Agenda Item No: 17.A

STAFF REPORT

Report To: Board of Supervisors **Meeting Date:** September 3, 2020

Staff Contact: Sean Slamon

Agenda Title: For Discussion Only: Discussion and presentation on the Carson City Fire Department Master Plan. (Sean Slamon, sslamon@carson.org)

Staff Summary: Emergency Services Consulting International ("ESCI"), in conjunction with the Carson City Fire Department ("CCFD"), has completed a study of the CCFD Master Plan. A Master Plan is a long range plan that evaluates CCFD's service levels and includes findings and recommendations for current and future emergency service levels. This presentation will include an overview of the Master Plan and the findings and recommendations in the Plan.

Agenda Action: Other / Presentation **Time Requested:** 1 hour

---

Proposed Motion
No action – presentation only

Board's Strategic Goal
Efficient Government

Previous Action
N/A

Background/Issues & Analysis
The purpose of a Master Plan is to evaluate where CCFD is in relation to the risks the community faces today, anticipate community growth (and therefore risk growth), and recommend steps to take to position CCFD to address that growth in advance with appropriate resources and infrastructure. In short, a Master Plan keeps CCFD from lagging behind community growth and development, maintaining or enhancing service as the community grows. It is an effective policy-making and budgeting tool as well. Knowing where and how the community will grow in the future and what CCFD will need in terms of policy and budget support to address it - well in advance - is critical knowledge for the Board of Supervisors.

ESCI analyzed the data provided by CCFD and others to determine the current levels of response performance. From this analysis, ESCI identified factors influencing risk and response performance, and opportunities for delivery system improvement. The Master Plan that ESCI has prepared establishes response time objectives, standards for measuring the effectiveness of CCFD resources, and the deployment of those resources. The Master Plan is divided into fifteen sections and ends with findings, conclusions, and recommendations.

Applicable Statute, Code, Policy, Rule or Regulation
N/A

Financial Information
Is there a fiscal impact? No

If yes, account name/number: N/A

Is it currently budgeted? No

Explanation of Fiscal Impact: N/A

Alternatives
N/A

Attachments:
Carson City NV Master Plan Final Report_Updated 8-25.pdf

Board Action Taken:

Motion: _____	1) _____	Aye/Nay
	2) _____	_____
		_____
		_____
		_____
		_____

_____
(Vote Recorded By)

Carson City Fire Department

Nevada

EMERGENCY SERVICES LONG RANGE MASTER PLAN

Emergency Services Consulting International

Providing Expertise and Guidance that Enhances Community Safety

July 2020

TABLE OF CONTENTS

ACKNOWLEDGMENTS

Emergency Services Consulting International (ESCI) would like to acknowledge that without the assistance and support of the Carson City Fire Chief, the Department's executive and administrative staff, Labor leadership, Commission members, City officials, and others, this project could not have been successfully completed.

Carson City Board of Supervisors

Robert Crowell, *Mayor*

Stacey Giomi, *Supervisor Ward 1*

Lori Bagwell, *Supervisor Ward 3*

Brad Bonkowski, *Supervisor Ward 2*

John Barrette, *Supervisor Ward 4*

EXECUTIVE SUMMARY

Emergency Services Consulting International (ESCI) was engaged by the Carson City (Nevada) Fire Department (CCFD) to conduct an emergency service long-range master plan for the fire department.

Purpose and Approach

The purpose of a master plan for the fire service is to understand where the fire department is in relation to the risks the community faces today, anticipate community growth (and therefore risk growth), and recommend steps to take to position the fire department to address that growth in advance with appropriate resources and infrastructure. In short, a master plan keeps the fire department from lagging behind community growth and development, maintaining or enhancing service as the community grows. It is an effective policy-making and budgeting tool as well. Knowing where and how the community will grow into the future and what the fire department will need in terms of policy and budget support to address it—well in advance—is a critical element of Board of Supervisors' deliberation.

ESCI analyzed the data provided by the Carson City Fire Department and others to determine the current levels of response performance. From this analysis, ESCI also identified factors influencing risk and response performance, and has identified opportunities for delivery system improvement. This document establishes response time objectives, standards for measuring the effectiveness of Department resources, and the deployment of those resources. The document is divided into fifteen sections and ends with findings, conclusions, and recommendations categorized as short, medium, and long-term.

CCFD serves a resident population of approximately 55,414 people and protects an area of roughly 145 square miles. CCFD operates from four fire stations, one of which is seasonal. The Department currently utilizes twelve response apparatus, not including reserve apparatus.

The analysis completed during this study revealed a number of important findings. These include:

- The working relationship between Fire, Public Works, and Law Enforcement is very positive.
- CCFD is keeping with effective budget management, leading to a very financially efficient operation.
- CCFD is monitoring the performance of its service delivery system and making adjustments as it can within its limited resources.
- CCFD is delivering a full range of services expected of an urban fire department.
- The community feels the Fire Department does a great job with community outreach.
- CCFD does not currently follow an annual review process for departmental policies and procedures.
- The Department does not have adequate facilities that will permit secure indoor storage of reserve apparatus.

- The City Emergency Operations Center located at Station 51 is inadequate in size and configuration for a city the size and complexity of Carson City.
- The Department does not have a replacement schedule in place for fixed facilities.
- CCFD does not have a replacement schedule in place for support equipment.
- The Department's administrative support system is strained due to reduced staffing, increased workloads caused by increased demands for services, and the performance of additional duties to support field personnel.
- Department staff lacks the time and resources necessary to track individual training conformance from the Training Division.
- The Department has not established a formalized and adopted planning process.
- The Department does not maintain a dedicated Fire and Life Safety Public Education Program for the Carson City Community.
- CCFD is not able to staff all incident types in accordance with its Critical Tasking Analysis.
- The total response workload has increased by 41.6 percent over the last nine years.
- Call processing by the dispatch center during 2018 was within 2 minutes, 58 seconds, 90 percent of the time, well over CCFD's goal.
- Fire Department turnout time during 2018 exceeded CCFD's goals.
- Travel and first arriving unit times for 2018 exceeded CCFD's goals.
- NFPA 1500 self-assessment has not been performed.
- Fire stations are in need of upgrades and remodeling.
- The Training Division is short-staffed, impacting all aspects of their responsibilities.
- Fire Pre-planning of moderate to high hazard occupancies is lacking and should be completed and updated annually.
- Hazardous Materials Team training time is limited, reducing opportunities to train as a Team and regionally.
- Airport Crash Fire/Rescue specific response equipment for on and off-airport aircraft incidents does not exist, other than the structure fire engines.
- The SWAT Team qualified personnel are not able to keep up with demand.
- The Technical Rescue Team access to timely and local training programs is limited.
- The Fire Inspection Program, during 2019, has been focused on new construction inspections (894) and business license inspections (309) with existing staffing. The High Hazard Occupancy Inspections of Assembly (24% inspected) and Apartments (67% inspected) are not meeting the Department's goal of 100 percent for each.
- The City's Reserve Fund Balance has diminished significantly from the beginning of the historical period to the present.
- The Ambulance Division Enterprise Fund is generating positive cash flow on an annual basis in its current deployment model.

The analysis conducted during the evaluation phase of this process identified a number of opportunities to improve service (improvement goals). The following improvement goals are offered for consideration. These goals and specific recommendations are categorized as short, medium, and long-term strategies and are described in more detail at the end of this report in the Conclusions section.

Short-Term Strategies

The short-term strategies listed in this report are a compilation of the recommendations aimed at improving the current conditions and levels of protection over the next one to two years.

Recommendation A: Adopt response performance goals to guide service delivery improvement.
A community's desired level of service is a uniquely individual decision. No two communities are exactly alike. Performance goals must be tailored to match community expectations, community conditions, and the ability to pay for the resources necessary to attain the desired level of service.

Recommendation B: Reduce the dispatch call processing time interval.
Once the call is answered at ECC, the caller is questioned about the nature and location of the emergency. Typically, the dispatch of response personnel does not occur until the end of that questioning or very near the end.

ECC should implement a pre-alert system that notifies response personnel of the emergency once the basic nature of the call (EMS, house fire, etc.) and the location are known. This should typically be within the first 30 seconds of the conversation.

Recommendation C: Reduce the turnout time interval.
Turnout time is the period between when dispatchers notify response personnel of the incident and when response crews begin to travel towards the incident location. The recommended performance goal for turnout time is within 80 seconds, 90 percent of the time for fire and special operations incidents, and within 60 seconds, 90 percent of the time for all other incidents. CCFD's overall turnout time performance is currently within 2 minutes, 11 seconds, 90 percent of the time, and 2 minutes, 20 seconds, 90 percent of the time for EMS incidents.

Recommendation D: Update fire stations to enhance facility health and safety.
The fire stations require light to moderate updating to improve firefighter safety and reduce the risk of exposure to bloodborne pathogens. CCFD should initiate improvements to enhance health and safety.

Recommendation E: Modify response assignments so that all incident types can receive sufficient resources, based on the critical task analysis.

The next three recommendations are linked with the intent of improving ambulance resource deployment, fully staffing the ladder truck, and reducing overtime expenditures.

Recommendation F: Consider dynamic deployment of the non-firefighter staffed ambulances based on the expected system workload.

CCFD currently staffs four ALS ambulances 24 hours per day, seven days per week. An additional non-emergency BLS transport unit is staffed during the day.

Requests for ambulance services are not consistent throughout the day. The workload is much greater during daytime hours than at night.

Dynamic deployment practices should be—and to a degree are now—used during unusual events such as predicted significant storms, special events with large gatherings of people, and the like. Because the likelihood of a response is greater during these events, additional resources should be assigned and positioned where incidents are likely to occur.

Recommendation G: Transition the Advanced Life Support rescue ambulances staffing to non-firefighters.

In FY 18/19, the Department estimated its use of overtime in its Operations Division would add approximately 28 percent to its salary costs. This amount of overtime suggests the addition of more full-time staff positions may, for the most part, be paid through the reduction in overtime costs.

Recommendation H: Transfer the Firefighter/Paramedics from the Advanced Life Support rescue ambulances to staff the ladder truck and utilize remaining personnel to reduce the use of overtime/call-backs.

The prior recommendation was offered to transition all ambulance positions to civilians with requisite medical certifications. That transition will free up 18 firefighters, with 12 being reassigned to the ladder truck, leaving six to be used to float as fill-ins to reduce the use of overtime.

Recommendation I: Fully staff and station the Department's ladder truck with four qualified firefighters per shift at Fire Station 51 to improve response capabilities to multi-story and high fire flow occupancies.

Based on ESCI's risk analysis, review of building inventory, and required fire flows, the Department should staff the ladder truck with four firefighters. In addition, the ladder truck should be stationed in the core area of the City at Fire Station 51.

Recommendation J: Institute regular and ongoing review of policies and procedures.

The fire department should institute an annual review of the policies and standard operating procedures to evaluate the need for updating and adding new documents that are relevant and purposeful in directing and guiding the agency.

Recommendation K: Develop a support equipment replacement schedule.

The fire department should create a schedule for replacing support equipment that wears out due to use and age.

Recommendation L: Evaluate how the current management of training documentation and performance tracking is performed.
The fire department should evaluate what level of fire staff management is needed to manage the training documentation for fire personnel properly. The updated process will enhance the performance review of the training records for all fire personnel.

Recommendation M: Reinstate the Fire Pre-Planning Program.
The fire department should reinstitute the fire pre-planning program that provides firefighters with a heightened awareness of moderate to high-risk facilities in the City.

Recommendation N: Add additional Fire Prevention inspection personnel to increase the frequency of inspections.
The fire department should continue to seek additional fire inspections staff, either full-time and/or part-time, to assist in meeting the need to inspect buildings and processes in alignment with the NFPA Standards.

Mid-Term Strategies

The mid-term strategies are progressive enhancements of the current conditions. Many will likely require three to five years to accomplish.

Recommendation O: Evaluate staffing levels required for Administrative Support Services.
The City should perform a time and motion study to evaluate the current efficiency of the non-safety administrative staff.

Recommendation P: Develop a plan to enhance Fire Safety and Public Education Programs.
The fire department should begin planning for re-instituting a Community Risk and Reduction public education program that addresses the multiple needs of the Carson City Community.

Recommendation Q: Conduct an NFPA Compliant Audit of the Fire Department's Health and Safety Program.
The fire department should perform the NFPA 1500 Safety Audit in accordance with the outlined schedule and process.

Recommendation R: Implement Community Risk Reduction strategies.
CCFD should embrace a concept called Integrated Community Risk Reduction (CRR). CRR is an integrated approach to risk management that marries emergency operations and prevention strategies into a more cohesive approach to reducing risks in any community.

Recommendation S: Acquire needed technology and implement closest unit dispatch.
CCFD should implement technology that ensures the closest available response unit is sent to an emergency.

Recommendation T: Explore opportunities to reduce response workload.
Response workload has grown by 41.6 percent over the past nine years. Most of this has been the growth in requests for emergency medical services. CCFD should work with frequent users of EMS services to reduce utilization where possible.

Recommendation U: Expand the Department's SWAT Medic Team Membership.
The fire department should develop a plan with the Sheriff's Office to expand the membership of the SWAT Medic Team.

Recommendation V: Improve Technical Rescue Team Training.
The fire department should seek methods and processes that provide for the Technical Rescue Team to train in accordance with OSHA required and NFPA standards.

Recommendation W: Improve Hazardous Materials Team Training.
The fire department should seek methods and processes that provide for the Hazardous Materials Team to train in accordance with OSHA required and NFPA standards.

Recommendation X: Improve Airport Crash/Fire Rescue Capabilities.
The fire department should coordinate with Airport management to develop a plan to acquire a specific aircraft incident vehicle that meets the current and expected category use of the airport.

Long-Term Strategies

The short and mid-term strategies discussed will move the organization forward substantially. A longer-term, high-level view of future needs is also important to provide a "big picture" view of how the organization may continue with future initiatives. Primarily, long-term strategies are centered around community growth and related workload and how both impact the future deployment of fire stations and personnel.

Recommendation Y: Plan for facility replacement and updating to maintain a high degree of safety, efficiency, long-term sustainability, and effectiveness.
The City should continue to plan and direct funding to improve numerous CCFD facilities

Recommendation Z: Add two staffed stations to reduce travel time and improve effective response force coverage.
CCFD is not meeting its target response times largely because of long travel times. It also does not provide an effective response force except in a very small portion of its service area. Two additional stations, each staffed with an ALS fire engine, will improve levels of service significantly.

EVALUATION OF CURRENT CONDITIONS

Emergency Services Consulting International (ESCI) begins this report with an Evaluation of Current Conditions, which provides a comprehensive appraisal of the Carson City Fire Department (referred to herein as CCFD) as compiled upon ESCI's completion of fieldwork and data collection in January 2020.

ESCI based this evaluation on data provided by CCFD and collected during ESCI's fieldwork. The information is mirrored against a combination of Nevada State laws and regulations, National Fire Protection Association (NFPA) standards, Commission on Fire Accreditation International (CFAI) self-assessment criteria, health and safety requirements, federal and state mandates relative to emergency services, and generally accepted best practices within the emergency services community, as well as the experience of ESCI's consultants.[1, 2]

Departments continue to improve and change over time. This report is a snapshot of the Carson City Fire Department at the time the information was gathered.

Each section in the following report provides the reader with general information about that element, as well as observations and analyses of any significant issues or conditions. Supporting discussion is provided following each section, where needed. The evaluation begins with a baseline review of the Department's organizational composition.

Carson City, Nevada

The Consolidated Municipality of Carson City, Nevada's territorial and state capital, has a rich and colorful frontier past. Carson City was founded as a community in 1858, seven years after the first settlement of the Eagle Station trading post in 1851. Eagle Valley had been settled by ranchers. Carson City is named for the famous frontiersman Kit Carson. During his 1843–1844 expedition, John C. Fremont had named Carson City's nearby river for Kit Carson, Fremont's scout. Pioneer Abraham Curry arrived in Eagle Valley in 1858 and soon thereafter surveyed and plotted a townsite. A cadre of well-connected attorneys whose names still decorate street signs here (Proctor, Musser) bought the richest part of the valley for $500 and a herd of horses. The farsighted and optimistic Curry set aside 10 acres expressly for the construction of a capital—this was before the formation of Nevada Territory in 1861. Carson City was soon designated both the territorial capital and county seat of the new Ormsby County. President Abraham Lincoln, recognizing the importance of Nevada's silver and gold to the Union's Civil War effort, signed the proclamation that ushered Nevada into statehood on October 31, 1864.

Census.gov estimates the 2018 population of Carson City at 55,414. The majority of the town's population lives in Eagle Valley, on the eastern edge of the Carson Range, a branch of the Sierra Nevada, about 30 miles south of Reno.

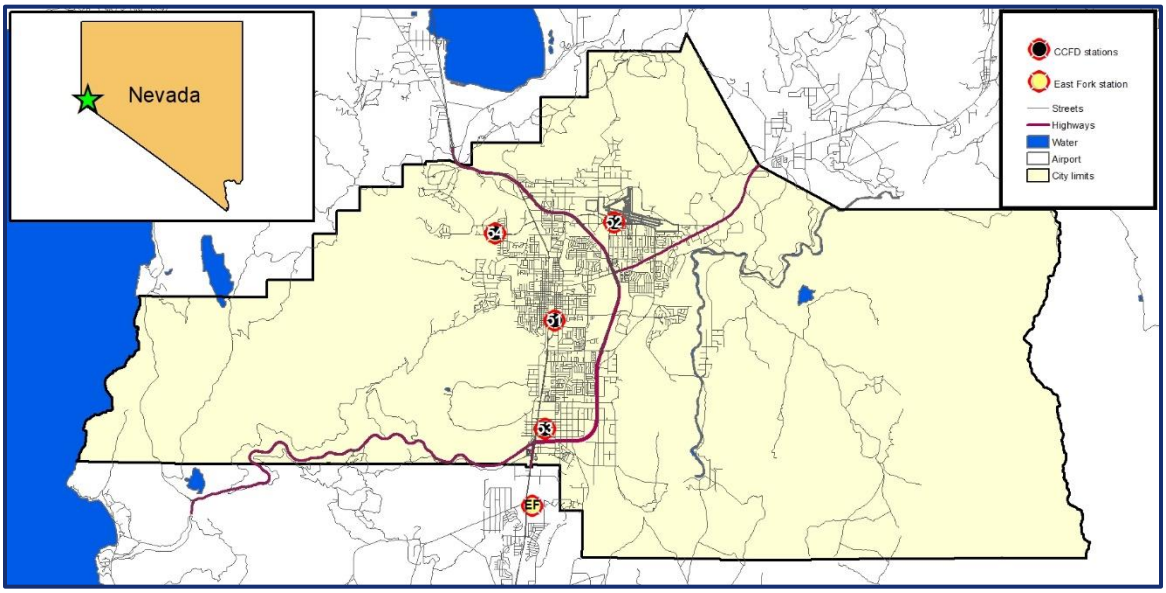
---

[1] NFPA, National Fire Protection Association, is a standard developing organization. Standards developed by NFPA are "voluntary consensus standards," created through procedures accredited for their consensus decision-making, openness, balance of interests represented, and fairness by the American National Standards Institute (ANSI).

[2] The CFAI organization is now a subsection of the Center for Public Safety Excellence (CPSE) but maintains its prime function of accrediting fire agencies.

The following figure displays the location of Carson City.

Figure 1: Carson City Study Area Map



The provision of fire protection and EMS is an essential service that governments must provide. However, for this service to be effective and efficient, it must be staffed and organized appropriately to address emergencies as they occur in an equitable manner.

Carson City Fire Department

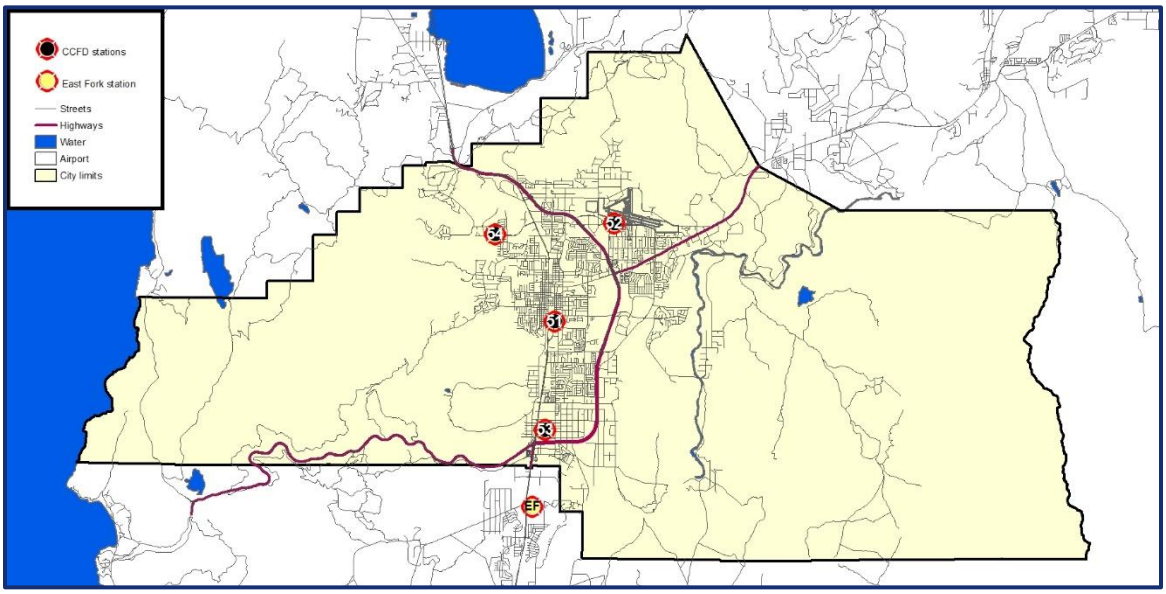
Carson City Fire Department operates four fire stations, one of which houses its headquarters and one of which is staffed seasonally. The headquarters station houses the main administrative components of the Department. In addition, the Department operates a training facility that routinely hosts regional training, including but not limited to basic firefighter academies.

Organizational Overview

The Organizational Overview component provides a summary of the agency's composition, discussing its configuration and the services it provides. Data provided by administrative and management staff, as well as internal and external stakeholders, was combined with information collected in the course of ESCI's fieldwork to develop the following overview.

The service area of the CCFD is depicted in the following figure.

Figure 2: Carson City Fire Department Service Area



Governance and Structure

The very basis of any service provided by governmental or quasi-governmental agencies lies within the policies that give that agency the responsibility and authority upon which to act. In most governmental agencies, including CCFD, those policies lie within the policy manual and other governing documents adopted by the agency.

Board of Supervisors

The Board is charged with providing orderly government and safeguarding the general health, welfare, and safety of its citizens. The Board is composed of a five-member elected representation called the Board of Supervisors. The Mayor and four Supervisors are elected by and accountable to the voters. They are all elected-at-large; however, the four Supervisors must reside within the boundaries of their respective Wards 1 through 4. All of the members of the Board serve 4-year staggered terms. The Mayor and Supervisors from Ward 2 and Ward 4 are elected during the Presidential election years. The Supervisors from Ward 1 and Ward 3 are elected during off-Presidential election years.

The Mayor is Chairman of and presides over all Board meetings. He is also recognized as the head of local government for ceremonial purposes, and during emergency, civil, or military disturbances.

The Mayor Pro Tempore is selected by the members of the Board for a term determined by the Board. The Mayor Pro Tempore serves in the Mayor's absence or disability.

The Board of Supervisors is the legislative and executive branch of the Carson City Consolidated Municipality. All power is concentrated in this elected body as a whole. Its members are the community's decision makers. The Board enacts all laws and is the key political and policy maker. The members are responsible for soliciting citizen views in forming these policies and interpreting them to the public.

The Board approves the budget, determines tax rates, focuses on the community's goals, major projects, capital financing and strategic planning, land use development, growth management, master plans, and contractual agreements.

The Board of Supervisors is responsible for appointing the City Manager, the Internal Auditor, the Public Guardian, and the Chief of Alternative Sentencing.

The organization functions under the council-manager form of government whereby the Board is the policymaking arm and City Manager is the administrative and operational arm of the full-service government.

Fire Chief Position

The Fire Chief is hired by and answers directly to the City Manager. The responsibilities of the Fire Chief are varied, and they encompass both City-designated and state statute requirements. Currently, the Fire Chief is managing the appropriate span of command that is consistent with best management practices.

Policy and Procedures

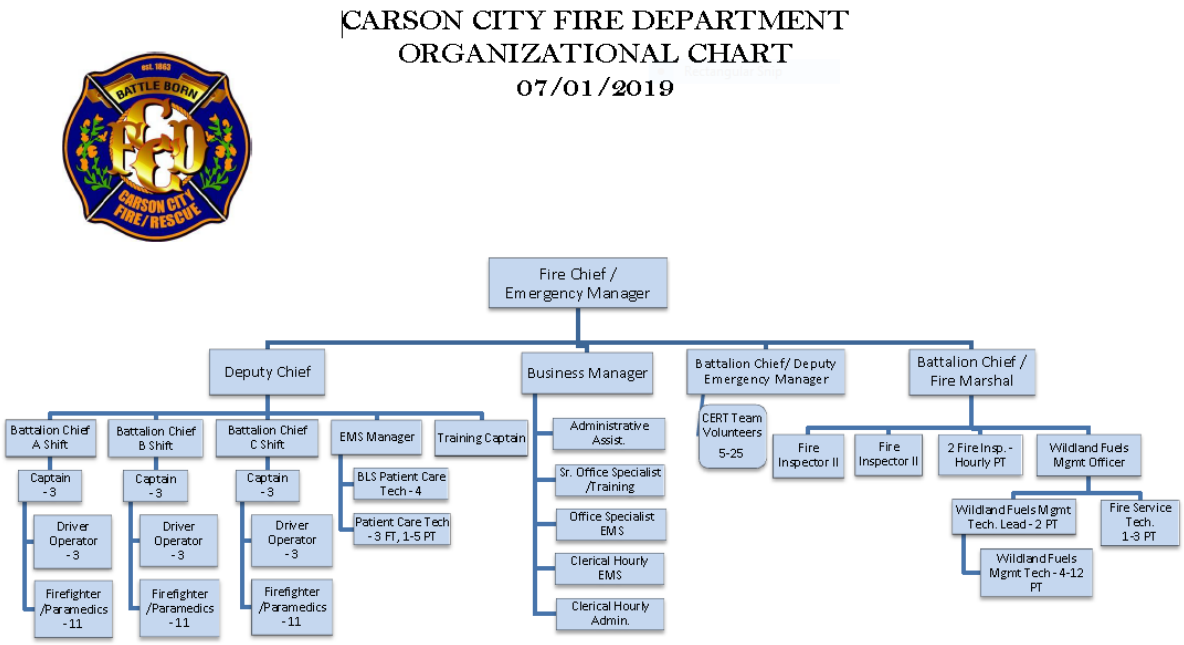
ESCI found that the Department possesses the requisite fundamental attributes upon which a successful organization is established. The CCFD outlines the duties and expectations of the Department in its policy and operations manuals. The documents are appropriate and necessary for the effective operation of the Department. These documents lay the foundation upon which the Fire Department operates; it is essential that those fundamental documents be current.

CCFD should consider establishing an annual review process of these departmental policies and procedures to maintain alignment with lawful and operational best practices.

Organizational Design

The structural design of an emergency services agency is vitally important to its ability to deliver service in an efficient and timely manner while providing the necessary level of safety and security to the members of the organization—whether career, paid-on-call, or volunteer. CCFD is organized as a relatively typical fire department hierarchy. The following is the organizational chart as the Department currently operates.

Figure 3: Organizational Chart



The span of control is visualized in an organizational chart. In the CCFD chart, the Fire Chief is indicated to have four direct reports. The Deputy Chief of the Department has three divisional responsibilities assigned. These are operations, training, and emergency medical services (EMS). The Business Manager oversees all positions that support the administration of the Department. The Battalion Chief Fire Marshal oversees all fire prevention staff and responsibilities, including inspections, plans review, and wildland fuels mitigation. The Emergency Management duties are assigned to a Battalion Chief who also oversees the CERT Team Volunteers.

During an emergency, an individual's ability to supervise multiple personnel is reduced; thus, industry standards recommend a span of control of three to seven personnel under stressed situations. This is a recommendation carried forward from military history and has shown to be effective in emergency services situations. On any given day, one-third of the Department is on duty. Incidents that exceed the on-duty staffing capacity will require callback of off duty personal or mutual aid resources. The resulting impact will stress the Department's span of control and require division of responsibilities based on the Incident Command System.

When not responding to 9-1-1 calls, Carson City Fire Department firefighters train for the worst-case scenarios. Fire personnel perform general facility maintenance, hose testing, and public education interactions.

Services Provided

The CCFD provides a variety of emergency and non-emergency services. Figure 4 describes the emergency services provided. Non-emergency services include fire prevention and public education, emergency management, and fire investigation.

Figure 4: Resource Staffing and Capabilities

Service	General Resource/Asset Capability	Basic Staffing Capability per Shift
Fire Suppression	3 staffed engines 0 staffed ladder trucks 1 command response unit 1 40-hour Training Captain Additional automatic and mutual aid engines, aerials, and support units available	15 Line personnel daily 1 Line Battalion Chief 1 40-hour Training Captain 3 40-hour Chief Officers 1 40-hour Non-Sworn EMS Manager
Emergency Medical Services	3 Engines, ALS equipped 3 ALS equipped Rescue Ambulances 1 BLS equipped Rescue Ambulance	6 Paramedics minimum per shift 10 Medics A Platoon 10 Medics B Platoon 11 Medics C Platoon
Vehicle Extrication	3 engines equipped with rescue tools, hand tools, stabilization cribbing, and battery-operated combination cutter-spreader rescue tools	All firefighters vehicle rescue trained
High-Angle Rescue **Squad 51**	1 cross-staffed heavy rescue equipped with rescue-rated rope and all associated hardware	All personnel trained to the operations level. 3 personnel per shift trained to the technician level in high-angle rope rescue.
Trench and Collapse Rescue **Squad 51, Support 51**	1 cross-staffed heavy rescue and a trailer equipped with pneumatic shoring jacks, cribbing, limited lumber and hand tools for initial stabilization	All personnel trained to the operations level. 3 personnel per shift trained to the technician level in trench and collapse rescue.
Swift-Water Rescue **Squad 51**	All engines and rescues equipped with throw bags, PFDs, and helmets.	All personnel trained to the operations level. 4 personnel per shift trained to the technician level in swift-water rescue.
Confined Space Rescue **Squad 51**	1 cross-staffed heavy rescue equipped with tripod, cribbing, pneumatic shores, air monitoring equipment, basket stretchers, rescue-rated rope	All personnel trained to the operations level. 2 personnel per shift trained to the technician level in confined space rescue.
Hazardous Materials Response **HM52**	Hazardous Materials response vehicle equipped with personal protective equipment, gas and radiation monitoring equipment, containment supplies, and non-sparking tools	All personnel trained to the operations level. 5 personnel per shift trained to the technician level in hazardous materials.

Service Area and Infrastructure

The size and composition of a fire department's service area affect the type and number of personnel, fire stations, and vehicles that are needed to provide services efficiently. Sometimes complex decisions must be made regarding deployment strategies to properly position resources based on land area, geography, risk, cost, and similar factors.

Figure 5: Service Area and Infrastructure

Agency Infrastructure	Carson City Fire Department
Agency Description	
Agency type (district, municipality, etc.)	Municipality
Area in square miles	145
Headquarters location (physical address)	777 S. Stewart St., Carson City, NV 89703
Number of fire stations	4 – 3 staffed, 1 seasonal
Other facilities	Training Center, Seasonal Fire Station
Emergency vehicles (number, type)	
Engine	3
Engine, reserve	3
Ladder truck	1
Ladder, reserve	0
Ambulances	Four 24-hour ALS one of which is cross staffed and one 12-hour BLS
Ambulance, reserve	3
Command Vehicles	8
Boat/Watercraft	0
Tenders/Brush	5

The Department serves an area of 145 square miles from three fire stations and one seasonal station. These stations have full-time staff and are supplemented with seasonal employees. The agency has three frontline engines, four paramedic or ALS (Advanced Life Support) level ambulances and one BLS (Basic Life Support) ambulance, three brush engines, and one water tender. The CCFD operates a Hazardous Materials Response Team. The Department houses a hazardous materials truck and the decontamination unit.

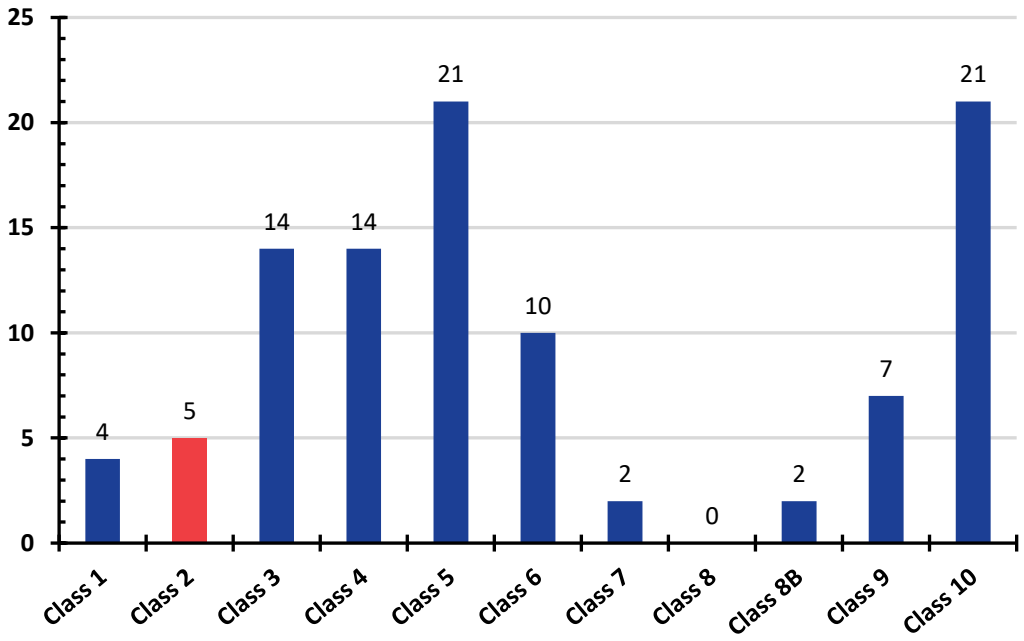
Public Protection Classification: Insurance Services Office—Rating Bureau

The Insurance Services Office (ISO), a subsidiary of Verisk Analytics, is a national data analytics provider that evaluates fire protection for communities across the country. According to ISO's Public Protection Classification program, or PPC, its rating "is a proven and reliable predictor of future fire losses." All other factors being equal, commercial property insurance rates are expected to be lower in areas with lower (better) ISO PPC Class rating.

At the time of the most recent ISO survey, the ISO Fire Suppression Rating Schedule (FSRS) measured three primary elements of a community's fire protection system: **Emergency Communications** (max 10 points); **Fire Department** (max 50 points); and **Water Supply** (max 40 points). In addition, the ISO grants 5.5 points for **Community Risk Reduction** activities for a maximum possible total of 105.5 points. After the points are accumulated, the ISO then assigns a grade using a scale of 1 to 10, with Class 1 representing the highest level of fire protection, and Class 10 is a fire suppression program that does not meet ISO's minimum criteria.

In 2014, the Carson City Fire Department was assigned an ISO rating of Class 2/10. CCFD is one of 5 communities surveyed across the State to achieve a Class 2 rating and ranks in the top quartile of all communities surveyed, as shown in the following figure.

Figure 6: State Comparative ISO Fire Department Class



Management Components

Effective fire department management is a common challenge for fire service leaders. Today's fire department must address management complexities that include an effective organizational structure, a qualified workforce, maintenance of personnel competencies, adequacy of emergency response, and financial sustainability for the future. In this section, the components of management will be discussed; however, it must be noted that good management alone will not guarantee a successful and effective organization.

Foundational Management Elements

To be effective, the management of a department needs to be based on a number of components. These include a clearly stated *mission* (what is the fundamental purpose of an agency?); a *vision* for the future (where is the organization going?); and the *values* or *guiding principles* (how will the organization treat its members, as it navigates from its current state to its desired future state?). From these fundamental elements, the organization evaluates the environment in which it operates, and establishes a series of strategic initiatives, goals, and objectives. These elements combine to form a strategic plan.

The development of baseline management components in an organization enables it to move forward in an organized and effective manner. In the absence of foundational management elements, the organization will tend to operate in a random and generally ineffective manner. Carson City Fire Department has the three foundational management elements: a mission statement, a vision statement, and a values statement, although termed differently.

Mission Statement

The mission statement should tell why the Department exists and perhaps how the mission will be executed. The mission of the Carson City Fire Department is as follows:

> *The mission of the men and women of the Carson City Fire Department is to serve the community with pride, commitment, and compassion.*

Vision Statement

The vision should define the Department when it has achieved its desired level of excellence. While the organization may not exhibit these traits consistently at this point in time, its goal is to achieve them. The Carson City Fire Department has not established formal vision statements.

The Department has established Guiding Principles, which are as follows:

- Community service is the number one priority.
- The most valuable asset of the Department is its personnel.
- Personal commitment and participation are crucial to the organization's success.
- To be successful in the long-term, prudent risk-taking is necessary.
- Innovation, creativity, and receptiveness to change are vital attributes to ensure our future success.

Values Statement

Every organization has its own unique combination of values, which govern the decisions of the group. These values represent the organizational culture. The values statement ideally should be designed by a cross-section of the members. It should accurately state those values that the members hold in common corporately. It should become a document that guides behavior daily for interactions between members and citizens, member to member, staff and line, management and firefighters. It should be easily understood and internalized if not actually memorized. The Carson City Fire Department lists its values as follows:

- Support and respect each other as individuals.
- Make decisions with integrity, fairness, honesty, and loyalty.
- Provide open communication and opportunities for formal and informal discussion.
- Support and encourage personal growth and development.

Management Documents and Processes

An organization should establish appropriate documentation, policies, procedures, and identification of internal and external issues that affect the agency. Processes must also be established to address the flow of information and communication within the fire department, as well as with its constituents.

Regulatory documents consist of policies and procedures, employee handbooks, and standard operating procedures or guidelines. These documents may be called different things and may be divided up differently in different departments.

A review of the policies and procedures demonstrates that the Carson City Fire Department uses an internal document management system. The documents are not currently being reviewed to bring them up to date and current. ESCI recommends that a review of all policies and procedures be accomplished on an annual cycle by an individual or group of employees. Reviewing one-third of the documents per year keeps the process manageable. The reviewer(s) can determine if the current practice is the same as the guideline. If there are no changes needed to the documents, the review date can be updated. If changes are needed, the document can be referred to the appropriate individual(s). Of course, as field procedures change, this should also trigger a guideline change. SOGs and some employee policies should be the focus of training periodically.

Internal and External Communications

The communication within the organization and to the external world are both very important. The following discussion describes internal and external communications in the Department.

Internal Communications

Internal communications within CCFD are accomplished in several ways, from in-person meetings to several print mediums. The in-person meetings include Chief's Briefings that occur every other month; these are formal meetings with a published agenda.

The Fire Chief has recently initiated a "Coffee with the Chief" program where the shift BC and the Chief meet with each station for a less formal meeting with no agenda.

The shift Battalions send out a shift report at the end of each set/tour, this report goes out to the entire department and covers training, significant events, and any critical information. On a monthly basis, the Department also publishes a "Monthly Report" that captures the activities and events from the previous month. This report goes out to the Department, retirees, to the Board of Supervisors and all department heads.

External Communications

Communicating and educating with the public is accomplished primarily through news releases, social media posts (Facebook & Twitter), and presentations to civic and community groups. In addition, the Department publishes an Annual Report that is distributed both internally and externally through print and electronic mediums.

Record Keeping and Documentation

In any organization, documentation of activities is of paramount concern. Carson City Fire Department does a good job collecting information regarding incidents and other activities. The Department uses Firehouse as its records management system. Computer files are password protected. Personnel records are kept in locked and secured files. Personnel exposure occurrences are documented and stored in the personnel files. Records for hose testing results, pump testing, gas monitors, and vehicle maintenance are maintained. These tests are completed internally. SCBA, breathing air, and ladder testing are all done by outside vendors, and these records are maintained as well.

Based on stakeholder interviews, ESCI was advised that the fire stations are disposing of the CAD print-out for response in the normal refuse containers. The information contained in the CAD print-out sheet documents primarily provides addressing and incident type. There are instances that specific information pertaining to hazards and risks will appear on the print-out, which may be of a sensitive nature for the address being dispatched to. CCFD should consider document disposal bins for shredding for fire station disposal of these records.

Security

Fire department facilities and department vehicles are locked by key and electronic access. Computers are protected by passwords. Assets are inventoried and tracked annually. Most of the fire apparatus are parked inside, with the exception of Station 52 having two reserve Rescues (ambulances) parked outside, which are locked.

FINANCE

Financial Analysis

Historical Revenue and Expense

A significant amount of historical financial information for Carson City was obtained through a review of the City's Comprehensive Annual Financial Reports for the fiscal years ending June 30, 2015, through June 30, 2018, and its internal accounting reports for FYE June 30, 2019. The City operates through 25 separate "governmental" funds and 10 "proprietary" funds. The most significant of the governmental funds is the General Fund through which most revenues are collected, and city government activities are conducted. The proprietary funds are not evaluated or discussed for this report.

The City reports its operations and balances using "government-wide financial statements that are designed to provide the readers with a broad overview of the City's finances, in a manner similar to private-sector business."[3] The statement of net position contained in the government-wide statements presents information on all of the City's assets and, additionally, deferred outflows of resources, and liabilities plus deferred inflows of resources, with the difference reported as net position. Similar to a private business financial statement, this statement combines and consolidates governmental funds' current financial resources (short-term spendable resources) with capital assets and long-term obligations.

The government-wide financial statements separate activities of the City that receive funding principally from taxes and intergovernmental revenues, denoted as government activities, from functions that are intended to recover all or a significant portion of their costs from charges for services, denoted as business activities. Government activities include most of the City's basic services such as general government, public safety, public works, and community development, and receive funding through property tax, sales tax, and other fees and taxes. The City's water, sewer, and gas system are included in business activities and receive support through charges for these services.

Typical governmental accounting utilizes funds to group related activities and to maintain control over resources that are segregated, typically through the budget process, for specific activities. The use of fund accounting is also necessary to ensure finance-related legal requirements. Carson City uses three fund types, governmental, proprietary, and fiduciary funds. For this study, no review or analysis will be made of the proprietary and fiduciary funds.

[3] *Carson City NV Comprehensive Annual Financial Report, Fiscal Year Ended June 30, 2018.*

Governmental funds focus on current inflows and outflows of resources. Government funds provide a detailed but short-term view of the City's operations. Analyzing these funds' statements, in conjunction with the government-wide financial statements, provides insight into the long-term impact of the City's short-term decisions. Carson City maintains twenty-five governmental funds. The City considers the General Fund, Debt Service Fund, and Capital Projects Fund to be its major funds. The City provides paramedic and basic life support ambulance services to its residents and medical facilities. While this service is provided through the fire department, the revenue and expense generated by its operations are segregated into a separate fund (Fund 501) for accounting purposes. This fund and the other twenty-two funds are consolidated into a single, combined presentation for financial reporting purposes.

The following section of the ESCI study focuses on the financial analysis of the various governmental funds, examining ". . . near-term inflows and outflows of spendable resources, as well as on balances of spendable resources available at the end of the fiscal year."[4] Historical analysis using this focus gives the reader a more realistic view of the City's short-term future (0–5 years) financial health and performance. Conversely, the statement of net position found in the Comprehensive Annual Financial Report looks at total assets (including fixed facilities, apparatus, and equipment) and liabilities (such as bonded debt and other long-term liabilities), the difference being its net position, to give the City a longer-term view of its financial health.

Revenues and Expenses

Figure 7 shows recurring and non-recurring revenues as well as restricted and unrestricted fund balance for the Governmental Funds, including the General Fund (GF), and the combined Non-Major governmental Funds (NMF) for the period FY 2015 through FY 2019 actual. Recurring revenues are those that can be reasonably expected to occur on a year-to-year basis in a generally predictable manner, such as property and other taxes, impact fees, and billing for various services such as ambulance transport and fire inspections/plans review. Non-recurring revenues are those that are finite in nature, such as grants, creation of debt instruments, and sales of surplus equipment; or difficult to predict year-to-year, such as donations, interest, and other miscellaneous income. Governmental funds are defined as those whose resources can be used to support Department operations as contrasted with fiduciary funds (such as retirement funds), which are restricted to outside obligations and cannot be used to offset operating costs.

The City accounts for the expenditure of funds by department within the City's operating structure. Within each of these departments, various types of expenditures occur for such items as salaries and benefits, supplies, services, and debt service.

[4] *Carson City NV Comprehensive Annual Financial Report, Fiscal Year Ended June 30, 2018; p. 180*

Figure 7: Carson City Government Funds Activities, FY 14/15–FY 18/19

Description	FY 14/15	FY 15/16	FY 16/17	FY 17/18	FY 18/19
Property Taxes	24,559,373	25,163,198	25,475,674	26,642,033	27,853,996
Other Taxes	9,759,166	10,988,718	11,723,520	12,637,057	13,845,302
Licenses & Permits	7,023,943	6,941,765	6,772,108	7,719,226	8,299,473
Intergovernmental Resources	33,632,163	34,111,823	38,489,332	40,081,700	54,151,163
Charges for Services	11,899,821	12,618,224	13,190,310	13,838,864	13,866,909
Fines & Forfeitures	859,277	725,895	790,940	843,824	787,048
Miscellaneous	2,522,356	2,741,595	2,056,593	2,101,630	1,983,223
Recurring Revenues	**90,256,099**	**93,291,218**	**98,498,477**	**103,864,334**	**120,787,114**
Financing Sources	14,217,443	(201,181)	3,644,931	4,109,520	16,958
Total Revenues	**104,473,542**	**93,090,037**	**102,143,408**	**107,973,854**	**120,804,072**
General Government	15,114,175	15,937,078	15,422,611	20,481,069	25,611,631
Judicial	4,802,335	5,041,248	5,435,010	5,594,792	6,171,013
Public Safety	32,041,246	33,485,088	33,644,064	35,157,243	37,153,367
Public Works	9,166,178	8,969,899	10,051,932	10,923,249	20,046,585
Sanitation	1,506,921	1,647,716	5,293,965	3,244,282	4,066,198
Public Health	5,745,394	8,437,950	5,865,721	4,830,765	6,796,686
Welfare	1,706,174	1,712,056	2,151,042	2,229,556	2,574,996
Culture & Recreation	11,940,526	13,053,950	8,000,556	8,466,893	16,888,270
Community Support	1,735,184	3,619,306	4,449,352	936,745	3,939,030
Economic Opportunity	-	-	-	364,449	1,153,509
Intergovernmental Expenditures	304,224	312,576	-	-	-
Contingency	-	-	-	-	150,000
Transfers (In) Out	6,521	(90,000)	210,000	(193,203)	(2,212,687)
Transit Systems	1,399,217	1,355,151	1,871,125	1,847,485	2,105,779
Airports	1,603,931	160,000	2,308,253	469,749	591,048
Debt Service - Principal	4,759,700	4,278,100	5,009,300	5,362,399	5,688,900
Debt Service - Interest	3,106,968	3,310,556	3,128,766	2,923,995	2,775,215
Recurring Expenditures	**94,938,694**	**101,230,674**	**102,841,697**	**102,639,468**	**133,499,540**
Net Cash Flow	**9,534,848**	**(8,140,637)**	**(698,289)**	**5,334,386**	**(12,695,468)**
Beginning Balance	**20,666,394**	**30,201,242**	**22,060,605**	**21,362,316**	**26,696,702**
Ending Balance	**30,201,242**	**22,060,605**	**21,362,316**	**26,696,702**	**14,001,234**

As noted in Figure 7, the City's ending balance has diminished almost each of the five years in the analysis period. The City has committed significant funds to its Culture and Recreation, Public Health, and Public Works Departments, which has been a major factor in this reduction. This has occurred while revenues, with the exception of FY 15/16, have grown.

The staff of the City and the Carson City Fire Department provided considerable financial information and background data to ESCI. This data covered actual revenue and expenses for the fiscal periods ending June 30, 2015, through June 30, 2019, and was reviewed in detail for the following discussion. The Department is supported through various revenue streams collected by the City's General Fund. The Department operates through several separate divisions within the General Fund (100), including Administration (2505), Operations (2512), Prevention (2513), Training (2520), Emergency Management (2530), and Wildland Fire Management (2545).

The following figure is a consolidation of the costs of operating the various General Fund divisions of the fire department.

Figure 8: Carson City Fire Department Recurring and Non-Recurring Expenses, FY 14/15–FY 18/19

Description	FY 14/15	FY 15/16	FY 16/17	FY 17/18	FY 18/19
Salaries	5,941,622	5,866,960	6,054,342	6,051,546	5,422,317
Benefits	2,714,685	2,765,101	2,667,784	2,699,137	2,756,260
Salaries & Benefits	**8,656,307**	**8,632,061**	**8,722,126**	**8,750,683**	**8,178,577**
Services & Supplies	949,268	916,063	977,610	1,094,272	1,080,146
Total Recurring Expenses	**9,605,575**	**9,548,124**	**9,699,736**	**9,844,955**	**9,258,723**
Debt Service	-	-	-	-	-
Capital	-	10,195	30,000	21,000	-
Total Non-Recurring Expenditures	**-**	**10,195**	**30,000**	**21,000**	**-**
Total Expenditures	**9,605,575**	**9,558,319**	**9,729,736**	**9,865,955**	**9,258,723**

The ambulance division of the fire department conducts its operations through a separate enterprise fund, an accounting system utilized to account for government activities that are similar to those of a typical for-profit business. In this environment, the ambulance division bills for its services, uses those revenues to pay the costs of providing those services, and either contributes excess funds to other City operations or draws funds from other City resources to pay costs not provided for through the collections for its services.

Revenues generated from billings to patients are collected from five primary sources. In the case of Carson City, the Medicare reimbursement accounts for the most significant of the collections, amounting to an average of approximately 53 percent over the past five years. Medicaid, payments from individuals, and health insurance each average approximately 15 percent over the past five years. The Carson City Care program payments an average of approximately 2 percent per year. Billings for service have increased significantly over the past five years, increasing from $7,730,000 in FY 14/15 to $9,250,000 in FY 18/19, a 19 percent increase in five years. A significant additional revenue source was realized from the Ambulance Division's participation in the Ground Emergency Medical Transportation program.

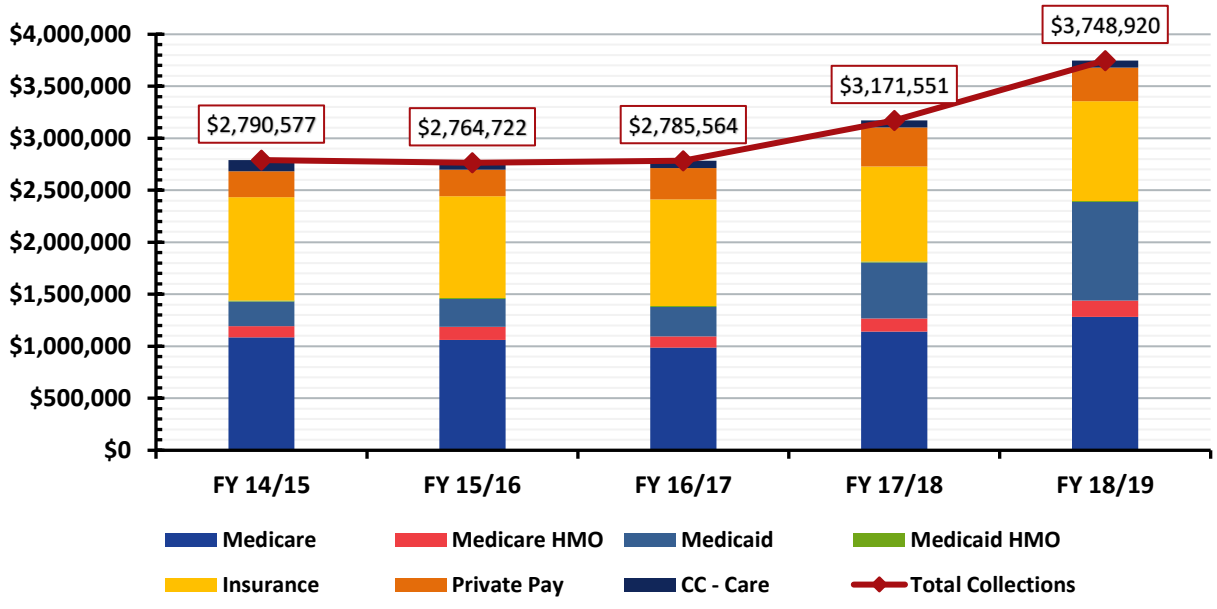
Patient billings are adjusted for discounts and other maximum allowable charges by each of the various sources, leaving collected revenues of approximately 40 percent of billings. Collected revenues from these billings have increased as well from $2,791,000 to $3,749,000, or an approximately 34 percent increase during the same period. The following figure reflects these payments.

Figure 9: Revenues Collected from Various Sources, FY 14/15–FY 18/19

Description	FY 14/15	FY 15/16	FY 16/17	FY 17/18	FY 18/19
Medicare	1,086,955	1,062,158	985,877	1,141,001	1,281,438
Medicare HMO	107,929	125,999	108,715	126,046	159,643
Medicaid	236,182	267,502	285,093	539,392	946,264
Medicaid HMO	8,100	9,423	8,351	8,249	9,006
Insurance	994,397	977,763	1,022,945	913,298	959,464
Private Pay	250,749	253,849	301,753	375,299	325,459
CC - Care	106,265	68,028	72,830	68,266	67,646
Total Collections	**2,790,577**	**2,764,722**	**2,785,564**	**3,171,551**	**3,748,920**
Refunds	(25,825)	(19,863)	(21,067)	(21,122)	(27,851)
Collection Adjustments	(14,963)	(18,258)	(2,667)	(18,889)	(12,272)
Net Collections	**2,749,789**	**2,726,601**	**2,761,830**	**3,131,540**	**3,708,797**
Reconciling Entry	412,280	444,582	423,292	450,809	369,900
GEMT Revenues	-	-	-	1,206,983	1,442,448
Total Ambulance Revenues	**3,162,069**	**3,171,183**	**3,185,122**	**4,789,332**	**5,521,145**

The growth in Ambulance Division Revenues during the historical period clearly evident a result of increased revenues from Medicare (royal blue) and Medicaid (medium blue).

Figure 10: Total Collections of Ambulance Division Billings, FY 14/15–FY 18/19



Costs associated with providing EMS services are also captured in the Ambulance Enterprise Fund. These costs are typical of an operating division of a municipality that provides services for a fee. These costs include salaries and benefits, operating supplies, and services provided by others. Salaries and benefits have steadily escalated as both compensation and the cost of providing benefits to employees has risen. Supplies and services have risen as call volume has increased and the price of supplies has risen due to inflation.

The Ambulance Division is staffed primarily with CCFD firefighter/paramedics and firefighter/EMTs. Non-sworn civilian EMTs staff some of the non-emergency transfer units.

Figure 11: Ambulance Division Operating Expenses, FY 14/15–FY 18/19

Description	FY 14/15	FY 15/16	FY 16/17	FY 17/18	FY 18/19
Salaries and Benefits	2,333,475	2,418,019	2,473,132	2,534,292	2,855,547
Supplies & Services	791,218	847,709	895,614	1,063,650	969,761
Cash Expended	**3,124,693**	**3,265,728**	**3,368,746**	**3,597,942**	**3,825,308**

As previously discussed, enterprise fund activities are undertaken by a city with an expectation of breaking even from a financial perspective or, if that is not possible, at least with a reasonable anticipation of the loss which the municipality will be required to fund from other resources. An enterprise fund, similar to a business, should maintain adequate reserves to provide funding for emergency needs. The following figure summarizes the activity of the Ambulance Division operations from FY 14/15 through FY 18/19 and identifies the cash flow required to be contributed by the City as well as the cash flow provided to the City during that time period. As is evident, the City's participation in the GEMT program created a significant revenue boost in FY 17/18 and FY 18/19, so much so that the Ambulance Division funded the purchase of a new pumper and a new ladder truck for the Fire Department in FY 18/19 and still maintained a significant cash balance.

Figure 12: Cash Flow from Operations of the Ambulance Division, FY 14/15–FY 18/19

Description	FY 14/15	FY 15/16	FY 16/17	FY 17/18	FY 18/19
Ambulance Revenues	3,162,069	3,171,183	3,185,122	4,789,332	5,521,145
Ambulance Expenses	3,124,693	3,265,728	3,368,746	3,597,942	3,825,308
Net Cash Provided (Required)	**37,376**	**(94,545)**	**(183,624)**	**1,191,390**	**1,695,837**
Interest on Fund Balance	2,259	5,087	2,689	13,233	91,434
Transfers In	400,000	300,000	350,000	276,797	-
Grants and Other Special Revenues	-	46,451	825	22,681	34,548
Capital Expenditure	-	-	(205,606)	(213,675)	(60,631)
Disposal of Surplus Property			-	2,470	1,045
Transfers Out	(31,020)	(31,020)	(31,020)	(31,020)	(1,971,020)
Net Increase (Decrease) in Cash	**408,615**	**225,973**	**(66,736)**	**1,261,876**	**(208,787)**
Beginning Fund Cash Balance	235,497	644,112	870,085	803,349	2,065,225
Ending Fund Cash Balance	**644,112**	**870,085**	**803,349**	**2,065,225**	**1,856,438**

Financial best practice, as recommended by the Government Financial Officers Association (GFOA), provides guidance on how to account for fund balance and how much is recommended for various purposes.[5] Additional financial best practices from the GFOA can be found in Appendix A. Formal City policy should explain the level of unrestricted fund balance to be maintained, how it should be used, and how and over what time period it should be restored if used. Risk of various types, whether natural or man-made, should be accounted for when developing a fund balance policy. Specifically, GFOA recommends that governments maintain at least two months or just under 17 percent of operating revenues or expenditures at a minimum. As shown in Figure 7, the Governmental Fund Balance has been reduced from approximately 32 percent in FY 14/15 to approximately 11 percent in FY 18/19. In contrast, the Ambulance Enterprise Fund, shown in Figure 11, has grown from approximately 20 percent to approximately 48 percent during the same time period. Included in the 48 percent Ambulance Fund Balance is the fact it provided approximately $1,971,000 in fund transfers to other Governmental Funds in FY 18/19.

The analysis of historical revenues and expenses for the City, Department, and Ambulance Enterprise Fund were completed to help identify relevant financial trends, strengths, and weaknesses, and to lay the groundwork for subsequent financial projections. The historical analysis helps illustrate how each funds its services—where the money comes from and where it goes. Historical budget data for each was provided by staff and was supplemented with a review of past audits and historical budget records. Where discrepancies were encountered between reported actual budget data and annual financial audits, between various audits and/or when external auditors were changed, ESCI used reconciling adjustments as the basis for addressing discrepancies between the various reports. The use of audit reports only may include non-cash adjustments that affect only financial presentations.

Financial Forecast

City of Carson City

Carson City has experienced a significant reduction in its fund balance over the historical period reviewed by ESCI in spite of significant growth in revenues. Expansion in expenses in virtually all Governmental Fund departments exceeded revenues from all sources bringing the Governmental Fund Balance to approximately 10.5 percent or a little over one month's expenditures. This trend in expenditure growth in most Departments carried over into the FY 19/20 budget cycle, further reducing the Fund Balance to approximately 6.5 percent or less than one month's expenditures. The issue may be mitigated through the use of "Transfers In" to Governmental Funds from other funds (Ambulance Fund, for example), the amount of which has not been determined.

[5] *http://www.gfoa.org/fund-balance-guidelines-general-fund.*

Based upon the historical review of City, Department, and Ambulance Division finances, ESCI developed the following status quo forecast to assess the sustainability of operations at the current level over the next five years. The forecast is based upon historical actual revenues and expenditures and informed assumptions about how those revenues and expenditures will change in the future. The key assumptions used in the forecast are presented below, followed by the forecast results and selected metrics. This scenario has been prepared for stakeholder consideration. This projection is made at the current service level scenario, with no new positions added and comparative year-over-year growth assumptions in revenues and expenses, with anticipated future needs in capital improvements.

Revenue Assumptions

- Property Taxes:
  - These have increased at an average annual rate of 2.7 percent over the historical period, and the forecast assumes that this trend will continue at 1.3 percent using budgeted FY 19/20 revenue as the basis for the forecast.
- Other Taxes:
  - Have averaged an 8.4 percent increase over the historical period with little fluctuation, but the budgeted projected revenue for FY 19/20 is flat, resulting in the forecast increasing at 3 percent of the annual amount.
- Licenses and Permits:
  - Has averaged approximately 3.6 percent annual growth over the historical period, and this level of increase has been reduced to 3 percent throughout the forecast period.
- Intergovernmental Resources:
  - Have increased an average of over 12 percent annually throughout the historical period but is projected to decrease by approximately 6 percent in the FY 19/20 budget. The forecast assumes the historical growth rate will not be sustained and is reduced to a 3 percent annual growth rate.
- Charges for Services:
  - Have been increasing at a proximately 3.3 percent over the historical period. The forecast assumes these charges will continue to grow at an annual rate of 3 percent throughout the forecast period.
- Other Sources:
  - The issuance of debt has occurred almost annually during the historical period, but it is difficult to project. The interest rate market is in turmoil, which could produce opportunities to refund debt at a lower interest rate. However, the negative impact on sales tax type revenue and, potentially, the loss of property value due to the impact of the COVID-19 epidemic may reduce those opportunities. No cash from debt issuance is forecast.
  - Miscellaneous Income was less than normal in FY 18/19, resulting in an anomaly in the historical analysis. The amount budgeted for this category is estimated to increase by 3 percent annually in the forecast.

Expenditure Assumptions

- Certain individual departments, General Government, Public Works, Culture and Recreation, experienced very significant increases in FY 18/19 expenditures and those elevated amounts were carried over in the FY 19/20 Adopted Budget.
- The expenditure assumptions are developed using the adopted FY 19/20 Budgeted amounts as the base figures for each department.
- General Government Department expenditures are projected to increase 2 percent annually.
- Current debt service payments for the general obligation bonds and other obligations are projected based on information contained in the FY 18/19 CAFR report

Figure 13: Carson City Government Funds Projected Activities, Budgeted FY 19/20–Projected FY 24/25

Description	Budgeted FY 19/20	Projected FY 20/21	Projected FY 21/22	Projected FY 22/23	Projected FY 23/24	Projected FY 24/25
Property Taxes	29,085,925	29,958,503	30,857,258	31,782,976	32,736,465	33,718,559
Other Taxes	13,833,535	14,248,541	14,675,997	15,116,277	15,569,766	16,036,858
Licenses & Permits	8,446,163	8,699,548	8,960,534	9,229,350	9,506,231	9,791,418
Intergovernmental Resources	50,602,122	52,120,186	53,683,791	55,294,305	56,953,134	58,661,728
Charges for Services	14,329,014	14,758,884	15,201,651	15,657,700	16,127,431	16,611,254
Fines & Forfeitures	821,000	845,630	870,999	897,129	924,043	951,764
Miscellaneous	2,555,987	2,632,667	2,711,647	2,792,996	2,876,786	2,963,089
Recurring Revenues	**119,673,746**	**123,263,958**	**126,961,877**	**130,770,733**	**134,693,855**	**138,734,671**
Financing Sources						
Total Revenues	**119,673,746**	**123,263,958**	**126,961,877**	**130,770,733**	**134,693,855**	**138,734,671**
General Government	25,390,981	25,898,801	26,416,777	26,945,112	27,484,014	28,033,695
Judicial	5,614,490	5,726,780	5,841,315	5,958,142	6,077,305	6,198,851
Public Safety	37,535,365	38,286,072	39,051,794	39,832,830	40,629,486	41,442,076
Public Works	21,173,786	21,597,262	22,029,207	22,469,791	22,919,187	23,377,571
Sanitation	3,606,031	3,678,152	3,751,715	3,826,749	3,903,284	3,981,350
Public Health	4,859,826	4,957,023	5,056,163	5,157,286	5,260,432	5,365,641
Welfare	3,340,035	3,406,836	3,474,972	3,544,472	3,615,361	3,687,669
Culture & Recreation	11,153,602	11,376,674	11,604,208	11,836,292	12,073,018	12,314,478
Community Support	1,146,613	1,169,545	1,192,936	1,216,795	1,241,131	1,265,953
Economic Opportunity	789,833	805,630	821,742	838,177	854,941	872,039
Intergovernmental Expenditures	-	-	-	-	-	-
Contingency	500,000	510,000	520,200	530,604	541,216	552,040
Transfers (In) Out	10,000	-	-	-	-	-
Transit Systems	1,961,403	2,000,631	2,040,644	2,081,457	2,123,086	2,165,547
Airports	-	-	-	-	-	-
Debt Service - Principal	5,857,100	6,442,100	6,459,500	5,829,300	5,829,300	5,829,300
Debt Service - Interest	2,601,173	2,432,789	2,217,543	1,998,217	1,998,217	1,998,217
Recurring Expenditures	**125,540,238**	**128,288,293**	**130,478,715**	**132,065,223**	**134,549,977**	**137,084,426**
Net cash flow	**(5,866,492)**	**(5,024,335)**	**(3,516,838)**	**(1,294,489)**	**143,878**	**1,650,245**
Beginning balance	**14,001,234**	**8,134,742**	**3,110,407**	**(406,431)**	**(1,700,921)**	**(1,557,042)**
Ending balance	**8,134,742**	**3,110,407**	**(406,431)**	**(1,700,921)**	**(1,557,042)**	**93,203**

Carson City Fire Department

Salary and wage increases have averaged approximately 4 percent during the historical period and are projected to continue at that pace. Retirement costs are projected at 40 percent of salaries and wages based on the historical levels. Employees are required to contribute to the Medicare program at a rate of 1.45 percent of compensation. Health insurance costs have historically grown at approximately 1 percent per year in the historical period and this growth rate is utilized in the projection period. For Workers' Compensation Insurance, a small portion of the employee costs are projected to increase 7 percent annually based on the historical growth rate.

The other operating costs of the Department, including but not limited to repairs, fuel, office supplies, uniform costs, operating supplies, utilities, radios, and fleet management costs, are projected to grow at 2 percent annually based on historical data.

Figure 14: Carson City Fire Department Status Quo Recurring and Non-Recurring Expenses, Budgeted FY 19/20–Projected FY 24/25

Description	Budgeted FY 19/20	Projected FY 20/21	Projected FY 21/22	Projected FY 22/23	Projected FY 23/24	Projected FY 24/25
Salaries	5,801,808	6,035,600	6,279,584	6,533,327	6,797,220	7,071,669
Benefits	3,047,207	3,242,013	3,354,173	3,471,085	3,592,975	3,720,075
Salaries & Benefits	**8,849,015**	**9,277,613**	**9,633,757**	**10,004,413**	**10,390,195**	**10,791,744**
Services & Supplies	1,084,514	1,106,204	1,128,328	1,150,895	1,173,913	1,197,391
Total Recurring Expenses	**9,933,529**	**10,383,818**	**10,762,085**	**11,155,308**	**11,564,108**	**11,989,135**
Debt Service	-	-	-	-	-	-
Capital	-	-	-	-	-	-
Total Non-Recurring Exp.	**-**	**-**	**-**	**-**	**-**	**-**
Total Expenditures	**9,933,529**	**10,383,818**	**10,762,085**	**11,155,308**	**11,564,108**	**11,989,135**

Carson City Fire Department Ambulance Division Enterprise Fund

Collections on billings are projected to increase at a 5 percent annual rate during the projection period. The payor mix is anticipated to remain similar to that experienced during the historical period. An obvious caveat to any attempted projection of revenue from federally funded medical programs is the current funding schedule is subject to change anytime the elected officials of this country deem it advisable to do so. The GEMT revenues are expected to increase at a 5 percent rate as well.

Figure 15: Status Quo Projected Collected Ambulance Revenues from Various Sources, Budgeted FY 19/20–FY 24/25

Description	Budgeted FY 19/20	Projected FY 20/21	Projected FY 21/22	Projected FY 22/23	Projected FY 23/24	Projected FY 24/25
Medicare	1,409,582	1,480,061	1,554,064	1,631,767	1,713,355	1,799,023
Medicare HMO	175,607	184,388	193,607	203,287	213,452	224,124
Medicaid	1,040,890	1,092,935	1,147,582	1,204,961	1,265,209	1,328,469
Medicaid HMO	9,907	10,402	10,922	11,468	12,042	12,644
Insurance	1,055,410	1,108,181	1,163,590	1,221,769	1,282,858	1,347,001
Private Pay	358,005	375,905	394,700	414,435	435,157	456,915
CC - Care	74,411	78,131	82,038	86,140	90,447	94,969
Total Collections	4,123,812	4,330,003	4,546,503	4,773,828	5,012,519	5,263,145
Refunds	(30,636)	(32,168)	(33,776)	(35,465)	(37,238)	(39,100)
Collection Adjustments	(13,499)	(14,174)	(14,883)	(15,627)	(16,408)	(17,229)
Net Collections	**4,079,677**	**4,283,661**	**4,479,844**	**4,722,736**	**4,958,873**	**5,206,816**
Reconciling Entry	(111,762)	-	-	-	-	-
GEMT Revenues	966,436	1,014,758	1,065,496	1,118,770	1,174,709	1,233,444
Total Ambulance Revenues	**4,934,351**	**5,298,418**	**5,563,339**	**5,841,506**	**6,133,582**	**6,440,261**

The operating costs of the ambulance division are expected to follow the growth factors of the Fire Department. The Status Quo projection assumes that no additional staff or stations are added in the forecast period FY 19/20–24/25. The Status Quo projection anticipates the billing contract with Wittman Enterprises LLC remains in place under the current terms.

The current Department starting salary for a Paramedic/Firefighter is $67,345, with the maximum pay for the position increasing to $84,105. Adding all employee benefit costs at approximately 54 percent of total compensation gives a fully burdened Ambulance Division employee cost of between $103,711 and $129,522 versus the average cost of a Senior Patient Care Tech of $41,636 plus benefits at a significantly lower percentage.

Figure 16: Status Quo Ambulance Division Operating Expenses, Budgeted FY 19/20–FY 24/25

Description	Budgeted FY 19/20	Projected FY 20/21	Projected FY 21/22	Projected FY 22/23	Projected FY 23/24	Projected FY 24/25
Salaries and Benefits	3,010,352	3,070,559	3,131,970	3,194,610	3,258,502	3,323,672
Supplies & Services	1,056,380	1,077,508	1,099,058	1,121,039	1,143,460	1,166,329
Cash Expended	**4,066,732**	**4,148,067**	**4,231,028**	**4,315,649**	**4,401,962**	**4,490,001**

Net Revenue/Deficit and Fund Balance

The following summarizes the projected cash flow from the operations of the Ambulance Division of the CCFD. The projections indicate the Ambulance Division is anticipated to produce significant cash flow from operations each year in the projection period. The status quo projections anticipate the Division acquiring replacement units and staff vehicles on a scheduled basis. The projected cash flow also anticipates the Ambulance Division continuing to transfer $31,020 to the capital replacement fund annually.

The Division is operating well within sound financial practices when considering GFOA guidelines for fund balance levels and should continue to plan on using a restricted reserve to fund its apparatus replacement program. The Division's financial situation will provide time to carefully consider how it moves forward with staffing, funding, and other decisions.

Figure 17: Status Quo Projected Cash Flow from Operations of the Ambulance Division, Budgeted FY 19/20–FY 24/25

Description	Budgeted FY 19/20	Projected FY 20/21	Projected FY 21/22	Projected FY 22/23	Projected FY 23/24	Projected FY 24/25
Ambulance Revenues	4,934,351	5,298,418	5,563,339	5,841,506	6,133,582	6,440,261
Ambulance Expenses	4,066,732	4,148,067	4,231,028	4,315,649	4,401,962	4,490,001
Net Cash Provided (Required)	**867,619**	**1,150,352**	**1,332,311**	**1,525,858**	**1,731,620**	**1,950,260**
Interest on Fund Balance	25,000	25,000	25,000	25,000	25,000	25,000
Transfers In	-	-	-	-	-	-
Grants and Other Special Revenues	-	-	-	-	-	-
Capital Expenditure	(271,042)	(270,000)	(110,000)	(215,000)	(215,000)	(215,000)
Disposal of Surplus Property	-	-	-	-	-	-
Transfers Out	(31,020)	(31,020)	(31,020)	(31,020)	(31,020)	(31,020)
Net Increase (Decrease) in Cash	**590,557**	**874,332**	**1,216,291**	**1,304,838**	**1,510,600**	**1,729,240**
Beginning Fund Cash Balance	1,856,438	2,446,995	3,321,327	4,537,618	5,842,456	7,353,056
Ending Fund Cash Balance	**2,446,995**	**3,321,327**	**4,537,618**	**5,842,456**	**7,353,056**	**9,082,296**

The following figure shows the growth in the projected FY 19/20–FY 24/25 net cash flow from operations of the Ambulance Division that is available to fund capital improvements or fund other Department or City needs.

Figure 18: Projected Ambulance Division Net Operating Cash Flow, Budgeted FY 19/20–FY 24/25

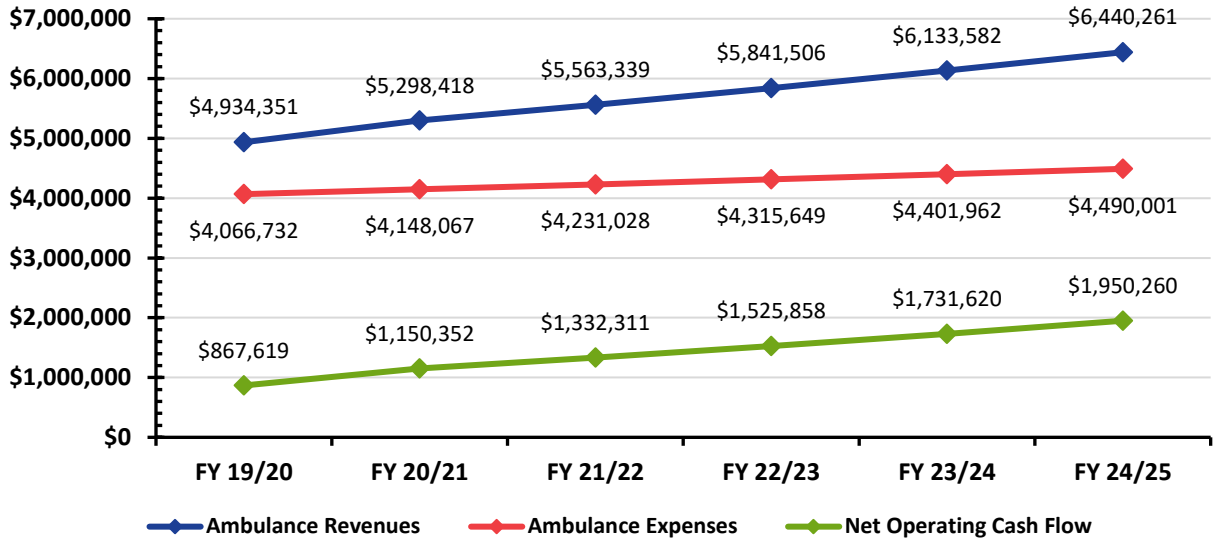


Figure 13 is a truer indicator of the difficult decisions facing the City of Carson City within a relatively short period. Governmental Fund expenses, driven by significant increase in funding for General Government, Public Works, and Culture/Recreation Departments increased at a much faster rate than revenue, which required the use of fund balance to cover the balance of operating costs not covered by annual revenues. A net operating loss of approximately $12,700,000 occurred in FY 18/19 that reduced the City's Fund Balance to approximately $14,000,000, followed by four consecutive years of projected losses that place the fund balance in a negative position in FY 23/24.

Previously in the discussion, the reader was referred to GFOA best practice that suggested a minimum of 2 to 2.5 months (16.7–20.8 percent) of operating revenue or expense should be held as an unrestricted reserve. The forecast shows that ending fund balance, which was 10.5 percent of expenses in FY 18/19 actual, drops to 6.5 percent at the end of FY 19/20 as forecast, well below the 16 to 20 percent suggested as best practice. While the Ambulance Fund is in a very good financial position for the entire forecast period, the Governmental Funds are clearly underfunded throughout the forecast, and adjustments to revenue or expense will be required soon.

CAPITAL ASSETS & CAPITAL IMPROVEMENT PROGRAMS

Capital assets related to the operation of the Carson City Fire Department include facilities, apparatus, and equipment. Facilities and apparatus are two of the most expensive infrastructure elements, but also typically long-lived resources used by a fire department. With the significant funding requirement for new, replacement, or refurbishment of these long-lived assets, a plan must be developed and adopted to provide funding. Few agencies are in a position to fund these assets in a single year and a multi-year funding strategy or funding source must be identified. Planning for the replacement or refurbishment of these facilities and apparatus must take place far in advance of the actual expense to allow the agency adequate time to acquire the funds necessary to implement the plan.

The following figure reflects the status of CCFD's planning efforts in this regard, and the funding mechanisms.

Figure 19: Capital Plans & Funding

Capital Element	Status
FACILITIES	
Capital Improvement Plan	No
APPARATUS	
Apparatus Replacement Plan	Yes
SUPPORT EQUIPMENT	
Equipment Replacement Plan	No

Facilities

Appropriately designed and maintained facilities are critical to a fire department's ability to provide services in a timely manner and with the appropriate deployment of assets. ESCI observed and reviewed the fire stations operated by CCFD. The findings noted by ESCI during the onsite walk-throughs are summarized in the following pages, and any areas of observed concern are identified.

The fire department staff provides the Carson City fire stations general daily maintenance. The Carson City Public Works Department provides additional maintenance.

The Emergency Operations Center (EOC) Facility is located in the meeting room of Fire Station 51. The room is small (450 square feet) with an additional small overflow room to handle the full operational activation of approximately 30 City personnel from various departments to the Center. The room is also used as a back-up dispatch center. Based on the stakeholder interviews and the on-site visit examination of the facility, CCFD should consider developing plans to replace or expand the EOC to meet the number of people deployed to the EOC and enhance the technology integration within the Center.

The Public Works Department is currently developing an Asset Management Program for the entire City. This program will be presented to the elected body for the FY 2021 budget planning process. All of the facilities, pavement, and other infrastructure are included in the project that will develop a financial needs projection.

Station Name/Number:	Station #51
Address/Physical Location:	777 S. Stewart St., Carson City, NV 89701

General Description:
This is the main station for Carson City Fire Department housing administration and operations functions. The station is staffed full-time with eight fire suppression personnel operating an ALS fire engine, two ALS rescues (ambulances), and the Battalion Shift Commander.

Structure						
Construction Type	Masonry Concrete Block					
Date of Construction	1993					
Seismic Protection	No					
Auxiliary Power	Yes					
General Condition	Fair					
Number of Apparatus Bays	5	Drive-through bays				Back-in bays
Special Considerations (ADA, etc.)	Yes					
Square Footage	18,074					
Facilities Available						
Separate Rooms/Dormitory/Other	9	Bedrooms	9	Beds	0	Dormitory Beds
Maximum Station Staffing Capability	18, if doubling up in the bedrooms					
Exercise/Workout Facilities	Yes, outdated equipment					
Kitchen Facilities	Needs remodel					
Individual Lockers/Storage Assigned	Yes					
Shower Facilities	Yes					
Training/Meeting Rooms	Yes					
Washer/Dryer	Yes, need replacing					
Safety & Security						
Sprinklers	Yes					
Smoke Detection	Yes					
Decontamination/Biohazard Disposal	No					
Security	Locks					
Apparatus Exhaust System	Plymovent					

Station Name/Number:	Station #52
Address/Physical Location:	2400 East College Parkway, Carson City, NV 89706

General Description:
The training facility is co-located with Station 52. Staffed by five personnel operating an ALS fire engine and ALS rescue (ambulance). The new Tiller Ladder Truck is located at the fire station for training purposes.

Structure						
Construction Type	Concrete block					
Date of Construction	1978					
Seismic Protection	No					
Auxiliary Power	Yes					
General Condition	Poor					
Number of Apparatus Bays	3	Drive-through bays			0	Back-in bays
Special Considerations (ADA, etc.)	Yes					
Square Footage	7,419					
Facilities Available						
Separate Rooms/Dormitory/Other	6	Bedrooms	6	Beds	0	Dormitory Beds
Maximum Station Staffing Capability	8					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers/Storage Assigned	Yes					
Shower Facilities	Yes					
Training/Meeting Rooms	No					
Washer/Dryer	Yes					
Safety & Security						
Sprinklers	No					
Smoke Detection	Yes					
Decontamination/Biohazard Disposal	No					
Security	Key card; no locked gates or cameras					
Apparatus Exhaust System	Yes					

Station Name/Number:	Station #53
Address/Physical Location:	4649 Snyder Avenue, Carson City, NV 89701

General Description:
The Joint Law Enforcement and Fire Dispatch Center are co-located with Station 53. The fire station is staffed by three personnel who operate the ALS fire engine and will cross-staff a rescue (ambulance) when all other Ambulances are committed.

Structure						
Construction Type	Concrete block					
Date of Construction	1978					
Seismic Protection	No					
Auxiliary Power	Yes					
General Condition	Poor					
Number of Apparatus Bays	1	Drive-through bays			1	Back-in bays
Special Considerations (ADA, etc.)	Yes					
Square Footage	5,028					
Facilities Available						
Separate Rooms/Dormitory/Other	4	Bedrooms	4	Beds	0	Dormitory Beds
Maximum Station Staffing Capability	5					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers/Storage Assigned	Yes					
Shower Facilities	Yes; No female facilities					
Training/Meeting Rooms	No					
Washer/Dryer	Yes					
Safety & Security						
Sprinklers	No					
Smoke Detection	Yes					
Decontamination/Biohazard Disposal	No					
Security	Key card;					
Apparatus Exhaust System	Yes					

Station Name/Number:	Station #54
Address/Physical Location:	West College Parkway, Carson City, NV 89701

General Description:
This station is not an in-service fire station. It is co-located on the College property and is a former Nevada Division of Forestry facility. The building also has a College shipping and receiving facility attached to the rear. The building houses vehicles and office space for the CCFD Fuels Management program. This building, as configured today, is not conducive for 24-hour operations. There are no bedrooms, and the apparatus bays are small.

Structure						
Construction Type	Metal					
Date of Construction	1984					
Seismic Protection	No					
Auxiliary Power	No					
General Condition	Fair					
Number of Apparatus Bays	0	Drive-through bays		3	Back-in bays	
Special Considerations (ADA, etc.)	Yes					
Square Footage	3,200					
Facilities Available						
Separate Rooms/Dormitory/Other	0	Bedrooms	0	Beds	0	Dormitory Beds
Maximum Station Staffing Capability	Seasonally staffed station during daytime					
Exercise/Workout Facilities	No					
Kitchen Facilities	Yes					
Individual Lockers/Storage Assigned	Yes					
Shower Facilities	Yes					
Training/Meeting Rooms	Yes					
Washer/Dryer	Yes					
Safety & Security						
Sprinklers	No					
Smoke Detection	Yes					
Decontamination/Biohazard Disposal	No					
Security	Metal card & key					
Apparatus Exhaust System	No					

Station Name/Number:	Carson City Regional Training Center
Address/Physical Location:	2400 East College Parkway, Carson City, NV 89706

General Description:
The Training Center classroom building is co-located with Station 52 on a multi-acre parcel. The classroom building had been converted from a storage building. The site also has a Drill Tower, Class A combustible burn room, a storage and workshop building, hazmat props, and confined space areas.

Structure – *Classroom*						
Construction Type	Single-Story, Metal on Steel Frame					
Date of Construction	1987					
Seismic Protection	No					
Auxiliary Power	No					
General Condition	Poor					
Number of Apparatus Bays	0	Drive-through bays			0	Back-in bays
Special Considerations (ADA, etc.)	Yes					
Square Footage	2,560					
Facilities Available						
Separate Rooms/Dormitory/Other	0	Bedrooms	0	Beds	0	Dormitory Beds
Maximum Station Staffing Capability	2					
Exercise/Workout Facilities	No					
Kitchen Facilities	No					
Individual Lockers/Storage Assigned	Yes					
Shower Facilities	Yes					
Training/Meeting Rooms	Yes					
Washer/Dryer	No					
Safety & Security						
Sprinklers	No					
Smoke Detection	Yes					
Decontamination/Biohazard Disposal	No					
Security	Yes					
Apparatus Exhaust System	No					

Station Name/Number:	Carson City Regional Training Center
Address/Physical Location:	2400 East College Parkway, Carson City, NV 89706

General Description:
This Annex/Warehouse is co-located with Station 52 on a multi-acre parcel. This building is currently used to store a reserve fire engine, SCBA maintenance, turnout gear, and miscellaneous equipment.

Structure – *Annex/Warehouse*						
Construction Type	Single-story, Metal on Steel Frame					
Date of Construction	1983					
Seismic Protection	No					
Auxiliary Power	Yes					
General Condition	Fair					
Number of Apparatus Bays	1	Drive-through bays			0	Back-in bays
Special Considerations (ADA, etc.)	Yes					
Square Footage	2,304					
Facilities Available						
Separate Rooms/Dormitory/Other	0	Bedrooms	0	Beds	0	Dormitory Beds
Maximum Station Staffing Capability	No					
Exercise/Workout Facilities	No					
Kitchen Facilities	No					
Individual Lockers/Storage Assigned	No					
Shower Facilities	No					
Training/Meeting Rooms	No					
Washer/Dryer	No					
Safety & Security						
Sprinklers	No					
Smoke Detection	No					
Decontamination/Biohazard Disposal	No					
Security	Yes					
Apparatus Exhaust System	No					

Station Name/Number:	Carson City Regional Training Center
Address/Physical Location:	2400 East College Parkway, Carson City, NV 89706

General Description:
The Training Tower is co-located with Station 52 on a multi-acre parcel. The building is used for tower and ladder drills.

Structure – *Training Tower*	
Construction Type	Masonry
Date of Construction	1980
Seismic Protection	No
Auxiliary Power	No
General Condition	Fair
Number of Apparatus Bays	N/A
Special Considerations (ADA, etc.)	No
Square Footage	2,000 – 400 sf x 5 stories

Address/Physical Location:	2400 East College Parkway, Carson City, NV 89706

General Description:
The Burn Room is co-located with Station 52 on a multi-acre parcel. This building is a Class A combustible burn facility. It is used by multiple agencies for burn-room training. This building had been converted from a natural gas fueled facility.

Structure – *Burn Room*	
Construction Type	Masonry
Date of Construction	Unknown
Seismic Protection	No
Auxiliary Power	No
General Condition	Poor
Special Considerations (ADA, etc.)	No
Square Footage	1,670

Facilities Summary

The five facilities range in age from 27 to 42 years old. Several have undergone varying levels of remodel/upgrades since their construction date, but most, if not all, need significant repair and/or upgrade.

Although all structures require routine maintenance, fire stations require even more because they are staffed with three or more personnel operating 24 hours per day. Because much of the routine maintenance has been deferred, many repairs are beginning to accumulate and becoming more urgent than "routine."

For example, all the stations need parking and driveway pavement preservation treatments or replacement. The current condition of the pavement at all the sites accumulate standing water pools during inclement weather and pose an uneven trip hazard for the public and employees. Water leaks inside buildings pose a mold and mildew hazard (Administration) that could affect the health of the occupants.

In addition to the routine maintenance needs, there are safety standards that are being overlooked. For example, the ice machine in the bay needs to be moved out of the apparatus bay (Station 53); the door seals between the apparatus bays and the living quarters are broken or not in place (all stations); there are sleeping and eating areas that are immediately adjacent to the apparatus rooms; several of the stations have their workout areas with access doors adjacent to the apparatus bays; and most stations do not have adequate shower facilities for all personnel to shower simultaneously should they become contaminated.

The flooring in the fire stations have carpeting that is extremely difficult to continuously disinfect, thus, a breeding ground for biohazards brought back from incidents on the duty footwear. Polished concrete floors are low maintenance and easy to disinfect daily.

The exercise equipment in most of the facilities shows excessive wear and required maintenance needs.

The lack of protective storage for the various vehicles at the Training Center causes increased degradation of the equipment and vehicles being exposed to the outdoors. Planning for the construction of vehicle covers (solar panel shade structures) or buildings should be considered.

Despite many of the stations being aged and in need of repair, personnel show a true sense of pride in what they have. In many stations, employees have completed repairs and have worked both on and off duty to complete repairs and maintenance.

In summary, maintenance on the fire facilities can no longer be deferred. Needed maintenance and repairs are accumulating to the point where potential liability is beginning to outweigh the savings achieved through deferral. The City is currently finalizing its Facilities Inventory Survey that includes an assessment of each building. This effort will lead to the development of a list of priorities to be used to develop a master facility maintenance plan for the City.

Facility Replacement

The Department does not have a replacement schedule in place for fixed facilities. Carson City is currently undergoing an Asset Management review to inventory and assess the current status of the community's public infrastructure. In interviews with both the City Manager and Public Works Director, the Carson City Board of Supervisors directed the review and will consider a long-term funding program to manage the needs.

In order to maintain the stations in good general repair, building maintenance plans should be established to ensure the regular maintenance and scheduled replacement of building systems and components such as Heating, Ventilation, and Air Conditioning (HVAC), generators, roofs, driveways, parking lots, painting, carpet replacement, etc. Establishing a building maintenance schedule will allow the Department to determine a funding source for its fixed facilities.

Apparatus

CCFD maintains a sizeable fleet of response vehicles, totaling 30 motorized units, including fire suppression vehicles, ambulances, and command staff operating out of four staffed and one seasonal facility. An inventory of fire apparatus, configuration, and condition, ordered by station, is provided in the following figure:

Figure 20: CCFD Fire Stations and Apparatus

Station 51							
Apparatus Designation	Type	Year	Make/Model	Condition	Seating Capacity	Pump Capacity	Tank Capacity
Battalion 50	Pickup	2019	Chevy/2500	Excellent	2	N/A	N/A
Engine 51	Type 1 Engine	2019	Pierce	Excellent	4	1500	750
Brush 51	Type 3 Engine	2001	Pierce International	Fair	4	500	650
Squad 51	Medium Duty Rescue	2004	Pierce	Good	4	N/A	N/A
Rescue 51	Ambulance	2016	Chevrolet	Fair	4	N/A	N/A
Rescue 151	Ambulance	2017	Chevrolet	Fair	4	N/A	N/A
Air 51	Air/Lighting Unit	2004	Pierce	Good	2	N/A	N/A
Engine 151	Type I Engine	2007	Pierce	Good	4	1500	750
Rescue 54	Van	2017	Ford	Good	4	N/A	N/A

Station 52							
Apparatus Designation	Type	Year	Make/Model	Condition	Seating Capacity	Pump Capacity	Tank Capacity
Engine 52	Type 1 Engine	2019	Pierce	Excellent	4	1500	750
Ladder 50	Tiller Ladder Truck	2019	Pierce	Excellent	5	N/A	100
Brush 52	Type 3 Engine	2000	International	Fair	4	500	650
Haz Mat 52	Haz Mat Unit	2005	Pierce	Good	4	N/A	N/A
Rescue 52	Ambulance	2012	Ford	Fair	4	N/A	N/A

Station 53							
Apparatus Designation	Type	Year	Make/Model	Condition	Seating Capacity	Pump Capacity	Tank Capacity
Engine 53	Type 1 Engine	2007	Piece	Good	4	1500	750
Engine 153	Type I Engine	2002	Pierce	Fair	4	1500	750
Brush 53	Type 3 Engine	2002	International	Fair	4	500	650
Rescue 53	Ambulance	2012	Ford	Fair	4	N/A	N/A

Station 54							
Apparatus Designation	Type	Year	Make/Model	Condition	Seating Capacity	Pump Capacity	Tank Capacity
Patrol 52	Type 6 Engine	2006	Ford	Good	4	50	300
Patrol 54	Type 6 Engine	2006	Ford	Good	4	50	200
Tender 52	Tactical Water Tender	2002	International	Good	2	500	3200
Brush 54	Type 3 Engine	1996	International	Fair	4	500	650

Station 52 Annex							
Apparatus Designation	Type	Year	Make/Model	Condition	Seating Capacity	Pump Capacity	Tank Capacity
Engine 152	Type 1 Engine	1993	HI Tech	Fair	4	1500	750
Academy Engine	Type 1 Engine	1996	3D	Poor	4	1500	750
Academy Engine	Type 1 Engine	1985	Seagrave	Poor	4	1500	750
Surplus Engine	Type 2 Engine	1998	Ferrara	Fair	4	1250	500
Backup Rescue	Ambulance	2007	Ford	Poor	4	N/A	N/A
Backup Rescue	Ambulance	2012	Ford	Poor	4	N/A	N/A
Backup Rescue	Ambulance	2012	Ford	Poor	4	N/A	N/A
Backup Rescue	Ambulance	2004	Ford	Poor	4	N/A	N/A

These are the types of apparatus shown in the preceding table:

- Engine—Primary response unit from each station for most types of service requests equipped with a pump and ability to carry water.
- Truck—A specialized apparatus used for structure fires, rescues, and other service requests equipped with long ladders, salvage, overhaul equipment, and rescue tools.
- Tender—A vehicle used for fires in areas without fire hydrants that is designed to carry large quantities of water to a fire incident.
- Wildland Engine—A smaller vehicle with a pump and water tank designed to be used for brush and grass fires in wildland areas.
- Rescue—A transport ambulance vehicle used to move medical patients.
- HazMat—A vehicle that carries specialized equipment for use on hazardous materials emergencies.

Apparatus Replacement

Fire apparatus are typically unique pieces of equipment, often very customized to operate efficiently in a narrowly defined mission. A pumper may be engineered such that the compartments fit specific equipment and tools, with virtually every space on the truck designated in advance for functionality. This same vehicle, with its specialized design, cannot be expected to function in a completely different capacity, such as a hazardous materials unit or a rescue squad. For this reason, fire apparatus are very expensive and offer little flexibility in use and reassignment. Thus, communities across the country have sought to achieve the longest life span possible for these vehicles.

Unfortunately, no mechanical piece of equipment can be expected to last forever. As vehicles age, repairs tend to become more frequent, parts more difficult to obtain, and downtime for repair increases. Given the emergency mission that is so critical to the community, this factor of downtime is one of the most frequently identified reasons for apparatus replacement.

Because of the large expense of fire apparatus, most communities find the need to plan for the cost of replacement. To properly do so, agencies often turn to the long-accepted practice of establishing a life cycle for the apparatus that results in a replacement date being anticipated well in advance. Forward-thinking organizations then set aside incremental funds during the life of the vehicle to provide replacement dollars when needed.

Commendably, the Department has established a replacement schedule for fire apparatus. The plan presented to ESCI extends to FY 21/22 and includes the estimated funding requirements. CCFD's apparatus replacement plan calls for engines and aerial apparatus to be refurbished after 15 years and then kept in service for an additional 10 years. In approximately 2015, the Department implemented a program to refurbish its ambulance units on a periodic basis based on either age or mileage. Ambulance units experience a re-chassis after 5 years or 100,000 miles of use and the ambulance "box" is refurbished. Utility Vehicles have a 12–15-year life expectancy in the CCFD Apparatus Replacement Plan.

Comparing the CCFD Apparatus Replacement Schedule with industry best practices, NFPA 1901: *Standard for Automotive Fire Apparatus* is a nationally recognized industry standard for the design, maintenance, and operation of fire suppression apparatus. The 1901 Standard is applicable to all fire apparatus with a Gross Vehicle Weight Rating (GVWR) of 10,000 pounds or greater. The issue of replacement cycles for various types of apparatus has been discussed among the committee that develops the standard for many years. In developing its latest edition, the committee calls for a life cycle of 15 years in front-line service and five years in reserve status for engines, and 15 years in front-line service and five years in reserve status for ladder trucks. The current replacement schedule for CCFD apparatus life expectancy exceeds these standards.

The current edition of NFPA 1901 addresses the issue of refurbishing and offers several items to consider when evaluating an apparatus refurbishment project.

An example of a replacement schedule for the CCFD's fleet of apparatus based on industry standards is included as Appendix B. CCFD currently uses a fleet replacement program to replace its apparatus that deviate from these recommendations based on the service demands of its community.

This example schedule calculates the cost of replacement for each vehicle in the CCFD fleet based on a conservative annual inflation factor of 4 percent. The schedule demonstrates that the current cash requirement for replacement is $6,150,276, and an annual additional cash requirement of $641,452 should be made to the replacement fund to fund the schedule fully.

CCFD should review its current apparatus inventory as well as the apparatus life cycle. This review should be based on industry best practices and ensure that the current inventory, as well as the life cycle of apparatus, meets both the operational and financial requirements of CCFD.

Support Equipment

Support equipment includes self-contained breathing apparatus (SCBA), radios, cardiac monitors, and other assorted high-value equipment. ESCI observed support equipment that was in service at CCFD stations. The equipment was generally well-maintained and in good condition.

Support Equipment Replacement

CCFD has a minimal replacement schedule in place for support equipment. Radios, heart monitors, and ambulance gurneys are included on this schedule. To ensure an inventory of equipment that is in good general repair, Equipment Replacement Plans should be established to ensure the scheduled replacement of SCBA, radios, cardiac monitors, and other high-value equipment. Establishing an Equipment Replacement Plan will allow the Department to identify life cycles for its equipment and identify or develop a funding source for its support equipment.

STAFFING AND PERSONNEL MANAGEMENT

Staffing

An organization's greatest asset is its people. It is important that special attention be paid to managing human resources in a manner that achieves maximum productivity while ensuring a high level of job satisfaction for the individual. Consistent management practices combined with a safe working environment, equitable treatment, the opportunity for input and recognition of the workforce's commitment, and sacrifice are key components impacting job satisfaction.

The size and structure of an organization's staffing are dependent upon the specific needs of the organization. These needs must directly correlate to the needs and funding capacity of the community, and a structure that works for one entity may not necessarily work for another agency. This section provides an overview of the CCFD's staffing configuration and management practices.

Fire department staffing can be divided into two distinctly different groups. The first group is what the citizens typically recognize and is commonly known as the operations unit, which can be generally classified as the emergency response personnel. The second group typically works behind the scenes to provide the support needed by the operation's unit by providing human resources functions, training, fire prevention and code enforcement, and other non-emergent services. This unit may be identified as the administrative section. CCFD maintains several distinct divisions within its structure.

Administrative and Support Staffing

One of the primary responsibilities of the Administration is to ensure that the operations segment of the organization has the ability and means to respond to and mitigate emergencies safely and efficiently. An effective administration and support services system is critical to the success of a response agency.

Like any other part of a municipal fire department, administration and support functions require appropriate resources to function properly. The review of administrative and support positions within an organization provides an understanding of the relative resources committed versus needed to provide these critical support functions. This review provides the agency information to best allocate administrative personnel to provide the best level of support to the organization. The appropriate balance of administration and support compared to operational resources and service levels is critical to the success of the Department in accomplishing its mission and responsibilities.

Typical responsibilities of the administration and support staff include planning, organizing, directing, coordinating, and evaluating the various programs within the Department. This list of functions is not exhaustive, and other functions may be added. It is also important to understand these functions do not occur linearly and more often take place concurrently. This requires the Fire Chief and administrative support staff to focus on many different areas at the same time.

The following figure reviews the administration and organizational support structure of CCFD.

Figure 21: Carson City Fire Department Administrative and Support Staffing

Position	Number
Fire Chief	1
Business Manager	1
Administrative assistants	1
Senior Office Specialist/Training	1
Office Specialist – EMS	1
Clerical Hourly – EMS	1
Clerical Hourly – Administration	1

Administrative Support

CCFD currently operates with civilian administrative support positions. Civilian personnel provide support in the development and administration of the annual budget, maintains the Department's web site, provides the general public with information on the Department and its operations, Clerical, Finance and Customer Records Management functions. The Division is managed by the Business Manager who reports directly to the Fire Chief. The Division also is responsible for processing the Department's payroll, maintains active and retired personnel files, processes payables and receivables, and maintains the Department's inventory control system. In addition, the Division maintains records for volunteer and paid employee physical exams, records and reports exposures, and reports hazardous materials responses.

Ambulance billing services are currently contracted to a third-party. There is one CCFD administrative position assigned to review ambulance billings from the field units and one EMS clerical position. The workflow of this paperwork billing review requires a robust frontend quality assurance by CCFD to provide the quality of billings being submitted to the third-party to ensure accurate collections for ambulance transports.

The agency should consider performing a Position Task Analysis to ensure it has the appropriate staffing positions in place to provide the right services and levels of such.

Fire Prevention

The Fire Prevention Division is responsible for, through the evaluation, enactment, and enforcement of codes and ordinances, the education of the public and, in coordination with the Operations Division, the mitigation of risk to the people, property, and environment from the incidents of fire and other human-made risks. This Division is managed by the Battalion Chief/Fire Marshal and reports directly to the Fire Chief. Additional staffing includes two Fire Inspector II positions, one part-time hourly inspector position, and the Wildland Fuels Management Officer.

The Division provides public education and training in the school district from kindergarten through the third grade and counseling services to juvenile fire setters. Awareness and fire extinguisher training are provided to the business community. Employees of the Division provide reviews of plans for buildings, fire sprinklers, and major projects as well as the related progress inspections. The Prevention Division participates in the wildland fuel management program, designed to reduce the wildfire threat.

Training

The Training Division is managed by a Captain-level officer position dedicated to the Division. Company Captains from the Operations Division assist the Training Captain by serving as Field Training Officers (FTOs) to ensure training objectives are met. Additionally, a Senior Office Assistant is attached to the Division to ensure documentation is completed to meet the requirements of local, state, and federal certifications.

The Training Captain evaluates the effectiveness of the Department's personnel and develops the program to maintain proficiency levels as well as specialty training. The position serves as the liaison to the Quad-County HazMat Training Committee.

Emergency Management

The emergency management function for Carson City is provided by the Carson City Fire Department and is assigned to the Battalion Chief/Deputy Emergency Manager. The Division is the formal liaison between the State Division of Emergency Management and Carson City. The Carson City Emergency Plan and Hazardous Materials Response Plan are under continuous review and revision. The Division is responsible for the training and deployment of the community's Community Emergency Response Team (CERT) program, a system developed to provide training to members of the community to become self-reliant during emergency incidents and to also assist emergency responders with, typically, non-emergent activities.

Emergency Medical Services Staffing

The EMS Division is responsible, by ordinance, for the delivery of emergency medical services and inter-facility transfers within the City Limits of Carson City. Service is provided under the direction of an EMS Manager, who reports to the Fire Chief and a physician Medical Director. Employees of this Division operate under a comprehensive medical protocol and are authorized to perform state-of-the-art advanced life-saving medical procedures in a field setting.

The Division supports 15 career firefighter/paramedics responding on three ALS equipped ambulances. Additional support for emergency medical responses is received from the Carson City Fire Department firefighter/paramedics responding on Type I engines. Administrative support is provided through one full-time and one part-time office personnel assigned to the EMS Division.

Emergency Response Staffing

The emergency response capability level of service and corresponding staffing levels are a determination made at the community level based on risk, financial capability, and citizen expectations and is guided by national recommendations such as those found in National Fire Protection Association Standard 1710.

Carson City Fire Department utilizes a traditional three platoon system operating on a 48-hour shift rotation per position to achieve this minimum staffing of 16. The following figure depicts CCFD's emergency staffing—with all authorized positions filled for the combined three shifts that CCFD employs.

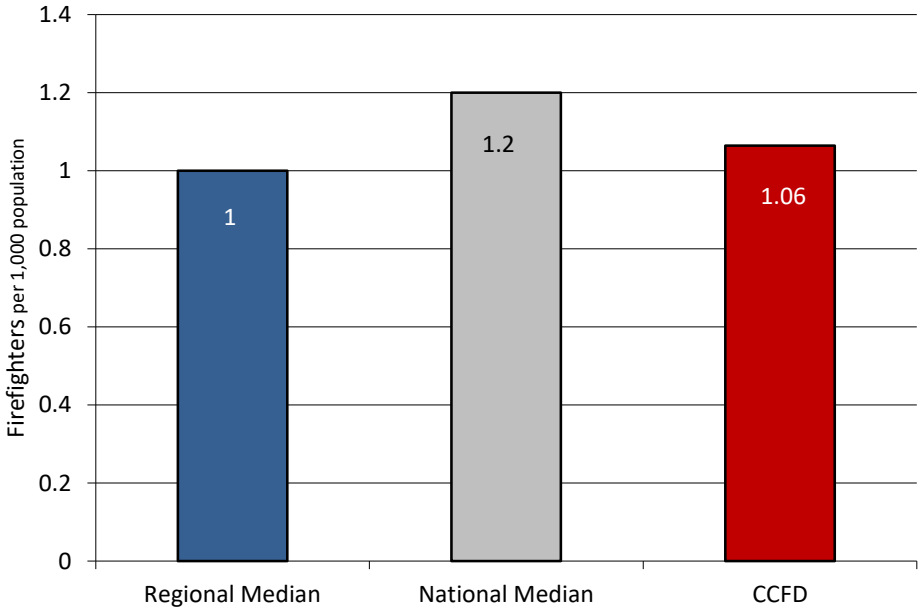
Figure 22: CCFD Emergency Response Staffing

Position	Number
Deputy Chief	1
Battalion Chief	4
Fire Captain	10
Fire Apparatus Operator	9
Firefighter – Career	35

CCFD is authorized at 59 emergency response personnel for EMS, rescue, and fire suppression activities.

A means of comparison, as used on a national basis, is that of measuring the number of firefighters on staff per 1,000 population of the service area. The following figure illustrates the current comparison of Carson City Fire Department staffing with both national and regional norms.

Figure 23: Firefighters per 1,000 Population[6]



CCFD response personnel are deployed, as shown in the following figure. No less than 16 personnel are on duty at any one time (19 with Rescue 54 and Fuels 54 staffed).

[6] *U.S. Fire Department Profile – 2019, National Fire Protection Association, Fire Analysis and Research, Quincy, MA. NFPA stops collecting career firefighter data for populations below 25,000 and stops collecting volunteer firefighter data for populations above 25,000. Career data from lowest population range for which it is available and move it into the remaining population categories below that. We then take the volunteer data from the highest population range for which it is available and move it into the remaining population categories above that. If the population is over 25,000, you are using accurate career ratios, but are using the nearest available volunteer ratios. Likewise, if the population category is under 25,000, you are using accurate volunteer ratios, but using the nearest available career ratio.*

Figure 24: Staffing by Station and Response Unit

Station	Apparatus	Minimum On-duty Staffing
Station 51	Engine 51	3
	Rescue 51	2
	Rescue 151	2
	Brush 51	0
	Rescue 54	2
	Squad 51	0
	Engine 151	0
	Battalion 50	1
	Air & Light 51	0
Station 52	Engine 52	3
	Rescue 52	2
	Rescue 152	0
	Water Tender 52	0
	Haz Mat 52	0
	Rescue 152	0
	Brush 52	0
	Engine 152	0
	Ladder 52	0
Station 53	Engine 53	3
	Rescue 53	0
	Brush 53	0
	Engine 153	0
Station 54	Brush 54	Seasonal crew
	Patrol 52	Seasonal crew
	Patrol 54	Seasonal Crew
	Fuels 54	1 plus 12 seasonal
TOTAL		**19 FT 12 seasonal**

CCFD also may call on neighboring fire agencies for support during major incidents. Figure 25 illustrates mutual aid resources available to CCFD.

Figure 25: Mutual Aid Resources, Include Resources Available Through 3rd Alarm

Department (Structure Fire)	Engines	Ladders Trucks	Other	Total Available Staffing
Truckee Meadows Fire Protection Dist.	2	0		6
East Fork Fire Protection Dist.	1	1		6
Tahoe Douglas Fire Protection Dist.	1	1		4
Central Lyon County Fire Protection District	1	0		2
North Lake Fire Protection Dist.	1	0		3
Storey County Fire Protection District	1	1		6
Reno Fire Department	1	1		8
TOTALS	**8**	**4**		**35**

Department (Wildland Fire)	Type 3 Engines	Handcrews	Water Tenders & Aircraft	Total Available Staffing
Truckee Meadows Fire Protection Dist.	2	0	1 Water Tender	6
East Fork Fire Protection Dist.	1	0	1 Water Tender	5
Tahoe Douglas Fire Protection Dist.	1	1		12
Central Lyon County Fire Protection District	1	0		
North Lake Fire Protection Dist.	1	1		20
Storey County Fire Protection District	1	0	1 Dozer	5
Reno Fire Department	2	0		8
NDF	3	2	1 Water Tender + Air	43+
BLM	3 IA	0	Air	12+
USFS	2 IA	1	Air	27+
TOTALS	**17**	**6**	**–**	**138**

Personnel Management

Although the delivery of emergency services to the citizens and visitors of a community is critical, effective management and organization of a public safety agency are just as critical to its success. The personnel that deliver those services are the backbone of the system. However, without proper administrative and support personnel to handle supervision, command, and control, operational personnel may not be able to perform satisfactorily.

It is commonly understood that an organization's greatest asset is its people. While the purchase of capital equipment can appear expensive when viewed as a one-time expense, CCFD expends approximately 89 percent of the organization's budget for personnel expenses. Special attention must be given to managing human resources in a manner that achieves maximum productivity while ensuring a high level of job satisfaction for the individual. Consistent management practices combined with a safe working environment, equitable treatment, the opportunity for input and professional growth, and recognition of the workforce's commitment and sacrifice are key components impacting job satisfaction.

In this section, we review and analyze the policies, procedures, job descriptions, and other personnel management related activities of the Carson City Fire Department.

Policies, Rules & Regulations, and Guidelines

The CCFD currently is in the process of reviewing its Policy Manual, which includes procedures and standard operating guidelines (SOGs). CCFD uses an internal document management system to organize and deliver its policy and procedures to its employees. A good way to ensure this review is to have a committee of CCFD members review one-third of the guidelines each year, recommending changes. There should also be a process to trigger changes of a guideline that has been modified due to a new method or a technology change.

Job Descriptions

CCFD employs several different job descriptions that compare to other agencies of similar size and organization. A review of current job descriptions reveals that the Carson City Human Resources Department reviews and updates the job descriptions prior to hiring or promotion processes.

Compensation

An agency's ability to attract, hire, and retain employees has a direct impact on its ability to effectively and efficiently provide the desired services. Carson City Fire Department is no different. Agencies should provide annual reviews of current compensation structures, market competitiveness, and Department compensation philosophies. These internal and external comparisons of equitable positions and workloads ensure the agency can attract and maintain an effective workforce.

Disciplinary Process

Under the existing organizational configuration, personnel-related decisions are made at different levels. The Fire Chief is authorized to hire, discharge, and promote. Discipline can be issued at several levels of the organization based on the severity of the infraction. The policy is outlined in the Carson City Fire Department Policy Manual. Personnel-related decisions can, and often do, subject an organization to potentially expensive liability exposure. Risk is presented that can result from a hiring mistake, improperly processed disciplinary process, wrongful termination claims, and more. Access to legal counsel can reduce this liability. The CCFD coordinates personnel actions with the City's HR department and, when necessary, the City's Attorneys. The City policies provide all employees with an appeal process through the established grievance policy.

Counseling Services

Our nation's firefighters are faced with emotional needs that are very different and unique to the occupation. The percentage of firefighters struggling with career-related stress is very high, with suicide rates climbing each year.[7] These issues manifest themselves through higher divorce rates and addictions such as alcohol, drugs, or gambling. Frequently seen in recent studies and another major concern is Post Traumatic Stress Disorder (PTSD). As these symptoms occur, employees need a support system in place that is readily accessible from someone who is qualified and truly understands his or her circumstances.

Several programs provide assistance through Critical Incident Stress Management, Employee Assistance Programs, and Intervention Programs, to name a few. CCFD and the City have Employee Assistance Programs (EAP), a structured Critical Incident Stress Debriefing, and the fire labor group has access to the IAFF Recovery Center at https://www.iaffrecoverycenter.com/behavioral-health/suicide-prevention. CCFD should continue to further support the Critical Incident Stress Debriefing program for its members. This program should be continuously communicated to make each member aware of the availability of resources.

Application, Recruitment, and Retention Process

Carson City Fire Department advertises on its website, department bulletin boards, and shift briefings. CCFD is also a participant in the Northern Nevada/California Firefighter Interagency Recruitment and Examination Program. Carson City Human Resources Department is responsible for the hiring processes for the fire department. The processes are in conformance with the County Code. The application process requires the normal background, reference, and qualifications checks. There is a physical standard established for new recruits, and an interview is conducted after successful knowledge-testing is completed. A medical and psychological evaluation is required. Carson City strives to recruit and hire a workforce that is reflective of the community.

Performance Reviews, Testing, Measurement, and Promotion Process

Carson City Fire Department provides annual performance reviews. Probationary employees receive an end-of-probation review to ensure the probationary employee has met the job satisfaction requirements to maintain employment. The department does not use periodic physical competence testing. The Department does provide periodic performance reviews of knowledge, skills, and abilities. Promotional testing is done on an as-needed basis to fill open positions in accordance with current collective bargaining agreements and the Carson City promotion guidelines.

[7] *https://rudermanfoundation.org/white_papers/police-officers-and-firefighters-are-more-likely-to-die-by-suicide-than-in-line-of-duty/.*

Health and Safety

NFPA 1500: *Standard on Fire Department Occupational Safety and Health Program,* is the industry standard for the development and administration of a fire department safety program. At the time of this report, the Carson City Fire Department has a safety committee in place; however, employees would like to see the committee become more active. The establishment and empowerment of a safety committee can be one of the best tools to increase the safety of firefighters. We strongly encourage the Department to ensure all activities of the safety committee are in alignment with Chapter 4 of NFPA 1500. To be effective, safety committees must be diverse in their representation from across the Department, ensuring representation by shift, rank, function, and interest, and including representation from non-uniformed and staff members as well.

Carson City Fire Department should establish and evaluate the diversity, as noted in the previous paragraph of representation within the Department.

The safety committee should meet monthly and include in its mission the raising of awareness and modifying of member behaviors that will result in a safe work environment. Additionally, the committee should review all accidents, injuries, near-miss incidents, and workplace safety suggestions. The committee should analyze the information before them and report their findings to the Fire Chief. In contrast to being reactionary through the development of additional rules, ESCI recommends that the committee should work to implement member safety education programs and encourage members' safety self-awareness. The committee should maintain regular and open meeting times and locations, and minutes of the meetings should be recorded and posted for all members of the Department to review. A diverse representation of command staff and labor representatives should constitute the committee, as is appropriate, and minutes should continue to be taken at the meetings. We cannot emphasize the importance of maintaining a functioning Safety Committee.

During the stakeholder interview process, the topic of annual firefighter medical examinations and reviews were discussed. CCFD should review the NFPA 1582 with the Medical provider to ensure that the firefighters are receiving the recommended screening tests per the schedule in the standard.

Staff Scheduling Methodology

Responsibilities and Activity Levels of Personnel

In every fire department, a number of activities must be accomplished that lie outside of the "regular" duties of responding to emergency incidents. These typically involve general maintenance of self-contained breathing apparatus (SCBA), hose testing, air monitor calibration, EMS quality assurance, and various committees. Carson City Fire Department performs hose testing and SCBA certification. The agency contracts for ladder testing. CCFD uses individuals who have a particular interest in these additional areas to accomplish other department programs and tasks. In addition to the benefit of completing these tasks, the additional responsibilities serve to further develop knowledge, skills, and abilities of participating individuals. These individuals learn project management, time management, and budgeting skills that prepare them for future promotional opportunities.

PLANNING FOR FIRE PROTECTION & EMS

Emergency services exist in a rapidly changing environment. Along with improved tools and technologies used to provide services, there is the increased regulation of activities, new risks to protect, and other challenges that can quickly catch the unwary off guard. Only through continuous internal and external environmental awareness and periodic course corrections can an organization stay on the leading edge.

To do a better job with available resources, the organization must focus on improving services while identifying programs or activities that may no longer serve its changing needs. Through appropriate planning, a fire department can establish a vision for the future, create a framework within which decisions are made, and chart its course to the future. The quality and accuracy of the planning function determine the success of the organization.

Based on discussions during the stakeholder interview process, the planning process within the CCPD has satisfied the Department's needs to date. While the community has grown and developed, the Department was consistently able to provide the level of service desired by the community. CCFD is now facing several challenges related to the delivery of fire service within the community that will require the planning efforts of the Department to be more formally integrated with the community it serves.

To be truly effective, an emergency services agency must consider planning for the future on five distinct levels:

Figure 26: Planning for the Future

Planning Level	Description
Tactical Planning	• The development of strategies for potential emergency incidents.
Operational Planning	• The organization of day-to-day activities, as primarily outlined by a department's standard operating guidelines and procedures. This includes the integration of the agency into other local, regional, or national response network.
Master Planning	• Preparation for the long-term effectiveness of the agency as the operating environment changes over time.
Strategic Planning	• The process of identifying an organization's mission, vision, and values and prioritizing goals and objectives for things that need to be accomplished in the near future.
Emergency Management Planning	• The process of identifying potential critical risks and threats facing a community with the intent to mitigate their impacts and positively impacting recovery.

CCFD performs some fundamental, short-term planning in the form of the annual budget development process, which is used to define the activities and priorities identified for the upcoming year. However, establishing a long-term planning perspective for the Department is important as well. Without a plan, an organization cannot know when it is reaching milestones or providing exceptional services to its constituency.

The Department has not established a formalized and adopted planning process, and historical planning has been limited to some basic strategic planning efforts, pre-incident planning, and annual work plan development. Commendably, recent initiatives have been implemented to address planning needs, including this master planning process as well as an apparatus replacement plan.

Tactical Planning

A firefighter's first visit to a building typically occurs when the building is involved in a fire or another emergency. This is also the point in time where the internal environment is at its worst. Contrary to movie portrayals of the inside of a building on fire, visibility is at or near zero due to smoke. A lack of familiarity with a building can easily lead a firefighter to become disoriented or injured by an unfamiliar internal layout, or by equipment or other hazards that might be encountered.

It is critically important that firefighters and command staff have comprehensive, accurate information readily at hand to identify hazards, direct operations, and use built-in fire-resistive features. This can only be accomplished by building familiarization tours, developing pre-fire plans, and conducting exercises, either on-site or by tabletop simulation.

While limited fire inspections are being conducted annually in the CCFD for the purpose of fire code enforcement, the information collected during these site visits is not being used to create pre-plans for the Department to reference during emergency response and training.

The pre-incident plans that CCFD has completed are described as "limited." There are no hazard-specific plans; however, line personnel do conduct building familiarization tours on a routine basis. The Department is encouraged to develop and maintain effective pre-incident and special hazard plans, and to incorporate the plans routinely into dispatch communications. Further developing and maintaining the program should be considered a priority for CCFD. A defined list of "target hazards" should be developed and aggressive effort taken to ensure response crews have ready access to the plans.

Target hazards are defined by:

- Buildings with large potential occupant loads.
- Buildings with populations who are partially or completely non-ambulatory.
- Buildings of large size (greater than 12,000 square feet).
- Buildings that contain process hazards, such as hazardous materials or equipment.

Pre-incident plans should be easy to use, quick reference tools for company officers and command staff. At a minimum, a pre-incident plan should include information such as:

- Building construction
- Occupant characteristics
- Incorporated fire protection systems
- Capabilities of public or industrial responding personnel
- Water supply
- Exposure factors
- Facility layouts

NFPA 1620 provides excellent information on the development and use of pre-incident plans and should be used as a reference. Once pre-incident plans are established and/or updated, training should be provided to all personnel who may respond to an incident at those locations. In addition, copies of pre-incident plans and drawings should be available on each response vehicle and incorporated into dispatch procedures.

Operational Planning

Operational planning includes the establishment of minimum staffing policies, standardized response protocols, regional incident command planning, mutual aid, automatic aid planning (locally and regionally), resource identification and planning, and disaster planning.

Within an agency, operational plans should be in place that ensure that adequate volumes of the appropriate types of resources are deployed to an emergency. Doing so involves:

- Identification of potential risk types;
- Determination of resources needed to mitigate an incident affecting the particular risk type; and
- A methodology of ensuring that adequate resources are dispatched to an incident via 911 center protocols.

Master Planning

Department leadership, firefighters from every rank and shift, and members of the community all articulated the need for a stronger planning process. Engaging in a long-range master planning process will assist CCFD to answer the following three questions:

- Where is the organization today?
- Where will we need to be in the future? And,
- How will we get there?

A master plan is particularly essential in a community undergoing change or growing and is important in effectively identifying needs and planning for an emergency response agency's future. Implementation of the master plan findings should be accomplished by way of an implemented strategic plan. Historically, CCFD has not involved citizens or business owners in planning processes. It is an industry "best practice" to involve community constituent groups in the master planning process. Should the Department choose at some point in the future to work toward international accreditation from the Center for Public Safety Excellence, the presence of a community-based master plan will be a significant consideration.

The CCFD has wisely recognized the need for a long-range planning effort by undertaking this master planning process. The master planning process will give the Department a clear idea of where it is today based on the Evaluation of Current Conditions. The Master Plan will also project CCFD's future needs as well as strategies for meeting them. This Master Plan is designed to provide a view of the organization in a 15-year time frame.

Strategic Planning

A strategic plan involves a three-to-five-year planning window and establishes prioritized goals and objectives for the organization. The planning approach is particularly important when a master plan has been completed. The reason is that a master plan identifies multiple recommendations and future strategies, which are then evaluated and prioritized within the strategic plan.

Establishing a customer-oriented strategic plan accomplishes the following:

- Development of a mission statement giving careful attention to the services currently provided and which logically can be provided in the future.
- Development of a vision statement of the agency moving forward.
- Establishes the values of the members of the agency.
- Identification of the strengths, weaknesses, opportunities, and challenges of the agency.
- Determination of the community's service priorities.
- Understanding of the community's expectations of the agency.
- Establishment of realistic goals and objectives for the future.
- Identifications of implementation tasks for each objective.
- Definition of service outcomes in the form of measurable performance objectives and targets.

A strategic plan is a dynamic tool that, when kept current, can be used to assist in guiding an agency. It provides not only a defined sense of purpose and direction, but also a map to chart the course for the agency moving forward.

Further, this Master Plan contains an extensive list of recommendations and advice for changes and new initiatives. The most effective way to prioritize and plan for the implementation of the Master Plan findings is via a strategic planning process. CCFD committed to the completion of a Strategic Plan following the close of this Master Plan. ESCI is positioned to assist with the process.

Emergency Management Planning

Emergency management, once a low priority in the mind of the public, has risen to the conscious level of everyday life. Nonexistent before 2001, the DHS (Department of Homeland Security), terrorist threat warnings, the Transportation Safety Administration (TSA) screenings on public transportation, and security checks at sporting events and concerts are now common parts of urban life.

Mindful community governments prepare themselves, other institutions, businesses, and the public to survive disaster by mitigating hazards to eliminate or reduce risk. By developing and maintaining emergency action plans, and by exercising and updating the plans regularly, municipal governments help limit (or manage) the consequences of a disaster. The common term for governmental disaster preparedness is emergency management.

The Superfund Amendment and Reauthorization Act, found in Title III of the Federal Code (SARA Title III), defines requirements for the tracking of hazardous materials used in fixed facilities and establishes requirements for emergency response planning. The Department should be involved with the Local Emergency Planning Committee (LEPC) in place at the county level. The LEPC is charged with the responsibility to identify and collect information on the use of hazardous materials by private and public entities. The information collected includes the type of material, quantity, and the location at each site. Additionally, the LEPC is charged with ensuring local response plans are adequate based on potential risk.

SARA Title III requires industries that use over a threshold limit of certain highly hazardous materials (extremely hazardous substance facilities, EHS) must develop comprehensive emergency plans for their facility. The act requires that local fire departments coordinate with the involved industry to ensure a quality response to the emergency.

A review of the existing plans and in interviews with the Fire Department Emergency Management Liaison noted that the City is current with the established planning schedules that are relevant to the community risks that have been identified.

SUPPORT PROGRAMS

Training

A comprehensive training program is one of the most critical factors in ensuring the safe and effective delivery of emergency services. This is especially true of smaller departments where staffing is limited, but the types of incidents they respond to can be the same as larger departments. Maintaining a sufficient initial and on-going fire, rescue, and hazardous materials training program—as well as continuing medical education—is essential to ensure maximum effectiveness and safety in the complex environment firefighters must work. Failure to provide necessary and effective training on a continual basis endangers firefighters and the citizens they serve, while concurrently exposing the fire department to liabilities with potentially severe consequences. It is proven that a well-trained workforce contributes substantially to better outcomes on incidents.

Following an initial training program, all firefighting personnel should actively be engaged in an ongoing training program that includes testing and ensuring practical skills and knowledge are maintained.

In order to deliver a comprehensive training regime, emergency service organizations must have access to qualified instructors and training resources. These resources are typically found within the organization, externally with regional partners, or a combination of both. It is essential to ensure training programs are applicable, consistent, and of high quality, and not just delivered to simply fulfill mandatory training hours. Fire administrators and instructors must ensure firefighters, EMS personnel, and officers are not only competent, but also self-confident in the variety of skills necessary to perform effectively in high-stress situations.

The types of training to consider when developing a training program include the following:

- Basic and advanced firefighter training
- Basic and advance medical training
- Driver/operators training courses
- Hazardous materials training
- Firefighter safety and survival
- Technical rescue training
- Wildland firefighting basics and refresher course work
- Officer development training

The Training Division Captain assigned to Administrative duties leads CCFD's training program. The Training Captain is responsible for serving as the single point of responsibility for conducting all training and education for mandated training programs required by local, state, and federal regulations. The Division maintains the certification requirements for all suppression-related personnel in accordance with OSHA, NFPA, and DMV standards. This Division is responsible for the Quad-County Hazardous Materials Response Readiness program and manages grants related to it. The Captain serves as the Department's representative to the Quad-County HazMat Training Committee. The Department hosts several joint training activities with departments surrounding Carson City that provide mutual aid.

To assist the Training Division Captain, station Company Captains serve as field training officers (FTOs). This assistance allows the Division to conduct refresher activities as well as new material required by certification and licensing agencies. The Captain serves as a Safety Officer during large-scale emergencies requiring the State Emergency Operations Center to open. Office personnel are assigned to this Division to ensure all required training and certification documentation is completed in a timely manner.

While the design and staffing of a fire department are dependent upon the specific needs of the community, a majority of needed training is common for all fire departments. In addition to maximizing resources through sharing training resources and opportunities, fire departments that train together tend to work better together during mutual aid incidents. This also lends itself to making the firefighters more well-rounded, as they are exposed to other lines of thinking. CCFD conducts a variety of training activities with mutual aid partners.

All initial/new firefighter applicants are required to participate in the Northern Nevada Firefighter Interagency Recruitment and Examination program. The program is sponsored by a consortium of Northern Nevada Fire Departments and is designed to test and select entry-level firefighters and firefighter/paramedics.

CCFD has a training division budget of $312,721 to pay for in-house training and tuition for personnel to attend some training programs outside of the organization. The budget also covers all aspects of training deemed appropriate for CCFD employees and includes Technical Rescue and Wildland Training programs.

CCFD Training Division has multiple training facilities consisting of a live Class A Combustible fire facility, confined space training, and a training tower that are easily accessible to CCFD personnel.

During our review, we noted that the responsibilities of the Training Captain are many and varied. The Captain appears to receive adequate support from the Company Captains in developing suggested training activities and pursuing successful outcomes in the training program.

Prevention & Life-Safety Services

Often the mission of fire prevention and public education programs becomes a combined effort between the department and their municipality. Outreach and education, combined with identifying and emphasizing Community Risk Reduction (CRR), should become part of the everyday mission of the fire department.

Fire Prevention

It is far more effective to prevent fires and other emergencies than it is to respond to them. The financial impact of a fire or injury goes far beyond the cost of extinguishment or treatment.

A strong fire prevention and life safety program, in conjunction with an effective application of relevant codes and ordinances, reduces the loss of life, property, and the personal disruption that accompanies a catastrophic fire and accident.

The fundamental components of an effective fire prevention program are listed in the following figure, accompanied by the elements needed to address each component.

Figure 27: Fire Prevention Program Components

Fire Prevention Program Components	Elements Needed to Address Program Components
Fire Code Enforcement	Proposed construction and plans review New construction inspections Existing structure/occupancy inspections Internal protection systems design review Storage and handling of hazardous materials
Public Fire and Life Safety Education	Public education Specialized education Juvenile fire setter intervention Prevention information dissemination
Fire Cause Investigation	Fire cause and origin determination Fire death investigation Arson investigation and prosecution

Code Enforcement Activities

The review of planned construction is a critical component of fire prevention. Working in conjunction with the building official ensures that planned construction will be built to codes and standards that make for a safe environment for those that will occupy/use it.

Comprehensive fire inspection and code enforcement services ensure that the business/occupancy continues to meet the codes and standards to which it was built but also provides an opportunity for fire personnel to develop a plan of action (preplan) in the event of a fire or other emergency that might occur in that structure. The recommended frequency for business/occupancy inspection may vary based on the type of property and degree of hazard. The National Fire Protection Association (NFPA) recommended standard for fire safety inspections by hazard class is noted in the following figure.

Figure 28: Recommended Fire Inspection Frequencies[8]

Hazard Classification	Example Facilities	Recommended Inspection Frequency
Low	Apartment common areas, small stores, and offices, medical offices, storage of other than flammable or hazardous materials.	Triennially
Moderate	Gas stations, large (> 12,000 square feet) stores and offices, restaurants, schools, hospitals, manufacturing (moderate hazardous materials use), industrial (moderate hazardous materials use), auto repair shops, storage of large quantities of combustible or flammable material.	Biennially
High	Nursing homes, large quantity users of hazardous materials, industrial facilities with high process hazards, bulk flammable liquid storage facilities, facilities classified as an "extremely hazardous substance" facility by federal regulations (SARA Title III).	Annually

State and local authorities having jurisdictions may have additional requirements for inspection frequency.

The Battalion Chief/Fire Marshal currently handles the fire prevention duties for CCFD. The efforts of fire prevention are detailed in later sections of the report. The operating structure of the Division is important, but further consideration must be given to specific duties of each position and the establishment of clear performance measures that enable the Division to achieve its mission. Public education programs are in place and are delivered upon request.

The CCFD follows the:

- 2018 Edition of the International Fire Codes (IFC)
- 2018 Edition of the Wildland-Urban Interface Code including appendices A and B
- Northern Nevada Fire Code Amendments
- Northern Nevada Wildland-Urban Interface Amendments
- 2019 Edition of NFPA 13, 13R, and 13D
- 2019 Edition of NFPA 72

The inspection data submitted by CCFD pertaining to life safety and building maintenance code inspections versus new construction inspections note that there are limited annual maintenance inspections conducted by qualified Fire Inspectors. The Fire Marshal noted during the stakeholder interviews that the Records Management System does not provide a user-friendly inspection activity report. Based on the information provided by the Fire Marshal, new construction, new business license inspections, and high-hazard facilities are the priority for the CCFD Inspectors. There are no Engine Company or Business Self-Inspection Programs.

[8] *NFPA 1 2018 Edition, Chapter 10.2.7.*

Based on the 2019 building inventory of approximately 2,450 inspectable buildings that CCFD has under its jurisdiction, the Fire Prevention Division was able to inspect 363 higher-hazard buildings. The focus of the Division has been on handling the current new construction growth (894) and new business licenses (309) inspections.

The Fire Prevention Division is currently focusing on inspecting the higher hazard occupancies, such as assembly, educational, hospitals, and apartments. Prevention does not schedule business inspections, unless an issue is brought to their attention. There are 990 B Occupancies in Carson City. The State Fire Marshal's Office has jurisdiction over State buildings and daycare businesses. The CCFD has an organizational goal to provide inspections on all buildings at least once a year based on the level of occupancy and risk.

As noted in Figure 28 the fire inspection frequency based on the building hazard classification can provide further guidance to CCFD in formulating a proactive inspection program. The following information was submitted by CCFD Fire Prevention:

Figure 29: Carson City Fire Inspections Activity, 2019

2019 Inspections	Number
Building Inventory	2,453
Buildings Inspected	363
Building % Inspected	14.5%

Based on the building inventory reviewed and the Fire Inspection Frequency Guide (Figure 28), CCFD should develop a mid-to-long-term plan to increase fire inspector staffing to meet the current and additional building inventory in conformance with national standards, and review the potential to develop a Business Self-Inspection Program to assist in the lower-risk B Occupancies.

New Construction Inspection and Involvement

New construction plan reviews in CCFD are handled internally, unless, a highly technical building is submitted, which it is then contracted to a Fire Protection Engineering firm for review (the cost for external review is passed onto the builder/architect). Plan review charges are handled by the Building Department, with the Fire Department receiving 1.5 percent value of the fire protection system fees.

CCFD is spending more time on new construction site inspections and not meeting the existing Life Safety Building Maintenance Fire Code Inspection cycles. New construction inspections are funded by the General Fund with any new construction fees applied to offset a portion of those inspection efforts. The cost of providing these inspections exceeds revenue intake. The Department should consider reviewing and updating the current fee schedule to seek parity in the costs of providing services with the fees being applied to new projects.

Fire and Life Safety Public Education Program

The prevention of fires and other emergency incidents is one of the most critical functions of any community's service to its citizens and visitors. This activity cannot be accomplished in a haphazard approach of simply "talking to people" in the course of doing business. Delivering fire and life safety messages must be accomplished through an intentional process resulting from a strategic fire protection campaign. A comprehensive fire and life safety education program involves teaching the public methods and techniques used to minimize the occurrence of fire and other accidents. The reality is that it is more cost-effective to prevent a fire or emergency than it is to respond to a fire or emergency. A well-educated and trained public becomes a force multiplier in maintaining a safe community. CCFD does not provide a dedicated Fire and Life Safety Public Education Program for the Carson City Community.

Providing fire and life safety education to the public to minimize the number of emergencies while training the community to take appropriate actions when an emergency occurs is essential. Life and fire safety education provides the best chance for minimizing the effects of fire, injury, and illness to the community. Fire and Life Safety Education Programs offered within CCFD include scheduled school programs for K–3rd grades, and classes that are offered by request to the community. Topics presented within the schools include Calling 911, Exit Drills in the Home (EDITH), and Injury Prevention. Programs offered to the community by request include Senior Citizen Fire Safety Training, Fire Extinguisher Training, Cardiopulmonary Resuscitation (CPR) Training, and a Juvenile Fire Setter Program.

CCFD should develop and implement a formal Community Risk Reduction (CRR) plan that is updated annually. The plan should evaluate the risks that are most commonly faced by the residents of the CCFD and establish strategies for reducing those risks. A formal risk evaluation will evaluate the need for additional programming, which could include carbon monoxide emergencies, cooking safety, and injury prevention. CCFD should consider the long-term establishment of the position of Community Outreach Coordinator. This position may be volunteer or paid and assigned to the Fire Marshal's Office. The role of the Community Outreach Coordinator would be to ensure the development, delivery, and enhancement of CCFD's Community Risk Reduction Program.

Fire Investigations Division

The Carson City Fire Investigations are managed by the Fire Marshal and works jointly with the Carson City Sheriff's Department.

Fire Investigator

Carson City Fire Department Fire Investigators are trained in fire investigation techniques, evidence collection, and interviewing. They look at the fire remains and obtain information and investigate to determine the origin, cause, and circumstances surrounding the fire.

Fire Origin and Cause Determination

Accurately determining the cause of a fire is an essential element of a fire prevention program. When fires are set intentionally, identification and/or prosecution of the responsible offender is critical in preventing additional fires and potential loss of life. Further, if the cause of fires is accidental, it is also of great importance because knowing and understanding how accidental fires start the most effective way is to identify appropriate fire prevention and public education measures to prevent a reoccurrence.

CCFD provides fire origin and cause determination and works in partnership with the Carson City Sheriff's Department as necessary for arson investigations and prosecution. There are three qualified Fire Investigators within the CCFD. These investigators are also Fire Prevention personnel assigned to inspections.

The number of fires requiring investigation currently meet the available qualified CCFD staffing. Consideration for succession planning in these highly technical positions should be continued and bolstered to assist with attrition challenges.

Data Collection and Analysis

The collection and analysis of data are important for determining the quality of programs and services delivered. Complete, accurate, and thorough data collection is absolutely necessary for this purpose.

CCFD presently uses Firehouse software as its fire records management system (RMS) to record inspections and incident data, and to produce reports. The fire crews do not input EMS information into the Fire RMS, the Department relegates this task to an administrative support position that reviews the ambulance ePCR to transfer information to the fire RMS.

Emergency Communications Dispatch

Emergency Communications Dispatch for the CCFD is provided by the Carson City Sheriff's Department Communications Center.

The Communications Center is a division of the Sheriff's Office, and includes the Public Safety Answering Point (911 answering point) and dispatch functions. While the center is the focal point of emergency service requests for sheriff, fire, and medical responses, it is also responsible for coordinating the non-emergency responses and the activities of most other city entities such as Public Works, Alternative Sentencing, Code Enforcement, and many others.

The Dispatch Center utilizes the Emergency Medical Dispatch (EMD) protocols for all medical 9-1-1 calls. The protocols are reviewed by the Agency's Medical Director quarterly and updated as defined by the protocol vendor and Agency Medical Director.

Dispatch Center Staffing

Carson City Sheriff's Dispatch Center is staffed by:

- Center Manager
- 5 Supervisors
- 15 full-time cross-trained Police/Fire Telecommunicators
- 2 open positions in the process of being filled

Communications Center

The current dispatch facility was occupied beginning in 1978. The communications center is co-located with the Carson City Fire Station 53 site. The building and its systems have undergone updating by the Sheriff's Department. There is a diesel generator to support the facility during power outages. The security for the facility is controlled by an ID card or remote entry system controlled by the on-duty dispatchers utilizing closed-circuit cameras at the access door. The communications building is easily accessed from the roadway.

EMERGENCY MEDICAL SERVICES SUPPORT & SYSTEM OVERSIGHT

Emergency Medical Services

As with most fire departments, medical emergencies account for a majority of the calls to which the Department responds. One of the goals of a fire department is to provide the best possible care to its citizens in a timely and effective manner. One element that makes up an effective and efficient EMS program is to have the EMS system integrated with the community's overall health care system. NFPA 450: *Guide for Emergency Medical Services & Systems* provides a technical reference to addressing the multiple elements of emergency medical systems and will be used where applicable in this section of the report.

Authorized by Carson City Ordinance, CCFD is fully responsible for providing first response and ambulance transports services, including inter-facility hospital transports within Carson City. CCFD has aligned the practice of advanced medical procedures in the field through a new comprehensive medical care protocol with the Medical Director, local hospital staff, and two neighboring fire/EMS agencies called the Northern Nevada Quad-County Protocols, which became active on February 1, 2020.

CCFD is dispatched to incidents by the Carson City Sheriff's Department Communication Division. To better manage the number and type of resources sent to medical incidents, CCFD utilizes Emergency Medical Dispatching criteria to handle medical incident caller information. The Dispatch Center utilizes Priority Dispatch Pro QA version 13 that is utilized within the Computer Aided Dispatch (CAD) system with a hard copy back-up. When dispatching medical incidents, the Dispatch Center will send a "dispatch tone" to alert the fire station of a critical medical incident, i.e., cardiac incident before the complete EMD criteria is completed. This process of using EMD sends the right resources to the level of medical emergency quickly and improves the efficient use of fire and medical response units.

CCFD employs 45 full-time firefighter/paramedics plus a Command Staff. The staffing of the fire department includes Advanced Emergency Medical Technicians (A-EMT) that align with the Intermediate or advanced level of certification. CCFD receives specific funding from the Carson City Board of Supervisors for providing paramedic level services that augment funding for 15 of the 45 paramedics assigned to the fire department.

The CCFD Emergency Medical Services provides 24-hour coverage through the deployment of three full-time staffed Advanced Life Support (ALS) transport ambulances staffed by a Firefighter/Paramedic and a Firefighter Advanced A-EMT (Station 51 has two units and Station 52 has one); one ALS ambulance is cross-staffed by a Fire Engine Crew at Station 53 and would be last called to an incident; three full-time staffed ALS fire engines; and two reserve ambulances. The Department also deploys a Basic Life Support (BLS) ambulance seven days a week during peak demand hours to handle inter-facility ambulance transports and BLS EMS transports. These BLS units are staffed by civilian (single-role) EMS personnel.

The single-role BLS transport unit has been in service for just under two years. The unit was initially operated five days per week, 8–10 hours per day. In July 2019, the unit went to seven days per week, 8–10 hours per day. When in service and available, this unit handles BLS transports and inter/intra-facility transports. In the evening when the BLS unit is out of service or otherwise not available, the 3 to 4 fire/paramedic ambulances handle the BLS transports.

Emergency medical calls accounted for 83.5 percent of the calls for service to which CCFD responded during the calendar year 2019. This figure is higher than the rates realized by most agencies across the United States. CCFD functions as a fire-based advanced life support (ALS) emergency medical services (EMS) response and medical transport system. CCFD also provides general ambulance transport from facilities, which accounts for the added call load to the medical response system. As a fire-based system, the advanced life support functions and transport functions are provided by CCFD.

Medical Control and Oversight

The EMS Division is headed by the EMS Manager, who is a Registered Nurse. This is a full-time administrative position that also oversees the EMS program and coordinates with the Medical Director and hospitals.

CCFD utilizes Dr. Brett Eisenmesser, a licensed physician from Carson Tahoe Regional Medical Center, to serve as the Medical Director for the agency. The Medical Director serves as the authority for CCFD to provide emergency medical response. CCFD now follows Northern Nevada Quad-County Protocols, which were recently updated and placed into effect on February 1, 2020. The Northern Nevada Quad-County Protocols will be continuously updated quarterly based on EMS Committee reviews of process and practices. The Medical Director does not currently participate in quality assurance reviews.

Quality Assurance/Quality Improvement

Carson City Fire Department does not have a formal EMS quality assurance (QA) program. The EMS Manager is currently working with the EMS billing service to provide spot checks of electronic patient care reports (ePCR) in an effort to improve the quality of the information and data collected by field EMS personnel. The next step, once the good data is in the system, will be to review the patient records to data-mine through best practice QA processes to evaluate the services provided and connect the information with improved patient outcomes and community health partners.

EMS Training and Skills Evaluation

CCFD utilizes the EMS Manager, an RN, to provide annual training to all fire EMS personnel through one 2-hour Continuing Education training session monthly. The training is currently based on the ePCR reviews performed each weekday. Any trends are discussed with the personnel. New EMS personnel are assigned field preceptors to evaluate knowledge and skills.

The EMS Training program is currently being enhanced under the new EMS Manager with a focus on quality assurance reviews and adaptive training programs that align with the review's outcomes/indicators.

EMS Billing

CCFD provides information to a third-party EMS billing service, Whittman Enterprises, LLC, who subsequently bills all patients who receive EMS care from the Division. Billings are submitted to several "payors" such as Medicare, Medicaid, private insurers, private individuals, and Carson City Care, a local EMS subscription service for reimbursement. Collections on these billings average approximately 40 percent of amounts billed. Carson City typically writes off approximately $4,000,000 in uncollectable charges, the vast majority of which are from differences in billed amounts versus Medicare/Medicaid or insurance reimbursement schedules.

HAZMAT SERVICES SUPPORT & RESPONSE CAPABILITIES

Hazardous Materials Response

Hazardous materials incidents are a part of almost every fire department's call volume. While this type of emergency response does not occur as often as some other emergency incidents, they can pose a very high risk due to the challenges and dangers of this type of incident. Carson City Fire Department has the capability to respond to hazardous materials incidents.

Carson City Fire Department is the lead agency that works with other city and county fire departments and other counties (referred to as the Quad-County Hazardous Materials Team) to respond to and mitigate hazardous material incidents throughout the region. Department training and training with other in-and-out of County fire departments happen periodically during the year. All of the County fire departments utilize the NFPA 472: *Standard for Competence of Hazardous Materials/Weapons of Mass Destruction Incidents* Job Performance Requirements (JPRs) that relate to hazardous materials in order to meet the continuing education requirements for certification purposes.

CCFD 2018 responses to HazMat incidents totaled 38. Thirty-seven of the incidents were minor in nature. CCFD responded to one major HazMat incident near Lake Tahoe, requiring a full on-duty team response with equipment. When a hazardous materials incident occurs either in the Fire Department or anywhere in the Quad-County region, and the single hazardous materials unit is requested, Carson City Fire Department is responsible for staffing the unit so it can respond to the scene. This affects the Department's internal staffing capabilities to respond to other incidents that occur within Carson City. There is an off-duty call-back process in place for more complex incidents.

Given the significant risk hazardous materials incidents pose to the community, CCFD, and its personnel, the Department has highly prioritized its response readiness to manage an incident of this nature. The amount of hazardous materials transiting Carson City via highway is substantial. However, the transportation routes are not the only risk the community faces. Industrial warehousing activities increase risk due to the handling of these raw materials. The Tier II storage and users of hazardous materials in Carson City inventory have been recently updated.

Carson City Fire Department operates a 2005 Hazardous Materials response unit out of Station 52. The vehicle is cross-staffed with personnel from Fire Engine 52. This is a "level A" resource, the highest level of HazMat response capability. To achieve level A capability, a combination of highly technical equipment is necessary, along with appropriately trained, technician-certified personnel. The department also staffs four to five Hazardous Material Technicians per shift in the City.

HazMat certification levels are defined by NFPA 472: *Standard for Competence of Hazardous Materials/ Weapons of Mass Destruction Incidents* and the Occupational Safety and Health Administration (OSHA) in CFR 1920.120. The highest level of certification for responders is the "Technician" level. Of the personnel in Carson City Fire Department, 18 are certified at the Technician level, and 48 are certified to the Operations level resulting in a considerable response capability. In addition, there are 18 personnel certified as Hazardous Materials Incident Commanders.

The National Fire Protection Association (NFPA) defines a Hazardous Materials Safety Officer certification level in NFPA 472: *Standard for Competence of Hazardous Materials/Weapons of Mass Destruction Incidents*. Carson City Fire Department has five Hazardous Materials Technicians trained to this certification level, which is an industry best practice.

ESCI staff performed a comprehensive assessment based on industry standard practice and consistent with the Occupational Safety and Health Administration (OSHA), NFPA 472: *Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents*, NFPA 473: *Standard for Competencies for EMS Personnel Responding to Hazardous Materials/Weapons of Mass Destruction Incidents*, NFPA 1710: *Standard for Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*, and the International Fire Service Training Association. The assessment was not a hazard-based risk analysis of the community, but instead, is based on a minimum level of capability regardless of hazardous materials incident type. It measured four major areas. These four areas were:

1. Standard Operating Procedures, Policies, and Guidelines
2. Human Resources
3. Training
4. Equipment

Standard Operating Procedures, Policies, and Guidelines

The first area of evaluation involves the established standard operating procedures, policies, and guidelines used to manage the team. Carson City Fire Department has an Emergency Response Plan for Hazardous Materials incidents. The existence of CCFD Emergency Response Plan (ERP) is related to the mandate from the Occupational Safety and Health Administration (OSHA) 29 CFR 1910.120 (q)(1), which requires that employers establish emergency procedures to be followed when responding to emergencies involving hazardous materials. This plan is available online to all employees and reflects pre-planning and coordination with outside shareholders. The Carson City ERP update was completed in 2019.

The Incident Command System is a standard on-site command and control system used to manage emergency incidents and planned events. Carson City Fire Department has adopted and uses the NIMS system to manage its incidents. This system defines the lines of authority, roles, and responsibilities for managing large scale incidents. Furthermore, it designates a single incident commander as well as recognizes the Unified Command concept. Passing of command to senior officials is recognized, and the safety officer is identified.

During hazardous materials responses, Carson City Fire Department maintains available advanced life supports services on-scene for responders during actual and potential immediately dangerous to life and health (IDLH) atmospheres. These advanced life support personnel are specifically trained in the medical aspects of hazardous materials.

The ERP used by Carson City Fire Department addresses safe distances and areas of refuge for responders who may require it. It further identifies the required personal protective equipment to be employed along with emergency equipment. The plan identifies site security and control as well as establishes the usage of a personal accountability system. The ERP is thorough and details the use of emergency evacuation procedures, and decontamination procedures to include collection and disposal of runoff. Finally, the response plan also details the procedures for after-action reports and critiques. This ERP provides for the deployment of resources outside of the jurisdiction for both local, regional, and state assistance.

The Carson City Fire Department Hazardous Materials Team has a personal protective equipment plan or program. This plan is very detailed and outlines the policies describing a method to address the hazard-based selection of protective ensembles, their use and limitations, work mission duration, maintenance and storage, decontamination and disposal, training and fitting, donning and doffing, and inspection procedures. Occupational Safety and Health Administration (OSHA) in CFR 1910.120 requires the employer to implement safe work procedures for the use of personal protective equipment in the workplace as well as train workers in its use. The regulation continues to require the employer to ensure that employees are complying with the regulations. Carson City Fire Department has policies in place to ensure this happens. All personnel are required to use a minimum of positive pressure, self-contained breathing apparatus until the atmosphere has been quantified.

Carson City Fire Department has policies and procedures that reference the usage of air monitors during the emergency response. These policies include documented maintenance procedures and calibration of its air monitors. CCFD ERP requires the establishment of a site-specific safety plan and has policies that reference a standardized methodology for assigning incident levels to hazardous materials emergencies. The ERP does not, however, outline the specific procedures for various tasks that team members may be required to perform, such as spill or leak control.

Human Resources

Occupational Safety and Health Administration (OSHA) in CFR 1910.120 requires that employers ensure that firefighters establish teams of two or more when working and that a rescue team suitably equipped is readily available. Listed specifically in the regulations are incidents involving hazardous materials. The accepted industry standard practice requires seven hazardous materials technicians to facilitate a minimal entry during a hazardous materials response. These seven people must be dispatched on the initial hazardous materials emergency response once it is determined that an emergency exists. Of these seven, one should be the designated hazardous materials safety officer trained in accordance with NFPA 472: *Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents*, and another the incident commander. Carson City Fire Department has a minimum staffing requirement of eight hazardous materials personnel assigned for the day. While all may not be technician trained, there is a provision to activate the Quad-County Hazardous Materials Team to ensure the needed requirements respond with personnel and equipment to fully meet the needs of the incident. Carson City Fire Department staffs four to five personnel normally per shift between fire stations and various other locations depending on department needs for the day. Ensuring that the initial alarm assignment contains the industry best practice should continue to be a goal for the organization.

Carson City Fire Department has a written medical surveillance plan for personnel assigned to the hazardous materials response team. This policy requires an opinion from a physician and provides for periodic examinations as determined by the physician. The medical surveillance plan provides for a medical assessment after exposures above the permissible exposure limit (PEL). All employees receive proper fitting for respiratory protective equipment.

Training

The Carson City Fire Department Hazardous Materials Team certifies that its members have achieved technician level training in accordance with NFPA 472: *Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents*. The Department keeps records for documenting initial and refresher training and requires the completion of a task book for all members and certifies all members who are required to use respiratory protection. All members have been trained to a minimum level of medical first responder. The CCFD Hazardous Materials Team has a plan for annual refresher training and measurement of continued competency of all team members. Team leaders have expressed that the ability to train more on these practices should be increased in an effort to increase efficiency and proficiency for rescuers.

Equipment

An objective review of equipment available for hazardous materials response was conducted. Carson City Fire Department has an adequate supply of decontamination equipment. This equipment consists of the required containment and collection items, as well as the necessary solutions for decontamination operations. Gross decontamination, as well as technical decontamination operations, were evaluated and found to be adequate for the type of operations the Department may encounter.

The inherent ability of hazardous materials emergencies to progress into longer-term operations dictates the need for effective rehabilitative efforts. Carson City Fire Department has arrangements in place for the sheltering of personnel during the rehabilitation process in an area out of the heat, cold, and elements. The means by which this is accomplished can be varied. Ambulances, buses, ventilated tents, and shelters are all possible means to achieve the desired outcome. Carson City Fire Department has policies in place to obtain meals for responders during extended operations.

Carson City Fire Department has various methods for analysis and detection of hazardous materials. This includes PH paper, multi-gas monitoring equipment, radiological monitors, and colorimetric chemical detection and analysis. There are also sufficient supplies for gathering and collecting samples. Carson City Fire Department uses the Hazmat ID to increase ability from simple detection to actual identification of specific compounds.

Every member of the hazardous materials team operating on-scene should have radio communications with the safety officer and entry coordinator during entry operations. At a minimum, one portable radio must be available for every entry team member who is at any level of dress (multiple entry teams and back up teams), as well as any team member who is coordinating a function (decontamination, science, safety, group leader, etc.). Carson City Fire Department has the communication capability to do this and has made it part of its standard operating procedures.

Carson City Fire Department has an assortment of equipment to handle LPG and NG leaks. Further spill and leak capabilities are available for various other types of hazardous materials releases. CCFD has Level A and B chlorine leak kits at their disposal (the rail service in the area is limited to the tourist industry). Moving equipment for handling drums is also available. CCFD stocks more than the appropriate amount of overpack drum capabilities.

Carson City Fire Department provides adequate fire protection capabilities with foam application if required. There is an adequate amount of foam on hand as well as in reserve should the need materialize as well as the equipment to operate at 250 gallons per minute during application. CCFD has the capability for Class D metal fire extinguisher usage. The equipment is located on Engine 52, which responds with Haz Mat 52 to all incidents.

Carson City Fire Department stocks the necessary medical equipment to monitor and provide treatment for team members during entry. As discussed previously in this report, there are medical treatment providers available with hazardous materials toxicology training; however, additional training is required to increase the number of personnel who can serve in this role.

Carson City Fire Department maintains an adequate number of reference materials and has the ability to provide internet capabilities for research. CCFD employs a weather station for immediate on-site analysis.

Carson City Fire Department carries a standard complement of protective ensembles for rescuers. These include both 60 and 45-minute SCBA bottles with sufficient reserve bottles and a cascade system to support long term operations. CCFD also requires responders to bring their issued turnout gear to ensure each rescuer has adequate NFPA compliant protective equipment that has been sized appropriately. This reduces the amount of equipment required to be stored for deployment. Industry best practices require each person operating as part of the team to be assigned NFPA compliant firefighting protective equipment.

TECHNICAL RESCUE SERVICES SUPPORT & RESPONSE CAPABILITIES

Technical Rescue Response

Much like hazardous materials incidents, Carson City Fire Department includes a Special Operations Team that is in place to respond to technical rescue incidents. The disciplines for which the agency is prepared include structural collapse rescue, confined space rescue, rope (high angle) rescue, vehicle/machinery rescue, trench, surface water rescue, swift water rescue, and ice rescue. The technical rescue operations are well structured, and appropriate training is in place. Carson City Fire Department deploys assets that are trained in technical rescue as well as hazardous materials. The dispatch of the mutual aid team is automatic on all reported technical rescue incidents.

ESCI staff performed a comprehensive assessment based on the current standard practices consistent with the Occupational Safety and Health Administration (OSHA) 29 CFR 1910.146, NFPA 1006: *Standard for Technical Rescuer Professional Qualifications*, NFPA 1670: *Standard on Operations and Training for Technical Search and Rescue Incidents*, NFPA 1710: *Standard for Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*, and the International Fire Service Training Association. The assessment was not a hazard-based risk analysis of the community, but instead, is based on a minimum level of capability. This assessment covered the same format as the hazardous materials assessment described previously in this report. These four areas were:

1. Standard Operating Procedures, Policies, and Guidelines
2. Human Resources
3. Training
4. Equipment

Standard Operating Procedures, Policies, and Guidelines

The first area of evaluation involves the established standard operating procedures, policies, and guidelines used to manage the team. This plan is available online to all employees and reflects pre-planning and coordination with outside stakeholders. Members are also governed by specific Standard Operating Guidelines (SOGs) and Standard Operating Procedures (SOPs).

The Incident Command System is a standard on-site command and control system used to manage emergency incidents and planned events. Carson City Fire Department has adopted and uses the NIMS system to manage its incidents. This system defines the lines of authority, roles, and responsibilities. Furthermore, it designates a single incident commander as well as recognizes the "Unified Command" concept. Passing of command to senior officials is recognized and the safety officer is identified.

During technical rescue responses, Carson City Fire Department maintains available advanced life support services on-scene for responders during actual and potential immediately dangerous to life and health (IDLH) atmospheres. These advanced life support personnel are specifically trained in the medical aspects of technical rescue incidents or hazardous materials. The roles of the emergency medical support personnel are clearly defined. The organization's Medical Director has approved medical treatment protocols for handling medical emergencies involving technical rescue incidents. Medical Treatment Protocols are a definite benefit to advanced life support personnel.

The Emergency Response Plan (ERP) used by the Carson City Fire Department addresses the required personal protective equipment to be employed along with emergency equipment. The plan identifies site security and control as well as establishes the usage of a personal accountability system. The ERP is thorough and details the use of emergency evacuation procedures. Finally, the plan also details the procedures for after-action reports and critiques. This ERP provides for the deployment of resources outside of the jurisdiction. In addition to the ERP, Carson City Fire Department has specific SOGs and SOPs for each discipline that provides further direction for personnel.

During the review, the Program Manager for special operations noted a need to review and update the Technical Rescue Team SOPs and Policies.

Human Resources

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*, requires that employers ensure that firefighters establish teams when working and that a suitably equipped rescue team is readily available, when firefighters are required to engage in emergency responses that require specific and advanced training and specialized equipment. There are ten members assigned to the Technical Rescue Team trained to various levels.

Carson City Fire Department has a written medical surveillance plan for personnel assigned to the technical rescue team. This policy does require an opinion from a physician, and it provides for periodic examinations as determined by the physician. Because the CCFD's Technical Rescue Team is expected to perform rescues in confined spaces, the medical surveillance plan provides for a medical assessment after exposures above the permissible exposure limit (PEL). All employees receive proper fitting for respiratory protective equipment for use during confined space entry.

Training

The CCFD Technical Rescue Team members receive their certification through either the California State Fire Marshal or other training system certifications processes to ensure that its members have achieved technician level training in accordance with NFPA 1006: *Standard for Technical Rescuer Professional Qualifications*. Carson City Fire Department keeps records for documenting initial and refresher training. The organization requires the completion of a task book for all members and certifies all members who are required to use respiratory protection. All members have been trained to a minimum level of Emergency Medical Technician. The CCFD Technical Rescue Team has a plan for annual refresher training or measurement of the continued competency of all team members. Annual skill assessment sheets are completed for all team members, and annual requirements for confined space entries are maintained.

It is noted that the Technical Rescue Team members have identified difficulty in obtaining initial and continued training. New team members must attend a long and extensive training regimen that requires a significant commitment from the Department to cover. As with many technical rescue teams, the amount and variety of skills required to be maintained amongst the various disciplines often make it difficult to cover all of them frequently enough. Monthly training sessions are currently conducted; however, full team training would be beneficial and ensure greater proficiency and team cohesion.

Equipment

The disciplines involved with technical rescue require an extensive amount of necessary equipment to meet the demands of the incident. The Carson City Fire Department uses a well-structured mix of deployment methods to deliver the necessary resources to the scene. The expensive nature of this equipment further complicates the ability to assemble the equipment and resources. CCFD has the equipment to operate initial operations and would require Mutual Aid from the City of Reno to provide heavy support.

CCFD has a strong complement of technical rescue equipment, including the needed equipment for water and ice rescue. The support for the program to maintain and replace equipment is good, but there are needs for replacement.

ADDITIONAL SPECIALTY SUPPORT & RESPONSE CAPABILITIES

Tactical Emergency Medical Services

In addition to hazardous materials and technical rescue response capabilities, the Carson City Fire Department is the sole tactical medical provider for Carson City, which means that when the Carson City Sheriff's Department requires tactical medical support, Carson City Fire Department provides that support.

The team is comprised of 3-members that are deployed one per shift. The shift Tactical Medic position is a mandatory back-fill requirement to provide 24-hour coverage for the Sheriff's Department. The response team is trained to the law enforcement level of Reserve Deputy Sheriff and has national certifications in Tactical Emergency Casualty Care (TECC). The Department operates with the assigned SWAT tactical response vehicles that include an Armored Ambulance, Humvee with trailer, and a utility pickup truck. The Department provides all equipment for team members with the exception of their service weapons (sidearm and rifle). Each member of the team must qualify six times a year with the weapons.

The training requirements to become a Tactical Medic for the Carson City Fire Department are:

- Pass the SWAT Team Tryout
- Attend and successfully complete the Nevada POST 40-hour school
- Attend and successfully complete a Tactical Medic course held in Houston, Texas, 40–48 hours
- Pass the Nevada State Reserve Officer/Deputy Program, online and skill-based

The Tactical Medics respond to approximately 16–24 incidents per year supporting the SWAT, patrol, warrant, bomb, and gang units for Carson City. The budget to maintain training and equipment is $12,000 that is earmarked funding provided by the Carson City Supervisors specific to the Tactical Medic Program. The cost of response is borne by the Fire Department budget for daily staffing and overtime costs for position coverage, off-duty response, and additional team training.

The Team has been successful in training Carson City residents in Stop the Bleed and receiving a grant to deploy Bleeding Control Kits throughout the area. The Team is in preliminary discussions with Washoe County TEMS providers to develop regional training and support programs that would assist in gaining access to local advanced training for the team members.

There is a need to develop a cost-sharing system with the Carson City Sheriff for funding overtime responses to law enforcement related events instead of the fire department assuming the full burden of the expense.

There is a need to develop funding for adding one position to the team that would provide greater flexibility to cover shift vacancies, training opportunities, and deploying an additional Tactical Medic to increased risk events/incidents that may occur.

COMMUNITY RISK ASSESSMENT

Determining potential risks for the Carson City Fire Department's future helps to see if there are additional impacts on the service demand for the City. In this section, there is a discussion of risks, some that Carson City Fire Department could affect by mitigation efforts. Other risks are infrequent and low probability. While CCFD may not be able to mitigate them, it can recognize the potential hazards and prepare for a response.

ESCI reviewed the Carson City 2016 Hazard Mitigation Plan that provided a comprehensive review of the potential risk types: population and population densities, community land use, occupancy types by land use, and hazardous substances, flooding, and weather-related incidents. Types of occupancies, such as assembly or religious institutions, have been targets for active shootings around the country and could be of higher (although slight) risk for such activities.

This section analyzes risks that are present within Carson City that could potentially threaten people and property. These risks are identified to assist the Department in planning where to locate response resources in the types and numbers necessary to respond to likely emergencies effectively. While not all hazards of individual occupancies can be considered—that is beyond the scope of the study—there are risks that seem to be relevant to the Department and surrounding areas.

ESCI recommends that the Department annually review the Carson City Hazard Mitigation Plan, annual objectives, and update such to keep abreast of any changing conditions that may impact the planning area. The following figure is one sample method of identifying and analyzing risks within a community.

Figure 30: Risk Identification and Analysis Process[1]

Step	Action
Hazard Identification	Identify hazards.
	What is the probability this hazard will occur?
	Is this hazard a significant threat to your jurisdiction?
	Approximately how often does this hazard occur in your jurisdiction?
Vulnerability Assessment	For each hazard identified in the hazard identification process, consider each of the five factors. Factor 1: Danger/Destruction/Personal harm Factor 2: Economic Impacts Factor 3: Environmental impacts Factor 4: Social Impacts Factor 5: Political considerations
	Score the vulnerability from this hazard.
	Reconsider the priority of each hazard based on vulnerability.
Risk Rating Score	Risk Rating = Probability[2] X Vulnerability[2]

[1] Adapted from the Community Risk Reduction Model – United States Fire Administration, National Fire Academy.
[2] Probability and Vulnerability are rated as 3 = High, 2 = Moderate, 1 = Low

The fire service assesses the relative risk of properties based on several factors: the service area population and population density, the demographics of the population, local land use and development, and the geography and natural risks present within the community. These factors affect the number and type of resources (both personnel and apparatus) necessary to mitigate an emergency. Properties with high fire and life risk often require greater numbers of personnel and apparatus. Therefore, staffing and deployment decisions should be made with consideration to the level of risk within the geographic sub-areas of a community.

Population

Studies show that certain segments of the population are at a higher risk of injury or death due to fire.[9]

- **Risk by age**: In 2015, adults ages 50 or older had a greater relative risk of dying in fires than the general population. Those ages 85 and older had the highest risk of fire death. In addition, while lower than the relative risk of the general population, children ages 4 and younger faced an elevated risk of both injury and death in a fire when compared with older children (ages 5 to 14).
- **Risk by gender**: Males were 1.7 times more likely to die in fires than females.
- **Risk by income level**: The danger of death or injury is closely tied to household income, and children and the elderly in the poorest homes are exposed to the greater risk.
- **Risk by race**: African Americans and American Indians/Alaska Natives were at a greater relative risk of dying in a fire than the general population.

The 2010 Census for Carson City revealed that 24.9 percent of the population was in a greater risk category based on age, according to the study. This category consists of persons under the age of 5 (5.3%) and persons who are 65 years of age and older (19.6%). Other vulnerable categories include persons under the age of 65 living with a disability (18.1%) and people living at or below the poverty level (13.7%).[10] Typically, populations within these categories have an increased likelihood of being injured or killed in fires. Additionally, populations in these categories place a high demand on emergency medical services.

---

[9] 'Fire Risk in 2015'; U.S. Fire Administration, September 2017, Volume 18, Issue 6; Retrieved from https://www.usfa.fema.gov/downloads/pdf/statistics/v18i6.pdf?utm_source=website&utm_medium=pubsapp&utm_content=Fire Risk in 2015&utm_campaign=RID.

[10] The Census Bureau "poverty" definition – Following the Office of Management and Budget's (OMB) Statistical Policy Directive 14, the Census Bureau uses a set of money income thresholds that vary by family size and composition to determine who is in poverty. If a family's total income is less than the family's threshold, then that family and every individual in it is considered in poverty. The official poverty thresholds do not vary geographically, but they are updated for inflation using Consumer Price Index (CPI-U). The official poverty definition uses money income before taxes and does not include capital gains or noncash benefits (such as public housing, Medicaid, and food stamps). For more information see How the Census Bureau Measures Poverty.

The City had a total of 22,460 housing units in 2014–18. The 2014–18 Housing data shows individual ownership is at 55.7 percent of all units and that the median housing unit value is $242,200. Carson City implemented a Growth Management Plan in 1978 that aligned with the ability to provide critical services and infrastructure, particularly water and sewer services. The plan generally has a limit based on the current population of no more than 3%. The Board Supervisors approve the maximum number of housing permits each fiscal year. Prior to 2017, the number of housing permits allowed exceeded the number of permits pulled by builders/developers. From 2006 to 2015, the number of permits per year ranged from less than 10 to under 50. In 2016, it increased to just under 200 housing permits. In 2017, there were less than 150 housing permits. In 2018, there were under 600 housing permits. In 2019, housing permits declined to less than 300. For 2020, the year-to-date permits are less than 50.[11] In review of the Community Development information on the City website, the majority of the past four years of residential permit growth is in multi-housing permits. The 2019 Carson City Assessor's Office data provided showed, of the 20,997 housing units, 13,522 (64.4%) were single-family detached households, 7,475 (35.6%) were multifamily structures (two or more apartments). The Carson City Assessor data set was not able to discern the building age inventory due to a recent update.

Typically, when there are high numbers of older pre-fire code buildings constructed and higher numbers of vulnerable citizens, increased demand for emergency services results. Given these factors for housing and population, it is likely that the Department has a steady call volume. However, over the next 10 years, it is likely that the population of Carson City will continue to grow, as will the population of people over the age of 65. Carson City has a large network of roads that service the area. Carson City is serviced by four U.S. Interstate Highways, one U.S. Highway, and four Nevada Highways. There are approximately 676 lane miles of roadways.

[11] *Information received from the Carson Development Services Department.*

Impact of Aging Population on Service Demand

This method of identifying the demographics of a community produces the potential number of calls in the future; however, it does not consider demographic changes. The existing population will likely continue to age in place. The increasing number of elderly populations will increase the demand for emergency medical services as the elderly population is a disproportionately greater user of these services. National medical industry studies suggest that patients over 65 years of age are three times more likely to access local emergency services than other age groups.

Figure 31: Carson City Demographics, 2020[12]

Demographic	Male	Female	Total
Under 5 years:	1,676	1,546	3,222
5 to 9 years:	1,621	1,566	3,187
10 to 14 years:	1,672	1,629	3,301
15 to 17 years:	1,080	1,022	2,102
18 and 19 years:	664	650	1,314
20 years:	304	326	630
21 years:	280	308	588
22 to 24 years:	904	881	1,785
25 to 29 years:	1,549	1,391	2,940
30 to 34 years:	1,391	1,397	2,788
35 to 39 years:	1389	1,484	2,873
40 to 44 years:	1,692	1,619	3,311
45 to 49 years:	1,867	1,937	3,804
50 to 54 years:	1,906	1,966	3,872
55 to 59 years:	1,781	1,917	3,698
60 and 61 years:	702	754	1,456
62 to 64 years:	979	1,088	2,067
65 and 66 years:	527	596	1,123
67 to 69 years:	761	795	1,556
70 to 74 years:	910	1,054	1,964
75 to 79 years:	720	902	1,622
80 to 84 years:	526	745	1,271
85 years and over:	410	767	1,177

The current population for persons 65–84 years of age living in the county is 7,536.[13] Over the next ten years, assuming the current 55–74 years of age demographic stays in the county, this will become the 65–84-year-old cohort. This group will grow to 11,864 persons. In twenty years, the group which is currently 45–64 years of age will be the 65–84 years of age and will be 14,897 persons.

[12] Suburban Stats, https://suburbanstats.org/population/nevada/how-many-people-live-in-carson-county

[13] The upper end of 84 was chosen as a cutoff based on the fact that the average life spans currently for all persons is 19 years over 65 per the CDC National Center for Health Statistics website.

It is reasonable to assume that the demand for emergency medical services in this age group will increase proportionally to the increase in the size of the demographic. This means that in ten years, the City and the Department could see growth in the elderly population to increase by 92 or more percent and in twenty years to increase by over 200 percent. Since the service demand data for EMS calls is not stratified as to age, it is difficult to predict the exact impact on the number of calls. It is also impossible to know if whether as people age, they will remain in the City or move to other areas. Conversely, it may be that the individuals moving into the service area may be disproportionately in the "over 65" demographics.

In addition to normal emergency medical services, there will be an increased need for non-emergent medical services that could be provided by a community paramedicine program or a mobile intensive healthcare program. Such a program might be developed through a cooperative venture between the hospital and the City.

Zoning

The first community hazard examined was the zoning risk. As expected, the areas in Wildfire Mitigation zones hold greater risk than other zones. This is typical where buildings are in the wildland fuel beds or adjacent to such. Wildfire spread, based on fuels, weather and topography, and the location of buildings and improvement in these areas are at higher risks and require continued monitoring and fuels abatement programs. The use of the 2018 (and current) Wildland-Urban Interface Code provides the City of Carson City with best-practice development guidance and code enforcement strategies to assist in mitigating the wildfire risks.

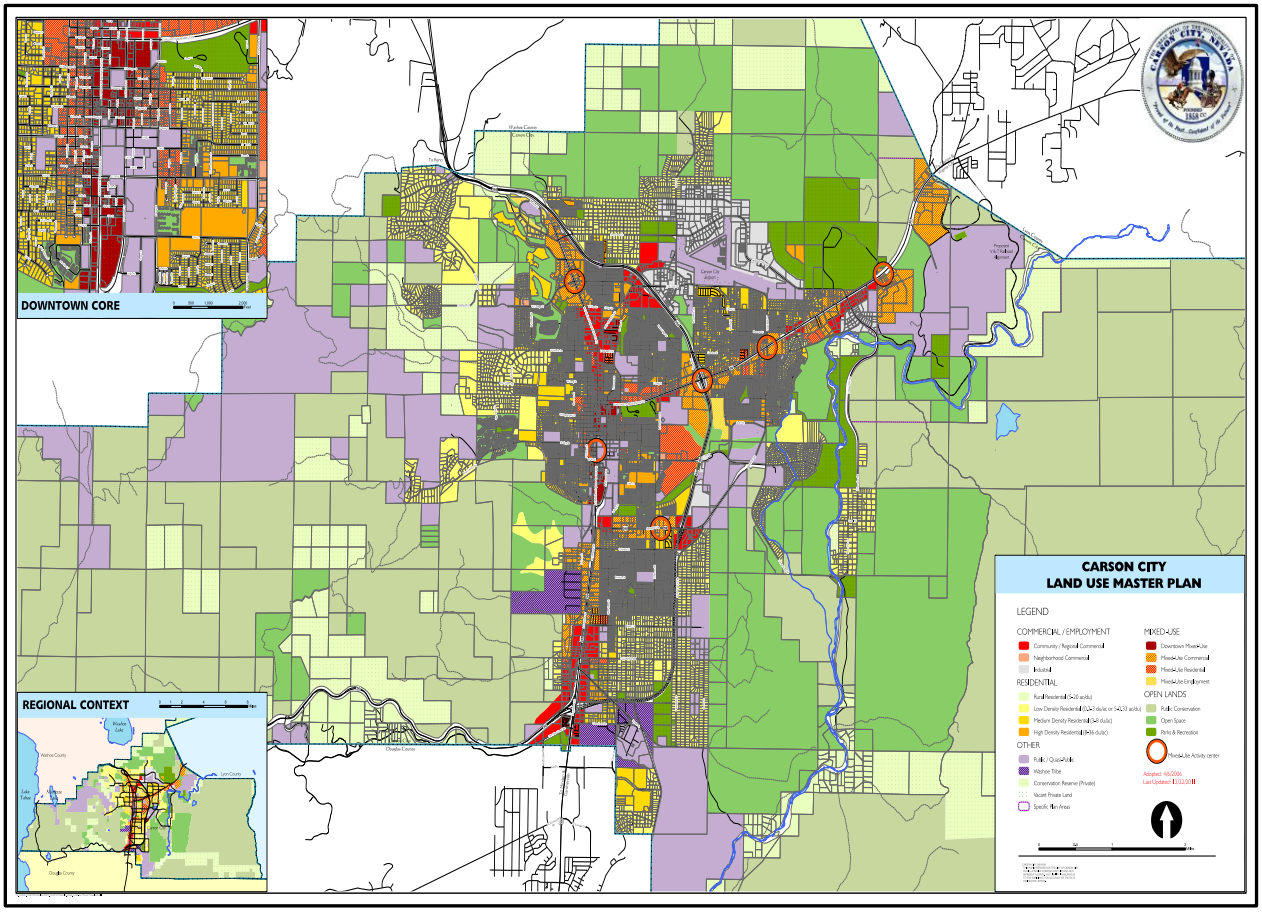
The following community risk assessment has been developed based on intended land uses, as described in the City's Master Plan designations of the respective jurisdictions. The following figure translates land use to categories of relative fire and life risk.

Figure 32: Translation of Land Use to Relative Risk Categories

Relative Risk Category	Zoning
Low Risk	Areas zoned and used for agricultural purposes, open space, and very low-density residential use.
Moderate Risk	Areas zoned for medium-density single-family properties, small commercial and office uses, low-intensity retail sales, and equivalently sized business activities.
High Risk	Areas zoned for Higher-intensity business districts, mixed-use areas, high-density residential, industrial, warehousing, and large mercantile centers.

The Carson City land use map is detailed in the following figure.

Figure 33: Carson City Land Use Map



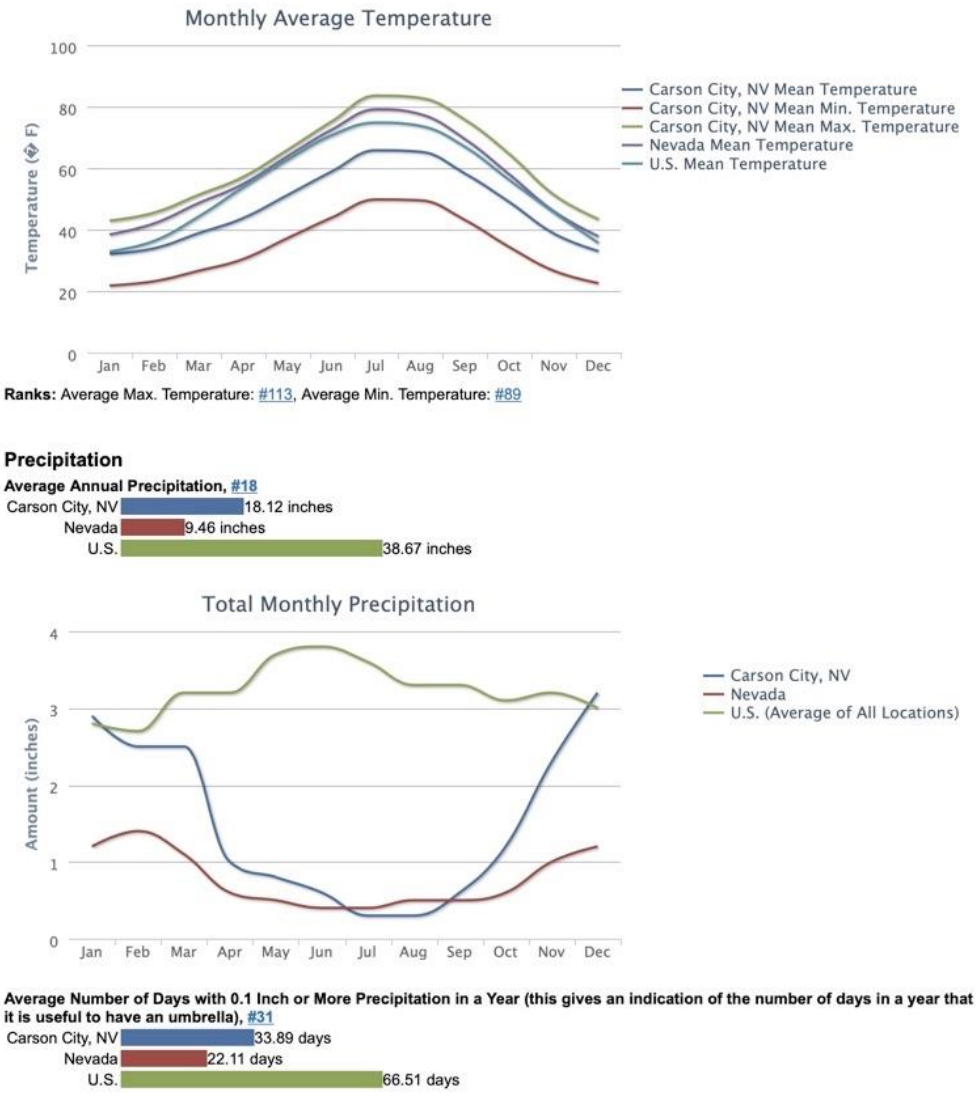
The majority of the City is suburban in nature, followed by public space and Washoe Tribal areas.

Geographic and Weather-Related Risks

Weather Risks

The climate for Carson City is driven by higher geographic altitudes providing pleasant summers and colder winters. Rainfall averages 11 inches with higher than average precipitation May through August, and average snowfall is 22 inches, usually from December through March. Last year's temperature, rainfall, and snowfall are depicted in the following figure.

Figure 34: Weather Averages for Carson City[14]



From a planning perspective, there are several weather-rated risks of concern to Carson City. Severe thunderstorms, which include lightning strikes and flash floods, are a high-risk event and hazard for the area.

[14] *https://www.ncdc.noaa.gov/.*

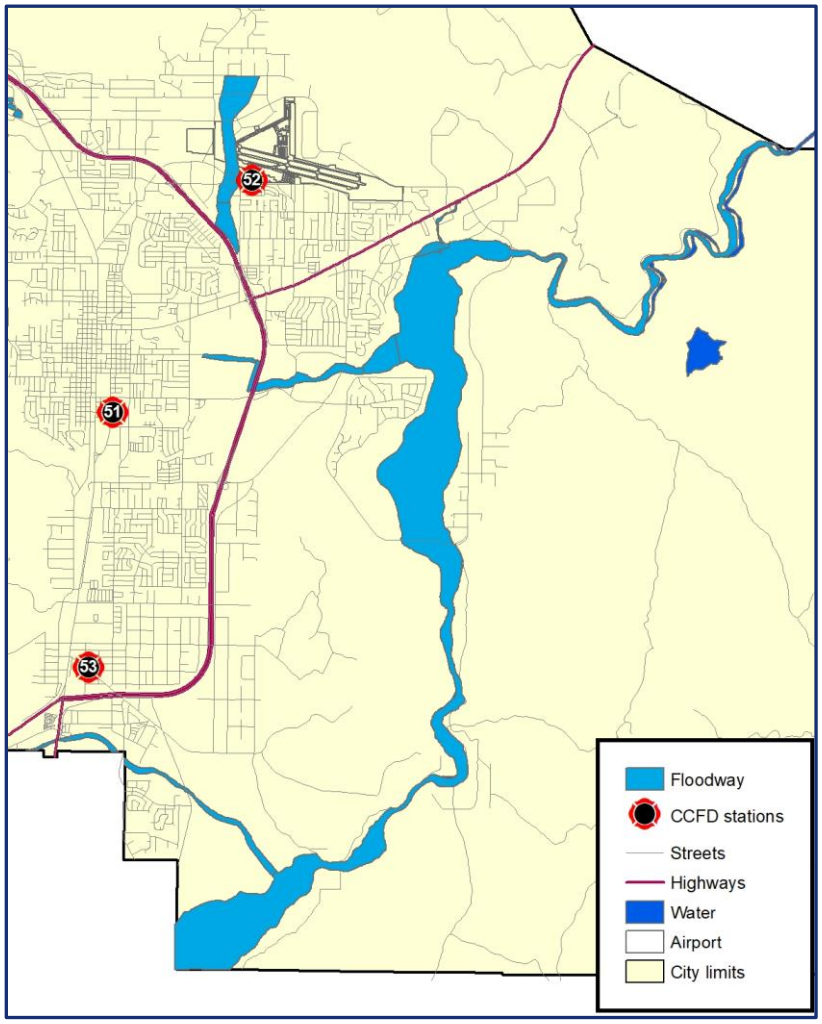
Flood

There are various risks associated with flooding in the service area. It is essential, therefore, that the community in the area of flood zones and areas prone should be informed of the risks. Before the flood, and as part of the planning process, Carson City Fire Department must consider station location and relocations as they relate to flood zones. Further, this should be a part of the public education process to ensure that residents are aware of the risks associated with flooding and the actions they should take to ensure readiness.

During a flooding event, the Carson City Fire Department will be called upon to assist in evacuations and rescues. These evacuations may include facilities with large numbers of people requiring EMS resources. Rescue and emergency evacuations may involve moving water requiring specialty-trained rescue teams to intervene.

After a flood as the residents begin recovery, EMS-related incidents will increase as injuries and medical conditions occur. Public education can help the community prepare for the recovery process.

Figure 35: Carson City Floodway Map



Transportation Risks

There are several transportation corridors and various modes of transportation that fall within CCFD's responsible area. Beginning with major roadways Interstate 580, U.S. 50, and U.S. 395 run through the response area and are a source of transportation-related crashes, fires, and rescues. Additionally, there are several major local roads within the City. Regardless of the size of the roadway or the speed limit, any roadway has the potential for motor vehicle crashes, vehicle fires, medical emergencies, brush fires, or hazardous material spills/leaks. Each of these is not only a risk to the community, but the responders are also at risk of being struck by vehicles while operating near moving traffic.

Carson City Airport is a General Aviation Airport providing services to privately owned aircraft and air taxi operators for business, pleasure, and state government businesses. The Federal Aviation Administration noted the number of operations (landings and takeoffs) from the Carson City Airport for 2019 was in excess of 80,000. This number of operations aligns with a busier general aviation airspace.

Following the on-site visit and in conjunction with stakeholder interviews, CCFD should consider the placement of a Crash/Fire/Rescue vehicle capable of mitigating potential general aviation incidents on and around the airport.

Earthquakes

Carson City is located in a High-Risk Earthquake zone as defined by the U.S. Geological Survey. There are 16 major Quaternary faults in the area. Given the jurisdictional limits of Carson City to include the central-eastern shore of Lake Tahoe, there also is a low Tsunami risk for that area. Within the Carson City 2016 Hazard Mitigation Plan, Table 5-6 (Figure 36 below) provides a Poisson Probabilities of Modified Mercalli Intensity Ground Motions Occurring in Carson City. This table provides valuable insights into the risks of Intensity Levels VI–IX events occurring in the region.

Figure 36: Poisson Probabilities of Modified Mercalli Intensity Ground Motions Occurring in Carson City[15]

Earthquake Intensity*	50-Year Probability
VI	78–79%
VII	55–57%
VIII	19–25%
IX	6–10%

**Intensity VI levels of ground motion can cause cracks in walls and people to be frightened; intensity VII levels can cause chimneys to topple and an emergency response; intensity VIII levels can cause weak buildings to partially collapse and a recovery effort to be mounted; intensity IX levels can cause damage to some modern buildings.*

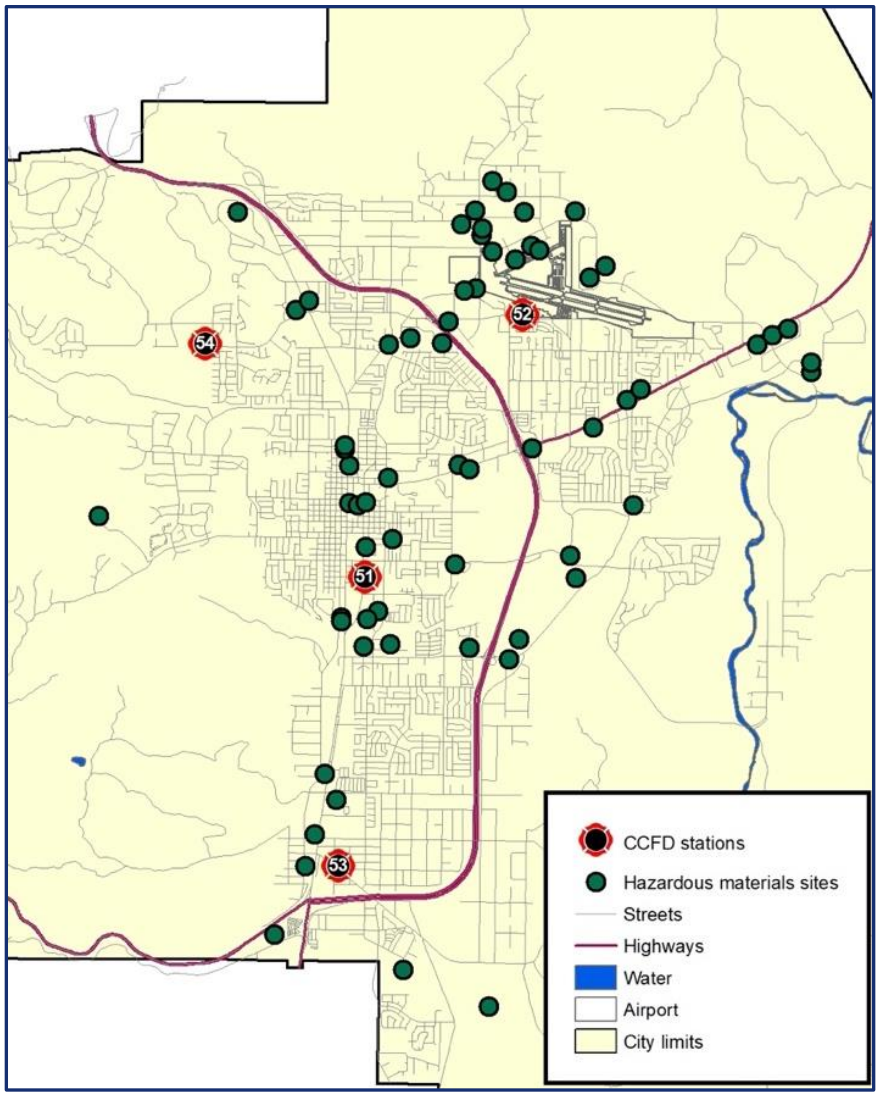
[15] *Carson City 2016 Hazard Mitigation Plan, Table 5-6. Based on U.S. Geological Survey Hazard Curves.*

Hazardous Substances

A federal law called the Emergency Planning and Community Right to Know Act (EPCRA) requires facilities in certain industries that manufacture, process, or use significant amounts of toxic chemicals to report annually on their releases of these chemicals. The U.S. Environmental Protection Agency (EPA) maintains this information in a database called the Toxics Release Inventory (TRI). The toxics release files on the National Library of Medicine's® (NLM) Toxicology Data Network (TOXNET®) come from TRI. The reports contain information about the types and amounts of toxic chemicals that are released each year to the air, water, land, and by underground injection, as well as information on the quantities of toxic chemicals sent to other facilities for further waste management. Facilities with ten or more full-time employees that process more than 25,000 pounds in aggregate or use greater than 10,000 pounds of any one TRI chemical, are required to report releases annually.

The hazardous substances that fit the above description are depicted in the following figure.

Figure 37: Hazardous Substances



Buildings

Many buildings in the response area are used for purposes that create a more significant risk than others during an emergency. High occupancy buildings, facilities providing care to vulnerable populations, and others may require greater numbers of emergency response and resources during an emergency.

Numerous buildings lie within the service area in which large numbers of people gather for entertainment, worship, and other similar events. A variety of nightclubs, bars, theaters, and other entertainment venues also exist.

Structural Risks

Certain buildings, contents, functions, and size present a greater firefighting challenge and require special equipment, operations, and training. The Insurance Services Office calls for a ladder truck within 2.5 miles of developed areas containing buildings three or more stories in height. Accessing the upper floors and roofs of buildings this tall typically requires ladder truck capability as ground ladders may not provide access. There are a few buildings in this class in the fire response area. Significant fires in those buildings could be expected to require mutual aid response.

Large buildings such as warehouses, malls, and large "box" stores require greater volumes of water for firefighting and require more firefighters to advance hose lines long distances into the building.

Figure 38: High Fire Flow Buildings for Carson City

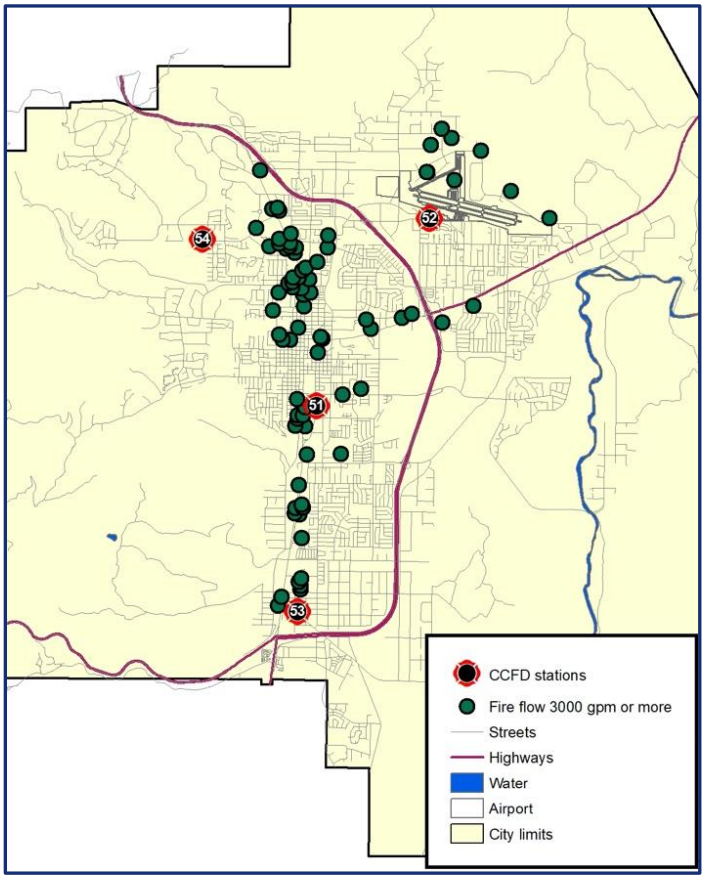


Figure 39: Buildings Over 100,000 Square Feet, Carson City

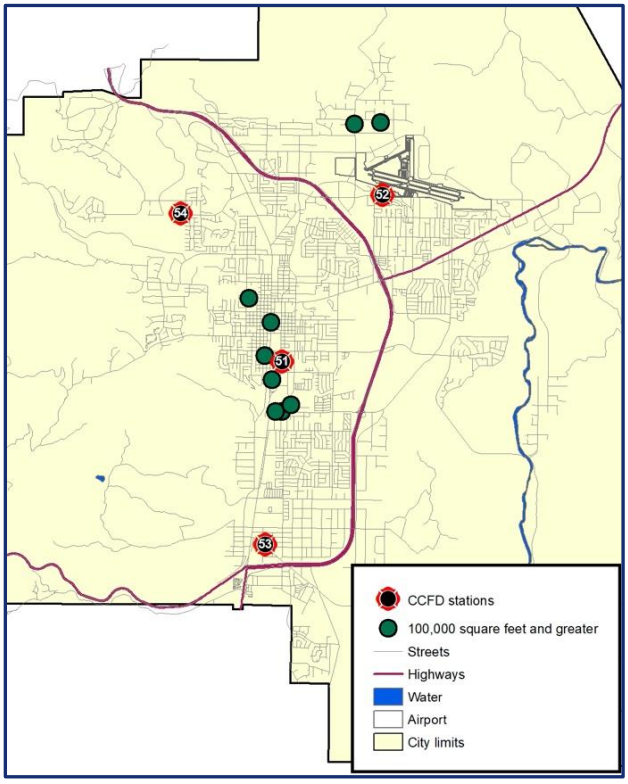


Figure 40: Buildings 3 or More Stories, Carson City

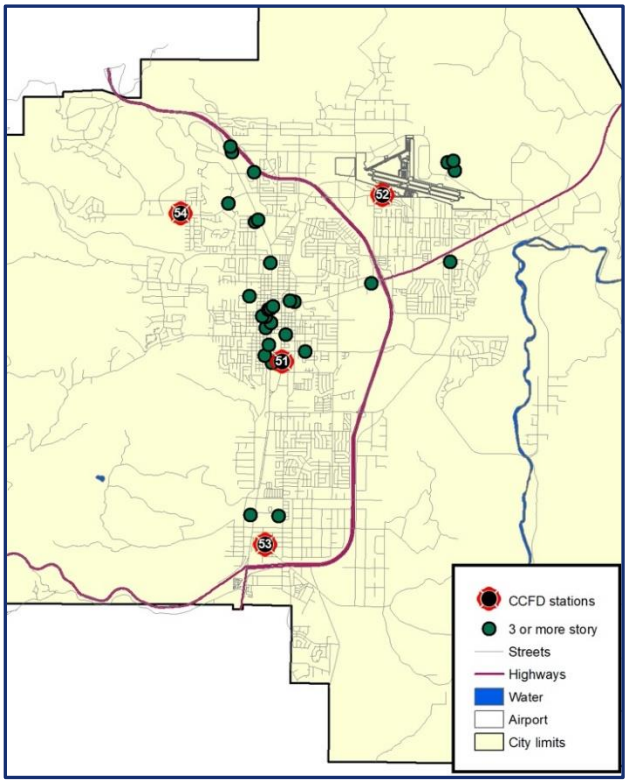
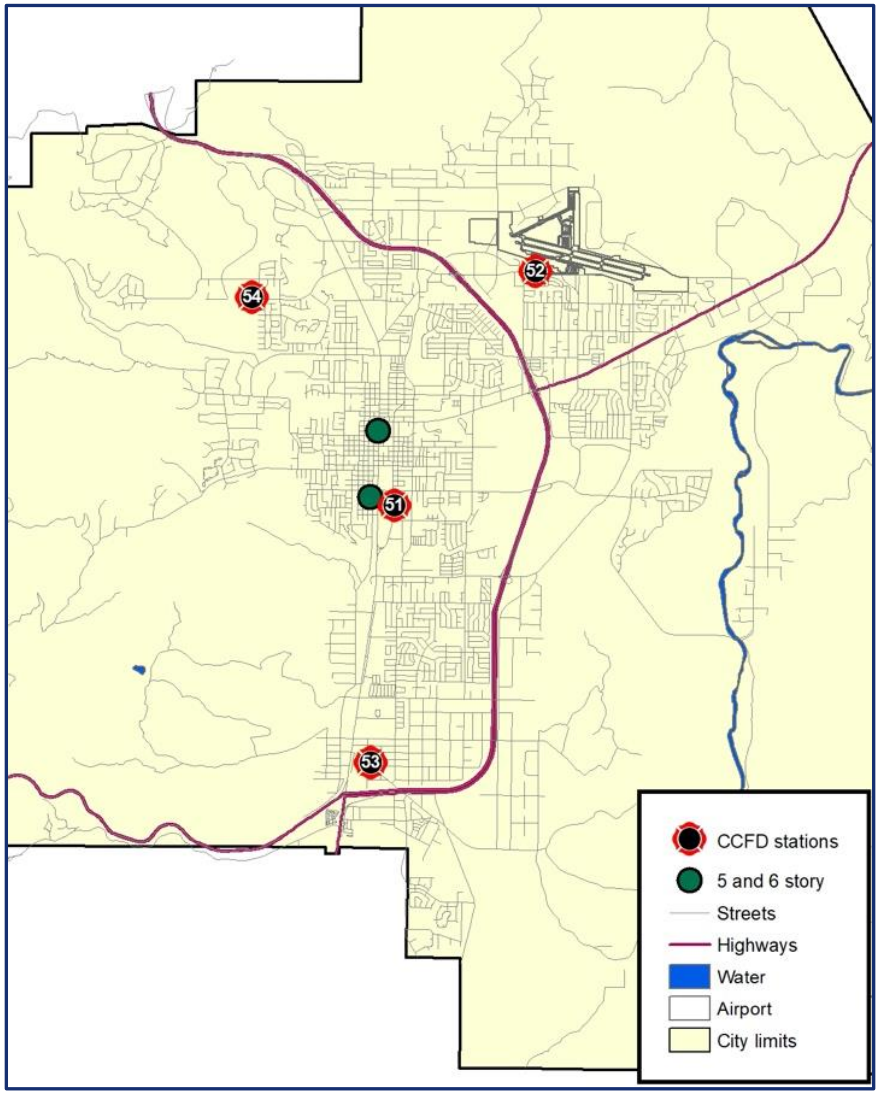


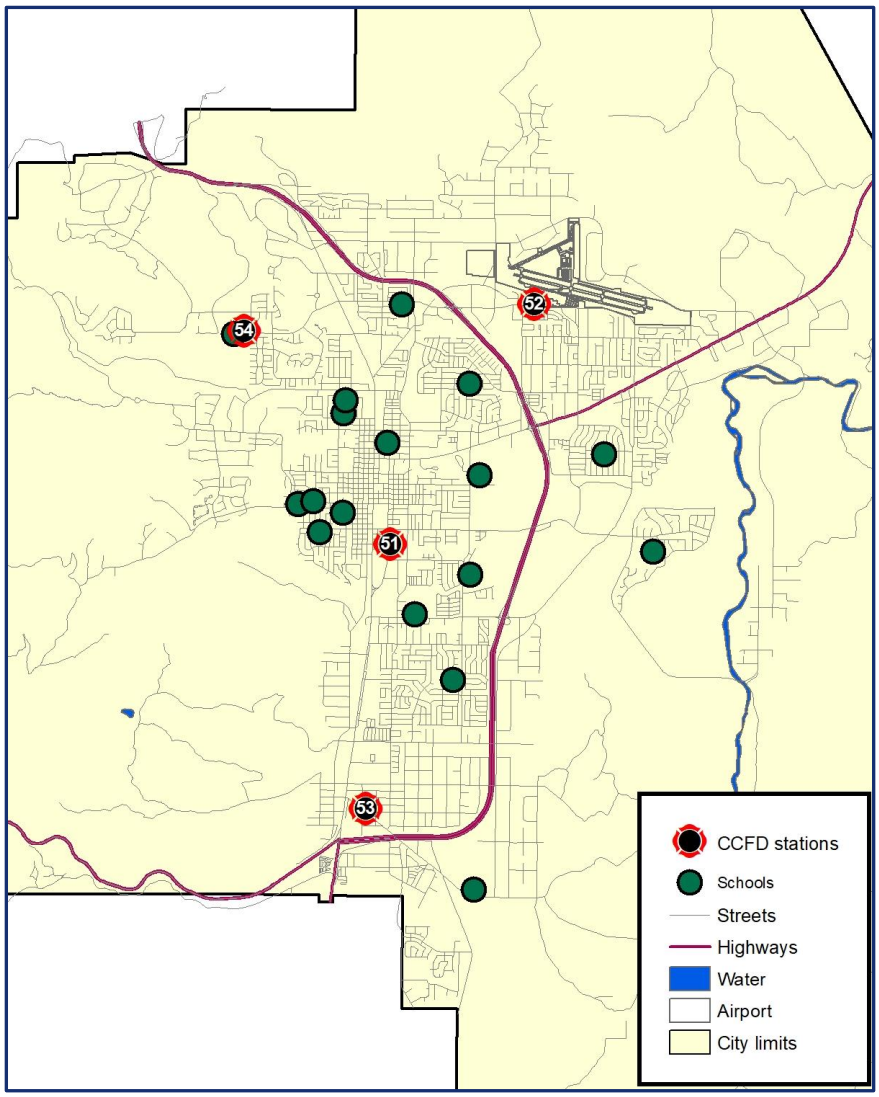
Figure 41: Buildings 5 and 6 Stories, Carson City



Colleges and Schools

These facilities present additional risk, primarily for mass casualty incidents. Fire, criminal mischief, and potentially terrorism could cause a major medical emergency requiring significant emergency service resources.

Figure 42: Schools, Carson City



Medical and Congregate Care Facilities

Medical and congregate care facilities, particularly hospitals and nursing homes, house vulnerable occupants. Although these facilities have regular fire safety inspections and are generally built of fire-resistive construction with built-in fire suppression, emergencies still can occur that require the quick movement of patients away from the hazard. Incidents at these facilities will require high resource levels.

Figure 43: Medical Facilities, Carson City

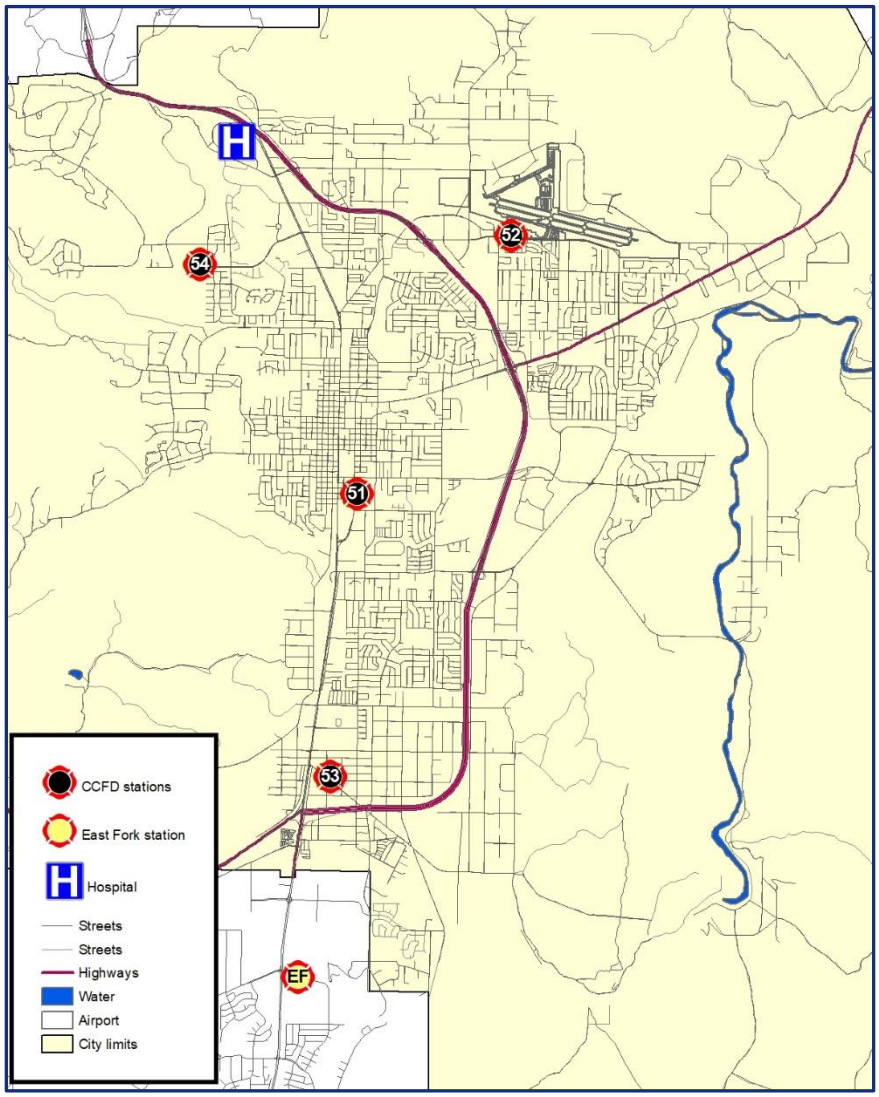
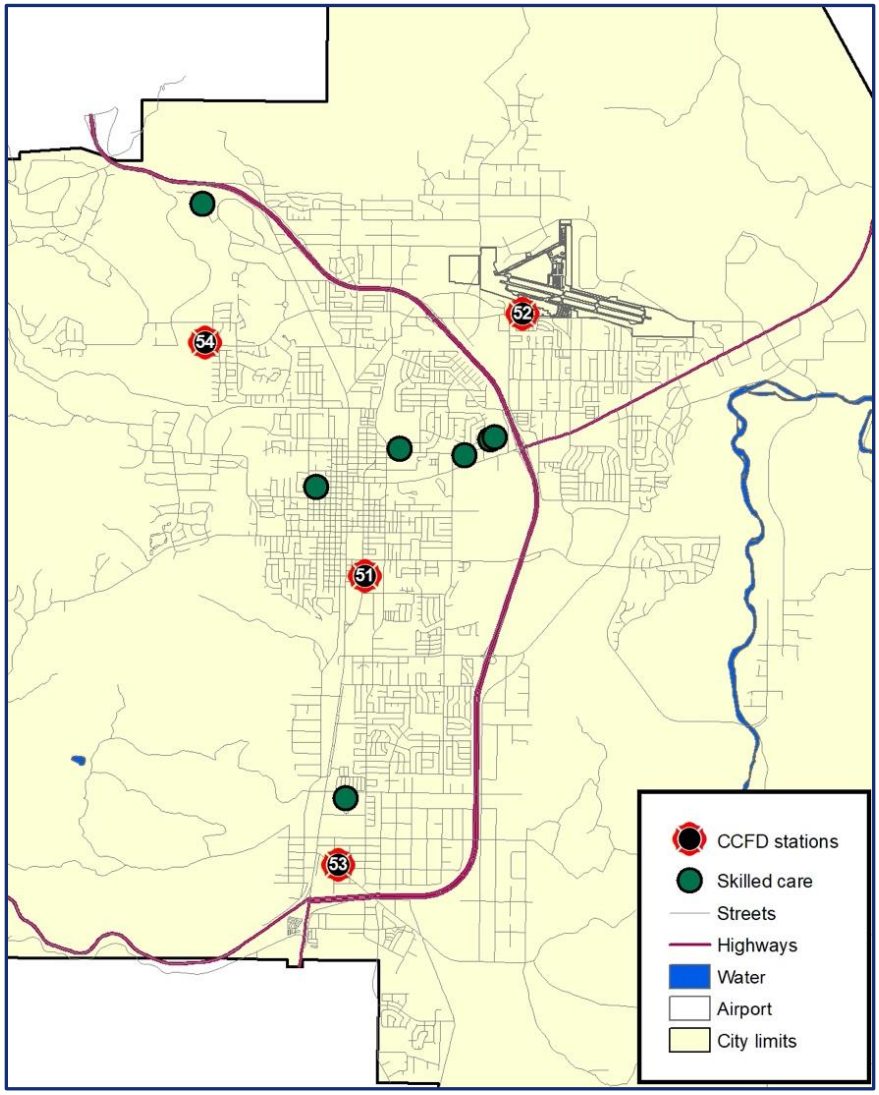


Figure 44: Skilled Care Homes, Carson City

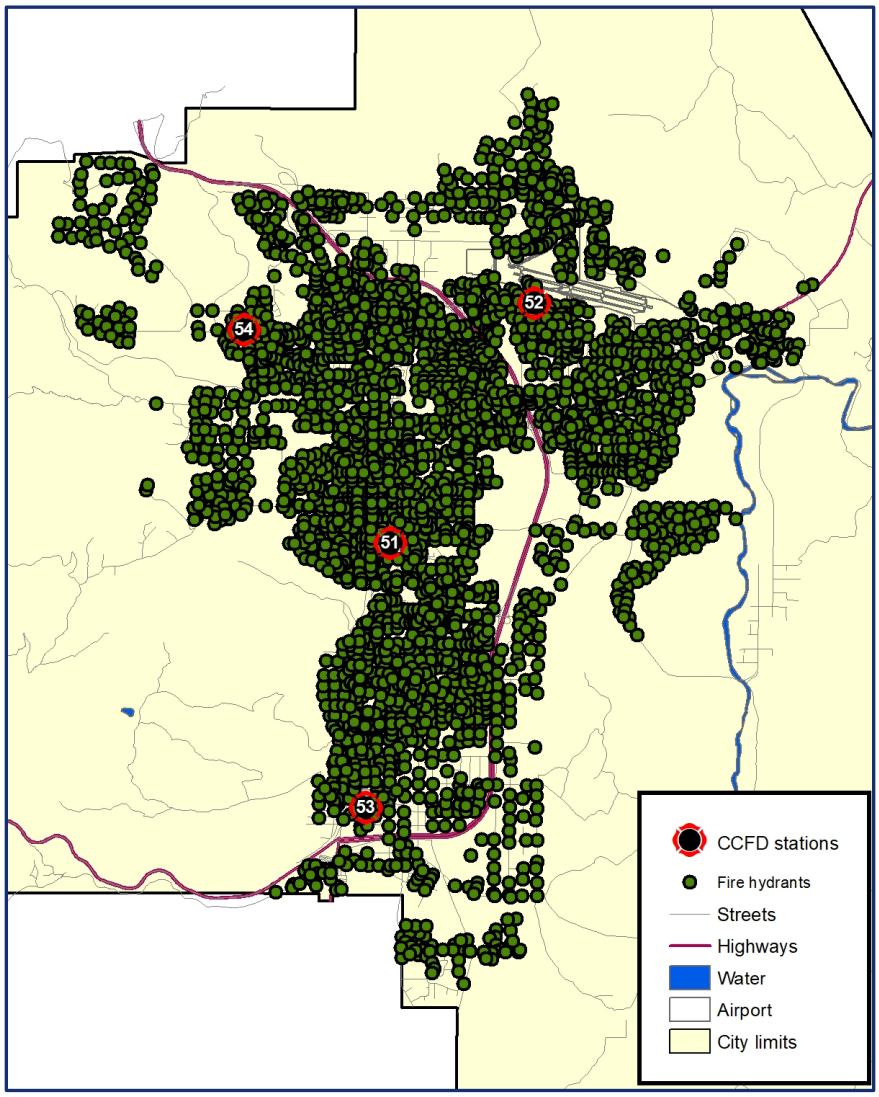


Other Critical Infrastructure

Water Supply & Hydrants

One concern to the Department is the water and fire hydrant system. Providing sufficient storage, distribution, and access to this valuable firefighting resource is very important. The Department is served by fire hydrants in the more populated or urbanized areas. The rural areas of the Department depend on water delivered by tenders or water storage tanks installed for fire suppression purposes.

Figure 45: Water Supply and Hydrants, Carson City

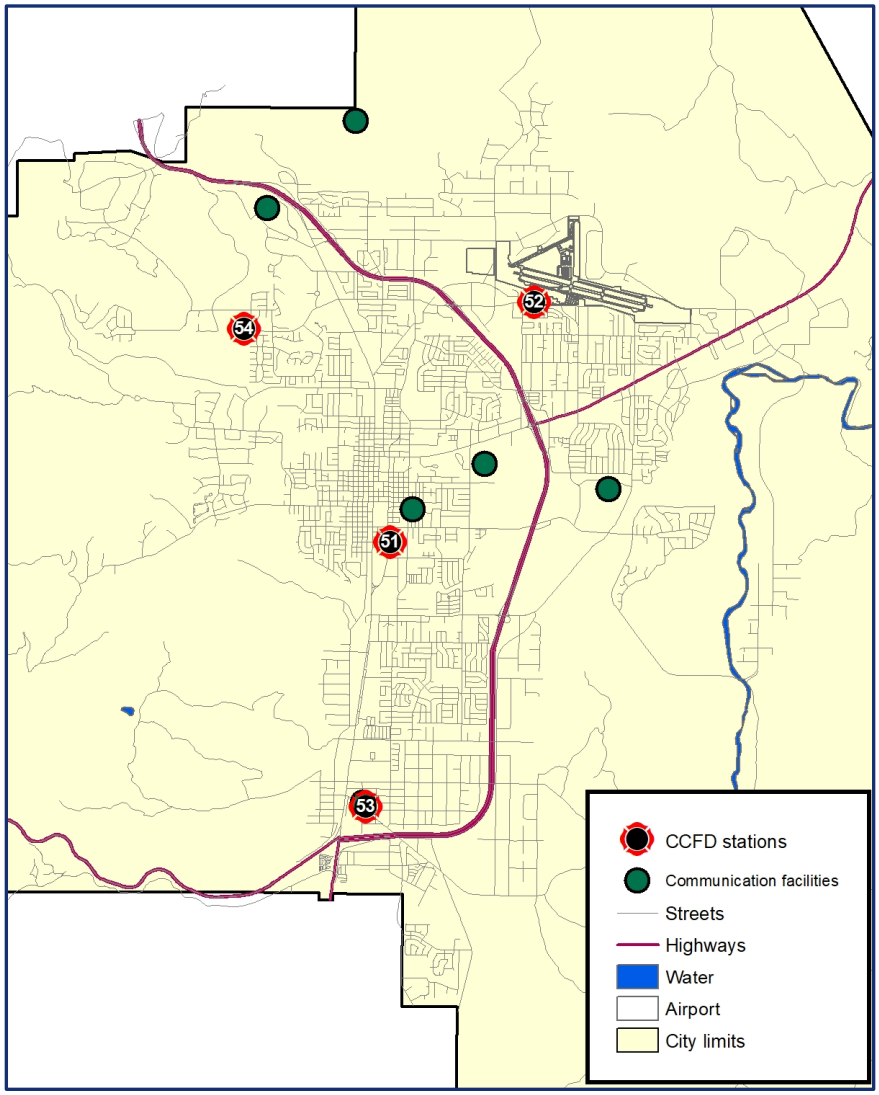


Communications

Emergency communications centers and the associated transmitting and receiving equipment are essential facilities for emergency response. The Carson City Dispatch Center provides call receipt and dispatch services to Carson City Fire and Sheriff's departments, public works, and park rangers in Carson City. This center provides for the answering of 911 calls, dispatching of fire and other emergency responders, and important support to the on-scene incident management function.

There are other communications facilities and equipment that are equally important to the community and government operations within the Carson City service area. These are the telephone company central offices and the transmission lines of local telephone service providers. Internet service providers, along with wireless cellular communications providers, provide essential communications capabilities for the community as well as emergency personnel through their facilities and equipment.

Figure 46: Communications Facilities, Carson City



Energy

The loss of electrical power is also a risk to the community. Community services, from communications to traffic signals to normal operation of supermarkets, require the use of energy. Whether it is electricity generation and transmission systems, fuel distribution and storage tanks, or natural gas pipelines and regulator stations, the community is dependent upon energy sources. The loss of energy is a planning consideration for response and readiness.

Terrorism

Carson City—as is anywhere—a potential target for terrorism. Carson City is the home of the State Capital of Nevada. Most of the previously categorized risks in the community are targets for such activity. In addition, the public gathering events during the year can also be targets. The Department needs to be vigilant in its training and preparedness in the event one or more coordinated acts of terror occur in the region.

CRITICAL TASKING & ALARM ASSIGNMENTS

The CCFD service area has a highly populated urban environment and, as such, contains an elevated number, density, and distribution of risk. As the actual or potential risk increases, the need for higher numbers of personnel and apparatus also increases. It also serves a very rural area with its own unique risks and response requirements. With each type of incident and corresponding risk, specific critical tasks need to be accomplished, and certain numbers and types of apparatus should be dispatched.

Tasks that must be performed at a fire can be broken down into two key components: life safety and fire flow. Life safety tasks are based on the number of building occupants, and their location, status, and ability to take self-preservation action. Life safety-related tasks involve the search, rescue, and evacuation of victims. The fire flow component involves delivering sufficient water to extinguish the fire and create an environment within the building that allows entry by firefighters.

The number and types of tasks needing simultaneous action will dictate the minimum number of firefighters required to combat different types of fires. In the absence of adequate personnel to perform concurrent action, the commanding officer must prioritize the tasks and complete some in chronological order, rather than concurrently. These tasks include the following:

- Command
- Scene safety
- Search and rescue
- Fire attack
- Water supply
- Pump operation
- Ventilation
- Backup/rapid intervention

Critical task analyses also apply to non-fire-type emergencies, including medical, technical rescue, and hazardous materials emergencies. Numerous simultaneous tasks must be completed to control an emergency effectively. The Department's ability to muster needed numbers of trained personnel quickly enough to make a difference is critical to successful incident outcomes.

The following figure illustrates the minimum emergency incident staffing recommendations of the Commission on Fire Accreditation, International (CFAI). The following definitions apply to the figure:

- **Low Risk**: Minor incidents involving small fires (fire flow less than 250 gallons per minute), single patient non-life-threatening medical incidents, minor rescues, small fuel spills, and small wildland fires without unusual weather or fire behavior.
- **Moderate Risk**: Moderate-risk incidents involving fires in single-family dwellings and equivalently sized commercial office properties (fire flow between 250 gallons per minute to 1,000 gallons per minute), life-threatening medical emergencies, hazardous materials emergencies requiring specialized skills and equipment, rescues involving specialized skills and equipment, and larger wildland fires.
- **High Risk**: High-risk incidents involving fires in larger commercial properties with a sustained attack (fire flows more than 1,000 gallons per minute), multiple patient medical incidents, major releases of hazardous materials, high-risk rescues, and wildland fires with extreme weather or fire behavior.

Figure 47: Staffing Recommendations Based on Risk

Incident Type	High Risk	Moderate Risk	Low Risk
Structure Fire	29	15	6
Emergency Medical Service	12	4	2
Rescue	15	8	3
Hazardous Materials	39	20	3

The CCFD has developed the following Critical Task Analysis for various incident types. Further, it has defined, based on current unit staffing levels, the number and type of apparatus needed to deliver sufficient numbers of personnel to meet the critical tasking identified. ESCI's review of the Critical Task Analysis concludes that all are generally in keeping with industry standards and provide the minimum number of personnel needed for effective incident operations.

Establishing resource levels needed for various types of emergencies is a uniquely local decision. Factors influencing local decisions for incident staffing include the type of equipment operated, training levels of responders, operating procedures, geography, traffic, and the nature of buildings and other risks protected.

Critical Tasking

Critical tasks are those activities that must be conducted early on and promptly by firefighters at emergency incidents to control the situation, to stop loss, and to perform necessary tasks required for a medical emergency. CCFD is responsible for ensuring that responding companies are capable of performing all of the described tasks in a prompt, efficient, and safe manner. These are the minimum number of personnel needed by incident type. More personnel will be needed for incidents of increased complexity or size.

Figure 48: Low-Rise Structure Fire

Task	Number of Personnel
Command/Safety	2
Pump Operations	1
Attack Line	3
Search and Rescue	2
Ventilation	2
RIC	3
Backup Line	3
Total	**16**

Figure 48: High-Rise Structure Fire (55+ Feet in Height)

Task	Number of Personnel
Command/Safety	8
Pump Operations	2
Attack Line	6
Search and Rescue	6
Ventilation	4
RIC	4
Backup Line	4
Total	**34**

Figure 49: Moderate-Risk Commercial Structure Fire

Task	Number of Personnel
Command/Safety	3
Pump Operations	2
Attack Line	6
Search and Rescue	4
Ventilation	4
RIC	4
Backup Line	4
Total	**27**

Figure 50: High-Risk Commercial Structure Fire

Task	Number of Personnel
Command/Safety	5
Pump Operations	2
Attack Line	6
Search and Rescue	4
Ventilation	8
RIC	4
Backup Line	4
Total	**33**

Figure 51: Wildland Fire—Low Risk

Task	Number of Personnel
Command/Safety	1
Attack Line	6
Total	**7**

Figure 52: Wildland Fire—High Risk

Task	Number of Personnel
Command/Safety	5
Pump Operations/Lookout	2
Attack Line	8
Structure Protection	6
Water Supply	3
Total	**24**

Figure 53: Aircraft Emergency Alert 1

Task	Number of Personnel
Command/Safety	1
Aircraft Fire Suppression	2
Pump Operations	1
Attack Line	0
Backup Line	0
Rescue	0
Emergency Medical Care	0
Water Supply	0
Total	**4**

Figure 54: Aircraft Emergency Alert 2 & 3

Task	Number of Personnel
Command/Safety	1
Aircraft Fire Suppression	2
Pump Operations	2
Attack Line	2
Backup Line	2
Rescue	2
Emergency Medical Care	2
Water Supply	1
Total	**14**

Figure 55: Hazardous Materials—Low Risk

Task	Number of Personnel
Command	1
Liaison	0
Decontamination	0
Research/Support	0
Team Leader, Safety, Entry Team, and Backup Team	3
Total	**4**

Figure 56: Hazardous Materials—High Risk

Task	Number of Personnel
Command	2
Liaison	1
Decontamination	4
Research Support	2
Team Leader, Safety, Entry Team, and Backup Team	6
Total	**15**

Figure 57: Emergency Medical Aid (Life Threatening)

Task	Number of Personnel
Patient Management	2
Patient Care	2
Documentation	1
Total	**5**

Figure 58: Major Medical Response (10+ Patients)

Task	Number of Personnel
Incident Command/Safety	2
Triage	2
Treatment Manager	1
Patient Care	10
Transportation Manager	1
Total	**16**

Figure 59: Motor Vehicle Accident (Non-Trapped)

Task	Number of Personnel
Scene Management/Documentation	1
Patient Care/Extrication	2
Total	**3**

Figure 60: Motor Vehicle Accident (Trapped)

Task	Number of Personnel
Command/Safety	1
Scene Management	1
Patient Care	2
Extrication/Vehicle Stabilization	5
Pump Operator/Suppression Line	2
Total	**11**

Figure 61: Technical Rescue—Water

Task	Number of Personnel
Command/Safety	1
Rescue Team	3
Backup Team	2
Patient Care	2
Rope Tender	2
Upstream Spotter	2
Downstream Safety	2
Total:	**14**

Figure 62: Technical Rescue—Rope

Task	Number of Personnel
Command/Safety	1
Rescue Team	2
Backup/Support Team	2
Patient Care	2
Rigger	1
Attendant	1
Ground Support	4
Edge Person	1
Total	**14**

Figure 63: Technical Rescue—Confined Space

Task	Number of Personnel
Command/Safety	2
Rescue Team	2
Backup/Support Team	2
Patient Care	2
Attendant	1
Rigger	3
Ground Support	4
Total:	**16**

Figure 64: Technical Rescue—Trench

Task	Number of Personnel
Command/Safety	2
Rescue Team	2
Backup/Support Team	2
Patient Care	3
Ground Support	2
Shoring	5
Total:	**16**

Alarm Assignments

To ensure sufficient personnel and apparatus are dispatched to an emergency event, the following first alarm response assignments have been established. "Total Staffing Needed" is the number identified in the previous Critical Tasking Analysis. The number of personnel and apparatus required to mitigate an active and complex working incident will require additional resources above and beyond the numbers listed next. With currently available resources, CCFD is not able to staff all incident types in accordance with its Critical Tasking Analysis.

Figure 65: Low-Rise Structure Fire

Unit Type	Number of Units	Total Personnel
Engine	4	12
Truck	0	0
Rescues	2	4
Battalion Chief	1	1
Total Staffing Provided		**17**
Total Staffing Needed		**16**

Figure 66: High-Rise Structure Fire (55+ Feet)

Unit Type	Number of Units	Total Personnel
Engine	4	12
Rescue	2	4
Battalion Chief	1	1
Total Staffing Provided		**17**
Total Staffing Needed		**34**

Figure 67: Moderate-Risk Commercial Structure Fire

Unit Type	Number of Units	Total Personnel
Engine	4	12
Rescue Ambulance	2	4
Battalion Chief	1	1
Total Staffing Provided		**17**
Total Staffing Needed		**27**

Figure 68: High-Risk Commercial Structure Fire

Unit Type	Number of Units	Total Personnel
Engine	4	12
Rescues	2	4
Battalion Chief	1	1
Total Staffing Provided		**17**
Total Staffing Needed		**33**

Figure 69: Wildland Fire—Low Risk

Unit Type	Number of Units	Total Personnel
Brush Engine	4	12
Rescue	2	4
Battalion Chief	1	1
Total Staffing Provided		**17**
Total Staffing Needed		**7**

Figure 70: Wildland Fire—High Risk

Unit Type	Number of Units	Total Personnel
Brush Engine	4	12
Rescue	2	4
Battalion Chief	1	1
Total Staffing Provided		**17**
Total Staffing Needed		**24**

Figure 71: Aircraft Emergency Alert 1

Unit Type	Number of Units	Total Personnel
Engine	1	3
Rescue	0	0
Battalion Chief	0	0
Total Staffing Provided		**3**
Total Staffing Needed		**4**

Figure 72: Aircraft Emergency Alert 2 & 3

Unit Type	Number of Units	Total Personnel
Engine	2	6
Rescue Squad	1	2
Rescue	1	2
Battalion Chief	1	1
Total Staffing Provided		**11**
Total Staffing Needed		**14**

Figure 73: Hazardous Materials—Low Risk

Unit Type	Number of Units	Total Personnel
Engine	1	3
Rescue	0	0
Battalion Chief	1	1
Hazardous Materials Unit	0	0
Total Staffing Provided		**4**
Total Staffing Needed		**4**

Figure 74: Hazardous Materials—High Risk

Unit Type	Number of Units	Total Personnel
Engine	3	9
Rescue	2	4
Battalion Chief	1	1
Hazardous Materials Unit	1	1
Total Staffing Provided		**15**
Total Staffing Needed		**15**

Figure 75: Emergency Medical Service (Life Threatening)

Unit Type	Number of Units	Total Personnel
Engine or Truck	1	3
Rescue	1	2
Total Staffing Provided		**5**
Total Staffing Needed		**5**

Figure 76: Major Medical Response (10+ Patients)

Unit Type	Number of Units	Total Personnel
Engine	3	9
Rescue	3	6
Battalion Chief	1	1
Total Staffing Provided		**16**
Total Staffing Needed		**16**

Figure 77: Motor Vehicle Accident (Non-Trapped)

Unit Type	Number of Units	Total Personnel
Engine or Truck	1	3
Total Staffing Provided		**3**
Total Staffing Needed		**3**

Figure 78: Motor Vehicle Accident (Trapped)

Unit Type	Number of Units	Total Personnel
Engine	2	6
Rescue	1	2
Battalion Chief	1	1
Total Staffing Provided		**9**
Total Staffing Needed		**11**

Figure 79: Technical Rescue—Water

Unit Type	Number of Units	Total Personnel
Engine	2	6
Rescue	1	2
Battalion Chief	1	1
Total Staffing Provided		**9**
Total Staffing Needed		**14**

Figure 80: Technical Rescue—Rope

Unit Type	Number of Units	Total Personnel
Engine	1	3
Rescue	1	2
Rescue Squad	1	2
Battalion Chief	1	1
Total Staffing Provided		**8**
Total Staffing Needed		**14**

Figure 81: Technical Rescue—Confined Space

Unit Type	Number of Units	Total Personnel
Engine	3	9
Rescue Squad	1	2
Rescue	1	2
Battalion Chief	1	1
Total Staffing Provided		**14**
Total Staffing Needed		**16**

Figure 82: Technical Rescue—Trench

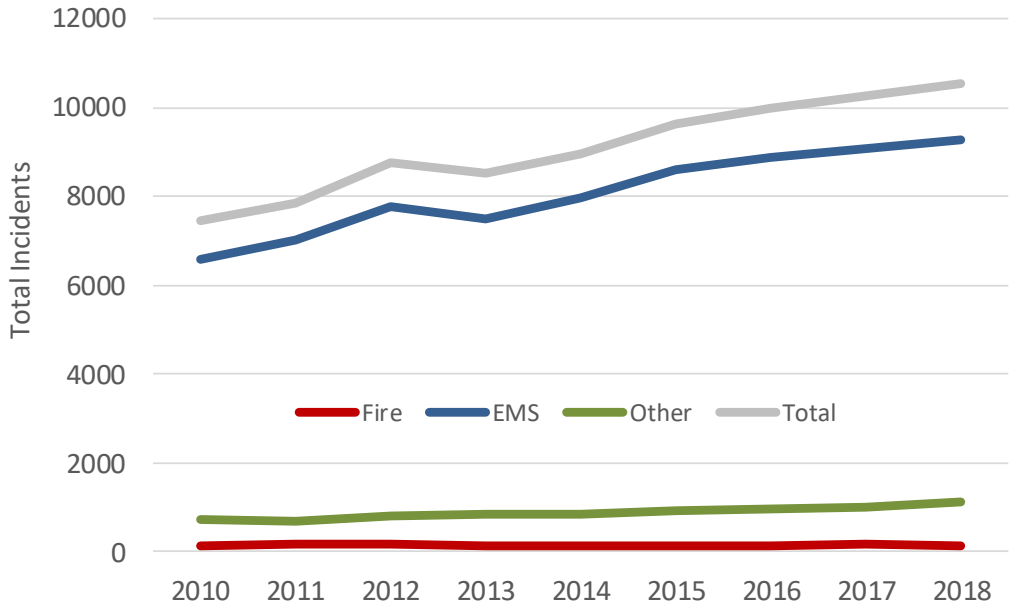
Unit Type	Number of Units	Total Personnel
Engine	3	9
Rescue Squad	1	2
Rescue	1	2
Battalion Chief	1	1
Total Staffing Provided		**14**
Total Staffing Needed		**16**

HISTORICAL SYSTEM RESPONSE WORKLOAD

Before a full response time analysis is conducted, it is important first to examine the level of workload (service demand) that a fire department experiences. Higher service demands can strain the resources of a department and may result in a negative effect on response time performance.

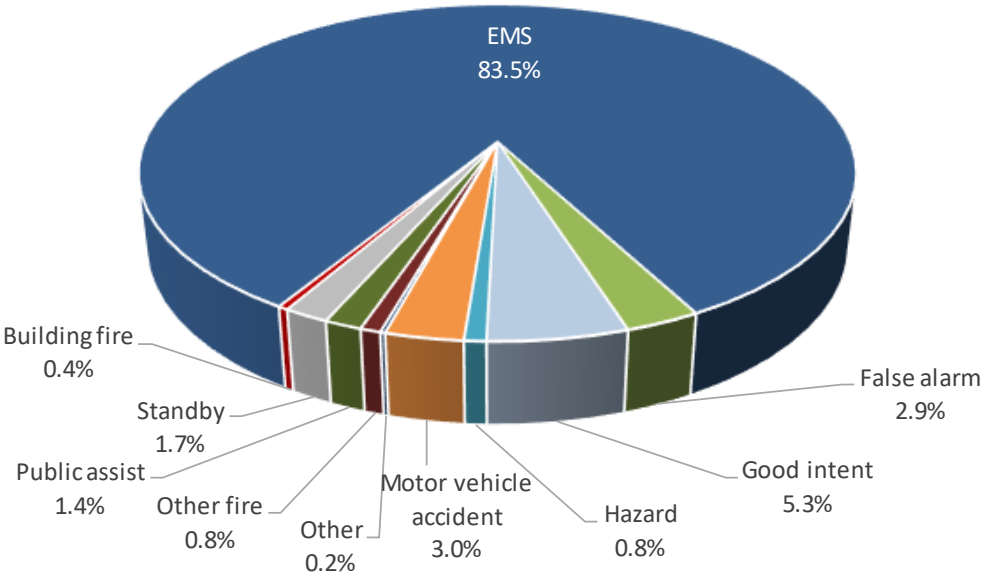
The following figure shows the response workload for nine years. The total response workload has increased by 41.6 percent over the nine years, primarily driven by the increase in emergency medical responses (40.7% increase since 2010). The community utilization rate of fire department services was 190.2 incidents per 1,000 population. This is a high number compared to other urban areas. Mostly it is due to the CCFD's ambulance service, a service not typical of many urban fire departments.

Figure 83: Response Workload History, 2010–2018



During 2018, CCFD responded to 10,544 incidents. The next figure shows responses by type of incident during 2018. Emergency medical type responses are the most common at 83.5 percent of total responses.

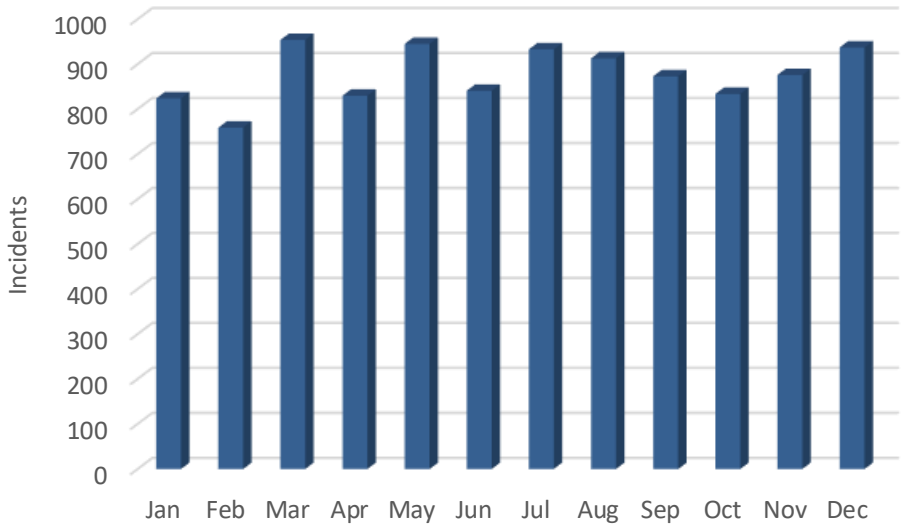
Figure 84: Responses by Type of Incident, 2018



Temporal Analysis

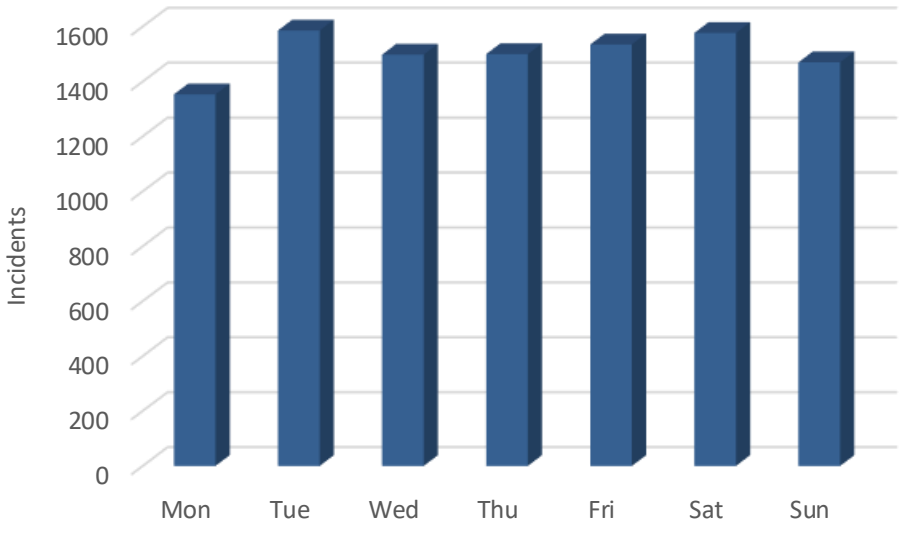
A review of incidents by time of occurrence also reveals when the greatest response demand is occurring. The following figures show how activity and demand change for CCFD based on various measures of time. Figure 85 shows the response activity during the study period by month. There is little variation by month.

Figure 85: Monthly Response Workload



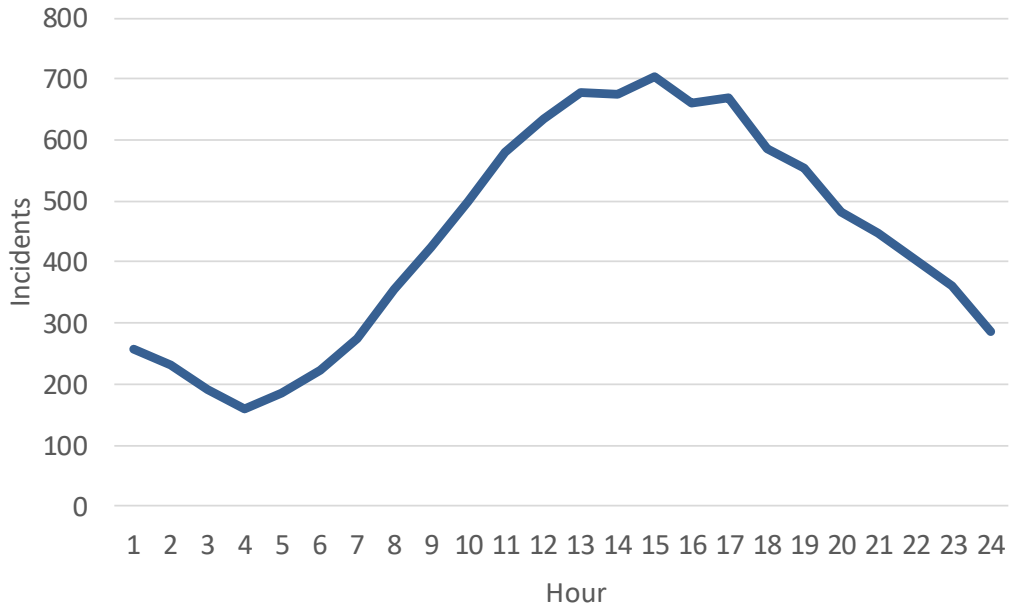
Next, the response workload is compared by the day of the week. Again, there is little variation in response workload by weekday.

Figure 86: Daily Response Workload



The time analysis that always shows significant variation is response activity by hour of day. Response workload directly correlates with the activity of people, with workload increasing during daytime hours and decreasing during nighttime hours, as shown in the following figure. Incident activity is at its highest between 9:00 a.m. and 9:00 p.m.

Figure 87: Hourly Response Workload

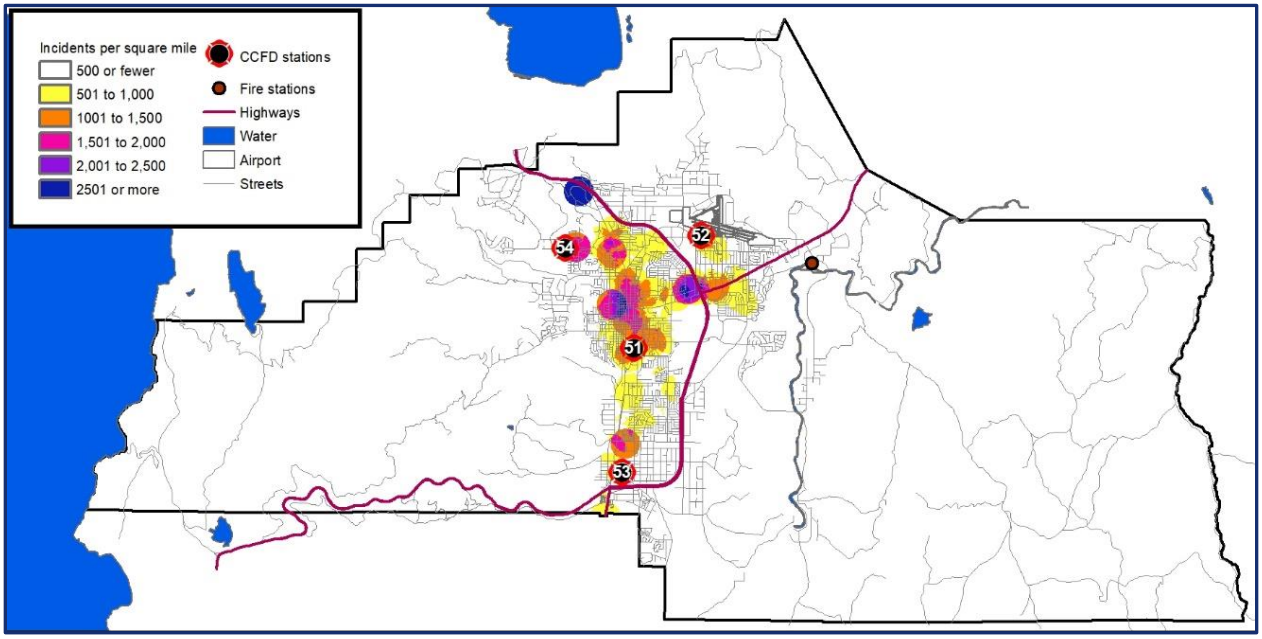


Spatial Analysis

In addition to the temporal analysis, it is useful to examine the geographic distribution of service demand. The following figures indicate the distribution of emergency incidents for CCFD during 2018.

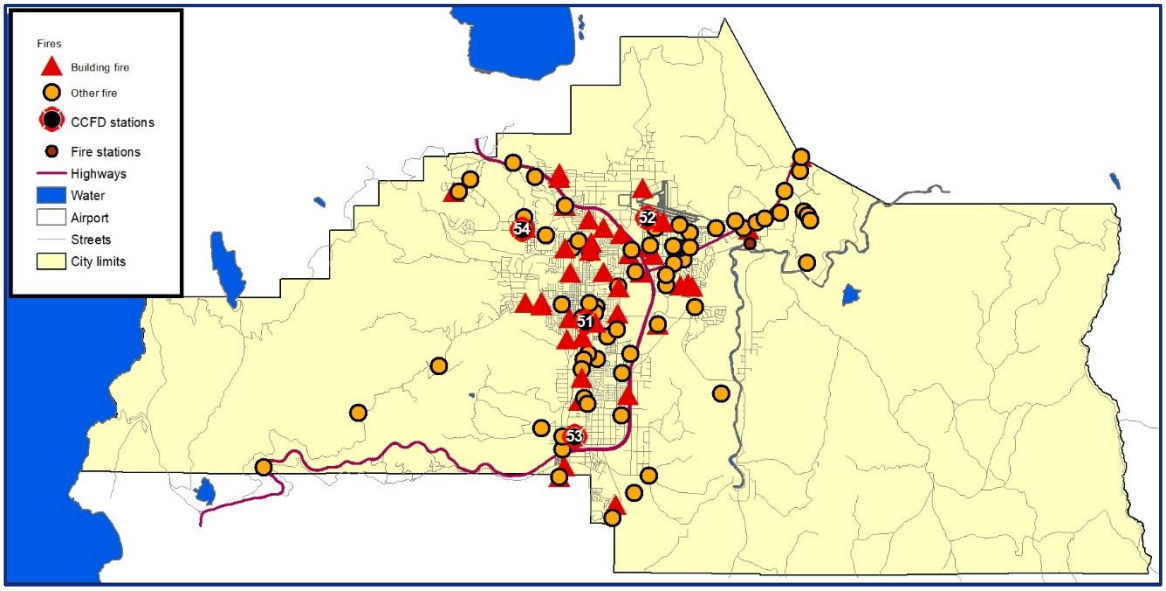
The first figure displays the number of incidents per square mile within various parts of the city. The greatest service demand is the area north of Fire Station 51.

Figure 88: Service Demand Density, 2018



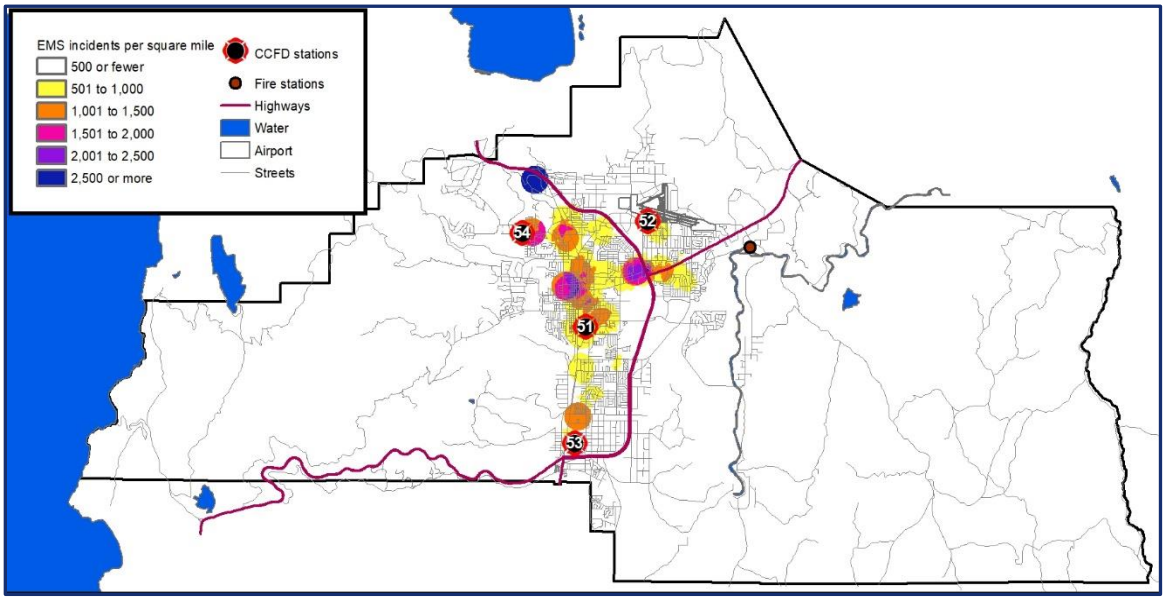
The preceding figure reflects all calls within the city served by CCFD. Service demand can vary by area based on incident type. The following figure displays the location of fires occurring within the CCFD service area during 2018. This illustrates that fire incidents are distributed throughout the developed area of the city.

Figure 89: Fires, 2018



Similarly, emergency medical incidents also occur in greater concentration in areas of higher population density. The following figure displays emergency medical incidents per square mile during 2018. Incident concentration follows population density.

Figure 90: Emergency Medical Incidents per Square Mile, 2018



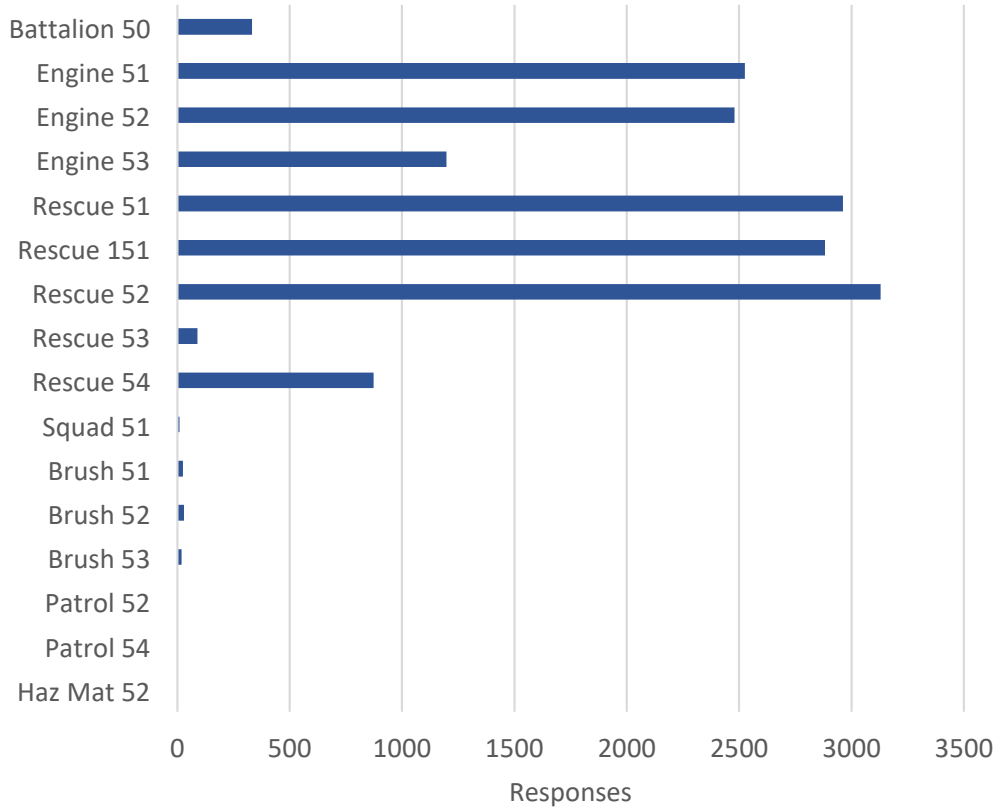
Unit Workload Analysis

A review of workload by response unit can reveal much about response time performance. Although fire stations and response units may be distributed in a manner to provide quick response, that level of performance can only be obtained when the response unit is available in its primary service area. If a response unit is already on an incident and a concurrent request for service is received, a more distant response unit will need to be dispatched. This will increase response times.

Response Unit Workload

The workload on individual response units during the study period is shown in the following figure. Individual response unit workload can be greater than the workload in its home station area. Many incidents, such as structure fires, require more than one response unit.

Figure 91: Response Unit Workload



The amount of time a given unit is committed to an incident is also an important workload factor. The following figure illustrates the average time each unit was committed to an incident, from initial dispatch until it was available for another incident.

Figure 92: Average Minutes Committed to an Incident by Unit

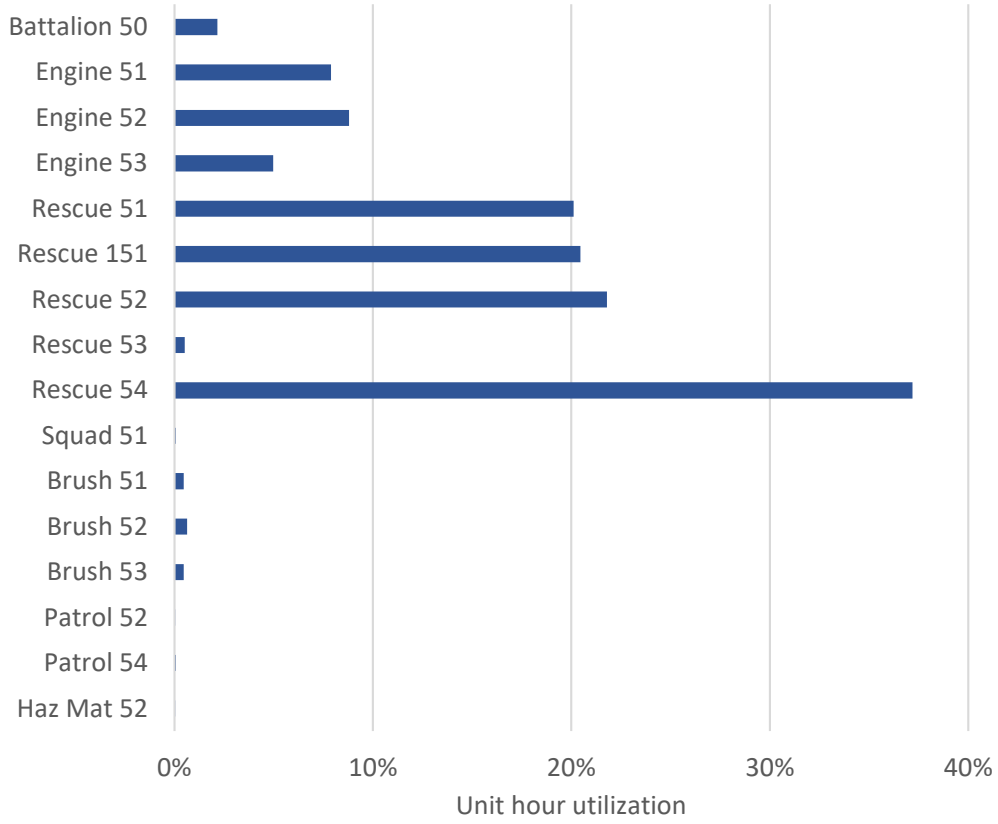
Unit	2019
Battalion 50	34.1
Engine 51	16.4
Engine 52	18.6
Engine 53	21.9
Rescue 51	35.7
Rescue 151	37.3
Rescue 52	36.6
Rescue 53	30.4
Rescue 54	53.2
Squad 51	37.5
Brush 51	98.6
Brush 52	110.0
Brush 53	137.7
Patrol 52	75.2
Patrol 54	186.7
Haz Mat 52	162.7

Unit hour utilization is an important workload indicator. It is calculated by dividing the total time a unit is committed to all incidents during a year divided by the total time in a year. Expressed as a percentage, it describes the amount of time a unit is not available for response since it is already committed to an incident. The larger the percentage, the greater a unit's utilization and the less available it is for assignment to an incident.

Unit hour utilization is an important statistic to monitor for those fire agencies using percentile-based performance standards, as does CCFD. In CCFD's case, where performance is measured at the 90th percentile, a response unit with greater than 10 percent utilization will not be able to provide an on-time response to its 90 percent target even if response is its only activity.

Rescues 51, 151, and 52 all exceed 10 percent utilization. Rescue 54, as primarily a BLS transport vehicle, predictably has the greatest unit hour utilization in the system. However, since it is not an emergency response unit, its high unit hour utilization does not impact response time performance.

Figure 93: Unit Hour Utilization



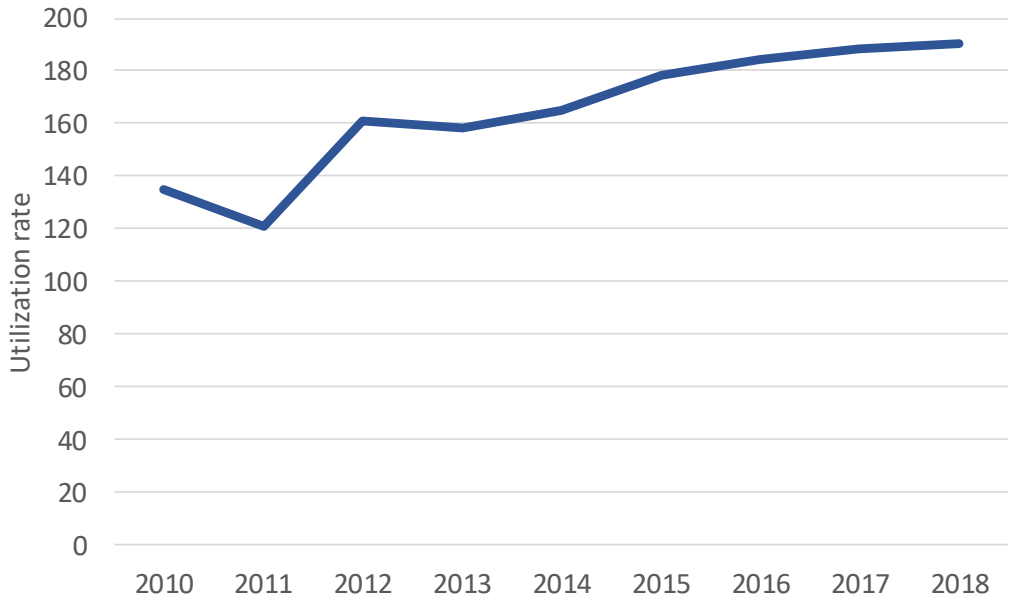
Population and Incident Workload Projection

The most significant predictor of future incident workload is population; 100 percent of requests for emergency medical service are people-driven. The National Fire Protection Association reports that approximately 70 percent of all fires are the result of people either doing something they should not have (i.e., misuse of ignition source) or not doing something they should have (i.e., failure to maintain equipment). It is reasonable to use forecast population growth to predict future fire department response workload.

The current population of Carson City is 55,414. The City provided a population forecast. Carson City's population is forecast to grow to 69,076 by 2033.

The current fire department services utilization rate is 190.2 incidents per 1,000 population. The total utilization rate has increased 41.2 percent over the last eight years. Figure 94 illustrates that growth.

Figure 94: Utilization Growth



If the utilization growth rate of the past eight years continues, the total utilization rate could reach 319.7 incidents per 1,000 population. The increased utilization rate, plus expected population growth, will increase the CCFD's workload to as many as 22,000 incidents by the year 2033 driven primarily by requests for emergency medical service and ambulance transportation.

REVIEW OF HISTORICAL SYSTEM PERFORMANCE

Incident data for the period between January 1, 2018, and December 31, 2018, was evaluated in detail to determine CCFD's current performance. Data was obtained from CCFD incident reports and the dispatch center's computer-aided dispatch system.

Only priority incidents occurring within the CCFD service area are included in the analysis. Priority incidents involve emergencies to which the fire department initiated a "code 3" (using warning lights and sirens) response (5,931 incidents during 2018). Non-emergency public assistance requests were excluded. Performance is reported based on the initial type of incident as dispatched. Three categories are used to report performance:

- **Fire:** Responses to a report of a fire.
- **Emergency medical:** All emergency medical incidents.
- **Other:** Any other incident to which the fire department responded with lights and sirens.

Each phase of the incident response sequence was evaluated to determine the current performance. This allows an analysis of each individual phase to determine where opportunities might exist for improvement.

The total incident response time continuum consists of several steps, beginning with the initiation of the incident and concluding with the appropriate mitigation of the incident. The time required for each of the components varies. The policies and practices of the fire department directly influence some of the steps.

CCFD's response performance was compared to its own adopted goals. These goals match those found in the national consensus standard for response performance; the National Fire Protection Association Standard 1710: *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*, 2016 Edition. The dispatch center's performance was compared to the CCFD's goals as well as standards found in the National Fire Protection Association Standard 1221: *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*, 2019 Edition.

The following figure summarizes the performance standards found in the National Fire Protection Association (NFPA) documents.

Figure 95: Summary of CCFD Performance Goals

Incident Interval	Performance Goal
9-1-1 call answer time (time from first ring to answer).	Within 15 seconds, 90% of the time
Call process time (time from acceptance at the dispatch center until notification of response units).	Within 60 seconds, 90% of the time
Turnout time (time from notification of response personnel until the initiation of movement towards the incident). Fire incidents and special operations incidents All other emergency incidents	 Within 80 seconds, 90% of the time Within 60 seconds, 90% of the time
First unit travel time (time from initiation of response until arrival of the first unit at the incident). Urban Rural	 Within 4 minutes, 90% of the time Within 9 minutes, 90% of the time
First unit response time (time from dispatch until arrival of the first unit at the incident). Fire incidents and special operations incidents All other emergency incidents	 Within 5 minutes, 20 seconds, 90% of the time Within 5 minutes, 90% of the time
Full effective response force travel time (time from dispatch until all units initially dispatched arrive at the incident. Response resources needed for a moderate risk building fire are used for the evaluation.)	Within 9 minutes, 20 seconds, 90% of the time

In keeping with NFPA Standards 1710 and 1221 and CCFD's performance goals, all response time elements are reported at a given percentile. Percentile reporting is a methodology by which response times are sorted from least to greatest, and a "line" is drawn at a certain percentage of the calls to determine the percentile. The point at which the "line" crosses the 90th percentile, for example, is the percentile time performance. Thus, 90 percent of times were at or less than the result. Only 10 percent were longer.

Percentile differs greatly from average. Averaging calculates response times by adding all response times together and then dividing the total number of minutes by the total number of responses (mean average). Measuring and reporting average response times is not recommended. Using averages does not give a clear picture of response performance because it does not clearly identify the number and extent of events with times beyond the stated performance goal.

What follows is a detailed description and review of each phase of the response time continuum. All phases will be compared to CCFD's performance goals.

Detection

The detection of a fire (or medical incident) may occur immediately if someone happens to be present or if an automatic system is functioning. Otherwise, detection may be delayed, sometimes for a considerable period. The time period for this phase begins with the inception of the emergency and ends when the emergency is detected. It is largely outside the control of the fire department and not a part of the event sequence that is reliably measurable.

Call Processing

Most emergency incidents are reported by telephone to the 9-1-1 center. Call takers must quickly elicit accurate information about the nature and location of the incident from persons who are apt to be excited. A citizen well-trained in how to report emergencies can reduce the time required for this phase. The dispatcher must identify the correct units based on incident type and location, dispatch them to the emergency, and continue to update information about the emergency while the units respond. This phase begins when the 9-1-1 call is answered at the primary public safety answer point (PSAP) and ends when response personnel are notified of the emergency. This phase, which has two parts, is labeled "call processing time."

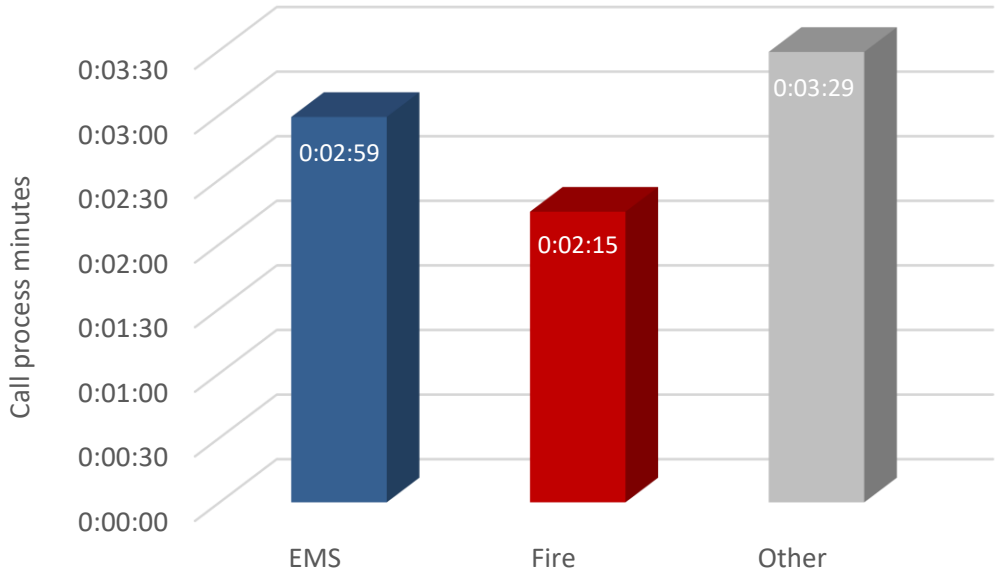
Carson City Public Safety Emergency Communications Center (ECC), a division of the Sheriff's Office, is the PSAP and dispatch service provider for the CCFD. It answers the call, processes the information, and dispatches CCFD response units.

The National Fire Protection Association Standard 1221 recommends that 9-1-1 calls be answered within 15 seconds, 90 percent of the time (within 20 seconds, 95% of the time). ECC reports they answer 96 percent of calls within 10 seconds and 100 percent of calls within 20 seconds.

The second part of call processing time, dispatch time, begins when the call is received at the dispatch center (ECC) and ends when response units are notified of the incident. CCFD standards prescribe that this phase should occur within 60 seconds, 90 percent of the time.

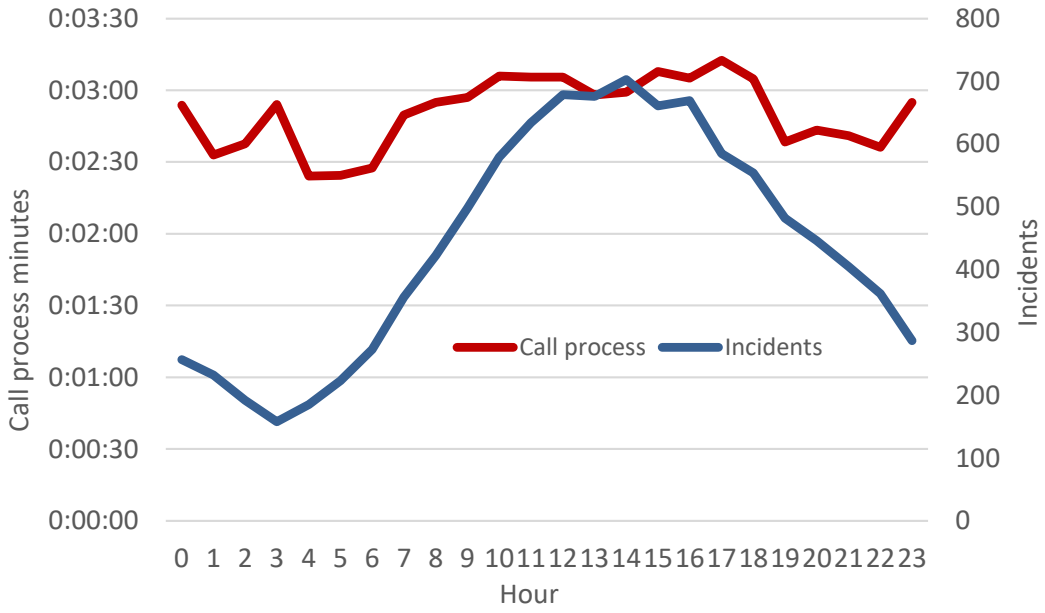
The following figure illustrates performance by ECC from the time it receives the call until it notifies response units. Overall performance during 2018 was within 2 minutes, 56 seconds, 90 percent of the time, well over CCFD's goal.

Figure 96: ECC Dispatch Time Performance



The workload at the dispatch center can influence call processing performance. The following figure illustrates performance at different times of the day compared to the fire department's response workload. Given that call process time appears to increase with higher call volume and decrease during periods of lower call volume, it appears that workload may be impacting dispatch center performance.

Figure 97: Call Processing Time by Hour of Day, 2018

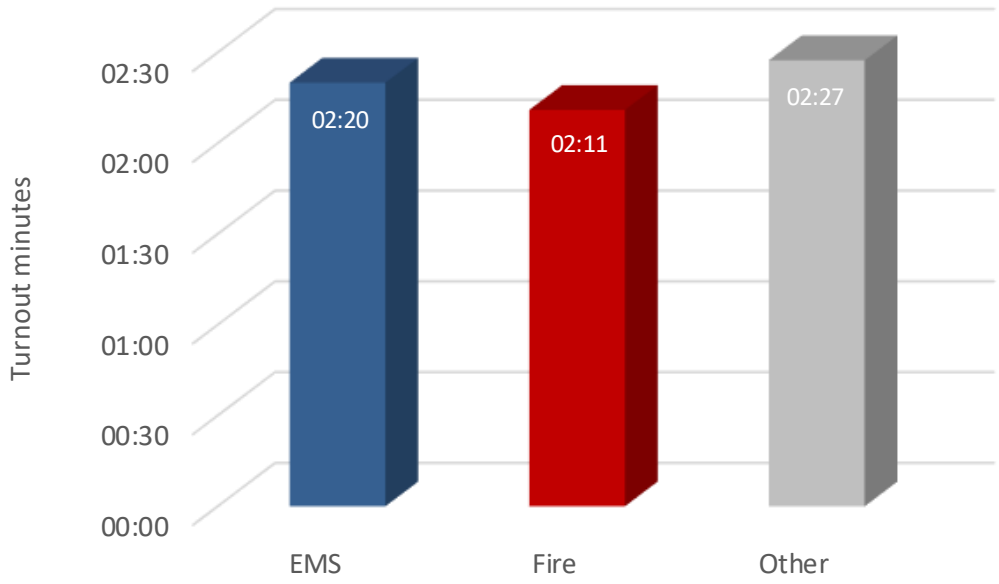


Turnout Time

Turnout time is a response phase controllable by the fire department. This phase begins at the notification of an emergency in progress by the dispatch center and ends when personnel and apparatus begin to move towards the incident location. Personnel must don appropriate equipment, assemble on the response vehicle, and begin travel to the incident. Good training and proper fire station design can minimize the time required for this step.

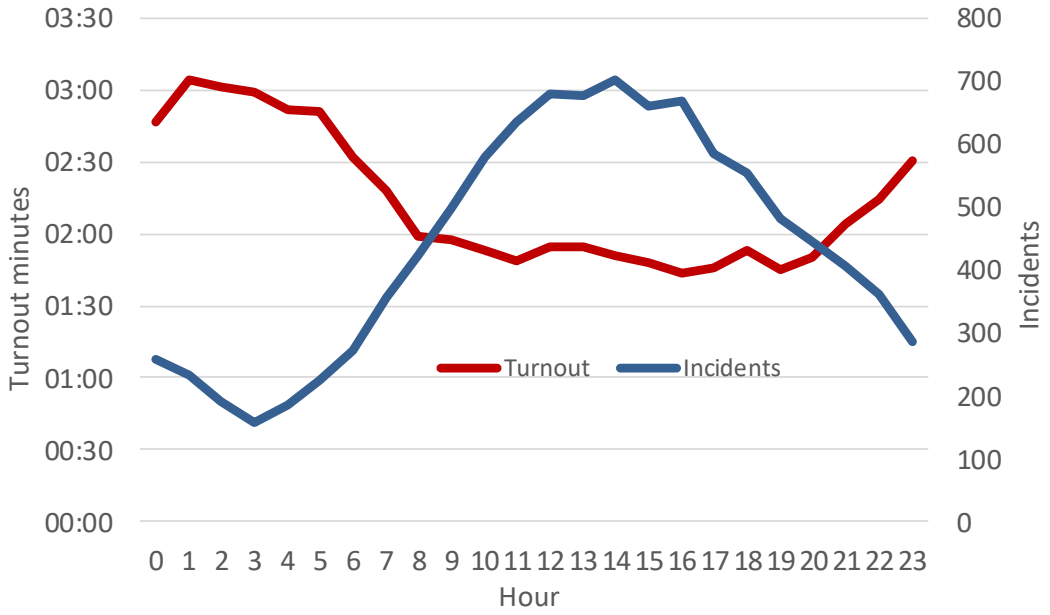
The performance goal for turnout time is within 80 seconds, 90 percent of the time for fire and special operations incidents, within 60 seconds, 90 percent of the time for all other priority emergency incidents. The following figure lists turnout time for all incidents as well as specific incident types. Turnout times for all incident types exceed standards. During 2018, turnout time for fire incidents was within 2 minutes, 11 seconds, 90 percent of the time, within 2 minutes, 20 seconds, 90 percent of the time for EMS incidents, and within 2 minutes, 27 seconds, 90 percent of the time for other incidents.

Figure 98: Turnout Time Performance



Turnout time can vary by the hour of the day. In this case, turnout time varied by 80 seconds between the early morning hours and daytime hours.

Figure 99: Turnout Time by Hour of Day, 2018



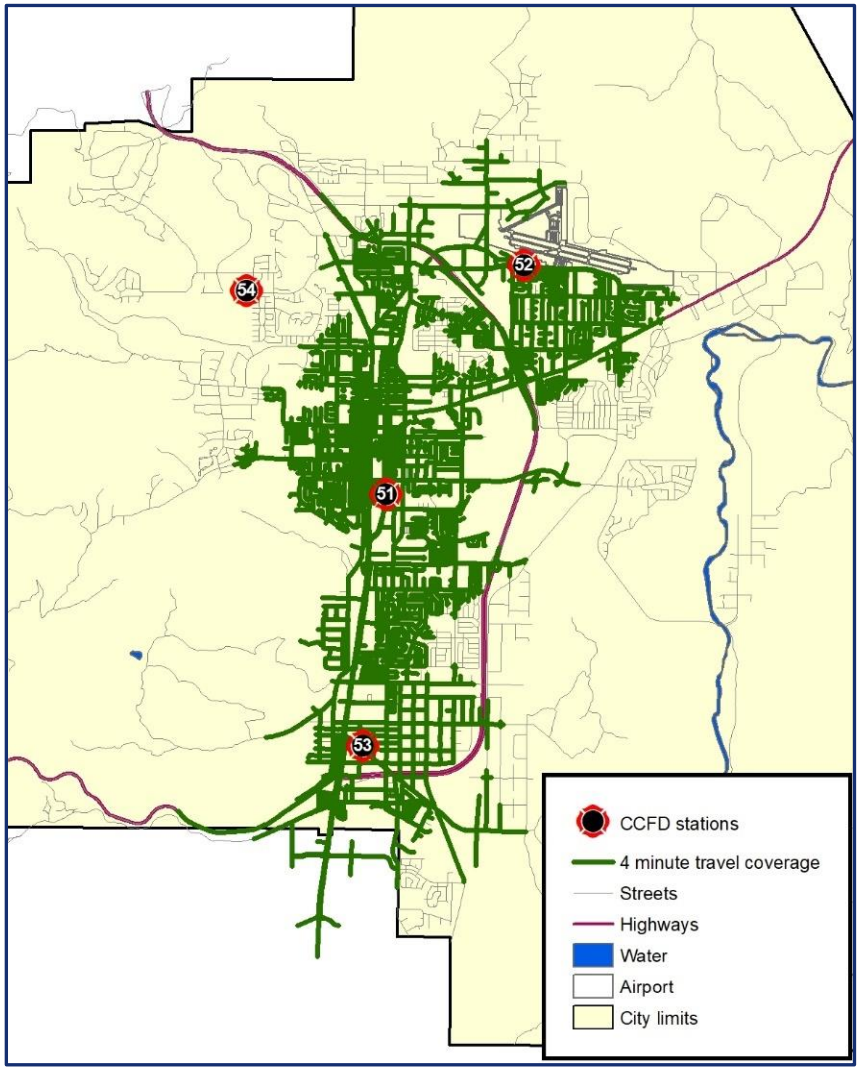
Distribution and Initial Arriving Unit Travel Time

Travel time is potentially the longest of the response phases. The distance between the fire station and the location of the emergency influences response time the most. The quality and connectivity of streets, traffic, driver training, geography, and environmental conditions are also factors. This phase begins with the initial apparatus movement towards the incident location and ends when response personnel and apparatus arrive at the emergency's location. Within the performance goal, 4 minutes is allowed for the first response unit to arrive at an incident in the urban area and 9 minutes within the rural area.

CCFD units are selected for the response based on which station is closest to the incident.

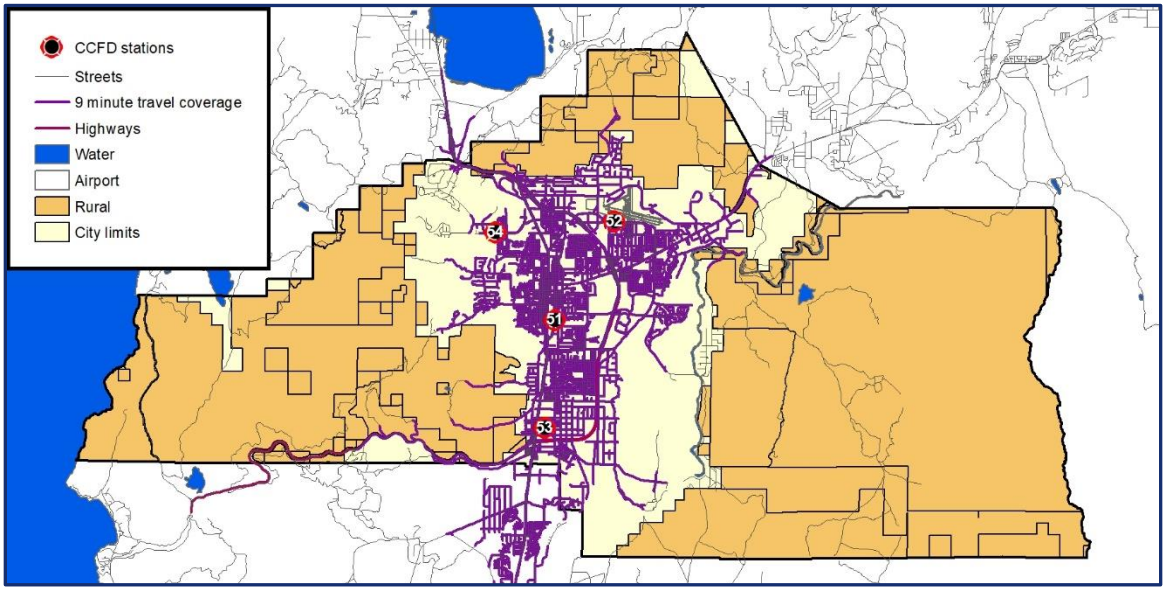
The following figure illustrates the street sections that can be reached from all staffed CCFD fire stations in 4 minutes of travel time. It is based on posted road speeds modified to account for turning, stops, and acceleration. No adjacent agency fire stations provide coverage within Carson City in four minutes or less.

Figure 100: Initial Unit Travel Time Capability—Urban



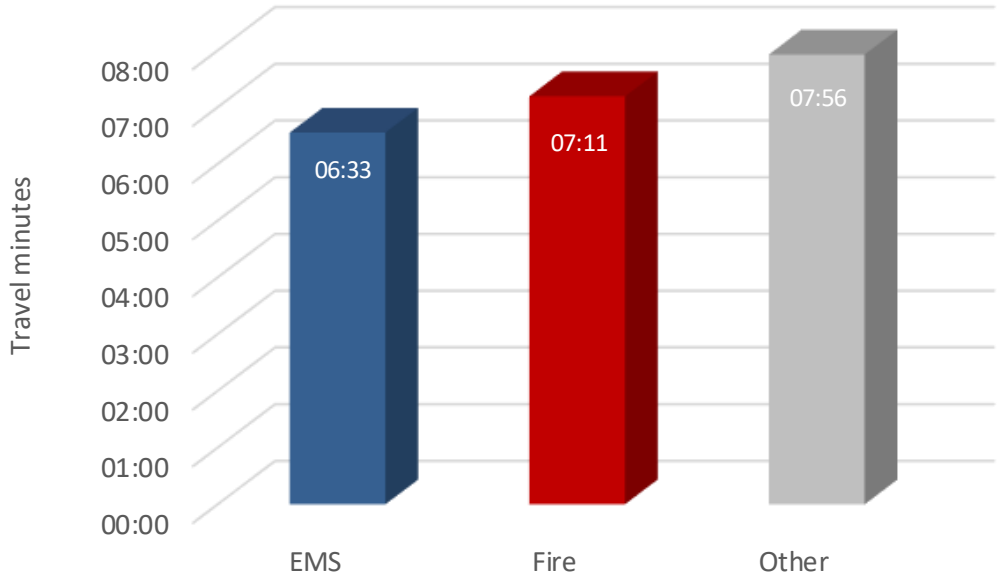
The next figure shows the area that can be reached within 9 minutes of travel and the area defined as "rural." It also shows the locations of incidents in the rural area during 2018.

Figure 101: Initial Unit Travel Time Capability—Rural



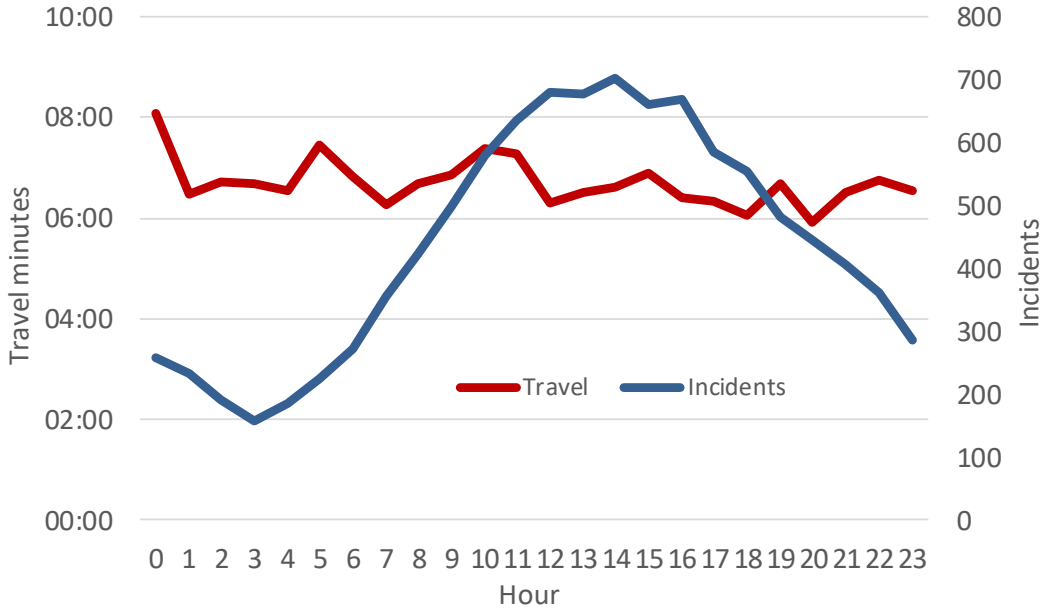
The following figure lists travel times for all priority incidents as well as specific incident types. CCFD's travel times exceed its goal in all incident types. Travel time for all incidents during 2018 was within 6 minutes, 40 seconds, 90 percent of the time.

Figure 102: Travel Time Performance—First Arriving Unit



Travel time can vary considerably by the time of day. Heavy traffic during morning and evening rush hours can slow the fire department's response. Concurrent incidents can also increase travel time since units from more distant stations would need to respond. Traffic does not appear to be a factor here as daytime travel was generally similar to nighttime travel.

Figure 103: Overall Travel Time and Incidents by Hour of Day—First Arriving Unit, 2018



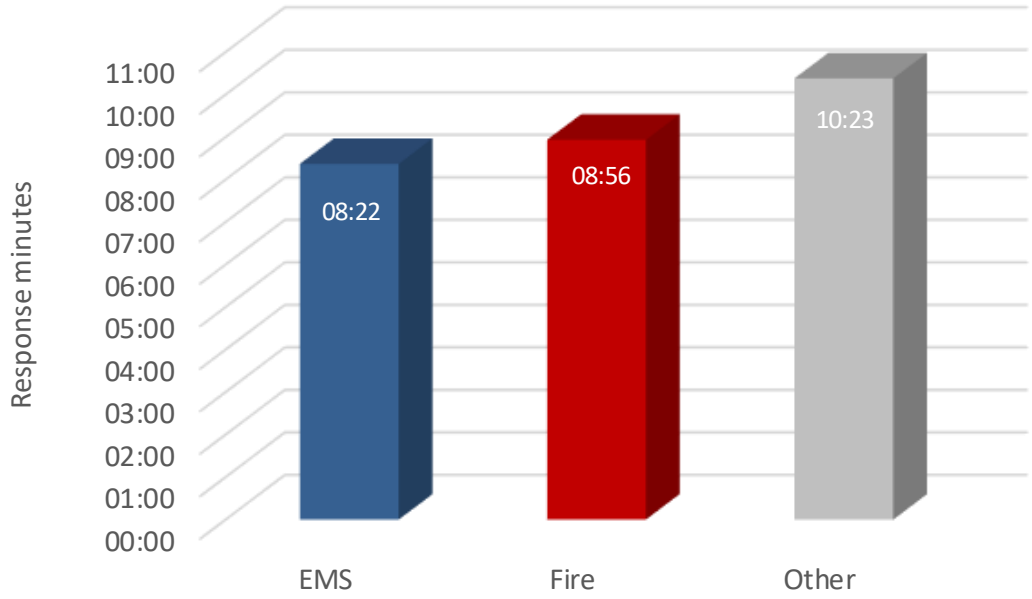
In order to provide an on-time response, a response unit must be within 4 travel minutes of the incident. Incidents were reviewed to identify how many occurred within 4 travel minutes of a fire station. During 2018, 4,636 of the 5,931 incidents in the city (78.1%) occurred within 4 travel minutes of a fire station.

First Arriving Unit Response Time

Response time is defined as that period between the notification of response personnel by the dispatch center that an emergency is in progress until the arrival of the first fire department response unit at the emergency. When turnout time and travel time are combined, the performance goal for response time is within 5 minutes, 20 seconds, 90 percent of the time for fire and special operations incidents, and within 5 minutes, 90 percent of the time for all other priority incidents.

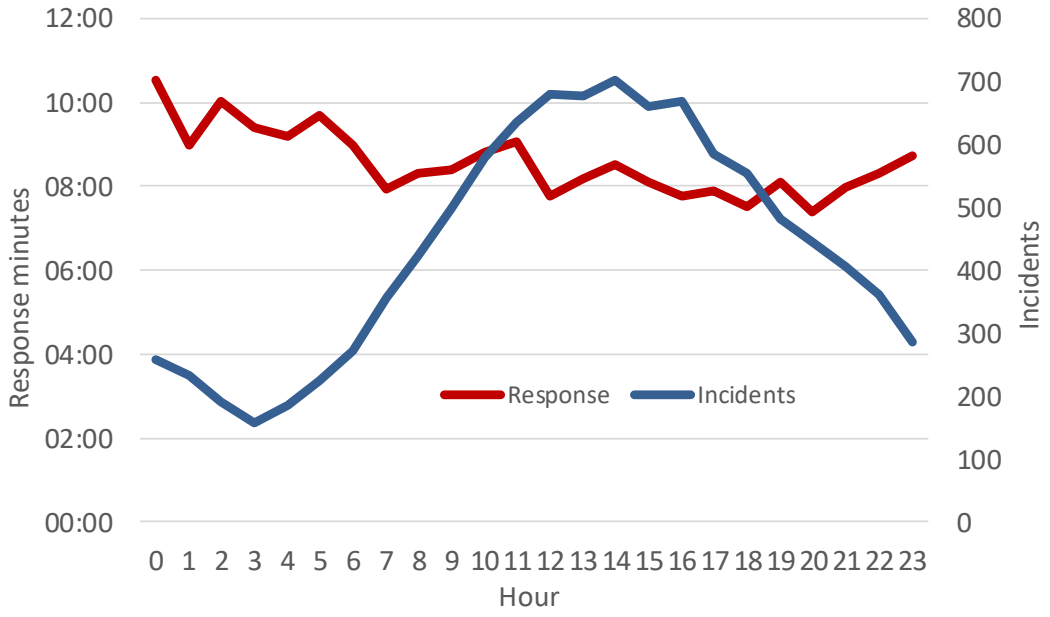
The following figure illustrates the response time for all priority incidents as well as specific incident types. Overall, response time for all priority incidents was within 8 minutes, 30 seconds, 90 percent of the time during 2018.

Figure 104: Response Time Performance—First Arriving Unit



The next figure shows response time and the number of incidents by the hour of the day for all incidents. Response time is slowest during the nighttime hours and fastest during the day. Generally, CCFD's best response times occur during the period of the day when response activity is at its highest.

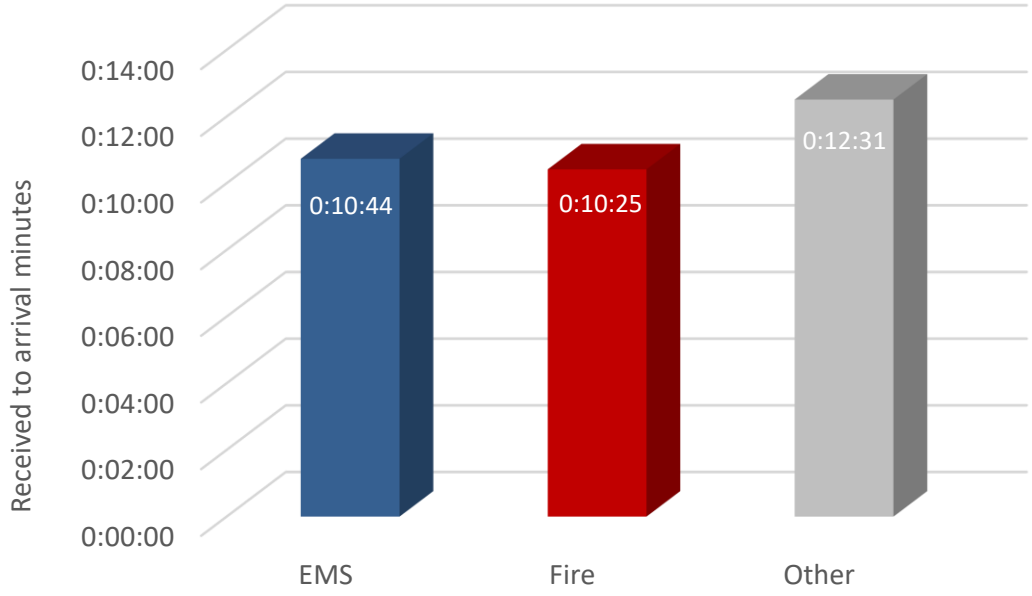
Figure 105: Hourly Response Time Performance, 2018



First Arriving Unit Received to Arrival Time

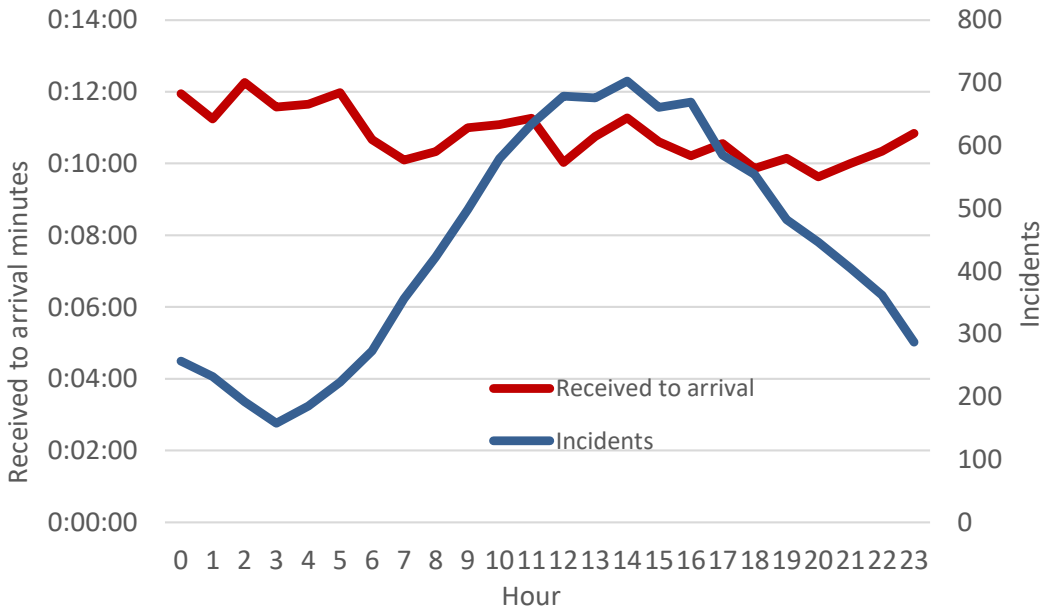
From the customer's standpoint, response time begins when the emergency occurs. Their first contact with emergency services is when they call for help, usually by dialing 9-1-1. Received to arrival time combines answer/transfer, call processing, turnout, and travel time. When the performance goals are combined, received to arrival time should be within 6 minutes, 20 seconds, 90 percent of the time for fire and special operations incidents, within 6 minutes, 90 percent of the time for all other priority incidents. The following figure shows received to arrival performance for priority incidents within the CCFD service area. Overall, received to arrival time was within 10 minutes, 46 seconds, 90 percent of the time during 2018.

Figure 106: Received to Arrival Time—First Arriving Unit



The next figure shows received to arrival performance by time of day also compared to incident activity by time of day. Received to arrival, from the customer's standpoint, is quickest during the day and slowest during the early morning hours.

Figure 107: Hourly Received to Arrival Performance, 2018



Concentration and Effective Response Force Capability Analysis

Effective Response Force (ERF) is the number of personnel and apparatus required to be present on the scene of an emergency incident to perform the critical tasks in such a manner to effectively mitigate the incident without unnecessary loss of life and/or property. The ERF is specific to each individual type of incident and is based on the critical tasks that must be performed.

The response time goal for the delivery of the full ERF to a building fire is within 9 minutes, 20 seconds, 90 percent of the time. CCFD has defined the minimum full effective response force for low rise building fires as four fire engines, two rescues, and one Battalion Chief with a total of 17 firefighters. For high-risk commercial building fires is 29 firefighters, a level of resource not available to CCFD within the specified time.

No data is available to identify if building fires by type of risk (low-rise, high-risk commercial, etc.). All building fires have been evaluated using the low-rise effective response force criteria. The following figure illustrates effective response performance during the study period. The effective response force was delivered to two building fires during 2018.

Figure 108: Effective Response Force Performance—4 Engines, 2 Rescues, 1 Battalion Chief

Time to Effective Response Force Arrival
0:18:23
0:16:56

Many building fires did receive a response from three engines, two rescues, and One Battalion Chief; the resources that are available from CCFD itself. This complement of apparatus, but fewer than the required 17 firefighters, was delivered to eight building fires during 2018. The following figure illustrates the time required to deliver this level of response to these fires.

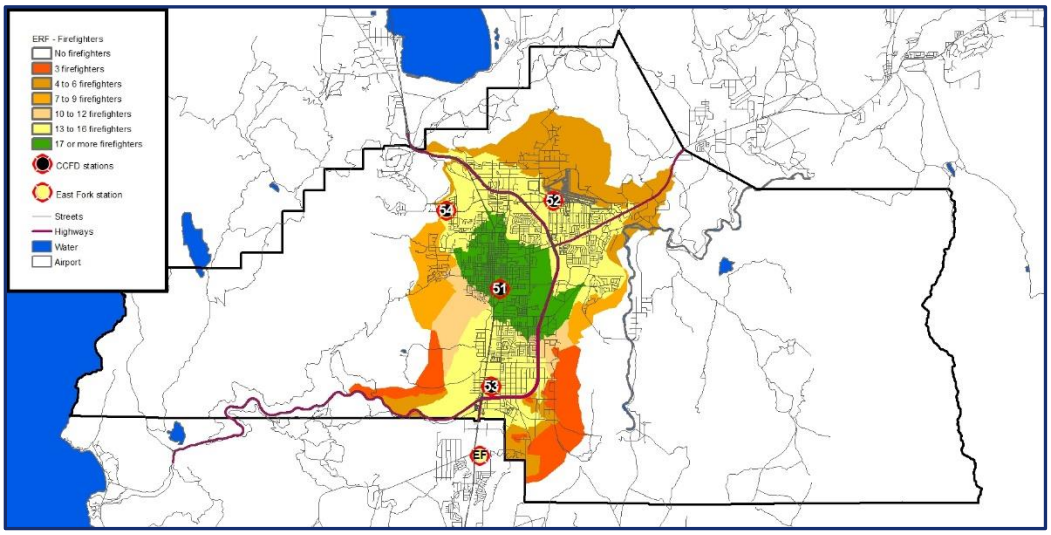
Figure 109: Effective Response Force Performance

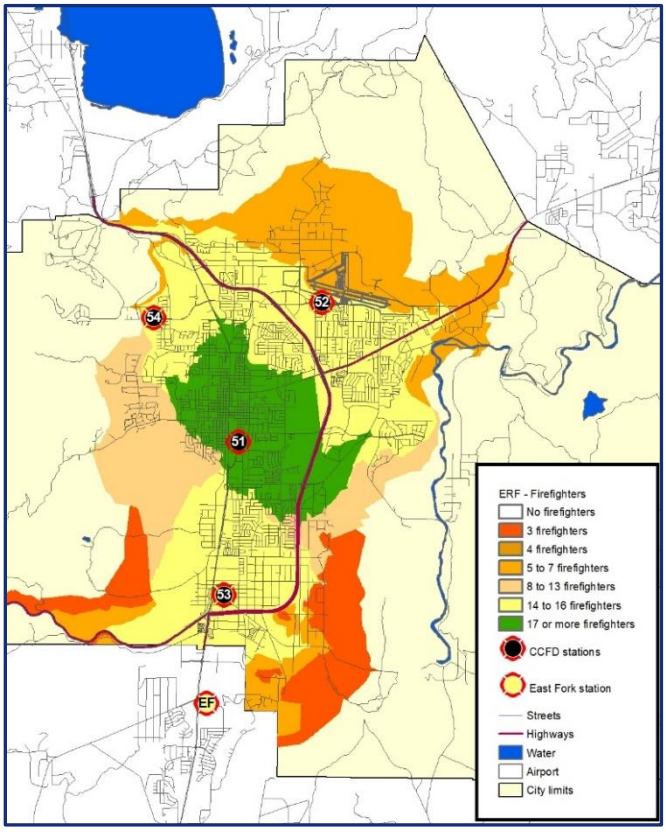
Time to Effective Response Force Arrival	Apparatus Only
0:16:46	Apparatus only
0:11:42	Apparatus only
0:11:30	Apparatus only
0:13:24	Apparatus only
0:12:06	Apparatus only
0:07:33	Apparatus only
0:18:29	Apparatus only
0:21:38	Apparatus only

Concentration analysis reviews the physical capability of CCFD's resources to achieve its target ERF travel time to its service area. The following figures depict the physical capability of CCFD to assemble apparatus and firefighters by area within an eight-minute travel time. The modeled analysis shown assumes that all response units are available.

The first figure shows the area that can be reached by the various numbers of firefighters. Eight minutes of travel time is allowed to assemble the defined full effective response force on-scene. Since automatic aid resources are farther than eight travel minutes from the city, this figure does not include the resources of adjacent agency stations. The minimum complement of 17 firefighters needed for a low-rise residential fire can only be provided in the area of Station 51. To no part of the city can CCFD provide the firefighters needed for a higher-risk fire.

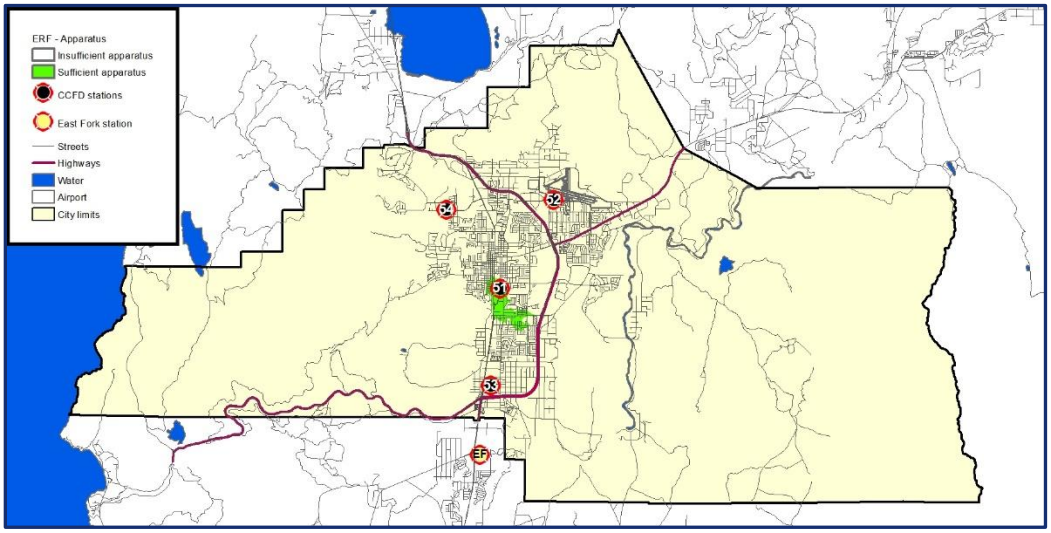
Figure 110: Effective Response Force—Firefighters

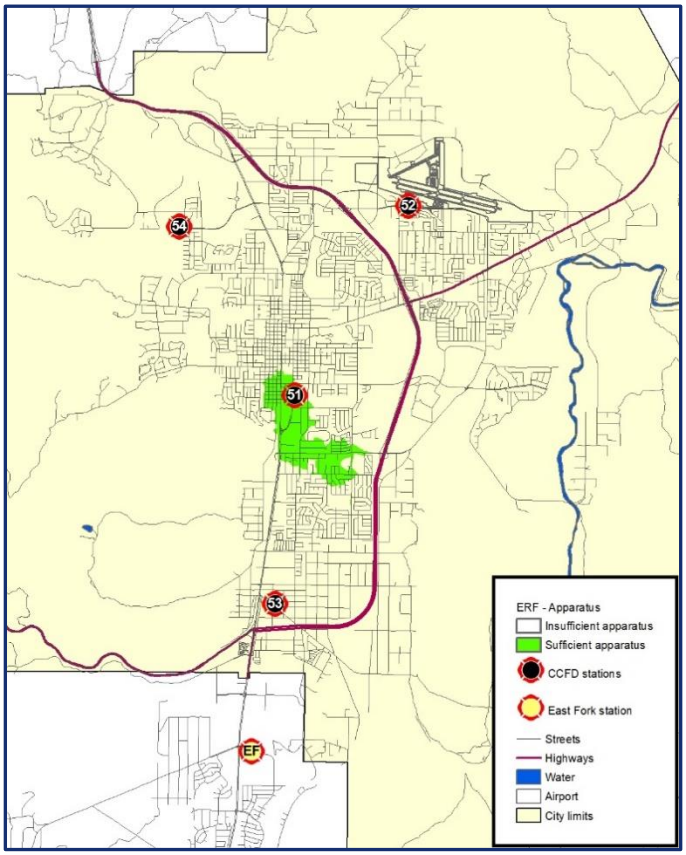




The next figure shows the area to which four fire engines, two rescues, and a Battalion Chief can respond within eight minutes of travel time. The model indicates these resources can be delivered within eight minutes of travel only to a small area around Station 51. CCFD lacks the resources needed for a higher-risk fire.

Figure 111: Effective Response Force—Apparatus, Low Rise Fire





Second Unit Arrival Time

CCFD fire engines are staffed with three personnel. Safety regulations require that at least four firefighters be on scene before firefighters can enter a burning building. The only exception is if it is known that a person is inside the building and needs rescue. Current staffing levels on engines require the arrival of a second response unit before non-rescue interior firefighting activities can be initiated.

Incident data for building fires during the study period were reviewed to determine the time the second response unit arrived on the scene. According to the data, the second unit arrived on-scene of a structure fire within 3 minutes, 19 seconds, 90 percent of the time after the arrival of the first unit (1 minute, 36 seconds on average).

Incident Concurrency and Reliability

When evaluating the effectiveness of any resource deployment plan, it is necessary to evaluate the workload of the individual response units to determine to what extent their availability for dispatch is affecting the response time performance. In simplest terms, a response unit cannot make it to an incident across the street from its own station in four minutes if it is unavailable to be dispatched to that incident because it is committed to another call.

Concurrency

One way to look at resource workload is to examine the number of times multiple incidents happen within the same time frame. Incidents during the study period were examined to determine the frequency of concurrent incidents. This is important because concurrent incidents can stretch available resources and delay response to other emergencies. This factor significantly impacts total response times to emergencies in the jurisdiction.

The following figure shows the number of times during the study period that one or more incidents occurred concurrently. This shows that 6,281 times during 2018 only one incident was in progress at a time. However, 2,999 times there were two incidents in progress at the same time; 873 times there were three incidents in progress at the same time; and once there were eight incidents in progress at the same time.

Figure 112: Incident Concurrency

Concurrent Incidents	2018
1	6,281
2	2,999
3	873
4	252
5	76
6	20
7	4
8	1

It is also useful to review the number of times one or more response units are committed to incidents at the same time. The following figure shows the number of times one or more CCFD response units were committed to incidents. It is more common than not for multiple response units to be simultaneously committed to incidents, with two to four concurrent responses occurring in significant numbers.

Figure 113: Response Unit Concurrency

Concurrent Unit Responses	2018
1	4,659
2	5,086
3	3,334
4	1,840
5	870
6	433
7	221
8	73
9	18
10	8
11	2

STAKEHOLDER INPUT

The ultimate goal of any emergency services delivery system is to provide sufficient resources (personnel, apparatus, and equipment) to the scene of an emergency in time to take effective action to minimize the impacts of the emergency. This need applies to fires, medical emergencies, and other emergency situations to which the fire department responds. Obtaining and understanding the desires and expectations of internal and external stakeholders proves an important first step.

It is important to note that the information solicited and provided during this process was provided in the form of "people inputs," some of which are perceptions as reported by stakeholders. All information was accepted at face value without an in-depth investigation of its origination or reliability. ESCI reviewed the information for consistency and frequency of comment to identify specific patterns and/or trends. The observations included in this report were confirmed by multiple sources, or the information provided was significant enough to be included. Based on the information review, the team was able to identify a series of observations, recommendations, and needs that are included in this report.

Perceptions about the Carson City Fire Department and the services it delivers were gathered by direct interviews of stakeholders. Twenty-nine stakeholders were scheduled for interviews that were completed over a two-day period. Of these 29 interviewees, these stakeholders represented the Carson City Manager and department heads, the City Council, business and community members, the firefighter's union, fire administrative staff, chief officers, and the Fire Prevention Bureau.

The responses are summarized below:

Citizen and Business Community Members

Describe your expectations of the Fire Department.

- They respond within an appropriate time.
- Within 10 minutes or less.

What expectations are not being met to your satisfaction?

- Disappointing that there are no longer any volunteers.

What do you think the Fire Department is doing particularly well?

- They are very responsive.

Are there services that you think the Department should be providing that they are not providing now?

- Inspections.
- Provide support during Fire Prevention Week.

Are there services the Department is providing that you think should be discontinued or done differently?

- If there is anything negative, it could be due to the Fire Department holding up a business's opening due to complying with regulations.

Do you believe the first arriving response units should be staffed and equipped to take appropriate actions given the emergency?

- Yes.
- The public believes it is a waste of manpower and seems like it's overkill to have both an engine and medic unit respond.

Please share any other thoughts or comments you may have.

- Carson City is growing quite a bit; the population has increased as well as the number of new housing developments.
- The City could use another fire station on the east end due to houses and apartments being built.
- The Fire Department does a great job reaching out to the community.
- Comments from other community members regarding the Fire Department are always positive, few—if any—complaints and more compliments.
- There exists a concern about the homeless in our community.

Administrative Support

What strengths contribute to the success of the fire department?

- There is greater strength and a positive change in culture due to the new Administration.
- Teamwork
- We are partners not adversaries.
- Support one another.
- Cross Trained.
- Get along well together.

What do you do well?

- Manage day-to-day operations.
- Respond quickly to the needs of the operational side.

What are some areas in which you think the Department could make improvements?

- There appear to be unlimited desires with a limited amount of people to meet those desires.
- Communication, i.e., not reading or responding to messages via email; this situation needs to be improved.
- This side of the Fire Department is like the stepchild and is always trying to catch up.
- Create an overall picture of what we are doing and where we are going.
- We are at maximum capacity when it comes to our workload.

What are the critical issues you believe need to be resolved?

- Call volume has increased significantly; we are responding with the same amount of staff we have had for the last twenty years.
- Overall staffing within the Fire Department due to not enough Administrative staff.
- Do we need another fire station?
- Upgrade the reporting systems, i.e., Firehouse, etc.
- Internal communications.

What opportunities, in your view, are available to improve the service and capabilities of the Fire Department?

- Administration "Staffing" needs a full-time position.
- Increase in Clerical in entering data into Firehouse.
- Additional staff to support EMS, Prevention, and Emergency Management as well as support for the Battalion Chiefs.

What do you do well?

- Manage day-to-day operations.
- Respond quickly to the operational side's needs.

How would you describe the level of emergency services provided by the Fire Department—in particular—in your division?

- Rated between a "6" and a "7" on a scale of "10."

How would you make it a "10?"

- Embrace what it is that we do; treat patients as if they are our own family.

If you could change one thing in the Fire Department, what would it be?

- Focus on long-term fiscal planning.
- Develop a Capital Improvement Plan.
- Apply for grants.

Chief Officers, Labor Leaders, Rank & File

What strengths contribute to the success of the Fire Department?

- The employees, we get it done doing more with less.
- We are the region's best multi-tasking Fire Department.
- Tenacious, hardworking folks.
- Need to work hard here; less staffing that 22 years ago.
- We take pride in what we do.

What do you do well?

- Take care of the City very well while lagging behind in staffing, support services.
- Good relationship with the Chief, who is trying to address challenges.
- We are busy running calls and are aggressive when getting the job done.
- Multi-tasking as an organization; we do it better than anybody.
- Rescues.
- Advanced Life Support transfers.
- Innovative; we initiated the Basic Life Support Program.
- On-going shift training as well as responding to request for services.
- Effective workforce.
- Cross-staffing rescue with the engine company.

What are some areas in which you think the Department could make improvements?

- Facilities, in general, are not large enough to work efficiently.
- There is not enough Administrative support.
- We are not staffed at an adequate level; we had 57 members online and now have 51.
- Recruitment and retention.
- Staff the ladder truck.
- Retention. We do not want to be a training agency for Firefighters or Paramedics who move on to other agencies.
- Increase the ratio of Firefighters compared to Medics.
- The attitude of the rank of Firefighters needs to be improved.
- Dispatch is overseen by the Carson City Sheriff, and there is no direct influence by the Fire Department. The system is outdated and needs to be brought up to date.
- Create a fully staffed Training Division.

What do you see as the top three critical issues faced by the Fire Department today?

- Staffing
- Recruitment and Retention
- A sustainable future at an appropriate level which would include facilities.

Elected Officials, City Management, and Department Heads

Describe your expectations of the Fire Department:

- Be responsive to the public.
- Be competent.
- Provide valuable services with the most effective means.
- Keep an eye on their expenses.
- Community-oriented like other fire services.
- On the budget side, supporting them in what they need in order to get the job done.

Which of these expectations is not being met to your satisfaction?

- All expectations are currently being met.
- The Department does a great job with what they have.
- Get control of their overtime.
- They do an excellent job even though their workload is higher than any fire department in Northern Nevada.
- Passion for the work that they do; it is very important to them.
- Fire, Public Works, and Law work very well together.
- The relationship between Fire, Public Works, and Law is very valuable.
- Incident command.

Are there services that you think the Fire Department should be providing that they are not now?

- Expand basic life support services to the next level.
- Explore the value of Community Paramedicine model with the hospital.
- Their weakest area is in Inspections – Prevention.

When you dial 9-1-1 to report an emergency, how long should it take for help to arrive?

- 2 minutes but it is not reasonable.
- Now it's under 5 minutes.
- 4 to 5 minutes.

Does that expectation change depending on where in the system's service area you are located?

- No, if they move to the outskirts of the Fire Department's service area, they should not expect to receive the same time-response as those living closer to the station.
- In a perfect world—it doesn't change, but it does change.

There are two deployment strategies for fire service resources. The first suggests that all residents of the Department should generally receive the same level of service (i.e., fire stations are spaced uniformly to equalize response time throughout the community). The second strategy suggests that resources should be deployed to serve the next most-likely emergency to occur (the more populated an area, the more likely an emergency will occur). One choice tries to create as much equity in the delivery of service to all residents. The other concentrates resources in areas with higher incident activity, leaving other areas with slower service. Which strategy do you think makes the most sense for the community?

- The 2nd scenario; society has the mindset of entitlement.
- Should try to keep the same response time to all that they serve.
- Neither strategy sounds perfect; however, recognize the value of both deployment strategies.

What opportunities, in your view, are available to improve the service and capabilities of the Fire Department?

- The existing Strategic Plan expires in June, and there is a need for another Fire Station and additional employees.
- There is a need for a 2nd station and consider locating it on the east side of town.
- Response times to the east side of town needs to be improved; appears to be between 10–15 minutes.

CONCLUSIONS & RECOMMENDATIONS

This section of this report contains various findings and recommendations with the specific intent of providing the Carson City Fire Department with a Long-Range Master Plan that identifies short, mid, and long-term recommendations that can deliver the desired levels of service at the most efficient cost. ESCI has taken into consideration population growth projections, along with historical and forecast activity rates, in the development of the projections for future service demand and the impacts on the Department and the community.

Key Findings

- The working relationship between Fire, Public Works, and Law Enforcement is very positive.
- CCFD is keeping with effective budget management, leading to a very financially efficient operation.
- CCFD is monitoring the performance of its service delivery system and making adjustments as it can within its limited resources.
- CCFD is delivering a full range of services expected of an urban fire department.
- The community feels the Fire Department does a great job with community outreach.
- CCFD does not currently follow an annual review process for departmental policies and procedures.
- The Department does not have adequate facilities that will permit secure indoor storage of reserve apparatus.
- The City Emergency Operations Center located at Station 51 is inadequate in size and configuration for a city the size and complexity of Carson City.
- The Department does not have a replacement schedule in place for fixed facilities.
- CCFD does not have a replacement schedule in place for support equipment.
- The Department's administrative support system is strained due to reduced staffing, increased workloads caused by increased demands for services, and the performance of additional duties to support field personnel.
- Department staff lacks the time and resources necessary to track individual training conformance from the Training Division.
- The Department has not established a formalized and adopted planning process.
- The Department does not maintain a dedicated Fire and Life Safety Public Education Program for the Carson City Community.
- CCFD is not able to staff all incident types in accordance with its Critical Tasking Analysis.
- The total response workload has increased by 41.6 percent over the 9 years.
- Call processing by the dispatch center during 2018 was within 2 minutes, 58 seconds, 90 percent of the time, well over CCFD's goal.

- Fire Department turnout time during 2018 exceeded CCFD's goals.
- Travel and first arriving unit times for 2018 exceeded CCFD's goals.
- NFPA 1500 self-assessment has not been performed.
- Fire stations are in need of upgrades and remodeling.
- The Training Division is short-staffed, impacting all aspects of their responsibilities.
- Fire Pre-planning of moderate to high hazard occupancies is lacking and should be completed and updated annually.
- Hazardous Materials Team training time is limited, reducing opportunities to train as a Team and regionally.
- Airport Crash Fire/Rescue specific response equipment for on and off-airport aircraft incidents does not exist, other than the structure fire engines.
- The SWAT Team qualified personnel are not able to keep up with demand.
- The Technical Rescue Team access to timely and local training programs is limited.
- The Fire Inspection Program, during 2019, has been focused on new construction inspections (894) and business license inspections (309) with existing staffing. The High Hazard Occupancy Inspections of Assembly (24% inspected) and Apartments (67% inspected) are not meeting the Department's goal of 100 percent for each.
- The City's Reserve Fund Balance has diminished significantly from the beginning of the historical period to the present.
- The Ambulance Division Enterprise Fund is generating positive cash flow on an annual basis in its current deployment model.

Recommendations

Based on the analysis and considering community expectations, recommendations are offered to assist the Department with long-range planning and improve the delivery of fire and emergency services to the community. ESCI does not expect that CCFD will implement all recommendations in the short-term. Some may wait until economic conditions allow their implementation. However, all of the recommendations offered chart a course to improved capability and service.

The recommendations are described as goals and should be implemented as funding allows. Each will improve CCFD's ability to provide effective service to the community.

Short-Term

The short-term strategies listed in this report are a compilation of the recommendations aimed at improving the current conditions and levels of protection over the next one to two years.

Recommendation A: Adopt response performance goals to guide service delivery improvement.
A community's desired level of service is a uniquely individual decision. No two communities are exactly alike. Performance goals must be tailored to match community expectations, community conditions, and the ability to pay for the resources necessary to attain the desired level of service.

Levels of service and resource allocation decisions are the responsibility of the community's elected officials, in this case, the Carson City Board of Supervisors. The policy-making body must carefully balance the needs and expectations of its citizenry when deciding how to allocate money to all the services it provides.

The following are recommended as CCFD's fire and life safety response performance goals. They align directly with nationally recommended standards. These are not levels of service that must be achieved immediately but, instead, are targets for achievement when resources are available to do so. Since CCFD serves two distinct areas, rural and urban, different response performance goals are recommended for each.

The adoption of goals allows CCFD management to regularly report progress on the achievement of these goals, conditions that are impeding progress, and resources needed to improve services.

Call-Processing Performance Goal

The first phase of overall response time is call processing time. This phase begins when the call is received at the PSAP center and ends when response resources are notified of an emergency. There are two components: answer time and dispatch time.

Recommended Call Processing Goal

- 9-1-1 calls will be answered at the primary PSAP within 10 seconds, 90% of the time.
- Response resources shall be notified of a priority incident within 60 seconds from receipt of the call at the dispatch center, 90% of the time.
  - Exceptions—These call types shall be processed and dispatched within 90 seconds, 90% of the time:
    - Calls requiring emergency medical dispatch questioning
    - Calls requiring language translation
    - Calls requiring the use of TTY/TTD devices
    - Calls of criminal activity
    - Hazardous materials and technical rescue incidents

Current performance: *Answer time is within 10 seconds, 96% of the time. Dispatch time is currently within 2 minutes, 56 seconds, 90% of the time.*

Turnout Time Performance Goal

Turnout time is one area over which the fire department has total control and is not affected by outside influences. Turnout time, or the time between when the call is received by the response units (dispatched) and when the unit is en route to the incident location (responding), affects overall response times. Reducing this time component reduces total response time.

The National Fire Protection Association Standard 1710 recommends turnout time performance of 80 seconds or less for fire and special operations response, and 60 seconds or less for all other priority responses.

Recommended Turnout Time Goal:

- Response personnel shall initiate the response of a unit capable of mitigating an incident to a priority fire and special operations incident 80 seconds from notification, 90% of the time.

  Current performance: *Within 2 minutes, 11 seconds, 90% of the time.*

- Response personnel shall initiate a response to all other priority incidents within 60 seconds from notification 90% of the time.

  Current performance: *Within 2 minutes, 20 seconds, 90% of the time.*

Response Time for the First-Due Unit Goal

The time required to deliver the first response unit capable of intervening in the emergency includes both turnout time and travel time, but not call processing time. When the recommended standards for turnout time and travel time are combined, response time should be within 5 minutes, 20 seconds, 90% of the time for fire and special operations incidents, and within 5 minutes, 90% of the time for all other priority incidents.

Recommended First-Due Response Time Goal—Urban:

- The first response unit capable of initiating effective incident intervention shall arrive at a priority fire or special operations incident within 5 minutes, 20 seconds from notification of response personnel, 90% of the time.

  Current performance: *Within 8 minutes, 56 seconds, 90% of the time.*

- The first response unit capable of initiating effective incident intervention shall arrive at all other priority incidents within 5 minutes from notification of response personnel, 90% of the time.

  Current performance: *Within 8 minutes, 22 seconds, 90% of the time.*

Recommended First-Due Response Time Goal—Rural:

- The first response unit capable of initiating effective incident intervention shall arrive at a priority fire or special operations incident within 10 minutes, 20 seconds from notification of response personnel, 90% of the time.

  Current performance: *Within 12 minutes, 22 seconds, 90% of the time.*

- The first response unit capable of initiating effective incident intervention shall arrive at all other priority incidents within 10 minutes from notification of response personnel, 90% of the time.

  Current performance: *Within 10 minutes, 3 seconds, 90% of the time.*

Effective Response Force Performance Goal

A fire department's resource *concentration* is the spacing of multiple resources close enough together so that an initial "Effective Response Force" (ERF) can be assembled on the scene of an emergency within the specific time frame identified in the community's performance goals for that risk type. An initial effective response force is defined as that which will be most likely to stop the escalation of the emergency.

The minimum ERF for low-rise structure fires is identified as the arrival of at least four fire engines, two rescues, and one Battalion Chief (17 personnel total). This initial ERF does not necessarily represent the entire alarm assignment, as additional units may be assigned based on long-term incident needs and risks. Additional engines, ladders, or other specialty companies are assigned to higher risk responses to accomplish additional critical tasks that are necessary beyond the initial attack and containment.

Recommended Effective Response Force Goal—Urban:

- The full effective response force shall arrive at a low-rise structure fire within 9 minutes, 20 seconds of notification of response personnel, 90% of the time.

  Current performance: *Within 18 minutes, 23 seconds, 90% of the time.*

Recommended Effective Response Force Goal—Rural:

- The full effective response force shall arrive at a low-rise structure fire within 17 minutes, 20 seconds of notification of response personnel, 90% of the time.

  Current performance: *Not currently known.*

Cost to Implement: *No cost to establish the goals.*

Recommendation B: Reduce the dispatch call processing time interval.

Once the call is answered at ECC, the caller is questioned about the nature and location of the emergency. Typically, the dispatch of response personnel does not occur until the end of that questioning or very near the end.

ECC should implement a pre-alert system that notifies response personnel of the emergency once the basic nature of the call (EMS, house fire, etc.) and the location are known. This should typically be within the first 30 seconds of the conversation.

There are computer-based systems that can be implemented that broadcast this information via computer-generated voice to responders that can be integrated into the computer-aided dispatch system. High-performance dispatch centers using this pre-alert process are notifying responders with 30 to 40 seconds, 90 percent of the time, a significant overall response time savings versus the ECC's current performance of 3 minutes, 25 seconds, 90 percent of the time.

ECC and CCFD should review call processing performance regularly to determine if the pre-alert process is reducing dispatch times to the extent possible.

Cost to Implement: *None unless computer-assisted pre-alert is implemented.*

Recommendation C: Reduce the turnout time interval.
Turnout time is the period between when dispatchers notify response personnel of the incident and when response crews begin to travel towards the incident location. The recommended performance goal for turnout time is within 80 seconds, 90 percent of the time for fire and special operations incidents, and within 60 seconds, 90 percent of the time for all other incidents. CCFD's overall turnout time performance is currently within 2 minutes, 11 seconds 90 percent of the time, and 2 minutes, 20 seconds 90 percent of the time for EMS incidents.

A review of fire station design should also be conducted to identify and remove impediments to a quick response. This can include station alerting systems, pathways from quarters to apparatus, and the like.

Department management should regularly prepare information that describes current turnout time performance by individual response crews (by shift and by unit). Performance expectations should be reinforced, and periodic monitoring conducted to determine if improvements are being made and sustained. Response personnel should avoid activities that extend turnout times. Response personnel must make serious efforts to improve their turnout time performance for the benefit of the community.

Cost to Implement: *Dependent upon the cost of improvements to or modifications of internal pathways for rapid egress.*

Recommendation D: Update fire stations to enhance facility health and safety.
The fire stations require light to moderate updating to improve firefighter safety and reduce the risk of exposure to bloodborne pathogens.

- The removal of all carpeting in the stations should be performed and replaced with closed-spaced floor tiles or polished concrete to vastly reduce the debris and bloodborne pathogens that reside on the footwear of the firefighters.
- Replace or apply commercial grade door seals on those doors that connect the living space with the apparatus bays. This will reduce airborne contaminants from entering the air-conditioned space of the living quarters, which are all negative pressure air-conditioning systems that pull air into the living quarters when doors are opened or not sealed properly.
- Replace worn and broken physical fitness equipment located in the stations with systems that are aligned with maintaining and improving firefighter job-related fitness.

Cost to Implement: *The estimated cost relates to staff, line personnel, and City facilities time to establish the scope of work for the flooring, door, and exercise equipment work that will conform to City purchasing requirements.*

Recommendation E: Modify response assignments so that all incident types can receive sufficient resources, based on the critical task analysis.

CCFD has developed its critical task analysis defining the minimum number of personnel needed by incident type. This analysis is in keeping with national recommendations. In a few cases, this analysis defines staffing needs that are not achievable given current resources (e.g., high rise and high-risk commercial building fires). In other cases, CCFD is not sending sufficient resources on the first alarm to meet the staffing needs defined in the critical task analysis (e.g., aircraft emergencies and technical rescues). In one case—wildland fire low-risk—far more resources are sent than are needed based on the critical task analysis.

CCFD should modify the response assignments used by the dispatch center to better align the actual number of resources sent to the critical task analysis for all incident types.

***Cost to Implement**: Staff time to modify response assignments.*

The next three recommendations are linked with the intent of improving ambulance resource deployment, fully staffing the Ladder Truck, and reducing overtime expenditures.

Recommendation F: Consider dynamic deployment of the non-firefighter staffed ambulances based on the expected system workload.

CCFD currently staffs four ALS ambulances 24 hours per day, seven days per week. An additional non-emergency BLS transport unit is staffed during the day.

Requests for ambulance services are not consistent throughout the day. The workload is much greater during daytime hours than at night.

Dynamic deployment practices should be, and to a degree are now, used during unusual events such as predicted significant storms, special events with large gatherings of people, and the like. Because the likelihood of a response is greater during these events, additional resources should be assigned and positioned where incidents are likely to occur.

This dynamic approach to deployment provides two benefits. First, additional response resources can be made available during times that each is predictably needed. Second, because these resources are not needed or assigned during slower workload periods, the organization is maximizing its ability to match resources with system demand.

Peak workload periods occur every day of the week. The following figure illustrates ambulance workload by the time of day during the study period. Workload is based on the number of requests for emergency medical services by the hour of the day.

Figure 114: EMS Incidents by Hour of Day, 2018

Hour	EMS Incidents 2018	Incidents per Hour
0	237	0.65
1	209	0.57
2	168	0.46
3	141	0.39
4	152	0.42
5	196	0.54
6	233	0.64
7	283	0.78
8	352	0.96
9	413	1.13
10	420	1.15
11	454	1.24
12	488	1.34
13	462	1.27
14	517	1.42
15	443	1.21
16	465	1.27
17	439	1.20
18	444	1.22
19	411	1.13
20	378	1.04
21	345	0.95
22	313	0.86
23	259	0.71

A process called "queuing analysis" has been used to determine the number of units needed in the system by the time of day. This process utilizes probability analysis to determine the number of units needed to reduce the likelihood that an ambulance would not be available to serve an incident to 10 percent or less. It uses the following variables: incidents per hour, number of available response units, and average time committed per incident (1.5 hours).

Though very useful to this effort, queuing analysis has some limitations. It assumes that customers (incidents) arrive at a constant rate. This is not always true in emergency services. It also assumes that each customer requires an equal amount of time from servers (response units). While the average time committed to an incident was used for service time, some incidents require less or substantially more than the average.

The following figure illustrates the current deployment and proposed deployment plan for both daytime (8:00 a.m. to 7:59 p.m.) and nighttime (8:00 p.m. to 7:59 a.m.) based on current station locations. The figure includes individual station workload based on incidents and the current and proposed probability of wait analysis based on the current number of stations. Five stations exceed 10 percent probability of wait during the day and two stations at night.

Figure 115: Current and Proposed Response Units

Hour	Current Units	Current Probability of wait	Proposed Units	Proposed Probability of Wait
0	4	1.87%	3	8.52%
1	4	1.22%	3	6.23%
2	4	0.57%	3	3.56%
3	4	0.31%	3	2.25%
4	4	0.40%	3	2.74%
5	4	0.98%	3	5.29%
6	4	1.77%	3	8.17%
7	4	3.35%	4	3.35%
8	4	6.67%	4	6.67%
9	4	10.82%	5	3.24%
10	4	11.37%	5	3.46%
11	4	14.26%	5	4.63%
12	4	17.53%	5	6.03%
13	4	15.00%	5	4.94%
14	4	20.60%	5	7.42%
15	4	13.28%	5	4.23%
16	4	15.28%	5	5.06%
17	4	12.94%	5	4.08%
18	4	13.37%	5	4.26%
19	4	10.66%	5	3.19%
20	4	8.30%	4	8.30%
21	4	6.27%	4	6.27%
22	4	4.62%	4	4.62%
23	4	2.51%	4	2.51%

An additional ambulance is needed between 9:00 a.m. and 8:00 p.m. to reduce the probability of wait to at or below 10 percent. As few as three are needed during the rest of the 24-hour period.

Cost to Implement: Currently, CCFD staffs four ambulances on a 24 hours per day basis, totaling 192 hours. The dynamic staffing model recommended in the above figure requires 200 hours or an additional 4.17% of payroll hours and benefits. In Figure 16, Status Quo Projections, the projected FY 20/21 amount for salaries and benefits for the Ambulance Division is $3,070,559. This recommendation results in an increase in the number of civilian employees in the Ambulance Division to a total of 41, with 35 positions being required to staff the 73,000 hours required under the model. This is necessary as the firefighters' standard work week is 53 hours while the civilian employees are assigned to a 40-hour work week. The following figure compares the costs of adopting the dynamic staffing model utilizing civilian paramedics and EMTs with the current projected amounts for firefighter/paramedic salaries and benefits.

Figure 116: Additional Costs to Convert Ambulance Staffing to the Proposed Dynamic Model

Expenditures	FY 20/21	FY 21/22	FY 22/23	FY 23/24	FY 24/25
Original Projections—Status Quo					
Salaries	1,886,580	1,924,311	1,962,798	2,002,054	2,042,095
Benefits	1,183,979	1,207,659	1,231,812	1,256,448	1,281,577
Total Salaries & Benefits	**3,070,559**	**3,131,970**	**3,194,610**	**3,258,502**	**3,323,672**
Civilian Staffing Costs					
Salaries	1,884,965	1,918,862	1,953,372	1,988,503	2,024,269
Benefits	1,194,515	1,235,284	1,277,735	1,321,944	1,367,993
Total Salaries & Benefits	**3,079,480**	**3,154,146**	**3,231,107**	**3,310,447**	**3,392,262**
Additional Costs to Convert to Civilian Staffing using Dynamic Staffing	**8,921**	**22,176**	**36,497**	**51,945**	**68,590**

Recommendation G: Transition the Advanced Life Support rescue ambulances staffing to non-firefighters.

In FY 18/19, the Department estimated its use of overtime in its Operations Division would add approximately 28 percent to its salary costs. This level of overtime may be responsible for additional lost-time injuries or prematurely ending a career with the Department. This amount of overtime suggests the addition of more full-time staff positions may, for the most part, be paid through the reduction in overtime costs.

A cost-effective solution would be the conversion of firefighter staffed ambulances to civilian Paramedic/EMT staffing and implementing the dynamic staffing model previously discussed. This returns 18 firefighter/paramedics to the ranks of the Operations Division of the Fire Department. This recommendation results in an increase in the number of civilian employees in the Ambulance Division to a total of 41, with 35 positions being required to staff the 73,000 hours required under the model. This is necessary as the firefighters' standard work week is 53 hours while the civilian employees are assigned to a 40-hour work week. The additional six employees are required to fill in for employees on vacation or otherwise off work. The following figure indicates the employee costs to staff the ambulances and assumes the current fire department supervisors remain in place to administer the program. Employee benefits costs increase as the number of employees necessary to staff the ambulances is increased.

Figure 117: Comparison of Employee Costs to Convert the Ambulance Division From Firefighters to Civilian Employees Using Dynamic Staffing Model

Expenditures	FY 20/21	FY 21/22	FY 22/23	FY 23/24	FY 24/25
Civilian Staffing Costs					
Salaries	1,884,965	1,918,862	1,953,372	1,988,503	2,024,269
Benefits	1,194,515	1,235,284	1,277,735	1,321,944	1,367,993
Total Salaries & Benefits	**3,079,480**	**3,154,146**	**3,231,107**	**3,310,447**	**3,392,262**
Dynamic Staffing w/ Firefighters					
Salaries	1,950,056	1,989,057	2,028,838	2,069,415	2,110,803
Benefits	1,222,574	1,260,505	1,299,852	1,340,677	1,383,043
Total Salaries & Benefits	**3,172,630**	**3,249,562**	**3,328,690**	**3,410,092**	**3,493,846**
Cost Savings Using Civilian Staffing	**93,150**	**95,416**	**97,583**	**99,645**	**101,584**

The next recommendation discusses the improved financial results of using the remaining six positions as fill-in/floaters to reduce the use of overtime.

Recommendation H: Transfer the Firefighter/Paramedics from the Advanced Life Support rescue ambulances to staff the ladder truck and utilize remaining personnel to reduce the use of overtime/call-backs.

The prior recommendation was offered to transition all ambulance positions to civilians with requisite medical certifications. That transition will free up 18 firefighters, with 12 being reassigned to the ladder truck, leaving six to be used to float as fill-ins to reduce the use of overtime.

Each of the remaining six firefighter/paramedics, assuming a minimal work history of one year, will have a scheduled vacation amount of 132 hours. With a firefighter scheduled to work 2,912 hours each year, this leaves a balance of 2,780 hours to be used to fill-in for other firefighters off shift, rather than requiring a call-in firefighter to fill the position using overtime. As an example, using an "apples to apples" comparison of six firefighter/paramedics at step two in their longevity, **insertion of these six firefighter positions would significantly reduce the Operations Division use of overtime and callback payments from approximately 22.6 percent to approximately 8.3 percent in FY 20/21 plus the additional savings related Medicare tax and pension costs.**

Figure 118: Cost Savings Associated with Adding Two Firefighters to Each Shift (Six Total) to Reduce Overtime Use

Expenditures	FY 20/21	FY 21/22	FY 22/23	FY 23/24	FY 24/25
Scheduled Hours	2,912	2,912	2,912	2,912	2,912
Scheduled Vacation	132	132	132	132	132
Hours available to cover OT	2,780	2,780	2,780	2,780	2,780
Six firefighter/paramedics	6	6	6	6	6
Total hours available to cover OT/Callbacks	16,680	16,680	16,680	16,680	16,680
Step 2 FF/Paramedic—2021	25.72	26.49	27.29	28.10	28.95
Annual Salary cost	449,322	462,802	476,686	490,986	505,716
Overtime/Callback hours	16,680	16,680	16,680	16,680	16,680
Step 2 FF/Paramedic—2021	25.72	26.49	27.29	28.10	28.95
Time and a half OT rate	38.58	39.74	40.93	42.16	43.42
Overtime/Callback Cost Reduction	**643,514**	**662,820**	**682,704**	**703,186**	**724,281**
Net Savings	**194,192**	**200,018**	**206,018**	**212,200**	**218,565**

Recommendation I: Fully staff and station the Department's ladder truck with four qualified firefighters per shift at Fire Station 51 to improve response capabilities to multi-story and high fire flow occupancies.

Based on ESCI's risk analysis, review of building inventory, and required fire flows, the department should staff the ladder truck with four firefighters. In addition, the ladder truck should be stationed in the core area of the City at Fire Station 51.

Cost to Implement: Staffing of the ladder truck will include a Captain, Driver/Operator, one Firefighter/Paramedic, and one Firefighter for a total of four personnel per shift. As this ladder is a specialty truck, requiring experienced and trained firefighters to not only safely maneuver the apparatus through the City's streets but also to safely operate the ladder and related equipment, the salaries are based on a second step for each of the personnel chosen. Related benefits and employee costs are estimated to be approximately 52 percent of compensation. Costs beginning with FY 20/21 are projected to be $1,530,324, increasing to $1,709,960 in FY 24/25.

Figure 119: Employee Costs to Staff the Ladder Truck with Three Shifts of Four Personnel Each

Expenditures	FY 20/21	FY 21/22	FY 22/23	FY 23/24	FY 24/25
Salaries	1,004,186	1,034,312	1,065,341	1,097,302	1,130,221
Benefits	520,113	532,822	545,901	559,362	573,217
Other Employee Costs	6,025	6,146	6,269	6,394	6,522
Total Salaries & Benefits	**1,530,324**	**1,573,280**	**1,617,511**	**1,663,058**	**1,709,960**

Recommendation J: Institute regular and ongoing review of policies and procedures.
The fire department should institute an annual review of the policies and standard operating procedures to evaluate the need for updating and adding new documents that are relevant and purposeful in directing and guiding the agency. This is a continuous evaluation and improvement process that is recommended by the Center for Public Safety Excellence and the Commission of Fire Accreditation International.

Cost to Implement: *The estimated cost relates to staff time to review the policies and procedures and utilizing on-duty personnel to assist in the program.*

Recommendation K: Develop a support equipment replacement schedule.
The fire department should create a schedule for replacing support equipment that wears out due to use and age. The replacement schedule allows the City to develop financial plans for addressing the cost of acquiring new equipment.

Cost to Implement: *The estimated cost relates to staff time in developing the current inventory and determining the life cycle and current/projected cost for each item.*

Recommendation L: Evaluate how the current management of training documentation and performance tracking is performed.
The fire department should evaluate what level of fire staff management is needed to manage the training documentation for fire personnel properly. The updated process will enhance the performance review of the training records for all fire personnel. This critical task is essential for managing and sustaining fire department readiness and compliance with OSHA requirements for firefighters and special team members.

Cost to Implement: *The estimated cost relates to staff time to determine the right level of management review and utilizing on-duty personnel to assist in the program.*

Recommendation M: Reinstate the Fire Pre-Planning Program.
The fire department should reinstitute the fire pre-planning program that provides firefighters with a heightened awareness of moderate to high-risk facilities in the City. The pre-plans should be shared with all fire stations, Battalion Chiefs, and fire prevention. The pre-plans should be reviewed annually or when a building has changed occupancy to either lower or higher risk. The pre-plans should be stored and made available electronically for ease of use and distribution.

Cost to Implement: *The estimated cost relates to staff and line personnel time to develop the pre-plan program criteria, tracking system, and pre-plan onsite work by station crews.*

Recommendation N: Add Additional Fire Prevention Inspection Personnel to increase the frequency of inspections.
The fire department should continue to seek additional fire inspections staff, either full-time and/or part-time, to assist in meeting the need to inspect buildings and processes in alignment with the NFPA Standards.

Cost to Implement: *Utilizing the NFPA 1730 Standard for guidance, the staff will analyze the Community Risk Assessment and Fire Inspection performance data to provide the Fire Chief staffing and process options. The funding solutions for personnel needs will be developed through the City fiscal process.*

Mid-Term Strategies

The mid-term strategies are progressive enhancements of the current conditions. Many will likely require three to five years to accomplish.

Recommendation O: Evaluate staffing levels required for Administrative Support Services.
The City should perform a time and motion study to evaluate the current efficiency of the non-safety administrative staff. There should be further review of the type of work, including report writing, being performed by the civilian staff and sworn fire personnel to evaluate efficiency and effectiveness. In addition, the Training Officer has a number of non-training job duties that impact essential occupational functions.

Cost to Implement: *The estimated cost relates to staff and City Human Resource personnel time to perform the studies and evaluate the results for subsequent personnel planning processes.*

Recommendation P: Develop a plan to enhance Fire Safety and Public Education Programs.
The fire department should begin planning for re-instituting a Community Risk and Reduction public education program that addresses the multiple needs of the Carson City Community. The plan should include the evaluation of the community risks and processes for which the fire department will provide or seek fiscal remedies to deploy resources to educate and mitigate.

Cost to Implement: *The estimated planning cost relates to staff time to review the Community Risk Assessment and provide options to the Fire Chief for re-instituting the program. The cost to adequately support the delivery of the Fire and Public Education Program will be based on the results of the fire department planning efforts.*

Recommendation Q: Conduct an NFPA Compliant Audit of the Fire Department's Health and Safety Program.

The fire department should perform the NFPA 1500 Safety Audit in accordance with the outlined schedule and process for performing such. The NFPA 1500 Audit provides the City and the fire department with objective processes to evaluate systems, processes, equipment, vehicles, and facilities. The Audit also provides the fire department with planning processes to review, update, and implement a comprehensive Firefighter Health and Safety Program.

Cost to Implement: *The estimated cost relates to staff and line personnel time to establish a cross-sectional team of line and staff to perform the NFPA 1500 Audit. The cost to perform the renovations and repairs will be based on the findings of the Audit.*

Recommendation R: Implement Community Risk Reduction strategies.

An emerging trend in the fire service nationally is a concept called Integrated Community Risk Reduction (CRR). CRR is an integrated approach to risk management that marries emergency operations and prevention strategies into a more cohesive approach to reducing risks in any community. It includes the fire department partnering with the community, nonprofit organizations, and any private sector agencies with a nexus to an identified community risk.

The concept starts with the fire department mining data to quantify community risk. Once the community risks have been identified, they are prioritized based on frequency of emergency service demand or consequence (to the victim, to the community, to the local economy). Upon prioritizing the risks, strategies are developed to mitigate the risks. These strategies are incorporated into a CRR plan, which integrates resources across the fire department, partner agencies, and the community to implement the various strategies in a cohesive manner. After plan implementation, the results are reviewed to determine the impact on the risks. Adjustments are made, as necessary, based on the results, and the process is refined and continuously re-implemented.

The risks are not limited to structure fires. They can include falls, drowning, interface exposure, disasters, or any risk requiring fire department response. Risk can also be localized by station area. Operations personnel, in collaboration with fire prevention staff and community groups, can develop and manage a station area-specific CRR plan as a subset of the fire department's plan. CRR lends itself well to a volunteer-supported effort, led by competent professional leadership. CRR also includes public education for risk reduction. A prepared and informed community is a safer community.

Cost to implement: Staff time to interpret response data and determine the high-frequency risks, and staff time to develop and implement an education program.

Recommendation S: Acquire needed technology and implement closest unit dispatch.
Many departments across the country have implemented technology that ensures the closest available response unit is sent to an emergency. This technology incorporates global positioning systems on fire apparatus linked to the dispatch center's computer-aided dispatch system. When a call is received at the dispatch center, the incident's location is instantly compared to the actual location of every available response unit. Travel times are computer calculated and the closest unit selected for dispatch. Implementation of this system requires:

- Dispatch center computer software capable of this function.
- Street information for use in the system that includes data points required to conduct "closest unit analysis."
- Global positioning equipment installed on fire apparatus (CCFD has already installed this equipment).

Communities that have implemented this technology have realized significant improvements in response times and emergency incident outcomes. Battalion Chiefs can better redistribute response resources to ensure effective city-wide response coverage during large incidents and periods of significant incident workload.

Cost to Implement: $44,000

Recommendation T: Explore opportunities to reduce response workload.
Response workload has grown by 41.6 percent over the past nine years. Most of this has been the growth in requests for emergency medical services.

At this rate of growth, CCFD will be unable to maintain service levels without new resources. Response workload is expected to increase to over 22,000 incidents per year by 2033. The City's ability to fund new resources to maintain service levels is limited.

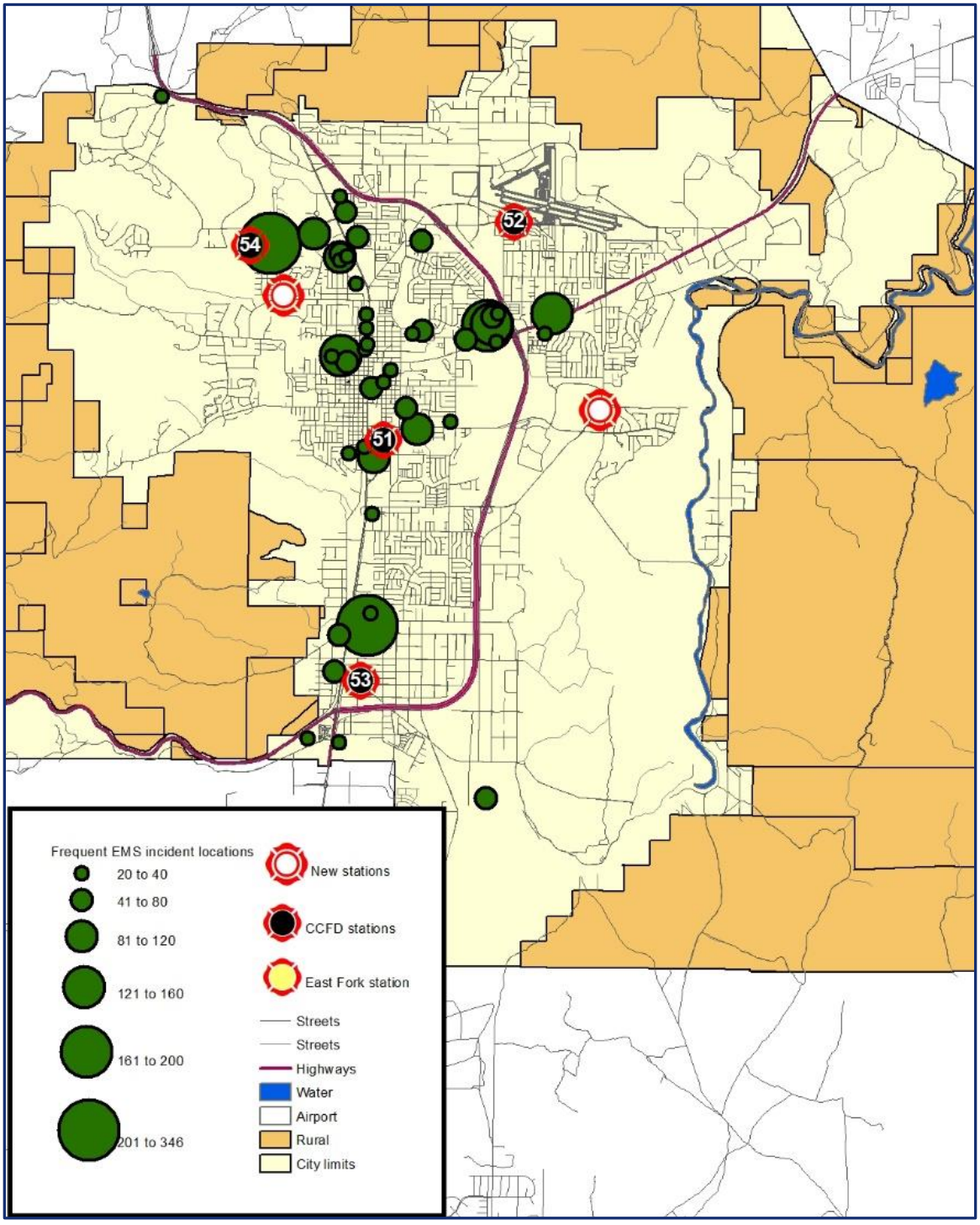
Work with Frequent Users of EMS Services to Reduce Utilization

Most fire service agencies have patients and facilities who routinely call multiple times for a response from the local fire department. While some of these patients undoubtedly have acute medical challenges that require a response and assessment, many others have chronic illnesses and have become reliant upon first responders as their primary care provider. Still others are living alone but struggling to live independently, relying instead on first responders to address their routine challenges. A smaller subset may be relying upon first responders for social needs or may have mental health challenges that cause them to call inappropriately for first responders.

Fire agencies can also have significant response workload at single facilities such as nursing homes, assisted living, and mobility-impaired resident facilities. Many calls for service are legitimate medical emergencies, while some are lift-assists that occur when a mobility-impaired resident falls from bed and needs assistance getting back into bed. First responders in these cases perform a quick assessment of the latter group and place them back into bed. While this may seem to be an appropriate service to provide to the residents of such facilities, in many cases, it is a liability shift and/or a staffing shift from a fee-for-service facility to the taxpayer-provided emergency responders. Further, it can misuse critical emergency response resources to address decidedly non-emergent problems.

The following figure illustrates locations that used fire department services 20 or more times during 2018.

Figure 120: Locations with 20 or More EMS Incidents During 2018



There are different approaches available to fire departments that experience the high-frequency individual and the high-frequency facility. These approaches are explained more fully in the two following subsections.

Responses to High-Frequency Patients

A growing concept nationally is the community paramedicine program. The concept of this approach is to support high-frequency EMS system users better. Community paramedicine is intended to decrease 9-1-1 over-users or abusers, decrease the on-scene time for response units, and provide a higher level of service to customers.

There are a variety of models in use throughout the country. Some employ a single paramedic in a vehicle who conducts follow-up visits of patients recently released from the hospital. The purpose is to ensure the patient is taking appropriate medications, following up with their primary care physician, and to check the patient's overall well-being. These single paramedic units can also be dispatched to incidents known to be non-life-threatening.

Other models team a paramedic with community social service workers who can also address other needs such as food, housing, mental health care, and the like.

Agencies that have successfully implemented a community paramedicine type program include Mesa, Arizona, which developed the concept, Spokane, Washington, Tualatin Valley Fire and Rescue, Oregon, and Bellevue, Washington.

Responses to High-Frequency Facilities

There are a number of care facilities within Carson City that generate frequent requests for fire department services, mostly EMS and other than transfers from facility to facility. Some of these facilities have medical professionals on-site; others may not. Of the top 24 addresses with repeat service requests for 2018, nine are nursing/rehabilitation care or senior living facilities. They are listed in order of response frequency.

Figure 121: Locations with 40 or More EMS Incidents During 2018

Facility	Number of EMS Incidents
Ormsby Post-Acute Rehab Center	346
Mt View Rehab Center	241
Carson Plaza Retirement	183
The Lodge Assisted Living and Memory Center	126
Carson Nursing and Rehab Center	124
Carson Tahoe Continuing Care Hospital	123
Sierra Place Senior Living	113
Frost Yasmer Estates Apartments	87
Carson Tahoe Urgent Care	86
Skyline Estates Senior Living and Memory Care	81
Carson City Nugget	74
North Nevada Correctional Center	72
Walmart	62

Facility	Number of EMS Incidents
Autumn Village Apartments	59
Carson City Jail	54
Parkway Plaza Apartments	52
Eagle Valley Care Center	51
2907 Mountain St	51
Royal Vista Apartments	49
Entertainment Complex	46
Liberty Dialysis	46
Sierra Ridge Apartments	43
Carson Tahoe Behavioral Health	42
Carson Park Condominiums	40

The nine nursing/rehabilitation care or senior living facilities account for over 13 percent of the total response demand CCFD handled in 2018. For facilities with qualified medical professionals, the dispatch center should have the ability to send only an ambulance when all that is needed is transportation of the patient to a medical facility.

For facilities without qualified medical professionals, a full response is typically sent to a request for emergency medical assistance. However, many of these requests can turn out to be lift-assists, or other minor problems.

CCFD should work with managers of high-frequency facilities to ensure fire department resources are not overused. This may involve providing training to facility staff, modifying EMS system regulations to allow alternative response practices, or other creative solutions.

The proposed community paramedicine would be operated as a component of the Ambulance Division and staffed with civilian paramedics.

***Cost to Implement**: A full-time, civilian paramedic staffed community paramedicine program, plus vehicle and equipment, is projected to cost $69,539 in salary and benefits, $10,000 in vehicle costs and supplies on an annual basis. In addition, capital expenditures include a full-size four-door pickup truck with emergency equipment and medical equipment are projected to cost approximately $110,000. It is expected that community health partners would likely provide subsidies for a program of this type.*

Recommendation U: Expand the Department's SWAT Medic Team Membership.
The fire department should develop a plan with the Sheriff's Office to expand the membership of the SWAT Medic Team to meet the current and growing tactical medic response needs for the community.

***Cost to Implement:** The estimated cost relates to staff and line personnel time to establish the criteria for an effective Tactical Medic response program and the training costs to increase the determined number of personnel.*

Recommendation V: Improve Technical Rescue Team Training.
The fire department should seek methods and processes that provide for the Technical Rescue Team to train in accordance with OSHA required and NFPA standards. The fire department should also continue to leverage regional technical rescue training opportunities to seek continuous readiness and improvement.

Cost to Implement: *The estimated cost relates to staff and line personnel time to establish the criteria for an effective and compliant Technical Rescue Training Program.*

Recommendation W: Improve Hazardous Materials Team Training.
The fire department should seek methods and processes that provide for the Hazardous Materials Team to train in accordance with OSHA required and NFPA standards. The fire department should also continue to leverage regional hazardous materials training opportunities to seek continuous readiness and improvement.

Cost to Implement: *The estimated cost relates to staff and line personnel time to establish the criteria for an effective and compliant Hazardous Materials Training Program.*

Recommendation X: Improve Airport Crash/Fire Rescue Capabilities.
The fire department should coordinate with Airport management to develop a plan to acquire a specific aircraft incident vehicle that meets the current and expected category use of the airport. In addition, the fire department should plan how to train and staff the equipment for on and off-airport aircraft incidents.

Cost to Implement: *The estimated cost relates to staff and Airport Management personnel time to perform the studies and evaluate the results for determining the specific aircraft incident vehicle(s) for the airport. The funding solutions for acquiring the vehicle(s) will be developed through the City fiscal process.*

Long-Term Strategies

The short and mid-term strategies discussed will move the organization forward substantially. A longer-term, high-level view of future needs is also important to provide a "big picture" view of how the organization may continue with future initiatives. Primarily, long-term strategies are centered around community growth and related workload and how both impact the future deployment of fire stations and personnel.

Recommendation Y: Plan for facility replacement and updating to maintain a high degree of safety, efficiency, long-term sustainability, and effectiveness.

The City should continue to plan and direct funding for the following facility projects:

- Replace the existing Emergency Operation Center with a facility that will meet the future needs of the City in planning, exercising, and managing events and incidents that require multiple City departments and neighboring agencies to coordinate resources and responses to the community needs.
- Construct facilities to house the fire department vehicles inside to prolong the life cycle of the vehicles and equipment, and to secure the equipment and supplies located on the vehicles.
- Replace the Fire Training Burn Building with an NFPA standard and OSHA compliant structure. The fire department should consider natural or propane heat sourced live-fire training to extend the life of a new burn building, and to reduce operating and maintenance costs.
- The fire stations' shower and bath facilities are not conducive to male and female firefighter staffing. Although the stations have scheduling and signage to promote proper use of existing bath facilities, the long-term plan to update or replace facilities that are designed to promote a healthy and compliant work environment for all personnel assigned to work the fire stations.

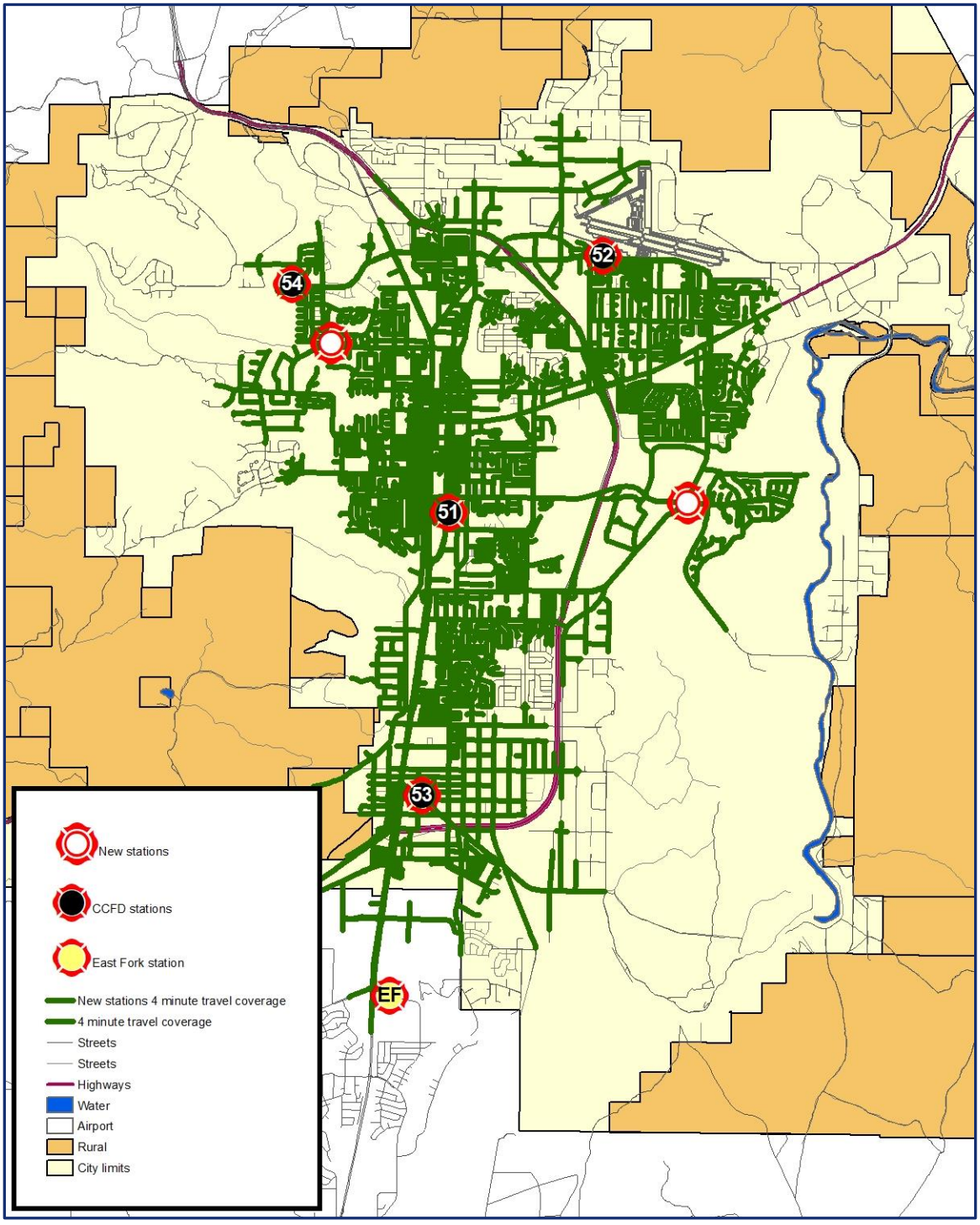
Cost to Implement: *The estimated cost relates to staff, line personnel, and City Facilities time to review the results of the citywide facilities audit and provide guidance for addressing the work needed on the fire department facilities and planning for the relocation of the EOC.*

Recommendation Z: Add two staffed stations to reduce travel time and improve effective response force coverage.

CCFD is not meeting its target response times largely because of long travel times. It also does not provide an effective response force except in a very small portion of its service area. Two additional stations, each staffed with a fire engine, will improve levels of service significantly.

The following figure shows the proposed locations of two new fire stations. It also shows the modeled travel coverage based on a four-minute travel time.

Figure 122: Four-Minute Travel Coverage with Two New Stations



With two new stations, 89 percent of all priority incidents during 2018 would have been within four travel minutes of a fire station instead of 78 percent currently.

The addition of two new staffed stations also provides a significant improvement in effective response force coverage. The following figures show effective response force coverage for low-rise building fires following the addition of the two stations. Coverage is greatly improved compared to current.

Figure 123: Effective Response Force—Firefighters

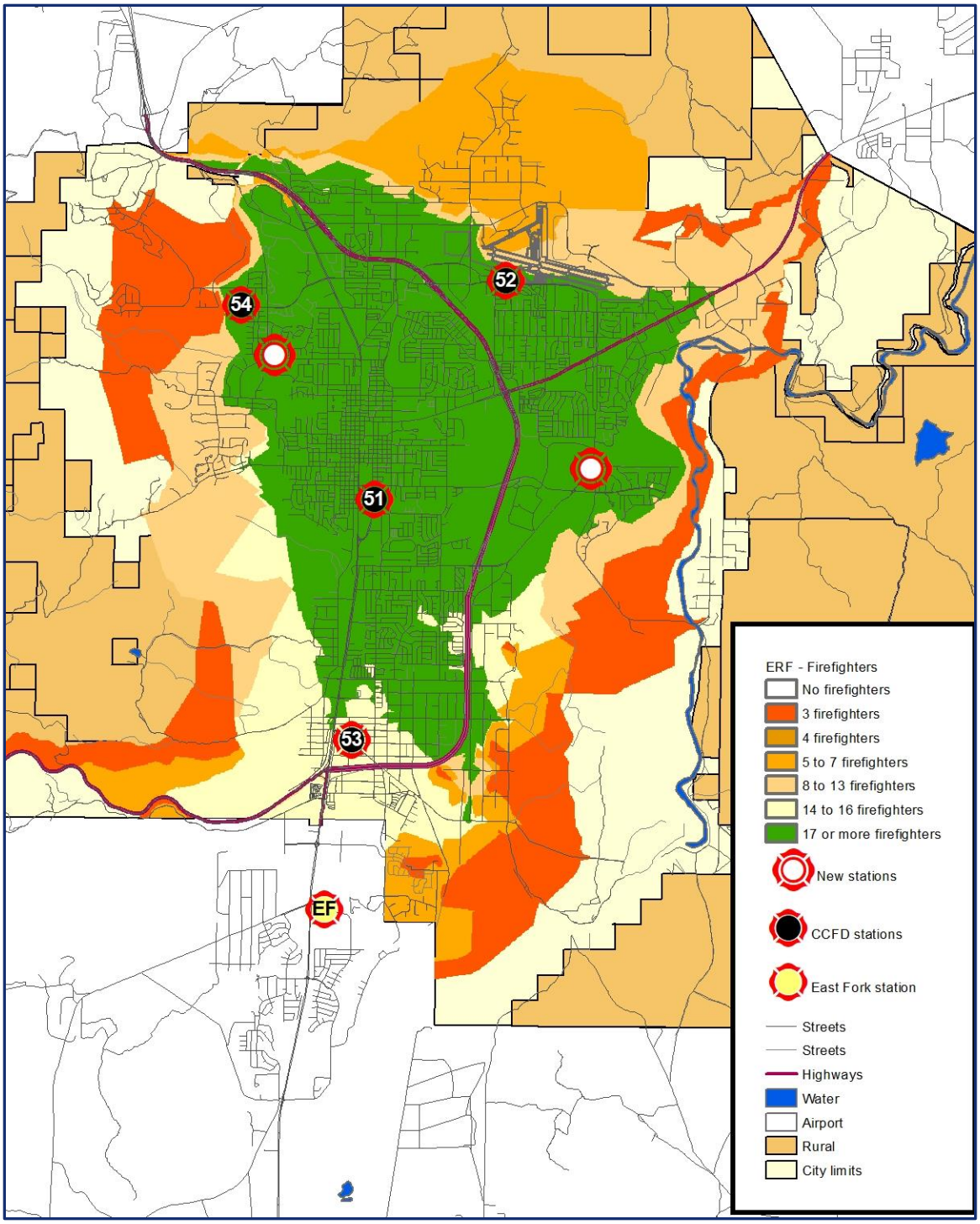
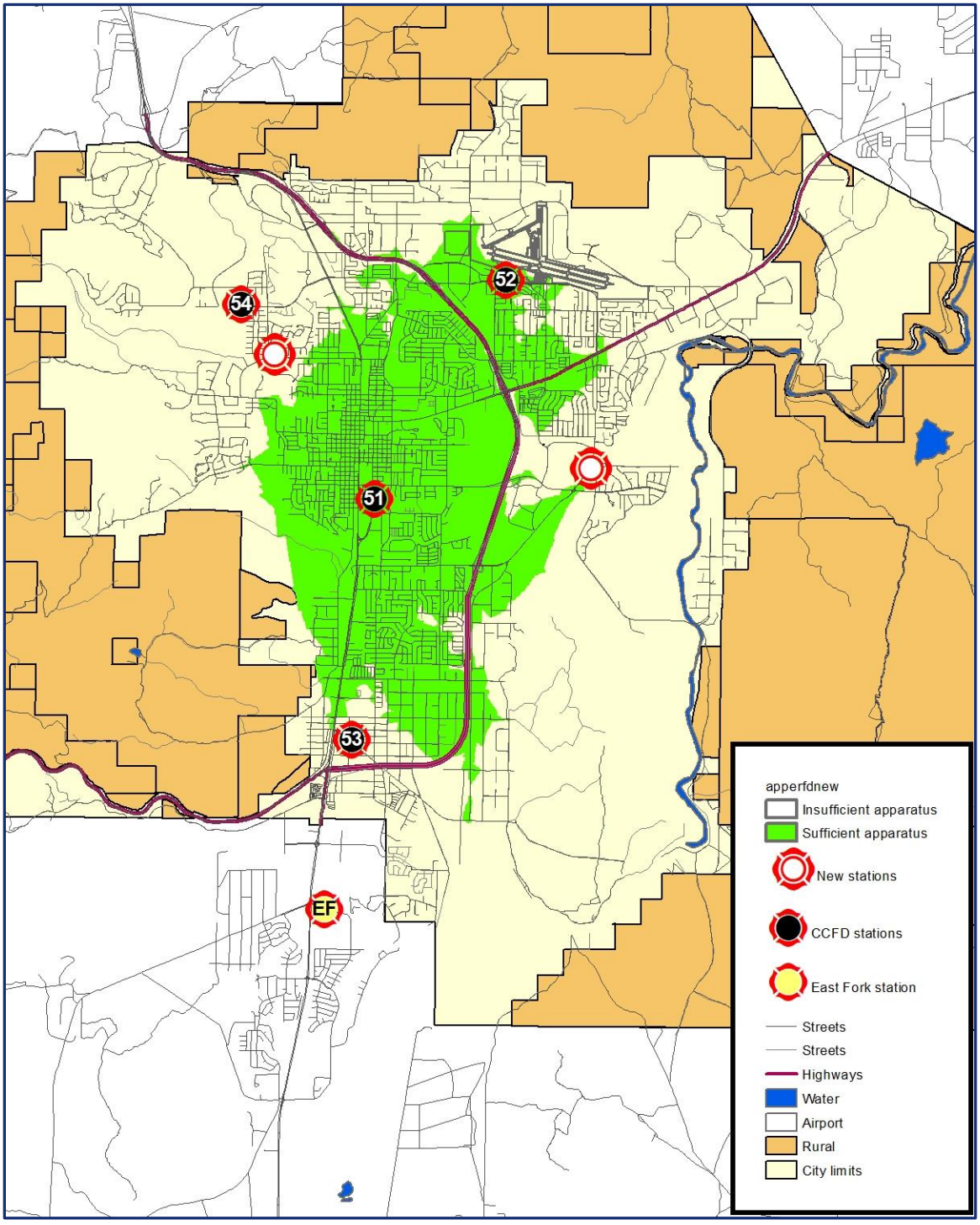


Figure 124: Effective Response Force—Apparatus



Cost to Implement: There are multiple cost components to be considered in the development of a fire station—land, architectural and engineering costs, construction and furnishing of the facility, and the cost of the apparatus and equipment. In addition, the more expensive and recurring costs of staffing and operating the fire station must be considered. The City informed ESCI that land has been acquired on Butti Way for a new combined fire station and EOC. It appears that this location will enhance response. Analysis of the actual location and its suitability for the recommended fire station was not part of the scope of work for this study. Land for an additional fire station, including the surveying, geotechnical work, and closing costs are estimated to be approximately $700,000 per acre with a one-acre tract being the minimum size on which to construct a fire station. Design and construction of a station, meeting the minimum safety requirements for the modern fire service residency is estimated at $5,000,000 for a 12,000 square foot structure, including three apparatus drive-through bays of sixty-foot in depth and capable of accommodating a minimum of six personnel per shift. An apparatus and related equipment are estimated at $850,000.

Personnel costs related to the staffing of the station, with a minimum complement of three personnel per shift, is projected to be $1,190,991 in FY 20/21. Other operating costs are projected to be $76,000 in FY 20/21.

APPENDIX A: TABLE OF FIGURES

APPENDIX B: SAMPLE APPARATUS REPLACEMENT SCHEDULE

ESCI has utilized the CCFD apparatus inventory and created an apparatus replacement schedule. The vehicle life expectancies used are those used throughout the industry for front-line operation. Heavy urban usage and low rural demand both effect the actual lifespan of a piece of apparatus. In city areas of high demand, the engine may operate less than 10 years, while in a rural setting with low demand and good maintenance, it may last longer than the expected 20 years. The replacement costs are based on recent purchase experience but can fluctuate with added features and options.

This schedule uses a 4 percent inflation figure to calculate the replacement cost of apparatus based on the remaining life expectancy.

Vehicle	Life Expectancy	Replacement Cost
Squad/Utility	15	75,000
Med Rescue Truck	15	210,000
Heavy Rescue Truck	20	500,000
Commercial Pumper	20	500,000
Custom Pumper	20	600,000
Tanker	20	375,000
Ladder	25	1,200,000
Brush	20	160,000
Type 3 Engine	15	310,000

Current Year:	Average Age:	Inflation:
2019	10.2	4.0%

Figure 125: Fire Department Apparatus Replacement Schedule with Funding Requirements, FY 18/19

Type	Unit	Year	Base Replace. Cost	Replace. Cost w/ Inflation	Current Cash Req't	Annual Cash Req't	Current Age	Life Expect.	Replace. Year	Years to Replace.
	Saber HM52	2005	500,000	608,326	456,245	30,416	15	20	2025	5
6	Fast Attack Pickup P54	2006	125,000	158,165	110,715	7,908	14	20	2026	6
	Water Tender WT54	2002	450,000	486,720	438,048	24,336	18	20	2022	2
1	Pumper Truck E151	2007	625,000	822,457	534,597	41,123	13	20	2027	7
1	Pumper Truck E152	1993	625,000	625,000	625,000	31,250	27	20	Overdue	(7)
1	Pumper Truck E153	2002	625,000	676,000	608,400	33,800	18	20	2022	2
1	Pumper Truck E53	2007	625,000	822,457	534,597	41,123	13	20	2027	7
1	Pumper Truck E52	2019	624,534	1,315,799	65,790	65,790	1	20	2039	19
1	Pumper Truck E51	2019	624,534	1,315,799	65,790	65,790	1	20	2039	19
1	Tiller Ladder Truck - Ladder 50	2019	1,264,741	2,664,619	133,231	133,231	1	20	2039	19
3	Brush Truck B52	2000	350,000	350,000	350,000	17,500	20	20	2020	-
3	Brush Truck B51	2001	350,000	364,000	345,800	18,200	19	20	2021	1
3	Brush Truck B53	2002	350,000	378,560	340,704	18,928	18	20	2022	2
3	Brush Truck B54	1996	350,000	350,000	350,000	17,500	24	20	Overdue	(4)
6	Patrol 52	2006	125,000	158,165	110,715	7,908	14	20	2026	6
Fire Apparatus			**7,613,809**	**11,096,067**	**5,069,633**	**554,803**				
	Ambulance R54	2017	215,000	282,925	84,878	14,146	3	10	2027	7
	Ambulance R251	2005	215,000	215,000	215,000	10,750	15	10	Overdue	(5)
	Ambulance R152	2007	215,000	215,000	215,000	10,750	13	10	Overdue	(3)
	Ambulance R151	2017	215,000	282,925	84,878	14,146	3	10	2027	7
	Ambulance R51	2016	215,000	272,044	108,817	13,602	4	10	2026	6
	Ambulance R52	2012	215,000	232,544	186,035	11,627	8	10	2022	2
	Ambulance R53	2012	215,000	232,544	186,035	11,627	8	10	2022	2
Medic Units			**1,505,000**	**1,732,982**	**1,080,643**	**86,649**				
Total/Average				**$12,829,050**	**$6,150,276**	**$641,452**				