THE UNIVERSITY of TENNESSEE

MUNICIPAL TECHNICAL ADVISORY SERVICE

MT. PLEASANT, TENNESSEE

Comprehensive Fire Management Overview

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Introduction and Scope of Work

Mt. Pleasant Fire Chief Tim Smith, on behalf of Mayor Robert Shakelford, requested a comprehensive management overview of the fire department. MTAS conducted this study by a review of submitted documentation, field study work involving interviews with Mt. Pleasant personnel, physical inspection of the fire station and equipment, and a tour of the service area.

Nothing in this report is a negative reflection of the Mt. Pleasant Fire Department. The firefighters and staff are professional, dedicated, hardworking, respond quickly to all emergencies, and provide additional value-added services to the community. This report provides an outside perspective of the city's fire services and future needs.

Background

Mt. Pleasant is located in Maury County, incorporated as a city in 1824, and has a General Law Manager-Commission form of government. Mt. Pleasant is part of the Nashville-Davidson–Murfreesboro–Franklin Metropolitan Statistical Area. A city commission consisting of a mayor, vice-mayor, and three commissioners governs the city. Mt. Pleasant has a certified population of 4,561 per the 2015 Tennessee Department of Economic and Community Development census. The city covers 14 square miles and could grow based on the existing urban growth boundary, but that growth will take many years to occur. The community is a mix of residential, commercial, industrial and institutional properties, with approximately 2,278 residential units.

In 2015, the fire department responded to 1,106 calls, a rate of 2.34 calls per day (see Appendix A). In 2015, the fire department responded to a total of 27 fires of all types (structure, vehicle, grass, etc.), a rate of 2.25 fires per month. Of those 27 fires, 20 were structure fires, a rate of 1.67 structure fires per month. The 2015 per capita property loss rate from fire is $43.10. The Insurance Services Office (ISO) determined that the basic fire flow for the community is 3,500 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) 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. Mt. Pleasant has been rated with a classification of Class 3/3X. Table 1 summarizes the individual scores for Mt. Pleasant's most recent ISO evaluation, which occurred in September 2014. The ISO rating improved from Class 6/9 to Class 3/3X, an improvement of three classifications, which is a tremendous accomplishment.

The Class 3 rating is very good (see Figures 1 and 2), as only 6.08% of all fire departments in Tennessee have a Class 3 ISO rating, and just 24 communities out of 921 communities in Tennessee have a better ISO rating. The Class 3 rating means the city and the fire department have taken steps to provide good fire protection, and because of these efforts, Mt. Pleasant residents and business owners pay competitive rates for property insurance. The improved classification means an estimated savings of 2% to 9% on residential property insurance premiums. Based on this range, the estimated annual community-wide collective savings on insurance premiums for single and 2-family dwellings resulting from the improved ISO rating is between $9,633.84 (2%) and $43,352.28 (9%). Since ISO will probably not reevaluate Mt. Pleasant for at least five years, MTAS estimates the collective 5-year estimated savings conservatively at between $48,169.21 (2%) and $216,761.42 (9%) for residential property owners. See Appendix B for more details on the estimated savings. This estimate does not include the savings that commercial and industrial property owners will enjoy as each insurance company rates such properties individually, which is a consideration when evaluating the total benefit of improved fire protection for the community.

ISO awards ratings on a scale of 0 to 100 points, and the range for a Class 3 rating is a score between 70.00 and 79.99 points. When ISO last evaluated Mt. Pleasant in September of 2014, Mt. Pleasant scored 71.27 points. Individually, in September 2014, the communications capabilities received a score equivalent to an ISO rating of Class 4, the fire department a score equivalent to an ISO rating of Class 5, while the water service has a score equivalent to an ISO rating of Class 1. Mt. Pleasant is 8.73 points away from a Class 2 rating, and the fire department has indicated a desire to improve the rating if possible. With some effort, the city should be able to improve the rating upon the next ISO evaluation, which will result in an estimated additional 2% to 9% savings on property insurance premiums for one and two-family dwellings (see Appendix B for estimates on property insurance premium savings). Commercial property owners will realize savings too, but it is not possible to estimate a range of savings for commercial property owners as insurers write commercial policies individually. The Class 3 rating is an incentive for attracting commercial and industrial occupancies. MTAS does not recommend that Mt. Pleasant chase an ISO rating, but MTAS does recommend that Mt. Pleasant consider improving community fire protection to increase community safety, which may result in an improved ISO rating.

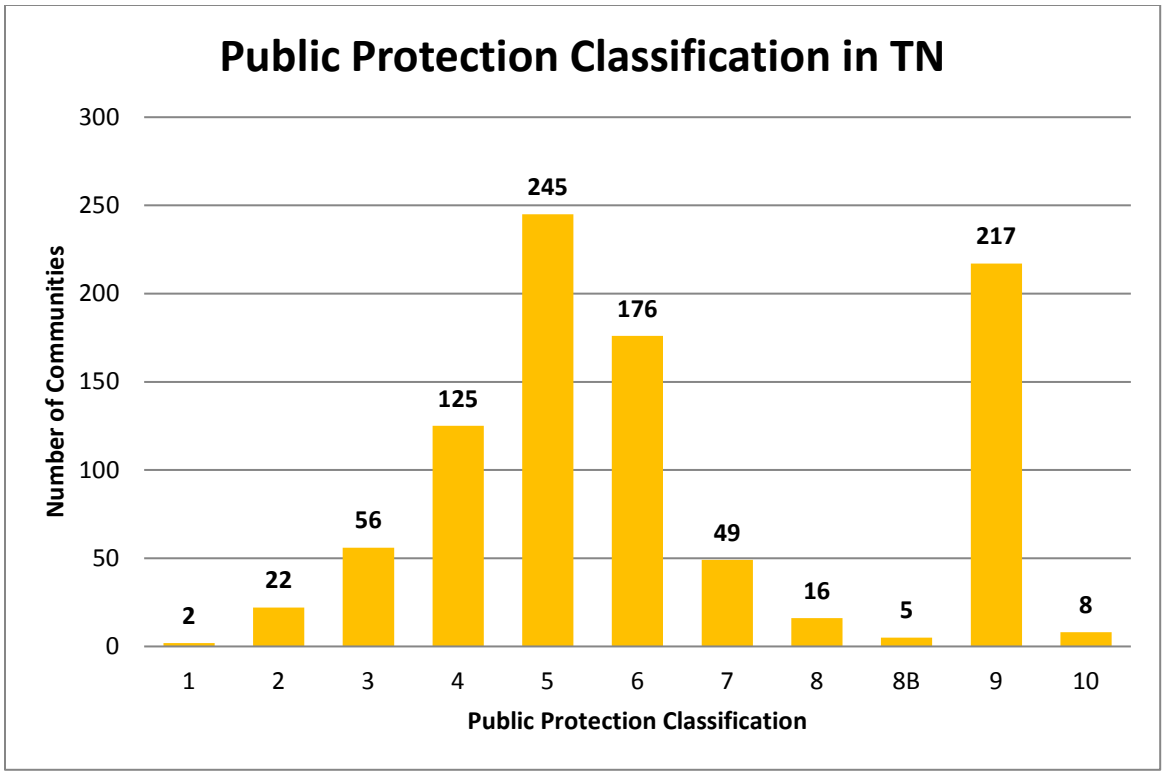


Figure 1 – Public Protection Classification (ISO Rating) in Tennessee

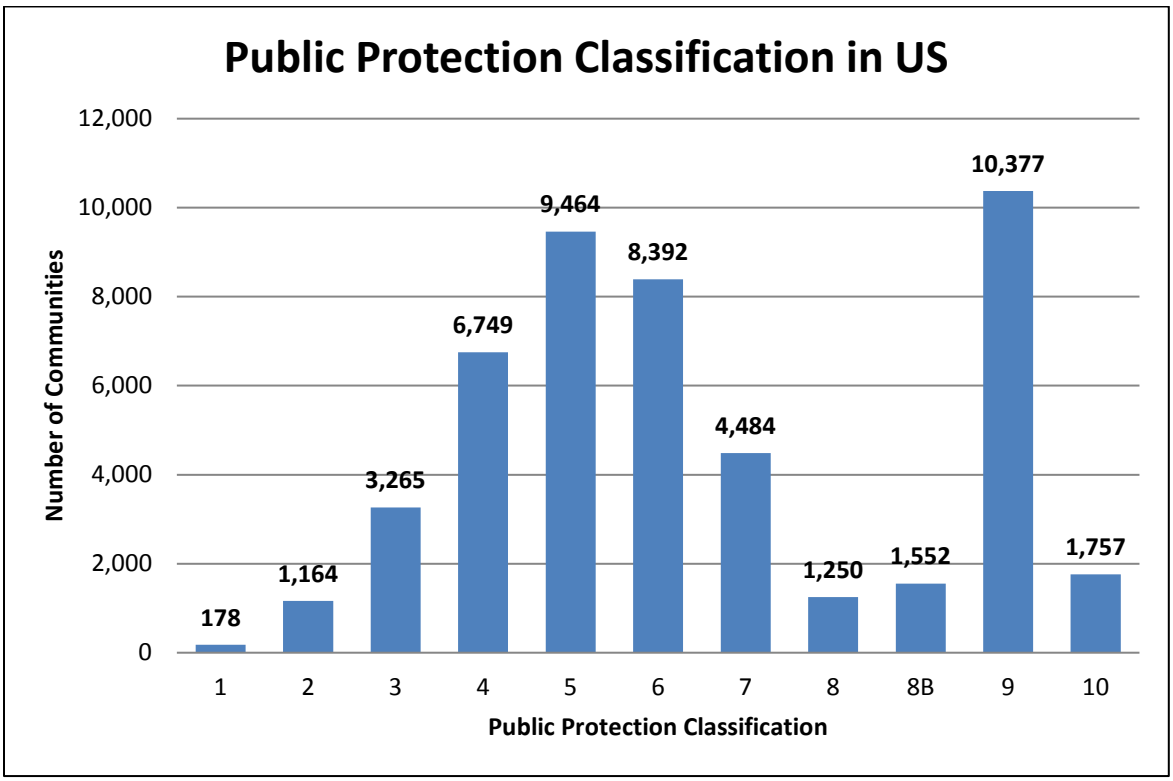


Figure 2 – Public Protection Classification (ISO Rating) in the US

FSRS Section		Credit Earned	Credit Available	Percent Earned
Emergency Communication				
414	Credit for Emergency Reporting	2.55	3.00	85.00%
422	Credit for Telecommunicators	3.20	4.00	80.00%
432	Credit for Dispatch Circuits	0.90	3.00	30.00%
440	**Credit for Receiving and Handling Fire Alarms**	6.65	**10.00**	66.50%
	Relative Classification for Communications	**4**		
Fire Department				
513	Credit for Engine Companies	6.00	6.00	100.00%
523	Credit for Reserve Pumpers	0.00	0.50	0.00%
532	Credit for Pump Capacity	3.00	3.00	100.00%
549	Credit for Ladder Service	3.94	4.00	98.50%
553	Credit for Reserve Ladder and Service Trucks	0.00	0.50	0.00%
561	Credit for Deployment Analysis	4.75	10.00	47.40%
571	Credit for Company Personnel	3.89	15.00	25.93%
580	Credit for Training	5.37	9.00	59.67%
730	Credit for Operational Considerations	2.00	2.00	100.00%
590	**Credit for Fire Department**	28.95	**50.00**	57.90%
	Relative Classification for the Fire Department	**5**		
Water Supply				
616	Credit for Supply System	28.54	30.00	95.13%
621	Credit for Hydrants	2.88	3.00	96.00%
631	Credit for Inspection and Flow Testing	7.00	7.00	100.00%
640	**Credit for Water Supply**	38.42	**40.00**	96.05%
	Relative Classification for Water Supply	**1**		
Divergence		**-7.63**	**–**	
1050	**Community Risk Reduction**	**4.88**	5.50	88.73%
Total Credit Earned		71.27	**105.50**	**67.55%**
	Public Protection Classification	**3**		

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

Review of Mt. Pleasant Fire Department ISO Evaluation

On July 1, 2013, a revised version of the ISO Fire Suppression Rating Schedule took effect in Tennessee. The new version places more emphasis on the deployment of resources, which is the number of engine companies and ladder companies available, and the location of those resources in the service area, than the previous schedule. The percentage column in the ISO summary tables shows the percent of credit received for the specified item. To improve the quality and level of fire services, Mt. Pleasant should consider improvements in the communications and fire department sections. There are areas for improvement in the water supply capability, but the system is already equivalent to a Class 1 water system, so benefits from improvements in the water supply would have minimal effect on the ISO rating. The cost for improvements in communications and the fire department may be zero to minimal, but the improvement in service levels will result in a safer community and additional savings in property insurance premiums.

Emergency Communications

Mt. Pleasant received 66.5% credit for emergency communications. For improved service and credit in emergency reporting, the communications center will need to add dynamic automatic location identification (ALI) for voice-over-Internet-protocol (VoIP) phone calls to the communications center. This will require an equipment upgrade.

For improved service and credit in telecommunicators, the communications center will need to adopt and use emergency dispatch protocols (EDP) containing questions and a decision-support process to facilitate correct call categorization and prioritization. This improvement should have minimal cost and will require training telecommunicators on the use of the protocols. If no other improvements are made and nothing else changes, the addition of dispatch protocols will raise the communications score to 7.45, which is a relative Class 3 rating for communications.

The ISO summary report did not include details on the credit awarded for dispatch circuits. A dispatch circuit is a circuit over which an alarm is transmitted from the communications center to a fire station and/or emergency response units (which can be fire apparatus that are away from the fire station and/or firefighters at or away from the fire station) to notify the fire department to respond to an emergency. Mt. Pleasant received 30% credit (0.90 points out of 3 possible) for this item. The city will need to contact ISO and request improvement statements and details on the evaluation of this section to know what needs to be done to improve service in this area.

Fire Department

Table 2 summarizes the points available, points earned, and percent of points earned for each sub-section in the fire department section of the grading schedule.

Section	Item	Credit Earned	Credit Available	Percent Earned
513	Engine Companies	6.00	6.00	100.00%
523	Reserve Engine	0.00	0.50	0.00%
532	Pump Capacity	3.00	3.00	100.00%
549	Ladder/Service Co.	3.94	4.00	98.50%
553	Res. Ladder/Service	0.00	0.50	0.00%
561	Deployment Analysis	4.75	10.00	47.50%
571	Personnel	3.89	15.00	25.93%
581	Training	5.37	9.00	59.67%
730	Operational Considerations	2.00	2.00	100.00%
590	Total Fire Department	28.95	**50.00**	57.90%

Table 2 – Summary of ISO Fire Department Points

Section 513 is the credit for engine companies. The basic fire flow for the community is 3,500 gpm, which requires that the fire department have three engine companies in service. The department has three engine companies in service. A response of two engines and a truck company to a low risk fire, such as a single-family residence, is adequate, but commercial and industrial fires require more resources. The fire department received 100% credit for this item.

Section 523 is the credit for reserve pumpers. The city needs one reserve pumper and it does not have a reserve pumper. In lieu of buying a pumper, the fire department should consider signing an interlocal agreement to share a reserve pumper owned by a neighboring department. However, this item is worth a maximum of a half-point (0.5), so other than the need for a reserve pumper if one of the fire department's pumpers goes down for maintenance, this is not a critical point item in the grading schedule.

Section 532 is the credit for pump capacity. Pump capacity is determined by calculating the total pump capacity of all engines and automatic aid engines (if any). Pump capacity should equal or exceed the basic fire flow for the community. Mt. Pleasant has adequate pump capacity (3,750 gpm total) to meet the 3,500-gpm basic fire flow and received 100% credit.

Section 549 is the credit for ladder service. Mt. Pleasant needs a service company, and the city has a service company. A service company carries all of the tools and equipment carried on a ladder company, but does not have an aerial ladder. The city received 98.5% credit for the service company.

Section 553 is the credit for reserve ladder and service companies. The fire department does not have a reserve ladder or service company and received no credit. The credit for a reserve ladder or service company is a half-point (0.5), so it may not be cost effective for Mt. Pleasant to acquire a reserve ladder or service company. Mt. Pleasant should explore the possibility of sharing a reserve ladder or service company with a neighboring fire department through an interlocal agreement. A shared reserve ladder would provide both a backup ladder truck or service company when needed for continuity of service and ISO credit.

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 1½ miles of an engine company and 2½ 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 47.5% credit for this item, which is worth 20% of the entire score for the fire department. 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 continue to carry all required equipment, which they apparently do because of the 100% score achieved on Section 513, Credit for Engine Companies. The fire department should continue to 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 2½-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 and the ISO rating.

Absent the actual details of the evaluation of deployment analysis, MTAS is making an assumption, based on the amount of credit received, that the credit was awarded based on travel distance. There is an alternate method of evaluating deployment analysis, and that is 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 is typically better than the credit based on travel distance.

The communication center must maintain excellent records of fire department turnout time and response time in order for ISO to consider awarding credit based upon the standard of cover. While it is doubtful that the fire department will qualify for this credit because of the size of the area served by a single fire station (for example, it is 4.2 miles from the fire station to Southeastern Shirt Corporation, an estimated travel time of 7:47, and an estimated total response time of 10:41), MTAS recommends that the fire department go back and evaluate and map response time performance for all structure

fires in the last 12 months against this standard to see to what extent the fire department met the performance requirements. Such an analysis will identify areas with deficient response times and the challenges that prevent the fire department from meeting the standard. The fire department should use this information to develop a plan to address those challenges and improve response times to deficient areas.

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. The fire department is a paid fire department, with both full-time and part-time personnel. ISO credits on-duty personnel on a 1-for-1 basis. ISO credits on-call personnel on a 3-for-1 basis. On-call personnel are fire department members who respond to a fire but are not at the fire station and on-duty (i.e. call back personnel, staff officers responding from home, etc.). Mt. Pleasant received 25.93% credit for this item. ISO awarded credit for 4 on-duty personnel and 4.33 on-call personnel.

The city uses mutual aid for large incidents, but does not have any automatic aid agreements with neighboring fire departments. Under automatic aid, fire resources from a neighboring fire department are dispatched simultaneously with Mt. Pleasant's resources. ISO will credit automatic aid resources towards the total resources responding, which means automatic aid personnel will increase the credit for company personnel. MTAS recommends that Mt. Pleasant consider using automatic aid agreements with neighboring departments to increase the number of personnel responding to structure fires.

Section 580 is the credit for training. The department earned 53.71% credit (4.83 points out of 9) for this item, which is a good score considering that the fire department does not have a creditable training facility, which represents 35% of the credit available for training. Table 3 summarizes the breakdown of the training credit. The reader will notice that the credit awarded by ISO (see Tables 1 and 2) is different from the credit calculated from the scores provided by ISO (Table 3). ISO awarded 5.37 points (59.67% credit), and MTAS is not able to explain the discrepancy.

Every fire department needs access to a training facility to train. For maximum ISO credit under Section 580A, the department needs a drill tower at least three stories in height, a burn building, and a paved training area at least two acres in size.

As a best practice that received maximum credit under section 580B, company training, the department provides sixteen hours of structural fire related training for each firefighter, including all officers, every month. All officers should have at least twelve hours of officer's classes each year and have fire officer certification.

The three areas for improvement in the training program are the lack of a training facility of any type (3.00% credit awarded), lack of training and certification of all fire officers (27.75% credit awarded), and lack of full compliance with the requirements for recruit training (26.60% credit awarded). For the maximum number of ISO points available for

recruit training, the fire department should require that new hires already have, or obtain within 12 months of their hire date, Fire Fighter II certification. According to Section 580G, "Firefighters who obtain the Firefighter I and Firefighter II designation (in accordance with the general criteria of NFPA 1001) before employment or within the first year of employment or tenure meet the intent of Section 580G." Improvements in the officer training program have already been made. The fire department achieved 100% credit for the pre-fire planning program, company training, the new and existing driver training program, and for hazmat training. The department maintains very good, complete records on all training and pre-fire planning inspections.

Fire Department		Credit Earned	Credit Available	Percent Earned	Points Awarded
581	**Training**				
580A	Facilities and Use	1.05	35.00	3.00%	0.09
580B	Company Training	25.00	25.00	100.00%	2.25
580C	Classes for Officers	3.33	12.00	27.75%	0.30
580D	New Driver and Operator Training	5.00	5.00	100.00%	0.45
580E	Existing Driver & Operator Training	5.00	5.00	100.00%	0.45
580F	Training on Hazardous Materials	1.00	1.00	100.00%	0.09
580G	Recruit Training	1.33	5.00	26.60%	0.12
580H	Pre-Fire Planning Inspections	12.00	12.00	100.00%	1.08
581	**Credit for Training**		**100.00**	53.71%	4.83

Table 3 – Summary of ISO Training Points

Recommendation: Evaluate response time performance for all structure fires in the last 12 months against the NFPA 1710 performance standard to see if the fire department met the performance requirements. If the fire department did not meet this performance standard, identify the challenges that prevent meeting the standard and develop a plan to address those challenges.

Recommendation: Consider using automatic aid agreements with neighboring departments to increase the number of personnel responding to all reported structure fires.

Recommendation: Use the ISO Public Protection Classification Summary Report as one of the resources needed to create a strategic plan for providing and improving community fire and emergency services protection. The strategic plan should include the mission, vision, core values, strategic focus areas, strategic goals, and action plans.

Recommendation: Ensure that all fire officers receive 12 hours of officer training annually in accordance with the general criteria of NFPA 1021, *Standard for Fire Officer Professional Qualifications*; NFPA 1521, *Standard for Fire Department Safety Officer*; and/or NFPA 1561, *Standard on Emergency Services Incident Management System*.

Recommendation: Pursue fire officer certification for all officers at a level commensurate with the officer's role and responsibility.

Recommendation: Improve the recruit training program by requiring that all new firefighters have or obtain Fire Fighter I and Fire Fighter II certification in accordance with the general criteria of NFPA 1001, *Standard for Fire Fighter Professional Qualifications* within the first 12 months of employment.

Recommendation: Develop a plan to provide a fire service training facility that meets the general criteria of NFPA 1402, *Guide to Building Fire Service Training Centers*.

Water Supply

The city received 96.05% credit for the water supply, which is exceptional. One item ISO did not give full credit for was fire hydrants. The city has 242 hydrants and 38 of them do not meet the American Water Works Association (AWWA) standard for hydrants that receive full credit. To receive full credit from ISO, a fire hydrant must have a 6-inch or larger branch connection and a large pumper outlet. ISO awarded 96% credit for hydrants, and replacing fire hydrants is expensive and time consuming. MTAS does not recommend that the city replace these fire hydrants unless they are defective, but MTAS does recommend that the city adopt a policy to purchase fire hydrants meeting AWWA Standard C502 for dry barrel fire hydrants for all future fire hydrant installation or replacements. The water system received full credit for inspection and flow testing, and MTAS recommends that Mt. Pleasant continue with the inspection and flow testing program.

Recommendation: Adopt a policy to purchase fire hydrants meeting AWWA Standard C502 for dry barrel fire hydrants for all future fire hydrant installations or replacements.

Management and Administration

The fire department's organizational structure is typical for a suburban fire department and is functional and efficient (see Appendix D for the organizational chart). The department's mission statement is good. The fire department should develop a comprehensive vision statement and set of values that complement the mission statement and provide direction and principles for the fire department to use in developing appropriate goals, objectives, and performance measurements.

Mission Statement

> The Mount Pleasant Fire Department is accountable to our community, to our City, and to each other to protect life and property through professional services, delivered with compassion and integrity. With a foundation on the highest ethics of operation, MPFD will provide the best fire, rescue, and medical assistance to the citizens of Mount Pleasant. Because safety is primary in everything we do, we provide high-caliber training for our employees in fire suppression, fire prevention programs, firefighting, rescue, and medical procedures.

Effective management, administration, supervision, communication, and leadership are essential for the fire department to accomplish its mission, achieve its goals, and deliver quality services to its residents. The management team of the fire department includes the fire chief directly supervising the assistant chief, and the assistant chief supervises the three shift captains. The positions of training officer and public safety educator shown on the organizational chart (Appendix D) are not filled. The assistant chief serves as the training officer, and each shift has a person who is a certified public life safety educator.

The fire department uses several types of technology, including the Emergency Reporting software program for records management (i.e. training records, pre-fire plans, etc.) incident reporting (TFIRS), and data analysis. The fire department does not have computer aided dispatch (CAD) capability.

The department reports to the Tennessee Fire Incident Reporting System (TFIRS) as required by state law under FDID number 60121. Appendix A provides a five year summary of responses by incident type.

The fire department's approved operating budget for FY15 was $918,433, and the proposed budget for FY16 is $986,000. This is a 7.36% increase in the operating budget. Expenses in the personnel category increased by 5.99%. In the organizational category expenses increased by 10.51%. Other expenses, which includes capital outlay, increased by 31.25%, which was due to an increase from $32,000 to $42,000 in capital outlay. This is not a maintenance budget, as the increase in allocations more than covers the annual increase in the cost of goods and supplies because, according to the Bureau of Labor Statistics, the average inflation rate in the United States in 2015 was 0.7%. The fire department's budget increase is part of a three year plan to enable the fire department to improve the training program and to increase staff to provide a minimum staffing level of four firefighters per shift, which increases service levels in the community. The department's budget program tracks expenditures effectively to allow for efficient management of fire department programs.

Leadership of the Fire Department

Interviews with staff and observations of the fire department show a professional, customer service focused working environment. Fire department personnel have been working steadily to improve the fire department's capabilities and the services provided, and these efforts have produced a Class 3 ISO Public Protection Classification for the community. The staff and officers have considerable years of experience and are professional. Fire personnel demonstrate professionalism and a commitment to service in their duties.

Fire department leaders value training and education as evidenced by achieving 100% of the credit available from ISO on company training. The fire chief desires to increase the level of practical skills training, which will require regular access to a training facility.

The fire department is very active in the community and engages in a variety of community risk reduction programs. Fire department personnel perform fire safety inspections, pre-fire planning inspections, teach fire safety to the public, teach CPR to the public, distribute smoke alarms, and participate in many public events.

The fire chief provides opportunities for professional growth and development of personnel, as evidenced by the high number of personnel who have achieved state certification at various levels ranging from Fire Fighter I to Fire Officer III through the Tennessee Commission on Fire Fighting Personnel Standards and Education (the Commission). The department requires that firefighters achieve Fire Fighter I certification through the Commission within one year of service, and Fire Fighter II certification within two years of service. Post-secondary education is valued, and the assistant chief has a bachelor's degree in fire administration. The emphasis on training, education, and certification develops the workforce and helps with succession planning. The incentive pay program is a good way to recognize and reward the accomplishments of personnel as they progress through the certification levels.

A fire department should be diverse and reflect the makeup of the community. Presently, the fire department is all male, with 23 white males and 1 black male. The fire department should actively recruit new personnel that reflect the makeup of the community.

The fire department complies with state laws regarding the fire chief, as the chief has been appointed an Assistant to the Commissioner of Commerce and Insurance as required by Tennessee Code Annotated (T.C.A.) § 68-102-101.

On all emergency incidents, the fire department uses an incident command system that complies with National Incident Management System (NIMS) requirements. All fire department personnel have completed ICS-100 and ICS-700 NIMS training. In addition, all fire department officers and command staff have completed ICS-200, ICS-300, ICS-400, and ICS-800 NIMS training.

All firefighters operating inside a structure fire have a portable radio. This is an excellent safety practice, as it is imperative that all firefighters on the fire ground have reliable two-way communication capability. In the event of a mayday situation, such as a firefighter down, trapped, out of air, etc., all firefighters need the ability to both report a mayday and to respond to a request for help.

As an excellent safety practice, every firefighter has and uses a personal alert safety system (PASS) device when entering a hazardous atmosphere. The department complies with the OSHA 1910.134(g)(4) two-in/two-out rule by using rapid intervention teams (RIT) to enhance firefighter safety on the fire ground. However, the minimum staffing level of four on-duty firefighters presents a challenge in complying with the OSHA regulation in a timely manner while providing effective firefighting operations.

The fire department has one thermal imaging camera (TIC). The camera is used by entry teams, and by officers performing a 360 degree scene size-up. This TIC is five years old, and TICs have a life expectancy of approximately ten years. The fire department will receive a second TIC as equipment on the new aerial ladder, which is scheduled to be delivered in July 2016.

The department has a blood borne pathogens policy that complies with OSHA 29 CFR 1910.1030. There have been no infectious disease or hazardous chemical exposures involving fire department personnel within the last three years.

The fire department has a written job description for every position on the fire department, and the job descriptions are available to fire department personnel.

The fire department conducts a pre-hire evaluation on new fire personnel and the application process includes a proficiency test, review of any certifications the applicant might have, an interview panel, and an agility test. The fire department requires annual physical exams and annual agility tests following NFPA 1582, *Standard on Occupational Medical Programs for Fire Departments*.

The fire department conducts background checks on new firefighters as allowed under T.C.A. § 68-102-308.

The department verifies annually that all personnel that drive city vehicles have a valid driver's license. The city does not require immediate drug screening/testing for drivers involved in an accident while operating a city vehicle. There have been no accidents involving fire department vehicles within the last three years.

New firefighters complete the minimum state training requirements outlined in T.C.A. § 4-24-112. This law requires new firefighters to complete a 16-hour class before making their first response, and within thirty-six months to complete a 64-hour basic firefighting course and a 16-hour live firefighting course.

New firefighters are required to achieve Fire Fighter I certification through the Tennessee Commission on Firefighting and Personnel Standards and Education (Commission) within one year of employment. Twelve full-time personnel and seven part-time personnel have achieved both Fire Fighter I and Fire Fighter II certification.

The city complies with the requirements of the Fair Labor Standards Act (FLSA). Full-time firefighters work a 24-on/48-off schedule with a 28-day overtime calculation cycle.

The fire department does not have a written, formal workforce development or succession plan in place, but the department's policies of training, education, and certification have resulted in significant development of the knowledge, skills, and abilities of fire department personnel.

Recommendation: The technology associated with thermal imaging cameras has improved significantly in the last 10 years, and the fire department should consider establishing a 10-year maximum life for replacing any cameras.

Recommendation: Require immediate drug screening for all personnel driving fire department vehicles when they are involved in a motor vehicle crash.

Recommendation: Develop a workforce development and succession plan to identify future leaders, and to improve the knowledge, skills, and abilities of employees to help make them better employees.

Communication within the Fire Department and with the City

Communication within the fire department is good, and personnel use the chain of command appropriately.

Fire department staff is responsive when asked to provide information to city hall and others.

The fire department does not have a strategic plan. A strategic plan helps communicate the department's vision, mission, goals, and objectives to all members of the fire department and create a unified effort in providing fire and emergency services.

The fire chief holds an officers' meeting daily with the assistant chief and on-duty captain. These meetings facilitate open communication within the fire department and keep staff up-to-date on current issues and projects. Communications involving fire department issues are addressed by several methods as appropriate, including face-to-face, via email, and through departmental memos.

The fire department provides many emergency and essential services and needs a way to measure and communicate the depth and value of those services to all stakeholders. Performance measures report output and outcome results from the work and services provided by the department. Good performance measures allow leaders, managers,

and elected officials to evaluate and compare the department's effort against its goals and objectives and against other departments and industry standards. Performance measures are effective tools to communicate to others on the status of the department.

The fire department collects data and uses a computer based records management system to analyze the data and produce reports, and the fire department reports selected data on fire department responses, training and testing of fire department personnel, and fire inspections through the city manager's State of the City monthly report. MTAS recommends that the fire department produce a regular statistical report complete with measureable output based and performance based measures. The fire department should develop and report outcome based performance measures as well as output based measures. Examples of outcome based performance measures include the percent of time the first unit arrives on the scene within a given response time standard (i.e. 90% of the time within 6:35), percent of structure fires confined to the area of origin, percent of fire code violations cleared in 30 days, percent of fires where the cause is determined, ratio of fire loss compared to total assessed valuation of all property within the city, annual property value saved as a percentage of market value in the city, and the percentage of pre-fire plans completed/updated annually (see Appendix H for sample measures). Outcome based performance measures show results and may be compared with similar sized fire departments to assess performance. MTAS has a Tennessee Municipal Benchmarking Project that can serve as an example and resource for the development of performance measurements.

Recommendation: The fire chief should continue to hold staff meetings with the assistant chief and shift captains to discuss department issues, keep staff informed on city issues as appropriate, gauge department performance against benchmarks, monitor progress on development of the strategic plan, discuss budget administration, and improve intradepartmental communication.

Recommendation: Use the ISO Public Protection Classification Summary Report, a community risk assessment, nationally accepted guidelines, and other resources to create SMART (Specific, Measureable, Accountable, Results-oriented, and Time-bound) objectives that includes both output and outcome based performance measurements. Track and monitor service levels and provide regular performance reports to all stakeholders.

Fire Related Ordinances

Section 7-102 covers fire hydrants and specifies a minimum fire flow of 500 gpm at 20 psi residual pressure, which is in accordance with Tennessee Department of Environment and Conservation rules for the minimum fire flow required to allow a fire department engine to connect to the hydrant with the fire pump engaged. This language is perfect for protecting the water system from potential damage should a fire engine attempt to draw water from a hydrant that cannot produce a flow of at least 500 gpm, but does not address the need for adequate fire flows to protect properties that have a needed fire flow greater than 500 gpm. A needed fire flow is the amount of

water that should be available for providing fire protection at a selected location based upon the life and fire risk associated with that location.

The section also requires color coding of fire hydrants to indicate flow, which is a best practice and allows the city to receive credit towards the ISO rating for marking fire hydrants.

MTAS recommends that Mt. Pleasant include language in the ordinance, or in a separate development standard, that addresses the need for adequate fire flows commensurate with the property at risk. Sample language:

> Water mains shall be sized, and fire hydrants shall be located, to provide adequate water supplies to meet the needed fire flow for the occupancy at risk.

The adopted fire code, the 2006 edition of the International Fire Code, is not in accordance with T.C.A. § 68-120-101(B)(5)(A), which requires that the adopted code be within seven years of the most recently published version of the model code, which is the 2015 edition. Since the International Code Council (ICC) publishes codes on a three-year schedule, the city will need to adopt either the 2009, 2012, or 2015 edition of the model code. The state will adopt the 2012 edition of the ICC model codes effective August 4, 2016. The city is in the process of updating the codes.

MTAS recommends rewording the section and provides the following example language for consideration by the city.

> 7-201. Fire code adopted. Pursuant to authority granted by Tennessee Code Annotated, §§ 6-54-501 through 6-54-506, and for the purpose of prescribing regulations governing conditions hazardous to life and property from fire or explosion, the International Fire Code, 20__ edition, including Appendices B, C, D, E, F, G, H, and I as published by the International Code Council, is hereby adopted as the Fire Code of the City of Mt. Pleasant, in the State of Tennessee for regulating and governing the safeguarding of life and property from fire and explosion hazards arising from the storage, handling and use of hazardous substances, materials and devices, and from conditions hazardous to life or property in the occupancy of buildings and premises as herein provided; providing for the issuance of permits and collection of fees therefore; and each and all of the regulations, provisions, penalties, conditions and collection of fees therefore; and each and all of the regulations, provisions, penalties, conditions and terms of said fire code on file in the Office of the City of Mt. Pleasant are hereby referred to, adopted, and made a part hereof, as if fully set out in this chapter, with additions, insertions, deletions and changes, if any, prescribed in § 7-204 of this chapter. Pursuant to the requirement of Tennessee Code Annotated, § 6-54-502, one (1) copy of the international fire code and the Life Safety Code have been filed with the city recorder and are available for public use and inspection. Said International Fire Code and Life Safety Code are

adopted and incorporated as fully as if set out at length herein and shall be controlling within the corporate limits. In the event of a conflict between the International Fire Code and the Life Safety Code, the most stringent code requirement shall apply.

MTAS recommends deleting Section 7-207, as T.C.A. § 6-54-502 now requires just one (1) copy of the code be on file, and this requirement is covered in the proposed language for a new Section 7-201.

Section 7-208 references the Uniform Fire Code. The Uniform Fire Code is a different fire code, also known as NFPA 1, published by the National Fire Protection Association and is not the code adopted by Mt. Pleasant. The reference should be changed to reflect the International Fire Code, which is the code Mt. Pleasant adopted.

MTAS recommends updating Section 7-301 as shown below and deleting Section 7-303, as Section 7-201 states that a copy of both the International Fire Code and the Life Safety Code is available in the recorder's office.

> 7-301. Life safety code adopted. Pursuant to authority granted by Tennessee Code Annotated, §§ 6-54-501 through 6-54-506, and for the purpose of prescribing regulations governing conditions hazardous to life and property from fire or explosion, the NFPA 101 Life Safety Code, 20__ edition, as published by the National Fire Protection Association, is hereby adopted and incorporated by reference as part of this code and is hereinafter referred to as the Life Safety Code.

The role of the fire department has changed significantly over the years. A fire department is no longer just a "fire" department, it is an "all hazards" department, providing emergency and essential services related to fires, EMS, hazardous materials, emergency management, technical rescue, etc. The six objectives listed in Section 7-402 are still valid, but they date to at least 1984 and do not reflect the all hazards mission of the fire department. MTAS recommends that Mt. Pleasant consider revising this section with a broader list of objectives, as suggested below, that reflect the current all hazards mission of the fire department.

> 7-402. Objectives. The fire department shall have as its objectives:
>
> (1) To prevent uncontrolled fires from starting.
> (2) To prevent the loss of life and property because of fires.
> (3) To confine fires to their places of origin.
> (4) To extinguish uncontrolled fires.
> (5) To prevent loss of life from asphyxiation or drowning.
> (6) To perform such rescue work as its equipment and/or the training of its personnel makes practicable.
> (7) To provide emergency medical care at the highest level that the equipment and training of the personnel makes practicable.

(8) To provide code enforcement and building inspections as directed by the city within adopted codes and ordinances.
(9) To serve as the emergency management agency of the city.
(10) To protect the health and safety of the citizens from the transportation, storage, or manufacture of hazardous materials to the extent possible that the level of equipment and training will allow.
(11) To work with the water department to insure that adequate water supplies for fire protection are available.
(12) To provide public fire and life safety education materials and information to the citizens in order that they may protect themselves from harm and reduce the risk of fire in the community.

Section 7-601(3) of the fireworks ordinance exempts the Mt. Pleasant High School from "any requirement for an application, permit and permit fee for fireworks and celebratory cannon fire at Mount Pleasant High School football games." While the city may want to exempt the high school from the permit fee, MTAS believes that potential liability exists if there is no permit for the discharge of fireworks or cannon fire at a game. The purpose of a permit is to make sure that the fireworks display is safe and meets all required laws and regulations. By exempting the high school from the permit, it appears there is no inspection to ensure that the fireworks discharge will be in compliance with applicable laws and safety regulations. MTAS recommends that the sentence be changed to read as follows:

> There shall be exempt from the public display provisions of this ordinance any requirement for a permit fee for fireworks and celebratory cannon fire at Mount Pleasant High School football games, but an application and permit shall be required for said games.

Section 1021 of the new ISO Fire Suppression Rating Schedule (FSRS) evaluates the adoption and enforcement of a fire code. Maximum credit is given for adoption of the current edition (which is the 2015 edition of the International codes), and credit is pro-rated for earlier editions.

Section 1024F of the ISO rating schedule evaluates fire prevention ordinances and gives credit for ordinances governing fire lanes, fireworks, hazardous materials routes, barbeque grills, and either the wildland-urban interface or weeds and trash. For urban and suburban communities that abut wildland areas ISO expects to see both addressed by ordinance.

A review of Section 7 of the Code of Ordinances shows that:

- Section 503.3 of the International Fire Code addresses fire lanes adequately.
- Section 7-601 et al. of the code addresses fireworks adequately.
- Section 7-205 addresses gasoline trucks. Section 5005.4.4 of the International Fire Code addresses hazardous materials routes.

- Section 308.1.4 of the International Fire Code addresses the use of barbeque grills on balconies.
- Sections 304.1.2, 307.1.1, and 308.1.4 address the wildland-urban interface risk in Mt. Pleasant. The city should also enforce an abatement program for weeds and trash.
- Section 307 of the International Fire Code addresses open burning.

Recommendation: Include language in Section 7-102, in the ordinance, or in a separate development standard, that requires water mains to be sized, and fire hydrants located, to provide adequate water supplies to meet the needed fire flow for the occupancy at risk.

Recommendation: Adopt a current version of the International Fire Code and reword Section 7-201 accordingly, delete Section 7-207, and reword Section 7-208 to reflect the International Fire Code.

Recommendation: Adopt an edition of the NFPA Life Safety Code that complements the 2012 edition of the International Fire Code.

Recommendation: Update Section 7-301 as recommended in this report and delete Section 7-303.

Recommendation: Consider revising Section 7-402 with a broader list of objectives that reflect the current all hazards mission of the fire department.

Recommendation: Revise Section 7-601(3) to require an application and permit, but no fee, for fireworks displays at the high school.

Staffing Levels

The city employs 24 personnel in the fire department: 14 full-time personnel and 10 part-time personnel. To allow for vacation, sick leave, training, Kelly Days, etc., the fire department uses part-time personnel, who are certified firefighters, to cover shifts when a full-time firefighter is absent. Minimum daily staffing is four full-time personnel. All staff personnel are trained firefighters and respond to fires and other emergencies as needed. For emergency response, the department operates three rotating shifts. Each shift works 24-hours on duty with 48-hours off-duty. The fire department has a minimum shift staffing requirement of four (4) personnel per shift as shown in Table 4. Staff officers work 40-hour weekday shifts and are subject to call-out at other times.

The minimum staffing level of four is not sufficient for an effective firefighting response to a structure fire. It is good that the fire department places one person on the ladder truck to respond the ladder truck to a fire, as ISO does not credit the response of a ladder company unless it responds on the initial alarm on all structure fire responses.

Company	Fire Station	Company Officers	Drivers	Firefighters	Maximum Staffing	Minimum Staffing
Engine 1	1	1	1	1	3	3
Engine 3	1	0	0	0	0	0
Ladder 1	1	0	1	0	1	1
Car 1 (8 hr)	Not part of shift staffing, responds when needed and available					
Car 2 (8 hr)						
Totals		**1**	**2**	**1**	**4**	**4**

Table 4 – On-Duty Shift Staffing Deployment

On-duty staffing levels are less than the recommended response level for a low risk structure fire. Government, community, and fire service leaders across the country have debated minimum staffing levels for decades, and staffing levels are a local policy decision. 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. Mt. Pleasant provides four firefighters per shift as a maximum and minimum staffing level (25% of what is considered adequate for a low risk structure fire) as shown in Table 4.

ISO recognized 4 on-duty personnel and 4.33 on-call personnel responding to structure fires. With the 3:1 ratio for on-call personnel, this response equates to credit 5.44 firefighters, and ISO subtracts one on-duty person for the role of incident commander. Actual on-duty response (4 personnel) is 25% of the recommended number of sixteen firefighters for a low-risk structure fire, as shown in Table 5 and Figure 3.

Initial full-alarm structure fire assignment per NFPA 1710, § 5.2.4.2.2		
5.2.4.2.2 Sub-section	Function	Minimum 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 Mt. Pleasant 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. NFPA 1710 Section 5.2.4.2.3 states that higher risk occupancies (schools, hospitals, apartments, commercial properties, industrial 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. Table 8 summarizes the number of apparatus and firefighters NFPA recommends for each risk level.

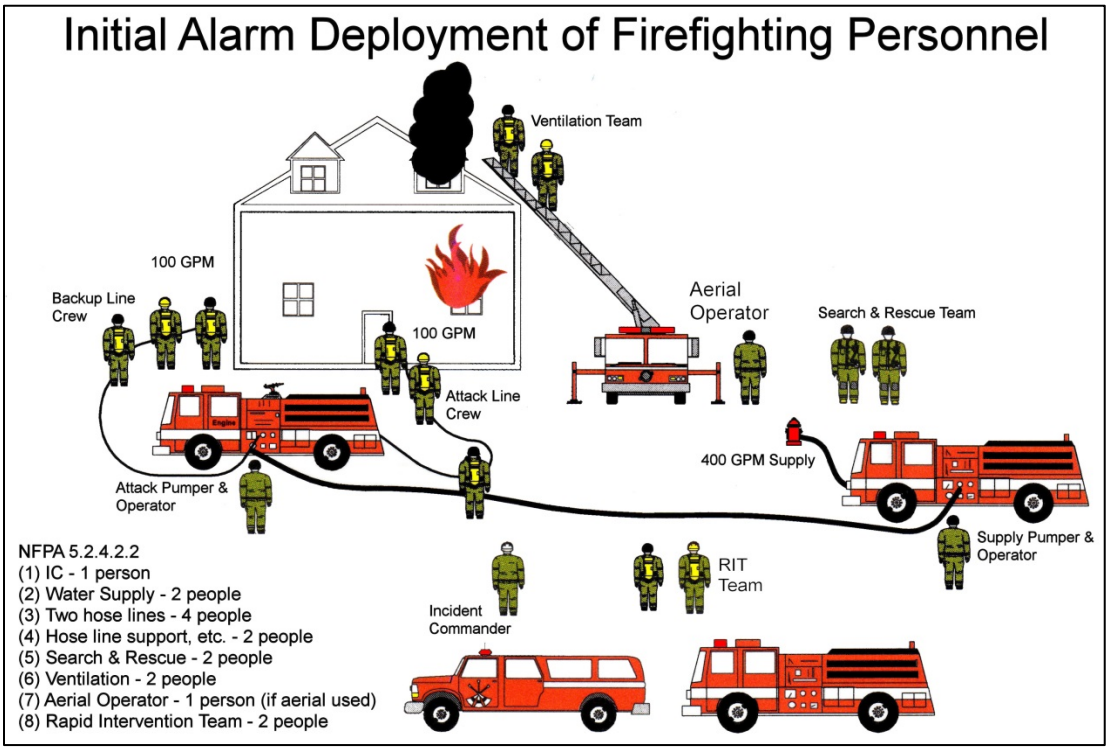


Figure 3 – Initial Alarm Deployment of Firefighting Personnel

Section 2000 of the ISO FSRS classifies properties with needed fire flows in excess of 3,500 gpm as individual properties. Mt. Pleasant has at least three properties with high needed fire flows that qualify the property as a high-hazard occupancy and therefore

require the response of a greater amount of fire resources on the initial alarm. While Mt. Pleasant has an ISO Public Protection Classification of Class 3, ISO rates the individual properties in Table 8 at a worse PPC classification, which means the cost for property insurance is greater for these 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, 5,000 and 5,500 gpm properties should receive an initial alarm response of 5 engines and 2 ladder companies, and 6,000 gpm properties should receive an initial alarm response of 6 engines and 2 ladder companies.

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 fire 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 Edition– Table 12.1.1, Page 12-12		

Table 6 – Typical Initial Attack Response Capability

It is obvious from these industry standard risk-based recommendations that the fire department is not overstaffed, and MTAS acknowledges Mt. Pleasant's current limited financial resources to hire enough paid 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 developed, and the city funded, a three year plan to reach the current minimum staffing level of four personnel per shift. The fire department should continue with this incremental approach and create a staffing plan that includes estimated costs and options for phasing in paid 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 allows flexible staffing plans to reduce the use of overtime, but the current number of part-time personnel is insufficient to guarantee availability when needed. The use of volunteer firefighters is another option. However, departments with volunteers struggle with volunteer retention and have high turnover rates, meaning the department is constantly training new firefighters. Part-time firefighters have higher retention rates than volunteers, and have the advantage of regular training with full-time firefighters while on-duty.

	High Hazard	**Medium Hazard**	**Low Hazard**
Engines	4	3	2
Aerial Ladder Trucks	2	1	1
Chief Officers	2	1	1
Firefighters	24	16	14
Safety Officers	1	1	1
RIT personnel	2	2	2
Total Personnel	**29**	**20**	**18**

Table 7 – Apparatus and Firefighters Required by Hazard Risk

Address	**Occupancy**	**Needed Fire Flow**	**ISO Rating**
500 1st Avenue	Appertain Corporation	4,500	6
400 Arrow Mines Road	Smelter Service Corp, Building 1	4,000	8
600 Greenwood Street	Maury County Board of Education	4,000	7

Table 8 – ISO Individually Rated Properties

Mt. Pleasant does not have any automatic aid agreements with neighboring fire departments. Automatic aid is assistance dispatched simultaneously with the primary fire department. Mt. Pleasant could use 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 of fifteen to sixteen personnel (see Appendix E for estimated response and travel times based on distance).

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

Recommendation: Adopt a plan to provide an effective firefighting response of sixteen personnel to a structure fire within 560 seconds (9.33 minutes) turnout and travel time on 90% of all incidents. 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.

Recommendation: Complete a community risk assessment and establish a standard of cover for each identified risk.

Recommendation: Review current response assignments to ensure that Mt. Pleasant dispatches a sufficient number of apparatus and personnel to each property at risk based on the standard of cover.

Recommendation: Consider using automatic aid agreements to provide additional firefighters on structure fire responses.

Recommendation: Prepare a staffing plan that includes estimated costs and options, such as part-time firefighters, for phasing in staffing to achieve a minimum staffing level proportionate with the community's risk.

Human Resources

The city has good job descriptions for all positions in the fire department. Job descriptions for all positions are available to all personnel.

The city has a comprehensive Personnel Rules and Regulations manual that covers all city employees. The city's manual includes policies to address typical benefits and requirements for a local government.

The fire department has a standard operating guideline (SOG) manual. The manual contains standard guidelines for personnel on many subjects and situations. The manual has a table of contents to assist in locating SOGs quickly. The manual is available to personnel in the fire station. The fire department does not provide a current copy of the manual to the city's human resources department. As a best practice, the city manager and city attorney should review the manual. As a best practice, every member of the fire department should be given, and sign for, a copy of the manual so there is no doubt that fire department members know what is expected of them.

ISO awards credit under the FSRS for established SOGs for fire department general emergency operations in the following areas. The SOGs MTAS reviewed cover all of these ten subject areas.

- response of apparatus
- operation of emergency vehicles
- safety at emergency incidents
- communications
- apparatus inspection and maintenance
- fire suppression
- company operations
- automatic-aid/mutual-aid operations
- training
- personnel response

The fire department responds on mutual aid with other fire departments, and the general orders manual should include a policy on working alongside mutual and automatic aid companies, including but not limited to incident command, common radio frequencies, fire ground safety, and common strategies and tactics.

For maximum credit, ISO requires a policy where the fire department reviews policies relating to structural firefighting annually.

Recommendation: Review and update the mutual aid policy of the standard operating guidelines manual to include guidelines on working alongside mutual and automatic aid companies, including but not limited to incident command, use of common radio frequencies, fire ground safety, and common strategies and tactics.

Recommendation: Update the standard operating guidelines manual to include a policy that addresses the annual review and updating, as needed, of structural firefighting related policies.

Recommendation: Appoint a committee of fire department members to review the standard operating guidelines manual on an annual basis and make recommendations for updates as needed.

Recommendation: Provide training and testing for competency to all fire personnel on the policies found in the standard operating guidelines manual. Every member should be familiar with its content and copies should be available readily to all fire department personnel. Provide a copy of the SOG manual to all personnel and keep a current copy in the fire station and in the human resources office. Forward updated policies to fire department personnel and human resources to keep their copies current.

Workforce Development and Succession Planning

Though the fire department uses many components of a workforce development and succession plans, such as creating individual employee development plans, the department has not formalized these practices into a formal, written workforce development and succession plan. Since the fire department has many components of such a plan, MTAS recommends that the fire department create a formal, written plan to outline current practices. Workforce development identifies human resource training needs and provides training and development opportunities for the growth of employees. Succession planning looks to the future, identifies anticipated turnover from retirements, promotions, etc., and anticipates the resulting loss of knowledge, skills, and experience. Succession planning identifies replacement candidates and preserves the organization's knowledge capital through programs that capture that knowledge in standard procedures, written manuals, and mentoring programs.

The fire department promotes training, education, and certification, and each employee participates in a process to create a personal development plan. The development plan reviews the employee's current status, identifies short and long term goals, and outlines the employee's desired career status in the organization.

The fire department is a small organization, so the loss of a single member can have a significant effect on operations. The fire department does not have much turnover, but three people left the fire department in 2015 (Table 9). Unless employees prepare for advancement, the city must go outside the organization for viable candidates. Supervisors must have the opportunity to attend advanced fire service leadership and management classes, such as classes offered at the Tennessee Fire and Codes Enforcement Academy, the National Fire Academy, accredited colleges, and on-line through accredited colleges and universities.

Calendar Year	Number of filled full-time positions	Number of full-time firefighters who left during the calendar year	Turnover Rate
2011	10	0	0%
2012	10	1	10%
2013	14	0	0%
2014	14	0	0%
2015	14	3	21.42%

Table 9 – Five Year Turnover Rate

Many personnel in the department have certification through the Tennessee Commission on Fire Fighting and Personnel Standards and Education (Commission). There are 24 members within the fire department, and Table 10 breaks down the certification for the entire department by full-time and part-time members. There are five officers in the fire department, and four of the officers have fire officer certification through the Commission. Certification through the Commission provides documentation

of individual knowledge, skills, and abilities referenced to nationally recognized standards. Certification for fire officers at the Fire Instructor and Fire Officer levels is an industry best practice. ISO now awards credit for officer certification under Section 580 of the FSRS. Tennessee state law does not require certification of firefighters or fire officers, so certification is a local policy decision.

Breakdown	Number	FF-I	Percent	FF-II*	Percent
Full-time Members	14	12	85.7%	12	85.7%
Part-time Members	10	7	70%	7	70%
* Firefighter-II certification includes Firefighter I certification					

Table 10 – Breakdown of State Firefighter Certification

The department sends personnel to the state fire academy for officer and specialized training.

The fire department provides training opportunities for supervisors and is developing a formal officer training program. Officer training includes training on knowledge and skills covered in NFPA 1021, *Standard for Fire Officer Professional Qualifications*; NFPA 1521, *Standard for Fire Department Safety Officer*; and NFPA 1561, *Standard on Emergency Services Incident Management System*. Mt. Pleasant can provide the training in-house, through programs such as MTAS's Municipal Management Academy (MMA) and the Municipal Administration Program (MAP), through classes at the state fire academy, through National Fire Academy classes, and through college courses and degree programs. The state fire academy will deliver training classes locally as long as there are enough students to make the course cost-effective, so Mt. Pleasant could host officer classes and invite other fire departments to send students.

As of July 1, 2016, the average tenure of the department as a whole is 8.85 years, and the average tenure of all shift personnel is 7.71 years. Table 11 shows the average tenure by position of all shift personnel. This represents a lot of experience at the level of driver and above, but not a lot of experience at the firefighter level. However, the recent hiring of additional personnel is the primary reason for the low average of firefighters. The assistant chief has a limited number of years with Mt. Pleasant, but has been in the fire service for many years. The average age of all personnel is 40.66 years. The department should introduce a workforce development and succession plan now to prepare younger personnel to advance in rank and responsibility as senior personnel retire, and to capture organizational knowledge and experience before senior personnel retire.

Pay and compensation are important factors to employees, as they are in every organization. MTAS's review of Mt. Pleasant's current compensation levels against several cities in Middle Tennessee showed that the compensation for fire department positions is below the range for the market average and below the median for all positions across the board (Table 10). The selected cities included in the survey were Ashland City, Columbia, Decherd, Dickson, Fairview, Hohenwald, Lawrenceburg, Lewisburg, Sparta, Spring Hill, and Winchester.

The city should develop a compensation strategy to recruit and retain employees aligned with the mission and vision of the organization. Compensation should be aligned with the knowledge, skills, and abilities needed to perform the work required to meet the city's goals and objectives. The fire department has an incentive pay program to increase compensation for firefighters who obtain additional training and skills that improves the service the fire department provides.

Use the market to determine pay increases and stay informed of market conditions. For maximum return on the investment of tax dollars, increases above market adjustments should be based on performance, with top performers receiving a higher-than-average increase. Improving an organization's compensation plan is "part of doing business," and the city should plan for and budget for changes in the compensation plan that support the goals and objectives of the city. Research the market to gather accurate pay and compensation information annually. Having a compensation philosophy in place to support the city's vision and mission contributes to the success of the city. MTAS has human resources consultants who can assist the city in reviewing existing compensation plans and in developing a long-range compensation philosophy.

Position	Lowest Years of Service	Highest Years of Service	Average Years of Service	MTAS Salary Survey Minimum Average	MTAS Salary Survey Maximum Average	Mt. Pleasant Actual Average
Firefighter	0.29	4.12	1.58	$36,233	$45,435	$29,578
Driver	1.90	18.26	10.42	$36,250	$48,351	$33,565
Captain	8.55	21.89	16.94	$40,583	$49,252	$39,312
Assistant Chief	3.31	3.31	3.31	$44,134	$51,275	$46,186
Chief	27.97	27.97	27.97	$56,522	$64,667	$48,450

Table 11 – Average Tenure and Annual Salary

Recommendation: Formalize the fire department's current workforce development and succession planning efforts into a comprehensive written plan. The fire department should work closely with the human resources director to continue to offer and develop both internal and external training programs to improve the knowledge, skills, and abilities of personnel in all positions, and prepare them for advancement and greater responsibility.

Recommendation: Establish a formal officer development and training program following the NFPA 1021 standard using as many sources for training as possible to provide the most opportunities possible. The program should be required for all officers, and available to firefighters who may aspire to be officers.

Recommendation: Establish as a job requirement that fire officers obtain a level of certification through the Commission matching their position. Company officers should achieve Fire Officer I certification, captains should achieve Fire Officer II or Fire Officer III certification, and chief and staff officers should achieve Fire Officer III or IV certification.

Recommendation: Review the city's compensation plan annually, and consider a comprehensive career development program to serve as a guide for workforce development and justification for competitive compensation. MTAS can assist the city with this recommendation.

Apparatus and Equipment

The fire department has two first out engines and one aerial ladder truck. The ladder truck has a 1,250-gpm pump, which makes it a quint, a vehicle capable of performing as both an engine and an aerial ladder truck. See Appendix G for a complete apparatus and vehicle roster.

Because of the number of square miles in Mt. Pleasant, the city needs either two ladder companies or one ladder company and one service company for maximum ISO credit. ISO requires a ladder or service company when a community has at least five buildings that are three-stories or more than thirty-two 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. Mt. Pleasant has one ladder truck, and for effective operations and full credit under the ISO grading schedule the ladder truck must respond to all structure fires. ISO refers to a "ladder company," meaning the ladder truck plus the personnel to operate the vehicle. Mt. Pleasant does not have sufficient staffing to operate the ladder truck and to perform essential fire ground operations simultaneously, which limits the effectiveness of fire suppression operations. Placing one firefighter on the ladder truck will get the vehicle to the scene, but without sufficient trained personnel, the truck is not effective and provides a visual false sense of adequate fire protection.

The fire department received 100% credit for engine companies, which is an excellent score. For maximum ISO credit and effective suppression operations, apparatus should have the appropriate inventory of tools, hose, equipment, etc., and properly documented annual hose, pump, and ladder tests.

The city has two first out engines, one first out truck company, one service company, and no reserve engine, as shown in Table 12.

Unit ID	Year	Make	Pump (gpm)	Tank (gallons)	Comments/ Condition	Year Age 15	Year Age 25
E-1	2012	Pierce	1,250	1,000	1st out, Station 1, engine/ Good	2027	2037
E-3	1987	Pierce	1,250	750	1st out MVA/Fair	2002	2012
L-1	2004	Rosenbauer	1,250	500	1st out, 60-foot ladder/Good	2019	2029
Service Company	2013	Ford F250	N/A-	N/A	As needed	N/A	N/A

Table 12 – Fire Apparatus Roster

Within the last decade, the NFPA standards covering the construction of fire apparatus have changed to reflect advances in technology, functional capability, and firefighter safety. Since the trucks are already paid for, it may seem to be cost efficient to continue to use older apparatus for first line or reserve service. However, older apparatus have few of the safety features, such as antilock braking systems, air bags, ergonomic design, and reinforced cabs, found in newer apparatus. In addition, the engine, transmission, and fire pump are old, and the pumper may have difficulty passing the annual pump test. For these reasons, it is a good business practice to plan for the depreciation and orderly replacement of fire apparatus just as other capital assets are replaced when their useful life has ended. NFPA recommends that, "Because the changes, upgrades, and fine tuning to NFPA 1901, *Standard for Automotive Fire Apparatus*, have been truly significant, especially in the area of safety, fire departments should seriously consider the value (or risk) to firefighters of keeping fire apparatus older than 15 years in first-line service." One (E-3) of the two first-out fire engines is more than 15 years old, and the capital cost to replace that engine is estimated at $550,000 (Table 13).

Unit ID	Type	Year Made	Age	Year unit should be relegated to reserve service	Year unit should be retired from service	Replacement Cost
E-1	Engine	2012	4	2027	2037	$550,000
E-3	Engine	1987	29	2002	2012	$550,000
L-1	Quint	2004	12	2019	2029	$950,000

Table 13 – Fire Apparatus Replacement Cost

Two of the apparatus are in good condition, and Engine 3 is in fair condition. Fire apparatus have a finite life, and the city should develop a plan that aligns with the city's needs, and NFPA 1901 recommendations on useful life, to fund the orderly replacement of fire apparatus.

ISO requires that a community have one reserve fire engine for every eight, or fraction thereof, required engines. The city does not have a reserve fire engine, but a cost-benefit analysis may not support the purchase of a reserve engine. The fire department should have a plan to borrow an engine if one of the first line units must be removed from service for an extended time.

Recommendation: Staff the aerial ladder truck with sufficient personnel to respond and operate the truck effectively on the initial alarm for all structure fires.

Recommendation: Establish an apparatus replacement program to fund and schedule the transition and replacement of fire apparatus on the 15 year/25 year life cycle recommended by NFPA.

Recommendation: Consider signing an interlocal agreement with a neighboring fire department to share a reserve engine and possibly a reserve ladder or service company.

Facilities

The map in Figure 4 shows the current city limits and the location of the single Mt. Pleasant fire station. The thick yellow lines represent the ISO defined 1½-mile service area for the fire station's engine company. Tables 14 and 15 summarize the age and bay capability of the fire department's facilities, their current condition, the number of square feet, and estimated replacement cost. Modern engines are generally thirty feet or more in length, so bays that are seventy feet in length or longer allow for stacking two engines in one bay, especially if one unit is a ladder truck. Door heights should be twelve feet or higher.

Station	Address	Year Built	Age	№. Bays	Bay Length	Door Height	Gender Friendly
1	1158 N Main St	1988	28	2	86’	12’	Yes

Table 14 – Mt. Pleasant Fire Station - Bays

Station	Address	Year Built	Age	Condition	Sq. Feet	Replacement Cost
1	1158 N Main St	1988	28	Good	3,000	$1,600,000

Table 15 – Mt. Pleasant Fire Station - Condition

The city has not added any fire stations since 1988 and none are projected in the next five years. The fire station itself is owned by Maury County and leased by the city. Maury Regional EMS has crew quarters and a bay for the ambulance in the building as well. The fire station does not have equipment for the removal of carbon monoxide, which is a known health risk to firefighters living and working in the fire station and to the public when they visit a fire station.

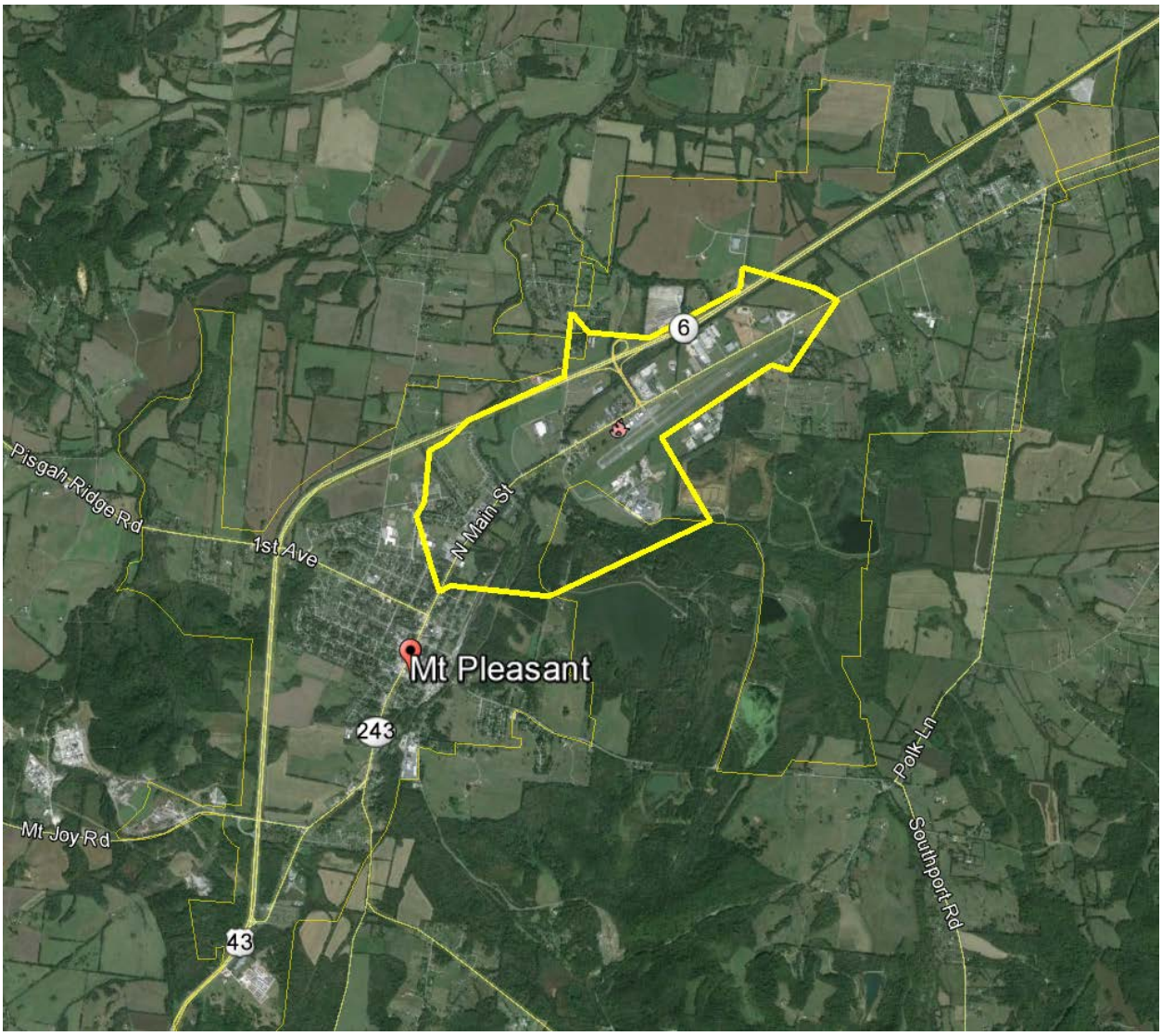


Figure 4 – City Limits and 1½ Mile Response Area for the Fire Station

Facility maintenance is adequate, with fire department personnel being responsible for daily housekeeping and some minor building maintenance issues. The fire station does not have any major maintenance issues now. Station 1 is 28 years old and has maintenance and space issues inherent with an older building. The station needs a dedicated training room as the department needs a place to hold formal training classes. The fire department administration works out of Fire Station 1, and there is a need for more administrative space.

Fire stations are critical infrastructure for a community, which means the stations must be capable of continuous operation during disasters. The station has a generator large enough to run the entire building in a power failure. Building codes classify fire stations as storage facilities, but people live in them, which makes them unique structures. In paid departments, fire stations are in use 24/7. Fire stations 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, and the station is gender friendly in compliance with T.C.A. § 4-24-301.

The fire department has an active first responder program but does not have space or facilities for decontamination of soiled/contaminated EMS equipment. The use of plastics and chemicals in the construction of homes and furnishings was minimal forty years ago. The fires firefighters fight today contaminate their turnouts with soot and chemicals that contain carcinogens. For this reason, fire departments need space for cleaning and decontamination of turnout gear, and the station does not have adequate space for this function.

Based on the size of the area served, the city needs at least one additional fire station. The exact number and placement of fire stations is outside the scope of this study, but as a rule, a single fire station can cover approximately 4.5 square miles effectively based on the ISO recommended 1½-mile travel distance for an engine company. Using this rule-of-thumb, with Mt. Pleasant's size of approximately 14 square miles, the city needs at least three fire stations. In reality, road networks and geographical features can reduce the size of the covered area, and this is the case in Mt. Pleasant. The airport, railroad, and Highway 43 by-pass present obstacles to direct response routes. Because of its location and the aforementioned obstacles, Station 1 covers just 2.22 square miles, or 49.3% of the ideal area for a standard response district for an engine company.

As a rule-of-thumb, a single ladder truck company can cover approximately 12.3 square miles based on the ISO recommended 2½-mile maximum travel distance. Mt. Pleasant has one ladder company and one service company. Mt. Pleasant needs at least one ladder company and the city has one ladder company. The ladder company must respond on all structure fires in order to receive the related ISO credit for a ladder company.

Mt. Pleasant's borders are asymmetrical, so determining the exact number and location of additional fire stations, ladder companies, and/or service companies will require a fire station location study. Recent changes in annexation laws at the state level make it unlikely that Mt. Pleasant will annex any additional land for quite some time. As an alternative to building an additional fire station, Mt. Pleasant could use an automatic aid agreement to provide service to areas that are further than 1½-miles from a fire station. For any city, the number of, and placement of, fire stations is a local policy decision.

When planning for adequate fire protection, city leaders must consider the phenomenon known as flashover. As a fire grows in size, it gives off temperatures that heat nearby objects. At some point on 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. A sufficient number of fire stations strategically located to provide quick response times might 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. Reliance on automatic aid or mutual aid response, with a response time greater than nine minutes, is inadequate except as a second alarm or backup response.

The average response time in Mt. Pleasant from dispatch to arrival is six minutes for the first unit to arrive on the scene. It is good that the fire department tracks and reports average response time, and it serves as a comparison statistic with other agencies. However, the average is the mean, which does not tell one how often the fire department arrives on the scene within six minutes. In addition to tracking average response time, MTAS recommends that the fire department track the percent of time the first unit arrives within six minutes. An industry best practice is to set a response time standard that should be met on 90% of emergency responses. Based on the performance criteria for ring time, call processing, turnout, and travel times found in NFPA 1710, MTAS recommends that the fire department adopt a performance standard of having the first unit arrive on the scene within six minutes thirty-five seconds (6:35) on 90% of emergency responses.

Recommendation: Conduct a needs assessment to determine if the current fire station contains enough square feet to meet the fire department's space needs. Use this information to develop a short and long-range facilities maintenance and replacement plan.

Recommendation: Conduct a fire station location study to assist Mt. Pleasant in planning for future fire stations to serve the community.

Recommendation: Adopt a response time standard for the community and use this standard to plan for the placement of future fire stations and service levels. 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 for Career Fire Departments*. 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.

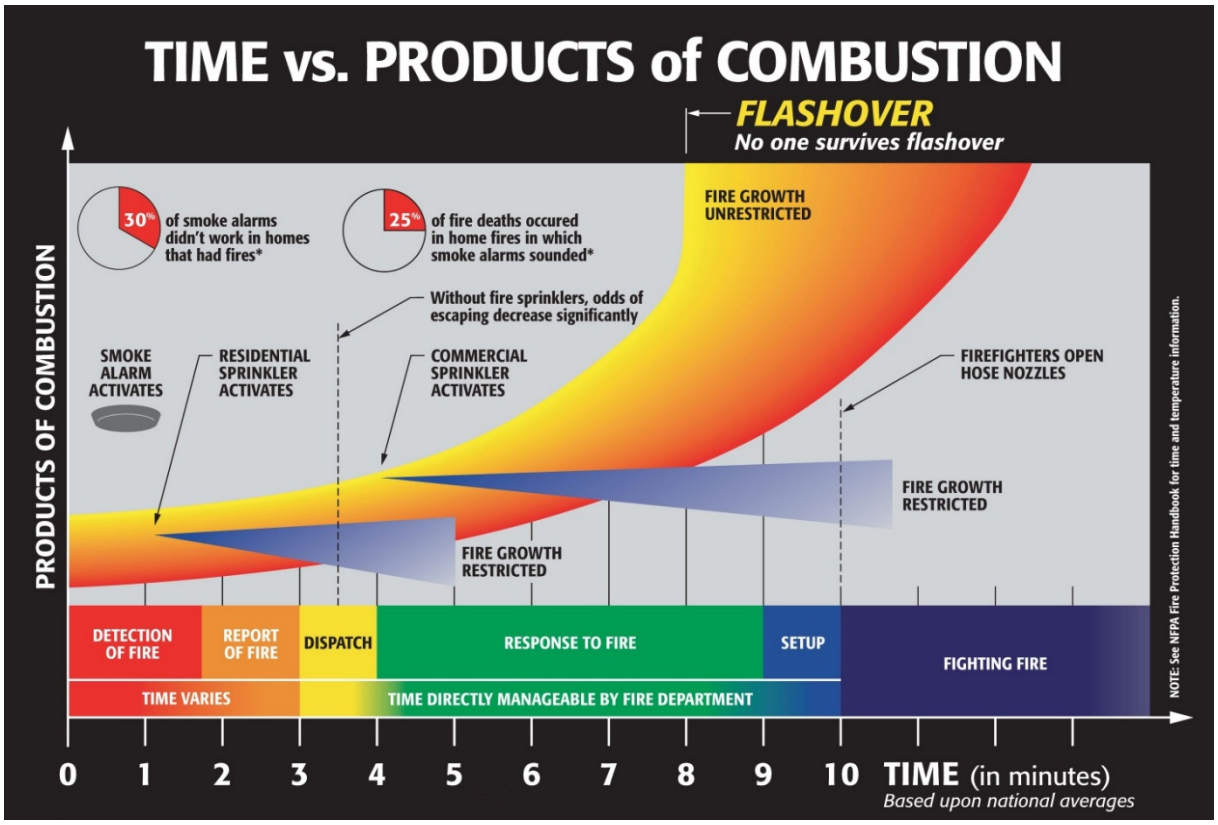


Figure 5 – Time versus Products of Combustion

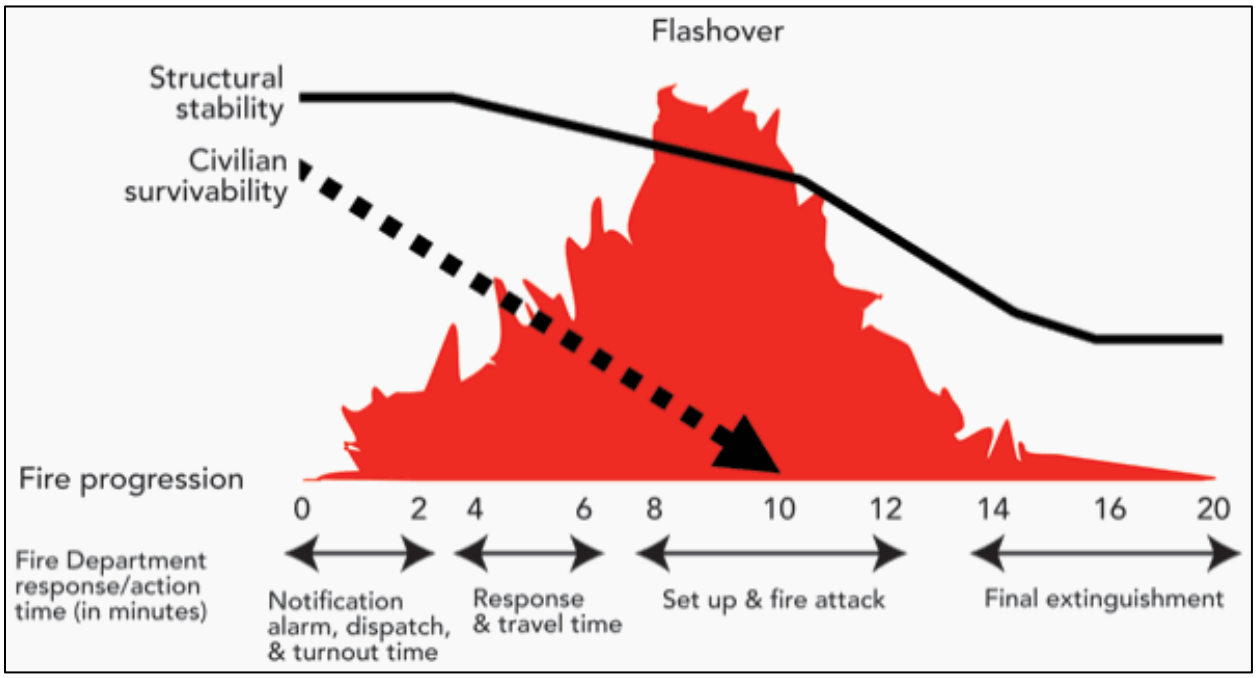


Figure 6 – Flashover, Structural Stability, and Survivability

Training

The department does not have a dedicated training officer, and the assistant chief performs many of the training duties. The position of training officer should be a staff position as the administrative and managerial duties of the assistant chief limits the ability of the assistant chief to conduct classes across the department. The position of training officer should have a rank sufficient to reflect the authority and responsibility that comes with the position, which is typically at the level of captain or higher. ISO awarded 59.67% of the training credit available, which is a good score when one considers that 35% of the credit for training requires a training center and Mt. Pleasant does not have a training center. When the possible points for the training center are removed from the equation, Mt. Pleasant received 81.01% of the credit that was available without a training center.

A training facility allows firefighters to learn and improve on the knowledge, skills, and abilities developed through hands-on practical training. For maximum ISO credit on drills, all personnel (including all officers) should receive 18 hours of structural firefighting related drill training annually at a training facility. Every firefighter should complete at least one live fire training evolution annually.

MTAS recommends that the fire department consider constructing a utility pole drill tower to use for ladder and other non-fire training drills. A three story tower with floor surface areas of about 400 square feet (20 x 20) should receive full credit from ISO as a drill tower. MTAS is aware of fire departments that were able to secure donated utility poles and discounted lumber to reduce the overall cost of such a project. Appendix C contains photos of example wooden drill towers.

For maximum ISO credit on company training, all personnel (including all officers) should receive 16 hours of structural firefighting related training each month. Fire personnel need to train in other skills as well, such as EMS and extrication, so the amount of training hours needed to cover all subjects and skills is considerable.

For recruit training, the department requires that all new paid personnel have Fire Fighter I certification from the Tennessee Commission on Fire Fighting within their first year of employment, and Fire Fighter II certification by the end of their second year of employment. For maximum ISO credit, the fire department needs to have all new firefighters complete a minimum of 240 hours of recruit training in accordance with the general criteria of NFPA 1001, *Standard for Fire Fighter Professional Qualifications*, or achieve Fire Fighter II certification from the Tennessee Commission within their first twelve months of employment.

The department conducts officer training classes, sends officers to the fire academy, and has a formal fire officer training program. It is a common misconception that many years of service and good skill as a firefighter makes a person a good fire officer. This is not always the case, as good firefighting ability is not the same as good management and leadership ability. The department has an officer development program to provide

good firefighters the opportunity to acquire the knowledge, skills, and abilities needed to be good fire officers, and six members are qualified for promotion to captain. For maximum ISO credit, since the ISO evaluation in 2014, the department requires all officers to complete at least twelve hours of classes annually that cover qualifications and skills found in NFPA 1021, *Standard for Fire Officer Professional Qualifications*. Officers should achieve state certification as fire officers (Fire Officer I through Fire Officer IV) at a level that is appropriate to their position.

The department has a formal training program for new driver/engineers meeting the requirements of NFPA 1002, *Standard for Fire Apparatus Driver/Operator Professional Qualifications*. New driver/engineers complete a minimum of 80 hours of formal classroom and practical training. Current driver/engineers complete a minimum of 12 hours of training that meets the requirements of NFPA 1002 annually.

The fire department has a good training library with current NFPA certification materials and training props. The fire department's budget includes adequate funds to keep the library current, maintain the training props, and send personnel to outside training classes and college level courses related to fire administration and fire operations.

The fire department should train on structural firefighting tactics with all mutual aid departments at least several times per year for a total of at least twelve hours.

The department has a pre-fire planning inspection program, conducts pre-fire planning inspections semi-annually, and maintains complete records on all training and pre-fire planning inspections. Training records are maintained in accordance with the general criteria found in NFPA 1410, *Standard on Training for Initial Emergency Scene Operations*. The pre-fire planning software is web based. Pre-fire plans are stored on the web and available on iPads carried in the fire apparatus. The fire department received 100% credit for the pre-fire planning program.

Recommendation: Provide 18 hours of structural firefighting drill training per firefighter and fire officer per year. The training must occur at a training facility.

Recommendation: Continue to provide at least 16 hours of company training in structure fire related subjects per month (192 hours per year) for each firefighter and officer.

Recommendation: Continue to provide at least 240 hours of recruit firefighter training for each new recruit, either in-house or through an outside agency such as the Tennessee Fire and Codes Academy.

Recommendation: Continue to provide 12 hours of leadership, management, supervisory, or incident management training per officer annually that complies with NFPA 1021, *Standard for Fire Officer Professional Qualifications*.

Recommendation: All current and new officers should achieve state certification from the state firefighting commission as fire officers (Fire Officer I through Fire Officer IV) at a level that is appropriate to their position.

Recommendation: Continue to provide a formal training program for new driver/engineers and existing driver/engineers meeting the requirements of NFPA 1002, *Standard for Fire Apparatus Driver/Operator Professional Qualifications*.

Recommendation: As part of the strategic planning process, evaluate the cost and benefits of establishing a training facility with a training tower, burn building, and drill field.

Recommendation: Provide college-level supervisory and management training for the fire chief and command staff officers. Encourage and support command staff officers to apply for and complete National Fire Academy courses.

Technical Services and Firefighter Safety

The fire department has a lot of specialized equipment, such as self-contained breathing apparatus (SCBA), rescue equipment, thermal imaging cameras, radios, and an air compressor and cascade systems. Outside vendors provide maintenance and repair of SCBA. OSHA required annual fit testing is provided by a local chemical plant using the quantitative method. Fire engines and ladder trucks are complex and require technical expertise to maintain and repair, and the fire department uses vendors for maintenance and repairs to apparatus. The department also does some of the station maintenance. The assistant chief is a certified safety officer through the Tennessee Commission on Fire Fighting, however, when the assistant chief serves as the incident commander on an emergency scene he cannot serve as the safety officer.

The department has a breathing air compressor, used to fill the cascade system SCBA cylinders used by the firefighters when fighting a fire, which meets current National Fire Protection Standards for breathing air compressors. The quality of the air is tested quarterly as required by NFPA Standard 1989.

All turnout gear and personal protective equipment (PPE) meet NFPA and OSHA standards in effect at the time of manufacture. The fire department uses a gear inspection checklist to inspect turnout gear on a regular basis. The department does not have a replacement schedule for turnout gear (coat, pants, hood, gloves, helmet, and boots). MTAS recommends that the fire department adopt a ten-year life for turnout gear, in accordance with Section 10.1.2 of NFPA 1851, *Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting*, 2014 edition, and replace the gear when it reaches ten years of age, or sooner if the equipment is damaged and cannot be repaired. The fire department should have a washer/extractor to wash and clean turnout gear of contaminants. The fire department has, and enforces, a written policy requiring the use of PPE on emergency scenes.

Community Risk Reduction

The easiest fire to fight is the one that never happens. ISO lists pre-fire planning credit under training, but it is really fire prevention through code enforcement, the elimination of fire hazards, and the maintenance of fire protection features. The department completes annual pre-fire planning inspections on all commercial, industrial, and institutional properties, and every property has a pre-fire plan. The fire department has an excellent pre-fire planning program, and ISO awarded the fire department 100% credit for pre-fire planning inspections.

The fire department enforces the fire code in Mt. Pleasant and conducts fire code enforcement inspections on existing buildings. The number of individual occupancies is increasing, and there are an estimated 219 in Mt. Pleasant now. The fire department completed pre-fire planning inspections on 100% of these occupancies in 2015.

The fire department provides public fire education programs, and the department is at many events, especially events for children. Each shift has a member who is a certified public life safety educator. The department received 100% credit from ISO for its public safety education efforts, which is an excellent score.

The department sends personnel to fire investigation classes, and each shift has a person trained in fire cause and origin. The department investigates all fires to determine cause and conducts arson investigations. The fire department is able to determine the cause of the fire on 100% of all fires, and ISO awarded 94% credit for the department's fire investigation program. An investigator from the Mt. Pleasant Police Department manages all administrative warrants and incendiary and/or criminal investigations.

The department should continue to conduct building familiarization and pre-incident planning tours of all commercial, industrial, institutional, and other similar buildings at least annually. Planning tours and pre-plans should meet the general criteria of NFPA 1620, *Standard for Pre-Incident Planning*. The department should continue to keep accurate records of the inspections (paper or electronic formats are acceptable) that include thorough notes, floor plans, and other pertinent information. All pre-plans must be available to the responding incident commander.

The fire department should be involved in all future community planning efforts relative to future annexation plans, expansion of existing buildings, and the review of development plans for new commercial and industrial construction.

Recommendation: Continue to conduct annual fire code compliance inspections on all commercial occupancies.

Recommendation: Continue annual inspections of all commercial, industrial, and institutional occupancies in the city, create/update the pre-fire plan, and have current pre-plans available to the incident commander on the scene.

EMS First Responder Program

The fire department values its role as the initial provider of emergency medical care (EMS) for life threatening illnesses and injuries. The fire department does not respond on every EMS call, which helps reduce annual call volume and keeps emergency resources available for true emergencies. The fire department may arrive before the ambulance, and fire apparatus carries automatic external defibrillators (AED) and other equipment to initiate lifesaving care. The prompt provision of such care contributes to a positive outcome for the patient. Mt. Pleasant provides care at the Emergency Medical Responder (EMR) level, which is basic life support. Fire department personnel work under the protocols of the Maury Regional EMS service.

Personnel must be trained and certified or licensed by the state to provide emergency care. Personnel must complete a minimum number of continuing education training hours every two years to maintain their certification or license, and the number of hours required increases with the skill level and capability of the certification or license. The fire department must have a quality assurance (Q/A) program in place to monitor the care provided and provide remedial training when needed. Fire department staff handle the Q/A duties, and the other duties associated with the EMS program, such as required paperwork and maintaining supplies.

EMS is a significant value-added emergency service the fire service provides to the community and accounts for a large portion of the effort expended to serve the residents and visitors to the community. Statewide in Tennessee in 2015, for example, fire departments reported that EMS responses accounted for 63.53% of all responses made that year. The percentage of EMS calls the fire department responds to in Mt. Pleasant is higher, as the department's EMS calls represented 69.07% of the call volume for 2015, and the number of EMS calls is likely to increase.

Recommendation: Continue to provide first responder service on prioritized emergency medical calls.

Recommendation: Expand the first responder program to provide both basic and advanced life support services.

All Hazards Response Capability

The fire department provides other emergency and essential services for the community. These emergency response services include vehicle extrication and hazardous materials incident response. These technical rescue services add value to the fire department's mission and contribute to a safer community. The fire department should have and maintain the proper tools and equipment for the particular response discipline and have the ability to train locally and/or off-site as needed to maintain the knowledge, skills, and abilities required for successful technical rescue operations.

For vehicle extrication services, all members have vehicle rescue technician certification. The department has a power unit on Engine 1 and Engine 3. Engine 1 carries a combination Hurst® tool with the spreader/cutter and ram, and this tool is approximately ten years old. Beginning in 2006, auto makers started using advanced-high-strength-steel, ultra-high-strength steel, and other exotic materials to improve the safety of their cars. Older rescue tools do not have the capability of cutting through these high strength metals. The fire department should evaluate the capabilities of its rescue tools and develop a replacement program to ensure that the fire department can effect vehicle extrication rescues in newer vehicles.

Recommendation: Continue to provide technical rescues services based on the risks found in the community and maintain the training and equipment necessary to provide these services.

Recommendation: Evaluate the capabilities of the current rescue tools and develop a replacement program to purchase vehicle extrication equipment that is capable of cutting the high strength materials found in newer vehicles.

Dispatch and Radio Communications

The Maury County 911 dispatches the fire department initially, and the Mt. Pleasant Police Department tracks times and, depending upon the incident type, handles some of the communication services. The department does not have information on call processing times in the Maury County 911 center.

NFPA 1221, *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*, 2013 edition, section 7.4 sets performance marks for dispatching. The phone must be answered within 15 seconds (that is less than 3 rings) 95% of the time. With the exception of certain types of calls defined in section 7.4.2.2 that require gathering additional information, the call must be processed (this includes all conversation with the caller, all fact/information gathering, and determining what resources need to be sent) within 60 seconds 80% of the time, and within 106 seconds 95% of the time (see Appendix F). This is a tight performance standard and cannot be met without sufficient resources (personnel, technology, training, etc.) and awareness in the 911 center of this performance standard. All of the expensive fire equipment and well-trained and equipped firefighters are worthless unless they are dispatched promptly.

ISO awarded 66.5% credit for receiving and handling fire alarms. The dispatch office has a minimum of two dispatchers on duty, and sometimes has three on duty. The dispatchers have completed fire dispatch training. MTAS recommends that the fire department offer to provide practical training for the dispatchers, where the dispatcher spends a minimum of four hours, and preferably an eight-hour shift, riding out at a fire station to observe firsthand what it is like for the firefighters to receive an alarm, respond to the call in a fire engine with the siren and engine noise, and function on the scene of the emergency.

The fire chief should continue to maintain an excellent working partnership with the 911 director to help the city benefit from quick total response times from the point the person in need of help calls 911 until the fire department arrives on the scene.

For consistency, all dispatches should be from a common script, where the information is transmitted in the same order on every call. This makes it easier for fire personnel to receive and understand the dispatch information. For example, "Engines 1 and 2, 123 Main Street, smoke in the building, the cross street is Elm, caller states everyone is out of the building." In this example, the units that will respond are given first, followed by the address, the nature of the call, the cross street, and any other relevant information. The department should tailor the exact order of the information to meet local needs. Consistent use of a dispatch script will reduce errors and improve turnout times.

The department has interoperability capability with area fire departments to facilitate an effective emergency response in a disaster or large-scale emergency.

Though ISO did not award credit for the use of standard dispatch protocols, the fire department says that the dispatchers have and use such protocols. Dispatchers should use standard emergency dispatch protocols for fire department dispatch and communications. The fire department should provide training on the policies and procedures to the dispatchers, review the policies at least annually, and update the policies as required.

To insure consistent quality of dispatch and to monitor performance and compliance with national standards, Mt. Pleasant needs a quality assurance (Q/A) program for dispatch. Under a Q/A program, the Q/A officer selects a number of random calls and reviews them for compliance with dispatch protocols and call processing times. The Q/A officer reviews the results with dispatchers on a regular basis to improve the quality of the service.

Recommendation: The fire chief should maintain an excellent working partnership with the 911 director to help the city benefit from quick total response times from the point the person in need of help calls 911 until the fire apparatus arrives on the scene.

Recommendation: Provide dispatchers with formal fire department indoctrination and familiarization of fire department operations that includes allowing dispatchers to ride-out and observe fire department operations for at least four hours every quarter.

Recommendation: Establish a quality assurance review procedure to review random dispatches for ways to improve dispatch services, and monitor compliance with the response time standard.

Recommendation: Use a dispatch script tailored to local needs on every dispatch event.

Water Supply and Fire Hydrants

The Mt. Pleasant Water Department provides water for Mt. Pleasant, and the fire department has a good working relationship with the utility. The fire department does not have a designated water supply officer, and MTAS recommends that the assistant fire chief serve as the department's water supply officer.

The water supply is adequate, and the water supply scored 96.05% in the most recent ISO evaluation, which is a relative Class 1 water system. The last ISO evaluation summary report did not include details on individual fire flows, so it is not possible to tell how many fire flow tests were deficient. MTAS recommends that Mt. Pleasant contact ISO and request details on individual flow tests. Mt. Pleasant should also request details on the limiting factors for any deficient flow tests. Limiting factors include supply works, main size and capacity, and/or a need for additional fire hydrants. Once the cause(s) of any deficiencies is/are identified, Mt. Pleasant can consider the cost-benefit of addressing the deficient fire flows.

Fire hydrant maintenance is good, and hydrants are color-coded to indicate available fire flows. The fire department checks the 242 fire hydrants annually, and each check includes a static pressure test and flushing the fire hydrant. Fire hydrants are well located and appear to be adequate in number for the given occupancy at risk. However, 38 of the fire hydrants do not meet the ISO standard for a full-credit fire hydrant. For full credit, ISO requires that a fire hydrant meet American Water Works Association (AWWA) Standard C503. Standard C503 hydrants have a 6-inch or larger branch connection and a 4-inch or larger pumper connection.

Mt. Pleasant inspects and flow tests the entire water system at least once every five years.

Recommendation: Have the assistant fire chief (or another officer) serve as the fire department water supply officer for coordination of fire hydrant and water supply activities with the water department.

Recommendation: Contact ISO and request the limiting factors details for any deficient flow tests.

Recommendation: Establish that the water department will purchase and install hydrants that meet the AWWA C503 standard.

Summary

The purpose of this comprehensive management review is to provide a summary report of key issues affecting the provision of fire services in Mt. Pleasant. Nothing in this report is a negative reflection of the Mt. Pleasant Fire Department. The firefighters and staff are dedicated and provide good service to the community. The report is an outside view of the department at a single point in time and includes recommendations for improvement.

The recent achievement of an ISO Public Protection Classification of Class 3 is excellent and speaks to the work the city and fire department have done so far. Additional effort is required to improve the Class 3 rating, and immediate major needs include an additional fire station, additional personnel, and a training center. Other needs include the development of a strategic plan, development of an apparatus replacement program, and an evaluation of compensation and benefits.

It is our sincere hope that the city and fire department leaders will use the report as a guide for improving the delivery of fire-related emergency services in the community. There is no doubt that the members of the fire department have the capability to fix any problems noted and implement a number of the recommendations made within existing budgetary restrictions. Major issues should be addressed through short and long range planning, and issues requiring significant expenditures should include a proposed budget that identifies funding sources. The city and fire department leadership should determine a reasonable time line and plan for prioritizing and adopting the recommendations proposed. MTAS would like to thank the City of Mt. Pleasant, its city leaders and staff, and the members of the Mt. Pleasant Fire Department for their professionalism, cooperation, and assistance in this study.

The summary of recommendations is a table listing each recommendation found in this report. There is a column for Mt. Pleasant to identify the key person responsible for overseeing the activities required to implement the recommendation, and a column to record the date the recommendation is implemented or completed. MTAS recommends that Mt. Pleasant officials in all departments involved in implementing specific recommendations work together to identify key personnel needed and to develop a timeline for implementation.

Table of Recommendations

Recommendation	Responsibility	Completed
1. Evaluate response time performance for all structure fires in the last 12 months against the NFPA 1710 performance standard to see if the fire department met the performance requirements. If the fire department did not meet this performance standard, identify the challenges that prevent meeting the standard and develop a plan to address those challenges.		
2. Consider using automatic aid agreements with neighboring departments to increase the number of personnel responding to all reported structure fires.		
3. Use the ISO Public Protection Classification Summary Report as one of the resources needed to create a strategic plan for providing and improving community fire and emergency services protection. The strategic plan should include the mission, vision, core values, strategic focus areas, strategic goals, and action plans.		
4. Ensure that all fire officers receive 12 hours of officer training annually in accordance with the general criteria of NFPA 1021, *Standard for Fire Officer Professional Qualifications*; NFPA 1521, *Standard for Fire Department Safety Officer*; and/or NFPA 1561, *Standard on Emergency Services Incident Management System*.		
5. Pursue fire officer certification for all officers at a level commensurate with the officer's role and responsibility.		
6. Improve the recruit training program by requiring that all new firefighters have or obtain Fire Fighter I and Fire Fighter II certification in accordance with the general criteria of NFPA 1001, *Standard for Fire Fighter Professional Qualifications* within the first 12 months of employment.		

Recommendation	Responsibility	Completed
7. Develop a plan to provide a fire service training facility that meets the general criteria of NFPA 1402, *Guide to Building Fire Service Training Centers*.		
8. Adopt a policy to purchase fire hydrants meeting AWWA Standard C502 for dry barrel fire hydrants for all future fire hydrant installations or replacements.		
9. The technology associated with thermal imaging cameras has improved significantly in the last 10 years, and the fire department should consider establishing a 10-year maximum life for replacing any cameras.		
10. Require immediate drug screening for all personnel driving fire department vehicles when they are involved in a motor vehicle crash.		
11. Develop a workforce development and succession plan to identify future leaders, and to improve the knowledge, skills, and abilities of employees to help make them better employees.		
12. The fire chief should continue to hold staff meetings with the assistant chief and shift captains to discuss department issues, keep staff informed on city issues as appropriate, gauge department performance against benchmarks, monitor progress on development of the strategic plan, discuss budget administration, and improve intradepartmental communication.		
13. Use the ISO Public Protection Classification Summary Report, a community risk assessment, nationally accepted guidelines, and other resources to create SMART (Specific, Measureable, Accountable, Results-oriented, and Time-bound) objectives that include both output and outcome based performance measurements. Track and monitor service levels and provide regular performance reports to all stakeholders.		

Recommendation	Responsibility	Completed
14. Include language in Section 7-102, in the ordinance, or in a separate development standard, that requires water mains to be sized, and fire hydrants located, to provide adequate water supplies to meet the needed fire flow for the occupancy at risk.		
15. Adopt a current version of the International Fire Code and reword Section 7-201 accordingly, delete Section 7-207, and reword Section 7-208 to reflect the International Fire Code.		
16. Adopt an edition of the NFPA Life Safety Code that complements the 2012 edition of the International Fire Code.		
17. Update Section 7-301 as recommended in this report and delete Section 7-303.		
18. Consider revising Section 7-402 with a broader list of objectives that reflect the current all hazards mission of the fire department.		
19. Revise Section 7-601(3) to require an application and permit, but no fee, for fireworks displays at the high school.		
20. Adopt a plan to provide an effective firefighting response of sixteen personnel to a structure fire within 560 seconds (9.33 minutes) turnout and travel time on 90% of all incidents. 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.		
21. Complete a community risk assessment and establish a standard of cover for each identified risk.		
22. Review current response assignments to ensure that Mt. Pleasant dispatches a sufficient number of apparatus and personnel to each property at risk based on the standard of cover.		

Recommendation	Responsibility	Completed
23. Consider using automatic aid agreements to provide additional firefighters on structure fire responses.		
24. Prepare a staffing plan that includes estimated costs and options, such as part-time firefighters, for phasing in staffing to achieve a minimum staffing level proportionate with the community's risk.		
25. Review and update the mutual aid policy of the standard operating guidelines manual to include guidelines on working alongside mutual and automatic aid companies, including but not limited to incident command, use of common radio frequencies, fire ground safety, and common strategies and tactics.		
26. Update the standard operating guidelines manual to include a policy that addresses the annual review and updating, as needed, of structural firefighting related policies.		
27. Appoint a committee of fire department members to review the standard operating guidelines manual on an annual basis and make recommendations for updates as needed.		
28. Provide training and testing for competency to all fire personnel on the policies found in the standard operating guidelines manual. Every member should be familiar with its content and copies should be available readily to all fire department personnel. Provide a copy of the SOG manual to all personnel and keep a current copy in the fire station and in the human resources office. Forward updated policies to fire department personnel and human resources to keep their copies current.		

Recommendation	Responsibility	Completed
29. Formalize the fire department's current workforce development and succession planning efforts into a comprehensive written plan. The fire department should work closely with the human resources director to continue to offer and develop both internal and external training programs to improve the knowledge, skills, and abilities of personnel in all positions, and prepare them for advancement and greater responsibility.		
30. Establish as a job requirement that fire officers obtain a level of certification through the Commission matching their position. Company officers should achieve Fire Officer I certification, captains should achieve Fire Officer II or Fire Officer III certification, and chief and staff officers should achieve Fire Officer III or IV certification.		
31. Review the city's compensation plan annually, and consider a comprehensive career development program to serve as a guide for workforce development and justification for competitive compensation. MTAS can assist the city with this recommendation.		
32. Staff the aerial ladder truck with sufficient personnel to respond and operate the truck effectively on the initial alarm for all structure fires.		
33. Establish an apparatus replacement program to fund and schedule the transition and replacement of fire apparatus on the 15 year/25 year life cycle recommended by NFPA.		
34. Consider signing an interlocal agreement with a neighboring fire department to share a reserve engine and possibly a reserve ladder or service company.		

Recommendation	Responsibility	Completed
35. Conduct a needs assessment to determine if the current fire station contains enough square feet to meet the fire department's space needs. Use this information to develop a short and long-range facilities maintenance and replacement plan.		
36. Conduct a fire station location study to assist Mt. Pleasant in planning for future fire stations to serve the community.		
37. Adopt a response time standard for the community and use this standard to plan for the placement of future fire stations and service levels. 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 for Career Fire Departments*. 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.		
38. Provide 18 hours of structural firefighting drill training per firefighter and fire officer per year. The training must occur at a training facility.		
39. Continue to provide at least 16 hours of company training in structure fire related subjects per month (192 hours per year) for each firefighter and officer.		
40. Continue to provide at least 240 hours of recruit firefighter training for each new recruit, either in-house or through an outside agency such as the Tennessee Fire and Codes Academy.		
41. Continue to provide 12 hours of leadership, management, supervisory, or incident management training per officer annually that complies with NFPA 1021, *Standard for Fire Officer Professional Qualifications*.		

Recommendation	Responsibility	Completed
42. All current and new officers should achieve state certification from the state firefighting commission as fire officers (Fire Officer I through Fire Officer IV) at a level that is appropriate to their position.		
43. Continue to provide a formal training program for new driver/engineers and existing driver/engineers meeting the requirements of NFPA 1002, *Standard for Fire Apparatus Driver/Operator Professional Qualifications*.		
44. As part of the strategic planning process, evaluate the cost and benefits of establishing a training facility with a training tower, burn building, and drill field.		
45. Provide college-level supervisory and management training for the fire chief and command staff officers. Encourage and support command staff officers to apply for and complete National Fire Academy courses.		
46. The fire department should have a washer/extractor to wash and clean turnout gear of contaminants.		
47. Continue to conduct annual fire code compliance inspections on all commercial occupancies.		
48. Continue annual pre-fire planning inspections of all commercial, industrial, and institutional occupancies in the city to create/update the pre-fire plan, and have current pre-plans available to the incident commander on the scene.		
49. Continue to provide first responder service on prioritized emergency medical calls.		
50. Expand the first responder program to provide both basic and advanced life support services.		
51. Continue to provide technical rescues services based on the risks found in the community and maintain the training and equipment necessary to provide these services.		

Recommendation	Responsibility	Completed
52. Evaluate the capabilities of the current rescue tools and develop a replacement program to purchase vehicle extrication equipment that is capable of cutting the high strength materials found in newer vehicles.		
53. The fire chief should maintain an excellent working partnership with the 911 director to help the city benefit from quick total response times from the point the person in need of help calls 911 until the fire apparatus arrives on the scene.		
54. Provide dispatchers with formal fire department indoctrination and familiarization of fire department operations that includes allowing dispatchers to ride-out and observe fire department operations for at least four hours every quarter.		
55. Establish a quality assurance review procedure to review random dispatches for ways to improve dispatch services, and monitor compliance with the response time standard.		
56. To improve response times, use a dispatch protocol script tailored to local needs on every dispatch event.		
57. Have the assistant fire chief (or another officer) serve as the fire department water supply officer for coordination of fire hydrant and water supply activities with the water department.		
58. Contact ISO and request the limiting factors details for any deficient flow tests.		
59. Establish that the water department will purchase and install hydrants that meet the AWWA C503 standard.		

Appendix A – Mt. Pleasant Fire Department 5-Year Response History

Calls By Incident Type (TFIRS Codes)

FIRES	2011	2012	2013	2014	2015	Average	% Average
Structure Fires (110-118, 120-123)	8	16	11	23	20	15.60	1.83%
Vehicle Fires (130-138)	7	3	9	4	2	5.00	0.59%
Other Fires (100, 140-173)	15	11	3	9	5	8.60	1.01%
Total Fires	**30**	**30**	**23**	**36**	**27**	**29.20**	3.42%
Pressure Ruptures, Explosion, Overheat (200-251)	1	0	1	0	0	0.40	0.05%
RESCUE CALLS							
Emergency Medical Treatment (300-323)	422	584	579	664	764	602.60	70.66%
All Others (331-381)	19	14	23	13	28	19.40	2.27%
Total Rescue Calls	**441**	**598**	**602**	**677**	**792**	**622.00**	72.94%
Hazardous Condition Calls (400-482)	16	14	16	21	32	19.80	2.32%
Service Calls (500-571)	29	67	61	142	112	82.20	9.64%
Good Intent Calls (600-671)	4	9	23	117	93	49.20	5.77%
Severe Weather or Natural Disaster (800-815)	0	1	0	0	1	0.40	0.05%
Special Incident Calls (900-911)	2	6	5	7	5	5.00	0.59%
Unknown Incident Type (UUU)	1	0	0	0	0	0.20	0.02%
FALSE CALLS							
Malicious Calls (710-715, 751)	0	1	2	0	1	0.80	0.09%
Other False Calls (700, 721-746)	35	28	66	46	43	43.60	5.11%
Total False Calls	**35**	**29**	**68**	**46**	**44**	**44.40**	5.21%
TOTAL CALLS	**559**	**754**	**799**	**1,046**	**1,106**	**852.80**	
Total Fire Dollar Loss	$82,855	$392,150	$15,500	$51,500	$82,000	$124,801	
Total Dollar Loss	$294,355	$439,650	$48,500	$112,500	$88,000	$196,601	

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

Estimated 1 and 2-family property market value in the community: **$137,626,300***

Estimated insurance savings for a single classification improvement in ISO Rating

Classes 1 thru 4: 2% to 9%, depending upon the insurance company
Classes 5 thru 8: 5% to 10%, depending upon the insurance company

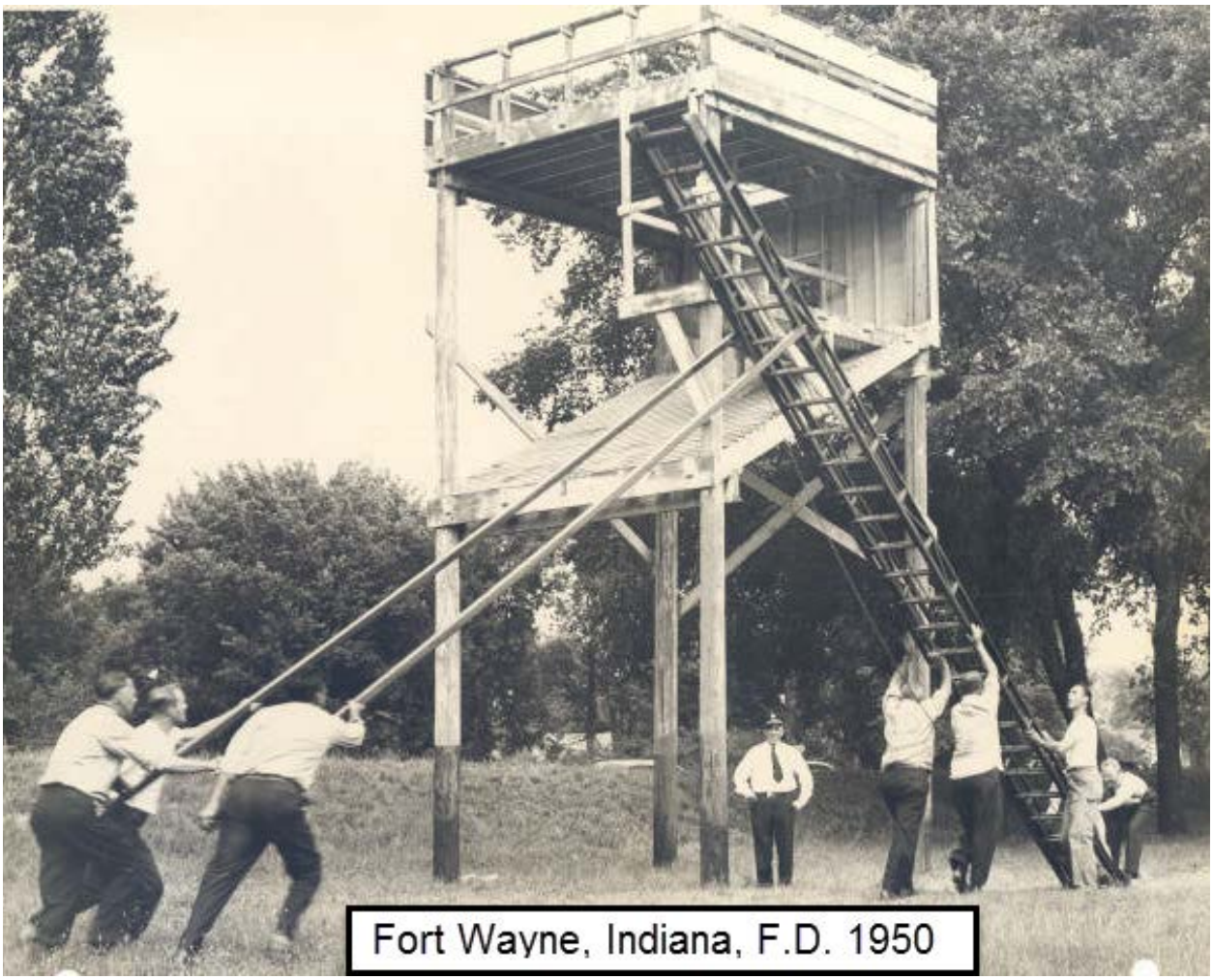
Aggregate premiums	**$481,692.05**
Est. % savings	2.00%
Est annual savings	**$9,633.84**
Est 5 year savings	$48,169.21
Est. % savings	3.00%
Est annual savings	**$14,450.76**
Est 5 year savings	$72,253.81
Est. % savings	4.00%
Est annual savings	**$19,267.68**
Est 5 year savings	$96,338.41
Est. % savings	5.00%
Est annual savings	**$24,084.60**
Est 5 year savings	$120,423.01
Est. % savings	6.00%
Est annual savings	**$28,901.52**
Est 5 year savings	$144,507.62
Est. % savings	7.00%
Est annual savings	**$33,718.44**
Est 5 year savings	$168,592.22
Est. % savings	8.00%
Est annual savings	**$38,535.36**
Est 5 year savings	$192,676.82
Est. % savings	9.00%
Est annual savings	**$43,352.28**
Est 5 year savings	$216,761.42
Est. % savings	10.00%
Est annual savings	**$48,169.21**
Est 5 year savings	$240,846.03

* Source for residential dollar value noted above (page 31):
https://www.comptroller.tn.gov/pa/pdf/2015TaxAggregateReport.pdf

Appendix C – Examples of Wooden Drill Towers

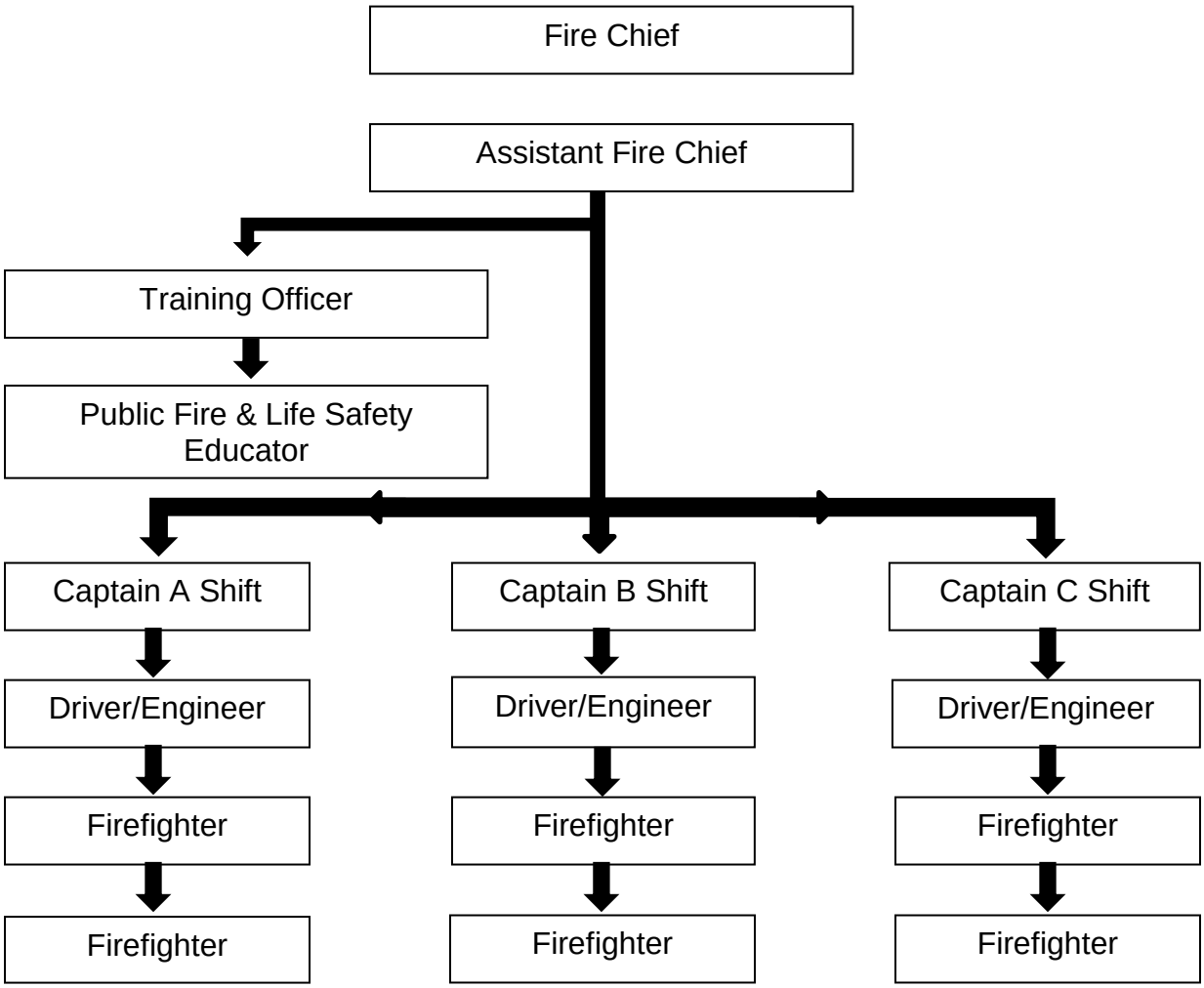
Three story drill tower under construction in Mt. Carmel, Tennessee. Built-in stairs allow hose advancement drills and easy access to the upper floors.

The second floor of wooden drill tower showing the window opening for ladder placement evolutions and the floored work area of adequate size for firefighters to stand and work.



Example of a 3-story wooden drill tower in use. Notice window opening on the rear of the second floor, incorporation of pitched roof simulator, and opening in the top floor for replaceable panel for vertical ventilation exercise with an axe.

Appendix D – Mt. Pleasant Fire Department Organizational Chart



Appendix E – 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

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 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 F – NFPA Dispatch Performance Standards

The following information is quoted from NFPA 1221 *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*, 2013 Edition.

7.4 Operating Procedures.

7.4.1* Ninety-five percent of alarms received on emergency lines shall be answered within 15 seconds, and 99 percent of alarms shall be answered within 40 seconds. *(For documentation requirements, see 12.5.2.)*

7.4.1.1 Compliance with 7.4.1 shall be evaluated monthly using data from the previous month.

7.4.2* With the exception of the call types identified in 7.4.2.2, 80 percent of emergency alarm processing shall be completed within 60 seconds, and 95 percent of alarm processing shall be completed within 106 seconds. *(For documentation requirements, see 12.5.2.)*

7.4.2.1 Compliance with 7.4.2 shall be evaluated monthly using data from the previous month.

7.4.2.2 Emergency alarm processing for the following call types shall be completed within 90 seconds 90 percent of the time and within 120 seconds 99 percent of the time:

(1) Calls requiring emergency medical dispatch questioning and pre-arrival medical instructions
(2) Calls requiring language translation
(3) Calls requiring the use of a TTY/TDD device or audio/video relay services
(4) Calls of criminal activity that require information vital to emergency responder safety prior to dispatching units
(5) Hazardous material incidents
(6) Technical rescue

7.4.3* For law enforcement purposes, the AHJ shall determine time frames allowed for completion of dispatch.

7.4.4* Where alarms are transferred from the primary public safety answering point (PSAP) to a secondary answering point, the transfer procedure shall not exceed 30 seconds for 95 percent of all alarms processed. *(For documentation requirements, see 12.5.2.)*

Note: NFPA offers free, read-only access to their codes at: http://www.nfpa.org/codes-and-standards/free-access.

Appendix G – Apparatus and Vehicle Roster

Equipment Type and Description	Year	Make	Condition	Station/ Unit ID	Year Unit Reaches Age 25 or Projected Replacement Year	Replacement Cost
Pumper 1,000 gal. tank/1,250 gpm	2012	Pierce	Good	Sta. 1/ Eng 1	2037	$550,000
Pumper 750 gal. tank/1,250 gpm	1987	Pierce	Fair	Sta. 1/ Eng 3	2012	$550,000
60' quint/aerial 500 gal. tank/1,250 gpm	2004	Rosenbauer	Good	Sta. 1/ Lad 1	2029	$950,000
Service Company	2013	Ford F250	Good	Sta. 1	2014	$40,000
Car 1	2004	Ford F150	Good	Command vehicle used by the fire chief	2024	$40,000
Car 2	2004	Fore F150	Good	Command vehicle used by the assistant fire chief	2024	$40,000

The total replacement cost for all apparatus and vehicles on this roster is $2,170,000.

Appendix H – Sample Benchmarks List

1. All calls for service by incident type
2. Calls for service per 1,000 population
3. Fire responses (Codes 1XX)
4. Fires per 1,000 population
5. Structure fires (Codes 111-123)
6. Structure fires per 1,000 population
7. Structure fires by occupancy type
8. Average number of firefighters responding on initial alarm to structure fires
9. EMS responses (Codes 32X)
10. Number of fire inspections made
11. Number of fire code violations found
12. Number of fire code citations issued
13. Percent of fire code violations cleared in 30 days
14. Average code violations found per inspection
15. Number of hours spent on fire inspections
16. Average time per inspection
17. Percent of commercial, industrial, and institutional occupancies inspected annually
18. Total response time
19. Percent of time first engine arrived in 6:35 time of 9-1-1- call
20. Dispatch time (ring time and call processing time)
21. Fire response time (turnout time and travel time)
22. Percent of structure fires where cause was determined
23. Percent of fires confined to the area of origin
24. Percent of fires confined to the area involved upon arrival of the fire department
25. Average structure fire control time
26. Percent of fires under control within 10 minutes of the arrival of the fire department
27. Total Fire Loss
28. Fire loss per capita
29. Fire loss per million of appraised value
30. Total value of property saved
31. Ratio of fire loss compared to potential fire loss
32. Total number of training hours
33. Average number of training hours taken by individual sworn employees (paid or volunteer)
34. Percent of fire department personnel Fire Fighter II certification
35. Percent of fire officers with Fire Officer I or higher certification
36. Number of public fire education programs presented
37. Number of persons reached with public fire education programs
38. Percent of homes with working smoke alarms (estimate)
39. Number of smoke alarms installed

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