

MUNICIPAL TECHNICAL Advisory Service

FAIRVIEW, TENNESSEE Fire Department Staffing Study



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Introduction and Scope of Work

City Manager Wayne Hall requested a fire department staffing study. The study's purpose is to answer the following questions.

- 1. Is the fire department appropriately staffed to provide currently targeted levels of service, and what are the target levels?
- 2. Does the fire department have sufficient resources deployed to provide these services?
- 3. Are there opportunities to redeploy personnel, to reclassify personnel, etc., that would result in improved effectiveness or efficiency in the fire department?
- 4. Is the current organizational structure designed to provide effective oversight, operations, planning, command and control?
- 5. Are there opportunities to make changes to the structure that would result in improved effectiveness or efficiency in the fire department?
- 6. Are there opportunities to enhance management systems in the fire department that would result in improvements to management, effectiveness, and efficiency?
- 7. Are service levels consistent with workload demands, industry and national standards, and locally adopted service objectives?
- 8. Are there gaps or areas of duplication in current service levels?
- 9. Can current services be provided more effectively and/or efficiently?
- 10. Is the current response network well positioned to handle future workload?
- 11. Does the fire department use an effective approach to operational line staffing and management of overtime?
- 12. Is technology used effectively?

MTAS conducted this study by review of submitted documentation, field study work involving interviews with Fairview personnel, and a tour of the service area.

Nothing in this report is a negative reflection of the Fairview Fire Department. The firefighters and staff are dedicated, hardworking, and respond quickly to all emergencies. This report provides an outside perspective of the city's current fire service staffing and future needs.

Background

Incorporated as a city in 1959 under a general law manager commission charter, Fairview is located in Williamson County. Fairview is part of the Nashville Metropolitan Statistical Area and is classified as a suburb with 1,000 to 10,000 inhabitants. A board of commissioners consisting of a mayor, vice-mayor, and three commissioners governs the city. Fairview has a Tennessee Economic and Community Development District certified 2015 population of 7,720, but Fairview officials, from the results of the recent special census, estimate the current population at closer to 8,020, and possibly as high as 8,800. The city covers 16.89 square miles, with a population density of 473.17 people per square mile. The community is a mix of residential, retail, commercial, and light industrial properties.

In 2015, the fire department responded to 931 calls, a rate of 2.55 calls per day, or one call every 9.4 hours (see Appendix A). In 2015, the fire department responded to a total of 49 fires of all types (structure, vehicle, grass, etc.), a rate of one fire every 7.45 days. Of those 49 fires, 23 were structure fires, a rate of one structure fire every 15.87 days. The 2015 per capita property loss from fire is \$250.66 based upon a total dollar loss of \$1,935,100. However, 2015 appears to be a year with a single large loss, as the average per capita fire loss for the previous four years is much less. The Insurance Services Office (ISO) determined that the basic fire flow for the community is 3,000 gallons-per-minute (gpm), and the community has the three engine companies needed for this basic fire flow.

The Use of the ISO Rating as an Evaluation and Planning Tool

The information on the ISO rating will assist the reader in understanding the complexities of providing modern fire protection. Communities use the ISO rating and the information provided in the Public Protection Classification Summary Report as an indicator of fire department capability, to assist in the prioritization of community needs, and to assist in the decision-making process.

The Insurance Services Office, Inc., also known as ISO, is a for-profit corporation that conducts a comprehensive evaluation of a community's ability to prevent and suppress structure fires. ISO rates a community on a scale of 1 to 10 based upon three major elements: communication (10% of the rating), fire department (50% of the rating), and water supply (40% of the rating), assesses community risk reduction efforts, and awards a Public Protection Classification, more commonly called the ISO rating. An ISO rating of Class 1 is the best (only 0.37% of the fire departments in the county have a Class 1 rating), and an ISO rating of Class 10 is equivalent to not having any fire protection. ISO sells the Public Protection Classification information to insurance companies, and insurance companies use this information as one of the components considered when setting property insurance premiums. Fairview has been rated with a classification of Class 5. Table 1 summarizes the individual scores for Fairview's most recent ISO evaluation, which occurred in January 2013.

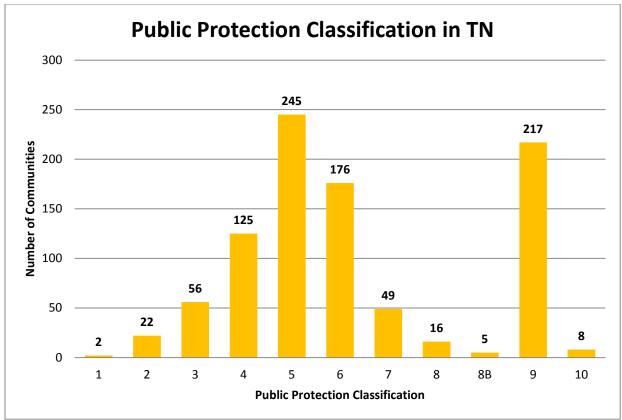


Figure 1 – Public Protection Classification (ISO Rating) in Tennessee

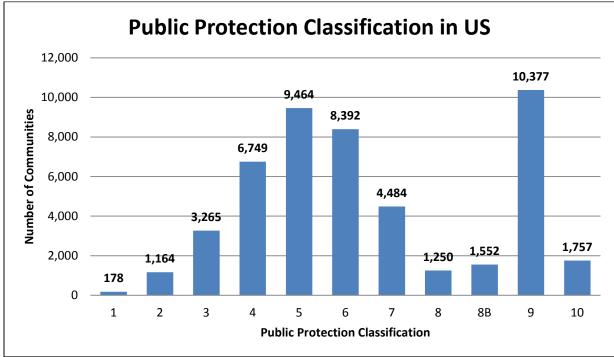


Figure 2 – Public Protection Classification (ISO Rating) in the US

	Credit Credit Percent					
	S Section	Earned	Available	Earned		
Eme	rgency Communication					
414	Credit for Emergency Reporting	2.00	2.00	100.00%		
422	Credit for Telecommunicators	2.82	3.00	94.00%		
432	Credit for Dispatch Circuits	3.25	5.00	65.00%		
440	Credit for Receiving and Handling Fire Alarms	8.07	10.00	80.70%		
	Relative Classification for Communications	2				
Fire	Department					
513	Credit for Engine Companies	7.40	10.00	74.00%		
523	Credit for Reserve Pumpers	0.71	1.00	71.00%		
532	Credit for Pump Capacity	5.00	5.00	100.00%		
549	Credit for Ladder Service	5.00	5.00	100.00%		
553	Credit for Reserve Ladder and Service Trucks	0.71	1.00	71.00%		
561	Credit for Deployment Analysis	1.67	4.00	41.75%		
571	Credit for Company Personnel	4.73	15.00	31.53%		
580	Credit for Training	4.47	9.00	49.67%		
590	Credit for Fire Department	29.69	50.00	59.38%		
	Relative Classification for the Fire Department	5				
Wate	er Supply					
616	Credit for Supply System	16.77	30.00	55.90%		
621	Credit for Hydrants	2.00	3.00	66.67%		
631	Credit for Inspection and Flow Testing	2.30	7.00	32.86%		
640	Credit for Water Supply	21.07	40.00	52.68%		
	Relative Classification for Water Supply	5				
Divergence		-1.34	-			
Tota	I Credit Earned	57.49	100.00	57.49%		
	Public Protection Classification	5				

 Table 1 – Summary of ISO Points Awarded by Element - 2014

The Class 5 rating is average (see Figures 1 and 2), as 26.607% of all fire departments in Tennessee have a Class 5 ISO rating, and 205 communities out of 921 communities in Tennessee have a better ISO rating. The Class 5 rating means the city and the fire department have taken steps to provide acceptable fire protection, and because of these efforts, Fairview residents and business owners pay competitive rates for property insurance.

ISO awards ratings on a scale of 0 to 100 points, and the range for a Class 5 rating is a score between 50.00 and 59.99 points. When ISO evaluated Fairview in January of

2013, Fairview scored 57.49 points. Individually, the communications capabilities received a score equivalent to an ISO rating of Class 2, the fire department a score equivalent to an ISO rating of Class 5, while the water service had a score equivalent to an ISO rating of Class 5.

Review of the Fire Department Section of the 2013 ISO Evaluation

This is a review of specific sections in the fire department section of the rating only, with a focus on staffing items. The section numbers referenced refer to the specific section in the ISO Fire Suppression Rating Schedule used by ISO when evaluating community fire protection.

Section 561 is the credit for deployment analysis. A community earns points for an adequate amount of fire engines, ladders, and service companies providing coverage to the developed areas of the community. All properties should be within 1¹/₂ miles of an engine company and 21/2 miles of a ladder or service company. This item also considers the equipment carried on the apparatus, the frequency of pump and hose testing, and pump capacity. ISO awarded 41.75% credit for this item, which indicates that the fire protection area needs at least one additional staffed fire station. MTAS does not have access to the actual calculations ISO made, so MTAS will provide general recommendations for improvement, such as ensuring that all engines and ladder/service companies carry all required equipment. The fire department should complete and document all required pump, hose, and ladder tests annually. Before annexing land, or developing vacant land, that is outside of the 1½-mile travel distance for an engine company and the 2¹/₂-mile travel distance for a ladder or service company, the city should consider the effect such action might have on the current level of fire protection, the fire department's ability to provide adequate service to the property and associated risk, and the ISO rating.

Credit is available in Section 561 for meeting turnout and response time standards based upon the recommendations found in NFPA Standard 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*. This is called a standard of cover, and under the standard of cover, ISO requires that the first engine must arrive on the scene within 320 seconds (5.33 minutes) of the fire department's being notified of the alarm, and the rest of the initial alarm assignment must arrive within 560 seconds (9.33 minutes). The credit received for meeting these standards may be higher than the credit based on travel distance. The communication center must have excellent records of fire department turnout time and response time in order for ISO to consider awarding credit based upon the standard of cover. However, with the size of the area served and the single staffed fire station, it is unlikely that Fairview could meet the performance criteria and therefore would not qualify for the higher credit.

Section 571 is the credit for company personnel. Firefighting is a labor-intensive job, and having adequate personnel contributes to effective firefighting operations, scene

safety, and better outcomes on fire losses. Fairview received 31.53% credit for this item. ISO awarded credit for 5.18 on-duty personnel and 4.33 on-call personnel responding on the first alarm to structure fires. For additional credit, the city would need to hire additional firefighters, which is expensive, as Fairview would need at least 19 firefighters on-duty 24/7 to receive full credit. An option to increase staffing would be to use volunteers or part-time personnel. Staffing is a local policy decision, and MTAS recommends that Fairview staff the fire department with enough firefighters to provide an effective firefighting force response on all reported structure fires.

Community Risk Assessment

It is important to determine the overall risk level in the community in order to address the issue of providing staffing for an effective firefighting force. Covering 16.89 square miles, Fairview is a community with a mix of rural and suburban areas. Fairview has a large urban growth boundary (reserve) area, and when the state legislature changes annexation laws, additional annexation and growth is likely. The highest percentage land use is low density residential, as shown in Table 2.

Occupancies can be classified, according to the risk level, as low, medium, or high risk (see Table 5 for risk descriptions and examples). Factors used in assigning a risk classification to an individual occupancy include the size of the building(s), construction type, the presence or absence of fire suppression features such as sprinklers and standpipes, the needed fire flow, the risk to life, the presence of chemicals and/or hazardous processes, and the amount of water available in relation to the needed fire flow. Table 2 contains a column with the general risk classification for the different zoning classifications. It is apparent that the majority of the land in Fairview (83.32%) is zoned for residential development. According to risk classifications, MTAS estimates that 69.22% of the occupancies are low risk, 24.74% are medium risk, and 6.04% are high risk.

Commercial occupancies include mostly retail and business uses distributed throughout the community and several industrial uses.

The ISO batch report lists the needed fire flow (the amount of water required to extinguish a fire if the building was fully involved) for every occupancy in Fairview. Table 3 lists the properties in Fairview with needed fire flows of 3,500 gpm or greater.

One of the properties listed in Table 3, Fairview High School, has a needed fire flow that is greater than 3,500 gpm. ISO classifies such properties as individual properties, and these properties require additional firefighting resources because of their increased risk. If the fire department cannot provide the needed resources, ISO applies a different ISO rating to that individual property that is different from the ISO rating applied to the rest of the community. ISO has applied a Class 9 rating to Fairview High School instead of the Class 5 enjoyed by the rest of the community. As a result, the property insurance premium for the high school is much higher than if the fire department had sufficient

resources to address the higher risk. Requiring automatic sprinkler systems for all future commercial properties will improve (reduce) the overall fire risk to the community.

Zoning Classification	Risk Level	Percent	Sq. Miles
Agriculture	Low	9.82%	1.66
General Business	Medium	4.61%	0.78
Light Industrial	High	2.25%	0.38
Multiple Family Dwelling	High	0.60%	0.1
Planned Low Density Residential	Low	0.25%	0.04
Low Density Residential	Low	59.15%	9.99
Planned Medium Density Residential	Medium	0.60%	0.1
Medium Density Residential	Medium	19.53%	3.3
Planned High Density Residential	High	2.66%	0.45
High Density Residential	High	0.53%	0.09
Totals		100.00%	16.89

 Table 2 – Land Use by Zoning Classification

ADDRESS	OCCUPANCY	NEEDED FIRE FLOW		
1601 W. Fairview Blvd	Fairview High School	4,500		
7200 Cumberland Drive	Fairview Middle School	3,500		
7612 Drag Strip Road	Tradewinds Industries	3,500		
7401 Cumberland Drive	Nashville Barrel Drum	3,000		
2714 Fairview Blvd	Fairview Recreation Center	3,000		
1407 Route 96	Deerfield Inn	3,000		
Table 3 – Properties with Needed Fire Flows of 3,000 gpm or more				

Fairview has more than five buildings over 32-feet in height, or with a needed fire flow greater than 3,500 gallons-per-minute (gpm), or a combination of five buildings meeting either of those criteria, so Fairview needs an aerial ladder truck. To receive credit, the ladder truck must respond on all reported structure fires. If the ladder truck does not respond, ISO will not award credit.

Highway 100 and Highway 96 are the major roads serving Fairview, and Fairview has easy access to Interstate 40 and Interstate 840. There are no major geographic barriers affecting the flow of traffic within the city, but the community does have many rural roads that slow the response speed of fire apparatus and increase response times.

The fire department uses an all-hazards approach to providing service to the community as evidenced by the list of emergency and essential services shown in Table 4.

Growth is occurring in Fairview, including a proposed high density residential development, a 700 home subdivision, additional apartment complexes, and

commercial occupancies. Growth increases the demand for both emergency and essential fire services, and this growth is likely to continue.

Besides fire suppression, the fire department provides other emergency and essential services to the community. For example, emergency medical calls (EMS) account for approximately 71% of the annual call volume.

Level	Service	Level	Service		
Р	Fires	Р	EMS (EMR, EMT, AEMT, EMT-P)		
Α	Confined space rescue	OPS	High angle rescue		
Α	Water rescue	Α	Trench rescue		
Р	Code enforcement	Р	Fire investigation		
Р	Arson investigation	OPS	Hazardous materials response		
OPS	Decontamination	Р	Special events stand-by/support		
Α	Structural collapse (USAR)	Р	Emergency management		
Р	Disaster response	N	Disaster recovery		
Р	Homeland security	Р	Fire prevention		
Р	Public education	Р	Smoke alarm programs		
OPS	Mass casualties	Ν	Active shooter/terrorism response		
Key:					
P = provides					
A -= provides at the awareness level					
OPS = provides at the operations level					
N = not currently provided, preparations in progress					

N = not currently provided, preparations in progress

Table 4 – Emergency and Essential Services Provided

In summary, Fairview's greatest risk by the number of risks shown is low risk residential occupancies (i.e. homes, which is where most fire fatalities occur), with medium risk residential, commercial, and institutional occupancies accounting for almost a quarter of the property in Fairview. High risk occupancies are the smallest by number, but present the greatest hazard to the fire department because the fire department does not have enough resources to fight a major fire in these occupancies without calling for automatic or mutual aid. The City of Fairview will continue to grow as Fairview offers an attractive, well-managed residential community with aesthetic design, has sufficient undeveloped land for planned residential and commercial growth, is conveniently located near Nashville, and has easy access to major transportation routes.

Current Staffing Levels

The city employs 14 full-time personnel and 15 volunteer firefighters (the number of volunteer firefighters fluctuates up or down by one to three members monthly). Volunteer firefighters receive a nominal fee of either \$50 or \$125, depending upon their level of training and certification, for working a 12-hour shift. Not all of the volunteers can fill a shift because they are new and still going through training. The fire chief and

training officer are trained firefighters and respond to fires and other emergencies as needed. Full-time firefighters work rotating shifts and staff the main fire station on Bowie Lake Road. Each shift works 48-hours on duty with 96-hours off-duty. The fire department has a minimum staffing level of three firefighters, which is not sufficient to meet the OSHA 2-in/2-out requirement. The department does not have a sufficient overtime budget, or other methods, to maintain minimum staffing levels throughout the year. Staff officers work 40-hour weekday shifts and are subject to call-out at other times.

On-duty staffing levels are not sufficient to respond an effective firefighting force to a low risk structure fire, much less to respond to a fire in a commercial or industrial occupancy. Government, community, and fire service leaders across the country have debated minimum staffing levels for decades. Factors involved in determining adequate staffing levels include, but are not limited to, community risk, available financial resources, the level of fire service response desired in the community, and the level of safety desired for residents and firefighters. While the decision on staffing levels is a local one, there are guidelines that city, community, and fire service leaders should use to determine the minimum staffing level. Fairview does not have enough on-duty personnel to respond to even one fire at a time, meaning that when two fires, or a fire and another emergency, occur simultaneously, the fire department does not have enough resources to respond adequately to both incidents. Table 5 and Figure 3 provide a breakdown of what is considered an adequate response for a low risk structure fire.

Initial full-alarm structure fire assignment per NFPA 1710, § 5.2.4.2.2			
5.2.4.2.2		Minimum	
Sub-section	Function	Number	
(1)	Incident command	1	
(2)	Pump - supply engine and attack engine	2	
(3)	Two hand lines with 2 firefighters each	4	
(4)	Hand line support, 1 for each hand line	2	
(5)	Search and rescue	2	
(6)	Ventilation	2	
(7)	Aerial device operator	1	
(8)	Rapid Intervention Team (RIT)	2	
	Total	16	
Table 5 – NFPA Recommended Minimum Response for House Fire			

In 1966, NFPA Standard 197, A Training Standard on Initial Fire Attack, stated, "*The desirable number of men normally required to respond with the apparatus to give this level of performance with properly manned hose streams and equipment would be approximately fifteen plus the chief.*" NFPA Standard 1710 replaced NFPA Standard 197 in 1979, but the idea of a minimum of fifteen firefighters plus an incident commander as a valid minimum number of personnel for the initial alarm has withstood the test of time. Various agencies have conducted many studies over the years

regarding the number of firefighters needed to extinguish a fire, and there is consensus among NFPA, ISO, and the International City/County Management Association (ICMA) that a low-risk structure fire requires between fourteen to nineteen firefighters for effective operations. A single-family dwelling is an example of a low-risk structure fire. For example, ISO gives full staffing credit for a response of nineteen personnel. NFPA recommends a minimum of sixteen as shown in Table 5 and Figure 3. Though Fairview has not adopted NFPA 1710, the standard is an industry best practice and is a useful guideline for staffing fire ground operations.

The response level described above is for a residential structure fire of a home of about 2,000 square feet with no basement or exposures. This would be a "typical" low risk structure fire, which represents about 59.4% of the community. NFPA 1710 Section 5.2.4.2.3 states that higher risk occupancies (schools, hospitals, apartments, commercial properties, etc.) require more resources, which means more apparatus and personnel. Table 6 is from the NFPA Fire Protection Handbook and shows the minimum response recommended for different risk levels.

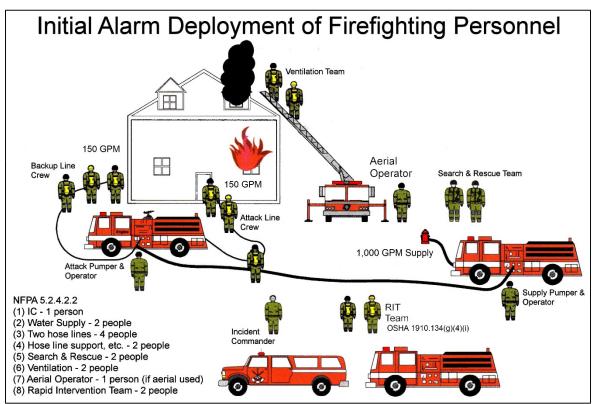


Figure 3 – Initial Alarm Deployment of Firefighting Personnel

Section 2000 of the ISO FSRS classifies properties with needed fire flows in excess of 3,500 gpm as individual properties. Fairview has one property, Fairview High School, with a high needed fire flow that qualifies the property as a high-hazard occupancy, which calls for the response of a greater amount of fire resources on the initial alarm (Table 3). While Fairview has an ISO Public Protection Classification of Class 5, ISO rates the individual properties separately from the community's classification. This

means that an individual property may have a worse ISO rating than the community, which means the cost for property insurance would be greater for those properties. According to ISO's FSRS, properties with a needed fire flow of 4,000 and 4,500 gpm should receive an initial alarm response of 4 engines and a ladder company (Fairview has 1 such property), 5,000 and 5,500 gpm properties should receive an initial alarm response of 5 engines and 2 ladder companies (Fairview currently has no such properties), and 6,000 gpm or more properties should receive an initial alarm response of 6 engines and 2 ladder companies (Fairview currently has no such properties).

A *standard of cover* is a document that identifies local risks and defines the appropriate response level for the given risk based on the hazard, needed fire flow, life risk, and other factors. Local leaders must decide on a level of fire protection for their community, balancing the cost of providing the service against the lives and property at risk. To make this decision, it is important for the leaders to understand both the level of risk in the community and the minimum response recommendations for those risks.

Typical Initial Attack Response Capability Assuming Interior Attack and Operation Plus Command Capability				
Risk	Description	Personnel and Apparatus		
High-hazard Occupancy	Schools, hospitals, nursing homes, explosive plants, refineries, high-rise buildings, and other high life hazard or large fire potential occupancies	At least 4 pumpers, 2 ladder trucks (or combination apparatus with equivalent capabilities), 2 chief officers, and other specialized apparatus as may be needed to cope with the combustible involved; not fewer than 24 firefighters and 2 chief officers. Extra staffing of units first due to high-hazard occupancies is advised. One or more safety officers and a rapid intervention team(s) are also necessary.		
Medium-hazard Occupancy	Apartments, offices, mercantile, and industrial occupancies not normally requiring extensive rescue or firefighting forces	At least 3 pumpers, 1 ladder truck (or combination apparatus with equivalent capabilities), 1 chief officer, and other specialized apparatus as may be needed or available; not fewer than 16 firefighters and 1 chief officer, plus a safety officer and a rapid intervention team.		

Typical Initial Attack Response Capability Assuming Interior Attack and Operation Plus Command Capability			
Risk	Description	Personnel and Apparatus	
Low-hazard occupancy	One, two-, or three-family dwellings and scattered small businesses and industrial occupancies	At least 2 pumpers, 1 ladder truck (or combination apparatus with equivalent capabilities), 1 chief officer, and other specialized apparatus as may be needed or available; not fewer than 14 firefighters and 1 chief officer, plus a safety officer and a rapid intervention team.	
Rural Operations	Scattered dwellings, small businesses, and farm buildings	At least 1 pumper with a large water tank (500 gal or more), one mobile water supply apparatus (1,000 gal or larger), and other specialized apparatus as may be needed to perform effective initial firefighting operations; at least 12 firefighters and 1 chief officer, plus a safety officer and a rapid intervention team.	
Additional Alarms		At least the equivalent of that required for rural operations for second alarm; equipment as may be needed according to the type of emergency and capabilities of the fire department. This may involve the immediate use of mutual-aid companies until local forces can be supplemented with additional off- duty personnel. In some communities, single units are "special called" when needed, without always resorting to a multiple alarm. Additional units may also be needed to fill empty fire stations.	
Source: NFPA Fire	Protection Handbook 20th E	dition- Table 12.1.1, Page 12-12	
Table 6 – Typical Initial Attack Response Capability			

Fairview may not have the financial resources to hire additional full-time personnel to provide that level of response to a structure fire, but the city is now aware of the need for adequate staffing levels and should consider ways to increase staffing levels. The fire department should prepare a staffing plan that includes estimated costs and options

for phasing in additional staffing to achieve a staffing level proportionate with the community's risk. The use of part-time paid firefighters is a viable option for providing additional personnel at a lower cost as part-time personnel would not receive full-time benefits. A sufficient number of part-time firefighters and/or additional volunteer firefighters allows flexible staffing plans to reduce the use of overtime, but the current number of volunteer personnel is insufficient to guarantee availability when needed. Fairview, as do other combination fire departments, struggles with volunteer retention and has a high turnover rate, meaning the department is constantly training new firefighters. The turnover rate for Fairview's volunteer firefighters is between 25% and 50%. Part-time firefighters have higher retention rates than volunteers, and have the advantage of regular training with full-time firefighters while on-duty.

Fairview has automatic aid agreements with neighboring fire departments. Automatic aid is assistance dispatched simultaneously with the primary fire department. Fairview uses automatic aid agreements (ISO recognizes personnel responding on automatic aid, but not mutual aid) to increase the number of trained firefighters on the scene of a structure fire, but this method takes more time to assemble an effective firefighting team consummate with the occupancy at risk (see Appendix B for estimated response and travel times based on travel distance). Neighboring fire departments may be reluctant to enter into automatic aid agreements because the call volume in Fairview may be higher than the call volume in their city, which means the automatic aid might take the companies out of their city more times than Fairview companies would be responding to their city. This makes automatic aid agreements unattractive for those communities.

Mutual aid is assistance requested after the primary fire department arrives on the scene and discovers that there is a fire. Fairview uses the model mutual aid agreement found in Tennessee Code Annotated § 58-8-101 to cover mutual aid responses.

Staffing Study Results

1. Is the fire department appropriately staffed to provide currently targeted levels of service, and what are the target levels?

The answer to this question is no. Fairview has not yet defined targeted levels of service based on risk: the fire department simply does not have enough resources to meet even the minimum response level of sending two engines, a ladder company, and an incident commander to a low risk structure fire. A minimum staffing level of three firefighters is insufficient to allow the fire department to comply with the 2-in/2-out requirement found in OSHA 29 CFR 1910.134(g)(4)(i) without the firefighters on the scene waiting for the response of off-duty, volunteer, or mutual aid resources. The fire department does comply with the OSHA 2-in/2-out requirement, but there is a considerable delay at times before the fourth firefighter arrives on the scene.

In the interviews with Fairview staff, the objective mentioned related to fire department service delivery was to protect the current Class 5 ISO rating, and a

desire to improve services and obtain a Class 3 ISO rating. The community rating of 57.49 points is a high Class 5 (the Class 5 point range is 50.00 to 59.99), so the current rating is not in jeopardy if all things remain the same. For the community to achieve a Class 3 rating, the fire department will need additional personnel, and other resources, and the water system will need to improve as well. Fairview does not need to chase an ISO rating, but the community does need to identify specific improvements desired in the services provided by the fire department and create a strategic plan to achieve those goals.

Improvements in services may provide an additional benefit for the community in an improvement in the ISO rating, which will result in lower property insurance premiums for all property owners. It is possible to use a formula to estimate property insurance premium savings for 1 and 2-family residential insurance policies, which is beneficial when doing a cost-benefit analysis of improving fire protection services. For example, lowering the ISO rating from Class 5 to Class 4 could result in a community-wide aggregate annual savings of between \$31,741 and \$142,833 for 1 and 2-family property owners (see Appendix D). This savings helps offset increased costs in improving fire protection. This is a low number, as it does not include the savings that commercial property owners would enjoy. Commercial policies are written individually, so it is not possible to estimate commercial property savings using a formula. A lower ISO rating helps a community recruit businesses, as insurance is a cost of doing business and lower property insurance premiums reduces annual operating costs. The estimate provided is for lowering the ISO rating by a single classification. The savings would be even greater if Fairview were to achieve a lowering of the rating by two classifications from Class 5 to Class 3.

MTAS recommends that Fairview conduct a comprehensive risk assessment and develop a standard of cover for each identified risk that defines the appropriate response level for the given risk based on the hazard, needed fire flow, life risk, and other factors. The risk assessment will quantify the actual risk levels in the community. Once the risk levels are known, the fire department should develop minimum response protocols based on the level of risk and recommend to the Commission that the Commission adopt the standard of cover as the targeted levels of service for the community. Once adopted, the fire department should develop a plan to respond an effective firefighting force to each risk level. This plan can include using Fairview Fire Department resources (on-duty, fire department administrative staff, volunteers, part-time, etc.) and automatic aid resources. The fire department should develop pre-fire plans for all commercial, institutional, and industrial occupancies and update the pre-fire plans annually.

MTAS recommends that Fairview prepare a staffing plan that includes estimated costs and options, such as increasing the number of volunteer firefighters, the use of part-time firefighters, hiring additional full-time firefighters, etc., for phasing in staffing to achieve a minimum staffing level proportionate with the community's risk.

2. Does the fire department have sufficient resources deployed to provide these services?

No. While the fire department has the required apparatus, the fire department does not have enough trained personnel to respond (deploy) the minimum effective response apparatus (2 engines, a ladder or service company, and an incident commander) and associated personnel to a reported structure fire.

MTAS recommends that Fairview review current response assignments to ensure that Fairview dispatches a sufficient number of apparatus and personnel to each property at risk based on the proposed standard of cover.

3. Are there opportunities to redeploy personnel, to reclassify personnel, etc., that would result in improved effectiveness or efficiency in the fire department?

There are too few personnel and no opportunities to redeploy or reclassify existing personnel (see the organizational chart in Appendix C). The fire chief and training officer already respond to fires and other emergencies to augment the on-duty staffing. A lieutenant does double duty as the fire inspector, and the shift captains have additional administrative duties.

4. Is the current organizational structure designed to provide effective oversight, operations, planning, command and control?

Given the current size of the fire department, yes. The fire chief's span of control and supervision is adequate for a fire department with just fourteen paid and fifteen volunteer members. The captains serve as shift supervisors and report directly to the fire chief. The training officer performs additional administrative duties to assist the fire chief in the daily operation of the fire department. The organizational structure would need to expand as the fire department expands.

5. Are there opportunities to make changes to the structure that would result in improved effectiveness or efficiency in the fire department?

Yes. The current organization structure provides an adequate span of control and supervision for the fire chief. Generally, a supervisor should supervise no more than five individuals, and the chief directly supervises four individuals. The training officer provides administrative support as needed. As the fire department grows, the organizational structure should expand to reflect growth and additional fire department functions, such as fire prevention and an expanded training program.

Fairview is growing now, and more homes, apartments, and commercial developments are already under construction and/or moving through the review and approval process. The current arrangement of a fire lieutenant serving as the fire inspector means this person is not available every day, which results in delays in

inspections or approvals on construction, or requires calling the individual in on overtime. The fire department has the opportunity to provide a position to serve as the fire marshal/fire inspector to provide the services needed to developers and contractors to keep pace with this growth. This position would be responsible for all community risk reduction (CRR) efforts, which encompasses plans review, fire inspection, code enforcement, fire investigation, and fire prevention. A strong CRR program improves safety in the community and is eligible for credit under the ISO grading schedule. The easiest fire to fight is the one that never starts, and a strong CRR program prevents fires.

A fire marshal/fire inspector position would provide additional support at the administrative level in the fire department, which would provide the fire chief with more flexibility in attending meetings and/or addressing operational issues and needs. Sometimes, because of scheduling conflicts, the fire chief cannot make a meeting or must defer an operational action because, besides the training officer, who has many duties, the chief has no one to send in his place.

6. Are there opportunities to enhance management systems in the fire department that would result in improvements to management, effectiveness, and efficiency?

Yes. The fire department should review and update standard operating procedures at least annually to keep them current and to refresh the knowledge of these procedures in all personnel. The fire department should develop and use a mix of workload and outcome based performance measures to track workload and results. The fire department has good data from TFIRS reports and should use TFIRS data, coupled with output and outcome based performance measures, in a data analysis model to support decision making. The department should use an accountability system to ensure completion of assigned duties and tasks. Training in firefighting and other emergency services is essential, and the fire department should include an educational component of management training in the department's training program to give personnel an appreciation of the complexity of providing fire services and to prepare personnel for advancement.

7. Are service levels consistent with workload demands, industry and national standards, and locally adopted service objectives?

Fairview has not defined or adopted local service objectives for minimum response, and MTAS recommends that Fairview do so. Current staffing and response levels are not consistent with industry or national standards. NFPA, ICMA, and ISO concur that somewhere between fourteen to nineteen firefighters are needed to provide an effective firefighting force on a low risk structure fire.

MTAS recommends that Fairview adopt a plan to provide a response of an effective firefighting force of sixteen personnel to a low-risk structure fire within 560 seconds (9.33 minutes) turnout and travel time on 90% of all incidents, with the first unit

arriving on the scene within 320 seconds (5.33 minutes) turnout and travel time. Turnout time is the time from when dispatch notifies the fire department of the response until the apparatus leaves the station. Travel time is the time elapsed from when the fire apparatus leaves the fire station until it arrives on the scene of the emergency. The effective firefighting force may be assembled through on-duty, oncall, and automatic aid personnel, and all personnel must respond on the initial alarm.

8. Are there gaps or areas of duplication in current service levels?

MTAS did not observe any gaps or duplication of services. In fact, personnel generally perform other duties beyond those in their job descriptions.

9. Can current services be provided more effectively and/or efficiently?

The fire department should make the most use of current technology and should consider additional technology to make the work most efficient and to provide ready access to information to assist in decision making.

10. Is the current response network well positioned to handle future workload?

No. The current annual workload is moderate, but growth is occurring and the workload will increase. Any structure fire is devastating to the property owner, and the low on-duty minimum staffing level and the extended response time of automatic aid companies contributes to greater risk to any building occupants, to the responding firefighters, and to increased property loss on structure fires.

11. Does the fire department use an effective approach to operational line staffing and management of overtime?

Yes. Overtime expense is approximately \$15,800 of a total operational budget of \$547,836. Overtime runs between 2.88% and 3.5% of the operating budget. This is less expensive than hiring an additional firefighter at approximately \$55,000 per year with salary and benefits. However, the fire department is understaffed.

12.1s technology used effectively?

The fire department is using some technology very well. For example, the fire department uses thermal imaging cameras to assist in structure firefighting operations. The fire department uses Active 9-1-1 to alert personnel of alarms. Active 911 is a digital messaging system that delivers alarms, maps, and other critical information instantly to first responders, and allows monitoring of response efforts in real time.

The fire department should explore other technology resources, such as mobile data terminals and on-line fire inspections and pre-fire planning, to improve services and efficiency.

Recommendations

Fairview should identify a key leader for the following recommendations. The key leader is responsible for initiating the review and/or implementation of the recommendation and keeping the program on track.

N⁰	Recommendation	Key Leader	Date Completed
1	Staff the fire department with enough firefighters to provide an effective firefighting force response on all reported structure fires.		
2	Prepare and submit a staffing plan to the Council that includes estimated costs and options for phasing in additional staffing to achieve a staffing level proportionate with the community's risk.		
3	Complete a comprehensive risk assessment and develop a standard of cover for each identified risk that defines the appropriate response level for the given risk based on the hazard, needed fire flow, life risk, and other factors.		
4	Once the comprehensive risk assessment is completed, the fire department should develop minimum response protocols based on the level of risk and recommend to the Commission that the Commission adopt the standard of cover as the targeted levels of service for the community.		
5	Once the Commission sets the targeted levels of service for the community, the fire department should develop a plan to respond an effective firefighting force to each risk level.		
6	Develop pre-fire plans for all commercial, institutional, and industrial occupancies and update the pre-fire plans annually.		
7	Review current response assignments to ensure that Fairview dispatches a sufficient number of apparatus and personnel to each property at risk based on the proposed standard of cover.		

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8	Review and update standard operating	
	procedures at least annually to keep them	
	current and to refresh the knowledge of	
	these procedures in all personnel.	
9	Develop and use a mix of workload based	
	and outcome based performance	
	measures to track fire department	
	productivity and results, report this	
	information to the Council, and use this	
	information in a data analysis model to	
	support decision making.	
10	Use an accountability system to ensure	
	completion of assigned duties and tasks.	
11	Include an educational component of	
	management training in the fire	
	department's training program to give	
	personnel an appreciation of the	
	complexity of providing fire services and	
	to prepare personnel for advancement.	
12	Adopt a response plan to provide an	
	effective firefighting force of sixteen	
	personnel to a low-risk structure fire within	
	560 seconds (9.33 minutes) turnout and	
	travel time, with the first unit arriving on	
	the scene within 320 seconds (5.33	
	minutes) turnout and travel time, on 90%	
	of all incidents.	
13	Explore the use of other technology	
	resources, such as mobile data terminals	
	and on-line fire inspections and pre-fire	
	planning, to improve services and	
	efficiency.	
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Appendix A – Fairview Fire Department 5-Year Response History

FIRES	2011	2012	2013	2014	2015	Average	% Average
Structure Fires (110-118, 120-123)	13	15	13	8	23	14.4	1.72%
Vehicle Fires (130-138)	8	9	8	11	7	8.6	1.03%
Other Fires (100, 140-173)	20	24	12	19	19	18.8	2.25%
Total Fires	41	48	33	38	49	41.8	5.00%
Pressure Ruptures, Explosion, Overheat (200-251)	0	0	0	1	0	0.2	0.02%
RESCUE CALLS							
Emergency Medical Treatment (300-323)	543	693	471	580	680	593.4	70.98%
All Others (331-381)	34	41	29	17	34	31	3.71%
Total Rescue Calls	577	734	500	597	714	624.4	74.69%
Hazardous Condition Calls (400-482)	16	16	13	22	15	16.4	1.96%
Service Calls (500-571)	54	77	75	65	67	67.6	8.09%
Good Intent Calls (600-671)	50	39	53	49	57	49.6	5.93%
Severe Weather or Natural Disaster (800-815)	5	9	4	3	1	4.4	0.53%
Special Incident Calls (900-911)	8	3	4	4	3	4.4	0.53%
Unknown Incident Type (UUU)	0	0	0	0	0	0	0.00%
FALSE CALLS							
Malicious Calls (710-715, 751)	0	0	1	1	0	0.4	0.05%
Other False Calls (700, 721-746)	30	19	31	29	25	26.8	3.21%
Total False Calls	30	19	32	30	25	27.2	3.25%
TOTAL CALLS	781	945	714	809	931	836	
Total Fire Dollar Loss	\$146,700	\$184,500	\$945,100	\$540,300	\$1,935,100	\$750,340	
Total Dollar Loss	\$146,700	\$184,500	\$945,100	\$540,300	\$1,935,100	\$750,340	

Calls By Incident Type (TFIRS Codes)

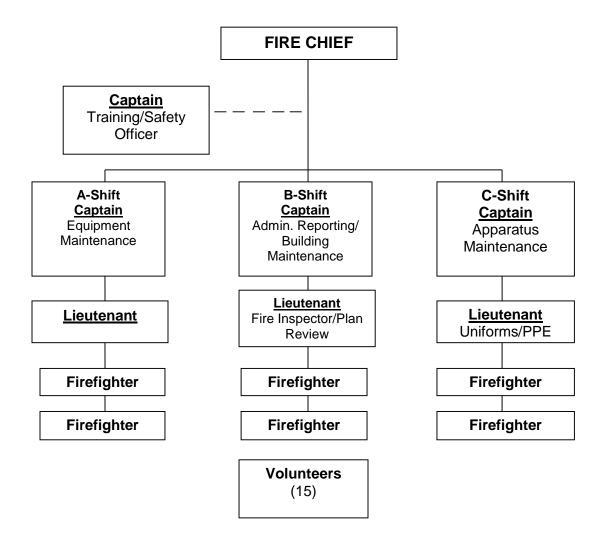
Distance To Travel in Miles	Estimated Travel Time	Ring Time	Call Processing Time	Fire Dept. Turnout Time	Estimated Total Response Time Under Ideal Conditions
0.25	1.08	0.25	1.00	1.33	3.66
0.38	1.30	0.25	1.00	1.33	3.88
0.50	1.50	0.25	1.00	1.33	4.08
0.75	1.93	0.25	1.00	1.33	4.51
1.00	2.35	0.25	1.00	1.33	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

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

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).

Appendix C – Fairview Fire Department Organizational Chart



Appendix D – Estimated Insurance Premium Savings on 1 and 2-Family Homes

Estimated 1 and 2-family	property market valu	ue in the community: \$453,439,408 *
		ssification improvement in ISO Rating
Classes 1 thru 4: 2% to 9		
Classes 5 thru 8: 5% to 1	0%, depending upo	on the insurance company
Aggregate premiums	\$1,587,037.93	
Est. % savings	2.00%	
Est annual savings	\$31,740.76	
Est 5 year savings	\$158,703.79	
Est. % savings	3.00%	
Est annual savings	\$47,611.14	
Est 5 year savings	\$238,055.69	
Est. % savings	4.00%	
Est annual savings	\$63,481.52	
Est 5 year savings	\$317,407.59	
Est. % savings	5.00%	
Est annual savings	\$79,351.90	
Est 5 year savings	\$396,759.48	
Est. % savings	6.00%	
Est annual savings	\$95,222.28	
Est 5 year savings	\$476,111.38	
Est. % savings	7.00%	
Est annual savings	\$111,092.65	
Est 5 year savings	\$555,463.27	
Est. % savings	8.00%	
Est annual savings	\$126,963.03	
Est 5 year savings	\$634,815.17	
Est. % savings	9.00%	
Est annual savings	\$142,833.41	
Est 5 year savings	\$714,167.07	
Est. % savings	10.00%	
Est annual savings	\$158,703.79	
Est 5 year savings	\$793,518.96	

* Source for the 1 and 2-family residential property value estimate (page 34): <u>https://www.comptroller.tn.gov/pa/pdf/2014TaxAggregateReport.pdf</u>