THE UNIVERSITY of TENNESSEE

MUNICIPAL TECHNICAL ADVISORY SERVICE

McMINNVILLE, TENNESSEE

Fire Station Study

Sow Natural!
McMinnville
WARREN COUNTY, TENNESSEE

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Municipal Technical Advisory Service

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Introduction and Scope of Work

MTAS conducted this study at the request of McMinnville City Administrator David Rutherford. MTAS Management Consultant Warren Nevad and Fire Consultant Dennis Wolf met with Fire Chief Randy Walker and Mr. Rutherford to discuss the scope of the study.

The purpose of this study is to evaluate the city's distribution of fire stations and to determine if the city needs a third fire station or if relocating one or both of the existing stations would provide adequate coverage. The study will review the current roster of fire apparatus and make recommendations on the city's fire apparatus needs. The scope of this study included review of the present ISO rating, meeting OSHA and NFPA requirements, and fire service best practices regarding deployment of resources. Best practices are acceptable performance standards in the fire service that are recognized and used to improve operations and safety. The recommendations provided in this report include consideration of local criteria including the size of the community, land usage, existing and potential use of resources, public perception of services, and geographical features of the community.

The level of fire services provided in any community is a local policy decision made by the elected governing body through the annual budget. The decision is unique to every community and includes factors such as desired response times, growth, increased life risk (schools, daycares, hotels, assisted care facilities, etc.), increased commercial and industrial risk, the desire to maintain or improve services, and the desire to maintain or improve the ISO rating. A fire department is an investment in the community. The Insurance Services Office (ISO) states that, "A community's investment in fire mitigation is a proven and reliable predictor of future fire losses." McMinnville has made a significant investment in community fire mitigation through the fire department as reflected in the favorable Class 3 ISO Rating.

A written request from the city authorized MTAS to conduct an official study.

Background

The City of McMinnville is the largest city in, and county seat of, Warren County, in Middle Tennessee, approximately 35 miles south of Cookeville, 40 miles southeast of Murfreesboro, and 70 miles northwest of Chattanooga, with a population of 13,605 and an area of ten square miles. A Mayor-Alderman form of government governs the city. The seven-member board, which includes the mayor, sets policy and evaluates the management of the city. The city administrator oversees all operational activities.

Fire protection and staffing is a local policy issue, and a community must balance local resources against acceptable risk. The City of McMinnville provides fire services to its residents through a municipal fire department authorized under Section 6-1-203 of the city charter. The fire chief is a city department head and reports to the city

administrator. The McMinnville Fire Department is a career fire department recognized by the State of Tennessee under TCA 68-102-108 and funded by the city.

The department uses a three-shift staffing system and has an authorized shift strength of thirty personnel, but two positions are vacant and frozen in regards to filling them, giving the department a current strength of twenty-eight personnel. One shift has ten personnel and two shifts have nine personnel. The fire chief leads and manages the department assisted by a training captain.

The fire department operates two engine companies and a truck company (Tower 1) from two fire stations (Table 1). All McMinnville engines have a minimum staffing level of at least three personnel and minimum staffing on the truck is two personnel.

Apparatus	Year Built	Type	Pump Capacity (gpm)	Aerial Ladder Length	Located at Fire Station
Engine 1	2003	Tower	1,500	95’	1
Engine 7	1989	Engine	1,500	n/a	2
Engine 8	1993	Engine	1,500	n/a	1
Reserve Apparatus					
Engine 5	1972	Engine	1,000	n/a	1
Engine 6	1978	Engine	1,500	55’	2

Table 1 – McMinnville Fire Department Apparatus

The Importance of the ISO Rating

This information will assist city leaders in their understanding of the complexities of providing fire protection, assist in the prioritization of community needs, and assist in the decision-making process.

The Insurance Services Office, Inc., also known as ISO, is a for-profit corporation that works for insurance companies to evaluate the capability of a community to suppress fires. ISO rates a community on a scale of 1 through 10. An ISO rating of 1 is the best (only 0.13% of the fire departments in the county have a Class 1 rating). An ISO rating of 10 is equivalent to not having any fire protection. McMinnville has a Class 3 rating. ISO rates a community based upon three major categories: communication (10% of the rating), fire department (50% of the rating), and water supply (40% of the rating).

McMinnville’s Class 3 rating is excellent. Less than four percent of all fire departments in Tennessee have a Class 3 ISO rating, and just five fire departments out of over 732 have a better ISO rating (see Figures 1 and 2). The Class 3 rating means the city is doing the right things to provide excellent service, and because of this McMinnville residents pay very competitive rates for property insurance.

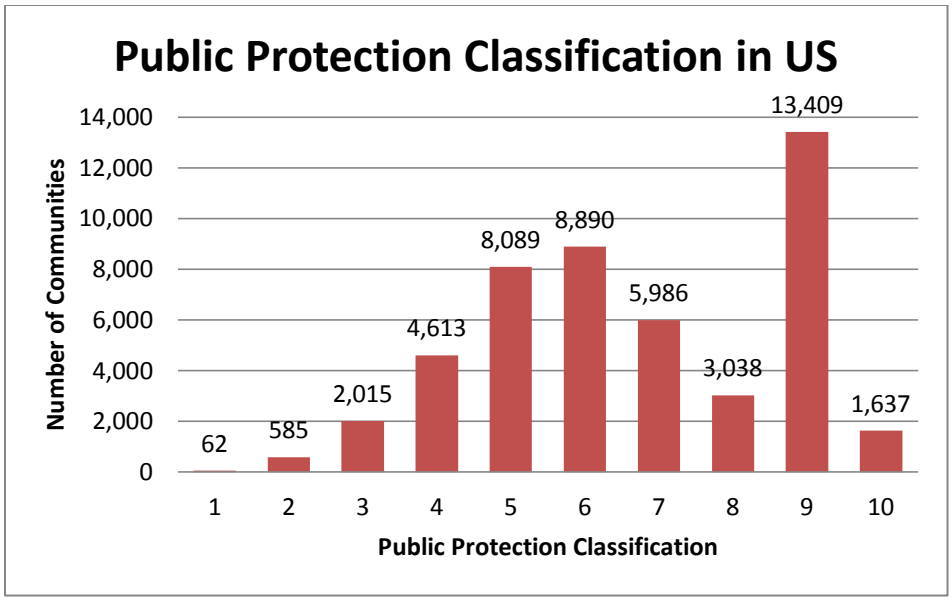

Figure 1 – Public Protection Classification (ISO Rating) in the US

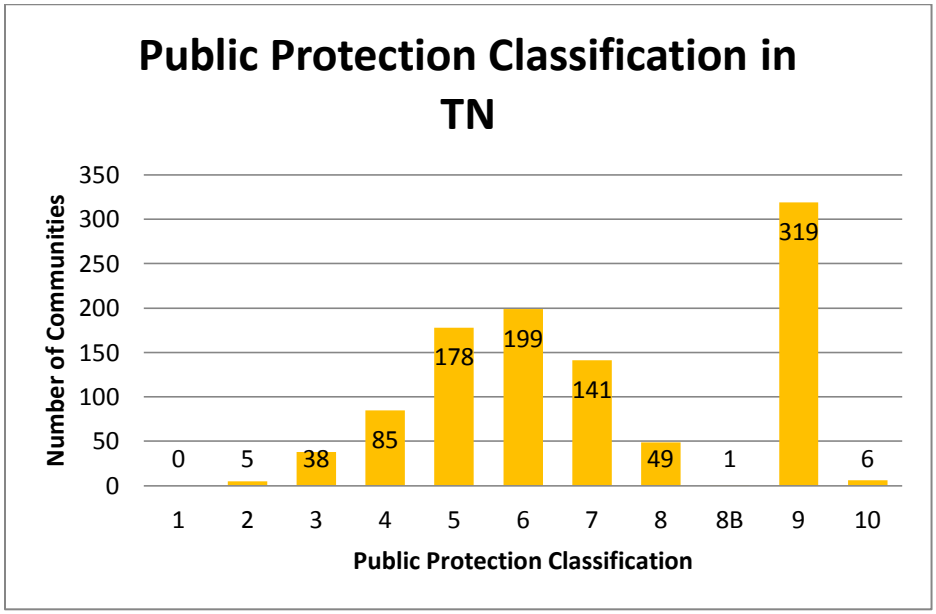

Figure 2 – Public Protection Classification (ISO Rating) in Tennessee

McMinnville's most recent ISO evaluation was in October 2007, and McMinnville earned 70.58 points out of 100. ISO awards a Class 3 rating for a score between 70.00 and 79.99 points, so the city is not a "strong" Class 3. This makes it *critical* for the city to continue to do the things they are doing, and to improve services and operations where possible, to maintain the Class 3 rating.

Facilities

Fire stations represent a major capital investment in the community. McMinnville has two fire stations as identified in Table 2 and located as shown on the map in Figure 3. The building code classifies a fire station as a storage facility, but people live in them, which makes them unique structures. Fire stations are in use 24/7, contain the mixed-use functions of storage of motorized apparatus, storage of hazardous chemicals, and use as a business office, contain cooking operations, and overnight accommodations for on-duty crews. Since 2007, the state expects new and existing fire stations to be gender friendly to accommodate men and women working in the same station. Fire stations are part of the community's critical infrastructure and station security should be part of the community's homeland security plan. Fire stations should be capable of continuous operation during disasters. As a rule of thumb, fire stations have a useful designed life of approximately fifty years.

Station	Address	Year Built	Age	Bays	Bay Length	Door Height	Gender Friendly
1	313 East Main Street	~1940	72	4	60'	14'	N
2	1022 Old Smithville Rd	2002	10	2	60' Drive through	16'	N

Table 2 – McMinnville Fire Stations

Modern fire apparatus is larger and heavier than apparatus designed twenty years ago. Innovations including high side compartments, mechanical/hydraulic ladder racks, topside storage compartments, elevated waterways, aerial ladders, platforms, and on-board foam systems have resulted in larger, wider, heavier, and taller apparatus. The use of polyethylene water tanks has increased the amount of water that a fire truck can carry, which in turn increases the weight, which means bay floors must be capable of supporting heavier fire trucks. The maximum height of a fire truck is 13' 6", but not all fire trucks are that tall. Depending upon the amount of storage space desired and the amount of water carried, most fire pumpers are at least twenty-four feet long, with lengths of thirty-two feet being common. Aerial ladder trucks and platforms (towers) are longer. Aerial ladder trucks have lengths starting around thirty-nine feet, and platforms have lengths starting around forty-seven feet.

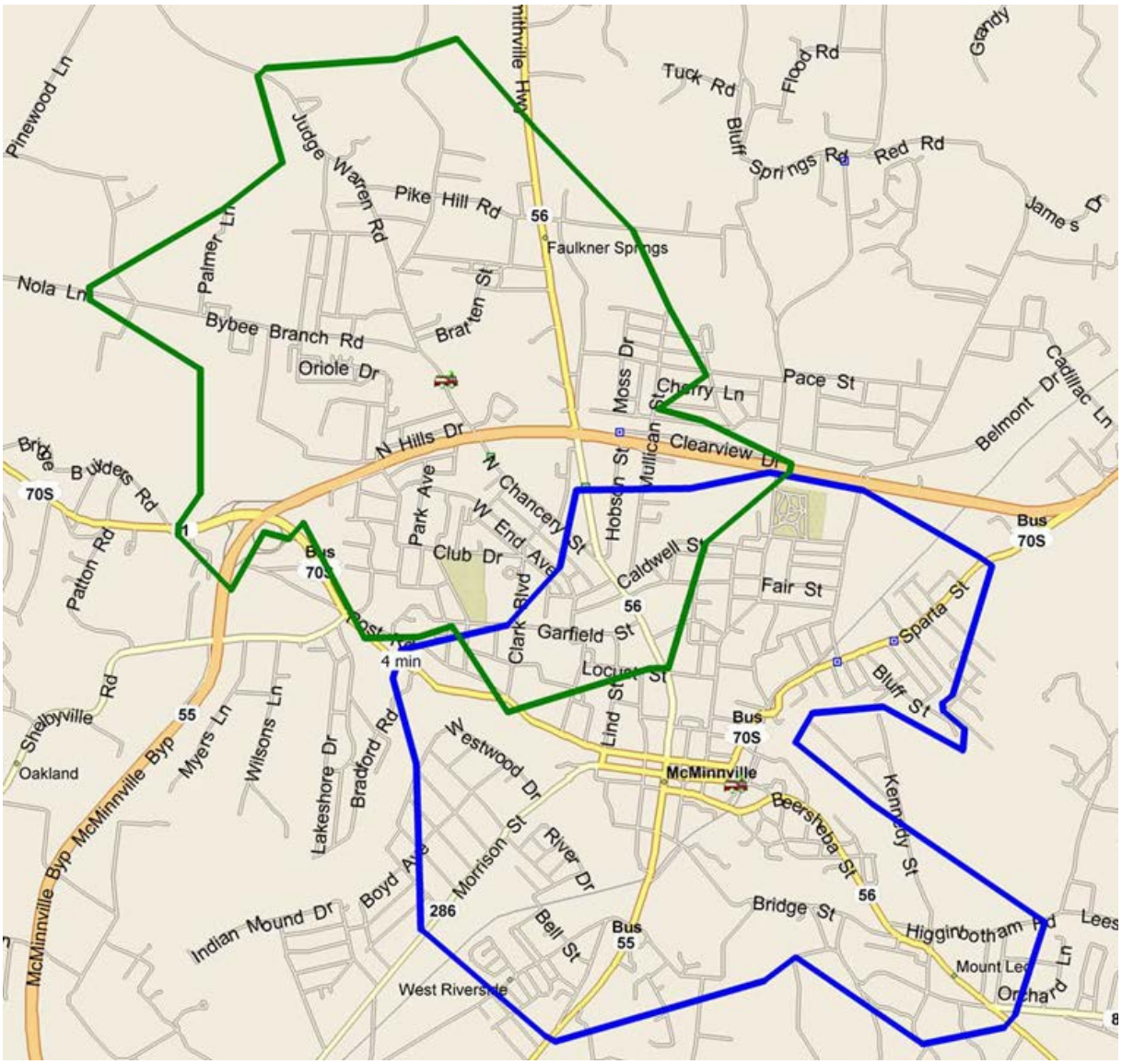

Figure 3 – McMinnville Fire Stations and 1.5 Mile Service Areas

Station 1 has a vehicle exhaust system in place that is not NFPA compliant. Station 2 does not have a vehicle exhaust system in place. Neither station has carbon monoxide warning signs as required by OSHA 1910.145, or carbon monoxide monitors in the living spaces. Station 1 is located in a building that was a car dealership, and the building has been adapted to use as a fire station. The estimated date of construction is about 1940, which makes the station 72 years old. Station 1 has the lowest overhead door clearance heights, which limits the type of apparatus that can be placed there. Environmentally, Station 1 lacks the level of energy efficient design in newer buildings. Both stations are gender friendly as suggested by TCA 4-24-301 through 303. Neither station has floor drains. Neither station has an emergency generator. Because of its age, and these considerations, Station 1 should be replaced, and Station 2 should receive upgrades.

How Many Fire Stations Does McMinnville Need?

To answer this question one must examine the size of the city, the basic fire flow for the community, and desired level of fire response associated with the Class 3 ISO rating. The map in Figure 4 shows the current city limits, designated by the black line, and the 1.5-mile response areas of the two fire stations. McMinnville has conducted some "finger" annexations that have extend the city limits along major roadways to the southwest, creating pocket areas separate from the main portion of the city.

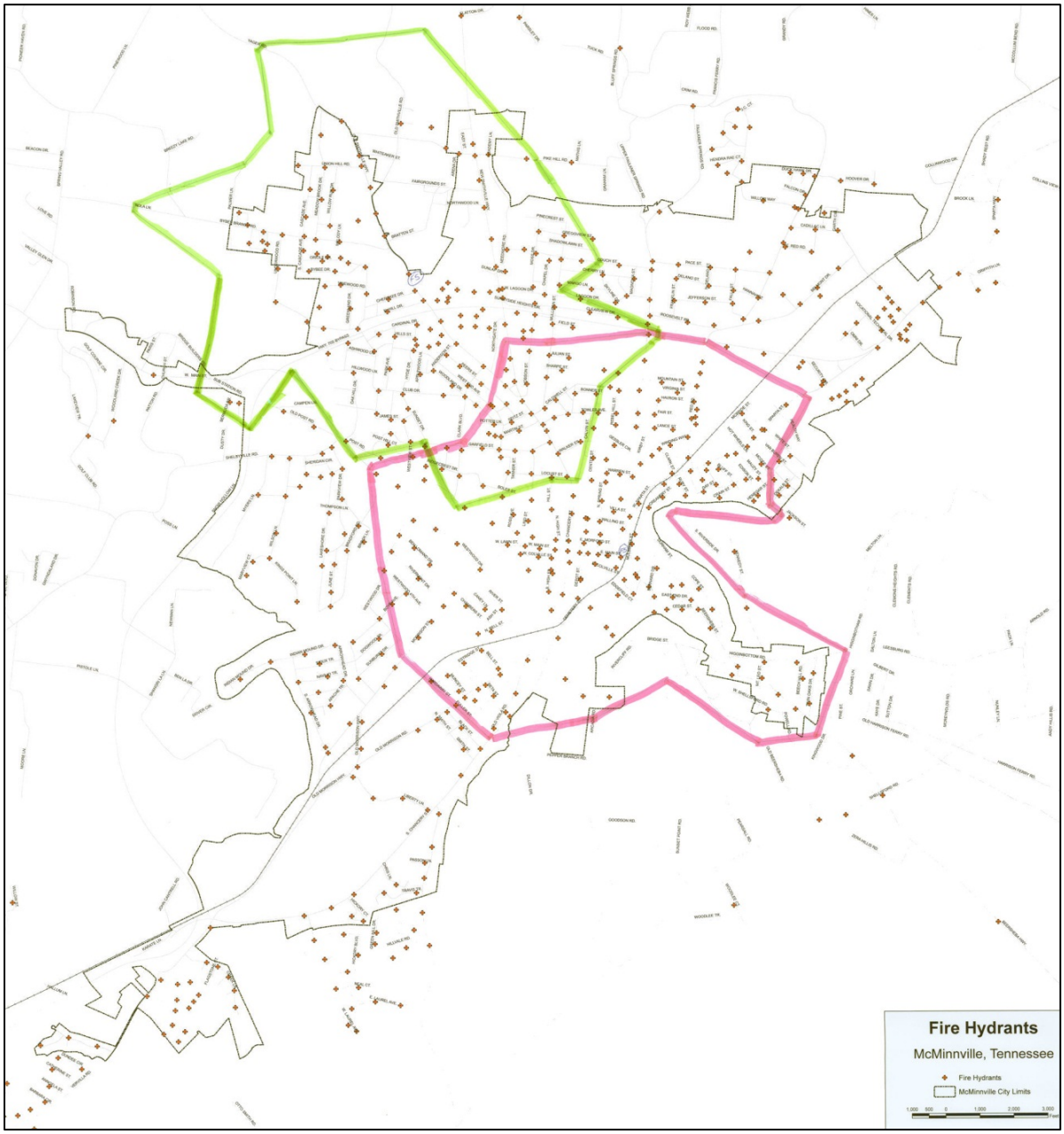

Figure 4 – McMinnville City Limits and Fire Station 1.5 Mile Service Areas

The first item to review is the Insurance Services Office (ISO) Fire Suppression Rating Schedule. Section 560 of the schedule covers distribution of companies and states: "The built-upon area of the city should have a first-due engine company within 1½-miles and a ladder-service company within 2½-miles." McMinnville's two fire stations are located as shown on the map in Figure 4. The colored lines indicate the 1.5-mile response area for each fire station.

It is interesting to note that there is minimal overlap (approximately 8%) of the 1.5 miles response zones, meaning the fire stations are well located for maximum benefit and minimal "waste" of coverage. There are some areas of deficient coverage, which is why ISO gave the city 58.5% credit (2.34 points out of a possible 4 points) for distribution. Distribution is credit ISO awards for the number and placement of fire stations to provide adequate coverage. The railroad tracks bisect the city east-to-west, which means the fire department should have sufficient stations on both sides of the tracks for optimal coverage and response, but both stations are on the north side of the tracks.

Using an "as the crow flies" radius of 1.5 miles to draw a circle does not adequately represent the geographical area that a single fire station can cover. Studies have shown that a polygon better represents the ISO required response area, and that the average size of the polygon is 4.5 square miles. Two caveats: the polygon model assumes the even distribution of resources throughout the area, which is generally not the case, and the formula does not allow for geographical barriers, such as rivers and railroads, but the formula is useful as a reference. Based upon the ten square miles within the city limits, a travel distance of 1.5 miles, and assuming all engine companies are evenly distributed throughout the ten square mile service area (which they are not) McMinnville needs 2.22 fire stations right now for adequate coverage.

One can use the polygon model to determine the number of needed ladder trucks or service companies based upon ISO's maximum travel distance of 2.5 miles for a ladder or service company. The average size of a polygon for a ladder or service company is 12.3 square miles. Based upon a ten square mile service area, a travel distance of 2.5 miles, and assuming all ladder or service companies are evenly distributed throughout the ten square miles (which they are not) McMinnville needs 0.81 ladder companies right now.

The second resource is the National Fire Protection Association (NFPA). NFPA addresses the number of fire stations needed in an indirect way based on minimum response times. NFPA Standard 1710 Section 5.2.4.1.1 allows a 240 second (4 minute) travel time for the first arriving engine company. Using an empirical model called the piece-wise linear travel time function, based upon studies done by the Rand Institute estimating the average response speed of fire apparatus at 35 mph, one can determine that the distance a fire engine can travel in 4 minutes is approximately 1.97 miles. A polygon based on a 1.97 mile travel distance covers on average 7.3 square miles. Based upon a ten square mile service area, a travel-time-calculated travel distance of 1.97 miles, and providing assuming all engine companies are evenly distributed throughout the ten square miles (which they are not) McMinnville needs 1.37

fire stations right now. However, the area of the city is not evenly distributed, and strip annexation has extended the corporate limits far beyond what the two core fire stations can cover adequately.

The previous two examples are based upon time and distance to be covered. A third resource is the ISO Fire Suppression Rating Schedule's determination of needed engine companies based upon the community's basic (needed) fire flow. Section 510 of the schedule requires one engine company for a basic fire flow of 500 to 1,000 gpm, two engine companies for a basic fire flow of 1,250 to 2,500 gpm, and three engine companies for a basic fire flow of 3,000 to 3,500 gpm. Basic fire flow is calculated by determining the needed fire flow for all non-sprinklered properties in the community, and then the fifth highest is considered the basic fire flow for the community. For McMinnville, that is 3,500 gallons-per-minute. For full ISO credit, the city needs to have enough fire engines on the scene to provide a total pump capacity of at least 3,500 gpm, and the fire department meets this requirement with Tower 1 and Engines 7 and 8. A strong commercial and residential sprinkler ordinance can limit significantly community risk, as ISO does not consider properties protected by automatic sprinkler systems when determining the basic fire flow, and sprinklered properties reduce the fire risk in the community. McMinnville has adopted model codes that require fire sprinklers in commercial occupancies, and McMinnville should consider adopting a residential sprinkler ordinance for one and two-family homes to reduce fire risk to the community.

Finally, city leaders must consider the phenomenon known as flashover. As a fire grows in size, it gives off temperatures that heat other objects near the fire. At some point in the time-temperature curve, all of the objects in the fire room reach their ignition temperature and ignite. The entire room bursts into flames, and the temperature rises to a point where no person can survive, including firefighters. This is flashover. The NFPA Fire Protection Handbook states: "During flashover, however, the temperature rises very sharply to such a level that survival of persons still in the room at that stage becomes unlikely. Thus the time interval between the start of the fire and the occurrence of flashover is a major factor in the time that is available for safe evacuation of the fire area." The development of fire conditions to reach the point of flashover is a function of temperature rise over time. Therefore, a sufficient number of fire stations strategically located to provide quick response times could reduce the incidence of flashover, thus saving lives and property. As shown in the graph in Figure 5, flashover can occur within 9 to 11 minutes of the start of a fire. Locating fire stations to provide a total response time of six to seven minutes is advantageous, as firefighters need time after arrival to setup, lay fire hose, and gain access to the seat of the fire before they can actually begin to search for trapped occupants or extinguish the fire. This is where having enough fire stations strategically located and apparatus staffed with a sufficient number of firefighters proves to be advantageous.

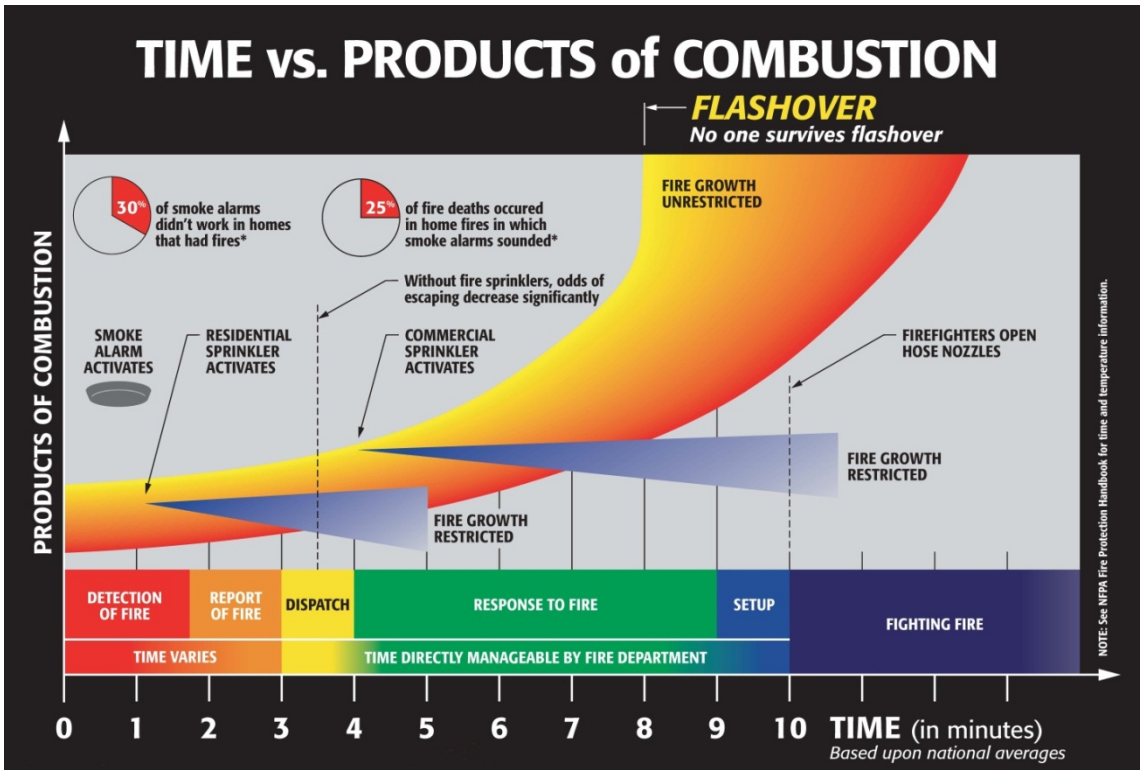

Figure 5 – Time versus Products of Combustion

Discussion of Fire Station Locations and Need for an Additional Station

McMinnville's two fire stations are well located with minimal overlap of coverage areas, but inadequate in number for the size of the area served. McMinnville needs to add a station to cover the area south of the railroad tracks toward the southwest portion of the city.

ISO determines the need for additional fire stations based on the coverage provided by existing fire stations using the largest area served by a fire station. If portions of the community exceed half of the size of the largest area served by a fire station, then the community needs an additional fire station. Station 1 covers approximately 40.55% of the service area, and approximately 29.32% of the city's ten square miles is outside the service area of either fire station. Since the area outside of either fire station's 1.5-mile response area is larger than half of the size of the area served by Station 1, the city needs another fire station per the ISO grading schedule.

It is possible for the city to relocate one or both fire stations to more evenly distribute coverage without adding a station. The city could relocate Station 2 to an area near North Chancery and New Smithville Highway, and relocate Station 1 to an area near Viola Road and South Chancery to place a station south of the railroad and improve response time to the southwest portion of the city. However, because of the layout of the city, relocating fire stations will not improve the ISO distribution score or negate the need for an additional station under the ISO grading schedule. This is important for the

city to understand because of the desire to maintain the ISO Class 3 rating. Relocating stations will not improve overall response time or help reduce the potential for flashover.

The recommended option is for the city to leave Station 2 where it is, as the current location provides good coverage. The railroad and the river are impediments to the relocation of Station 1. Relocating Station 1 to the northeast would improve coverage in the northeast corner, but would remove coverage from the "finger" area out Beersheba Highway, and possibly increase the overlap with Station 2, so there is minimal benefit to moving Station 1 too far from its current location, and Station 1 is well located the serve the central business district. The city should consider replacing Station 1 with a new building designed to serve as a fire station. Relocating Station 1 to a new lot near its current location would maintain the same coverage area, provide a new fire station, and maintain the current level of fire service while the new station is under construction.

The city should look for a suitable site for a third fire station to cover the southwest portion of the city. The site should be a minimum of two acres and located near, but not necessarily on, a major road. A minimum two-bay drive through station with bays deep enough to accommodate two pumpers in-line would serve the community for many years to come. The city could use this as an opportunity to address other space needs for the fire department, such as for office space, classrooms, and storage space, and include these in the station's design.

A fire station is an essential facility for the community and should be self-sufficient for major emergencies (power outages, ice storms, etc.) and immediately occupiable following an earthquake of a magnitude possible for the community, which is an M5.5 for Warren County. McMinnville has a higher than average risk for tornados (the largest tornado in the McMinnville area was an F5 that occurred in 1974 just 17.9 miles from the city center), and all new stations should have a safe room for firefighters to use during tornado warnings. A fire station is a complex building, and McMinnville should use professional architects, engineers, and builders who are familiar with the special requirements and needs for fire stations.

How Many Ladder or Service Companies Does McMinnville Need?

A community needs a ladder company when it has at least five buildings that are three stories or more than thirty-five feet in height, or five or more buildings with a needed fire flow greater than 3,500 gpm, or a combination of five buildings meeting these criteria. McMinnville has enough buildings to require a ladder truck under ISO requirements. ISO states that if the community does not need a ladder company, a service company is then required. A service company carries the same tools and equipment as a ladder company, but does not have the aerial ladder. Based on ISO's requirements for distribution, McMinnville needs one ladder company and one service company. The fire department has one ladder company at Station 1 and receives partial credit for a service company. The map in Figure 6 shows the 2.5-mile coverage area for Truck 1.

The fire department has two quints, which helps with ISO credit by providing aerial ladder capability and partial credit for an aerial ladder where a ladder is not required, i.e. a service company. A quint is a fire apparatus that carries a pump, water tank, required fire hose load, carries extension ladders, and has an aerial ladder device. Provided the apparatus carries all the required tools and equipment, and has all of the required annual tests, ISO gives quint apparatus up to full credit for an engine company and up to half credit for a ladder company. Tower 1 and Engine 6 are quints. The city should continue to use a quint as the required truck company because a quint provides the additional pump capacity needed to meet the required 3,500 gpm of available pump capacity while serving as the required truck company.

Figure 6 – 2.5 Mile Response Area of the Tower Ladder Truck at Station 1

Apparatus

McMinnville has three first line units, meaning apparatus that is staffed and equipped for immediate response. The fire department has two reserve, or backup, apparatus. ISO requires that a community have at least one reserve engine and ladder truck for every eight, or fraction thereof, required engines or ladder trucks, and the fire department complies with this requirement. NFPA Standard 1901 recommends that properly maintained fire apparatus that is fifteen years or older be placed in reserve service, and apparatus more than twenty-five years old not be used for emergency response. Older apparatus lacks the safety features and operational capabilities found on newer apparatus, such as enclosed seating areas, auxiliary braking systems, reflective striping, improved warning light requirements, and increased tip load requirements for aerial devices.

Apparatus	Year Built	Age	Type	Move To Reserve Service	Retire from Emergency Service	Estimated Replacement Cost
First Out Apparatus						
Engine 1	2003	9	Tower	2018	2028	$1,300,000
Engine 7	1989	23	Engine	2004	2014	$550,000
Engine 8	1993	19	Engine	2008	2018	$550,000
Reserve Apparatus						
Engine 5	1972	40	Engine	1987	1997	$550,000
Engine 6	1978	34	Engine	1993	2003	$800,000

Table 3 – Age of Fire Apparatus

The city performs maintenance and repair on the fire apparatus and maintains maintenance records. McMinnville has two first out pumpers that are more than fifteen years old. All reserve apparatus exceed the recommended maximum age for the apparatus to be used for emergency service (see Table 3). The city should implement a program to replace apparatus on a fifteen year/twenty-five year life cycle so that the city can budget for this capital expense and the fire department can develop specifications in a timely manner. The city should retain properly maintained and serviceable apparatus that reaches the age of fifteen years as reserve apparatus. Once apparatus reaches the age of twenty-five years, the city should retire the apparatus from service. The city may consider retaining older apparatus with possible historical value, for public relations, parades, or other non-emergency service. For liability reasons, if the city elects to dispose of older apparatus, the city should make sure that it does not sell the apparatus to another fire department for use in emergency service.

MTAS recommends that the city place Engines 7 and 8 in reserve service as soon as practical and possible, and take Engines 5 and 6 out of service as soon as practical and possible.

Summary

The residents and business community of McMinnville is well served by the McMinnville Fire Department as evidenced by the Class 3 ISO rating. However, the fire department has needs in the area of equipment, apparatus, and facilities. Immediate challenges include replacement of older fire apparatus, whether to add a fire station, whether to relocate stations, and a decision on the replacement of Station 1.

The apparatus fleet is aging, and the city should move the two first line engines to reserve service now. In less than six years, the city should move Tower 1 to reserve service. One of the first line engines, Engine 7, if moved to reserve service, should be retired from service in 2014. This means the city needs to replace the entire first line fleet in a very short time frame. The two reserve apparatus are long past the point where they should have been retired from emergency service. The need to replace so much apparatus places a financial burden on the community, and the city should develop a formal apparatus replacement program to plan for and fund the replacement of fire apparatus now and in the future.

Three fire stations will best serve the community. Stations 1 and 2 are well located, and MTAS recommends that the city leave Station 2 where it is, and relocate Station 1 to a new location very near its present location. This option maintains current response districts and response times. The city should construct a new fire station to serve the southwest portion of the community. Station 2 needs to have an emergency generator and other upgrades to make the station functional as an essential facility and to improve occupant safety. The city should hire architects familiar with the special requirements for fire stations to design all new fire stations.

The fire department has an authorized strength of thirty personnel, but two positions are vacant because of the economy. MTAS recognizes that the city has limited financial resources because of the economy, but the city should try to fill these positions as soon as possible. MTAS noted that the truck company does not respond on all fire calls. ISO does not award credit for apparatus that does not respond on the initial alarm, so the city is not getting full credit for this resource if it sits in the station and does not respond on the initial alarm. While research has shown that four-person crews are the most effective in fire suppression operations, many city's staff fire apparatus with three-person crews. Filling the vacant positions will give the fire chief the ability to place three personnel on the two engines and the truck, and respond the truck on the initial alarm.

All of these items requiring planning and funding. The best way to examine and prioritize these needs is through a comprehensive strategic plan. The fire department should develop a strategic plan with short and long-range goals and objectives tied to the level of risk present in the community and the level of fire protection desired. The

plan will serve as a roadmap for the city in planning for a budgeting for maintaining and improving service levels.

Recommendations

1. When financially practical and possible, fill the two vacant firefighter positions. Adopt a minimum staffing policy of three firefighters per engine and truck.
2. Adopt a response time standard for the initial arriving company that includes all components of response time. McMinnville is a perpetual organization that will outlast current leaders, and this study looks towards eventual build out, which is many years in the future. Once adopted, the response time standard will serve as a planning guide for future leaders. This study recommends a response time standard of 6:35 (six minutes, 35 seconds) for 90% of all responses, which is based upon recommendations found in NFPA Standard 1710, Standard for the Organization and Deployment of Fire Suppression Operations. The 6:35 breaks down as follows: ring time – 15 seconds, call processing time – 60 seconds, firefighter turnout time – 80 seconds, travel time – 240 seconds. Using this standard, planners would look for fire station locations to maintain a 4 minute travel time to as much of the area to be protected as possible. Track and report response time monthly. Use the table in Appendix A, showing estimated response times and travel distance times, as a resource.
3. Adopt a response time standard for the full first alarm assignment that includes all components of response time. This study recommends a first alarm response time standard of 10:35 (ten minutes, 35 seconds) for 90% of all responses, which is based upon recommendations found in NFPA Standard 1710, Standard for the Organization and Deployment of Fire Suppression Operations. The 10:35 breaks down as follows: ring time – 15 seconds, call processing time – 60 seconds, firefighter turnout time – 80 seconds, travel time – 480 seconds. Monitoring this benchmark will help community leaders determine if the fire department is meeting the desired service level for the community. Track and report this time monthly.
4. Install an NFPA compliant vehicle exhaust system in Station 2. Specify that all vehicle exhaust systems must be NFPA complaint.
5. Install carbon monoxide warning signs as required by OSHA 1910.145 in the apparatus bays. Install carbon monoxide monitors in the living spaces.
6. Provide emergency generators for Stations 1 and 2. The generator should be capable of supplying enough power to keep the facility operational during and extend disaster or other emergency where commercial power is down.
7. Place Engines 7 and 8 in reserve service as soon as possible and replace them with fire apparatus meeting the current requirements of NFPA Standard 1901. Replace all current reserve apparatus with apparatus that is less than 25 years old.

8. Plan for and construct a fire station to serve the southwestern portion of the community. Before designing the station, perform an assessment of the space needs (offices, storage, training, backup emergency operations center, etc.) for the fire department and incorporate these needs in the new station.
9. Develop a strategic plan for fire services. The plan should state the desired service level for the community, identify goals and objectives to achieve the desired level of service, identify desired performance measures to monitor progress, include a time line, and identify key individuals responsible for specific goals and objectives.

Appendix A – Estimated Travel Times and Total Response Time in Minutes

Distance To Travel in Miles	Estimated Travel Time	Ring Time	Call Processing Time	Fire Dept. Turnout Time	Total Response Time
0.25	1.08	0.25	1.00	1.33	3.66
0.38	1.30	0.25	1.00	1.33	3.88
0.50	1.50	0.25	1.00	1.33	4.08
0.75	1.93	0.25	1.00	1.33	4.51
1.00	2.35	0.25	1.00	1.33	4.93
1.25	2.78	0.25	1.00	1.33	5.36
1.50	3.20	0.25	1.00	1.33	5.78
1.75	3.63	0.25	1.00	1.33	6.21
2.00	4.05	0.25	1.00	1.33	6.63
2.25	4.48	0.25	1.00	1.33	7.06
2.50	4.90	0.25	1.00	1.33	7.48
2.75	5.33	0.25	1.00	1.33	7.91
3.00	5.75	0.25	1.00	1.33	8.33
3.25	6.18	0.25	1.00	1.33	8.76
3.50	6.60	0.25	1.00	1.33	9.18
3.75	7.03	0.25	1.00	1.33	9.61
4.00	7.45	0.25	1.00	1.33	10.03
4.25	7.88	0.25	1.00	1.33	10.46
4.50	8.30	0.25	1.00	1.33	10.88
4.75	8.73	0.25	1.00	1.33	11.31
5.00	9.15	0.25	1.00	1.33	11.73
5.25	9.58	0.25	1.00	1.33	12.16
5.50	10.00	0.25	1.00	1.33	12.58
5.75	10.43	0.25	1.00	1.33	13.01
6.00	10.85	0.25	1.00	1.33	13.43
6.25	11.28	0.25	1.00	1.33	13.86
6.50	11.70	0.25	1.00	1.33	14.28
6.75	12.13	0.25	1.00	1.33	14.71
7.00	12.55	0.25	1.00	1.33	15.13

Notes:

- Travel time was calculated using the Rand formula of T = 1.7(D) to estimate travel time, where T is time and D is the distance to be covered expressed in miles.
- The 15-second ring time, 60-second call processing time, and 80-second turnout time are based on recommendations found in NFPA Standard 1710.
- Minutes are expressed as decimal minutes: to compute seconds, multiply the decimal number by 60. For example, 3.66 decimal minutes equals 3:40 (three minutes, forty seconds).

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