Round Rock, Texas

Fire/EMS Operations and

Data Analysis

January 2013

FINAL REPORT

FIRE/EMS OPERATIONS

CENTER FOR PUBLIC SAFETY MANAGEMENT

Submitted by and reply to:
ICMA Center for Public Safety Management
International City/County Management Association
777 North Capitol Street NE, Suite 500
Washington, DC 20002
PublicSafety@icma.org
202-962-3607

ICMA

Leaders at the Core of Better Communities

General Information

About ICMA

The International City/County Management Association (ICMA) is a 100-year-old nonprofit professional association of local government administrators and managers, with approximately 9,000 members located in 28 countries.

Since its inception in 1914, ICMA has been dedicated to assisting local governments in providing services to their citizens in an efficient and effective manner. Our work spans all of the activities of local government: parks, libraries, recreation, public works, economic development, code enforcement, brownfields, public safety, and a host of other critical areas.

ICMA advances the knowledge of local government best practices across a wide range of platforms, including publications, research, training, and technical assistance. Our work includes both domestic and international activities in partnership with local, state, and federal governments, as well as private foundations. For example, we are involved in a major library research project funded by the Bill & Melinda Gates Foundation and are providing community policing training in El Salvador, Mexico, and Panama with funding from the United States Agency for International Development. We have personnel in Afghanistan helping to build wastewater treatment plants and have teams working with the United States Southern Command (SOUTHCOM) in Central America on conducting assessments and developing training programs for disaster preparedness.

ICMA Center for Public Safety Management

The ICMA *Center for Public Safety Management* (ICMA/CPSM), one of four centers within ICMA's U.S. Programs Division, provides support to local governments in the areas of police, fire, emergency medical services (EMS), emergency management, and homeland security. In addition to providing technical assistance in these areas, we also represent local governments at the federal level and are involved in numerous projects with the U.S. Department of Justice and the U.S. Department of Homeland Security.

ICMA/CPSM is also involved in police and fire chief selection, assisting local governments in identifying these critical managers through original research, the identification of core competencies of police and fire managers, and assessment center resources.

Our local government technical assistance includes workload and deployment analysis, using operations research techniques and credentialed experts to identify workload and staffing needs and best practices. We have conducted approximately 140 such studies in 90 communities ranging in size from 8,000 population (Boone, Iowa) to 800,000 population (Indianapolis, Indiana).

Thomas Wieczorek is the Director of the Center for Public Safety Management. Leonard Matarese is the Director of Research & Project Development.

Methodology

The ICMA Center for Public Safety Management team follows a standardized approach to conducting analyses of fire, police, and other departments involved in providing services to the

public. We have developed this approach by combining the experience sets of dozens of subject matter experts in the areas of police, fire, and EMS. Our collective team has more than one hundred years of conducting research in these areas for cities in and beyond the United States.

The reports generated by the operations and data analysis team are based upon key performance indicators that have been identified in standards and safety regulations and by special interest groups such as the International Association of Fire Chiefs (IAFC), the International Association of Fire Fighters (IAFF), and the Association of Public-Safety Communication Officials International, and through ICMA's Center for Performance Measurement. These performance measures have been developed following decades of research and are applicable in all communities. For that reason, the data yield similar reporting formats, but each community's data are analyzed on an individual basis by the ICMA specialists and represent the unique information for that community.

The ICMA team begins most projects by extracting calls for service and raw data from a public safety agency's computer-aided dispatch system. The data are sorted and analyzed for comparison with nationally developed performance indicators. These performance indicators (e.g., response times, workload by time, multiple-unit dispatching) are valuable measures of agency performance regardless of departmental size. The findings are shown in tables and graphs organized in a logical format. Despite the size and complexity of the documents, a consistent approach to structuring the findings allows for simple, clean reporting. The categories for the performance indicators and the overall structure of the data and documents follow a standard format, but the data and recommendations are unique to the organization under scrutiny.

The team conducts an operational review in conjunction with the data analysis. The performance indicators serve as the basis for the operational review. The review process follows a standardized approach comparable to that of national accreditation agencies. Before the arrival of an on-site team, agencies are asked to provide the team with key operational documents (policies and procedures, asset lists, etc.). The team visits each city to interview fire agency management and supervisory personnel, rank-and-file officers, and local government staff.

The information collected during the site visits and through data analysis results in a set of observations and recommendations that highlight the strengths, weaknesses, and opportunities of—and threats to—the organizations and operations under review. To generate recommendations, the team reviews operational documents; interviews key stakeholders; observes physical facilities; and reviews relevant literature, statutes and regulations, industry standards, and other information and/or materials specifically included in a project's scope of work.

The standardized approach ensures that the ICMA Center for Public Safety measures and observes all of the critical components of an agency, which in turn provides substance to benchmark against localities with similar profiles. Although agencies may vary in size, priorities, and challenges, there are basic commonalities that enable comparison. The approach also enables the team to identify best practices and innovative approaches.

In general, the standardized approach adopts the principles of the scientific method: We ask questions and request documentation upon project start-up; confirm accuracy of information received; deploy operations and data analysis teams to research each unique environment; perform

data modeling; share preliminary findings with the jurisdiction; assess inconsistencies reported by client jurisdictions; follow up on areas of concern; and communicate our results in a formal written report.

ICMA/CPSM Project Contributors

Thomas J. Wieczorek, Director
Leonard A. Matarese, Director of Research and Project Development
Joseph E. Pozzo, Senior Manager for Fire and EMS
Dov N. Chelst, Ph.D., Director of Quantitative Analysis
Gang Wang, Ph.D., Senior Quantitative Analyst
Gerard Hoetmer, Senior Associate
Sarita Vasudevan, Quantitative Analyst
Priscila Monachesi Kale, Quantitative Analyst
Dennis Kouba, Editor

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Executive Summary

ICMA was retained by the city of Round Rock, Texas, to conduct a comprehensive analysis of the city's fire department. The analysis is designed to provide the city with a thorough and unbiased review of fire services provided by the Round Rock Fire Department (hereinafter, RRFD). This report is the result of this analysis and is accompanied by recommendations for ways to improve efficiencies in the delivery of services. The report also provides a benchmark of the city's existing service delivery performance. Benchmark performance information can be found in the data analysis section of this report.

To begin the review, the project management staff asked the city for certain documents, data, and information. The project management staff used this information/data to familiarize themselves with the fire department's structure, assets, and operations. The information that was provided was also used in conjunction with the raw performance data collected to determine the existing performance of the fire department and compare that performance to national benchmarks. These benchmarks have been developed by organizations such as the National Fire Protection Association (NFPA), Center for Public Safety Excellence, Inc., and the ICMA Center for Performance Measurement. City staff was provided an electronic shared information folder to upload information for analysis and use by the ICMA project management staff.

The ICMA project management staff conducted site visits for the purpose of observing fire department and agency-connected supportive operations, interviewing key fire department staff, and reviewing preliminary data and operations. Follow-up telephone calls were also conducted between ICMA project management staff and department staff so that ICMA staff could affirm the project information and elicit further discussion regarding this operational analysis.

The ICMA team, while reviewing information and discussing operations with department members, always seeks first to understand the operations, then to identify ways the department can improve efficiency, effectiveness, and safety for both its members as well as the community it serves. ICMA found that the city of Round Rock is not unique, in that it seeks to create a more efficient fire department within existing financial resources.

ICMA found the RRFD has a very capable department and staff for the delivery of fire programs, but there is always room for improvement. Critical areas the ICMA team has identified that need improvement and that resulted in our recommendations are: a lack of formal strategic and risk management planning documents with accompanying performance measures and goals that will assist the RRFD with current operations and more importantly assist in planning for the future; the need to implement an emergency medical dispatch system that has a goal of dispatching the appropriate RRFD resources to EMS calls based on the type and seriousness of the call in an effort to increase efficiencies in the RRFD; consideration of a service model change regarding EMS service delivery that utilizes future and current capacity within the RRFD as well as multifunctional apparatus; and the need to adjust sleeping quarters in identified fire facilities to ensure gender separation and to relieve cramped quarters. Additional recommendations are offered as well to assist the department in overall efficiency, effectiveness, and improvement.

Recommendations

Thirty recommendations for the RRFD are listed below and in the applicable sections within this report. The recommendations are based on best practices derived from the NFPA, the CPSE, ICMA, the U.S. Fire Administration, the International Association of Emergency Managers (IAEM), and the Federal Emergency Management Agency (FEMA), and other sources, as well as the knowledge of ICMA reviewers. Priority recommendations, as determined by ICMA, are listed first. Additional recommendations follow these in the order they appear in the report.

Priority Recommendations:

1. The RRPD emergency communications center should implement emergency medical dispatch software or, at a minimum, utilize the WCEMS 911 EMD system and dispatch the appropriate RRFD resources based on the type and seriousness of the EMS call (as outlined by the RRFD and in conjunction with WCEMS) in an effort to increase efficiencies in the RRFD. It is strongly recommended that the RRFD not respond to all EMS calls, only those that are, by call type, of a serious nature.

2. It is strongly recommended that the RRFD develop and implement a comprehensive strategic plan.

3. The RRFD should consider deploying a multipurpose unit equipped with CAFS from the proposed station in the northwest portion of the city and from other stations as well (**as an alternative vehicle to the two squads**). The RRFD should further consider a service model change that includes assisting WCEMS with EMS transport.

4. The lack of separate gender sleeping quarters, as well as the generally cramped sleeping quarters in stations three, four, and five should be considered a problem. Due to station 3's limited and potentially dangerous equipment egress and the inability to house an aerial apparatus there, relocating station 3 should be a priority.

5. Develop and implement a succession planning process that identifies and develops future leaders.

6. The fire prevention staff should identify fire alarm trends and implement appropriate measures to mitigate alarm issues, with a focus on reducing responses.

7. The department should undertake a community risk and vulnerability assessment, and use the results for the ongoing planning of fire response run cards, identification of apparatus needs, and staffing and deployment of resources.

8. Develop a training plan that includes quarterly tabletop exercises so that city management becomes more familiar with the emergency management plan, management responsibilities, and the workings of the EOC.

9. The RRFD should develop and implement an internal risk management plan following the standards of NFPA 1500, Standard for a Fire Department Occupational Safety and Health Program.

10. Retain the emergency management planner position after the expiration of UASI grant funding by matching EMPG and city general funds on 50/50 match basis. This will provide the essential back-up to the EMC and continue expert emergency management planning assistance.

Recommendations:

11. The proposed functional table of the organization should be developed to accompany the formal department organizational chart and the current RRFD functional table of the organization.

12. The training division has two key positions (training chief and driver operator trainer) that will require replacement due to retirement over the next five years. Although the department realizes the need for succession planning, it is not fully prepared to handle the impact these two retirements will have. Prioritize these two positions when developing and implementing a succession plan for the department.

13. The RRFD should review all interlocal agreements on a regular schedule. This review should occur at minimum every three to five years, and when a change in the response environment is known to exist. These reviews will ensure there remains a clear definition of responsibilities, equity in the provision of the services provided by all the parties and, if needed, a provision for cost recovery where imbalance in the provision of service may exists.

14. Incorporate measurable and obtainable goals and objectives into strategic and comprehensive planning documents as well as annual and long-range fiscal documents.

15. Consider the CPSE accreditation program and conduct a self-assessment under the CPSE guidelines as a means toward overall organizational improvement. If this program is implemented, appoint an accreditation manager whose primary function is to manage the accreditation process until the RRFD is fully accredited.

16. The department should obtain specific data and rationale from property insurance carriers to determine the community financial benefits, if any, of maintaining the current ISO rating to determine if there will be a significant difference in insurance rates should the department move to a lower rating, and compare this against any potential change in tax rate to maintain the ISO 2 rating.

17. The RRFD should develop and implement a performance measure reporting system that expands the type of measurements it employs, including a program logic model.

18. Performance measures should be developed for each department activity, and should link to the strategic and comprehensive planning documents and fiscal/budget documents.

19. The RRFD should implement a nonemergency documentation program that captures nonemergency productivity and should review and report on productivity measures regularly (monthly and annually) to find opportunities for continued improvement, monitor staff productivity, and monitor achievement of goals and objectives.

20. The RRFD should continue to monitor response time components by establishing specific performance measures, with the goal of continuous improvement.

21. The RRFD should develop a preventive maintenance program for all facility components to maintain efficiencies of systems and longevity of equipment, with the goal of reducing overall building maintenance costs.

22. The RRFD should develop a facility replacement/refurbishment plan that includes projected funding and expenditures.

23. Evaluate current and future department funding to strive to meet the minimum requirements of the *Fire Suppression Rating Schedule Texas Addendum* for fire inspection staffing to meet service demands of the fire prevention division.

24. Evaluate current and future department funding to strive to add a plans review position (non-uniform) to the fire marshal's office to effectively meet the demands of this function and release fire inspection personnel to perform fire prevention inspections.

25. Review with city management and city council the life safety and the property protection benefits of requiring residential sprinkler systems in newly constructed homes of more than 5,000 square feet; encourage city council support of residential sprinkler legislation that allows local jurisdictions the ability to adopt the International Residential Code, requirements for automatic fire sprinkler systems in new one- and two- family dwellings.

26. Review the fire prevention division's current records management process for efficiency and determine whether additional technological improvements can be made.

27. Enhance the fire and life safety public education program with community and civic groups and other private organizations for the placement of AEDs, and seek out private contributions to assist in funding this vital community program.

28. Review and adopt the USFA's juvenile firesetter survey to assist in identifying emotionally disturbed children who may be at risk of acting out with fire.

29. Improve the damage assessment annex in Round Rock's all-hazard emergency plan by assigning a person skilled in damage assessment and by creating a specific task plan of how this crucial function will be accomplished. The submittal of a damage assessment is a prerequisite to receiving state and federal assistance.

30. Purchase the necessary audio-visual equipment to fit-out the EOC for improving situational awareness capability.

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Operational Analysis

Governance and Administration

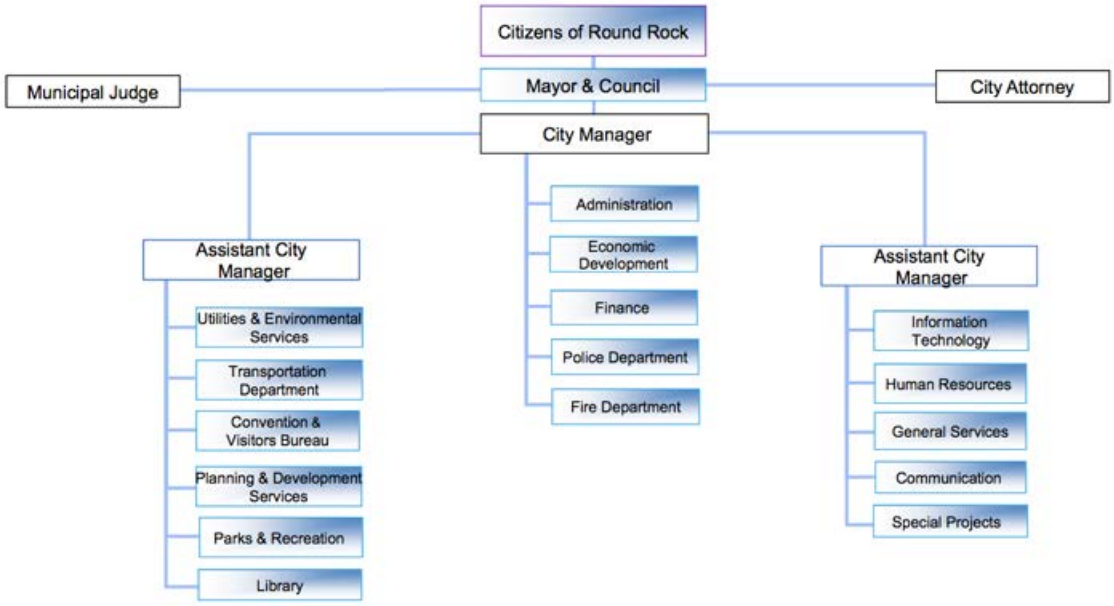
Pursuant to Section 1.01 of the City Charter, the city of Round Rock operates under a council-manager form of government. Article IV, Section 4.01 of the charter establishes the position of city manager and provides for the duties and responsibilities therein.[1]

Article III, Section 3.01 of the charter establishes that the city council shall be comprised of the Mayor and six council members[1]. The council positions are elected from the city at-large for three-year terms. The city manager is appointed by a majority vote of the council to administer the affairs of the city other than exceptions identified in the charter.

Chapter 2, Article III, Division 2, Section 2-78 of the Code of Ordinances establishes the fire department. It also delineates the duties of the fire chief to include, but not be limited to, the fighting of fires, providing emergency rescue services, providing emergency medical services, providing fire prevention services and enforcement, and other duties as may be prescribed by the city council.[1]

Figure 1 illustrates the organizational chart for the city of Round Rock, Texas.

Figure 1: City of Round Rock Organizational Chart - 2011



[1] Code of Ordinances, City of Round Rock, Texas.

Organizational Structure

The RRFD is a career fire department serving more than 100,000 permanent residents in 37 square miles of suburban land area. The RRFD deploys fire and a technical service through 129 employees assigned to seven fire stations, and provides fire administration and supportive agency functions. The ISO Public Protection Classification for the community, which includes the RRFD as a major component, is a rating of two.

Services are provided out of seven fixed facilities strategically located throughout the city. From these stations, two quints[2], five engines, one tower ladder, and two squad companies provide first-line response. In addition, a heavy rescue unit is located at station 2 and is cross-staffed with personnel from the engine when this service is needed. Additionally, station 6 houses the house hazardous materials team which includes two response units. This response component is also cross-staffed with personnel from the engine company assigned to this station.

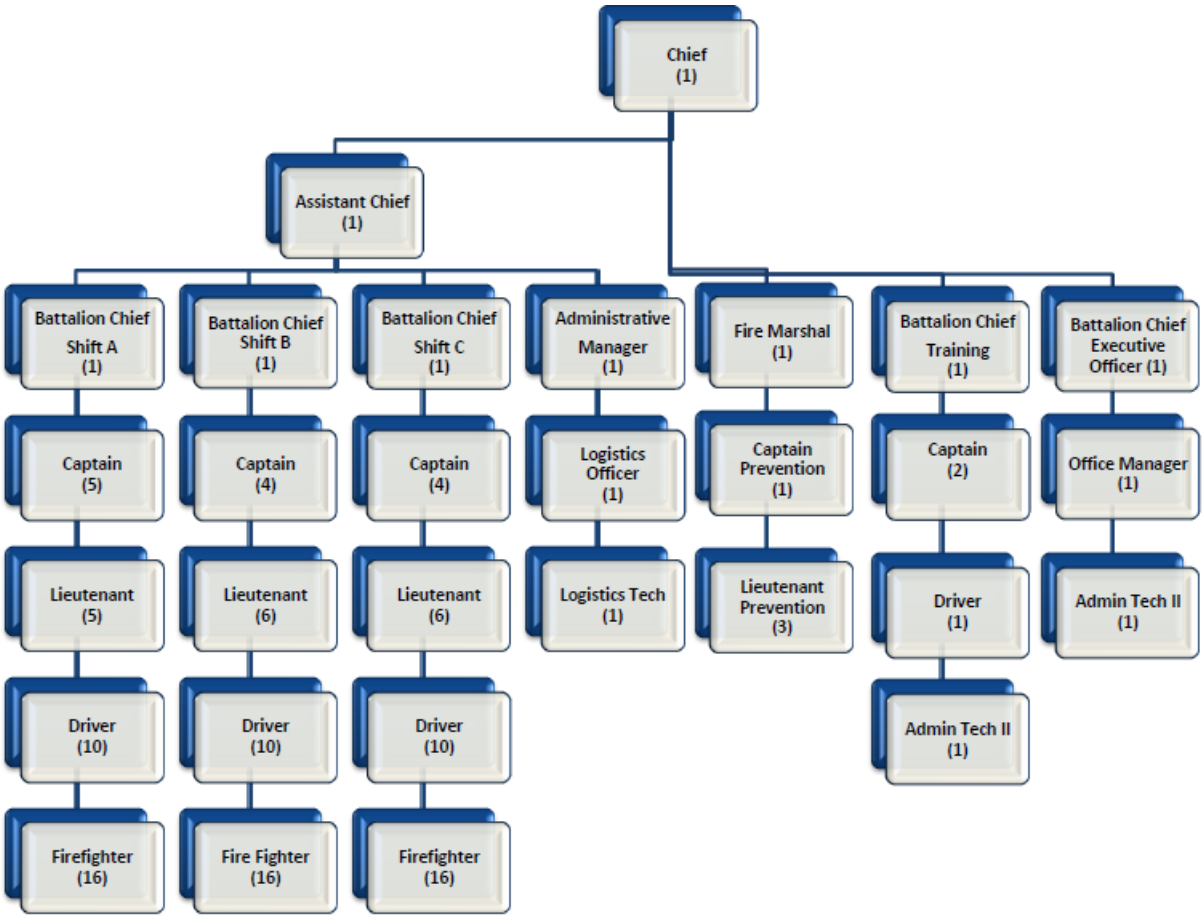
The RRFD utilizes a traditional organizational structure that focuses on the core mission of emergency services delivery. This structure provides a clearly defined division of responsibility for critical day-to-day functions, and identifies each functional division/program under the purview of the organization. This also distributes authority so that service is delivered in a timely, orderly, and effective manner, with leadership and accountability identified from the top of the organization to company-level officers.[3]

The RRFD is led by a fire chief who reports to the city manager and who is responsible for the overall management and leadership of the department. The fire chief is supported by an assistant fire chief and three administrative staff officers, each of whom is responsible for a division in the organization (as shown in Figure 2). The assistant chief is responsible for the largest division, which is the operations component of the department. The assistant chief oversees the three shift battalion chiefs and the administrative/logistics unit.

Like many other communities, the city of Round Rock has over the years expanded both its fire service delivery area and the types of services that its fire department provides. Technical rescue and hazardous materials (hazmat) are among the RRFD's expanded responsibilities. Although the current organizational chart (Figure 2) illustrates the structural hierarchy of the organization and the traditional organizational roles, it does not include functional information about what services each level provides or is expected to execute.

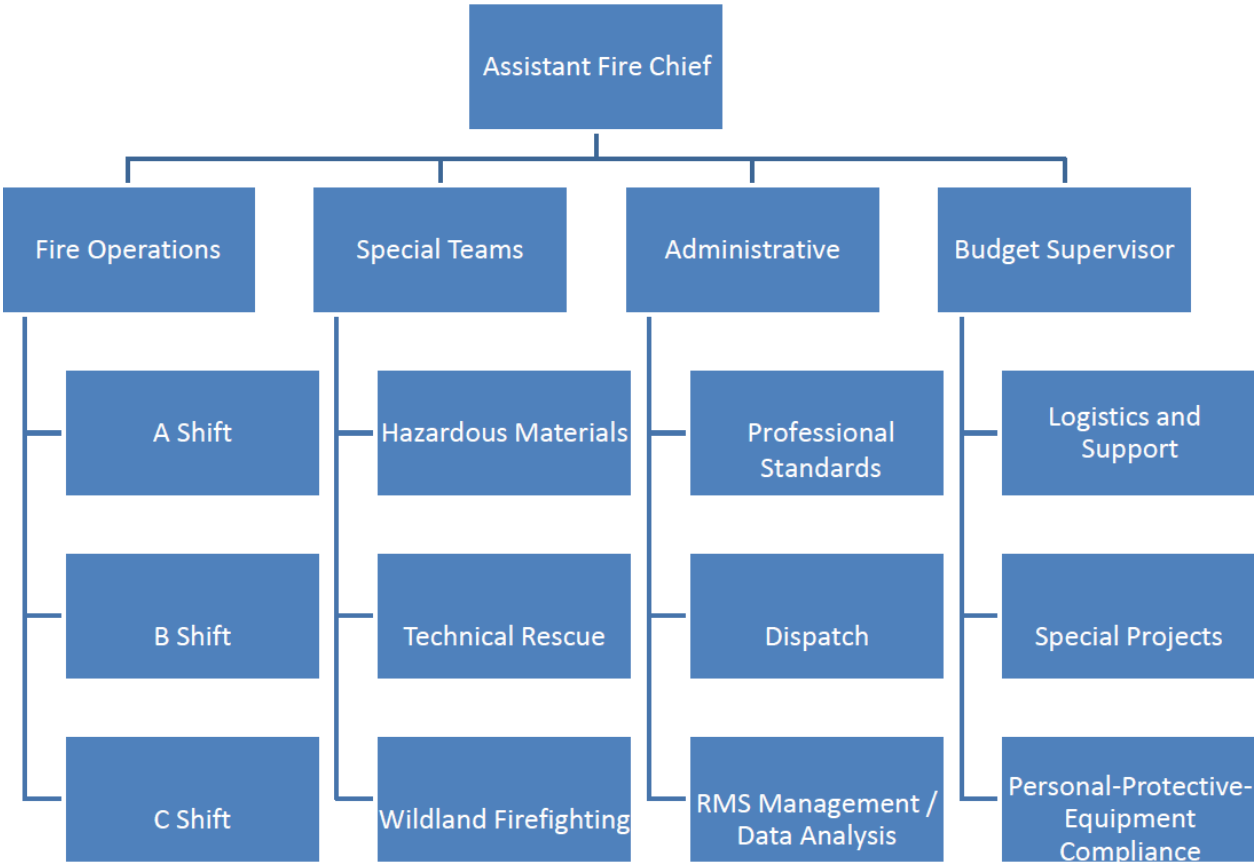
[2] Quint is a fire service apparatus that serves the dual purpose of an engine and a ladder truck. The five functions that a quint provides are: pump, water tank, fire hose, aerial device, and ground ladders.
[3] Dennis Compton and John Granito, eds., *Managing Fire and Rescue Services* (Washington, DC: International City/County Management Association, 2002), 115.

Figure 2: RRFD Organizational Chart



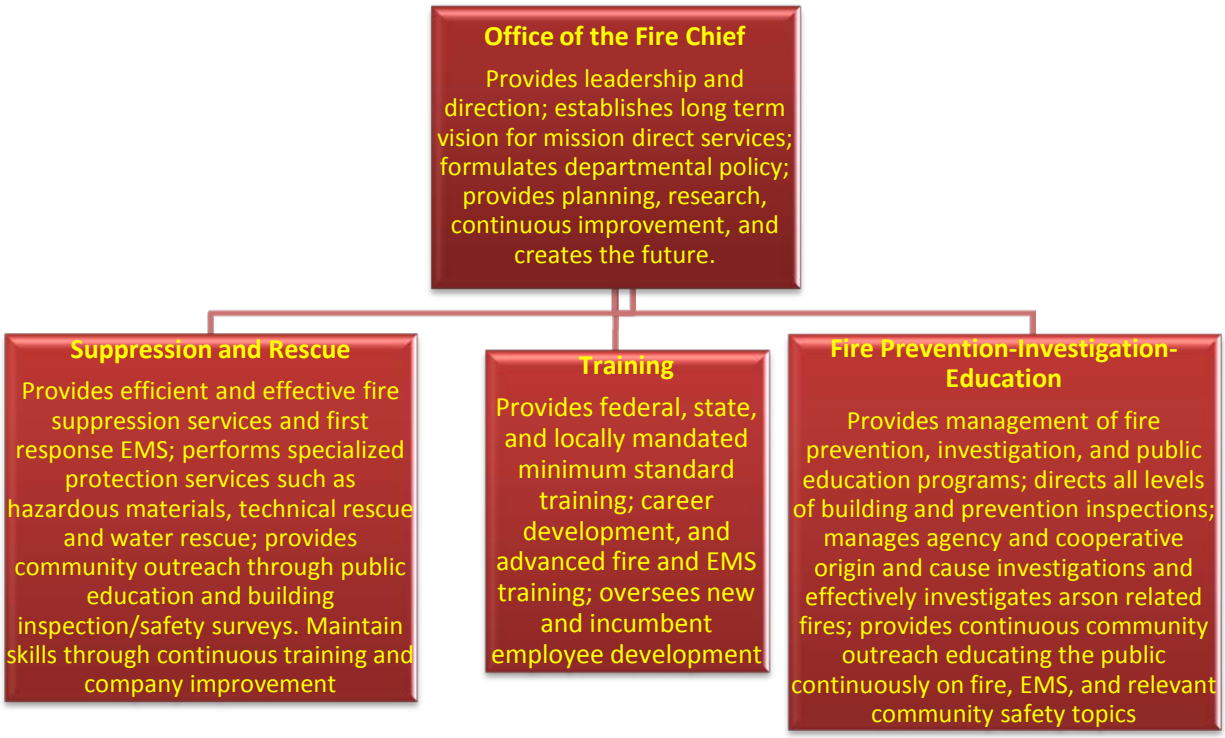
Many organizations use functional organizational charts to supplement the information in their formal organizational charts. A functional chart of the organization gives the community a clear picture of what and where key services are located within an organization. In this type of chart, each task or functional area becomes a focal point. Specialization is centralized and employees who are doing these specialized jobs or tasks can be identified. The RRFD utilizes functional charts or descriptive documents for several divisions in the department such as operations, training, and the fire marshal's office. Figure 3 is an example of a functional chart used by the RRFD for the assistant fire chief.

Figure 3: RRFD Assistant Chief Functional Chart



A functional chart of the organization that links all of the divisions together would provide the RRFD a much clearer picture of the leadership functions at each organizational level, and would illustrate the work that must be performed at each of the organizational levels to include the fire chief's office. Integrating the organization's functional and traditional organizational charts facilitates the view of an organization as a set of related responsibilities, and creates leadership teams within each organizational component. This reduces organizational silos and promotes lateral team building between organizational divisions. Figure 4 illustrates a functional table of the organization that if implemented, potentially may improve organizational structure efficiencies for the RRFD.

Figure 4: Proposed Functional Organization Chart



Recommendation:

- The proposed functional table of the organization should be developed to accompany the formal department organizational chart and the current RRFD functional table of the organization.

Staffing and Deployment

The RRFD delivers field operational services through a clearly defined division of labor that includes a middle manager (battalion chief), first-line operational supervisors (captains and lieutenants), technical specific staff (drivers), and firefighters. The city is considered a single operational battalion and is commanded each day by a battalion chief. Within the city are individual fire suppression companies, each of which is supervised by a company-level officer (captain or lieutenant). Staffing for engine, ladder, and quint companies is a minimum of three, and staffing for squad units is a minimum of two. In total, it requires a minimum of 29 operational personnel to provide the required minimum staffing each day.

The operational division is commanded by the assistant fire chief. Operational staff members work a 56-hour work week and are scheduled for 24-hour workdays. The operational schedule rotates on a regular schedule between three platoons (A, B, and C). This schedule is 24 hours on and 48 hours off. Operational shift staffing is such that eight additional personnel are available each day to cover

both scheduled and unscheduled leave. Current staffing guidelines allow six personnel to be on scheduled leave each 24-hour shift. Two additional staff is available to cover for unscheduled leave and to fill vacancies created through training opportunities. Should minimum staffing require additional staff over and above these eight available positions, overtime is utilized to maintain minimum staffing at 29 personnel.

To better manage operational staffing, the department has procured the Kronos Telestaff system. Kronos TeleStaff is an event-based public safety unit scheduling system.[4] This software offers staffing solutions and web-based access, and allows the department to establish rules and parameters for scheduling and managing overtime, scheduled and unscheduled leave, and callbacks. Additionally, the department can mine data on virtually every scheduling category in the department's system for use in planning and budgeting.

Figure 5 illustrates station locations for the RRFD.

Figure 5: RRFD Fire Station Locations

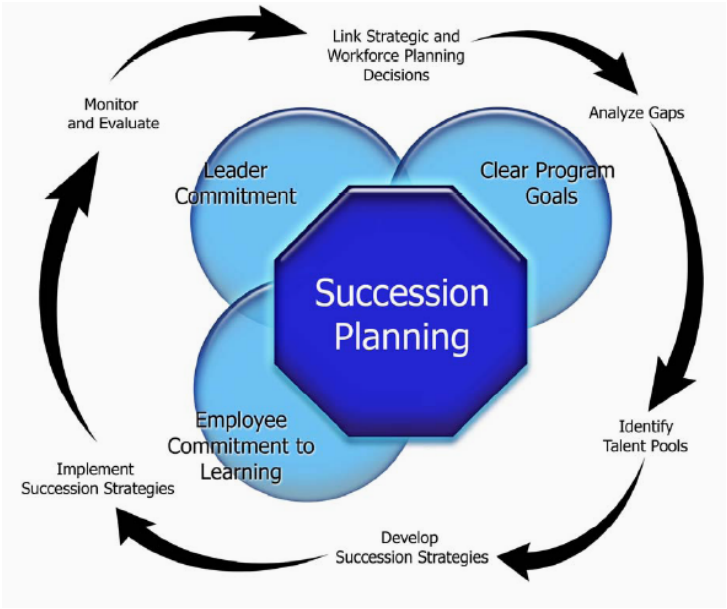
[4] http://www.kronos.com/telestaff.aspx

Succession Planning

The analysis of the RRFD did not identify a clear organizational succession plan. There is a career path training program within the training division that outlines expectations to help to prepare staff for advancement at various levels in the organization. One important piece for the organization, which has a fairly new fire chief, is to implement programs that identify the future leaders of the organization; that is, go beyond the technical courses for promotional preparation. A key to this is to develop and implement a formal succession plan. Succession planning is a systematic approach to developing potential successors to ensure organizational leadership stability. Successful succession planning identifies, develops, and nurtures potential future leaders. It is critical for the long-term success of any organization that such a process be in place and ongoing.

Critical to the success of succession planning is the engagement and commitment of the senior leaders to the program, as well as a commitment of other members of the organization to their own personal and professional development. To be a part of the succession plan, one must commit to one's own professional development process to be able to compete for and fill critical organizational leadership roles. Recommendations are discussed later in this report regarding formal and technical education regimens and opportunities for this self/organizational development process. Figure 6 illustrates one example of a succession plan.

Figure 6: Six-Step Succession Planning Model



From United States Office of Personnel Management, HCAAF Systems, 2005.

Recommendation:

- Develop and implement a succession planning process that identifies and develops future leaders.

Education and Training Programs

A thirty-year RRFD veteran battalion chief manages the department's training division. He is supported by a four-person staff, including two captains, one of whom also serves as the EMS coordinator, a driver trainer (another thirty-year veteran), and a civilian administrative assistant. The RRFD training division does an exceptionally good job of preparing firefighters through a repetitive and continuous career advancement training program. Similarly, the department's officers are prepared in advance for the next position in their career; they must attain certification as TCFP Fire Officer I and Instructor I before becoming a lieutenant; Fire Officer II before advancing to captain; and for upcoming Battalion Chiefs, Fire Officer III and IV and Fire Instructor II. A minimum of two years' service is required in the next lower grade before being eligible to test for advancement. An integral part of the training is that each new level of advancement is accompanied by an employee completing a skills task book and checking off each skill as it is accomplished. The program's training philosophy is built on positive reinforcement and coaching, the continual repetition of good tactical practices, and ongoing career path development.

As with most Texas jurisdictions, the RRFD's recruit firefighters are required to have been certified as a Structural Firefighter through the Texas Commission on Fire Protection and a minimum of EMT-Basic through the Texas Department of State Health Services prior to being hired by the department. Once hired, recruits are put through a skills test, an intensive seven week academy that provides orientation on the department's policies and the use of all equipment including self-contained breathing apparatus. As soon as they complete this initial training, recruits begin an intense six- to nine-month process of repetitive firefighter skills training. Once they have mastered these basic skills they immediately move on to relief driver operator training and so on. The department has also taken advantage of the excellent training available at the Federal Emergency Management Agency's (FEMA) National Fire Academy in Emmitsburg, Md. The National Fire Academy has an extensive array of officer and leadership programs available at minimal cost (tuition, airfare, and housing are free to students). The department regularly sends at least two fire department personnel to the Academy each year.

In summary, the above described ongoing, focused training program, the career development and leadership training, and the continual development of critical firefighter survival skills are not just emblematic of this exceptional training division but are at the heart of the RRFD.

The training chief annually establishes a general training calendar with specific curriculum refined regularly one month in advance. Training is held three times per week on Tuesday, Wednesday, and Thursday. Live fire training is held three to four times per year, usually at a Pflugerville training facility, and if not there, in one of three other neighboring communities. The department currently has only one conference room at station 6 that serves as a classroom. The classroom is connected electronically using Polycom teleconferencing so as to provide training to all fire stations, each of which has a television and teleconferencing abilities for interactive instruction. The department's internal training capability has the capacity to record training sessions for those who are on leave so these personnel can remain current with all training. Recently the department purchased the Brunacini Blue Card Training program. The department is planning to reinforce its officer tactical training drills with this online program and in class simulations of National Incident Management System (NIMS) type 4 and 5 incidents.

Although the current training facilities have served the department well, the department has had a long term need to upgrade its training facilities. For example, besides the regular need to use the burn facilities of other communities, it has had to rent facilities from private firms for driving pads suitable for driver operator training, and to use the space at a former lumber yard (currently city owned and scheduled to be built into an indoor sports complex) for hands-on training, including hazmat, multi-company, and extrication training.

The Round Rock city council has approved planning for building a public safety training center on a seventy acre site inside the city limits and which will provide a full complement of classroom and hands-on training facilities for both the police and fire department. The draft report that details the critical need for the center, the various police and fire training facilities to be housed at the center, as well as a needs assessment survey of the training needs of nearby police and fire departments is currently being developed by a private firm and the city of Round Rock police and fire department staff.

As part of the city of Round Rock development of an overall city strategic planning process, the training division has begun the development a five-year strategic plan for the training division. Although still in draft form, the document spells out the essentials of the training division's long-term vision for the department's training. The plan has begun to lay out the goals and the specific objectives of what the training division hopes to accomplish over the next five years, as well as the performance indicators (only very broadly) on how it will measure the degree of success it has had in achieving the planned outcomes.

Recommendation:

- The training division has two key positions (training chief and driver operator trainer) that will require replacement due to retirement over the next five years. Although the department realizes the need for succession planning, it is not fully prepared to handle the impact of these two retirements will have. Prioritize these two positions when developing and implementing a succession plan for the department.

External System Relationships

Local governments use many types of intergovernmental agreements to enhance local fire protection and EMS services, with mutual aid and automatic aid agreements among the most common types of these shared service agreements. It is also important that fire departments be able to quickly access extra and/or specialized resources in the aftermath of a disaster or other large-scale event. In addition, because these types of incidents do not respect jurisdictional boundaries, they often require coordinated response. Sharing specialized capabilities, such as wildland fire team response units, also helps departments reduce costs without impacting service delivery. These circumstances point to the critical need for good working relationships with other fire and EMS organizations.

Establishing a clear understanding of each organization's responsibilities, cost reimbursement, and/or payment for services rendered is critical for building and maintaining effective regional cooperation. In addition, having interoperable communications, such as the linking of CAD systems

(soon to be completed between the city and Williamson County EMS) and unit status monitors, is essential for providing a cohesive and coherent approach to service delivery.

The RRFD has several interlocal agreements with the adjoining cities of Georgetown and Pflugerville, Williamson County, and emergency service districts (ESD) 2, 3, and 9. The RRFD also has an automatic aid agreement with the Sam Bass Volunteer Fire Department that services the Vista Oak of Williamson County ESD 9. These agreements detail the level of responsibility of each department as indicated as follows:

- The RRFD has an automatic aid agreement with the Sam Bass Volunteer Fire Department. Both jurisdictions agree that the agreement is reciprocal. The agreement was signed in 2007 and automatically renews annually. This agreement should be reviewed on a regular schedule not to exceed five years.
- The RRFD agreement with the city of Georgetown is for automatic assistance into areas of each jurisdiction to improve response time. Both jurisdictions agree that the agreement is reciprocal. The agreement was approved and signed in 2007, and is reviewed every five years. Updates are incorporated as needed and as agreed upon. This agreement should be reviewed in 2012.
- The RRFD has an automatic aid agreement with the Williamson County ESD 3. Both jurisdictions agree that the agreement is reciprocal. The agreement was signed in 2012, and automatically renews annually. This agreement should be reviewed on a regular schedule not to exceed five years.
- The RRFD has an automatic aid agreement with the Travis County ESD 2. Both jurisdictions agree that the agreement is reciprocal. The agreement was signed in 2007, and automatically renews September 1 of each year. This agreement should be reviewed on a regular schedule not to exceed five years.
- The RRFD has a mutual aid agreement with the Williamson County Fire Chiefs Association, which includes 18 fire departments. These fire departments include the Bartlett FD, Cedar Park FD, Coupland FD, Florence FD, Georgetown FD, Liberty Hill FD, Sam Bass FD, Taylor FD, Granger FD, Hutto FD, Jarrell FD, Jollyville FD, Leander FD, Taylor FD, Thorndale FD, Thrall FD, and Weir FD. The Round Rock Volunteer FD is also a signatory, but the department is no longer in operation. This agreement was signed in 2007 and is reviewed annually. The Hutto FD and RRFD also have a separate automatic aid agreement covering sections of ESD 3, which takes precedence.
- The RRFD has a contractual agreement, signed in 2007, with ESD 9 to provide fire protection and emergency medical first responder services. These services are to be dispatched in the same manner as occurs in the city. This agreement automatically renews for successive one-year terms. There is an additional and separate agreement with ESD 9, signed in 2008, to provide fire code enforcement. These agreements are service contracts, whereby the district reimburses the city for services as delineated in the agreement utilizing an agreed-upon formula. This agreement should be reviewed annually.

Recommendation:

- The RRFD should review all interlocal agreements on a regular schedule. This review should occur at minimum every three to five years, and when a change in the response environment is known to exist. These reviews will ensure there remains a clear definition of responsibilities, equity in the provision of the services provided by all the parties and, if needed, a provision for cost recovery where imbalance in the provision of service may exist.

Report continues on next page.

Assessment and Planning

A fire department should conduct a needs assessment and community risk analysis within its community for use in the comprehensive strategic planning process. This assessment process will assist a department in determining the necessary resources and assets needed to accomplish its defined core mission functions.

Deciding how many emergency response resources to deploy, and where, is not an exact science. The final decision on a deployment model is based on a combination of risk analysis, professional judgment, and the city of Round Rock's willingness to accept more or less public safety risk based on available revenues. Accepting more risk generally means that fewer resources are deployed, or resources are deployed from a greater distance. It is important to note, however, that deploying more resources or deploying resources within a geographically smaller area to reduce response times will not guarantee that loss will be less, especially in the short term. In any case, matching available revenues to expenditures generally is the greatest driver for deploying fire and EMS resources. A comprehensive planning process will assist in determining the necessary resources and assets needed to accomplish the department's core mission functions.

Strategic Planning

The development of a long-range fire protection and prevention comprehensive strategic plan involves three key steps. The first step is to generate an assumption of what the community will look like at the end of the planning process. Second, the department needs to assess realistically the strengths and weaknesses of the existing fire protection system to include codes, standards, and ordinances relating to fire prevention efforts, public safety education programs, and emergency response capability. The third and final step is to project the needed capabilities and capacity of the fire protection system and its fire department component as the community changes.[5] This process helps to ensure that an adequate level of resources, including staffing and equipment, are allocated to meet the community's needs for the services delivered by the fire department as efficiently as possible. A strategic plan also assists the department in matching resources with available revenues.

Defining clear goals and objectives for any organization through a formal strategic planning document establishes a resource that any member of the organization, or those external to the organization, can view and determine in what direction the organization is heading, and, as well, how the organization is planning to get there.

In a strategic plan, it is essential that clear and achievable goals and objectives for each program area are developed. Each program area must then (1) define its goals; (2) translate the goals into measurable indicators of goal achievement; (3) collect data on the indicators for those who have utilized the program; and (4) compare the data on program participants and controls in terms of goal criteria.[6] Objectives should be SMART, an acronym that stands for **s**pecific, **m**easurable,

[5] *Fire Protection Handbook,* Twentieth Edition, Volume II (National Fire Protection Association, 2008), 12-5.
[6] Starling, *Managing the Public Sector,* 287.

ambitious/**a**ttainable, **r**ealistic, and **t**ime-bound. Additionally, these goals should link back to fiscal planning goals and be utilized in budget documents.

The RRFD does not have a departmental comprehensive strategic plan that focuses on defining the future, providing clear departmental direction, and defining resources that support the strategy for fire protection and EMS service deliverables. The department did begin such a plan; however, it stopped this process when notified of the ICMA study. The RRFD does have established goals and objectives; however, they are not linked to a department document that encompasses a clearly defined strategy. Figure 7 illustrates a basic strategic planning model the RRFD can utilize when developing its comprehensive strategic plan.

Figure 7: Basic Strategic Planning Model

As there is no perfect strategic planning model for an organization, the above model provides a starting point from which the organization can begin to develop a strategic planning process, and eventually a strategic plan. Following are the steps for a successful approach to this critical process[7]:

Purpose-Mission: This is the statement that describes why the organization exists. This statement should describe what customer needs are intended to be met and with what services. Top level management should agree what the mission statement/purpose is, understanding this will change over the years as the organization changes.

Selection of goals the organization must meet to accomplish its mission: Goals are general statements about what the organization needs to accomplish to meet its purpose, or mission, and address major issues facing the organization.

7 McNamara, C. (1996-2007) Basic Overview of Various Strategic Planning Models. Adapted from the Field Guide to Nonprofit Strategic Planning and Facilitation. Minneapolis, MN: Authenticity Consulting, LLC.

Identify specific approaches or strategies that must be implemented to reach each goal: The strategies are often what change the most as the organization eventually conducts more robust strategic planning, particularly by more closely examining the external and internal organizational environments.

Identify specific actions to implement each strategy: Specific activities each division or major function must undertake to ensure it is effectively implementing each strategy. Objectives should be clearly worded to the extent that staff and the community can assess if the objectives have been met or not. Ideally, top management develops specific committees that each have a work plan, or set of objectives.

Monitor and update the plan: Regularly reflect on the extent to which the goals are being met and whether action plans are being implemented. Perhaps the most important feedback is positive feedback from customers, both internal and external.

Recommendations:

- It is strongly recommended that the RRFD develop and implement a comprehensive strategic plan.
- Incorporate measurable and obtainable goals and objectives into strategic and comprehensive planning documents as well as annual and long-range fiscal documents.

Risk Assessment and Risk Management Planning

Community risk and vulnerability assessment are essential elements in a fire department's planning process. According to a National Fire Protection Association (NFPA) paper on assessing community vulnerability, fire department operational performance is a function of three considerations: resource availability/reliability, department capability, and operational effectiveness.[8] These elements can be further defined as:

Resource availability/reliability: The degree to which the resources are ready and available to respond.

Department capability: The ability of the resources deployed to manage an incident.

Operational effectiveness: The product of availability and capability. It is the outcome achieved by the deployed resources or a measure of the ability to match resources deployed to the risk level to which they are responding.[9]

The community risk and vulnerability assessment evaluates the community as a whole, and with regard to property, measures all property and the risk associated with that property and then

[8] Fire Service Deployment, Assessing Community Vulnerability: From http://www.nfpa.org/assets/files/pdf/urbanfirevulnerability.pdf.
[9] National Fire Service Data Summit Proceedings, U.S. Department of Commerce, NIST Tech Note 1698, May 2011.

segregates the property as either a high, medium, or low hazard. According to the NFPA *Fire Protection Handbook*, these hazards are defined as:

High-hazard occupancies: Schools, hospitals, nursing homes, explosive plants, refineries, high-rise buildings, and other high life-hazard or large fire-potential occupancies.

Medium-hazard occupancies: Apartments, offices, and mercantile and industrial occupancies not normally requiring extensive rescue by firefighting forces.

Low-hazard occupancies: One-, two-, or three-family dwellings and scattered small business and industrial occupancies. [10]

Linking a fire department's operational performance functionality to the community risk and vulnerability assessment further assists fire personnel in the planning process by increasing their understanding of the community risk with regard to property and life-hazard potential. Through plotting the rated properties on a map, planners can better understand how current and future fire station locations and resource capabilities relate to specific risks and vulnerabilities, and then can identify potential gaps in service delivery. In combination with response run cards and staffing patterns, the analysis can help the RRFD shift resources from areas at less risk to concentrate more resources where there is a greater likelihood of incidents, and to prepare for worst-case scenarios.[11] The community risk assessment may also include determining and defining the differences in risk between a detached single-family dwelling, a multifamily dwelling, an industrial building, and a high-rise building by placing each in a separate category.

In addition to examining community risk and vulnerability, the RRFD should examine internal risk and vulnerability. Risk assessment and vulnerability analysis are not new to the fire service, as the NFPA 1500 Standard for a Fire Department Occupational Safety and Health Program document requires the development of a separate risk management plan for fire departments aside from the risk management plan in a local government plan.[12]

In order for this process to be effective, the following components must be included in the risk management plan:

Risk identification: Actual or potential hazards.

Risk evaluation: The potential for occurrence of a given hazard and the severity of its consequences.

Prioritizing risk: The degree of hazard based upon the frequency and severity of occurrence.

Risk control: Solutions for eliminating or reducing real or potential hazards by implementing an effective control measure.

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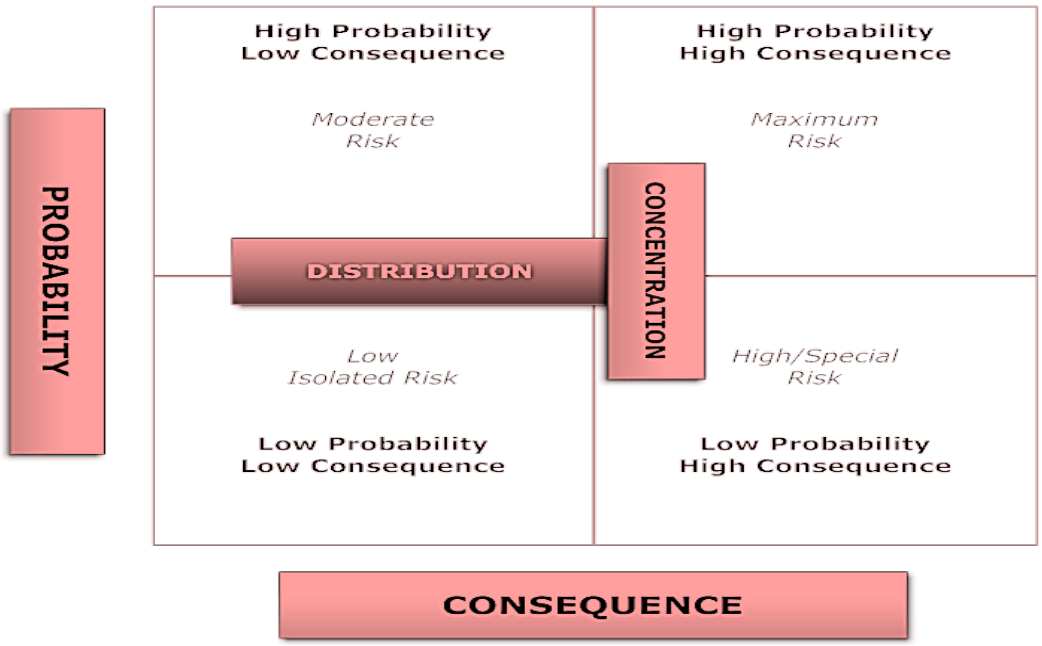
[10] Cote, Grant, Hall & Solomon, eds., *Fire Protection Handbook* (Quincy, MA: NFPA 2008), 12.
[11] *Fire and Emergency Service Self-Assessment Manual*, Eighth Edition, (Center for Public Safety Excellence, 2009), 49.
[12] Barr and Eversole, eds., *The Fire Chief's Handbook*, Sixth Edition, 270.

Risk monitoring: Evaluation of effectiveness of risk control measures. [13]

The risk management plan establishes a standard of safety for the daily operations of the RRFD. This standard of safety establishes the parameters within which the RRFD should conduct all activities during emergency and nonemergency operations. The intent is for all members to operate within this standard or plan of safety and not deviate from this process.

Figure 8 provides a matrix illustrating the considerations of both internal and external risk assessment: the probability of an event occurring and the seriousness of the consequence if an event should occur. This matrix divides the risk assessment into four quadrants. Each quadrant of the chart suggests different requirements in the community for commitment of resources, and/or in the organization as the organization deploys its resources to combat the risk, whatever it is.

Figure 8: Probability and Consequence Matrix



Recommendations:

- The department should undertake a community risk and vulnerability assessment should be undertaken. The RRFD should use the results for the ongoing planning of fire response run cards, identification of apparatus needs, and staffing and deployment of resources.

- The RRFD should develop and implement an internal risk management plan following the standards of NFPA 1500, Standard for a Fire Department Occupational Safety and Health Program.

[13] NFPA 1500 (2007). Standard for a Fire Department Occupational Safety and Health Program, Annex D.

Insurance Services Office Rating/Accreditation

In February 2010 the RRFD was notified by the Insurance Services Office (ISO) that the city would receive the ISO rating of Class 2 for the fire protection system of the city of Round Rock. This decision was based on a site visit and evaluation conducted in May 2009.

ISO is a for-profit subsidiary of Verisk Analytics Company. ISO provides services relating to risk analysis by gathering information through community assessments and providing the information to the insurance industry. The data have historically been used to develop premiums for both residential and commercial policies. The ISO's Fire Suppression Rating Schedule (FSRS) is analyzed to assign the Public Protection Classification (PPC).[14] The FSRS is a manual of the criteria which measures the tools (assets and practices) in a community's arsenal to fight fires. The schedule contains a point system from 0 to 100. Every ten points is a "Class." The grade is presented as a class from 1 to 10: Class 1 is the highest class; a rating of Class 9 is considered the "lowest recognized protection." A Class 10 does not meet the minimum criteria established by the ISO. Table 1 depicts the PPC classifications by point value. The national distribution of PPC classifications is illustrated in Figure 9.

Table 1: PPC Point Values

PPC	Points
1	90.00 or more
2	80.00 to 89.99
3	70.00 to 79.99
4	60.00 to 69.99
5	50.00 to 59.99
6	40.00 to 49.99
7	30.00 to 39.99
8	20.00 to 29.99
9	10.00 to 19.99
10	0.00 to 9.99

According to ISO, the FSRS evaluates three areas when considering a locality's fire protection: fire alarms, water supply, and the agency itself. [15] Ten percent of the community's score is based on the manner in which a fire department receives and dispatches calls for fire alarms. Included in the observations is a detailed analysis of the communications center (personnel and number of lines coming into the center). In Round Rock, the police emergency communications center handles the dispatch of fire and EMS calls.

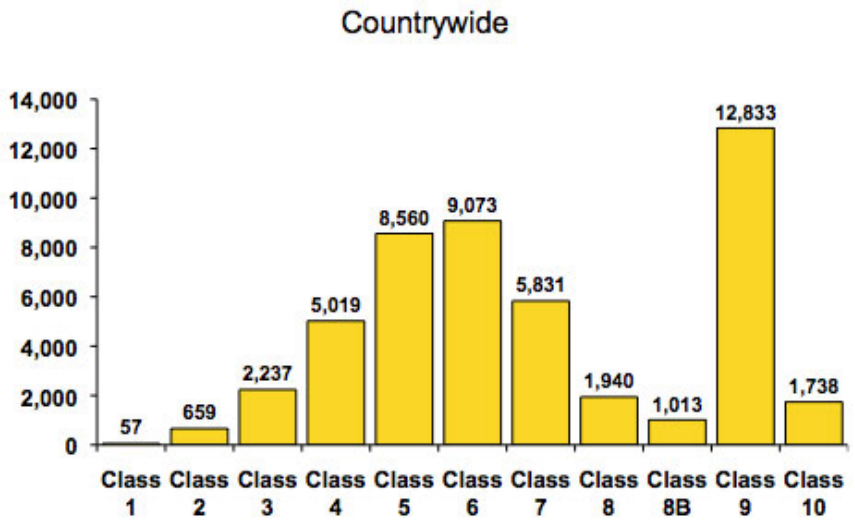
Forty percent of the FSRS score is based on the sufficiency of the community's water supply system and its ability to provide water in excess of the daily maximum consumption. In Round Rock, the water supply for fire protection is managed by the City of Round Rock utilities.

Lastly, the fire agency itself is evaluated and this assessment contributes to 50 percent of the overall score. Within this module, ISO reviews the distribution of stations and companies throughout the area, all components of personnel training, and equipment inventory to include review of maintenance and testing. There are three important areas included within the fire department analysis. Fifteen percent of this module is attributed to company personnel available to respond to first alarms; however, ISO does apply an upper limit for staffing as there is a finite number of personnel who can effectively operate a piece of apparatus at any given time. Ten percent of this module is given for the comparison of in-service pumpers and equipment carried, with the number of necessary pumpers and equipment as determined by "Basic Fire Flow, the size of the area served, and the method of operation." The third-highest weighted score (9 percent) in

[14] ISO Mitigation Online, *About ISO* (2012), http://www.isomitigation.com/docs/about0001.html (accessed on October 31, 2012).
[15] ISO Mitigation Online. *About ISO*.

this module is the rating of the department's training. ISO evaluates the training programs and available training facilities. This review includes the training of officers, drivers, and recruits, along with ensuring familiarization with buildings and pre-fire planning.

Figure 9: National PPC Distribution



Source: ISO Mitigation Online, About *ISO* (2012), http://www.isomitigation.com/docs/about0001.html.

For decades, the ISO's PPC rating schedule has been utilized to aid insurance companies with determining premiums for property insurance. Recently, there has been some discussion as to whether the system provides the appropriate benchmark for the quality of an agency's delivery of fire suppression services. Professionals within the fire industry have debated whether the ISO's methodology is outdated and whether it provides a comprehensive analysis of the fire suppression ability of the particular agency. In 2010, the ISO began to solicit input from various organizations regarding the process and to determine if there were any necessary changes to the rating schedule. The NFPA, the IAFC, the National Volunteer Fire Council (NVFC), the IAFF, the Association of Public-Safety Communication Officials (APSCO), and the National Association of State Fire Marshals all provided varying forms of suggestions to ISO.[16] In addition to the three components currently examined, the changes being considered include the addition of a fourth component: community risk reduction. This would include a review of all activities relating to fire prevention within an agency, such as administration, adoption, and enforcement of the fire code.

Some critics of the rating system have stated that the ISO is outdated and fails to give credit for new technologies that have proven effective in fire suppression efforts. ISO has taken this criticism into consideration when reviewing the new proposals to the schedule and system. Janet Wilmoth, in a recent article of *Fire Chief,* reports that ISO has developed a relationship with the CPSE and has

[16] Janet Wilmoth, "Suppression Ratings See Unscheduled Maintenance," *The Fire Chief* (June 1, 2010), http://firechief.com/print/suppression/ar/suppression-rating-changes-201006 (accessed Oct. 31, 2012).

been an active participant in fire department accreditation. The ISO recognized the importance of the accreditation process and how it provides an exceptional tool that can be utilized for continuous self-improvement and professional development. Fire professionals also recognize that the accreditation process bolsters the quality of service delivery.

An available best practice that involves a comprehensive assessment of a fire department is the accreditation program managed by the CPSE. This program provides an analytical self-assessment process to evaluate ten categories of the agency's performance. During this process, the department examines more than 240 separate performance indicators, 98 of which are considered core or required competencies.

Included within the ten accreditation categories is an expectation for the fire department to analyze itself by planning zones, to identify the hazards posed within each planning zone, to rank hazards by potential severity, and to ensure that the appropriate resources are available to manage the hazards.[17] There seems to be a current trend to focus an agency's planning and resources on becoming accredited and/or maintaining the accreditation. As noted, the PPC process evaluates only certain areas of a department's fire program and may not provide an accurate picture of the agency's ability to effectively fight and prevent fires. The accreditation process provides the individual department the benefit of a critical self-analysis of its performance at varying levels to ensure continuous self-improvement. It is an extremely comprehensive review that is conducted over a certain time period and requires reaccreditation, which helps to ensure that the standards are being maintained.

Assuming all other factors are "equal," communities with higher ratings through the PPC program generally benefit from lower property insurance than communities that have a lower PPC rating. A large majority of insurers consider the ISO's PPC program when assessing policies. However, State Farm, one of the nation's largest insurance carriers, has phased out the use of the ISO rating when considering property premiums for communities.[18] Where permissible by law, State Farm has elected to institute its own fire rating system, which analyzes actual claims in a given zip code. State Farm has determined this provides a more accurate depiction of a community's "fire-fighting ability." Texas does not require State Farm to consider ISO's PPC.

An argument can be made that a department and its leadership should focus efforts on the accreditation process, which may in turn potentially reduce the ISO PPC rating. Furthermore, the accreditation process assists local governments justifying their expenditures by demonstrating a direct link to improved services. Particularly for emergency services, local officials need criteria to assess professional performance and efficiency. The CPSE fire accreditation process provides a well-defined, internationally recognized benchmark system to measure the quality of fire and emergency services.[19]

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[17] CPSE, *CFAI Accreditation Process* (2012) http://www.publicsafetyexcellence.org/agency-accreditation/the-process.aspx (accessed on October 31, 2012).
[18] Insure.com, *Smoke but No Fire where State Farm Abandons Standard Fire Ratings* (February 13, 2003), http://www.insure.com/home-insurance/state-farm-fire.html (accessed on October 31, 2012).
[19] CPSE, *About CPSE* (2012), http://www.publicsafetyexcellence.org (accessed on October 31, 2012).

While it is auspicious for a fire department to strive for a higher PPC to potentially achieve an improved insurance rating for residents and businesses, one has to ask at what cost. It is true the higher PPC for a jurisdiction can reduce the amount of insurance paid by residents and businesses, but it is equally true that the cost of making the improvements necessary to obtain that reduction (which translates into higher taxes paid by those same residents and businesses) can exceed the insurance savings realized.[20] Fire departments should consider pursuing accreditation, as it also has a positive effect on the community's ISO PPC rating.[21]

Historically, jurisdictions have sought to have the highest ISO classification possible. In more recent years, however, these same jurisdictions have been more closely analyzing the benefits gained from a high ISO rating as compared to the cost to the taxpayers to reach such a rating. While there can be differences in insurance premiums paid by a private business based on the ISO rating, as a practical matter, most large businesses are individually rated by insurance companies. The insurers take into consideration the very specific characteristics of the building occupied by the business, the site and the type of business, and if it has fire protection systems in place—such as automatic sprinkler systems.

Insurance premiums are generally not affected for residential properties by differences in the ISO rating if the rating is banded in one of the higher classes (between 1 and 5). Stated more directly, it is unknown what specific benefits property owners derive from the ISO rating. In an effort to answer that question an increasing number of jurisdictions are seeking information from the insurance industry. This is not to suggest that the city of Round Rock should no longer strive for a Class 2 ISO rating, but it does suggest that data should be obtained and analyzed to determine the relative costs and benefits of this rating. Both the ISO process and the accreditation process are important ways to judge the quality of an organization and community, but on balance, the accreditation process is generally more helpful in building a high-performance fire and emergency services organization that potentially delivers premier fire and EMS services.

Recommendations:

- Consider the CPSE accreditation program and conduct a self-assessment under the CPSE guidelines as a means toward overall organizational improvement. If this program is implemented, appoint an accreditation manager whose primary function is to manage the accreditation process until the RRFD is fully accredited.
- The department should obtain specific data and rationale from property insurance carriers to determine the community financial benefits, if any, of maintaining the current ISO rating to determine if there will be a significant difference in insurance rates should the department move to a lower rating, and then compare this change against any potential change in tax rate to maintain the ISO 2 rating.

[20] Barr and Eversole, *The Fire Chief's Handbook*, 203.
[21] Ron Holt, *A Different Perspective of Fire Department Accreditation*, CPSE, http://www.publicsafetyexcellence.org/files/pdf/A-Different-Perspective-Accred.pdf (accessed on October 31, 2012).

Performance Measurement/Goals and Objectives

Fire safety and prevention programs need to be planned and managed to achieve specific, agreed-upon results. This requires establishing intended results and a set of goals for the activities of any given program to achieve these results. Determining how well an organization or program is doing requires that these goals be measurable and that they are measured against desired results. This is the goal of performance measurement.

Simply defined, performance measurement is the ongoing monitoring and reporting of progress toward pre-established goals. It captures data about programs, activities, and processes, and displays data in standardized ways that help communicate to service providers, customers, and other stakeholders how well the agency is performing in key areas. Performance measurement provides organizations with tools to assess performance and identify areas in need of improvement. In short, what gets measured gets done.

The need to continually assess performance requires adding new words and definitions to the fire service lexicon. Fire administrators need to be familiar with the different tools available and the consequences of their use. In *Managing the Public Sector*, business professor Grover Starling applies the principles of performance measurement to the public sector. He writes that the consequences to be considered for any given program include:

> **Administrative feasibility:** How difficult will it be to set up and operate the program?
>
> **Effectiveness:** Does the program produce the intended effect in the specified time? Does it reach the intended target group?
>
> **Efficiency:** How do the benefits compare with the costs?
>
> **Equity:** Are the benefits distributed equitably with respect to region, income, gender, ethnicity, age, and so forth?
>
> **Political feasibility:** Will the program attract and maintain key actors with a stake in the program area?[22]

Performance measurement systems vary significantly among different types of public agencies and programs. Some systems focus primarily on efficiency and productivity within work units, whereas others are designed to monitor outcomes produced by major public programs. Still others track the quality of services provided by an agency and the extent to which citizens are satisfied with these services.

Within the fire service, performance measures tend to focus on inputs (the amount of money and resources spent on a given program or activity) and short-term outputs (the number of fires in the community, for instance). One of the goals of any performance measurement system should be also to include efficiency and cost-effectiveness indicators, as well as explanatory information on how these measures should be interpreted. The types of performance measures are shown in Table 2.

[22] Starling, *Managing the Public Sector*, 396.

Table 2: The Five GASB Performance Indicators

Category	Definition
Input indicators	These are designed to report the amount of resources, either financial or other (especially personnel), that have been used for a specific service or program.
Output indicators	These report the number of units produced or the services provided by a service or program.
Outcome indicators	These are designed to report the results (including quality) of the service.
Efficiency (and cost-effectiveness) indicators	These are defined as indicators that measure the cost (whether in dollars or employee hours) per unit of output or outcome.
Explanatory information	This includes a variety of information about the environment and other factors that might affect an organization's performance.

From Harry P. Hatry et al., eds. *Service Efforts and Accomplishments Reporting: Its Time Has Come* (Norwalk, CT: GASB, 1990).

One of the most important elements of performance measurement within the fire service is to describe service delivery performance in a way that both citizens and those providing the service have the same understanding. The customer will ask, "Did I get what I expected?" the service provider will ask, "Did I provide what was expected?"

Ensuring that the answer to both questions is "yes" requires alignment of these expectations and the use of understandable terms. The author of the "Leadership" chapter of the 2012 edition of ICMA's *Managing Fire and Emergency Services* "Green Book" explains how jargon can get in the way:

> Too often, fire service performance measures are created by internal customers and laden with jargon that external customers do not understand. For example, the traditional fire service has a difficult time getting the public to understand the implications of the "time temperature curve" or the value of particular levels of staffing in the suppression of fires. Fire and emergency service providers need to be able to describe performance in a way that is clear to customers, both internal and external. In the end, simpler descriptions are usually better.[23]

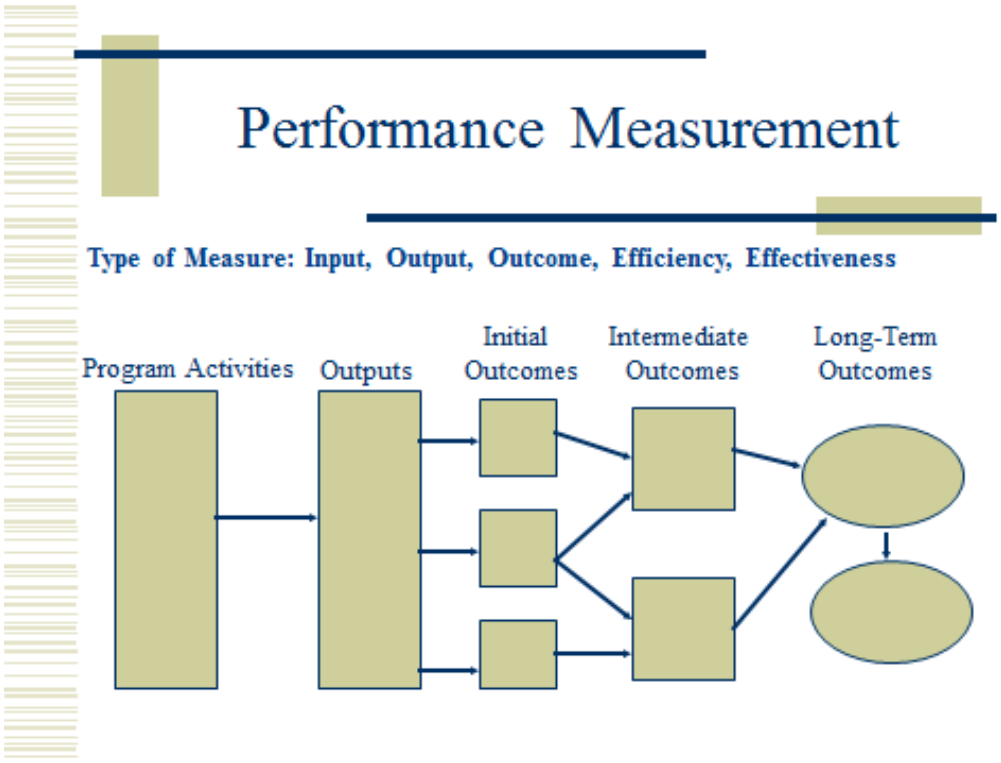
The RRFD measures some aspects of performance through published department goals. For instance, it collects and reports typical fire department data on response times and nonemergency services, fire loss, training, and department communication to name a few. This data, although reflecting typical workload measures and department activity seen among fire service organizations today, should link department goals to specific target rates or percentages if they are to be used to justify program budgets and service delivery levels.

[23] I. David Daniels, "Leading and Managing," in *Managing Fire and Emergency Services* (Washington, DC: 2012), 202.

To accomplish this linkage, other forms of performance measures, particularly service-quality and customer-satisfaction measures, should be incorporated into the system. Staff throughout the organization should participate in developing performance measures. In addition to helping facilitate department wide buy-in, this could provide an opportunity for upper management to better understand what the line staff believes to be critical goals—and vice versa. For the same reason, the process of developing performance measures should include citizen input, which the city has with regard to service level preferences. Translating this advice from the citizens into performance measures will link the citizens and business community to the department, and will articulate clearly if their expectations are being met.

Establishing a performance management system within the framework of an overall strategic plan would help city management and elected officials gain a better understanding of what the RRFD is trying to achieve. Building any successful performance management system that measures more than outputs requires a consistent model. Figure 10 illustrates a successful program logic model[24] designed to build consistent performance measures and should be linked to the performance measure indicators shown in Table 2 to build a successful performance measurement system.

Figure 10: Performance Measure Program Logic Model[25]



[24] Shows the logic by which program activities are expected to lead to targeted outcomes. Poister, 35.

[25] Theodore Poister, *Measuring Performance in Public and Nonprofit Organizations* (San Francisco, CA: 2003), 44.

Program logic component definitions:

- Type of Measure: identify the type of indicator to be measured.
- Program Activities: the provision of services provided by this program area.
- Outputs: the results of or how much is produced from the program activities.
- Initial/Intermediate Outcomes: substantive changes/improvements/benefits of the program as measured against the program goal.
- Long-term Outcomes: satisfy the stated *Goal*—links to the Budget/Strategic Plan.

Recommendations:

- The RRFD should develop and implement a performance measure reporting system that expands the type of measurement it employs, including a program logic model.
- Performance measures should be developed for each department activity, and should link to the strategic and comprehensive planning documents and fiscal/budget documents.

Operational Analysis

Fire Suppression/Emergency Medical Services

As discussed, the RRFD operates fire operational assets out of seven fixed facilities utilizing five engines, two quints, one tower ladder, two squads, and an array of specialty equipment that is cross-staffed with existing on-duty personnel. Through these assets (facilities, apparatus, and staffing), the RRFD provides services to include the mitigation of fire/all-hazards related calls for service, and first response non-transport EMS calls for service.

EMS transport services are provided by Williamson County EMS (WCEMS). WCEMS is a not-for-profit third-service EMS system that is funded through the county budget. WCEMS provides a dual-paramedic system (each ambulance is staffed with two paramedics) and provides EMS transport services to the entire 1,100 square miles of the county, including the incorporated cities. WCEMS currently operates 15 front-line ambulances that are stationed out of EMS stand-alone stations or service area fire department facilities and its crews work a 24/48 rotating schedule. WCEMS calls per year are averaging just fewer than 30,000.[26]

ICMA learned through a conversation with Kenny Schnell, Director of WCEMS, that WCEMS has a response time goal of 8 minutes and 50 seconds for urban response, and 15 minutes for rural response. According to Schnell, for the city of Round Rock the average response time is in the range of 6 minutes and 56 seconds (although this does not include an average 1 minute and 30 second chute time). Considered together, this total time for response in Round Rock is below the WCEMS urban response time goal.[27] This is achieved because WCEMS operates out of RRFD stations 3 and 5 as well as two stand-alone WCEMS facilities.

Fire/EMS Category Call Type

During the 12-month study period from which data was derived (July 1, 2012-June 30, 2012), the RRFD responded to 8,369 calls, including 77 mutual aid calls. Of these responses to calls for service, EMS calls for the year totaled 5,637(67 percent of all calls) with fire-related calls totaled 1,797 (22 percent of all calls). Actual fire calls the department responded to included 84 structure fire calls and 142 outside fire calls. Table 3 details the types and totals of fire and EMS response incidents, while Figures 11 and 12 illustrate this information in terms of the percentage of the total. Calls per day and call percentage in Table 3 are measured against the overall total number of calls.

[26] Retrieved from: http://www.wilco.org/CountyDepartments/EMS/tabid/453/language/en-US/Default.aspx.
[27] Personal conversation with Kenny Schnell, WCEMS Director, August 8, 2012.

Table 3: Fire and EMS Call Types

Call Type	Number of Calls	Calls per Day	Call Percentage
Cardiac and stroke	557	1.5	6.7
Seizure and unconsciousness	486	1.3	5.8
Breathing difficulty	508	1.4	6.1
Overdose and psychiatric	260	0.7	3.1
MVA	611	1.7	7.3
Fall and injury	855	2.3	10.2
Illness and other	2,360	6.4	28.2
EMS Total	**5,637**	**15.4**	**67.4**
Structure fire	84	0.2	1.0
Outside fire	142	0.4	1.7
Hazard	262	0.7	3.1
False alarm	549	1.5	6.6
Good intent	137	0.4	1.6
Public service	623	1.7	7.4
Fire Total	**1,797**	**4.9**	**21.5**
Mutual aid	77	0.2	0.9
Canceled	858	2.3	10.3
Total	**8,369**	**22.9**	**100**

Figure 11: EMS Calls by Type

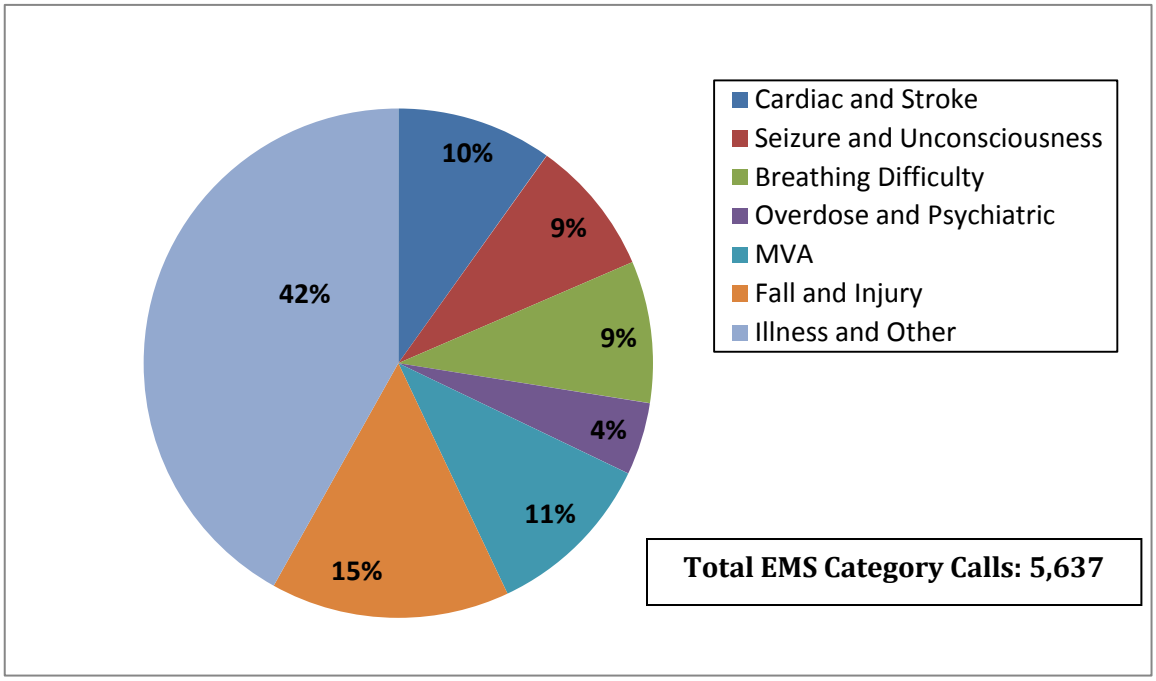
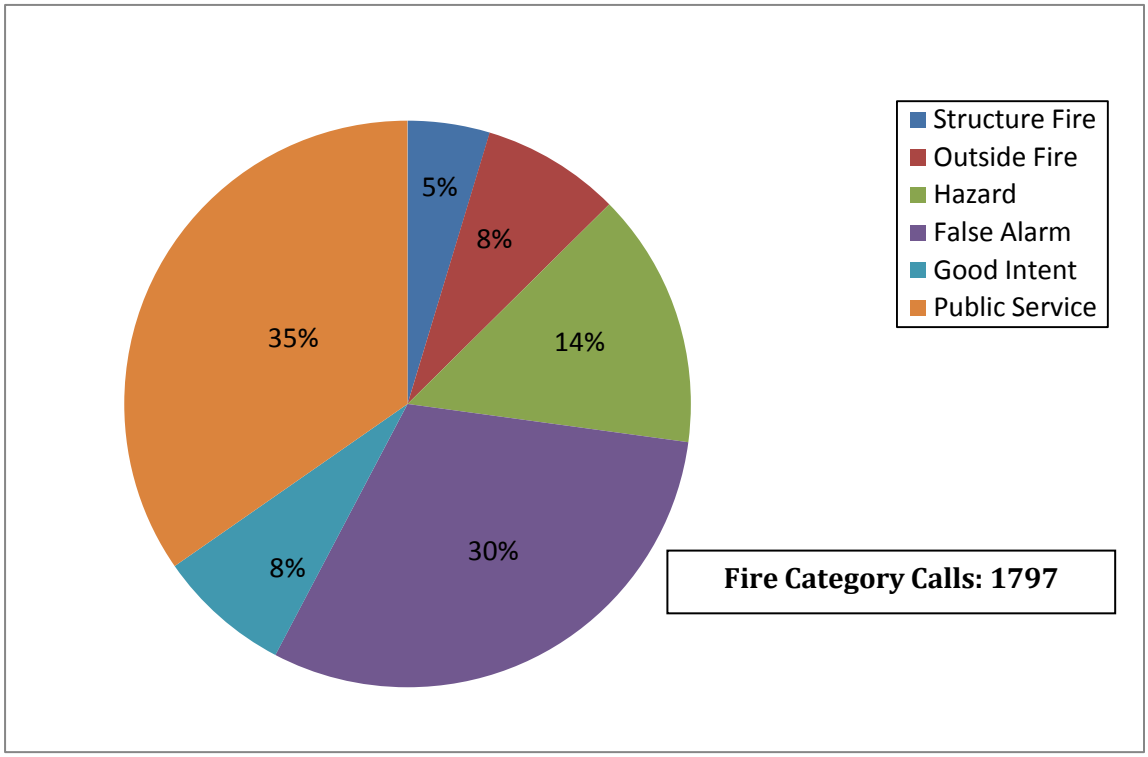


Figure 12: Fire Calls by Type



Observations from this data are:

- The department responded to an average of 22.9 calls per day, including 0.2 mutual aid calls and 2.3 canceled calls.
- EMS calls for the year averaged 15.4 per day.
- Fire category calls for the year averaged 4.9 per day.
- Structure and outside fire calls combined accounted for 226 calls during the year, averaging 0.6 calls per day, or a combined 13 percent of the overall fire category calls.
- False alarm calls and public service calls comprised 66 percent of the fire category total.
- Calls related to illness or other medical issues were the largest EMS call category and comprised 42 percent of the EMS category total.

Recommendation:

- The fire prevention staff should identify fire alarm trends and implement appropriate measures to mitigate alarm issues, with a focus on reducing responses.

Fire/EMS Category Unit Deployment Time

The time a unit is deployed on a single call is referred to as deployed time on a call for service and indicates the workload of that particular unit or station. This can be measured as productive emergency response time over a shift period. In the case of the RRFD, the shift is twenty-four hours. An analysis of the RRFD response data shows that a total of 5,585 EMS category calls (99 percent) lasted less than one hour and a total of 1,599 fire category calls (95 percent) lasted less than one hour.

Additional analysis and observations regarding calls for service in the fire category include: of the structure fire calls, 62 calls (74 percent) lasted less than one hour, 10 calls (12 percent) lasted between one and two hours, and 12 calls (14 percent) lasted more than two hours; of the false alarm calls, 542 calls (99 percent) lasted less than one hour and 6 false alarm calls lasted more than one hour.

Further analysis of EMS first response calls handled by the RRFD include: for illness and other calls, 2,354 calls, or 99 percent, lasted less than one hour, and 6 (less than 1 percent) illness and other calls lasted more than one hour; 585 motor vehicle accident (MVA) calls (96 percent of these calls) lasted less than one hour; 846 fall and injury calls (99 percent of this category of call) lasted less than one hour, and 8 (less than one percent) fall and injury calls lasted between one and two hours.

Table 4 and Figure 13 further break down workload and deployment time by hour of day and by call type. Table 4 depicts the annual deployed time for all RRFD emergency incidents, and Figure 13 depicts call workload by hour of day.

Report continues on next page.

Table 4: Annual Deployed Time by Call Type

Call Type	Average Deployed Minutes per Run	Annual Hours	Percent of Total Hours	Deployed Minutes per Day	Annual Number of Runs	Runs per Day
Cardiac and stroke	22.0	218	6.2	35.7	595	1.6
Seizure and unconsciousness	20.7	178	5.0	29.1	516	1.4
Breathing difficulty	21.2	188	5.3	30.7	531	1.5
Overdose and psychiatric	22.8	104	3.0	17.0	274	0.7
MVA	25.6	365	10.4	59.8	854	2.3
Fall and injury	21.2	323	9.2	52.9	913	2.5
Illness and other	17.0	719	20.4	117.9	2,534	6.9
EMS Total	**20.2**	**2,094**	**59.4**	**343.2**	**6,217**	**17.0**
Structure fire	55.4	312	8.9	51.1	338	0.9
Outside fire	25.0	118	3.4	19.4	284	0.8
Hazard	28.1	176	5.0	28.8	375	1.0
False alarm	15.6	220	6.2	36.0	845	2.3
Good intent	13.2	46	1.3	7.6	211	0.6
Public service	17.0	199	5.6	32.6	703	1.9
Fire Total	**23.3**	**1,071**	**30.4**	**175.6**	**2,756**	**7.5**
Mutual aid	127.7	251	7.1	41.2	118	0.3
Canceled	6.1	108	3.1	17.6	1,067	2.9
Total	**20.8**	**3,523**	**100.0**	**577.6**	**10,158**	**27.8**

Note: Each dispatched unit is a separate "run." As multiple units are dispatched to some calls, there are more runs than calls. Therefore, the department recorded 22.9 calls per day and 27.8 runs per day.

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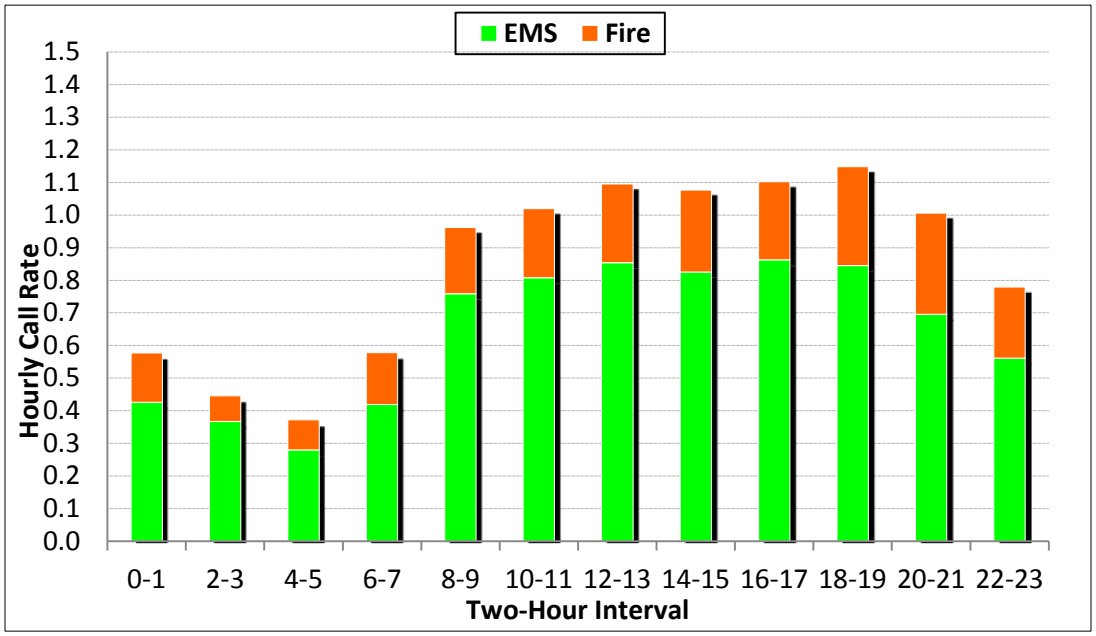
Figure 13: Calls by Hour of Day



Observations from this data show that the total deployed time for the year, or deployed hours, was 3,523 hours. This is the total deployment time of all the units deployed on all type of calls, including 251 hours spent on mutual aid. The deployed hours for all units combined averaged approximately 9.6 hours per day. Of the total workload, EMS calls accounted for 60 percent. Regarding call workload by hour of day, call rates were highest between 8:00 a.m. and 10:00 p.m., and lowest between midnight and 8:00 a.m.

Table 5 further breaks down workload by individual unit.

Report continues on next page.

TABLE 5: Call Workload by Unit

Station	Unit Type	Unit ID	Average Deployed Minutes per Run	Annual Number of Runs	Annual Hours	Runs per Day	Deployed Hours per Day
1	Engine	E1	18.0	1,518	455.1	4.1	1.2
	Ladder Truck	TK1	18.4	580	177.8	1.6	0.5
	Reserve Engine	E201	8.1	3	0.4	NA	NA
2	Engine	E2	21.6	1,124	404.4	3.1	1.1
	Reserve Engine	E202	16.8	41	11.5	NA	NA
3	Quint	Q3	21.3	785	278.6	2.1	0.8
	Squad	SQD3	18.0	1,291	387.9	3.5	1.1
4	Quint	Q4	23.2	633	244.0	1.7	0.7
	Squad	SQD4	20.0	1,076	358.8	2.9	1.0
5	Engine	E5	24.1	912	365.8	2.5	1.0
6	Engine	E6	20.1	1,031	345.7	2.8	0.9
7	Engine	E7	25.4	1,164	493.4	3.2	1.3

Note: Heavy rescue HR2 and E2 were cross-staffed and counted as E2. Ladder truck TK4 and Q4 were cross-staffed and counted as Q4. Brush truck B5 and E5 were cross-staffed and counted as E5. Air truck AIRTRL, Hazmat truck HAZMAT, and E6 were cross-staffed and counted as E6. Brush truck B7, tender truck TN7, and E7 were cross-staffed and counted as E7. Reserve engines E201 and E202 were not regularly staffed and the daily averages were not applicable.

From this table, it can be observed that units in station 1 were deployed the most often (runs per day) followed by the units in station 3. The units in station 3 had the largest number of deployed hours followed by the units in station 1. On average, the units in station 1 had 5.7 runs per day and were deployed 1.7 hours per day. The units in station 3 averaged 5.6 runs per day and were deployed 1.9 hours per day. Overall, the data reveal there is substantial capacity in the system to consider different deployment methods or apparatus.

The RRFD can reduce some of the EMS workload through a more efficient screening of incoming calls in the emergency communications center. Currently the RRFD responds to all EMS calls for service except specific medical office locations, and certain calls that are downgraded to nonemergency. Additionally, as EMS calls are received by the Round Rock Police Department (RRPD) emergency communications center, they are transferred to the WCEMS communications center and the RRFD is then dispatched (other than to incidents as noted). A more efficient call processing would be required in the RRPD to only send the RRFD to the more emergent EMS calls for service. Currently, the RRPD dispatchers are trained in emergency medical dispatch (EMD), a system where call takers are trained to screen incoming calls for service in order to properly type and prioritize the call by chief compliant, and then provide information to the caller prior to responders arriving on the scene.

Unfortunately, the RRPD is currently not implementing any formal EMD system; therefore the RRFD is dispatched to almost every EMS call for service. Judging by the workload analysis contained in this report, this is extremely inefficient. According to Geoff Cady[28], an expert in medical dispatch systems: "The most visible features of an EMD system is its ability to identify the need for pre-arrival instruction and prioritize an EMS response." Prioritizing EMS calls and sending the units and responders that are required, based the severity of the call, is the most efficient system the RRFD can deploy in conjunction with WCEMS.

The RRFD does not formally report all nonemergency activities in terms of numbers of program components completed and staff hours dedicated to complete these critical tasks. Documentation and reporting of nonemergency productive time is critical in the transparency of local government programs. To accurately account for nonemergency time, and to provide an accounting of how resources are utilized in a fire department's nonemergency downtime, a regular reporting system is essential.

Station-level nonemergency tasks that should be captured and reported include: station and equipment maintenance; training, both classroom and practical; fire prevention inspections; pre-fire planning; physical fitness training; and target hazard inspections. This information should be reported in a standard format on a monthly basis by each operational shift. Aggregated information demonstrating both emergency and nonemergency productivity should be included in an annual summary. This would enable the data to be utilized in planning, setting annual goals and objectives, conducting performance reviews of staff members where applicable, and in justifying programs and funding.

Recommendations:

- The RRPD emergency communications center should implement emergency medical dispatch software or, at a minimum, utilize the WCEMS 911 EMD system and dispatch the appropriate RRFD resources based on the type and seriousness of the EMS call (as outlined by the RRFD and in conjunction with WCEMS) in an effort to increase efficiencies in the RRFD. It is strongly recommended that the RRFD not respond to all EMS calls and only those that are, by call type, of a serious nature.
- The RRFD should implement a nonemergency documentation program that captures nonemergency productivity and should review and report on productivity measures regularly (monthly and annually) to find opportunities for continued improvement, monitor staff productivity, and monitor achievement of goals and objectives.

[28] Geoff Cady, "The Medical Priority Dispatch System:-A System and Product Overview," http://www.emergencydispatch.org/articles/ArticleMPDS (Cady).html.

Fire/EMS Category Response Times

Dispatch time is the time interval that begins when the alarm is received at the communication center and ends when the response information begins to be transmitted via voice or electronic means to the emergency response facility or emergency response units in the field. *Turnout time* is the time interval that begins when the notification process to emergency response facilities and emergency response units begins by an audible alarm or visual announcement or both and ends at the beginning point of travel time. **The fire department has the greatest control over these segments of the total response time.** *Travel time* is the time interval that initiates when the unit is en route to the call and ends when the unit arrives at the scene. *Response time* (or total response time) is the time interval that begins when the call is received by the primary dispatch center (RRPD communications center) and ends when the dispatched unit arrives on the scene to initiate action.

According to NFPA 1710, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Departments 2010 Edition, where the primary public safety answering point is the communications center the alarm processing time or dispatch time should be less than or equal to 60 seconds 90 percent of the time.[29] This standard also states that the turnout time should be less than or equal to 80 seconds for fire and special operations 90 percent of the time, and travel time shall be less than or equal to 240 seconds for the first arriving engine company 90 percent of the time. The standard further states the initial first alarm assignment should be assembled on scene in 480 seconds 90 percent of the time. NFPA 1710 response time criterion is a benchmark for service delivery and not an ICMA recommendation.

A more conservative and stricter measure of total response time is the 90th percentile measurement. Simply explained, for 90 percent of calls, the first unit arrived within a specified time, and if measured, the second and third unit. Table 6 shows the average dispatch, turnout, travel, and total response times of first arriving fire units by fire category calls. Table 6 includes the 90th percentile response time as well.

For the study period, the following averages were determined: the average dispatch time was 0.8 minutes; the average turnout time was 1.1 minutes; and the average travel time was 4.0 minutes. The average response time was 5.9 minutes, and the 90th percentile response time was 8.5 minutes.

[29] NFPA 1710, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Departments, 2010 Edition, 7.

Table 6: Average Dispatch, Turnout, Travel, and Response Times of First Arriving Unit by Call Type

Call Type	Dispatch Time	Turnout Time	Travel Time	Response Time	90th Percentile Response Time	Sample Size
Cardiac and stroke	0.8	1.1	3.9	5.7	7.5	456
Seizure and unconsciousness	0.7	1.0	3.8	5.5	7.6	357
Breathing difficulty	0.7	1.1	4.1	6.0	8.4	387
Overdose and psychiatric	0.8	1.1	4.4	6.3	8.6	61
MVA	0.6	1.2	3.9	5.6	8.7	438
Fall and injury	0.8	1.1	3.7	5.7	7.7	271
Illness and other	0.8	1.1	4.2	6.1	8.3	654
EMS Total	**0.8**	**1.1**	**4.0**	**5.8**	**8.1**	**2,624**
Structure fire	0.9	1.3	3.6	5.8	8.1	62
Outside fire	1.0	1.2	4.1	6.3	8.9	102
Hazard	1.1	1.2	4.5	6.8	11.5	59
False alarm	1.1	1.2	3.9	6.3	8.4	161
Good intent	1.1	1.3	4.4	6.7	8.7	37
Public service	0.9	1.2	4.2	6.3	8.3	41
Fire Total	**1.0**	**1.2**	**4.1**	**6.3**	**8.5**	**462**
Total	**0.8**	**1.1**	**4.0**	**5.9**	**8.2**	**3,086**

Note: First arriving units with valid dispatch, turnout, and travel times were used in this analysis.

From the data in the table it can be seen that those components of response time the RRFD can control are within reasonable limits, and on average, travel time is within reasonable limits as well. Benchmarked against the NFPA 1710 benchmark where the 90th percentile is the standard, there are overall improvements that can be made to reduce the total response time.

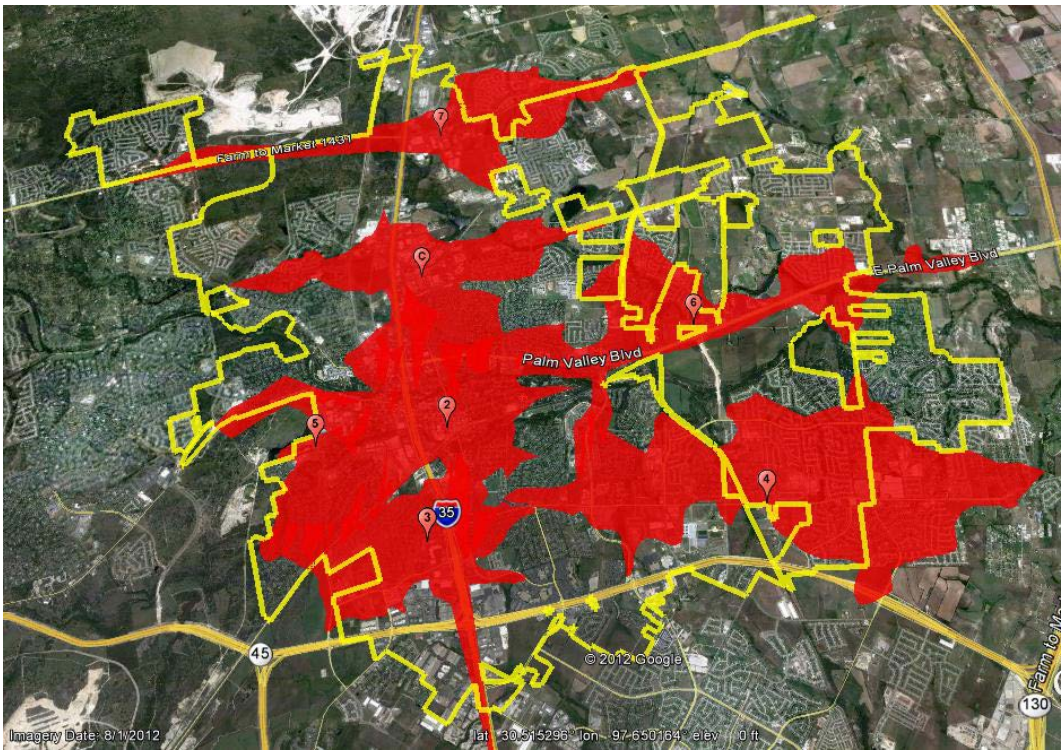
The location of responding units is one important factor in response time; reducing response times, which is one of the key performance measures in determining the efficiency of department operations, often depends on this factor. The goal of having a network of responding fire stations in a single community is to optimize coverage with short travel distances while giving special attention to natural and manmade barriers, and response routes that can create response-time problems.[30]

[30] NFPA 1710, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Departments, 2010 Edition, 122.

As well as response times and station locations, a community's fire risk analysis and the agency's pre-incident planning process will contribute to determining the number and type of fire and EMS units needed to adequately respond to a reported fire.[31]

Figures 14, 15, and 16 illustrate the reach of current station locations using travel time bleeds[32] from each. Figure 14 shows 240-second travel time bleeds; Figures 15 and 16 show 360-second and 480-second travel time bleeds, respectively. Figure 17 overlays these travel times in one map to provide a complete perspective of travel time response capabilities from current fire stations.

Figure 14: 240-Second Travel Time Bleeds



[31] Compton and Granito, eds., Managing Fire and Rescue Services, 52.
[32] A "bleed" is a term used to describe a painted illustration of a prescribed area on a map. In this case it describes a response area by seconds from a fire station utilizing current road networks.

Figure 15: 360-Second Travel Time Bleeds

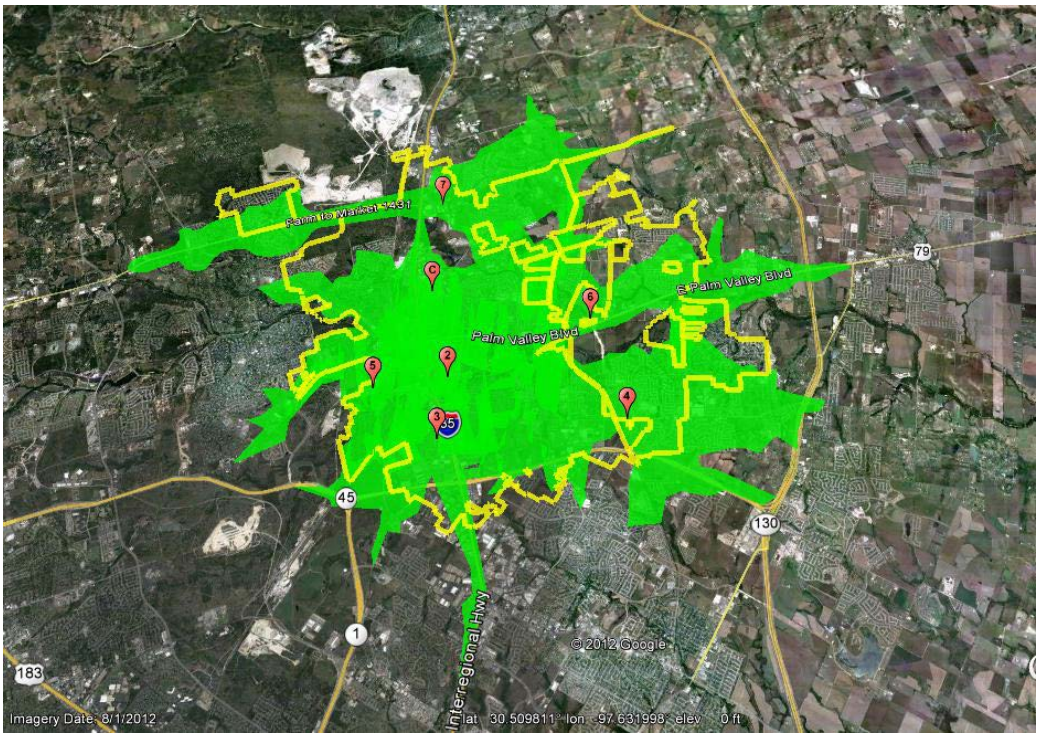


Figure 16: 480-Second Travel Time Bleeds

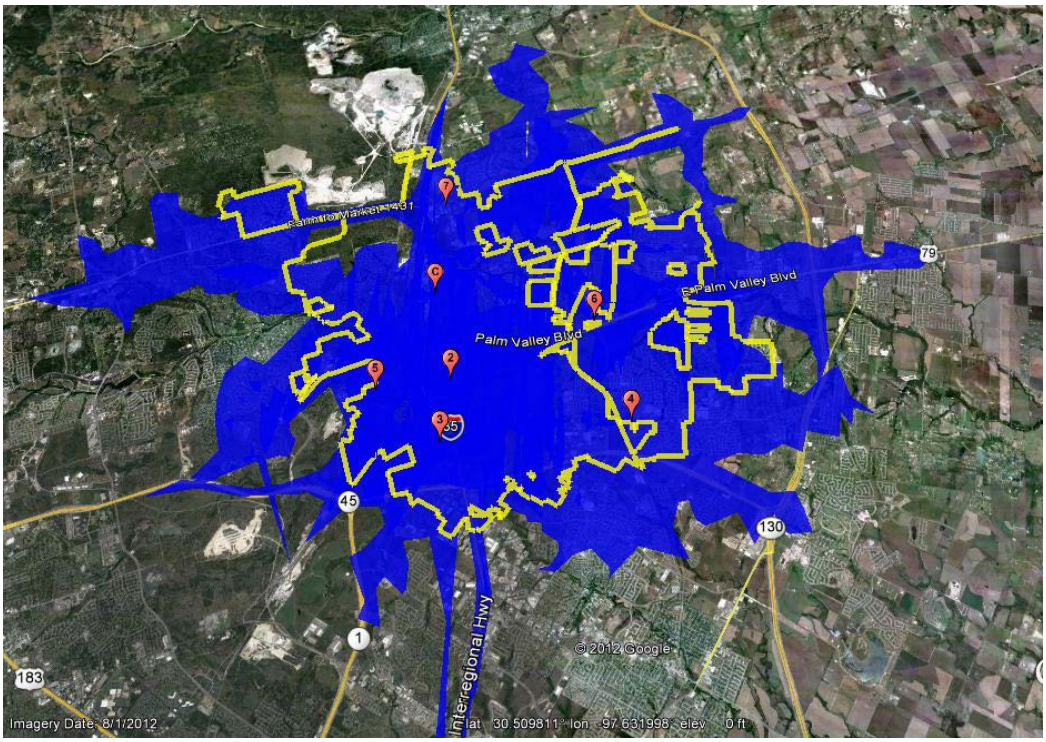
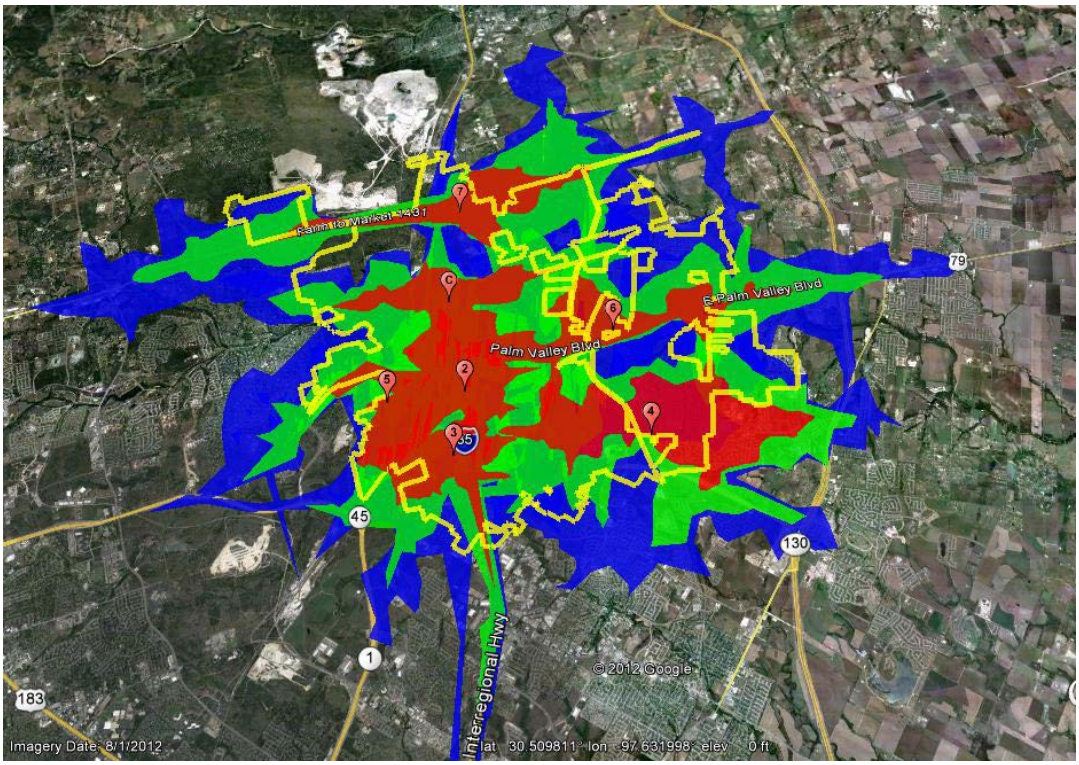


Figure 17: 240-, 360-, and 480-Second Travel Time Bleed Overlay



Analysis of Figures 14 through 17 points out that the initial first alarm units can be collected and deployed when benchmarked against industry standard times (480 seconds). The figures also show that while the road network and distance factors may not allow for complete coverage of the city in 240 seconds, at 360 seconds there is marked improvement, and at 480 seconds there 100 percent coverage.

Meeting NFPA-recommended standards for travel time can increase a fire service agency's cost, which raises two questions: *What are the added costs?* and *What is the evidence supporting these recommendations?* NFPA 1710 travel times are established for two primary reasons: (1) the risk of flashover as shown in the fire propagation curve (Figure 18); and (2) to address situations of sudden cardiac arrest, where brain damage and permanent brain death occur in four to six minutes (Figure 19).

According to fire service educator Clinton Smoke, the fire propagation curve establishes that temperature rise and time within a room on fire corresponds with property destruction and potential loss of life.[33] At approximately the 10-minute mark of fire progression, the fire flashes over (due to superheating of room contents and other combustibles) and extends beyond the room of origin, thus increasing proportionately the destruction to property and potential endangerment of life. The ability to quickly deploy adequate fire staff before flashover thus limits the fire's extension beyond the room or area of origin.

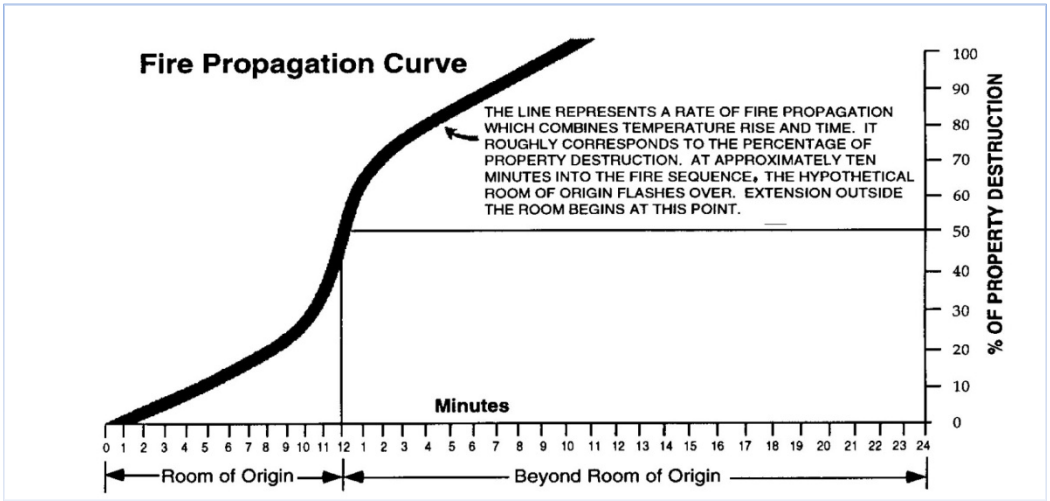
[33] Clinton Smoke, *Company Officer* (Clifton Park, NY: Delmar Learning, 2004).

Regarding the risk of flashover, the authors of an IAFF report conclude:

> Clearly, an early aggressive and offensive initial interior attack on a working structural fire results in greatly reduced loss of life and property damage. Consequently, given that the progression of a structural fire to the point of "flashover" (the very rapid spreading of the fire due to superheating of room contents and other combustibles generally occurs in less than 10 minutes, two of the most important elements in limiting fire spread are the quick arrival of sufficient numbers of personnel and equipment to attack and extinguish the fire as close to the point of its origin as possible.[34]

Figure 18 shows the fire propagation curve.

Figure 18: Fire Propagation Curve

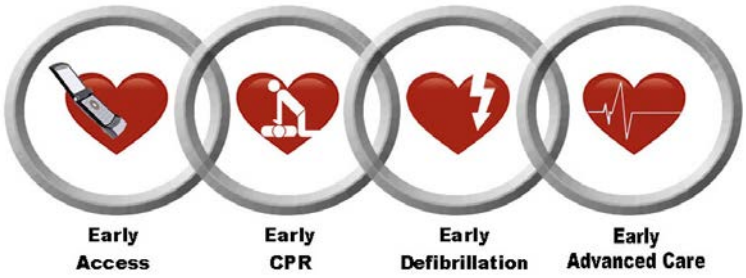


From John C. Gerard and A. Terry Jacobsen, "Reduced Staffing: At What Cost?" *Fire Service Today* (September 1981), 15–21.

Figure 19 illustrates the chain of survival, a series of actions that, when put in motion, reduce the mortality of sudden cardiac arrest. Adequate fire and EMS response times coupled with community and public-access defibrillator programs potentially can affect the survival rate of sudden cardiac arrest victims.

[34] *Safe Fire Fighter Staffing: Critical Considerations* Second Edition (Washington, DC: International Association of Fire Fighters, 1995).

Figure 19: Sudden Cardiac Arrest Chain of Survival



From "Chain of Survival," http://en.wikipedia.org/wiki/Chain_of_survival.

Two technology tools that could be incorporated into any communications and dispatch system to improve response times for public safety units are automatic vehicle location (AVL) and mobile data computers (MDCs.) An AVL system allows dispatchers to see the precise location of any unit on a computer-generated map. The AVL data can also be integrated into the CAD system to calculate the truly closest unit to any given emergency and make a dispatch recommendation accordingly, rather than making recommendations based on fixed fire station locations.

In addition to improving dispatching, AVL improves personnel safety because a unit that is in trouble can be located quickly. Additionally, an AVL system can be integrated with MDCs installed in each emergency response unit. With the appropriate integration of AVL, navigational, and MDC technologies, the AVL can provide the MDC with a visual map showing the current unit and incident location, together with the most efficient travel route. MDCs can be used to provide CAD data, city maps, building plans, fire rescue preplans, hospital status, patient information, and navigational directions to responding units directly in the field. MDCs can also be used to log unit status and file field reports. They can be supported by 800 MHz radio system channels, code-division multiple access (CDMA) cellular technology, and other wireless communications technologies. At the time of the ICMA on-site visit, the RRFD did not utilize MDCs and did not have AVL technology. According to staff, this was scheduled for testing on fire apparatus in the late summer of 2012.

Recommendations:

- The RRFD should continue to monitor response time components by establishing specific performance measures, with the goal of continuous improvement.

Fiscal Resources

The RRFD is funded through the city's general fund budget, which is supported primarily by sales and property tax receipts The property tax rate for fiscal year 2012-13 is 42.035 cents per $100 of property value. Together, the sales and property taxes generate about 78 percent of Round Rock's total revenues.

The RRFD does generate revenue from fees and permits for the provision of fire prevention and code enforcement, and from providing fire protection services to the unincorporated area included in emergency service district (ESD) 9. This revenue goes into the city's general fund. Table 7 shows the service fee revenue collected for the two most recent fiscal years and the current fiscal year.

Table 7: RRFD Generated Revenues

FY 2010-11	FY 2011-12	FY 2012-13 (Projected)
$1,309,729	$1,159,500	$1,282,800

The RRFD FY12-13 budget is $14,306,223, which represents 16.3 percent of the city's $87.72 million general fund budget. The RRFD budget for the year is up 1.7 percent over the previous fiscal year's budget.

RRFD expenditures have increased 13.7 percent since FY2009-10, with personnel costs, which are 90 percent of the RRFD budget, up by 13.5 percent in that period. Contracted services have increased 24 percent; materials and supplies have decreased 2.9 percent; and other services and charges have increased 43.8 percent. Capital outlays have increased 306 percent over this same period. Table 8 provides a comparative of the current and previous three years budgets.

Table 8: RRFD Budgets, Fiscal Years 2009-10 through 2012-13

	Actual 2009-2010	Actual 2010-2011	Budget 2011-2012	Budget 2012-2013
Personnel	$11,341,538	$11,578,356	$12,543,605	$12,876,992
Contracted services	265,708	283,952	279,142	329,706
Materials and supplies	813,212	792,878	850,059	789,805
Other services and charges	104,472	126,681	142,900	150,220
Capital outlay	52,073	182,463	252,159	159,500
Total	$12,577,003	$12,964,330	$14,067,865	$14,306,223

Fixed Facilities

Fire department capital facilities are exposed to some of the most intense and demanding uses of any public local government facility, as they are occupied 24 hours a day.[35] The Round Rock Fire Department operates out of seven fire stations with eleven staffed pieces of response apparatus. The seven fire stations range in age from five to thirty years, with the central fire station being the oldest. The fire administration offices are also located at the central fire station.

The day-to-day cost of operating a fixed capital facility can burden the operating budget. Building maintenance and utility costs are charged directly to the RRFD general operating budget, as noted above. Any cost incurred for utilities and/or building repairs and maintenance must be controlled, and members must be responsible for seeking opportunities for cost savings. Properly maintaining mechanical and structural components is critical to the longevity of the facility. Deferring routine maintenance creates inefficiencies of mechanical systems and increases costs for replacement and repairs.

All of the stations are considered in good condition. Station 3, which is 21 years old, has a poor placement (limited egress) on a very small lot that does not allow for an expansion. The station's existing sleeping quarters are cramped, female firefighters do not have separate quarters, and the apparatus bays cannot accommodate an aerial apparatus. Stations one, two, six, and seven have adequate space for personnel living needs (gender separation), and adequate space is available for the needs of station personnel. Additionally, stations four and five do not have adequate space for personnel living needs (gender separation).

The RRFD has considered relocating both stations 3 and 4. As discussed above, station 3 is located on a lot that will not allow any expansion. Regarding station 4, the RRFD has discussed splitting station 4 into two stations to better provide coverage east of the interstate along Gattis School/ Red Bud and the SH45 corridor.

[35] Compton and Granito, eds., *Managing Fire and Rescue Services*, 219.

Site visits to several stations by the ICMA team showed that the stations are maintained, clean, and orderly.

Figure 20 illustrates the profile and location of each station within the city, along with the apparatus housed at each.

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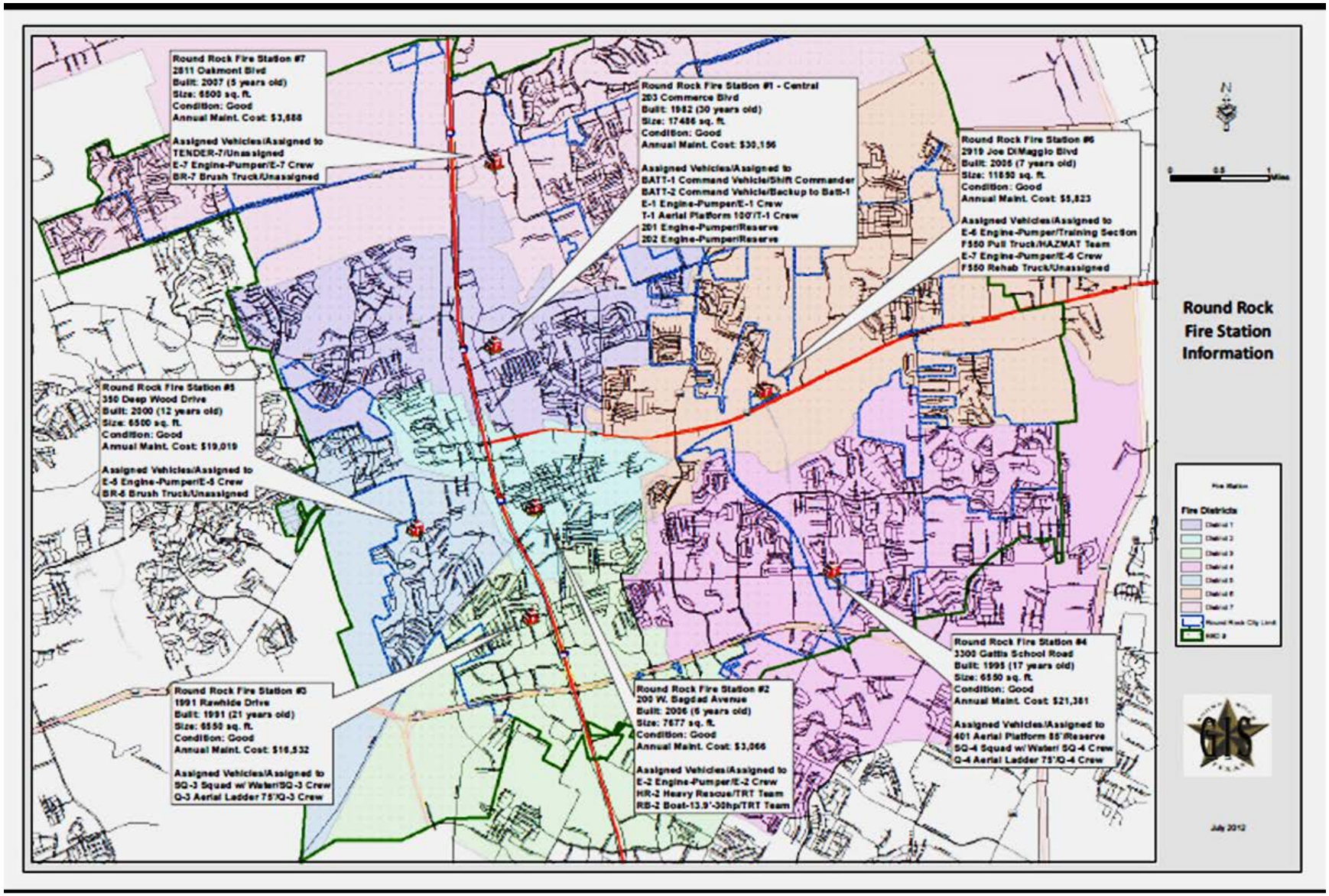
Figure 20: RRFD Station Location and Station Information



The department is considering the construction of a new station 8 on Sam Bass Rd. at Wyoming Springs Dr. in the northwest portion of the city. However, the RRFD has not started on the station's design as the proposed location could be an area considered an endangered species habitat. The city has asked for an opinion from the Federal Fish and Wildlife Service that will provide clarification on what the potential building restrictions could be, if any, for the site. If it is concluded that construction could be limited or prohibited, then RRFD will need to research another site for this station.

Figures 21 and 22 illustrate the affect the proposed station 8 will have on response time improvement. As noted above and revisited here, there are response time gaps in the 240-second travel time benchmark. The planned station in the northwest portion of the city will close the gap in this area as illustrated in Figure 21. However, at the 360-second travel time benchmark (as again noted in Figure 22), the city is almost entirely covered by currently deployed resources.

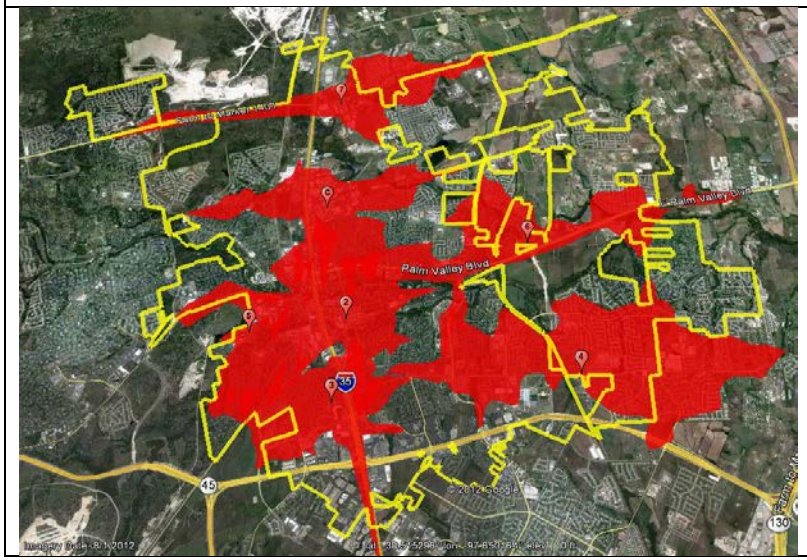
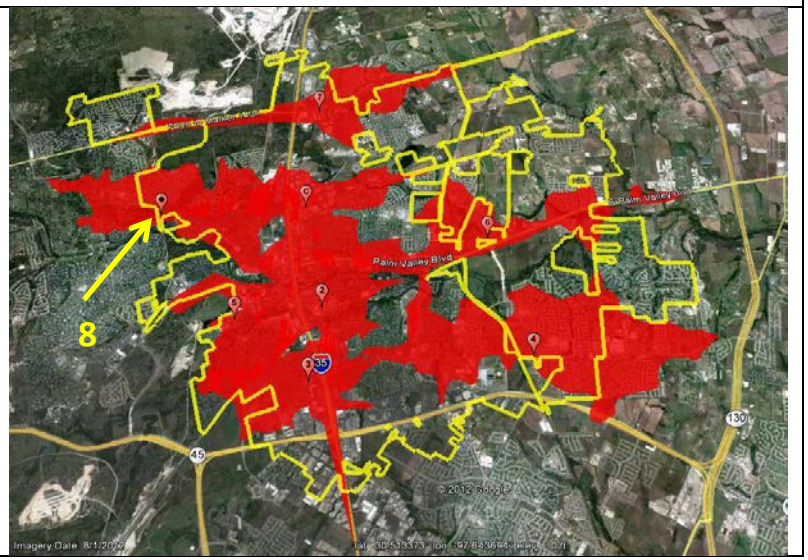
Regarding the proposed station 8, the type of unit/apparatus and the staffing levels are critical considerations when planning for this station. According to the data studied, the demand for service in Round Rock is primarily for EMS; however, fire incidents still may pose an issue from a risk and response-time perspective in this area.

Instead of equipping this proposed station with the traditional fire apparatus unit, an efficient alternative would be to acquire a fire unit also capable of EMS transport. These multifunctional units are designed to serve response areas that may have a demand for either fire or EMS service. This type of unit also deploys staff efficiently; can be equipped with a compressed air foam system (CAFS) that extends the fire extinguishing agent;[36] provides a full EMS transport compartment where both basic and advanced life support prehospital care can be delivered; and reduces the cost of capital equipment, because two units are combined into one. Minimum staffing on these units can be either two or three, depending on jurisdictional preference and based on funding and resource factors already discussed. Figures 23, 24, and 25 illustrate the functionality of this type of apparatus.

This apparatus alternative would represent a service model change for the RRFD, and for the provision of EMS transport in the city of Round Rock and Williamson County. The alternative is offered here for consideration to close response gaps in the proposed station 8 response area in both fire suppression and EMS service delivery, and as well to utilize the available capacity within the RRFD as identified in this report. Further consideration by the RRFD on this service model change is warranted, as it offers efficiency in the delivery of service and potential cost savings (staffing/equipment) as this new station is being considered. Additionally, this deployment model from other stations as well (**as an alternative to the two squads**) may offer a more effective use of current staffing to assist WCEMS with EMS transport in the city of Round Rock during peak demand, and at other times when the primary EMS service is stressed due to an increase in demand countywide.

[36] CAFS reduces the amount of water needed to suppress the vast majority of fires, so primary water tanks and fire engines can become smaller, as CAFS offers a 7:1 ratio when utilized.

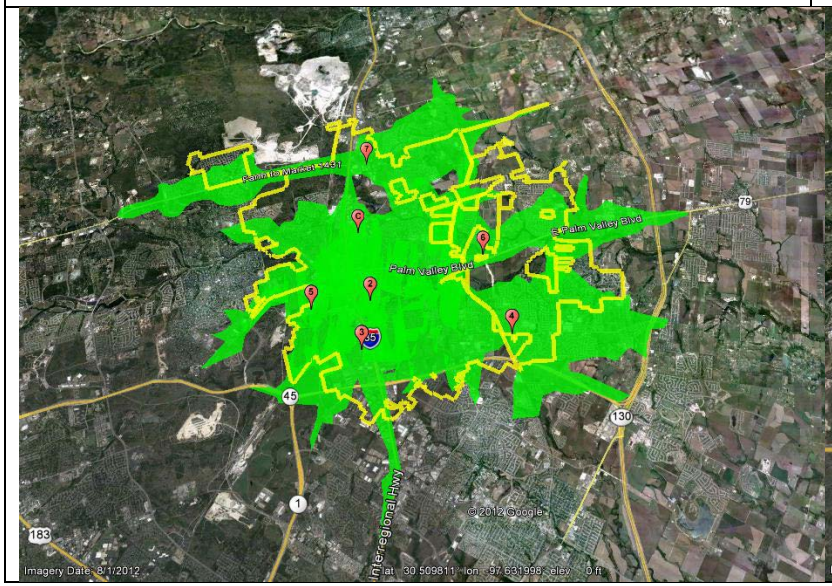
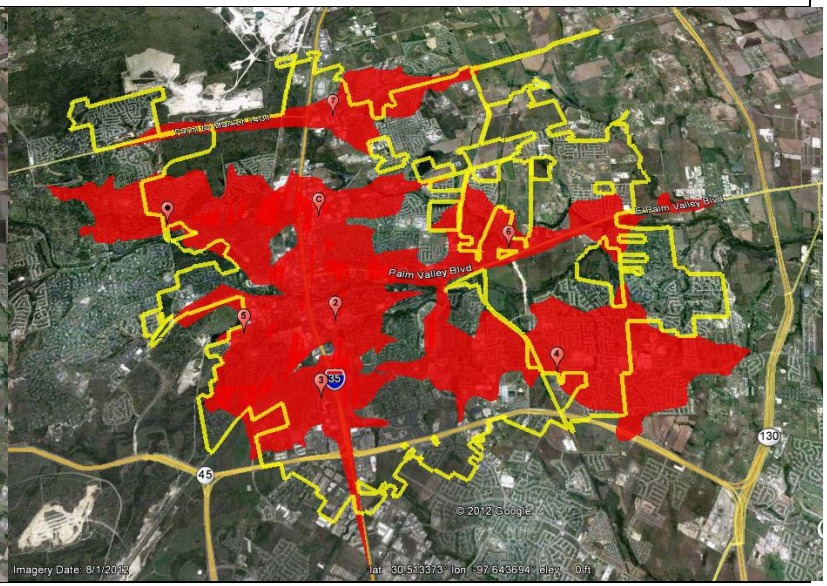
Figure 21: 240-Second Travel Time Bleeds with the Proposed Station 8

240-Second Travel with Current Stations	240-Second Travel Time With Proposed Station 8
	

As the map on the right indicates, response time into the northwest portion of the city is somewhat improved utilizing the 240-second benchmark with the addition of station 8. Comparatively though, at the 360-second benchmark, these areas are already almost 100 percent covered. This coverage at 360 seconds is the current RRFD overall response goal; however the RRFD travel time goal is 240 seconds[37]. Figure 22 illustrates this comparison.

[37] Fire department goals. Retrieved from http://www.roundrocktexas.gov?templates/printer_versionasp?page=425

Figure 22: 360-Second Travel Time Bleeds with the Proposed Station 8

360-Second Travel with Current Stations	240-Second Travel Time With Proposed Station 8
	

It is recommended as station location and construction is considered, a community risk analysis be performed, and the demand for services and response time be thoroughly reviewed to ensure expected and essential service delivery objectives match the expenditure for new construction, staffing, and deployment of resources.

Figure 23: Fire/EMS Transport Vehicle

This particular unit has a 500 gallon-per-minute pump, 300 gallon water tank, and a compressed air foam system (CAFS). The unit has initial attack hose lines, typical firefighting hand tools, electric rescue tools for vehicle extrication, and supply hose. Additional engineering can allow several hundred feet of 3-inch supply hose to be deployed from the rear. Figures 24 and 25 illustrate the functionality of this type of apparatus.

Figure 24: Fire Suppression Component of Fire/EMS Transport Vehicle

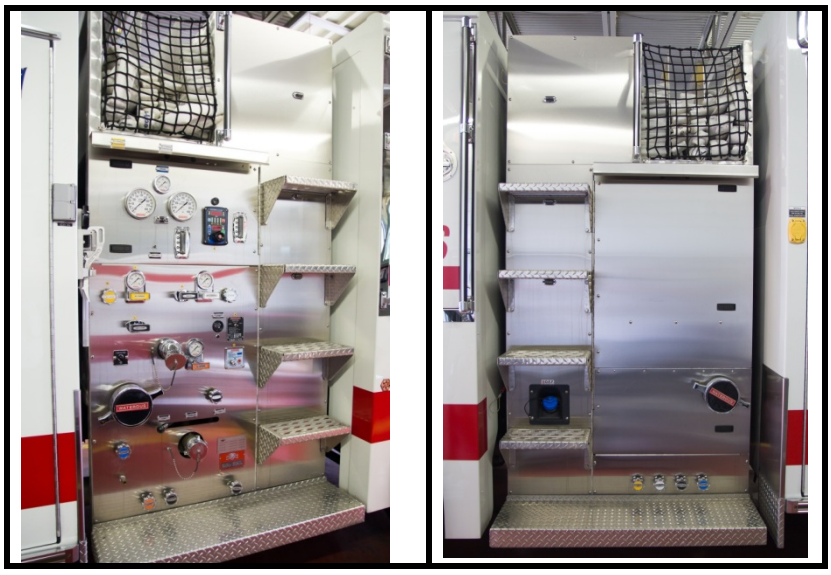


Figure 25: EMS Transport Component of Fire/EMS Transport Vehicle

Recommendations:

- The lack of separate gender sleeping quarters as well as the generally cramped sleeping quarters in stations 3, 4, and 5 should be considered a problem. Also, due to station 3's limited and potentially dangerous equipment egress and the fact it is incapable of housing an aerial apparatus, relocating station 3 should be a priority.
- The RRFD should develop a preventive maintenance program for all facility components to maintain efficiencies of systems and longevity of equipment, with the goal of reducing overall building maintenance costs.
- The RRFD should develop a facility replacement/refurbishment plan that includes projected funding and expenditures.
- The RRFD should consider deploying a multipurpose unit equipped with CAFS from the proposed station in the northwest portion of the city and from other stations as well (as an alternative vehicle to the two squads). The RRFD should further consider a service model change that includes assisting WCEMS with EMS transport.

Capital Equipment

As discussed in this report, the RRFD operates five engines, two quints, two squads, one aerial platform, and one command vehicle. The department also has the ability to operate the following unstaffed apparatus as needs or call demands dictate: one technical rescue unit, one hazardous materials response trailer, two brush trucks, one tender, one air trailer, and one rehabilitation trailer. The department further maintains two reserve engines, one reserve quint, and one reserve command vehicle.

The RRFD has a scheduled apparatus replacement program that has been reviewed and approved by the city council, city management, and city finance. Because of this, there are no surprises to city management when a vehicle needs to be replaced. Additionally, the department no longer has to request the replacement of fire apparatus during annual budgeting process. The program projects 10-year life cycles for each piece (except ladders, which are on a 15-year replacement cycle) of fire apparatus, with seven years on the front line and three years in reserve.

The city's general services administration fleet maintenance facility services the fire department's vehicles on a regular maintenance schedule. Two specialized mechanics maintain the apparatus and contract if necessary with a local firm for any additional and specialized mechanical work. Tests on pumps, ground ladders, and aerial apparatus are conducted annually each February for each vehicle. The Round Rock vehicle maintenance program is well known in the fire service, and has an exceptional reputation. This reputation is demonstrated by the fact that RRFD no longer sells its used apparatus at auction, where used pumpers generally sell for only $4,000 to $6,000. A recent sale of a 14-year-old RRFD pumper generated $95,000 on the open market.

The department's administrative management keeps a very detailed inventory and central control and purchase of all its equipment, protective gear, and supplies. The department's inventory and equipment management is exceptional and should clearly be considered a national best practice.

Prevention and Education

Fire Prevention

The RRFD fire marshal has primary responsibility for fire inspections for the city of Round Rock. The fire marshal's office inspection responsibilities include reviewing fire code adoption and compliance; issuing permits for fire protection systems; overseeing and maintaining fire alarm systems, standpipes, fire pumps, underground storage tanks, hazardous materials installations, and other systems; conducting plan reviews for new construction and building renovations; and conducting inspections for fire occupancy and special events. The fire prevention division provides new construction plan reviews and inspections under contract for ESD 9.

The fire prevention division is supervised by a fire marshal that has the rank of battalion chief. In addition to fire marshal the division currently has four certified inspectors, a captain who serves as assistant fire marshal, and three lieutenants. These inspectors also serve as plan reviewers, arson investigators (two additional shift officers fill in on rotation as investigators), and public fire educators. Current standards by the *Fire Suppression Rating Schedule Texas Addendum* stipulate that there should be a minimum of one fire inspector per 20,000 residents.[38] The Round Rock Fire Department does not meet this minimum recommendation with regard to fire inspectors. The division has requested that one additional fire inspector be hired in FY 2013.

The workload requires all fire prevention personnel to review plans (including the fire marshal), in addition to other inspection, incident and loss data reporting, and arson investigation responsibilities. Adding a position dedicated to plan review would improve the productivity and overall efficiency of the fire prevention function. Having a dedicated plans examiner would enable more time to be allocated for fire inspectors to address needs associated with new construction, and would allow fire marshal office personnel to conduct routine inspections of high- and moderate-risk locations within the city limits. This new position is essential to reaching departmental goals, as fire and building codes are of little use if they are not enforced regularly.

The city of Round Rock city council is in the process of adopting the 2012 edition of the International Fire Code and updating the city's permit, hazmat, inspection, and plan review fees. The last time these fees were reviewed was in 2008.

Automatic sprinklers are required in industrial and commercial occupancies; however, as state law restricts a city from adopting a residential sprinkler ordinance, there is currently no requirement for residential sprinklers, even in large homes of more than 5,000 square feet.

The division uses both FIREHOUSE software as well as paper files to record and monitor its inspection process, site plans, and plan reviews. Recording and reporting vital incident data, sharing site plans, conducting plat and plan reviews, and investigating complaints are an essential responsibility of the division. A review of the efficiency of the record-keeping process and looking for other technical applications for additional efficiencies such as paperless inspections and

[38] Texas Addendum to the Fire Suppression Rating Schedule. Texas Department of Insurance (January 2004), 5–8.

computerized plan reviews are worth the time and effort, and will increase the effectiveness of the overall performance of the division.

Recommendations:

- Evaluate current and future department funding to strive to meet the minimum requirements of *Fire Suppression Rating Schedule Texas Addendum* for fire inspection staffing to meet service demands of the fire prevention division.
- Evaluate current and future department funding to strive to add a plans review position (non-uniform) to the fire marshal's office to effectively meet the demands of this function and release fire inspection personnel to perform fire prevention inspections.
- Review with city management and city council the life safety and the property protection benefits of requiring residential sprinkler systems in newly constructed homes of more than 5,000 square feet; encourage city council support of residential sprinkler legislation that allows local jurisdictions the ability to adopt the International Residential Code, requirements for automatic fire sprinkler systems in new one- and two- family dwellings.
- Review the division's current records management process for efficiency and determine whether additional technological improvements can be made.

Public Education

Fire suppression and response, although necessary to protect property, have little impact on preventing fire deaths. Rather, public fire education, fire prevention, and built-in fire protection systems are essential elements in protecting citizens from death and injury due to fire, smoke inhalation, and carbon monoxide poisoning.

The fire prevention division staff visits elementary schools during the months of October and November to teach fire and life safety to children. In addition to providing fire and life safety messages, the *Rock Solid Safety* program delivered by the RRFD provides instruction on other topics that are priorities for the schools, including bullying and personal hygiene. The program distributes age-appropriate material that the children are able to take home and share with their families. The *Rock Solid Safety* program has a national reputation and the department has been asked to demonstrate the program for various fire and emergency service organizations from all over the country and Mexico. Round Rock fire prevention educators serve on several national organizations, including the Arizona Fire and Burn Educators Association, Partners in Fire Education with Golden Corral, and Life and Fire Safety Inc.

The fire prevention staff offers fire extinguisher training to local businesses and service groups. Approximately six to ten presentations are given annually. Recently, 300 people received this training. The division staff partners with Round Rock senior citizens centers to provide monthly presentations entitled "Hot Topics" where approximately 15 to 25 seniors attend. Seniors are also offered home safety inspections at no cost.

As with any program, there are some actions that could be taken to enhance the division's public education program. As studies suggest, the best way to increase the survival rate of heart attack victims is by training citizens in the use of cardiopulmonary resuscitation (CPR) and automated

external defibrillators (AEDs). The public education program should expand its curriculum to include teaching these critical skills. Having AEDs readily available is another crucial element to survival. The city and fire department should engage local businesses, nonprofit organizations, and other local entities to increase the availability of AEDs in the community

Recommendation:

- Enhance the fire and life safety public education program with community and civic groups and other private organizations for the placement of AEDs, and seek out private contributions to assist in funding this vital community program.

Fire Investigations

The fire prevention division has five certified cause-and-origin investigators (a dual role for the fire prevention staff), one state certified arson investigator (the assistant fire marshal), and two ex-officio line officers. Current standards by the *Fire Suppression Rating Schedule Texas Addendum* require one fire investigator for every 40,000people. [39] The Round Rock Fire Department has the recommended number of cause-and-origin investigators, but falls short of the requisite number of arson investigators. Arson investigation requires specialized and thorough training, particularly as expert forensic skills are needed to provide credible evidence in court. It is important for Round Rock to have an additional state certified arson investigator to provide arson investigation services. Although the workload for this area may not demand an additional certified arson investigator, the division should be prepared should the current assistant fire marshal and two shift personnel be unavailable. In the short term, this additional trained/certified specialist can come from current staff (a division lieutenant is currently enrolled in the Texas Commission on Law Enforcement Officer Standards and Education Peace Officer Training Program).

Juvenile fire setters are a problem in many communities across the country. The fire prevention division has incorporated juvenile fire setter prevention into its public education program. The division should review and consider adopting a screening survey developed by the U.S. Fire Administration (USFA) that can help identify emotionally disturbed children and teens who may be at risk of acting out with fire, as well as children and teens with deeply rooted psychological problems that manifest themselves in deliberate fire setting.[40]

Recommendation:

- Review and adopt the USFA's juvenile firesetter survey to assist in identifying emotionally disturbed children who may be at risk of acting out with fire.

[39] Texas Addendum to the Fire Suppression Rating Schedule. Texas Department of Insurance (January 2004), 5–8.
[40] Juvenile Firesetter Intervention Handbook, Jessica Gaynor, PhD, US Fire Administration January 2002.

Emergency Management

The mayor of Round Rock, as the chief elected official, is the legally responsible emergency manager for the city. The mayor has, by state law, the authority to declare a disaster for the city and, if needed, to request from the governor of Texas a state disaster declaration and disaster assistance. The governor can then declare a state disaster, and in turn request a federal emergency or disaster declaration from the president of the United States.

The city of Round Rock has a full-time emergency management coordinator (EMC) responsible for the management of the emergency management division. The emergency management coordinator reports to the fire chief. He is assisted by a full-time planner whose position currently is funded by a federal grant set to expire at the end of 2012. The emergency management coordinator is in charge of the emergency operations center, updating the EM planning, managing grants from the state and the Department of Homeland Security, NIMS training requirements, monitoring statewide events and Round Rock special events, and coordinating the resource needs of the Round Rock regional task forces. The range and number of responsibilities held by the emergency management coordinator is extensive. Redundancy will need to be built in to back-up this critical position. Retaining the planner position after the expiration of the federal grant will be essential, should the city choose to keep its eligibility for federal emergency management planning grants (EMPG), which require that a community emergency management plan is kept at the federal advanced level.

Disaster response generally requires numerous agencies to work together and share resources. These agencies typically have overlapping lines of authority and responsibility and, during a response work in dynamic and uncertain situations under extremely stressful conditions. At the same time, there is often an immediate need for critical and frequently insufficient resources. Too often these conditions cause miscommunication and conflict. Lines of authority must be clear during a disaster. It is uncertain from the emergency management plan if the EMC reports directly to the city manager or continues to report to the fire chief during a response.

The city of Round Rock mayor and city manager are familiar with their critical emergency-related responsibilities. During a disaster, the mayor is sought out by local and national media to serve as a spokesperson and is seen by the public as an expert on the situation. Training in the EOC is also critical for city and department heads. The EMC, the fire chief, and others with emergency management responsibilities must make sure that other city department heads (finance, public works, etc.) and their key staff are fully trained in EOC operations and engaged in disaster preparedness and response.

Regular tabletop exercises should be scheduled to familiarize management with the plan, management responsibilities, and the workings of the EOC. In Round Rock, such exercises should be conducted at least quarterly, with a particular need prior to tornado season.

The city of Round Rock has a comprehensive all-hazard emergency management plan that includes departmental and generic function annexes. Sections are updated annually on a five-year cycle, so the plan in total is updated every five years. The plan details responses to different hazards as well as the requirements of generic functions such as damage assessment, warning, evacuation, sheltering, search and rescue, and so forth. The plan describes all the generic functions and

delineates the departmental and/or individual responsibility for each functional annex. Damage assessment is especially crucial because a full assessment is required to request state and possibly federal assistance. The plan's annex that details this need should be very clear about how damage assessment will be accomplished in a timely manner. Currently, the person responsible for this function is the EMC or his designee. The annex does not detail a plan on how this crucial and complex function is to be readily accomplished.

A comprehensive five-year hazard mitigation plan for the city is nearing completion and is being reviewed for presentation to and approval by the Round Rock city council. The plan details the various hazards and degree of risk the city faces and describes specific mitigation actions and costs to remediate each hazard risk. The private firm H20 Partners assisted the city staff in gaining public input thru a survey and workshops. The hazard mitigation plan gives the city an excellent set of mitigation priorities to improve the overall life safety and property protection for the community. Once the plan is approved by council the submission of the plan to FEMA will make the city fully eligible for all federal disaster recovery funds available to it if a disaster were to strike.

The emergency operations center (EOC) is spacious and includes separate sleeping/quiet rooms, and a policy making room. It is strategically located in the same building as the joint police and fire communication center that is managed by the police department. However, the EOC is not fully functional to run a major disaster because it lacks the electronic equipment to monitor updated weather data, traffic, and news information to maintain situational awareness, as well as real-time CAD data and current AVL information. The EOC's capability to monitor the State's WebEOC system, the TXDOT traffic camera systems, and possible expansion of the HAM Operator program, should be strongly considered.

Recommendations:

- Improve the damage assessment annex in the Round Rock all-hazard emergency plan by assigning a person skilled in damage assessment and by creating a specific task plan of how this crucial function will be accomplished. The submittal of a damage assessment is a prerequisite to receiving state and federal assistance.
- Develop a training plan that includes quarterly tabletop exercises so that city management becomes more familiar with the emergency management plan, management responsibilities, and the workings of the EOC.
- Retain the emergency management planner position after the expiration of UASI grant funding by matching EMPG and city general funds on a 50/50 match basis. This will provide the essential back-up to the EMC and continue expert emergency management planning assistance.
- Purchase the necessary audio-visual equipment to fit-out the EOC for improving situational awareness capability.

Data Analysis

Introduction

During the year-long period covered by this study, the Round Rock Fire Department (RRFD) operated out of seven fire stations with eleven staffed pieces of response apparatus, including five engines, two quints, two squads, one aerial platform, and one command vehicle. The department also has the ability to operate the following unstaffed apparatus as needs or call demands dictate: one technical rescue unit, one hazardous materials response trailer, two brush trucks, one tender, one air trailer, and one rehabilitation trailer. The department further maintains two reserve engines, one reserve quint, and one reserve command vehicle. The department currently runs three shifts, each with minimum daily staffing of twenty-nine full-time staff that includes officers, driver/operators and firefighters.

This data analysis is divided into four sections. The first section focuses on call types and dispatches. The second section explores time spent and workload of individual units. The third section presents analysis of the busiest hours in a year and the fourth section presents a response time analysis.

This report covers all calls for service between July 1, 2011, and June 30, 2012, as recorded in the RRFD's National Fire Incident Reporting System (NFIRS) database. During this period, RRFD units responded to 8,369 calls, including 77 mutual aid calls. The department responded to 84 structure fire calls and 142 outside fire calls. As sometimes multiple units are dispatched to a call, a total of 10,158 RRFD units were dispatched to all calls. The total combined yearly workload (deployed time) for all units was 3,523 hours. The average estimated response time for calls responded with lights and a siren was 5.9 minutes and the 90th percentile response time was 8.2 minutes. The average estimated response time for calls responded without lights and a siren was 7.1 minutes.

Aggregate Call Totals and Dispatches

During the year studied, the Round Rock Fire Department responded to 8,369 calls. Calls as mutual aid (given) within the NFIRS system and those whose zone information did not start with "RR" or "SD" were categorized as mutual aid calls. Calls were grouped by NFIRS incident types into a small set of categories that are fully described in Appendix IV. Lastly, we used the reason field in the NFIRS data to subdivide EMS category calls.

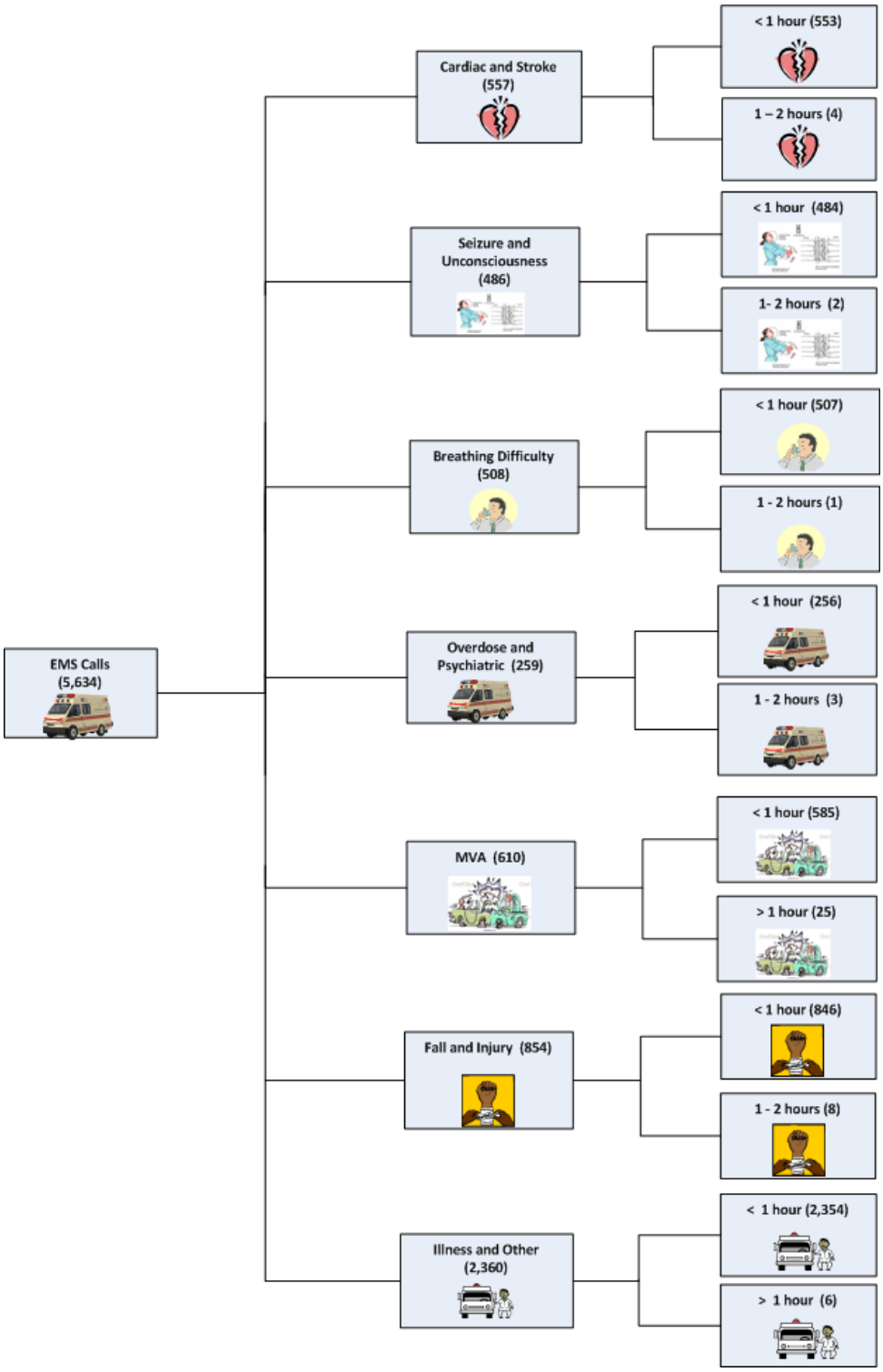
Table 9: Call Types

Call Type	Number of Calls	Calls per Day	Call Percentage
Cardiac and stroke	557	1.5	6.7
Seizure and unconsciousness	486	1.3	5.8
Breathing difficulty	508	1.4	6.1
Overdose and psychiatric	260	0.7	3.1
MVA	611	1.7	7.3
Fall and injury	855	2.3	10.2
Illness and other	2,360	6.4	28.2
EMS Total	**5,637**	**15.4**	**67.4**
Structure fire	84	0.2	1.0
Outside fire	142	0.4	1.7
Hazard	262	0.7	3.1
False alarm	549	1.5	6.6
Good intent	137	0.4	1.6
Public service	623	1.7	7.4
Fire Total	**1,797**	**4.9**	**21.5**
Mutual aid	77	0.2	0.9
Canceled	858	2.3	10.3
Total	**8,369**	**22.9**	**100**

Observations:

- The department responded to an average of 22.9 calls per day, including 0.2 mutual aid calls and 2.3 canceled calls.
- EMS calls for the year totaled 5,637 (67 percent of all calls), averaging 15.4 per day.
- Fire category calls for the year totaled 1,797 (22 percent of all calls), averaging 4.9 per day.
- Structure and outside fires calls combined accounted for 226 calls during the year, averaging 0.6 calls per day.

Figure 26: EMS Calls by Type and Duration

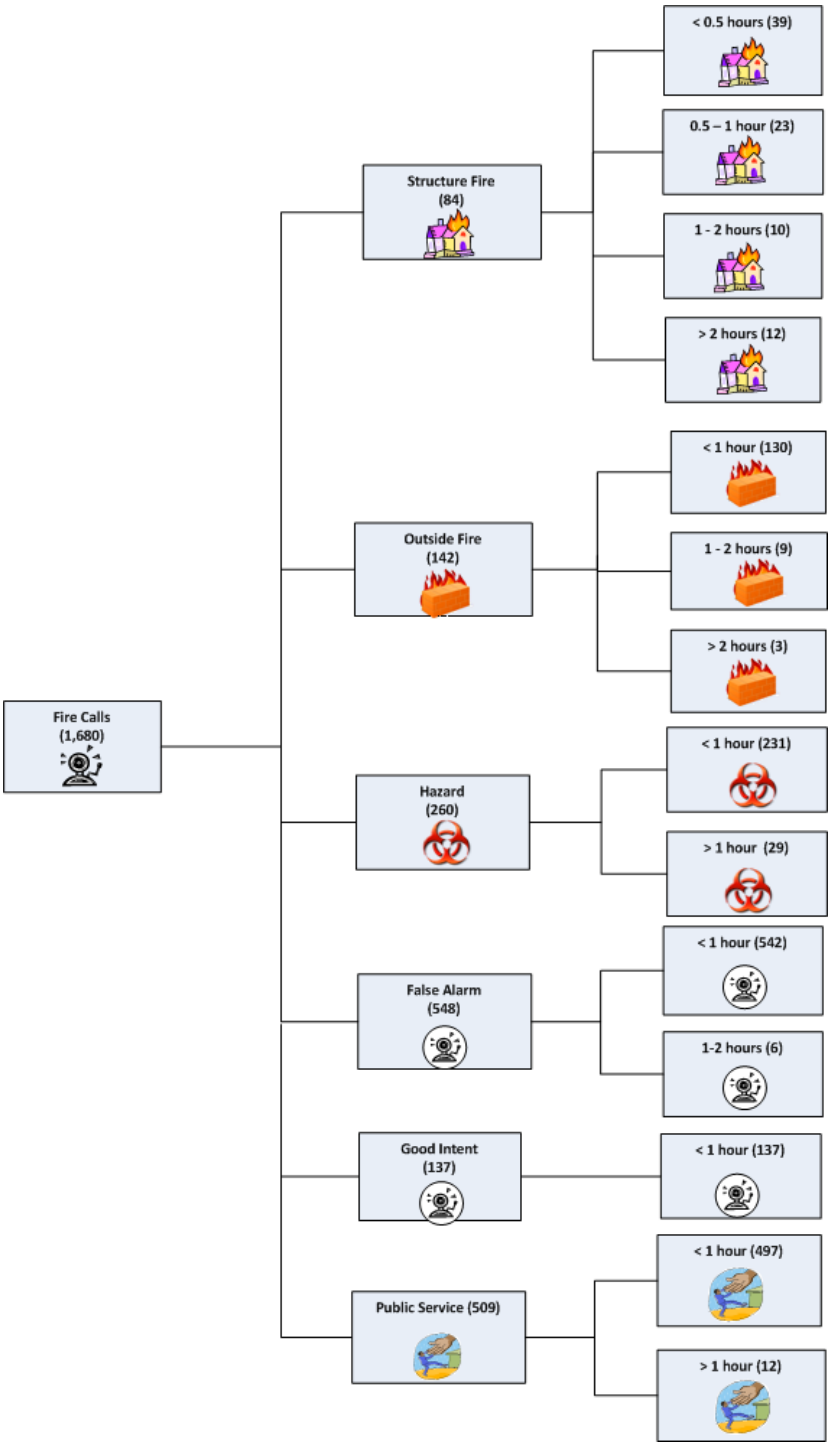


Note: Duration is the longest time from dispatch to clear of all fire units which responded to the same call. A total of three EMS calls which were responded to by administrative units or had zero duration are excluded.

Observations:

- A total of 5,585 EMS category calls (99 percent of EMS calls) lasted less than one hour, 44 EMS category calls (1 percent) lasted between one and two hours, and just 5 EMS category calls lasted more than two hours. On average, there were 0.1 EMS category calls per day that lasted more than one hour.
- Almost all of the cardiac and stroke calls (553 calls or 99 percent) lasted less than one hour, and 4 cardiac and stroke calls lasted between one and two hours.
- A total of 585 motor vehicle accident (MVA) calls (96 percent of this category) lasted less than one hour, and 25 MVA calls (4 percent) lasted more than one hour.
- A total of 846 fall and injury calls lasted less than one hour, and 8 fall and injury calls lasted between one and two hours.
- A total of 484 seizure and unconsciousness calls lasted less than one hour, and 2 of these calls lasted between one and two hours.
- A total of 507 breathing difficulty calls lasted less than one hour, and 1 call lasted more than one hour.
- A total of 256 overdose and psychiatric calls lasted less than one hour, and 3 of these calls lasted more than one hour.
- A total of 2,354 illness and other calls lasted less than one hour, and 6 illness and other calls lasted more than one hour.

Figure 27: Fire Calls by Type and Duration

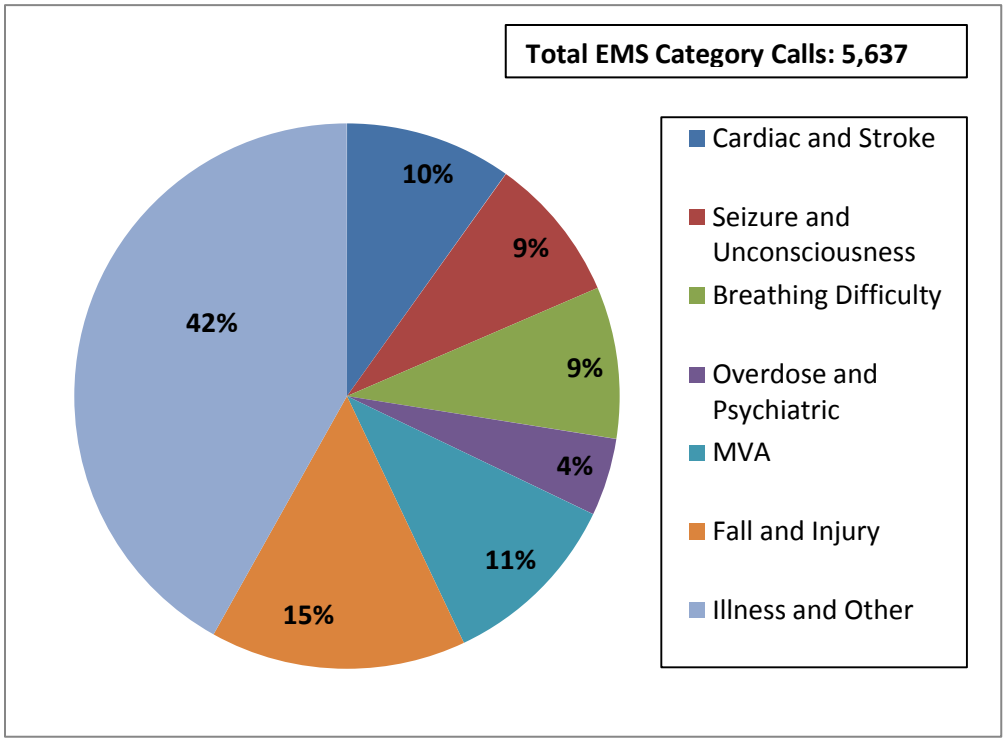


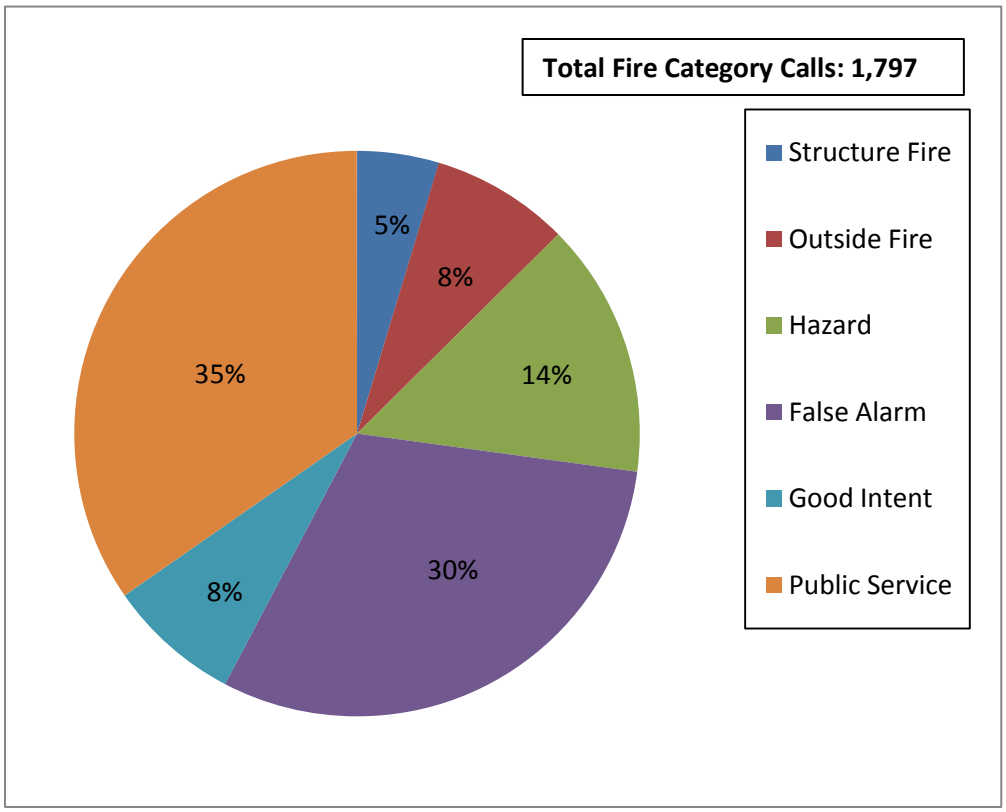
Note: Duration is the longest time from dispatch to clear of all fire units which responded to the same call. A total of 117 fire category calls (114 public service calls, 2 hazardous condition calls, and 1 false alarm call) that were responded to by administrative units or had zero duration are excluded.

Observations:

- A total of 1,599 fire category calls (95 percent of fire category calls) lasted less than one hour, 55 fire category calls (3 percent) lasted between one and two hours, and 26 fire category calls (2 percent) lasted more than two hours. On average, there were 0.2 fire category calls per day that lasted more than one hour.
- A total of 62 structure fire calls (74 percent of this type of calls) lasted less than one hour, 10 calls (12 percent) lasted between one and two hours, and 12 calls (14 percent) lasted more than two hours.
- A total of 130 outside fire calls (92 percent of this type of calls) lasted less than one hour, 9 calls (6 percent) lasted between one and two hours, and 3 calls (2 percent) lasted more than two hours.
- A total of 231 hazardous condition calls (89 percent of this type of call) lasted less than one hour, 20 hazardous conditions calls (8 percent) lasted between one and two hours, and 9 calls (3 percent) lasted more than two hours.
- A total of 542 false alarm calls (99 percent of this type of call) lasted less than one hour and 6 false alarm calls lasted more than one hour.

Figure 28: EMS and Fire Calls by Type

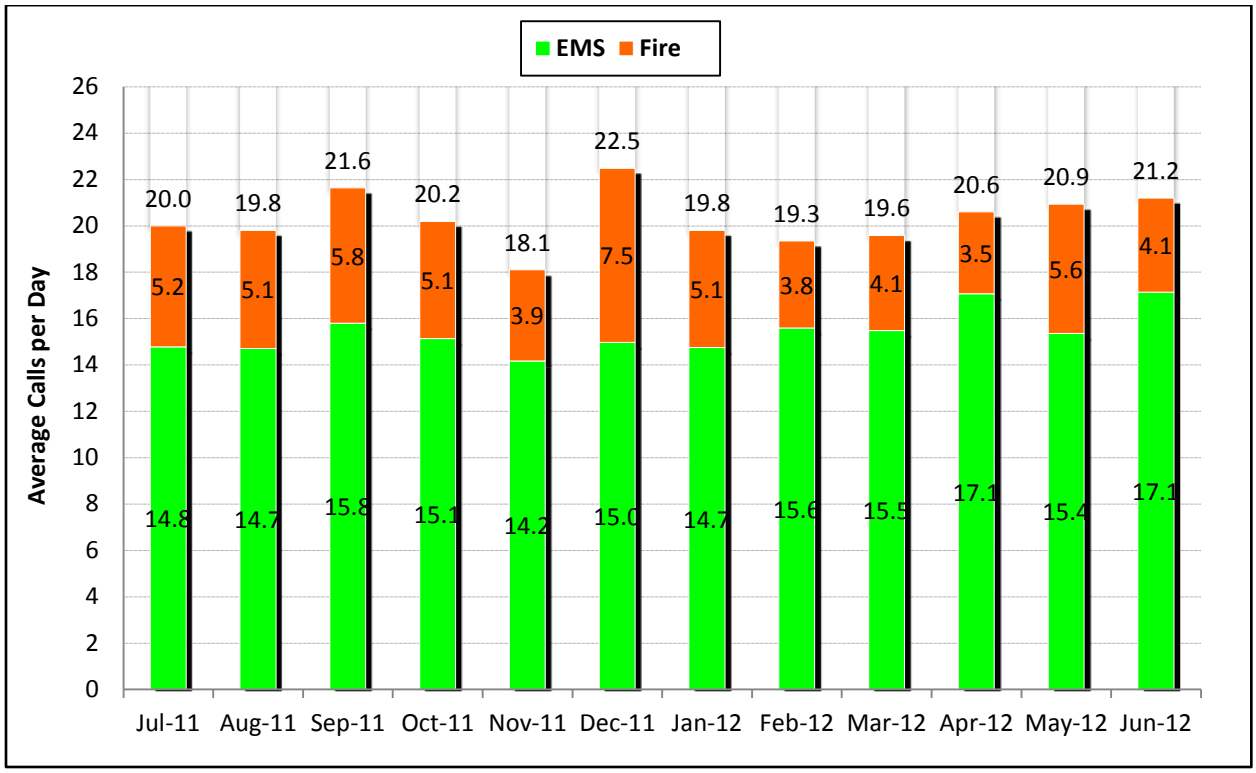




Observations:

- A total of 84 structure fire calls accounted for 5 percent of the fire category total.
- A total of 142 outside fire calls accounted for 8 percent of the fire category total.
- False alarm calls were 31 percent of the fire category total.
- Public service calls comprised the largest fire call category. There were 623 of these calls for the year, accounting for 35 percent of the fire category total.
- Hazardous condition calls were 15 percent of the fire category total.
- Cardiac or stroke calls were 10 percent of the EMS category total.
- Fall and Injury calls were 15 percent of the EMS category total.
- Motor vehicle accident calls were 11 percent of the EMS category total.
- Calls related to illness or other medical issues were the largest EMS call category and comprised 42 percent of the EMS category total.

Figure 29: Average Calls per Day by Month



Observations:

- Average calls per day per month ranged from a low of 18.1 calls per day in November 2011 to a high of 22.5 calls per day in December 2011. The highest monthly average was 24 percent greater than the lowest monthly average.
- Average EMS calls per day varied from a low of 14.2 calls per day in November 2011 to a high of 17.1 calls per day in April and June 2012.
- Average fire calls per day varied from a low of 3.5 calls per day in April 2012 to a high of 7.5 calls per day in December 2011.
- The highest number of calls received in a single day was 108, which occurred on December 31, 2011. The 108 calls included 89 public service calls (82 were fireworks ordinance violation calls only handled by administrative units), 10 EMS calls, 2 outside fire calls, 3 false alarm calls, 1 good intent call, and 3 canceled calls.

Figure 30: Calls by Hour of Day

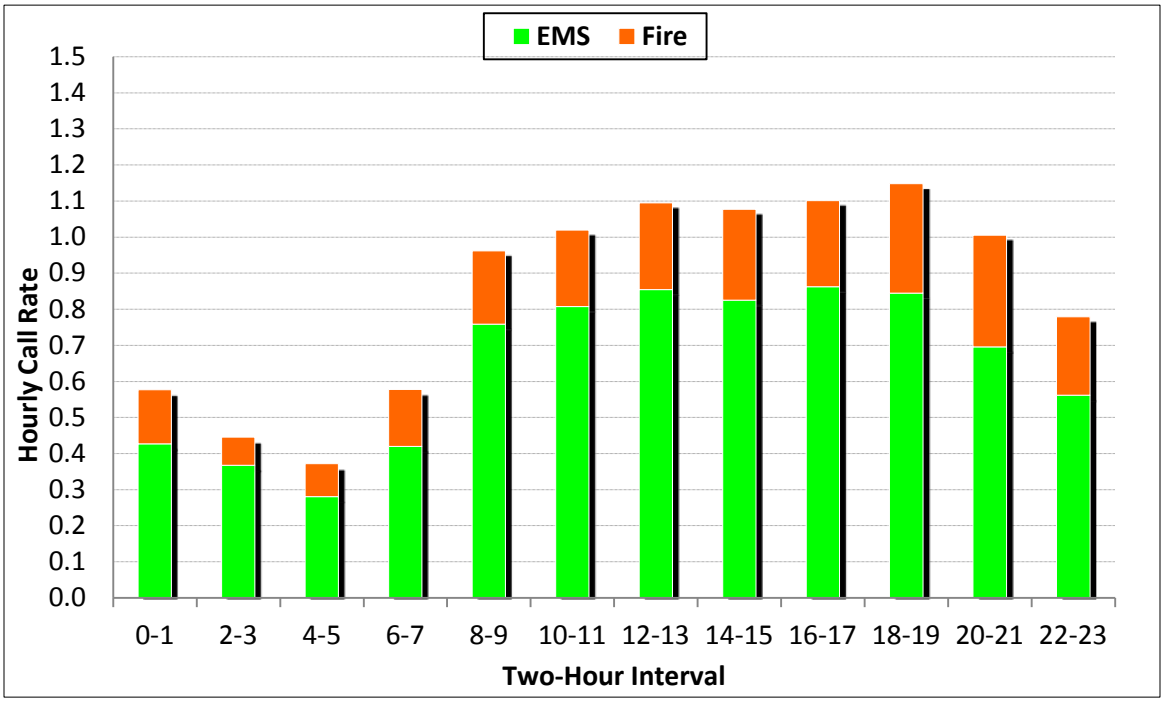


Table 10: Calls by Hour of Day

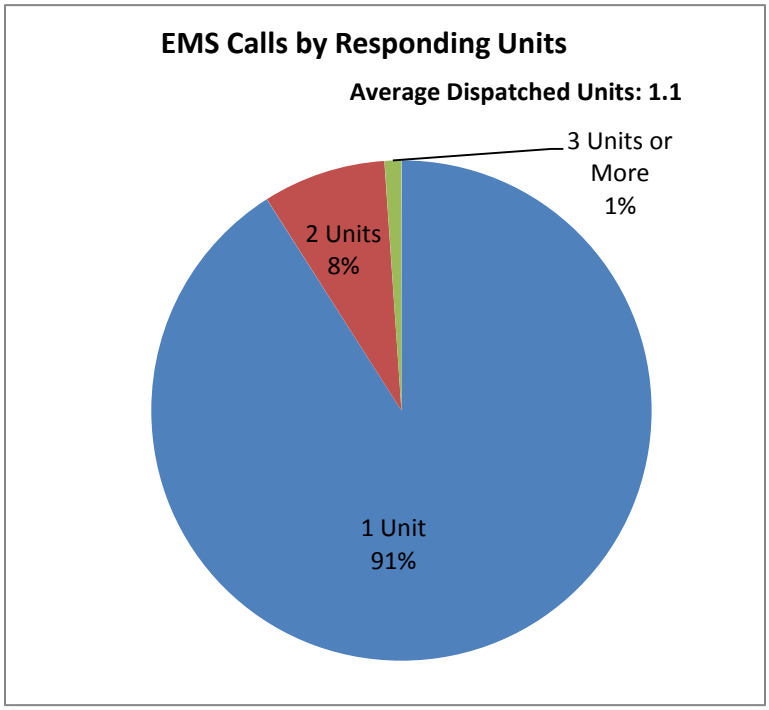
Two-Hour Interval	Hourly Call Rate		
	EMS	Fire	Total
0-1	0.4	0.2	0.6
2-3	0.4	0.1	0.4
4-5	0.3	0.1	0.4
6-7	0.4	0.2	0.6
8-9	0.8	0.2	1.0
10-11	0.8	0.2	1.0
12-13	0.9	0.2	1.1
14-15	0.8	0.3	1.1
16-17	0.9	0.2	1.1
18-19	0.8	0.3	1.1
20-21	0.7	0.3	1.0
22-23	0.6	0.2	0.8
Calls per Day	**15.4**	**4.9**	**20.3**

Note: Average calls per day shown are the sum of each column multiplied by two, since each cell represents two hours.

Observations:

- Hourly call rates averaged between 0.4 calls and 1.1 calls per hour.
- Call rates were highest between 8:00 a.m. and 10:00 p.m., averaging between 1.0 and 1.1 calls per hour.
- Call rates were lowest between midnight and 8:00 a.m., averaging between 0.4 and 0.6 calls per hour. This is equivalent to about 4 calls in the 8-hour period.

Figure 31: Number of Units Dispatched to Calls



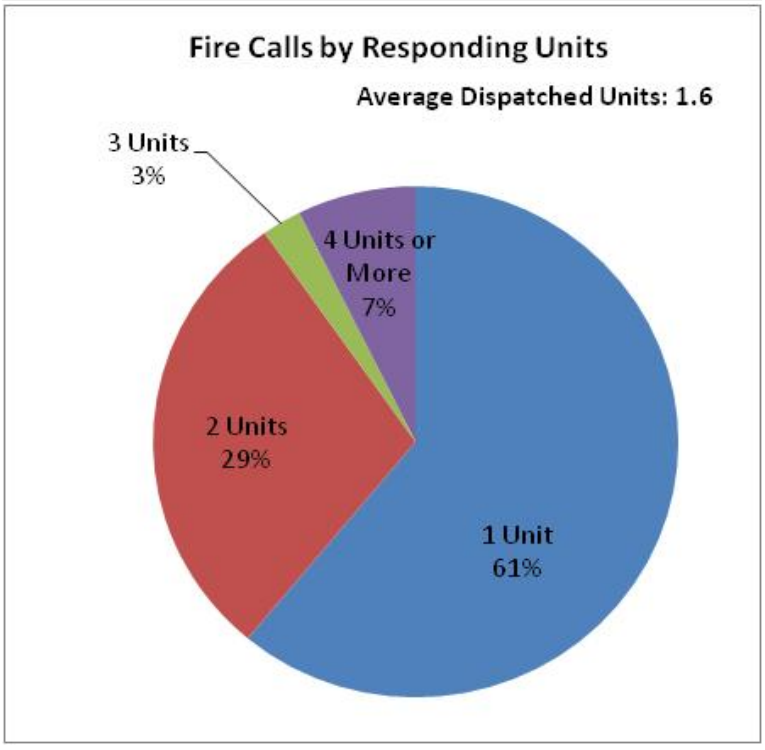


Table 11: Number of Units Dispatched to Calls

Call Type	Units per Call				
	One	Two	Three	Four or More	Total
Cardiac and stroke	519	38	0	0	557
Seizure and unconsciousness	456	30	0	0	486
Breathing difficulty	485	23	0	0	508
Overdose and psychiatric	248	10	2	0	260
MVA	423	139	40	8	610
Fall and injury	799	51	4	0	854
Illness and other	2,196	157	5	2	2,360
EMS Total	**5,126**	**448**	**51**	**10**	**5,635**
Structure fire	20	7	1	56	84
Outside fire	78	32	9	23	142
Hazard	195	43	6	16	260
False alarm	279	251	15	4	549
Good intent	103	15	6	13	137
Public service	351	143	4	11	509
Fire Total	**1,026**	**491**	**41**	**123**	**1,681**
Grand Total	**6,152**	**939**	**92**	**133**	**7,316**
Percentage	**84.1**	**12.8**	**1.3**	**1.8**	**100**

Note: A total of 118 calls involving only administrative vehicles are not included. Mutual aid and canceled calls are also excluded.

Observations:

- Overall, four or more units were dispatched to 2 percent of calls.
- On average, 1.6 units were dispatched per fire category call.
- For fire category calls, one unit was dispatched 61 percent of the time, two units were dispatched 29 percent of the time, three units were dispatched 3 percent of the time, and four or more units were dispatched 7 percent of the time.
- For structure fire calls, four or more units were dispatched 67 percent of the time.
- For outside fire calls, one unit was dispatched 55 percent of the time and two units were dispatched 23 percent of the time.
- On average, 1.1 units were dispatched per EMS call. For 5,126 EMS calls (91 percent) one unit was dispatched. For 448 EMS calls (8 percent), two units were dispatched and for 61 EMS calls (1 percent) three or more units were dispatched.

Table 12: Annual Deployed Time by Call Type

Call Type	Average Deployed Minutes per Run	Annual Hours	Percent of Total Hours	Deployed Minutes per Day	Annual Number of Runs	Runs per Day
Cardiac and stroke	22.0	218	6.2	35.7	595	1.6
Seizure and unconsciousness	20.7	178	5.0	29.1	516	1.4
Breathing difficulty	21.2	188	5.3	30.7	531	1.5
Overdose and psychiatric	22.8	104	3.0	17.0	274	0.7
MVA	25.6	365	10.4	59.8	854	2.3
Fall and injury	21.2	323	9.2	52.9	913	2.5
Illness and other	17.0	719	20.4	117.9	2,534	6.9
EMS Total	**20.2**	**2,094**	**59.4**	**343.2**	**6,217**	**17.0**
Structure fire	55.4	312	8.9	51.1	338	0.9
Outside fire	25.0	118	3.4	19.4	284	0.8
Hazard	28.1	176	5.0	28.8	375	1.0
False alarm	15.6	220	6.2	36.0	845	2.3
Good intent	13.2	46	1.3	7.6	211	0.6
Public service	17.0	199	5.6	32.6	703	1.9
Fire Total	**23.3**	**1,071**	**30.4**	**175.6**	**2,756**	**7.5**
Mutual aid	127.7	251	7.1	41.2	118	0.3
Canceled	6.1	108	3.1	17.6	1,067	2.9
Total	**20.8**	**3,523**	**100.0**	**577.6**	**10,158**	**27.8**

Note: Each dispatched unit is a separate "run." As multiple units are dispatched to a call, there are more runs than calls. Therefore, the department recorded 22.9 calls per day and made 27.8 runs per day.

Observations:

- Total deployed time for the year, or deployed hours, was 3,523 hours. This is the total deployment time of all the units deployed on all type of calls, including 251 hours spent on mutual aid. The deployed hours for all units combined averaged approximately 9.6 hours per day.
- There were 10,158 runs, including 118 runs dispatched for mutual aid calls. The daily average was 27.8 runs for all units combined.
- Fire category calls accounted for 30 percent of the total workload.
- There were 622 runs for structure and outside fire calls, with a total workload of 430 hours. This accounted for 12 percent of the total workload. The average deployed time for structure fire calls was 55.4 minutes, and the average deployed time for outside fire calls was 25.0 minutes.
- EMS calls accounted for 60 percent of the total workload. The average deployed time for EMS calls was 20 minutes. The deployed hours for all units spent on EMS calls averaged 5.7 hours per day.

Workload by Individual Unit—Calls and Total Time Spent

In this section, the actual time spent by each unit on calls is reported in two types of statistics: workload and runs. A dispatch of a unit is defined as a run and thus a call might include multiple runs.

Table 13: Call Workload by Unit

Station	Unit Type	Unit ID	Average Deployed Minutes per Run	Annual Number of Runs	Annual Hours	Runs per Day	Deployed Hours per Day
1	Engine	E1	18.0	1,518	455.1	4.1	1.2
	Ladder Truck	TK1	18.4	580	177.8	1.6	0.5
	Reserve Engine	E201	8.1	3	0.4	NA	NA
2	Engine	E2	21.6	1,124	404.4	3.1	1.1
	Reserve Engine	E202	16.8	41	11.5	NA	NA
3	Quint	Q3	21.3	785	278.6	2.1	0.8
	Squad	SQD3	18.0	1,291	387.9	3.5	1.1
4	Quint	Q4	23.2	633	244.0	1.7	0.7
	Squad	SQD4	20.0	1,076	358.8	2.9	1.0
5	Engine	E5	24.1	912	365.8	2.5	1.0
6	Engine	E6	20.1	1,031	345.7	2.8	0.9
7	Engine	E7	25.4	1,164	493.4	3.2	1.3

Note: Heavy rescue HR2 and E2 were cross-staffed and counted as E2. Ladder truck TK4 and Q4 were cross-staffed and counted as Q4. Brush truck B5 and E5 were cross-staffed and counted as E5. Air truck AIRTRL, hazmat truck HAZMAT, and E6 were cross-staffed and counted as E6. Brush truck B7, tender truck TN7, and E7 were cross-staffed and counted as E7. Reserve engines E201 and E202 were not regularly staffed and the daily averages were not applicable.

Observations:

- Units in station 1 were deployed the most often followed by the units in station 3. The units in station 3 had the largest number of deployed hours followed by the units in station 1. On average, the units in Station 1 had 5.7 runs per day and were deployed 1.7 hours per day. The units in station 3 averaged 5.6 runs per day and were deployed 1.9 hours per day.
- On average, engine E1 was dispatched 4.1 times a day, and its average deployed hours per day was 1.2 hours. Engine E7 was also deployed 1.3 hours per day with an average of 3.2 runs per day.

Figure 32: Deployed Minutes by Hour of Day

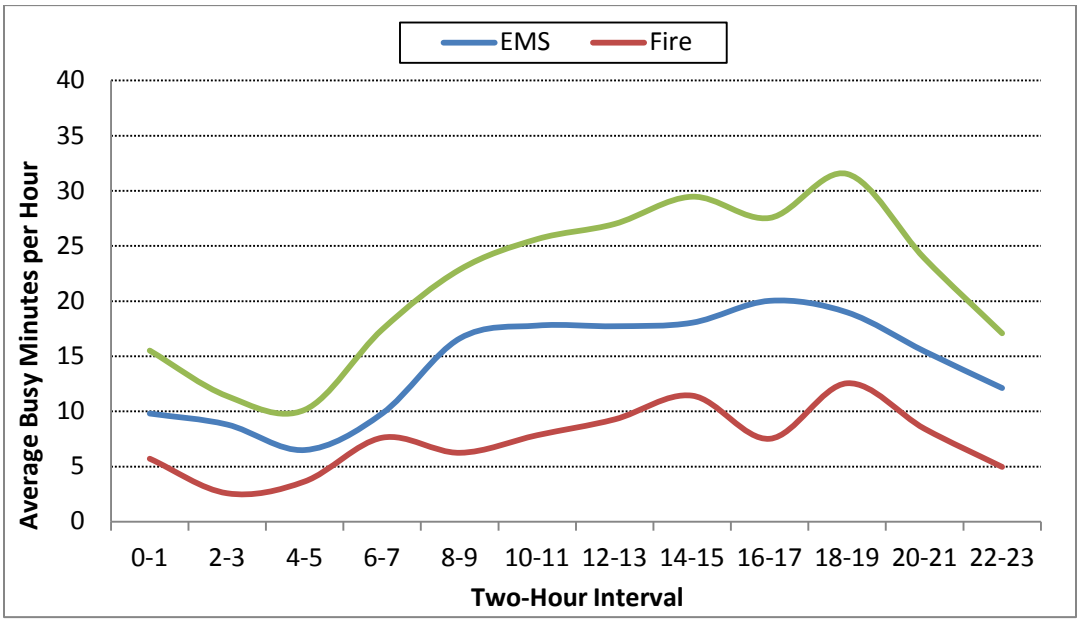


Table 14: Deployed Minutes by Hour of Day

Two-Hour Interval	EMS	Fire	Total
0-1	9.8	5.7	15.5
2-3	8.8	2.6	11.4
4-5	6.5	3.6	10.1
6-7	9.8	7.6	17.4
8-9	16.6	6.2	22.9
10-11	17.8	7.8	25.6
12-13	17.7	9.3	27.0
14-15	18.0	11.4	29.5
16-17	20.0	7.5	27.5
18-19	19.0	12.6	31.5
20-21	15.4	8.4	23.9
22-23	12.1	5.0	17.1
Daily Total	343.3	175.6	518.8

Note: Daily totals shown equal the sum of each column multiplied by two, since each cell represents two hours. Canceled calls are not included.

Observations:

- Hourly deployed minutes were the highest between 10:00 a.m. and 8:00 p.m., averaging between 26 and 32 minutes per hour.
- Hourly deployed minutes were the lowest between 2:00 a.m. and 6:00 a.m., averaging between 10 and 11 minutes per hour.

Table 15: Total Annual Number of Runs by Call Type and Unit

Station	Unit	EMS	**Structure Fire**	**Outside Fire**	Hazard	False Alarm	Good Intent	Public Service	Mutual Aid	Canceled	**Total**	**Runs per Day**
1	E1	1,002	**40**	**35**	54	92	29	91	11	164	**1,518**	**4.1**
	TK1	184	**37**	**19**	33	123	12	93	1	78	**580**	**1.6**
	E201	0	**0**	**1**	1	0	0	1	0	0	**3**	**NA**
2	E2	770	**52**	**28**	47	40	20	50	5	112	**1,124**	**3.1**
	E202	23	**0**	**1**	0	5	1	5	0	6	**41**	**NA**
3	Q3	345	**38**	**24**	50	143	25	58	8	94	**785**	**2.1**
	SQD3	948	**30**	**27**	15	80	14	48	13	116	**1,291**	**3.5**
4	Q4	233	**29**	**20**	50	106	27	84	11	73	**633**	**1.7**
	SQD4	793	**19**	**26**	20	56	11	63	13	75	**1,076**	**2.9**
5	E5	595	**32**	**23**	24	59	22	84	6	67	**912**	**2.5**
6	E6	653	**32**	**25**	42	57	30	54	7	131	**1,031**	**2.8**
7	E7	671	**29**	**55**	39	84	20	72	43	151	**1,164**	**3.2**

Observations:

- Of all units, Engine E1 was dispatched most often. It made 1,518 runs during the year, of which 1,002 runs were made for EMS calls. Runs it made for structure and outside fire calls totaled 75 in a year.
- Engine E7 was dispatched most often for structure and outside fire calls, totaling 84 runs in a year.
- The two quint units, Q4 and Q3, were dispatched 633 and 785 times, respectively, during the year.
- The two squad units, SQD4 and SQD3, were dispatched 1,076 and 1,291 times, respectively, during the year.
- Ladder truck TK1 was dispatched 580 times during the year.

Table 16: Daily Average Deployed Minutes, by Call Type and Unit

Station	Unit	EMS	**Structure Fire**	**Outside Fire**	Hazard	False Alarm	Good Intent	Public Service	Mutual Aid	Canceled	**Total**	**Fire Category Calls Percentage**
1	E1	51.2	**6.2**	**1.8**	4.0	3.9	1.1	2.6	1.4	2.4	**74.6**	**31.4**
	TK1	9.5	**5.9**	**0.6**	1.5	4.0	0.5	6.3	0.0	1.0	**29.2**	**67.5**
2	E2	43.4	**7.9**	**1.7**	3.0	2.0	0.7	2.7	2.7	2.3	**66.3**	**34.5**
3	Q3	21.1	**6.0**	**2.0**	3.5	6.1	1.0	2.5	2.0	1.5	**45.7**	**53.8**
	SQD3	49.0	**3.0**	**1.8**	0.8	2.8	0.3	1.2	2.9	1.8	**63.6**	**23.0**
4	Q4	15.4	**4.1**	**1.3**	4.5	5.1	1.0	4.3	2.8	1.5	**40.0**	**61.5**
	SQD4	44.3	**3.4**	**1.9**	0.9	1.7	0.3	2.1	2.9	1.4	**58.8**	**24.7**
5	E5	34.3	**5.1**	**2.6**	2.5	2.5	0.7	3.8	7.0	1.4	**60.0**	**42.8**
6	E6	33.8	**5.4**	**1.2**	4.7	3.2	1.0	2.8	2.4	2.1	**56.7**	**40.4**
7	E7	40.0	**4.1**	**4.4**	3.4	4.5	1.0	4.1	17.1	2.3	**80.9**	**50.6**

Note: Reserve engines E201 and E202 were not regularly staffed and the daily averages were not applicable.

Observations:

- Of the five engines, E7 was deployed for the most time, averaging 81 minutes per day. Fire category calls accounted for 51 percent of its daily workload. On average, unit E7 spent 8.5 minutes per day fighting structure or outside fires. Engine E2, on average, spent the most time on structure and outside fire runs, averaging 9.6 minutes per day.
- Of the two quint units, Q3 was deployed 54 minutes and Q4 was deployed 40 minutes per day.
- Of the two squads, SQD3 averaged 63.6 minutes per day of deployed time overall with 4.8 minutes per day spent on structure and outside fires. SQD4 was deployed on average 59 minutes per day with 5.3 minutes per day on structure and outside fires.

Analysis of Busiest Hours

There is significant variability in the number of calls from hour to hour. One special concern relates to the fire and EMS resources available for hours with the heaviest workload. We tabulated the data for each of the 8,784 hours in the year. Approximately once every 1.6 days, the Round Rock Fire Department responded to four or more calls in an hour. This is 3 percent of the total number of hours. Here, we also report the top ten hours with the most calls received and provide a detailed analysis of the two hours with the most calls received.

Table 17: Frequency Distribution of the Number of Calls

Number of Calls in an Hour	Frequency	Percentage
0	3,680	41.9
1	2,976	33.9
2	1,401	15.9
3	501	5.7
4	160	1.8
5	44	0.5
6 or more	22	0.3

Observations:

- During 226 hours (3 percent of all hours), four or more calls occurred; in other words, the RRFD responded to four or more calls in an hour roughly once every 1.6 days (39 hours).
- Five or more calls occurred only during 66 hours.

Table 18: Top 10 Hours with the Most Calls Received

Hour	Number of Calls	Number of Runs	Total Busy Hours
12/31/2011, 8 p.m. to 9 p.m.	24	4	0.8
12/31/2011, 10 p.m. to 11 p.m.	23	2	0.2
1/1/2012, 12 a.m. to 1 a.m.	21	3	1.2
5/10/2012, 9 p.m. to 10 p.m.	16	22	3.7
12/31/2011, 7 p.m. to 8 p.m.	14	11	1.7
12/31/2011, 9 p.m. to 10 p.m.	14	1	0.2
5/10/2012, 8 p.m. to 9 p.m.	12	15	5.0
12/31/2011, 6 p.m. to 7 p.m.	10	2	0.4
12/31/2011, 11 p.m. to 12 a.m.	10	1	0.5
5/10/2012, 11 p.m. to 12 a.m.	9	10	2.9

Note: Workload of administrative units is excluded. The combined workload is the total deployed minutes spent responding to calls received in the hour, and which may extend into the next hour or hours.

Observations:

- Seven of the busiest hours occurred consecutively from 6:00 p.m. on December 31, 2011 through 1:00 a.m. on January 1, 2012. Many of these calls were fireworks ordinance violations.
- The hour with the most calls received was between 8:00 and 9:00 p.m. on December 31, 2011. The 24 calls included 21 fireworks ordinance violation calls, which were solely handled by administrative units. The other three calls included two public service calls, and one overdose and psychiatric call, which were handled by four dispatches of fire units.
- The hour with the second most calls received was between 10:00 and 11:00 p.m. on December 31, 2011. The 23 calls included 22 fireworks ordinance violation calls, which were solely handled by administrative units, and one good intent call, which was responded by two fire units.
- The hour between midnight and 1:00 a.m. on January 1, 2012 had 21 fireworks ordinance violation calls, which were entirely handled by administrative units.
- The hour with the most dispatches was between 9:00 and 10:00 p.m. on May 10, 2012. The 16 calls involved 22 individual dispatches. These calls included one EMS call, eleven hazardous condition calls, one false alarm call, two public service calls, and one canceled call. The combined workload was 3.7 hours. The longest call was a hazardous condition call that was responded by four units and lasted 23 minutes.
- The hour between 7:00 and 8:00 p.m. on December 31, 2011 saw 14 calls. The calls involved 11 individual dispatches. These calls included one outside fire call, two false alarm calls, and eleven public service calls. Nine public service calls were firework ordinance violation calls and solely handled by administrative units. The combined workload of fire units was 1.7 hours. The longest call was an unauthorized burning call that was dispatched with five units and lasted 16 minutes. The grass fire call was responded by one unit and lasted 15 minutes.

Table 19: Unit Workload Analysis between 9:00 and 10:00 p.m. on May 10, 2012

Hour	Station	1		2	3	3	4		5	6	7	Number of Busy Units
	Type	Engine	Ladder Truck	Engine	Quint	Squad	Quint	Squad	Engine	Engine	Engine	
	Unit	E1	TK1	E2	Q3	SQD3	Q4	SQD4	E5	E6	E7	
5/10/2012, 9 p.m. to 10 p.m.	0-5	5.0	5.0	5.0	5.0	5.0	5.0	3.6	5.0	4.6	5.0	10
	5-10	5.0	5.0	5.0	5.0	0.9	3.8	5.0	3.1	5.0	5.0	10
	10-15	1.4	5.0	5.0	5.0	4.8		5.0	5.0	5.0	5.0	9
	15-20		5.0	1.5	5.0	5.0		5.0	5.0	5.0	5.0	8
	20-25		5.0		5.0	0.1		5.0	5.0	4.8	5.0	7
	25-30		0.6		5.0			1.2	5.0	5.0	5.0	6
	30-35	2.4			3.8	2.1			5.0	4.8	4.0	6
	35-40	5.0				5.0			5.0	5.0	5.0	5
	40-45	5.0				1.8			4.0	5.0	4.4	5
	45-50	2.4		4.0	3.4	4.8			5.0	5.0	3.2	7
	50-55	2.5	2.5	4.2	5.0	5.0	4.6	3.0	5.0	2.1	5.0	10
	55-60			5.0	5.0	4.7	5.0	5.0	5.0		4.7	7
	Total	28.7	28.1	29.7	47.2	39.2	18.4	32.8	57.1	51.3	56.3	

Note: The numbers in the cells are the deployed minutes within the five-minute block. The cell values greater than 2.5 are coded red.

Observations:

- During this hour, RRFD units made 22 runs and responded to 16 calls. These calls included one EMS call, eleven hazardous condition calls, one false alarm call, two public service calls, and one canceled call. The longest call was a hazardous condition call that was responded by four units and lasted 23 minutes.
- During the busiest 15 minutes in the hour (9:00 to 9:10 p.m., and 9:50 to 9:55), 10 units were simultaneously deployed. A total of six units were deployed for more than 30 minutes.

Table 20: Unit Workload Analysis between 7:00 and 8:00 p.m. on December 31, 2011

Hour	Station	1		2	3	3	4		5	6	7	Number of Busy Units
	Type	Engine	Ladder Truck	Engine	Quint	Squad	Quint	Squad	Engine	Engine	Engine	
	Unit	E1	TK1	E2	Q3	SQD3	Q4	SQD4	E5	E6	E7	
12/31/2011, 7 p.m. to 8 p.m.	0-5											0
	5-10	2.2	2.2	2.2					2.2	2.2		5
	10-15	3.6	3.8	5.0					4.2	3.8		5
	15-20			5.0								1
	20-25			4.0								1
	25-30											0
	30-35				4.4	3.0						2
	35-40		0.9		5.0	2.0					0.9	4
	40-45		5.0		1.6						5.0	3
	45-50		0.2		1.0						5.0	3
	50-55				5.0						4.0	2
	55-60				5.0			4.4				2
	Total	5.8	12.1	16.2	22.0	5.0		4.4	6.4	6.0	14.9	

Note: The numbers in the cells are the deployed minutes within the five minute block. The cell values greater than 2.5 are coded red.

Observations:

- During this hour, RRFD units made 11 runs and responded to 14 calls. These calls included one outside fire call, two false alarm calls, and eleven public service calls. Nine public service calls were firework ordinance violation calls and solely handled by administrative units. The longest call was an unauthorized burning call that was dispatched with five units and lasted 16 minutes. The grass fire call was responded to by one unit and lasted 15 minutes.
- During the busiest ten minutes of the hour (7:05 to 7:15 p.m.), five units were simultaneously deployed.

Dispatch Time and Response Time

This section presents dispatch and response time statistics for calls that were responded with lights and sirens by different types and units. For most types of calls, the main focus is the dispatch and response time of the first arriving units. However, for structure and outside fire calls, we also analyze the response time of the first and second arriving fire vehicles. The comparison of dispatch, turnout, travel, and response times of first arriving units for calls responded with or without lights and sirens is presented in Appendix III.

Different terms are used to describe the components of response time: **Dispatch processing time** is the difference between the unit dispatch time and call received time. **Turnout time** is the difference between the unit time en route and the unit dispatch time. **Travel time** is the difference between the unit on-scene arrival time and the time en route. **Response time** is the difference between the on-scene arrival time and call received time.

In this section, a total of 3,086 calls whose first arriving unit responded with lights and sirens were used in the analysis. The average dispatch time was 0.8 minutes. The average turnout time was 1.1 minutes, and the average travel time was 4.0 minutes. The average response time for EMS calls was 5.8 minutes, and the average response time for fire category calls was 6.3 minutes.

Table 21: Average Dispatch, Turnout, Travel, and Response Times of First Arriving Unit, by Call Type

Call Type	Dispatch Time	Turnout Time	Travel Time	Response Time	90th Percentile Response Time	Sample Size
Cardiac and stroke	0.8	1.1	3.9	5.7	7.5	456
Seizure and unconsciousness	0.7	1.0	3.8	5.5	7.6	357
Breathing difficulty	0.7	1.1	4.1	6.0	8.4	387
Overdose and psychiatric	0.8	1.1	4.4	6.3	8.6	61
MVA	0.6	1.2	3.9	5.6	8.7	438
Fall and injury	0.8	1.1	3.7	5.7	7.7	271
Illness and other	0.8	1.1	4.2	6.1	8.3	654
EMS Total	**0.8**	**1.1**	**4.0**	**5.8**	**8.1**	**2,624**
Structure fire	0.9	1.3	3.6	5.8	8.1	62
Outside fire	1.0	1.2	4.1	6.3	8.9	102
Hazard	1.1	1.2	4.5	6.8	11.5	59
False alarm	1.1	1.2	3.9	6.3	8.4	161
Good intent	1.1	1.3	4.4	6.7	8.7	37
Public service	0.9	1.2	4.2	6.3	8.3	41
Fire Total	**1.0**	**1.2**	**4.1**	**6.3**	**8.5**	**462**
Total	**0.8**	**1.1**	**4.0**	**5.9**	**8.2**	**3,086**

Note: First arriving units with valid dispatch, turnout, and travel times were used in this analysis.

Figure 33: Average Dispatch, Turnout, and Travel Times of First Arriving Unit, by EMS Call Type

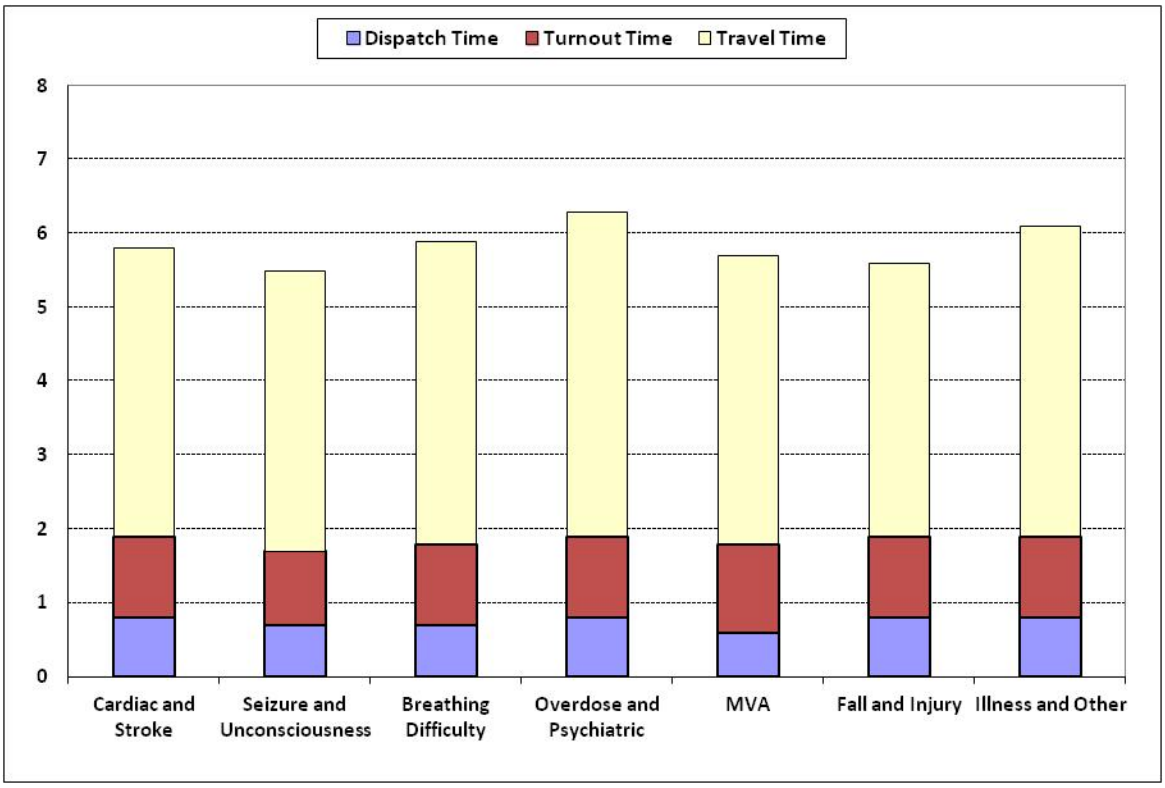
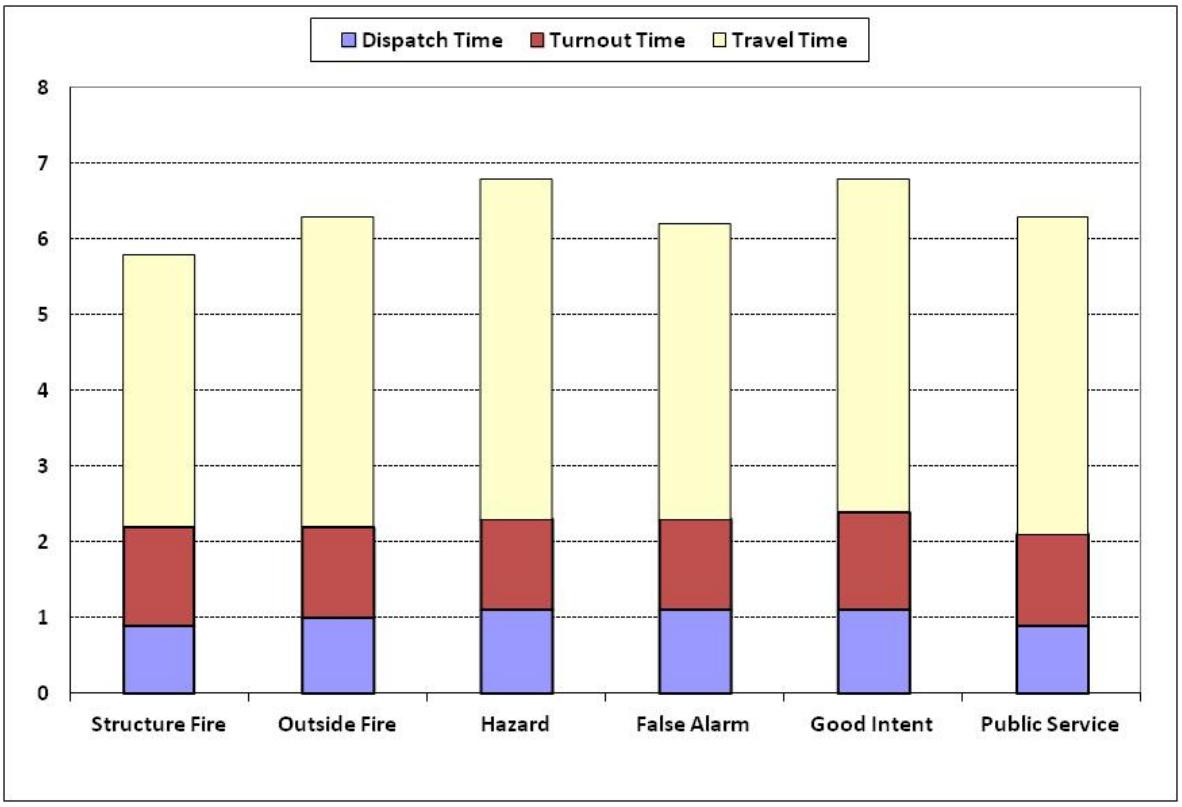


Figure 34: Average Dispatch, Turnout, and Travel Times of First Arriving Unit, by Fire Call Type



Observations:

- The average dispatch time for all calls was 0.8 minutes.
- The average turnout time for all calls was 1.1 minutes.
- The average travel time for all calls was 4.0 minutes.
- The average response time for EMS calls was 5.8 minutes.
- The average response time for fire category calls was 6.3 minutes.
- The average response time for structure fire calls was 5.8 minutes.
- The average response time for outside fire calls was 6.3 minutes.
- The 90th percentile response time for all calls was 8.2 minutes.

Figure 35: Average Dispatch, Turnout, Travel, and Response Time of First Arriving Unit, by Hour of Day

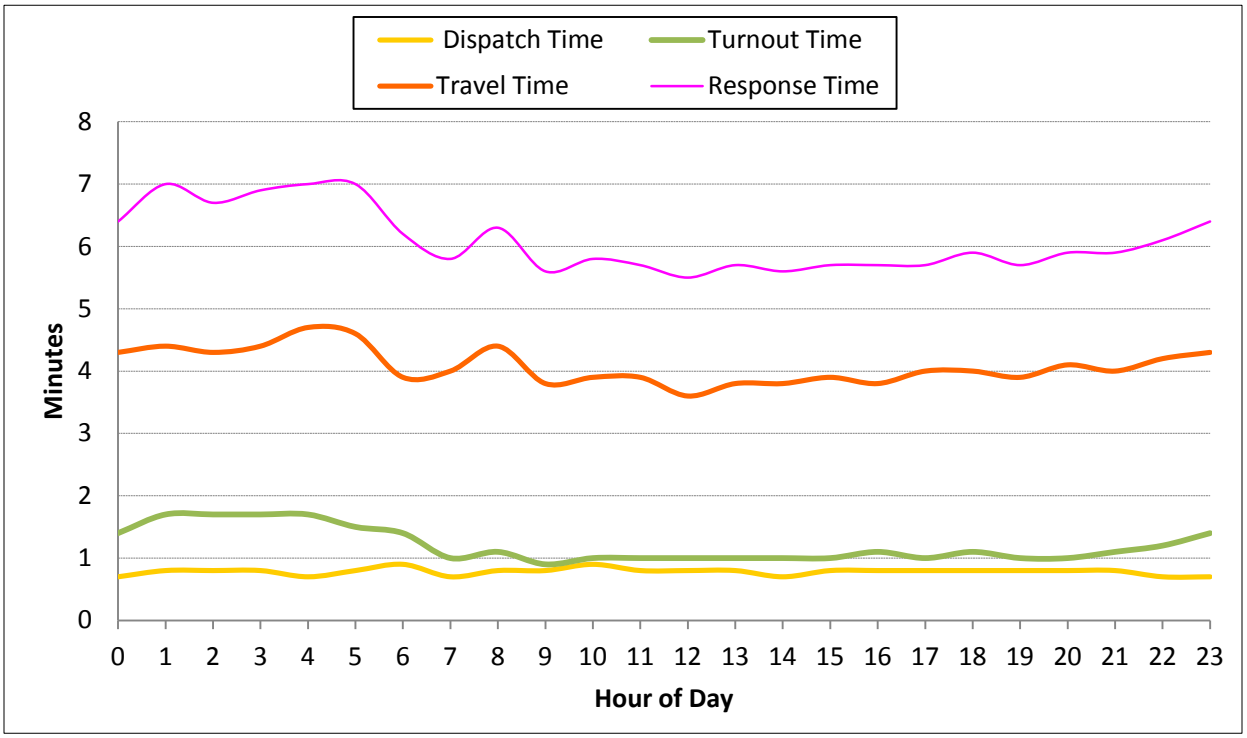


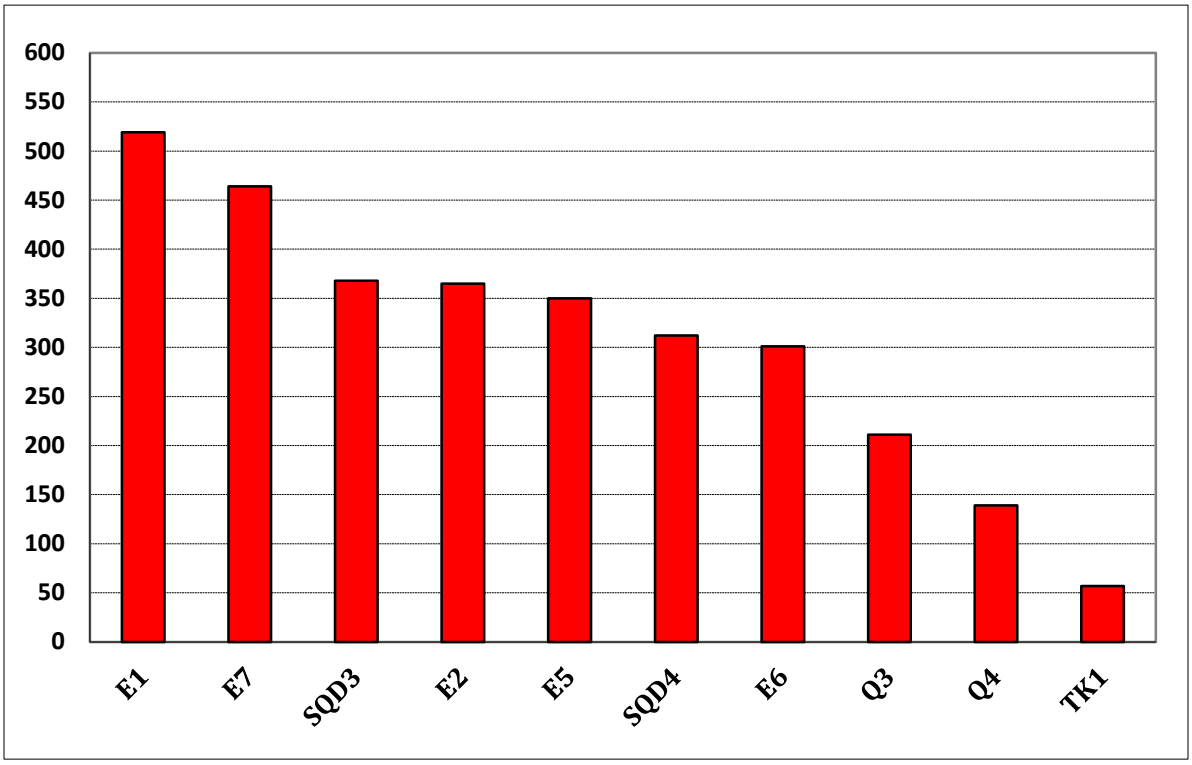
Table 22: Average Dispatch, Turnout, Travel, and Response Times of First Arriving Unit, by Hour of Day

Hour	Dispatch Time	Turnout Time	Travel Time	Response Time	90th Percentile Response Time	Sample Size
0	0.7	1.4	4.3	6.4	8.3	56
1	0.8	1.7	4.4	7.0	9.1	56
2	0.8	1.7	4.3	6.7	8.8	51
3	0.8	1.7	4.4	6.9	9.0	50
4	0.7	1.7	4.7	7.0	9.4	37
5	0.8	1.5	4.6	7.0	9.0	59
6	0.9	1.4	3.9	6.2	8.6	75
7	0.7	1.0	4.0	5.8	8.0	91
8	0.8	1.1	4.4	6.3	9.0	138
9	0.8	0.9	3.8	5.6	7.5	170
10	0.9	1.0	3.9	5.8	7.6	172
11	0.8	1.0	3.9	5.7	8.1	195
12	0.8	1.0	3.6	5.5	7.6	176
13	0.8	1.0	3.8	5.7	7.5	182
14	0.7	1.0	3.8	5.6	7.6	178
15	0.8	1.0	3.9	5.7	8.0	175
16	0.8	1.1	3.8	5.7	8.0	159
17	0.8	1.0	4.0	5.7	7.9	209
18	0.8	1.1	4.0	5.9	8.0	211
19	0.8	1.0	3.9	5.7	7.9	178
20	0.8	1.0	4.1	5.9	8.3	160
21	0.8	1.1	4.0	5.9	7.6	122
22	0.7	1.2	4.2	6.1	8.3	106
23	0.7	1.4	4.3	6.4	8.2	80

Observations:

- Average dispatch time was between 0.7 and 0.9 minutes.
- Average turnout time was between 0.9 and 1.7 minutes. It peaked between 1:00 a.m. and 5:00 a.m., averaging 1.7 minutes.
- Average travel time was between 3.6 and 4.7 minutes.
- Average response time was between 5.5 and 7 minutes. The response time peaked between 1:00 a.m. and 6:00 a.m. and averaged between 6.7 and 7.0 minutes, which was caused by longer turnout time.

Figure 36: Number of Total Calls by First Arriving Units



Note: Figure 36 and Table 23 include calls whose first arriving unit responded with lights and sirens.

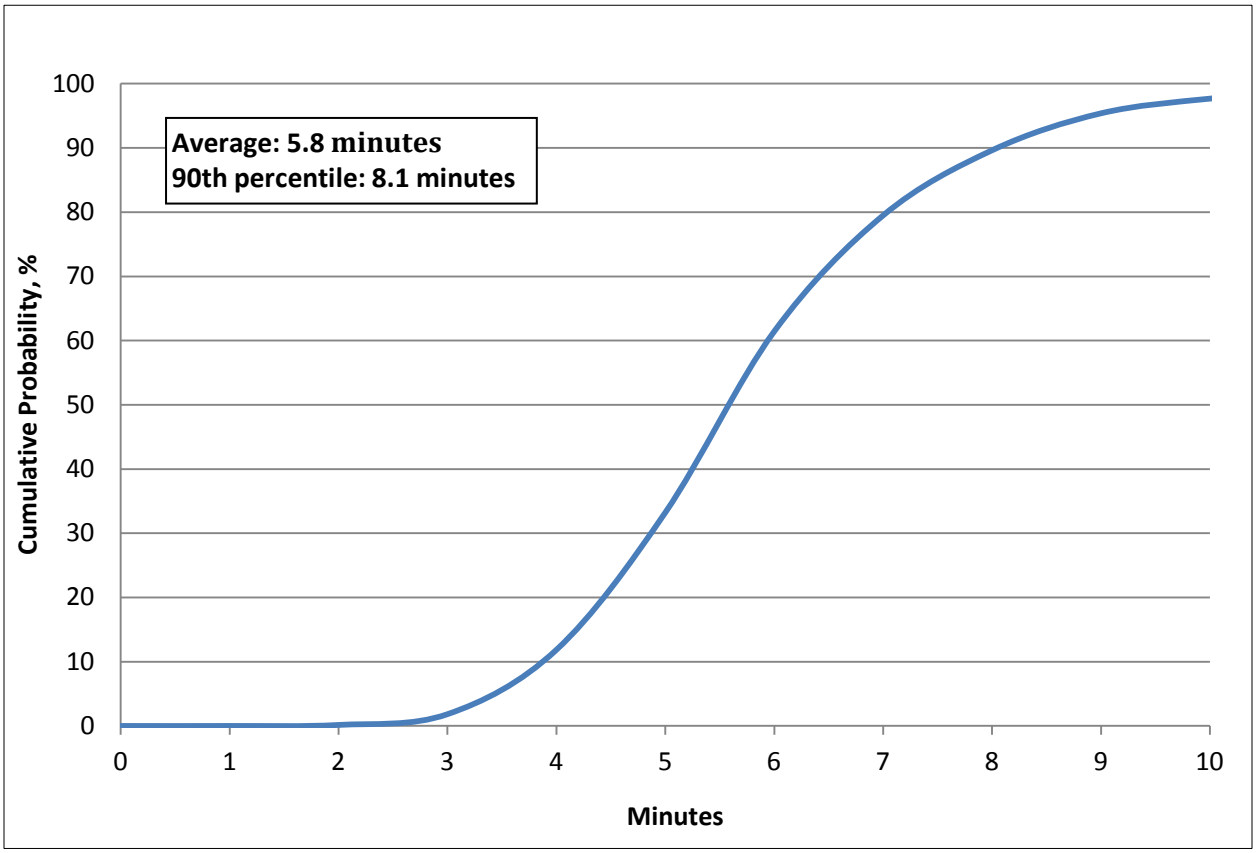
Table 23: Number of Total Calls by First Arriving Units

Unit	EMS	Structure and Outside Fire	Fire Other	Total	Percentage	Cumulative Percentage
E1	446	24	49	519	16.8	16.8
E7	387	23	54	464	15.0	31.9
SQD3	342	14	12	368	11.9	43.8
E2	319	22	24	365	11.8	55.6
E5	314	10	26	350	11.3	66.9
SQD4	280	19	13	312	10.1	77.1
E6	257	18	26	301	9.8	86.8
Q3	136	17	58	211	6.8	93.6
Q4	99	11	29	139	4.5	98.2
TK1	44	6	7	57	1.8	100.0

Observations:

- Engine E1 arrived first on scene most often, followed by engine E7. The top four first arriving units accounted for 56 percent of the first arrivals at calls.
- For structure and outside fire calls, engine E1, engine E7, and engine E2, in that order, were the first units on scene most often.

Figure 37: Cumulative Distribution Function (CDF) of Response Time of First Arriving Unit for EMS Calls



Reading the CDF Chart: The vertical axis is the probability or percentage of calls. The horizontal axis is response time. For example, with regard to EMS calls, the 0.9 probability line intersects the graph at the time mark at about 8.1 minutes. This means that for 90 percent of EMS calls, the first unit arrived in less than 8.1 minutes.

Figure 38: Frequency Distribution of Response Time of First Arriving Unit for EMS Calls

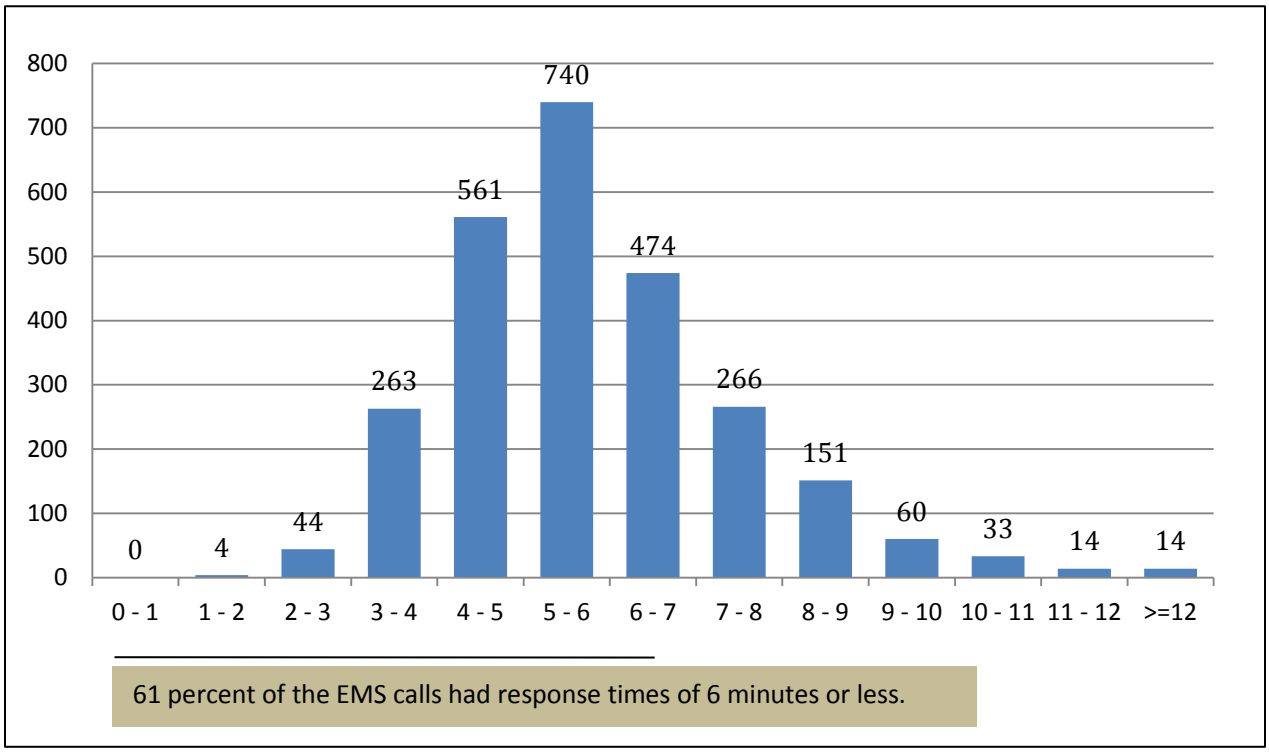


Table 24: Cumulative Distribution Function (CDF) of Response Time of First Arriving Unit for EMS Calls

Response Time (minute)	Frequency	Cumulative Percentage
0 - 1	0	0.0
1 - 2	4	0.2
2 - 3	44	1.8
3 - 4	263	11.9
4 - 5	561	33.2
5 - 6	740	61.4
6 - 7	474	79.5
7 - 8	266	89.6
8 - 9	151	95.4
9 - 10	60	97.7
10 - 11	33	98.9
11 - 12	14	99.5
>=12	14	100.0

Observations:

- The average response time for EMS calls was 5.8 minutes.
- For 61 percent of EMS calls, the response time was less than or equal to 6 minutes.
- For 90 percent of EMS calls, the response time was less than 8.1 minutes.

Response Time Analysis for Structure and Outside Fire Calls

The following section focuses on structure and outside fire calls. Response times for both the first arriving unit and the second arriving unit are considered. The analysis focuses on firefighting equipment, including engines, ladder truck, quint, and squad. The response time analysis does **not** include dispatched heavy rescue and administrative units. Heavy rescue is not included because it does not carry water.

Table 25: Average Response Time for Structure and Outside Fire Calls by First Arriving Fire Unit

Unit Type	First Arriving Unit	Outside Fire		Structure Fire		Total	
		Response Time	Number of Calls	Response Time	Number of Calls	Response Time	Number of Calls
Engine	E1	6.3	14	6.1	11	6.2	25
	E2	6.4	15	5.4	7	6.1	22
	E5	7.1	6	4.7	5	6.2	12
	E6	7.3	11	6.7	7	7.1	18
	E7	5.9	19	6.4	6	6.1	25
Ladder truck	TK1	6.7	3	5.4	7	5.8	10
Quint	Q3	5.6	11	6.4	7	5.9	18
	Q4	7.4	8	4.9	3	6.7	11
Squad	SQD3	6.1	9	4.9	6	5.7	15
	SQD4	5.8	11	6.0	9	5.9	20
Total		**6.4**	**108**	**5.8**	**68**	**6.2**	**176**

Note: All calls with a valid total response time were included in this analysis, even if individual components (e.g. turnout time) might have been invalid. Thus this analysis has a larger sample size than Table 21.

Observations:

- For outside fire calls, the average response time of the first arriving firefighting equipment was 6.4 minutes.
- For outside fire calls, Engine E7 was the first unit on scene most often and had an average response time of 5.9 minutes.
- For structure fire calls, the average response time of first arriving firefighting equipment was 5.8 minutes.
- For structure fire calls, Engine E1 was the first unit on scene most often and had an average response time of 6.1 minutes.

Table 26: Average Response Time for Structure and Outside Fire Calls by Second Arriving Fire Unit

Unit Type	Second Arriving Unit	Outside Fire		Structure Fire		Total	
		Response Time	Number of Calls	Response Time	Number of Calls	Response Time	Number of Calls
Engine	E1	12.5	2	6.6	8	7.7	10
	E2	9.9	3	6.4	11	7.2	14
	E5	12.4	1	7.2	3	8.5	4
	E6	4.2	1	8.3	5	7.6	6
	E7	8.5	7	NA	0	8.5	7
Ladder truck	TK1	9.1	5	7.0	7	7.9	12
Quint	Q3	6.7	3	5.6	7	5.9	10
	Q4	8.2	1	6.5	6	6.8	7
Squad	SQD3	10.0	5	5.8	3	8.4	8
	SQD4	12.5	3	13.1	2	12.8	5
Total		**9.4**	**31**	**6.9**	**52**	**7.8**	**83**

Note: Calls with valid response times for at least two fire units were used in this analysis.

Observations:

- The average response time of the second arriving unit for outside fire calls was 9.4 minutes, compared to 6.4 minutes for the first arriving unit.
- The average response time of the second arriving unit for structure fire calls was 6.9 minutes, compared to 5.8 minutes for the first arriving unit.
-

Figure 39: Cumulative Distribution Function (CDF) of Response Time of First and Second Arriving Fire Units for Structure Fire Calls

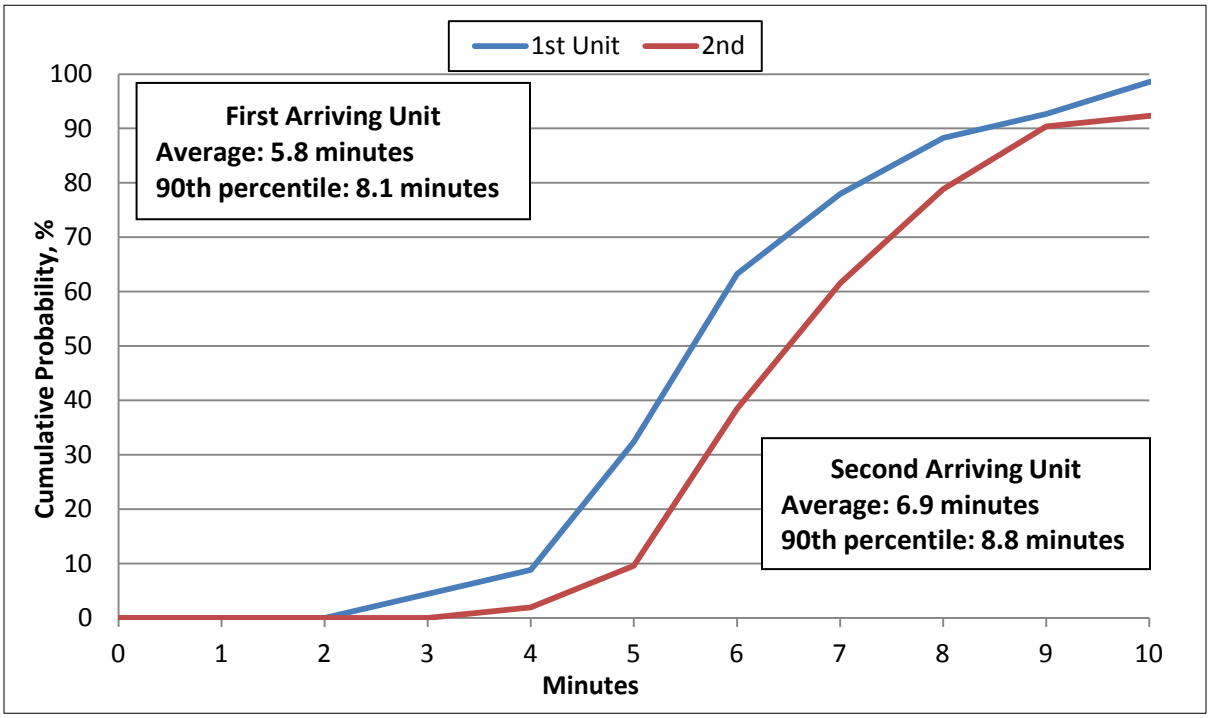


Figure 40: Frequency Distribution of Response Time of First Arriving Unit for Structure Fire Calls

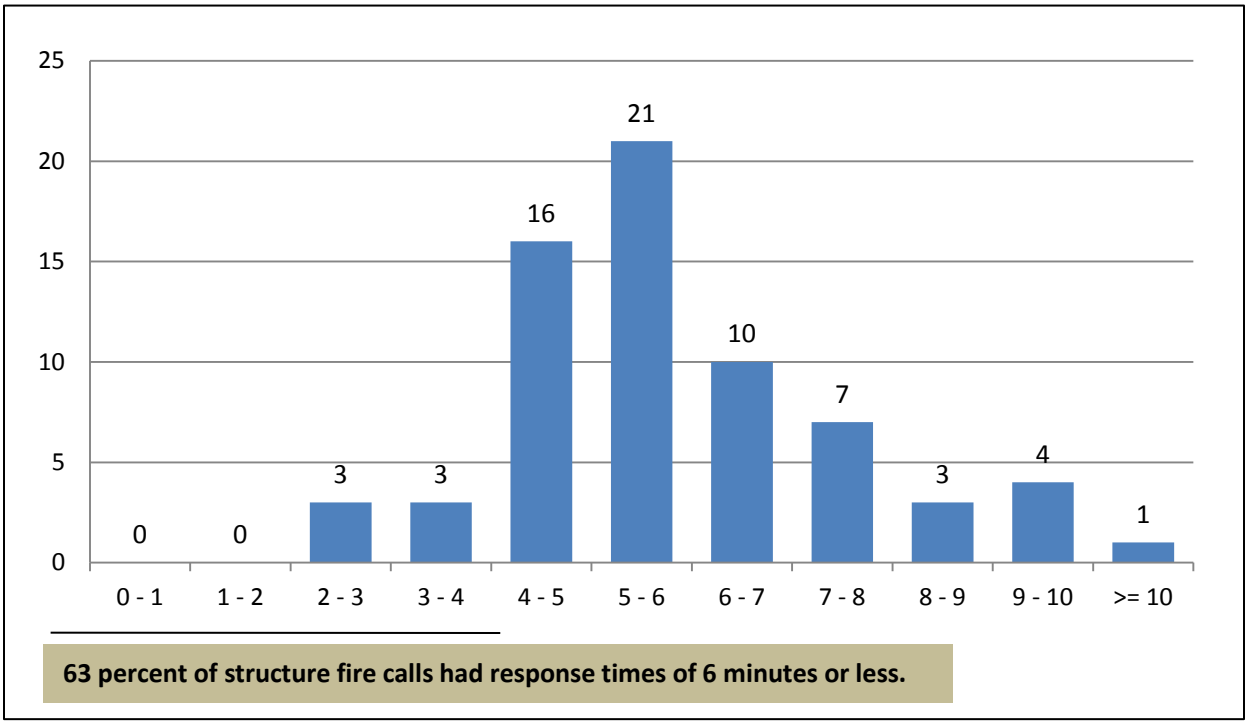


Table 27: Cumulative Distribution Function (CDF) of Response Time of First and Second Arriving Fire Units for Structure Fire Calls

Response Time (minute)	First Unit		Second Unit	
	Frequency	Cumulative Percent	Frequency	Cumulative Percent
0 - 1	0	0.0	0	0.0
1 - 2	0	0.0	0	0.0
2 - 3	3	4.4	0	0.0
3 - 4	3	8.8	1	1.9
4 - 5	16	32.4	4	9.6
5 - 6	21	63.2	15	38.5
6 - 7	10	77.9	12	61.5
7 - 8	7	88.2	9	78.8
8 - 9	3	92.6	6	90.4
9 - 10	4	98.5	1	92.3
>= 10	1	100.0	4	100.0

Observations:

- The average response time of the first arriving fire unit for structure fire calls was 5.8 minutes.
- 63 percent of structure fire calls had a response time of 6 minutes or less.
- 90 percent of the time, the first fire unit's response time was less than 8.1 minutes.
- On average, the response time of the second arriving unit was 6.9 minutes, which was 1.1 minutes longer than that of the first arriving unit.
- 90 percent of the time, the second fire unit's response time was less than 8.8 minutes.

Figure 41: Cumulative Distribution Function (CDF) of Response Time of First Arriving Fire Unit for Outside Fire Calls

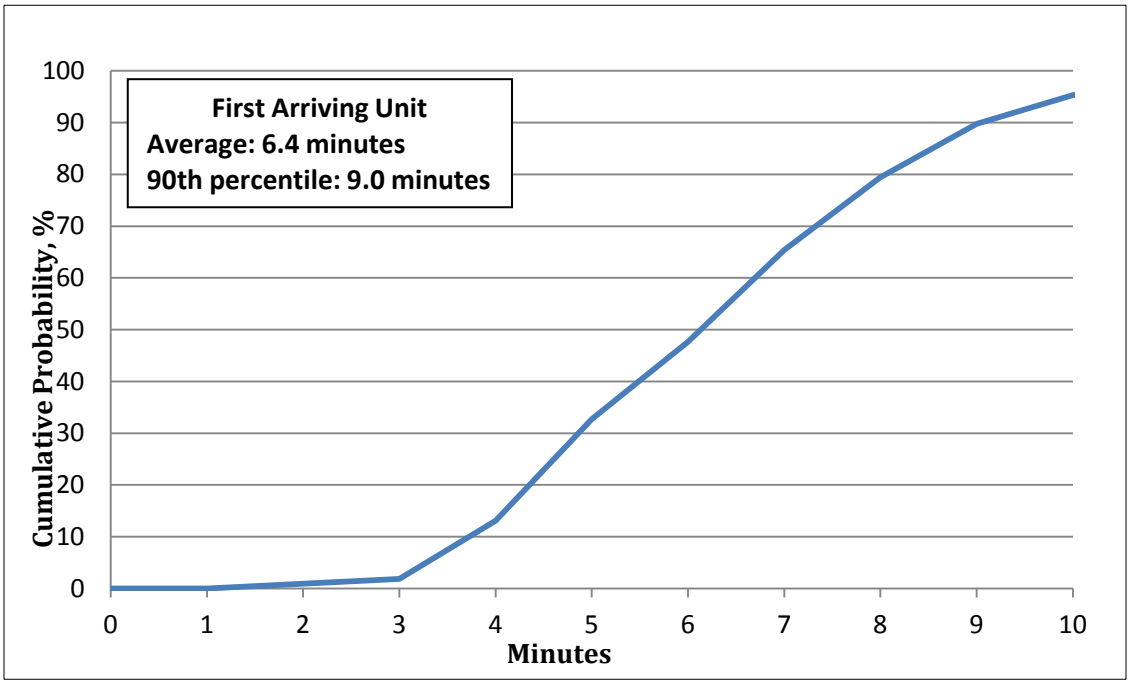


Figure 42: Frequency Distribution of Response Time of First Arriving Unit for Outside Fire Calls

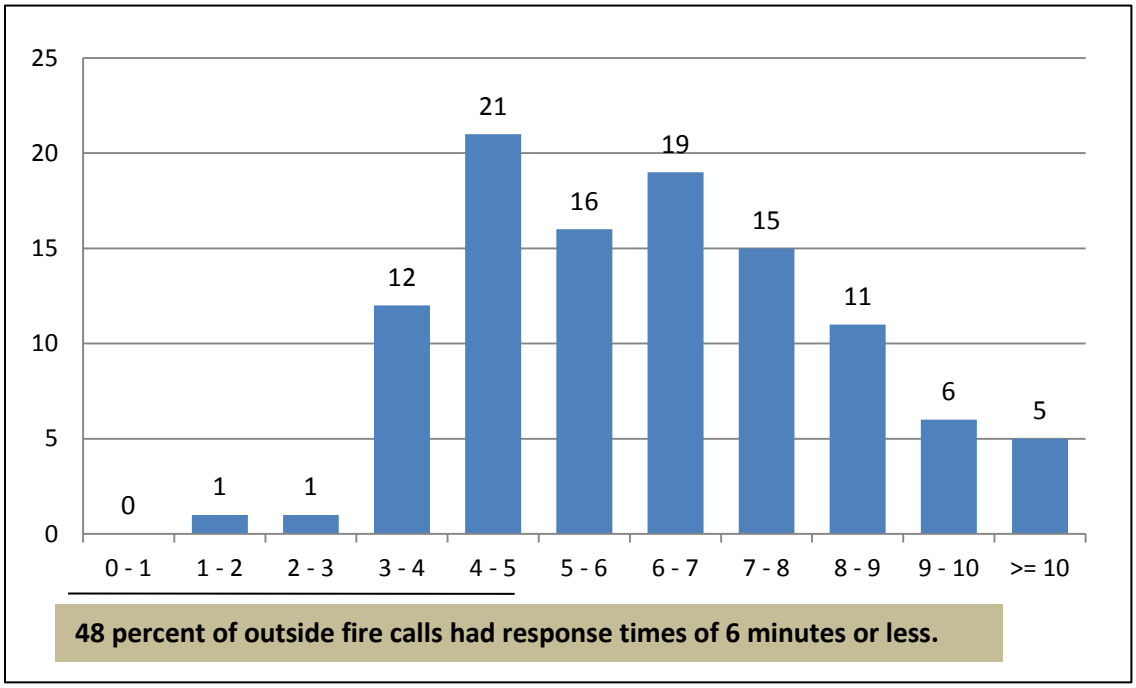


Table 28: Cumulative Distribution Function (CDF) of Response Time of First Arriving Fire Unit for Outside Fire Calls

Response Time (minute)	Frequency	Cumulative Percent
0 - 1	0	0.0
1 - 2	1	0.9
2 - 3	1	1.9
3 - 4	12	13.1
4 - 5	21	32.7
5 - 6	16	47.7
6 - 7	19	65.4
7 - 8	15	79.4
8 - 9	11	89.7
9 - 10	6	95.3
>= 10	5	100.0

Observations:

- The average response time of the first arriving fire unit for outside fire calls was 6.4 minutes.
- 48 percent of outside fire calls had a response time of 6 minutes or less
- 90 percent of the time, the first fire unit's response time was less than 9 minutes.

Appendix I

Workload of Administrative Units

Unit Description	Unit ID	Number of Runs	Total Deployed Hours
Asst. chief	F101	64	26.1
Asst. fire marshal	F121	25	42.1
Battalion	BATT1	314	176.8
	BATT2	2	0.3
Executive officer	F102	5	17.4
Fire chief	F100	1	0.9
Fire inspector	F122	4	11.2
	F123	2	6.5
	F124	11	3.2
Fire marshal	F120	28	6.6
Fire training chief	F130	3	6.5
Fire training personnel	F131	9	16.4
Fire training personnel	F132	2	9.8
Shift battalion chief	F114	37	5.7
Total		**507**	**329.4**

Appendix II

Property and Content Loss Analysis for Structure Fire Calls

Call Type	Property Loss		Content Loss	
	Loss Value	Number of Calls	Loss Value	Number of Calls
Structure Fire	$92,367	9	$1,000	1

Note: There is no property or content loss recorded in the NFIRS for other types of calls

Appendix III

Response Time Analysis of First Arriving Unit by Call Type and Response Type

Call Type	Lights/Sirens (code 3 response)					Non-emergency (Code 1 response)				
	Dispatch Time	Turnout Time	Travel Time	Response Time	Sample Size	Dispatch Time	Turnout Time	Travel Time	Response Time	Sample Size
Cardiac and stroke	0.8	1.1	3.9	5.7	456	0.8	1.2	4.2	6.1	72
Seizure and unconsciousness	0.7	1.0	3.8	5.5	357	0.8	1.1	4.5	6.4	106
Breathing difficulty	0.7	1.1	4.1	6.0	387	0.8	1.2	4.5	6.6	93
Overdose and psychiatric	0.8	1.1	4.4	6.3	61	0.7	1.2	5.0	7.0	183
MVA	0.6	1.2	3.9	5.6	438	0.5	1.2	4.6	6.3	111
Fall and injury	0.8	1.1	3.7	5.7	271	0.8	1.2	4.8	6.8	538
Illness and other	0.8	1.1	4.2	6.1	654	0.8	1.2	5.1	7.1	1,541
EMS Total	**0.8**	**1.1**	**4.0**	**5.8**	**2,624**	**0.8**	**1.2**	**4.9**	**6.9**	**2,644**
Structure fire	0.9	1.3	3.6	5.8	62	1.1	1.1	4.7	6.9	12
Outside fire	1.0	1.2	4.1	6.3	102	1.2	1.2	6.4	8.7	28
Hazard	1.1	1.2	4.5	6.8	59	1.3	1.1	5.4	7.8	167
False alarm	1.1	1.2	3.9	6.3	161	1.1	1.2	4.8	7.2	337
Good intent	1.1	1.3	4.4	6.7	37	1.2	1.1	5.3	7.6	90
Public service	0.9	1.2	4.2	6.3	41	1.3	1.2	5.4	7.9	334
Fire Total	**1.0**	**1.2**	**4.1**	**6.3**	**462**	**1.2**	**1.2**	**5.2**	**7.6**	**968**
Total	**0.8**	**1.1**	**4.0**	**5.9**	**3,086**	**0.9**	**1.2**	**5.0**	**7.1**	**3,612**

Observations:

- A total of 3,612 (54 percent) calls were responded without lights and sirens, and the average response time was 7.1 minutes.
- The average travel time for calls responded without lights and sirens was 5.0 minutes, which is 1.0 minute longer than calls responded with lights and sirens. This contributes to the overall longer response time for nonemergency calls.

Appendix IV

Correspondence between NFIRS Incident Code and Call Type

Call Type	NFIRS Incident Type Code	NFIRS Incident Description
EMS	300	Rescue, EMS incident, other
EMS	311	Medical assist, assist EMS crew
EMS	3111	Auto accident without injuries
EMS	3112	Medical assist, cancelled upon arrival
EMS	321	EMS call, excluding vehicle accident with injury
EMS	322	Motor vehicle accident with injuries
EMS	323	Motor vehicle/pedestrian accident (MV Ped)
EMS	331	Lock-in (if lock out , use 511)
EMS	350	Extrication, rescue, Other
EMS	351	Extrication of victim(s) from building/structure
EMS	352	Extrication of victim(s) from vehicle
EMS	353	Removal of victim(s) from stalled elevator
Structure Fire	111	Building fire
Structure Fire	112	Fires in structure other than in a building
Structure Fire	113	Cooking fire, confined to container
Structure Fire	114	Chimney or flue fire, confined to chimney or flue
Structure Fire	118	Trash or rubbish fire, contained
Structure Fire	121	Fire in mobile home used as fixed residence
Outside Fire	100	Fire, other
Outside Fire	131	Passenger vehicle fire
Outside Fire	132	Road freight or transport vehicle fire
Outside Fire	138	Off-road vehicle or heavy equipment fire
Outside Fire	140	Natural vegetation fire, other
Outside Fire	141	Forest, woods or wildland fire
Outside Fire	142	Brush or brush-and-grass mixture fire
Outside Fire	143	Grass fire
Outside Fire	150	Outside rubbish fire, other
Outside Fire	151	Outside rubbish, trash or waste fire
Outside Fire	154	Dumpster or other outside trash receptacle fire
Outside Fire	160	Special outside fire, other
Outside Fire	161	Outside storage fire
Hazard	200	Overpressure rupture, explosion, overheat other
Hazard	251	Excessive heat, scorch burns with no ignition
Hazard	400	Hazardous condition, other

Call Type	NFIRS Incident Type Code	NFIRS Incident Description
Hazard	410	Combustible/flammable gas/liquid condition, other
Hazard	411	Gasoline or other flammable liquid spill
Hazard	412	Gas leak (natural gas or LPG)
Hazard	413	Oil or other combustible liquid spill
Hazard	420	Toxic condition, other
Hazard	421	Chemical hazard (no spill or leak)
Hazard	424	Carbon monoxide incident
Hazard	440	Electrical wiring/equipment problem, Other
Hazard	441	Heat from short circuit (wiring), defective/worn
Hazard	442	Overheated motor
Hazard	443	Breakdown of light ballast
Hazard	444	Power line down
Hazard	445	Arcing, shorted electrical equipment
Hazard	461	Building or structure weakened or collapsed
Hazard	463	Vehicle accident, general cleanup
Hazard	480	Attempted burning, illegal action, other
Hazard	481	Attempt to burn
False Alarm	700	False alarm or false call, other
False Alarm	710	Malicious, mischievous false call, other
False Alarm	713	Telephone, malicious false alarm
False Alarm	715	Local alarm system, malicious false alarm
False Alarm	721	Bomb scare - no bomb
False Alarm	730	System malfunction, other
False Alarm	731	Sprinkler activation due to malfunction
False Alarm	732	Extinguishing system activation due to malfunction
False Alarm	733	Smoke detector activation due to malfunction
False Alarm	734	Heat detector activation due to malfunction
False Alarm	735	Alarm system sounded due to malfunction
False Alarm	736	CO detector activation due to malfunction
False Alarm	740	Unintentional transmission of alarm, other
False Alarm	741	Sprinkler activation, no fire - unintentional
False Alarm	742	Extinguishing system activation
False Alarm	743	Smoke detector activation, no fire - unintentional
False Alarm	744	Detector activation, no fire - unintentional
False Alarm	745	Alarm system activation, no fire - unintentional
Good Intent	600	Good intent call, other
Good Intent	631	Authorized controlled burning
Good Intent	650	Steam, Other gas mistaken for smoke, other
Good Intent	651	Smoke scare, odor of smoke

Call Type	NFIRS Incident Type Code	NFIRS Incident Description
Good Intent	652	Steam, vapor, fog or dust thought to be smoke
Good Intent	653	Smoke from barbecue, tar kettle
Good Intent	661	EMS call, party transported by non-fire agency
Good Intent	671	HazMat release investigation w/no HazMat
Public Service	500	Service Call, other
Public Service	510	Person in distress, other
Public Service	511	Lock-out
Public Service	520	Water problem, other
Public Service	522	Water or steam leak
Public Service	531	Smoke or odor removal
Public Service	540	Animal problem, other
Public Service	542	Animal rescue
Public Service	550	Public service assistance, other
Public Service	551	Assist police or other governmental agency
Public Service	552	Police matter
Public Service	553	Public service
Public Service	554	Assist invalid
Public Service	555	Defective elevator, no occupants
Public Service	561	Unauthorized burning
Public Service	571	Cover assignment, standby, move up
Public Service	800	Severe weather or natural disaster, other
Public Service	814	Lightning strike (no fire)
Public Service	900	Special type of incident, other
Public Service	911	Citizen complaint
Public Service	9111	Fireworks ordinance violation
Canceled	611	Dispatched & cancelled en route
Canceled	621	Wrong location
Canceled	622	No Incident found on arrival at dispatch address

—END—