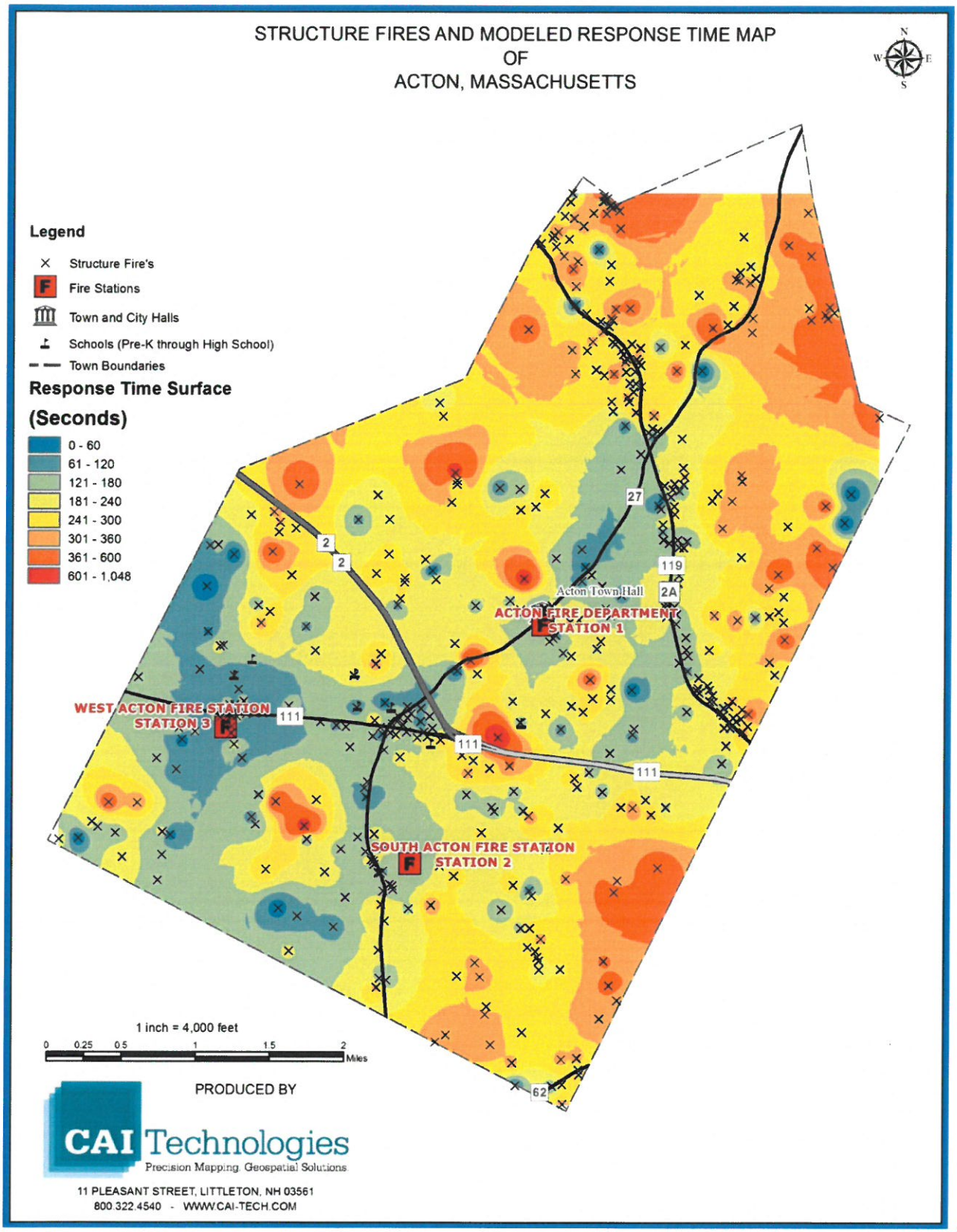


FIGURE 18

Municipal Resources

Another important factor with regard overall response time, and one the fire department has very little direct control over, is travel, or drive, time. This is the time from when a unit it actually responding (often referred to as wheels turning) until it arrives on location. Drive time is the factor where things such as the number and location of stations play a critical role. The estimated drive time was calculated utilizing an expected average response speed of approximately 35 miles per hour. Overall, the average drive time for the first arriving fire unit in Acton is currently projected at 3.4 minutes. However, when looked at by existing fire district, station 1's average drive time is more than a minute longer than station 2's, and a minute and a half longer than station 3's (Figure 19).

	AVERAGE DRIVE/ RESPONSE TIME (MINUTES)	AVERAGE DRIVE/ RESPONSE TIME (SECONDS
DISTRICT 1	4.0 Minutes	240 Seconds
DISTRICT 2	2.9 Minutes	174 Seconds
DISTRICT 3	2.5 Minutes	150 Seconds
ACTON AVERAGE	3.4 Minutes	204 Seconds

FIGURE 19
CURRENT PROJECTED FIRST UNIT DRIVE TIME

Figure 20 provides a heat map modeling drive/response times for the three existing Acton stations. As would be expected, the quickest times (green color), less than two minutes, are closest to each of the stations. The next area is response times of three to four minutes (yellow color) which encompasses virtually all of fire districts two and three, and much of district one, including most of Acton Center and even much of North Acton. Any response areas that are green or yellow indicate an acceptable response or drive time of four minutes or less, which achieves the benchmarks established by NFPA 1710 for first unit on scene in a career fire department.

Areas that are orange in color indicate an expected drive/response time of five to six minutes and exceed the recommended times found in NFPA 1710. These areas are primarily located in North Acton, north of Route 2A/119. There is also a small area south of 2A/119, an area around Route 2 near the town's western border, and a very small area on the far eastern edge of Acton in District 2. Areas colored in red have drive/response times greater than six minutes and are confined to the far northern edges of the town.

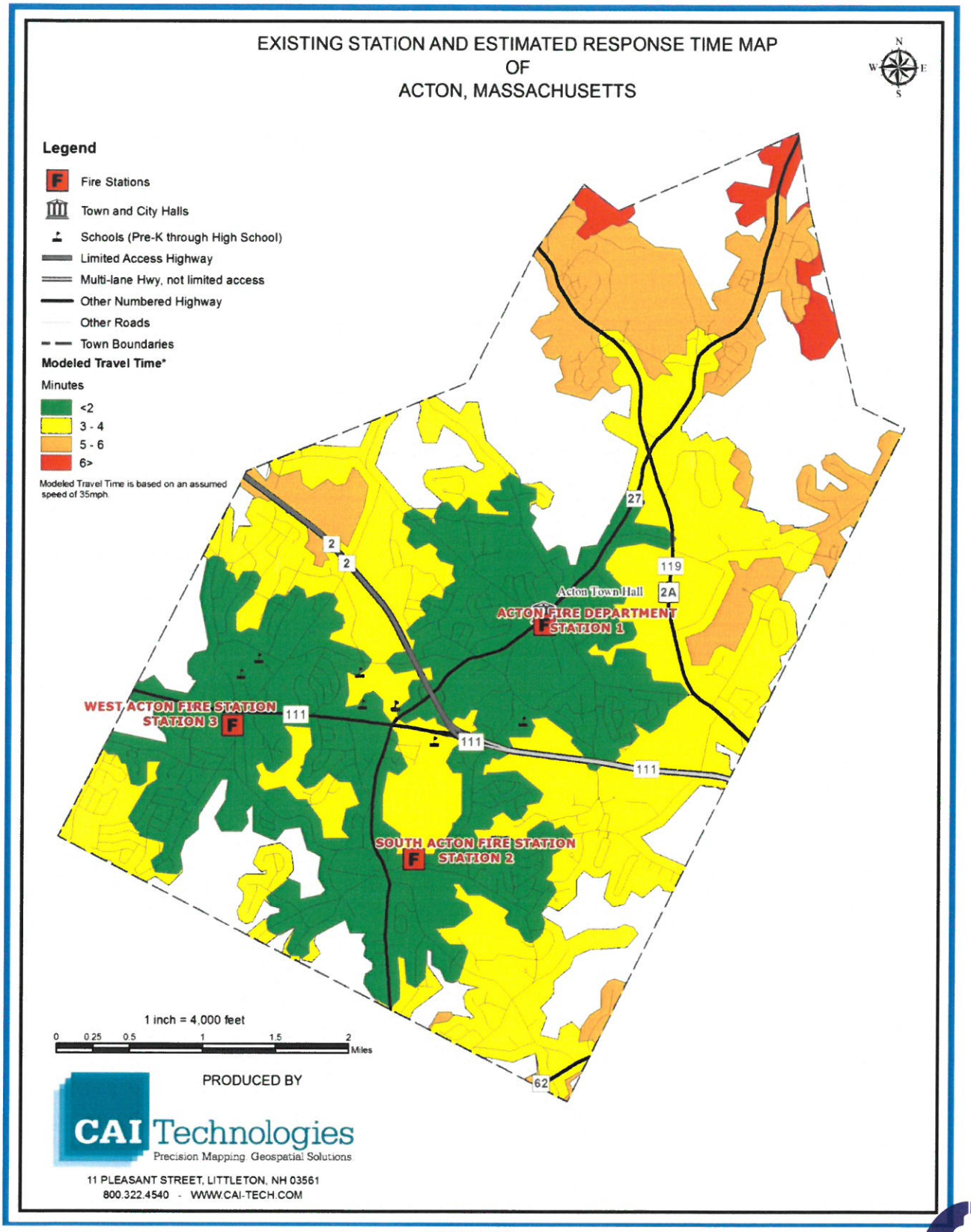


FIGURE 20

Municipal Resources

VII. RESOURCE DEPLOYMENT ANALYSIS AND RECOMMENDATIONS

Overall, the Acton Fire Department's current response times are close to what is recommended by NFPA and other emergency services recommendations and best practices. The department arrives on location within six minutes of the receipt of a 9-1-1 call, or 83.1% of the time. This is just under 7% lower than the recommended benchmark of 90%. Overall the department's current average projected drive times are also very good, particularly in districts 2 and 3. However, even in district 1, the current average drive time is calculated at exactly four minutes (240 seconds).

Looking at the projected drive time map (Figure 19), a large percentage of Acton is within a four-minute drive time from the closest fire station. The primary areas that are outside of the recommended four minute (240 second) drive time for the first arriving unit are in North Acton, mostly north of Route 2A/119. This area is the area that has been the focus of discussion regarding the need for an additional station in the town, or the redeployment of current resources.

It was reported to the MRI study team that there have been discussions regarding the need for a fourth fire station in North Acton since the 1970s. Since that time, there have been a number of studies conducted that focused on, or included, an examination of the fire department's deployment model and the need for an additional station. These include:

- Charles M. Evans and Associates (1980)
- Joint Board Capital Committee (Funding possibilities; 1996)
- Bennett Associates (2000)
- Fire and EMS Task Force (Including looking at tax impacts; 2001)
- Site Selection Committee (2007)

For the most part, these studies concurred that a fire and EMS facility was needed in the northern section of Acton. While the addition of a fourth station was presented as an option in each case, there also seemed to be a consensus that a three-station deployment model could also work. This scenario would involve the relocation of an existing station.

At this point, it is worth pointing out again that the expectations for the quality and quantity of fire and emergency medical services must come from its residents and other taxpayers. There is no "right" amount of fire protection and EMS delivery. It is a

constantly changing level based on the expressed needs of the community. The standards provide recommended benchmarks not mandated requirements. It is the responsibility of elected officials to translate community needs into reality. Decisions regarding deployment of resources or positioning of stations are never easy decisions especially when one considers the fact that virtually any decisions on emergency service deployment that involve moving and/or relocating a resource, even for the considerable benefit of the community as a whole, may have a negative effect on at least a small percentage of the population.

We mention the above information again due to the fact that in 2007, preliminary design work was completed for a new 10,000 square foot, 3 bay fire station in North Acton. This station would have been located on a plot of town owned land at the intersection of Routes 27 and 2A, which had been identified by the site selection committee as a preferred location for the North Acton station. However, a key component of this plan was that it would actually be a relocation of the existing Station 1 to a location farther north on Route 27. The plan was abandoned in 2008, in part, due to oppositions of residents of in Acton Center to the fire station being relocated out of their area.

If an additional station is constructed in North Acton, it would basically divide the existing response area of station 1, District 1, in half. This reconfiguration would certainly improve response times in North Acton, and as a result would improve overall response times throughout the town. This is obviously a positive. The question is, does it improve response times enough to justify the cost?

Figure 21, below, illustrates what the Town of Acton's fire district response areas would look like if a fourth district were added.

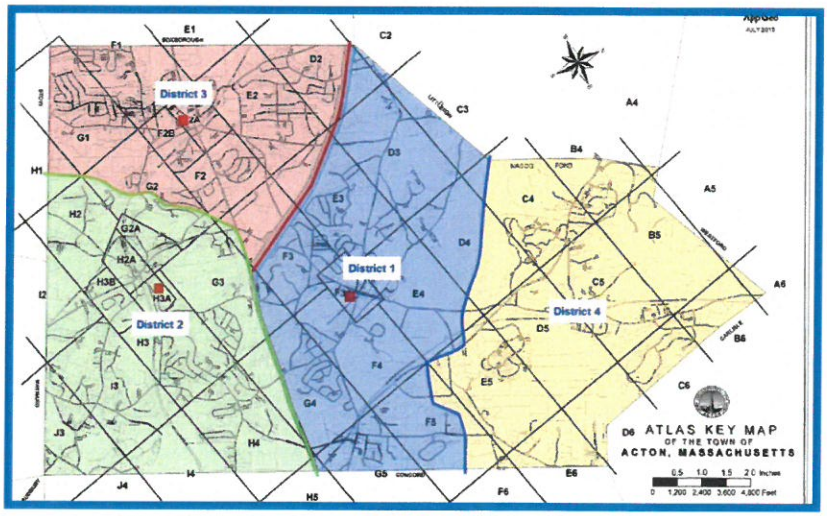


FIGURE 21
PROPOSED FOUR FIRE DISTRICT MODEL WITH CURRENT FIRE STATION LOCATIONS

POSSIBLE LOCATIONS FOR NORTH ACTON STATION

Two locations have been identified as possible sites for a fire station in the North Acton area. The first is located at approximately 655 Main Street, near the northeast corner of Route 27 and 2A. This site was identified as a potential location in several of the studies that have previously been completed and was the choice of the 2007 site selection committee (Figure 22). While this site, referred to later in the analysis as Station 4A, does have some positives, such as being near the major intersection of Routes 27 and 2A allowing response in all directions, and being land already owned by the town, it does have a number of negatives.

The site itself is a relatively small piece of land which is bordered by a recreation area with several ball fields. This would require the station be placed at an angle of the lot facing directly toward the intersection, rather than either of the roads. There is a significant elevation change between the front and rear of the site, reportedly between 15' and 20' (Figures 23 and 24). This will necessitate extensive site work to level the ground for construction of a station. It was also noted by the study team that there was significant standing water at the lower elevations of the site which could suggest drainage issues. Southbound traffic on Route 27 also tends to back up at the traffic light for Route 2A (Figure 25). The presence of the recreation field could also present challenges particularly during times of heavy use. This location is also rather close to the southern border of what would be a new district 4.





Figure 22 (left)
Possible site for fire station location (Station 4A), at approximately 655 Main Street, near the northeast corner of Routes 27 and 2A.

Figure 23 (right)
Site has significant elevation change from front to rear.





Figure 24 (left)
There is an elevation distance of possibly 15' to 20' from the front of the site to the rear.

Figure 25 (right)
Southbound traffic on Route 27 often backs up north from the traffic signal at Route 2A. This could create traffic hazards when exiting the station during emergency responses.

The other potential location for a North Acton station, referred to as Station 4B, is located at 68 Harris Street (Figure 26). This is the location of a former Fish and Wildlife Commission office. The site only emerged as a potential location in late 2016.

Overall, this location appears to be a much better site for a potential station. The site itself is much larger and appears to be relatively level, which would minimize the site work that needs to be done. The site is much more centrally located in a proposed new district 4, near many of the identified incident "hot spots" in the town, particularly along Route 2A. Harris Road is a good, secondary road which provides easy access to Route 27 to the east and Route 2A to the west (Figure 28).

There are several existing buildings on the site which would need to be demolished. The town's parks and recreation department may have interest in one of them, which is a three-bay pole barn located in the rear of the property (Figure 27). The property to the west of this site, which contains an unoccupied single family dwelling, is also for sale (Figure 28). Purchasing this property could expand the size of a fire station site/facility if necessary.





Figure 26 (left)
Potential fire station location (Station 4B) at 68 Harris Street, site of the former Fish and Wildlife offices.
Figure 27 (right)
Three bay pole barn in the rear of the property.



Figure 28
Harris Road looking west. The property to the right is unoccupied and for sale.

The addition of a fourth fire district in North Acton would essentially divide the existing district 1 into two relatively equal sections. The dividing line would be just south of the intersection of Routes 27 and 2A. Figure 29, below, provides a breakdown of the fire incidents in both the existing district 1, as well as, the revised district 1 with the addition of district 4. In each category, the newly created district 4 will actually be busier than the revised district 1. In fact, over the period analyzed for this study, it would have averaged 1.2 more responses per day than the revised district 1 would.

	NUMBER OF EMERGENCY INCIDENTS	NUMBER OF REPORTED FIRE INCIDENTS	NUMBER OF ACTUAL FIRE INCIDENTS	NUMBER OF REPORTED STRUCTURE FIRE INCIDENTS*	NUMBER OF ACTUAL STRUCTURE FIRES **
EXISTING DISTRICT 1	6,559	981	142	762	77
REVISED DISTRICT 1	3,061	476	68	360	33
NEW DISTRICT 4	3,498	505	74	402	44

FIGURE 29
ACTON FIRE INCIDENTS – WITH DISTRICT 4
DECEMBER 7, 2011 – DECEMBER 7, 2016

* NFIRS category 111 reported structure fire.
** Includes NFIRS categories 111 thru 118 for various types of fires in structures.
NFIRS category 111, significant structure fires, totals 44 incidents during the time period analyzed.

Figure 30, on the next page, is essentially the same map as Figure 13 in that it plots the location of all fire and EMS incidents that have occurred in Acton from December 7, 2011, through December 7, 2016[4]. This map illustrates the incident locations by frequency which range from a single response, to locations that have generated more than 101 responses during this time frame. In the lower right hand corner is an inset map that identifies incident high incident density, or "hot spot" areas, locations which generate a significant number of emergency responses. The difference is that this map illustrates the addition of a fourth district 4 in North Action, along with the potential locations of station 4A and 4B.

[4] It should be noted this plotting includes all activities that the Acton Fire Department considered to be an "incident", including inspections, investigations, and training, not just emergency responses. There are a total of 22,999 "incidents".

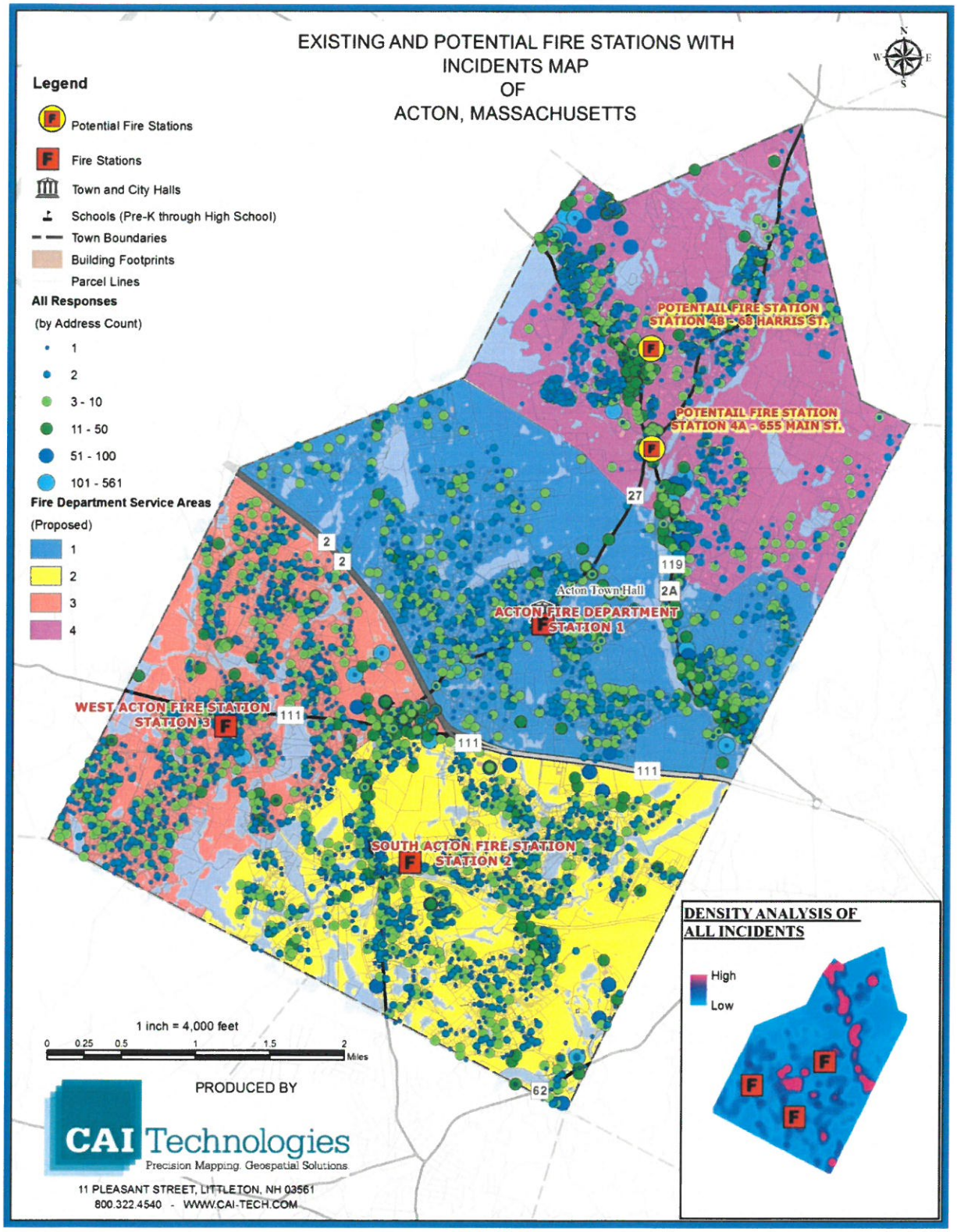


FIGURE 30

Municipal Resources

A closer analysis of the areas of district 1 which would become part of a new district 4 with a station in North Acton shows that the average response time to that area of the town is currently 310.4 seconds, which equates to five minutes, 10.4 seconds (00:05:10.4). This is 43 seconds longer than the current district 1 overall average response time and more than one minute longer than the overall Acton average (Figure 31).

	AVERAGE RESPONSE TIME (MINUTES)	AVERAGE RESPONSE TIME (SECONDS)
EXISTING DISTRICT 1	4 minutes, 27.4 seconds (00:04:27.4)	267.4 seconds
CURRENT DISTRICT 4 AREA OF DISTRICT 1	5 minutes, 10.4 seconds (00:05:10.4)	310.4 seconds
ACTON AVERAGE	4 minutes, 7.7 seconds (00:04:07.7)	247.7 seconds

FIGURE 31
CURRENT AVERAGE FIRST UNIT RESPONSE TIME
DISTRICT 1 OVERALL AND PROPOSED DISTRICT 4

Of the response times for these five years, in what would become district 4, just 69.8% of the incidents have a response time of six minutes or greater (Figure 32). This percentage is more than 20% under the NFPA 1710 compliance target of 90%. More than one in ten incidents in this area (11.2%) had response times of eight minutes or greater. It is our belief that this lack of ability to comply with the NFPA response time standard is due to extended travel distances to incidents in the North Acton area.

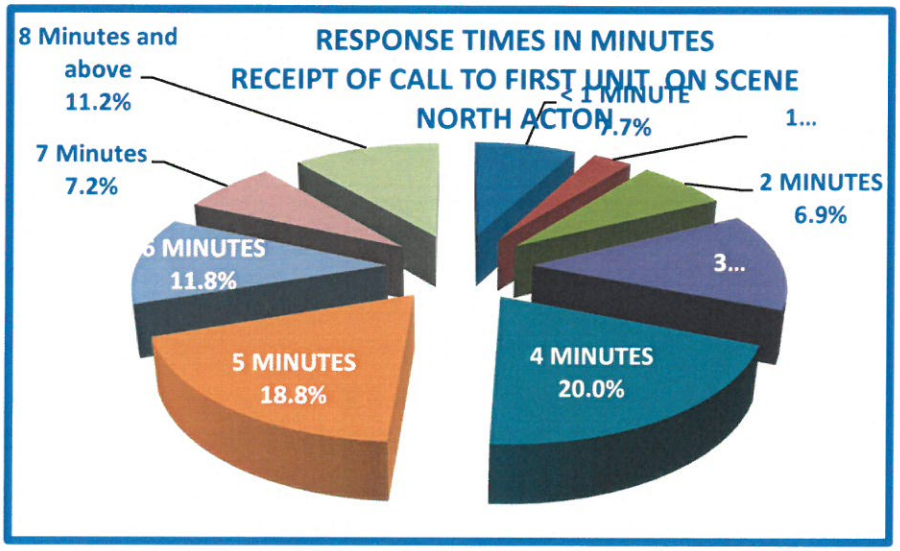


FIGURE 32

Municipal Resources

As was previously discussed when looking at the current situation in Acton, one of the important benchmarks regarding overall response time is travel, or drive, time. This is the time from when a unit it actually responding, until it arrives on location. Drive time is the factor where things such as the number and location of stations play a critical role. The estimated drive times utilized in this report were calculated utilizing an expected average response speed of approximately 35 miles per hour. As previously identified, the average drive time for the first arriving fire unit in Acton is currently projected at 3.4 minutes. However, when looked at existing Station 1's average drive time, it is more than a minute longer than Station 2's, and a minute and a half longer than Station 3's (Figure 18).

With the addition of a District 4, with a station in North Acton, the average projected drive times drop considerably regardless of which station option, 4A or 4B, is chosen (Figure 33). Maximum projected drive time to anywhere in the district, from either station, is five minutes, 30 seconds (00:05:30). It would certainly be anticipated that the overall Acton average drive time would also decrease with the addition of a North Acton station.

	AVERAGE DRIVE/ RESPONSE TIME (MINUTES)	AVERAGE DRIVE/ RESPONSE TIME (SECONDS
CURRENT DISTRICT 1	4.0 Minutes	240 Seconds
PROPOSED DISTRICT 4 AREA OF CURRENT DISTRICT 1	4.9 Minutes	294 Seconds
PROPOSED STATION 4A	2.9 Minutes	174 Seconds
PROPOSED STATION 4B	2.9 Minutes	174 Seconds
CURRENT ACTON AVERAGE	3.4 Minutes	204 Seconds

FIGURE 33: PROJECTED FIRST UNIT DRIVE TIMES WITH DISTRICT 4

Figure 34 provides heat map modeling drive/response times for the proposed station 4A, while figure 35 does the same for potential station location 4B, three existing Acton stations. The quickest times (green color), less than two minutes, are closest to each of the stations. The next area is response times of three to four minutes (yellow color), which now encompasses most of the remainder of the town. The response areas that are green or yellow indicate an acceptable response or drive time of four minutes or less, which achieves the benchmarks established by NFPA 1710 for first unit on scene in a career fire department.

Under either configuration, there are only a few isolated pockets remaining that are orange in color, indicating an expected drive/response time of five to six minutes and exceeding the recommended times found in NFPA 1710. The areas where this situation may occur is slightly more prevalent for the location of station 4B when compared to station 4A. There would be no areas remaining with an expected drive time greater than six minutes. The reason the modeled response time surfaces (heat areas) do not stretch to the town boundary is because there were no incidents beyond the envelope of the modeled area.

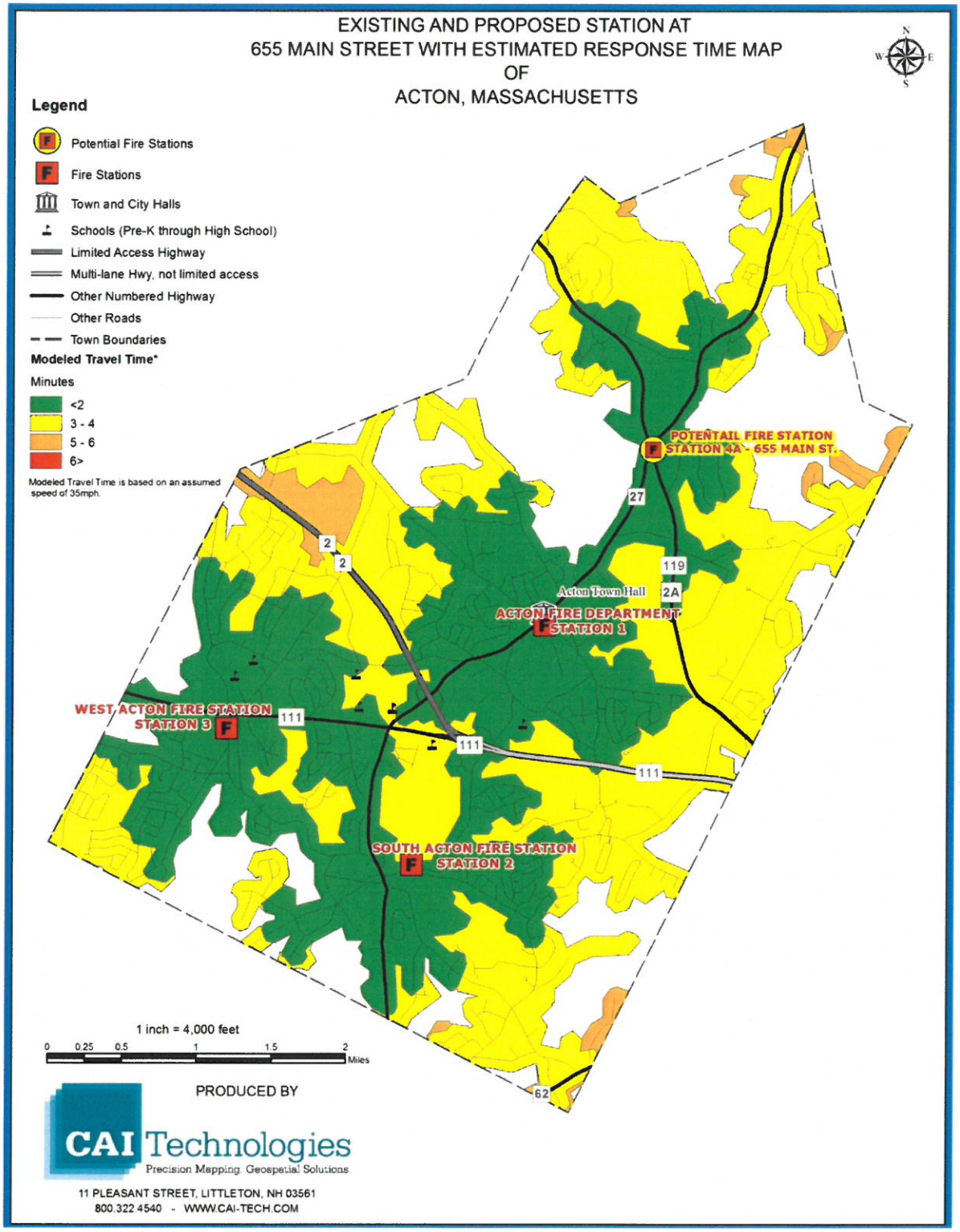


FIGURE 34

Municipal Resources

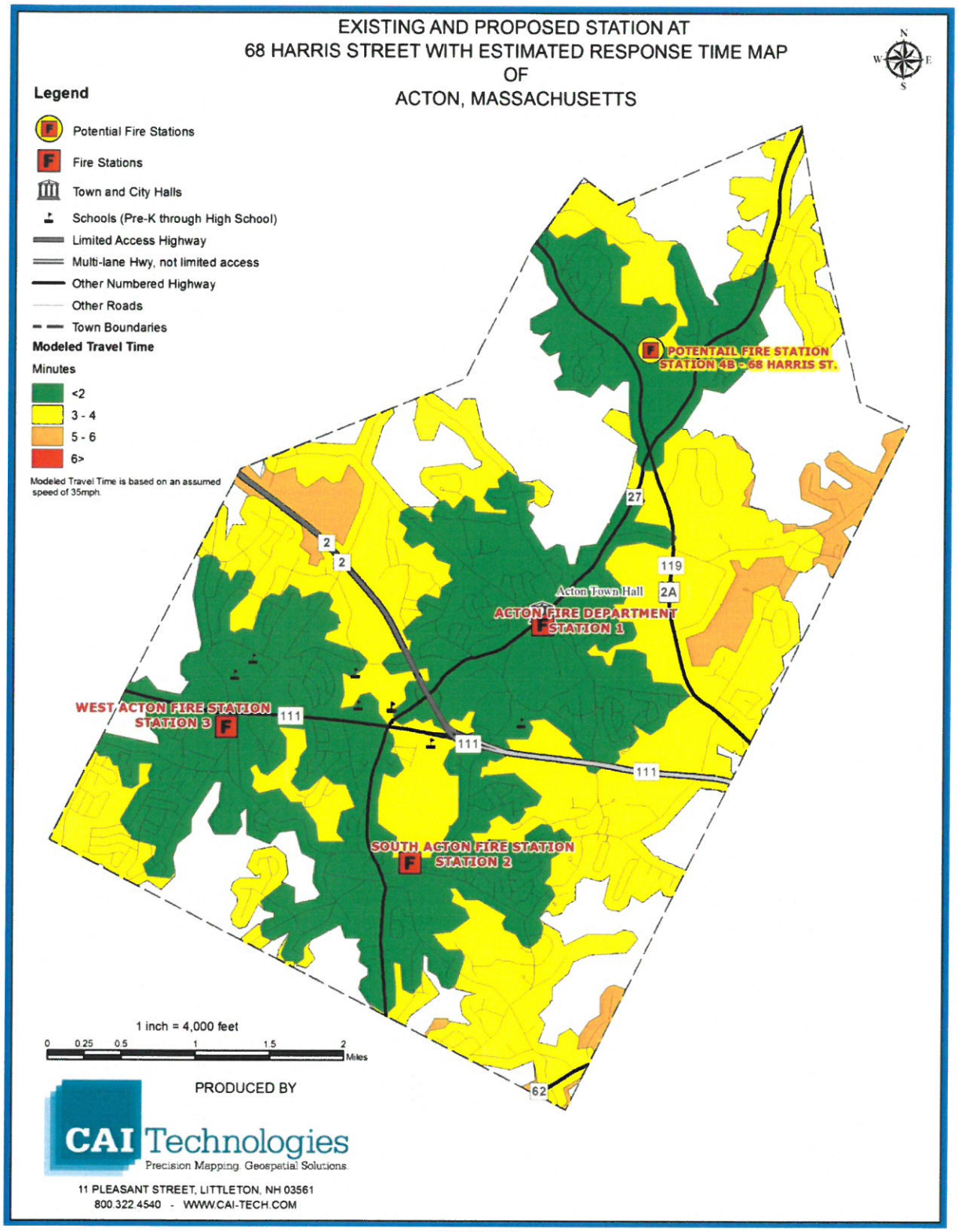


FIGURE 35

Municipal Resources

Constructing, staffing, and maintaining fire station facilities is an expensive proposition. The actual construction costs are usually funded through the community's capital budget, often through the sale of general obligation bonds. The ongoing operational expenses must then be funded through the annual budget appropriations. In the current Action situation, the fire chief has a plan that he believes is workable where the North Acton station will be able to be staffed within the current authorized strength of the department. He will need to redeploy personnel and resources; however, he does not believe that he would absolutely need to hire any additional staff.

It is the opinion of the MRI study team that while Acton currently does very well regarding response times to emergencies within the town (and better than a lot of other communities), there is still room for improvement. Acton's fire protection system has not kept up with the growth the town has experienced over the past 50 years. This is particularly true for North Acton. The department falls somewhat short in complying with the response time and first unit on scene benchmark times recommended in NFPA and through industry best practices. This is in large part due to extended travel distances and response times to North Acton. The various mapping that was done indicates an obvious gap in the service levels in that area of the town, particularly the farther north and west one travels. The need for a station in the North Acton area has been recognized and discussed for more than 40 years. Several other studies have also concluded that a station is needed in that area.

It is the belief of the MRI study team that the Town of Acton would be well served by a two-part capital investment in its fire stations. Taken collectively these recommendations would serve to:

- Eliminate the existing service gaps in the North Acton area of the town.
- Reduce travel distances and response times to emergency incidents in North Acton, potentially saving lives during serious medical emergencies and reducing property damage during fire incidents.
- Achieve a normal first unit on scene response time of six minutes or under to nearly the entire town.
- Achieve compliance with the first unit on scene response time benchmarks found in NFPA 1710.
- Allow eventual redeployment of the fire department's ladder truck and shift commander to the much more centrally located Acton Center station for improved operational effectiveness and efficiency.

Any project of this type takes a considerable amount of time from start to completion. Should the Town of Acton decide to move forward with our recommendations it is very likely that it will be a minimum of three to five years before either project is completed. If done in stages, which would make sense, the time frame could realistically be five to ten years.

RECOMMENDATIONS

The Town of Acton should move forward with the process for designing, financing, and constructing a new fire and EMS Station in the North Acton area.

The Town of Acton should give primary consideration to the site at 68 Harris Road as a preferred location for a new North Acton Station.

The Town of Acton should seriously consider either expanding and significantly upgrading, or replacing, the existing Acton Center Station (Station 1) to allow it to accommodate the redeployment of the ladder truck, and shift commander, to a more central location in the town.

The MRI team was asked to also consider a deployment model that, while adding the needed station in North Acton, might also allow for the elimination of one of the existing stations, thus retaining a reconfigured three station model. This possibility was discussed in some of the other studies that have been conducted. It was also considered in 2007, but was dropped when the residents of Acton Center expressed concern over the possible relocation of Station 1 to North Acton.

Figure 36 models the three-station configuration that was proposed in 2007, basically relocating Station 1 from Acton Center to North Acton. We choose to model the Harris Street location as we believe this is the more suitable location for a new station. Consideration of this option creates a large area in the Acton Center area with response times of five to six minutes, thus exceeding the recommended benchmark times. Under this scenario, nearly the entire center of Acton would experience increased response times. We do not believe that this option would be in the Town of Acton's, or its residents' best interests. Utilizing the Main Street Station, site would probably change the model somewhat, but probably not enough to make it viable.

Figure 37 models a scenario where there is a new station in North Acton, and eventually Station 3 is decommissioned. Under this scenario, the three stations would be aligned linearly along the Route 27 corridor. This model, although it does have its shortcomings, is more viable than the other option. Station 3 protects the smallest district in the town, and the one with the fewest incidents in its area. Station 2 is relatively centrally located between South and West Acton, and provides acceptable coverage to most areas south

of Route 2. Although there are some areas of the town that will still experience normal response times of between five and six minutes, the percentage of town that will is much less than if Station 1 was relocated. The main areas that would be impacted under this scenario is a small area of West Acton near the western and southwestern borders of the town. Any areas north of Route 2 that have those extended response times face them even with the four-station configuration. An added benefit of this scenario is that with Station 3 being located very close to the West Acton commercial district, there is probably a good chance the town could recoup some capital funds through the sale of the building, and get it back on the tax rolls in a repurposed use.

RECOMMENDATIONS

Long-term, once the other recommended capital projects are completed, the Town of Acton should consider returning to a reconfigured three Station fire department through the decommissioning of the West Acton Station (Station 3).

At the appropriate time, and before a decision is made to decommission Station 3, the Town of Acton and the Acton Fire Department should conduct additional, in-depth, analysis of the potential implications, at that time, of closing the Station to ensure that the most up-to-date data is utilized in the decision-making process.

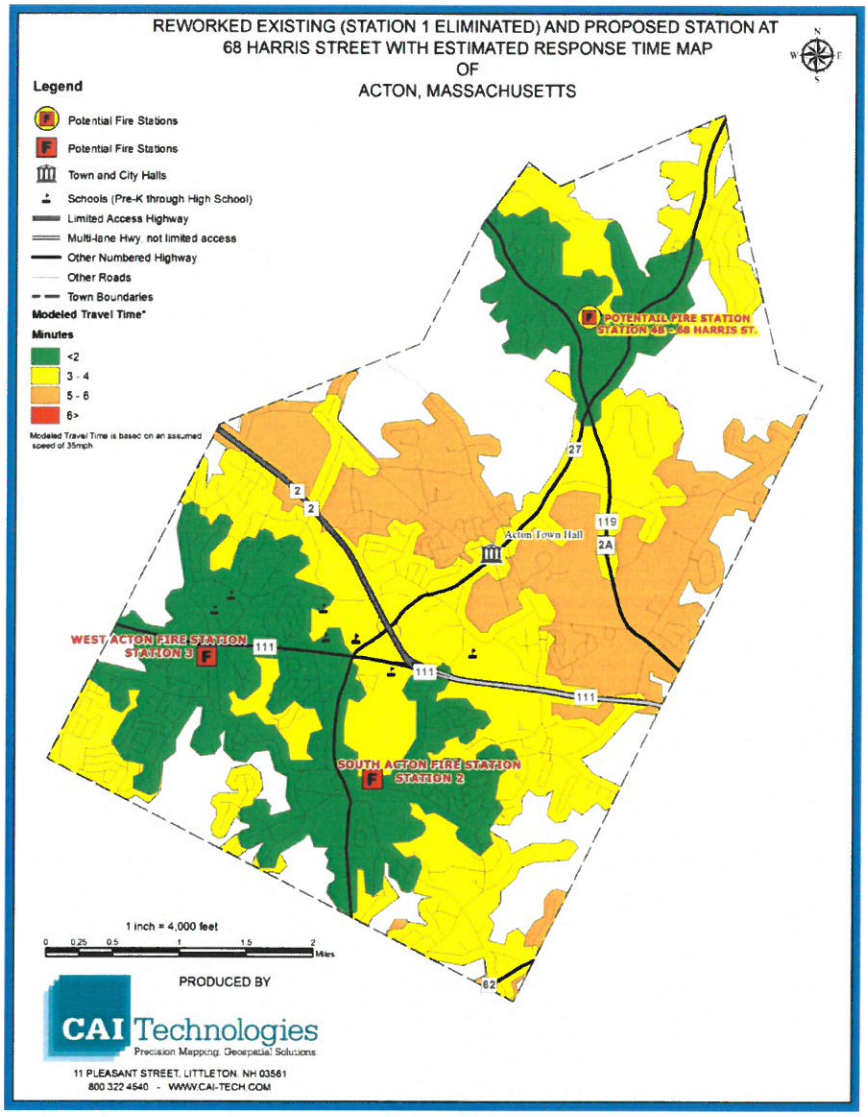


Figure 36

Municipal Resources

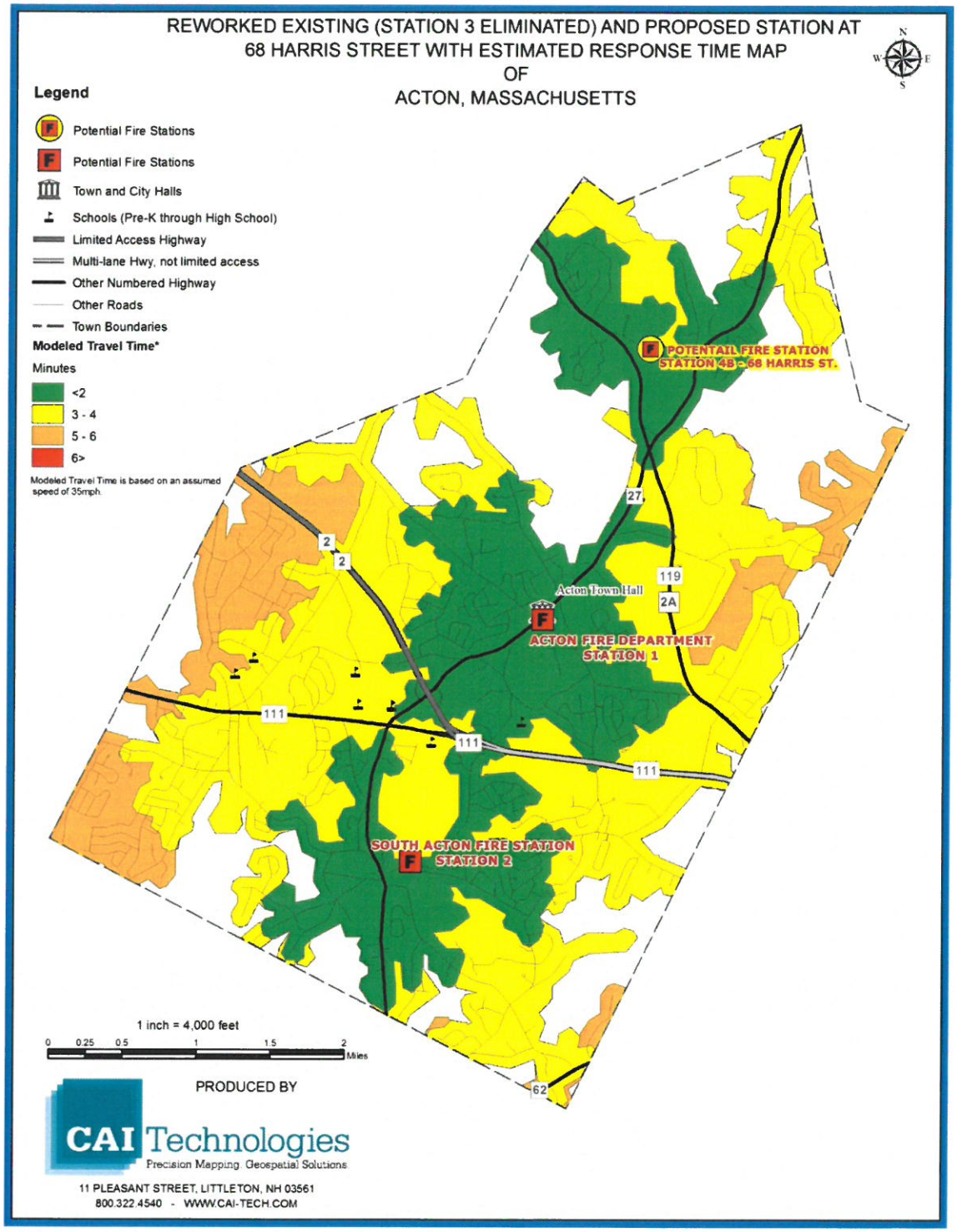


FIGURE 37

Municipal Resources

VIII. CONCLUSION

In summary, the Town of Acton should develop a multi-faceted capital plan for addressing their long-term fire station facility needs. First, there is a definitive need for a new fire and rescue facility in North Acton to handle the significant, and growing, number of incidents that occur in that area of the community. The location of a new facility in North Acton will have a significant positive impact on reducing first unit on scene response times to incidents in that area of town where they are currently higher than recommended by NFPA standards. We believe that the Harris Road site is the preferable of the two possible locations. Second, there is a need to either upgrade or replace the existing Acton Center fire station. This renovation or replacement will permit the fire department to relocate the ladder truck and shift commander from their current locations at Stations 2 and 3, respectively, to a much more centrally positioned facility. Overall, this will result in a better operational deployment for the department.

Once these facility needs in Acton Center and North Acton have been addressed, and resources redeployed, consideration should be given to decommissioning Station 3 in West Acton. Although there will be some areas on the western town line where response times will increase to between five and six minutes, the limited number of incidents that occur in those areas should still allow the department overall to achieve the 90% compliance benchmark for first unit on scene. Finally, the town should give serious consideration to installing complete automatic fire detection and fire suppression stations in all fire station facilities. The installation of these systems will not only provide increased life safety to the occupants of the stations, it will also help to protect the significant facility and equipment investment the taxpayers of the community have invested in the Acton Fire Department.

Please contact me with any questions relating to this management letter.

Sincerely,

Brian P. Duggan

Brian P. Duggan
Director of Fire/EMS and Emergency Management Services