CENTER FOR PUBLIC SAFETY MANAGEMENT, LLC

OPERATIONAL AND ADMINISTRATIVE ANALYSIS

RENO FIRE DEPARTMENT

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CPSM®

CENTER [illegible] PUBLIC SAFETY MANAGEMENT, LLC
475 K [illegible] STREET N[illegible] SUITE 702 • WASHINGTON, DC 20001
WWW.C[illegible] 769-1360

ICMA

Exclusive Provider of Public Safety Technical Services for
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The International City/County Management Association is a 103-year-old, nonprofit professional association of local government administrators and managers, with approximately 13,000 members located in 32 countries.

Since its inception in 1914, ICMA has been dedicated to assisting local governments and their managers in providing services to its citizens in an efficient and effective manner. ICMA advances the knowledge of local government best practices with its website (www.icma.org), publications, research, professional development, and membership. The ICMA Center for Public Safety Management (ICMA/CPSM) was launched by ICMA to provide support to local governments in the areas of police, fire, and emergency medical services.

ICMA also represents local governments at the federal level and has been involved in numerous projects with the Department of Justice and the Department of Homeland Security.

In 2014, as part of a restructuring at ICMA, the Center for Public Safety Management (CPSM) was spun out as a separate company. It is now the exclusive provider of public safety technical assistance for ICMA. CPSM provides training and research for the Association's members and represents ICMA in its dealings with the federal government and other public safety professional associations such as CALEA, PERF, IACP, IFCA, IPMA-HR, DOJ, BJA, COPS, NFPA, and others.

The Center for Public Safety Management, LLC, maintains the same team of individuals performing the same level of service as when it was a component of ICMA. CPSM's local government technical assistance experience includes workload and deployment analysis using our unique methodology and subject matter experts to examine department organizational structure and culture, identify workload and staffing needs, and align department operations with industry best practices. We have conducted more 315 such studies in 42 states and provinces and 224 communities ranging in population from 8,000 (Boone, Iowa) to 800,000 (Indianapolis, Ind.).

Thomas Wieczorek is the Director of the Center for Public Safety Management. Leonard Matarese serves as the Director of Research & Program Development. Dr. Dov Chelst is the Director of Quantitative Analysis.

CENTER FOR PUBLIC SAFETY MANAGEMENT PROJECT CONTRIBUTORS

Thomas J. Wieczorek, Director
Leonard A. Matarese, Director, Research & Project Development
Dov Chelst, Ph.D. Director of Quantitative Analysis
Michael Iacona, Senior Manager Fire and EMS
Leah Balter, Data Analyst
Dennis Kouba, Senior Editor

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SECTION 1. EXECUTIVE SUMMARY

The Center for Public Safety Management, LLC (CPSM) was retained by the City of Reno to conduct an Operational and Administrative Analysis for its fire department, including a detailed review of department operations, its interaction with REMSA, workload, staffing, fire stations, fire apparatus, and deployment practices. This analysis includes a thorough review of the organization structure, training, performance measures, prevention activities, and interactions with mutual aid and regional partners. Specifically, CPSM was tasked with providing recommendations and alternatives regarding fire department operations, staffing levels, and alternative modes of operation referencing both the current service demand and options that can position the department to best manage the community's anticipated growth.

During the study, CPSM analyzed performance data provided by the Reno Fire Department (RFD) and also examined firsthand the department's operations. Fire departments tend to deploy resources utilizing traditional approaches, which are rarely reviewed. To begin the review, project staff asked for certain documents, data, and information. The project staff used this information/data to familiarize themselves with the department's structure, assets, and operations. The provided information was supplemented with information collected during an on-site visit to observe the performance of the department and to compare that performance to national benchmarks. CPSM will typically utilize benchmarks that have been developed by organizations such as the National Fire Protection Association (NFPA), Center for Public Safety Excellence, Inc. (CPSE), the ICMA Center for Performance Measurement, as well as others.

Project staff conducted a site visit on April 9-11 2019, for the purpose of observing fire department and agency-connected support operations, interviewing key department staff, and reviewing preliminary data and information. Telephone conference calls as well as email exchanges were conducted between CPSM project management staff, the City, and the fire department so that CPSM staff could affirm the project scope, and elicit further discussion regarding this analysis.

The Reno Fire Department is a highly skilled and progressive organization that is making exceptional progress in dealing with a very significant and growing workload. The personnel with whom CPSM interacted are truly interested in serving the City to the best of their abilities and demonstrated a unified goal of achieving excellence in service delivery. As service demands increase and the fire department is required to provide expanded services, it is essential that the organization continue its strategic planning efforts, organizational team building, performance measurement, and goal setting. The challenges in Reno are not unique nor are they insurmountable. CPSM will provide a series of observations and recommendations that we believe will enable the RFD to become ***more efficient*** and ***smarter*** in the management of its emergency and nonemergency responsibilities.

RECOMMENDATIONS

The RFD provides an excellent range of services to its citizens, local businesses, the university, and visitors to the area. The department is well-respected in the community and by City leadership. For organizations of the caliber of the RFD, the recommendations provided in our analysis are minor in comparison to the department's performance and do not denote major flaws in its day-to-day operations or overall efficiencies. In an organization such as the Reno Fire Department, which is achieving a high level of performance, the real challenge becomes the drive to maintain—in its line personnel and managerial staff—the continued pursuit of excellence and ongoing improvement.

Thirty-two recommendations are listed below and in the applicable sections within this report. The recommendations are based on best practices derived from the NFPA, CPSM, ICMA, the U.S. Fire Administration, the International Association of Emergency Managers (IAEM), and the Federal Emergency Management Agency (FEMA).

These recommendations are listed in the order in which they appear in the report.

1. Reno should implement a policy that limits the number of consecutive hours an employee can work. (See p. 9.)
2. RFD should consider the expansion of program management duties to field personnel and utilize these assignments to enhance career development and subsequently consider successful fulfillment of these duties as a factor in the promotional process. (See p. 13.)
3. The RFD should institute an internet-based video conferencing system to facilitate regular meeting forums (daily/weekly/monthly), to discuss departmental initiatives and new directives, and enable remote training delivery sessions by chief officers and support personnel. (See p. 14.)
4. RFD should expand the training requirements, certifications, and college education prerequisites for the Fire Equipment Operator, Captain, and Battalion Chief promotional processes. (See p. 14.)
5. The City should undertake a comprehensive fire station capital improvements program that provides the necessary repairs, renovations, and reconstruction of this critical capital resource. (See p. 18.)
6. The City should adopt a fire apparatus replacement schedule that includes an evaluation process that takes into account vehicle age, miles/hours of usage, maintenance records, and historical repair costs. (See p. 22.)
7. The City should adopt a fire apparatus replacement fund that is supported through the annual budgetary process to address both the short-term and long-term apparatus replacement needs. (See p. 23.)
8. The City should work REMSA, area EMS Advisory Boards, and the Washoe County Health District to implement a common radio frequency that is utilized by ambulance and fire first responders on all EMS calls. (See p. 24.)
9. The Reno Fire Department should conduct a formal fire risk analysis that concentrates on the City's downtown, strip commercial establishments, big-box occupancies, high-rise structures, industrial, processing, and institutional properties. (See p. 27.)
10. The Reno Fire Department should implement a pre-fire planning process for all target hazards and high-risk commercial properties. (See p. 32.)

11. The Reno Fire Department should institute an effort to enter pre-fire/incident plans on apparatus MDTs in order to provide real-time quick retrieval of this information. (See p. 33.)
12. Reno should consider CPSE fire accreditation in the future. (See p. 33.)
13. The Reno Fire Department should re-evaluate its initial assignment of 20 personnel and seven response units to a reported residential structure fire. (See p. 35.)
14. The City should re-evaluate its current practice of offering compensatory time off in lieu of actual pay for both holiday accruals and out-of-area wildland assignments. (See p. 36.)
15. The RFD should consider the hiring of seasonal fuel crews who provide fuel management and wildfire mitigation efforts in the community. (See p. 42.)
16. RFD should develop an integrated risk management plan that focuses on structure fires in areas of the community that demonstrate the highest risk of occurrence. (See p. 44.)
17. RFD, REMSA, and the Health District should move to a centralized quality assurance and quality review process for all medical care procedures and protocol adherence among first response agencies and the ambulance transport provider. (See p. 48.)
18. RFD should re-evaluate its efforts to expand the number of ALS first response units that are operational in the City. (See p. 49.)
19. RFD should move to a cross-staffing model that utilizes personnel currently assigned to the City's two ladder trucks to deploy on alternative response vehicles (squad units) when the call type and service needs merit this type of response. (See p. 50.)
20. RFD and REMSA should develop a process in which the call-screening process and call priority determinants established by the REMSA dispatch center are communicated directly to responding RFD units. (See p. 54.)
21. RFD should reestablish a full and unrestricted automatic response arrangement with the Truckee Meadows FPD. (See p. 55.)
22. RFD should implement a series of performance measures that enable ongoing review of service outcomes. The process of developing these measures should utilize input from RFD members, the fire union, the community, the City Council, and City Administration. (See p. 79.)
23. RFD should consider participating in ESO Solutions for the purpose of reviewing its EMS performance and the comparisons made in this clinical and EMS operational database. (See p. 81.)
24. RFD should work with the City of Reno Building Department, the Planning Department, the County Tax Appraiser, the Finance Department, and other local officials in creating a master file of inspectable properties within the City of Reno. (See p. 83.)
25. The City of Reno should revise its residential fire sprinkler requirements so that automatic fire sprinklers are required in all new residential home construction. (See p. 83.)
26. The Reno Fire Department should institute an in-service fire company inspection program that promotes responder familiarization, code enforcement, and fire prevention efforts. (See p. 84.)
27. RFD should discontinue the use of a firefighter recruit academy and instead require attainment of Firefighter I & II and EMT certifications as employment prerequisites for all new firefighters. (See p. 88.)
28. The Reno Fire Department should establish a training steering committee composed of Battalion Chiefs, Captains, Driver Operators, Firefighters, union representatives, and EMS staff.

This committee should conduct a training needs assessment, develop priorities, and provide direction regarding the training efforts of the department. (See p. 89.)

29. The Reno Fire Department should institute written and practical skills testing as part of the department's comprehensive fire training program. (See p. 89.)
30. RFD should institute an annual physical fitness evaluation process for all emergency response personnel, including chief officers. (See p. 89.)
31. The City of Reno and REMSA should evaluate options for consolidating the REMSA dispatch operations into Reno Public Safety Dispatch. (See p. 92.)
32. Reno Public Safety Dispatch and the REMSA Dispatch Center should move as quickly as possible to establish a CAD-to-CAD interface between their two centers. (See p. 93.)

SECTION 2. SCOPE OF PROJECT

The scope of this project was to provide an independent review of the services provided by the Reno Fire Department (RFD) so that the Mayor and City officials, including officials of RFD, could obtain an external perspective regarding the City's fire and EMS delivery system. This study provides a comprehensive analysis of the RFD, including its organizational structure, workload, staffing, overtime, deployment, training, fire prevention, emergency communications (911), planning, and public education efforts. In addition, CPSM will provide its insights to help the department determine the appropriateness of the level of response and alternative delivery systems that could be utilized in meeting both current and projected service demand. Local government officials often commission these types of studies to measure their department against industry best practices. In this analysis, CPSM provides recommendations where appropriate, and offers input on a strategic direction for the future.

Key areas evaluated during this study include:

- Fire department response times (using data from the City's computer-aided dispatch system and the RFD records management systems).
- Deployment, staffing, and overtime.
- Agency interaction with REMSA and neighboring mutual aid and joint response partners.
- Organizational structure and managerial oversight.
- Fire and EMS workloads, including unit response activities.
- RFD support functions (training, fire prevention/code enforcement, and 911 dispatch).
- Essential facilities, equipment, and resources.
- An evaluation of the capacity of the organization to best position itself in meeting anticipated demand.

SECTION 3. ORGANIZATION AND MANAGEMENT

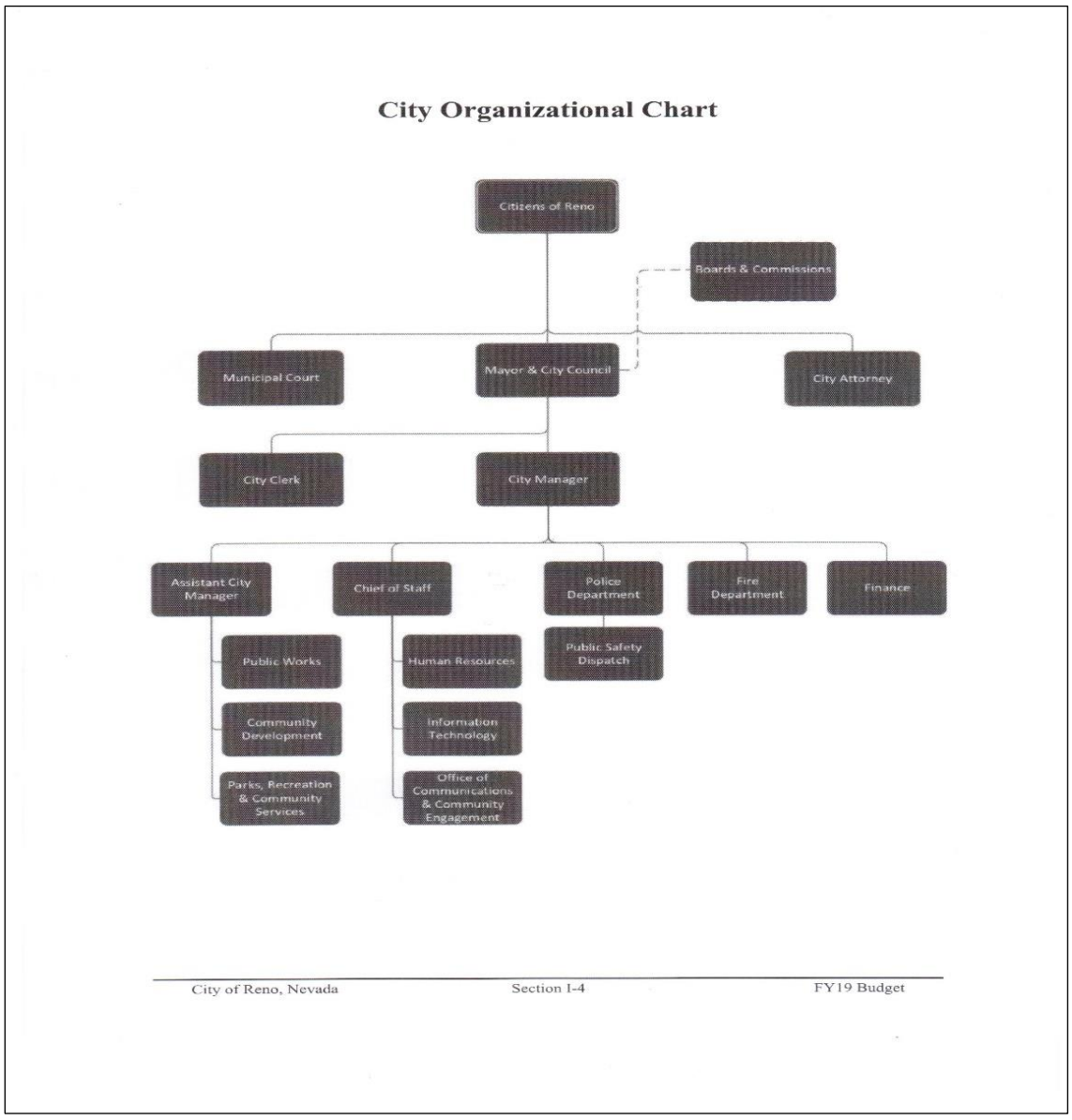
GOVERNANCE AND ADMINISTRATION

Reno is the county seat of Washoe County; the City is located on the eastern slopes of the Sierra Nevada Mountain range, approximately 22 miles northeast of Lake Tahoe. The City is approximately 130 miles east of the Sacramento, California, and about 440 miles northwest of Las Vegas. Reno is located along Interstate 80, which is the predominant east-west thoroughfare in the western United States between Chicago and San Francisco. Reno is the fourth largest City in Nevada, and had an estimated population in 2017 of 248,853, according to the U.S. Census Bureau. Reno, known as the "Biggest Little City in the World," is a rapidly growing community that is diversifying its economic base and is home to a number of high-tech industries. Reno is a driver of the Tahoe Reno Industrial Center (TRIC), which is a massive industrial park and home to over 100 companies, warehouse complexes, and processing centers for companies that include PetSmart, Home Depot, Walmart, Panasonic, Tesla Motors, and others. The corporate limits of the City encompass a land area of approximately 106 square miles.

Reno is an incorporated municipal government within the state of Nevada; it operates under a council-manager form of government. The Mayor is selected at-large, as is one member of City Council. The remaining five City Council members are elected from individual wards. City Council appoints the City Manager and City Clerk. The City Attorney is elected at-large in a municipal election. The City Council serves as the legislative body for the City. The Mayor presides at the City Council meetings and votes along with the six council members to effectuate any decision of the Council. City Council responsibilities include enacting laws that govern the City, adopting the annual budget, and appropriating funds to provide city services. Most transactions require only a quorum or simple majority be present.

Reno is typical of many cities and towns across the United States in that it operates its own public works department, library, parks and recreation, and several internal functions including finance and human resources. Reno operates its own police department and fire department. Emergency 911 dispatch services are provided throughout city government and neighboring agencies by Reno Public Safety Dispatch.

FIGURE 3-1: City of Reno Table of Organization



RENO FIRE DEPARTMENT OVERVIEW

The Reno Fire Department (RFD) is a career fire department comprised of 257 personnel, of which 226 are sworn, uniformed fire rescue personnel assigned to emergency operations. The department also has 31 personnel who are assigned to administrative, fire prevention, and fleet maintenance positions.

The department is led by a Fire Chief who has overall responsibility for managing the department's day-to-day operations and providing administrative oversight. The Fire Chief is assisted by six Division Chiefs and an Administrative Services Manager. The Operations Division includes 226-line personnel who are assigned to the 14 fire stations operational throughout the city. The department structure also includes EMS Operations, which is headed by a Division

Chief; and Fire Prevention, which includes the Fire Marshal/Division Chief. The RFD also utilizes four Division Chiefs who supervise Departmental Safety & Training, EMS Facilities/Fleet Maintenance, and Emergency Management/Health & Wellness. Fire Prevention includes 15 personnel who are responsible for inspections, code enforcement, plans review, public education, and fire investigations. In addition, the department employs the City's Emergency Manager, who works in concert with the Washoe County Office of Emergency Management. The Operations Division is broken into three shifts, and there are two (24-hour) field supervisors (Battalion Chiefs) assigned daily to supervise field operations, scheduling, and personnel matters.

The Operations Division is responsible for providing the department's emergency response functions for a wide array of fire, rescue, and emergency medical services. From its 14 fire stations, the department staffs two ladder trucks, 12 engines, one squad unit (non-transport EMS/Support), two rescue vehicles, two BC/command units, and a Training & Safety Captain vehicle. These units are operational 24 hours per day, 7 days a week.

RFD operates with four-person staffing on each of its engines and ladder trucks. The squad and rescue vehicles have two-person staffing. The daily minimum staffing is set at 65 personnel. Each shift is assigned 72 personnel; for each shift, upwards of 14 personnel are allowed off on various leave types (vacation, sick, holiday, compensatory time, disability, FMLA, etc.). On most days, overtime is utilized to maintain the minimum staffing requirements.

During the one-year period of this study from January 1, 2018 through December 31, 2018, the RFD responded to 41,718 incidents, of which 67 percent were EMS-related. All personnel are cross-trained and are able to provide emergency medical care as well as structural and wildland fire fighting. Of the personnel, 110 are Advanced EMTs (A-EMT), approximately 62 possess Advanced Life Support/paramedic certification (ALS), and the remaining hold Basic EMT certification (B-EMT). The department provides advanced life support services (ALS), from seven of its fourteen fire stations on a 24/7 basis.

RFD operates in what is often termed a ***two-tiered EMS delivery system***. In this arrangement the fire department provides EMS first response and a private ambulance provider (REMSA) provides advanced life support services (ALS) and ambulance transport. The department provides engine-based advanced life support services on six of its primary first response apparatus. Station 1 operates a two-person ALS Squad Unit. Station 7 operates a single rescue unit that is staffed with two personnel, one of which is a paramedic. This brings the number of ALS first response units operated by the RFD to eight.

In addition to their emergency response duties, emergency services personnel also provide a wide range of customer service and community outreach efforts, including blood pressure screenings, child car seat installations, tours of fire stations and apparatus, smoke detector installations, and fire and life safety presentations.

Operations personnel work a three-platoon system in which personnel are on duty for 48 consecutive hours followed by 96 hours off. This schedule equates to a 56-hour workweek if averaged throughout the year. Overtime guidelines relating to municipal fire personnel are specified in the Fair Labor Standards Act (FLSA) and the "***7(k) exemption,***" which allows municipal fire personnel to work up to 53 hours each week before an overtime premium is required.[1] FLSA only requires overtime pay when the actual hours worked are in excess of the designated workweek. FLSA does not require that this calculation include time not worked, such as vacation time, sick leave, or holidays (federal or otherwise).[2] Reno operates on a 12-day FLSA

1. See 29 USC §207(k).
2. U.S. Department of Labor, Wage and Hour Division, Overtime Pay: General Guidance.

cycle and FLSA overtime is paid for all hours worked in excess of 91 hours. RFD personnel do not include any leave time as time worked in the calculation for FLSA overtime eligibility. This exclusion is done as part of the payroll review process and CPSM considers this a ***Best Practice***.

Under the current work schedule, employees are allowed to exchange their shifts, and this often results in employees working 144 consecutive hours (six consecutive 24-hour days) without relief. There have been a number of studies done involving firefighter work schedules and a schedule's detrimental effects on sleep patterns.[3] Reno does not have in place a policy that restricts the number of consecutive on-duty hours a department employee can work. CPSM believes that the city should review this situation and impose limits on the consecutive hours that an employee can work.

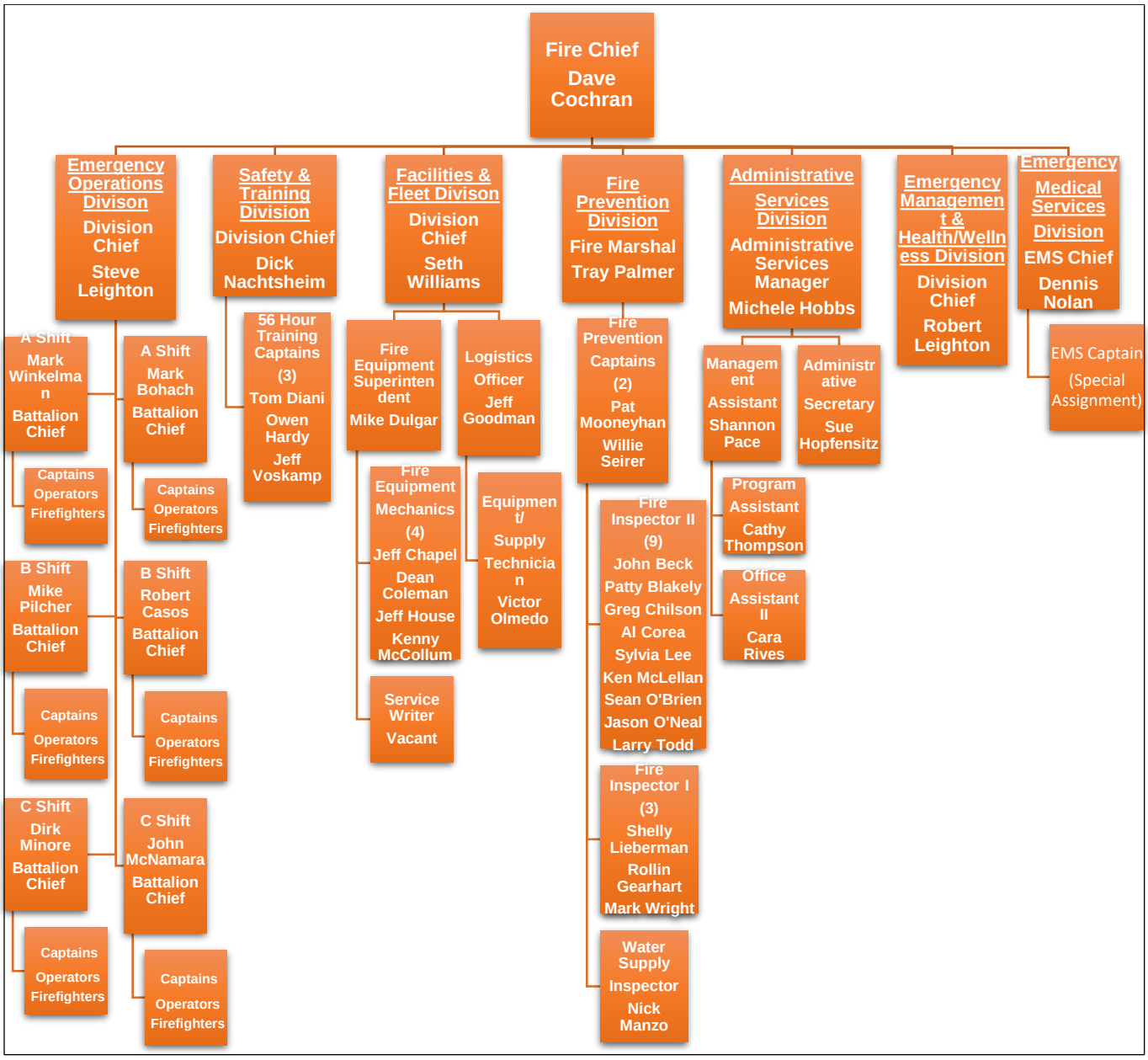
> ***Recommendation: Reno should implement a policy that limits the number of consecutive hours that an employee can work. (Recommendation No. 1.)***

CPSM also believes that the current work schedule is conducive to extended periods of fatigue, given the normal dire and EMS workload combined with the frequent overtime and wildland assignments. The current 48 / 96-hour schedule (48 hours on duty followed by 96 hours off duty) is prone to periods of fatigue during periods with a high number of runs and major incidents. CPSM believes that a 72-hour limitation for consecutive on-duty hours should be considered.

The City of Reno is divided into two geographic response areas, north and south, which are designated as Battalion 1 and Battalion 2. Battalion 1 includes stations 1, 2, 4, 8, 9, 10, 11, and 19, Battalion 2 includes stations; 3, 5, 6, 7, 12, and 21. Each 24-hour Battalion is supervised by an operational Battalion Chief, who reports to the Division Chief of Fire Operations. All emergency response vehicles are supervised by a Captain (engines, ladders, recues, and the squad). Figure 3-2 illustrates the current organizational structure within the Reno Fire Department.

3. See: https://www.usfa.fema.gov/current_events/081717.html, https://fireflow.blog/2017/08/18/shift-work-linked-to-poor-sleep-quality-study-suggests/

FIGURE 3-2: Reno Fire Department Table of Organization



STAFFING AND DEPLOYMENT

Individual unit staffing and minimum daily staffing levels are perhaps the most contentious aspects of managing fire operations in the U.S. There are a number of factors that have fueled the staffing debate. Aside from FAA requirements for minimum staffing levels at commercial airports, ***there are no state or federal requirements for the staffing of structural fire apparatus.*** The U.S. Occupational Safety and Health Administration (OSHA) has issued a standard that has been termed the ***"Two-in-Two-Out"*** provision. This standard affects most public fire departments across the U.S., including the RFD. Under this standard, firefighters are required to operate in teams (of

no fewer than two personnel) when engaged in ***interior structural firefighting.*** The environment in which interior structural firefighting occurs is further described as areas that are immediately dangerous to life or health (an IDLH atmosphere) and subsequently require the use of self-contained breathing apparatus (SCBA). When operating in these conditions, firefighters are required to operate in pairs and they must remain in visual or voice contact with each other and must have at least two other employees located outside the IDLH atmosphere. This assures that the "***two in***" can monitor each other and assist with equipment failure or entrapment or other hazards, and the "***two out***" can monitor those in the building, initiate a rescue, or call for back up if a problem arises.[4] This standard does not specify staffing on individual apparatus, but rather specifies a required number of personnel be assembled on-scene when individuals are in a hazardous environment. There is, however, a provision within the OSHA standard that allows two personnel to make entry into an IDLH atmosphere without the required two back-up personnel outside. This is allowed when they are attempting to rescue a person or persons in the structure before the entire team is assembled.[5]

A second factor that contributes to the staffing debate is the National Fire Protection Agency (NFPA) 1710 publication, *Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments (2016 Edition Sec., 5.2.1.)*. This standard specifies that the staffing level on responding engine and ladder companies be established at **a minimum of four on-duty personnel**. Unlike the OSHA guideline, which is a mandatory provision, the ***NFPA 1710 guideline is advisory***, meaning that communities (including Reno) are not required to adhere to this NFPA guideline. NFPA 1710 also provides guidance regarding staffing levels for units responding to EMS incidents; however, the provision is less specific and does not specify a minimum staffing level for EMS response units. Instead, the standard states; "*EMS staffing requirements shall be based on the minimum levels needed to provide patient care and member safety.*"[6] The difficulty that many agencies have is the co-utilization of fire companies and EMS companies in responding to both fire and EMS calls. Working fires involving hazardous environments are labor intensive and more personnel are needed to effectively manage these incidents. EMS calls are typically managed with fewer personnel, and the majority of EMS calls can be handled with a single rescue company of two fire personnel. In the call-screening process, those calls that require additional personnel are typically identified at the dispatch level and additional personnel can be assigned when needed.

RFD operates 14 primary fire suppression companies that are staffed on a daily basis (12 engines and 2 ladders). In addition, there are two, two-person rescue vehicle, a two-person squad, two Battalion Chief/Command units and one, one-person Training and Safety Captain. RFD operates 20 emergency response units with a minimum daily staffing that is set at 65 personnel.

Most fire stations operate with a single crew that consists of a Fire Captain, a Fire Equipment Operator, and two Firefighters. All response personnel are cross-trained and certified as Emergency Medical Technicians (EMTs), Advanced Emergency Medical Technicians (A-EMTs), and at least eight units have a paramedic assigned. Two fire stations (Station 1 and Station 3) operate both an engine and a ladder truck. These stations are each staffed with eight personnel (four on the engine and four on the ladder). Station 1 also operates with a squad unit that is staffed with two personnel. Station 3 and Station 21 house the City's on-duty Battalion Chiefs.

4. OSHA-Respiratory Protection Standard, 29CFR-1910.134(g)(4).
5. Ibid, Note 2 to paragraph (g).
6. (NFPA) 1710, *Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments* (2016 Edition Sec., 5.3.32.).

Most of the stations are equipped with various vehicle types that are cross-staffed with the assigned personnel and the most appropriate apparatus is utilized when a call is assigned. These vehicle types include wildland engines, USAR, the hazardous materials response unit, and an array of reserve units of various types. Table 3-1 identifies the primary response units operating from each of the stations and the personnel assigned.

TABLE 3-1: RFD Fire Stations, Response Units, and Assigned Personnel

Station #	Response Units	Minimum Assignment
1(ALS)	1 Engine 1 Ladder Truck 1 Squad	4 4 2
2	1 Engine	4
3(ALS)	1 Engine 1 Ladder Truck 1 BC/Command	4 4 1
4	1 Engine	4
5	1 Engine	4
6(ALS)	1 Engine	4
7(ALS)	1 Rescue	2
8	1 Engine	4
9(ALS)	1 Engine	4
10	1 Engine 1 Training & Safety Captain	4 1
11(ALS)	1 Engine	4
12(ALS)	1 Engine	4
19	1 Rescue	2
21(ALS)	1 Engine 1 BC/Command	4 1
14 Stations	**20 Response Units**	**65 on-duty personnel**

Many agencies often assign the oversight of program management duties to those staff officers and chief officers who are assigned to 40-hour assignments. CPSM believes it is critical that many of the program management duties required in the operation of a modern fire and EMS organization be delegated to and under the direction of field personnel. RFD has made a number of assignments of support duties to line personnel and this is commendable. However, these assignments are selective and not all officers have been assigned program management duties. The ability to properly manage key organizational duties is beneficial from a career development perspective. In addition, the assumption of program management duties and the effectiveness with which an individual performs in these assignments, can be a viable consideration in the promotional process. Table 3-2 lists a variety of program management duties that could be considered for assignment to field personnel.

TABLE 3-2: Program Assignment Duties

Program Description	Assignment Level
Promotional Testing	Battalion Chief
Performance Appraisals	Battalion Chief
Haz Mat/Technical Rescue	Battalion Chief
Employee Recognition/Awards	Battalion Chief
CISM/EAP	Battalion Chief
Sick Leave/Absenteeism Review	Battalion Chief
Budget Committee	Battalion Chief
Payroll / Executive Time Auditing	Battalion Chief
Police Department Liaison	Battalion Chief
EMS Protocols	Captain
Station Maintenance/Upkeep and Supplies	Captain
Fire Reporting QA	Captain
Hose Testing	Captain/Fire Equipment Operator/FF
Hydrant Testing	Captain/Fire Equipment Operator/FF
Radio Programming	Captain/Fire Equipment Operator
Mapping	Captain/Fire Equipment Operator
Fire Pre-incident Planning	Captain
Infectious Disease Control	Captain/Paramedic
EMS Supplies/Decon/Bio Disposal	Captain/Fire Equipment Operator/FF
911 Liaison	Captain
Station Response Area Designation	Captain
Response Protocols	Captain
Fire Investigations	Captain/Fire Equipment Operator
Safety/ReHab/Risk Management	Captain
SOP/Ops Committee	Captain/Fire Equipment Operator/FF
Fitness Committee	Captain/Fire Equipment Operator/FF
Shift Training Coordinator	Captain
Recruit Training/Proctoring	Captain
Public Information Officer	Captain/Fire Equipment Operator/FF
Driver Training/EVOC	Captain/Fire Equipment Operator
Fleet Maintenance/Repair Record Keeping	Captain/Fire Equipment Operator
Internal Communications/Newsletter	Captain/Fire Equipment Operator/FF
Social Media/FD Web Page	Captain/Fire Equipment Operator/FF
FF/EMS Recruitment Committee	Captain/Fire Equipment Operator/FF
Car Seat Installation	Captain/Fire Equipment Operator/FF
Smoke Detector Replacement	Captain/Fire Equipment Operator/FF

Recommendation: RFD should consider the expansion of program management duties to field personnel and utilize these assignments to enhance career development and subsequently consider successful

fulfillment of these duties as a factor in the promotional process. (Recommendation No. 2.)

The ability to communicate work assignments, conduct training sessions, discuss new program initiatives, or merely to update employees on departmental programs or the strategic direction of the organization requires ongoing outreach, specifically from the Fire Chief, chief officers, and training instructors in the organization. There are a number of communication tools currently available that can be used to conduct video conference calls, training sessions, and information exchanges among multiple work settings (for example, see GoTo Meeting™, WebEX™, Skype for Business™, and AnyMeeting™, etc.). These tools are inexpensive and, in some cases, once the initial software is purchased, there are no recurring charges. CPSM believes that the RFD would benefit greatly from an expanded information exchange, which would also prove useful in coordinating daily training assignments, shift activities, personnel movements, etc.

Recommendation: The RFD should institute an internet-based video conferencing system to facilitate regular meeting forums (daily/weekly/monthly), to discuss departmental initiatives and new directives, and enable remote training delivery sessions by chief officers and support personnel. (Recommendation No. 3.)

The ability to discuss key department issues along with training sessions is critical to organizational effectiveness and operational readiness. An on-line delivery forum would allow for real-time discussions, question and answer sessions, and the ability to record and review these meetings and training sessions at alternate time periods.

Essential to the sustainability of any organization is the concept of career development and professional growth of the workforce. Fire service organizations are extremely regimented in the oversight of personnel issues. As is the case in Reno, these processes are guided by civil service rules, collective bargaining agreements, and public personnel guidelines. The fire service promotional process is very competitive, yet it provides an opportunity to develop individual skills and to institute organizational philosophies. The ability to direct the learning effort in developing the needed skill sets is a key function that can be orchestrated through the promotional testing process. This factor is essential in the development of the future workforce and in creating or perhaps changing the culture of an organization. In the promotional and testing process, management has the ability to identify and utilize the source materials for testing and to establish the prerequisite training criteria for promotional eligibility. The ability to establish prerequisites that include components such as college coursework, associate's and bachelor's degrees, specific training certifications, project management experience, and fitness and performance appraisal achievements is extremely important. The RFD promotional process is very limited, only requiring basic certifications for EMT and wildland fire fighting. There are no requirements for supervisory training or computer or technical training, nor are company officers required to complete Incident Command Training or to obtain an associate's or bachelor's Degree.

Recommendation: RFD should expand the training requirements, certifications, and college education prerequisites for the Fire Equipment Operator, Captain, and Battalion Chief promotional processes. (Recommendation No. 4.)

FIRE STATION 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 and in use 24 hours a day and 7 days a week.[7] The Reno Fire Department operates out of 14 fire stations with 20 staffed emergency response apparatus. Department administrative offices are located in the Reno City Hall. Table 3-3 shows the location, year built, and size of the department's stations.

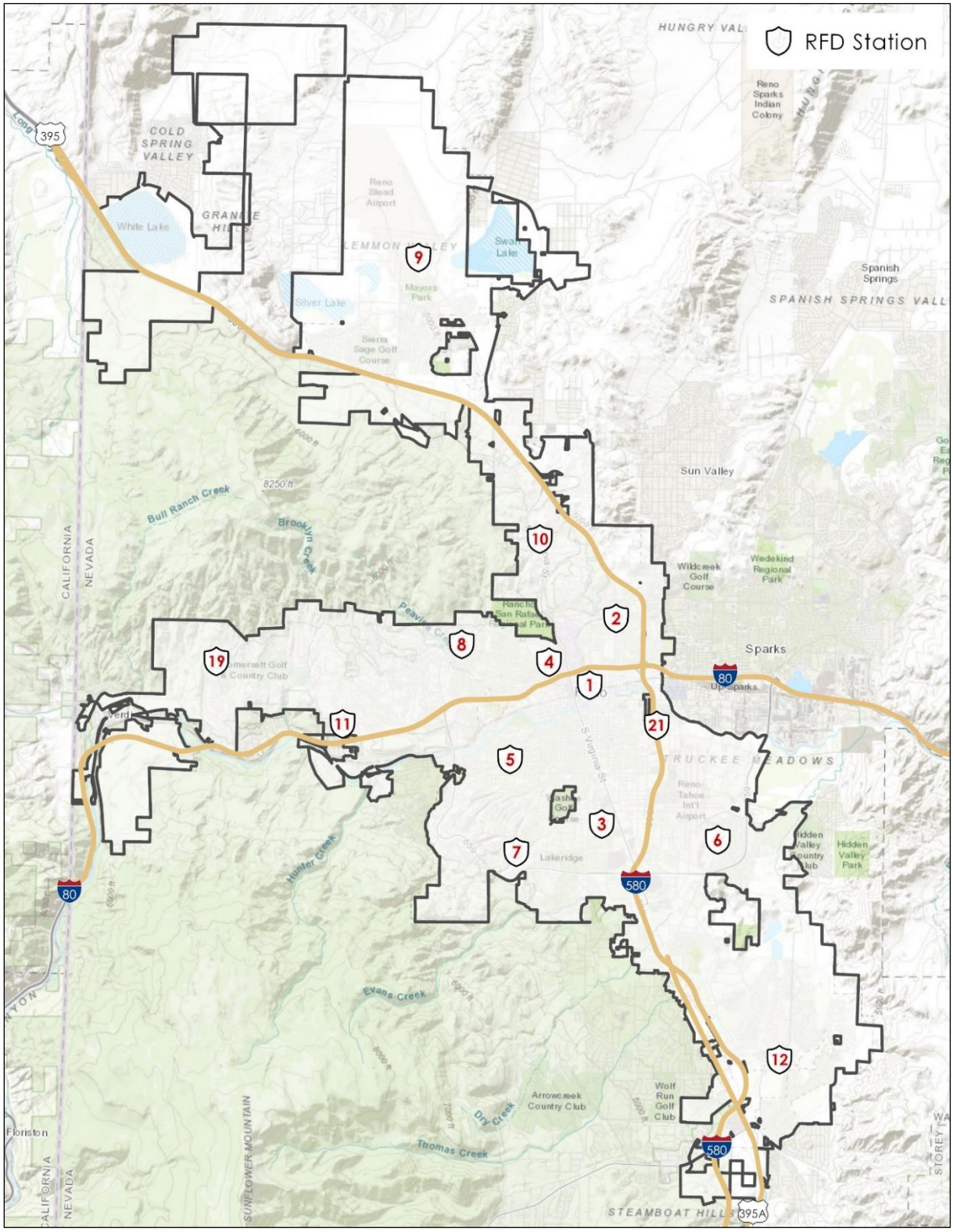
TABLE 3-3: Station Locations, Year Built, and Size

Building	Address	Year Built	Size/Sq. Ft.
Fire Station #1	495 EAST FOURTH	2008	7,342(Temp)
Fire Station #2	2500 SUTRO	2008	7,350
Fire Station #3	240 W. MOANA LANE	1989	15,184
Fire Station #4	1096 RALSTON	1986	5,723
Fire Station #5	1500 MAYBERRY DR.	1961	2,897
Fire Station #6	3970 MIRA LOMA	1984	5,781
Fire Station #7	3050 SKYLINE BLVD.	1966	4,592
Fire Station #8	3600 KINGS ROW	1969	4,137
Fire Station #9	14005 MT. VIDA	1986	5,232
Fire Station #10	5250 N. VIRGINIA ST.	1984	5,668
Fire Station #11	7105 MAE ANNE AVENUE	1999	16,000
Fire Station #12	1190 STEAMBOAT PKWY	2015	Unknown
Fire Station #19	2015 HAWK MEADOW TRAIL	2007	6,116
Fire Station #21	2501 MILL STREET	2008	7,716(Temp)

Figure 3-3 is a graphic depiction of the location of the City's 14 fire stations and the municipal boundaries for Reno.

7. Compton and Granito, eds., *Managing Fire and Rescue Services*, 219.

FIGURE 3-3: City of Reno Fire Department Station Locations



The RFD serves an estimated population of approximately 248,853 people and a total service area of 106 square miles. The average service area for each of the 14 fire stations is approximately 7.57 square miles.

In an FY 2011 *ICMA Data Report*, ICMA tabulated survey information from 34 municipalities with populations greater than 100,000 people. In this grouping the average fire station service area was 13.1 square miles.[8] The median service area for this grouping was 7.17 square miles per fire station.[9]

In addition, the NFPA and ISO have established different indices in determining fire station distribution. The ISO Fire Suppression Rating Schedule, Section 560, indicates that first-due engine companies should serve areas that are within a 1.5-mile travel distance.[10] The placement of fire stations that achieves this type of separation creates service areas that are approximately 4.5 square miles in size, depending on the road network and other geographical barriers (rivers, lakes, railroads, limited access highways, etc.). The National Fire Protection Association (NFPA) references the placement of fire stations in an indirect way. It recommends that fire stations be placed in a distribution that achieves the desired minimum response times. NFPA Standard 1710, Section 5.2.4.1.1, suggests an engine placement that achieves a 240-second (four-minute) travel time.[11] Using an empirical model called the "piece-wise linear travel time function" the Rand Institute has estimated that the average emergency response speed for fire apparatus is 35 mph. At this speed the distance a fire engine can travel in four minutes is approximately 1.97 miles.[12] A polygon based on a 1.97-mile travel distance results in a service area that on average is 7.3 square miles.[13]

From these comparisons, it can be seen that the average 7.57 square-mile service area per station in Reno is very much in line with the noted references.

Fire and EMS services are extremely labor intensive. Typically, the overwhelming share of the annual operating expenses are primarily attributable to personnel costs. In many systems it is not uncommon to see personnel costs account for as much as 85 to 90 percent of the annual budget expenditures. For this reason, fire departments will not deploy additional resources (new fire stations, new apparatus, and the assigned staffing) until the actual service demand exists. Unlike public water utilities, sewer systems, and transportation networks, where it is cost effective to develop this infrastructure prior to development, fire and EMS service enhancements are best established after growth has occurred and the service demand actually exists.

Fire service demand is very predictable. In many systems, this demand is a by-product of population growth, the transportation network, and service demand generators related to commerce, institutions, and tourist attractions. Another important point when considering the expansion of the service network is that the increase in additional call volume is typically very gradual and can be tracked or monitored sufficiently to allow for a more orderly expansion of the service network. As subdivisions are built and commercial markets are developed, the

8. *Comparative Performance Measurement*, FY 2011 Data Report - Fire and EMS, ICMA Center for Performance Measurement, August 2012.
9. Ibid.
10. Insurance Services Office. (2003) Fire Protection Rating Schedule (edition 02-02). Jersey City, NJ: Insurance Services Office (ISO).
11. National Fire Protection Association. (2010). NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*. Boston, MA: National Fire Protection Association.
12. University of Tennessee Municipal Technical Advisory Service, "Clinton Fire Location Station Study," Knoxville, TN, November 2012. p. 8.
13. Ibid. p. 9.

activities involved in responding to calls gradually trail the growth of these alarm generators. The ongoing ability to monitor response activities provides ample lead time to develop funding, construct new facilities, and deploy the needed resources. The only real difficulty in meeting future service expansion is when there is a rapid and block-type service increase associated with the assumption of service responsibilities from an existing development that typically occurs when there is an annexation or an addition of a contract service arrangement with a developed community or service district. Even in these scenarios, there is ample lead time to arrange temporary quartering or deployment strategies until the permanent infrastructure and staffing can be established.

Stations are designed to adequately house apparatus and necessary equipment. Typically, new fire stations have an anticipated service life of 50 years. However, we note that in many jurisdictions older facilities are being replaced in a 30- to 35-year time frame. In most cases, facilities require replacement because of their size constraints, a need to relocate the facility to better serve changing population centers, the absence of needed safety features or service accommodations, and the general age and deterioration of the facility.

RFD stations range in age from 58 years of age (Station 5) to about 4 years of age (Station 12). Two fire stations (Station 1 and Station 21) are temporary structures that have exceeded the recommend useful life expectancy of these facilities. In addition, there are a number of stations that require significant repairs and renovations. As a result of the most recent economic downturn and the necessity for significant lay-offs and personnel reductions, much of the preventative maintenance effort at a number of the fire stations was deferred.

Consequently, there is a need for a comprehensive capital facilities improvement program. This work includes roof replacement and repair, seismic safety improvements, electrical, plumbing, mechanical, exterior and interior finishes, and site paving. CPSM believes that the cost associated with a facilities replacement and improvement program in Reno will entail a multiyear effort that will require upwards of $20 million to complete.

> ***Recommendation: The City should undertake a comprehensive fire station capital improvements program that provides the necessary repairs, renovations and re-construction of this critical capital resource. (Recommendation No. 5.)***

This effort will require a multiyear planning, prioritization, and funding program to accomplish. However, providing safe and adequate facilities that support fire and EMS response should be elevated as a critical funding project for the City.

APPARATUS AND FLEET MANAGEMENT

Fire departments utilize a wide range of fire apparatus, along with tools and equipment, in carrying out their core mission. Apparatus generally includes emergency response vehicles such as engines, tenders/tankers (water supply vehicles), aerial apparatus (ladders), quints,14 rescue vehicles/squads, and ambulances. There are also specialized apparatus including wildland engines and off-road vehicles, along with watercraft that are typically part of the emergency fleet. Trailers are utilized to carry specialized equipment when needed. These include hazardous materials response/equipment, decontamination devices and diking materials, structural collapse equipment, portable air filling stations, scene lighting, foam units, and mass casualty

14. A "quint" serves the dual purpose of an engine and a ladder truck. The name "quint" refers to the five functions that these units provide: fire pump, water tank, fire hose, aerial device, and ground ladders.

incident supplies. In addition, a wide range of utility vehicles including command vehicles and emergency communications units, staff vehicles, and maintenance trucks can be part of the fleet.

The mission, duties, demographics, geography, and construction features within the community all play a major role in the makeup of the apparatus and equipment inventory utilized. These factors, as well as the funding available, must be taken into consideration when specifying and purchasing apparatus and equipment. Every effort should be made to make new apparatus as versatile, safe, and multifunctional/capable as is possible as well as practical.

Apparatus maintenance is also an integral part of any fire department, and budget-wise it is invariably a key component in keeping such large ticket items as apparatus running and extending their usefulness. It takes a big chunk of a City's budget to purchase and subsequently maintain a fire department fleet. As fleets age, it is logical and sound planning to conclude that repairs and costs will increase exponentially. There are two proven ways to mitigate the long-term and short-term costs associated with repairs and replacements. The primary way is to have a sound, dedicated preventive maintenance (PM) program that is on a regular cycle for each and every vehicle in a department's fleet. PM should be a sacrosanct practice and unwavering. This strategy not only saves money, but saves lives as well by keeping the number of viable fleet apparatus ready to respond to emergencies and accident free. The other method is to have a realistic capital improvement plan (CIP) to acquire new apparatus when an existing vehicle has outlived its usefulness. NFPA 1911, which sets standards for *Guidelines for First-Line and Reserve Fire Apparatus*, has changed and adapted over the years to reflect the changes in industry standards, but on one thing it has been wholly consistent:

> *"…it is imperative that all fire apparatus be checked and maintained regularly to ensure that they are reliable and safe to use. The manufacturer's instructions should always be followed when maintaining the fire apparatus." (Italics and underlines added)*

The standard further states:

> *"In the fire service there are fire apparatus with 8 to 10 years of service that are simply worn out. There is also fire apparatus that were manufactured with quality components, that have had excellent maintenance, and that have responded to a minimum number of incidents that are still in serviceable condition after 20 years. …the quality and timelessness of maintenance are perhaps the most significant factors in determining how well a fire apparatus ages. (Italics added)*

NFPA Standard 1915 addresses the minimum expectations for a comprehensive PM program. The benefits of implementing a PM program in compliance with NFPA 1915 are many. First, maintaining a vehicle is less expensive than repairing it. Second, vehicles that undergo PM on a dedicated schedule are more likely to have a longer lifespan. Third, PM reduces the time that a vehicle is unavailable for use in the community by reducing the chances that it will need repairs that take it out of service for a lengthy period of time. Finally, demonstrating adherence to an NFPA 1915-compliant PM program reduces the chance of a maintenance-related untoward event and possible resulting lawsuits.

The RFD deploys 20 primary first response units to accomplish its mission. These apparatus are strategically placed among the 14 fire stations and include 12 engines, two ladders, two rescue units, a squad, one training and safety unit, and two BC/command vehicles. The RFD also deploys a number of special service units such as a hazmat unit, a boat unit, a USAR unit, and eight brush trucks. These units are not staffed on a daily basis; instead when necessary, the

personnel assigned to that station will operate these units and deploy as needed. The brush trucks, for instance, are deployed in the event of a wildfire, which is a palpable, seasonal risk in Reno and neighboring joint-response areas.

Finally, the Department maintains several reserve apparatus (engines, rescues, ladders, and ambulances) for use when maintenance or repair is needed for its frontline apparatus. Reserve ambulances are also deployed at certain stations to provide a backup for any frontline ambulances engaged in calls. Units are also assigned to the training division. Altogether, the department's entire fleet is comprised of 140 vehicles including apparatus, rescue units, trailers, boats, etc. Table 3-4 shows the basic frontline inventory.

TABLE 3-4: RFD Inventory of Frontline Apparatus

Unit	Type	Make	Year	Age	Mileage*
Engine 1	Type 1/Engine	Pierce Saber	2016	3 years	20,910
Engine 2	Type 1/Engine	Pierce Arrow XT	2008	11 years	123,624
Engine 3	Type 1/Engine	Pierce Saber	2016	3 years	2,500
Engine 4	Type 1/Engine	Pierce Arrow XT	2008	11 years	112,176
Engine 5	Type 1/Engine	Pierce Saber	2016	3 years	33,592
Engine 6	Type 1/Engine	Pierce Quantum	2005	14 years	174,187
Engine 8	Type 1/Engine	Pierce Quantum	2004	15 years	146,516
Engine 9	Type 1/Engine	Pierce Arrow XT	2008	11 years	133,180
Engine 10	Type 1/Engine	Pierce Arrow XT	2008	11 years	129,327
Engine 11	Type 1/Engine	Pierce Quantum	2003	16 years	104,543
Engine 12	Type 1/Engine	Pierce Arrow XT	2006	13 years	114,564
Engine 21	Type 1/Engine	Pierce Saber	2018	1 year	1,000
Truck 1	Ladder Truck	Pierce Quantum	2006	13 years	80,201
Truck 3	Ladder Truck	E-One Cyclone	2004	15 years	91,489
Rescue 7	Ambulance	Ford F-350	2000	19 years	135,272
Rescue 19	Ambulance	Ford F-350	1999	20 years	107,765
Rescue 21	Ambulance	Ford F-350	2006	13 years	127,561
Squad 1	Rescue	Ford F-550	2007	12 years	72,767
Haz Mat 3	Utility	Freightliner FL-80	2004	15 years	13,375
USAR 11	Heavy Rescue	White/Volvo	1986	33 years	46,076
Boat 4	Water Rescue	Ford F-550	2006	15 years	8,471
Brush 2	Brush Truck	International 7400	2007	12 years	7,631
Brush 6	Brush Truck	International 7400	2007	12 years	14,720
Brush 8	Brush Truck	International 7400	2007	12 years	13,425
Brush 9	Brush Truck	International 7400	2007	12 years	10,510
Brush 10	Brush Truck	International 7400	2007	12 years	19,407
Brush 11	Brush Truck	Freightliner FL-80	1999	20 years	23,395
Brush 12	Brush Truck	International 7400	2007	12 years	12,631
Brush 21	Brush Truck	International 7400	2007	12 years	17,244

*__Note:__ Mileage as of 7/11/2018

The department's frontline pumpers range in age from 1 year to 16 years. On average, first-line engines in the fleet are 9.3 years of age. The two ladder trucks are 13 and 15 years old, respectively. The three primary rescue units have been in service 13, 19, and 20 years. The reserve apparatus in the fleet are generally sufficient to serve in a replacement mode. While well-maintained, the rescue units will be subject to significant replacement due to their years of service and the heavy usage of this equipment.

RFD fleet management is headed by a Fleet Maintenance Supervisor who reports directly to the Division Chief of Facilities and Fleet Division. The Fleet Maintenance Supervisor is doing well in maintaining the various apparatus and equipment under their responsibility. The apparatus service facility/shop located at 315 Edison Way is well-equipped, sufficiently sized, clean, and well-maintained. The Fleet Maintenance Supervisor oversees the shop and the entire fleet maintenance system; the Supervisor is assisted by four mechanics. CPSM highly commends the efficiency and effectiveness of the fleet management unit given the staff and the corresponding output of services delivered.

Preventive maintenance is performed every 4,000 miles or at six-month intervals on trucks, engines, and ambulances. Typically, it takes an entire day to complete a full maintenance service on one apparatus. The maintenance unit will do just about all repairs in-house, except transmission, radiator, and windshields, all of which are contracted out. Fleet maintenance personnel are integrally involved in writing and reviewing vehicle specifications and working with RFD operational personnel on vehicle acceptance. The shop maintains a significant supply inventory of minor parts and auto supplies that are securely stored in-house. Most repair needs are filled and delivered by local parts establishments.

The capability to track the annual cost of operations, including mechanical repair costs, is critical in determining whether a vehicle is costing excessive amounts to be maintained. This can include vehicle repairs, labor costs, and parts. This information is critical in determining when replacement is warranted or can be anticipated in upcoming budget cycles. At the time of this assessment, fleet management was utilizing an automated system to track work orders, labor rates, and parts. This system appears effective in its reporting and is kept up to date.

NFPA 1901, *Standard for Automotive Fire Apparatus*, 2016 edition, serves as a guide to the manufacturers that build fire apparatus and the fire departments that purchase them. The document is updated every five years, using input from the public/stakeholders through a formal review process. The committee membership is made up of representatives from the fire service, manufacturers, consultants, and special interest groups. The committee monitors various issues and problems that occur with fire apparatus and attempts to develop standards that address those issues. Of primary interest to the committee over the past years has been improving firefighter safety and reducing fire apparatus accidents.

The Annex Material in NFPA 1901 contains recommendations and work sheets to assist in decision making in vehicle purchasing. With respect to recommended vehicle service life, the following excerpt is noteworthy:

> *"It is recommended that apparatus greater than 15 years old that have been properly maintained and that are still in serviceable condition be placed in reserve status and upgraded in accordance with NFPA 1912, Standard for Fire Apparatus Refurbishing, to incorporate as many features as possible of the current fire apparatus standard. This will ensure that, while the apparatus might not totally comply with the current edition of the automotive fire apparatus standards, many improvements and*

upgrades required by the recent versions of the standards are available to the firefighters who use the apparatus."[15]

"Apparatus that were not manufactured to the applicable apparatus standards or that are over 25 years old should be replaced."[16]

In a 2004 survey of 360 fire departments in urban, suburban, and rural settings across the nation, Pierce Manufacturing reported on the average life expectancy for fire pumpers.[17] The results are shown in Table 3-5.

TABLE 3-5: Fire Pumper Life Expectancy by Type of Jurisdiction

Demographic	First-Line Service	Annual Miles Driven	Reserve Status	Total Years of Service
Urban	15 Years	7,629	10 Years	25
Suburban	16 Years	4,992	11 Years	27
Rural	18 years	3,034	14 Years	32

Note: Survey information was developed by Added Value Inc. for Pierce Manufacturing in, "Fire Apparatus Duty Cycle White Paper," Fire Apparatus Manufacturer's Association (FAMA), August 2004.

Department staff and city administration have acknowledged that there is a need to adopt a formal policy for apparatus replacement. It was estimated that total replacement value of the RFD frontline fleet is $12,420,000. Using a straight-line amortization schedule that anticipates a 15-year replacement schedule for engines, 20-years for ladders, and 10 years for rescues, CPSM estimates that an annual vehicle replacement schedule will require an estimated $844,000 annually to keep pace with the replacement schedule. This schedule assumes a replacement cost of $685,000 for an engine, $1.6 million for a ladder, and $250,000 for rescues and squads. Also, no adjustment was made for the annual cost increase of fire apparatus, which historically has averaged 3 percent to 5 percent annually.

Recommendation: The City should adopt a fire apparatus replacement schedule that includes an evaluation process that takes into account vehicle age, miles/hours of usage, maintenance records, and historical repair costs. (Recommendation No. 6.)

Most agencies utilize a combination of funding methods for apparatus replacements. These include capital replacement funds, bond initiatives, or simply through annual budget allocations. The key, however, is to develop an ongoing funding mechanism to fund the replacement of apparatus when their useful lifespan has been met. Reno has not created a dedicated funding source for apparatus replacement. Fortunately, the current condition of the fleet is good. There is only one engine that has more than 175,000 miles and which should be replaced. The three rescue vehicles are nearing the end of their usefulness in frontline service. However, the City must be realistic in its budgeting forecasts to begin the replacement funding for the fire fleet. CPSM believes that a fire apparatus funding program is needed and the City should consider an immediate annual allocation into the fund in the amount of $1 million.

[15] NFPA 1901, *Standard for Automotive Fire Apparatus*, 2016 Edition. Quincy, MA.
[16] NFPA 1901, *Standard for Automotive Fire Apparatus*, 2016 Edition. Quincy, MA.
[17] "Fire Apparatus Duty Cycle White Paper," Fire Apparatus Manufacturer's Association. August 2004.

Recommendation: The City should adopt a fire apparatus replacement fund that is supported through the annual budgetary process to address both the short-term and long-term apparatus replacement needs. (Recommendation No. 7.)

Capital Equipment

Fire apparatus are equipped with various types of tools and equipment that are utilized in providing fire and EMS services. Many of the tools and much of the equipment carried on fire apparatus are specified in NFPA and ISO guidelines. Fire and EMS equipment includes such items as hose, couplings, nozzles, various types of ladders, foam, scene lighting, oxygen tanks, AEDs, defibrillators, stretchers, small hand tools, fire extinguishers, mobile and portable radios, salvage covers, and medical equipment and supplies. Many of the small tools and equipment are considered disposable items and are replaced with ongoing operating funds. However, some pieces of equipment are very expensive, and thus require planning for their useful life and replacement. The more expensive capital items include:

- Self-contained breathing apparatus (SCBA) and fill stations.
- Firefighting PPE (personal protective equipment).
- Hydraulic/pneumatic extrication equipment.
- ECG Monitors/Defibrillators/AEDs.
- Ambulance stretchers.
- Thermal imaging cameras.
- Mobile/portable and base radios.
- Mobile data computers.
- Gas monitoring and detection devices.
- Watercraft/boats/outboard motors.

Much of the more expensive capital equipment is generally on a ten-year replacement cycle. Each new apparatus is equipped with these types of capital equipment, which has an estimated cost of nearly $200,000. The total cost of outfitting a department the size of the RFD for the capital items described is estimated to be in excess of $7 million. Thus, CPSM estimates that the annual replacement needs for these types of capital items in the RFD is approximately $400,000 to $500,000.

RADIO INTEROPERABILITY AND COVERAGE

In general, interoperability refers to seamless radio communications between emergency responders using different communication systems or products. Wireless communication interoperability is the specific ability of emergency responders to use voice and data communication in real time, without delay. For example, police, fire, and EMS responding to an incident are interoperable when all can communicate with one another over individual and perhaps shared communication channels. Interoperability enables first responders from any

jurisdiction to communicate with one another at larger incidents and also enables emergency planners and personnel to coordinate their radio operations in advance of major events.[18]

The RFD has transitioned its radio system to a P-25, trunked system. This system provides complete interoperability with area law enforcement and surrounding jurisdictions. Unfortunately, REMSA does not utilize the P-25 compliant trunked system and direct unit-to-unit radio communications are not possible unless patched by the dispatch center or an alternate mutual aid channel is utilized. It is essential to have unit-to-unit communication between emergency responders who jointly respond on the majority of all calls. CPSM believes that efforts must be made through the area EMS advisory boards (MAB and PMAC) along with Washoe County Health District to move REMSA units to the P-25 compatible trunked system.

Recommendation: The City should work with REMSA, area EMS advisory boards, and the Washoe County Health District to implement a common radio frequency that is utilized by ambulance and fire first responders on all EMS calls. (Recommendation No. 8.)

18. SAFECOM, U.S. Department of Homeland Security, "Interoperability," http://www.safecomprogram.gov/SAFECOM/interoperability/default.htm.

SECTION 4. ANALYSIS OF PLANNING APPROACHES

FIRE RISK ANALYSIS

The cost of providing fire and EMS protection in many communities has increased steadily in recent years. This has been fueled in part by rising wages, additional special pay, and escalating overtime costs. In addition, funding requirements have been compounded by increasing health insurance premiums and spiraling pension contributions. At the same time, the workforce has become less productive, largely because of the increases in lost time, specifically vacation leave, greater usage of sick leave, compensatory time, and increases in other miscellaneous lost time categories (workers' compensation, light duty, FMLA, holiday leave, training leave, etc.). As a result, many jurisdictions are asking the fundamental question of whether the level of risk in their jurisdiction is commensurate with the type of protective force that is being deployed. To this end, a fire risk and hazard analysis can be helpful in providing a more objective assessment of a community's level of risk.

A fire risk analysis utilizes a "fire risk score," which is a rating of an individual property on the basis of several factors, including:

- Needed fire flow if a fire were to occur.
- Probability of an occurrence based on historical events.
- The consequence of an incident in that occupancy (to both occupants and responders).
- The cumulative effect of these occupancies and their concentration in the community.

A community risk and vulnerability assessment is used to evaluate community properties and assign an associated risk as either a high, medium, or low hazard. The NFPA *Fire Protection Handbook* defines these hazards 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. [19]

Plotting the rated properties on a map provides a better understanding of how the response matrix and staffing patterns can be used to ensure a higher concentration of resources for worst-case scenarios or, conversely, fewer resources for lower levels of risk.[20]

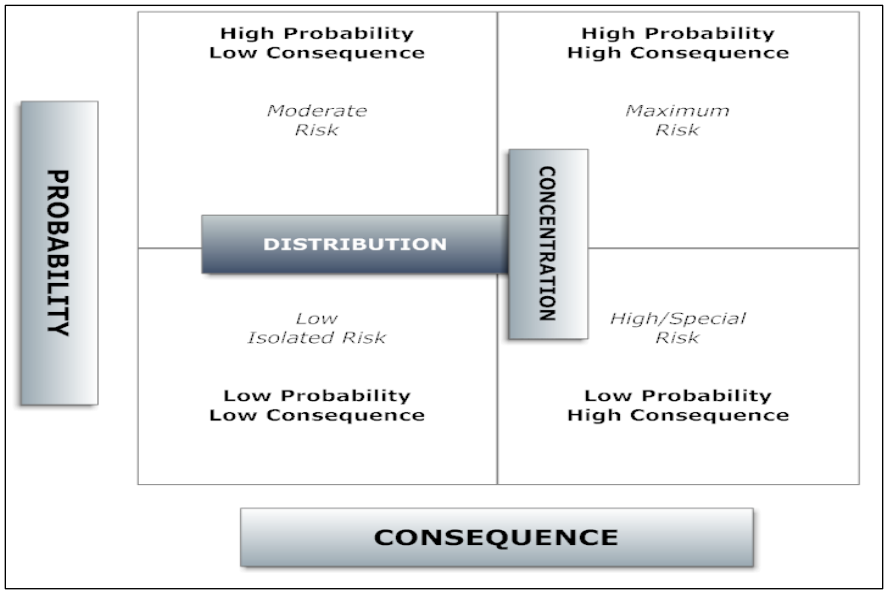
19. Cote, Grant, Hall & Solomon, eds., *Fire Protection Handbook* (Quincy, MA: NFPA 2008), 12.
20. *Fire and Emergency Service Self-Assessment Manual*, Eighth Edition (Center for Public Safety Excellence, 2009), 49.

Hazard Analysis and Community Risk Assessment

Hazard analysis and community risk assessment are essential elements in a fire department's planning process. The City of Reno and the RFD have recognized the need for a comprehensive community risk and vulnerability assessment and are working diligently in pursuing this outcome to help define the optimum arrangement for deploying resources. Each jurisdiction has to decide what degree of risk is acceptable to the citizens it serves. This determination is based on criteria that have been developed to define the levels of risk (e.g., of fire) within all sections of the community.[21] To this end, a comprehensive planning approach that includes a fire risk assessment and hazard analysis is essential in determining local needs.

The term *integrated risk management* refers to a planning methodology that recognizes that citizen safety, the protection of property, and the protection of the environment from fire and related causes must include provisions for the reasonable safety of emergency responders. This means assessing the risk faced, taking preventive action, and deploying the proper resources in the right place at the right time.[22] There are two main considerations of a risk assessment: the probability of an event occurring and the consequence of that event occurring. The matrix in Figure 4-1 divides the risk assessment into four quadrants. Each quadrant of the chart creates different requirements in the community for commitment of resources.

FIGURE 4-1: Community Risk Matrix



Plotting the rated properties on a map will provide a better understanding of how the response matrix and staffing patterns can be used to ensure a higher concentration of resources for worst-case scenarios or, conversely, fewer resources for lower levels of risk.[23]

Community risk and vulnerability assessments are essential elements in a fire department's planning process. Although the City of Reno and the RFD have identified a number of potential

21. Compton and Granito, *Managing Fire and Rescue Services*, 39.
22. Cote, Grant, Hall & Solomon, eds., *Fire Protection Handbook* (Quincy, MA: NFPA 2008), 12-3.
23. *Fire and Emergency Service Self-Assessment Manual*, Eighth Edition, (Center for Public Safety Excellence, 2009), 49.

hazards in the community, a comprehensive community risk and vulnerability assessment has not been done.

> ***Recommendation: The Reno Fire Department should conduct a formal fire risk analysis that concentrates on the City's downtown, strip commercial establishments, big-box occupancies, high-rise structures, industrial processing, and institutional properties. (Recommendation No. 9.)***

As a guide in conducting a vulnerability assessment, CPSM has developed the following template that may be utilized in completing this process.

Community Risk Assessment Template

TASK 1: Establish a Risk Assessment Team

- Five to six members with assorted skills.
- Team leader.
- Data analyst.
- Tactical/command expertise.
- City planning/growth management.
- Financial/economic.
- GIS/mapping.

TASK 2: Review and Plot Historical Workload (5 years)

- Breakout daily call distribution by type.
  - Location/occupancy type.
  - High-volume/frequent use.
    - Hospital.
    - University.
    - Adult living center.
- Identify high-dollar loss fire events (>$25K).
  - Location/occupancy type.
  - Cause & origin/demographic.
- Identify high-manpower events (>20 people).
- Identify high-time duration events (>2 hours).
- Identify events with significant economic impact (>$1 million).
- Identify events with multiple injuries or fatalities.
- Identify events with significant environmental impacts (which require remediation).

TASK 3: Identify the Community Risks for High-profile Events

- Transportation accidents (rail, air, roadway, port).
- Occupancies with high OVAP scores.
- Wildfire events.

- Large, complex fire (dormitory, assisted living, jail, hospital, etc.).
- Processing or manufacturing accident (chemical, radiologic, petroleum, electrical, etc.).
- Mass casualty incident.
- Weather, flooding, or seismic event.
- Terrorist event.
- Driven by a community profile or demographic.

TASK 4: Identify Capacity Issues or Incidents in which Insufficient Resources Resulted in a Negative Outcome

- Related to daily activities.
- Related to larger/significant events.
- Related to incidents requiring the utilization of mutual aid or external resources.
- Other incident types.

TASK 5: Identify Additional Service Demands Related to Anticipated Growth of the Service Area

- Affecting daily activities
- Related to larger/significant events
- Incidents that required specialized services or a currently unavailable expertise

TASK 6: Identify Risk Reduction or Prevention Efforts that can Reduce or Eliminate Future Workload

- Related to daily activities.
- Related to larger/significant events.
- Related to new demand resulting from growth.
- Develop cost/outcome analysis.

TASK 7: Identify Additional Training Needs to Better Manage Current or Anticipated Service Demand

- Develop cost/outcome analysis.

TASK 8: Identify Organizational or Tactical Capabilities Needed to Meet Current Shortfalls

- Develop cost/outcome analysis.

In addition to examining risks faced by the community at large, the department needs to examine internal risks. The National Fire Protection Association's *Standard for a Fire Department Occupational Safety and Health Program* (NFPA 1500) requires a risk management plan for fire departments to be developed separately from those that are incorporated in the local government plan.[24] The Reno Fire Department does not have a written internal risk management program in place.

A fire department risk management plan is developed and implemented to comply with the requirements of NFPA 1500. The following components must be included in the risk management plan:

24. Robert C. Barr and John M. Eversole, eds., *The Fire Chief's Handbook*, 6th edition (PennWell Books, 2003), 270.

Risk Identification: Actual or potential hazards.

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

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

Risk Control: Solutions for elimination or reduction of real or potential hazards by implementing an effective control measure.

Risk Monitoring: Evaluation of effectiveness of risk control measures. [25]

HAZARDOUS MATERIALS RESPONSE

Hazardous materials incidents occur with some frequency in Reno. In 2018, according to data provided by the RFD, there were 275 hazmat-related calls of varying degree. Incidents ranged from natural gas and propane leaks, carbon monoxide incidents, biologic hazards, combustible and flammable gas spills, chemical hazards, assorted spills and leaks, and chemical incidents. A portion of the incidents are directly attributable to gasoline and oil spills from vehicles that run through portions of Reno. I-80 and I-580/HWY 395 run through and are adjacent to the City and account for much of the city traffic and a portion of the spill calls. Hwy 649 and HWY 657 also run through the City. Another concern is the Union Pacific rail line, which carries Amtrak trains along with high-volume cargo trains that run through the City on a regular basis. In addition, the Reno-Tahoe International Airport is located within City limits, and while crash fire rescue is provided by the airport personnel, RFD has joint response duties for any significant event. The airport offers 140 daily flights on nine different commercial carriers. The airport also supports four major cargo airlines. The airport sees annual passenger traffic of more than 4.2 million travelers per year.

The types of hazardous materials at both fixed facilities and passing through on major transportation thoroughfares in Reno present the potential for a more significant event and the possibility for an event is always present. The presence of the interstate highways and multilane highways with an unknown quantity of hazardous materials traveling through the City on a daily basis poses a challenge in the development of adequate mitigation measures.

Indeed, the traditional primary risks are those generated by hazmat transportation and fixed facilities. However, over the years, the type and nature of incidents to which regional hazmat teams may respond has significantly changed and have become more technically challenging. Examples include the following:

- Clandestine labs, criminal and terrorist use of hazmat as weapons, chemical suicides, etc.
- Interdisciplinary response scenarios in which the regional hazmat teams interface with their response partners in the law enforcement, emergency medical, and fire communities. Scenarios include special events and the use of Joint Hazard Assessment Teams (JHAT), improvised explosive devices, coordinated/complex attack scenarios, active shooter/assailant scenarios, and the emergence of virus threats such as Ebola and Zika.
- Tourism and economic development initiatives have drawn national level and sporting events and festivals to the state. While this is a positive economic development, high-profile and high-

25. NFPA 1500, *Standard for a Fire Department Occupational Safety and Health Program* (2007 ed.), Annex D.

density crowd events raise the threat level that requires a more sophisticated hazmat preparedness and response package.

- Changes in the U.S. domestic energy infrastructure have impacted the response community, such as for incidents involving high-hazard, flammable trains with crude oil and ethanol, increased use of liquefied natural gas (LNG) and related facilities, etc.
- The increasing use of social media is viewed as both a situational awareness asset and a potential operations security (OPSEC) vulnerability. The regional hazmat teams can assume a leadership role in determining future pathways and options on how social media can be safely and effectively integrated into response operations.[26]

Response to hazardous materials incidents are defined in the RFD Standard Operating Procedures. Reno is compliant with OSHA, Hazardous Waste Operations and Emergency Response, 29 CFR Part 1910.120 and NFPA 472, *Professional Competence of Responders to Hazardous Materials Incidents*. Level I incidents can be effectively managed and mitigated by the first response personnel without a hazardous materials response team or other special unit. These incidents include:

- Spills that can be properly and effectively contained/or abated by equipment and supplies immediately accessible to RFD.
- Leaks and ruptures that can be controlled using equipment and supplies accessible to RFD.
- Fires involving toxic materials and which can be extinguished and cleaned up with resources immediately available to RFD.
- Hazardous materials incidents not requiring civilian evacuation. (Example: A small pool supply spill that can be diluted with water for clean-up.)

The Reno Fire Department contributes 33 members to the Regional Hazardous Materials Response Team (RHMRT). The team is composed of members from RFD, Sparks Fire Department, and the Truckee Meadows Fire Protection District. The team is specialized in providing critical skills and equipment needed during any emergency where hazardous materials, chemical, radiologic, and biological dangers are present. The RHMRT provides hazard identification, response, and mitigation to not only Reno and the metro area, but throughout northern Nevada and areas in eastern California.

Each RFD responder maintains hazardous materials operations-level certification, which enables them to identify hazards and defensive operations for those situations requiring Level II and III capability. CPSM recognizes the RFD's participation in the RHMRT as a ***Best Practice***, and we view the current level of response capability as appropriate for the community.

TARGET HAZARDS AND FIRE PREPLANNING

The process of identifying target hazards and pre-incident planning are basic preparedness efforts that have been key functions in the fire service for many years. In this process, critical structures are identified based on the risk they pose. Then, tactical considerations are established for fires or other emergencies in these structures. Consideration is given to the activities that take place (manufacturing, processing, etc.), the number and types of occupants (elderly, youth, handicapped, imprisoned, etc.), and other specific aspects relating to the

26. Flippin, P., et al; Virginia Department of Emergency Management Hazmat Program Strategic Review (VDEM, Richmond, VA, 2016)

construction of the facility or any hazardous or flammable materials that are regularly found in the building. Target hazards are those occupancies or structures that are unusually dangerous when considering the potential for loss of life or the potential for property damage. Typically, these occupancies include hospitals, nursing homes, and high-rise and other large structures. Also included are arenas and stadiums, industrial and manufacturing plants, and other buildings or large complexes.

NFPA's 1620, *Standard for Pre-Incident Planning, through its Sample Pre-Incident Plan Field Collection Card and Facility Data Record* in Annex A is quite specific in identifying the need to utilize a written narrative, diagrams, and predesignated, detailed forms to depict the physical features of a building, its contents, and any built-in fire protection systems. Information collected for pre-fire/incident plans includes, but is certainly not limited to, data such as:

- The occupancy types.
- Floor plans/layouts.
- Building construction type and features.
- Building fire protection systems.
- Utility locations.
- Hydrant locations.
- Hazards to firefighters and/or firefighting operations.
- Hazmat considerations and locations.
- Special conditions in the building.
- Apparatus placement plan.
- Fire flow requirements and/or water supply plan.
- Forcible entry and ventilation plan.
- Emergency contact information.

NFPA 1620 goes on to state that "A pre-incident plan is one of the most valuable tools available for aiding responding personnel in effectively controlling an emergency."27 The information contained in pre-incident fire plans enables firefighters and officers to have a familiarity with the building/facility, its features, characteristics, operations, and hazards. Thus, they can more effectively, efficiently, and safely conduct firefighting and other emergency operations. Pre-incident fire plans should be reviewed regularly and tested by periodic table-top exercises and on-site drills, especially in the most critical and frequented occupancies.

Strategically and from an operational standpoint, according to NFPA 1620, pre-incident planning is a total concept based upon the following:

- Situation awareness.
- Management commitment.
- Education.
- Protection.

27. http://www.nfpa.org/codes-and-standards/all-codes-and-standards/codes-and-standards/detail?code=1620

- Prevention.
- Emergency organization.[28]

CPSM believes that these conceptual considerations are particularly relevant in the case of RFD and the RFD Fire Prevention Division. RFD does not involve line personnel in in-service company inspections and the RFD's pre-fire incident planning was discontinued in recent years. CPSM believes this is a detriment to the necessary tactical efforts that are gained through preplanning reconnaissance; in addition, the ability to inspect and correct code violation and life-safety concerns is considerably reduced. All of the organizational tenets above are directly related to the ability of fire department personnel being able to walk through the structures that present a hazard or potential heretofore unseen, or new hazards, or special conditions and actually identify them firsthand.

Reno is home to several hospitals and medical centers. These include the Renown South Meadows Medical Center and Renown Children's Hospital. These is also the Sierra Nevada VA Health Care System and Saint Mary's Regional Medical Center and West Hills Hospital. There are numerous senior assisted living facilities in Reno, including Atria, Park Place Assisted Living, Summit Estates Senior Living, Reno Valley Assisted Living & Retirement Center, Five Star Premier Residences of Reno, The Seasons of Reno, Royal Heights, Monaco Ridge, Baileys Group Home, Life Care Center of Reno, Home Away From Home, The Fountains Senior Care, Golden Years Castle Home Care, Diamond Residential, St Joseph Care, and Little Angel.

The City has 22 casinos, including a number of large and intricate facilities. There are a number of chemical distributers including A-#1 Chemical Inc., Industrial & Technical Chemicals, Trion Chemicals, Cimpress, Geofortis Pozzolans, Thatcher Chemical, and Brady Industries, The downtown area also has many businesses, casinos, and restaurants with suppression systems for which familiarization and preplanning walk-throughs could be accomplished during some form of company inspection program.

Many fire departments establish a uniform and systematic program for the prefire planning for critical buildings and occupancies by fire company personnel. The purpose of the program is for fire crews to become familiar with a building's or business's physical layout (preplan), understand its storage and processing activities, and to review any fire suppression or notification systems and their operability. For instance, familiarization with alarm and notification systems in nursing homes, hospitals, and schools can greatly mitigate confusion during the most routine calls and create a more efficient response model for the more serious calls. This information provides a great benefit during a response to an actual emergency. The Reno Fire Department does not conduct company inspections and the suspension of prefire planning activities further degrades this important function.

> ***Recommendation: The Reno Fire Department should implement a prefire planning process for all target hazards and high-risk commercial properties. (Recommendation No. 10.)***

The results of the preplanning process should be systematically documented and subsequently stored in on-board mobile data terminals (MDTs) for ease of accessibility by company and chief officers during emergency responses. The department has mobile data terminals (MDTs) in all first-line apparatus. Currently, pre-incident fire plans are not retrievable on the fire department MDTs. CPSM believes that pre-fire incident plans should be rapidly available on apparatus MDTs for responding personnel.

28. Ibid.

Recommendation: The Reno Fire Department should institute an effort to enter prefire/incident plans on apparatus MDTs in order to provide real-time quick retrieval of this information. (Recommendation No. 11.)

The prefire planning process is critical from both an incident planning perspective and for responder familiarization. The critical aspect in preplanning is to ensure that these plans are kept up-to-date and that all critical facilities are visited and contact is made on an annual or bi-annual basis. These visits should involve the building manager and/or owner/occupant to generate, update, and maintain this information exchange.

Accreditation

Accreditation is a comprehensive self-assessment and evaluation model that enables organizations to examine past, current, and future service levels. It is used to evaluate internal performance and compares this performance to industry best practices. The intent of the process is to improve service delivery.

The Center for Public Safety Excellence (CPSE) provides an extensive evaluation process, on a fee basis, to member agencies and which ultimately leads to accreditation. CPSE is governed by the Commission on Fire Accreditation International (CFAI), an 11-member commission representing a cross-section of the fire service, including fire departments, city and county management, code councils, the U.S. Department of Defense, and the International Association of Firefighters.

The CPSE Accreditation Program is built around the following key measurements:

- Determine community risk and safety needs.
- Evaluate the performance of the department.
- Establish a method for achieving continuous organizational improvement.

Local government executives face increasing pressure to "do more with less" and justify expenditures by demonstrating a direct link to improved or measured service outcomes. Particularly for emergency services, local officials need criteria to assess professional performance and efficiency.

CPSE accreditation has national recognition and is widely used throughout the fire service. The key to its success is that it allows communities to set their own standards that are reflective of their needs and a service delivery model that is specific to these needs. In addition, it is a program that is based on ongoing improvement and continuous monitoring. The CPSE accreditation model may be well-suited for Reno.

Recommendation: Reno should consider CPSE fire accreditation in the future. (Recommendation No. 12.)

RFD initiated an effort to achieve accreditation in 2011 by completing its Stadand of Cover analyisis. CPSM believes that this effort should be continued and could prove benficial to the organization.

SECTION 5. OPERATIONAL RESPONSE APPROACHES

As mentioned previously, many agencies incorporate the use of prefire plans to provide a response and tactical strategy for those more critical or complex occupancies in the community. Figures 5-1 and 5-2 illustrate the critical tasks and resources required on low-risk incidents and moderate-risk structure fires, respectively. Understanding the community's risk greatly assists fire department planning, and with ongoing training, these activities improve overall effectiveness and responder safety.

FIGURE 5-1: Low-Risk Response–Exterior Fire Attack

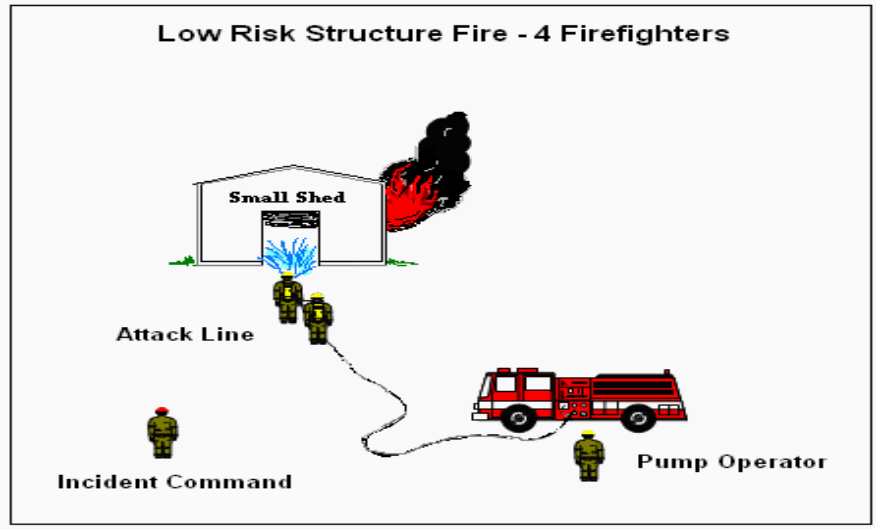
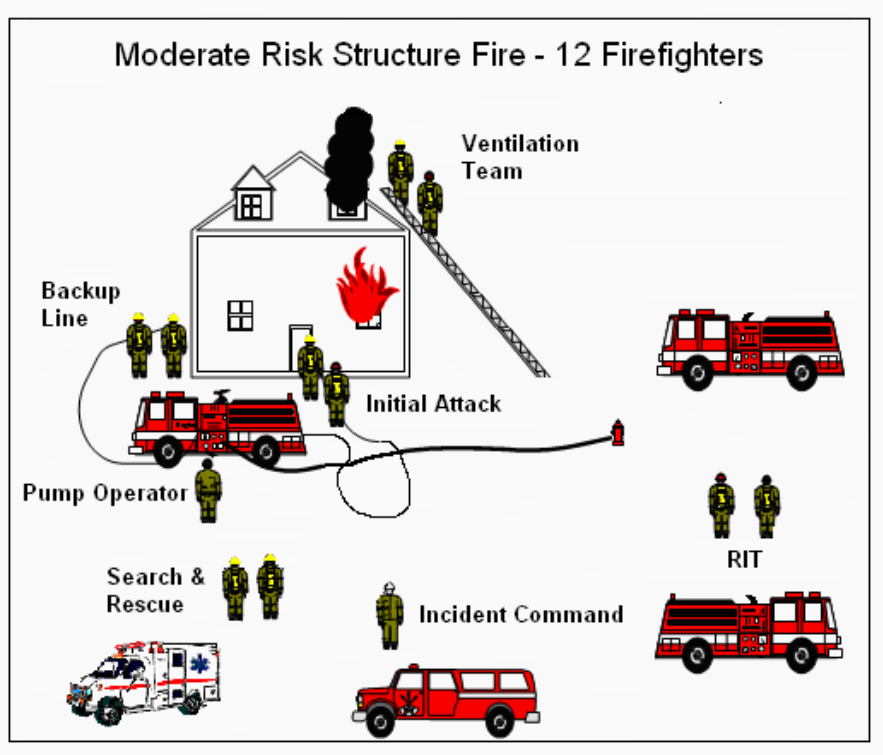


Figure 5-2 represents the critical task elements for a moderate-risk structure fire. Some jurisdictions add additional response resources to meet and, in some cases, exceed the national benchmarking provided by the National Fire Protection Association (NFPA) 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Departments*, 2014 Edition. NFPA 1710 calls for the initial assignment of 14 personnel on a single-family residential structure fire when an aerial ladder is not utilized. Reno is able to assemble a full complement of resources for a single-family residential structure fire from its on-duty resources. In fact, on the initial assignment to a residential structure fire, RFD will typically assemble upwards of 20 personnel. As well, RFD often incorporates the resources from neighboring jurisdictions through mutual aid and automatic response agreements. CPSM recognizes these joint and automatic response activities as a ***Best Practice***.

FIGURE 5-2: Moderate Risk Response–Interior Fire Attack



RENO RESPONSE PROTOCOLS

Fire Response

The ability to assemble the necessary resources to effectively manage even a smaller residential or commercial structure fire is significant. As mentioned above, the NFPA standard (NFPA 1710) recommends a minimum of 14 personnel as the initial response to a fire at a single-family residential structure. An actual fire of any significance will require 14 to 17 personnel or more for extended periods of time. As the incident grows in size and complexity, it is not unusual to see staffing needs that can exceed 30 to 40 personnel. This would be the case in a fire at a big-box retail center like a Home Depot or Walmart, a wildfire, or a fire at an apartment complex. Though these larger incidents do not occur frequently, when they do occur, the ability to assemble sufficient resources rapidly can significantly impact the outcome.

The decision as to what is the proper staffing level for a specific community's protection is perhaps the most difficult assessment faced by policy makers and fire department leadership across the nation. As communities adjust this level of response, the costs associated with maintaining this level of readiness will have significant financial implications. CPSM believes that Reno is very well-staffed to manage its current workload. RFD is currently assigning 20 personnel to all structure fires. CPSM believes that this level of initial response is unnecessary and serves to increase the response activities of the existing resources.

> ***Recommendation: The Reno Fire Department should re-evaluate its initial assignment of 20 personnel and seven response units to a reported residential structure fire. (Recommendation No. 13.)***

The key to organizational efficiency and the safety of responding personnel is directly related to response activities and departmental deployment practices. Reno should evaluate its response practices and make every effort to dispatch the fewest number of units needed and whenever possible minimize the frequency in which units respond with lights and sirens. In our review of RFD responding activities to structure fire incidents, the data indicates that there was a total of 348 structure fire calls in which the assigned complement of 20 personnel were initially dispatched. We were able to determine that on only 71 of these calls did the full assignment of 20 personnel actually arrive at the scene. This indicates that ***on 80 percent of the structure fire incidents (277 calls), the full assignment of responding units were not needed and were canceled prior to their arrival.***

Another area that appears to provide opportunities for improved efficiencies is in the number of personnel who are allowed off on scheduled leave. The current time-off policy allows up to 14 personnel off for vacation, comp time and holiday leave. This is a negotiated provision of the current collective bargaining agreement (CBA) between the fire union and the City. During periods of full staffing, each shift will have seven additional personnel who can cover for both scheduled and unscheduled lost time (sick leave, disability, bereavement, FMLA, etc.). In looking at the vacation accrual provision in the CBA, the maximum accrual rate is 338 hours annually. If we were to calculate the number of personnel who would be off in order to utilize the maximum accrual of vacation time, we determined that approximately 8.4 vacation slots would be needed each day for each of the three shifts. The per-shift calculations are:

- 338 Maximum Vacation Accrual Hours X 72 personnel = 24,336 Vac. Hrs./Year.
- 121, 24-hour Shifts per Year.
- 24,336/121 = 201 Vacation Hours Need to be Off per Day.
- 201/24 = 8.4 Vacation Slots Required.

In reviewing the RFD policy and contractual provision for compensatory time, it was determined that employees have the option to receive time off in lieu of pay for both holiday time accrued and out-of-area wildland assignment time accrued. These accruals can be scheduled for time off and can increase significantly the number of employees off duty on any given day. CPSM believes that there would be a significant cost savings if the time-off option was discontinued.

> ***Recommendation: The City should re-evaluate its current practice of offering compensatory time off in lieu of actual pay for both holiday accruals and out-of-area wildland assignments. (Recommendation No. 14.)***

The issue of allowing compensatory time in lieu of pay is compounded in the case of out-of-area wildland assignments. In these situations, the City is reimbursed for the hours that employees are assigned to out-of-area wildland assignments. Employees receive time and one-half of their normal hourly wage for these assignments and the City is reimbursed for this pay. However, if the employee chooses to take their time in compensatory leave (comp time) in lieu of pay, the replacement cost for this lost time is more costly than the reimbursed amount if paid. For example:

- 80 hours of wildland assignment at $30 per hour ($20 per hour X 1.5) = ***$2,400.***
- 80 hours of wildland assignments received in comp-time = 120 hours off.
- 120 hours of lost time and backfilled at $30 per hour ($20 per hours X 1.5) = ***$3,600***
- Difference in unreimbursed costs when pay is awarded as comp-time = ***$1,200***

- ***Thus, CPSM estimates a 50 percent increase in cost to the City which is not reimbursed when wildland pay is awarded as comp time in lieu of actual overtime pay.***

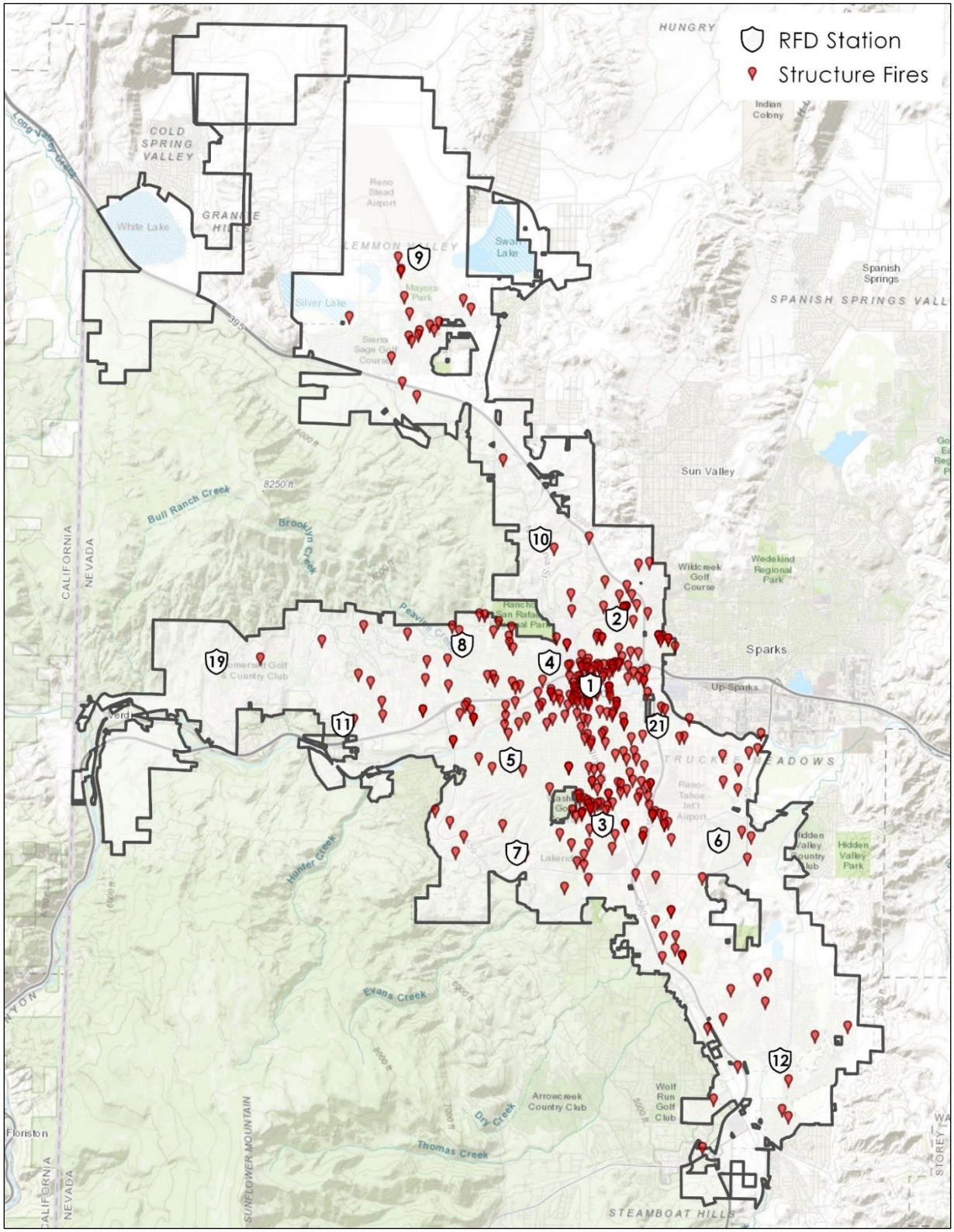
Table 5-1 shows the aggregate call totals for the 12-month period evaluated. EMS calls represent the largest percentage of calls for service at almost 67.4 percent. This predominance of EMS call activity is not unusual when compared to what we usually observe in many communities. Our experience is that EMS-related calls typically account for about 70 percent of the call activity; in some communities with a larger senior demographic, this can go as high as 75 to 80 percent. While all types of fire calls in Reno represent approximately 11.9 percent of all calls for service, actual fires (structural and outside) represent only 2.4 percent of the overall call activity. Hazard, false alarms, good intent, and public service calls represent the largest percentage of the fire calls (81.9 percent). This is also very typical in CPSM data and workload analyses of other fire departments.

TABLE 5-1: Calls by Type

Call Type	Number of Calls	Calls per Day	Call Percentage
Breathing difficulty	3,637	10.0	8.7
Cardiac and stroke	3,852	10.6	9.3
Fall and injury	5,932	16.3	14.2
Illness and other	4,581	12.6	11.0
MVA	3,203	8.8	7.7
Overdose and psychiatric	879	2.4	2.1
Seizure and unconsciousness	5,966	16.3	14.3
EMS Total	**28,050**	**76.8**	**67.4**
False alarm	2,042	5.6	4.9
Good intent	386	1.1	0.9
Hazard	427	1.2	1.0
Outside fire	528	1.4	1.3
Public service	1,201	3.3	2.9
Structure fire	348	1.0	0.8
Wildfire	20	0.1	0.1
Fire Total	**4,953**	**13.6**	**11.9**
Canceled	8,574	23.5	20.6
Mutual aid	63	0.2	0.2
Total	**41,639**	**114.1**	**100.0**

In looking in more detail at the **348 structure fires**, it was determined that for **192** of these events, there was ***no reported fire damage***. When we looked at the time spent on structure fire incidents, we found that on 266 of the 348 structure fires and 446 of the 530 outside fires, the call duration for these incidents was 60 minutes or less. This is indicative of a relatively minor occurrence. However, 38 structure fire calls saw a duration of greater than one hour and 46 lasted for more than two hours. This would indicate a more significant event. Figure 5-3 shows the locations of structure fires in Reno during the evaluation period.

FIGURE 5-3: Location of Structure Fires



There were 126 structure fires in which some degree of fire damage was noted in the incident report. The total fire loss (structure and contents) for all structural fires in the 12-month evaluation period was estimated to be $2,248,787. Fire damage estimates are made by RFD investigators and company officers.

For the calls in which damage was reported (structure and contents), we estimate that the average damage for each fire was approximately $14,415. We can compare this experience to average fire loss nationwide for structure fires. NFPA estimates that in 2017 the average fire loss for a structure fire in the U.S. was $21,463.[29] From this perspective the average fire loss in Reno is significantly lower than the amount of loss found in many communities across the nation.

Another indication that we use in our analysis of structure fire occurrence is the frequency in which an individual event results in a combined loss that exceeds $20,000. The $20,000 demarcation is relevant from two perspectives. First, this is a dollar amount that is comparable to the national average for fire loss in a structure fires, and second, it indicates a fire loss that from CPSM's perspective is representative of a more significant fire event that requires fire department extinguishment. In the period evaluated, there were ***only 23 structure fires in which the combined fire loss exceeded $20,000.*** The largest combined fire loss (structure and contents) for a single event was $305,000. The average fire loss and the frequency of higher loss fires appears lower in Reno than what would be expected. It is hard to fully determine the reason(s) for the lower number of fires that resulted in significant fire loss. Much of this must be attributed to the quality of the fire suppression efforts exhibited by RFD and another factor must be the fire prevention efforts of the residents of the city and their ability to limit those factors that contribute to larger fire loss. It is our assessment, however, that the fire problem is limited in Reno and this a very positive aspect in considering the overall risk in the community.

Tables 5-2 and 5-3 provide an analysis of fire loss in Reno during the year-long evaluation period.

TABLE 5-2: Content and Property Loss – Structure and Outside

Call Type	Property Loss		Content Loss	
	Loss Value	Number of Calls	Loss Value	Number of Calls
Outside fire	$1,092,928	164	$306,541	103
Structure fire	$1,837,590	126	$411,197	122
Total	**$2,930,517**	**290**	**$717,739**	**225**

Note: This includes only calls with recorded loss greater than zero.

TABLE 5-3: Total Fire Loss Above and Below $20,000

Call Type	No Loss	Under $20,000	$20,000 plus
Outside fire	340	170	18
Structure fire	192	133	23
Total	532	303	41

Observations:

Outside Fires

- Out of 528 outside fires, 164 had recorded property loss, with a combined $1,092,927 in losses.

29. Ben Evarts, "Fire Loss in the United States during 2017," NFPA September 2018.

- 103 outside fires had content loss, with a combined $306,541 in losses.
- The highest total loss for an outside fire was $150,000.

Structure Fires

- Out of 348 structure fires, 126 had recorded property loss, with a combined $1,837,590 in losses.
- 122 structure fires had content loss with a combined $411,197 in losses.
- The average total loss for all structure fires was $6,425.
- The average total loss for structure fires with loss was $14,415.
- The highest total loss for a structure fire was $305,000.
- 194 structure fires had no recorded loss.
- 23 structure fires had $20,000 or more in loss.

Wildland Fires

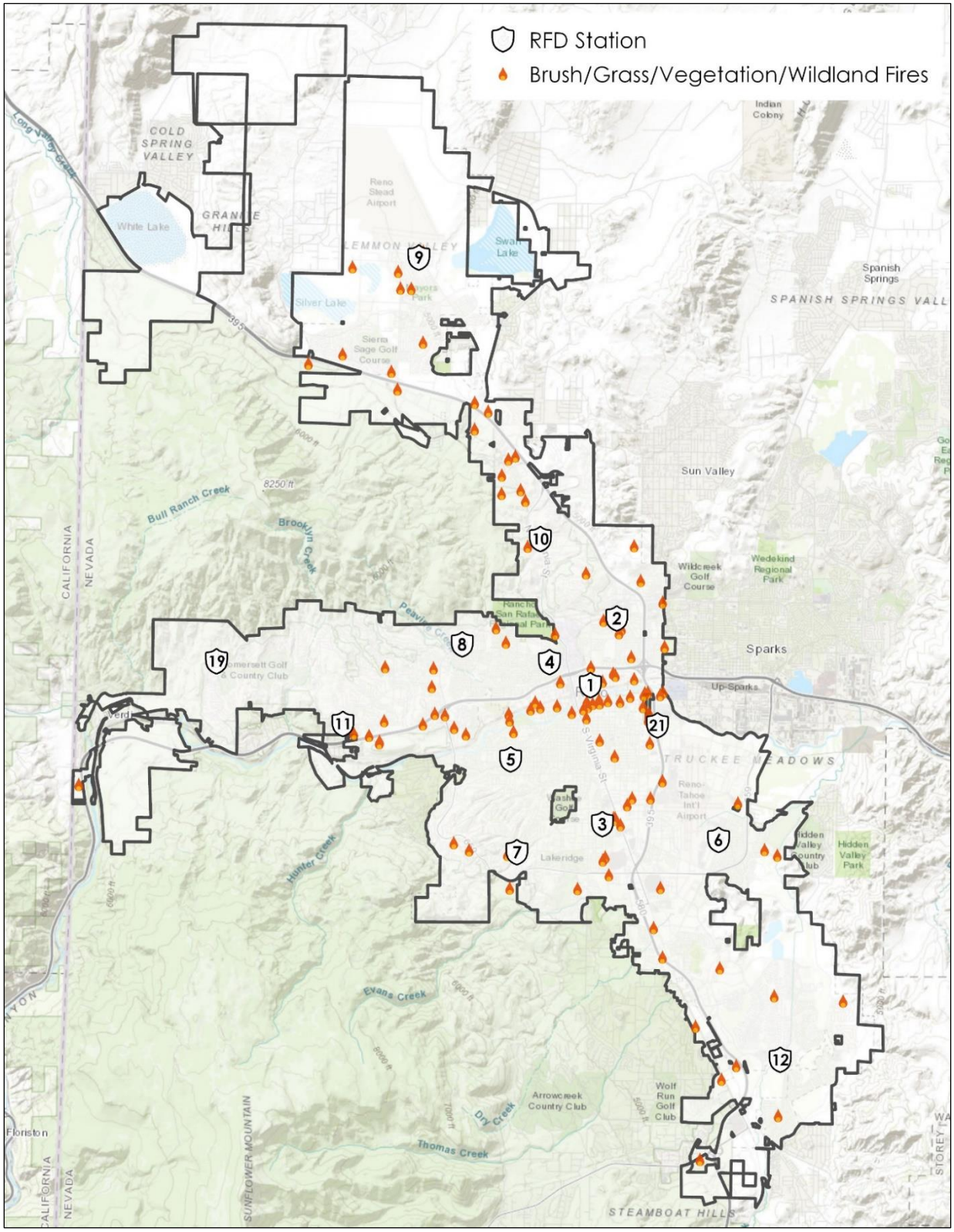
Wildland fires occur with regular frequency in the Reno area and surrounding communities. Generally, the fire season extends from June through October of each year, during the hot and dry months. Most wildland fires are controlled and contained early, with limited damage to residences, outside buildings, equipment, and infrastructure. For those ignitions that are not readily contained and become wildfires, damage can be extensive and can quickly require state and federal assistance. In the 12-month evaluation period, RFD responded to 155 incidents that were classified as wildfires, grass fires, or brush fires in city jurisdiction and in neighboring joint response areas. These fires were primarily small in nature and involved fires in open areas, forest or woodlands, grass fires, and fires in cultivated croplands. Most fires were contained rapidly, in less than an hour; however, there were more than 50 fires that required significant resources and took more than several hours to contain. Table 5-4 is a breakout of the size in acres of wildfire/brush and grass fires in Reno and neighboring mutual aid jurisdictions.

TABLE 5-4: Wildland/Grass & Brush Fires, Reno and Mutual Aid Communities

Number of Acres Burned	Number of Calls
0.1 Acres or Less	86
Between 0.1 Acres and 1 Acre	35
Between 1 and 10 Acres	9
Larger than 10 Acres	3
Total	**133**

The Reno area is subject to larger events, such as fires in 2017 when the Earthstone, Truckee, and Winnemucca Ranch fires burned about 155,000 acres. In 2016, a wildfire in Washoe Valley destroyed more than a dozen homes and forced evacuations and road closures and resulted in power outages in the area. The 2012 Washoe Drive Fire, which occurred just south of Reno, saw 3,177 acres burned and 27 homes destroyed. In 2011 the Caughlin, Fire burned 1,935 acres and destroyed 29 homes. Figure 5-4 identifies the locations of the brush/grass/wildland and vegetation fires that occurred within Reno corporate limits during the study period.

FIGURE 5-4: Location Brush/Grass Wildland and Vegetation Fires within Reno



Fuel Management and Wildfire Hazard Mitigation Programs

The goal of fuel management and wildfire hazard mitigation programs is to protect life and property by providing effective public education and wildfire home protection strategies through fuel reduction efforts. Programs of this type include prescribed burning, forest thinning projects, vegetation management, directed logging efforts, and watershed protection. The reduction of wildfire hazards helps protect firefighter and public safety, as well as improves the ability to protect property in the event of a fire. To be effective, programs of these types need to be carried out on a regional basis and must involve collaborative efforts at the local, regional, state, and federal levels. These programs can be employed to identify and prioritize prefire and post-fire management strategies and tactics, all of which are aimed at reducing the threat of a loss to life and property from wildfires.

Several tools can be used to reduce forest biomass fuels. Prescribed burning is the deliberate use of fire in specific areas under specified conditions to reduce fuel loads. Thinning is the selective removal of fuels to eliminate fuel ladders that contribute to the larger and more devastating crown fires. Broadcast burns eliminate fine fuels, grasses, and smaller ground fuel which reduces the head and spread rate of fires when they occur.

Many communities that are susceptible to wildfire have undertaken fuel management and fuel mitigation efforts that focus on those specific risks in their communities. These include protecting and hardening efforts for housing in the wildland urban interphase (WUI) or specific infrastructure that is critical to the community (electrical transmission lines, transportation networks, utility systems, watersheds, etc.). Fuel management programs are typically orchestrated during seasonal operating periods, utilizing temporary employees who provide multiple functions. Such as thinning or clearing efforts in wildfire prone areas. In addition, these employees can provide public education and home prescription guidance for those properties that are vulnerable. Lastly, they provide additional wildland firefighting forces that can be deployed both locally and for out-of-area assignments.

> ***Recommendation: The RFD should consider the hiring of seasonal fuel crews who provide fuel management and wildfire mitigation efforts in the community. (Recommendation No. 15.)***

The fuel management effort must be collaborative and involve key agencies, including local government, the U.S. Forest Service, National Parks personnel, the Bureau of Land Management, tribal entities, and local universities. These efforts must be coordinated; specific outreach and community awareness efforts must be orchestrated to improve overall effectiveness and acceptance.

Integrated Risk Management

Fire suppression and response, although necessary to minimize property damage, have little impact on preventing fires. Rather, public fire education, fire prevention, and built-in fire protection and notification systems are essential elements in protecting citizens from death and injury due to fire. The term *integrated risk management*, first developed in the United Kingdom, refers to a planning methodology that focuses on citizen safety and the protection of property and the environment through a community-wide fire reduction effort. This is accomplished by assessing the risk faced, taking preventive action, and deploying the proper resources in the right place at the right time.[30]

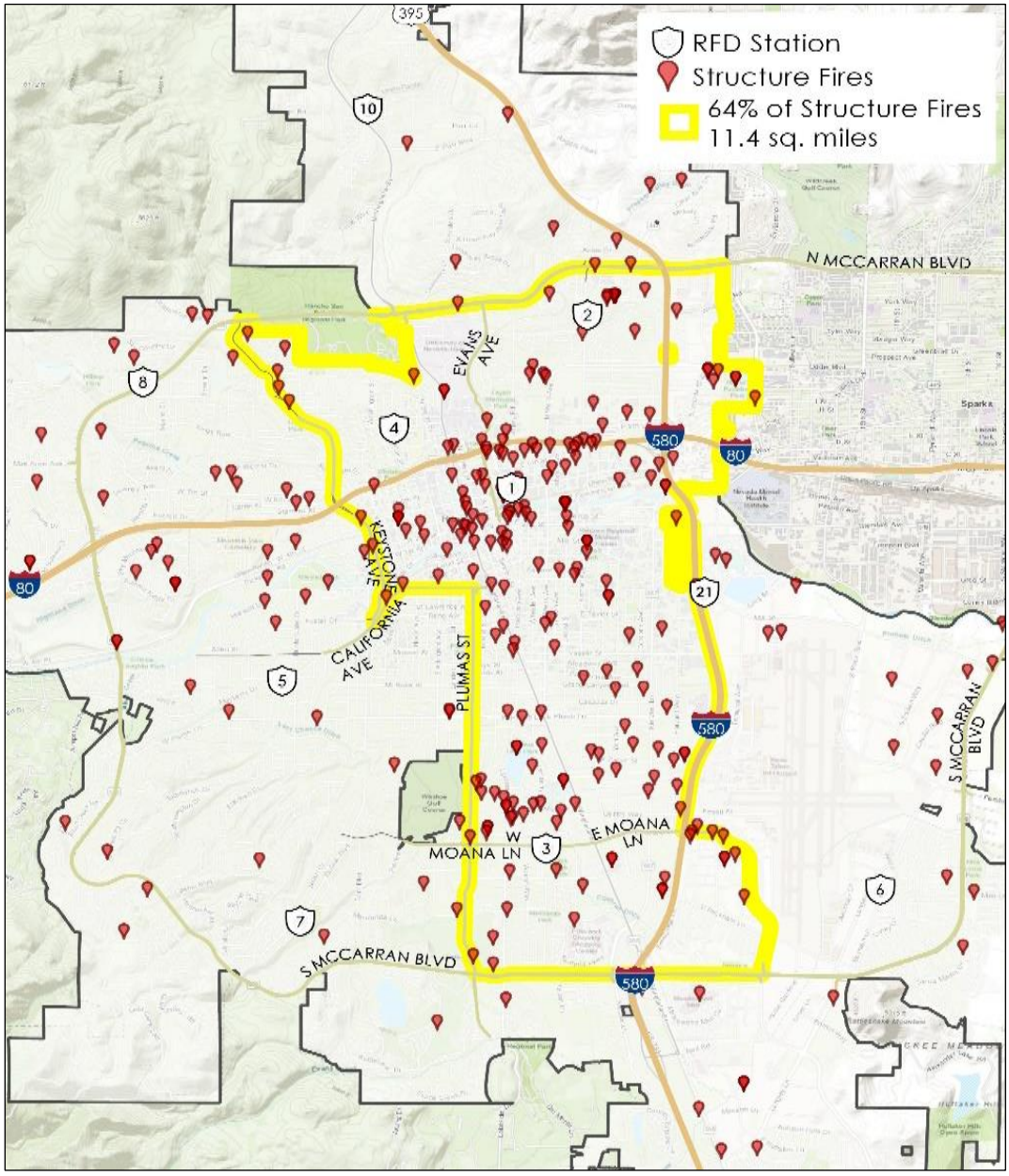
30. National Fire Protection Association, *Fire Protection Handbook* (2008 Edition), 12-3.

An integrated risk management model uses incident data (location, construction types, population density, demographics, etc.) to assess all types of fire, health, and safety risk in the community. The model is then used to manage risk through targeted, community-based risk reduction strategies and flexible approaches to incident response (See Merseyside Fire and Rescue Service and Nanaimo Fire Rescue). It helps deploy the fire department's response and prevention resources to best meet the frequency and location of incidents. It also aids in all-hazard risk assessment, and increases the value of risk reduction efforts (such as fire prevention education for the elderly and children, the populations that are the most vulnerable to fire). Finally, the model measures the fire department services' workload, and assesses the efficiency and outcome of the delivery of each service, making adjustments as needed. In essence, integrated risk management pulls together all the different planning aspects of community hazard and vulnerability analysis, fire department risk management, resource allocation, and performance measurement into one unified, cohesive whole. ***The end product of this effort is the reduction of fire incidents.***

In looking more closely at the location of structure fires in the City, it appears that there is a marked concentration of structure fires in the downtown area surrounding Station 1 and Station 3. We identified an area of approximately 11.2 square miles in this area that generated nearly two-thirds of all the structure fires and nearly three-quarters of the fire loss that occurred in the City during our evaluation period. If we look further at this concentration it can be seen that:

- 64 percent of the City's structure fires occurred in this area (224 fires).
- The area generated 72 percent of the City's total fire loss.
- The area was the location of the City's five fires with the highest fire loss.

FIGURE 5-5: Area of Concentration of Reno Structure Fires



It appears that this area is ideal for a concentrated effort that focuses on reducing the occurrence of fire. CPSM believes that enhanced code enforcement efforts, concentrated public outreach, directed prefire planning, smoke detector distribution, and in-service company inspections would have a significant impact on reducing fire incidents in this area.

Recommendation: RFD should develop an integrated risk management plan that focuses on structure fires in areas of the community that demonstrate the highest risk of occurrence. (Recommendation No. 16.)

The downtown area depicted in Figure 5-5 clearly shows a concentration of structure fires. The key to future prevention is to drill down on these incidents to determine if any patterns or

similarities exist regarding the cause of these incidents. Questions that could be investigated include: Are there seasonal trends; do fires frequently involve cooking or heating appliances; are there certain demographic groups involved, such as the elderly or certain ethnic groups; are fires concentrated in rental properties? Identifying trends or patterns thus points the way to opportunities to concentrate code enforcement, inspections, or public outreach efforts that could impact these outcomes.

RFD has a significant workload, the majority of which is EMS-related. RFD has recognized this fact and has begun in recent years to deploy two-person EMS rescue and squad units to better manage this workload. CPSM recognizes this effort as a ***Best Practice*** and believes that a continued effort in this regard is warranted. In addition, RFD is deploying a single resource to most incidents. For the 12-month evaluation period, it was determined that on most incidents, both fire and EMS, RFD dispatched a single unit. Overall, about 97 percent of all incidents in Reno are handled by a single unit response. CPSM believes this is also a ***Best Practice*** and should be continued. Figures 5-6 and 5-7 illustrate the breakout of unit responses for EMS and fire call types, respectively.

FIGURE 5-6: Number of Units Dispatched – EMS

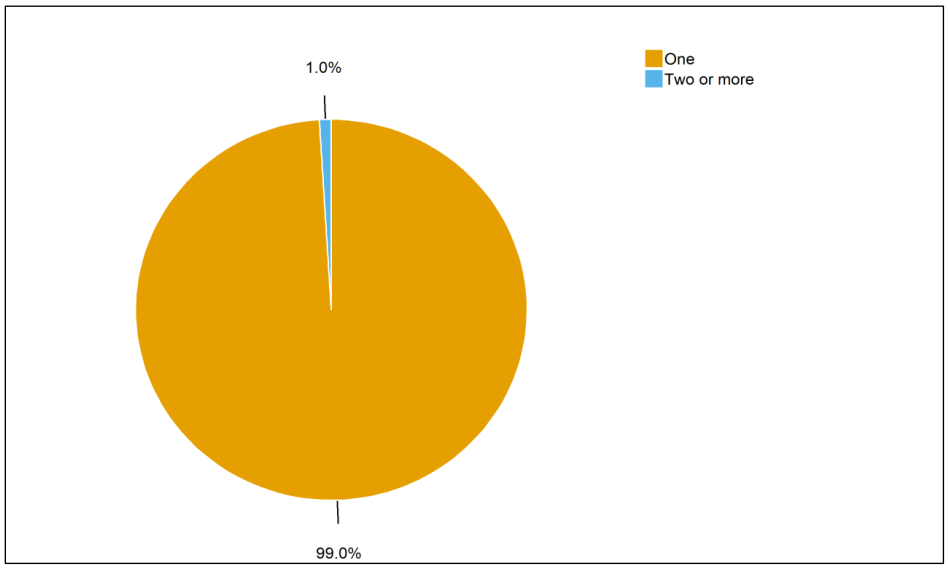


FIGURE 5-7: Number of Units Dispatched – Fire

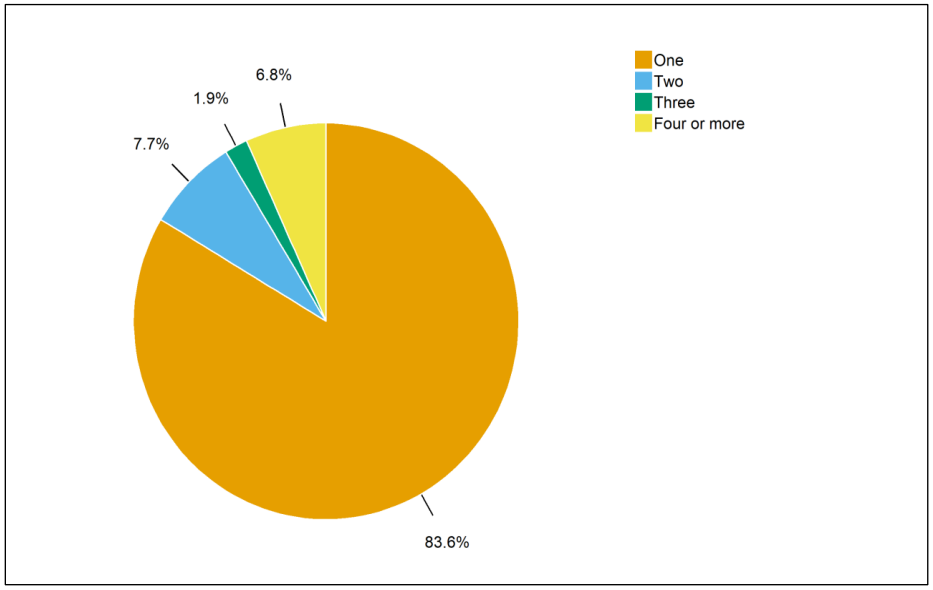


TABLE 5-5: Number of Units Dispatched to Calls by Call Type

Call Type	Number of Units			Total Calls
	One	Two	Three or More	
Breathing difficulty	3,631	2	1	3,634
Cardiac and stroke	3,794	55	1	3,850
Fall and injury	5,906	20	0	5,926
Illness and other	4,490	44	18	4,552
MVA	3,087	73	35	3,195
Overdose and psychiatric	871	7	0	878
Seizure and unconsciousness	5,939	18	1	5,958
EMS Total	**27,718**	**219**	**56**	**27,993**
False alarm	1,783	211	34	2,028
Good intent	314	20	45	379
Hazard	309	28	88	425
Outside fire	374	51	101	526
Public service	1,115	30	8	1,153
Structure fire	167	31	149	347
Fire Total	**4,077**	**376**	**425**	**4,878**
Canceled	126	11	17	154
Mutual aid	46	10	5	61
Total	**31,967**	**616**	**503**	**33,086**
Percentage	**96.6**	**1.9**	**1.5**	**100.0**

Observations:

Overall

- On average, 1.1 units arrived to all calls; for 97 percent of calls only one unit arrived.
- Overall, three or more units arrived for 2 percent of calls.

EMS

- For EMS calls, one unit arrived 99 percent of the time, and two or more units arrived 1 percent of the time.
- On average, 1.0 unit arrived per EMS call.

Fire

- For fire calls, one unit arrived 84 percent of the time, two units arrived 8 percent of the time, three units arrived 2 percent of the time, and four or more units arrived less than 7 percent of the time.
- On average, 1.4 units arrived per fire call.
- For outside fire calls, three or more units arrived 19 percent of the time.
- For structure fire calls, three or more units arrived 43 percent of the time.

EMS Response and Transport

EMS calls make up the predominant workload within the RFD system. As already mentioned, over 67 percent of all call activities reviewed in our analysis involve EMS-related responses (including MVAs). In addition, it was determined that of the more than 8,500 canceled calls, the majority of these were EMS-related. In total then, we estimate that EMS-related calls account for more than 80 percent of the RFD call activity. RFD operates in a two-tiered EMS delivery system in cooperation with REMSA (Regional Emergency Medical Service Authority). REMSA is a private, non-profit, fully integrated health care provider that has an exclusive franchise to provide all ground and air ambulance service in Washoe County, including the City of Reno. REMSA has been operational since 1986 and operates as a ***"Public Utility Model."*** REMSA contracts and has oversight of an EMS contractor, Regional Ambulance Service Inc. (RASI), which is responsible for the delivery of EMS prehospital care and advanced life support (ALS) ambulance transport services. Both REMSA and RASI operate under franchise agreements with the Washoe County Health District, which provides oversight of their operations.

The level of oversight and coordination among REMSA, RFD, and the Health District is somewhat limited; however, the level of care that is provided under this arrangement is very effective. Though the Health District has attempted to inject itself as the coordinating and clinical control officer in managing EMS prehospital care in Washoe County, it has only attained a limited role as a regulatory entity in its administration of the franchise agreement with REMSA. REMSA, however, has maintained significant autonomy and has been able to manage its operations independent of any significant oversight from the Health District or local government.

The arrangement in Reno involving REMSA and the Health District is interesting and unique. Though the system has a single ambulance provider, common protocols, and centralized coordination from the County Health District, the system operates in an independent and decentralized fashion. It was only recently (2018) that the system first established a common set of medical protocols.

The agencies provide centralized reporting of their ePCR data through the National Emergency Medical Services Information System (NEMSIS) database. This information is reviewed by the Health District on a monthly basis. All quality assurance is carried out independently by each agency, with limited transparency. The system as a whole does not utilize a common set of performance measures that monitor clinical performance or patient feedback.

Each agency uses independent medical control (Medical Directors), radio communications does not facilitate unit-to-unit communications, and the 911 dispatching process is somewhat disjointed. REMSA conducts a call-screening and medical priority dispatching, but this information is very seldom passed on to the fire agency first responders.

From a positive perspective, however, the quality of care is very good, and services are consistent throughout the district, notwithstanding the difference normally expected in urban versus rural service zones. Response times are realistic, costs for transports are relatively low, the system operates without government subsidies or tax revenues, and service is reliable. From this perspective it is hard to justify a significant overhaul or modification to the current process, as it is reliable and provides quality care to the community and its visitors. We do believe that aside from the recommended changes for unit-to-unit radio communications, coordination of call prioritization, and the dispatching process, the only additional recommendation that is needed is in the area of a common and centralized quality review and quality assurance process of clinical procedures.

Recommendation: RFD, REMSA, and the Health District should move to a centralized quality assurance and quality review process for all medical care procedures and protocol adherence among first response agencies and the ambulance transport provider. (Recommendation No. 17.)

It is a logical progression that this service should be provided by the Health District; however, both REMSA and RFD have been reluctant to provide additional oversight responsibilities to the Health District. CPSM believes that this aspect of review is critical to ensure quality patient care and consistency in service provision and should be implemented in a manner that is viable and functional among the key service providers.

Many agencies often struggle with the question of maintaining EMS first response at the ALS level or if a BLS-level first response is more appropriate. RFD currently provides ALS response from seven of its 14 fire stations and has indicated an interest in expanding this effort. On those RFD units that do not provide ALS care, services are provided at the Advanced EMT (A-EMT) level. This is a high level of EMS first response and in most instances is sufficient to provide the treatment that is needed for optimum patient care.

CPSM has observed a number of ALS first response systems that are beginning to question the effectiveness of ALS first response over BLS first response. In fact, a number of recent clinical studies have found that there are limited impacts on patient outcomes when EMS first response services are at the BLS level vs ALS.[31] The ability to provide ALS first response care is significantly more expensive than BLS first response or A-EMT first response. These costs are a result of the additional equipment that is required in the delivery of ALS care and the level of training required for paramedics versus EMTs. In addition, most systems pay higher pay to paramedics maintaining this higher level of certification. In the RFD system, paramedics receive a 6 percent

31. https://www.amr.net/about/medicine/articles/outcomes-of-als-vs-bls.pdf, https://sjtrem.biomedcentral.com/articles/10.1186/1757-7241-18-62

pay adjustment over A-EMTs for maintaining their paramedic certification. Paramedics are maintained at the following fire stations:

- Station # 1
- Station # 3
- Station # 6
- Station # 7
- Station # 9
- Station # 11
- Station # 12
- Station # 21

The placement of RFD ALS units appears to be concentrated in the core areas of the City and aligned with those areas that generate the highest EMS call volumes. However, Reno does not adjust its response of ALS units on the basis of call severity. ALS units will typically respond to only those calls in their immediate geographic response zone regardless as to whether the call type is ALS or BLS. In addition, the placement of ALS units does not take into consideration the corresponding response patterns and coverage provided by REMSA units.

From these perspectives, it appears that RFD is deploying its ALS units with little regard to the actual impacts of having ALS versus A-EMT response and instead is attempting to move towards a full ALS response deployment rather than a strategic ALS/A-EMT deployment that places and utilizes its ALS resources where this level of care is most warranted. CPSM believes that RFD should re-evaluate the use and distribution of its ALS units and determine if there is any measurable benefit in providing ALS care over the care provided by A-EMTs.

> ***Recommendation: RFD should reevaluate its efforts to expand the number of ALS first response units that are operational in the City. (Recommendation No. 18.)***

In addition, Reno is similar to many communities that are experiencing a changing demographic in which the population is growing older and thus more likely to utilize EMS services. This fact is compounded by the ever-evolving healthcare and medical insurance industries, which tend to foster an increase in the frequency with which residents first utilize municipal-based emergency responders for their basic healthcare needs. The nearly universal awareness of the 911 system and the more frequent utilization of this service to address a full array of individual needs results in a higher utilization of the EMS first response network.

Another key issue in the EMS delivery system is the type of vehicle that is utilized in responding to the cross-section of calls for service. There is a cost benefit in utilizing smaller, more fuel-efficient vehicles for the more frequent EMS and public service call activity. In addition, smaller units are more maneuverable and can achieve faster response times than larger fire apparatus, especially ladder trucks. There is also a perceptual benefit in the community in responding an alternative response vehicle to EMS calls rather than larger fire apparatus.

A number of communities are looking at the deployment of ladders and fire trucks for EMS calls and opting instead to use an alternative response vehicle, ambulance, or squad unit (see, for example, Tualatin Valley Fire Rescue, "CARS" Program; and the Shreveport Fire Department, "SPRINT" Program). The RFD has begun to address this issue and is utilizing its two rescue units and an additional squad unit to handle the high volume of EMS calls for service. CPSM believes that

the deployment of these alternative response vehicle, each staffed with two personnel, is a viable and efficient deployment practice that CPSM considers a ***Best Practice***. It should be continued.

At the same time, RFD only utilizes dedicated staffing on its rescue vehicles. CPSM believes that there are a number of options in which a ***cross-staffing*** concept can be utilized to improve efficiency and reduce the wear and tear on fire apparatus. Cross-staffing is a deployment concept in which the same crew of on-duty personnel are utilized to staff and deploy on multiple apparatus types. This is frequently done in the deployment of Brush Units, EMS Squad Units, Heavy Rescue, Special Operations, Technical Rescue, Air and Light units, Water Entry, etc. In a cross-staffing approach depending on the dispatched call type, the crew would respond on the most appropriate apparatus type that are housed at their particular station. We feel that the concept of cross-staffing should be considered in the deployment of the City's two ladder trucks.

In a review of the response activities of the City's two ladder trucks during the 12-month evaluation period, it was determined that these units responded to a combined total of 4,116 incidents. We found that only 243 of these responses were to structure fires, the incident type for which the specialized aerial equipment on these vehicles is most likely to be utilized. From this perspective, it was determined that nearly 94 percent of the ladder truck response activities were to incident types in which that ladder apparatus was not needed and, in fact, most responses were EMS related. Table 5-6 shows the number of annual runs and call types to which RFD ladder trucks responded.

TABLE 5-6: Truck Company Annual Runs and Call Types

Unit ID	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
Truck-1	1,030	389	69	101	78	92	163	325	5	2,252
Truck-3	1,062	133	58	91	46	101	80	291	1	1,864
Total	2,092	522	127	192	124	193	243	616	6	4,116

CPSM believes that a cross-staffing model that utilizes ladder personnel (eight people daily) can better serve the needs of the City if these personnel were deployed on four alternative response units (squad-type vehicles). This process would reduce significantly the wear and tear on both ladder trucks and would expand the deployment capacity of the on-duty staff as the department would be able to operate four additional squad units on a daily basis.

> ***Recommendation: RFD should move to a cross-staffing model that utilizes personnel currently assigned to the City's two ladder trucks to deploy on alternative response vehicles (squad units) when the call type and service needs merit this type of response. (Recommendation No. 19.)***

The cross-staffing concept is not a unique concept in the RFD, as all brush units, the hazardous materials unit, technical rescue and water entry are cross-staffed with engine personnel.

An analysis of repair costs for fire apparatus compared to lighter weight alternative response vehicles and squads offers a striking contrast. The cost comparisons shown in Table 5-7 were utilized by the Shreveport Fire Department in helping to make its decision to initiate its Sprint program, which is a cross-staffing model.

TABLE 5-7: Fire Apparatus-Small Vehicle Maintenance/Response Cost Comparison

Service	Fire Apparatus (Engine)	Alternative Response Vehicle
Oil and filter change	$175	$25.95
Set of tires	$1,800	$625
Complete brake job	$3,600	$270
Battery replacement	$429	$53.95
Alternator replacement	$1,195	$125
Windshield replacement	$2,400	$600
Fuel efficiency	3-5 MPG	15-20 MPG

CPSM believes that the percentage of EMS call activities will continue to grow and become an even larger portion of the overall emergency response workload in Reno.

The concepts in prehospital emergency medical care are rapidly evolving as more evidence-based research becomes available on the efficacy and effectiveness of traditional EMS models. Two of the more widely-held EMS system response beliefs have been challenged by this research are:

- Faster response times improve patient outcomes.
- The more paramedics in an EMS system the higher the level of care.

Four recent studies evaluated the impact of response times on patient outcomes; findings consistently point to the fact that there is very little, if any association, between EMS response times and patient outcomes.[32] Further, a 2008 statement developed by the Consortium of U.S. Metropolitan Municipalities EMS Medical Directors published in Pre-hospital Emergency Care Journal contains the following:

> "*Over-emphasis upon response-time interval metrics may lead to unintended, but harmful, consequences (e.g., emergency vehicle crashes).*"[33]

As EMS systems were initially developed, the concept of a paramedic on every call seemed logical. This concept led to the development of ALS first response. It is thought that the evidence for an ALS first response model was derived, for the most part, from early research that showed improved cardiac arrest outcomes with an ALS response time of eight minutes or less.[34] At the time of this study (1979), only paramedics could perform defibrillation. Today, automated external defibrillators (AEDs) are commonplace and are used effectively by bystanders. In fact, most current research indicates that the initiation of CPR and AED use by bystanders are the most significant survival predictors for out-of-hospital cardiac arrest (OHCA) victims.[35]

Conversely, there have been several published studies that indicate that when there is an excess of paramedics on an EMS call, and there are more paramedics operating in an EMS

32. See: https://www.ncbi.nlm.nih.gov/pubmed/15995089
https://www.ncbi.nlm.nih.gov/pubmed/19731155
https://www.ncbi.nlm.nih.gov/pubmed/12217471
https://www.ncbi.nlm.nih.gov/pubmed/11927452
33. Prehospital Emergency Care 2008;12:141–151
34. JAMA. 1979 May 4;241(18):1905-7
35. https://www.ncbi.nlm.nih.gov/pubmed/28427882

system, there is a ***negative*** impact on patient outcomes.[36] While initially this may seem counter-intuitive, the reality is that the performance of critical ALS skills requires regular practice on real patients.

When paramedics are assigned to every response vehicle and they are assigned to every service district in the jurisdiction, there is very little likelihood that an individual paramedic assigned to the slower service response areas will encounter a high number of critical patients that require these advanced services. However, when paramedics are utilized selectively and assigned to only the most critical patients, the frequency with which they use advanced medical procedures and critical treatment protocols is expanded dramatically. Think of it this way: If you need to select a cardiac surgeon, are you likely to choose the surgeon that conducts one procedure a month or the one who conducts 20 procedures a month? The ability to develop and maintain critical life-saving skills are enhanced and more readily monitored when these services are provided by a limited number of individuals.

The position statement of the Consortium of U.S. Metropolitan Municipalities' EMS Medical Directors contains the following provision:

> *"As more paramedics are added to a particular system, however, the frequency with which each individual paramedic has the opportunity to assess and manage critically ill or injured patients in the primary or "lead" paramedic role may decrease. Pragmatically, considering that ALS cases constitute a small minority of all EMS 9-1-1 responses, adding more paramedics into the system may actually reduce an individual paramedic's exposure to critical decision-making and clinical skill competencies."*[37]

Interestingly, EMS systems that are widely recognized for their exceptional outcomes on critical patients, such as Seattle (King County) and Milwaukee, actually limit the number of paramedics operating in these EMS systems. The theory is it is better to have a few, very well-experienced paramedics than a large number of paramedics who rarely practice their critical skills.

Evolved EMS systems have revised response configurations based on quality emergency medical dispatch processes, deemphasizing speed as a proxy for quality service. These systems liberally use non-lights and siren responses and reserve precious ALS first response resources for the few calls in which the rapid arrival of an EMS unit may make a life or death difference. The key component in making this distinction is the utilization of an effective and coordinated call screening and emergency medical dispatching process.

In our analysis of the response patterns of RFD units, it was found that on virtually all EMS responses, RFD units respond "*HOT,*" that is, with lights and sirens. In the current dispatch process, 911 calls in the City are initially received by Reno Public Safety Dispatch. Once the Reno Center determines that the call is EMS in nature, it will dispatch an RFD unit and pass the call on to the REMSA dispatch center. REMSA then does a comprehensive call-screening process to determine the severity of the call and determine if the mode of response should be altered. Unfortunately, the information obtained regarding call severity is rarely passed on to RFD units; subsequently, all RFD responses are hot. The inability to disseminate this critical call information is problematic for a number of reasons. First and foremost, responding through urban centers with lights and sirens increases the potential for vehicle accidents involving both emergency response units and private citizens.

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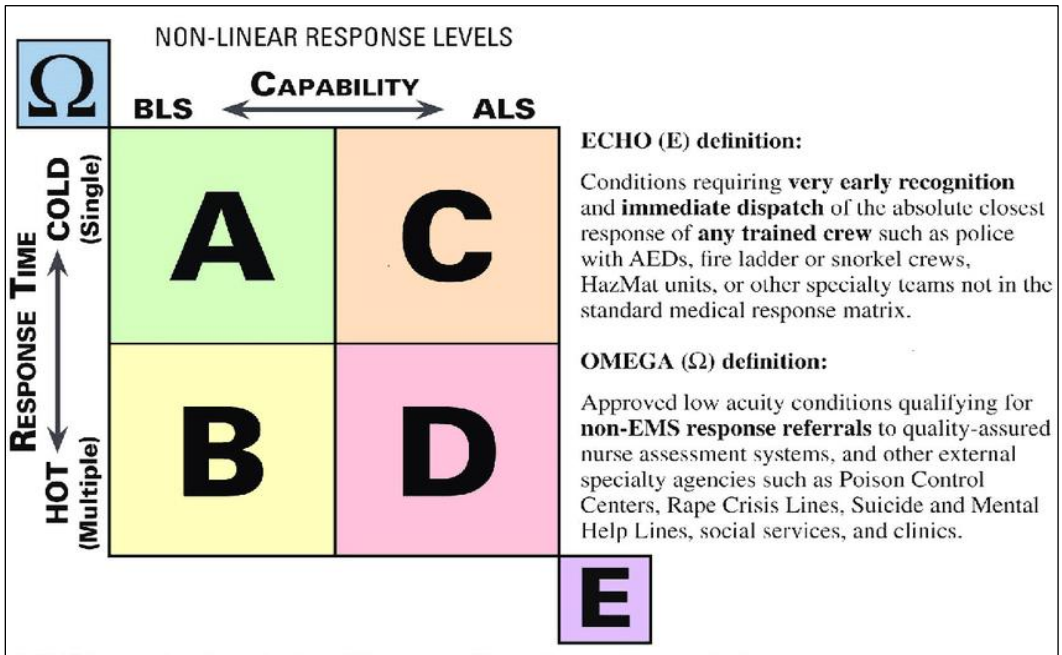
36. See: https://www.ncbi.nlm.nih.gov/pubmed/19499471
https://www.ncbi.nlm.nih.gov/pubmed/18584496
37. *Prehospital Emergency Care* 2008;12:141–151.

In a recent report compiled by the National Highway Traffic Safety Administration (NHTSA), entitled: "Lights and Sirens Use by Emergency Medical Services (EMS): Above All Do No Harm,"38 revealed that HOT responses are inherently dangerous, do not result in changes of patient outcomes, and should be limited to only time-life critical events. The study goes on to recommend that HOT responses should be less than 50 percent of all EMS responses.

Our observations and national statistics indicate that when medical priority dispatching systems are fully functional, the number of Priority 1 calls that necessitate a "HOT" response are dramatically reduced. We have also observed in in a number of urban EMS delivery systems that responding fire officers and paramedics are given the latitude to alter their mode of response on the basis of the dispatch call-screening process and dispatcher notes and their familiarity with the caller.[39] As a result of this discretion, the ensuing response patterns have been altered so that "HOT" responses are being reduced significantly to about 20 percent of the total call activity.[40]

In addition to modifying the response mode, there is also the option to actually ***eliminate*** the fire department's response completely for those very minor EMS call types or public assist calls in which a single ambulance response is sufficient. This point is critical, as government entities are frequently faced with requests for additional EMS response capabilities because of the volume of EMS call activity. Figure 5-8 is a graphic developed by the International Academies of Emergency Dispatch that provides guidance regarding the mode of response and resources deployed on the basis of the call-screening and call-prioritization process.

FIGURE 5-8: MDPS Response Matrix



BLS: Basic Life Support.
ALS: Advance Life Support.
Ω: MPDS OMEGA determinant level.
C: MPDS CHARLIE determinant level.
A: MPDS ALPHA determinant level.
D: MPDS DELTA determinant level.
B: MPDS BRAVO determinant level.
E: MPDS ECHO determinant level.

38. https://www.ems.gov/pdf/Lights_and_Sirens_Use_by_EMS_May_2017.pdf
39. See Sugar Land Fire-Rescue, a suburb of Houston TX.
40. Ibid.

In the current call-screening process in Reno, there is a clear disconnect between the dispatch call-screening process and conveying this information to responding RFD units. CPSM believes that the communication link between the REMSA call-screening process and responding RFD units should be enhanced.

Recommendation: RFD and REMSA should develop a process in which the call-screening process and call priority determinants established by the REMSA dispatch center are communicated directly to responding RFD units. (Recommendation No. 20.)

In discussion with RFD and REMSA officials, we found that there is currently the technical capability for the REMSA dispatch center and RFD responding units to talk directly over the existing radio communication network. What has been lacking is the directive from both agencies to implement this vital communication link on a regular basis. In Section 8 of this study under the "Emergency Communications" (911), we discuss additional considerations in addressing the current inter-agency radio communication shortfalls between REMSA and RFD.

Mutual Aid/Automatic Response

Local governments use many types of intergovernmental agreements to enhance fire protection and EMS services. These arrangements take various shapes and forms and range from a simple automatic response agreement that will respond a single unit to a minor vehicle accident or EMS call, to a more complex regional hazardous materials team or a helicopter trauma service that involves multiple agencies and requires a high level of coordination.

It is important that fire departments are able to quickly access extra and/or specialized resources to manage significant events. In addition, because these types of incidents do not respect jurisdictional boundaries, they often require a coordinated response. Sharing resources also helps departments reduce costs without impacting service delivery. All of these situations point to the need for good working relationships with other fire and EMS organizations.

The geographic boundary of the City of Reno is elongated and borders multiple areas of Washoe County and the City of Sparks. Up until 2012, Reno and the Truckee Meadows Fire Protection District operated in a boundary-drop agreement and agency resources from both agencies were utilized to manage fire, EMS and other emergency events. This agreement was terminated in July 2012. At that time the two agencies severed their automatic response agreement and chose to serve their respective service areas independently. For larger or extended incidents, the agencies will utilize mutual aid to supplement on-duty resources.

CPSM was advised that the primary reason for the termination of the automatic response agreement centered on the different staffing policies that were used in the two agencies. Reno was using four-person staffing while Truckee Meadows utilized three-person staffing. Since 2012, the agencies have moved back to a limited joint response arrangement in which the agreement only requires the response of a single, closest unit from the neighboring jurisdiction. Under this arrangement, when multiple units are assigned to an incident, only one unit from the neighboring agency will respond. In this arrangement, other closer units are not activated and the host agency will respond with more distant personnel and equipment because of this limitation.

The issue surrounding four-person staffing is extremely contentious and often pits labor unions, fire chiefs, and city administrators, along with elected officials, against each other in determining the optimum deployment strategy for a community. The staffing issues center around the safety of firefighters, but it also impacts the size of the workforce and the level of overtime needed to

maintain this level of deployment. There is no doubt that during larger fires both in structures and in the wildland, a large workforce is needed to manage these events. The counterpoint to this is in managing the daily workload, in which EMS and non-emergency incidents predominate the call activity, four-person staffing provides little added benefit.

The issue of four-person staffing has compounded the ability to establish a fully functional joint response arrangement with the Truckee Meadows FPD. From our perspective, given the broad expanse of the jurisdictional boundaries, the distribution of resources and the frequency of call activity, the current arrangement limits the opportunity to efficiently draw upon neighboring resources in best serving the community. CPSM believes that the RFD and the citizens of Reno will be better served if the automatic response agreement with the Truckee Meadows FPD is re-instated.

> ***Recommendation: RFD should reestablish a full and unrestricted automatic response arrangement with the Truckee Meadows FPD. (Recommendation No. 21.)***

Workload Analysis

The current workload being handled by the Reno Fire Department is significant, with many units experiencing what can be classified as high to very high call volumes. CPSM considers units responding to more than 3,000 calls each year as having a high workload. Overall, RFD units are responding to approximately 141 calls each day.

The RFD operates from 14 fire stations with 20 primary response units. Combined, these units handled over 41,600 calls for service in the one-year period covered by this report. These 41,619 calls generated 51,521 runs or unit responses. On any given call there are multiple unit responses or "runs." For example, a single structure fire call will generate seven runs. There were six RFD units that responded to more than 3,000 calls in the 12-month evaluation period (E-1, SQ-1, E-2, E-3, E-4, and E-21). Engine 6 responded to nearly 3,000 calls (2,979).

However, given the relatively short call durations for both Fire and EMS calls (average of 15.5 minutes), the cumulative in-service time associated with this call activity was not exceedingly high. Tables 5-8 and 5-9 show the annual runs, call types, and deployed time for the primary RFD response units. Of note is the column labeled "***Avg. Deployed Min. per Day***", in Table 5-8, which shows that Engine 1, for example, which is the busiest unit in the City, is only involved in emergency response activities a total of 184 minutes (3.1 hours) each 24-hour duty day.

TABLE 5-8: Call Workload by Unit

Battalion	Station	Unit ID	Unit Type	Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Min. per Day	Total Annual Runs	Avg. Runs per Day
1	1	E1	Engine	12.5	1,119.3	184.0	5,394	14.8
		R1	Rescue	2.4	0.0	0.0	1	0.0
		SQ1	Squad	10.7	899.9	147.9	5,041	13.8
		T1	Truck	13.7	512.9	84.3	2,252	6.2
		Total		**12.0**	**2,532.1**	**416.2**	**12,688**	**34.8**
	2	B2	Brush Engine	31.3	45.4	7.5	87	0.2
		E2	Engine	16.1	1,124.3	184.8	4,180	11.5
		Total		**16.4**	**1,169.7**	**192.3**	**4,267**	**11.7**
	4	E4	Engine	13.5	892.5	146.7	3,975	10.9
		Total		**13.5**	**892.5**	**146.7**	**3,975**	**10.9**
	8	B8	Brush Engine	39.2	33.9	5.6	52	0.1
		E8	Engine	17.1	771.6	126.8	2,711	7.4
		Total		**17.5**	**805.6**	**132.4**	**2,763**	**7.6**
	9	B9	Brush Engine	10.6	2.5	0.4	14	0.0
		E9	Engine	17.1	530.7	87.2	1,861	5.1
		Total		**17.1**	**533.1**	**87.6**	**1,875**	**5.1**
	10	B10	Brush Engine	42.4	51.6	8.5	73	0.2
		E10	Engine	16.2	515.5	84.7	1,915	5.2
		Total		**17.1**	**567.1**	**93.2**	**1,988**	**5.4**
	11	B11	Brush Engine	26.6	18.2	3.0	41	0.1
		E11	Engine	17.4	457.8	75.2	1,574	4.3
		Total		**17.7**	**475.9**	**78.2**	**1,615**	**4.4**
	19	E19	Engine	0.2	0.0	0.0	1	0.0
		R19	Rescue	26.2	114.6	18.8	263	0.7
		Total		**26.1**	**114.6**	**18.8**	**264**	**0.7**
	Total			**14.5**	**7,090.7**	**1,165.6**	**29,435**	**80.6**
2	3	E3	Engine	14.6	1,283.1	210.9	5,264	14.4
		R3	Rescue	8.8	1.5	0.2	10	0.0
		SQ3	Squad	14.2	162.6	26.7	687	1.9
		T3	Truck	15.3	476.3	78.3	1,864	5.1
		Total		**14.7**	**1,923.5**	**316.2**	**7,825**	**21.4**
	5	E5	Engine	15.6	639.0	105.0	2,460	6.7
		Total		**15.6**	**639.0**	**105.0**	**2,460**	**6.7**
	6	B6	Brush Engine	61.1	43.8	7.2	43	0.1
		E6	Engine	16.0	781.0	128.4	2,936	8.0
		Total		**16.6**	**824.7**	**135.6**	**2,979**	**8.2**
	7	E7	Engine	18.6	97.6	16.0	315	0.9
		R7	Rescue	21.3	242.0	39.8	680	1.9

Battalion	Station	Unit ID	Unit Type	Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Min. per Day	Total Annual Runs	Avg. Runs per Day
		SQ7	Squad	21.1	15.4	2.5	44	0.1
		Total		**20.5**	**355.0**	**58.4**	**1,039**	**2.8**
	12	B12	Brush Engine	51.1	20.4	3.4	24	0.1
		E12	Engine	18.2	689.4	113.3	2,273	6.2
		Total		**18.5**	**709.8**	**116.7**	**2,297**	**6.3**
	21	B21	Brush Engine	32.0	35.2	5.8	66	0.2
		E21	Engine	15.1	1,053.3	173.1	4,177	11.4
		R21	Rescue	9.2	2.3	0.4	15	0.0
		SQ21	Squad	29.1	0.5	0.1	1	0.0
		UT21	Off-highway Vehicle	8.7	2.5	0.4	17	0.0
		Total		**15.3**	**1,093.7**	**179.8**	**4,276**	**11.7**
	112	RE112	Reserve Engine	10.6	0.5	0.1	3	0.0
		Total		**10.6**	**0.5**	**0.1**	**3**	**0.0**
	121	RE121	Reserve Engine	18.1	0.3	0.0	1	0.0
		Total		**18.1**	**0.3**	**0.0**	**1**	**0.0**
	Total			**15.9**	**5,546.6**	**911.8**	**20,880**	**57.2**
Total				**15.1**	**12,637.3**	**2,077.4**	**50,315**	**137.8**

TABLE 5-9: Annual Runs and Deployed Time by Call Type

Call Type	Avg. Deployed Min. per Run	Total Annual Hours	Percent of Total Hours	Avg. Deployed Min. per Day	Total Annual Runs	Avg. Runs per Day
Breathing difficulty	14.3	940.7	7.1	154.6	3,958	10.8
Cardiac and stroke	15.0	1,102.2	8.3	181.2	4,406	12.1
Fall and injury	16.0	1,762.9	13.3	289.8	6,591	18.1
Illness and other	15.3	1,335.7	10.1	219.6	5,231	14.3
MVA	20.8	1,401.9	10.6	230.5	4,050	11.1
Overdose and psychiatric	16.6	273.9	2.1	45.0	988	2.7
Seizure and unconsciousness	15.1	1,650.6	12.4	271.3	6,580	18.0
EMS Total	**16.0**	**8,468.0**	**63.8**	**1,392.0**	**31,804**	**87.1**
False alarm	15.1	741.2	5,6	121.8	2,941	8.1
Good intent	13.2	215.5	1.6	35.4	980	2.7
Hazard	22.7	476.9	3.6	78.4	1,259	3.4
Outside fire	28.7	771.4	5.8	126.8	1,612	4.4
Public service	18.0	454.1	3.4	74.6	1,512	4.1
Structure fire	37.3	1,000.4	7.5	164.4	1,611	4.4
Fire Total	**22.1**	**3,659.4**	**27.6**	**601.6**	**9,915**	**27.2**
Canceled	6.4	1,027.9	7.7	169.0	9,681	26.5
Mutual aid	62.2	125.4	0.9	20.6	121	0.3
Total	**15.5**	**13,280.8**	**100.0**	**2,183.1**	**51,521**	**141.2**

Observations:

Overall

- Total deployed time for the year was 13,280.8 hours. The daily average was 36.4 hours for all units combined.
- There were 51,521 runs, including 9,681 runs dispatched for canceled calls and 121 runs dispatched for mutual aid calls. The daily average was 141.2 runs.

EMS

- EMS runs accounted for 64 percent of the total workload.
- The average deployed time for EMS runs was 16.0 minutes. The deployed time for all EMS runs averaged 23.2 hours per day.

Fire

- Fire runs accounted for 28 percent of the total workload.
- The average deployed time for a fire run was 22.1 minutes. The deployed time for all fire runs averaged 10.0 hours per day. There were 3,223 runs for structure and outside fire calls combined, with a total workload of 1,771.8 hours. This accounted for 13 percent of the total workload.

- The average deployed time for outside fire runs was 28.7 minutes per run, and the average deployed time for structure fire runs was 37.3 minutes per run.

When we look at the availability rates of the responding units in Reno the pattern observed is very positive and indicative of a system that is well-managed and maintains an appropriate amount of resources to manage the existing workload. Most systems attempt to achieve an availability rate of between 85 and 90 percent. This means that on 85 to 90 percent of the calls, a unit is available to respond to an incident originating in its first due area. Availability rates are most often affected by simultaneous call activity, vehicle maintenance, meetings, or other reasons in which a unit is temporarily unavailable to respond to a call in its primary response area.

Table 5-10 shows the availability rates for the responding units in the RFD. As can be seen from this graphic, RFD units are available to respond to calls occurring in their primary districts on average about 94.2 percent of the time. This is a significant achievement given the size of the service area and the call volume.

TABLE 5-10: Station Availability to Respond to Calls

Station	Calls in Area	First Due Responded	First Due Arrived	First Due First	Percent Responded	Percent Arrived	Percent First
1	6,697	6,580	6,542	6,519	98.3	97.7	97.3
2	3,052	2,751	2,697	2,678	90.1	88.4	87.7
3	4,906	4,723	4,693	4,665	96.3	95.7	95.1
4	2,587	2,407	2,389	2,363	93.0	92.3	91.3
5	1,577	1,466	1,449	1,425	93.0	91.9	90.4
6	2,153	1,978	1,969	1,949	91.9	91.5	90.5
7	828	711	687	671	85.9	83.0	81.0
8	2,198	2,047	2,040	2,029	93.1	92.8	92.3
9	1,551	1,461	1,453	1,443	94.2	93.7	93.0
10	1,243	1,181	1,178	1,170	95.0	94.8	94.1
11	1,115	1,068	1,063	1,056	95.8	95.3	94.7
12	1,837	1,755	1,749	1,745	95.5	95.2	95.0
19	216	181	177	175	83.8	81.9	81.0
21	3,104	2,825	2,806	2,781	91.0	90.4	89.5
Total	**33,064**	**31,134**	**30,892**	**30,669**	**94.2**	**93.4**	**92.8**

Note: For each station, we count the number of calls occurring within its first due area. Then, we count the number of calls to which at least one RFD unit responded. Next, we focus on units from the first due station to see if any units responded, arrived, or arrived first.

Another indicator of workload is the frequency with which peak service demand is occurring. Peak demand can occur when there are multiple calls occurring simultaneously or when there are larger events that draw on the system's resources and additional calls continue to occur while resources are assigned to the larger incident. All systems experience peak service demands that strain the available resources in the system. This is why it is necessary for mutual aid and joint response agreements, and that is to help mitigate these occurrences.

The key to any deployment strategy is to have sufficient resources to handle the day-to-day call activities and have the system designed to adjust and respond effectively during those high

demand periods. In the Reno system, given the area being covered and the overall call volume, we would anticipate that throughout the year there would typically be five to six calls occurring within the same hour on a regular basis. This call activity can easily triple to 15 to 20 calls in an hour during periods of inclement weather, high traffic periods, and other times when call volume is higher than normal.

Table 5-11 is a compilation of ten busiest hours in the 12-month evaluation period and the numbers of calls occurring during each of those hours. It must be pointed out that, given the relatively short call duration in Reno (15.5 minutes), it is very likely that two calls can occur in an hour in the same service area and not overlap one another.

TABLE 5-11: Top 10 Hours with the Most Calls Received

Hour	Number of Calls	Number of Runs	Total Deployed Hours
6/7/2018, 10:00 a.m. to 11:00 a.m.	17	19	4.2
7/12/2018, noon to 1:00 p.m.	16	25	6.9
3/7/2018, 8:00 a.m. to 9:00 a.m.	16	21	4.4
11/15/2018, 5:00 p.m. to 6:00 p.m.	15	26	6.8
7/14/2018, 8:00 p.m. to 9:00 p.m.	15	24	4.4
4/9/2018, 4:00 p.m. to 5:00 p.m.	15	22	4.1
12/4/2018, 4:00 p.m. to 5:00 p.m.	15	20	5.6
6/2/2018, 5:00 p.m. to 6:00 p.m.	15	19	4.3
7/23/2018, 8:00 a.m. to 9:00 a.m.	15	18	4.9
12/26/2018, 7:00 p.m. to 8:00 p.m.	14	30	5.4

Note: Total deployed hours is a measure of the total time spent responding to calls received in the hour, and which may extend into the next hour or hours. The number of runs and deployed hours only includes RFD support and nonsupport units.

TABLE 5-12: Frequency Distribution of the Number of Calls

Calls in an Hour	Frequency	Percentage
0	241	2.8
1	629	7.2
2	1,020	11.6
3	1,268	14.5
4	1,296	14.8
5	1,132	12.9
6	1,008	11.5
7	827	9.4
8	518	5.9
9	366	4.2
10	208	2.4
11+	247	2.8
Total	**8,760**	**100.0**

There were frequent occurrences observed throughout the year in which a cluster of calls occurred within a given hour. We observed a total of 3,696 times (31.2 percent of all hours) in

which three to five calls occurred in a given hour. On 208 occasions, there were ten calls that occurred in the same hour. These hourly call rates are indicative of the high call volume in the Reno system. However, given the level of department resources and the short call durations for most responses, CPSM has determined that the ***RFD is very effective in managing its current workload***.

SECTION 6. RESPONSE TIME ANALYSIS

Response times are typically the primary measurement used in evaluating fire and EMS services. Most deployment models attempt to achieve a four-minute initial travel time for EMS calls and a full-force travel time of eight minutes for fire calls. A full-force travel time indicates the time it takes for the initial response of all resources assigned for the call to arrive on the scene.

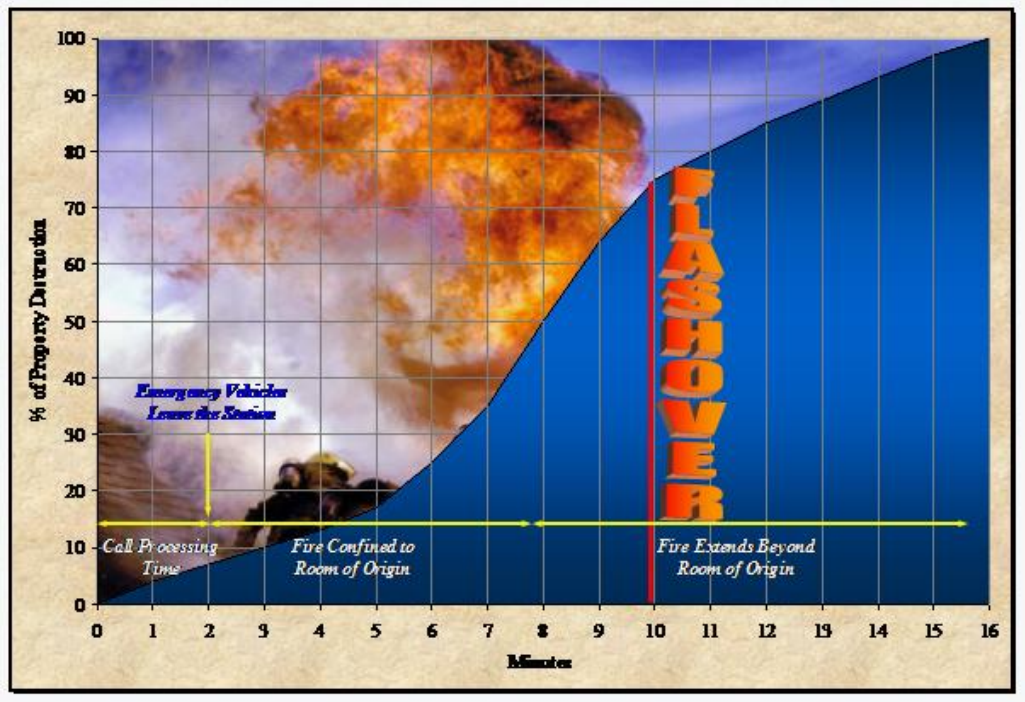
While these times have validity, the actual impact of a speedy response time is limited to very few incidents. For example, in a full cardiac arrest, analysis shows that successful outcomes are rarely achieved if basic life support (CPR) is not initiated within four minutes of the onset of the arrest. However, cardiac arrests occur very infrequently; on average these are 1 percent to 1.5 percent of all EMS incidents.[41] There are also other EMS incidents that are truly life-threatening and the time of response can clearly impact the outcome. These involve drownings, electrocutions, and severe trauma (often caused by gunshot wounds, stabbings, and severe motor vehicle accidents, etc.). Again, the frequency of these types of calls are limited.

Regarding response times for fire incidents, the frequency of actual fires in Reno (structure and outside fires) is very low, approximately 2.1 percent of all incidents. Actual structure fires were less than 1 percent of all calls, or 348 in the 12-month period evaluated. The criterion for fire response is based on the concept of "flashover." This is the state at which super-heated gasses from a fire in an enclosed area results in a near-simultaneous ignition of the combustible material in the area. In this situation, usually after an extended period of time (eight to twelve minutes), the fire expands rapidly and is much more difficult to contain. When the fire reaches this hazardous state, a larger and more destructive fire occurs. Figure 6-1 illustrates the flashover phenomenon and its potential for increased damage.

Another important factor in the whole response time question is what we term "detection time." This is the time it takes to detect a fire or a medical situation and notify 911 to initiate the response. In many instances, particularly at night or when automatic detection systems (fire sprinklers and smoke detectors) are unavailable or inoperable, the detection process can be extended. Fires that go undetected and thus able to expand in size become more destructive and are more difficult to extinguish.

41. Myers, Slovis, Eckstein, Goodloe et al. (2007). "Evidence-based Performance Measures for Emergency Medical Services System: A Model for Expanded EMS Benchmarking." *Pre-hospital Emergency Care*.

FIGURE 6-1: Fire Propagation Curve



MEASURING RESPONSE TIMES

There have been no documented studies that have made a direct correlation between response times and outcomes in fire and EMS events. No one has been able to show that a four-minute response time is measurably more effective than a six-minute response time. The logic has been "faster is better," but this has not been substantiated by any detailed analysis. Furthermore, the ability to measure the difference in outcomes (patient saves, reduced fire damage, or some other quantifiable measure) between a six-minute, eight-minute, or ten-minute response is not a performance measure often utilized in the fire service. So, in looking at response times it is prudent to design a deployment strategy around the actual circumstances that exist in the community and the fire problem that is perceived to exist. This requires a "fire risk assessment" and a political determination as to the desired level of protection for the community. It would be imprudent, and very costly, to build a deployment strategy that is based solely upon response times.

For the purpose of this analysis, ***response time*** is a product of three components: ***dispatch time***, ***turnout time***, and ***travel time***.

- *Dispatch time* is the time interval that begins when the alarm is received at the communication center and ends when the response information is transmitted via voice or electronic means to the emergency response facility or emergency response units in the field. Dispatch time is the responsibility of the 911 center and outside the control of RFD officials.
- *Turnout time* is the time interval that begins when the notification process to emergency response facilities and emergency response begins through 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 this segment of the total response time measurement.

- *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*, also known as total response time, is the time interval that begins when the call is received by the primary dispatch center and ends when the dispatched unit arrives on the scene to initiate action.

RENO RESPONSE TIMES

For this study, and unless otherwise indicated, our response time calculation measures the first arriving unit only. Typically, we track only those responses in which the unit is responding with lights and sirens (hot). Out of the 41,751 total calls, our response time analysis was based on a total of 32,471 calls. We excluded any canceled calls and mutual aid responses (8,637), 112 calls to which only administrative units responded, 20 calls that were determined to be out-of-area wildland assignments, 321 calls where no units recorded a valid on-scene time, 77 calls in which the first arriving unit response was greater than 30 minutes, 8 calls that did not record a unit response in an emergency priority, and 105 calls where one or more segments of the first arriving unit's response time could not be calculated due to missing or faulty data. On the basis of these calculations we determined:

- The average dispatch time for all calls within City corporate limits was 1.5 minutes (90 seconds).
- The average turnout time was 1.4 minutes (84 seconds).
- The average travel time was 4.9 minutes.
- The average total response time for EMS calls in the City was 7.8 minutes.
- The average total response time for fire category calls was 8.2 minutes.
- The average response time for structure fire calls was 7.1 minutes.
- The average response time for outside fire calls was 7.5 minutes.

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,* 2014 Edition, the alarm processing time or dispatch time should be less than or equal to 60 seconds 90 percent of the time. This standard also states that the turnout time should be less than or equal to 80 seconds (1.33 minutes) 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. Table 6-1 shows the average response time in minutes for the first arriving unit, by call type.

TABLE 6-1: Average Response Time of First Arriving Unit, by Call Type

Call Type	Dispatch	Turnout	Travel	Total	Number of Calls
Breathing difficulty	1.3	1.4	4.6	7.4	3,617
Cardiac and stroke	1.3	1.4	4.6	7.3	3,829
Fall and injury	1.5	1.5	5.3	8.2	5,845
Illness and other	1.5	1.4	4.9	7.8	4,486
MVA	1.7	1.4	4.7	7.8	3,143
Overdose and psychiatric	1.8	1.6	6.7	10.0	860
Seizure and unconsciousness	1.5	1.3	4.7	7.5	5,918
EMS Total	**1.5**	**1.4**	**4.9**	**7.8**	**27,968**
False alarm	1.5	1.6	4.9	8.0	2,016
Good intent	2.0	1.5	5.1	8.7	374
Hazard	1.9	1.5	5.3	8.7	423
Outside fire	1.5	1.5	4.4	7.5	519
Public service	1.9	1.5	5.7	9.0	1,099
Structure fire	1.5	1.5	4.0	7.1	342
Fire Total	**1.7**	**1.5**	**5.0**	**8.2**	**4,773**
Total	**1.5**	**1.4**	**4.9**	**7.8**	**32,471**

TABLE 6-2: Reno 90th Percentile Response Times

Call Type	Dispatch	Turnout	Travel	Total	Number of Calls
Breathing difficulty	2.3	2.4	7.4	10.3	3,617
Cardiac and stroke	2.4	2.4	7.1	10.2	3,829
Fall and injury	2.7	2.5	8.6	12.2	5,845
Illness and other	2.6	2.5	7.7	11.0	4,486
MVA	3.1	2.3	8.0	11.7	3,143
Overdose and psychiatric	3.1	2.5	13.6	17.2	860
Seizure and unconsciousness	2.6	2.3	7.4	10.7	5,918
EMS Total	**2.7**	**2.4**	**7.9**	**11.2**	**27,698**
False alarm	2.4	2.5	8.0	11.4	2,016
Good intent	3.6	2.4	8.3	12.6	374
Hazard	3.3	2.5	8.4	12.1	423
Outside fire	2.8	2.4	7.6	11.2	519
Public service	4.0	2.6	9.2	13.0	1,099
Structure fire	2.8	2.4	6.6	10.1	342
Fire Total	**3.1**	**2.5**	**8.2**	**11.9**	**4,773**
Total	**2.7**	**2.4**	**7.9**	**11.3**	**32,471**

Observations:

- The average dispatch time was 1.5 minutes.
- The average turnout time was 1.4 minutes.
- The average travel time was 4.9 minutes.
- The average total response time was 7.8 minutes.
- The average response time was 7.8 minutes for EMS calls and 8.2 minutes for fire calls.
- The average response time was 7.5 minutes for outside fires and 7.1 minutes for structure fires.
- The 90th percentile dispatch time was 2.7 minutes.
- The 90th percentile turnout time was 2.4 minutes.
- The 90th percentile travel time was 7.9 minutes.
- The 90th percentile total response time was 11.3 minutes.
- The 90th percentile response time was 11.2 minutes for EMS calls and 11.9 minutes for fire calls.
- The 90th percentile response time was 11.2 minutes for outside fires and 10.1 minutes for structure fires.

The ***NFPA 1710 standard*** further states the initial first alarm assignment (a total of 14 personnel for a single-family residential structure) should be assembled on scene in 480 seconds (8 minutes), 90 percent of the time (not including dispatch and turnout time). RFD responds an initial assignment of 20 personnel to a reported structure fire and this was addressed previously in this report. However, in looking at the RFD statistics on an initial first alarm assignment to structure fires, we found that of the 348 structure fires in which a first alarm assignment was dispatched, there were a total of 122 times in which a total of 14 personnel arrived at the scene. We would assume that for the remaining 226 incidents (348 – 122 = 226), the units were canceled in route because the fire was minor and the full initial assignment was not needed. Tables 6-3 and 6-4 provide an analysis of response to structure fires and the number of responders, including the arrival of the initial unit dispatched and the full assignment of 14 personnel.

TABLE 6-3: Average and 90th Percentile Travel Time for Structure Fires

Response Type	Travel Time in Minutes	
	Average	90th Percentile
First Arriving Unit	4.3	6.9
Full Complement of 14 Personnel	8.9	15.1

Note: In this section, travel time is calculated differently than in the other response-time tables. In those tables, an individual unit's in route and arrive timestamps were used to calculate the travel time for that unit, yielding a unit-level travel time. Here, in contrast, NFPA defines travel time as beginning from when the first unit goes in route – even if it is not the same unit that arrived first. Thus, this travel time corresponds to the travel time of an entire call, and not for a specific unit responding to a given call.

TABLE 6-4: Number and Percentage of Structure Fire Calls Meeting NFPA 1710

Response Type	Calls Meeting Standard		Number of Calls
	Number of Calls	Percent of Calls	
First Arriving Unit	174	50.0	348
Full Complement of 14 Personnel	73	59.8	122

Observations:

- Of the 348 structure fire calls, 122 of them had a full arriving complement of at least 14 personnel.
- The average travel time for the first arriving unit was 4.3 minutes, and the 90th percentile travel time was 6.9 minutes.
- The average travel time for the full arriving complement of at least 14 personnel was 8.9 minutes, and the 90th percentile travel time was 15.1 minutes.
- Of the 348 structure fire calls, the first arriving unit arrived within 4 minutes 174 times, or 49.7 percent of the time.
- Of the 122 structure fire calls that had a full arriving complement of at least 14 personnel, the full complement arrived within 8 minutes 73 times, or 59.8 percent of the time.

NFPA 1710 response time criteria are utilized by CPSM as a benchmark for service delivery and in the overall staffing and deployment of fire departments, and is not a CPSM recommendation. It is also our observation that agencies are seldom able to achieve the response time criteria established in this standard. The data observed in the Reno system are indicative of a system that is extremely proficient in its service delivery, yet it still is unable to meet the response time criteria espoused in NFPA 1710.

The fire station is a critical link in service delivery and where facilities are located is the single most important factor in determining overall response times and workload distribution. As noted previously, the fire department operates from 14 fire stations. The RFD fire stations are located as follows:

- Station 1: 495 EAST FOURTH
- Station 2: 2500 SUTRO
- Station 3: 240 W. MOANA LANE
- Station 4: 1096 RALSTON
- Station 5: 1500 MAYBERRY DR.
- Station 6: 3970 MIRA LOMA
- Station 7: 3050 SKYLINE BLVD.
- Station 8: 3600 KINGS ROW
- Station 9: 14005 MT. VIDA
- Station 10: 5250 N. VIRGINIA ST.
- Station 11: 7105 MAE ANNE AVENUE
- Station 12: 1190 STEAMBOAT PKWY
- Station 19: 2015 HAWK MEADOW TRAIL
- Station 21: 2501 MILL STREET

Figures 6-2, 6-3, and 6-4 illustrate these station locations and their respective travel distance projections: 240 seconds (indicated by the green overlay), 360 seconds (indicated by the amber overlay), and 480 seconds (indicated by the red overlay). These projections are based on actual road travel distances and the posted speed limits on these roadways.

FIGURE 6-2: Reno Station Locations and 240-seconds Travel Projection

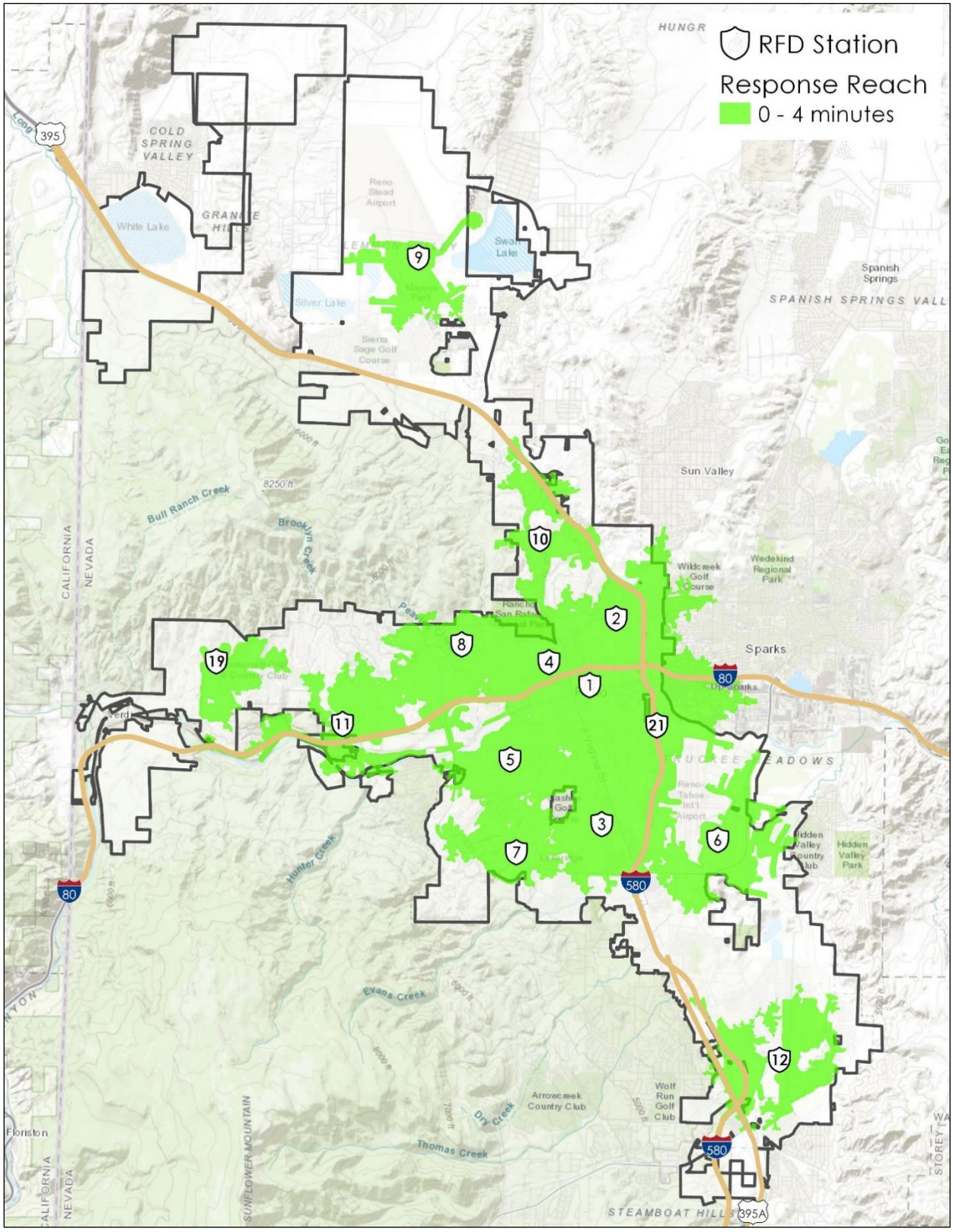


FIGURE 6-3: Reno Station Locations and 360-seconds Travel Projection

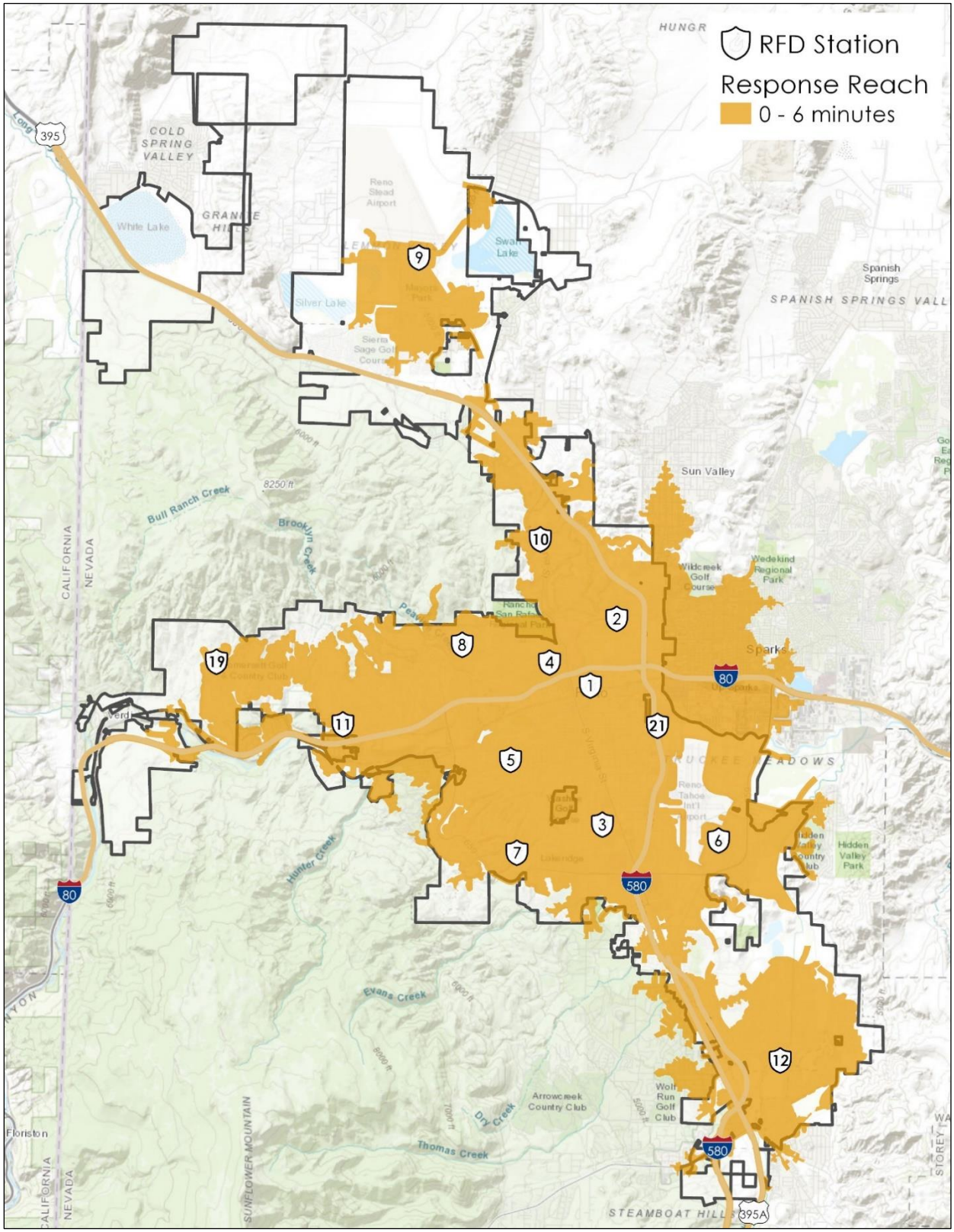


FIGURE 6-4: Reno Station Locations and 480-seconds Travel Projection

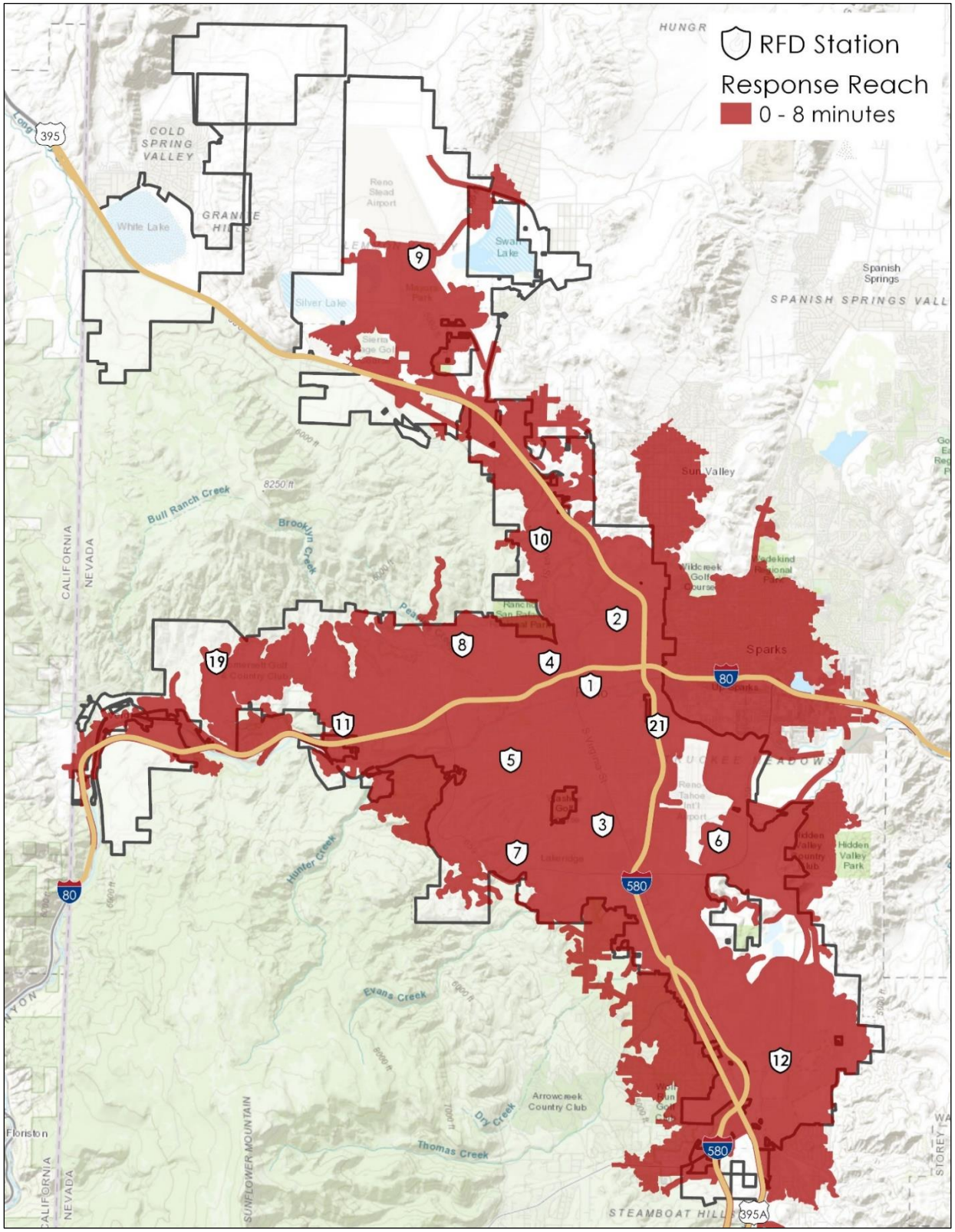
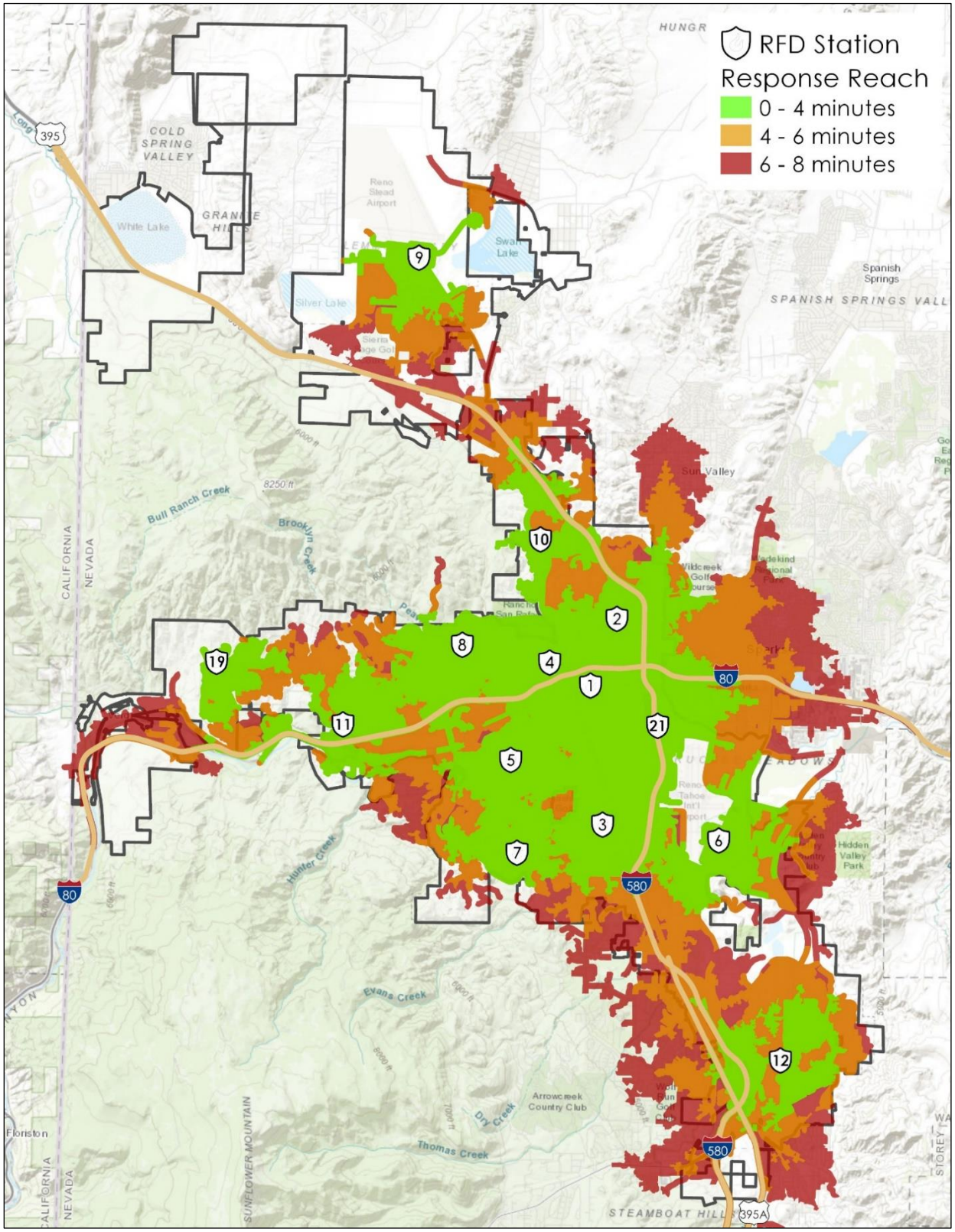


FIGURE 6-5: Reno City Station Locations and Composite Travel Distances



The figures show that approximately 50 to 60 percent of the developed areas of the City are covered under the 240-second benchmark. We would estimate that approximately 70 percent of the developed areas of the City are covered under the 360-second overlay and approximately 80 to 85 percent of the City is covered under the 480-second benchmark. ***These maps only depict travel distances and not actual response times.***

Figures 6-6, 6-7, and 6-8 show the actual locations of fire, EMS, and other emergency responses carried out by the Reno Fire Department. It is apparent from this graphic that most responses in Reno should result in travel times that are within four to six minutes. It also appears that the overall distribution of calls is generally equally dispersed throughout the existing service boundaries and the fire station distribution should provide suitable coverage to ensure an appropriate response outcome.

FIGURE 6-6: RFD Fire Runs

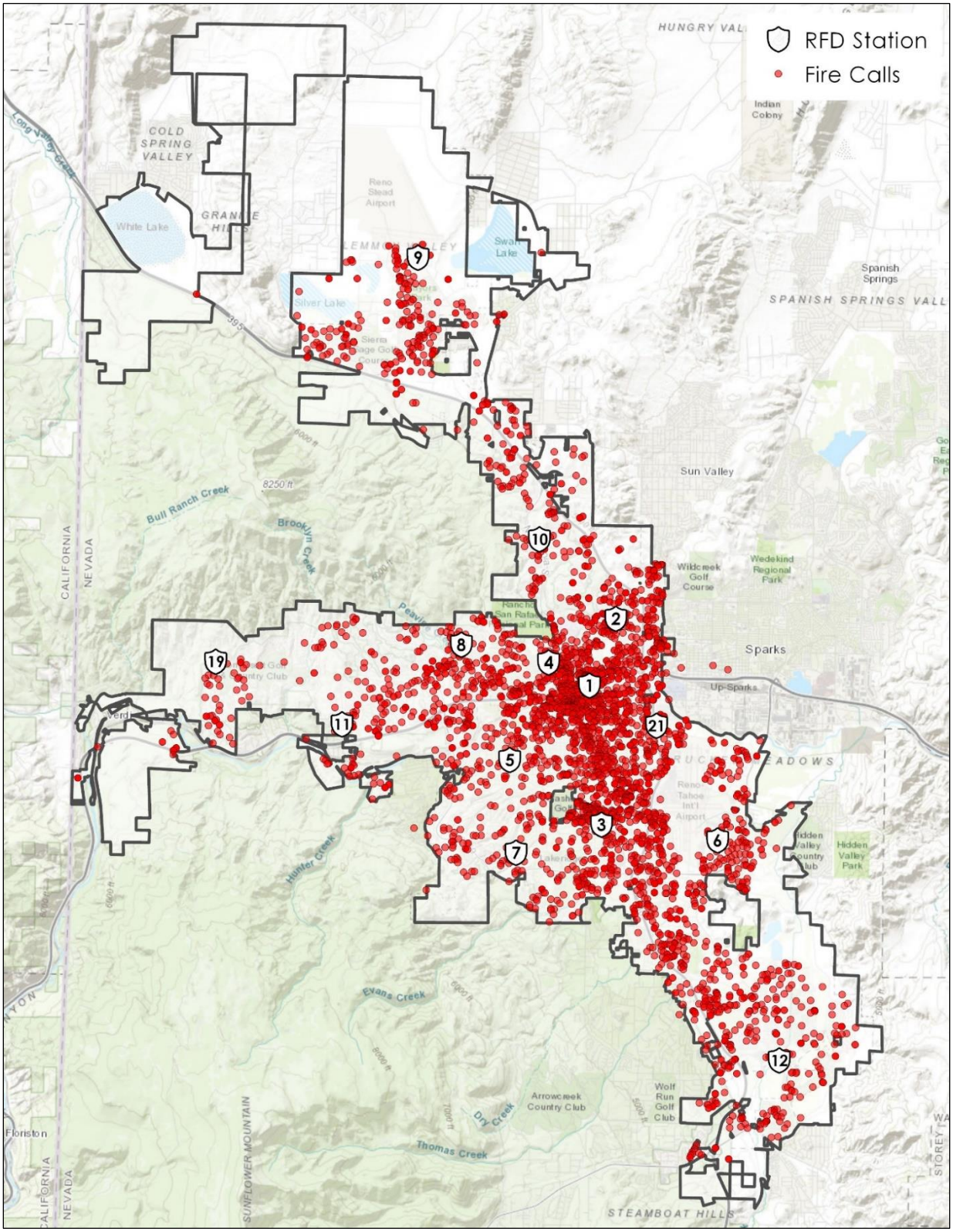


FIGURE 6-7: RFD EMS Runs

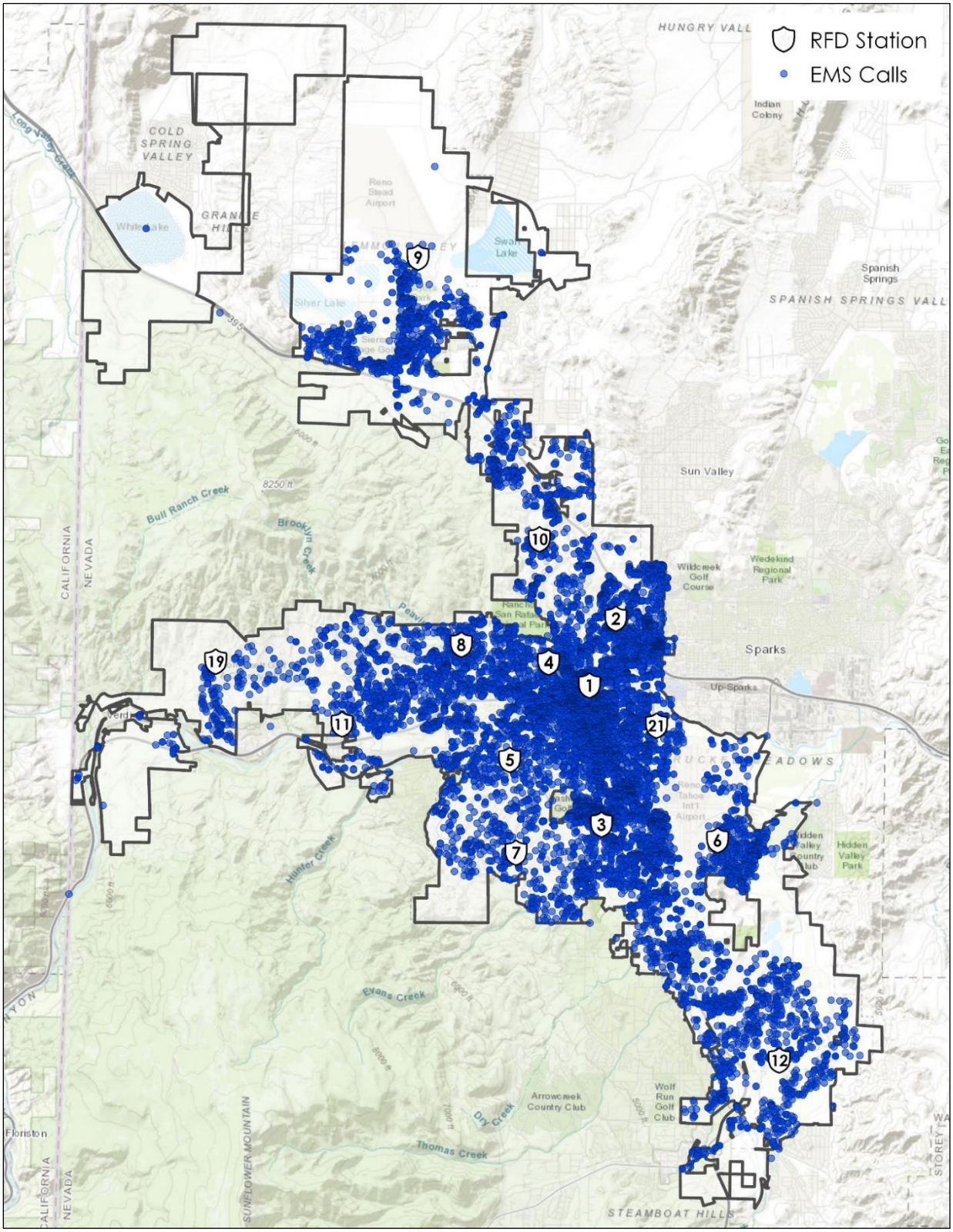
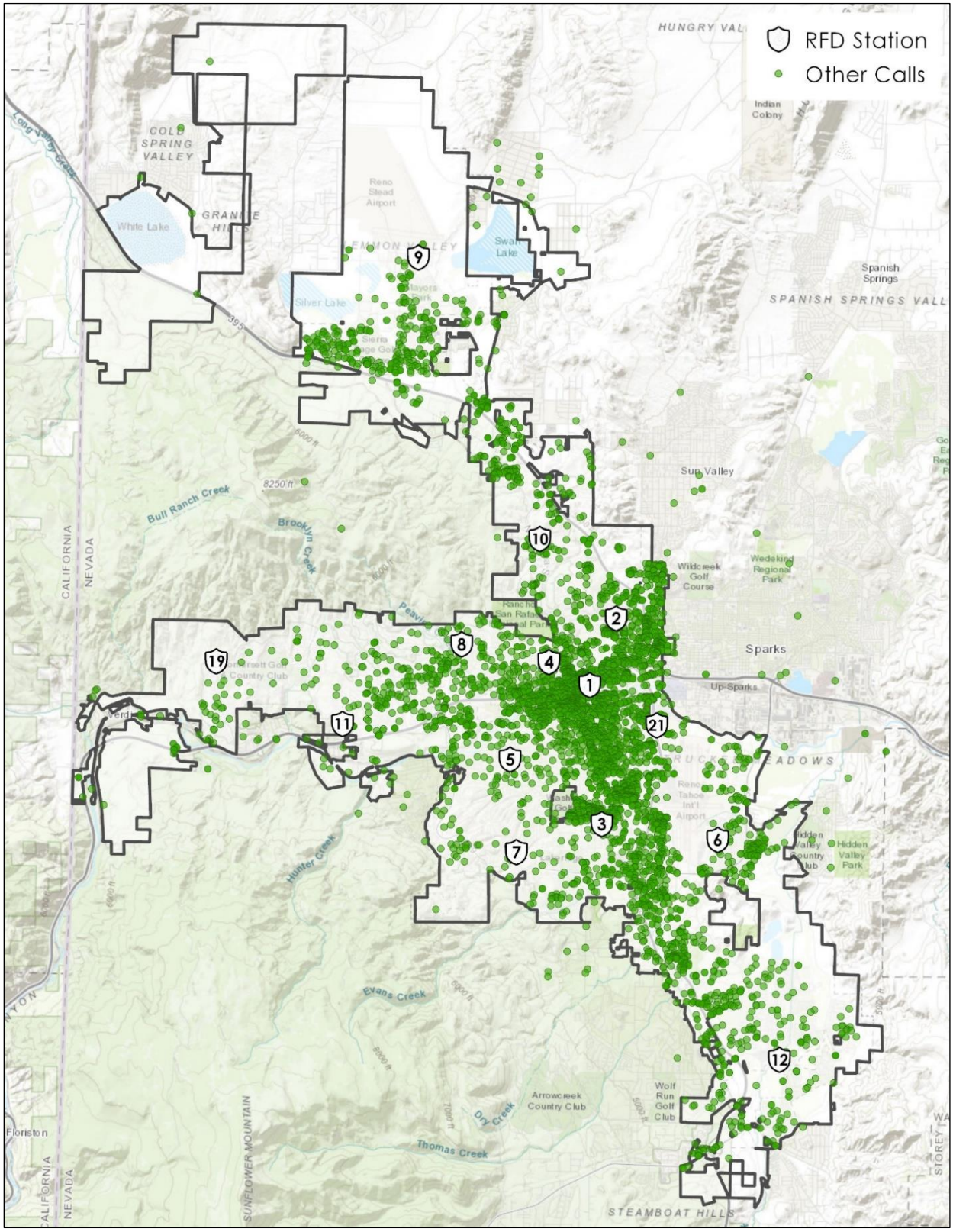
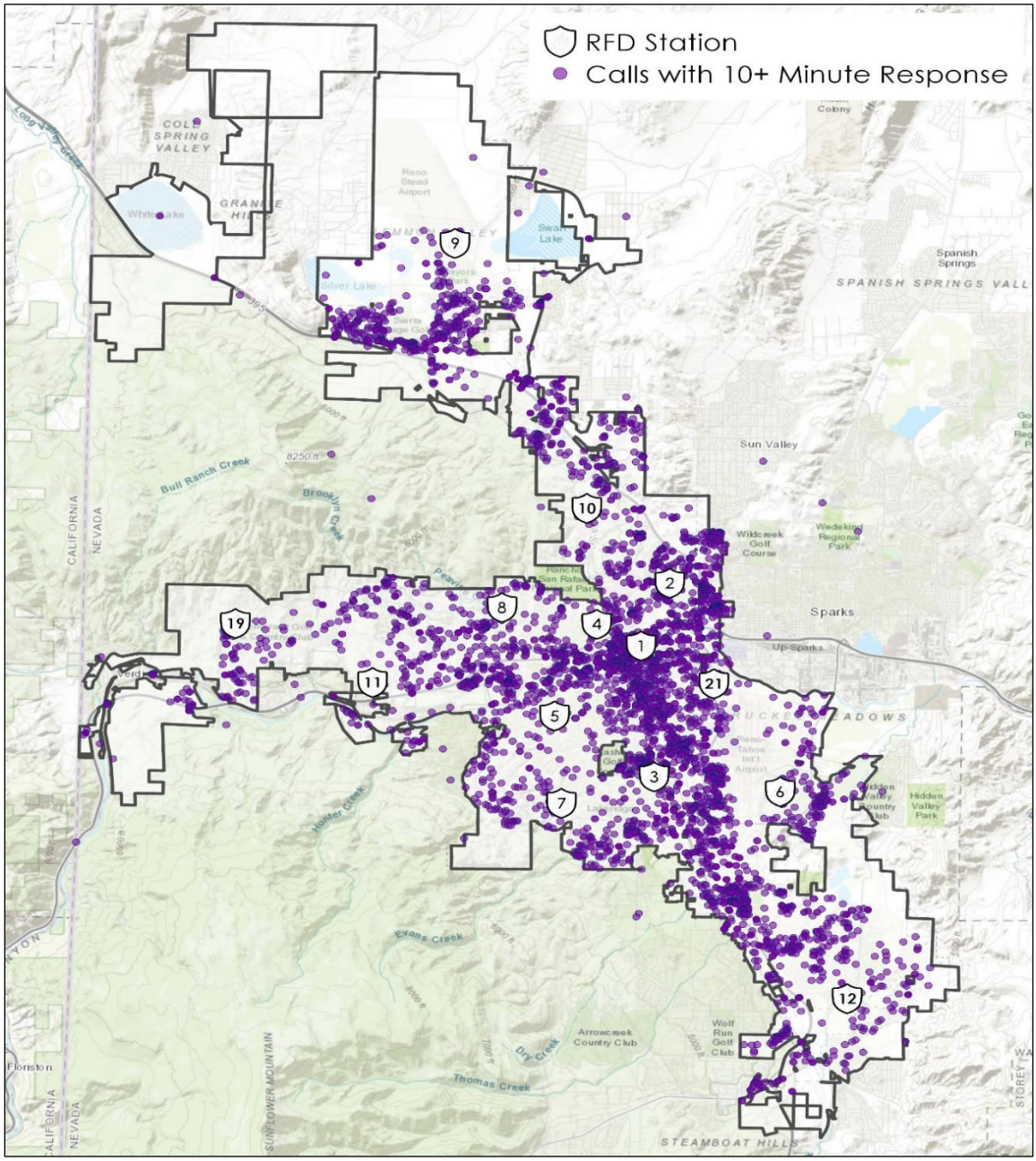


FIGURE 6-8: RFD Other Runs



In our analysis we also looked at those calls with extended total response times, that is, those response times greater than 10 minutes within City limits. We determined that approximately 17 percent of all responses resulted in a total response time greater than 10 minutes. Also surprising was the large volume of these calls that were generally in close proximity to existing facilities and resources. Figure 6-9 illustrates the 5,727 calls that had a total response time in excess of 10 minutes.

FIGURE 6-9: RFD Responses with Total Response Time Exceeding 10 Minutes



SECTION 7. PERFORMANCE MEASUREMENT

Fire suppression, prevention programs, and EMS service delivery need to be planned and managed so that these efforts achieve specific, agreed-upon results. This requires establishing a set of goals for the activities of any given program. 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 an organization with tools to assess performance and identify areas in need of improvement. In short, ***what gets measured gets improved***.

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?[42]

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, number of EMS calls, response times, etc.). 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. An explanation of these types of performance measures are shown in Table 7-1.

42. Grover Starling, *Managing the Public Sector*, (Cengage Learning), 396.

TABLE 7-1: The Five GASB Performance Indicators[43]

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.

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.*[44]

The RFD does utilize performance measures in limited applications but does not regularly publish or distribute these findings beyond the annual budget process. It is critical that RFD develop a series of internal reporting processes that provide a direct link to department goals or specific target measures. It is also critical that these measures be both quantitative and qualitative in nature and reflect on multiple areas of service delivery within the organization. This type of ongoing analysis and the monitoring of trends are most useful to justify program budgets and to measure service delivery levels.

Staff throughout the organization should participate in the development of any 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

43. From Harry P. Hatry et al., eds. *Service Efforts and Accomplishments Reporting: Its Time Has Come* (Norwalk, CT: GASB, 1990).
44 I. David Daniels, "Leading and Managing," in *Managing Fire and Emergency Services* (ICMA: Washington, DC: 2012), 202.

vice versa. For the same reason, the process of developing performance measures should include citizen input, specifically 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 identify clearly if the public's expectations are being met.

> ***Recommendation: RFD should implement a series of performance measures that enable ongoing review of service outcomes. The process of developing these measures should utilize input from RFD members, the fire union, the community, the City Council, and City Administration. (Recommendation No. 22.)***

Following are a number of performance measures that may be considered:

Operations:

- Response times (fire and percentile/average/frequency of excessive times).
  - Alarm/dispatch handling times.
  - Turnout times.
  - Travel times.
  - On-scene time.
  - Call duration.
  - Canceled in route.
- Workload measures
  - Emergency vs. nonemergency responses.
  - EMS transports—ALS/BLS.
  - Response to automatic fire alarms/frequency and outcomes.
  - Company inspections/area occupancy familiarization.
  - Fire preplanning.
  - Public education: contact hours/numbers by age group.
- Outcome measures
  - EMS/save rates/action taken.
  - Successful IVs and Intubations.
  - EMS protocol compliance.
  - Fire loss/limit of fire spread—point of origin, room of origin, etc.
  - On-duty injuries/workers' comp claims.
  - Lost time—sick/injury.
  - Vehicle accidents.
  - Equipment lost or broken.

Training:

- Fire and EMS hours.

- Officer development.
- Skills assessment compliance.
- Specialty training.
- Professional development/formal education/certifications.
- Fitness performance.

Prevention:

- Plans review (numbers/valuation amount/completion time).
- Inspections (new and existing).
  - Numbers.
  - Completion time.
  - Violations (found/corrected).
  - Quantification by type of violation and occupancy type.
- Fire investigations
  - Numbers and determinations.
  - Occupancy types, time of occurrence, ignition source.
  - Fire loss/structure and contents.
  - Arson arrests/convictions.
  - Fire deaths (demographics/occupancy type/cause and origin).

Miscellaneous:

- Customer service surveys (by engine/by shift).
  - Following emergency response.
  - Public assist.
  - Inspections (prevention and company).
  - Public education.
  - In-service training (employee assessments).
- Financial/budgetary.
  - Overtime expenditures and cause.
  - Apparatus repair costs and out-of-service time.

Key Performance Indicators for EMS

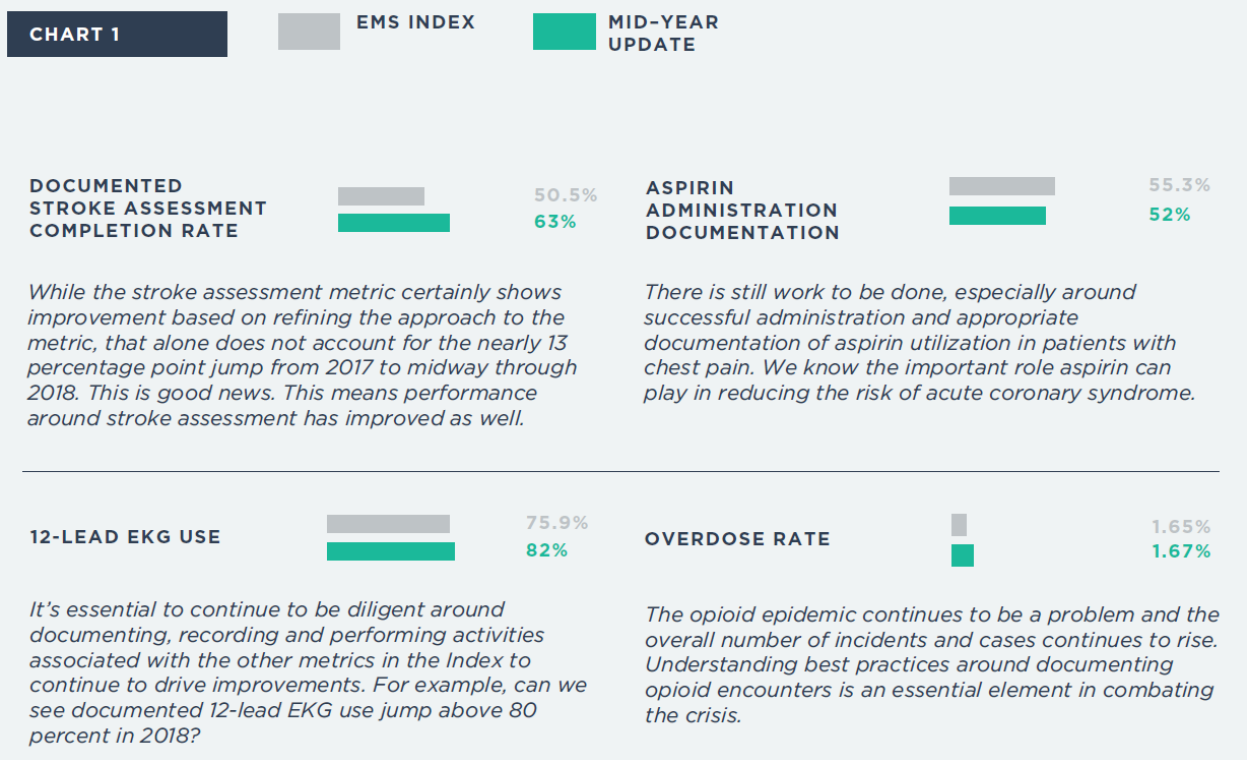
ESO is an industry leader in patient care reporting software and also as a clinical data analytics provider, ESO utilizes electronic patient care reports (ePCRs) as its platform. In 2018, ESO released its ***ESO EMS Index***, which is an analysis of key performance indicators (KPIs) for EMS quality metrics. The dataset is real-world data, compiled and aggregated from more than 1,000 agencies across the United States that use ESO's products and services. These data are based on 5.02 million patient encounters between January 1, 2017, and December 31, 2017. The Index tracks performance of EMS agencies nationwide across five metrics:

- Stroke assessment and documentation.
- Overdose events.
- End-tidal carbon dioxide ($ETCO_2$) monitoring.
- 12-lead electrocardiogram (EKG) use.
- Aspirin administration for chest pain.

This report is beginning to serve as a benchmark comparator for EMS providers across the country for several important measures of clinical quality. CPSM believes that the ESO EMS Index can provide a valid and comprehensive basis upon which EMS service delivery in Reno can be compared. These comparisons should be reported on a regular basis (no less than quarterly), distributed publicly, and used as a basis for continuous quality improvement.

Recommendation: RFD should consider participating in ESO Solutions for the purpose of reviewing its EMS performance and the comparisons made in this clinical and EMS operational database. (Recommendation No. 23.)

FIGURE 7-1: ESO EMS Index Example



SECTION 8. ESSENTIAL RESOURCES

FIRE PREVENTION AND CODE ENFORCEMENT

Ensuring that services are delivered effectively is paramount in any fire service organizational mission. The functions of the fire marshal and fire prevention are most critical in that organizational milieu. The foundation of a good risk management program is to prevent fires before they occur and reduce the losses from those that do occur. The critical role of each person assigned to enforcement activities is likely to avert more losses than is any single firefighter and in some cases the fire department as a whole.

The fire departments that are most effective in reducing losses are those that have successfully integrated prevention as a core value throughout the organization and continuously review the impact of prevention on the overall services provided by the department. There are basic approaches that can be used to ensure that prevention is treated as a paramount department-wide priority. One way to accomplish this is to have that core value of an organization referenced directly in the mission statement.

The Reno Fire Prevention Division provides fire prevention code enforcement, plans review, public safety education, and cause and origin investigation services to City of Reno. Fire prevention activities in Reno are supervised by a Division Chief/Fire Marshal. The Fire Prevention Division is staffed with 16 full-time prevention personnel. Of these, two are Captains, nine are Fire Inspector II's and three are Fire Inspector I's. The Fire Prevention Division also employees a Water Supply Officer.

The Fire Prevention Division has a wide range of duties. These include plans review and code compliance regarding both new buildings while under construction, as well as ongoing maintenance inspections after the building or business is occupied. A significant percentage of these inspections are mandated as part of the Nevada State Fire Marshal inspection guidelines regarding the inspection of specific occupancies. The remainder are performed in accordance with nationally recognized standards and best practices, with a large number being required as part of the business licensing process. In total, it is estimated that there are more than 13,000 inspectable properties within the City of Reno. All fire and life-safety inspections in Reno are conducted by the Fire Prevention Division. The RFD does not conduct In-service fire company inspections.

TABLE 8-1: RFD Fire Prevention Division Major Activity Statistics 2015 - 2018

	2015	2016	2017	2018
New Construction Plans Review	1,759	1,800	1,450	1,834
New Constructions Inspections	2,025	1,955	2,758	3,667
Re-Occurring District & Other Inspections*	4,171	3,352	4,918	5,788
Total Inspections and Plans Reviews	**7,955**	**7,107**	**9,126**	**11,289**

Note: *Inspections Involving New and Existing Business Licenses, Special Events, District, Complaints & Re-inspections.

CPSM probed RFD fire prevention officials regarding the number of inspectable properties in the City that are not being inspected. Due to accuracy issues in the current building files, it could not be determined as to the number of inspectable properties; consequently, RFD officials could not provide an accurate estimate regarding the numbers of properties that should be inspected

but were not being inspected. We were told that this number could be in excess of 4,000. It is not uncommon to see a building inspection database that is outdated or inaccurate. Many businesses frequently change hands, or relocate, or new businesses open up and there is a lag in the updating of these files. The RFD building files are also compounded by a large number of building files that were not purged from the system after the separation with the Truckee Meadows Fire Protection District; many of these files remain in the system. Regardless of the reasons, it is essential for the City of Reno Fire Department to have an accurate inventory of inspectable properties and a complete record of inspections and their outcomes.

Recommendation: RFD should work with the City of Reno Building Department, the Planning Department, the County Tax Appraiser, the Finance Department, and other local officials in creating a master file of inspectable properties within the City of Reno. (Recommendation No. 24.)

The City of Reno currently utilizes the 2018 International Building and Fire Codes. These codes are adopted throughout the State of Nevada; however, local jurisdictions are allowed to adopt specific amendments to this code for local applications. In the Reno area a number of local municipalities and fire protection districts have unified their fire codes to provide local contractors, architects, and building design officials with a common series of requirements. This unified approach involves the cities of Reno, Sparks, Carson City, and Elko City along with the Fire Protections Districts of Truckee Meadows, North Lake Tahoe, East Fork, Tahoe Douglas, Smith Valley, North Lyon, and Central Lyon County. CPSM recognizes this fire code unification process as a ***Best Practice***.

The International Fire Code provides authorization for local jurisdictions to require automatic fire sprinklers in both residential and other structures and the State of Nevada has not excluded this provision in its State Code adoption process. Through amendment, however, the City of Reno has added criteria that limits the requirement for automatic fire sprinklers to occupancies that are greater than 5,000 square feet in size, and in the case of residential structures, the sprinkler requirement is only applicable if the proposed structure is greater that a six-minute travel time from the nearest Reno fire station.

Automatic fire sprinklers have proven to be very effective in reducing fire loss and minimizing fire deaths in residential structures. Statistics reveal that there has never been any multiple loss of life in a fully sprinklered building.[45] Property losses are 85 percent less in residences with fire sprinklers compared to those without sprinklers.[46] Where sprinklers were present, flame damage was confined to the room of origin in 97 percent of those fires.[47] The average firefighter injury rate of 13 per 1,000 in reported home fires was 79 percent lower where sprinklers were present than in fires with no automatic extinguishing systems.[48]

Recommendation: The City of Reno should revise its residential fire sprinkler requirements so that automatic fire sprinklers are required in all new residential home construction. (Recommendation No. 25.)

[45] Tufts University-2019, https://publicsafety.tufts.edu/firesafety/myths-and-facts-about-sprinkler-systems/
46. Ibid.
47. NFPA-2017, https://www.nfpa.org/-/media/Files/News-and-Research/Fire-statistics-and-reports/Fact-sheets/SprinklerHOmesFactSheet.pdf
48. Ibid.

According to the NFPA, the average cost nationally for installing automatic fire sprinklers in new, single family residential structures is estimated to be $1.35 per square foot.[49] For a 2,000 square-foot home, the estimated cost would be approximately $2,700. This can be less than the cost of granite counter tops or a carpeting upgrade. In addition, many homeowner insurance policies provide a discount (between 8 percent and 13 percent) for homes equipped with residential fire sprinklers. Given the anticipated residential home expansion in the Reno area, CPSM believes that the City should amend its current fire code and require automatic fire sprinklers in all new single family and duplex residential structures regardless of the size of the structure or its distance from an existing fire station.

As was previously discussed, in-service company inspections are currently not being carried out by the Reno Fire Department. CPSM believes that an in-service fire company inspection program, if managed properly, can yield significant benefits to the system. Many fire agencies across the country require in-service fire companies to conduct various levels of inspections. Typically, these inspections are in smaller retail establishments, both store-front commercial businesses and restaurants and usually involve limited inspectable actions. These inspections usually involve the placement and operational capacity of fire extinguishers, the testing of exit and emergency lighting, evaluating any blockage or storage in emergency egress passageways, the operation of emergency exits, checking the kitchen hood systems, evaluating occupancy loading, etc.

The number of inspectable properties is significant in most communities and when not done by in-service engine companies, these inspections must be done by fire prevention personnel. In many cases, when fire companies identify suspected code violations, these violations are brought to the owner's attention and a follow-up inspection is scheduled to determine if corrective action was taken. For those more critical issues, a report is provided to the fire prevention staff for follow-up. The key to in-service inspection efforts is identifying problems before an emergency response is needed. In addition, when conducting these inspections, operations personnel gain a tactical advantage by familiarizing themselves with the building and any fire suppression systems, and this knowledge may prove beneficial during an emergency. In addition, the building owners are made aware of issues so they can be resolved and potentially prevent future problems. The program can also facilitate improved interaction between the fire department and businesses.

Recommendation: The Reno Fire Department should institute an in-service fire company inspection program that promotes responder familiarization, code enforcement, and fire prevention efforts. (Recommendation No. 26.)

Fire agencies often indicate that in-service units are too busy with training and emergency response activities to have sufficient time to conduct fire inspections. Though there is a likelihood that in-service personnel will be interrupted when doing inspections because of alarm activity, this should not be a deterrent to providing this service. In our analysis of unit workloads, CPSM found that the busiest unit in the RFD system was E-3. We estimate that on average, E-3 is involved in emergency response duties a total of 3.5 hours each 24-hour period. At least nine of the seventeen primary response apparatus (Truck 1, Truck 3, E-5, E-9, E-10, E-11, E-12, Rescue 7, and Rescue 19) are typically involved in emergency response duties on average, less than two hours for each 24-hour duty period. CPSM believes that this provides ample time to commit approximately one hour each day to this vital service. Combine this with the fact that upwards of 4,000 inspectable properties are not being inspected because of the workload constraints of

49. https://www.nfpa.org/News-and-Research/Data-research-and-tools/Suppression/Home-Fire-Sprinkler-Cost-Assessment-Final-Report.

the fire prevention staff, and one can see the benefits of an in-service fire company inspection program.

Fire Investigations

Fire investigations are conducted by four RFD personnel who have received specialized training in this discipline and are Nevada P.O.S.T.-certified as law enforcement officers. Personnel who are trained and certified to conduct fire investigations assume other duties in the fire prevention division and are called out to investigate fires on a rotational basis.

Over the four-year period from 2015 through 2018, the Fire Investigators from the Fire Prevention Bureau averaged 146 investigations per year. These investigations resulted in 37 arrests for arson and 33 juveniles being referred to court sanctioned fire-setter intervention programs.

TABLE 8-2: Fire Investigations Bureau Statistics, 2015–2018

	2015	2016	2017	2018
Fires Investigated	118	109	156	200
Arson Arrests	6	7	12	12
Juvenile Interventions/Referrals	9	7	4	13

ISO RATING

The Insurance Services Office (ISO) collects data for more than 48,000 communities and fire districts throughout the country. These data are then analyzed using a proprietary Fire Suppression Rating Schedule (FSRS). This analysis then results in a PPC (Public Protection Classification) score between 1 and 10 for a community, with Class 1 representing "superior property fire protection" and Class 10 indicating that an area doesn't meet the minimum criteria set by the ISO. In 2013, the revised FSRS was released; it adds an emphasis on a community's effort to limit loss before an incident occurs (fire prevention).

Since the 1800s, insurance companies have been involved in one way or another in “rating” fire departments. As cities grew and buildings became larger and communities more industrialized, insurance companies sometimes incurred large losses from fires. Much of the time, these losses were due to inadequate water supplies and ineffective fire suppression capabilities. To help reduce losses, insurance companies developed criteria to evaluate community fire suppression capabilities and to quantify the level of fire services provided. Once quantified, insurance companies used the information (rating) to determine and assign fire insurance rates. The emphasis then, as now, was primarily to reduce dollar loss from fires. Though improving water supplies and fire suppression can and does improve life safety, the purpose of rating fire departments is to adjust insurance rates to lessen insurance company losses.

ISO uses data and information provided by each community to derive a Public Protection Classification (PPC). Community evaluations are performed periodically or when there is reason to believe there may be a change in the PPC. As it is intended, the PPC is only used to assess a community’s fire protection—it does not consider other emergencies or important services provided by the fire department such as EMS, technical rescue, or hazmat incident mitigation.

The ISO acknowledges the use of the PPC is limited to assessing *fire suppression capabilities* and that fire departments do many more things to improve public safety.[50]

In developing a PPC, the following major categories are evaluated:

- Emergency Communications: Fire alarm and communication systems, including telephone systems, telephone lines, staffing, and dispatching systems.
- Fire Department: The fire department, including equipment, staffing, training, and geographic distribution of fire companies.
- Water Supply: The water supply system, including the condition and maintenance of hydrants and the amount of available water compared to the amount needed to suppress fires.
- Fire Prevention: Programs that contain plan review; certificate of occupancy inspections; compliance follow-up; inspection of fire protection equipment; and fire prevention regulations related to fire lanes on area roads, hazardous material routes, fireworks, barbecue grills, and wildland-urban interface areas.
- Public Fire Safety Education Programs: Fire safety education training and programs for schools, private homes, and buildings with large loss potential or hazardous conditions, and a juvenile fire-setter intervention program.

Reno was rated ISO Class 2 in 2014. The City's score was 86.24, which is just 3.76 points from a achieving an ISO Class 1 rating. In the evaluation, Reno scored exceptionally well in all areas of the evaluation. CPSM recognizes the City's achievement as a Class 2 ISO rating as a ***Best Practice***. Nationwide in 2014, only 750 communities were designated at an ISO 2 rating.

It is also important to note that RFD received good scoring in the areas of fire training, receiving 8.09 points out of 9. In Emergency Communication (911), the review was scored at 9.78 points out of a possible 10. The water utility system was scored at 38.23 out of a possible 40. In the area of Company Personnel, RFD received 9.63 points out of a total of 15 points available.

EDUCATION AND TRAINING PROGRAMS

Training is one of the most important functions that a fire department should be performing on a regular basis. One could even make the argument that training is, in some ways, more important than emergency responses, because a department that is not well-trained, prepared, and operationally ready will be unable to effectively and safely fulfill its emergency response obligations. A comprehensive, relative, and ongoing training program is absolutely critical to the fire department's level of success.

An effective fire department training program must cover all of the essential elements of that department's core missions and responsibilities. The program must include an appropriate combination of technical/classroom training, manipulative or hands-on/practical evolutions, and training assessment to gauge the effectiveness of these efforts. Most of the training, but particularly the practical, hands-on training evolutions, should be developed based upon the department's own operating procedures while remaining cognizant of widely accepted practices and standards.

50. Flippin, P., Gaull E., Laun, J., Flicko, R., District of Columbia Fire and Emergency Medical Services Fleet Management Audit and Assessment (District of Columbia Fire and Emergency Medical Services, Washington, DC 2013).

Certain Occupational Safety and Health Administration (OSHA) regulations dictate that minimum training must be completed on an annual basis, covering various topics that include:

- A review of the respiratory protection standard, self-contained breathing apparatus (SCBA) refresher and user competency training, SCBA fit testing (29 CFR 1910.134).
- Blood Borne Pathogens Training (29 CFR 1910.1030).
- Hazardous Materials Training (29 CFR 1910.120).
- Confined Space Training (29 CFR 1910.146).
- Structural Firefighting Training (29 CFR 1910.156).

Education and training programs help to create the character of a fire service organization. Agencies that place a real emphasis on their training have a tendency to be more proficient in carrying out day-to-day duties. The prioritization of training also fosters an image of professionalism and instills pride in the organization.

The training functions of the RFD are managed by a Training Section Division Chief who is responsible for the development and delivery of all non-EMS training activities. In addition, the training effort is supported by three shift Captains (one on each shift) who assist in training delivery and respond to all major incidents as the Safety Officer. The EMS Division handles the majority of all training activities for EMS and coordinates the delivery of recertification requirements for EMT, A-EMT, and Paramedic refresher training as specified by the Nevada Division of Public and Behavioral Health, the National Registry. The EMT, A-EMT, and Paramedic refresher training (recertification) is managed by the EMS Division; the training utilizes the State On-line Application Portal (SOAP). Paramedics must achieve 40 hours of continuing education training (CEs) every two years. A-EMTs must achieve 30 CEs and EMTs must achieve 24 CE hours to recertify. The bulk of the EMS continuing education requirements are provided through designated coursework that is offered both in-house and through outside agencies (ACSL, PALS, ITLS and CPR). National Registry allows upwards of 10 hours of online CEs for recertification.

Fire service agencies have traditionally trained new firefighters in-house utilizing the NFPA guidelines. It is very common for smaller agencies, particularly those with a limited number of position openings, to utilize an on-the-job training process and task-book progression to train and qualify new employees or members for various assignments. Many municipal and county organizations (including Reno) have traditionally utilized an internal firefighter recruit training academy in which employees are hired as "recruit firefighters" or "firefighter trainees" while undergoing this basic training. As the training requirements for firefighter have expanded and additional subjects have been included in the basic training (EMT, CPR, Hazardous Materials Response, Wildland Firefighting, Emergency Vehicle Operations, etc.), a number of technical schools and community colleges have begun to offer this training to independent students on a fee basis.

Due to the costs and time constrains associated with an in-house training academy, CPSM has been observing a number of fire agencies that have moved away from the recruit firefighter training academy and are instead requiring new employees to obtain Firefighter I & II qualifications along with EMT or even paramedic certification as a prerequisite for employment. These agencies will then hold a new employee orientation process that is a much shorter duration, typically three to four weeks, and is much less costly to conduct. Supporting this effort is the fact that the firefighter job market is very competitive and this has allowed prospective employers to require these expanded training prerequisites along with practical job experience and still have ample candidates from which to choose. It is also important to note that the firefighter turnover rates are typically some of the lowest in the public safety arena (four to seven

percent annually) and this also contributes to an ability to hire suitable candidates because of the low numbers of vacancies available. In the most recent RFD hiring process there were between 400 and 500 applicants, many of whom possessed the required certifications and practical experience. Reno requires new candidates to have completed either their EMT or Paramedic training as a prerequisite for selection.

RFD continues to utilize an internal fire academy and draws its instructional staff primarily from off-duty fire personnel who are paid on an overtime basis. In addition, RFD will temporarily transfer a Fire Captain to a 40-hour assignment and backfill for this position with overtime during the academy's duration. The reassigned Captain serves as the recruit training coordinator, lead instructor and has the responsibility to coordinate the scheduling of instructors, provide employee evaluations, and arrange for books, equipment, supplies, and other training materials. The number of instructors utilized in the academy varies from day to day, but may be as high as four to six on any given day, depending on the types of instruction or the practical drills that are required. CPSM requested a cost estimate for the academy from RFD, and was told that the instructional staff overtime and back-fill costs were estimated to be approximately $100,000 for each academy.

In the 2018 RFD recruit fire academy, a 16-week curriculum was utilized and there were 16 firefighters enrolled. CPSM estimates that the personnel costs associated with the salaries for the recruit firefighters for the 16-week period was approximately $591,000 (assuming a $120,000 fully burdened annual firefighter recruit salary prorated for the 16 weeks of training (52/16 weeks = 30.8 percent X $120,000 = $36,960) X 16 recruits = $591,360). In addition, we estimate that the instructional staff (2.5 @ 40 hours =100 Hours/week)) along with the backfill costs for the reassigned Captain (56 hours/week), would add an additional $124,800 (16 weeks at 156 hours OT per week = 2,496 hours at the average OT rate of $50.00 per/hr. (average OT Rate for Operators and Captains) X 2,496 hrs. = $124,800). Subsequently, the estimated expense to run the 16-week RFD academy is approximately ***$716,000***.

> ***Recommendation: RFD should discontinue the use of a firefighter recruit academy and instead require attainment of Firefighter I & II and EMT certifications as employment prerequisites for all new firefighters. (Recommendation No. 27.)***

CPSM estimates that a four-week orientation for new firefighters would cost an estimated $179,000; this is a ***savings of $537,000 compared to an internal academy***. Firefighter certification courses are readily available throughout Nevada and the ability to require these as entry qualifications reduces the time and costs associated with an in-house training academy.

The Training Division develops and distributes a very detailed and comprehensive training calendar that provides guidance to the individual company officers and Battalion Chiefs regarding the daily and monthly training activities. Company officers, with assistance from the Training Chief, Training and Safety Captains, and Battalion Chiefs, are typically responsible for delivering departmental training. In addition, the Training Division coordinates a monthly "Divisional Level Training" in which multiple companies attend while on duty.

CPSM believes it is essential that the training effort by the department ensures consistency in the competencies of its employees to perform those activities that are needed to operate successfully in emergency settings. This requires a comprehensive review of training activities and a more regimented process in the RFD to ensure that all employees receive consistent updates and refresher training in those activities that are not regularly performed in day-to-day operations.

There does not appear to be a coordinated, department-wide focus in determining training needs and priorities that guide overall training. CPSM believes that it is beneficial for an organization to utilize a key group of its leadership to identify and direct the training efforts of the organization. RFD officials have recognized this need and were attempting to implement a training steering committee at the time of our site visit.

> ***Recommendation: The Reno Fire Department should establish a training steering committee composed of Battalion Chiefs, Captains, Fire Equipment Operators, Firefighters, union representatives, and EMS staff. This committee should conduct a training needs assessment, develop priorities, and provide direction regarding the training efforts of the department. (Recommendation No. 28.)***

The training steering process must be a dynamic effort that is used continuously to review training priorities and align the focus of training to organizational needs. The delivery of multiple training programs alone does not ensure that skills are developed and the needed proficiencies are achieved. The RFD fire training programs, when conducted, typically do not include a formal testing component or skills assessment as part of the training regimen.

Many aspects of the EMS training curriculum require a skills assessment in order to obtain the necessary continuing education credits required for certification. Fire and other related service training typically does not include a skills assessment and a recorded scoring to determine individual proficiency.

> ***Recommendation: The Reno Fire Department should institute written and practical skills testing as part of the department's comprehensive fire training program. (Recommendation No. 29.)***

The ability to monitor and record training test scores is beneficial from an overall proficiency standpoint. In addition, training scores should be incorporated into the annual performance appraisal process for both the employee, the supervisor, and the training staff. In addition, the concept of adding a testing process to each training evolution adds to the importance, consistency, and seriousness in which these activities are carried out.

Employee physical fitness is a key component in the ability of fire and EMS personnel to do their jobs effectively and avoid injuries. Rigid fitness standards are typically required in many fire departments throughout the nation; NFPA 1583, Standard on Health-Related Fitness Programs for Fire Department Members, is a recognized industry standard for monitoring and maintaining firefighter fitness. RFD does not have a fitness standard for its emergency response personnel. Though employees are encouraged to maintain appropriate levels of fitness, and current firefighting job descriptions include language requiring good physical conditioning, a formal organizational fitness assessment does not exist.

> ***Recommendation: RFD should institute an annual physical fitness evaluation process for all emergency response personnel, including chief officers. (Recommendation No. 30.)***

RFD requires new firefighters to pass a physical fitness evaluation that is based on the ***Candidate Physical Ability Test (CPAT)***. This testing utilizes a number of firefighter skill components (stair climb, hose drag, equipment carries, ladder raise, forcible entry, rescue drag, search, and ceiling pull) that are completed in a sequential order and as a timed event. RFD should consider the use of a modified CPAT exam as the annual fitness qualification for all emergency response

personnel. In addition, RFD personnel operate within a wildland environment. Most wildland firefighter certifications utilize ***The Pack Test-Work Capacity Testing for Wildland Fire Fighting*** as an annual fitness qualification. This may also be considered as an annual fitness requirement for all RFD personnel.

EMERGENCY MANAGEMENT

Emergency management is the discipline and profession of applying science, technology, planning, and management to deal with extreme events that can injure or kill large numbers of people, do extensive damage to property, and disrupt community life. When such events do occur and cause extensive harm, they are called disasters.[51]

Washoe County and its regional partners—the City of Reno, City of Sparks, Reno-Sparks Indian Colony, Pyramid Lake Paiute Tribe, Washoe County School District, and the University of Nevada-Reno—have jointly created a Regional Operations Plan (REOP). The REOP is an integrated plan based on the National Incident Management System providing an all-hazards approach in managing emergency incidents. The plan outlines a concept for emergency operations, assigns roles and responsibilities, and prescribes management and procedures for the Regional Operations Center. Washoe County has a total area of nearly 6,600 square miles and a population in 2018 estimated to be 465,735. The county is located on the eastern slopes of the Sierra Mountains in western Nevada, bordering California and Oregon.

The REOP provides emergency management coordination, planning, and training activities in a cooperative effort. This plan is issued in accordance with, and under the provisions of the Nevada Revised Statutes (NRS) Chapter 414, which establishes the authority for jurisdictions to establish an Emergency Management Organization (EMO) and appoint an 'Emergency Management Director' who will be responsible for the organization, administration, and operation of the EMO. The agreement specifies a scope of services that include the maintenance of the adopted County Emergency Management Plan, the staffing of the Washoe County Emergency Operations Center, yearly exercises and training, coordination with public and private agencies, compliance with the requirements of the Emergency Planning and Community Right to Know Act (EPCRA), and regular reporting to the County Commission

The REOP is a usable and thorough document that was last updated and distributed in 2016. The Regional Emergency Operations Center (REOC) describes the structure and procedures for single-agency or joint operations at the REOC, including a description of the site and procedures for initiating, conducting, and terminating operations. The State Comprehensive Emergency Management Plan (SCEMP) is the foundation document for identifying the overarching roles and responsibilities of state, local, and tribal governments. It provides guidance for the development, implementation, and sustainment of Nevada's emergency management and coordination efforts.

Supporting this REOP are the following functional annexes:

- Administration and finance.
- Agriculture and natural resources.
- Alert and notification.

51. *Emergency Management: Principles and Practice for Local Government*. Eds. Thomas E. Drabek, Gerard J. Hoetmer. International City Management Association, 1991. p. xvii

- Communications.
- Critical infrastructure and key resources restoration.
- Damage assessment.
- Debris management.
- Detection and monitoring.
- Direction, control, and coordination.
- Donation management.
- Emergency public information.
- Energy and utilities services.
- Fatality management and mortuary services.
- Firefighting/fire protection.
- Hazardous materials.
- Human services (including food, water, and commodities distribution).
- Incident and needs assessment.
- Information collection, analysis, and dissemination.
- Law enforcement.
- Mass care and sheltering.
- Mutual aid.
- Population protection (evacuation and shelter-in-place).
- Private sector coordination.
- Public health and medical.
- Public works and engineering.
- Resource management and logistics.
- Search and rescue.
- Transportation systems and resources.
- Volunteer management.
- Warning.

Washoe County, Reno, and Sparks recognize the need to have a single, permanently established, ready-to-operate regional EOC location to perform individual and/or integrated EOC response services in support of jurisdictional emergencies or larger regional emergencies and disasters involving two or more jurisdictions. The Regional Emergency Operations Center (REOC) is located at 5195 Spectrum Blvd. in Reno, appears very functional, is spacious, and has designated locations for specific emergency functions and support groups. The center has auxiliary power from an on-site generator that enables the center to be operational during power outages. The REOP is well-exercised, with annual drills and a full-scale exercise done every other year. CPSM considers the Washoe County Regional Emergency Operation Plan approach to be very effective and a ***Best Practice***.

EMERGENCY COMMUNICATIONS CENTER (911)

Reno Public Safety Dispatch provides the City's 911 emergency communications, and is responsible for the dispatching and radio communications for RFD operations. The center also dispatches for the Reno Police Department, Reno Municipal Court Marshal's Division, Truckee Meadows Community College Police, Truckee Meadows Fire Protection District, University of Nevada Police, and the Washoe County Sherriff's Office.

The 911 Center Director is very knowledgeable in the field of public safety communications and understands the advantages and challenges of the next generation of 911 (NextGen911) in the U.S. She has surrounded herself with a staff that are highly capable and efficient in managing emergency communications and who have a long working history in the unit.

The dispatch center is staffed 24 hours a day, seven days a week, with a minimum staffing of five personnel. During peak periods the center's staffing will increase to nine positions. Dispatchers work 12-hour shifts. Peak times are 2:00 p.m. to 10:00 p.m. During major incidents, it is common practice for additional personnel to be brought in to assist in operations. On major events, a dispatcher will be assigned specifically to the incident. All dispatchers are cross-trained and can take up any position in the center, be it fire or law enforcement. New dispatchers have a probationary period of 18 months. Initial training for dispatchers includes four weeks in the classroom, and an additional six months of supervised positional training for the various dispatch assignments (call taker, police, and fire). All dispatch personnel receive Association of Public-Safety Communications Officials (APCO) 911 certification.

All voice and radio transmissions are recorded. The center uses a Phase II triangulation system to identify the location of cell phone calls that are received. All critical dispatch equipment is on an uninterrupted power supply (UPS). The center is fully backed up with an auxiliary generator that is tested monthly; also, it has an alternative site in case of major outages.

Emergency Medical Dispatching (EMD) is not being done at the Reno Center. When a call is identified to be EMS-related, the caller is transferred to the REMSA Dispatch Center (at a remote location), which then provides EMD to determine the call severity and dispatch response protocol. RFD units are dispatched to the call by the Reno Center after it is determined to be an EMS call. If REMSA determines that the RFD unit can be cancelled, this information is communicated back to the Reno Center, which then contacts RFD responding units. RFD units will rarely alter their mode of response (Hot or Cold) on the basis of the call severity, as this information is not typically passed on to RFD units. Subsequently, RFD units are responding with lights and sirens to all incidents.

The current dispatching process is redundant, often results in delays due to the call transfer, and results in RFD units responding with lights and sirens to many calls that are minor in nature. The dispatch screening process is a critical element in determining the severity of the call type and in determining the number and mode of response for fire and EMS units. In addition, the transfer of the caller from the Reno Center to the REMSA dispatch center adds time to the dispatching process and can be frustrating to the caller who is experiencing an emergency and has to repeat the nature of the call and the location of the incident multiple times. CPSM believes that the process can be improved if the Reno Center and the REMSA dispatch operations are consolidated.

Recommendation: The City of Reno and REMSA should evaluate options for consolidating the REMSA dispatch operations into Reno Public Safety Dispatch. (Recommendation No. 31.)

Reno Public Safety Dispatch utilizes the Tiburon Command-CAD version 2.9 computer-aided dispatch software. This system is different from the CAD system utilized by REMSA. Subsequently, the ability to interface the CAD information between the two systems is currently not available. CAD-to-CAD interface is critical in that it allows the immediate transfer of critical patient information and call status updates between the systems. Both REMSA and City of Reno officials are aware of this lack of connectivity and have been working to develop the CAD-to-CAD interface.

Recommendation: Reno Public Safety Dispatch and the REMSA Dispatch Center should move as quickly as possible to establish a CAD-to-CAD interface between their two centers. (Recommendation No. 32.)

SECTION 9. DATA ANALYSIS

This data analysis examines all calls for service between January 1, 2018, and December 31, 2018, as recorded in the City of Reno's Public Safety Dispatch's computer-aided dispatch (CAD) system and the RFD's National Fire Incident Reporting System (NFIRS).

This analysis is made up of four parts. The first part focuses on call types and dispatches. The second part explores time spent and workload of individual units. The third part presents an analysis of the busiest hours in the year studied. The fourth part provides a response time analysis of RFD units.

During the year covered by this study, on a daily basis RFD operated out of 14 stations, utilizing 12 engines, two rescues, two trucks, one squad, two battalion chiefs, one safety officer, and one on-call fire investigator. The department also operates one air truck, two boat trailers, eight brush trucks, one communication unit, one hazmat decon trailer, one hazmat lab, one heavy rescue, and one off-highway vehicle. Additionally, administrative staffing for the department includes four Division Chiefs, one EMS Chief, one civilian fire chaplain, one Fire Marshal, two fire prevention Captains, and 12 inspectors also assigned to Fire Prevention Bureau. The department has Special Teams that respond to HazMat incidents, water rescues, technical rescues, and urban search and rescue (USAR). The department also responds to out-of-district assignments (primarily wildland fires) with a variety of equipment and qualifications including Type I and Type III engines, overhead personnel for Incident Management Teams, a Rapid Extrication Module (staffed at the ALS level with Technical Rescue personnel), and fire-line paramedics.

During the study period, the fire department responded to 41,751 calls, of which 67 percent were EMS calls. The combined workload (deployed time) for RFD units was 13,280.8 hours. Units were deployed to 20 out-of-area wildfires for an additional 5,964.6 hours. The average dispatch time for the first arriving unit was 1.5 minutes, the average turnout time was 1.4 minutes, and the average travel time was 4.9 minutes, yielding an overall average response time for the first arriving RFD unit of 7.8 minutes. The 90th percentile dispatch time was 2.3 minutes, the 90h percentile turnout time was 2.4 units, and the 90th percentile travel time was 7.9 minutes, yielding an overall 90th percentile response time of 11.3 minutes.

METHODOLOGY

In this analysis, CPSM examines calls and runs. A call is an emergency service request or incident. A run is a dispatch of a unit (i.e., a unit responding to a call). Thus, a call may include multiple runs.

We received NFIRS data for the RFD, and then classified the calls in a series of steps. We first used the NFIRS incident type to identify canceled calls and to assign EMS, motor vehicle accident (MVA), and fire category call types. EMS calls were then assigned detailed categories based on detailed dispatch descriptions. Mutual aid calls were identified based on the information recorded in the NFIRS data's 'mutual aid code' field.

Units with no corresponding call, and units with no en route or arrival time, were removed. Then, calls with no responding RFD units were removed. In addition, a total of 112 incidents to which the command or administrative units were the sole responders are not included in the analysis sections of the report. However, the workload of administrative units is documented in Attachment II.

The RFD also responded to several major out-of-area wildfires, many of which lasted for days or weeks at a time. These 20 calls were included when analyzing calls by type, but were excluded in all other analysis sections of the report. However, these calls are further examined in Attachment IV.

In this report, canceled and mutual aid calls are included in all analyses other than the response time analyses.

AGGREGATE CALL TOTALS AND RUNS

During the year studied, RFD responded to 41,639 non-administrative calls. Of these, 348 were structure fire calls and 528 were outside fire calls within RFD's jurisdiction.

Calls by Type

Table 9-1, Figure 9-1, and Figure 9-2 show the number of calls by call type, average calls per day, and the percentage of calls that fall into each call type category for the 12-month period studied.

TABLE 9-1: Call Types

Call Type	Number of Calls	Calls per Day	Call Percentage
Breathing difficulty	3,637	10.0	8.7
Cardiac and stroke	3,852	10.6	9.3
Fall and injury	5,932	16.3	14.2
Illness and other	4,581	12.6	11.0
MVA	3,203	8.8	7.7
Overdose and psychiatric	879	2.4	2.1
Seizure and unconsciousness	5,966	16.3	14.3
EMS Total	**28,050**	**76.8**	**67.4**
False alarm	2,042	5.6	4.9
Good intent	386	1.1	0.9
Hazard	427	1.2	1.0
Outside fire	528	1.4	1.3
Public service	1,201	3.3	2.9
Structure fire	348	1.0	0.8
Wildfire	20	0.1	0.1
Fire Total	**4,953**	**13.6**	**11.9**
Canceled	8,574	23.5	20.6
Mutual aid	63	0.2	0.2
Total	**41,639**	**114.1**	**100.0**

FIGURE 9-1: EMS Calls by Type

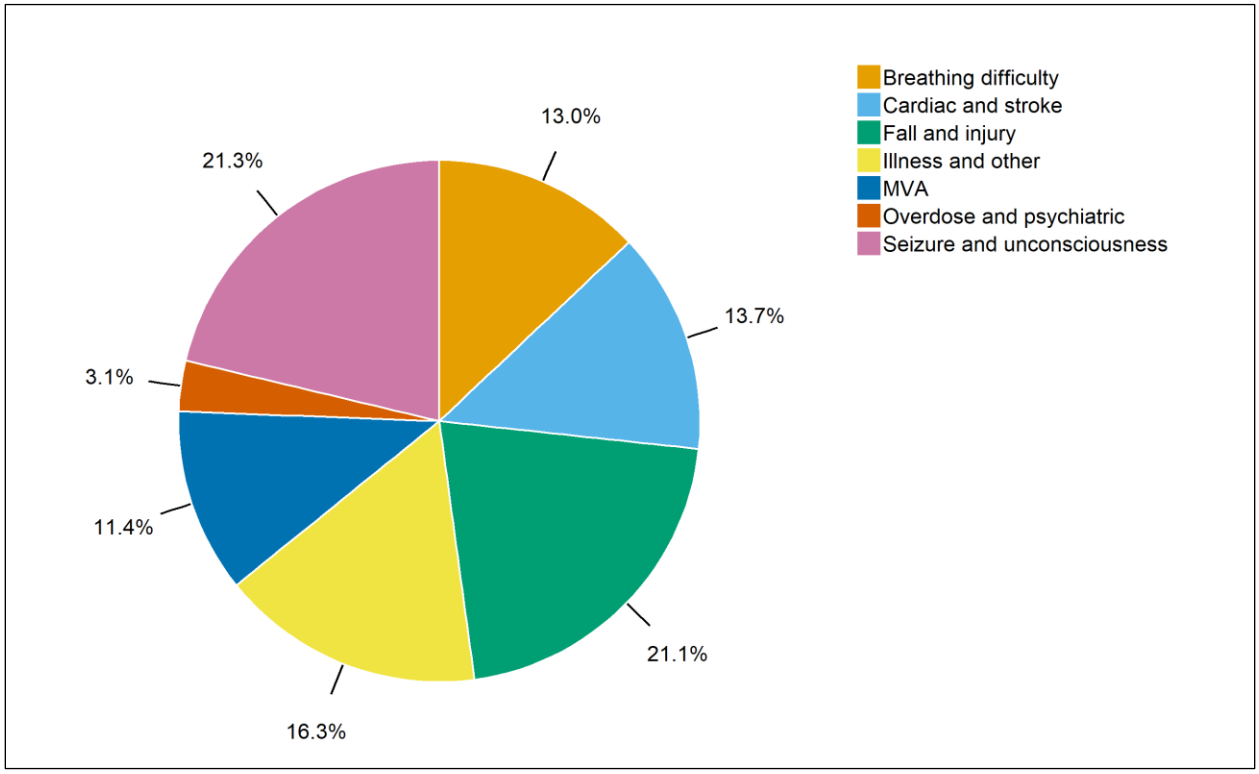
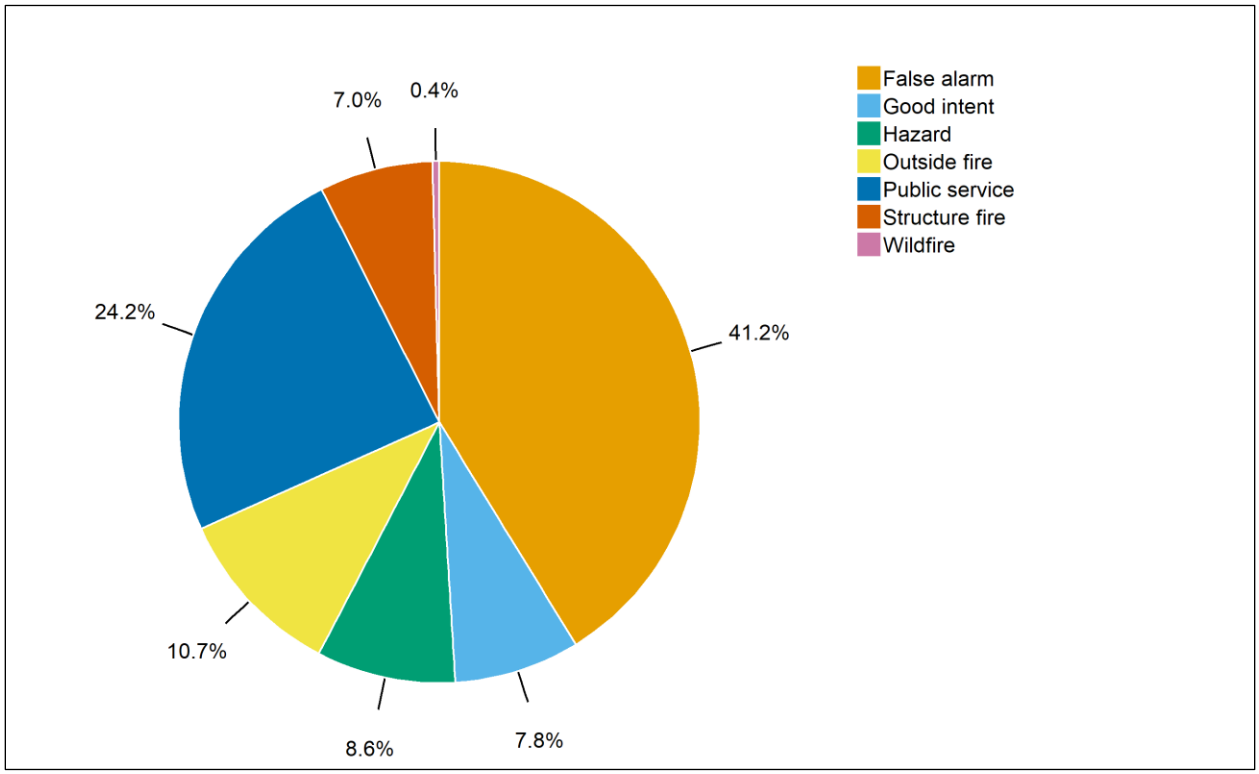


FIGURE 9-2: Fire Calls by Type



Observations:

Overall

- The department received an average of 114.1 calls per day, including 23.5 canceled and 0.2 mutual aid calls.
- EMS calls for the year totaled 28,050 (67 percent of all calls), an average of 76.8 per day.
- Fire calls for the year totaled 4,953 (12 percent of all calls), an average of 13.6 per day.

EMS

- Seizure and unconsciousness calls were the largest category of EMS calls at 21 percent of EMS calls, an average of 16.3 calls per day.
- Cardiac and stroke calls made up 14 percent of EMS calls, an average of 10.6 calls per day.
- Motor vehicle accidents made up 11 percent of EMS calls, an average of 8.8 calls per day.

Fire

- False alarm calls were the largest category of fire calls at 41 percent of fire calls, an average of 5.6 calls per day.
- Structure and outside fire calls combined made up 18 percent of fire calls, an average of 2.5 calls per day.

Calls by Type and Duration

Table 9-2 shows the duration of calls by type four duration categories: less than 30 minutes, 30 minutes to one hour, one to two hours, and more than an hour.

TABLE 9-2: Calls by Type and Duration

Call Type	Less than 30 Minutes	30 Minutes to One Hour	One to Two Hours	More Than Two Hours	Total
Breathing difficulty	3,463	164	9	1	3,637
Cardiac and stroke	3,576	247	21	8	3,852
Fall and injury	5,424	480	22	6	5,932
Illness and other	4,317	222	30	12	4,581
MVA	2,789	344	59	11	3,203
Overdose and psychiatric	799	72	8	0	879
Seizure and unconsciousness	5,570	365	23	8	5,966
EMS Total	**25,938**	**1,894**	**172**	**46**	**28,050**
False alarm	1,853	171	18	0	2,042
Good intent	353	30	3	0	386
Hazard	288	92	40	7	427
Outside fire	289	168	52	19	528
Public service	1,038	130	21	12	1,201
Structure fire	205	61	39	43	348
Fire Total	**4,026**	**652**	**173**	**81**	**4,932**
Canceled	8,511	58	5	0	8,574
Mutual aid	29	9	11	14	63
Total	**38,504**	**2,613**	**361**	**141**	**41,619**

Observations:

EMS

- A total of 27,832 EMS calls (99 percent) lasted less than one hour, 172 EMS calls (1 percent) lasted one to two hours, and 46 EMS calls (less than 1 percent) lasted two or more hours.
- On average, there were 0.6 EMS calls per day that lasted more than one hour.
- A total of 3,823 cardiac and stroke calls (99 percent) lasted less than one hour, 21 cardiac and stroke calls (1 percent) lasted one to two hours, and 8 cardiac and stroke calls (less than 1 percent) lasted two or more hours.
- A total of 3,133 motor vehicle accidents (98 percent) lasted less than one hour, 59 motor vehicle accidents (2 percent) lasted one to two hours, and 11 motor vehicle accidents (less than 1 percent) lasted two or more hours.

Fire

- A total of 4,678 fire calls (95 percent) lasted less than one hour, 173 fire calls (4 percent) lasted one to two hours, and 81 fire calls (2 percent) lasted two or more hours.
- On average, there were 0.7 fire calls per day that lasted more than one hour.
- A total of 266 structure fire calls (76 percent) lasted less than one hour, 39 structure fire calls (11 percent) lasted one to two hours, and 43 structure fire calls (12 percent) lasted two or more hours.
- A total of 457 outside fire calls (87 percent) lasted less than one hour, 52 outside fire calls (10 percent) lasted one to two hours, and 19 outside fire calls (4 percent) lasted two or more hours.
- A total of 2,024 false alarm calls (99 percent) lasted less than one hour, and 18 false alarm calls (1 percent) lasted one to two hours.

Average Calls per Day and per Hour

Figure 9-3 shows the monthly variation in the average daily number of calls handled by the RFD during the year studied. Similarly, Figure 9-4 illustrates the average number of calls received each hour of the day over the course of the year.

FIGURE 9-3: Average Calls per Day, by Month

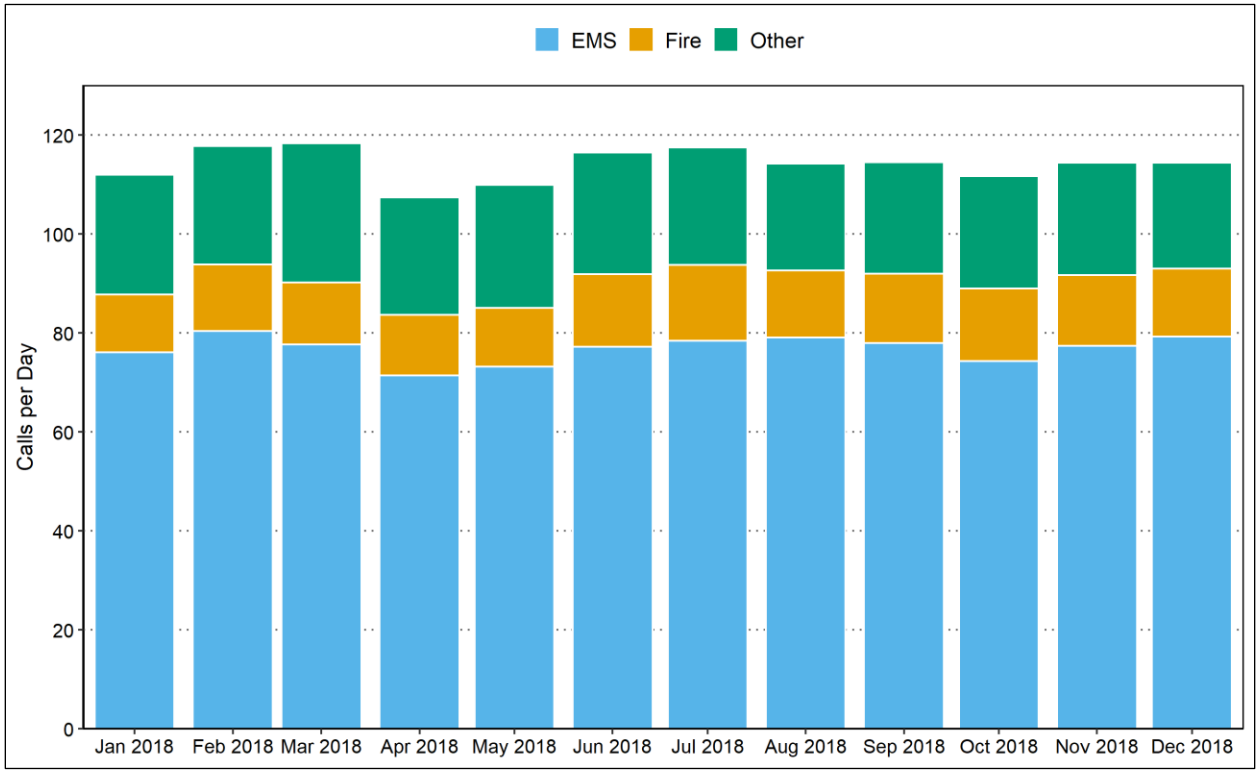
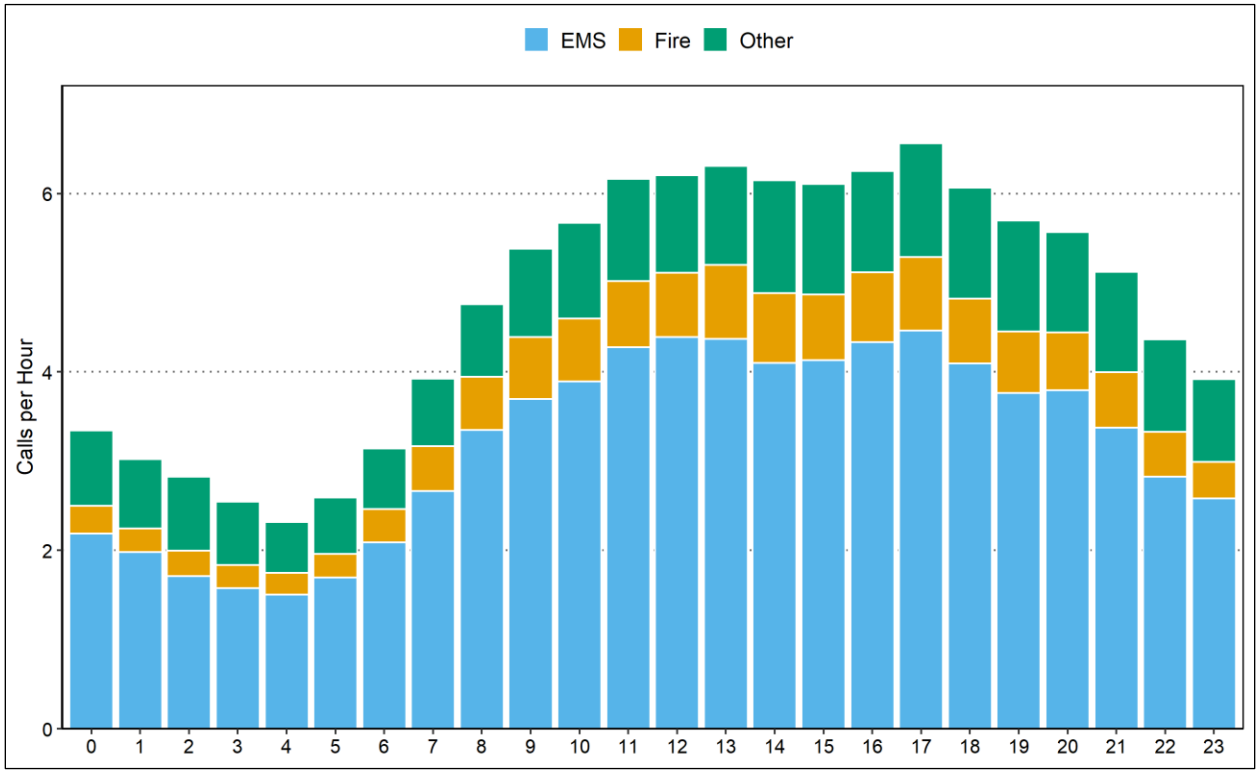


FIGURE 9-4: Calls by Hour of Day



Observations:

Average Calls per Month

- Average EMS calls per day ranged from 71.5 in April 2018 to 80.4 in February 2018.
- Average fire calls per day ranged from 11.7 in January 2018 to 15.3 in July 2018.
- Average other calls per day ranged from 21.5 in December 2018 to 28.1 in March 2018.
- Average calls per day overall ranged from 107.4 in April 2018 to 118.3 in March 2018.

Average Calls per Hour

- Average EMS calls per hour ranged from 1.5 between 4:00 a.m. and 5:00 a.m. to 4.5 between 5:00 p.m. and 6:00 p.m.
- Average fire calls per hour ranged from 0.2 between 4:00 a.m. and 5:00 a.m. to 0.8 between 1:00 p.m. and 2:00 p.m.
- Average other calls per hour ranged from 0.6 between 4:00 a.m. and 5:00 a.m. to 1.3 between 5:00 p.m. and 6:00 p.m.
- Average calls per hour overall ranged from 2.3 between 4:00 a.m. and 5:00 a.m. to 6.6 between 5:00 p.m. and 6:00 p.m.

Units Arriving to Calls

Table 9-3, along with Figures 9-5 and 9-6, detail the number of units arriving to RFD calls, broken down by call type.

TABLE 9-3: Calls by Call Type and Number of Units Arriving

Call Type	Number of Units			Total Calls
	One	Two	Three or More	
Breathing difficulty	3,631	2	1	3,634
Cardiac and stroke	3,794	55	1	3,850
Fall and injury	5,906	20	0	5,926
Illness and other	4,490	44	18	4,552
MVA	3,087	73	35	3,195
Overdose and psychiatric	871	7	0	878
Seizure and unconsciousness	5,939	18	1	5,958
EMS Total	**27,718**	**219**	**56**	**27,993**
False alarm	1,783	211	34	2,028
Good intent	314	20	45	379
Hazard	309	28	88	425
Outside fire	374	51	101	526
Public service	1,115	30	8	1,153
Structure fire	167	31	149	347
Fire Total	**4,077**	**376**	**425**	**4,878**
Canceled	126	11	17	154
Mutual aid	46	10	5	61
Total	**31,967**	**616**	**503**	**33,086**
Percentage	**96.6**	**1.9**	**1.5**	**100.0**

FIGURE 9-5: Calls by Number of Units Arriving - EMS

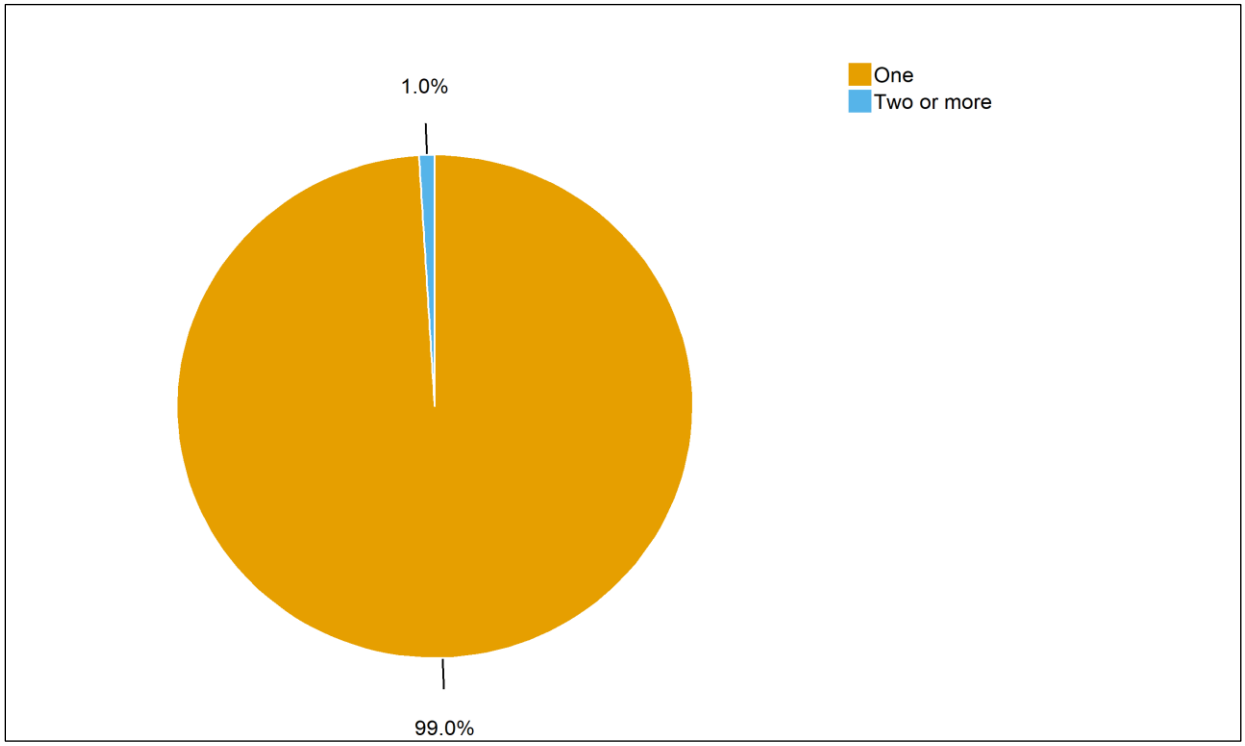
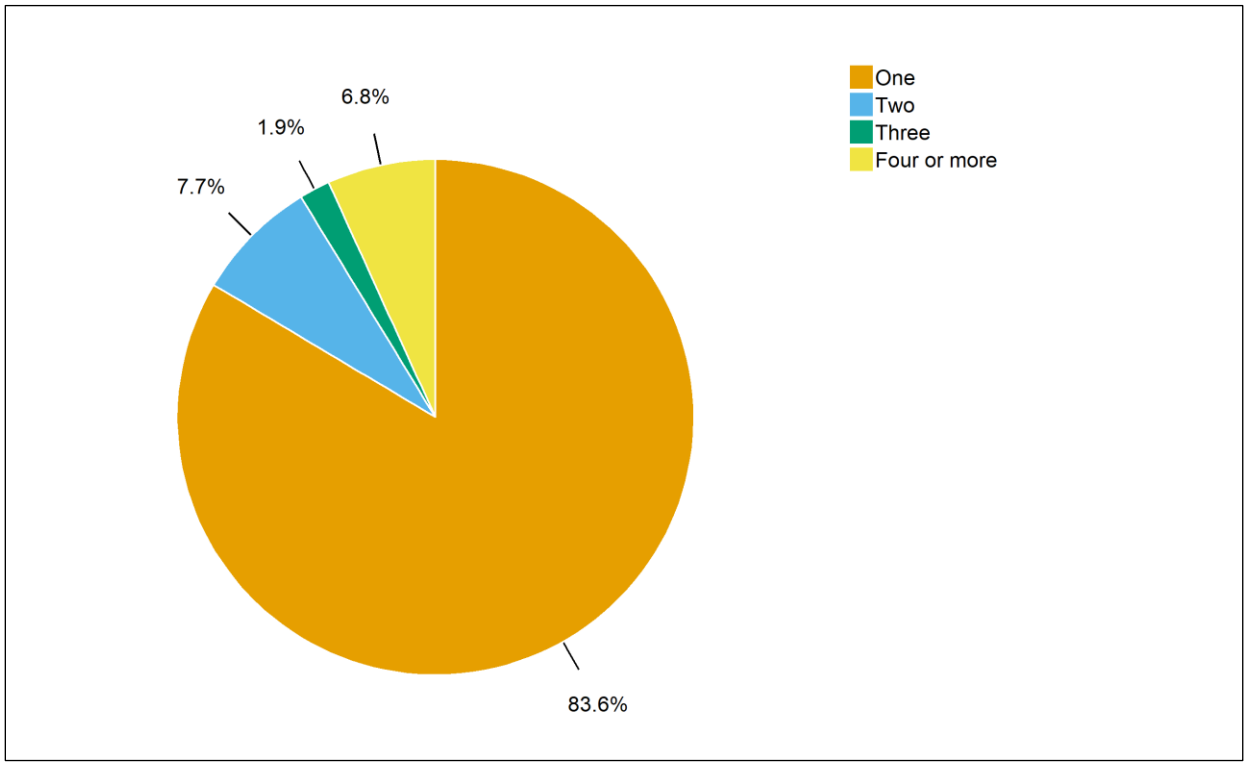


FIGURE 9-6: Calls by Number of Units Arriving – Fire



Observations:

Overall

- On average, 1.1 units arrived to all calls; on 97 percent of calls only one unit arrived.
- Overall, three or more units arrived for 2 percent of calls.

EMS

- For EMS calls, one unit arrived 99 percent of the time, and two or more units arrived 1 percent of the time.
- On average, 1.0 units arrived per EMS call.

Fire

- For fire calls, one unit arrived 84 percent of the time, two units arrived 8 percent of the time, three units arrived 2 percent of the time, and four or more units arrived less than 7 percent of the time.
- On average, 1.4 units arrived per fire call.
- For outside fire calls, three or more units arrived 19 percent of the time.
- For structure fire calls, three or more units arrived 43 percent of the time.

WORKLOAD: RUNS AND TOTAL TIME SPENT

The workload of each unit is measured in two ways: runs and deployed time. The deployed time of a run is measured from the time a unit is dispatched through the time the unit is cleared. Because multiple units respond to some calls, there are more runs than calls and the average deployed time per run varies from the total duration of calls.

Runs and Deployed Time – All Units

Deployed time, also referred to as deployed hours, is the total deployment time of all units deployed on all runs. Table 9-4 shows the total deployed time, both overall and broken down by type of run, for RFD units during the year studied.

TABLE 9-4: Annual Runs and Deployed Time by Run Type

Call Type	Avg. Deployed Min. per Run	Total Annual Hours	Percent of Total Hours	Avg. Deployed Min. per Day	Total Annual Runs	Avg. Runs per Day
Breathing difficulty	14.3	940.7	7.1	154.6	3,958	10.8
Cardiac and stroke	15.0	1,102.2	8.3	181.2	4,406	12.1
Fall and injury	16.0	1,762.9	13.3	289.8	6,591	18.1
Illness and other	15.3	1,335.7	10.1	219.6	5,231	14.3
MVA	20.8	1,401.9	10.6	230.5	4,050	11.1
Overdose and psychiatric	16.6	273.9	2.1	45.0	988	2.7
Seizure and unconsciousness	15.1	1,650.6	12.4	271.3	6,580	18.0
EMS Total	**16.0**	**8,468.0**	**63.8**	**1,392.0**	**31,804**	**87.1**
False alarm	15.1	741.2	5,6	121.8	2,941	8.1
Good intent	13.2	215.5	1.6	35.4	980	2.7
Hazard	22.7	476.9	3.6	78.4	1,259	3.4
Outside fire	28.7	771.4	5.8	126.8	1,612	4.4
Public service	18.0	454.1	3.4	74.6	1,512	4.1
Structure fire	37.3	1,000.4	7.5	164.4	1,611	4.4
Fire Total	**22.1**	**3,659.4**	**27.6**	**601.6**	**9,915**	**27.2**
Canceled	6.4	1,027.9	7.7	169.0	9,681	26.5
Mutual aid	62.2	125.4	0.9	20.6	121	0.3
Total	**15.5**	**13,280.8**	**100.0**	**2,183.1**	**51,521**	**141.2**

Observations:

Overall

- Total deployed time for the year was 13,280.8 hours. The daily average was 36.4 hours for all units combined.
- There were 51,521 runs, including 9,681 runs dispatched for canceled calls and 121 runs dispatched for mutual aid calls. The daily average was 141.2 runs.

EMS

- EMS runs accounted for 64 percent of the total workload.
- The average deployed time for EMS runs was 16.0 minutes. The deployed time for all EMS runs averaged 23.2 hours per day.

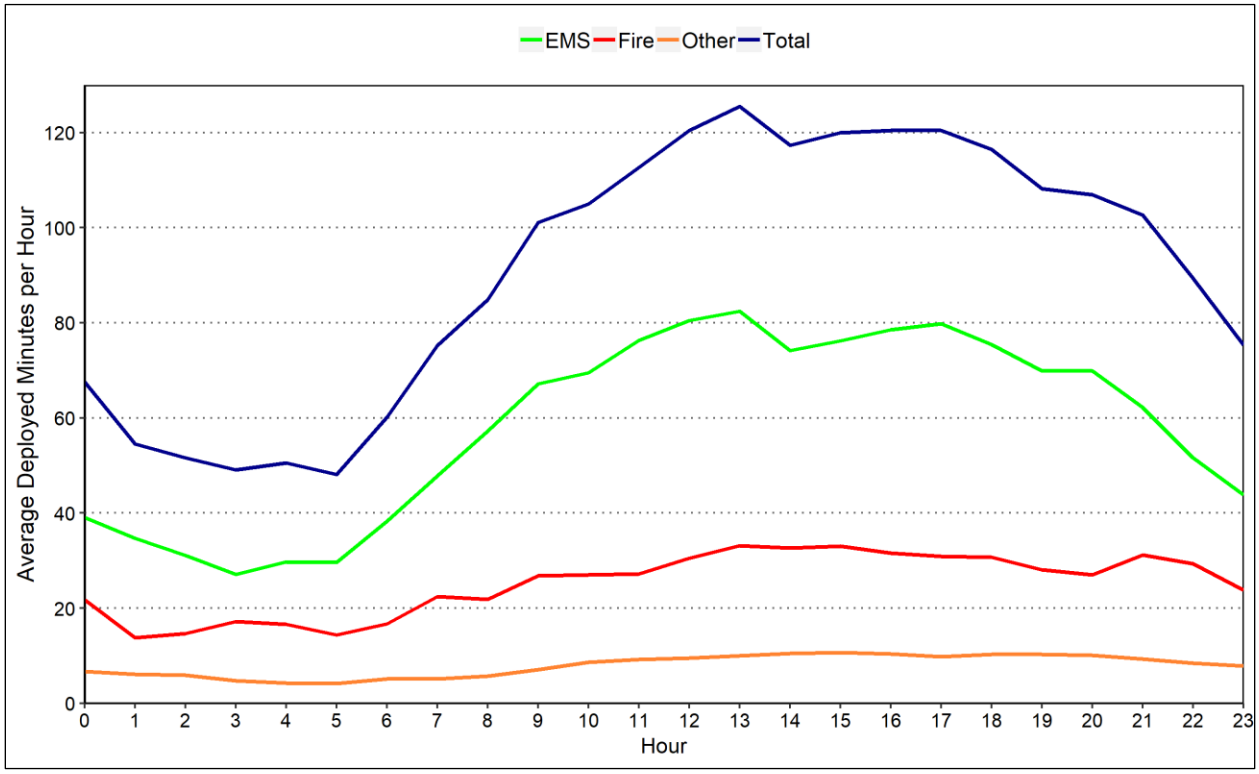
Fire

- Fire runs accounted for 28 percent of the total workload.
- The average deployed time for fire runs was 22.1 minutes. The deployed time for all fire runs averaged 10.0 hours per day. There were 3,223 runs for structure and outside fire calls combined, with a total workload of 1,771.8 hours. This accounted for 13 percent of the total workload.
- The average deployed time for outside fire runs was 28.7 minutes per run, and the average deployed time for structure fire runs was 37.3 minutes per run.

TABLE 9-5: Average Deployed Minutes by Hour of Day

Hour	EMS	Fire	Other	Total
0	39.1	21.8	6.7	67.5
1	34.7	13.8	6.1	54.5
2	31.0	14.6	5.9	51.6
3	27.1	17.1	4.8	49.1
4	29.8	16.6	4.2	50.6
5	29.6	14.3	4.2	48.1
6	38.3	16.7	5.1	60.1
7	47.8	22.4	5.1	75.3
8	57.3	21.9	5.7	84.8
9	67.2	26.8	7.1	101.1
10	69.5	27.0	8.6	105.0
11	76.3	27.2	9.2	112.7
12	80.5	30.5	9.5	120.5
13	82.4	33.2	10.0	125.5
14	74.2	32.6	10.5	117.3
15	76.2	33.0	10.7	119.9
16	78.5	31.6	10.4	120.4
17	79.8	30.8	9.8	120.4
18	75.5	30.7	10.2	116.4
19	69.9	28.0	10.3	108.2
20	69.9	27.0	10.0	106.9
21	62.2	31.2	9.3	102.7
22	51.6	29.3	8.4	89.4
23	43.8	23.8	7.8	75.4
Daily Average	**1,392.0**	**602.0**	**189.4**	**2,183.4**

FIGURE 9-7: Average Deployed Minutes by Hour of Day



Observations:

- Hourly deployed time was highest during the day from noon to 6:00 p.m., averaging between 1 hour and 57 minutes and 2 hours and 6 minutes.
- Average deployed time peaked between 1:00 p.m. and 2:00 p.m., averaging 2 hours and 6 minutes.
- Average deployed time was lowest between 5:00 a.m. and 6:00 a.m., averaging 48 minutes.

Workload by Unit

Table 9-6 provides a summary of each suppression unit's workload overall. Tables 9-7 and 9-8 provide a more detailed view of workload, showing each unit's runs broken out by run type (Table 9-7) and the resulting daily average deployed time by run type (Table 9-8). Tables 9-9, 9-10, and 9-11 provide similar analysis for support units.

TABLE 9-6: Call Workload by Unit – Suppression Units

Battalion	Station	Unit ID	Unit Type	Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Min. per Day	Total Annual Runs	Avg. Runs per Day
1	1	E1	Engine	12.5	1,119.3	184.0	5,394	14.8
		R1	Rescue	2.4	0.0	0.0	1	0.0
		SQ1	Squad	10.7	899.9	147.9	5,041	13.8
		T1	Truck	13.7	512.9	84.3	2,252	6.2
		Total		**12.0**	**2,532.1**	**416.2**	**12,688**	**34.8**
	2	B2	Brush Engine	31.3	45.4	7.5	87	0.2
		E2	Engine	16.1	1,124.3	184.8	4,180	11.5
		Total		**16.4**	**1,169.7**	**192.3**	**4,267**	**11.7**
	4	E4	Engine	13.5	892.5	146.7	3,975	10.9
		Total		**13.5**	**892.5**	**146.7**	**3,975**	**10.9**
	8	B8	Brush Engine	39.2	33.9	5.6	52	0.1
		E8	Engine	17.1	771.6	126.8	2,711	7.4
		Total		**17.5**	**805.6**	**132.4**	**2,763**	**7.6**
	9	B9	Brush Engine	10.6	2.5	0.4	14	0.0
		E9	Engine	17.1	530.7	87.2	1,861	5.1
		Total		**17.1**	**533.1**	**87.6**	**1,875**	**5.1**
	10	B10	Brush Engine	42.4	51.6	8.5	73	0.2
		E10	Engine	16.2	515.5	84.7	1,915	5.2
		Total		**17.1**	**567.1**	**93.2**	**1,988**	**5.4**
	11	B11	Brush Engine	26.6	18.2	3.0	41	0.1
		E11	Engine	17.4	457.8	75.2	1,574	4.3
		Total		**17.7**	**475.9**	**78.2**	**1,615**	**4.4**
	19	E19	Engine	0.2	0.0	0.0	1	0.0
		R19	Rescue	26.2	114.6	18.8	263	0.7
		Total		**26.1**	**114.6**	**18.8**	**264**	**0.7**
	Total			**14.5**	**7,090.7**	**1,165.6**	**29,435**	**80.6**

Battalion	Station	Unit ID	Unit Type	Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Min. per Day	Total Annual Runs	Avg. Runs per Day
2	3	E3	Engine	14.6	1,283.1	210.9	5,264	14.4
		R3	Rescue	8.8	1.5	0.2	10	0.0
		SQ3	Squad	14.2	162.6	26.7	687	1.9
		T3	Truck	15.3	476.3	78.3	1,864	5.1
		Total		**14.7**	**1,923.5**	**316.2**	**7,825**	**21.4**
	5	E5	Engine	15.6	639.0	105.0	2,460	6.7
		Total		**15.6**	**639.0**	**105.0**	**2,460**	**6.7**
	6	B6	Brush Engine	61.1	43.8	7.2	43	0.1
		E6	Engine	16.0	781.0	128.4	2,936	8.0
		Total		**16.6**	**824.7**	**135.6**	**2,979**	**8.2**
	7	E7	Engine	18.6	97.6	16.0	315	0.9
		R7	Rescue	21.3	242.0	39.8	680	1.9
		SQ7	Squad	21.1	15.4	2.5	44	0.1
		Total		**20.5**	**355.0**	**58.4**	**1,039**	**2.8**
	12	B12	Brush Engine	51.1	20.4	3.4	24	0.1
		E12	Engine	18.2	689.4	113.3	2,273	6.2
		Total		**18.5**	**709.8**	**116.7**	**2,297**	**6.3**
	21	B21	Brush Engine	32.0	35.2	5.8	66	0.2
		E21	Engine	15.1	1,053.3	173.1	4,177	11.4
		R21	Rescue	9.2	2.3	0.4	15	0.0
		SQ21	Squad	29.1	0.5	0.1	1	0.0
		UT21	Off-highway Vehicle	8.7	2.5	0.4	17	0.0
		Total		**15.3**	**1,093.7**	**179.8**	**4,276**	**11.7**
	112	RE112	Reserve Engine	10.6	0.5	0.1	3	0.0
		Total		**10.6**	**0.5**	**0.1**	**3**	**0.0**
	121	RE121	Reserve Engine	18.1	0.3	0.0	1	0.0
		Total		**18.1**	**0.3**	**0.0**	**1**	**0.0**
	Total			**15.9**	**5,546.6**	**911.8**	**20,880**	**57.2**
Total				**15.1**	**12,637.3**	**2,077.4**	**50,315**	**137.8**

TABLE 9-7: Total Annual Runs by Run Type and Unit – Suppression Units

Battalion	Station	Unit ID	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
1	1	E1	3,467	332	78	76	127	123	142	1,046	3	5,394
		R1	1	0	0	0	0	0	0	0	0	1
		SQ1	3,480	44	72	105	71	33	163	1,069	4	5,041
		T1	1,030	389	69	101	78	92	163	325	5	2,252
		Total	**7,978**	**755**	**219**	**282**	**276**	**248**	**468**	**2,440**	**12**	**12,688**
	2	B2	3	2	6	0	61	1	3	7	4	87
		E2	2,603	180	41	57	101	129	78	986	5	4,180
		Total	**2,606**	**182**	**47**	**57**	**162**	**130**	**81**	**983**	**9**	**4,267**
	4	E4	2,364	174	45	63	88	93	83	1,064	1	3,975
		Total	**2,364**	**174**	**45**	**63**	**88**	**93**	**83**	**1,064**	**1**	**3,975**
	8	B8	1	1	2	1	36	1	5	3	2	52
		E8	1,878	113	47	47	52	91	48	434	1	2,711
		Total	**1,879**	**114**	**49**	**48**	**88**	**92**	**53**	**437**	**3**	**2,763**
	9	B9	1	2	2	0	2	0	0	5	2	14
		E9	1,202	95	22	33	37	52	17	392	11	1,861
		Total	**1,203**	**97**	**24**	**33**	**39**	**52**	**17**	**397**	**13**	**1,875**
	10	B10	1	3	5	2	45	0	4	8	5	73
		E10	1,137	98	51	40	69	58	50	405	7	1,915
		Total	**1,138**	**101**	**56**	**42**	**114**	**58**	**54**	**413**	**12**	**1,988**
	11	B11	1	1	6	2	20	3	1	6	1	41
		E11	1,031	101	23	36	40	55	27	252	9	1,574
		Total	**1,032**	**102**	**29**	**38**	**60**	**58**	**28**	**258**	**10**	**1,615**
	19	E19	0	0	0	0	0	1	0	0	0	1
		R19	176	10	1	4	3	20	11	36	2	263
		Total	**176**	**10**	**1**	**4**	**3**	**21**	**11**	**36**	**2**	**264**
	Total		**18,376**	**1,545**	**470**	**567**	**830**	**752**	**795**	**6,038**	**62**	**29,435**

2	3	E3	3,489	318	93	116	115	150	114	868	1	5,264
		R3	10	0	0	0	0	0	0	0	0	10
		SQ3	506	4	4	13	14	12	16	118	0	687
		T3	1,063	133	58	91	46	101	80	291	1	1,864
		Total	**5,068**	**455**	**155**	**220**	**175**	**263**	**210**	**1,277**	**2**	**7,825**
	5	E5	1,486	154	56	63	64	80	92	464	1	2,460
		Total	**1,486**	**154**	**56**	**63**	**64**	**80**	**92**	**464**	**1**	**2,460**
	6	B6	0	2	3	1	27	1	1	4	4	43
		E6	1,805	201	44	70	52	99	58	603	4	2,936
		Total	**1,805**	**203**	**47**	**71**	**78**	**100**	**59**	**607**	**8**	**2,979**
	7	E7	178	24	7	10	19	23	10	44	0	315
		R7	517	4	2	0	2	18	22	109	6	680
		SQ7	23	4	0	2	2	6	6	1	0	44
		Total	**718**	**32**	**9**	**12**	**23**	**47**	**38**	**154**	**6**	**1,038**
	12	B12	0	0	1	0	14	0	1	4	4	24
		E12	1,469	177	47	61	32	78	32	375	2	2,273
		Total	**1,469**	**177**	**48**	**61**	**46**	**78**	**33**	**379**	**6**	**2,297**
	21	B21	0	1	6	0	42	0	3	8	6	66
		E21	2,614	313	72	95	140	109	126	693	15	4,177
		R21	12	0	0	0	0	0	0	3	0	15
		SQ21	1	0	0	0	0	0	0	0	0	1
		UT21	13	0	0	0	0	1	0	3	0	17
		Total	**2,740**	**314**	**78**	**95**	**182**	**110**	**129**	**707**	**21**	**4,276**
	112	RE112	1	2	0	0	0	0	0	0	0	3
		Total	**1**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**
	121	RE121	1	0	0	0	0	0	0	0	0	1
		Total	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
	Total		**13,188**	**1,337**	**393**	**522**	**569**	**678**	**561**	**3,588**	**44**	**20,880**
Total			**31,564**	**2,882**	**863**	**1,089**	**1,399**	**1,430**	**1,356**	**9,626**	**106**	**50,315**

TABLE 9-8: Daily Average Deployed Minutes by Run Type and Unit – Suppression Units

Battalion	Station	Unit ID	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
1	1	E1	115.2	14.4	2.8	4.7	8.8	4.8	15.1	18.1	0.1	184.0
		R1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		SQ1	108.2	1.3	2.3	4.8	3.8	0.6	13.7	12.8	0.4	147.9
		T1	35.6	11.6	2.3	4.5	3.0	4.6	16.9	5.2	0.6	84.3
		Total	**259.0**	**27.4**	**7.3**	**13.9**	**15.6**	**10.0**	**45.7**	**36.2**	**1.1**	**416.2**
	2	B2	0.1	0.1	0.1	0.0	5.3	0.0	0.0	0.1	1.6	7.5
		E2	134.2	7.3	1.3	3.2	7.2	6.2	6.7	18.4	0.3	184.8
		Total	**134.3**	**7.4**	**1.4**	**3.2**	**12.5**	**6.2**	**6.7**	**18.6**	**1.9**	**192.3**
	4	E4	96.8	8.2	2.1	4.7	5.8	4.4	6.5	18.3	0.0	146.7
		Total	**96.8**	**8.2**	**2.1**	**4.7**	**5.8**	**4.4**	**6.5**	**18.3**	**0.0**	**146.7**
	8	B8	0.0	0.0	0.1	0.0	4.3	0.0	0.1	0.1	0.9	5.6
		E8	94.4	5.2	2.0	3.0	5.4	4.5	3.7	8.5	0.1	126.8
		Total	**94.5**	**5.2**	**2.0**	**3.0**	**9.7**	**4.6**	**3.8**	**8.6**	**1.0**	**132.4**
	9	B9	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.4
		E9	60.8	4.4	0.9	2.3	4.2	2.8	1.4	9.4	1.1	87.2
		Total	**60.9**	**4.5**	**1.0**	**2.3**	**4.2**	**2.8**	**1.4**	**9.5**	**1.1**	**87.6**
	10	B10	0.0	0.1	0.1	0.0	6.0	0.0	0.0	0.2	2.0	8.5
		E10	55.6	4.4	2.0	2.1	5.7	2.7	3.5	7.5	1.2	84.7
		Total	**55.6**	**4.5**	**2.1**	**2.1**	**11.7**	**2.7**	**3.6**	**7.7**	**3.2**	**93.2**
	11	B11	0.0	0.0	0.3	0.0	1.9	0.5	0.0	0.1	0.1	3.0
		E11	53.2	5.4	0.9	2.2	4.1	2.8	1.4	4.4	0.8	75.2
		Total	**53.3**	**5.4**	**1.2**	**2.2**	**6.0**	**3.3**	**1.5**	**4.5**	**0.9**	**78.2**
	19	E19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		R19	12.5	0.4	0.0	0.9	0.5	1.0	2.4	0.9	0.4	18.8
		Total	**12.5**	**0.4**	**0.0**	**0.9**	**0.5**	**1.0**	**2.4**	**0.9**	**0.4**	**18.8**
	Total		**766.9**	**63.0**	**17.1**	**32.3**	**66.0**	**34.9**	**71.5**	**104.2**	**9.7**	**1,165.6**

Battalion	Station	Unit ID	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
2	3	E3	143.5	12.5	3.5	9.4	7.9	5.4	13.5	15.2	0.0	210.9
		R3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
		SQ3	20.9	0.2	0.1	0.6	0.8	0.8	1.5	1.7	0.0	26.7
		T3	44.2	4.5	2.1	6.2	2.4	5.3	9.2	4.5	0.0	78.3
		Total	**208.8**	**17.1**	**5.7**	**16.2**	**11.2**	**11.5**	**24.2**	**21.4**	**0.0**	**316.2**
	5	E5	68.7	6.2	2.4	4.0	4.6	4.2	6.6	8.3	0.0	105.0
		Total	**68.7**	**6.2**	**2.4**	**4.0**	**4.6**	**4.2**	**6.6**	**8.3**	**0.0**	**105.0**
	6	B6	0.0	0.1	0.1	0.0	5.2	0.0	0.0	0.1	1.8	7.2
		E6	86.1	9.4	1.5	4.1	3.7	5.1	6.2	12.1	0.1	128.4
		Total	**86.1**	**9.5**	**1.5**	**4.1**	**8.9**	**5.1**	**6.2**	**12.2**	**1.9**	**135.6**
	7	E7	9.1	1.1	0.3	0.5	2.3	1.4	0.6	0.8	0.0	16.0
		R7	31.4	0.1	0.1	0.0	0.2	0.9	4.7	1.7	0.7	39.8
		SQ7	1.4	0.1	0.0	0.1	0.0	0.3	0.6	0.0	0.0	2.5
		Total	**42.0**	**1.3**	**0.3**	**0.6**	**2.5**	**2.6**	**5.9**	**2.4**	**0.7**	**58.4**
	12	B12	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.1	2.0	3.4
		E12	79.2	9.4	1.7	4.6	2.8	4.6	2.9	7.5	0.6	113.3
		Total	**79.2**	**9.4**	**1.6**	**4.6**	**4.0**	**4.6**	**2.9**	**7.6**	**2.6**	**116.7**
	21	B21	0.0	0.0	0.2	0.0	2.8	0.0	0.1	0.2	2.5	5.8
		E21	112.8	13.4	2.3	4.9	9.7	5.5	12.0	11.2	1.4	173.1
		R21	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
		SQ21	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
		UT21	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
		Total	**113.5**	**13.4**	**2.4**	**4.9**	**12.5**	**5.5**	**12.1**	**11.5**	**3.9**	**179.8**
	112	RE112	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
		Total	**0.0**	**0.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.1**
	121	RE121	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Total	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
	Total		**598.5**	**57.0**	**14.1**	**34.5**	**43.7**	**33.5**	**57.9**	**63.4**	**9.2**	**911.8**
Total			**1,365.4**	**120.0**	**31.2**	**66.8**	**109.7**	**68.4**	**129.4**	**167.7**	**18.9**	**2,077.4**

Observations:

- Battalion 1 made the most runs (29,435 or an average of 80.6 runs per day) and had the highest total annual deployed time (7,090.7 or an average of 19.4 hours per day).
  - EMS calls accounted for 62 percent of runs and 66 percent of total deployed time.
  - Structure and outside fire calls accounted for 6 percent of runs and 12 percent of total deployed time.
- Battalion 2 made the second most runs (20,880 or an average of 57.2 runs per day) and had the second highest total annual deployed time (5,546.6 or an average of 15.2 hours per day).
  - EMS calls accounted for 63 percent of runs and 66 percent of total deployed time
  - Structure and outside fire calls accounted for 5 percent of runs and 11 percent of total deployed time.
- Station 1 made the most runs (12,688 or an average of 34.8 runs per day) and had the highest total annual deployed time (2,532.1 or an average of 6.9 hours per day).
  - EMS calls accounted for 63 percent of runs and 62 percent of total deployed time
  - Structure and outside fire calls accounted for 6 percent of runs and 15 percent of total deployed time
- Station 3 made the second most runs (7,825 or an average of 21.4 runs per day) and had the second highest total annual deployed time (1,923.2 or an average of 5.3 hours per day).
  - EMS calls accounted for 65 percent of runs and 66 percent of total deployed time
  - Structure and outside fire calls accounted for 5 percent of runs and 11 percent of total deployed time
- E1 made the most runs (5,394, or an average of 14.8 runs per day) and had the third highest total annual deployed time (1,119.3 or an average of 3.1 hours per day).
  - EMS calls accounted for 64 percent of runs and 63 of total deployed time.
  - Structure and outside fire calls accounted for 5 percent of runs and 13 percent of total deployed time.
- E3 made the second most runs (5,264, or an average of 14.4 runs per day) and had the highest total annual deployed time (1,283.1 or an average of 3.5 hours per day).
  - EMS calls accounted for 66 percent of runs and 68 percent of total deployed time.
  - Structure and outside fire calls accounted for 4 percent of runs and 10 percent of total deployed time.

TABLE 9-9: Call Workload by Unit – Support Units

Station	Unit ID	Unit Type	Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Min. per Day	Total Annual Runs	Avg. Runs per Day
1	COMM1	Communication	2.0	0.0	0.0	1	0.0
	FC1	Chaplain	121.5	105.3	17.4	52	0.1
	Total		**119.2**	**105.3**	**17.4**	**53**	**0.1**
3	FC3	Chaplain	194.1	3.2	0.5	1	0.0
	HAZ3	Hazmat	34.4	20.1	3.3	35	0.1
	Total		**38.8**	**23.3**	**3.8**	**35**	**0.1**
4	BT4	Boat	12.6	6.5	1.1	31	0.1
	SRV4	Service Rig	13.1	0.2	0.0	1	0.0
	Total		**20.8**	**47.1**	**7.8**	**136**	**0.4**
10	SAFET	Safety Officer	26.2	453.7	74.8	1,039	2.9
11	BT11	Boat	54.3	2.7	0.4	3	0.0
	HR11	Heavy Rescue	9.5	0.5	0.1	3	0.0
	Total		**31.9**	**3.2**	**0.5**	**6**	**0.0**
SHOP	AIR	Air Truck	76.9	51.3	8.5	40	0.1
Total			**32.0**	**643.5**	**106.1**	**1,206**	**3.3**

TABLE 9-10: Total Annual Runs by Run Type and Unit – Support Units

Station	Unit ID	Unit Type	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
1	COMM1	Communication	1	0	0	0	0	0	0	0	0	1
	FC1	Chaplain	27	0	0	0	2	1	20	1	1	52
	Total		**28**	**0**	**0**	**0**	**2**	**1**	**20**	**1**	**1**	**53**
3	FC3	Chaplain	1	0	0	0	0	0	0	0	0	1
	HAZ3	Hazmat	0	2	10	20	0	2	0	1	0	35
	Total		**1**	**2**	**10**	**20**	**0**	**2**	**0**	**1**	**0**	**36**
4	BT4	Boat	23	0	1	0	0	5	0	2	0	31
	SRV4	Service Rig	1	0	0	0	0	0	0	0	0	1
	Total		**24**	**0**	**1**	**0**	**0**	**5**	**0**	**2**	**0**	**32**
10	SAFET	Safety Officer	182	57	106	149	208	74	203	47	13	1,039
11	BT11	Boat	2	0	0	0	0	0	0	1	0	3
	HR11	Heavy Rescue	2	0	0	0	0	0	0	1	0	3
	Total		**4**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**6**
SHOP	AIR	Air Truck	1	0	0	1	3	0	32	2	1	40
Total			**240**	**59**	**117**	**170**	**213**	**82**	**255**	**55**	**15**	**1,206**

TABLE 9-11: Daily Average Deployed Minutes by Run Type and Unit – Support Units

Station	Unit ID	Unit Type	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
1	COMM1	Communication	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	FC1	Chaplain	8.5	0.0	0.0	0.0	0.9	0.4	7.3	0.0	0.2	17.4
	Total		**8.5**	**0.0**	**0.0**	**0.0**	**0.9**	**0.4**	**7.3**	**0.0**	**0.2**	**17.4**
3	FC3	Chaplain	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
	HAZ3	Hazmat	0.0	0.0	0.6	2.5	0.0	0.2	0.0	0.0	0.0	3.3
	Total		**0.5**	**0.0**	**0.6**	**2.5**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**3.8**
4	BT4	Boat	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1
	SRV4	Service Rig	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total		**1.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**1.1**
10	SAFET	Safety Officer	16.1	1.8	3.6	8.9	15.5	5.6	20.7	1.2	1.3	74.8
11	BT11	Boat	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
	HR11	Heavy Rescue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
	Total		**0.5**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.1**	**0.0**	**0.5**
SHOP	AIR	Air Truck	0.0	0.0	0.0	0.3	0.8	0.0	7.1	0.0	0.2	8.5
Total			**26.7**	**1.9**	**4.2**	**11.6**	**17.1**	**6.3**	**35.1**	**1.3**	**1.8**	**106.1**

Observations:

- SAFET made the most runs (1,039 or an average of 2.9 runs per day) and had the highest total annual deployed time (453.7 or an average of 74.8 minutes per day).
  - EMS calls accounted for 18 percent of runs and 22 percent of total deployed time.
  - Structure and outside fire calls accounted for 40 percent of runs and 48 percent of total deployed time.

ANALYSIS OF BUSIEST HOURS

There is significant variability in the number of calls from hour to hour. One special concern relates to the resources available for hours with the heaviest workload. We tabulated the data for each of the 8,760 hours in the year. Table 9-12 shows the number of hours in the year in which there were zero to 11 or more calls during the hour. Table 9-13 examines the number of times a call within a station's first due area overlapped with another call within the same area. Table 9-14 examines the availability of a unit within a station to respond to calls within its first due area. Table 9-15 shows the 10 one-hour intervals which had the most calls during the year.

TABLE 9-12: Frequency Distribution of the Number of Calls

Calls in an Hour	Frequency	Percentage
0	241	2.8
1	629	7.2
2	1,020	11.6
3	1,268	14.5
4	1,296	14.8
5	1,132	12.9
6	1,008	11.5
7	827	9.4
8	518	5.9
9	366	4.2
10	208	2.4
11+	247	2.8
Total	**8,760**	**100.0**

TABLE 9-13: Frequency of Overlapping Calls

Station	Scenario	Number of Calls	Percent of All Calls	Total Hours
Station 1	No overlapped call	6,799	79.3	1,569.1
	Overlapped with one call	1,563	18.2	185.1
	Overlapped with two calls	184	2.1	16.0
	Overlapped with three calls	21	0.2	0.9
	Overlapped with four calls	3	0.0	0.3
Station 2	No overlapped call	3,584	89.6	890.1
	Overlapped with one call	389	9.7	48.5
	Overlapped with two calls	27	0.7	2.4
Station 3	No overlapped call	4,886	82.0	1,345.3
	Overlapped with one call	960	16.1	135.4
	Overlapped with two calls	106	1.8	9.2
	Overlapped with three calls	6	0.1	0.5
Station 4	No overlapped call	3,309	92.2	788.2
	Overlapped with one call	267	7.4	31.3
	Overlapped with two calls	11	0.3	1.1

Station	Scenario	Number of Calls	Percent of All Calls	Total Hours
	Overlapped with three calls	2	0.1	0.1
Station 5	No overlapped call	1,840	94.0	517.4
	Overlapped with one call	115	5.9	15.8
	Overlapped with two calls	2	0.1	0.1
Station 6	No overlapped call	2,535	92.1	732.4
	Overlapped with one call	205	7.4	26.5
	Overlapped with two calls	11	0.4	0.9
	Overlapped with three calls	1	0.0	0.0
	Overlapped with four calls	1	0.0	0.0
Station 7	No overlapped call	922	95.7	314.3
	Overlapped with one call	40	4.2	6.5
	Overlapped with two calls	1	0.1	0.1
Station 8	No overlapped call	2,431	91.8	729.4
	Overlapped with one call	206	7.8	27.8
	Overlapped with two calls	10	0.4	0.8
Station 9	No overlapped call	1,843	93.3	544.4
	Overlapped with one call	128	6.5	20.2
	Overlapped with two calls	4	0.2	0.3
Station 10	No overlapped call	1,534	94.2	453.4
	Overlapped with one call	92	5.6	11.9
	Overlapped with two calls	3	0.2	0.2
Station 11	No overlapped call	1,274	95.9	402.7
	Overlapped with one call	52	3.9	8.3
	Overlapped with two calls	2	0.2	0.2
Station 12	No overlapped call	2,056	92.6	687.7
	Overlapped with one call	156	7.0	22.7
	Overlapped with two calls	7	0.3	0.5
	Overlapped with three calls	2	0.1	0.2
Station 19	No overlapped call	251	97.3	101.9
	Overlapped with one call	7	2.7	1.5
Station 21	No overlapped call	3,351	89.0	916.9
	Overlapped with one call	384	10.2	48.4
	Overlapped with two calls	30	0.8	2.3
	Overlapped with three calls	2	0.1	0.3

TABLE 9-14: Station Availability to Respond to Calls

Station	Calls in Area	First Due Responded	First Due Arrived	First Due First	Percent Responded	Percent Arrived	Percent First
1	6,697	6,580	6,542	6,519	98.3	97.7	97.3
2	3,052	2,751	2,697	2,678	90.1	88.4	87.7
3	4,906	4,723	4,693	4,665	96.3	95.7	95.1
4	2,587	2,407	2,389	2,363	93.0	92.3	91.3
5	1,577	1,466	1,449	1,425	93.0	91.9	90.4
6	2,153	1,978	1,969	1,949	91.9	91.5	90.5
7	828	711	687	671	85.9	83.0	81.0
8	2,198	2,047	2,040	2,029	93.1	92.8	92.3
9	1,551	1,461	1,453	1,443	94.2	93.7	93.0
10	1,243	1,181	1,178	1,170	95.0	94.8	94.1
11	1,115	1,068	1,063	1,056	95.8	95.3	94.7
12	1,837	1,755	1,749	1,745	95.5	95.2	95.0
19	216	181	177	175	83.8	81.9	81.0
21	3,104	2,825	2,806	2,781	91.0	90.4	89.5
Total	**33,064**	**31,134**	**30,892**	**30,669**	**94.2**	**93.4**	**92.8**

Note: For each station, we count the number of calls occurring within its first due area. Then, we count the number of calls to which at least one RFD unit responded. Next, we focus on units from the first due station to see if any units responded, arrived, or arrived first.

TABLE 9-15: Top 10 Hours with the Most Calls Received

Hour	Number of Calls	Number of Runs	Total Deployed Hours
6/7/2018, 10:00 a.m. to 11:00 a.m.	17	19	4.2
7/12/2018, noon to 1:00 p.m.	16	25	6.9
3/7/2018, 8:00 a.m. to 9:00 a.m.	16	21	4.4
11/15/2018, 5:00 p.m. to 6:00 p.m.	15	26	6.8
7/14/2018, 8:00 p.m. to 9:00 p.m.	15	24	4.4
4/9/2018, 4:00 p.m. to 5:00 p.m.	15	22	4.1
12/4/2018, 4:00 p.m. to 5:00 p.m.	15	20	5.6
6/2/2018, 5:00 p.m. to 6:00 p.m.	15	19	4.3
7/23/2018, 8:00 a.m. to 9:00 a.m.	15	18	4.9
12/26/2018, 7:00 p.m. to 8:00 p.m.	14	30	5.4

Note: Total deployed hours is a measure of the total time spent responding to calls received in the hour, and which may extend into the next hour or hours. The number of runs and deployed hours only includes RFD support and nonsupport units.

Observations:

- During 247 hours during the year (2.8 percent of all hours), 11 or more calls occurred; in other words, the department responded to 11 or more calls in an hour roughly five times a week.
- The highest number of calls to occur in an hour was 17, which happened once.
- The hour with the most calls was 10:00 a.m. to 11:00 a.m. on June 7, 2018. The hour's 17 calls involved 19 individual dispatches resulting in 4.2 hours of deployed time. These 17 calls included four seizure and unconsciousness calls, three breathing difficulty calls, three canceled calls, three illness and other calls, one cardiac and stroke call, one fall and injury call, one motor vehicle accident, and one outside fire call.
- The hour with the second most calls was noon to 1:00 p.m. on July 12, 2018. The hour's 16 calls involved 25 individual dispatches resulting in 6.9 hours of deployed time. These 16 calls included four motor vehicle accidents, three canceled calls, two breathing difficulty calls, two fall and injury calls, one cardiac and stroke call, one false alarm, one good intent call, one illness and other call, and one seizure and unconsciousness call.

RESPONSE TIME

In this part of the analysis we present response time statistics for different call types. We separate response time into its identifiable components. *Dispatch time* is the difference between the time a call is received and the time a unit is dispatched. Dispatch time includes call processing time, which is the time required to determine the nature of the emergency and types of resources to dispatch. *Turnout time* is the difference between dispatch time and the time a unit is in route to a call's location. *Travel time* is the difference between the time in route and arrival on scene. *Response time* is the total time elapsed between receiving a call to arriving on scene.

In this analysis, we included all calls to which at least one non-administrative RFD unit responded in an emergency priority, while excluding canceled and mutual aid calls. In addition, out-of-area wildfire calls with units dispatched for more than one day were excluded, as were calls with a total response time of more than 30 minutes. Finally, we focused on units that had complete time stamps, that is, units with all components recorded, so that we could calculate each segment of response time.

Of the 41,751 total calls, we excluded 112 calls to which only administrative units responded, 20 out-of-area wildfire calls with units dispatched for longer than 12 hours, 8,637 cancelled and mutual aid calls, 321 calls where no units recorded a valid on-scene time, 77 calls where the first arriving unit response was greater than 30 minutes, 8 calls that did not record a unit response in an emergent priority, and 105 calls where one or more segments of the first arriving unit's response time could not be calculated due to missing or faulty data. As a result, in this section, a total of 32,471 calls are included in the analysis.

Response Time by Type of Call

Table 9-16 provides average dispatch, turnout, travel, and total response time for the first arriving unit to each call in the City, broken out by call type. Figures 9-8 and 9-9 illustrate the same information. Table 9-17 gives the 90th percentile time broken out in the same manner. A 90th percentile time means that 90 percent of calls had response times at or below that number. For example, Table 9-17 shows a 90th percentile response time of 11.3 minutes which means that 90 percent of the time a call had a response time of no more than 11.3 minutes.

TABLE 9-16: Average Response Time of First Arriving Unit, by Call Type (Minutes)

Call Type	Dispatch	Turnout	Travel	Total	Number of Calls
Breathing difficulty	1.3	1.4	4.6	7.4	3,617
Cardiac and stroke	1.3	1.4	4.6	7.3	3,829
Fall and injury	1.5	1.5	5.3	8.2	5,845
Illness and other	1.5	1.4	4.9	7.8	4,486
MVA	1.7	1.4	4.7	7.8	3,143
Overdose and psychiatric	1.8	1.6	6.7	10.0	860
Seizure and unconsciousness	1.5	1.3	4.7	7.5	5,918
EMS Total	**1.5**	**1.4**	**4.9**	**7.8**	**27,968**
False alarm	1.5	1.6	4.9	8.0	2,016
Good intent	2.0	1.5	5.1	8.7	374
Hazard	1.9	1.5	5.3	8.7	423
Outside fire	1.5	1.5	4.4	7.5	519
Public service	1.9	1.5	5.7	9.0	1,099
Structure fire	1.5	1.5	4.0	7.1	342
Fire Total	**1.7**	**1.5**	**5.0**	**8.2**	**4,773**
Total	**1.5**	**1.4**	**4.9**	**7.8**	**32,471**

FIGURE 9-8: Average Response Time of First Arriving Unit, by Call Type – EMS

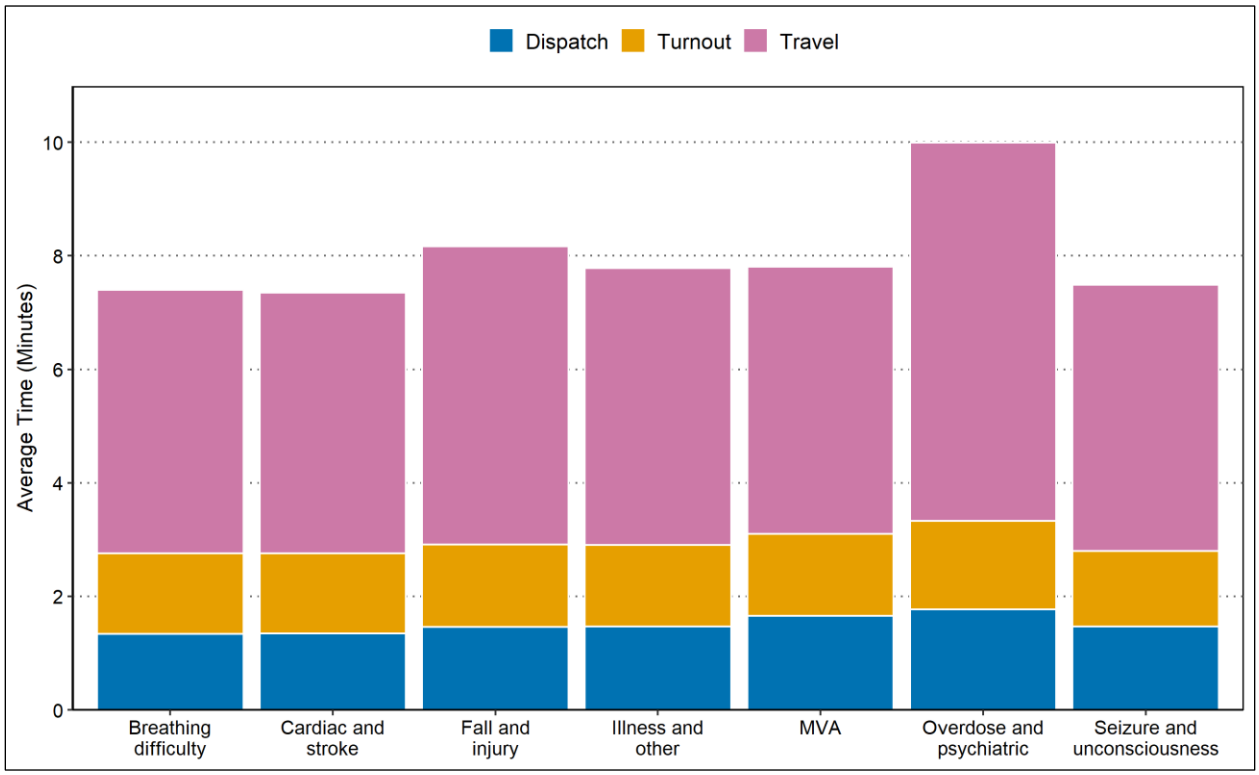


FIGURE 9-9: Average Response Time of First Arriving Unit, by Call Type – Fire

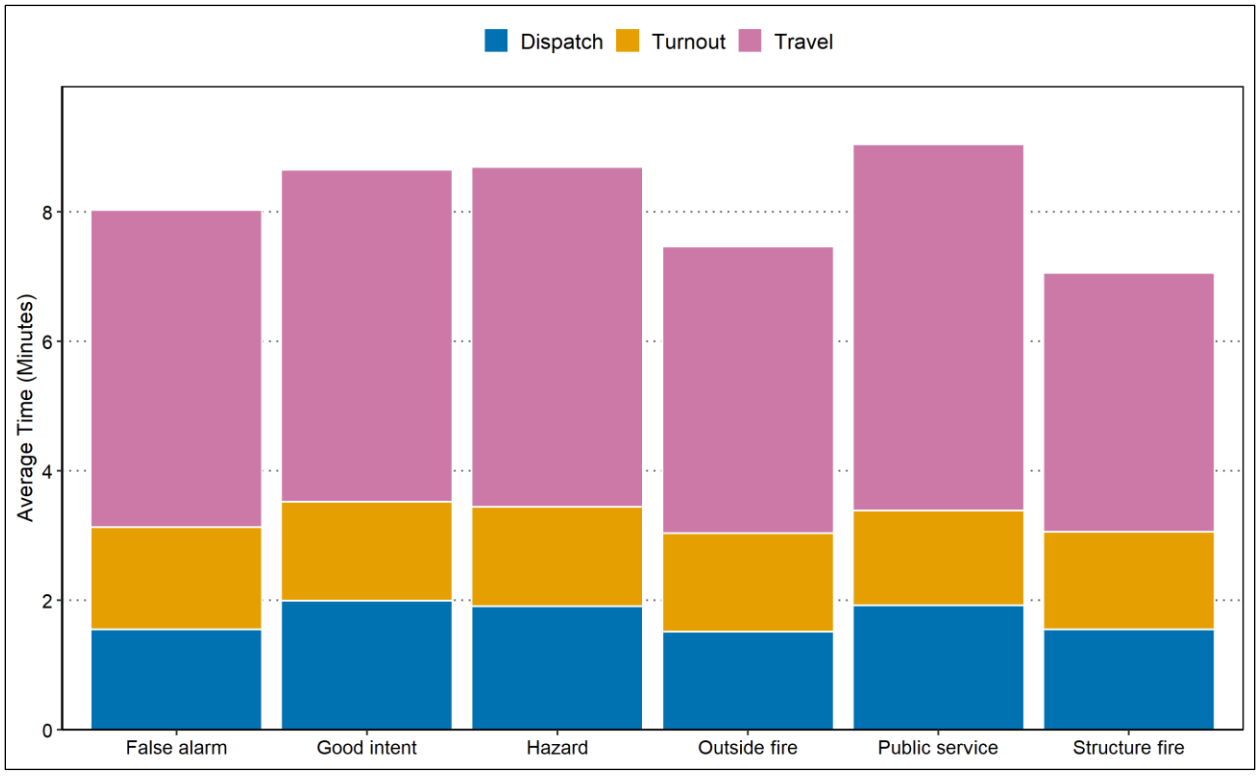


TABLE 9-17: 90th Percentile Response Time of First Arriving Unit, by Call Type (Minutes)

Call Type	Dispatch	Turnout	Travel	Total	Number of Calls
Breathing difficulty	2.3	2.4	7.4	10.3	3,617
Cardiac and stroke	2.4	2.4	7.1	10.2	3,829
Fall and injury	2.7	2.5	8.6	12.2	5,845
Illness and other	2.6	2.5	7.7	11.0	4,486
MVA	3.1	2.3	8.0	11.7	3,143
Overdose and psychiatric	3.1	2.5	13.6	17.2	860
Seizure and unconsciousness	2.6	2.3	7.4	10.7	5,918
EMS Total	**2.7**	**2.4**	**7.9**	**11.2**	**27,698**
False alarm	2.4	2.5	8.0	11.4	2,016
Good intent	3.6	2.4	8.3	12.6	374
Hazard	3.3	2.5	8.4	12.1	423
Outside fire	2.8	2.4	7.6	11.2	519
Public service	4.0	2.6	9.2	13.0	1,099
Structure fire	2.8	2.4	6.6	10.1	342
Fire Total	**3.1**	**2.5**	**8.2**	**11.9**	**4,773**
Total	**2.7**	**2.4**	**7.9**	**11.3**	**32,471**

Observations:

- The average dispatch time was 1.5 minutes.
- The average turnout time was 1.4 minutes.
- The average travel time was 4.9 minutes.
- The average total response time was 7.8 minutes.
- The average response time was 7.8 minutes for EMS calls and 8.2 minutes for fire calls.
- The average response time was 7.5 minutes for outside fires and 7.1 minutes for structure fires.
- The 90th percentile dispatch time was 2.7 minutes.
- The 90th percentile turnout time was 2.4 minutes.
- The 90th percentile travel time was 7.9 minutes.
- The 90th percentile total response time was 11.3 minutes.
- The 90th percentile response time was 11.2 minutes for EMS calls and 11.9 minutes for fire calls.
- The 90th percentile response time was 11.2 minutes for outside fires and 10.1 minutes for structure fires.

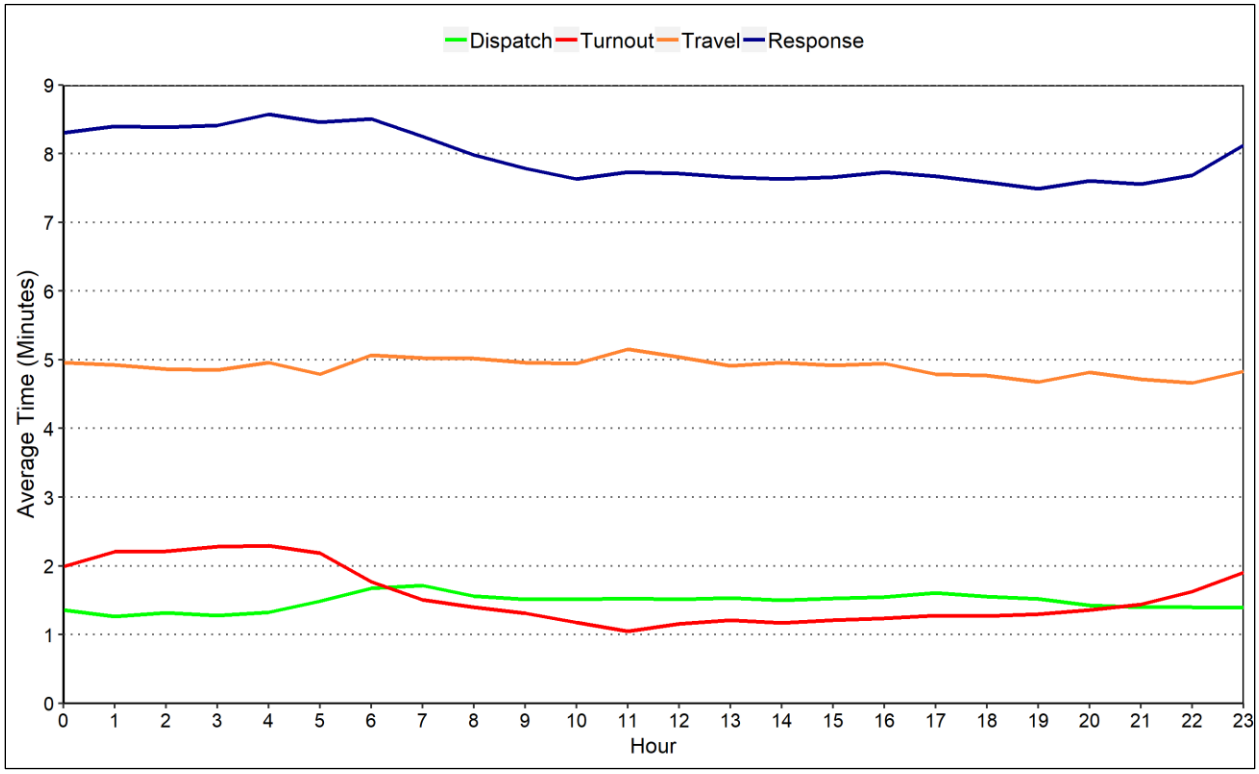
Response Time by Hour

Average dispatch, turnout, travel, and total response time by hour for calls are shown in Table 9-18 and Figure 9-10. The table also shows 90th percentile response times.

TABLE 9-18: Average and 90th Percentile Response Time of First Arriving Unit, by Hour of Day

Hour	Dispatch	Turnout	Travel	Response Time	90th Percentile Response Time	Number of Calls
0	1.4	2.0	5.0	8.3	11.7	907
1	1.3	2.2	4.9	8.4	11.6	810
2	1.3	2.2	4.9	8.4	11.6	719
3	1.3	2.3	4.9	8.4	11.7	660
4	1.3	2.3	5.0	8.6	11.6	633
5	1.5	2.2	4.8	8.5	11.6	708
6	1.7	1.8	5.1	8.5	11.8	888
7	1.7	1.5	5.0	8.2	11.9	1,132
8	1.6	1.4	5.0	8.0	11.3	1,424
9	1.5	1.3	5.0	7.8	11.2	1,584
10	1.5	1.2	4.9	7.6	10.7	1,652
11	1.5	1.0	5.2	7.7	11.4	1,792
12	1.5	1.2	5.0	7.7	11.3	1,831
13	1.5	1.2	4.9	7.7	11.1	1,867
14	1.5	1.2	5.0	7.6	11.3	1,743
15	1.5	1.2	4.9	7.7	11.2	1,741
16	1.5	1.2	4.9	7.7	11.2	1,827
17	1.6	1.3	4.8	7.7	11.5	1,910
18	1.6	1.3	4.8	7.6	11.1	1,724
19	1.5	1.3	4.7	7.5	11.0	1,595
20	1.4	1.4	4.8	7.6	10.9	1,596
21	1.4	1.4	4.7	7.6	11.0	1,439
22	1.4	1.6	4.7	7.7	10.7	1,203
23	1.4	1.9	4.8	8.1	11.6	1,086
Total	**1.5**	**1.4**	**4.9**	**7.8**	**11.3**	**32,471**

FIGURE 9-10: Average Response Time of First Arriving Unit, by Hour of Day



Observations:

- Average dispatch time was between 1.3 minutes (4:00 a.m. to 5:00 a.m.) and 1.7 minutes (6:00 a.m. to 7:00 a.m.).
- Average turnout time was between 1 minutes (11:00 a.m. to noon) and 2.3 minutes (3:00 a.m. to 4:00 a.m.).
- Average travel time was between 4.7 minutes (11:00 a.m. to noon) and 5.2 minutes (10:00 p.m. to 11:00 p.m.).
- Average response time was between 7.5 minutes (7:00 p.m. to 8:00 p.m.) and 8.6 minutes (4:00 a.m. to 5:00 a.m.).
- The 90th percentile response time was between 10.7 minutes (10:00 p.m. to 11:00 p.m.) and 11.9 minutes (7:00 a.m. to 8:00 a.m.).

Response Time Distribution

Here, we present a more detailed look at how response times to calls are distributed. The cumulative distribution of total response time for the first arriving unit to EMS calls is shown in Figure 9-11 and Table 9-19. Figure 9-11 shows response times for the first arriving RFD unit to EMS calls as a frequency distribution in whole-minute increments, and Figure 9-12 shows the same for the first arriving RFD unit to outside and structure fire calls.

The cumulative percentages here are read in the same way as a percentile. In Figure 9-11, the 90th percentile of 11.2 minutes means that 90 percent of EMS calls had a response time of 11.2 minutes or less. In Table 9-19, the cumulative percentage of 62, for example, means that 62 percent of EMS calls had a response time under 8 minutes.

FIGURE 9-11: Cumulative Distribution of Response Time – First Arriving Unit – EMS

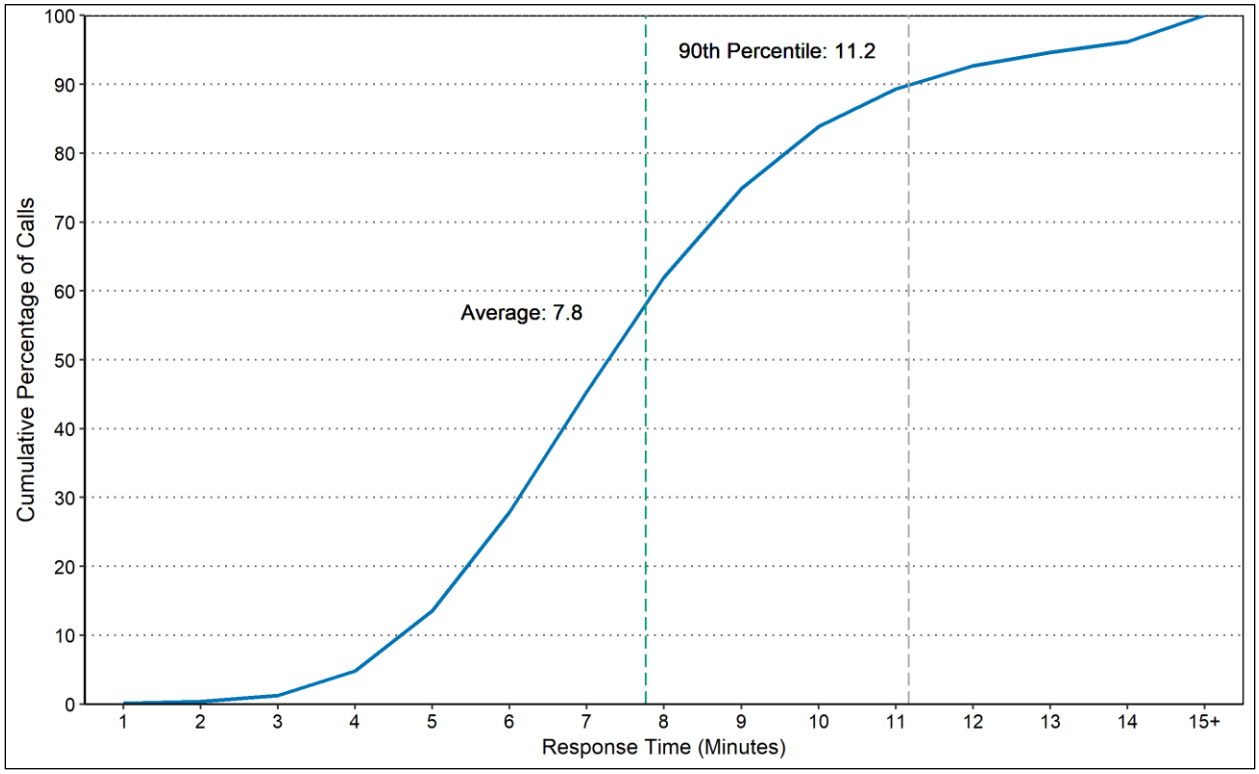


FIGURE 9-12: Cumulative Distribution of Response Time – First Arriving Unit – Structure and Outside Fires

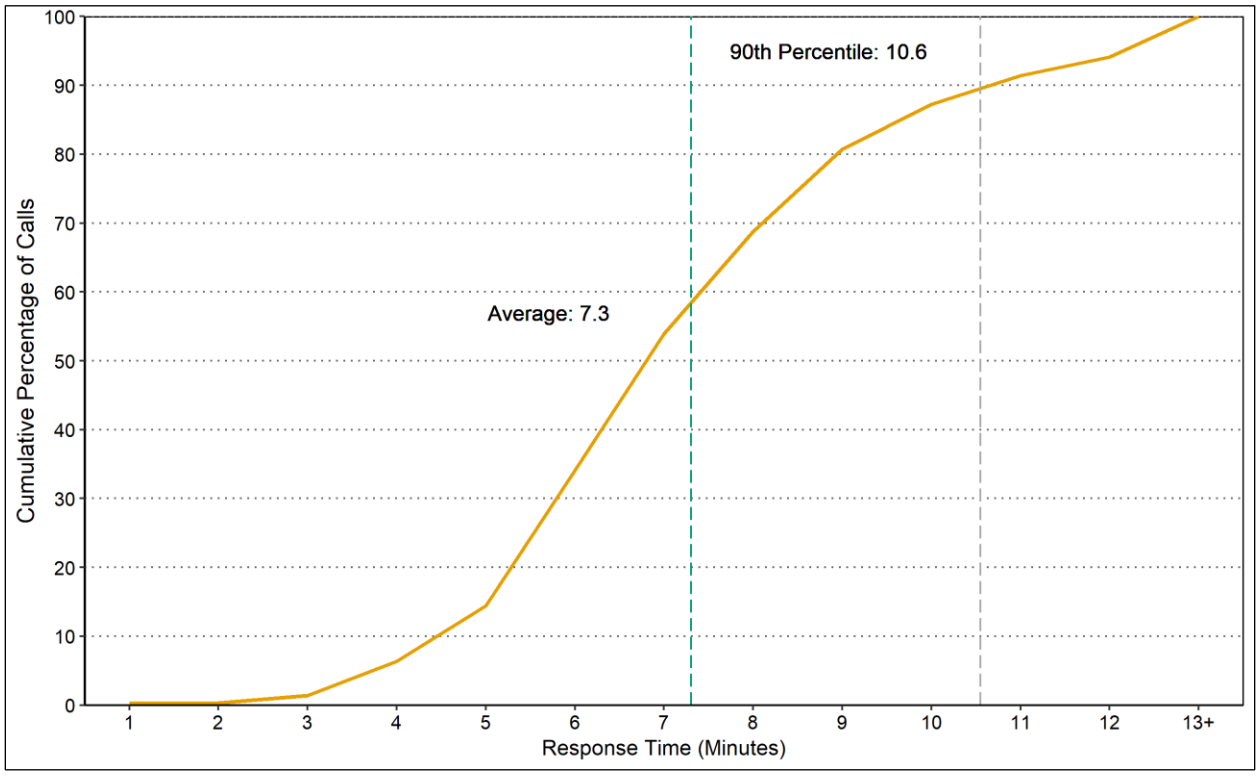


TABLE 9-19: Cumulative Distribution of Response Time – First Arriving Unit – EMS

Response Time (minute)	Frequency	Cumulative Percentage
1	33	0.1
2	77	0.4
3	240	1.3
4	987	4.8
5	2,418	13.6
6	3,965	27.9
7	4,844	45.4
8	4,602	62.0
9	3,580	74.9
10	2,487	83.9
11	1,519	89.4
12	916	92.7
13	550	94.7
14	424	96.2
15+	1,056	100.0

TABLE 9-20: Cumulative Distribution of Response Time – First Arriving Unit – Structure and Outside Fires

Response Time (minute)	Frequency	Cumulative Percentage
1	2	0.2
2	1	0.3
3	9	1.4
4	43	6.4
5	69	14.4
6	170	34.1
7	170	53.9
8	128	68.8
9	103	80.7
10	56	87.2
11	36	91.4
12	23	94.1
13+	51	100.0

Observations:

- For 62 percent of EMS calls, the response time of the first arriving unit was less than 8 minutes.
- For 68.8 percent of outside and structure fire calls, the response time of the first arriving unit was less than 8 minutes.

ATTACHMENT I: ACTIONS TAKEN

TABLE 9-21: Actions Taken Analysis for Structure and Outside Fire Calls

Action Taken	Number of Calls	
	Outside Fire	Structure Fire
Action taken, other	13	5
Assistance, other	4	3
Confine fire (wildland)	3	0
Contain fire (wildland)	14	0
Control fire (wildland)	22	1
Control traffic	4	0
Establish fire lines (wildfire)	5	0
Establish safe area	6	9
Evacuate area	0	1
Extinguishment by fire service personnel	353	166
Fire control or extinguishment, other	33	34
Fires, rescues & hazardous conditions, other	1	5
Forcible entry	1	6
Hazardous condition, other	1	0
Incident command	11	13
Information, investigation & enforcement, other	20	19
Investigate	22	22
Investigate fire out on arrival	38	31
Notify other agencies.	2	0
Operate apparatus or vehicle	1	0
Provide advanced life support (ALS)	3	0
Provide apparatus	0	1
Provide equipment	0	1
Provide information to public or media	0	2
Provide light or electrical power	0	1
Provide manpower	1	3
Refer to proper authority	2	0
Remove hazard	15	32
Remove water	0	1
Rescue, remove from harm	1	0
Restore fire alarm system	1	5
Salvage & overhaul	86	63
Secure property	0	5
Shut down system	1	3
Standby	1	0
Systems and services, other	3	1

Action Taken	Number of Calls	
	Outside Fire	Structure Fire
Ventilate	6	56
Total	**674**	**489**

Note: Totals are higher than the total number of structure and outside fire calls because some calls had more than one action taken.

Observations:

- Out of 528 outside fires, 353 were extinguished by fire service personnel, which accounted for 66.9 percent of outside fires.
- Out of 348 structure fires, 166 were extinguished by fire service personnel, which accounted for 47.7 percent of structure fires.

ATTACHMENT II: ADMINISTRATIVE UNITS

TABLE 9-22: Workload of Administrative Units

Unit	Unit Type	Annual Hours	Annual Runs
BAT1	Battalion Chief	257.6	588
BAT2	Battalion Chief	236.0	507
BAT5	Battalion Chief	109.4	216
CH2	Division Chief	5.3	7
CH3	Division Chief	0.1	1
CH4	Division Chief	0.6	2
CH5	Division Chief	6.1	5
CH6	Division Chief	0.4	3
CH8	Division Chief	1.0	1
CH10	Division Chief	1.6	3
CH11	Division Chief	0.2	1
CH13	Division Chief	18.1	27
INSP1	Inspector	0.1	1
INSP3	Inspector	55.1	39
INSP6	Inspector	16.7	17
INSP7	Inspector	0.2	1
INSP8	Inspector	38.2	35
INSP9	Inspector	1.8	4
INV	Investigator	3.1	2

ATTACHMENT III: FIRE LOSS

TABLE 9-23: Content and Property Loss – Structure and Outside Fires

Call Type	Property Loss		Content Loss	
	Loss Value	Number of Calls	Loss Value	Number of Calls
Outside fire	$1,092,927	164	$306,541	103
Structure fire	$1,837,590	126	$411,197	122
Total	**$2,930,517**	**290**	**$717,738**	**225**

Note: This includes only calls with recorded loss greater than 0.

Observations:

Outside Fires

- Out of 528 outside fires, 164 had recorded property loss, with a combined $1,092,927 in losses.
- 103 outside fires had content loss with a combined $306,541 in losses. Out
- The highest total loss for an outside fire was $150,000.

Structure Fires

- Out of 348 structure fires, 126 had recorded property loss, with a combined $1,837,590 in losses.
- 122 structure fires had content loss with a combined $411,197 in losses.
- The average total loss for all structure fires was $6,462.
- The average total loss for structure fires with loss was $14,415.
- The highest total loss for a structure fire was $305,000.

TABLE 9-24: Total Fire Loss Above and Below $20,000

Call Type	No Loss	Under $20,000	$20,000 plus
Outside fire	340	170	18
Structure fire	192	133	23
Total	532	303	41

Observations:

- 340 outside fires and 192 structure fires had no recorded loss.
- 18 outside fires and 23 structure fires had $20,000 or more in loss.

ATTACHMENT IV: WILDFIRES

In this section, we provide more detail on out-of-area wildland fires. An out-of-area wildfire for this analysis was defined as a vegetation fire outside of RFD's jurisdiction that had at least one unit deployed for longer than 12 hours. Table 9-25 quantifies the workload associated with each wildfire, and Table 9-26 further examines the workload of each responding unit.

TABLE 9-25: Wildfire Workload by Incident

Month	Name	State	Unit ID	Total Deployed Days	Percent Annual Wildfire Workload
July	Hendricks Fire	Oregon	WILDMED1	14.7	5.9
			WILDMED2	15.1	6.1
			Total	**29.8**	**12.0**
	Fire at Pyramid Way and Grass Valley Road	Nevada	B11	0.6	0.2
			B21	0.7	0.3
			Total	**1.3**	**0.5**
	Perry Fire	Nevada	B6	5.8	2.3
			B11	0.6	0.2
			Total	**6.4**	**2.6**
	Susanville Fire	California	B10	15.9	6.4
	Total			**53.3**	**21.5**
August	Beartrap Fire	Utah	WILDMED2	19.1	7.7
	Cougar Fire	Idaho	WILDMED1	13.8	5.6
			WILDMED2	24.8	10.0
			Total	**38.7**	**15.6**
	Mesa Fire	Idaho	WILDMED1	8.0	3.2
	Murphy Fire	California	B8	18.5	7.4
	Natchez Fire	California	WILDMED1	7.5	3.0
			WILDMED3	0.0	0.0
			Total	**7.5**	**3.0**
	Mill Creek Fire	California	B9	7.5	3.0
	Rabbit Foot Fire	Idaho	B21	16.2	6.5
	Total			**115.4**	**46.5**

September	Boot Fire	California	R19	0.2	0.1
			R21	9.8	3.9
			Total	**10.0**	**4.0**
	North Fire	California	B6	10.8	4.4
			WILDMED1	5.5	2.2
			Total	**16.3**	**6.6**
	Roosevelt Fire	Wyoming	WILDMED1	8.2	3.3
			WILDMED2	8.3	3.4
			Total	**16.6**	**6.7**
	Pole Creek Fire	Utah	E10	4.5	1.8
	Total			**47.4**	**19.1**
November	Camp Fire	California	B6	11.9	4.8
			RE110	13.2	5.3
			Total	**25.1**	**10.1**
	Woolsey Fire	California	B10	7.2	2.9
	Total			**32.3**	**13.0**
Total				**248.5**	**100.0**

Note: There were no wildfires from January through June, in October, and in December 2018. Total deployed days in a month is determined by the month a call began and may include time worked in the following month(s).

TABLE 9-26: Wildfire Workload by Unit

Unit Type	Unit ID	Average Deployed Hours Per Run	Total Annual Hours	Percent Annual Wildfire Workload	Total Runs
Rescue	R19	5.6	5.6	0.1	1
	R21	234.8	234.8	3.9	1
Brush Engine	B6	228.2	684.5	11.5	3
	B8	444.0	444.0	7.4	1
	B9	178.9	178.9	3.0	1
	B10	277.6	555.2	9.3	2
	B11	14.1	28.3	0.5	2
	B21	202.1	404.2	6.8	2
Engine	E10	107.8	107.8	1.8	1
Fireline Medic	WILDMED1	231.1	1,386.7	23.2	6
	WILDMED2	404.4	1,617.4	27.1	4
	WILDMED3	0.2	0.2	0.0	1
Reserve Engine	RE110	317.0	317.0	5.3	1
Total		**229.4**	**5,964.6**	**100.0**	**26**

Observations:

- The Idaho Cougar Fire had the highest deployed time (38.7 days) and was responsible for 16 percent of the total annual wildfire workload.
- The Oregon Hendricks Fire had the second highest deployed time (29.8 days) and was responsible for 12 percent of the total annual wildfire workload.
- Calls beginning in August 2018 were responsible for 46.5 percent of the total annual wildfire workload.
- WILDMED2 had the second-most runs (4) and the highest annual deployed time (1,617.4 hours, or 67.4 days).
- WILDMED1 had the most runs (6) and the second highest annual deployed time (1,386.7 hours, or 57.8 days).

ATTACHMENT V: NFPA 1710 ANALYSIS

In this section, we further examine structure fires using the guidelines established in the National Fire Protection Association's standard 1710 (NFPA 1710). Included in these guidelines is a set of standards for the travel time of units responding to a structure fire, where travel time is defined as beginning when the first unit goes in route. The first arriving unit should arrive in 4 minutes, and a minimum full complement of 14 personnel should arrive in 8 minutes.

Overall, there were 351 structure fires in Reno. In the main analysis section of the report, we only analyze 348 of them—3 of the 351 calls only had administrative units responding, and the workload of those units were documented in Attachment II. With regard to NFPA 1710, all arriving units count toward the minimum full responding complement, and so for this analysis, we analyze all calls with arriving units. One of the 351 calls had no units with recorded arrival timestamps, and so in this section, we only consider 350 calls.

Table 9-27 examines the average and 90th percentile travel times for both the first arriving unit and for the arrival of the full complement. Table 9-28 looks at the number and percentage of calls meeting the standards delineated in NFPA 1710. Table 9-29 breaks down structure fires by the number of responders.

TABLE 9-27: Average and 90th Percentile Travel Time

Response Type	Travel Time in Minutes	
	Average	90th Percentile
First Arriving Unit	4.3	6.9
Full Complement of 14 Personnel	8.9	15.1

Note: In this section, travel time is calculated differently than in Tables 9-16 and 9-17. In those tables, an individual unit's in route and arrive timestamps were used to calculate the travel time for that unit, yielding a unit-level travel time. Here, in contrast, NFPA defines travel time as beginning from when the first unit goes in route, even if it is not the same unit that arrived first. Thus, this travel time corresponds to the travel time of an entire call, and not for a specific unit responding to a given call.

TABLE 9-28: Number and Percentage of Calls Meeting NFPA 1710

Response Type	Calls Meeting Standard		Number of Calls
	Number of Calls	Percent of Calls	
First Arriving Unit	174	49.7	350
Full Complement of 14 Personnel	73	59.8	122

TABLE 9-29: Structure Fires by Number of Responders

Number of Responders	Number of Calls
1	3
2	2
3	5
4	141
5	18
6	4
7	1
8	23
9	7
10	4
11	3
12	8
13	9
14	4
15	7
16	6
17	10
18	10
19	14
20	17
21	11
22	4
23	4
24	8
25	4
26	6
27	7
28	3
29	1
30	2
31	1
33	1
35	1
39	1
Total	**350**

Observations:

- Of the 350 structure fire calls, 122 of them had a full arriving complement of at least 14 personnel.
- The average travel time for the first arriving unit was 4.3 minutes, and the 90th percentile travel time was 6.9 minutes.

- The average travel time for the full arriving complement of at least 14 personnel was 8.9 minutes, and the 90th percentile travel time was 15.1 minutes.
- Of the 350 structure fire calls, the first arriving unit arrived within 4 minutes 174 times, or 49.7 percent of the time.
- Of the 122 structure fire calls that had a full arriving complement of at least 14 personnel, the full complement arrived within 8 minutes 73 times, or 59.8 percent of the time.

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