CENTER FOR PUBLIC SAFETY MANAGEMENT, LLC

# STANDARDS OF COVER STRATEGIC PLANNING REPORT

## Town of Queen Creek, Ariz.

## *Final Report: May 2020*


CPSM®

CENTER FOR PUBLIC SAFETY MANAGEMENT, LLC
475 K STREET NW, STE. 702 • WASHINGTON, DC 20001
WWW.CPSM.US • 716-969-1360

ICMA

Exclusive Provider of Public Safety Technical Services for
International City/County Management Association

**Updated January, 2021**

# THE ASSOCIATION & THE COMPANY

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

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

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

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

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

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

# CENTER FOR PUBLIC SAFETY MANAGEMENT PROJECT CONTRIBUTORS

**Thomas J. Wieczorek,** Director
**Leonard A. Matarese,** Director, Research & Project Development
**Dov Chelst,** Ph.D. Director of Quantitative Analysis
**Joseph E. Pozzo,** Senior Manager
**Peter Finley,** Senior Associate
**Dennis Kouba,** Senior Editor

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# SECTION 1. EXECUTIVE SUMMARY

The Center for Public Safety Management (CPSM) was contracted by the Town of Queen and the Queen Creek Fire and Medical Department (QCFMD) to complete a Standards of Response Cover (SOC) report and to facilitate the development of a strategic planning document for the fire and medical department.

The QCFMD is a relatively new organization, having commenced operations on January 1, 2008. It was created administratively (rather than by ordinance) by the town. Prior to this, Rural/Metro Corporation provided emergency and non-emergency medical services, fire protection, and other related safety services in Queen Creek. When the QCFMD was formed, the town hired the firefighters who worked for Rural/Metro in Queen Creek. The department's first group of 15 firefighters was hired in January 2008 and the second group of 12 in February 2008.

Initially, the fire and medical department operated out of two fire stations, Station 1 located in the town center and Station 2 in the southwest part of town. Station 2 was supposed to be replaced with a 'brick and mortar' station several years ago; however, growth in other parts of the town has shifted priorities.

The department currently operates five fire stations with the opening of station #4 on Dec 1. These stations operate on a 24-hour basis and has total uniformed staff of 63 personnel (with additional administrative support), of which 34 are paramedics able to render on-scene advanced life support (ALS) care (one additional member was in school at the time of this assessment). The department provides structural and wildland fire suppression, ALS-level emergency medical care, technical rescue, along with fire and life safety prevention services.

The QCFMD service area covers approximately 40.39 square miles within the Town of Queen Creek, plus surrounding areas of Maricopa and Pinal Counties. The total current department service area is approximately 48 square miles. The MPA for future growth and development encompasses approximately 71.5 square miles. The department has an extensive array of automatic aid and mutual aid agreements with neighboring agencies and participates in the Phoenix regional mutual aid system. Advanced life support transport services are provided by a third party, American Medical Response (AMR).

The service demands of this rapidly growing community are numerous for the department. The QCFMD takes great pride in finding innovative solutions to its demand challenges through the robust use of automatic and mutual aid, the pursuit of grants for staffing and equipment to meet its needs, and this strategic planning process.

In the one-year period between July 1, 2018, and June 30, 2019, QCFMD responded to 3,856 calls for service. Of these, 2,322 were EMS calls, while 724 were fire-related. Of the fire-related calls, 39 were structure fires, 44 were outside fires, 353 were for public service, 51 involved hazardous conditions, and 206 were false alarms. QCFMD provided automatic aid to other agencies 443 times and mutual aid 19 times. Conversely, Queen Creek received automatic aid 277 times and mutual aid on an additional 5 incidents.

The Standards of Cover (SOC) portion of this document is designed to report on the current level of service provided by the QCFMD compared to best practices. As well, it will provide incident data and relevant information to be utilized for future planning and self-review of service levels

for continued improvement designed to meet community expectations and mitigate emergencies effectively and efficiently.

A significant component of the SOC report is the completion of an All-Hazard Risk Assessment of the Community. The All-Hazard Risk Assessment of the Community contemplates many factors that cause, create, facilitate, extend, and enhance risk in and to a community. The risk analysis conducted by CPSM for Queen Creek considers the impact of each risk or factor utilizing a three-axis approach. The three-axis approach to evaluating risk includes the *probability* of the event, *consequences* to the community, and *impact* on the organization, in this case the QCFMD. Factors that are discussed are:

- Population and demographics.
- Climate and the environment.
- Community growth.
- Buildings located in the town (the built environment).
- Transportation.
- Targeted building/occupancy hazard
- Fire- and EMS-related risks.
- Incident demand.

CPSM measured and reported on these risks individually and as a whole.

Another significant component of the SOC is an analysis of the current deployment of resources and the performance of these resources in terms of response times and fire management zones; current and future staffing levels and patterns; department resiliency (ability to handle more than one incident); QCFMD participation in the regional automatic and mutual aid system; and critical tasking elements for specific incident responses; and assembling an effective response force. CPSM analyzed these items and provided recommendations where applicable to improve service delivery, and for future planning purposes.

In summation, a comprehensive risk assessment is a critical aspect of creating Standards of Cover, as it assists the QCFMD in quantifying the risks that it faces in the town and unincorporated fire district. Once those risks are known, the department is better equipped to determine if the current response resources are sufficiently staffed, equipped, trained, and positioned. The factors that drive the service needs are examined and then link directly to discussions regarding the assembling of an effective response force and when contemplating the response capabilities needed to adequately address the existing risks, which encompasses the component of critical tasking.

Although it can reasonably be anticipated that the QCFMD's call volume will continue to gradually increase each year as the town continues its growth and development, at the present time the department appears well-positioned to handle its normal call volume in an effective and efficient manner. With the resources the department currently deploys, the department can handle most of the requests for service that it receives without the need for outside assistance. Once the new ladder truck is placed in service, QCFMD's reliance on automatic aid for this asset on the initial response to many fire-related incidents will experience a decrease.

QCFMD possesses sufficient operational redundancy to handle most instances of simultaneous calls without the need for outside assistance. QCFMD is part of one of the premier automatic and mutual aid systems in the nation. Under this system, more than 25 fire departments operate

seamlessly with each other, almost as if they were a single department. The automatic and mutual aid system helps to assure that every incident in Queen Creek will be handled expeditiously by highly trained personnel regardless of whether they are members of the QCFMD, or any other agency in the Valley.

CPSM was also asked to engage in the development of a strategic plan for the QCFMD. The strategy utilized by CPSM was to use a process that was organizationally driven and facilitated so that the members of the organization would have the greatest opportunity for buy-in. This provides the greatest opportunity for the strategic plan to become a successful living document that guides the organization as it moves forward.

CPSM utilized an interactive process that primarily involved an internal stakeholder meeting. This meeting involved 12 department personnel who participated in the development of the strategic plan utilizing a traditional SWOT (strengths, weakness, opportunities, and threats) analysis. The CPSM project staff guided the participants through the process and challenged the participants to think differently about how the community views their services, what internal cultural and behavior dynamics may create blind spots to efficiencies, and explored how other agencies handle similar challenges as experienced in Queen Creek. Ultimately, the product was generated primarily by the stakeholders, as the CPSM facilitator guided the process and tried to stimulate discussion but did not dictate which items rose to priority status.

This strategic plan is intended to capture all of the stakeholders' participation and input without bias and limited influence from the CPSM staff. In other words, the product is primarily the direct reflection of the work accomplished by the members of the Queen Creek Fire and Medical Department.

The members of the internal stakeholder group identified 16 key goals they recommended as priorities over the next five fiscal years. The group was encouraged to build broad buy-in and support for these consensus goals and dedicate the appropriate resources, leadership, and approval to provide the greatest likelihood of bringing these goals to fruition. This, indeed, occurred.

CPSM would like to thank the Town of Queen Creek and the QCFMD for allowing us to participate in this project. CPSM also compliments the QCFMD, as well as numerous other stakeholders, who provided information necessary for this project to be successful, on their professionalism and attention to detail. This document represents considerable effort in a compressed time frame and is very comprehensive.

The Queen Creek Fire and Medical Department (QCFMD) demonstrates exemplary dedication to continuous improvement, innovation, and professionalism. The development of a strategic plan is concrete evidence of the agency's desire to provide highly professional, accountable, and transparent services to the community.

This report contains a series of observations and recommendations provided by CPSM that are intended to help the QCFMD deliver services more efficiently and effectively. ***This report is a snapshot in time, capturing service levels of the QCFMD in the present with some insight into the near future. As Queen Creek is a rapidly growing community, the reader of this report should note that QCFMD service levels are evolving, and may have changed or will change ahead of planned strategic outcomes, to align with the town's growth and increased service demands.***

Recommendations and considerations for continuous improvement of services are presented here. CPSM recognizes there may be recommendations and considerations offered that first must be budgeted for, or for which processes must be developed prior to implementation.

## RECOMMENDATIONS

1. The Town of Queen Creek and QCFMD should continue to maintain the current long-range capital plan for funding the replacement of all fire apparatus and fire department support vehicles. As the number of QCFMD stations increases, the plan will need to be adjusted to take into account the larger fleet size and related implications for replacement needs. (See p. 22.)
2. The Town of Queen Creek and QCFMD should continue to maintain minimum staffing of four personnel on all fire suppression units to maximize operational effectiveness and efficiency, as well as to provide for enhanced firefighter safety. (See p 27.)
3. The QCFMD should build at least a portion of its training regimens and tactical strategies around the exterior or transitional attack for when the fire scenario and the number of available units/responding personnel warrant this approach. (See p. 33.)
4. In recognition of potential changes to the regional EMS transport system with Mesa and Gilbert pursuing their own fire department ambulance services, the Town of Queen Creek and QCFMD should continue to proactively consider all options for the continued delivery of the highest quality EMS services in the community. (See p. 40.)
5. Should the QCFMD implement a transport ambulance system, it should then reevaluate its current priority dispatching protocol and consider using a more traditional dispatch of resources to medical emergencies based upon their acuity (see Figure 3-20). (See p. 40.)
6. The QCFMD, in conjunction with other community healthcare partners, should continue to monitor the incidents of recurring, non-emergency requests for medical assistance. Before the number of requests starts to put a strain on the delivery system, the QCFMD and its partners should explore the feasibility of implementing some type of community-based mobile integrated health care. This would be an attempt to provide better service to the community, and to the extent possible, seek to minimize the recurring demand on the service from continual and repeated use of critical resources for non-emergency responses. (See p. 43.)
7. The QCFMD should explore the possibility of enhancing its technological capabilities to provide increased service to the community for serious cardiac incidents. One such available program is PulsePoint®. PulsePoint® is an app for iPhones which can be downloaded by anyone in the community who is willing to participate in this program. It enables them to be notified when someone is having a cardiac arrest in their vicinity. Utilizing this type of technology, bystander performance and active citizenship enhances the care provided to the community. (See p. 43.)
8. The Town of Queen Creek and QCFMD should consider the creation of a full-time position of training officer at the battalion chief rank to develop, deliver, and coordinate all department training and safety operations. (See p. 47.)
9. The QCFMD should consider the implementation of a shift training officer on each shift to assist the training officer with the delivery of shift-level training. This should be a captain who assists with this function as an ancillary duty. (See p. 47.)
10. All QCFMD captains should be certified as a minimum at the Fire Instructor I level, while chief-level officers should be certified as a minimum at the Fire Instructor II level. (See p. 47.)
11. The QCFMD should institute written and practical skills testing and proficiency evaluations as part of the department's comprehensive fire training program. (See p. 47.)

12. The QCFMD should prioritize a policy that on-duty personnel train a minimum of two hours each duty day, of which 50 percent must be manipulative (hands-on) type training. (See p. 48.)
13. The QCFMD should provide all companies and personnel with high-intensity training on various subjects, including periodic live fire training on a quarterly basis at an appropriate location where appropriate and wide-ranging training facilities, structures, and props are available. (See p. 48.)
14. The QCFMD should consider the conducting one- or two-week engineer and captain academies to assist with providing newly promoted personnel with the tools needed to operate both administratively and in field settings. (See p. 49.)
15. The QCFMD should institute as a job requirement that its officers complete rank-appropriate fire officer training programs and obtain a certain level of fire officer certification. Recommendations would be: Fire Officer I for captain; Fire Officer II for battalion fire chief; Fire Officer III for deputy fire chief; and Fire Officer IV for fire chief. (See p. 49.)
16. The QCFMD should implement a formal officer training and development program. There are several excellent programs available, including those from the International Association of Fire Chiefs and the Phoenix Fire Department. (See p. 49.)
17. The QCFMD should continue to evaluate new technology that will enable reliable high-speed internet connections to be established between all stations for the purpose of implementing video conferencing/training and on-line/internet-based training programs. (See p. 50.)
18. The Town of Queen Creek should proceed with providing funding for the construction of the QCFMD Resource Building and Skills Center in the soonest possible fiscal year. (See p. 50.)
19. The QCFMD should continue its program of using on-duty personnel to conduct regular in-service inspections of all low- and moderate-hazard buildings/occupancies within their respective response districts. These inspections should also include construction sites. The purpose of these inspections is to: a) identify and mitigate fire hazards and fire code violations; b) enable firefighters to become thoroughly familiar with buildings, including the building design, layout, structural conditions, building systems, and hazards and challenges to firefighting operations; c) educate property owners and occupants on good fire safety practices; and d) establish a positive relationship with property owners and occupants. (See p. 51.)
20. With the town poised to continue significant growth over the next several years, and which could result in thousands of new residential occupancies being constructed—eventually possibly doubling or even tripling the population—the Town of Queen Creek should consider the adoption of a town ordinance that mandates the installation of an automatic fire suppression (sprinkler) system in all new construction, including one- and two-family dwellings. CPSM further recommends the QCFMD develop a compelling public education program that includes discussing the significant life-saving benefits of installing residential fire sprinklers in all new one- and two-family dwellings. (See p. 55.)
21. The Town of Queen Creek and QCFMD should consider the creation of a full-time civilian position of logistical specialist in the budget year in which the Resource Building and Skills Center is completed. This person would be responsible for all QCFMD supply and logistical functions, as well as the testing, inspection, and maintenance of SCBA, PPE, radios, meters, hose, nozzles, and other equipment, as needed. (See p. 56.)

22. The QCFMD should take steps to continue to improve both the dispatch time and incident turnout times for both fire and EMS incidents in order to reduce overall response times to emergency incidents. (See p. 103.)
23. In recognition of the fact that automatic fire alarms should be considered to be a possible fire until confirmed to be otherwise, it is recommended the QCFMD continue having at least one engine respond to automatic fire alarm activations Code 3 with lights and sirens, and further continue with the risk management best practice of having additional units respond Code 2. (See p. 105.)
24. In order to provide for more effective, efficient, and safe overall incident management, and to enhance critical incident scene safety, the QCFMD should implement the position of battalion safety officer, at the rank of captain, to function as a part of an integrated command team with each battalion chief. (See p. 122.)
25. The QCFMD should develop a survey instrument to assist the town and department in determining specific external stakeholder expectations for the current and future delivery of fire and emergency medical services to the community. (See p. 129.)
26. The QCFMD should conduct its own periodic external stakeholder satisfaction survey independent of the MCSO so the department is being fully rated on its own service and merits. (See p. 129.)
27. The QCFMD mission statement, vision statement, core values, and motto should be prominently displayed in each station. (See p. 138.)

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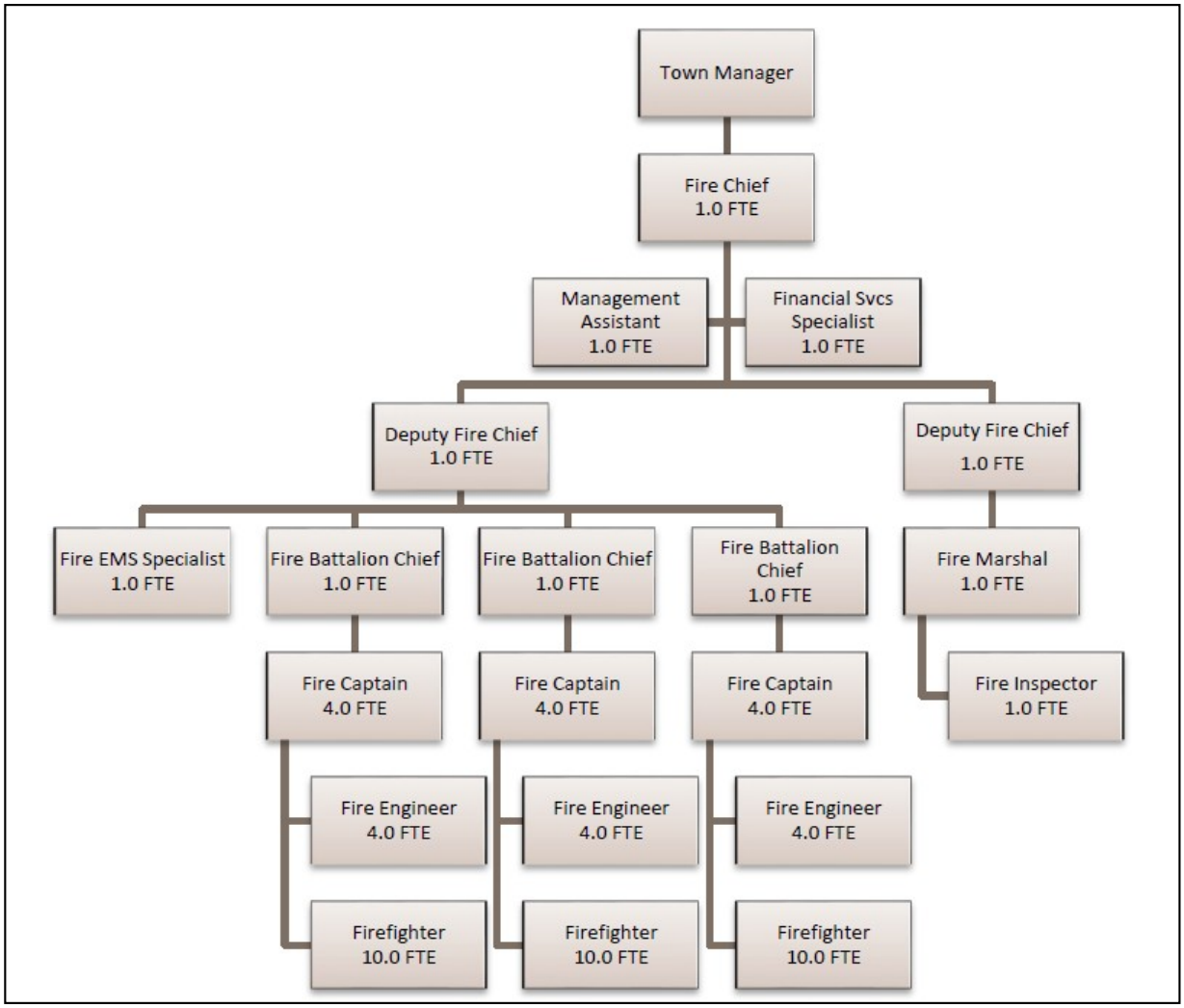
# SECTION 2. AGENCY CHARACTERISTICS

## LEGAL BASIS FOR THE DEPARTMENT

Chapter 18, Article 18-1-1, of the Town Code for the Town of Queen Creek establishes the fire department to be headed by a fire chief. The fire chief is granted authority through the Town Code to enforce the provisions of Chapter 18 of the Town Code to include the adopted fire prevention code. Through Article 18-1-1, the fire chief is given the responsibility for the direction of all firefighting, fire prevention, and fire service activities of the town and is responsible for planning and developing programs to protect the life and property in the town from fire. Currently the department is branded as the Queen Creek Fire and Medical Department (QCFMD).

The following figure illustrates the current organizational chart for the department.

### FIGURE 2-1: Queen Creek Fire and Medical Department Organizational Chart



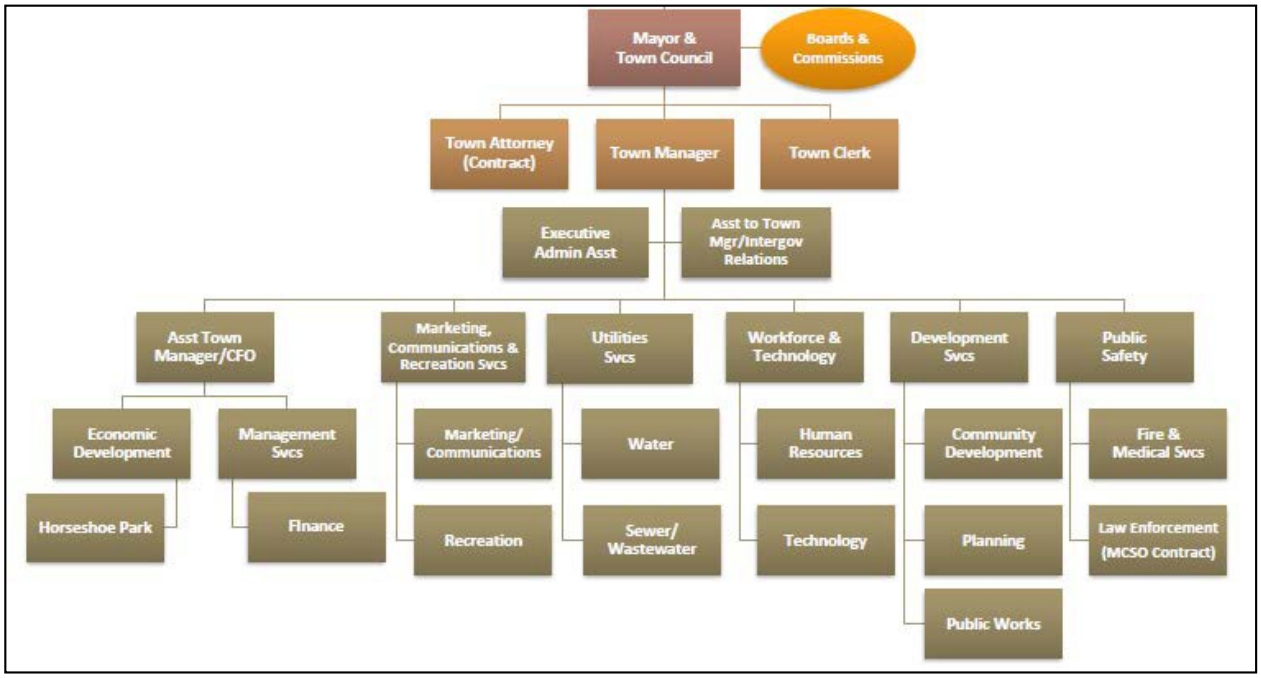
## GOVERNANCE AND ADMINSTRATION

The Town Council is the governing body for the Town of Queen Creek. Governance in the Town of Queen Creek is through the council-manager form of government, which is established in the Town Code. In this model of governance, the town combines the strong political leadership of elected officials in the form of a Town Council, with the strong managerial experience of an appointed town manager. The Mayor presides over the Town Council and all matters presented to the Town Council. The town manager works closely with the Mayor and Town Council to ensure the Council's policies are implemented. Chapter 2 of the Town Code establishes the ordinances from which the Mayor and Town Council operate under. Chapter 3, section 3-2-6(G) establishes the powers and duties of the town manager.

The fire chief is the head of the fire department and serves as a member of senior management, participates in the town's strategic planning efforts, and addresses town-wide fire and emergency medical services service delivery and service-level issues. The chief reports directly to the town manager, who, in turn, reports to the Town Council. The chief's duties include informing the town manager and Town Council on matters of budget, planning, and policies when called upon while remaining accountable to the town manager. The town manager may direct the fire chief to prepare studies and reports that are eventually used to guide the policy decisions of the Town Council on all matters relevant to the department.

The following figure illustrates the organizational chart for the Town of Queen Creek.

### FIGURE 2-2: Town of Queen Creek Organizational Chart



## HISTORICAL PERSPECTIVE

The QCFMD officially began as a town department on January 1, 2008. Prior to this, town residents could subscribe to a private fire protection service with Rural/Metro fire service. In 2006, while Town Council was contemplating renewing the fire protection subscription service with Rural/Metro, approximately 40 percent of the town residences subscribed to the service.[1] This meant that 60 percent of the community's residential and business structures were exposed to costly fees for service to fire emergencies and potentially no insurance coverage, depending on the underwriter.

A contributing factor that led to the creation of the QCFMD was the need for mutual and automatic aid. Queen Creek discovered that it could not participate in the Phoenix regional automatic aid system if it contracted with a private provider for fire services. Town officials saw the value in the Valley-wide automatic aid system, that is, neighboring fire departments responding either automatically or when requested.

On January 1, 2008, Queen Creek established a town fire department and entered an agreement with the Town of Gilbert. Under this arrangement, Gilbert provided staff and fire apparatus for the initial year, while Queen Creek hired its own administrative and operational staff, as well as procured fire apparatus. By mid-2009, the QCFMD was fully functional (with staff and apparatus) and the department staff began responding from two stations.

As of 2019, the QCFMD operates out of four fire stations and has a total FY 2019/2020 staff (administrative and operational) of 66. A fifth station is planned for the future.

## FUNDING

According to the FY 2019/2020 approved budget document, the Town of Queen Creek adopted budget for the year is $452.7 million, of which $20,209,170, or 4.5 percent is allocated the QCFMD. The total budget for the department is $21,289,170, which includes $1,080,000 in a Transfer Out-CIP expenditure line. The FY 2019/2020 overall budget allocation to the QCFMD is 2.5 percent higher than what was allocated in the revised FY 2018/2019 budget. This increase includes 2.0 additional full-time equivalent (FTE) positions, include an EMS specialist (1.0 FTE) and a fire inspector/investigator (1.0 FTE). Since FY 2014/2015, the number of FTEs in the department has almost doubled. The following table shows the department's growth over the last five budget years, ***and demonstrates the continued commitment the Town Council and town manager have to sustain and grow a town fire and medical department.***

### TABLE 2-1: QCFMD FTE Growth

| Year | FY 14/15 | FY 15/16 | FY 16/17 | FY 17/18 | FY 18/19 | FY 19/20 |
|---|---|---|---|---|---|---|
| **FTEs** | 36.00 | 36.00 | 51.00 | 51.00 | 64.00 | 66.00 |

In FY 2018/2019, the QCFMD recruited for and hired 12 sworn FTEs for the staffing and operation of Station 4 (an increase in service level). Additionally, in FY 2018/2019 a deputy chief was hired to assist in the management of the growing department. In FY 2016/2017, the QCFMD recruited and hired 15 sworn FTEs for the staffing and operations of Station 3 (an increase in service level).

1. http://www.eastvalleytribune.com/local/fail-to-get-fire-plan-in-queen-creek/article_251afff1-db83-5139-a7be-d55c694b2716.html

Table 2-2 illustrates the revenue sources that fund the QCFMD; department expenditures are shown in Table 2-3. Of note is that the general fund transfer to the revenues has been significantly reduced in FY 2019/2020, as the EMS fund-direct revenues have increased.

### TABLE 2-2: QCFMD Funding Sources

| Funding Sources | FY 2015/16 Actual | FY 2016/17 Actual | FY 2017/18 Actual | FY 2018/19 Revised | FY 2019/20 Adopted | Dollar Change | % Change |
|---|---|---|---|---|---|---|---|
| EMS Fund - Direct Revenues | $ 8,360,975 | $ 9,777,271 | $ 11,588,700 | $ 11,692,606 | $ 16,089,000 | $ 4,396,394 | 38% |
| Pension Reserve Funding | $ - | $ - | $ - | $ 1,320,369 | $ 1,650,000 | $ 329,631 | 25% |
| Utility ROI | $ - | $ - | $ - | $ 2,468,100 | $ 2,835,055 | | |
| General Fund | $ 3,050,292 | $ 3,106,842 | $ 5,655,209 | $ 4,137,391 | $ 715,115 | $ (3,422,276) | (83%) |
| ***Net Operating Result*** | ***$ 11,411,267*** | ***$ 12,884,113*** | ***$ 17,243,909*** | ***$ 19,618,466*** | ***$ 21,289,170*** | ***$ 1,303,749*** | ***9%*** |

### TABLE 2-3: QCFMD Expenditures by Type

| Expense Category | FY 2015/16 Actual | FY 2016/17 Actual | FY 2017/18 Actual | FY 2018/19 Revised | FY 2019/20 Adopted | Dollar Change | % Change |
|---|---|---|---|---|---|---|---|
| Salaries & Fringes | $ 4,575,768 | $ 5,647,903 | $ 6,992,529 | $ 8,213,392 | $ 8,450,658 | $ 237,266 | 3% |
| Supplies & Services | $ 716,797 | $ 763,803 | $ 697,693 | $ 1,035,835 | $ 1,515,945 | $ 480,110 | 46% |
| Department Support Costs | $ 320,882 | $ 348,936 | $ 404,100 | $ 417,350 | $ 453,064 | $ 35,714 | 9% |
| MCSO | $ 5,468,842 | $ 5,982,348 | $ 6,214,856 | $ 7,758,355 | $ 8,293,582 | $ 535,227 | 7% |
| Debt Service | $ 83,380 | $ 83,380 | $ 83,380 | $ 83,380 | $ 83,381 | $ 1 | 0% |
| Capital Outlay | $ 245,598 | $ 57,742 | $ 496,099 | $ 545,254 | $ 1,079,020 | $ 533,766 | 98% |
| Contingency | $ - | $ - | $ - | $ 229,310 | $ 333,520 | $ 104,210 | 45% |
| ***Subtotal Expenses*** | ***$ 11,411,267*** | ***$ 12,884,113*** | ***$ 14,888,657*** | ***$ 18,282,876*** | ***$ 20,209,170*** | ***$ 1,926,294*** | ***11%*** |
| Transfers Out - Debt Service | $ - | $ - | $ - | $ - | $ - | $ - | N/A |
| Transfers Out - CIP | $ - | $ - | $ 2,355,252 | $ 1,262,890 | $ 1,080,000 | $ (182,890) | (14%) |
| Transfers Out-Grants Match | $ - | $ - | $ - | $ 72,700 | $ - | $ (72,700) | (100%) |
| ***Department Total*** | ***$ 11,411,267*** | ***$ 12,884,113*** | ***$ 17,243,909*** | ***$ 19,618,466*** | ***$ 21,289,170*** | ***$ 1,670,704*** | ***9%*** |

## SERVICE AREA

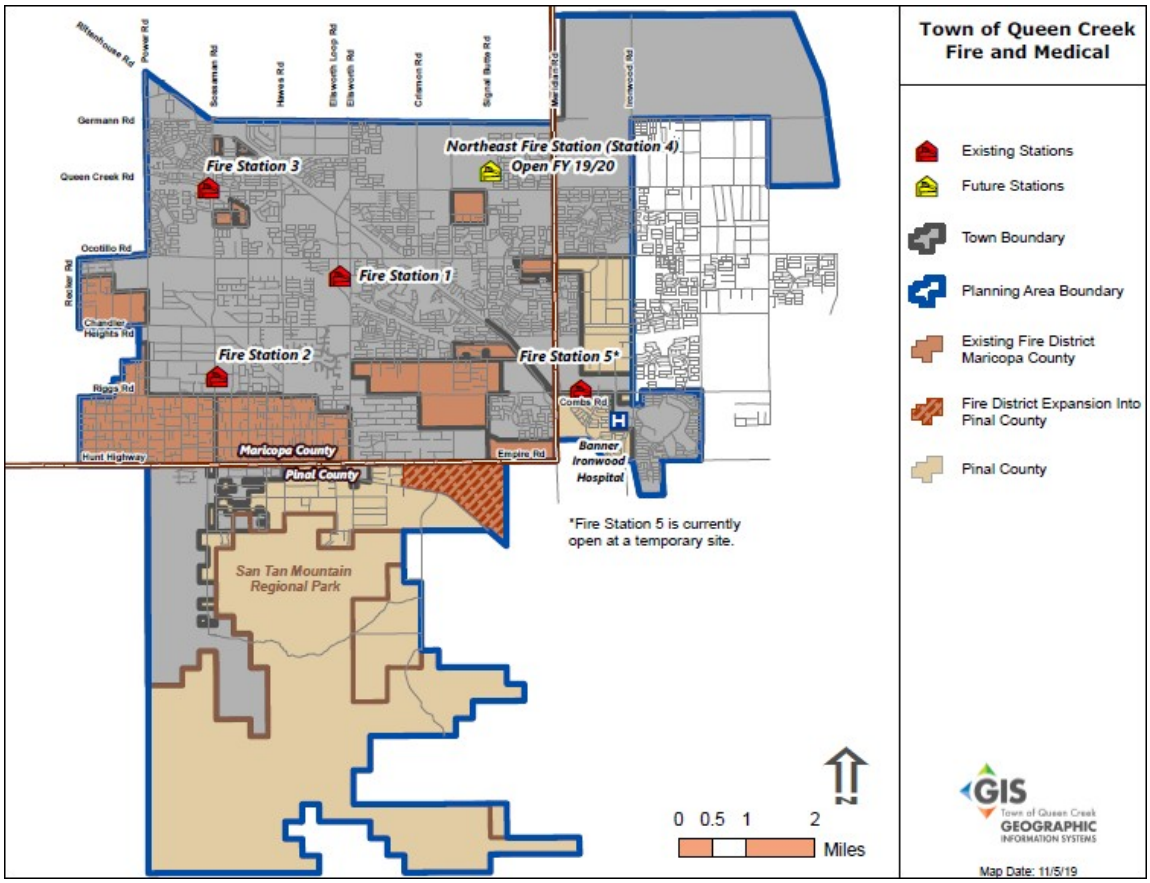
The Town of Queen Creek is located in the southeast corner of Maricopa County and the northwest portion of Pinal County and comprises a land area of approximately 40 square miles. Queen Creek is on the southeast edge of the Phoenix metropolitan area. The following figure illustrates the Town of Queen Creek's relationship to the region.

### FIGURE 2-3: Town of Queen Creek and the Phoenix Metro Region

The fire and medical service area of the QCFMD includes the incorporated boundaries of the town, as well as unincorporated areas of Maricopa and Pinal Counties. Fire services are provided from Queen Creek stations 1, 2, 3, and 5. Emergency medical service (EMS) transport is provided to the town through a contractual agreement with American Medical Response (AMR). This agreement is in partnership with the Town of Gilbert and serves as a regional agreement. As of the date of this report, AMR provides one 24-hour transport unit from station 1, a 24-hpur quick response unit from the eastside of Queen Creek, and a 12-hour unit (8:00 am to 8:00 pm) from Station 3. QCFMD medics assist as an additional medic during critical transports when needed.

The following figure illustrates the current service area of the QCFMD as well as future proposed unincorporated area in Pinal County for which the department may assume service coverage.

## FIGURE 2-4: QCFMD Current and Future Service Area



# SECTION 3. AGENCY PROGRAMS AND SERVICES

## LOCATION OF EXISTING FIRE STATIONS AND COMPANIES

The fire station is a critical link in service delivery and where these facilities are located is the single most important factor in determining overall response times.

The QCFMD operates from a total of five facilities. Fire administration is stationed in the Municipal Services Building located at 22358 S. Ellsworth Rd.; however, this location does not have any emergency response units. The following table lists the locations of the town's fire stations and the staffed resources deployed from them.

### TABLE 3-1: Queen Creek Fire and Medical Department Station Locations

| Station | Location | Staffed Operations Units | Specialty Units / Functions |
|---|---|---|---|
| Station 1 | 20678 E. Civic Parkway | Engine 411*<br>Battalion 411<br>AMR 411<br>24-hour Medic Unit | Rescue 411 |
| Station 2 | 24787 S. Sossaman Rd. | Engine 412 | Brush 412<br>Tender 411 |
| Station 3 | 19159 E. Queen Creek Rd. | Engine 413<br>AMR 413<br>12-hour Medic Unit<br>(8:00 am-8:00 pm) | |
| Station 4 | 20155 S. Signal Butte | Engine 414<br>AMR 414<br>24-hour Medic Unit*** | |
| Station 5** | 980 W. Combs Rd. | Engine 415 | |

*This unit will be replaced by a quint,[2] to be designated Ladder 411, QCFMD's first aerial apparatus, in early 2020. An engine, to be designated Ladder Tender 411 will also be deployed from the station.
** Temporary station location opened on March 1, 2019. Permanent station will be located approximately one-quarter mile east on Combs Road near Banner Ironwood Medical Center.
***AMR 414 is a roving unit on the east side of Queen Creek and is not stationed at Fire Station 4

The QCFMD has an estimated town population of 50,000+ residents (some internal town estimates place the population at more than this number, due to recent annexations) in an area of 40.39 square miles. This includes the recent annexation into the town of approximately 6.5 square miles of currently vacant state lands, and the approximately one square-mile Encanterra development for which annexation is in process. Based on just the area of the town, this equates

2. The term "quint" refers to the five components the multi-purpose vehicle has: fire pump, water tank, hose, ground ladders, and a minimum of a 75-foot aerial ladder.

to a service area of 10.09 square miles for each of the four current town stations (Stations 1, 2, 3, and 5) from which fire suppression and EMS units are deployed. With the opening of Fire Station 4 on December 1, 2020 the average per-station service area decreases to 8.08 square miles.

In addition to providing both fire and EMS service to the town proper, the QCFMD is also responsible for providing primary emergency services response to several Maricopa County "islands," that is, unincorporated areas of the county that are located either completely within or directly adjacent to the town's borders. These areas, which comprise approximately seven square miles, are protected under a fire district agreement with the residents. The district has also recently expanded protection into a small area (approximately one square mile) of Pinal County on the town's southern border. These areas expand the total fire service coverage area to approximately 48 square miles. With the existing four-station deployment, these additional areas means each station covers an average first due service area of 12 square miles. With the opening of Station 4, this average area will decrease to 9.6 square miles. Altogether, the Municipal Planning Area (MPA) for the town and possible future expansion and development encompass 71.56 square miles.

In a FY 2011 *Performance Measurement Data Report* on fire and EMS, ICMA tabulated survey information from 76 municipalities with populations ranging from 25,000 to 100,000 people. In this grouping the average fire station service area was 11 square miles.[3] The median service area for this grouping of communities was 6.67 square miles per fire station.[4]

In addition, the NFPA and ISO have established different indices in determining fire station distribution. The ISO Fire Suppression Rating Schedule, section 560, indicates that first-due engine companies should serve areas that are within a 1.5-mile travel distance. The placement of fire stations that achieves this type of separation creates service areas that are approximately 4.5 square miles in size, depending on the road network and other geographical barriers (rivers, lakes, railroads, limited access highways, etc.). The National Fire Protection Association (NFPA) references the placement of fire stations in an indirect way. It recommends that fire stations be placed in a distribution that achieves the desired minimum response times. NFPA Standard 1710, section 4.1.2.1(3) and (6), suggests an engine placement that achieves a 240-second (four-minute) travel time for the first arriving unit. Using an empirical model called the "piece-wise linear travel time function," the Rand Institute has estimated that the average emergency response speed for fire apparatus is 35 mph. At this speed the distance a fire engine can travel in four minutes is approximately 1.97 miles.[5] A polygon based on a 1.97-mile travel distance results in a service area that, on average, is 7.3 square miles.[6]

It is important to make several notes regarding the polygon models and the associated travel distances and times. First, the model often assumes that resources are distributed equally throughout a service area, which is generally not the case. However, in the case of Queen Creek where all of the stations are new, there appears to be a more even distribution of resources to adequately serve the town. In addition, the road network, and geographical barriers such as the railroad or limited access highways, can impact the distance units can cover

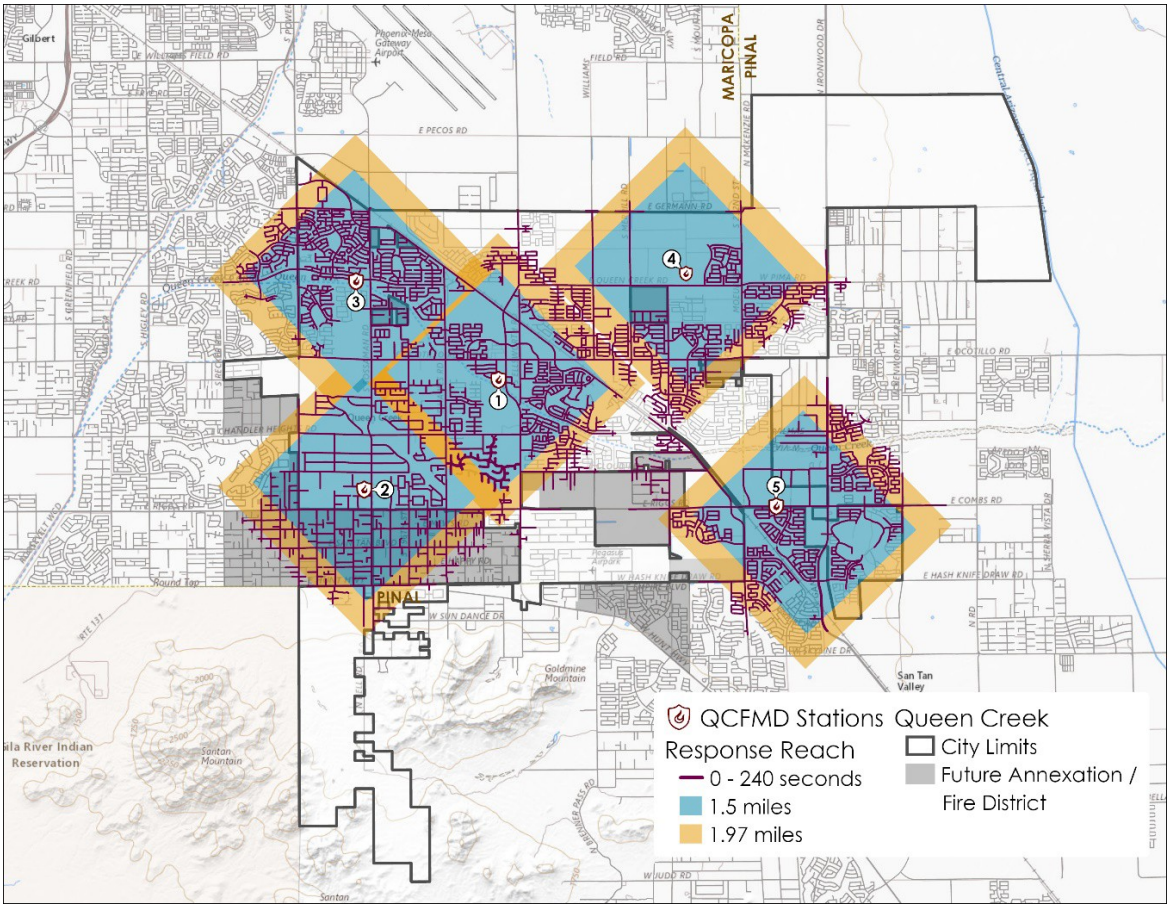
3. Comparative Performance Measurement, FY 2011 Data Report - Fire and EMS, ICMA Center for Performance Measurement, August 2012.
4. Ibid.
5. University of Tennessee Municipal Technical Advisory Service, Clinton Fire Location Station Study, Knoxville, TN, November 2012. p. 8.
6. Ibid., p.9

over the same amount of time. That said, the formulas do provide a useful reference when attempting to benchmark travel distances and response times.

When looking at the entire fire service area, and, factoring in the opening of Station 4 in 2020, at 9.6 square miles Queen Creek's fire station service area will be 43.9 percent larger than the median size determined in the ICMA report but about 12.8 percent below the average response area size. However, the current configuration, overall, provides very good coverage to the town, with a minimal amount of overlap, and limited gaps in what will be targeted response times. The following figure illustrates polygons of 1.5 square miles and 1.97 square miles around each existing QCFMD station (including the soon-to-be-completed Station 4) overlaid with "bleeds" that designate a 240-second first due travel time from each station.

The impact of service area size on the important consideration of response time will be discussed and illustrated in greater detail in Section 5 of this report, *Current Deployment and Performance*.

### FIGURE 3-1: Station Locations with Response Area Polygons and 240-Second Travel Time Bleeds



## RESOURCE DESCRIPTIONS

Fire stations are a critical community public safety asset. The fire station facilities of a modern fire department are designed to do much more than simply provide a garage for apparatus and a place for firefighters to wait for a call. Fire department capital facilities are exposed to some of the most intense and demanding uses of any public local government facility, as they are occupied 24 hours a day.[7] The very nature of the fire department's operations necessitate that all stations be functional, adequate to fulfill the department's core missions, and be well maintained.

National best practices, such as guidance provided by the National Fire Protection Association (NFPA) and the Federal Emergency Management Agency (FEMA) recommend that among other things the following features be included in modern fire station capabilities:

- Seismic-resistant construction (based on local risk assessment).
- Flood hazard protection (based on local risk assessment).
- Automatic fire sprinkler system and smoke detection system.
- Carbon monoxide detectors.
- Vehicle exhaust extraction system.
- Capability to decontaminate, launder, and dry personal protective equipment, station uniforms, and tools and equipment.
- Adequate facility security.
- Emergency power supply and system redundancy.
- Exercise and training area(s).
- Compliance with the Americans with Disabilities Act (ADA).
- Compliance with current fire and building codes.
- Adequate storage for supplies and equipment, including emergency medical and disaster supplies.
- Adequate parking for on-duty personnel, administrative staff, and visitors.
- Capability for future expansion .

Typically, fire stations have an anticipated service life of approximately 50 years, although some newer stations are being designed to remain functional longer. In most cases, facilities require replacement because of the size constraints of the buildings, a need to relocate the facility to better serve changing population centers, the absence of needed safety features or service accommodations, and the general age and condition of the facility. The day-to-day cost of operating a fixed capital facility can burden the operating budget. Properly maintaining mechanical and structural components is critical to the longevity of the facility. Deferring routine maintenance creates inefficiencies in mechanical systems and increases costs for replacement and repairs. It can also shorten the station's serviceable life.

Sound community fire-EMS protection requires the strategic distribution of an adequate number of station facilities. Proper siting is essential to ensure that effective service area coverage is achieved, that predicted response travel times satisfy prevailing community goals and national

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

best practices, and that the facilities are capable of supporting mission-critical personnel and vehicle-oriented requirements and needs.

With Queen Creek being a community that is experiencing rapid growth and development, and the QCFMD being a relatively new organization, the town has a unique opportunity to properly site, design, and build fire stations that will meet the needs of the department and community for the next 50 to 75 years. At the time of this study, QCFMD was operating from four stations, with a fifth station under construction. Of these facilities, two, Stations 1 and 3, are permanent facilities that were completed in March 2017 and August 2017, respectively. Stations 2 and 5 are located in temporary facilities with the latter—which opened in March 2019— also being in a temporary location. Station 4 opened December 1, 2020. The old station 1, which the town owns and which was utilized by Rural/Metro when the QCFMD was formed, is currently used by the fire department for vehicle storage.

Although the CPSM study team did not inspect any of the stations during our field visit, we were informed that the new stations meet all applicable recommended best practices for new facilities. While the temporary facilities do meet these same standards, they are both slated for replacement in the next several years so investing significant money in upgrades would not make fiscal sense. However, in the interim the town should ensure that the temporary stations do meet minimum fire and life safety standards.

Figures 3-2 through 3-6 show the current QCFMD stations, including the under-construction Station 4. Figure 3-7 shows a typical QCFMD station floor plan.

**FIGURE 3-2: QCFMD Station 1**

**FIGURE 3-3: QCFMD Station 2**

**FIGURE 3-4: QCFMD Station 3**


**FIGURE 3-5: QCFMD Station 4**

## FIGURE 3-6: QCFMD Station 5

## FIGURE 3-7: QCFMD Station 4 Floor Plan

The resources that the fire department uses to perform its core mission and mitigate a wide range of emergency incidents are generally divided into two major categories: apparatus and tools/equipment. Apparatus generally includes the department's motorized vehicle fleet and includes the major emergency response apparatus such as pumpers (engines), tenders/tankers (water supply vehicles), aerial apparatus/quints[8], rescue vehicles, and ambulances. Specialized

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

apparatus includes emergency units such as brush trucks and other off-road vehicles. It also often includes trailers for unique applications such as technical rescue, hazardous materials response/ equipment, hazardous material decontamination, structural collapse rescue equipment, breathing air/light support units, foam units/supplies, and mass casualty incident supplies. Support vehicles that are critical to fire department operations, both routine and emergency, include command post and emergency communications units, command/staff vehicles and maintenance trucks.

The mission, duties, responsibilities, demographics, geography, infrastructure, hazards protected, and construction features within the community a department is protecting all play a major role in the composition of each department's unique and individualized apparatus fleet and equipment inventory.

The geography, infrastructure, and building construction characteristics of Queen Creek present the fire department with a wide variety of strategic and tactical challenges related to emergency response preparedness and mitigation. This includes firefighting, emergency medical incidents, motor vehicle accidents and rescues, and the potential for complex incidents requiring special operations capabilities such as technical rescue and hazardous materials emergencies. Commercial buildings and an assortment of target hazards present much different hazards and challenges, and thus apparatus and equipment needs and capabilities than those required for operations in single-family dwellings. These factors, as well as projected future needs, must be taken into consideration when specifying and purchasing apparatus and equipment. Every effort should be made to make new apparatus as versatile and multifunctional/capable as is possible and practical.

The QCFMD currently deploys a fleet of seven fire suppression vehicles to accomplish the mission of the department. This includes five engines (pumpers), one water tender, and one brush truck. In addition, the department operates one fully equipped ALS-capable ambulance for EMS duty during times of high incident volume. It also deploys several command and support vehicles.

The following figures illustrate the current QCFMD apparatus fleet.

### FIGURE 3-8: Engine 411 (2020 Pierce ladder tender) and Engine 412 (2014 Pierce Impel Pumper)

**FIGURE 3-9: Engine 413 (2017 Pierce Velocity Pumper) and Engine 414 (2019 Pierce Velocity Pumper)**

**FIGURE 3-10: Reserve Engine (2009 Pierce Quantum Pumper) and Tender 411 (2007 International 7400, 3,000 Gallon Water Tender)**

**FIGURE 3-11: Rescue 411 (2015 Ford F350/Horton Ambulance) and Battalion 411 (2015 Chevrolet K2500 Battalion Chief Command Vehicle)**


## FIGURE 3-12: Brush 412 (2007 Chevrolet 2500 Pick-up with Skid Unit)


The QCFMD's current apparatus fleet make-up with regards to types and numbers of apparatus is very appropriate for a community of the size and demographics of the town. The department has the proper make-up of vehicles and in appropriate numbers. There is no area where we believe that the amount of apparatus is excessive. Overall, the fleet appears to be in very good to excellent condition. All units appear to be well-maintained with all equipment properly mounted or stowed in compartments in an orderly fashion. All apparatus appears to be fully equipped according to NFPA and ISO recommendations commensurate with vehicles their age.

As the town has continued its rapid growth, including an increase in commercial development, the need for apparatus equipped with an aerial device has increased. Thus, the department's first aerial apparatus, a quint ladder tower equipped with an 88-foot aerial ladder with a bucket, is was placed in service in 2020. It is deployed from Station 1as Ladder 411. The following figure shows the new Ladder 411.

## FIGURE 3-13: Ladder 411 (2019 Rosenbauer 88-foot Ladder Tower)


The department's pumpers range in age from one year for Engine 414 to 12 years for Engine 411 and the reserve engine. The oldest vehicle that is in service and regularly used for emergency response is the 2007 water tender, at 12 years of age. The department also maintains a total of eight other command and staff vehicles comprised of Ford and Chevrolet models. One of these vehicles is the 2015 Chevrolet K2500 that is utilized by the on-duty battalion chief. The remainder of the vehicles range in age from one to ten years.

NFPA 1901: *Standard for Automotive Fire Apparatus*, serves as a guide to the manufacturers that build fire apparatus and the fire departments that purchase them. The document is updated

every five years, using input from the public/stakeholders through a formal review process. The committee membership is made up of representatives from the fire service, manufacturers, consultants, and special interest groups. The committee monitors various issues and problems that occur with fire apparatus and attempts to develop standards that address those issues. A primary interest of the committee over the past years has been improving firefighter safety and reducing fire apparatus crashes.

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

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

The impetus for these recommended service life thresholds is that, despite good stewardship for maintaining emergency vehicles in sound operating condition, advances in occupant safety reflected in each revision of NFPA 1901 provide safer response vehicles for those providing emergency services within the community, as well those "sharing the road" with these responders. Recent advances include fully enclosed cabs, enhanced rollover protection and air bags, three-point restraints, antilock brakes, higher visibility, cab noise abatement/hearing protection, and a host of other improvements.

The QCFMD fleet is presently comprised of vehicles that are well within the NFPA 1901 recommendations for service life. The town and department are also following a very reasonable apparatus acquisition and replacement schedule for major apparatus purchases. The following major acquisitions are planned over the next five years:

- A new engine 411 was placed in service in 2020 and is designated Ladder Tender 411 at Station 1 (a ladder tender has all of the capabilities of the ladder with the exception of the aerial device).
- The department is currently in the process of building a new Engine 415. It is anticipated this unit will be very similar to Engine 414. This unit is under construction with delivery anticipated in the near future. The existing Engine 414 moved to the new station when it opened on December 1, 2020.
- A replacement for Engine 412 will appear in the town's capital plan for FY 2021/2022.

## Recommendation:

- The Town of Queen Creek and QCFMD should continue to maintain the current long-range capital plan for funding the replacement of all fire apparatus and fire department support vehicles. As the number of QCFMD stations increases, the plan will need to be adjusted to take into account the larger fleet size and related implications for replacement needs. (Recommendation No. 1.)

## STAFFING LEVELS AND STAFFING PATTERNS

The fire service has experienced tremendous technological advances in equipment, procedures, and training over the past 50 years. Better personal protective equipment (PPE), the widespread use of self-contained breathing apparatus (SCBA), large diameter hose, better and lighter hand lines and nozzles, and thermal imaging cameras are just a few of the numerous advances in equipment and procedures that have allowed firefighters to perform their duties more effectively, efficiently, safely, and with fewer personnel. However, the fact remains that the emergency scene in general, and the fireground involving a structure fire in particular, is a dynamic, dangerous, frequently unpredictable, and rapidly changing environment where conditions can deteriorate very quickly and can place firefighters in extreme personal danger, particularly if there are not enough on scene to handle all the critical tasks.

The operations necessary to successfully extinguish a structure fire, and do so effectively, efficiently, and safely, requires a carefully coordinated and controlled plan of action where certain operations such as venting ahead of the advancing interior hose line(s) must be carried out with a high degree of precision and timing. Multiple operations, frequently where seconds count, such as search and rescue operations and trying to cut off a rapidly advancing fire, must also be conducted simultaneously. If there are not enough personnel on the incident initially to perform all the critical tasks, some will, out of necessity, be delayed. This can result in an increased risk of serious injury, or death, to building occupants and firefighters, along with increased property damage.

Staffing and deployment of fire services is not an exact science. While there are many benchmarks that communities and management utilize in justifying certain staffing levels, there are certain considerations that are data driven and reached through national consensus that serve this purpose as well. CPSM has developed metrics it follows and recommends that communities consider when making recommendations regarding staffing and deployment of fire resources.

Staffing is one component and the type of apparatus the personnel are deployed on and from where (station locations) are the other two components that determine how fire and EMS services are delivered. Linked to these components of staffing and deployment are 11 critical factors that drive various levels and models from which fire and EMS departments staff and deploy. These factors are:

**Fire Risk and Vulnerability of the Community**: A fire department collects and organizes risk evaluation information about individual properties, and on the basis of the rated factors then derives a "fire risk score" for each property. The community risk and vulnerability assessment evaluates the community as a whole, and with regard to property, measures all property and the risk associated with that property and then segregates the property as either a high-, medium-, or low-hazard depending on factors such as the life and building content hazard, and the potential fire flow, staffing, and apparatus types required to mitigate an emergency in the specific property. Factors such as fire protection systems are considered in each building evaluation. *Included in this assessment should be both a structural and nonstructural (weather, wildland-urban interface, transportation routes, etc.) analysis.*

**Population, Demographics, and Socioeconomics of a Community**: Population and population density drives calls for local government service, particularly public safety. The risk from fire is not the same for everyone, with studies telling us age, gender, race, economic factors, and what region in the country one might live in contribute to the risk of death from fire. Studies also tell us these same factors affect demand for EMS, particularly population increase and the more

frequent use of hospital emergency departments due to many uninsured or underinsured patients relying on EDs for their primary and emergent care, utilizing prehospital EMS transport systems as their entry point.

**Call Demand:** Demand is made up of the types of calls to which units are responding and the location of the calls. This drives workload and station siting considerations. Higher population centers with increased demand require resources.

**Workload of Units:** The types of calls to which units are responding and the workload of each unit in the deployment model. This tells us what resources are needed and where. This links to demand and station location, or in a dynamically deployed system, where to post units.

**Travel Times from Fire Stations:** Looks at the ability to cover the response area in a reasonable and acceptable travel time when measured against national benchmarks. Links to demand and risk assessment.

**NFPA Standards, ISO, OSHA requirements (and other national benchmarking).**

**EMS Demand:** Community demand; demand on available units and crews; demand on non-EMS units responding to calls for service (fire/police units); availability of crews in departments that utilize cross-trained EMS staff to perform fire suppression.

**Critical Tasking:** The ability of a fire and EMS department to comprise an effective response force when confronted with the need to perform required tasks on a fire or EMS incident scene defines its capability to provide adequate resources to mitigate each event. Department-developed and measured against national benchmarks. Links to risk and vulnerability analysis.

**Innovations in Staffing and Deployable Apparatus:** The fire department's ability and willingness to develop and deploy innovative apparatus (combining two apparatus functions into one to maximize available staffing, as an example). Deploying quick response vehicles (light vehicles equipped with medical equipment and some light fire suppression capabilities) on those calls (typically the largest percentage) that do not require heavy fire apparatus.

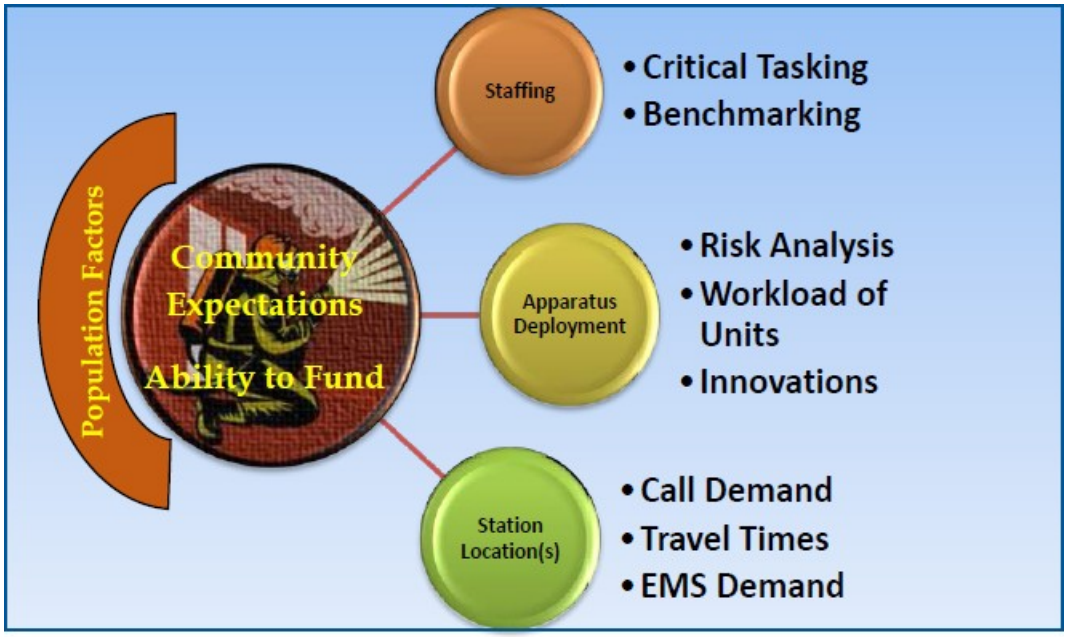
**Community Expectations:** Measuring, understanding, and meeting community expectations.

**Ability to Fund:** The community's ability and willingness to fund all local government services and understanding how the revenues are divided up to meet the community's expectations.

These factors are further illustrated in the following figure.

§ § §

**FIGURE 3-14: Staffing and Deploying Fire and EMS Departments**




While each component presents its own metrics of data, consensus opinion, and/or discussion points, aggregately they form the foundation for informed decision-making geared toward the implementation of sustainable, data- and theory-supported, effective fire and EMS staffing and deployment models that fit the community's profile, risk, and expectations. The Town of Queen Creek had not completed a comprehensive analysis of these elements prior to this study. However, part of CPSM's analysis involved the completion of a community fire risk and target hazard analysis.

The QCFMD currently has an authorized staff of 61 sworn emergency response personnel. Of these, 57 are assigned to fire and EMS operations positions while the remainder perform a variety of administrative and support functions. The department also employs four non-uniformed support personnel, which includes a fire inspector/fire investigator, and an EMS training coordinator.

Of the department's uniformed personnel, 34 are certified paramedics. At the time of CPSM's field visit, four personnel were in paramedic school, three of whom graduated in December 2019. The fourth member is scheduled to graduate in February 2020. The remainder of the personnel are either advanced emergency medical technicians (A-EMT) or basic emergency medical technicians (EMT-B). All new personnel who are hired by the department are required to possess, or obtain, paramedic certification and maintain it for the duration of their tenure as a condition of employment.

The department delivers field operations and emergency response services through a clearly defined division of labor that includes a middle manager (battalion chief), first-line operational supervisors (captains), technical specific staff (engineers), and firefighter/paramedics. The entire town is considered a single operational battalion and is commanded each day by a battalion chief. Field personnel work a three-platoon, 56-hour work week that is comprised of 24-hour long duty days.

The QCFMD operates out of four stations, primarily staffing four engines one command vehicle. The department also has one transport-capable ALS unit (ambulance), one water tender, and

one brush truck, all of which are cross-staffed by on-duty personnel when needed. The department's first aerial apparatus was placed in service in 2020. The department also maintains a reserve fire suppression unit (pumper).

When fully staffed, each of the department's three shifts have 23 personnel assigned to them. This consists of one battalion chief, five captains, five engineers, and twelve firefighters. Minimum on duty staffing is 21. When the number of personnel on duty falls below that number, overtime is utilized to bring it back to 21.

In order to comply with the Regional Metropolitan Phoenix Fire Service Automatic Aid Agreement of which QCFMD is a participant, all primary fire suppression units (engines, ladders, etc.) must normally be staffed with a minimum of four personnel. In extenuating circumstances, the agreement permits them to operate with just three personnel for up to eight hours. When staffing permits, QCFMD tries to staff Ladder Tender 411 and Engine 413 with five personnel, while Engines 412, 414, and 415 are staffed with four. However, whenever anyone is off duty for any reason, Ladder Tender 411 and Engine 413 can drop to four-person staffing. Every effort is made to maintain 5-person staffing on these two units. At least two personnel on each QCFMD unit are always certified paramedics able to provide advanced life support (ALS) care and interventions on patients.

In acknowledgement of the improved operational effectiveness and efficiency and enhanced level of safety it provides for firefighters, QCFMD should be commended for its practice of maintaining four-person minimum staffing on all fire suppression units. CPSM considers this to be a **Best Practice**.

AMR, which provides the EMS transport service under contract with the town (in a regional agreement with Mesa and Gilbert), also staffs and deploys ALS-capable ambulances from several QCFMD stations. Each AMR unit is staffed with two personnel, at least one of whom must be a paramedic. Units at stations 411 and 413 are staffed and in service 24/7. Station 3 switched from a 12-hour deployment to 24 hours in the fall of 2019. AMR also staffs and deploys a part-time unit from Station 5. AMR 414 is a roving unit in Station 5's area and is staffed 24 hours with different crews in 12-hour blocks. It should be noted that one of the concerns that was mentioned to CPSM by QCFMD personnel is that when AMR has fewer staff available then necessary, it will often take a 12-hour unit out of service. This can have an impact on service levels in the town.

The following table illustrates how the on-duty staffing is normally deployed.

§ § §

### TABLE 3-2: Normal QCFMD Staffing/Deployment Model

| Unit | Normal Staffing |
|---|---|
| **Station 1*** | |
| **Ladder Tender/Ladder 411** | 1 – Captain, 1 – Engineer, 2/3 - Firefighters |
| **Battalion 411** | 1 - Battalion Chief |
| **AMR 411** | 2 – Personnel (minimum 1 - Paramedic, 1 – EMT) |
| **Rescue 411** | Rescue 411 is fully equipped, ALS-capable ambulance that can be placed in service as needed if AMR is unable to cover the town due to high call volume or other staffing issues. When placed in service it is staffed with one paramedic and one EMT, normally dropping two engine companies to three-person crews. If Engine 411 or 413 has five-person staffing, they will detail two firefighters—one Paramedic and one EMT—to staff Rescue 411 while the engine responds with a crew of three. |
| **Tender 411** | When needed one firefighter from Engine 411, or another company assigned to staff it if E-411 is not immediately available, will respond with the tender, leaving three personnel on the engine company. |
| **Station 2** | |
| **Engine 412** | 1 – Captain, 1 – Engineer, 2 - Firefighters |
| **Brush 412** | If Brush 412 is needed, Engine 412 will normally staff it with two fire fighters and the engine and brush truck will respond together to the incident. If Engine 412 is unavailable, another engine company may be assigned to go to Station 2 and pick up the unit. |
| **Station 3** | |
| **Engine 413** | 1 – Captain, 1 – Engineer, 2/3 - Firefighters |
| **AMR 413** | 2 – Personnel (minimum 1 - Paramedic, 1 – EMT) (8:00 am -8:00 pm) |
| | **Station 4** |
| **Engine 414** | 1 – Captain, 1 – Engineer, 2 - Fire Fighters |
| **Station 5** | |
| **Engine 415** | 1 – Captain, 1 – Engineer, 2 - Fire Fighters |
| **AMR 414** | 2 – Personnel (minimum 1 - Paramedic, 1 – EMT) (24-hour unit Roving Unit) |

***** Ladder 411 will be cross staffed with Ladder Tender 411. Ladder Tender 411 will be will run calls in place of Ladder 411 as appropriate. The Ladder Tender will have the same equipment and abilities as the ladder company minus the aerial. It will be at the captain's discretion which unit is most appropriate for the incident.

## Recommendation:

- The Town of Queen Creek and QCFMD should continue to maintain minimum staffing of four personnel on all fire suppression units to maximize operational effectiveness and efficiency, as well as to provide for enhanced firefighter safety. (Recommendation No. 2.)

■ ■ ■ ■

In anticipation of the opening of Fire Station 4 in late 2020, the QCFMD began a recruit academy for 15 new firefighters in the summer of 2020. The addition of these new firefighters increased the department's total sworn/uniformed personnel to 76. These personnel completed

the academy in December, 2020 and Station 4 opened. The on-duty staffing has increase to a maximum of 24, with minimum staffing set at 21 personnel on duty 24/7.

QCFMD also has an active Community Emergency Response Team (CERT) program that helps prepare individuals to respond to emergency situations in the community and provide assistance and support to the professional emergency response personnel. CERT programs are community-based initiatives to engage citizens in homeland security and other forms of emergency preparedness, CERT educates citizens in giving critical support to first responders, providing immediate assistance to victims, and organizing volunteers to assist at a major emergency or disaster site. In 2019, the department brought on a CERT volunteer to provide coordination of future classes and assist with better organizing and enhancing the overall program. A class of nine community members completed the training in 2019.

QCFMD is to be commended for its efforts to develop a community-wide CERT team, which CPSM considers to be a ***Best Practice***.

## AUTOMATIC AND MUTUAL AID

Mutual aid is an essential component of almost every fire department's operations. Except for the largest cities, no municipal fire department can, or should, be expected to have adequate resources to respond to and safely, effectively, and efficiently mitigate large-scale and complex incidents. Mutual aid is shared between communities when their day-to-day operational fire, rescue, and EMS capabilities have been exceeded, and this ensures that the citizens of the communities are protected even when local resources are overwhelmed.

Automatic aid is an extension of mutual aid, where the resources from adjacent communities are dispatched to respond at the same time as the units from the jurisdiction where the incident is occurring. There are two basic principles for automatic aid, the first being that all jurisdictional boundaries are essentially erased, which allows for the closest, most-appropriate unit to respond to an incident, regardless of which jurisdiction it belongs to. The second is to provide, immediately and at the time of initial dispatch, additional personnel or resources that may be needed to mitigate the reported incident. An example of this would be that Queen Creek does not yet have a ladder truck in service; therefore, any time there is a reported structure fire in the town, either Gilbert or Mesa respond with a ladder truck on automatic aid.

Automatic and mutual aid is generally provided without charge among the participants.

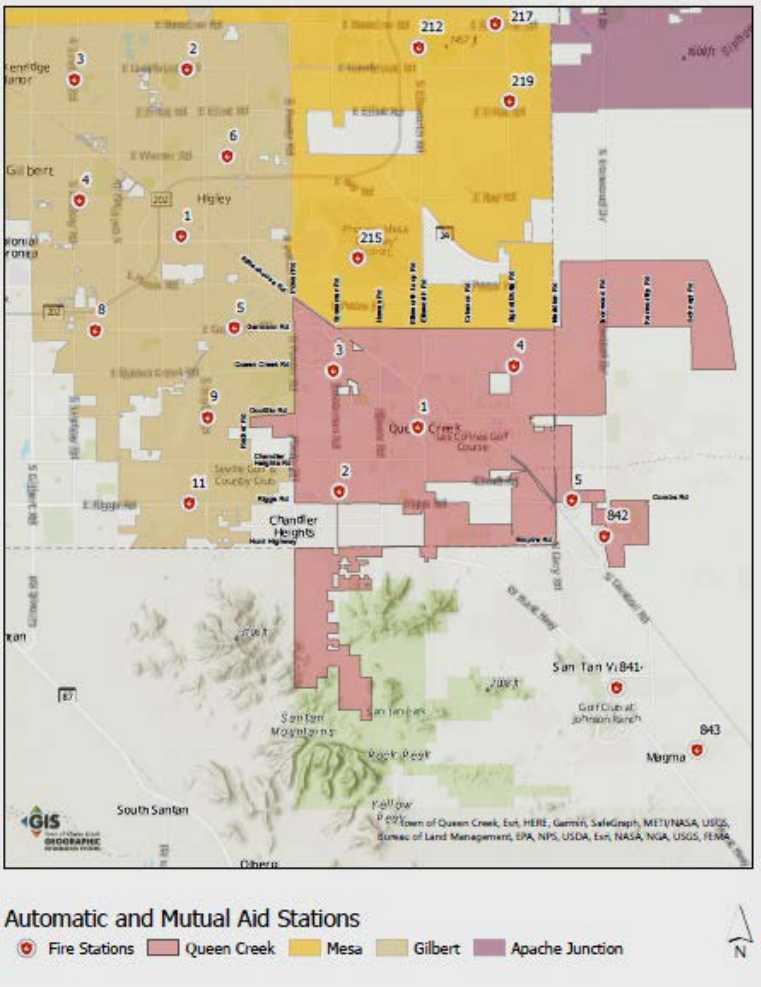
The QCFMD participates in a robust automatic and mutual aid system with its surrounding departments. This includes both fire- and EMS-related incidents. The department is a participant in the Regional Metropolitan Phoenix (also referred to as the "Valley") Fire Service Automatic Aid Agreement that includes nearly 25 different jurisdictions in the Phoenix area. This system has been in place for more than 30 years.

The seamless use of automatic aid as utilized in the "Valley" for the delivery of fire protection, emergency medical services, and special operations provides the community with a high level of service and high levels of effectiveness by providing the customer—the 9-1-1 caller—with the fastest response to their emergency. In addition, the delivery of emergency services through robust automatic aid agreements is a model for intergovernmental cooperation, efficiency, and customer service and is considered the "Gold Standard" of emergency service delivery systems.

The Town of Queen Creek and QCFMD are to be commended for their full participation in the Regional Metropolitan Phoenix Fire Service Automatic Aid Agreement, which CPSM considers to be a ***Best Practice***.

The following figure illustrates the location of QCFMD stations along with the location of automatic/ mutual aid partner stations. It should be noted that Stations 841, 842, and 843 located southeast of Queen Creek are Rural Metro Stations in Pinal County. Rural Metro will respond when requested for mutual aid but is not a participant in the regional automatic aid system.

### FIGURE 3-15: Current QCFMD Stations with Automatic and Mutual Aid Stations




One additional benefit to the Valley automatic aid system is that all participants utilize a standardized set of operational policies and procedures for emergency incident operations. This allows for a consistent approach to each type of emergency incident, and ensures that all personnel are working together in a unified and standardized way, regardless of which jurisdiction or agency they work for.

During the 12-month period analyzed, QCFMD provided automatic aid 443 times and mutual aid an additional 19. It received automatic aid 272 times and mutual aid in an additional 5 instances. Table 3-3 breaks down the automatic and mutual aid that queen Creek received by call type. Table 3-4 breaks down the automatic and mutual aid given by QCFMD by call type.

## TABLE 3-3: Aid Received Calls by Call Type

| Call Type | QCFMD Units Responded | | No QCFMD Units Responded | |
|---|---|---|---|---|
| | Automatic Aid | Mutual Aid | Automatic Aid* | Total |
| Breathing difficulty | 0 | 0 | 11 | 11 |
| Cardiac and stroke | 8 | 0 | 20 | 28 |
| Fall and injury | 3 | 0 | 11 | 14 |
| Illness and other | 6 | 0 | 10 | 16 |
| MVA | 34 | 2 | 10 | 46 |
| Overdose and psychiatric | 1 | 1 | 9 | 11 |
| Seizure and unconsciousness | 3 | 2 | 18 | 23 |
| **EMS Total** | **55** | **5** | **89** | **149** |
| False alarm | 0 | 0 | 10 | 10 |
| Good intent | 2 | 0 | 1 | 3 |
| Hazard | 32 | 0 | 1 | 33 |
| Outside fire | 7 | 0 | 1 | 8 |
| Public Service | 9 | 0 | 53 | 62 |
| Structure Fire | 12 | 0 | 0 | 12 |
| **Fire Total** | **62** | **0** | **66** | **128** |
| **Total** | **117** | **5** | **155** | **277** |

**Note**: There were no mutual aid received calls in QCFMD's fire district without a responding QCFMD unit.
* For most of the report, these 155 calls were excluded.

## TABLE 3-4: Aid Given Calls by Call Type

| Call Type | Automatic Aid | Mutual Aid |
|---|---|---|
| Breathing difficulty | 24 | 1 |
| Cardiac and stroke | 33 | 1 |
| Fall and injury | 65 | 0 |
| Illness and other | 62 | 0 |
| MVA | 66 | 11 |
| Overdose and psychiatric | 15 | 0 |
| Seizure and unconsciousness | 34 | 1 |
| **EMS Total** | **299** | **14** |
| False alarm | 24 | 0 |
| Good intent | 0 | 1 |
| Hazard | 31 | 0 |
| Outside fire | 12 | 2 |
| Public service | 61 | 1 |
| Structure fire | 16 | 1 |
| **Fire Total** | **144** | **5** |
| **Total** | **443** | **19** |

# FIRE AND EMS OPERATIONS AND RESPONSE METRICS

Fire, rescue, and emergency medical system (EMS) incidents, and the fire department's ability to respond to, manage, and mitigate them effectively, efficiently, and safely, are mission-critical components of the emergency services delivery system. In fact, fire, rescue, and EMS operations provide the primary, and certainly most important, basis for the very existence of the fire department.

Nationwide, fire departments are responding to more EMS calls and fewer fire calls, particularly fire calls that result in active firefighting operations by responders. This is well documented in both national statistical data, as well as CPSM fire studies. Queen Creek's experience is consistent with these trends, particularly in light of the fact that the town is a new community. Improved building construction, code enforcement, automatic sprinkler systems, and aggressive public education programs have contributed to a decrease in serious fires and, more importantly, fire deaths among civilians.

These trends and improvements in the overall fire protection system notwithstanding, fires still do occur, and the largest percentage of those occur in residential occupancies where they place the civilian population at risk. Although they occur with less frequency than they did several decades ago, when they occur today, they grow much quicker and burn more intensely than they did in the past. As will be discussed later in this report, it is imperative that the fire department is able to assemble an effective response force (ERF) within a reasonable time period in order to successfully mitigate these incidents with the least amount of loss possible.

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*, 2016 edition (National Fire Protection Association, Quincy, Mass.) outlines organization and deployment of operations by career, and primarily career fire and rescue organizations.[9] It is the benchmark standard that the United States Department of Homeland Security utilizes when evaluating applications for staffing grants under the Staffing for Adequate Fire and Emergency Response (SAFER) grant program.

## Fire Operations

With a population density estimated to be somewhere between approximately 1,050 and 1,250 people per square mile (not counting the county islands that fall within the city's boundaries), Queen Creek is considered an urban community by the U.S. Census Bureau.

Like many newer communities that are experiencing rapid growth, the town has an assortment of commercial and residential buildings (Queen Creek has almost no industry). If a fire grows to an area in excess of 2,000 square feet, or extends beyond the building of origin, it is most probable that additional personnel and equipment will be needed, as initial response personnel will be taxed beyond their available resources. From this perspective it is critical that QCFMD units respond quickly and initiate extinguishment efforts as rapidly as possible after notification of an incident. It is, however, difficult to determine in every case the effectiveness of the initial response in limiting the fire spread and fire damage. Many variables will impact these outcomes, including:

9. NFPA 1710 is a nationally recognized standard, but it has not been adopted as a mandatory regulation by the federal government or the State of Arizona. It is a valuable resource for establishing and measuring performance objectives for the Town of Queen Creek but should not be the only determining factor when making local decisions about the town's fire and EMS services.

- The time of detection, notification, and ultimately response of fire units.
- The age and type of construction of the structure. Being primarily a community where the development has occurred over the past several decades, the majority of buildings in Queen Creek will be of lightweight construction, which is prone to early collapse in a fire situation.
- The presence of any built-in protection (automatic fire sprinklers) or fire detection systems. Fortunately, the majority of the new commercial construction in Queen Creek is equipped with automatic fire suppression systems.
- The contents stored in the structure and its flammability.
- The presence of any flammable liquids, explosives, or compressed gas canisters.
- Weather conditions and the availability of water for extinguishment.

Subsequently, in those situations in which there are extended delays in the extinguishment effort or the fire has progressed sufficiently upon arrival of fire units, there is actually very little that can be done to limit the extent of damage to the entire structure and its contents. In these situations, suppression efforts may need to focus on the protection of nearby or adjacent structures (exterior exposures) with the goal being to limit the spread of the fire beyond the building of origin, and sometimes the exposed building. This is often termed ***protecting exposures***. When the scope of damage is extensive, and the building becomes unstable, firefighting tactics typically move to what is called a ***defensive attack***, or one in which hose lines and more importantly personnel are on the outside of the structure and their focus is to merely discharge large volumes of water until the fire goes out. In these situations, the ability to enter the building is very limited and if victims are trapped in the structure, there are very few safe options for making entry.

Today's fire service is actively debating the options of interior firefighting vs. exterior firefighting. These terms are self-descriptive in that an ***interior fire attack*** is one in which firefighters enter a burning building in an attempt to find the seat of the fire and from this interior position extinguish the fire with limited amounts of water. An ***exterior fire attack***, also sometimes referred to as a ***transitional attack***, is a tactic in which firefighters initially discharge water from the exterior of the building, either through a window or door and knock down the fire before entry in the building is made. The concept is to introduce larger volumes of water initially from the outside of the building, cool the interior temperatures, and reduce the intensity of the fire before firefighters enter the building. A transitional attack is most applicable in smaller structures, typically single family, one-story detached units which are smaller than approximately 2,500 square feet in total floor area. For fires in larger structures, the defensive type, exterior attacks generally involve the use of master streams capable of delivering large volumes of water for an extended period of time.

Recent studies by UL have evaluated the effectiveness of interior vs. exterior attacks in certain simulated fire environments. These studies have found the exterior attack to be equally effective in these simulations.[10] This debate is deep-seated in the fire service and traditional tactical measures have always proposed an interior fire attack, specifically when there is a possibility that victims may be present in the burning structure. The long-held belief in opposition to an exterior attack is that this approach may actually push the fire into areas that are not burning or where victims may be located. The counterpoint supporting the exterior attack centers on firefighter safety.

10. "Innovating Fire Attack Tactics," U.L.COM/News Science, Summer 2013.

The exterior attack limits the firefighter from making entry into those super-heated structures that may be susceptible to collapse. From CPSM's perspective, there is at least some likelihood that a single crew of four personnel will encounter a significant and rapidly developing fire situation. This situation can occur during times of high incident activity when other units may be committed on other emergencies, or, in fringe areas of the town where other units responding to the incident may have longer response times to arrive on the scene. It is prudent, therefore, that the QCFMD build at least a component of its training and operating procedures around the tactical concept of the exterior fire attack when the situation warrants such an approach.

## Recommendation:

- The QCFMD should build at least a portion of its training regimens and tactical strategies around the exterior or transitional attack for when the fire scenario and the number of available units/responding personnel warrant this approach. (Recommendation No. 3.)

The ability to quickly develop an adequate and sustainable water supply is key to successful mitigation of almost every fire incident. Queen Creek has an excellent municipal water supply system for fire department use. Currently, there are 23 water supply wells supplemented by 18 water tanks. The town plans on bringing 12 additional wells on-line over the next few years, along with erecting four more tanks, each with a capacity of three million gallons of water.

Water mains are set up in one-mile square grids with the primary feeders being 12 inches in diameter. Each grid also has a 12-inch main through its middle. Supply lines into subdivisions are 8 inches in diameter with some 6-inch lines used in short cul-de-sacs. Pressure is normally maintained between 45 and 50 PSI, with 40 PSI being the minimum. All of these are adequate for the typical residential fire hazard found in most of Queen Creek.

Queen Creek's water department appears to be a forward-looking agency that projects water infrastructure needs and expansions out approximately a decade in advance. In addition, when planning and implementing expansion of the water system, it usually will expand the system beyond the boundaries of current projects in anticipation of future development. As such, the water department serves an area much larger than the current fire service area.

As currently staffed, the QCFMD should be able to handle most fires in single-family dwellings, particularly those that are limited in size and intensity, without the need for automatic or mutual aid. Fire incidents in larger structures often require additional personnel and resources to successfully mitigate. Critical staffing necessary to successfully mitigate various types of incidents will be discussed in detail in *Section 5* of this report.

The achievability of the QCFMD being able to handle larger, more complex incidents without the need for automatic or mutual aid will increase as the town continues to incrementally increase the number of personnel and resources that are deployed. In the short term, fires occurring when there are no other incidents in progress that would reduce the immediately available number of personnel, and when the fire department can arrive at the fire incident and take definitive action to mitigate the situation prior to flashover occurring, will impact how effectively and quickly incidents can be mitigated. If flashover has occurred, holding the fire to the building of origin is achievable as well.

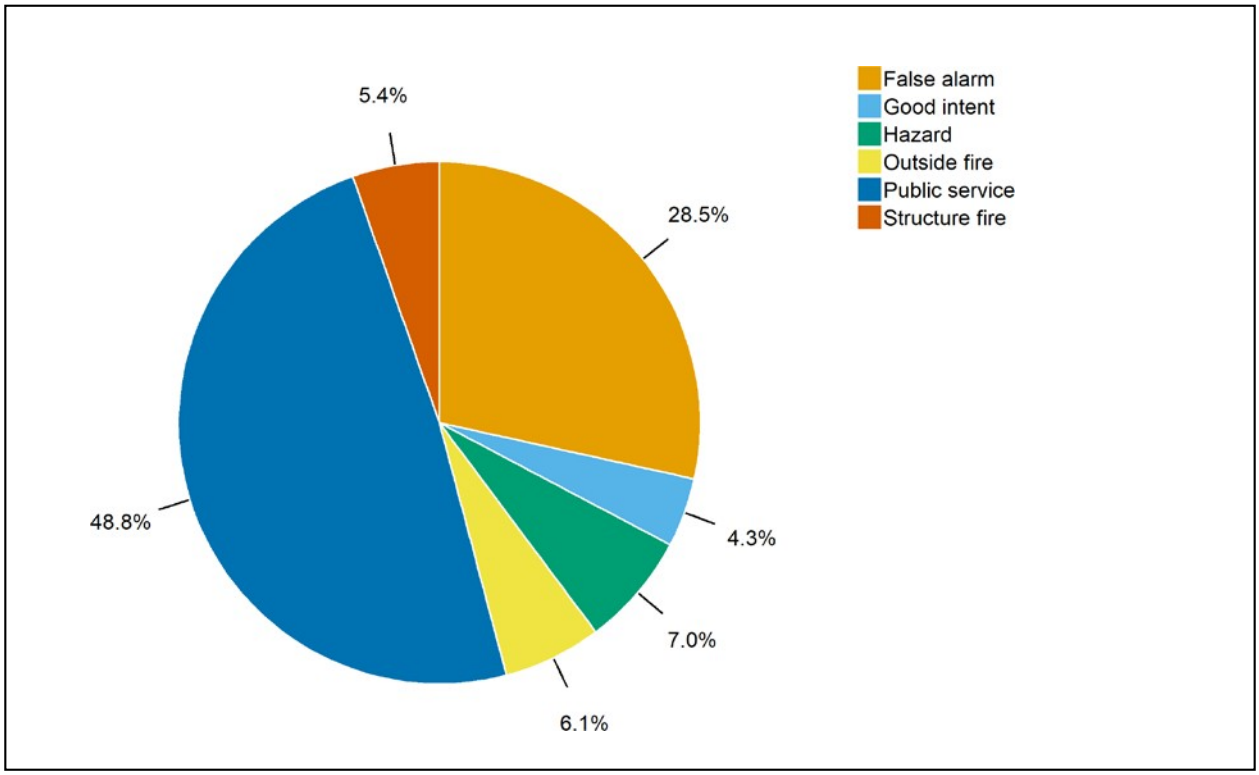
The following table and figure show the fire call totals for the 12-month period evaluated, including number of calls by type, average calls per day, and the percentage of fire calls by category for all calls received. While fire call types were 18.8 percent of the total calls for service,

actual fire calls (structural and outside) were only 2.1 percent of the overall calls for service (approximately 0.22 calls per day or one actual fire-type call every 4.5 days). The 83 actual fires represent 11.5 percent of the fire-related incidents. Hazardous conditions, false alarms, public service, and good intent calls represent the largest percentage of fire-type calls for service. This experience is typical in CPSM data and workload analyses of other fire departments.

### TABLE 3-5: Fire Calls by Type and Number, and Percent of All Calls

| Call Type | Number of Calls | Calls per Day | Call Percentage |
|---|---|---|---|
| False alarm | 206 | 0.6 | 5.3 |
| Good intent | 31 | 0.1 | 0.8 |
| Hazard | 51 | 0.1 | 1.3 |
| Outside fire | 44 | 0.1 | 1.1 |
| Public service | 353 | 1.0 | 9.2 |
| Structure fire | 39 | 0.1 | 1.0 |
| **Fire Total** | **724** | **2.0** | **18.8** |

### FIGURE 3-16: Fire Calls by Type and Percentage



The data in the table and figure tell us that:

- Fire calls for the year totaled 724 (18.8 percent of all calls), an average of 1.98 per day.
- Structure and outside fires combined for a total of 83 calls during the year, an average of one call every 4.5 days.
- A total of 39 structure fire calls accounted for 5.4 percent of the fire calls.
- A total of 44 outside fire calls accounted for 6.1 percent of the fire calls.
- Public service calls were the largest fire call category, with 48.8 percent of the fire calls.
- False alarms were the second largest fire call category, with 28.5 percent of the fire calls.

An additional analysis of fire response was conducted regarding the workload of incident types. The following table shows that the largest amount of fire responses (79.6 percent) lasted less than thirty minutes. This suggests that the majority of fire incidents were relatively minor in nature. The second largest amount of fire responses (13.3 percent) lasted 30 minutes to an hour. Just 5.2 percent of fire incidents lasted between one and two hours, while 1.9 percent were two hours or longer in duration, which would indicate a more significant event. Overall, the QCFMD had about 4.3 fire incidents per month—one per week—that lasted longer than one hour.

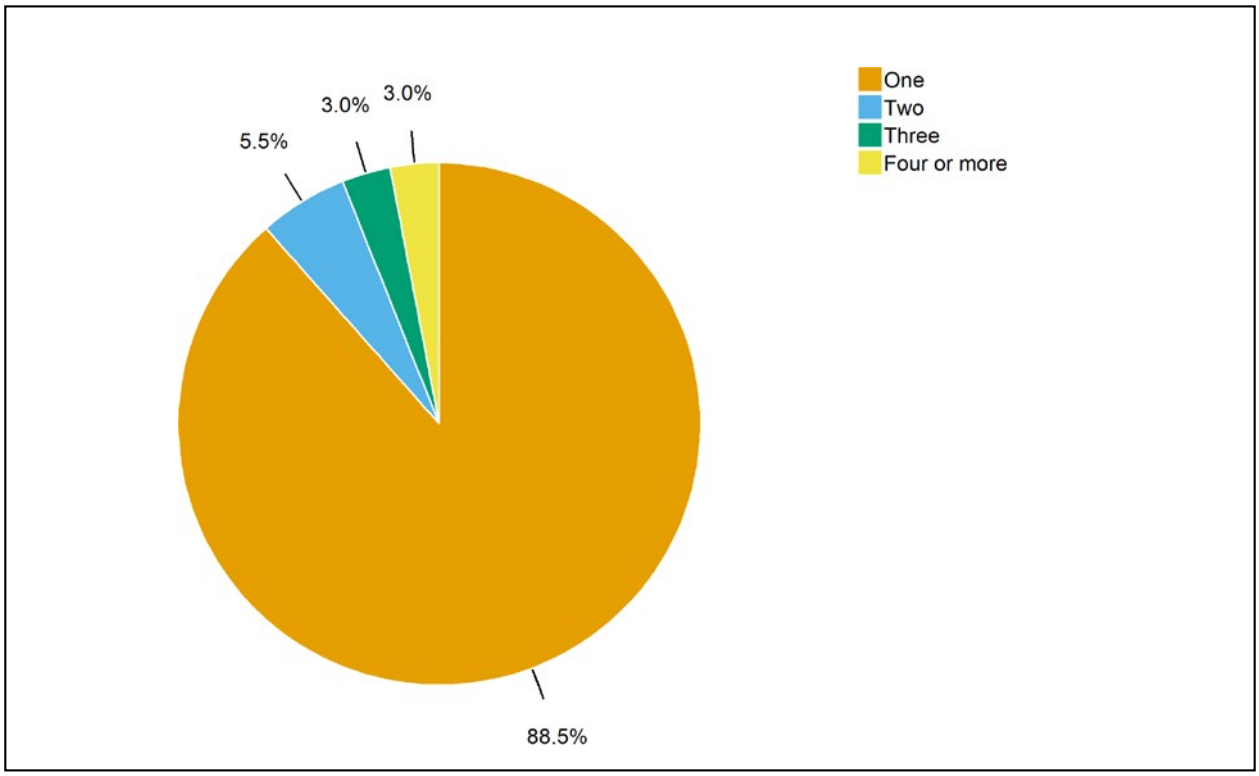
### TABLE 3-6: Fire Calls by Type and Duration

| Call Type | Less than 30 Minutes | 30 Minutes to One Hour | One to Two Hours | More Than Two Hours | Total |
|---|---|---|---|---|---|
| False alarm | 181 | 23 | 2 | 0 | 206 |
| Good intent | 26 | 3 | 2 | 0 | 31 |
| Hazard | 18 | 19 | 11 | 3 | 51 |
| Outside fire | 20 | 13 | 8 | 3 | 44 |
| Public service | 304 | 32 | 10 | 7 | 353 |
| Structure fire | 27 | 6 | 5 | 1 | 39 |
| **Fire Total** | **576** | **96** | **38** | **14** | **724** |

The following figure shows the workload of fire responses by number of units responding to these incident types. On average, 1.2 units were dispatched to each fire call. This figure tells us that single fire unit responses to fire incident types (88.5 percent) make up the largest fire response workload. Public service and false alarm calls represent the largest fire response categories for single fire unit responses. For structure fire calls, three of more units were dispatched 25.6 percent of the time. For outside fires, three or more units were dispatched to 22.7 percent of the incidents. The data analysis shows us that Engine 411 has the highest fire apparatus response workload, with 582 fire responses (1,853 total responses).

§ § §

## FIGURE 3-17: Calls by Number of Units Dispatched – Fire




Of the 83 fires in Queen Creek, both structure and outside, 50 (60.2 percent) resulted in no reported loss. Twenty-eight fires (33.7 percent) reported damage of under $20,000. This includes 19 outside fires and 9 structure fires. Five fires (6.0 percent) which consisted of four structure fires and one outside fire reported damage in excess of $20,000 each. The highest total loss for an outside fire was $70,000. The average total loss for structure fires with loss was $20,739. The highest total loss for a structure fire was $170,000.

The following table breaks down the loss due to fire in Queen Creek during the period analyzed.

## TABLE 3-7: Content and Property Loss, Structure and Outside Fires

| Call Type | Property Loss | | Content Loss | |
|---|---|---|---|---|
| | Loss Value | Number of Calls | Loss Value | Number of Calls |
| Outside fire | $121,651 | 18 | $24,101 | 11 |
| Structure fire | $191,326 | 11 | $78,276 | 10 |
| **Total** | **$316,977** | **29** | **$102,377** | **21** |

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

When looking at fire loss comparisons nationwide for structure fires, NFPA estimates that in 2016, the average community in the United States with a population between 25,000 and 49,999 reported 103 actual fires, of which 40 were structure fires, with a total fire loss $1,019,332.00.[11] By comparison, Queen Creek experienced approximately 19.5 percent fewer total fires, but almost

11. "Fire Loss in the United States in 2016" Hylton J.G. Haynes, National Fire Protection Association, Quincy, MA., September 2017. https://www.nfpa.org/-/media/Files/News-and-Research/Fire-statistics/Overall-Fire-Statistics/osFireLoss.pdf

exactly the same number of structure fires as the average, similar-sized community. However, its fire loss of $419,354 was just 41.1 percent of the average. The average fire loss for a structure fire was $16,609,[12] or 80.1 percent of NFPA's average. This is most likely a tribute to the quick response and effective fire ground operations of the Queen Creek Fire and Medical Department, for which it should be commended. It is also important to keep in mind that although the fire loss in Queen Creek was fairly low, at any time a single fire can occur that results in millions of dollars in fire loss.

## EMS Operations

Emergency medical service (EMS) operations are an important component of the comprehensive emergency services delivery system in any community. Together with the delivery of police and fire services, it forms the backbone of the community's overall public safety net. As will be noted in several sections of this report, the QCFMD, like many, if not most, fire departments, responds to significantly more emergency medical incidents and low acuity incidents than actual fires or other types of emergency incidents.

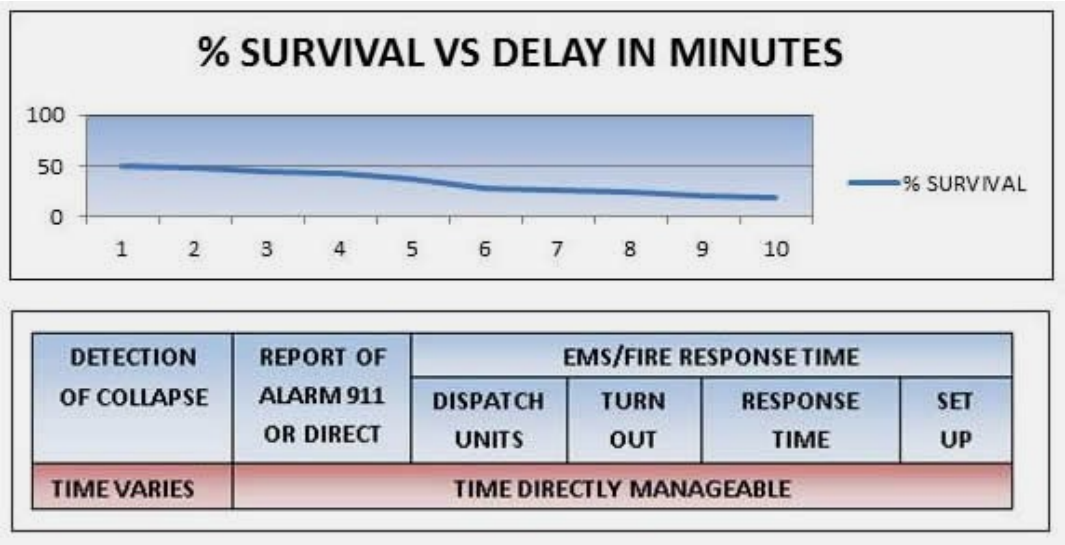
The EMS component of the emergency services delivery system is more heavily regulated than the fire side. In addition to National Fire Protection Association (NFPA) Standard 1710, *Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments* (2016 Edition), NFPA 450 *Guidelines for Emergency Medical Services (EMS) and Systems*, (2009 edition), provides a template for local stakeholders to evaluate an EMS system and to make improvements based on that evaluation. The Commission on Accreditation of Ambulance Services (CAAS)[13] also promulgates standards that are applicable to their accreditation process for ambulance services. In addition, the State of Arizona Department of Health Services Bureau of Emergency Medical Services and Trauma System[14] regulates EMS agencies, and certain federal Medicare regulations are also applicable.

As a percentage of overall incidents responded to by the emergency agencies in most communities, it could be argued that EMS incidents constitute the greatest number of "true" emergencies, where intervention by trained personnel does truly make a difference, sometimes literally between life and death.

Heart attack and stroke victims require rapid intervention, care, and transport to a medical facility. The longer the time duration without care, the less likely the patient is to fully recover. Numerous studies have shown that irreversible brain damage can occur if the brain is deprived of oxygen for more than four minutes. In addition, the potential for successful resuscitation during cardiac arrest decreases exponentially with each passing minute that cardiopulmonary resuscitation (CPR), or cardiac defibrillation, is delayed (see following figure).

12. Hylton J.G. Haynes, "Fire Loss in the United States during 2016," NFPA September 2017, 19.
13. The Commission on Accreditation of Ambulance Services (CAAS) is an independent commission that established a comprehensive series of standards for the ambulance service industry.
14. https://www.azdhs.gov/documents/preparedness/emergency-medical-services-trauma-system/statutes-rule-book.pdf

## FIGURE 3-18: Cardiac Arrest Survival Timeline




The figure illustrates that the potential for successful resuscitation during cardiac arrest decreases exponentially, by 7 percent to 10 percent, with each passing minute that cardiopulmonary resuscitation (CPR) or cardiac defibrillation and advanced life support intervention is delayed. The figure also illustrates that few attempts at resuscitation after 10 minutes are successful.

Emergency medical services (EMS) for the Town of Queen Creek and fire service area are provided at the advanced life support (ALS)/paramedic level by the QCFMD. Advanced life support or ALS-level care refers to prehospital interventions that can be brought into the field by paramedics. Typically, this service level includes the ability to bring much of the emergency room capability to the patient. Paramedics can administer intravenous fluids, manage a patient's airway, provide drug therapy, utilize the full capabilities of a 12-lead cardiac monitor, and provide a vital communication link to the medical control physician who can provide specific medical direction based on the situation.

Of the QCFMD's current sworn personnel, 34 (53.9 percent) possess paramedic certification, with the remainder possessing at least basic EMT certification. Current department policy is that every fire unit in the department is staffed at all times with a minimum of two paramedics, meaning that currently there are always at least eight on duty. This number will increase to 10 with the opening of Station 4 in late 2020. All QCFMD fire suppression units (engines and the ladder when it is placed into service) are also equipped with ALS capabilities that enable crews to provide critical lifesaving interventions, when necessary, while awaiting the arrival of an ambulance transport unit.

Hospital transport services in the Town of Queen Creek are provided under contract by American Medical Response (AMR). This agreement is in with partnership with the Town of Gilbert and is a regional agreement. The agreement previously included the City of Mesa also; however, Mesa is now providing its own EMS hospital transportation services. The current contract was initiated in September 2016 and was for a term of three years. The agreement provides for up to three, one-year renewals by mutual agreement of the parties, which could extend it until September 2022.

At the time of CPSM's field visit to Queen Creek, AMR was providing two 24-hour units—AMR 411—from Station 411, and AMR 415 from Station 4. Additionally there is a part-time unit, AMR

413. AMR 413 operates from Station 3 and is in service from 8:00 a.m. to 8:00 p.m. Standard staffing for AMR units is one paramedic and one EMT per unit. QCFMD paramedics will accompany the patient to the hospital based on the fire department's discretion. As was previously noted, one of the concerns that was mentioned to CPSM by QCFMD personnel is that when AMR has less staff available than necessary, it will often take a 12-hour unit out of service, which could have an impact on service levels in the town.

It is also important to note that original contract for EMS transport services was with Southwest Ambulance. Southwest was then acquired by AMR. With any contract with a private, for-profit entity, the sudden withdrawal of the provider from the market is also a potential concern. This may occur if provider decides the market doesn't provide enough revenue to support its service, or it can be due to internal financial issues that force downsizing. The community needs to clearly address this in the contract and remain alert to the potential need for another contractor if one is available and willing to take on the contract to provide service on short notice. We mention this issue in general, but also more specifically in light of the fact that Gilbert is also seriously considering a fire department-based hospital transport system.

Queen Creek utilizes a priority dispatch system to classify emergency medical calls as to their severity. Current practice in Queen Creek is that a fire department engine is dispatched alone—without the simultaneous response of an ambulance—to most medical related calls. However, for more serious calls, such as possible CVAs (strokes), chest pains/cardiac emergency, cardiac and respiratory arrests, drowning, childbirth, hostile events (shooting/stabbing), and motor vehicle accidents with possible entrapment, an ambulance is dispatched immediately along with the fire department resource(s).

While CPSM finds this protocol unusual, it is apparently common in the greater Phoenix area. The QCFMD department believes that this protocol provides better resource management of ambulances and keeps them more available for true emergencies. Before the town went to priority dispatching, data indicated that the fire department was cancelling the ambulance nearly 75 percent of the time. For any particular incident, the captain has the discretion to upgrade for an immediate ambulance response.

For patients that require transportation to the hospital, the QCFMD paramedics will decide whether to transfer care to the AMR personnel, or accompany the patient to the hospital in the ambulance. As a general rule, QCFMD paramedics will accompany the patient if they were/are in cardiac arrest, narcotic drugs were administered, the patient is a Level I (serious) trauma, or if treatment has been administered with no result.

The QCFMD does have its own fully equipped, ALS transport-capable ambulance, which is staffed on an as-needed basis, with no set protocol. During times of high incident activity when AMR may not have an ambulance immediately available in Queen Creek, or if AMR 411 is temporarily relocated due to call volume in other areas, the department will place Rescue 411 in service with two personnel. The personnel to staff the ambulance come from Engines 411 and 413 if they have five personnel on duty. Otherwise, personnel are taken off of engines, which will then operate with three personnel.

Looking ahead, Gilbert is planning on initiating a fire department-based hospital transport service using internal resources, starting with one unit in October 2019. Additional units will be deployed gradually over time. This situation could obviously have implications for Queen Creek as well since the AMR contract is with both communities. Mesa is also planning on implementing its own fire department-based ambulance service in 2020. All three communities have expressed concern over service delivery challenges that in many cases mirror those that the communities faced prior to the previous provider, Southwest Ambulance, being acquired by AMR.

In order to be proactive to the potential changes that could have an impact on the town, Queen Creek should consider all options for the future provision of transport EMS services, including the possibility of implementing fire department-based ambulance transportation. This is only prudent as the town needs to be prepared in the event that AMR were to decide that it was no longer in the company's interest to provide service to the town. Queen Creek is already a certificated ground ambulance service provider as designated by the Arizona Department of Health Services; thus, regulatory requirements had previously been met. However, with the annexation of the Encanterra area and the fire district expansion, QCFMD would need to apply for a new/updated certificate of need.

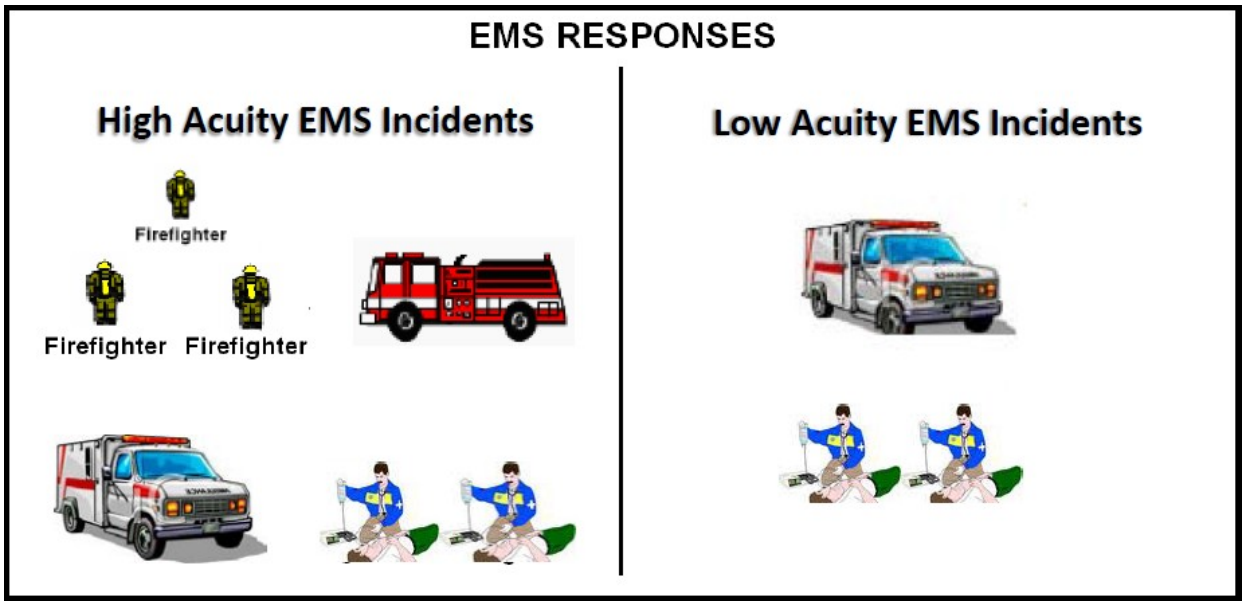
With the deployment of any new resource or service, there are associated costs. QCFMD notes in its documents that "ambulance service in the State of Arizona is heavily regulated. These regulations dictate equipment and supply levels, as well as billing and cost recover practices." The department also notes that its current certificate of need from the state specifies billing rates. QCFMD has performed analysis of anticipated costs versus projected revenue and believes that with a five percent year-over-year growth in transport volume, a fire department ambulance service can be self-subsidizing in approximately five years from inception.

While CPSM did not review the QCFMD ambulance service costs versus revenues, we do caution that few communities break even or operate in the black for ambulance transport services. In most cases, the revenues generated by transports help to offset, but do not fully cover, the cost of providing the service. Conversely, there are several factors that could assist Queen Creek with achieving full self-subsidy should it decide/need to implement its own ambulance transport service, including the fact that the town has the lowest percentage of uninsured and underinsured residents in Maricopa County (about 6 percent each), and that more than 60 percent of the town's residents have private insurance.

## Recommendations:

- In recognition of potential changes to the regional EMS transport system with Mesa and Gilbert pursuing their own fire department ambulance services, the Town of Queen Creek and QCFMD should continue to proactively consider all options for the continued delivery of the highest quality EMS services in the community. (Recommendation No. 4.)
- Should the QCFMD implement a transport ambulance system, it should then reevaluate its current priority dispatching protocol and consider using a more traditional dispatch of resources to medical emergencies based upon their acuity (see following figure). (Recommendation No. 5.)

## FIGURE 3-19: EMS Response Recommendations



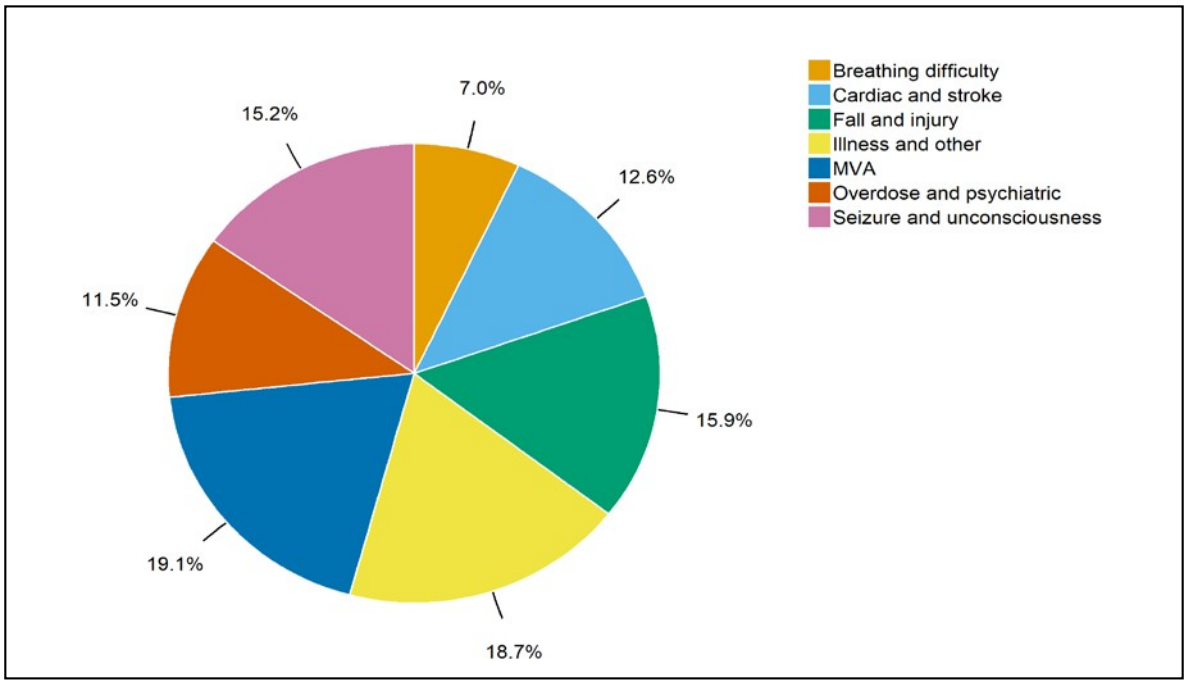

In acknowledgement of the increasing incidents involving active shooters and other violent types of incidents that involve multiple victims and often a dynamic and rapidly involving situation where the perpetrator(s) has/have not been neutralized, the QCFMD does have a tactical medical capability. While escorted by law enforcement personnel, medics can begin life-saving care in areas where they would otherwise be unable to operate. The net effect of this is the ability to potentially save lives that may otherwise have not been possible in earlier eras. The QCFMD should be commended for developing a tactical medical capability with the potential to save lives in a violent incident, which CPSM considers to be a **Best Practice**.

During the period of time analyzed for this study, July 1, 2018 to June 30, 2019, the QCFMD responded to 2,322 EMS calls. This accounted for 60.2 percent of all incidents the department responded to. This percentage is lower than what CPSM typically sees in our studies, which is between 70 percent and 80 percent of calls being EMS-related. The following table and figure show the EMS call totals for the 12-month period evaluated for this study, including number of calls by type, average calls per day, and the percentage of calls that fall into each call type category.

## TABLE 3-8: EMS Calls by Type and Number, and Percent of All Calls

| Call Type | Number of Calls | Calls per Day | Call Percentage |
|---|---|---|---|
| Breathing difficulty | 162 | 0.4 | 4.2 |
| Cardiac and stroke | 292 | 0.8 | 7.6 |
| Fall and injury | 370 | 1.0 | 9.6 |
| Illness and other | 435 | 1.2 | 11.3 |
| MVA | 444 | 1.2 | 11.5 |
| Overdose and psychiatric | 266 | 0.7 | 6.9 |
| Seizure and unconsciousness | 353 | 1.0 | 9.2 |
| **EMS total** | **2,322** | **6.4** | **60.2** |

## FIGURE 3-20: EMS Calls by Type and Percentage




The EMS call data tells us that:

- EMS calls for the year totaled 2,322 (60.2 percent of all calls), an average of 6.4 per day.
- MVAs were the largest category of EMS calls at 19.1 percent, an average of 1.2 per day.
- Illness and other calls were the second largest category of EMS calls at 18.7 percent of EMS calls, also an average of 1.2 calls per day.
- Cardiac and stroke calls made up 12.6 percent of EMS calls, an average of 0.8 calls per day.

Many communities are experiencing an increasing percentage of service requests that are for non-emergency, but recurring, medical issues, such as the treatment of chronic disease. Addressing such conditions with emergency care is expensive for patients, insurers, hospitals, and communities. Patients and/or their insurers must pay for both emergency transportation costs and well as emergency room visits. Hospitals must absorb the costs of providing care for those who cannot afford it. Increasingly, hospitals also face pressure from health regulators, notably via the Affordable Care Act, to reduce hospital readmissions, with attendant financial penalties for failure to do so. However, it was reported to CPSM that so far this has not been an issue in Queen Creek. An internal study done by the department found only about a dozen patients who make frequent requests for fire department services.

Mobile Integrated Health Care and Community Paramedic (MIH/CP) presents a possible solution to these problems should they eventually become problematic in Queen Creek. Mobile Integrated Healthcare is defined by the National Association of EMTs (NAEMT) as "*the provision of healthcare using patient-centered, mobile resources in the out of hospital environment*." It can be provided through community paramedicine programs, which are programs that use EMTs and paramedics to provide this out-of-hospital health care. MIH/CP programs can help facilitate more appropriate uses of emergency care resources, and enhance access to primary care, particularly for underserved populations, by focusing on chronic disease management, post-discharge follow up, and transport to non-emergency care settings. CPSM was informed

that this type of program was initially popular in the Valley region but has now mostly disappeared.

Some communities have started pilot programs that incorporate trained volunteers into the emergency medical response system. The American Heart Association continues to recognize the chain of survival by early recognition, early CPR, early defibrillation, and rapid transport. PulsePoint® is an app for iPhones which can be downloaded by anyone in the community who is willing to participate in this program, and which notifies them when someone is having a cardiac arrest in their vicinity. Fifty-seven percent of adults in the United States say they've had CPR training. Utilizing this type of technology, bystander performance, and active citizenship enhances the care provided to the community.

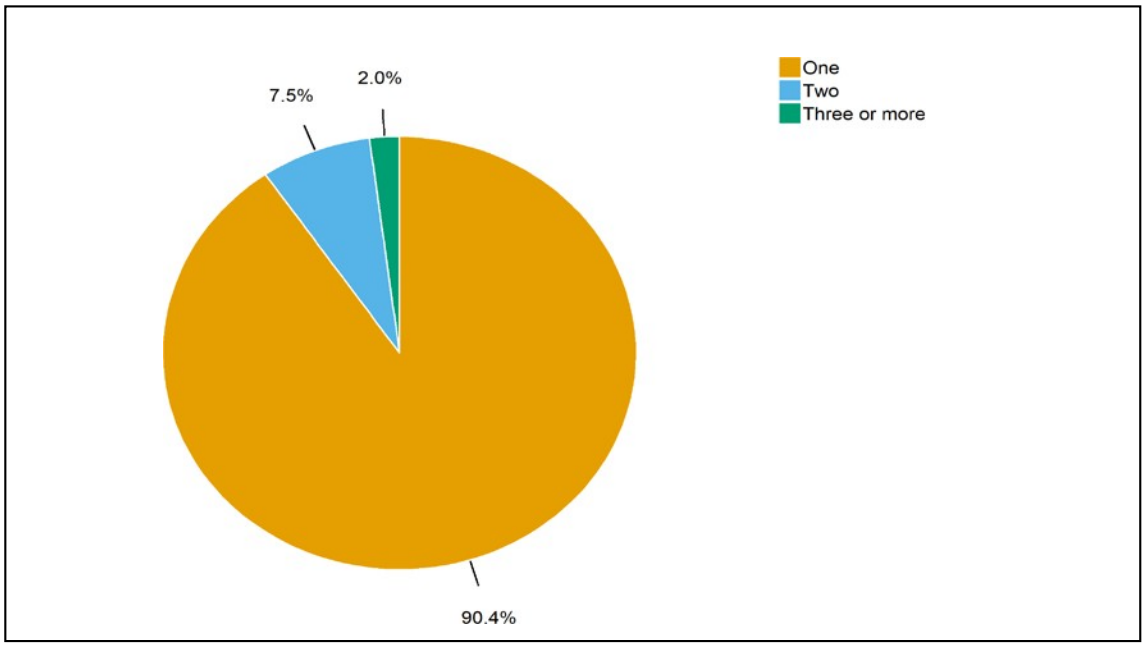
## Recommendations:

- The QCFMD, in conjunction with other community healthcare partners, should continue to monitor the incidents of recurring, non-emergency requests for medical assistance. Before the number of requests puts a strain on the delivery system, QCFMD and its partners should explore the feasibility of implementing some type of community-based mobile integrated health care in an attempt to provide better service to the community, and to the extent possible, attempt to minimize the recurring demand on the service from continual and repeated use of critical resources for non-emergency responses. Recommendation No. 6.)
- The QCFMD should explore the possibility of enhancing its technological capabilities to provide increased service to the community for serious cardiac incidents. One such available program is PulsePoint®. PulsePoint® is an app for iPhones and which can be downloaded by anyone in the community who is willing to participate in this program. It notifies them when someone is having a cardiac arrest in their vicinity. Utilizing this type of technology, bystander performance and active citizenship enhances the care provided to the community. (Recommendation No. 7.)

The following figure shows the number of units that were dispatched to various types of EMS-related incidents. This analysis does not examine the number of ambulances or units from other fire departments on a call. On average, 1.1 units were dispatched to each EMS call. This figure tells us that single fire unit responses to EMS incident types (90.4 percent) make up the largest EMS response workload. MVAs represent the largest EMS response categories for multiple fire unit responses (20 percent), followed by cardiac and stroke incidents (16.4 percent). The data analysis shows us that Engine 411 has the highest fire apparatus response workload with 1,271 EMS responses (1,853 total responses).

§ § §

## FIGURE 3-21: Calls by Number of QCFMD Units Dispatched – EMS




The following table shows the overall number of calls by call type broken out by transport and non-transport calls handled by the QCFMD. Transport calls were identified by requiring that at least one responding medical unit had recorded both 'beginning to transport' time and 'arriving at hospital' time. This analysis is limited to transport calls within QCFMD's jurisdiction that had a QCFMD unit on the call.

## TABLE 3-9: Transport Calls by Call Type

| Call Type | Number of Calls | | | Conversion Rate |
|---|---|---|---|---|
| | Non-transport | Transport | Total | |
| Breathing difficulty | 47 | 115 | 162 | 71.0 |
| Cardiac and stroke | 78 | 214 | 292 | 73.3 |
| Fall and injury | 116 | 254 | 370 | 68.6 |
| Illness and other | 146 | 289 | 435 | 66.4 |
| MVA | 305 | 139 | 444 | 31.3 |
| Overdose and psychiatric | 66 | 200 | 266 | 75.2 |
| Seizure and unconsciousness | 99 | 254 | 353 | 72.0 |
| **EMS Total** | **856** | **1,465** | **2,321** | **63.1** |

For the overall EMS delivery system by the QCFMD, this data tells us:

- Overall, 63.1 percent of EMS calls in Queen Creek that had a QCFMD unit on the call involved transporting one or more patients.
- On average, there were approximately 4 calls per day that involved transporting one ormore patients.

An additional analysis of fire response was conducted regarding the workload of EMS incident types. The following table shows that the largest amount of EMS responses (61.2 percent) lasted less than thirty minutes. This suggests that the majority of these incidents were relatively minor in

nature and the QCFMD crew transferred care to the AMR ambulance crew. The second largest amount of EMS responses (36.6 percent) lasted 30 minutes to an hour. Just 2.4 percent of EMS incidents lasted between one and two hours, while 0.1 percent (4 total incidents) were two hours or longer in duration. Overall, the QCFMD has about 0.2 EMS incidents per day—one every five days—that last longer than one hour. The majority of these incidents were MVAs and cardiac/stroke incidents.

### TABLE 3-10: EMS Calls by Type and Duration

| Call Type | Less than 30 Minutes | 30 Minutes to One Hour | One to Two Hours | More Than Two Hours | Total |
|---|---|---|---|---|---|
| Breathing difficulty | 113 | 49 | 0 | 0 | 162 |
| Cardiac and stroke | 196 | 83 | 13 | 0 | 292 |
| Fall and injury | 206 | 156 | 7 | 1 | 370 |
| Illness and other | 243 | 182 | 9 | 1 | 435 |
| MVA | 295 | 134 | 15 | 0 | 444 |
| Overdose and psychiatric | 138 | 119 | 8 | 1 | 266 |
| Seizure and unconsciousness | 221 | 127 | 4 | 1 | 353 |
| **EMS Total** | **1,412** | **850** | **56** | **4** | **2,322** |

Overall, most EMS-related incidents, including those that involve a transport to the hospital, do not take a significant period of time to complete. From this perspective, the town and QCFMD will benefit from having a hospital within the town should they decide to implement their own ambulance service.

## OTHER PROGRAMS AND SERVICES

### Training Programs

Training is, without question, one of the most important functions that a fire department should be performing on a regular basis. One could even make a credible argument that training is, in some ways, more important than emergency responses because a department that is not well-trained, prepared, and operationally ready will be unable to effectively, efficiently, correctly, and safely fulfill its emergency response obligations and mission. A comprehensive, diverse, and ongoing training program is absolutely critical to the fire department's level of success.

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

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

- A review of the respiratory protection standard, self-contained breathing apparatus (SCBA) refresher and user competency training, SCBA fit testing (29 CFR 1910.134).

- Blood Borne Pathogens Training (29 CFR 1910.1030).
- Hazardous Materials Training (29 CFR 1910.120).
- Confined Space Training (29 CFR 1910.146).
- Structural Firefighting Training (29 CFR 1910.156).

In addition, National Fire Protection Association (NFPA) standards contain recommendations for training on various topics such as a requirement for a minimum of 24 hours of structural firefighting training annually for each fire department member.

Education and training programs also help to create the character of a fire service organization. Agencies that place a real emphasis on their training have a tendency to be more proficient in carrying out day-to-day duties. The prioritization of training also fosters an image of professionalism and instills pride in the organization. Overall, although the QCFMD training program appears to be headed in the right direction, and there exists a dedicated effort focused on a wide array of training activities, there are still gaps in the system that need to be addressed.

Despite the fact that the department has grown rapidly over the past several years and now consists of more than 60 full-time, uniformed personnel—with an additional 15 slated to be added in 2020—the department does not have an officer dedicated full-time to the all-important fire training aspect of its operations. The department did hire a full-time Fire EMS specialist in FY 2020 to coordinate all of the department's important EMS training, certifications, and delivery of continuing education required for EMS certifications. This is a civilian (non-uniformed) position. **The Town of Queen Creek and QCFMD are to be commended for the creation of this position, which we believe will provide tremendous value to the department's overall operations.**

The need for an officer dedicated full time to the training function will only increase as the department continues to grow and expand. The training officer in many departments is assisted by one or more officers on each shift who help with the coordination and delivery of training to their shift as an ancillary duty. Typical tasks that are assigned to the training officer include, but are certainly not limited to:

- Development of training program curriculums, drill outlines, and a department training manual.
- Development of skill sheets and evaluation criterion.
- Direct delivery of training to department members to ensure consistency of delivery.
- Development of annual and monthly training calendars.
- Coordinating the delivery of other training with shift training coordinators.
- Coordinating recruit training.
- Coordinating the delivery of specialized training such as technical rescue.
- Coordinating training for department personnel by and/through outside agencies.
- Maintaining accurate personnel training records, certifications, etc.
- Overseeing overall department safety operations.
- Serving as the safety officer (as required under the National Incident Management System, NIMS) on significant incidents.
- Performing injury and accident investigations.

## Recommendations:

- The Town of Queen Creek and QCFMD should consider the creation of a full-time position of training officer at the battalion chief rank to develop, deliver, and coordinate all department training and safety operations. (Recommendation No. 8.)
- The QCFMD should consider the implementation of a shift training officer on each shift to assist the training officer with the delivery and training of shift-level training. This should be a Captain who assists with this function as an ancillary duty. (Recommendation No. 9.)
- All QCFMD captains should be certified as a minimum at the Fire Instructor I level, while chief-level officers should be certified as a minimum at the Fire Instructor II level. (Recommendation No. 10.)

All new QCFMD personnel must successfully complete a basic firefighting recruit academy prior to being assigned to the field. Due to its rapid growth, the department is also a very young department (50 percent of personnel in the department have fewer than three years of experience) with the majority of personnel having limited practical experience in firefighting and rescue operations. This creates challenges for the department in trying to balance experience levels between shifts and stations. This challenge will be exacerbated even more in late 2020 when an additional 15 probationary firefighters are hired. At that point the majority of department personnel will have fewer than three years of experience. This situation significantly increases the mission critical importance of training as an integral part of the department's overall daily operations.

QCFMD officers typically provide feedback to personnel regarding their performance but there is no formal testing or skills assessments for fire training in the department. Training is a required activity in the fire service and the ability to incorporate a formal testing process as part of the learning effort is essential. EMS skills assessments, both practical and written, are regularly incorporated into EMS training. Traditionally, fire departments are reluctant to incorporate skills testing into their fire training components. However, an increasingly common way to evaluate the department's training program is through the use of annual skills proficiency evaluations where all members of the department are required to successfully perform certain skills and/or complete standardized evolutions, either individually, or as part of a team. A program such as this will be critical to not only encourage skill development but also to evaluate proficiency.

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

## Recommendation:

- The QCFMD should institute written and practical skills testing and proficiency evaluations as part of the department's comprehensive fire training program. (Recommendation No. 11.)

Many departments have policies that all personnel and shifts are required to drill a minimum of one to two hours per day, with a certain percentage of this drill in some cases required to be manipulative (hands on) training. This training is often a combination of the training that is

assigned by the training division augmented by additional training on topics identified by the captains and battalion chiefs. Some departments require all shifts to have a monthly safety meeting.

A problem often encountered is that compliance with the daily training requirements is sporadic due to inconsistent enforcement by the battalion chiefs, as well as the position that it is "difficult to meet" the 20 hours of documented training each month that ISO requires for maximum credit during an evaluation because of many other demands on the time of on-duty personnel. It is clearly reasonable that on some days it will be difficult to complete the required training, as various time demands throughout the duty day, including an ever-rising number of emergency responses, increasingly compete with each other. Yet, in many fire departments less-than-efficient time management, and even past practice, can hinder attempts to provide training for on-duty personnel.

Again, due to the relative inexperience level of many members of the QCFMD, CPSM strongly believes that every effort should be made to make completion of this daily task a high priority. Additional daily opportunities for training can be found during related activities such as daily/weekly apparatus and equipment inspections and building preplanning activities. Training can and should also be conducted during evening hours and on weekends.

## Recommendation:

- The QCFMD should prioritize a policy that on-duty personnel train a minimum of two hours each duty day, of which 50 percent must be manipulative (hands-on) type training. (Recommendation No. 12.)

As the QCFMD is a relatively new organization, staffed primarily with personnel with limited firefighting experience, coupled with a low incidence of significant structure fires, there is the potential for operational challenges for the department as the community continues to grow and the frequency of these incidents increase. While personnel will gain additional experience with each incident they are involved in, gaining experience ahead of time through live fire training will be critical to their continued development as firefighters.

## Recommendation:

- The QCFMD should provide all companies and personnel with high-intensity training on various subjects, including periodic live fire training on a quarterly basis at an appropriate location where appropriate and wide-ranging training facilities, structures, and props are available. (Recommendation No. 13.)

The QCFMD utilizes a formal Task Book process to provide training guidance and new rank orientation. Task books are in place for firefighter, engineer, captain, and battalion chief. The successful completion of the appropriate task book along with certain educational requirements serve as pre-requisites for promotion to higher rank including captain or battalion chief, and are also required to serve in an acting capacity.

Currently, in order to be eligible for promotion to captain, personnel must have four years of experience as a firefighter and/or engineer, three of them with the QCFMD. In 2022, the

requirement goes to five years as a firefighter and/or engineer, four of them with QCFMD. Candidates must also be certified as Firefighter II and EMT or Paramedic level, have completed classes on building construction, firefighting tactics, firefighter safety and survival, and supervisory training, and have completed the engineer's task book or taken the engineer's exam.

## Recommendation:

- The QCFMD should consider the conducting one- or two-week engineer and captain academies to assist with providing newly promoted personnel with the tools needed to operate both administratively and in field settings. (Recommendation No. 14.)

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Professional development for fire department personnel, especially officers, is also an important part of overall training. There are numerous excellent opportunities for firefighters and officers to attend training on a wide range of topics outside of Queen Creek, including the National Fire Academy in Emmitsburg, Maryland. Numerous, free on-line courses and training programs are also available. Beyond the practical benefits to be gained from personnel participating in outside training, encouraging, or if possible, requiring, personnel to earn and/or maintain various specialized certifications such as fire instructor or fire officer increases the positive professional perception of the organization and can help to demonstrate a commitment to continued excellence.

As of the time of this assessment the QCFMD had no formal professional development program in place. Supervisors are not required to hold fire officer certifications, and there is no system for professional development in anticipation of promotion.

## Recommendation:

- The QCFMD should require its officers to complete rank-appropriate fire officer training programs and obtain a certain level of fire officer certification as a job requirement. Recommendations would be: Fire Officer I for captain; Fire Officer II for battalion fire chief; Fire Officer III for deputy fire chief; and Fire Officer IV for fire chief. (Recommendation No. 15.)

■ ■ ■ ■

Beyond the establishment of requirements to achieve certain levels of certification for promotion, the department should consider the implementation of a formal professional development program for all department personnel. The program should attempt to strike an appropriate balance between technical/practical task books, simulator training, formal certifications, mentor relationship, and outside influences. Where practical, best practices identified by the NFPA, ISO, and the Center for Public Safety Excellence (CPSE), along with Arizona and Phoenix regional practices, should be incorporated.

## Recommendations:

- The QCFMD should implement a formal officer training and development program. There are several excellent programs available, including those from the International Association of Fire Chiefs and the Phoenix Fire Department. (Recommendation No. 16.)

- The QCFMD should continue to evaluate new technology that will enable reliable high-speed internet connections to be established between all stations for the purpose of implementing video conferencing/training and on-line/internet-based training programs. (Recommendation No. 17.)

■ ■ ■ ■

Since automatic and mutual aid is a daily part of operations in the Valley region, the need for departments, companies, and personnel to be familiar with each other and their operations is mission critical. As noted previously, one component of the Valley automatic aid system is that all participants utilize a standardized set of operational policies and procedures for emergency incident operations. This enables a consistent approach to each type of emergency incident, ensuring that all personnel are working together in a unified and standardized way, regardless of which jurisdiction or agency they work for. To reinforce this seamless approach to emergency incident operations, QCFMD participates in regional training exercises on a quarterly basis with its automatic aid partners to test interoperability of training, communications, procedures, and operations. QCFMD is to be commended for this endeavor which CPSM considers to be a **Best Practice**.

The QCFMD has proposed the construction of a Resource Building and Skills Center that would allow the department to conduct a large percentage of its training within the town rather than needing to send personnel on a frequent basis to more distant fire training centers. Since it would be strictly a facility for the QCFMD, it would be much easier to hold impromptu training without the need for advance scheduling. The proposed 10,000 square-foot building will include approximately a 1,200 square-foot "dirty" classroom where practical evolutions can be performed in firefighting PPE and with various firefighting props, and a 600 square-foot "clean" classroom for various training classes including EMS CEU and skill training, and training for newly promoted officers. It will also have space available for outside training. The QCFMD has developed a thorough and compelling white paper in support of this project.

### Recommendation:

The Town of Queen Creek should proceed with providing funding for the construction of the QCFMD Resource Building and Skills Center in the soonest possible fiscal year. (Recommendation No. 18.)

■ ■ ■ ■

## Fire Prevention Programs

Fire prevention activities are one of the most important missions of a modern-day fire department. A comprehensive fire protection system in every jurisdiction should include, at a minimum, the key functions of fire prevention, code enforcement, inspections, and public education. Preventing fires before they occur, and limiting the impact of those that do, should be priority objectives of every fire department. Educating the public about fire safety and teaching citizens on appropriate behaviors should they be confronted with a fire are also important life safety responsibilities of the fire department.

Fire prevention is a key responsibility of every member of the fire department, and fire prevention activities should include all personnel. On-duty personnel can be assigned the responsibility for "in-service" inspections to identify and mitigate fire hazards in buildings, to familiarize firefighters with the layout of buildings, identify risks that may be encountered during firefighting operations,

and to develop prefire plans. On-duty personnel in many departments are also assigned responsibility for permit inspections and public fire safety education activities.

Fire prevention has a wide-ranging portfolio of duties and responsibilities that it must fulfill. These include plans review and code compliance and enforcement regarding both new buildings while under construction, as well as ongoing fire and safety inspections after the building or business is occupied. The Fire Prevention Bureau also conducts fire cause and origin investigations, performs public safety education for schools and businesses, and participates in health and safety fairs and special events support. Tasks performed by the Fire Prevention Bureau include plan reviews (fire alarms, fire sprinklers, equipment installation with health hazards, etc.) and issuing permits with subsequent inspections for new, existing, and temporary structures/operations in accordance with the provisions of Queen Creek's adopted fire code.

The Fire Prevention Bureau is currently staffed by two personnel, a fire marshal (a sworn position), and a fire inspector (a civilian position). The latter position was created recently and filled in 2019 to assist the fire marshal with the growing number of tasks and inspections that must be completed as the town's rapid growth continues.

According to the QCFMD website, "*the QCFMD in conjunction with Queen Creek's Development Services Department, completed a comprehensive review of the town's adopted fee schedule for fire prevention services. The review included a full costing of providing fire prevention services, reviewing the town's fire code, as well as a comparative analysis of the fees charged for similar services by other fire departments. As a result of this review, it was determined that the town's adopted fee schedule for fire prevention services was very limited and did not capture the full range of services provided, nor did it capture the full scope of the operational permits and certain inspections required by the town's fire code. As a result, it was determined that the fee schedule did not appropriately recover the cost of providing fire prevention services.*

*As a result of this review, the QCFMD proposed the adoption of a new, comprehensive fee schedule for fire prevention services. The proposed fee schedule more appropriately aligned with the fire code and includes future operational and occupancy types. This includes the establishment of three categories for inspection frequency of businesses based upon the fire code. It also includes a mechanism for cost recovery for emergency medical equipment and standby personnel for havingfirefighters and paramedics on standby at a large event in case of an emergency. These events include things such as concerts, carnivals, large outdoor assembly events, and trade shows*[15]*."*

## Recommendations:

- The QCFMD should continue its program of using on-duty personnel to conduct regular in-service inspections of all low- and moderate-hazard buildings/occupancies within their respective response districts. These inspections should also include construction sites. The purpose of these inspections is to: a) identify and mitigate fire hazards and fire code violations; b) enable firefighters to become thoroughly familiar with buildings, including the building design, layout, structural conditions, building systems, and hazards and challenges to firefighting operations; c) educate property owners and occupants on good fire safety

[15] https://www.queencreek.org/departments/fire-department/fire-permits-fees-inspections

practices; and d) establish a positive relationship with property owners and occupants. (Recommendation No. 19.)

■ ■ ■ ■

Fire suppression and response, although necessary to minimize property damage, have little impact on preventing fires. Rather, public fire education, fire prevention, and built-in fire protection and notification systems are essential elements in protecting citizens from death and injury due to fire. Automatic fire sprinklers have proven to be very effective in reducing fire loss and minimizing fire deaths in residential structures. However, many communities, Queen Creek among them, have been reluctant to impose code provisions that require these installations.

Automatic sprinklers are highly effective elements of total system designs for fire protection in buildings, including one- and two-family dwellings. Sprinklers help prevent fires from reaching flashover in a compartment fire, which is key to reducing fire deaths and injuries. They save lives and property, contributing to a large reduction in the number of deaths per thousand fires, in average direct property damage per fire, and especially in the likelihood of a fire with large loss of life or large property loss. They do so much quicker, and often more effectively and with less damage, than firefighters do. **No fire safety improvement strategy has as much documented life safety effectiveness as fire sprinklers because they actually extinguish the fire or, at a minimum, hold it in check and prevent flashover, until the arrival of the fire department**.

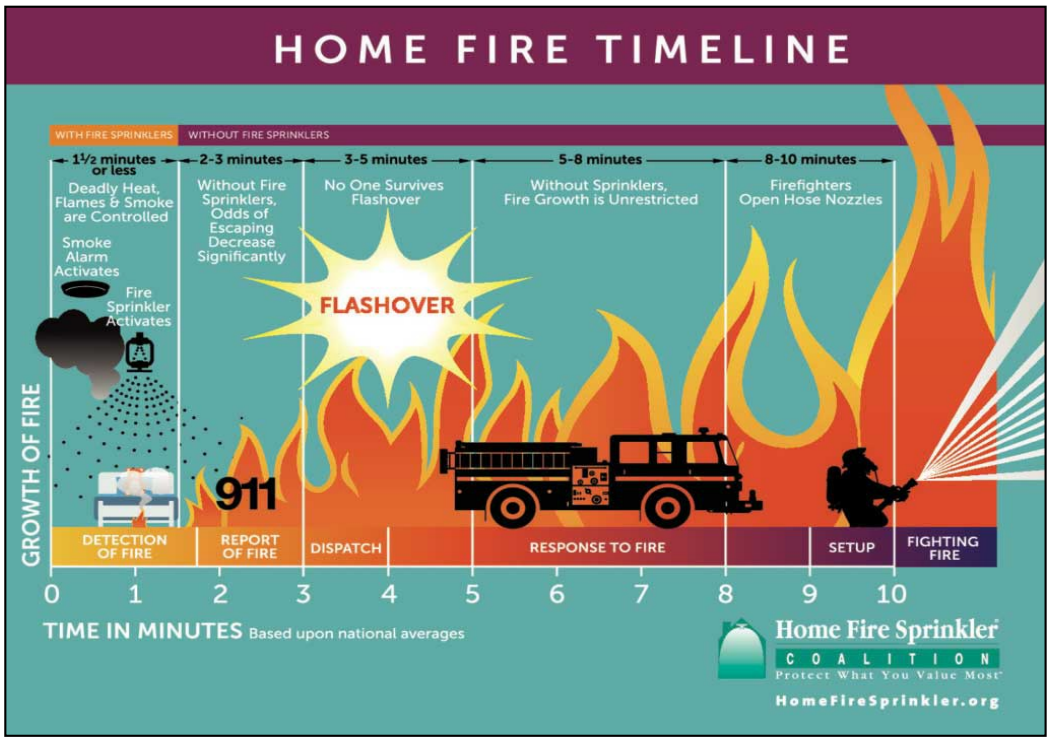
In 2007 to 2011, fires in all types of structures, when sprinklers were present in the fire area of a fire large enough to activate sprinklers in a building not under construction, the sprinklers operated 91 percent of the time.[16] When they operated, they were effective 96 percent of the time, resulting in a combined performance of operating effectively in 87 percent of reported fires where sprinklers were present in the fire area and the fire was large enough to activate sprinklers.[17] **In homes (including apartments), wet-pipe sprinklers operated effectively 92 percent of the time. When wet-pipe sprinklers were present in the fire area in homes that were not under construction, the fire death rate per 1,000 reported structure fires was lower by 82 percent, and the rate of property damage per reported home structure fire was lower by 68 percent**.[18] In all structures, not just homes, when sprinklers of any type failed to operate, the reason most often given (64 percent of failures) was shut-off of the system before the fire began.[19]

The installation of residential sprinklers has proven their effectiveness a number of times in Upper Merion Township, Pennsylvania, which has had a residential sprinkler ordinance since 1988. According to a January 2011 article in *Fire Engineering* by John Waters and Tim Knisely titled, "*Residential Sprinklers Still Under Fire,*" on December 22, 2006, Upper Merion Township Fire and Rescue Services responded to a house fire in the Candlebrook section of the township. The first apparatus arrived six minutes after the initial dispatch. The Candlebrook fire achieved flashover and resulted in one fatality.[20] Figure 3-22 shows a residential fire that has experienced flashover. In addition to the damage to the home on fire, note the damage to the house to the right caused by radiated heat. Figure 3-23 provides a typical residential fire timeline.

16. U. S. Experience with Sprinklers. John R. Hall, Jr. National Fire Protection Association, June 2013.
17. U. S. Experience with Sprinklers. John R. Hall, Jr. National Fire Protection Association, June 2013.
18. U. S. Experience with Sprinklers. John R. Hall, Jr. National Fire Protection Association, June 2013.
19. U. S. Experience with Sprinklers. John R. Hall, Jr. National Fire Protection Association, June 2013.
20. http://www.fireengineering.com/articles/print/volume-164/issue-1/features/residential-sprinklers-still-under-fire.html

**FIGURE 3-22: Fire in a Residence Not Equipped with Residential Sprinklers.**

**FIGURE 3-23: Residential Fire Timeline**




The next several figures illustrate the value of residential sprinklers. On January 12, 2009, Upper Merion firefighters responded to a house fire in the township's Valley Forge Estates section. Figure 3-24 depicts the conditions on arrival—eight minutes from dispatch.[21] On January 9, 2009, firefighters responded to a house fire in the township's Rebel Hill section. Figure 3-25 depicts

21. http://www.fireengineering.com/articles/print/volume-164/issue-1/features/residential-sprinklers-still-under-fire.html

conditions on arrival 10 minutes from dispatch; the missing object to the left of the washer in the figure is a clothes dryer that caught on fire (Figure 3-26).[22] Both the Valley Forge Estates and Rebel Hill fires were well on their way to flashover; however, just one sprinkler head operated at each fire, and neither family had to move out for the evening.[23]

### FIGURE 3-24: Bedroom Fire Extinguished by One Sprinkler

Bedroom fire that was extinguished by the activation of a single residential sprinkler head; virtually no damage to the room.

### FIGURE 3-25: Laundry Room Fire Extinguished by One Sprinkler

### FIGURE 3-26: Clothes Dryer the Only Damage in Sprinkler-Extinguished Fire

Figures 3-25 and 3-26 show the aftermath of a fire in a clothes dryer, which was extinguished by the activation of a single residential sprinkler head. No damage to the house other than to the dryer.

22. http://www.fireengineering.com/articles/print/volume-164/issue-1/features/residential-sprinklers-still-under-fire.html
23. http://www.fireengineering.com/articles/print/volume-164/issue-1/features/residential-sprinklers-still-under-fire.html

According to the NFPA, the average cost nationally for installing automatic fire sprinklers in new, single-family residential structures is estimated to be $1.61 per square foot.[24] For a 2000 square-foot home, the estimated cost would be approximately $3,220. This can be less than the cost of granite countertops or a carpeting upgrade. In addition, many homeowner insurance policies provide a discount for homes equipped with residential fire sprinklers. The neighboring State of California has mandated the installation of residential fire sprinkler systems in all new one- and two-family dwellings and townhouses statewide since 2010.

## Recommendations:

- With the town poised to continue significant growth over the next several years, and which could result in thousands of new residential occupancies being constructed—eventually possibly doubling or even tripling the population—the Town of Queen Creek should consider the adoption of a town ordinance that mandates the installation of an automatic fire suppression (sprinkler) system in all new construction, including one- and two-family dwellings. CPSM further recommends the QCFMD develop a compelling public education program that includes discussing the significant life-saving benefits of installing residential fire sprinklers in all new one- and two-family dwellings. (Recommendation No. 20.)

# Logistics

Despite its rapidly growing size, as of the time of this assessment, the QCFMD does not have neither a facility nor a staff member fully dedicated to the department's supply and logistical needs. The department's current logistical building is an 800 square-foot "house" next to the municipal building. Due to its condition and lack of adequate climate control, only warehouse type supplies can be stored in the building. Most of the department's other equipment must be stored in other locations that are more environmentally appropriate. In short, this location is totally inadequate for the department's needs.

In addition to the need to store all of the department's tools and equipment in one central location, there is also a need for there to be places for the testing and repair of equipment, self-contained breathing apparatus (SCBA), meters and air monitoring equipment, personal protective equipment (PPE), hose, and nozzles. Some of this equipment, such as meters and SCBA, require clean, dedicated areas for testing and repair. Under current configurations, these operations are scattered among various department facilities and are not specific to the various maintenance functions as is recommended.

As previously noted in the training section of this report, the QCFMD has proposed the construction of a Resource Building and Skills Center that would allow the department to have all storage, testing, and maintenance functions in a centralized location. The proposed 10,000 square-foot building will include approximately 5,000 square feet for storage, 1,000 square feet for storage of reserve fire apparatus, and 800 square feet for SCBA, PPE, tool, equipment, and radio maintenance. It will also include approximately 500 square feet for several offices. As previously noted, the QCFMD has developed a thorough and compelling white paper in support of this project. **CPSM fully supports this project and recommends the Town of Queen Creek**

24. NFPA, "Cost of Installing Residential Fire Sprinklers Averages $1.61 per Square Foot" Quincy, MA: September 11, 2008.

**should proceed with providing funding for the construction of the Resource Building and Skills Center in the soonest possible fiscal year**.

Many of the logistical duties for the QCFMD are currently performed as an ancillary duty by officers and other personnel. The same is true of equipment testing and maintenance. As the department continues to grow larger, as it keeps pace with community growth and development, it will become more difficult for these officers and personnel to perform both functions adequately. In addition, the increased need for training necessitated by QCFMD being a young and largely inexperienced department, coupled with possible increased involvement in more prevention activities, will place additional demands on the time of these officers and personnel. Incident activity will also continue to increase at a steady rate. As these developments come about, the department will need to dedicate a full-time person tohandling the wide-ranging logistical functions.

### Recommendation:

- The Town of Queen Creek and QCFMD should consider the creation of a full-time civilian position of logistical specialist in the budget year that the Resource Building and Skills Center is completed. This person would be responsible for all QCFMD supply and logistical functions, as well as the testing, inspection, and maintenance of SCBA, PPE, radios, meters, hose, nozzles, and other equipment, as needed. (Recommendation No. 21.)

## ISO RATING

The ISO is a national, not-for-profit organization that collects and evaluates information from communities across the United States regarding their capabilities to combat building fires. The data collected from a community is analyzed and applied to ISO's Fire Suppression Rating Schedule (FSRS) from which a Public Protection Classification (PPC™) grade is assigned to a community (1 to 10). A Class 1 represents an exemplary fire suppression program that includes all of the components outlined below. A Class 10 indicates that the community's fire suppression program does not meet ISO's minimum criteria. It is important to understand the PPC is not just a fire department classification, but rather a compilation of community services that include the fire department, the emergency communications center, and the community's potable water supply system operator.[25]

A community's PPC grade depends on:

- **Needed Fire Flows** (building locations used to determine the theoretical amount of water necessary for fire suppression purposes).
- **Emergency Communications** (10 percent of the evaluation).
- **Fire Department** (50 percent of the evaluation).
- **Water Supply** (40 percent of the evaluation).

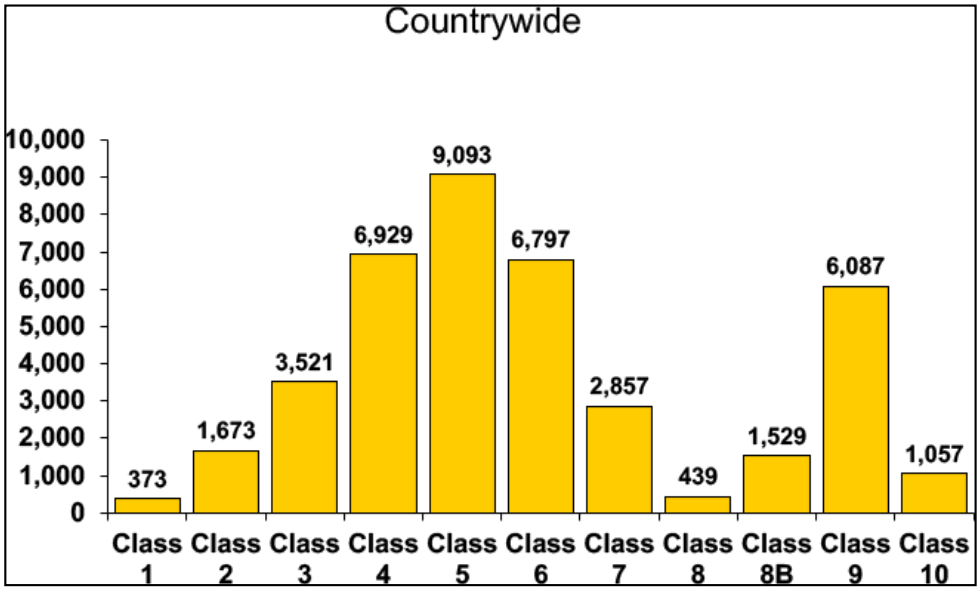
***The Town of Queen Creek maintains an ISO rating of Class 2/2X.*** This rating was achieved in October 2017, with an effective date of February 2018. Since that time, the QCFMD has increased its service level by one additional fire stations to include staffing and one engine

25. QCFMD ISO PPC report; October, 2017

company. **Fire department points and credits will likely increase when the town undergoes another ISO evaluation.** It is unknown how this will affect the overall PPC.

Some communities have a split classification, such as Queen Creek. The first number represents the class that applies to properties within five road miles of the responding fire station and 1,000 feet of a creditable water supply, such as a fire hydrant, suction point, or dry hydrant. The second number is the class that applies to properties within five road miles of a fire station but beyond 1,000 feet of a credible water supply. The following figure illustrates the dispersion of PPC ratings across the United States.

**FIGURE 3-27: PPC Ratings in the United States**[26]



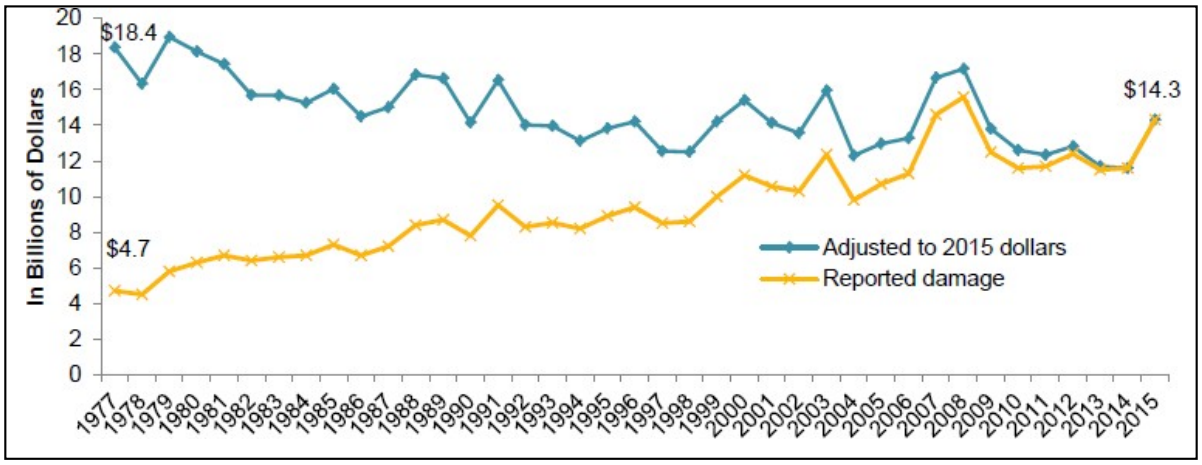

## COMMUNITY LOSS AND SAVE INFORMATION

Fire loss is an estimation of the total loss from a fire to the structure and contents in terms of replacement. Fire loss includes contents damaged by fire, smoke, water, and overhaul. Fire loss does not include indirect loss, such as business interruption.

In a 2017 report published by the National Fire Protection Association on trends and patterns of U.S. fire losses, it was determined that home fires still cause the majority of all civilian fire deaths, civilian injuries, and property loss due to fire. The following figure illustrates the fire loss trend in the U.S. from 1977 to 2015.

26. https://www.isomitigation.com/ppc/program-works/facts-and-figures-about-ppc-codes-around-the-country/

## FIGURE 3-28: U.S. Fire Loss Trend: 1977 to 2015[27]




For the five-year period of FY 2014/2015 to FY 2018/2019, the Town of Queen Creek experienced a total of $6,096,798 in loss a result of fire incidents. During this period there were three fire-related deaths. The following table provides detail on the larger categories of fire loss during this period.

## TABLE 3-11: Major Categories of Fire Loss in Queen Creek: FY 2014/2015–FY 2018/2019

| Call Type: NFIRS Reporting System | Count | Dollar Loss |
|---|---|---|
| Building fire | 51 | $4,599,061 |
| Grass fire | 3 | $450,102 |
| Passenger vehicle fire | 25 | $289,100 |
| Structure fire other | 2 | $170,300 |
| Off-road vehicle or heavy | 3 | $131,000 |
| Fire in mobile home | 1 | $85,000 |
| Camper or recreation vehicle | 2 | $85,000 |
| Fire - other | 8 | $78,105 |
| **Total** | **93** | **$5,887,668** |

For the CPSM data analysis study period (July 1, 2018-June 30, 2019), CPSM analyzed the QCFMD's success in confining the fire in buildings to the room and structure of origin as a measurement of property loss by fire. QCFMD responded to five calls with NFIRS incident type 111 (building fire), and one call with NFIRS incident type 112 (fire in structure other than a building) in QCFMD's fire service area during the year studied. In this data set, CPSM analyzed these six incidents in further detail. The following table provides information on this analysis.

27. Trends and Patterns of U.S. Fire Losses: National Fire Protection Association, January 2017.

## TABLE 3-12: Structure Fire Details During CPSM Data Analysis Period

| Incident Date | Incident Type | Structure Type | Building Height (stories) | Stories Damaged by Flame | Fire Confined To |
|---|---|---|---|---|---|
| **September 23, 2018** | 111 | Enclosed building | 1 | 0 | Floor of origin |
| **October 2, 2018** | 111 | Enclosed building | 2 | 0 | Building of origin |
| **January 17, 2019** | 111 | Enclosed building | 1 | 0 | Room of origin |
| **February 18, 2019** | 112 | Other type of structure | 0 | 0 | * |
| **May 1, 2019** | 111 | Enclosed building | 2 | 0 | Object of origin |
| **June 8, 2019** | 111 | Enclosed building | 1 | 0 | Room of origin |

**Note:** The 'fire confined to' field was not filled in for the incident.

Key points to this data set are:

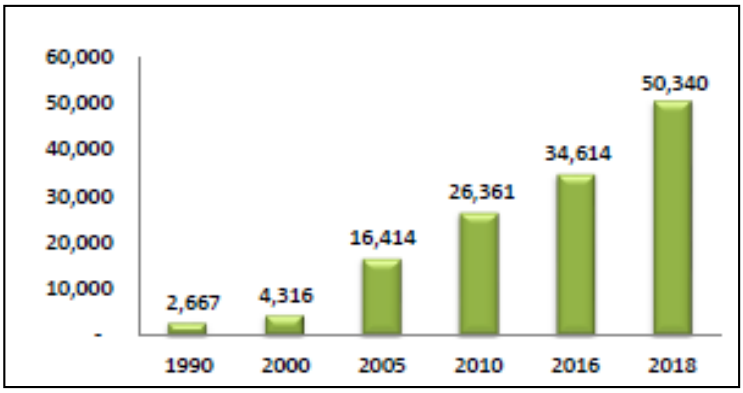
- Of the five fires in an enclosed building, the fire was confined to the object of origin once (20 percent of the time), the room of origin twice (40 percent of the time), the floor of origin once (20 percent of the time), and to the building of origin once (20 percent of the time).
- The five fires in an enclosed building each involved only one building.

# SECTION 4. ALL-HAZARD RISK ASSESSMENT OF THE COMMUNITY

## POPULATION AND COMMUNITY GROWTH

According to town information, the 2018 population for Queen Creek is 50,340.[28] This is a 91 percent increase from 2010 and a more than 200 percent increase from 2005. At 33 square miles, the town's population density is 1,525/square mile, with some areas of the town more dense than others. This rapid increase in population coincides with the town's aggressive increase in fire protective services. The following figure illustrates the town's rapid polulation growth since 2005.

### FIGURE 4-1: Queen Creek Population




The age and socio-economic factors of the population can also have an impact on requests for fire and EMS service. Evaluation of the number of seniors and children by fire management zones can provide insights into trends in service delivery and quantitate the probability of future service requests. In a 2018 National Fire Protection Association (NFPA) report on residential fires, the following key findings were identified for the period 2011–2015.[29]

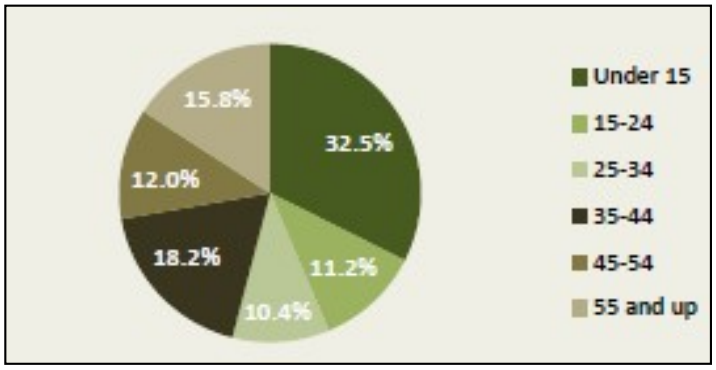
- Males were more likely to be killed or injured in home fires than females and accounted for a larger percentages of the victims (57 percent of the deaths and 54 percent of the injuries).
- The largest number of deaths (19 percent) in a single age group was among people ages 55 to 64
- Half (50 percent) of the victims of fatal home fires were between the ages of 25 and 64, as were three of every five (62 percent) of the non-fatally injured
- One-third (33 percent) of the fatalities were ages 65 or older; only 15 percent of the non-fatally injured were in that age group
- Children under the age of 15 accounted for 12 percent of the home fire fatalities and 10 percent of the injuries. Children under the age of five accounted for 6 percent of the deaths and 4 percent of the injuries.

28. https://www.queencreek.org/home/showdocument?id=26686
29. M. Ahrens, "Home Fire Victims by Age and Gender", Quincy, MA: NFPA, 2018.

- Adults of all ages had higher rates of non-fatal fire injuries than children.
- While smoking materials were the leading cause of home fire deaths overall, this was true only for people in the 45 to 84 age group.
- For adults age 85 and older, a cooking fire was the leading cause of fire death.

The following figure illustates Queen Creek's 2018 population age distribution. **Queen Creek has risk in the reported NFPA age groups as outlined above.**

## FIGURE 4-2: Queen Creek Population




Additional Queen Creek socioecnomic factors are:[30]

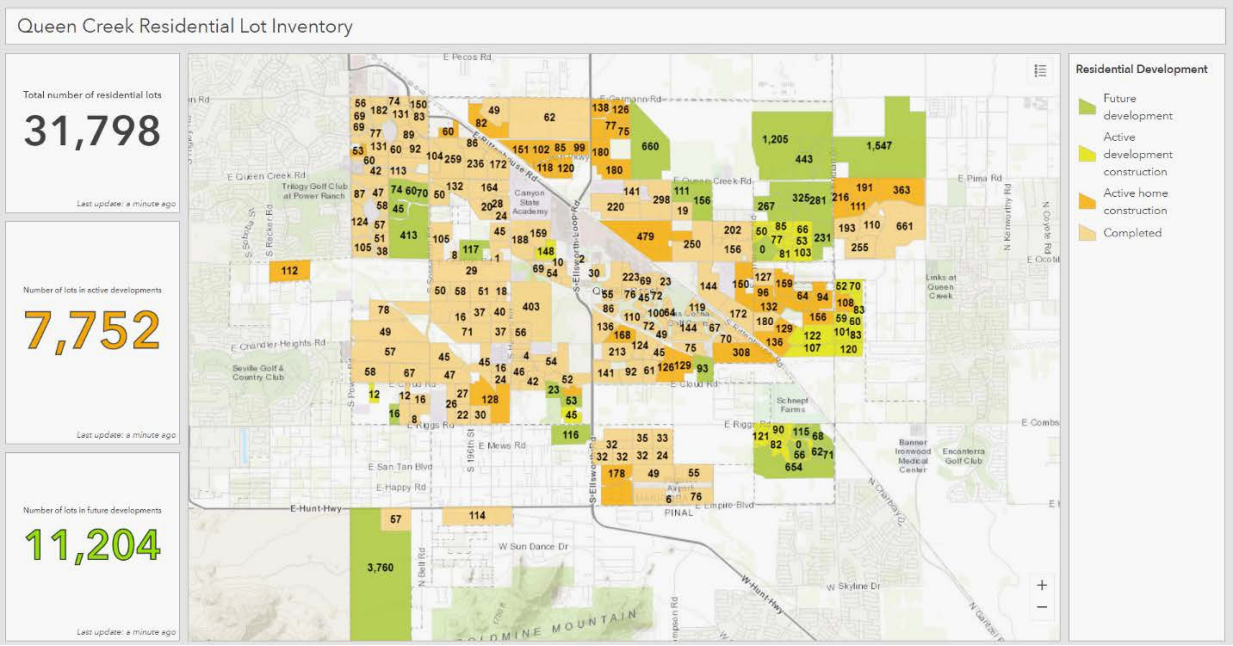
- The 2018 average household income is $107,207.
- The 2018 median household income is $90,687.
- 96.4 prcent of the population has a high school degree or higher.
- The 2017 American Community Survey's five-year estimate for the poverty rate in the town is 7.9 percent.[31]

Figure 4-3 illustrates future growth areas in the town and town planning area. The figure depicts the 31,798 current residential lots, as well as the 7,752 lots under construction. Addtionally, Figure 4-4 illustrates another 11,294 lots that are identified for future residential development. **This figure also provides a topical view of the town's density.** As a note, the density of the population within a given fire management zone should be regularly evaluated to determine the likelihood of service requests. While there is no definitive number that indicates when and what resources may be required, the density of the population is both a good indicator of service request activity and service level capabilities, and should be utilized as an input into outreach and prevention efforts.

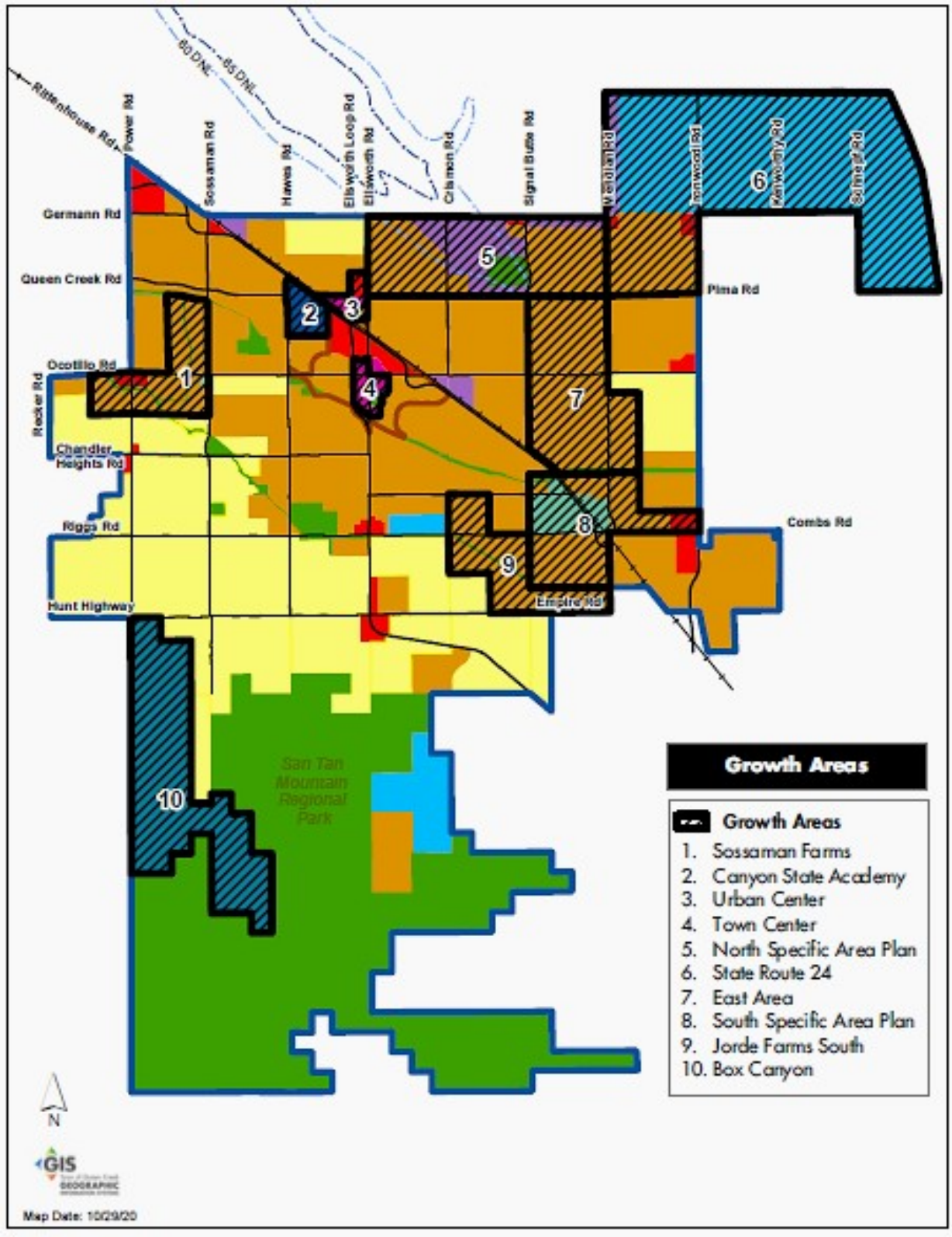
The combined 19,046 lots either under construction or that are identified for construction represent a 60 percent increase in the number of lots currently built upon. This expansion in residential lots will increase population and population density. As of July 2018, U.S. Census information for the town showed there were 3.29 persons per household (2013-2017 estimates). **Based on this, the 19,046 additional residential units will potentially increase the town's population by an estimated 60,000 new residents. This will increase fire and medical calls for service in each fire managemanet zone.**

30. https://www.queencreek.org/home/showdocument?id=26686
31. https://www.census.gov/quickfacts/queencreektownarizona

## FIGURE 4-3: Queen Creek Residential Lot Inventory



## FIGURE 4-4: Queen Creek Growth Areas Map[32]




32. Town of Queen Creek, AZ, October, 2020

## ENVIRONMENTAL FACTORS

The most common natural hazards prevelant to the region, according to the Maricopa County Emergency Management Department, are:[33]

- Dust storms or haboobs, produced from thunderstorms, straight winds, or tornadoes. These storms are unpredictable and create visibility and health issues.
- Extreme heat.
- Localized flooding from heavy rains over a short period of time.
- Flash flooding from local or distant mountainous areas moving quickly through normally dry washes and riverbeds.
- Monsoon storms, which bring heavy rains, lightning, strong winds, and flooding.
- Wildfires in the wildland/urban interface areas.
- Drought.
- Earth fissures and landslides created by the removal or depletion of groundwater and the excessive use of surface water.
- Earthquakes. Although rare, since 1850 Arizona has experienced 20 earthquakes with magnitudes of 5.0 or higher.

**Queen Creek has exposure and community risk to the environmental risks identified above.**

## BUILDING FACTORS

Community risk and vulnerability evaluates the community as a whole, and with regard to buildings, measures all buildings and the risk associated with properties and then segregates the properties as either a high-, medium-, or low-hazards depending on factors such as the life and building content hazard, and the potential fire flow and staffing required to mitigate an emergency in the specific property. According to the NFPA *Fire Protection Handbook*, these hazards are defined as:

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

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

**Low-hazard occupancies:** One-, two-, or three-family dwellings and scattered small business and industrial occupancies.[34]

Queen Creek has the following building types and inventory:

- Single-family housing units: 13,480 (at the time of this report, the town is rapidly adding single family dwellings).
- Apartment buildings: 4.

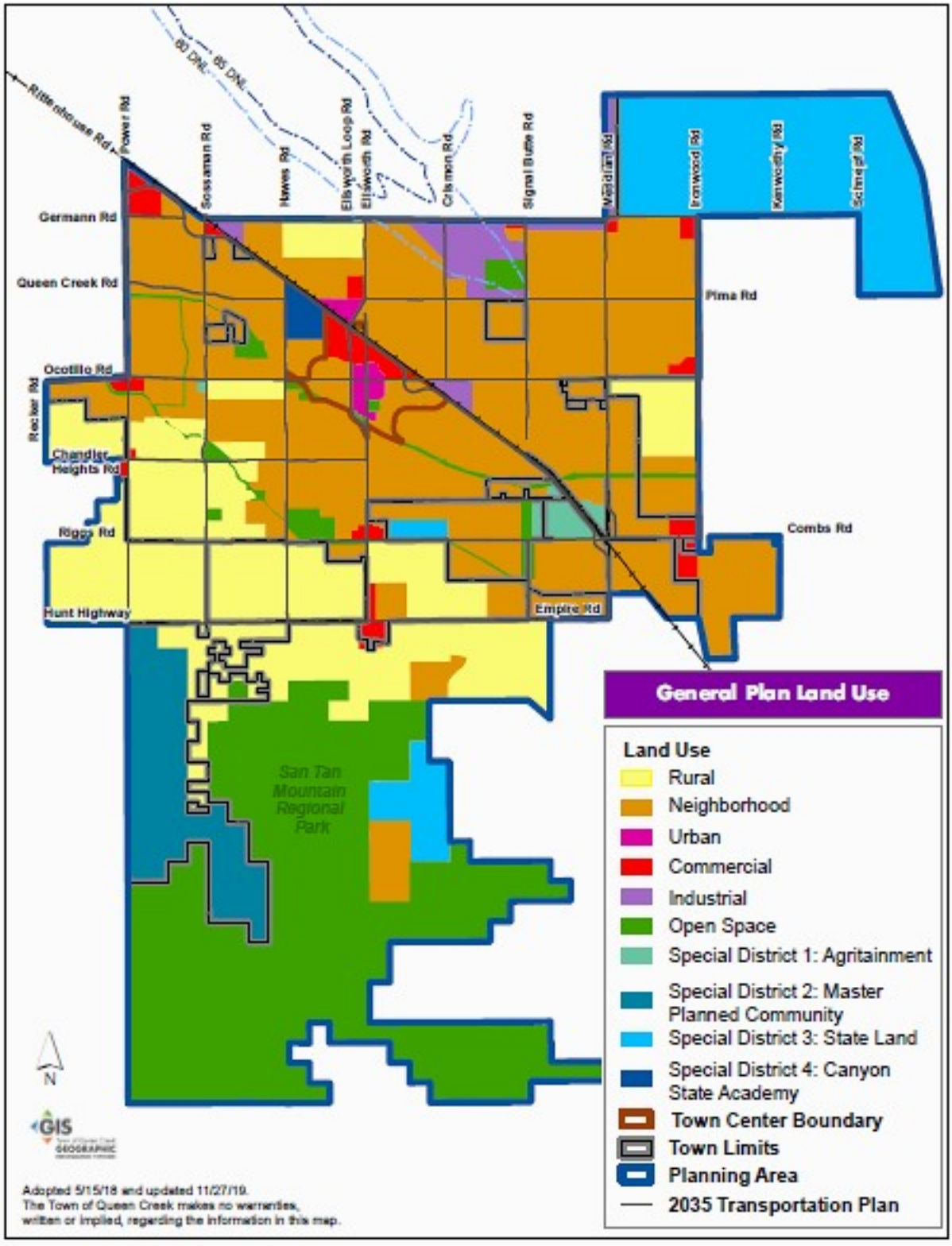
33. Maricopa County Emergency Management
34. Cote, Grant, Hall & Solomon, eds., Fire Protection Handbook (Quincy, MA: National Fire Protection Association, 2008), 12.

- Number of Units: 665.
- Schools: 8.
  - Elementary Schools: 15.
  - Middle School: 3.
  - High School: 5.
- Hospitals: 1.
- Commercial Centers (with anchor store and/or inline commercial occupancies): 11.
  - Power Marketplace Phase 2 (NEC Rittenhouse and Power).
  - Power Marketplace Phase I - Home Depot (SEC Rittenhouse and Power).
  - Safeway (SEC Queen Creek and Power).
  - Basha's (SWC Power and Chandler Heights).
  - Queen Creek Marketplace (SWC Ellsworth Loop and Rittenhouse).
  - QC District (SWC Ellsworth Loop and Rittenhouse).
  - QC Fiesta.
  - Cornerstone (NEC Rittenhouse and Ocotillo).
  - QC Crossroads (SEC Rittenhouse and Ellsworth).
  - Queen Creek Village Center (NEC Ellsworth and Ocotillo).
  - Safeway (NWC Ganztel and Ocotillo).
  - Car Dealership (Ellsworth and Hunt Highway)
  - 3-story U-Haul Storage Facility (Ellsworth and Hunt Highway)
- Hotel: Four-story, new construction in 2019/2020.

**Based on the Queen Creek building types identified above, the town has a predominately low-hazard building risk (single-family dwellings).** Medium- and high-hazard building risks are noted in this section.

The following figure illustrates the current town land-use map.

## FIGURE 4-5: Queen Creek Land Use Map[35]




35. Town of Queen Creek, AZ, October 2020

## TRANSPORTATION FACTORS

Within the town boundaries there is a combination of:[36]

- Arterial streets, which carry high volumes of traffic, can be up to six lanes and either dividied or undivided by medians, have limited access to land uses, and connect high-density residential and commercial lots.
- Collector streets which provide connection to arterial roads and local street networks as well as residential and commercial land uses.
- Local streets which provide a direct road network to property and move traffic through neighborhoods.

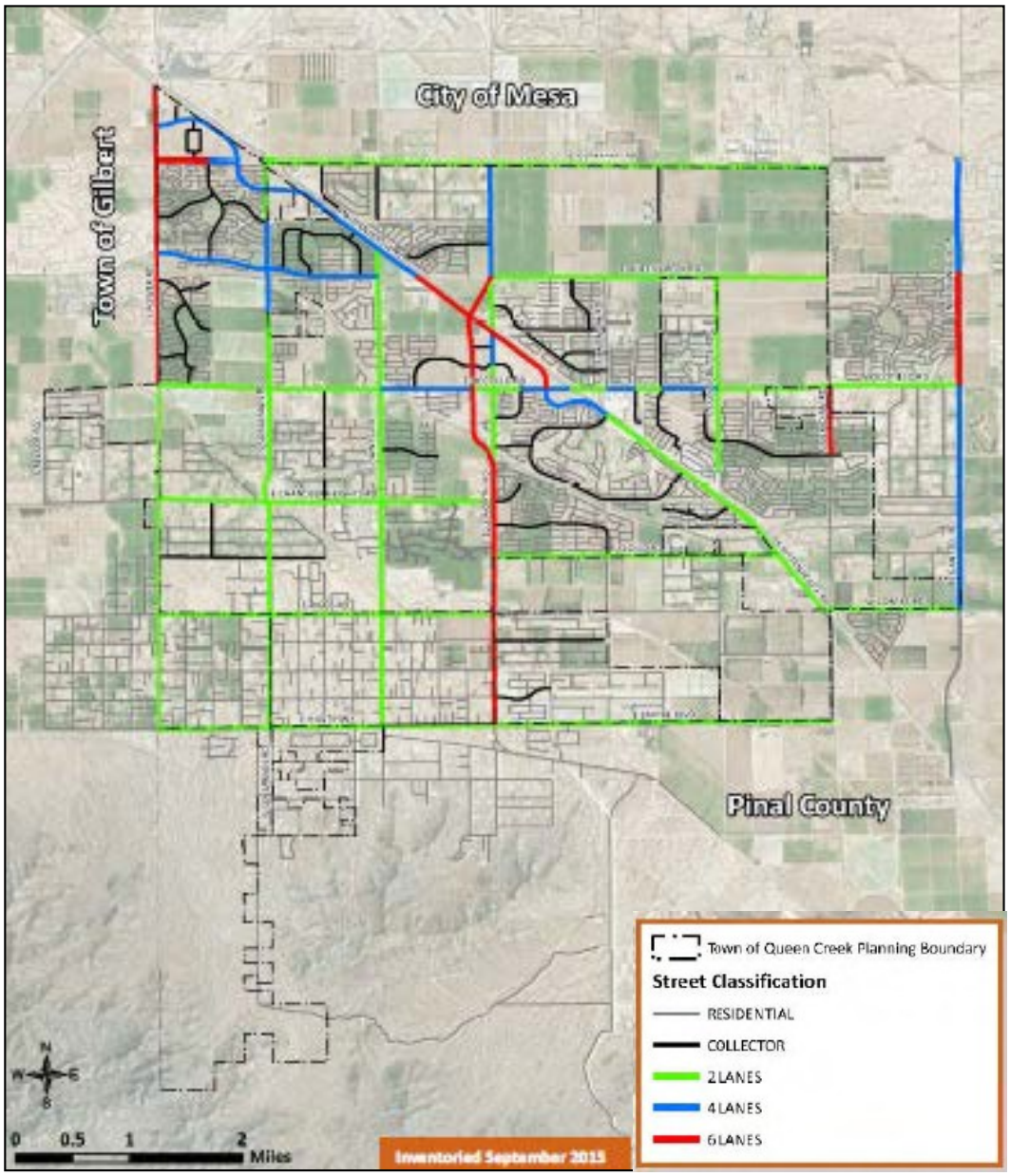
There are no limited access roads, interstate highways, or freeways that run through the town boundaries.

**The road network described herein poses vehicular accident and vehicular-versus-pedestrian risks to Queen Creek. There are additional transportation risks, since tractor trailers and other commercial vehicles traverse the roadways of Queen Creek to deliver mixed commodities to businesses and residential locations. Fires involving these products can produce smoke and other products of combustion risks that may be hazardous to health.**

The following figure depicts the 2015 inventoried road network in Queen Creek as illustrated in the 2016 Queen Creek Transportation Master Plan.

36. Town of Queen Creek, "Final Transportation Master Plan," 2016

## FIGURE 4-6: Queen Creek Road Network (2016)

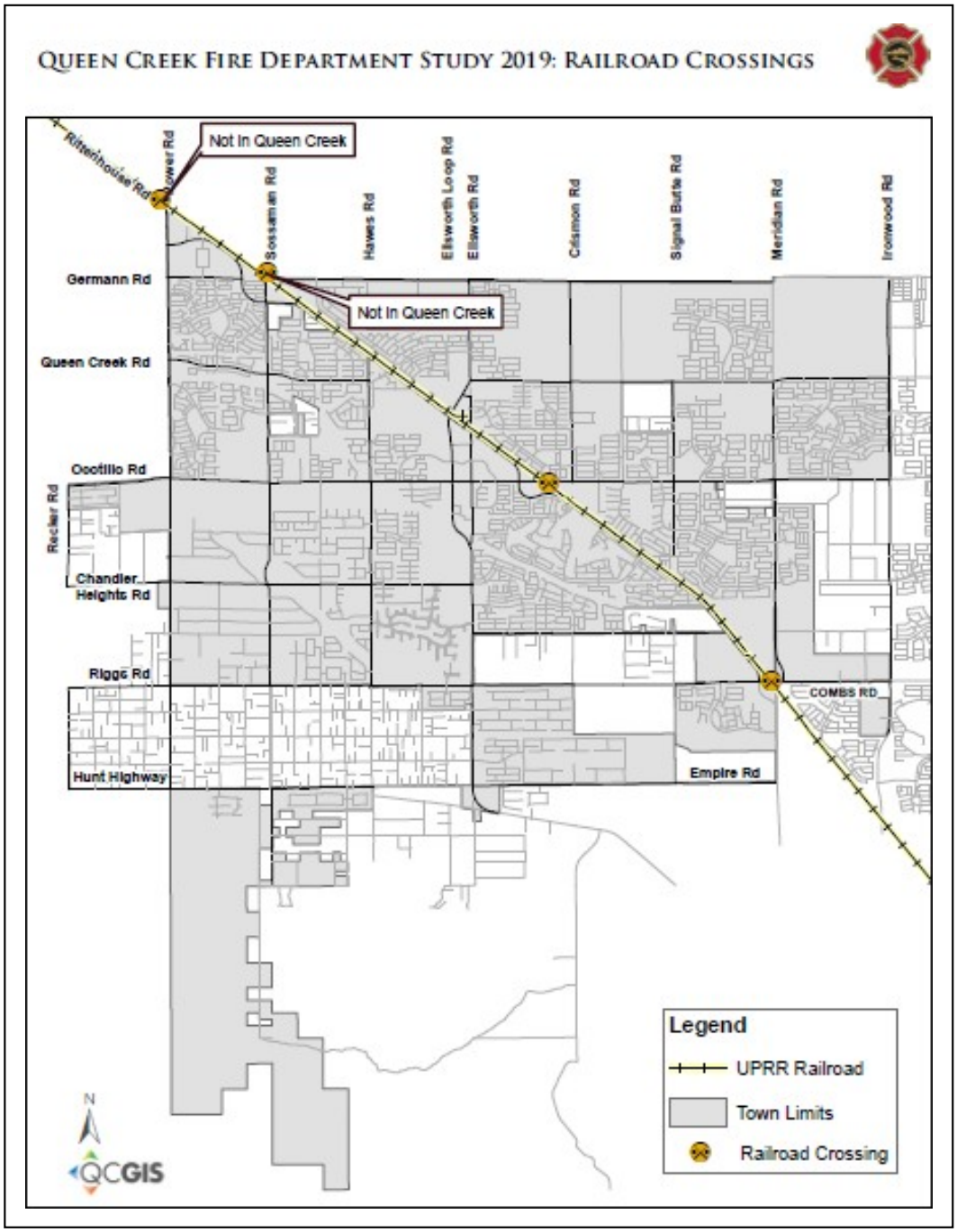



In addition to the risks associated with road travel, which includes vehicle-to-vehicle and vehicle-to-pedestrian accidents causing injury and property loss, the town also has railroad traffic. A Union Pacific Railroad (UPRR) rail line bisects the town, running parallel (Northwest to Southeast) along Rittenhouse Road. This rail line crosses three street intersections, thus posing risks for vehicles and pedestrians at grade crossings. There are also four underpasses where the rail line does not directly intersect with vehicular traffic. Federal Railroad Adminstration 2018 inventory forms report two freight trains run between 6:00 am and 6:00 pm, and two freight trains run between 6:00 pm and 6:00 am, for a total of four trains per day. Of course, the rail traffic can increase or decrease based on demand for service. The town reports as many to six to eight per day. Rail commodities may include intermodel-wholesale, non-ferrous metals, metallic minerals, ferrous scrap, wheat and flour, grain, assembled autos, lumber and building materials, and corn

refining.[37] **While these commodities are not considered hazardous materials, fires involving these products can produce smoke and other products of combustion risks that may be hazardous to health.**

The following figure illustates the UPRR line and grade crossings in and contiguous to town boundaries.

## FIGURE 4-7: UPRR Grade Crossings



37. https://www.up.com/cs/groups/public/@uprr/@corprel/documents/up_pdf_nativedocs/pdf_arizona_usguide.pdf

## TARGET HAZARD FACTORS

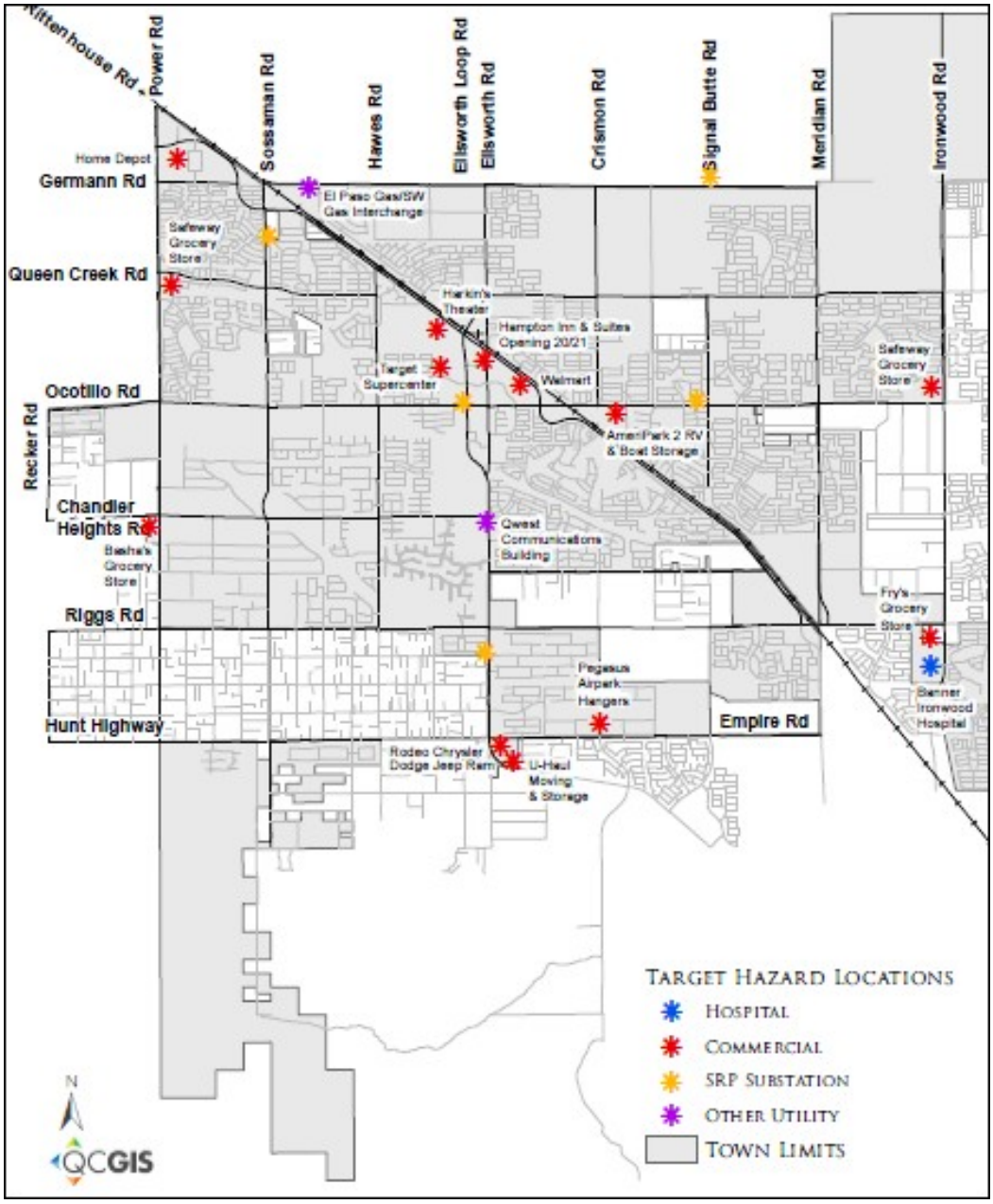
Target hazards are those occupancies or structures that are unusually dangerous when considering the potential for loss of life or the potential for extensive property damage that displaces large numbers of people or has an adverse effect on the commerce of the community while closed. Consideration is given to the activities that take place (manufacturing, processing, etc.), the number and types of occupants (elderly, youth, handicapped, imprisoned, etc.), and other specific aspects relating to the construction of the facility, or any hazardous materials that are regularly found in the building.

Queen Creek has a variety of target hazards that include big-box stores that carry mixed commodities; a hospital; and critical infrastructure facilities for natural gas and electric services. Queen Creek has no buildings with the highest floor greater than 75 feet. Generally, big-box stores pose a low fire risk as they are protected by sprinkler systems. However, due to the mixed commodities including exposed lumber and building finishing products, paint and paint products, and other combustible products stored in these buildings, should a fire overrun the fire protection system, these fires tend to consume large areas of the building and may require many fire response assets and large water flow capacity to bring the fire under control. The following figure illustrates the location of these target hazard types in Queen Creek.

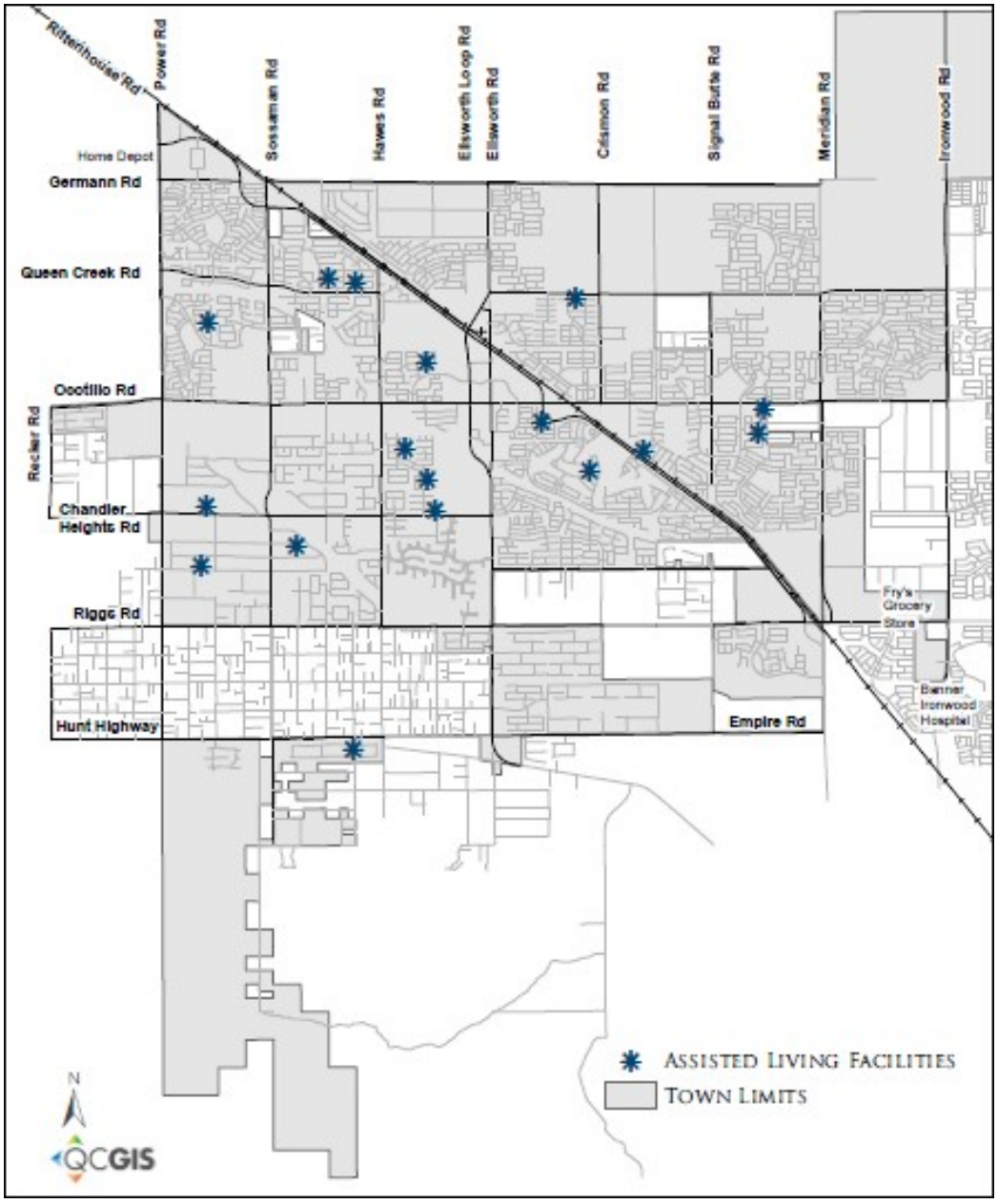
Two additional target hazard types in Queen Creek include assisted living facilities and apartment/multifamily occupancies. Assisted living facilities of any size and any number of residents poses a risk during fire-related responses due to the number of occupants with disabilities living in these facilities. EMS responses generally increase to these facilities for the same reason. For these reasons, assisted living facilities are classified as target hazards. In addition to the assisted living facilities already operating, a large, single-story, multibed facility is under construction on E. Ocotillo Rd. Figure 4-9 illustrates the location of assisted living facilities in town.

The town also has four apartment complexes that have buildings that range from single story to three stories. One of the four complexes is in the unincorporated area in which the QCFMD provides service. Fires in apartment complexes pose a risk to a moderate to large number of people (of all ages), can occur in a single apartment or the exterior or common areas of an apartment building and spread to the other building areas/apartments unknown to building occupants, have pumper and aerial ladder access issues, and can displace building occupants for extended periods of time. Figure 4-10 illustrates the location of apartment complexes the QCFMD responds to.

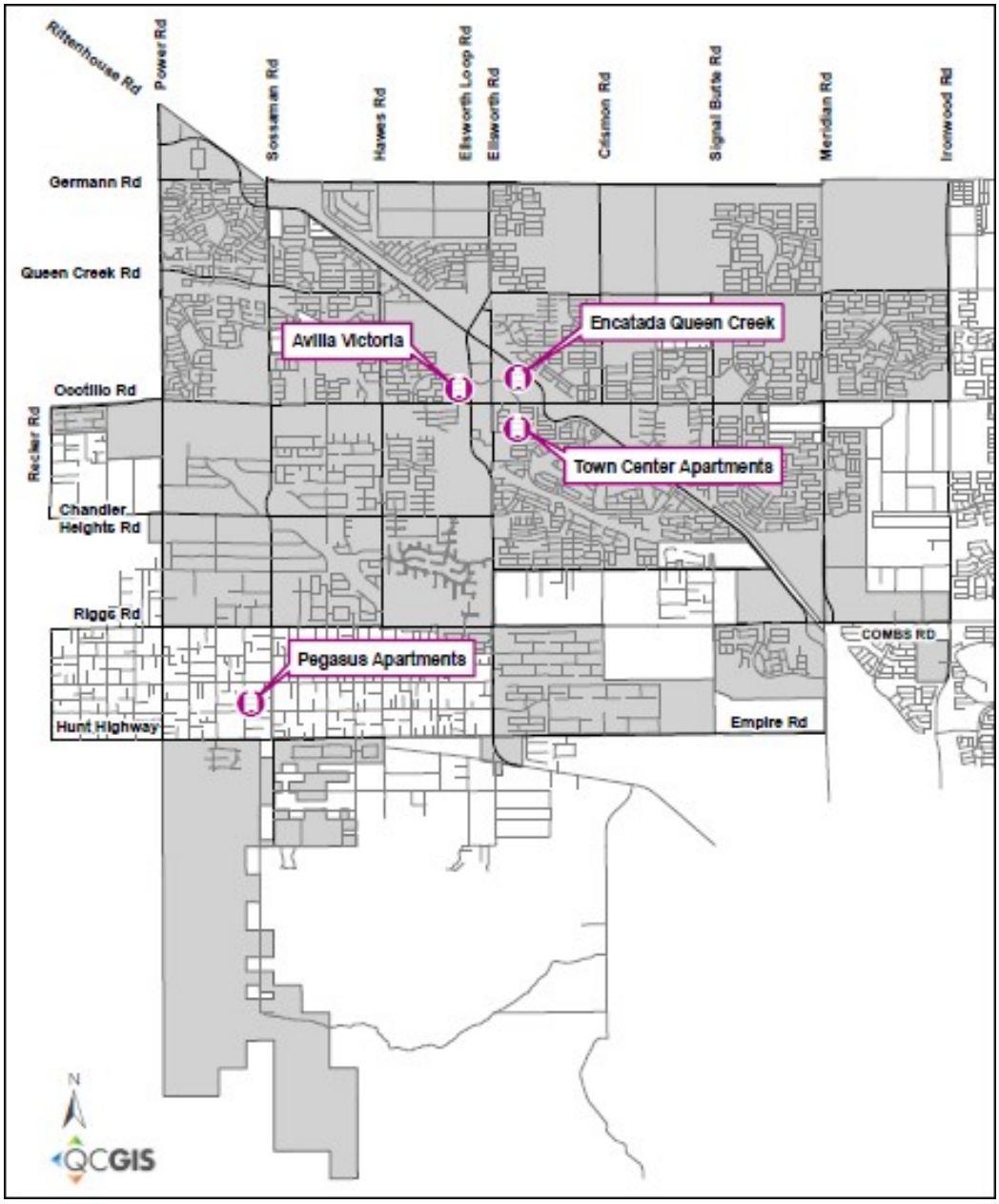
## FIGURE 4-8: Location of Target Hazards



## FIGURE 4-9: Location of Assisted Living Facilities



## FIGURE 4-10: Location of Apartment Complexes



## FIRE AND FIRE-RELATED INCIDENT RISK

An indication of the community's fire risk is the type and number of fire-related incidents the fire department responds to. During the CPSM data analysis study period (July 1, 2018-June 30, 2019), the QCFMD responded to 724 fire-related calls for service. The following table details the number of calls by type, along with average calls per day and call percentage compared to all calls.

### TABLE 4-1: Fire and Fire-Related Call Types

| Call Type | Number of Calls | Ave. Calls per Day | Call Percentage |
|---|---|---|---|
| False alarm | 206 | 0.6 | 5.3 |
| Good intent | 31 | 0.1 | 0.8 |
| Hazard | 51 | 0.1 | 1.3 |
| Outside fire | 44 | 0.1 | 1.1 |
| Public service | 353 | 1.0 | 9.2 |
| Structure fire | 39 | 0.1 | 1.0 |
| **Fire Total** | **724** | **2.0** | **18.8** |

Key points to this data set are:

- Public service calls were the largest category of fire calls at 49 percent of fire calls, an average of 1.0 calls per day.
- False alarm calls made up 28 percent of fire calls, an average of 0.6 calls per day.
- Structure and outside fire calls combined made up 11 percent of fire calls, an average of0.2 calls per day, or one call every 5 days.

## EMS RISK

As with fire risks, an indication of the community's pre-hospital emergency medical risk is the type and number of EMS responses the fire department responds to. During the CPSM data analysis study period (July 1, 2018-June 30, 2019), the QCFMD responded to 2,322 EMS-related calls for service. The following table outlines the call types and call type totals for these types of EMS risks.

American Medical Response (AMR) is contracted by the Town of Queen Creek to provide medical transportation for patients. During the CPSM data analysis study period (July 1, 2018-June 30, 2019), AMR made 1,465 transports to the hospital. Table 4-3 identifies transport calls within QCFMD's jurisdiction and which had a QCFMD unit on the call.

## TABLE 4-2: EMS Call Types

| Call Type | Number of Calls | Ave. Calls per Day | Call Percentage |
|---|---|---|---|
| Breathing difficulty | 162 | 0.4 | 4.2 |
| Cardiac and stroke | 292 | 0.8 | 7.6 |
| Fall and injury | 370 | 1.0 | 9.6 |
| Illness and other | 435 | 1.2 | 11.3 |
| MVA | 444 | 1.2 | 11.5 |
| Overdose and psychiatric | 266 | 0.7 | 6.9 |
| Seizure and unconsciousness | 353 | 1.0 | 9.2 |
| **EMS Total** | **2,322** | **6.4** | **60.2** |

Key points to this data set are:

- Motor vehicle accidents were the largest category of EMS calls at 19 percent of EMS calls, an average of 1.2 calls per day.
- Cardiac and stroke calls made up 13 percent of EMS calls, an average of 0.8 calls per day.

## TABLE 4-3: Transport Calls by Call Type

| Call Type | Number of Calls | | | Conversion Rate |
|---|---|---|---|---|
| | Non-transport | Transport | Total | |
| Breathing difficulty | 47 | 115 | 162 | 71.0 |
| Cardiac and stroke | 78 | 214 | 292 | 73.3 |
| Fall and injury | 116 | 254 | 370 | 68.6 |
| Illness and other | 146 | 289 | 435 | 66.4 |
| MVA | 305 | 139 | 444 | 31.3 |
| Overdose and psychiatric | 66 | 200 | 266 | 75.2 |
| Seizure and unconsciousness | 99 | 254 | 353 | 72.0 |
| **EMS Total** | **856** | **1,465** | **2,321** | **63.1** |

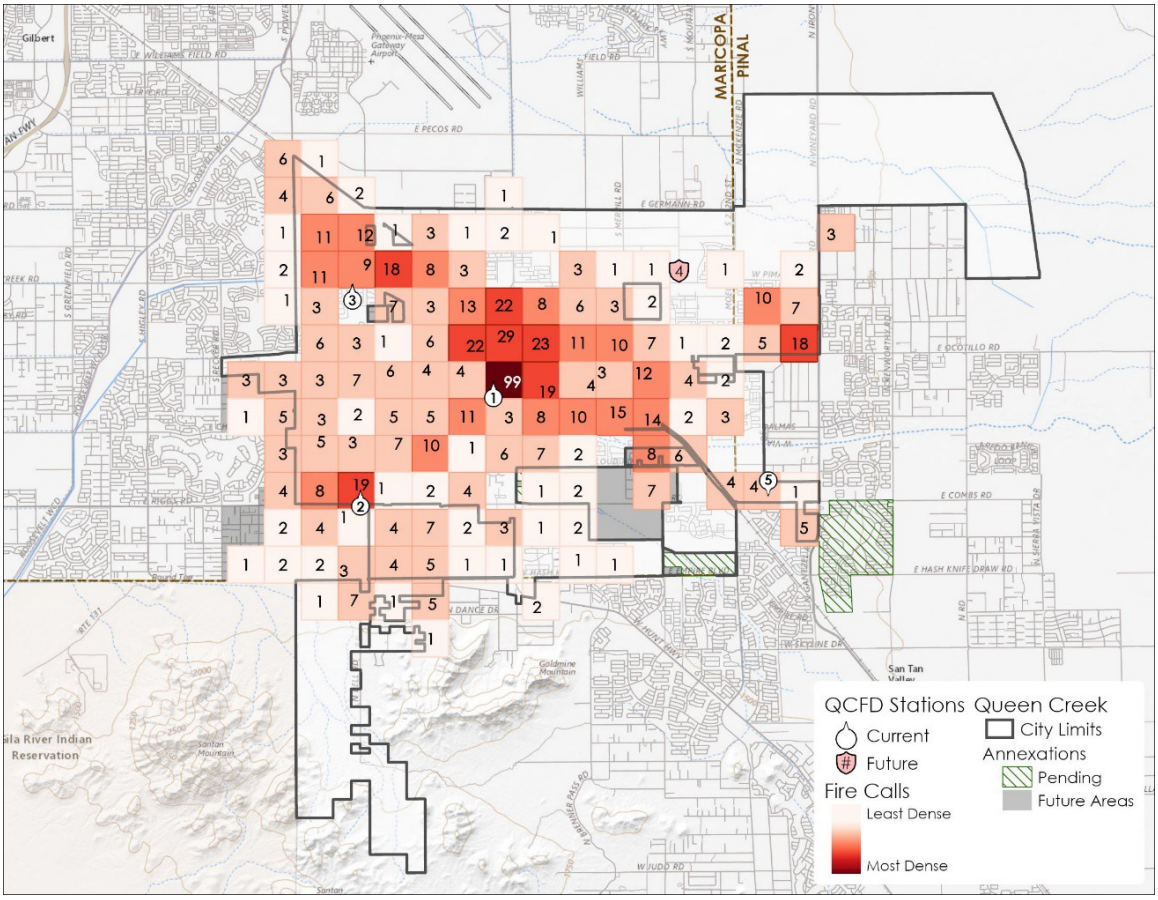
Key points to this data set are:

- Overall, 63 percent of EMS calls in Queen Creek that had a QCFMD unit on the call involved transporting one or more patients.
- On average, there were approximately 4 calls per day that involved AMR transporting one or more patients.

## FIRE INCIDENT DEMAND AND EMS INCIDENT DEMAND

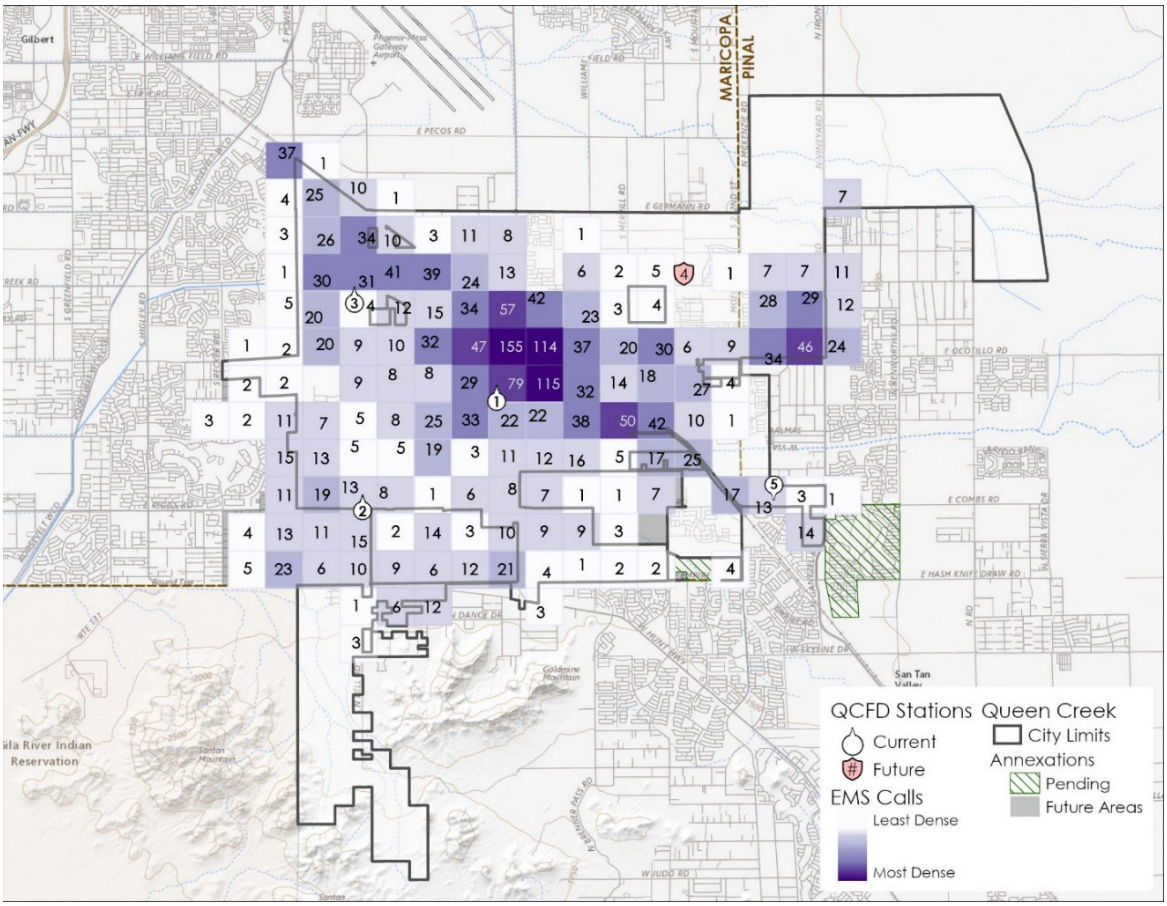
The fire and EMS risk in terms of numbers and types of incidents is important when analyzing the community's risk as outlined above. Analyzing *where* the fire and EMS incidents occur, and the demand density of fire and EMS incidents, determines adequate fire management zone resource assignment and deployment. The following figures illustrate fire and EMS demand in QCFMD fire management zones.

### FIGURE 4-11: Fire Incident Demand Density




The fire incident demand/risk is greatest in Station 1 and Station 3's fire management zones. The facilities in these fire management zones are positioned to properly manage the risk. Station 2's greatest fire demand/risk is centric to the fire management zone's facility. Station 4, once built and staffed, will be positioned to properly manage current fire incident demand/risk and future planned development that will create fire demand/risk. Station 5 has the lowest demand/risk fire management zone. Station 1's fire management zone, in the center of the town, has the highest demand/risk of all fire management zones. Because this fire management zone is in the center of the town, and the other four stations (three current and one future) are positioned or will be positioned on each of the four corners of the town, a favorable response approach has been planned and implemented to manage fire demand/risk.

## FIGURE 4-12: EMS Incident Demand Density




EMS overall presents a greater demand/risk for the community and fire management zone resources than fire and fire-related incident demand/risk. The EMS incident demand/risk is greatest in Station 1 and Station 3's fire management zones, although Station 2 and future Station 4's fire management zone show significant demand/risk as well. Station's 1,2, and 3 are positioned to properly manage the risk. Station 4, once built and staffed, will be positioned to properly manage the current EMS incident demand/risk and future planned development that will create additional EMS demand/risk. Station 5 has the lowest demand/risk for EMS-related incidents. Station 1's fire management zone, in the center of the town, has the highest EMS demand/risk of all fire management zones. Because this fire management zone is in the center of the town, and the other four stations (three current and one future) are positioned or will be positioned on each of the four corners of the town, a favorable response approach has been planned and implemented to manage EMS demand/risk, particularly overlapping EMS incidents in Station 1's zone.

## RISK CATEGORIZATION

A comprehensive risk assessment is a critical aspect of creating standards of cover. A risk assessment can assist the QCFMD in quantifying the risks that it faces in the town and unincorporated fire district. Once those risks are known, the department is better equipped to determine if the current response resources are sufficiently staffed, equipped, trained, and positioned. In this component, the factors that drive the service needs are examined and then link directly to discussions regarding the assembling of an effective response force (EFR); the factors also support the determination of the response capabilities needed to adequately address the existing risks, which encompasses the component of critical tasking.

The risks that the department faces can be natural or man-made and may be affected by the changing demographics of the community served. Using the information available from the CPSM data analysis, the QCFMD, the town's planning department, and public research, CPSM can begin an analysis of the town and fire district's risks and can work toward recommendations and strategies to mitigate and minimize their effects. This section contains an analysis of the various risks considered within the QCFMD's service area.

Community risks are often categorized in three ways, which are consequence of the event on the community, the probability the event will occur in the community, and the impact on the fire department. Tables 4-4, 4-5, and 4-6 examine the probability of the event occurring (Table 4-4), which ranges from unlikely to frequent; consequence to the community (Table 4-5), which is categorized ranging from insignificant to catastrophic; and the impact to the organization (Table 4-6), which ranges from insignificant to catastrophic.

### TABLE 4-4: Event Probability

| Descriptor | Chance of Occurrence | Description | Risk Score |
|---|---|---|---|
| **Unlikely** | 2%-25% | Event may occur only in exceptional circumstances. | **2** |
| **Possible** | 26%-50% | Event could occur at some time and/or no recorded incidents. Little opportunity, reason, or means to occur. | **4** |
| **Probable** | 51%-75% | Event should occur at some time and/or few, infrequent, random recorded incidents or little anecdotal evidence. Some opportunity, reason or means to occur; may occur. | **6** |
| **Highly Probable** | 76%-90% | Event will probably occur and/or regular recorded incidents and strong anecdotal evidence. Considerable opportunity, means, reason to occur. | **8** |
| **Frequent** | 90%-100% | Event is expected to occur. High level of recorded incidents and/or very strong anecdotal evidence. | **10** |

## TABLE 4-5: Consequence to Community

| Descriptor | Impact Categories | Description | Risk Score |
|---|---|---|---|
| **Insignificant** | Life Safety | ■ 1 or 2 people affected, minor injuries, minor property damage, and no environmental impact. | **2** |
| **Minor** | Life Safety<br><br>Economic and Infrastructure<br><br>Environmental | ■ Small number of people affected, no fatalities, and small number of minor injuries with first aid treatment. Minor displacement of people for <6 hours and minor personal support required.<br>■ Minor localized disruption to community services or infrastructure for <6 hours. Minor impact on environment with no lasting effects. | **4** |
| **Moderate** | Life Safety<br><br>Economic and Infrastructure<br><br>Environmental | ■ Limited number of people affected (11 to 25), no fatalities, but some hospitalization and medical treatment required. Localized displacement of small number of people for 6 to 24 hours. Personal support satisfied through local arrangements. Localized damage is rectified by routine arrangements.<br>■ Normal community functioning with some inconvenience.<br>■ Some impact on environment with short-term effects or small impact on environment with long-term effects. | **6** |
| **Significant** | Life Safety<br><br>Economic and Infrastructure<br><br>Environmental | ■ Significant number of people (>25) in affected area impacted with multiple fatalities, multiple serious or extensive injuries, and significant hospitalization.<br>■ Large number of people displaced for 6 to 24 hours or possibly beyond. External resources required for personal support. Significant damage that requires external resources. Community only partially functioning, some services unavailable.<br>■ Significant impact on environment with medium- to long-term effects. | **8** |
| **Catastrophic** | Life Safety<br><br>Economic and Infrastructure<br><br>Environmental | ■ Very large number of people in affected area(s) impacted with significant numbers of fatalities, large number of people requiring hospitalization with serious injuries with long-term effects. General and widespread displacement for prolonged duration and extensive personal support required. Extensive damage to properties in affected area requiring major demolition.<br>■ Serious damage to infrastructure causing significant disruption to, or loss of, key services for prolonged period.<br>■ Community unable to function without significant support.<br>■ Significant long-term impact on environment and/or permanent damage. | **10** |

## TABLE 4-6: Impact on QCFMD

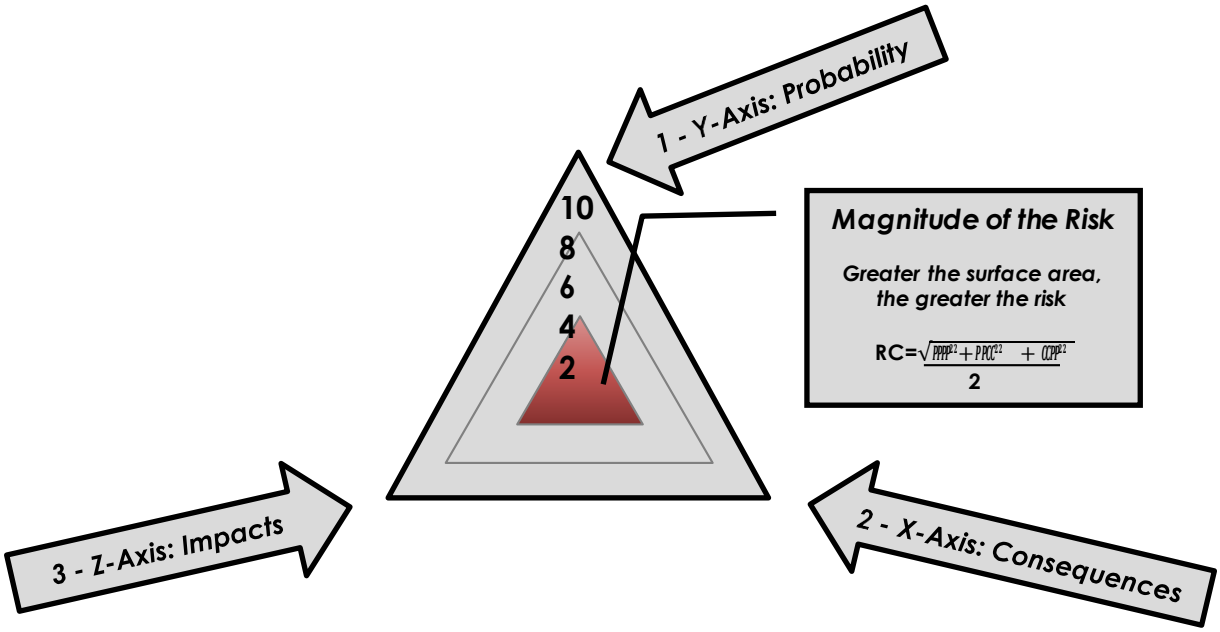
| Descriptor | Impact Categories | Description | Risk Score |
|---|---|---|---|
| **Insignificant** | Personnel and Resources | One apparatus out of service for period not to exceed 1 hour. | **2** |
| **Minor** | Personnel and Resources | More than one but not more than two apparatus out of service for a period not to exceed one hour. | **4** |
| **Moderate** | Personnel and Resources | Two to three apparatus out of service for a period between one hour and four hours. More than 50 percent of available resources committed to incident for more than 30 minutes. | **6** |
| **Significant** | Personnel and Resources | More than four apparatus out of service for a period of more than four hours or more than 75 percent of available resources committed to an incident for over 30 minutes. | **8** |
| **Catastrophic** | Personnel, Resources, and Facilities | More than 90 percent of available resources committed to incident for more than two hours or event which limits the ability of resources to respond. | **10** |

## RISK CLASSIFICATION AND CATEGORIES

This section contains an analysis of the various risks considered in the town. In this analysis, information presented and reviewed earlier in this section (All-Hazards Risk Assessment of the Community) have been considered. Risk is categorized as *Low*, *Moderate*, *High*, or *Special*.

Prior risk analysis has only attempted to evaluate two factors of risk: probability and consequence. Contemporary risk analysis considers the impact of each risk to the organization, thus creating a three-axis approach to evaluating risk as depicted in the following figure. A contemporary risk analysis now includes probability, consequences to the community, and impact on the organization, in this case the QCFMD.

### FIGURE 4-13: Three-Axis Risk Calculation




The following factors/hazards were identified and considered:

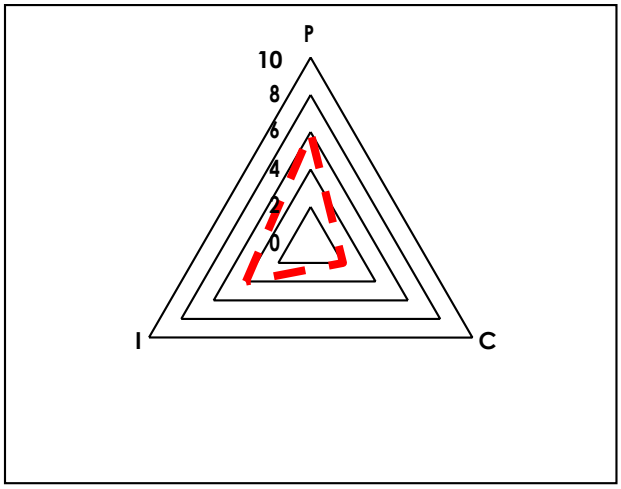
- **Demographic factors** such as age, socio-economic, density.
- **Natural hazards** such as flooding/flash flooding, dust storms, extreme heat, wild land fires.
- **Man-made hazards** such as rail lines, roads and intersections, target hazards.
- **Structural/building risks**.
- **Fire and EMS incident numbers and density**.

The assessment of each factor and hazard as listed below took into consideration the likelihood of the event, the impact on the town itself, and the impact on QCFMD's ability to deliver emergency services, which includes automatic aid capabilities as well. The list is not all inclusive but includes categories most common or that may present to the town and the QCFMD.

## Low Risk

- Automatic fire/false alarms.
- BLS EMS Incidents
- Minor flooding with thunderstorms.
- Good intent/hazard/public service fire incidents with no life safety exposure.
- Outside fires such as grass, rubbish, dumpster, vehicle with no structural/life safety exposure.

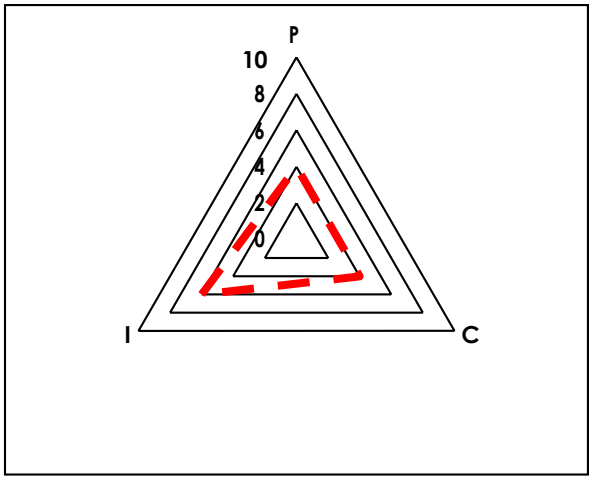
### FIGURE 4-14: Low Risk



## Moderate Risk

- Fire incident in a single-family dwelling where fire and smoke or smoke is visible, indicating a working fire.
- Suspicious substance investigation involving multiple fire companies and law enforcement agencies.
- ALS EMS incident.
- Motor vehicle accident (MVA).
- MVA with entrapment of passengers.
- Grass/brush fire with structural endangerment/exposure.
- Low angle rescue involving ropes and rope rescue equipment and resources.
- Surface water rescue.
- Good intent/hazard/public service fire incidents with life safety exposure.

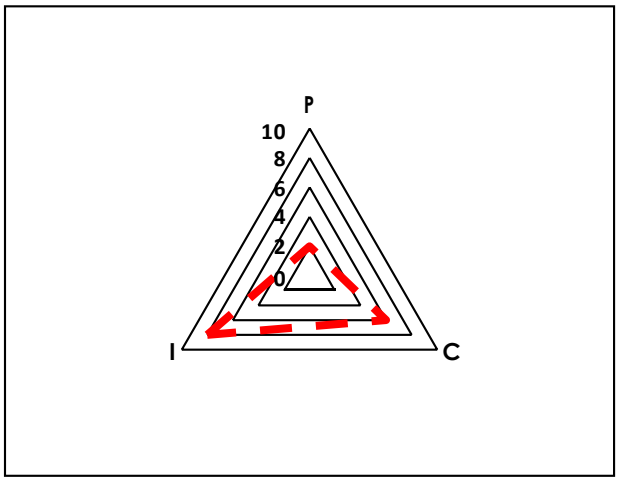
### FIGURE 4-15: Moderate Risk



## High Risk

- Working fire in a target hazard.
- Cardiac arrest.
- Mass casualty incident of more than 10 patients but fewer than 25 patients.
- Confined space rescue.
- Structural collapse involving life safety exposure.
- High angle rescue involving ropes and rope rescue equipment.
- Trench rescue.
- Suspicious substance incident with injuries.
- Industrial leak of hazardous materials that causes exposure to persons or threatens life safety.
- Weather event that creates widespread flooding, building damage, and/or life safety exposure.

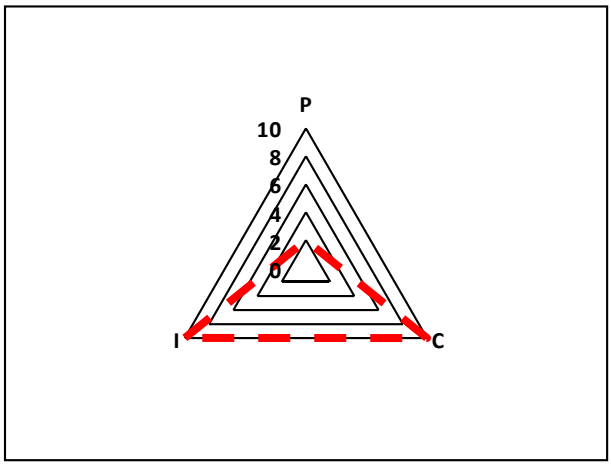
### FIGURE 4-16: High Risk



## Special Risk

- Working fire in a structure of more than three floors.
- Fire at an industrial building or complex with hazardous materials.
- Mass casualty incident of more than 25 patients.
- Rail or transportation incident that causes life safety exposure or threatens life safetythrough the release of hazardous smoke or materials.
- Explosion in a building that causes exposure to persons or threatens life safety or outside of a building that creates exposure to occupied buildings or threatens life safety.

### FIGURE 4-17: Special Risk



# SECTION 5. CURRENT DEPLOYMENT AND PERFORMANCE

## EVALUATION OF CURRENT DEPLOYMENT AND PERFORMANCE

Response times are typically the primary measurement for evaluating fire and EMS services. Response times can be used as a benchmark to determine how well a fire department is currently performing, to help identify response trends, and to predict future operational needs. Achieving the quickest and safest response times possible should be a fundamental goal of every fire department. At the same time, the actual impact of a speedy response time is limited to very few incidents. For example, in a full cardiac arrest, analysis shows that successful outcomes are rarely achieved if basic life support (CPR) is not initiated within four minutes of the onset. However, cardiac arrests occur very infrequently; on average they are 1 percent to 1.5 percent of all EMS incidents.[38] There are also other EMS incidents that are truly life-threatening, and the time of response can clearly impact the outcome. These involve full drownings, allergic reactions, electrocutions, and severe trauma (often caused by gunshot wounds, stabbings, and severe motor vehicle accidents, etc.). Again, the frequency of these types of calls are limited.

Regarding response times for fire incidents, the criterion is based on the concept of "flashover." This is the state at which super-heated gasses from a fire are released rapidly, causing the fire to burn freely and become so volatile that the fire reaches an explosive state (simultaneous ignition of the all combustible materials in a room). In this situation, usually after an extended period (often eight to twelve minutes after ignition but times as quickly as five to seven minutes), and a combination of the right conditions (fuel and oxygen), the fire expands rapidly and is much more difficult to contain. When the fire does reach this extremely hazardous state, initial firefighting forces are often overwhelmed, larger and more destructive fire occurs, the fire escapes the room and possibly even the building of origin, and significantly more resources are required to affect fire control and extinguishment.

Flashover occurs quicker and more frequently today and is caused at least in part by the introduction of significant quantities of plastic- and foam-based products into homes and businesses (e.g., furnishings, mattresses, bedding, plumbing and electrical components, home and business electronics, decorative materials, insulation, and structural components). These materials ignite and burn quickly and produce extreme heat and toxic smoke.

As a benchmark, paragraph 4.1.2.1(3) of NFPA 1710 recommends the first arriving engine at a fire suppression incident have **a travel time of 240 seconds or less**. Paragraph 4.1.2.1(4) recommends that other than for a high-rise incident, the entire initial response of personnel be on scene within eight minutes of dispatch. It is also important to keep in mind that once units arrive on scene, they will need to get set up to commence operations. NFPA 1710 recommends that units be able to commence an initial attack within two minutes of arrival, 90 percent of the time.

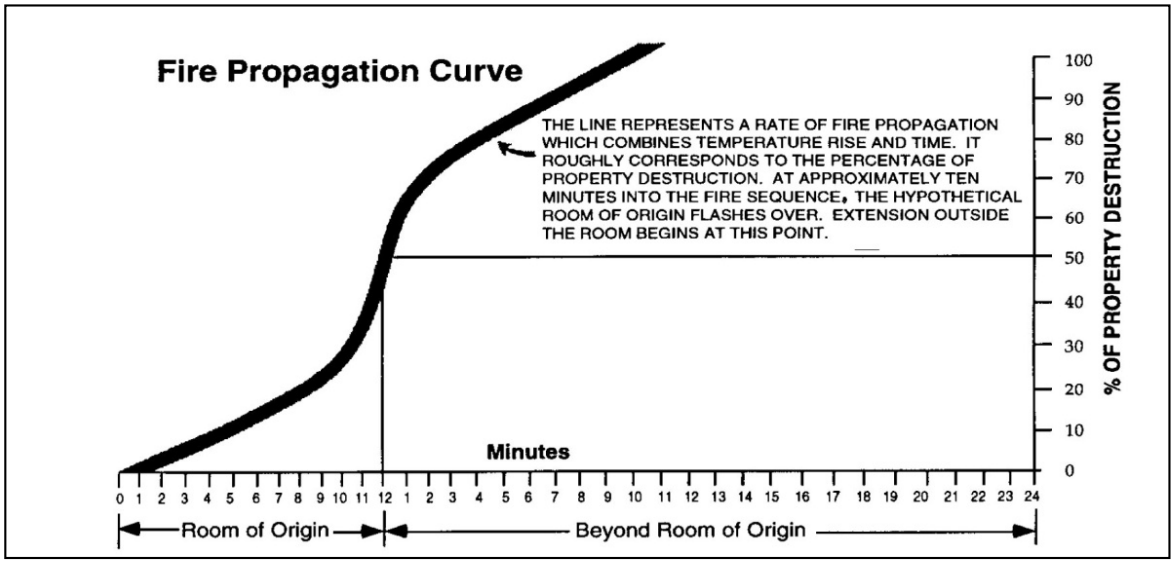
Although trying to reach the NFPA benchmark for travel time may be laudable, the question is, At what cost? What is the evidence that supports such recommendations? NFPA 1710's travel

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

times are established for two primary reasons: (1) the fire propagation curve; and (2) sudden cardiac arrest, where brain damage and permanent brain death occur in four to six minutes.

The following figure shows the fire propagation curve relative to fire being confined to the room of origin or spreading beyond it and the percentage of destruction of property by the fire.

## FIGURE 5-1: Fire Propagation Curve




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

According to fire service educator Clinton Smoke, the fire propagation curve establishes that temperature rise and time within in a room on fire corresponds with property destruction and potential loss of life if present.[39] At approximately the ten-minute mark of fire progression, the fire flashes over (due to superheating of room contents and other combustibles) and extends beyond the room of origin, thus increasing proportionately the destruction to property and potential endangerment of life. The ability to quickly deploy adequate fire staff prior to flashover thus limits the fire's extension beyond the room or area of origin.

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

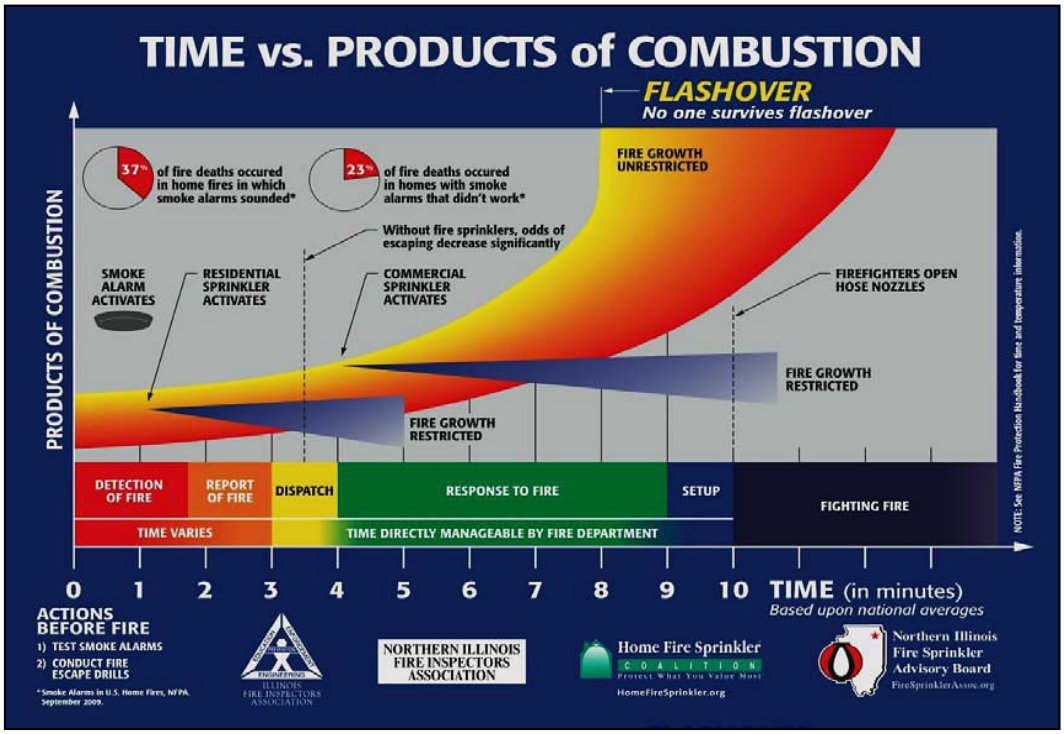
> *Clearly, an early aggressive and offensive initial interior attack on a working structural fire results in greatly reduced loss of life and property damage. Consequently, given that the progression of a structural fire to the point of "flashover" (the very rapid spreading of the fire due to super-heating of room contents and other combustibles) generally occurs in less than 10 minutes, two of the most important elements in limiting fire spread are the quick arrival of sufficient numbers of personnel and equipment to attack and extinguish the fire as close to the point of its origin as possible.*[40]

The following figure illustrates the time progression of a fire from inception through flashover. The time versus products of combustion curve shows activation times and effectiveness of residential sprinklers (approximately one minute), commercial sprinklers (four minutes), flashover (eight to ten minutes), and firefighters applying first water to the fire after notification, dispatch, response,

39. Clinton Smoke, *Company Officer*, 2nd ed. (Clifton Park, NY: Delmar, 2005).
40. *Safe Fire Fighter Staffing: Critical Considerations*, 2nd ed. (Washington, DC: International Association of Fire Fighters), 5.

and set up (ten minutes). It also illustrates that the fire department's response time to the fire is one of the only aspects of the timeline that the fire department can exert direct control over.

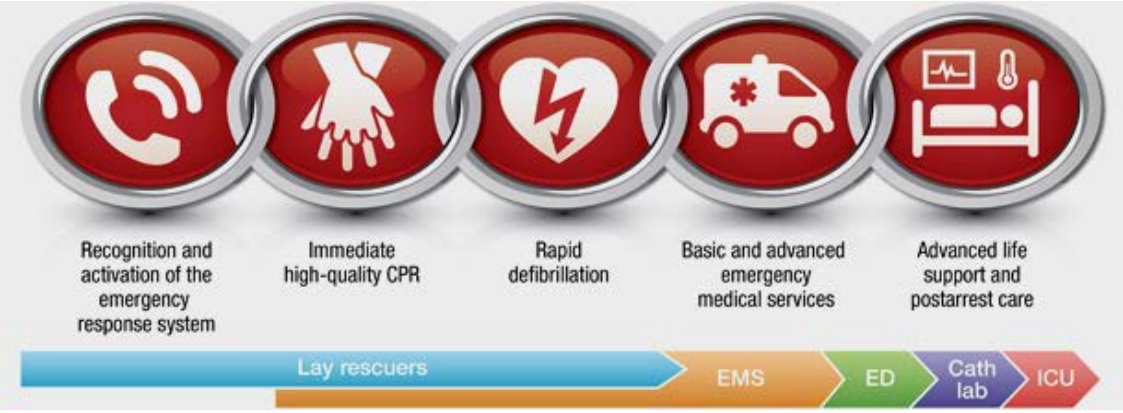
**FIGURE 5-2: Fire Growth from Inception to Flashover[41]**




From the EMS perspective, the following figure illustrates the chain of survival, which is a series of actions that, when put in motion, reduce the mortality of sudden cardiac arrest. Adequate response times coupled with community and public access defibrillator programs potentially can impact the survival rate of sudden cardiac arrest victims by deploying early CPR, early defibrillation, and early advanced care.

41. Source: Northern Illinois Fire Sprinkler Advisory Board.

## FIGURE 5-3: Sudden Cardiac Arrest Chain of Survival




**From:** "Out of Hospital Chain of Survival," http://cpr.heart.org/AHAECC/CPRAndECC/AboutCPRFirstAid/CPRFactsAndStats/UCM_475731_Out-of-hospital-Chain-of-Survival.jsp

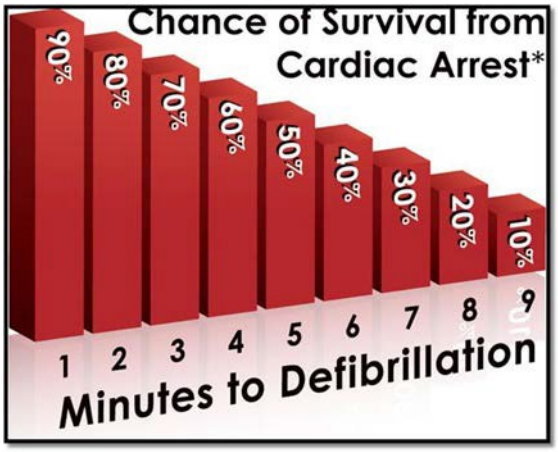
Since the 1970s, arriving within eight minutes of receipt of an emergency call, 90 percent of the time, has been the recognized benchmark for determining the quality of an EMS system. Today, the national standard of care benchmark based on stroke and cardiac arrest protocols has evolved to have an emergency response unit on scene at a medical emergency within six minutes of receipt of the call. Paragraph 4.1.2.1(6) of NFPA 1710 recommends that for EMS incidents a unit with first responder or higher level trained personnel and equipped with an AED should arrive on scene within six minutes of the receipt of the emergency call (at the dispatch center), and **four minutes of response (240 second travel time)**. An advanced life support (ALS) unit should arrive on scene within ten minutes (eight minutes of response).

According to NFPA 1710, "*This requirement is based on experience, expert consensus, and science. Many studies note the role of time and the delivery of early defibrillation in patient survival due to heart attacks and cardiac arrest, which are the most time-critical, resource-intensive medical emergency events to which fire departments respond.*" CAAS recommends that an ambulance arrive on scene within eight minutes, fifty-nine seconds (00:08:59) of dispatch. However, research in EMS indicates that if emergency medical intervention is delayed as long as nine minutes, patient survival of cardiac arrests approaches zero (Figure 5-4).[42]

§ § §

42. Eisenberg, M.S., et al., "Predicting Survival from Out-of-Hospital Cardiac Arrest: A Graphic Model," *Annals of Emergency Medicine*; November 1993; pp. 1652-1658.

**FIGURE 5-4: Cardiac Arrest Survival Probability by Minute**




Typically, fewer than 10 percent of 9-1-1 patients have time-sensitive ALS needs. But, for those patients that do, time can be a critical issue of morbidity and mortality. For the remainder of those calling 9-1-1 for a medical emergency, though they may not have a medical necessity, this 90 percent still expect rapid customer service. Response times for patients and their families are often the most important issue regarding the use the fire department's services and are what most people often refer to when they "rate" their local emergency responders. Regardless of the service delivery model, appropriate response times are more than a clinical issue; they are also a customer service issue.

Another important factor in the whole response time question is what we term as "detection time." This is the time it takes to detect a fire or medical situation and notify 9-1-1 to initiate the response. In many instances, particularly at night or when automatic detection systems (fire sprinklers and smoke detectors) are unavailable or inoperable, the detection process can be extended.

## STATION LOCATIONS

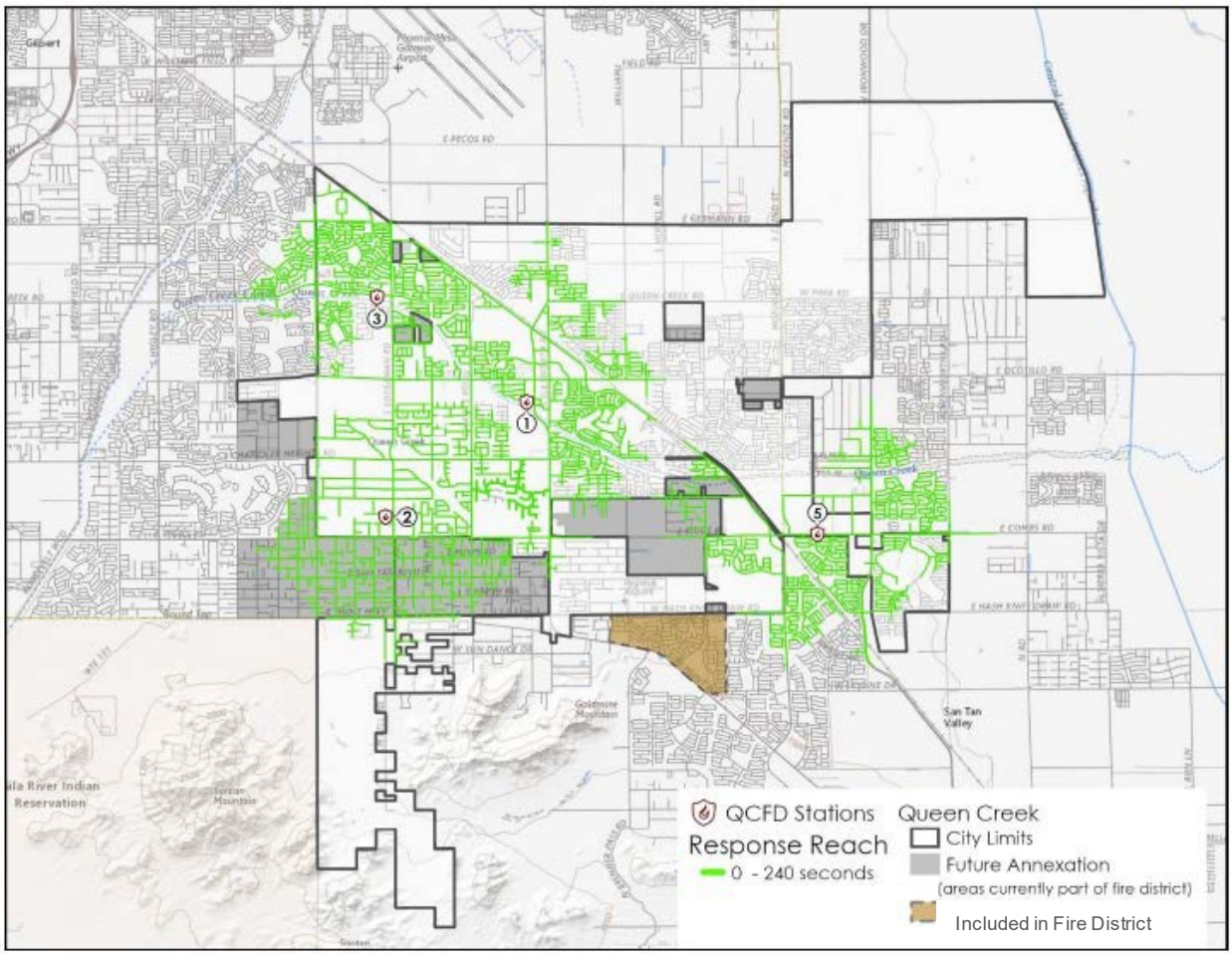
The fire station is a critical link in service delivery and where these facilities are located is the single most important factor in determining overall response times.

Illustrating response time is important when considering the location from which assets should be deployed. When historic demand is coupled with risk analysis, a more informed decision can be made. The following figure uses GIS mapping to illustrate the 240-second travel time bleed comparisons, utilizing the existing road network, from each current QCFMD station. The largest area that falls outside of the 240-second travel time from the existing stations is the northeast quadrant of the town where Station 4 will now serve as it opened December 1, 2020. While there are areas in other parts of the town that appear to be outside of the 240-second travel time, with the exception of the south central area near the Pinal County border, most of these areas have simply not been filled in with development and a road network. Also note that the bleeds from Station 5 extend into unincorporated areas of Maricopa and Pinal Counties that have not been annexed into the town.

It is also important to note that the road network in Queen Creek will have a negative impact on responses, slowing them down.

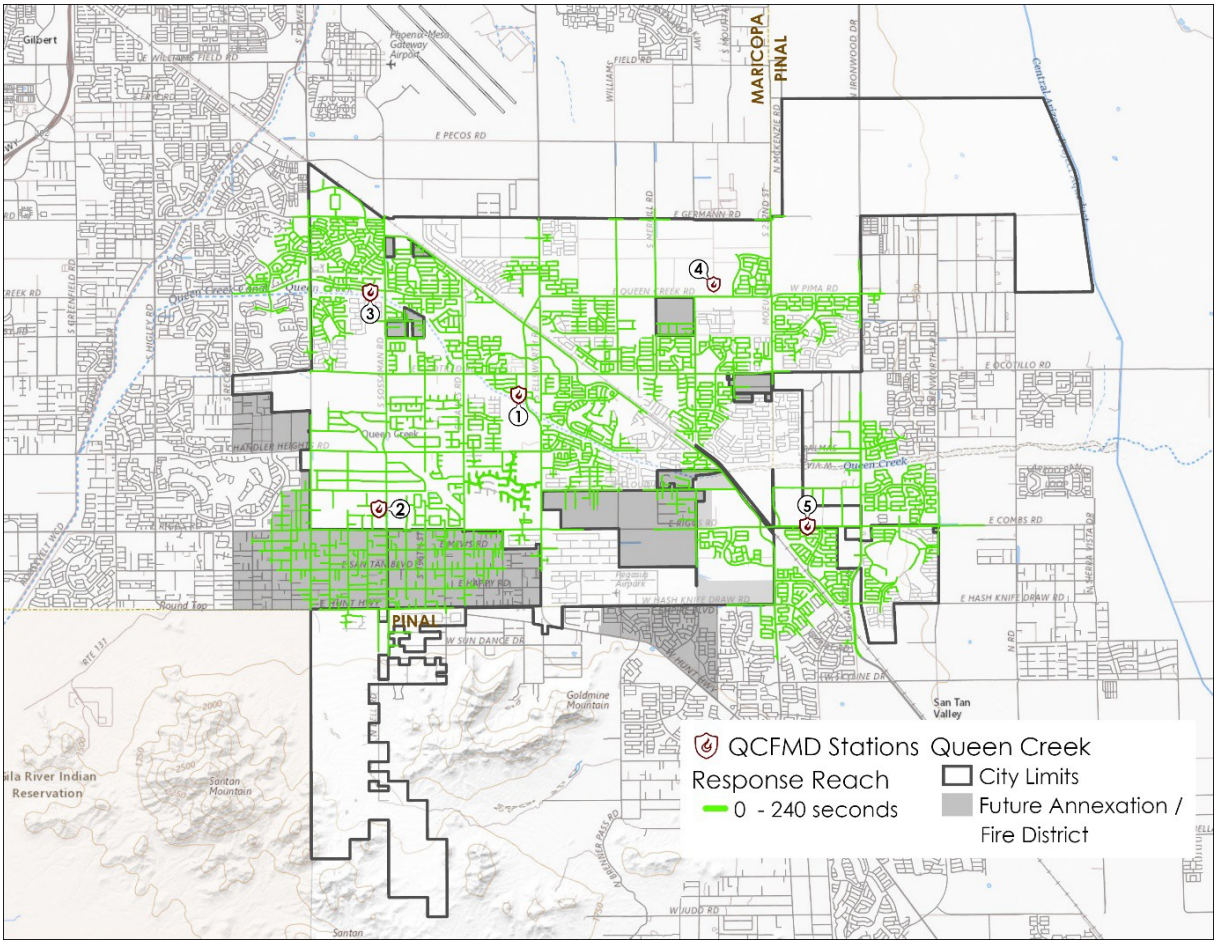
This situation will need to be considered as part of future decisions regarding station placements. There are currently only a limited number of streets that cross the town entirely from one end to the other. Sossaman and Ellsworth Roads traverse from north to south, while Ocotillo and Riggs (recently completed) Roads bisect the town from east to west. German Road may eventually run entirely from east to west as well. In addition, there are five roads that traverse the Union Pacific rail line: Power, Ellsworth, Combs, Ocotillo, and Ironwood. Traffic volume can also play a significant role in response times, with heavier traffic conditions slowing responses. It is estimated that more than 110,000 drivers pass through Queen Creek daily traveling to and from destinations outside of the town.

**FIGURE 5-5: 240-second Travel Time from QCFMD Fire Stations without Station 4**



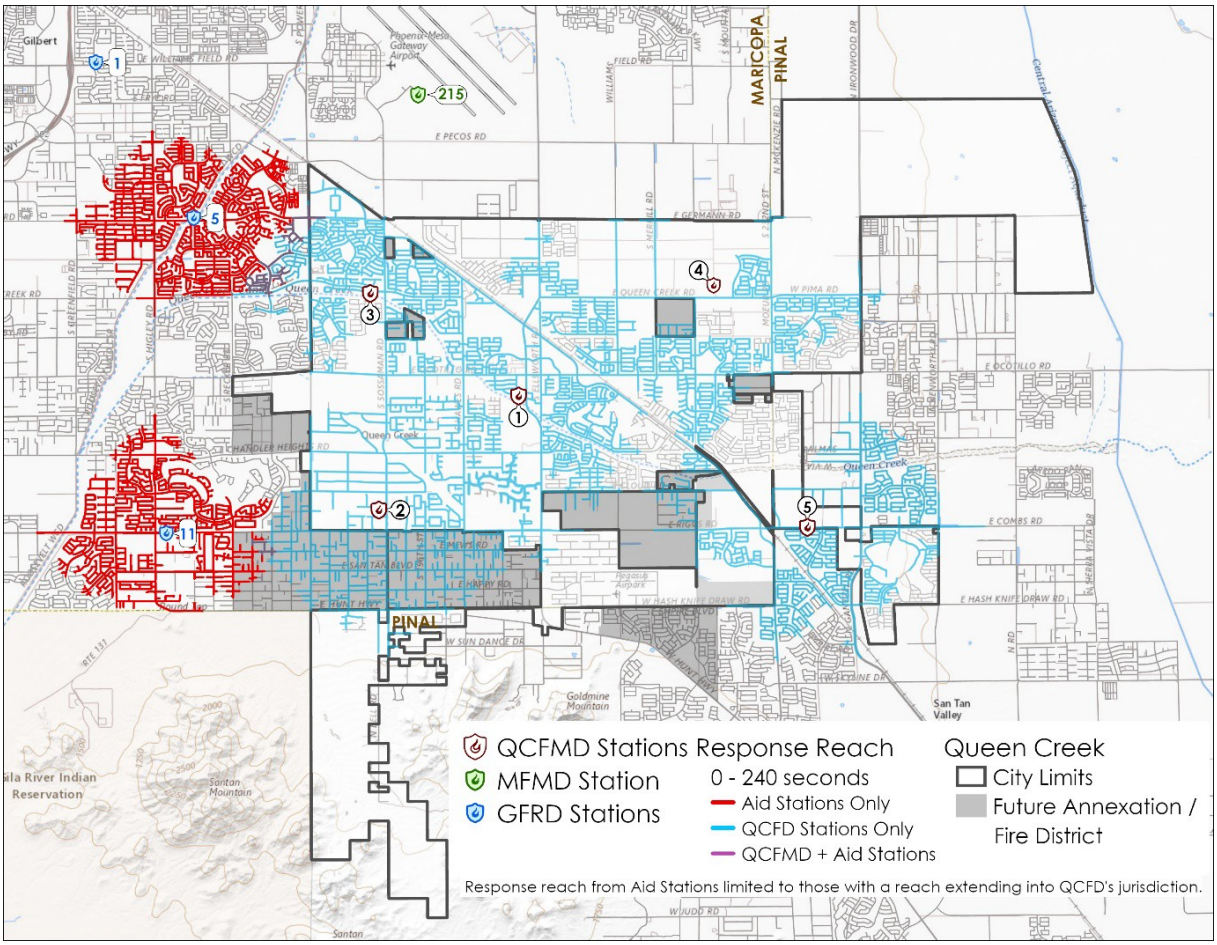

The following figure illustrates the 240-second travel time bleed comparisons, utilizing the existing road network, from each QCFMD station and Station 4 that opened December 1, 2020. The developed areas in the northeast quadrant of the town are now mostly within the 240-second travel time for the first arriving fire or EMS unit. With this configuration the town appears to be close to being able to achieve the NFPA 1710 benchmark recommendations for first unit response.

## FIGURE 5-6: 240-second Travel Time from QCFMD Fire Stations, including Station 4



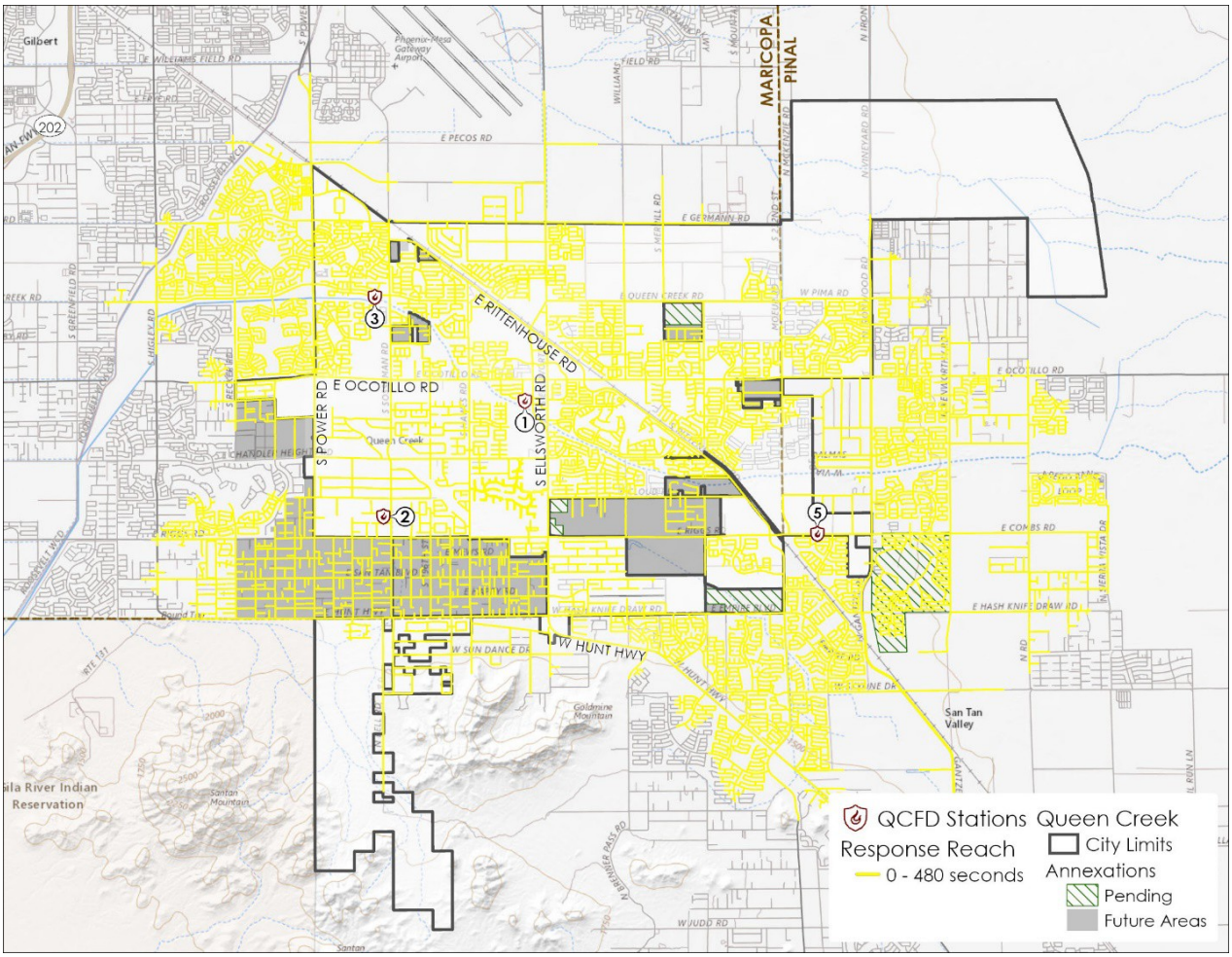

The next figure illustrates the 240-second travel time bleed comparisons, utilizing the existing road network, from each QCFMD station including Station 4, along with stations in Gilbert and Mesa. As illustrated, neither of those communities have a station that is within 240 seconds of travel time from Queen Creek and which might be closer to certain parts of town than the QCFMD would be. Conversely, the 240-second travel time from QCFMD stations 412 and 413 both extend outside of the town into Gilbert. As previously noted, Station 5's travel time extends into unincorporated areas of both counties.

## FIGURE 5-7: 240-second Travel Time from QCFMD and Automatic Aid Fire Stations



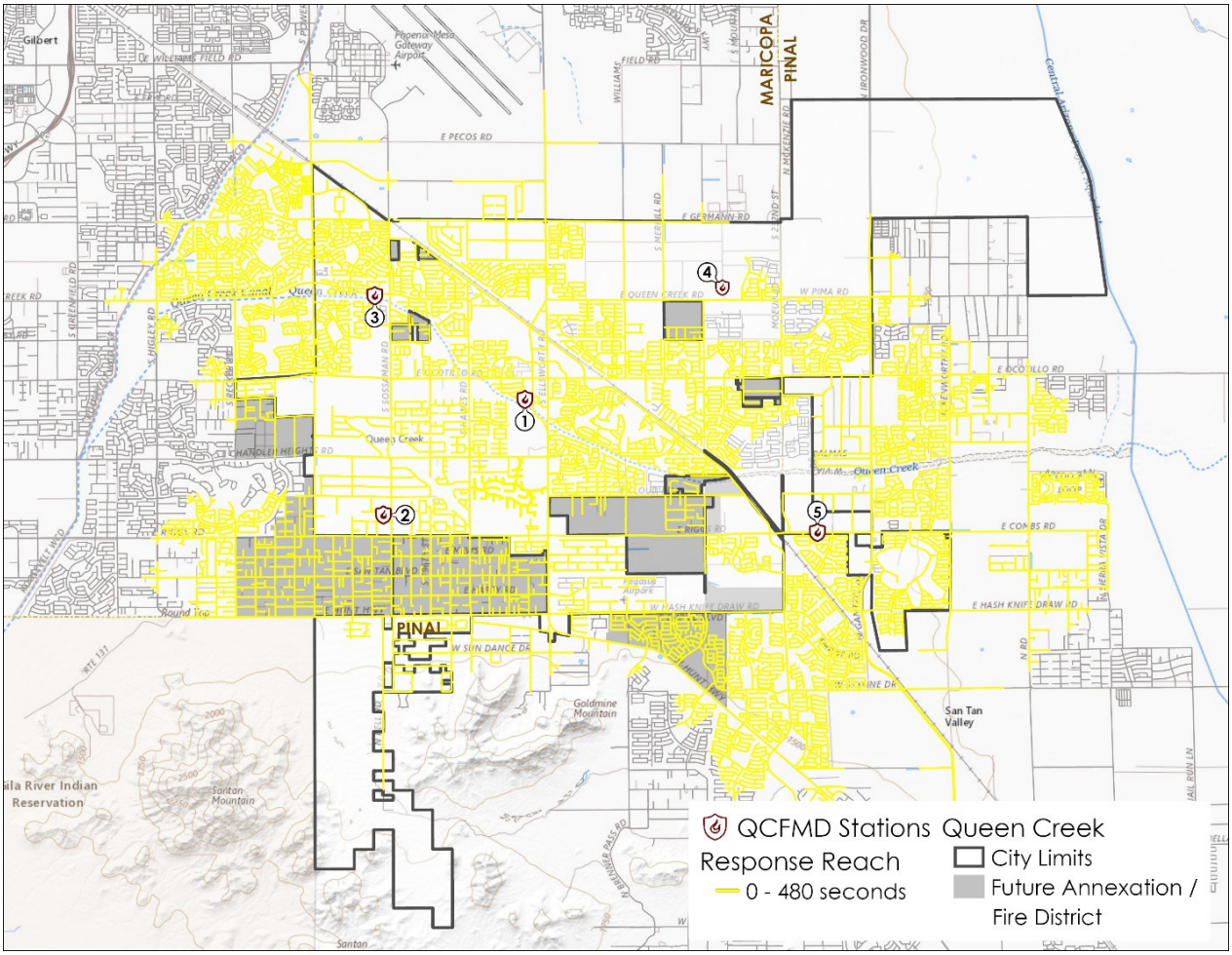

The benchmark NFPA 1710 standard recommends that for structure fire responses that the entire first alarm assignment of resources and personnel, for most types of occupancies, be on the scene within 480 seconds of travel time. The next figure illustrates the 480-second travel time bleed comparisons, utilizing the existing road network, from each current QCFMD station prior to Station 4 opening. The entire town, as well as areas of Gilbert, Mesa, and unincorporated areas of both Maricopa and Pinal Counties are well with the 480-second travel time.

## FIGURE 5-8: 480-second Travel Time from QCFMD Fire Stations without Station 4



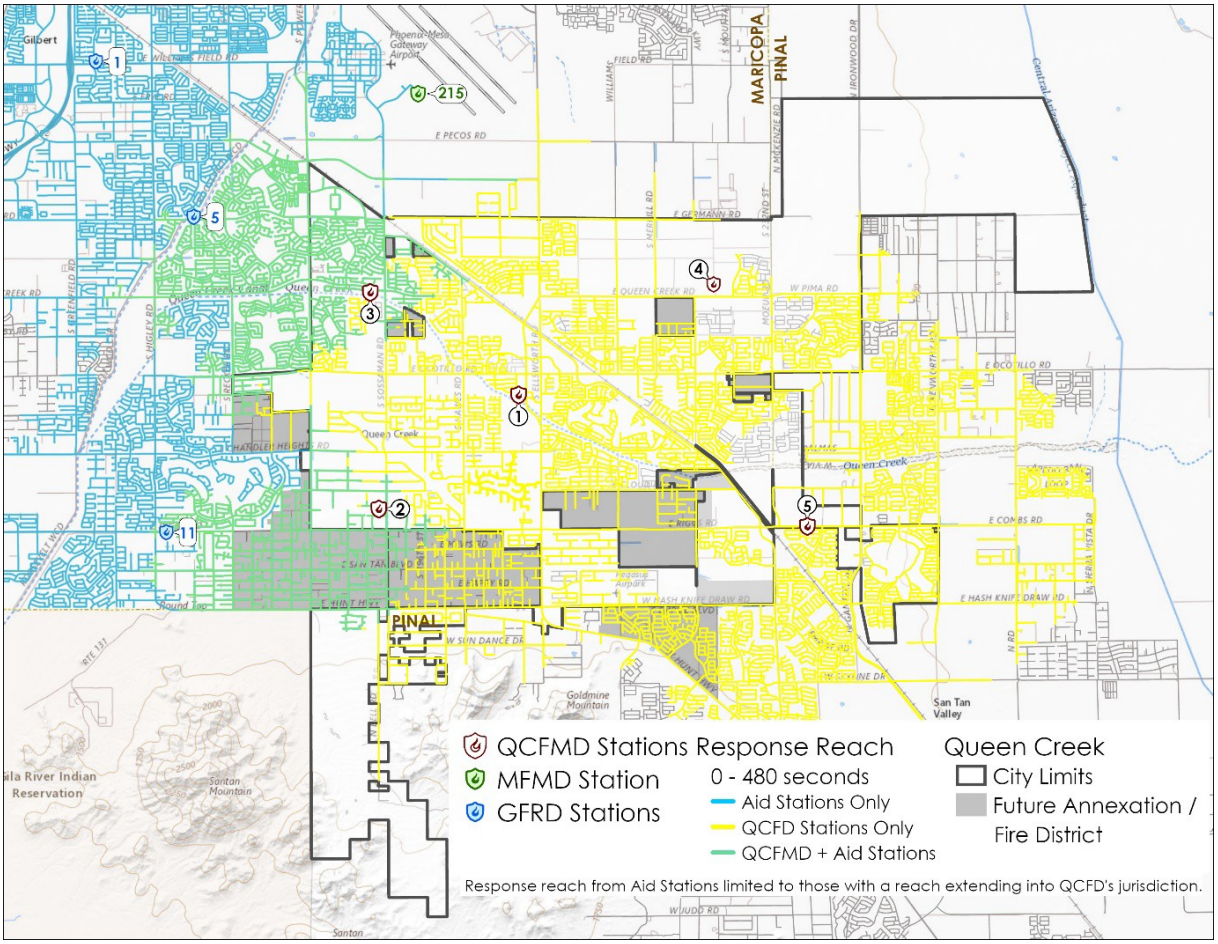

The following figure illustrates the 480-second travel time bleed comparisons, utilizing the existing road network, from each QCFMD station with Station 4 now open. This station serves to increase the areas that are reachable within the benchmark time.

## FIGURE 5-9: 480-second Travel Time from QCFMD Fire Stations, including Station 4




The next figure illustrates the 480-second travel time bleed comparisons, utilizing the existing road network, from each QCFMD station including Station 4, along with stations in Gilbert and Mesa. This map indicates that stations in Gilbert and Mesa could provide assistance just to two west side areas of Queen Creek within the suggested benchmark travel time. It is important to note, however, that the 480-second benchmark is a recommendation, not a requirement, and Gilbert and Mesa will continue to provide much needed—and exemplary—assistance to QCFMD on a wide range on incidents. There are a number of areas between QCFMD Stations 412 and 413, and Gilbert Station 5 and 11, and Mesa Station 215 where multiple stations are within a 480-second travel time.

## FIGURE 5-10: 480-second Travel Time from QCFMD and Automatic Aid Fire Stations




In anticipation of the future growth and expansion that the Town of Queen Creek is projected to experience, the QCFMD will need to continue to expand its number of deployment points to keep pace with an expanding population and a corresponding increase in call volume. This deployment point expansion will be necessary for the QCFMD to continue to achieve benchmark response and travel time standards.

Significant planned expansions of the town and QCFMD service areas include:

- **State Lands Area**: This approximately 6.5 square mile area was annexed into the northeast quadrant of Queen Creek in late 2019. This area could conceivably support approximately 17,000 units of residential construction, including multifamily complexes. However, more conservative estimates by the town prepared for economic analysis place a buildout at between 12,000 and 13,000 residential units. With an average of 3.5 people per household, even the lower estimate could potentially increase the population of the town by approximately 42,000 residents.
- In addition to residential development, one or more interchanges of the State Route 24 Freeway, including its proposed terminus in this area, will promote additional commercial development and traffic considerations.

- **Box Canyon Area:** This area on the southwest corner of the town in Pinal County is eventually projected to include approximately 3,760 homes with a potential population of around 13,000. QCFMD already has a projected station location in this area, approximately one-half mile south of Hunt Highway. It should be noted that the configuration of this area will dictate that all units responding to an incident will come from one direction, a situation that will potentially extend response times for the full first alarm assignment for structure fires.
- **Encantera:** This approximately one square mile of unincorporated area of Pinal County on Queen Creek's southeast border was annexed into the city in December 2019. When buildout is complete this area could have up to 2,399 housing units with a potential population of approximately 8,400.
- **Pinal County Fire District Expansion:** The QCIFD fire district area has also been requested to assume fire protection and EMS coverage for an approximately one square mile area of unincorporated Pinal County adjoining the town's southern border. This expansion has been completed as planned. This area is proposed to eventually include 1,500 to 1,800 homes, which could result in an increased population of approximately 5,200 to 6,300. This area may also include a Florence School District school. One developer in this area has already started building model homes, while a second plans to have models built in 2020. This area is the brown triangle on the following maps.

As previously mentioned, the NFPA and ISO have established different indices in determining fire station distribution. The ISO Fire Suppression Rating Schedule, section 560, indicates that first-due engine companies should serve areas that are within a 1.5-mile travel distance. The placement of fire stations that achieves this type of separation creates service areas that are approximately 4.5 square miles in size, depending on the road network and other geographical barriers.

NFPA references the placement of fire stations in an indirect way. It recommends that fire stations be placed in a distribution that achieves the desired minimum response times. NFPA Standard 1710, section 4.1.2.1(3) and (6), suggests an engine placement that achieves a 240-second (four-minute) travel time for the first arriving unit. Using an empirical model called the "piece-wise linear travel time function," the Rand Institute has estimated that the average emergency response speed for fire apparatus is 35 mph. At this speed the distance a fire engine can travel in four minutes is approximately 1.97 miles.[43] A polygon based on a 1.97-mile travel distance results in a service area that, on average, is 7.3 square miles.[44]

The next three figures illustrate the current 240-second first due bleeds along with polygons that depict the ISO (blue) and NFPA (tan) recommended response area sizes for potential, additional QCFMD stations. Three potential station configurations are depicted, for seven, eight, and nine stations.

Figure 5-11 illustrates a seven-station configuration, with a station in the Box Canyon area and a single station serving the state lands area. The lower part of the Box Canyon area may not be within a 240-second travel time from a new station; however, the road network once in place may assist with improving coverage. In the state lands area, a large portion of the area would not be within a 240-second travel time with a single station model. With the area being designated to be primarily residential, the potential road network will in all probability not be conducive to rapid response. Traffic congestion will also be a potential factor at certain times of the day, particularly around the freeway interchanges.

43. University of Tennessee Municipal Technical Advisory Service, Clinton Fire Location Station Study, Knoxville, TN, November 2012. p. 8.
44. Ibid., p.9

## FIGURE 5-11: QCFMD Seven Station Deployment Model

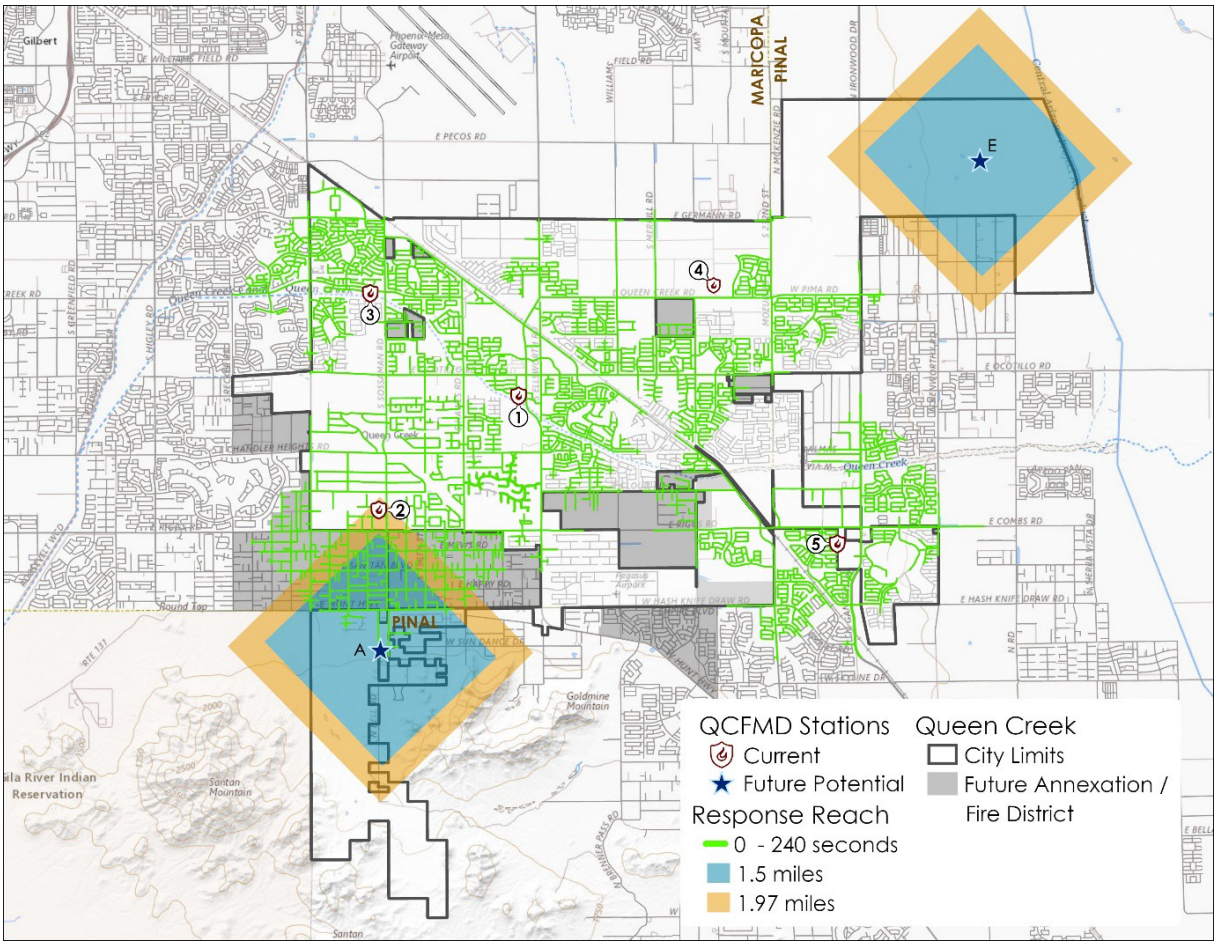
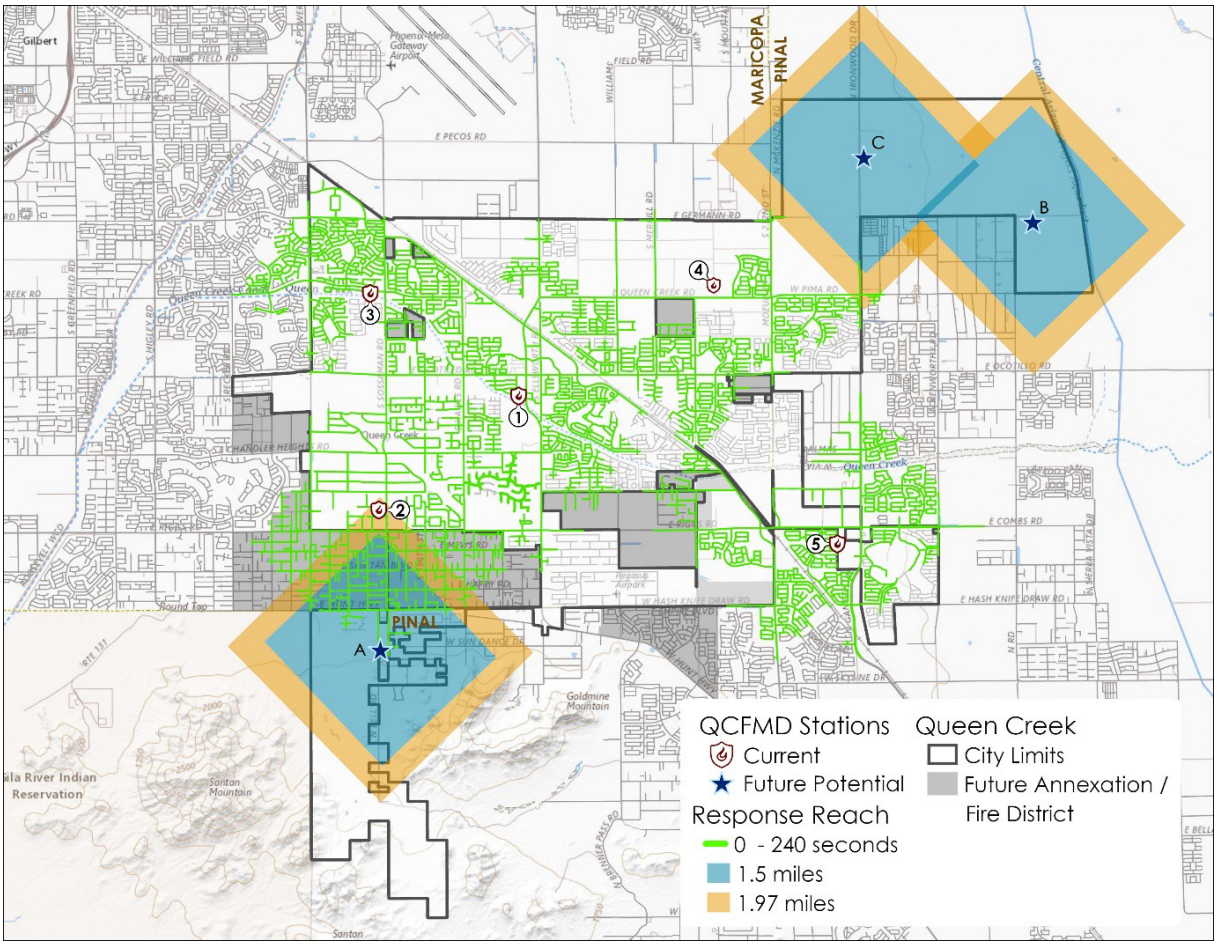


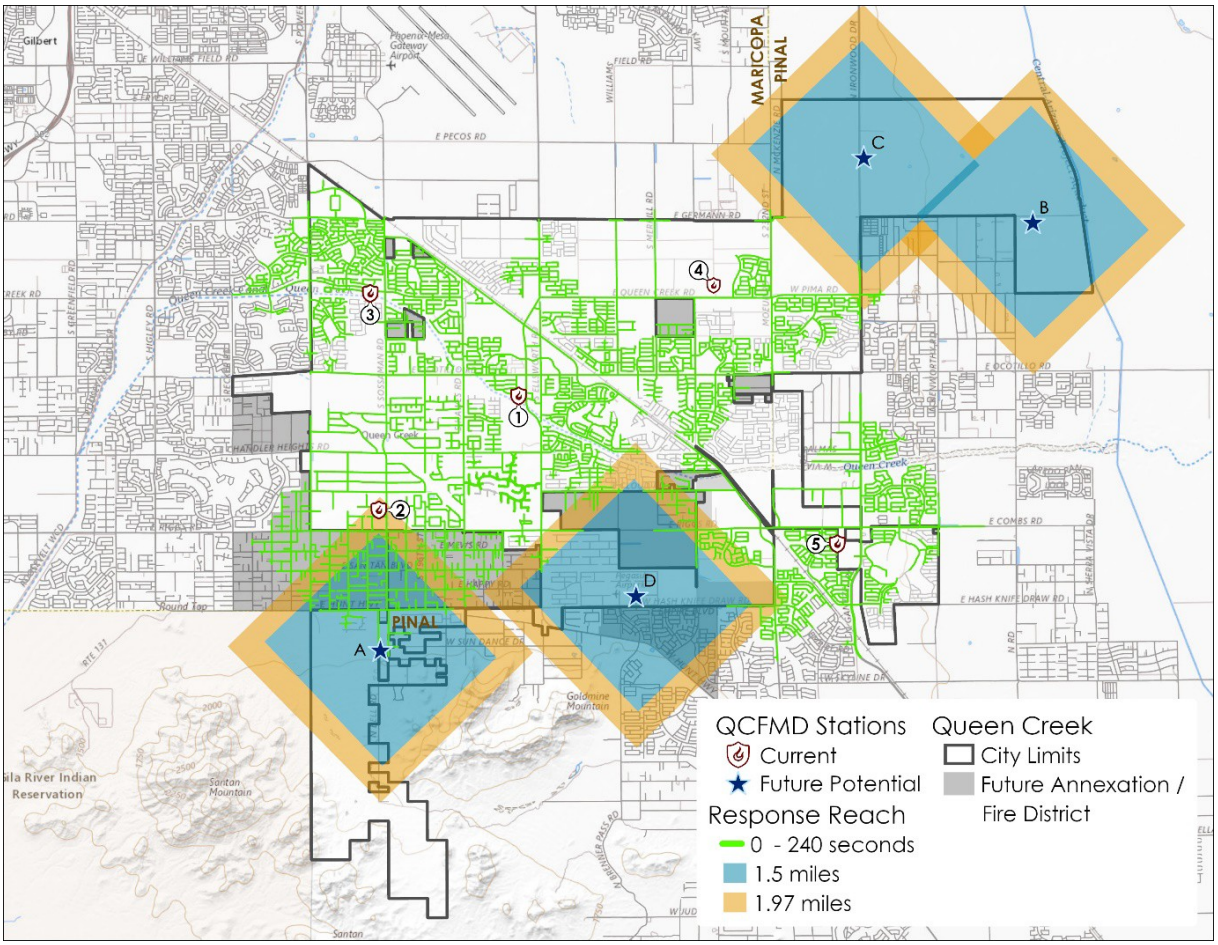

Figure 5-12 illustrates an eight-station deployment model that includes a second station in the state lands area. This model provides much more complete coverage, with almost the entire area being within a 240-second travel time from a fire station. It also closes the 240-second gap between Station 4 and Station "C." With two stations in this area the 240-second travel times extend beyond the town's borders into both Mesa and unincorporated areas of Maricopa County.

## FIGURE 5-12: QCFMD Eight Station Deployment Model




One area where the 240-second travel time bleed maps indicate there is a significant gap in the benchmark coverage is in the southern end of the town, between Stations 412 and 415, primarily north of Hunt Highway. This also includes some existing fire district area, in addition to the new fire district expansion area in Pinal County. Figure 5-13 illustrates a nine-station configuration with a station located on or near Hunt Highway in this area. This station would fill in the gap in coverage and should place this entire area in, or very close, to a 240-second travel time from a Station "D."

## FIGURE 5-13: QCFMD Nine Station Deployment Model

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## OPERATIONAL SERVICE OBJECTIVES

There is no "right" amount of fire protection and EMS delivery; it is a constantly changing level based on such things as the expressed needs of the community, community risk, and population growth.

When looking at response times it is prudent to design a deployment strategy around the actual circumstances that exist in the community and the fire problem that is identified to exist. The strategic and tactical challenges presented by the widely varied hazards that a department protects against need to be identified and planned for through a community risk analysis planning and management process as identified in this report. It is ultimately the responsibility of elected officials to determine the level of risk that is acceptable to their community. Once the acceptable level of risk has been determined, then operational service objectives can be established. Whether looking at acceptable risk, or level of service objectives, it would be imprudent, and probably very costly, to build a deployment strategy that is based solely upon response times.

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

- *Dispatch time* is the time interval that begins when the alarm is received at the initial public safety answering point (PSAP) or communications center and ends when the response information begins to be transmitted via voice and/or electronic means to the emergency response facility or emergency response units or personnel in the field.
- *Turnout time* is the time interval that begins when the notification process to emergency response facilities and emergency response personnel and units begins by an audible alarm and/or visual announcement and ends at the beginning point of travel time. The fire department has the greatest control over these segments of the total response time.
- *Travel time* is the time interval that initiates when the emergency response unit is actually moving in response to the incident and ends when the unit arrives at the scene.
- *Response time*, also known as **total response time**, is the time interval that begins when the call is received by the primary dispatch center and ends when the dispatched unit(s) arrives on the scene of the incident to initiate action.

For this study, and unless otherwise indicated, response times and travel times measure the first arriving unit only. The primary focus of this section is the dispatch and response time of the first arriving units for calls responded to with lights and sirens (Code 3).

According to NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Departments*, 2016 Edition:

- Alarm processing time or dispatch time should be less than or equal to 60 seconds 90 percent of the time.
- Turnout time should be less than or equal to 60 seconds for EMS incidents, and 80 seconds (1.33 minutes) for fire and special operations 90 percent of the time. As noted above, turnout time is the segment of total response time that the fire department has the most ability to control.

- Travel time shall be less than or equal to 240 seconds for the first arriving fire suppression or EMS unit, 90 percent of the time. The standard further states the initial full first alarm assignment for structure fires should be assembled on scene in 480 seconds, 90 percent of the time.

It should be noted that NFPA 1710 response time criterion is a nationally accepted benchmark for service delivery but not necessarily a CPSM recommendation. However, **CPSM was informed that Queen Creek desires to meet the NFPA 1710 recommended benchmarks as much as possible and that maintaining acceptable response times are an important priority for the Mayor and Town Council**.

Our analysis of QCFMD response times included all calls to which at least one QCFMD unit responded with lights and sirens and excluded canceled and mutual aid calls, along with those that had an extended response time (more than 30 minutes). Also, only units that had complete time stamps are included so that each segment of response time could be calculated. Based upon this criterion, a total of 2,002 calls are included in the analysis.

It is important to note here that the QCFMD responds to many calls, including most public service calls Code 2, that is, without the use of warning lights and sirens. On automatic fire alarms, the first-due unit responds Code 3 (lights and siren) with the remaining dispatched units responding Code 2. This policy, which is commendable from a risk assessment perspective, can serve to increase response times since units make their response with the normal traffic flow. In Queen Creek, the Code 2 response policy resulted in 1,012 non-emergency calls being excluded from the response time analysis.

The following table provides the average dispatch, turnout, travel, and total response time for the first arriving unit to each call in QCFMD's fire service area, broken out by the location of the call, whether in the town or in the fire district.

It is important to make several notes here regarding all the response time data. First, Station 5 was only in service for part (approximately 33 percent) of the 12-month period that was analyzed, as it opened in March 2019. As such, it would be expected that response times have improved with the deployment of resources from that station. In addition, the planned opening of Station 4 in late 2020 can be further expected to reduce overall response times in the town.

### TABLE 5-1: Average Response Time of First Arriving Unit, by Location

| Location | Call Type | Time (Min.) | | | | Number of Calls |
|---|---|---|---|---|---|---|
| | | Dispatch | Turnout | Travel | Total | |
| Queen Creek | EMS | 0.8 | 1.1 | 4.4 | 6.3 | 1,637 |
| | Fire | 0.8 | 1.1 | 4.6 | 6.5 | 195 |
| | **Total** | **0.8** | **1.1** | **4.5** | **6.3** | **1,832** |
| Unincorporated (in fire district) | EMS | 0.7 | 1.2 | 4.9 | 6.8 | 146 |
| | Fire | 1.1 | 1.0 | 5.3 | 7.4 | 24 |
| | **Total** | **0.8** | **1.1** | **5.0** | **6.9** | **170** |
| **Total** | | **0.8** | **1.1** | **4.5** | **6.4** | **2,002** |

Analysis of this table tells us:

- The average dispatch time for all calls was 0.8 minutes.
- The average turnout time for all calls was 1.1 minutes.

- The average travel time for all calls was 4.5 minutes.
- The average total response time for all calls was 6.4 minutes.

A more conservative and stricter measure of total response time is the 90th percentile measurement. Simply explained, for 90 percent of calls, the first unit arrived within a specified time, and if measured, the second and third unit. The following table includes the 90th percentile times for dispatch, turnout, travel, and total response time unit to each call in QCFMD's fire service area, broken out by the location of the call, whether in the town of in the fire district.

**TABLE 5-2: 90th Percentile Response Time of First Arriving Unit, by Location**

| Location | Call Type | Time (Min.) | | | | Number of Calls |
|---|---|---|---|---|---|---|
| | | Dispatch | Turnout | Travel | Total | |
| Queen Creek | EMS | 1.4 | 1.8 | 7.4 | 9.7 | 1,637 |
| | Fire | 1.4 | 2.0 | 7.4 | 10.0 | 195 |
| | **Total** | **1.4** | **1.8** | **7.4** | **9.7** | **1,832** |
| Unincorporated (in fire district) | EMS | 1.4 | 1.8 | 7.5 | 9.3 | 146 |
| | Fire | 3.0 | 1.7 | 7.3 | 10.6 | 24 |
| | **Total** | **1.4** | **1.8** | **7.5** | **9.3** | **170** |
| **Total** | | **1.4** | **1.8** | **7.4** | **9.7** | **2,002** |

Observations taken from the table tell us:

- The 90th percentile dispatch time was 1.4 minutes. (Emergency medical dispatch has some impact on EMS call processing time; however, both fire and EMS dispatching times are slightly above the recommended NFPA benchmark.) Although it was based on a very small sample of just 24 calls, dispatch time for fires in the fire district was double for all other calls and three times the recommended benchmark.
- The 90th percentile turnout time was 1.8 minutes, well above the NFPA 1710 benchmark of 1.0 minutes for EMS and 1.33 minutes for fire. Remember, this is the one aspect of total response time the fire department has the most direct impact on.
- Aggregate fire and EMS 90th percentile travel time was 7.4 minutes (well above the NFPA 1710 benchmark). However, as previously noted, the opening of Station 5 in 2019 and the opening of Station 4 on December 1, 2020 will result in significant improvement in these times.
- 90th percentile total response time for all calls was 9.7 minutes, significantly exceeding the NFPA 1710 benchmarks of 6.0 and 6.33 minutes, respectively. The addition of Stations 414 and 415 should also significantly improve these times.

## Recommendation:

- The QCFMD should take steps to continue to improve both the dispatch time and incident turnout times for both fire and EMS incidents in order to reduce overall response times to emergency incidents. (Recommendation No. 22.)

## FIRE ON-SCENE OPERATIONS

The following table breaks down fire response times by type of fire incident. As a reminder, the small number of fire-related incidents analyzed here is because QCFMD responds to many fire related incidents Code 2 with no lights and sirens. This includes most fire alarm and public service type of incidents. As such, these incidents were excluded from the response time analysis.

### TABLE 5-3: Average Response Time of First Arriving Unit, by Fire Call Type

| Call Type | Time (Min.) | | | | Number of Calls |
|---|---|---|---|---|---|
| | Dispatch | Turnout | Travel | Total | |
| False alarm | 0.6 | 1.1 | 4.7 | 6.3 | 44 |
| Good intent | 0.8 | 1.0 | 4.5 | 6.3 | 19 |
| Hazard | 0.8 | 1.4 | 4.5 | 6.6 | 35 |
| Outside fire | 0.5 | 1.3 | 5.3 | 7.1 | 31 |
| Public service | 1.0 | 1.0 | 4.7 | 6.7 | 63 |
| Structure fire | 0.9 | 1.2 | 4.4 | 6.5 | 27 |
| **Fire Total** | **0.8** | **1.1** | **4.7** | **6.6** | **219** |

Analysis of this table tells us:

- Average dispatch time was 0.8 minutes.
- Average turnout time was 1.1 minutes.
- Average travel time was 4.7 minutes.
- Average overall response time was 6.6 minutes.
- For actual fire calls, the average overall response time for structure fire calls was 6.5 minutes, and the average response time for outside fire calls was 7.1 minutes.

The following table shows the 90th percentile times for dispatch, turnout, travel, and total response time unit to each fire-related call included in the analysis.

### TABLE 5-4: 90th Percentile Response Time of First Arriving Unit, by Fire Call Type

| Call Type | Time (Min.) | | | | Number of Calls |
|---|---|---|---|---|---|
| | Dispatch | Turnout | Travel | Total | |
| False alarm | 1.2 | 1.9 | 7.7 | 10.6 | 44 |
| Good intent | 1.7 | 1.4 | 9.9 | 11.8 | 19 |
| Hazard | 1.4 | 2.4 | 7.0 | 10.6 | 35 |
| Outside fire | 0.8 | 2.0 | 8.8 | 11.1 | 31 |
| Public service | 2.3 | 1.7 | 7.1 | 9.5 | 63 |
| Structure fire | 2.3 | 2.2 | 7.3 | 10.1 | 27 |
| **Fire Total** | **1.5** | **1.9** | **7.4** | **10.1** | **219** |

Observations that we can make from this table are:

- The 90th percentile dispatch time was 1.5 minutes (about 50 percent above the recommended NFPA benchmark).
- The 90th percentile turnout time was 1.9 minutes (above the NFPA 1710 benchmark of 1.33 minutes for fire). Remember, this is the one aspect of total response time the fire department has the most direct impact on.
- Aggregate 90th percentile travel time was 7.4 minutes (well above the NFPA 1710 benchmark). However, as previously noted, the opening of Station 5 in 2019 and the planned opening of Station 4 in 2020 should result in significant improvement in these times.
- The 90th percentile total response time for all fire calls was 10.1 minutes, significantly exceeding the NFPA 1710 benchmark of 6.33 minutes. The total response time for structure fires was also 10.1, minutes while it was 11.1 minutes for outside fires. The addition of Stations 414 and 415 should also significantly improve these times.

Statistics generated by fire departments nationwide consistently show that the majority of fire department fire alarm responses end up not requiring fire department services. These alarms are often set off accidentally for a wide range of reasons (unattended/careless cooking, dust from construction, maintenance, poor system/detector placement, etc.). Nonetheless, their purpose is to provide the fire department with early detection and notification of potential fire incidents. Due to the high statistical probability of the alarm being generated for a reason other than an actual fire, fire departments nationwide have reduced their responses to many of these types of incidents. However, also recognizing the fact that automatic fire alarms should be treated as a potential real fire until confirmed to not be, and in the interest of a rapid response, most fire departments still have at least one unit respond to these incidents Code 3 (lights and sirens). Ultimately this becomes a risk management decision.

## Recommendation:

- In recognition of the fact that automatic fire alarms should be considered to be a possible fire until confirmed to be otherwise, it is recommended the QCFMD continue having at least one engine respond to automatic fire alarm activations Code 3 with lights and sirens, and further continue with the risk management best practice of having additional units respond Code 2. (Recommendation No. 23.)

## EMS ON-SCENE OPERATIONS

The following table breaks down EMS response times by type of EMS incident. QCFMD also responds to many EMS related incidents—those that appear to be minor BLS type incidents—Code 2 with no lights and sirens. As such, these incidents were excluded from the response time analysis.

### TABLE 5-5: Average Response Time of First Arriving Unit, by EMS Call Type

| Call Type | Time (Min.) | | | | Number of Calls |
|---|---|---|---|---|---|
| | Dispatch | Turnout | Travel | Total | |
| Breathing difficulty | 0.6 | 1.2 | 4.3 | 6.0 | 157 |
| Cardiac and stroke | 0.5 | 1.1 | 4.1 | 5.7 | 294 |
| Fall and injury | 0.8 | 1.2 | 4.7 | 6.7 | 263 |
| Illness and other | 0.9 | 1.1 | 4.7 | 6.7 | 249 |
| MVA | 1.0 | 1.0 | 4.8 | 6.7 | 394 |
| Overdose and psychiatric | 0.8 | 1.1 | 4.8 | 6.7 | 95 |
| Seizure and unconsciousness | 0.9 | 1.0 | 4.1 | 6.1 | 331 |
| **EMS Total** | **0.8** | **1.1** | **4.5** | **6.4** | **1,783** |

Analysis of the table tells us:

- Average dispatch time was 0.8 minutes.
- Average turnout time was 1.1 minutes.
- Average travel time was 4.5 minutes.
- Average overall response time was 6.4 minutes.
- For the most serious types of EMS incidents, cardiac and stroke calls, the average overall response time was 5.7 minutes.

The following table shows the 90th percentile times for dispatch, turnout, travel, and total response time unit to each EMS-related call included in the analysis.

### TABLE 5-6: 90th Percentile Response Time of First Arriving Unit, by EMS Call Type

| Call Type | Time (Min.) | | | | Number of Calls |
|---|---|---|---|---|---|
| | Dispatch | Turnout | Travel | Total | |
| Breathing difficulty | 0.9 | 1.9 | 6.7 | 8.3 | 157 |
| Cardiac and stroke | 0.9 | 1.7 | 6.5 | 8.3 | 294 |
| Fall and injury | 1.5 | 2.1 | 7.8 | 9.8 | 263 |
| Illness and other | 1.8 | 2.0 | 7.8 | 10.2 | 249 |
| MVA | 1.8 | 1.6 | 7.8 | 10.7 | 394 |
| Overdose and psychiatric | 1.5 | 2.0 | 8.4 | 10.0 | 95 |
| Seizure and unconsciousness | 1.4 | 1.8 | 7.2 | 9.3 | 331 |
| **EMS Total** | **1.4** | **1.8** | **7.4** | **9.6** | **1,783** |

Observations we can make from the table are:

- The 90th percentile dispatch time was 1.4 minutes (about 40 percent above the recommended NFPA benchmark.)
- The 90th percentile turnout time was 1.8 minutes (well above the NFPA 1710 benchmark of 1.0 minutes for EMS incidents). Remember, this is the one aspect of total response time the fire department has the most direct impact on.
- Aggregate EMS 90th percentile travel time was 7.4 minutes (well above the NFPA 1710 benchmark of 4 minutes). However, as previously noted, the opening of Station 5 in 2019 and the planned opening of Station 4 in 2020 should result in significant improvement in these times.
- The 90th percentile total response time for all EMS calls was 9.6 minutes, significantly exceeding the NFPA 1710 benchmark of 6.0 minutes. The total response time for cardiac/stroke and difficulty breathing calls was 1.3 minutes less at 8.3 minutes. The addition of Stations 414 and 415 should also significantly improve these times.

## TECHNICAL INCIDENT RESPONSE ON-SCENE OPERATIONS

At the current time, the QCFMD has only very limited internal special operations capabilities. When needed for complex incidents, special operations teams are available from Gilbert and Mesa to assist Queen Creek on hazardous materials and technical rescue type incidents. Developing additional internal special operations capabilities is a goal of the QCFMD.

## CRITICAL TASKING

To effectively respond to and mitigate requests for emergency services, an agency must have a thorough understanding of its community's risk factors, both fire and EMS. Once identified and understood, each category or level of risk is associated with the necessary resources and actions required to mitigate it. This is accomplished through a critical task analysis. The exercise of matching operational asset deployments to risk, or critical tasking, considers multiple factors including national standards, performance measures, and the safety of responders.

Critical tasks are those activities that must be conducted in a timely manner by responders at emergency incidents to control the situation and stop loss. Critical tasking for fire operations is the minimum number of personnel needed to perform the tasks required to effectively control a fire. The same is true for EMS as there are specific patient care tasks that must be completed in succession and often together to support positive prehospital care. The specific number of people required to perform all the critical tasks associated with an identified risk is referred to as an *Effective Response Force* (ERF). The goal is to deliver an ERF within a prescribed time frame.

During fire incidents, to be effective, critical tasking must assign enough personnel so that all identified functions can be performed simultaneously. However, it is important to note that secondary support functions may be handled by initial response personnel once they have completed their primary assignment. Thus, while an incident may end up requiring a greater commitment of resources or a specialized response, a properly executed critical task analysis will provide adequate resources to immediately begin bringing the incident under control.

The specific number of people required to perform all the critical tasks associated with an identified risk is referred to as an *Effective Response Force* (ERF). The goal is to deliver an ERF

within a prescribed time frame. NFPA 1710, as a nationally recognized consensus standard on staffing and deployment for career fire departments, provides a benchmark for ERF.[45]

The NFPA *Fire Protection Handbook*[46] classifies buildings and occupancies by their relative risk and provides recommendations on the minimum ERF that will be needed to handle fire incidents in them. These include:

**High-hazard Occupancies:** Schools, hospitals, nursing homes, high-rise buildings, and other high life safety-hazard or large fire-potential occupancies. The Town of Queen Creek has a limited number of these occupancies; however, that does not diminish the risk they would present in a fire situation.

> *Operational Response:* at least four pumpers, two ladder trucks (or combination apparatus with equivalent capabilities), two chief officers and other specialized apparatus as may be needed to cope with the combustible involved; not less than 24 firefighters and two chief officers **plus** a safety officer and a rapid intervention team. Extra staffing for high-hazard occupancies is advised.

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

> *Operational Response:* At least three pumpers, one ladder truck (or combination apparatus with equivalent capabilities such as a quint), one chief officer, and other specialized apparatus as may be needed or available; not less than 16 firefighters and one chief officer **plus** a safety officer and a rapid intervention team.

**Low-hazard Occupancies:** One-, two-, or three-family dwellings and scattered small business and industrial occupancies. This represents the majority of occupancies found in Queen Creek.

> *Operations Response Capability:* At least two pumpers, one ladder truck (or combination apparatus with equivalent capabilities such as a quint), one chief officer, and other specialized apparatus as may be needed or available; not less than 12 firefighters and one chief officer, **plus** a safety officer, and a rapid intervention team.

Regarding the implementation of an ERF and its aggregate effect on fireground operations, there has been much research done by a number of fire departments on the effects of various staffing levels. A comprehensive yet scientifically conducted, verified, and validated, study titled *Multiphase Study on Firefighter Safety and the Deployment of Resources* was performed by the National Institute of Standards and Technology (NIST) and Worcester Polytechnic Institute (WPI), in conjunction with the International Association of Fire Chiefs, the International Association of Fire Fighters, and the Center for Public Safety Excellence. For the first time, quantitative evidence has been produced regarding the impact of crew size on accomplishing critical tasks. Additionally, continual research from UL has provided tactical insights that shed further light on the needs related to crew size and firefighter safety. This body of research includes:

- An April 2010 report on *Residential Fireground Field Experiments* from the National Institute of Standards and Technology (NIST).
- An April 2013 report on *High-Rise Fireground Field Experiments* from the National Institute of Standards and Technology (NIST-HR).

45. It is important to note that compliance with NFPA 1710 has not been mandated in the State of Arizona or by the federal government. It is considered a "best practice" that fire departments strive to achieve.
46. Cote, Grant, Hall & Solomon, eds., *Fire Protection Handbook* (Quincy, MA: NFPA 2008), 12-3

- A December 2010 report on the *Impact of Ventilation on Fire Behavior in Legacy and Contemporary Residential Construction* (UL).

Additional collaborative efforts such as the Governor's Island and Spartanburg Burns continue to expand upon and reinforce the findings of NIST and UL.

As stated, some of these studies' findings have a direct impact on the exercise of critical tasking. For example, as UL studied the impact of ventilation on fire behavior, it was able to obtain empirical data about the effect of water application on fire spread and occupant tenability. The research clearly indicates that the external application of a fire stream, especially a straight stream, does not "push fire" or decrease tenability in any adjacent rooms. Therefore, during the deployment of resources for the critical task of fire attack, consideration must be given to the option of applying water to the fire from the exterior when able. This approach enables a fire attack that can begin prior to the establishment of an IRIT as well as decreases the time to getting water on the fire, which has the greatest impact on occupant survivability.

The NIST studies examined the impact of crew size and stagger on the timing of fireground task initiation, duration, and completion. Although each study showed crew size as having an impact on time-to-task, consideration must be given to what tasks were affected and to what extent. For example, four-person crews operating at a low-hazard structure fire completed all fireground tasks (on average) in 5.1 minutes or 25 percent faster than three-person crews.

- Four-person firefighting crews were able to complete 22 essential firefighting and rescue tasks in a typical residential structure 30 percent faster than two-person crews and 25 percent faster than three-person crews.
- The four-person crews were able to deliver water to a similar-sized fire 15 percent faster than the two-person crews and 6 percent faster than three-person crews, steps that help to reduce property damage and reduce danger/risks to firefighters. The latter time represents a 34-second difference.
- Four-person crews were able to complete critical search and rescue operations 30 percent faster than two-person crews and 6 percent faster than three-person crews. The latter time represents a 23-second difference. The "rescue time" difference from a four-person to a three-person crew is only seven seconds.

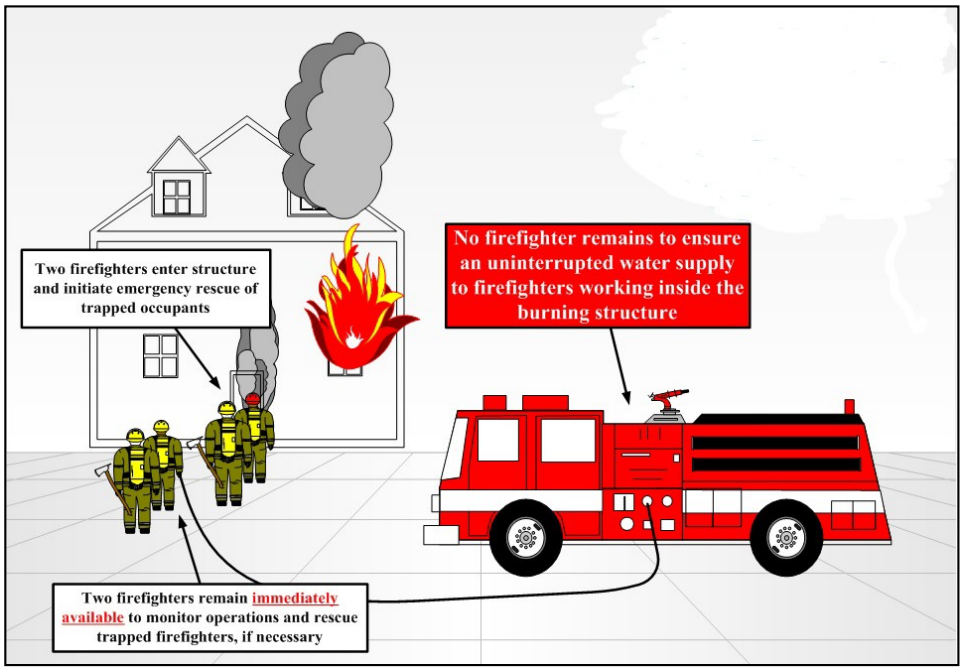
When considering critical tasking for the deployment of an ERF for fire suppression operations, the QCFMD will need to consider both its own resources, as well as resources from surrounding automatic and mutual aid partners. It must also consider the cost-benefit of various deployment strategies. It is important to note that the impact of crew size as it relates to high-risk categories is greater than its low-risk implications and should be considered when staffing units that cover a greater amount of risk. With QCFMD's fire suppression units staffed with either four or five personnel (four minimum), this situation does not present the same operational challenges and concerns as it does in many other communities. Once again, Queen Creek is to be commended for maintaining minimum staffing of 4 personnel on all fire suppression units.

There is no Arizona or federal requirement that specifies staffing levels on fire apparatus. The closest thing that approaches a requirement for staffing levels is the OSHA 29 CFR 1910.134 standard, often referred to as the ***"Two-in/Two-out"*** guideline. This standard, which is a safety mandate that has application to municipal firefighting, requires the use of four personnel (two inside the structure and two outside the structure) when conducting interior firefighting activities in a hazardous work environment (that is, an environment that is immediately dangerous to life or health, or IDLH). **It is important to note that the potential for an IDLH atmosphere to exist is not just limited to structure fires**. They can exist on natural gas leaks, carbon monoxide incidents,

confined space emergencies, chemical spills, and even automatic fire alarm activations where there is an actual fire in progress.

The following figure illustrates one example of how this standard is intended to be implemented.

**FIGURE 5-14: OSHA "Two-in/Two-out" Rule Illustrated**




The OSHA requirement has two key provisions that allow considerable flexibility regarding staffing:

- One provision specifies that the four personnel who engage in interior firefighting are required at the incident (assembled) and are not a staffing requirement for the individual responding unit.
- The second provision is that an exception is provided when crews are performing rescue operations where there is the **potential** for serious injury or death of the occupants. In this case the standard allows the entry of two personnel to conduct the rescue activity without two firefighters outside immediately available to monitor operations and rescue trapped firefighters, if necessary.

It was consistently reported to CPSM that the QCFMD does follow the provisions of the OSHA Two-In/Two-Out regulation regarding waiting to initiate an interior fire attack until four personnel are assembled when there are no rescues to be made. The department is to be commended for this adherence.

In addition, the 2018 edition of NFPA 1500, *Standard on Fire Department Occupational Safety, Health, and Wellness*, section 8.8.2, states: "*In the initial stages of an incident where only one crew is operating in the hazardous area at a working structure fire, a minimum of four individuals shall be required, consisting of two individuals working as a crew in the hazardous area and two individuals present outside this hazardous area available for assistance or rescue at emergency operations where entry into the danger area required.*" This standard also stipulates the utilization of a stand-by crew member assigned another task (i.e., apparatus operator) is allowable so long as abandoning his/her task does not jeopardize the operating crews.

As with the OSHA standard, NFPA 1500 does support entry into a hazardous area with less than four personnel assembled if initial attack personnel find an imminent life-threatening situation where the immediate action could prevent loss of life or serious injury.

The Center for Public Safety Excellence (CPSE) has also established benchmarks regarding staffing and deployment. CPSE sets standards for agencies seeking and achieving accreditation through the Commission on Fire Accreditation International (CFAI). CFAI uses standards set forth in the *Community Risk Assessment Manual: Standards of Cover*, 6th edition, to provide guidance in staffing and deployment to agencies desiring accreditation through Core Competencies.

Core Competency 2C.4 requires that "*the agency conduct a critical task analysis of each risk category and risk class to determine the first due and effective response force capabilities, and to have a process in place to validate and document the results.*" The process considers the number of personnel needed to perform the necessary emergency scene operations. Completion of the process also helps to identify any gaps in the agency's emergency scene practices.

Ultimately, overall on-duty fire department staffing is a local government decision. It is also important to note that the OSHA standard (and NFPA 1500/1710/1720) specifically references "interior firefighting." Firefighting activities that are performed from the exterior of the building are not regulated by this portion of the OSHA standard. However, **in the end, the ability to assemble adequate personnel, along with appropriate apparatus to the scene of a structure fire, is critical to operational success and firefighter safety**. How and where personnel and resources are located, and how quickly they can arrive on scene play major roles also.

For QCFMD, emergency responses are based on caller information provided to dispatchers, at the Mesa Regional Dispatch Center, depending on the nature and type of call for service. The dispatch center provides dispatch services to Mesa Fire/Medical Department, Gilbert Fire and Rescue, Superstition Fire and Medical District, Queen Creek Fire and Medical Department, and Rio Verde Fire District. QCFMD details out its response procedures through a response plan in the dispatch center. This response plan covers both high- and low-frequency incidents that range from low to high risk. Structure fire responses represent the type of high-risk/low-frequency incidents that present the greatest challenges to an organization.

For any given emergency to which QCFMD responds, there are critical tasks that must be completed. These tasks can range from the immediate rescue of trapped occupants within a burning structure to vehicle or water rescue when needed. A set of critical tasks have been developed in an effort to identify what resources are needed for each incident type. QCFMD has developed a response matrix detailing the initial levels of response for varying incident types. The following critical task analysis was performed independent of these policies; however, a comparison is provided.

The intent of the risk management process is for the department to develop a standard level of safety while strategically aligning its resources with requests for service. Thus, the critical tasking presented herein will consider the EFR in relation to either a low-, moderate-, or high-risk classification.

Critical tasking has been identified for the following incident types:

- Structure Fire – Low Risk.
- Structure Fire – Moderate Risk.
- Structure Fire – High Risk.

- Vehicle Fire.
- Outside Fire Grass/Brush/Rubbish Fire.
- Fire Alarm – Low Risk.
- Fire Alarm – Moderate Risk.
- Fire Alarm – High Risk.
- Motor Vehicle Crash – No Entrapment.
- Motor Vehicle Crash – With Entrapment.
- Natural Gas Leak – Interior and Exterior.
- Hazardous Materials Incident.
- Water Rescue Incident.
- Technical Rescue Incident.

Tables 5-7 through 5-20 outline the critical tasking to assemble an effective response force for the various responses to which the QCFMD is likely to be dispatched.

QCFMD utilizes a standard alarm assignment for all reported structure fire responses, regardless of occupancy type or hazard. This is a standard response assignment for Queen Creek, Gilbert, and Mesa. In fact, with all departments in the regional mutual aid system utilizing standardized standard operational procedures, this initial assignment is standard throughout the Phoenixarea.

A response to this type of incident includes the following:

- 3 – Engines.
- 1 – Ladder.
- 2 – Battalion Chiefs.

This response places between 18 and 22 personnel on the scene depending upon whether QCFMD has engines staffed with 5, and whether the battalion chiefs are partnered with a battalion safety officer (BSO). Once the incident is determined to be a "working fire" the following additional resources are dispatched:

- 1 – Engine.
- 1 – Utility Truck (staffed with 1 person).
- 1 – Ambulance.

This brings staffing to between 27 and 30 personnel; however, since they are not dispatched at the time of initial dispatch their arrival will be delayed. In addition, the ambulance personnel can only provide medical care, not engage in firefighting operations.

If additional personnel and/or resources are needed due to the size and/or complexity of a fire incident, a first alarm assignment is dispatched. This includes the following resources:

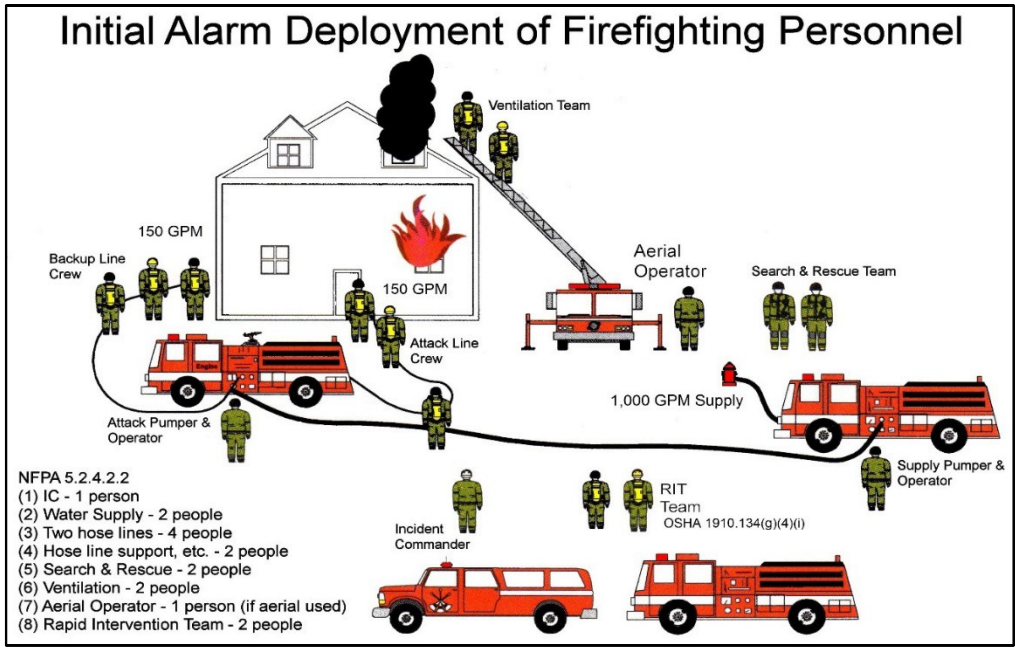
- 6 – Engines.
- 2 – Ladders.
- 3 – Command (Chief) Officers.
- 1 – Command Van (staffed with 1 person).

When necessary the dispatch center also initiates move up or cover assignments where additional units are moved into the area where there is a fire or other significant incident to provide coverage to empty stations that are committed to the emergency.

### TABLE 5-7: Structure Fire – Low Risk

| Critical Task | Needed Personnel |
|---|---|
| Incident Command | 1 |
| Continuous Water Supply/Pump Operator | 1 |
| Fire Attack via Two Handlines | 4 |
| Hydrant Hook-Up, Forcible Entry, Utilities | 2 |
| Primary Search and Rescue | 2 |
| Ground Ladders and Ventilation | 2 |
| Aerial Operator (if Aerial is Used) | 1 |
| Establishment of an IRIT (Initial Rapid Intervention Team) | 2 |
| **Effective Response Force** | **14/15** |
| **QCFMD Response Provided** | **18/22** |

### FIGURE 5-15: Initial Deployment of Firefighting Personnel/ERF Recommendation: Single-family Dwelling




These tasks meet the minimum requirements of NFPA 1710 for the initial full alarm assignment to a typical low-risk, 2,000 square-foot, two-story residential structure. These are the proverbial "bread and butter" structural fire incidents that fire departments respond to, and which are, by far, the most common type of structure fire. Personnel requirements for fires involving large, more complex structures such as commercial or industrial facilities or multifamily residential occupancies will require a significantly greater commitment of personnel.

The 2016 edition of NFPA 1710 recommends a minimum of 27/28 personnel on the initial response for fires involving moderate hazard garden-style apartments and strip shopping centers.

### TABLE 5-8: Structure Fire – Moderate Risk

| Critical Task | Needed Personnel |
|---|---|
| Incident Command | 2 |
| 2 – Independent Water Supply Lines/Pump Operators | 2 |
| Fire Attack via Three Handlines | 6 |
| Support Firefighter for each Handline | 3 |
| 2 - Search and Rescue Teams | 4 |
| 2 - Ground Ladders and Ventilation Teams | 4 |
| Aerial Operator (if Aerial is Used) | 1 |
| Rapid Intervention Team (1 Officer/3 Firefighters) | 4 |
| EMS/Medical | 2 |
| **Effective Response Force** | **27/28** |
| **QCFMD Response Provided** | **18/22** |

### TABLE 5-9: Structure Fire – High Risk

| Critical Task | Needed Personnel |
|---|---|
| Incident Command | 2 |
| 2 – Independent Water Supply Lines/Pump Operators | 2 |
| Investigation/Initial Fire Attack Line | 3 |
| Backup Line | 3 |
| Secondary Attack Line | 3 |
| 3 - Search/Rescue Teams | 6 |
| 2 – Ground Ladder and Ventilation teams | 4 |
| Water Supply/Fire Department Connection | 2 |
| Aerial Operators (if Aerials are Used) | 2 |
| Safety/Accountability | 2 |
| Rapid Intervention Team (1 Officer/3 Firefighters) | 4 |
| EMS/Medical | 2 |
| **Effective Response Force** | **33/35** |
| **QCFMD Response Provided** | **18/22** |

Initial responses to vehicle and outside/grass/brush/rubbish fires is a single engine company.

### TABLE 5-10: Vehicle Fire

| Critical Task | Needed Personnel No Exposures | Needed Personnel With Exposures/Life Hazards |
|---|---|---|
| Incident Command | 1 | 1 |
| Pump Operator | 1 | 1 |
| Fire Attack Line | 2 | 2 |
| Backup Line/Secondary Attack Line | | 2 |
| Water Supply | | 1 |
| Check Fire Extension | | 2 |
| **Effective Response Force** | **4** | **9** |
| **QCFMD Response Provided** | **4/5** | **4/5** |

### TABLE 5-11: Outside Fire – Grass/Brush/Rubbish

| Critical Task | Needed Personnel |
|---|---|
| Incident Command | 1 |
| Pump Operator | 1 |
| Fire Attack Line | 2 |
| **Effective Response Force** | **4** |
| **QCFMD Response Provided** | **4/5** |

The QCFMD normally dispatches a single engine company to all fire alarm systems regardless of the type of occupancy. These responses are made Code 3 (lights or sirens) by the first-due unit. If there are additional responding units, these additional units respond Code 2 (no lights and siren).

### TABLE 5-12: Fire Alarm System – Low Risk

| Critical Task | Needed Personnel |
|---|---|
| Incident Command | 1 |
| Investigation | 3 |
| **Effective Response Force** | **4** |
| **QCFMD Response Provided** | **4/5** |

### TABLE 5-13: Fire Alarm System – Moderate Risk

| Critical Task | Needed Personnel |
|---|---|
| Incident Command | 1 |
| Pump Operator | 1 |
| Investigation | 4 |
| Forcible Entry/Ventilation (if necessary) | 2 |
| **Effective Response Force** | **8** |
| **QCFMD Response Provided** | **4/5** |

Based upon needed personnel for an ERF for a moderate risk fire alarm system, consideration should be given to an initial response of:

- 1 – Engine.
- 1 – Ladder.

### TABLE 5-14: Fire Alarm System – High Risk

| Critical Task | Needed Personnel |
|---|---|
| Incident Command | 1 |
| Pump Operator | 1 |
| Water Supply/Fire Department Connection | 1 |
| Investigation | 4 |
| Search and Rescue (if necessary) | 2 |
| Annunciator Panel | 2 |
| **Effective Response Force** | **11** |
| **QCFMD Response Provided** | **4/5** |

Based upon needed personnel for an ERF for a high-risk fire alarm system, consideration should be given to an initial response of:

- 2 – Engines.
- 1 – Ladder.
- 1 – Battalion Chief.

### TABLE 5-15: Motor Vehicle Crash – No Entrapment

| Critical Task | Needed Personnel |
|---|---|
| Incident Command | 1 |
| Hazard Abatement | 1 |
| Patient Evaluation/Care | 2 |
| **Effective Response Force** | **4** |
| **QCFMD Response Provided** | **4/5** |

QCFMD response to a motor vehicle accident with potential/reported entrapment includes the following resources:

- 2 – Engines.
- 1 – Ladder.
- 1 – Battalion Chief.
- 1 – Ambulance.

### TABLE 5-16: Motor Vehicle Crash – With Entrapment

| Critical Task | Needed Personnel |
|---|---|
| Incident Command | 1 |
| Pump Operator | 1 |
| Scene Protection Line | 2 |
| Hazard Abatement | 2 |
| Patient Extrication | 4 |
| Patient Evaluation/Care | 4 |
| **Effective Response Force** | **14** |
| **QCFMD Response Provided** | **15/17*** |

**Note:** * Includes AMR ambulance immediate response.

QCFMD response to an interior gas leak includes the following resources:

- 2 – Engines.
- 1 – Ladder.
- 1 – Battalion Chief.
- 1 – Hazardous Material Unit from Mesa or Gilbert (staffed with four).

### TABLE 5-17: Natural Gas Leak – Interior and Exterior

| Critical Task | Needed Personnel |
|---|---|
| Incident Command | 1 |
| Investigation/Air Monitoring | 3 |
| Pump Operator/Water Supply (if needed) | 1 |
| Protection line (if needed) | 2 |
| Forcible Entry, Utility Control, Ventilation | 2 |
| Search and Rescue (if needed) | 2 |
| Establishment of an IRIT (Initial Rapid Intervention Team) | 2 |
| **Effective Response Force** | **13** |
| **QCFMD Response Provided** | **17/19** |

QCFMD initial response to a possible hazardous materials incident includes the following resources:

- 2 – Engines.
- 1 – Ladder.
- 1 – Battalion Chief.
- 2 – Hazardous Material Unit from Mesa or Gilbert (each staffed with four).
- 1 – Ambulance.

### TABLE 5-18: Hazardous Materials Incident

| Critical Task | Needed Personnel |
|---|---|
| Incident Command/Safety | 2 |
| Entry Team (Haz. Mat. Technician) | 2 |
| Back-up Team (Haz. Mat. Technician) | 2 |
| Decontamination Personnel | 4 |
| Research (Haz. Mat. Technician) | 1 |
| Support Personnel | 6 |
| Medical | 2 |
| **Effective Response Force** | **19** |
| **QCFMD Response Provided** | **23/25*** |

**Note:** * Includes AMR ambulance immediate response.

QCFMD initial response to a water rescue incident includes the following resources:

- 2 – Engines.
- 1 – Ladder.
- 1 – Battalion Chief.
- 1 – Technical Rescue Team from Mesa or Superstition (staffed with four).
- 1 – Ambulance.

### TABLE 5-19: Water Rescue Incident

| Critical Task | Needed Personnel |
|---|---|
| Incident Command | 1 |
| Rescue Team (Technical Rescue Technician) | 2 |
| Back-up Team (Technical Rescue Technician) | 2 |
| Shore Support | 6 |
| Safety | 1 |
| Medical | 2 |
| **Effective Response Force** | **13** |
| **QCFMD Response Provided** | **18/20*** |

**Note:** * Includes AMR ambulance immediate response.

QCFMD initial response to a technical rescue incident includes the following resources:

- 2 – Engines.
- 1 – Ladder.
- 2 – Battalion Chiefs.
- 3 – Technical Rescue Teams from Mesa or Superstition (each staffed with four).
- 1 – Utility (staffed with one).
- 1 – Command Van (staffed with one).
- 1 – Ambulance.

### TABLE 5-20: Technical Rescue Incident

| Critical Task | Needed Personnel |
|---|---|
| Incident Command | 1 |
| Rescue Team (Technical Rescue Technician) | 4 |
| Back-up Team (Technical Rescue Technician) | 4 |
| Support | 8 |
| Safety | 1 |
| Accountability | 2 |
| Medical | 2 |
| **Effective Response Force** | **22** |
| **QCFMD Response Provided** | **30/34*** |

**Note:** * Includes AMR ambulance immediate response.

Establishing an ERF for medical emergencies is significantly less labor intensive than it is for fire incidents. NFPA 1710 provides guidance regarding staffing levels for units responding to EMS incidents; however, the provision does not specify a minimum staffing level for EMS response units. Instead, section 5.3.32 of the standard states: "*EMS staffing requirements shall be based on the minimum levels needed to provide patient care and member safety.*" It furtherrecommends that resources should be deployed to provide "*for the arrival of a first responder with AED within a 240-second travel time to 90 percent of the incidents,*" and, "*when provided, the fire department's EMS for providing ALS shall be deployed to provide for the arrival of an ALS unit within a 480-second travel time to 90 percent of the incidents provided a first responder with AED or BLS unit arrived in 240 seconds or less travel time.*"

EMS calls are typically managed with fewer personnel, and the majority of EMS calls can be handled with a single ambulance staffed with two personnel. In the call-screening process, those calls that require additional personnel are typically identified at the dispatch level and additional personnel can be assigned when needed. These types of incidents could include cardiac and respiratory arrest, unconscious persons, and other incidents where the initial call seems to indicate a severe and imminent threat to life. NFPA 1710 suggests for these types of emergencies that "*personnel deployed to ALS emergency responses shall include a minimum of two members trained at the emergency medical technician–paramedic level and two members trained at the emergency medical technician–basic level arriving on scene within the established travel time.*" However, these types of emergencies constitute a small percentage of overall EMS incidents as identified herein.

## Principal Findings: Community Risk-Critical Tasking for Standards of Cover

- Low-risk occupancies represent the greatest share of occupancy risk in Queen Creek. There are currently more than 13,400 single-family dwellings in the QCFMD's service area. There is a high level of construction still occurring and forecast to continue for the foreseeable future. Current estimates for buildout could eventually exceed 40,000 of these types of dwellings.
- Medium-risk occupancies consist of four apartment complexes comprising a total of 665 units. The apartments are currently primarily near the center of Queen Creek, although there is one located in the southwest area of the town. Additional apartments are expected to be constructed in the state lands area as it is developed. Commercial occupancies are primarily located near the center of town. Additional commercial development is expected in the state lands area.
- The lowest number of occupancy risk sites but those with the highest potential fire and life safety loss are high-risk occupancies. There is one hospital located in the southeast corner of Queen Creek. There are 18 assisted living facilities, located primarily near the center and west side of town; however, there is also a facility on the town's southern border. Twenty-two schools are scattered throughout the town with more expected to be built as the population continues to grow.
- In the critical tasking for structure fires, the QCFMD responds a higher effective response force (ERF) to low-risk calls for service when benchmarked against NFPA 1710 (low risk) and current research (Table 5-7).
- For medium- and high-risk occupancies, the QCFMD responds a lower effective response force when benchmarked against NFPA 1710 recommendations (Tables 5-8 and 5-9).
- For automatic fire alarm systems in medium- and high-risk occupancies the QCFMD responds with a single resource, less than a recommended ERF (Tables 5-13 and 5-14). Considerations for number of resources to dispatch to these types of incidents are included after the respective tables.
- Of the remaining critical tasking categories not identified above, the QCFMD responds a greater ERF on five categories (Tables 5-16, 5-17, 5-18, 5-19, and 5-20). While QCFMD responds a greater initial ERF than the critical tasking suggests may be necessary, many of these incidents can be complicated and require a large commitment of personnel and resources to successfully mitigate. In addition, the special hazards units such as hazardous materials units and technical rescue teams have longer response times since they are responding from neighboring communities. As such, CPSM does not believe that any of the initial ERFs dispatched by QCFMD are unreasonably large and we are not recommending any reductions.
- Although risk management processes and appropriate call screening are important parts of determining the appropriate number of resources that should be initially dispatched to various types of emergency incidents, it is also important that enough personnel and resources be initially available to handle all critical tasks in a timely manner should they need to be performed. For this reason, it is the widespread practice in the fire service to send multiple resources to incidents and which ultimately end up not being utilized if the incident turns out to be a minor one that is easily mitigated. Even today, within reason, this remains a prudent approach.

- Of the remaining critical tasking categories not identified above, the QCFMD responds with the recommended ERF to four categories (Tables 5-10, 5-11. 5-12, and 5-15) of incidents, and responds a smaller than recommended ERF to one (Table 5-10).
- Long term, as the QCFMD continues to expand as the town grows, once the department reaches a projected six-station deployment model, consideration will need to be given to placing the following additional resources in service (in addition to engines and/or ambulances):
  - A second battalion chief, with the town being divided into two battalions of four stations each. Under the National Incident Management System (NIMS) proper span of control is between three and seven, with 5 being considered optimal. This will allow for a proper span of control for each battalion chief.
  - A second ladder company to provide improved travel/response times for ladder coverage throughout the entire expanded town and fire district.

A critical component of the incident command system is the establishment of the role of safety officer to monitor conditions at fires and emergency incident scenes to ensure that appropriate safety procedures are being followed. The incident safety officer is an important member of the incident command team. The safety officer works directly under and with the incident commander to help recognize and manage the risks that personnel take at emergencies.

The concept of a command team recognizes that there is a shared responsibility for the proper and safe performance of personnel operating on the emergency scene. The fact is that one of the roles that the safety officer needs to play is that of challenging and confirming the incident commander's actions. The safety officer should be included in the development and monitoring of the incident action plan. In simple terms, the incident commander and the safety officer command team is a system of checks and balances designed to keep all personnel on the emergency scene safe. Once the incident action plan is established, the safety officer monitors the plan for effectiveness and efficiency.

Departments in the Phoenix area place a high priority on the assignment of a qualified officer to fill the safety officer position during a wide range of incidents. According to Phoenix Regional Standard Operating Procedures "*Incident Safety Officer System*," for most incidents, the safety officer provides the following functions:

- Incident Recon.
- Assess the risk/benefit of operations.
- Assess and address safety concerns on the incident scene.
- Communicate and report safety issues to command.
- Intervene as necessary to provide for safety.

During larger-scale incidents, the safety officer reviews the incident action plan and specific details of the safety plan. As appropriate, the safety officer confirms that a safety plan is in effect, reviews it, and provides recommendations. The incident commander may request that the safety officer develop a proposed safety plan and recommendations for command.

Beyond the specific emphasis on safety, the role of incident commander is a dynamic position and highly stressful position that has numerous critical responsibilities that must be handled simultaneously and in a time -critical manner. In the Phoenix area, multiple fire departments utilize battalion safety officers (BSO) paired with a battalion chief as part of a permanent incident management team. This is a concept that QCFMD wants to implement to provide for

more effective, efficient, and safer incident command operations. When teamed with a battalion chief, in addition to normal safety officer functions, the BSO also fulfills the following roles and responsibilities:

- Assist with managing the incident.
- Define, evaluate, and recommend changes to the incident action plan.
- Provide direction relating to tactical priorities and specific critical fireground factors.
- Become the incident safety officer.
- Manage personnel accountability on the incident.
- Evaluate the need for additional resources.
- Assign logistics responsibilities.
- Assist with the tactical worksheet for control and accountability.
- Evaluate the fireground organization and span of control.
- Assist with personnel air management.
- Manage crew work/rest cycles and rehab.
- Other duties as necessary.

### Recommendation:

- In order to provide for more effective, efficient, and safe overall incident management, and to enhance critical incident scene safety, the QCFMD should implement the position of battalion safety officer, at the rank of captain, to function as a part of an integrated command team with each battalion chief. (Recommendation No. 24.)

## OPERATIONAL RESPONSE RESILIENCY

As was mentioned earlier in this report, one of the primary driving forces in how emergency resources are staffed and deployed is the call volume that the community will normally be expected to experience on a regular basis. While the number of incidents will fluctuate from day to day, over an extended period of time trends and averages or norms will emerge.

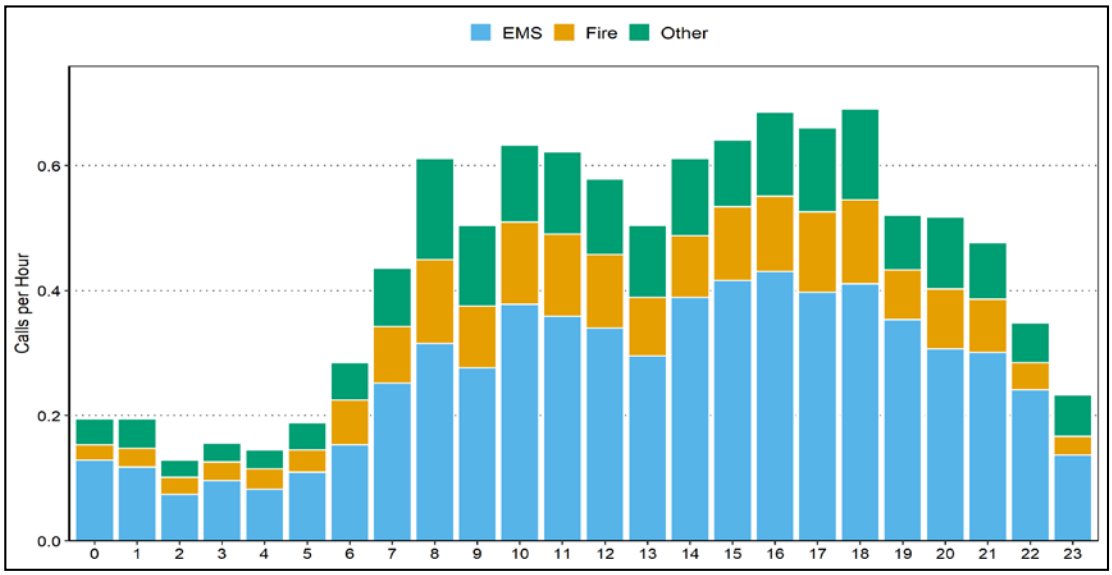
During our interviews with various department stakeholders we were informed that the department is growing increasingly busy. While that is undoubtedly true, since QCFMD serves a rapidly growing community, the department both overall and broken down by each individual unit is not unreasonably busy. This is particularly the case for a community whose current population is probably somewhere around 50,000 to 55,000 residents. Overall, the department averaged 10.6 calls per day during the 12-month period analyzed, with 6.4 of those calls being EMS-related and 2.0 calls being fire calls. While community call volume can vary significantly, even among communities of similar size, it is CPSM's experience that the current QCFMD call volume is very low for a community the size of Queen Creek.

Additional Queen Creek data as depicted in the data analysis for the period of time studied indicates:

- Average total calls per day overall ranged from 9.5 in January 2019 to 12.5 in March 2019. The three highest months for average daily calls were February, March, and April, which may be a result of seasonal visitors or residents. Even in its busiest month, the department averaged just one call every two hours.
- Total average calls of all types—EMS, fire, and other—per hour overall ranged from 0.13 between 2:00 a.m. and 3:00 a.m. to 0.69 between 6:00 p.m. and 7:00 p.m.
- Average EMS calls per hour ranged from 0.07 between 2:00 a.m. and 3:00 a.m. to 0.43 between 4:00 p.m. and 5:00 p.m.
- Overall, the average number of total calls in an hour never exceeded 0.69 calls per hour.

The following figure illustrates the QCFMD's average number of responses by hour throughout the day.

## FIGURE 5-16: Average Calls by Hour of Day




The following table shows the average number of minutes each day that QCFMD units were deployed on calls. This ranges from just 4.9 minutes from 3:00 a.m. to 4:00 a.m. to 23.5 minutes between 6:00 p.m. and 7:00 p.m.. Hourly deployed time was highest during the day from 10:00 a.m. to 8:00 p.m., averaging between 19.5 and 23.5 minutes per hour.

## TABLE 5-21: Average Deployed Minutes by Hour of Day

| Hour | EMS | Fire | Other | Total |
|---|---|---|---|---|
| 0 | 4.1 | 1.0 | 1.7 | 6.9 |
| 1 | 3.9 | 1.2 | 1.4 | 6.5 |
| 2 | 3.5 | 1.5 | 0.8 | 5.7 |
| 3 | 2.7 | 1.5 | 0.7 | 4.9 |
| 4 | 2.9 | 2.5 | 0.8 | 6.1 |
| 5 | 2.9 | 1.8 | 0.9 | 5.6 |
| 6 | 4.9 | 2.7 | 1.2 | 8.7 |
| 7 | 6.9 | 3.5 | 1.3 | 11.8 |
| 8 | 9.3 | 2.9 | 3.7 | 15.9 |
| 9 | 9.1 | 4.1 | 4.5 | 17.7 |
| 10 | 10.5 | 6.0 | 3.3 | 19.8 |
| 11 | 10.3 | 4.7 | 2.6 | 17.5 |
| 12 | 10.6 | 4.2 | 2.9 | 17.6 |
| 13 | 9.2 | 3.7 | 2.6 | 15.4 |
| 14 | 10.8 | 4.3 | 3.4 | 18.5 |
| 15 | 13.8 | 4.4 | 3.5 | 21.6 |
| 16 | 14.9 | 5.1 | 3.0 | 23.0 |
| 17 | 11.4 | 5.9 | 3.0 | 20.3 |
| 18 | 14.0 | 6.5 | 3.0 | 23.5 |
| 19 | 11.8 | 4.6 | 2.1 | 18.5 |
| 20 | 11.0 | 4.4 | 2.6 | 18.0 |
| 21 | 9.6 | 4.5 | 1.9 | 15.9 |
| 22 | 7.6 | 2.1 | 2.7 | 12.3 |
| 23 | 6.1 | 1.6 | 1.8 | 9.5 |
| **Total** | **201.6** | **84.5** | **55.3** | **341.4** |

There is significant variability in the number of calls from hour to hour. One special concern relates to the resources available for hours with the heaviest workload. The following table shows the number of hours in the year in which there were zero to four or more calls during the hour. It illustrates that for 91.5 percent of all hours in the year the QCFMD was dispatched to one or zero calls. There were two calls in an hour just 7.1 percent of the time or about once every 1.7 days. Three or more calls in an hour occurred 1.4 percent of the time, just 122 times during the year, about once every three days. The department responded to four or more calls in an hour roughly once every 23 days. There were never more than four calls in an hour during the time period analyzed.

## TABLE 5-22: Frequency Distribution of the Number of Calls

| Calls in an Hour | Frequency | Percentage |
|---|---|---|
| 0 | 5,784 | 66.0 |
| 1 | 2,234 | 25.5 |
| 2 | 620 | 7.1 |
| 3 | 106 | 1.2 |
| 4+ | 16 | 0.2 |
| **Total** | **8,760** | **100.0** |

Table 5-23 examines the number of times a call within a station's first due area overlapped with another call in the same area. The number of times there were no overlapped calls in a station's first due area ranged from a low of 81.1 percent for Station 1to a high of 97.2 percent for Station 3. Table 5-24 examines the availability of a unit at a station to respond to calls within its first due area. The percentage of time the unit from a station arrived first in its first due area ranged from 61.3 percent for Station 5 to 82.9 percent for Station 3. The average for all stations was 77 percent.

## TABLE 5-23: Frequency of Overlapping Calls

| Station | Scenario | Number of Calls | Percent of All Calls | Total Hours |
|---|---|---|---|---|
| 411 | No overlapped call | 1,590 | 81.1 | 1,185.5 |
| | Overlapped with one call | 328 | 16.7 | 125.2 |
| | Overlapped with two calls | 39 | 2.0 | 8.0 |
| | Overlapped with three calls | 4 | 0.2 | 0.8 |
| 412 | No overlapped call | 579 | 92.3 | 528.0 |
| | Overlapped with one call | 44 | 7.0 | 26.3 |
| | Overlapped with two calls | 4 | 0.6 | 0.4 |
| 413 | No overlapped call | 490 | 97.2 | 375.6 |
| | Overlapped with one call | 14 | 2.8 | 5.0 |
| Temp 415 | No overlapped call | 195 | 92.4 | 165.1 |
| | Overlapped with one call | 15 | 7.1 | 4.9 |
| | Overlapped with two calls | 1 | 0.5 | 0.1 |

## TABLE 5-24: Station Availability to Respond to Calls

| Station | Calls in Area | First Due Responded | First Due Arrived | First Due First | Percent Responded | Percent Arrived | Percent First |
|---|---|---|---|---|---|---|---|
| 411 | 1,805 | 1,562 | 1,543 | 1,413 | 86.5 | 85.5 | 78.3 |
| 412 | 576 | 460 | 456 | 421 | 79.9 | 79.2 | 73.1 |
| 413 | 475 | 427 | 409 | 394 | 87.8 | 86.1 | 82.9 |
| Temp 415 | 191 | 130 | 124 | 117 | 68.1 | 64.9 | 61.3 |
| **Total** | **3,047** | **2,569** | **2,532** | **2,345** | **84.3** | **83.1** | **77.0** |

Although it can reasonably be anticipated that the QCFMD's call volume will continue to gradually increase each year as the town continues its rapid growth and development, at the present time the department appears well-positioned to handle its normal call volume in an effective and efficient manner. With the number of resources, the department currently deploys, the department can handle most of the requests for service that it receives without the need for outside assistance. Once the new ladder is placed in service its reliance on automatic aid for initial response to many fire-related incidents should decrease. The current call volume will only exceed the department's ability to deploy sufficient resources on a very occasional basis.

QCFMD possesses sufficient operational redundancy to handle most instances of simultaneous calls without the need for outside assistance. However, on those occasions when the department does require assistance to handle an incident, whether due to size of the incident, needing a special resource such as a hazardous materials or technical rescue unit that the department does not have, or a major incident that exhausts its own resources, QCFMD is part of one of the premier automatic and mutual aid systems in the nation. In the system, more than 25 fire departments operate seamlessly with each other, almost as if they were a single department. The automatic and mutual aid system helps to assure that every incident in Queen Creek will be handled expeditiously by highly trained personnel regardless of whether they are members of the QCFMD or any other agency in the Valley.

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# SECTION 6. PLAN FOR MAINTAINING AND IMPROVING RESPONSE CAPABILITIES

Strategic planning is an organization's process of defining its direction and making decisions relative to the optimization of limited resources. A strategic plan also contains tools that can guide the implementation of the strategy. Strategic planning became prominent in corporations during the 1960s, and it remains an important aspect of organizational planning. In this case, the Town of Queen Creek will need to consider the recommendations that were defined within the recently completed fire service Standards of Cover (SOC) analysis and involve as many stakeholders as possible in developing paced action that will lead toward successful implementation of these recommendations.

The development of a long-range fire protection and prevention comprehensive strategic plan involves three key steps:

- The first step is to generate an assumption of what the community will look like at the end of the planning process.
- Second, the department needs to assess realistically the strengths and weaknesses of the existing fire protection system to include codes, standards, and ordinances relating to fire prevention efforts, public safety education programs, and emergency response capability.
- The third and final step is to project the needed capabilities and capacity of the fire protection system and its fire department component as the community changes.[47]

This process helps to ensure that an adequate level of resources, including staffing and equipment, are allocated to meet the community's needs for the services delivered by the fire department as efficiently as possible. A strategic plan also assists the department in matching resources with available revenues.

The recommendations contained in this document form the framework for action and indicate where change is necessary. This document provides guidance relative to how to pace and implement those recommendations. The strategic implementation process considers the intricacies of the organizational environment including the following:

- **Inputs**: Information utilized to formulate recommendations.
- **Outputs**: Development of a plan of implementation.
- **Outcomes** that require evaluation.
- **Customer** Expectations.

## Inputs

Data is gathered from a variety of sources, such as interviews with key fire service personnel, review of pertinent data and documents on the community, service demand, desired service level, standard of cover selected, organizational performance, and observations gathered through field visits. Inputs are then collected to help support an understanding of the environment and its opportunities and risks. Other inputs include an understanding of the values of stakeholders. These values may be captured in an organization's mission statement, and in the

47. Starling, *Managing the Public Sector*, 287.

observed organizational culture, which provides an emerging perspective on the actual values present within an organization. The inputs gathered during the organizational analysis form the basis for each of the recommendations that have been developed.

## Outputs

The output of strategic planning includes documentation and communication describing the organization's strategy and how it should be implemented, sometimes referred to as the strategic plan. The strategy may include a diagnosis of the competitive situation, a guiding policy for achieving the organization's goals, and specific action plans to be undertaken for the implementation of the recommendations listed. A strategic plan may cover multiple years and is a flexible document that should be updated periodically.

## Outcomes

The strategic planning process produces outputs, as described above; the implementation of the strategic plan produces outcomes. Ultimately, the implementation of the recommendations contained in this report will produce significant change and place the organization on an intended path. Change within a public sector organization typically produces some level of initial skepticism, discomfort, and places personnel in a situation that is unfamiliar. As the process of implementing change moves forward, each action often elicits a reaction. Therefore, the team working to implement desired organizational change should be ready to address unanticipated outcomes, which often manifest themselves as barriers to continued change. The process of implementing change should be considered a learning process.

## Customer Expectations

One of the greatest challenges when agencies attempt to utilize customer feedback is a lack of clarity of the services provided. This is particularly true when dealing with a relatively new agency in a rapidly growing community where just keeping up with burgeoning requests for service while attempting to prepare for future needs can be all-consuming. For this reason, we encourage the QCFMD to understand the value and importance of the community's perceptions and beliefs of services and to clearly identify opportunities to improve the transparency in operations to bolster an ongoing dialogue.

Early in the internal stakeholder workshop, which will be discussed in detail below, the participants were asked to provide information and perspective regarding two questions.

- What do you believe the external customer expectations are?
- What feedback do you get from your customers?

Queen Creek does conduct an annual citizen survey on public safety that is shared with the Maricopa County Sheriff's Office (MCSO). However, this survey, which rates the QCFMD very highly, is more focused on services that were provided, rather than on forward-looking customer expectations. The department's website also contains a customer service feedback link and form that asks for the department's service to be rated. However, the form only contains options for Engines 411 and 412, so it does not appear to have been updated recently.

During our interviews, various stakeholders informed CPSM that in general, the town's citizens expect the highest level of services possible with the available funding that is provided to the department. Our experience within other communities where we have performed similar studies is that agencies often share similar expectations from the community. Table 6-1 lists these

common expectations. CPSM believes that it is reasonable that these would also be the common expectations of the community's external stakeholders in Queen Creek.

**TABLE 6-1: Common External Stakeholder Expectations for Fire and EMS Services**

| |
|---|
| 1. Rapid response to fires and medical emergencies. (This expectation sometimes based upon a prioritized criterion.) |
| 2. Purchase and maintain an effective fire/rescue emergency fleet that meets the specific needs of the community. |
| 3. Provide residents and businesses with inspections and evaluations for improving safety. Keep community informed regarding what they can do to help themselves prevent fires. Provide community education for fire, public health, first aid, CPR, and an active school program. |
| 4. Active participation in the community in more than just responses and fire department related activities. |
| 5. Staff that is well trained and with the highest level of competency in all areas of fire protection and safety, fire suppression, and emergency medical care. |
| 6. Have enough staffing to efficiently and effectively suppress fires safely. |
| 7. Highly effective, professional, and timely provision of service. |
| 8. Be cost effective and efficient. |
| 9. For structure fires, save as much of the structure from the fire, and prevent as much damage, as possible. |
| 10. Respond to other emergencies such as auto accidents, drownings, specialized rescues, etc. |
| 11. Maintain a good working relationship with other emergency services providers in the area. |
| 12. Provide employees with fair and competitive wages and benefits so the fire and EMS agency attracts and retains quality personnel. |

## Recommendations:

- The QCFMD should develop a survey instrument to assist the town and department to determine specific external stakeholder expectations for the current and future delivery of fire and emergency medical services to the community. (Recommendation No. 25.)
- The QCFMD should conduct its own periodic external stakeholder satisfaction survey independent of the MCSO so the department is being fully rated on its own service and merits. (Recommendation No. 26.)

## INTERNAL STAKEHOLDER GROUP FINDINGS

CPSM facilitated a one-day work session, on August 13, 2019, with a cross-section of representatives of the QCFMD. The purpose of this work session was to review and discuss the department's approach to "Community-Centered Strategic Planning." The work session generated a high level of interest and participation.

Discussion at the work session focused on the QCFMD's Mission, Values, Core Services, and Supporting Programs, as well as the department's perceived Strengths, Weaknesses, Opportunities, and Threats.

In the process of strategic planning, the following are important:

- Review of the agency's history, culture, and evolution.
- Identification of the current status of the department.
- Determining where and what the agency desires to be in the future.

This process could not have been completed without the participation of the members of the QCFMD and their internal stakeholders. Their insights were invaluable in putting together this strategic plan. The assistance and resources graciously made available to CPSM are appreciated. The participants took their work very seriously and accepted the challenge to develop a quality product. Participants are listed in the following table.

### TABLE 6-2: Participating Internal Stakeholders

| | | |
|---|---|---|
| Vance Gray<br>Fire Chief | Andy Marlar<br>Deputy Fire Chief | Lee Barnes<br>Deputy Fire Chief |
| Kris Gale<br>Battalion Chief | Cody Gable<br>Battalion Chief | Matt Skowron<br>Battalion Chief |
| David Vilt<br>Captain/Union President | Aaron Athey<br>Captain | Andy Wolrey<br>Captain |
| Bryan Nicholas<br>Firefighter | Cesar Ureña<br>Firefighter | Angie White<br>Management Assistant |

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**FIGURE 6-1: QCFMD Internal Stakeholder Working Group**

## S.W.O.T. Analysis

A SWOT analysis is a business process utilized to identify the *strengths*, *weaknesses*, *opportunities,* and *threats* present within an agency's operating environment. This type of analysis involves specifying the objective or mission of an organization and identifying the internal and external factors that are favorable and unfavorable to achieve that objective.

- Strengths: Characteristics of the agency that allow it to meet its mission, work toward achieving its vision, or provide exceptional service to a community.
- Weaknesses: Characteristics of the agency that may create internal conflict, dysfunction, and/or frustrate organizational performance thus creating a disadvantage to the organization in its efforts to meet the goals established by its mission statement.
- Opportunities: Elements that the organization could pursue or develop to its advantage.
- Threats: Elements in the environment that could create organizational instability or reduce the ability of an agency to fulfill its mission and/or achieve its vision.

A SWOT analysis aims to identify the key internal and external factors seen as important to achieving an organizational objective. SWOT analysis groups key pieces of information into two main categories:

- Internal factors: The *strengths* and *weaknesses* internal to the organization.
- External factors: The *opportunities* and *threats* presented by the environment external to the organization.

Analysis may view the internal factors as strengths or as weaknesses depending upon their effect on the organization's objectives. What may represent strengths with respect to one objective may be weaknesses (distractions) for another objective.

A SWOT analysis can be used to:

- Explore new solutions to problems.
- Identify barriers that will limit goals/objectives.
- Decide on direction that will be most effective.
- Reveal possibilities and limitations for change.
- Revise plans to refocus on an organization's mission statement.
- Brainstorm and record as a means of communication.
- Create a series of recommendations in the context of an organizational study.

The SWOT analysis in the public safety framework is beneficial because it helps an organization decide whether or not an objective is obtainable and therefore enables an agency to set achievable goals, objectives, and steps to further the change or enhance organizational development. It enables organizers to take visions and produce practical and efficient outcomes that effect long-lasting change. It also helps organizations gather meaningful information to maximize their potential. Completing a SWOT analysis is a useful process regarding the consideration of key organizational priorities.

This process undertaken by the QCFMD work group included an evaluation of both the external environment, as well as the department's internal factors and the interrelationship between the two. In this way, the process continues to reinforce a stakeholder-driven perspective.

### *Strengths*

Through a consensus process, the internal stakeholders identified the strengths of QCFMD as shown in the following table.

**TABLE 6-3: Strengths of Queen Creek Fire and Medical**

| | |
|---|---|
| Personnel | Open lines of communications |
| Flexible | Embrace innovation |
| Service delivery | Diversity of membership |
| Positive internal relationships | Eagerness to learn |
| Great relationship with the community | Personnel involvement |
| Great relationship with outside agencies | Equipment |
| Exceeding expectations | Opportunity for advancement |
| Council support | Operational proficiency |
| town management staff support | |

### *Weaknesses*

The following table lists the areas identified by the internal stakeholders as weaknesses.

#### TABLE 6-4: Weaknesses of Queen Creek Fire and Medical

| | |
|---|---|
| Logistical and administrative support | Keeping up with growth |
| Lack of experience (more than half of the department have less than two years of experience) | Data collection and evaluation |
| Consistency of training across all shifts | Succession planning |
| Reliance on automatic aid | Lack of adequate facilities/resources |

### *Opportunities*

The internal stakeholders identified opportunities for QCFMD as shown in the following table.

#### TABLE 6-5: Opportunities for Queen Creek Fire and Medical

| | |
|---|---|
| Growth of the department | EMS service delivery |
| New programs | Internal training |
| Promotions | Defining the right culture |
| Evaluate assuming responsibility for EMS transports | Establish a residential sprinkler ordinance |

### *Threats*

Some of the current and potential threats to QCFMD identified by the internal stakeholders are listed in the following table.

#### TABLE 6-6: Threats to Queen Creek Fire and Medical

| | |
|---|---|
| Economic downturn | Attrition/losing newer employees to other departments |
| Competition for funding | Ambulance transportation |
| Rapid growth outpacing department's ability to keep pace | Regional programs and changes |

## Critical Issues and Service Gaps

Upon completion of the SWOT analysis, the internal stakeholder group then refined their lists to capture the most critical issues and service gaps facing QCFMD. These service gaps and critical issues were then utilized as the framework for establishing the goals for the strategic planning period. This iterative process is formed through consensus and much dialogue to establish only those issues that are believed to be of the highest priority to the organization.

### TABLE 6-7: Critical Issues Facing Queen Creek Fire and Medical

| |
|---|
| ■ Keeping up with growth |
| ■ Training |
| ■ Succession planning |
| ■ Accomplishing the strategic plan within five years |
| ■ Quality and consistency of training |
| ■ Lack of updating infrastructure |
| ■ New annexations/expansion of the fire district |
| ■ Ambulance services (regional considerations and implications) |
| ■ Need for additional administrative support staff |

### TABLE 6-8: Service Gaps of Queen Creek Fire and Medical

| |
|---|
| ■ Coverage for training |
| ■ Northeast and southeast coverage |
| ■ relying on auto aid for specialty teams |
| ■ Battalion safety officer |
| ■ Ambulance response time non-compliance |

## The Mission Statement

The Mission, Vision, and Values are the foundation of any successful organization. Having a sense of common vision is important in any organization to ensure that the organization and its personnel are moving in unison toward a common goal(s). Having a common vision is not only about making sure that all parties are aware that they are in the same boat and rowing in unison, but even more importantly, that they are rowing in the same direction.

The perceptions shared by members of an organization can be extremely important in either establishing, or conversely, distorting that sense of a unified common vision. Every effort should be made to keep these current and meaningful so that the individuals who make up the organization are well guided by them in the accomplishment of the organization's goals, objectives, and day-to-day tasks. In addition, part of the foundation of these statements is an understanding of *"Why is the department's work important?"*

When analyzing a department's mission statement (assuming one already exists) there are four key questions that must be answered.

- What is it?
- Is it accurate? (key elements to guide organizational efforts)
- Does it accurately reflect the department's overall mission?
- Does it need revision?

The first challenge that confronted the internal stakeholder group was determining exactly what the department's current mission statement was and how it had been developed. During the dialogue on this topic, at least three different "mission statements" were identified from various sources. Except for one, which may have been borrowed from the Phoenix Fire Department, no one knew definitively what the origins of the others were.

**From documents provided to CPSM for the 2014 study of the department:**

*The mission of the Queen Creek Fire and Medical Department is to:*

- *Prevent or minimize the loss of life and property for our citizens through emergency planning and the response of skilled fire crews.*
- *Provide the highest level of emergency medical services to each Queen Creek citizen and family.*
- *Successfully mitigate the potential damage of man-made or natural disasters in cooperation with neighboring communities, country governments, and the State of Arizona.*
- *Promote fire, safety, and medical training for families and businesses throughout the community.*
- *Foster goodwill within the community by developing mutual respect and trust.*
- *Safeguard the economic and environmental base of the Town and its neighbors.*

**From the QCFMD website:**

*Our Mission: We honor our past and embrace our future in being the best place to live and do business.*

**From 2019/2020 adopted town budget with the QCFMD organizational chart:**

*Department Mission:*

- *Prevent or minimize the loss of life and property for our citizens through emergency planning and the response of skilled fire crews.*
- *Provide the highest level of emergency medical services to each Queen Creek citizen and family.*

The internal stakeholder group spent time brainstorming regarding the department's mission, vision, and values. They worked hard to ensure that QCFMD's mission statement accurately captured the key elements necessary to guide organizational efforts. After considerable effort and dialogue, a "new" mission statement was created. The proposed mission statement for QCFMD is presented in the following figure.

### FIGURE 6-2: Queen Creek Fire and Medical Mission Statement

*The mission of the Queen Creek Fire and Medical Department is to deliver the highest level of professional service to protect lives and property by honoring tradition and embracing innovation.*

## Vision Statement

A vision statement identifies, usually in broad terms, the current and future objectives of an organization. The vision statement is intended as a guide to help the organization make decisions that align with its philosophy and declared set of goals. It can be thought of as a roadmap to where the organization wants to be within a certain timeframe. To that end, there are several key questions that must be answered that will guide the development of the department's vision statement. These are:

- Where is the organization now?
- Where do you see the organization in:
  - 5 years?
  - 10 years?

Starting with a vision statement that was found on the QCFMD website, the internal stakeholder group once again worked hard to ensure that the vision statement would accurately capture the broad but key elements necessary to guide organizational efforts into the future. After extensive dialogue, a "new" vision statement was created. The current and the proposed vision statements for QCFMD are presented in the following figure.

### FIGURE 6-3: Queen Creek Fire and Medical Vision Statement

**Current:**

*To ensure a high quality of life, promote a strong sense of community, protect our residents, and provide world-class public service.*

**Proposed:**

*To provide exemplary service while developing leaders at every level to maintain Queen Creek Fire and Medical Department as a world class organization.*

## Core Values

A department's values statement should identify values that represent the beliefs, behaviors, and action of all the members of the organization. Key questions that need to be answered in this regard are:

- What are the values?
- Are they accurate?
- Do they accurately reflect the department's values?
- Do they need revision?

As with the development of the department's mission statement, the internal stakeholder group had to first review two core values statements for the QCFMD which had been located from various sources. As with the multiple mission statements, no one knew definitively the origins of this material.

**From documents provided to CPSM for the 2014 study of the department:**

*As an organization, and as individual firefighters, the Queen Creek Fire and Medical Department pledges to represent the following values:*

- *Quality service to our citizens. Such service by our fire crews will be quick, skillful, caring, consistent, professional, and resourceful.*
- *Strong support for each other (the individual members of our department).*
- *The management of change—always seeking to improve our programs and services.*
- *The willingness to be open-minded and flexible in an effort to take advantage of opportunities and available resources in order to better serve the real needs of the community.*
- *Respect, consideration, and empathy for each citizen and for each other.*
- *Development of positive traditions that promote the well-being of each firefighter and encourage individual members to mature professionally and personally.*

**From the QCFMD website:**

*Our Values:*

- *Responsive.*
- *Innovative.*
- *Transparent.*
- *Respectful.*
- *Friendly.*

In concert with the previous sections on establishing mission and vision statements, the internal stakeholder group examined the existing values to determine if they were adequately capturing the values of the organization. After extensive brainstorming and discussion, the group came to consensus on revising the core values to include five main values that they believe represents the beliefs, behaviors, and action of all the members of the QCFMD. The proposed core values for QCFMD are presented in the following figure.

### FIGURE 6-4: Queen Creek Fire and Medical Core Values


## Organizational Motto

The QCFMD 2017 annual report included the following statement on the first page: "*Our family serving yours*." This stimulated discussion during the brainstorming session regarding what statement would serve as an appropriate motto for the department. As the internal stakeholders reached consensus on what should be included in the mission and vision statements and core values, they also reached agreement on what should be used as a motto. The proposed motto for QCFMD is presented in the following figure.

### FIGURE 6-5: Queen Creek Fire and Medical Motto


## Recommendation:

- The QCFMD mission statement, vision statement, core values, and motto should be prominently displayed in each station. (Recommendation No. 27.)

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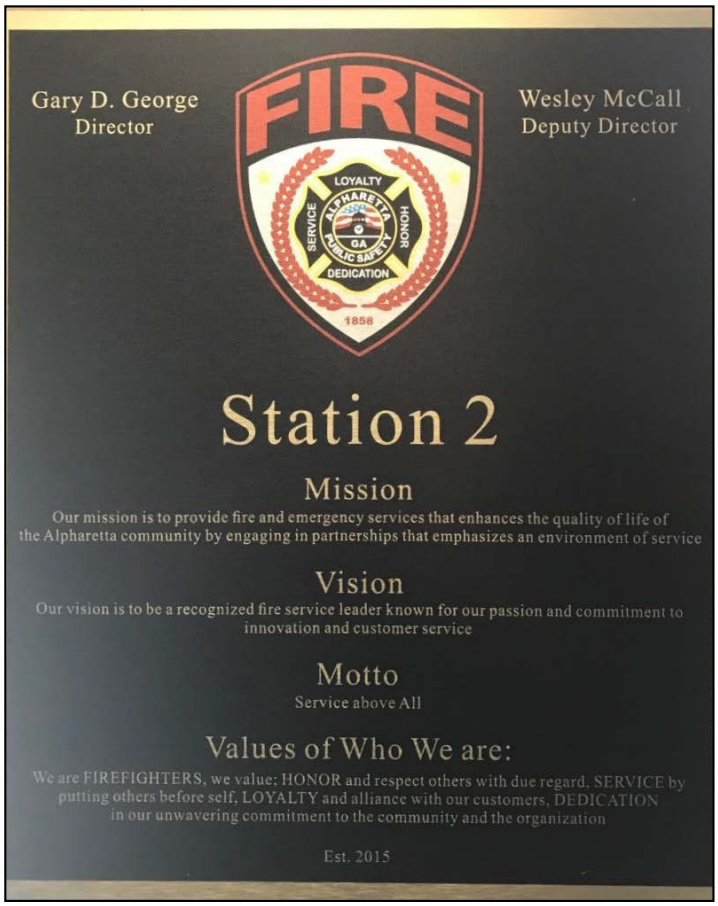
**FIGURE 6-6: Sample Mission, Vision, Core Values, and Motto Station Plaque**




## Services Provided

The internal stakeholder group went through an iterative process to identify which of the organization's services were core services and which were supporting programs. This process was valuable to the group to both ensure that the internal and external expectations were aligned and to prioritize services internally to bring greater clarity to elements of efficient use of time and resources. This prioritization is particularly important for the QCFMD as it attempts to meet the challenges presented by the rapid growth in the town and the need to expand fire and medical services to keep up with demand. The following tables depict core services and core support programs identified by the QCFMD.

### TABLE 6-9: QCFMD Core Services

| |
|---|
| ■ Fire Suppression. |
| ■ Emergency Medical Services Response. |
| ■ Hazards Mitigation. |
| ■ Fire and Medical Administration. |
| ■ Fire Prevention.<br>□ Plan Review.<br>□ New Construction Inspections.<br>□ Annual High-Hazard Inspections. |

### TABLE 6-10: QCFMD Core Support Programs

| | |
|---|---|
| ■ Community outreach | ■ Training |
| ■ Car seat program | ■ Apparatus maintenance |
| ■ Community CPR training | ■ Resource management |
| ■ Stop the bleed training | ■ Hazard and risk prevention |
| ■ Community Emergency Response Team (CERT) | ■ Community event stand-bys |
| ■ Fire cadet program | ■ Maintenance of automatic and mutual aid agreements and relationships. |
| ■ Participation in professional associations | |

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## STRATEGIC PLANNING GOALS AND OBJECTIVES

This phase of the strategic planning process resulted in the establishment of goals and objectives that are reasonable and obtainable over the next five-year planning period. The internal stakeholder group began with selecting, through consensus, the critical issues and service gaps with the highest priority. The next step was the establishment of goals and objectives. The goals are the overarching desired outcome in a broad sense. Objectives are the iterative steps to accomplish the goal. Most goals are supported by several objectives and each objective is supported by several critical tasks required to bring each objective to fruition.

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

Strategy has many definitions, but generally involves setting goals, determining actions to achieve the goals, and mobilizing resources to execute the actions. A strategy describes how the ends (goals) will be achieved by the means (resources). In Queen Creek, the Town Council, Mayor, and town manager are tasked with determining strategy. Strategy can be planned (intended) or can be observed as a pattern of activity (emergent) as the organization adapts to its environment or competes. It is our observation that the strategy currently in place in Queen Creek is planned and intended in that it appears to be proactive to the needs of a rapidly growing community. However, because of the extremely rapid growth occurring in the Town, there is some reactive activity as well, because the town's services struggle to keep pace with its explosive growth. Through this document, it is our goal to assist Queen Creek with, to the extent possible, maintaining a planned, or intended, strategic posture.

Strategic implementation is analytical in nature and involves identifying how to best reach a goal or desired outcome. In a strategic plan, it is essential that clear and achievable goals and objectives for each program area are developed. Each program area must then (1) define its goals; (2) translate the goals into measurable indicators of goal achievement; (3) collect data on the indicators for those who have utilized the program; and (4) compare the data on program participants and controls in terms of goal criteria. Objectives should be **SMART**, an acronym that stands for **S**pecific, **M**easurable, **A**ttainable, **R**ealistic, and **T**imely. Additionally, these goals should ideally link back to fiscal planning processes.

The establishment of the goals and objectives attempts to provide an answer to the question: *"How will the department get to where it wants to be in five to ten years?"*

- Station configuration.
- Staffing levels.
- Response capabilities.
- Regional player.
- Organizational programs.

The internal stakeholder group identified ***15 key goals*** that they wanted to make a priority over the next five fiscal years. The group was encouraged to build broad buy-in and support for these consensus goals and dedicate the appropriate resources, leadership, and approval to provide the greatest likelihood of bringing these goals to fruition.

CPSM would like to complement the Town of Queen Creek and Queen Creek Fire and Medical Department, as the department has taken a significant step toward setting up the strategic plan and the planning process for success. During the internal stakeholder process a wide cross-section of the department's internal stakeholders participated. Looking forward, QCFMD will also need to build broad-based buy-in and support for the plan from both the town leadership and the department's external stakeholders, primarily the residents of Queen Creek.

The ***15 key goals*** presented here are listed by fiscal year, but not necessarily in priority order for that year. Also, some goals for Fiscal Year 2020 are already significantly on their way to completion. In addition, some goals for later years are already being accelerated, which may change the priority order throughout the plan.

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| Goal 1<br>FY 2020 | Formally Adopt New Mission Statement, Vision Statement, and Core Values |
|---|---|

| Objective 1A | Obtain Town Council approval by resolution |
|---|---|
| **Timeline** | April 2020 |
| **Critical Tasks** | ■ Meet with council members to explain development process and gain support.<br>■ Meet with town manager and mayor to explain development process and gain support.<br>■ Present to Town Council for approval. |

| Objective 1B | Integrate into QCFMD day-to-day operations |
|---|---|
| **Timeline** | July 2020 |
| **Critical Tasks** | ■ Publicize new statements in various ways, such as website, annual report, etc.<br>■ Provide training and explanation to all department members.<br>■ Display Mission Statement, Vision Statement, Core Values, and Motto prominently in each station so members see them every duty day.<br>■ Display QCFMD motto on apparatus. |

| Goal 2<br>FY 2020 | Implement In-house QCFMD EMS Training and Certification |
|---|---|

| Objective 2A | Conduct cost/benefit analysis |
|---|---|
| **Timeline** | August 2019 (Completed) |
| **Critical Tasks** | ■ Determine the costs of the process.<br>■ Estimate the number of staff hours needed.<br>■ Identify the beneficiaries.<br>■ Determine who benefits and how they do so. |

| Objective 2B | Obtain necessary regulatory approvals |
|---|---|
| **Timeline** | October 2019 (Completed) |
| **Critical Tasks** | ■ Determine and obtain, if necessary, any state regulatory requirements.<br>■ Determine and obtain, if necessary, any county regulatory requirements.<br>■ Work with Medical Director to develop parameters of program. |

| Objective 2C | Obtain Town Council approval by resolution |
|---|---|
| **Timeline** | December 2019 (Completed) |
| **Critical Tasks** | ■ Meet with council members to explain benefits of position and gain support.<br>■ Meet with town manager and mayor to explain position and gain support.<br>■ Present to Town Council for approval. |

| Objective 2D | Implement program |
|---|---|
| **Timeline** | February 2020 (Completed) |
| **Critical Tasks** | ■ Develop job description.<br>■ Advertise for position.<br>■ Interview candidates.<br>■ Hire EMS Educator. |

| Goal 3<br>FY 2021 | Research Residential Sprinkler Ordinance |
|---|---|

| Objective 3A | Obtain preliminary Town Council support through education |
|---|---|
| **Timeline** | July 2020 |
| **Critical Tasks** | ■ Initiate data gathering and exploring communities which have same by April 2020.<br>■ Provide statistics on life safety benefits of residential sprinklers by July 2020.<br>■ Conduct a cost/benefit analysis by July 2021.<br>■ Meet with stakeholders (contractors, home builders, realtors, insurance industry reps, fire sprinkler industry reps., elected officials, and the planning department) by August 2021. |

| Goal 4<br>FY 2021 | Commence Construction Process for Permanent Fire Station 2 |
|---|---|

| Objective 4A | Obtain Town Council approval |
|---|---|
| **Timeline** | April 2020 |
| **Critical Tasks** | ■ Meet with council members to emphasize need, gain support, and seek funding commitment.<br>■ Meet with town manager and mayor emphasize need, gain support, and seek funding commitment. |

| Objective 4B | Obtain funding commitment |
|---|---|
| **Timeline** | June 2020 |
| **Critical Tasks** | ■ Obtain town council approval in FY 2021 capital budget. |

| Objective 4C | Finalize station design work |
|---|---|
| **Timeline** | December 2020 |
| **Critical Tasks** | ■ Complete design work for station with architect/engineer.<br>■ Expedite plan by using same design/plan as Station 3 or 414.<br>■ Develop bid or RFP for station construction. |

| Objective 4D | Issue bid request/RFP for construction |
|---|---|
| **Timeline** | January – March 2021 |
| **Critical Tasks** | ■ Issue bid/RFP for station construction.<br>■ Receive and evaluate bids/proposals received.<br>■ Award contract for construction. |

| Objective 4E | Construction of station |
|---|---|
| **Timeline** | February 2021 – December 2021 |
| **Critical Tasks** | ■ Oversee construction of station.<br>■ Avoid construction delays and cost overruns.<br>■ Accept completed station from general contractor. |

| Objective 4F | Occupy new Station 2 |
|---|---|
| **Timeline** | December 2021 |
| **Critical Tasks** | ■ Obtain necessary station furniture and other needed equipment.<br>■ Move personnel and equipment from old station to new. |

| Goal 5<br>FY 2021 | Implement Officer Development Training Academies for Engineer and Captain |
|---|---|

| Objective 5A | Research available programs and models |
|---|---|
| **Timeline** | July/August 2020 |
| **Critical Tasks** | ■ Evaluate current task book process and content.<br>■ Evaluate current department practice and training including requirements for promotion.<br>■ Research industry standards and best practices.<br>■ Research other department programs (e.g., New York state program).<br>■ Contact professional associations that may have relevant programs.<br>■ Determine requirements for personnel to receive professional certification at conclusion of program, such as Fire Officer I/II. |

| Objective 5B | Develop program curriculum |
|---|---|
| **Timeline** | September – December 2020 |
| **Critical Tasks** | ■ Determine program length and scheduling.<br>■ Develop curriculum and course materials to be used.<br>■ Schedule needed instructors from both inside and outside of the department.<br>■ Encourage current officers to assist with part of instruction.<br>■ Obtain approval for issuance of certifications (if appropriate) such as Fire Apparatus Operator and Fire Officer I/II.<br>■ Develop assessment instruments. |

| Objective 5C | Deliver program/hold academies |
|---|---|
| **Timeline** | January – April 2021 |
| **Critical Tasks** | ■ Schedule several offerings of each academy.<br>■ All current personnel holding these ranks and those on promotional lists should be scheduled for one of the academies.<br>■ Recognize achievement with public graduation ceremony at conclusion of academies. |

| Goal 6<br>FY 2021 | Replace Current Brush 412 with New Type VI Engine |
|---|---|

| Objective 6A | Obtain Town Council approval |
|---|---|
| **Timeline** | April 2020 |
| **Critical Tasks** | ■ Meet with council members to explain need, gain support, and seek funding commitment for town match. Explain intention to seek funding through an Assistance to Firefighters grant.<br>■ Meet with town manager and mayor to emphasize need, gain support, and seek funding commitment for town match. Explain intention to seek funding through an Assistance to Firefighters grant.<br>■ Obtain town funding match in FY 2021 budget.<br>■ Discuss alternative funding options if grant application is not successful. |

| Objective 6B | Develop specifications and prepare bid documents |
|---|---|
| **Timeline** | July/August 2020 |
| **Critical Tasks** | ■ Develop specifications for new vehicle.<br>■ Seek cost estimates from manufacturers.<br>■ Develop bid specifications.<br>■ Do research and gather data for when grant application period opens. |

| Objective 6C | Submit grant application |
|---|---|
| **Timeline** | February 2021 (Based upon 2020 application period) |
| **Critical Tasks** | ■ Attend grant seminar.<br>■ Submit grant application per guidelines for program.<br>■ Seek letter of support from congressman. |

| Objective 6D | Issue bid request for new truck |
|---|---|
| **Timeline** | Within 90 days of grant award |
| **Critical Tasks** | ■ Issue bid request for new truck.<br>■ Receive and evaluate bids received.<br>■ Award contract for purchase.<br>■ File periodic grant reports as required. |

| Objective 6D | Place new brush truck in service |
|---|---|
| **Timeline** | Within one year of grant award |
| **Critical Tasks** | ■ Obtain necessary equipment to outfit truck.<br>■ Provide training for all personnel.<br>■ File final grant report as required. |

| Goal 7<br>FY 2021 | Build Multifunctional Resource/Skills Center |
|---|---|

| Objective 7A | Obtain Town Council approval |
|---|---|
| Timeline | February/March 2021 |
| Critical Tasks | ■ Meet with council members to explain need, multifunctional facility cost/benefit analysis including any revenue generating potential, development process, and gain support.<br>■ Meet with town manager and mayor to explain need, multifunctional facility cost/benefit analysis including any revenue generating potential, development process, and gain support.<br>■ Present to town council for approval. |

| Objective 7B | Obtain funding commitment |
|---|---|
| Timeline | February March 2021 |
| Critical Tasks | ■ Obtain town council approval in FY 2022 capital budget. |

| Objective 7C | Finalize facility design work |
|---|---|
| Timeline | April/May 2021 |
| Critical Tasks | ■ Visit other facilities that perform various functions to be included in the building.<br>■ Complete design work for facility with architect/engineer.<br>■ Develop bid or RFP for facility construction. |

| Objective 7D | Issue bid request/RFP for construction |
|---|---|
| Timeline | May/June 2021 |
| Critical Tasks | ■ Issue bid/RFP for facility construction.<br>■ Receive and evaluate bids/proposals received.<br>■ Award contract for construction. |

| Objective 7E | Construction of Facility |
|---|---|
| Timeline | June 2021 to April 2022 |
| Critical Tasks | ■ Oversee construction of facility.<br>■ Avoid construction delays and cost overruns.<br>■ Accept completed facility from general contractor. |

| Objective 7F | Occupy new multifunction Resource/Skills facility |
|---|---|
| Timeline | April 2022 |
| Critical Tasks | ■ Obtain necessary facility furniture and other needed equipment.<br>■ Move personnel and equipment from old facilities/locations to new facility. |

| Goal 8<br>FY 2022 | Hire Resource Specialist (Civilian) to Oversee QCFMD Logistical Operations |
|---|---|

| Objective 8A | Conduct cost/benefit analysis |
|---|---|
| **Timeline** | March 2022 |
| **Critical Tasks** | ■ Determine the costs of the position.<br>■ Estimate if full-time status is needed.<br>■ Identify the beneficiaries.<br>■ Determine who benefits and how they do so.<br>■ Develop presentation explaining position needs and benefits. |

| Objective 8B | Obtain Town Council approval |
|---|---|
| **Timeline** | June 2022 |
| **Critical Tasks** | ■ Meet with council members to explain benefits of position and gain support.<br>■ Meet with town manager and mayor to explain position and gain support.<br>■ Present to town council for approval and funding in FY 2022 budget. |

| Objective 8C | Hire resource specialist |
|---|---|
| **Timeline** | January - June 2022 |
| **Critical Tasks** | ■ Develop job description.<br>■ Advertise for position.<br>■ Interview candidates.<br>■ Hire resource specialist.<br>■ Provide training if needed, such as SCBA field technician training/certification. |

| Goal 9<br>FY 2022 | Maintain the Continuity of EMS Services in Queen Creek in the Event of Changes in Cooperator Agency Status by Developing Contingency Plans for Staffing Ambulance Transport Services |
|---|---|

| Objective 9A | Identify cooperator agencies and define how they influence or impact QCFMD services |
|---|---|
| **Timeline** | July 2021 through September 2021 |
| **Critical Tasks** | ■ Identify agencies that have an impact on QCFMD ambulance transport services.<br>■ Identify related contracts, agreements, and performance expectations.<br>■ Identify other potentially affected/impacted stakeholders.<br>■ Define or quantify how the agencies, cooperators, or agreements influence or impact (or may influence or impact in the future) QCFMD EMS and/or patient transport services.<br>■ Develop systems to continue to benchmark and track cooperator performance as it relates to the Town of Queen Creek. |

| Objective 9B | Conduct a risk analysis to QCFMD services in the event of change to cooperator status |
|---|---|
| **Timeline** | October 2021 through December 2021 |
| **Critical Tasks** | ■ Determine funding impacts.<br>■ Determine impact/s on current deployment plan and ambulance transportation services.<br>■ Complete a SWOT analysis for each identified cooperator and for QCFMD. |

| Objective 9C | Develop contingency plans to maintain continuity of services |
|---|---|
| **Timeline** | January 2022 through March 2022 |
| **Critical Tasks** | ■ Develop strategies to maintain, improve, and secure current levels of EMS services including ambulance transportation.<br>■ Conduct cost/benefit analysis for identified strategies and options.<br>■ Identify ways to enhance current relationships with cooperators, if possible.<br>■ Evaluate benefits/disadvantages of initiating QCFMD-based ambulance service.<br>■ Prepare a written plan and seek broad-based stakeholder support.<br>■ Develop projected program budget including revenue projections. |

| Objective 9D | Obtain necessary regulatory approvals |
|---|---|
| **Timeline** | January 2022 through March 2022 |
| **Critical Tasks** | ■ Determine and obtain, if necessary, any state regulatory requirements.<br>■ Determine and obtain, if necessary, any county regulatory requirements.<br>■ Work with Medical Director to develop parameters of QCFMD ambulance service, if necessary. |

| Objective 9E | Obtain Town Council approval |
|---|---|
| **Timeline** | April 2022 |
| **Critical Tasks** | ■ Meet with council members to explain need for QCFMD-based ambulance service, emphasize benefits of program, and gain support.<br>■ Meet with town manager and mayor to explain need for QCFMD based ambulance service, emphasize benefits, and gain support.<br>■ Present to town council for approval and funding in FY 2023 budget. |

| Objective 9F | Hire civilian EMTs and paramedics to staff QCFMD ambulance service |
|---|---|
| **Timeline** | April 2022 through August 2022 |
| **Critical Tasks** | ■ Develop job descriptions.<br>■ Advertise for positions.<br>■ Test, screen, and Interview candidates.<br>■ Hire EMTs and paramedics.<br>■ Provide QCFMD initial training as necessary and appropriate. |

| Goal 10<br>FY 2023 | Create Full-Time, Dedicated Position of Training Officer to Oversee and Coordinate All QCFMD Training |
|---|---|

| Objective 10A | Conduct cost/benefit analysis |
|---|---|
| **Timeline** | March 2022 |
| **Critical Tasks** | ■ Determine the costs of the position.<br>■ Identify the beneficiaries.<br>■ Determine who benefits from the position and how they do so.<br>■ Develop compelling presentation explaining position needs and benefits. |

| Objective 10B | Obtain Town Council approval |
|---|---|
| **Timeline** | June 2022 |
| **Critical Tasks** | ■ Meet with council members to explain need for and benefits of position and gain support.<br>■ Meet with town manager and mayor to explain need for and benefits of position and gain support.<br>■ Present to town council for approval and funding in FY 2023 budget. |

| Objective 10C | Create and fill position of training officer |
|---|---|
| **Timeline** | July – September 2022 |
| **Critical Tasks** | ■ Develop job description for position (recommend rank of battalion chief).<br>■ Advertise for promotional opportunity.<br>■ Interview interested personnel (give promotional exam if necessary).<br>■ Promote training officer.<br>■ Provide training if needed such as to obtain fire instructor certification and attend classes on fire service course development, training program management, etc. |

| Goal 11<br>FY 2023 | Create Positions of Battalion Safety Officer to Work with Battalion Chiefs as Part of an Integrated Command Team |
|---|---|

| Objective 11A | Conduct cost/benefit analysis |
|---|---|
| **Timeline** | March 2022 |
| **Critical Tasks** | ■ Determine the cost of the positions (three).<br>■ Identify the beneficiaries.<br>■ Determine who benefits from the program and how they do so.<br>■ Develop compelling presentation explaining position needs and benefits. |

| Objective 11B | Obtain Town Council approval |
|---|---|
| **Timeline** | June 2022 |
| **Critical Tasks** | ■ Meet with council members to explain need for and benefits of positions and gain support.<br>■ Meet with town manager and mayor to explain need for and benefits of positions and gain support.<br>■ Present to town council for approval and funding in FY 2023 budget. |

| Objective 11C | Create and fill three positions of battalion safety officer |
|---|---|
| **Timeline** | July - September 2022 |
| **Critical Tasks** | ■ Develop job description for positions (recommended rank is captain).<br>■ Advertise for promotional opportunity.<br>■ Interview interested personnel (Give promotional exam if necessary).<br>■ Fill three positions of battalion safety officer.<br>■ Have newly promoted captains complete captain academy.<br>■ Provide training for newly assigned battalion safety officers with departments that already utilize position, provide incident safety officer training and certification. Provide additional health- and safety-related training as deemed necessary. |

| Goal 12<br>FY 2022 | Commence Construction Process for Permanent Fire Station 5 |
|---|---|

**Scheduled for FY 2023—Accelerated to FY 2021/2022**

| Objective 12A | Obtain Town Council approval |
|---|---|
| **Timeline** | Completed |
| **Critical Tasks** | ■ Meet with council members to emphasize need, gain support, and seek funding commitment.<br>■ Meet with town manager and mayor to emphasize need, gain support, and seek funding commitment. |

| Objective 12B | Obtain funding commitment |
|---|---|
| **Timeline** | Completed |
| **Critical Tasks** | ■ Obtain town council approval in FY 2021 capital budget. |

| Objective 12C | Finalize station design work |
|---|---|
| **Timeline** | Completed |
| **Critical Tasks** | ■ Complete design work for station with architect/engineer.<br>■ Expedite plan by using same design/plan as Station 3 or 414.<br>■ Develop bid or RFP for station construction. |

| Objective 12D | Issue bid request/RFP for construction |
|---|---|
| **Timeline** | January 2021 |
| **Critical Tasks** | ■ Issue RFQ CMAR for station construction.<br>■ Receive and evaluate CMAR proposals received.<br>■ Award contract for construction. |

| Objective 12E | Construction of station |
|---|---|
| **Timeline** | February 2021 to December 2021 |
| **Critical Tasks** | ■ Oversee construction of station.<br>■ Avoid construction delays and cost overruns.<br>■ Accept completed station from general contractor. |

| Objective 12F | Occupy New Station 5 |
|---|---|
| **Timeline** | December 2021 |
| **Critical Tasks** | ■ Obtain necessary station furniture and other needed equipment.<br>■ Move personnel and equipment from old station to new. |

| Goal 13<br>FY 2021/2022 | Hire Additional Administrative Assistant (Civilian) to Provide Additional Support for QCFMD Administrative Operations |
|---|---|

| Objective 13A | Conduct cost/benefit analysis |
|---|---|
| **Timeline** | March 2021 |
| **Critical Tasks** | ■ Determine the costs of the position.<br>■ Determine if full-time status is needed.<br>■ Identify the beneficiaries.<br>■ Determine who benefits from the position and how they do so.<br>■ Develop presentation explaining position needs and benefits. |

| Objective 13B | Obtain Town Council approval |
|---|---|
| **Timeline** | May/June 2021 |
| **Critical Tasks** | ■ Meet with council members to explain need for and benefits of position and gain support.<br>■ Meet with town manager and mayor to explain need for and benefits of position and gain support.<br>■ Present to town council for approval and funding in FY 2023 budget. |

| Objective 13C | Hire administrative assistant |
|---|---|
| **Timeline** | July - September 2021 |
| **Critical Tasks** | ■ Develop job description.<br>■ Advertise for position.<br>■ Screen and Interview candidates.<br>■ Hire administrative assistant. |

| Goal 14<br>FY 2022 | Replace Current Engine 412 with New Type I Engine |
|---|---|

| Objective 14A | Obtain Town Council approval |
|---|---|
| **Timeline** | April 2021 |
| **Critical Tasks** | ■ Meet with council members to explain need, gain support, and seek funding commitment.<br>■ Meet with town manager and mayor to emphasize need, gain support, and seek funding commitment.<br>■ Obtain town funding in FY 2021/2022 budget.<br>■ Discuss alternative funding options including lease purchase and grant application if necessary. |

| Objective 14B | Develop specifications and Order New Engine |
|---|---|
| **Timeline** | June through August 2021 |
| **Critical Tasks** | ■ Develop specifications for new vehicle.<br>■ Seek cost estimates from manufacturers.<br>■ Place Order with Manufacture |

| Objective 14C | Place new engine 412 in service |
|---|---|
| **Timeline** | May/June 2022 |
| **Critical Tasks** | ■ Obtain necessary equipment to outfit truck.<br>■ Provide training for all personnel. |

The concept of accreditation in emergency services is a relatively new idea to many fire departments. However, it has been a common practice for many years in a variety of professions, including hospitals and schools. Fire departments across the country are attempting to achieving accreditation through the Commission on Fire Accreditation International (CFAI). Accreditation can immediately improve a department, and be used to plan for the future, show the public and elected officials what the fire department is doing and make the department a safer place to work.

Accreditation is a comprehensive self-assessment and evaluation model that enables organizations to examine past, current, and future service levels, along with internal performance, and compare them to industry best practices. This process leads to improved service delivery.

Accreditation allows fire and emergency service agencies to compare their performance to industry best practices in order to:

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

The accreditation process provides a well-defined, internationally-recognized benchmark system to measure the quality of fire and emergency services.[48]

The Commission on Fire Accreditation International's (CFAI) comprehensive self-assessment process promotes excellence and encourages quality improvement by enabling fire and EMS agencies to:

- Assure colleagues and the public that they have definite missions and objectives that are appropriate for the jurisdictions they serve.
- Provide a detailed evaluation of the services they provide to the community.
- Identify areas of strength and weakness within the department.
- Create methods or systems for addressing deficiencies while building organizational success.
- Encourage professional growth for both the department and its personnel.
- Provide a forum for the communication of organizational priorities.
- Foster national recognition by colleagues and the public.
- Create a mechanism for developing strategic and program action plans.[49]

48. http://www.cpse.org/agency-accreditation/about-accreditation-cfai.aspx
49. http://www.cpse.org/agency-accreditation/the-benefits.aspx

| Goal 15<br>FY 2025 | Continuous Self-improvement through Ongoing Departmental Evaluation Processes |
|---|---|

| Objective 15A | Initiate the application process with Commission for Fire Accreditation International (CFAI) |
|---|---|
| **Timeline** | January 2025 |
| **Critical Tasks** | ■ Attend seminar on accreditation and self-assessment process.<br>■ Visit one or more accredited agencies.<br>■ Obtain data on the self-evaluation and accreditation process.<br>■ Obtain buy-in from internal and external stakeholders.<br>■ Obtain support from mayor, town manager, and Town Council.<br>■ Designate a project manager and team members. |

| Objective 15B | Conduct a cost/benefit analysis |
|---|---|
| **Timeline** | January 2025 |
| **Critical Tasks** | ■ Determine the costs of the process.<br>■ Estimate the number of staff hours needed.<br>■ Identify the beneficiaries.<br>■ Determine who benefits and how they do so.<br>■ Develop compelling presentation explaining the benefits of the accreditation process. |

| Objective 15C | Complete the self-assessment process |
|---|---|
| **Timeline** | January 2026 |
| **Critical Tasks** | ■ Approach project systematically.<br>■ Implement strategic plan recommendations.<br>■ Audit existing policies and procedures.<br>■ Create deployment standards.<br>■ Publish the Standards of Cover document.<br>■ Identify the ongoing commitments once accreditation is achieved. |

| Objective 15D | Obtain third-party accreditation through the Commission on Fire Accreditation International (CFAI) |
|---|---|
| **Timeline** | January 2027 |
| **Critical Tasks** | ■ Initiate application process with CFAI.<br>■ Recognize achievement with public ceremony at time that accreditation is achieved.<br>■ Publicize obtaining accreditation in various ways such as website, annual report, etc.<br>■ Display accreditation logo prominently in each station so members see it every duty day.<br>■ Display accreditation logo on all QCFMD apparatus.<br>■ Keep track of requirements necessary for reaccreditation.<br>■ Ongoing analysis of data and compliance with benchmarks.<br>■ Commitment to continual system improvement. |

Some fire departments that provide EMS transport services become accredited through the Commission on Accreditation of Ambulance Services (CAAS). CAAS accreditation signifies that the fire department has met the "gold standard" determined by the ambulance industry to be essential in a modern emergency medical services provider. These standards often exceed those established by state or local regulation. The CAAS standards are designed to increase operational efficiency and clinical quality, while decreasing risk and liability to the organization. Should the Town of Queen Creek decide it is in its best interests to implement its own ambulance transport service operated by the QCFMD, this may be an additional accreditation it may wish to work toward obtaining.

## Implementation and Evaluation Methodology

The development of this strategic plan comes at a time of rapid growth not only in the Town of Queen Creek but also within the QCFMD as well. This young department, which is just over 12 years old has, to this point, been just looking to play catch-up on service delivery needs for a community that is undergoing unprecedented growth; there appears to be leveling out in the growth within the foreseeable future. CPSM believes that particularly with the projected opening of Station 4 in late 2020, the department will have achieved the goal of providing exemplary service in accordance with nationally recognized standards and benchmarks to the currently developed areas of the town. The challenge ahead will be to keep pace with, or even ahead of, the future projected growth while also attempting to update facilities that, while providing appropriate deployment points, are substandard in nature.

Having a sense of common vision is important for any organization to ensure that the organization and its personnel are moving in unison toward common goals. Having a common vision is not just making sure that all parties are aware that they are in the same boat and rowing in unison, but even more importantly, that they are rowing in the same direction. The impact of sharing a common vision will be very noticeable in the quality and quantity of work performed, but also with the spirit and passion by which the work of the organization is accomplished. We see that in the QCFMD.

It should be noted that because both the town and QCFMD are both undergoing almost daily changes fueled by the extreme level of growth and development that is occurring, that this strategic plan will be more fluid that many. CPSM noted many projects and processes are

already in the development and implementation stages by the QCFMD. In fact, during the completion of this report and development of the plan, we were advised on several occasions that the timelines for various projects had tentatively been adjusted. Where appropriate these have been noted after the specific goal. The QCFMD will need to be cognizant of the work already in progress and how it may relate to, or impact, the implementation of strategic plan recommendations.

QCFMD should implement a multipronged approach to the implementation of the strategic plan goals:

1. Ongoing prioritization of goals and objectives by QCFMD leadership in conjunction with Mayor, town manager and Town Council.

2. Establishment of task groups or teams to work on implementation through completion of critical tasks for each objective. Some groups may be working on multiple objectives at the same time and more than one task group may be working on the same objectives and critical tasks simultaneously.

3. Confirmation of implementation timelines.

4. Monthly meetings of task groups to develop solutions and processes for the completion of critical tasks.

5. Development of quarterly progress reports from each task group. These can include needs assessments of the group.

6. Objective/goal implementation strategies developed and documented by task groups.

7. Objective/goal implementation strategies endorsed by QCFMD leadership (and town leadership if necessary).

8. Objectives/goal implementation strategy (including and expectations of entire department, new procedures, promotional opportunities, etc.) communicated to entire QCFMD membership.

9. Objectives/goals implemented as appropriate.

10. Annual review and assessment of entire strategic plan.

A critical part of the strategic planning process is an ongoing evaluation of progress. Strategic plans should be viewed as living documents, not static ones. As such, they are constantly evolving, but to do so the level of success toward meeting the established goals and objectives must be subject to ongoing review. Without this key step, there is no way to measure progress (or lack thereof) and thus provide accurate assessments to various stakeholders.

The completion of the various goals and objectives may identify new ones. The continued growth of Queen Creek, with the corresponding need for increased fire and EMS services, will most assuredly result in the identification of new needs and the development of new goals along with their corresponding implementation objectives. This process may also result in an acceleration of certain needs or priorities identified by the town related to the completion of certain goals and objectives that are deemed most critical.

Conversely, if a task group(s) determine that certain objectives are not achieving their intended results, or there are other issues with achievement of the goal as envisioned, realignment or

reprioritization of the goal and/or its enabling objectives or the processes to achieve them may be necessary.

Because of its status as a living and evolving document, an effective strategic plan will not remain accurate for five years without review and updating. The plan should be thoroughly reviewed by the department leadership with input from various stakeholders including the local governing body. Goals that have been accomplished in the preceding year should be publicly recognized by the department. The review should include an assessment of the continued validity of the plan's current goals and enabling objectives, with revisions made as necessary. Newly identified or prioritized goals and/or objectives should be added in. Finally, an addendum to the plan should be prepared and distributed to all stakeholders and which identifies any additions, subtractions, and realignments or other changes that are being incorporated into the plan.

## Conclusion

In conclusion, the mission performed by the fire department are some of the most basic and fundamental functions of government; to ensure the safety and protection of its residents and visitors. The real issue facing the QCFMD, and the Town of Queen Creek, as it is for every community, is to determine an acceptable level of risk and then define an appropriate level of service for the community. There is no "right" amount of fire protection or EMS delivery. It is a constantly changing level based on the expressed needs of the community. Determining the appropriate level of service also involves deciding upon the municipality's fiscal ability and willingness to pay for the desired level of service. These are decisions that the citizens of the town and Town Council will ultimately need to make.

In the meantime, the citizens of Queen Creek, and those within the fire district response area, who are protected by the QCFMD should feel very confident that the department is a highly professional emergency services organization that is providing a very high-quality level of service to the community. We continue to be impressed with the dedication and commitment of its members. CPSM further believes that the QCFMD has the skills, capabilities, and motivation to continue to be an extremely effective, highly trained, and in short, exemplary organization that meets, and in many cases exceeds, nationally recognized standards for operational readiness. The biggest challenge facing the department is attempting to keep pace with the continued growth of the town and the need to continue to provide the high level of service that it does today. We are quite confident the QCFMD will rise to the occasion.

# SECTION 7. DATA ANALYSIS

This data analysis examines all calls for service between July 1, 2018, and June 30, 2019, as recorded in the Mesa Regional Dispatch Center's computer-aided dispatch (CAD) system and the QCFMD's National Fire Incident Reporting System (NFIRS).

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

For the first part of the year covered by this study, QCFMD operated out of three stations, utilizing three engines, one brush truck, one tanker, one ambulance, and one battalion chief vehicle. Additionally, the department operated several units part-time as needed, including a backup battalion chief vehicle, an engine, and a special event unit. The fire chief and operations chief also respond to incidents at their discretion. On March 1, 2019, Interim Fire Station 5 opened, and another engine went into service.

During the study period, the department responded to 3,856 calls, of which 68 percent were EMS calls. The total combined workload (deployed time) for all QCFMD units was 2,077.6 hours. The average dispatch time for the first arriving unit was 0.8 minutes and the average response time of the first arriving unit was 6.4 minutes. The 90th percentile dispatch time was 1.4 minutes and the 90th percentile response time was 9.7 minutes.

## METHODOLOGY

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

We received CAD data and NFIRS data for the Queen Creek Fire and Medical Department. We first matched the NFIRS and CAD data based on incident numbers provided. Then, we classified the calls in a series of steps. We first used the NFIRS incident type to identify canceled calls and to assign EMS, motor vehicle accident (MVA), and fire category call types. EMS calls were then assigned detailed categories based on the call's description in either the data from the NFIRS EMS module or in the CAD data. Mutual and automatic aid calls were identified based on information recorded in the NFIRS's data mutual aid code field.

Finally, units without a corresponding call, and units without en route or arrival time, were removed. In the first three sections of the report, we limited ourselves to calls that had at least one responding QCFMD unit. In the response section of the report, we limited ourselves to calls in QCFMD's jurisdiction but included calls that had no responding QCFMD unit. In the transport section of the report, we limited ourselves to calls in QCFMD's jurisdiction that had at least one responding QCFMD unit. In addition, runs by command or administrative units were not included in the analysis sections of the report. However, the workload of administrative units is documented in Attachment II.

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

## AGGREGATE CALL TOTALS AND RUNS

During the year studied, QCFMD responded to 3,856 calls. Of these, 39 were structure fire calls and 44 were outside fire calls in QCFMD's jurisdiction.

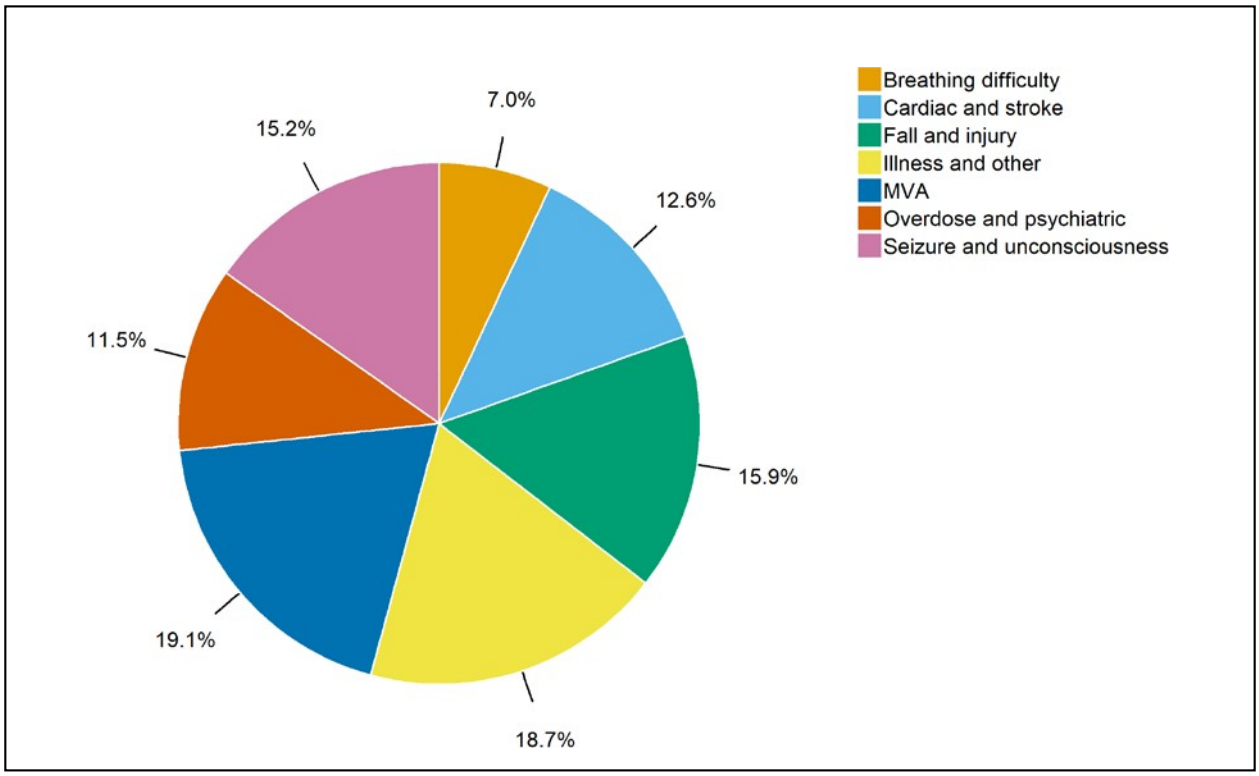
### Calls by Type

The following table and two figures show the number of calls by call type, average calls per day, and the percentage of calls that fall into each call type category for the 12-month study period.

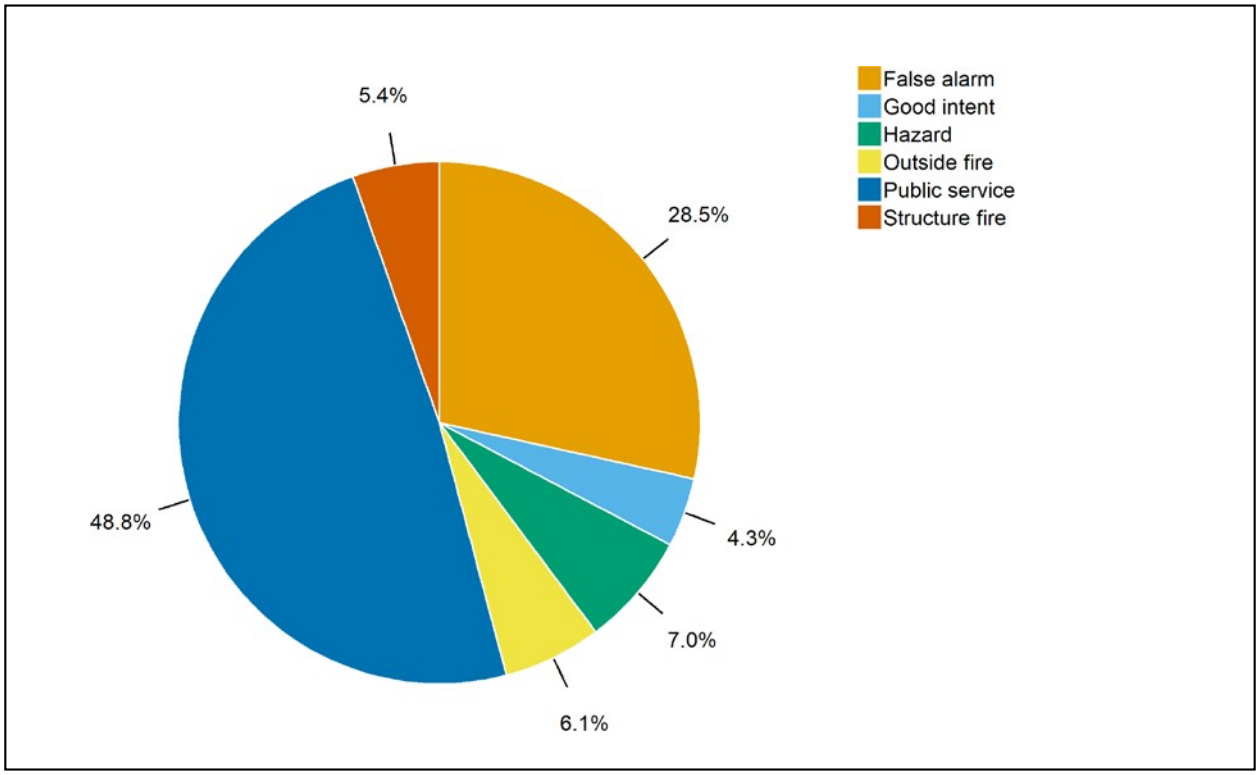
#### TABLE 7-1: Call Types

| Call Type | Number of Calls | Calls per Day | Call Percentage |
|---|---|---|---|
| Breathing difficulty | 162 | 0.4 | 4.2 |
| Cardiac and stroke | 292 | 0.8 | 7.6 |
| Fall and injury | 370 | 1.0 | 9.6 |
| Illness and other | 435 | 1.2 | 11.3 |
| MVA | 444 | 1.2 | 11.5 |
| Overdose and psychiatric | 266 | 0.7 | 6.9 |
| Seizure and unconsciousness | 353 | 1.0 | 9.2 |
| **EMS Total** | **2,322** | **6.4** | **60.2** |
| False alarm | 206 | 0.6 | 5.3 |
| Good intent | 31 | 0.1 | 0.8 |
| Hazard | 51 | 0.1 | 1.3 |
| Outside fire | 44 | 0.1 | 1.1 |
| Public service | 353 | 1.0 | 9.2 |
| Structure fire | 39 | 0.1 | 1.0 |
| **Fire Total** | **724** | **2.0** | **18.8** |
| Automatic aid | 443 | 1.2 | 11.5 |
| Canceled | 348 | 1.0 | 9.0 |
| Mutual aid | 19 | 0.1 | 0.5 |
| **Total** | **3,856** | **10.6** | **100.0** |

## FIGURE 7-1: EMS Calls by Type




## FIGURE 7-2: Fire Calls by Type



## Observations:

### *Overall*

- The department received an average of 10.6 calls per day, including 1.3 aid given calls and 1.7 canceled calls.
- EMS calls for the year totaled 2,322 (60 percent of all calls), an average of 6.4 per day.
- Fire calls for the year totaled 724 (19 percent of all calls), an average of 2.0 per day.

### *EMS*

- Motor vehicle accidents were the largest category of EMS calls at 19 percent of EMS calls, an average of 1.2 calls per day.
- Cardiac and stroke calls made up 13 percent of EMS calls, an average of 0.8 calls per day.

### *Fire*

- Public service calls were the largest category of fire calls at 49 percent of fire calls, an average of 1.0 calls per day.
- False alarm calls made up 28 percent of fire calls, an average of 0.6 calls per day.
- Structure and outside fire calls combined made up 11 percent of fire calls, an average of 0.2 calls per day, or one call every 4 days.

## Calls by Type and Duration

The following table shows the duration of calls by type using four duration categories: less than 30 minutes, 30 minutes to one hour, one to two hours, and more than an hour. Here, we only consider the amount of time QCFMD units spend on a call.

### TABLE 7-2: Calls by Type and Duration

| Call Type | Less than 30 Minutes | 30 Minutes to One Hour | One to Two Hours | More Than Two Hours | Total |
|---|---|---|---|---|---|
| Breathing difficulty | 113 | 49 | 0 | 0 | 162 |
| Cardiac and stroke | 196 | 83 | 13 | 0 | 292 |
| Fall and injury | 206 | 156 | 7 | 1 | 370 |
| Illness and other | 243 | 182 | 9 | 1 | 435 |
| MVA | 295 | 134 | 15 | 0 | 444 |
| Overdose and psychiatric | 138 | 119 | 8 | 1 | 266 |
| Seizure and unconsciousness | 221 | 127 | 4 | 1 | 353 |
| **EMS Total** | **1,412** | **850** | **56** | **4** | **2,322** |
| False alarm | 181 | 23 | 2 | 0 | 206 |
| Good intent | 26 | 3 | 2 | 0 | 31 |
| Hazard | 18 | 19 | 11 | 3 | 51 |
| Outside fire | 20 | 13 | 8 | 3 | 44 |
| Public service | 304 | 32 | 10 | 7 | 353 |
| Structure fire | 27 | 6 | 5 | 1 | 39 |
| **Fire Total** | **576** | **96** | **38** | **14** | **724** |
| Automatic aid | 284 | 136 | 15 | 8 | 443 |
| Canceled | 345 | 2 | 1 | 0 | 348 |
| Mutual aid | 12 | 6 | 0 | 1 | 19 |
| **Total** | **2,629** | **1,090** | **110** | **27** | **3,856** |

## Observations:

### *EMS*

- A total of 2,262 EMS calls (97 percent) lasted less than one hour, 56 EMS calls (2 percent) lasted one to two hours, and 4 EMS calls (less than 1 percent) lasted two or more hours.
- On average, there were 0.2 EMS calls per day that lasted more than one hour.
- A total of 279 cardiac and stroke calls (96 percent) lasted less than one hour, and 13 cardiac and stroke calls (4 percent) lasted one to two hours.
- A total of 429 motor vehicle accidents (97 percent) lasted less than one hour, and 15 motor vehicle accidents (3 percent) lasted one to two hours.

### *Fire*

- A total of 672 fire calls (93 percent) lasted less than one hour, 38 fire calls (5 percent) lasted one to two hours, and 14 fire calls (2 percent) lasted two or more hours.
- On average, there were 0.1 fire calls per day that lasted more than one hour.
- A total of 33 structure fire calls (85 percent) lasted less than one hour, 5 structure fire calls (13 percent) lasted one to two hours, and 1 structure fire call (3 percent) lasted two or more hours.
- A total of 33 outside fire calls (75 percent) lasted less than one hour, 8 outside fire calls (18 percent) lasted one to two hours, and 3 outside fire calls (7 percent) lasted two or more hours.
- A total of 204 false alarm calls (99 percent) lasted less than one hour, and 2 false alarm calls (1 percent) lasted one to two hours.

§ § §

## Average Calls per Day and per Hour

Figure 7-3 shows the monthly variation in the average daily number of calls handled by the QCFMD during the year studied. Similarly, Figure 7-4 illustrates the average number of calls received each hour of the day over the course of the year.

### FIGURE 7-3: Average Calls per Day, by Month

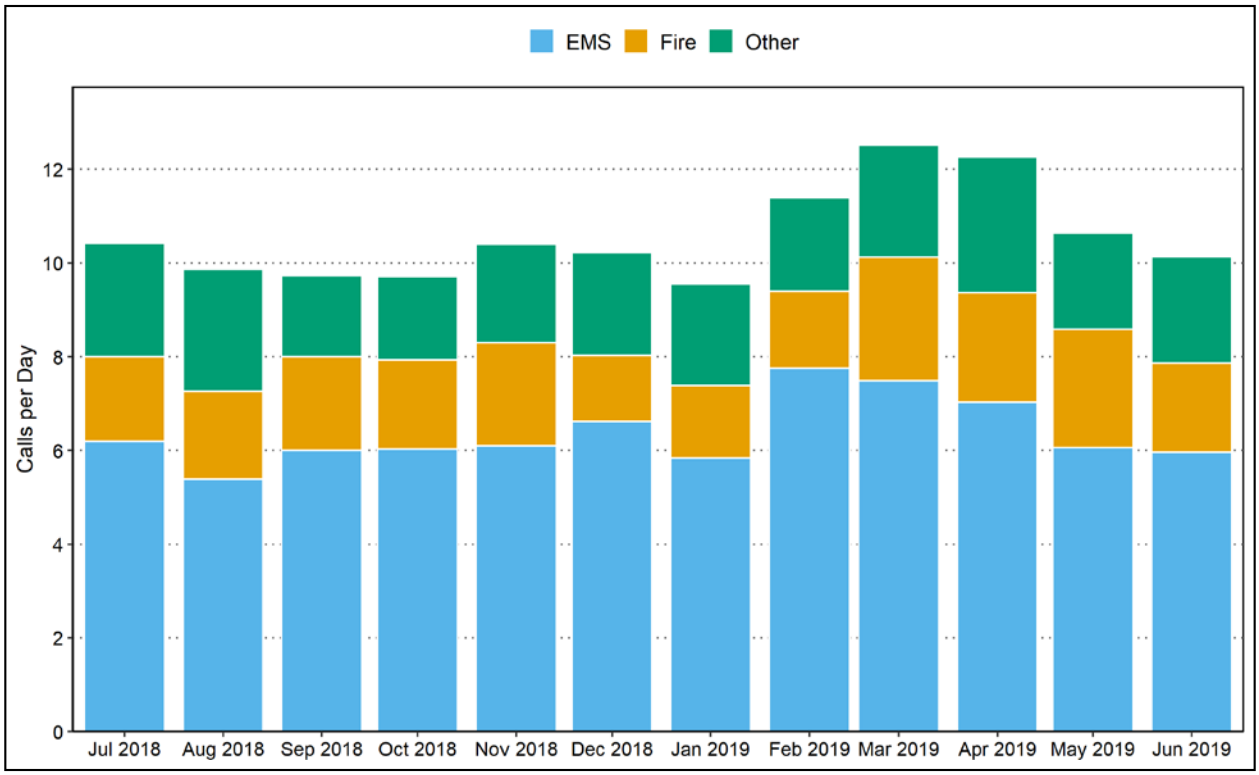
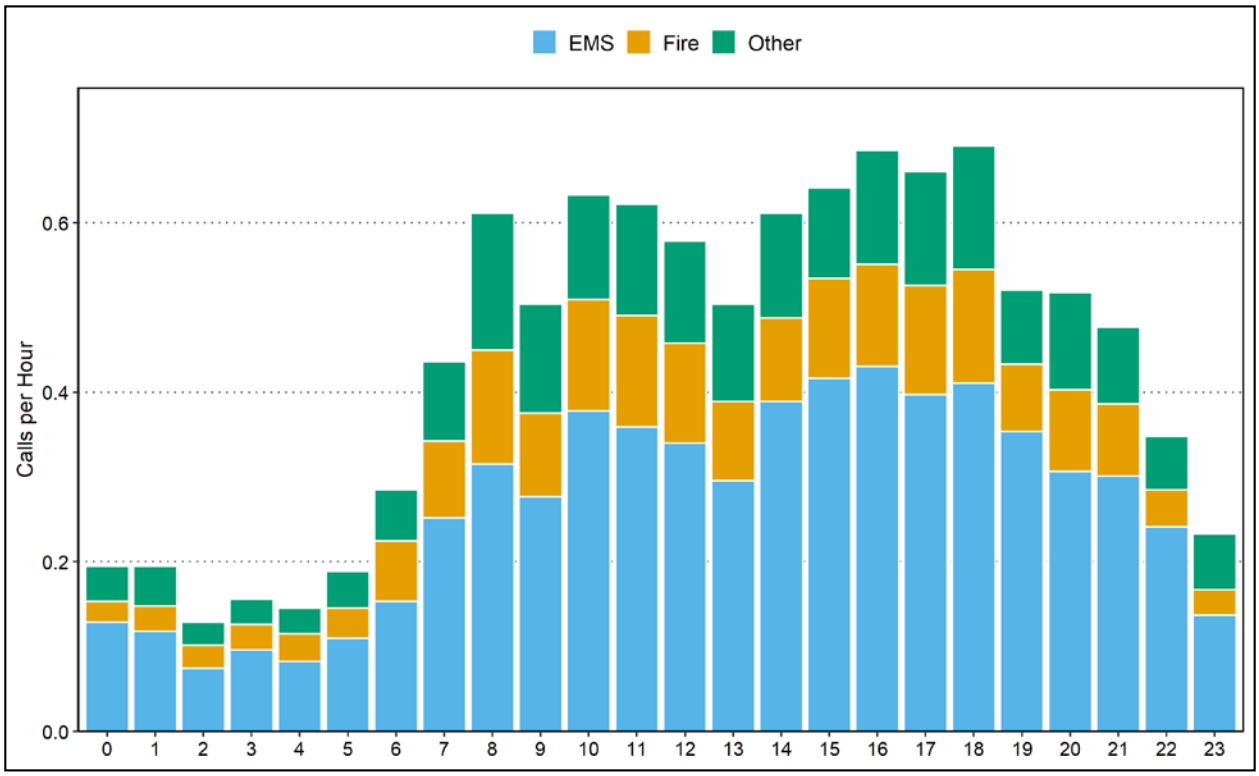


**FIGURE 7-4: Average Calls by Hour of Day**




## Observations:

### *Average Calls per Month*

- Average EMS calls per day ranged from 5.4 in August 2018 to 7.8 in February 2019.
- Average fire calls per day ranged from 1.4 in December 2018 to 2.6 in March 2019.
- Average other calls per day ranged from 1.7 in September 2018 to 2.9 in April 2019.
- Average calls per day overall ranged from 9.5 in January 2019 to 12.5 in March 2019.

### *Average Calls per Hour*

- Average EMS calls per hour ranged from 0.07 between 2:00 a.m. and 3:00 a.m. to 0.43 between 4:00 p.m. and 5:00 p.m.
- Average fire calls per hour ranged from 0.02 between midnight and 1:00 a.m. to 0.13 between 8:00 a.m. and 9:00 a.m. and between 6:00 p.m. and 7:00 p.m.
- Average other calls per hour ranged from 0.03 between 2:00 a.m. and 3:00 a.m. to 0.16 between 8:00 a.m. and 9:00 a.m.
- Average calls per hour overall ranged from 0.13 between 2:00 a.m. and 3:00 a.m. to 0.69 between 6:00 p.m. and 7:00 p.m.

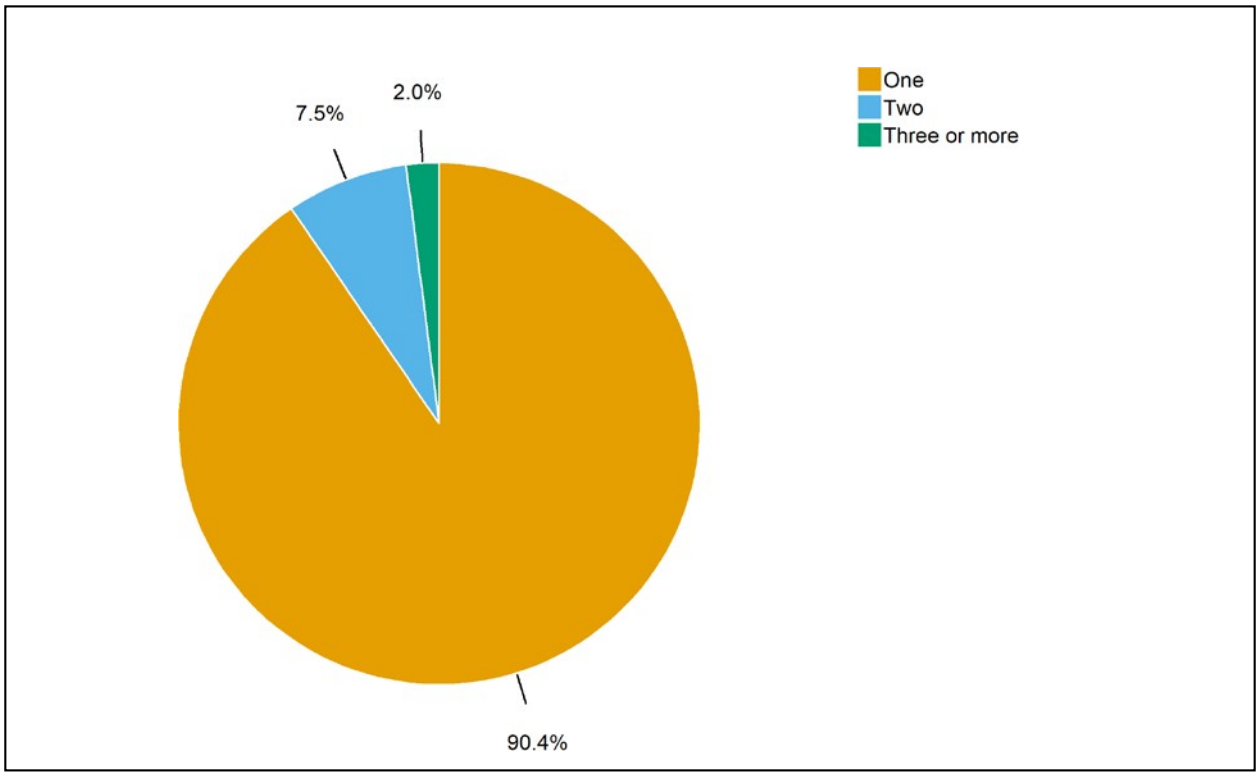
## Units Dispatched to Calls

The following table and two figures detail the number of QCFMD calls with one, two, or three or more QCFMD units dispatched overall and broken down by call type. This analysis does not examine the number of ambulances or units from other fire departments on a call.

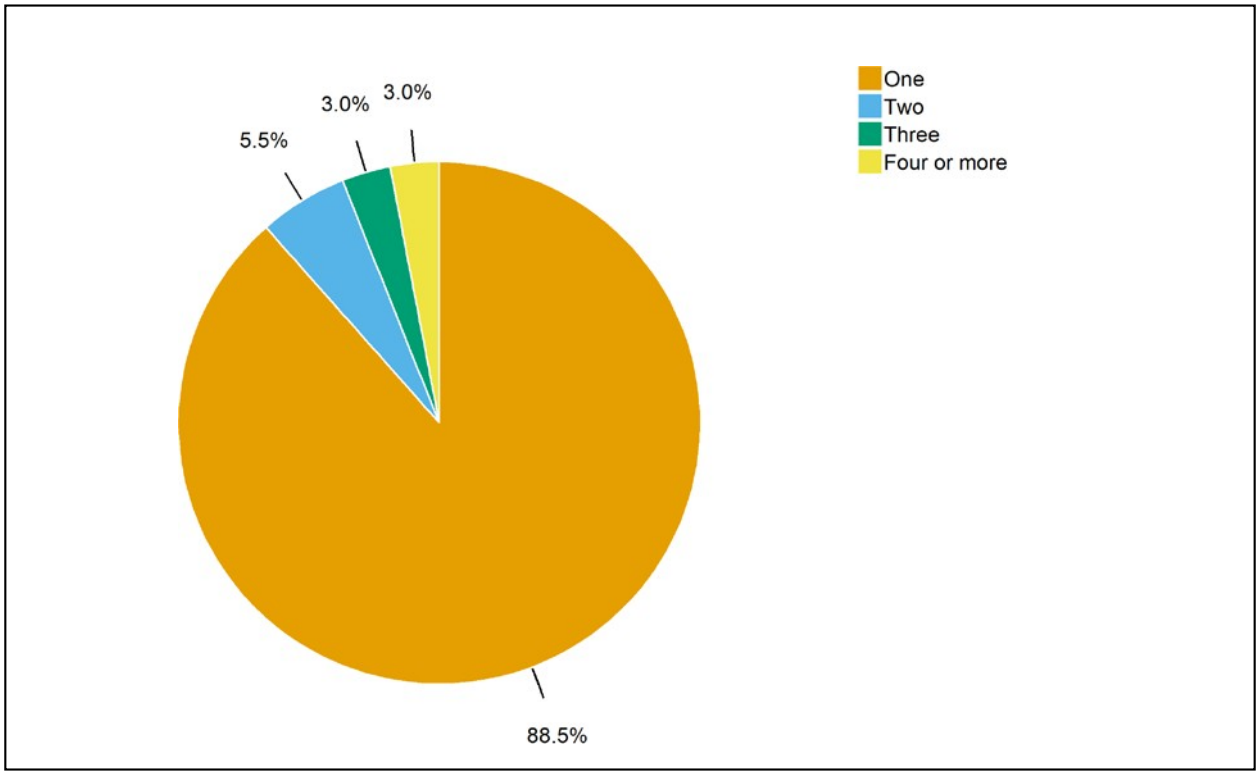
### TABLE 7-3: Calls by Call Type and Number of QCFMD Units Dispatched

| Call Type | Number of Units | | | Total Calls |
|---|---|---|---|---|
| | One | Two | Three or More | |
| Breathing difficulty | 158 | 4 | 0 | 162 |
| Cardiac and stroke | 244 | 36 | 12 | 292 |
| Fall and injury | 348 | 20 | 2 | 370 |
| Illness and other | 417 | 12 | 6 | 435 |
| MVA | 355 | 63 | 26 | 444 |
| Overdose and psychiatric | 247 | 18 | 1 | 266 |
| Seizure and unconsciousness | 331 | 22 | 0 | 353 |
| **EMS Total** | **2,100** | **175** | **47** | **2,322** |
| False alarm | 198 | 8 | 0 | 206 |
| Good intent | 26 | 5 | 0 | 31 |
| Hazard | 28 | 5 | 18 | 51 |
| Outside fire | 29 | 5 | 10 | 44 |
| Public service | 335 | 12 | 6 | 353 |
| Structure fire | 24 | 5 | 10 | 39 |
| **Fire Total** | **640** | **40** | **44** | **724** |
| Automatic aid | 410 | 23 | 10 | 443 |
| Canceled | 322 | 24 | 2 | 348 |
| Mutual aid | 15 | 2 | 2 | 19 |
| **Total** | **3,487** | **264** | **105** | **3,856** |
| **Total Percentage** | **90.4** | **6.8** | **2.7** | **100.0** |

## FIGURE 7-5: Calls by Number of Units Arriving – EMS




## FIGURE 7-6: Calls by Number of Units Arriving – Fire



## Observations:

### *Overall*

- On average, 1.1 units were dispatched to all calls; for 90 percent of calls only one unit was dispatched.
- Overall, three or more units were dispatched to 3 percent of calls.

### *EMS*

- For EMS calls, one unit was dispatched 90 percent of the time, two units were dispatched 8 percent of the time, and three or more units were dispatched 2 percent of the time.
- On average, 1.1 units were dispatched per EMS call.

### *Fire*

- For fire calls, one unit was dispatched 88 percent of the time, two units were dispatched 6 percent of the time, three units were dispatched 3 percent of the time, and four or more units were dispatched 3 percent of the time.
- On average, 1.2 units were dispatched per fire call.
- For outside fire calls, three or more units were dispatched 23 percent of the time.
- For structure fire calls, three or more units were dispatched 26 percent of the time.

## WORKLOAD: RUNS AND TOTAL TIME SPENT

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

### Runs and Deployed Time – All Units

Deployed time, also referred to as deployed hours, is the total deployment time of all units deployed on all runs. The following table shows the total deployed time, both overall and broken down by type of run, for QCFMD units during the year studied.

#### TABLE 7-4: Annual Runs and Deployed Time by Run Type

| Call Type | Avg. Deployed Min. per Run | Total Annual Hours | Percent of Total Hours | Avg. Deployed Min. per Day | Total Annual Runs | Avg. Runs per Day |
|---|---|---|---|---|---|---|
| Breathing difficulty | 27.0 | 74.7 | 3.6 | 12.3 | 166 | 0.5 |
| Cardiac and stroke | 27.7 | 162.7 | 7.8 | 26.7 | 353 | 1.0 |
| Fall and injury | 29.9 | 197.9 | 9.5 | 32.5 | 397 | 1.1 |
| Illness and other | 29.8 | 228.6 | 11.0 | 37.6 | 460 | 1.3 |
| MVA | 26.1 | 246.0 | 11.8 | 40.4 | 566 | 1.6 |
| Overdose and psychiatric | 30.9 | 147.8 | 7.1 | 24.3 | 287 | 0.8 |
| Seizure and unconsciousness | 27.6 | 173.0 | 8.3 | 28.4 | 376 | 1.0 |
| **EMS Total** | **28.3** | **1,230.8** | **59.2** | **202.3** | **2,605** | **7.1** |
| False alarm | 17.5 | 62.6 | 3.0 | 10.3 | 215 | 0.6 |
| Good intent | 20.8 | 12.5 | 0.6 | 2.1 | 36 | 0.1 |
| Hazard | 45.6 | 73.7 | 3.5 | 12.1 | 97 | 0.3 |
| Outside fire | 86.0 | 111.8 | 5.4 | 18.4 | 78 | 0.2 |
| Public service | 33.1 | 211.0 | 10.2 | 34.7 | 383 | 1.0 |
| Structure fire | 31.8 | 38.7 | 1.9 | 6.4 | 73 | 0.2 |
| **Fire Total** | **34.7** | **510.4** | **24.6** | **83.9** | **882** | **2.4** |
| Automatic aid | 32.1 | 261.9 | 12.6 | 43.1 | 489 | 1.3 |
| Canceled | 7.7 | 48.6 | 2.3 | 8.0 | 377 | 1.0 |
| Mutual aid | 55.5 | 25.9 | 1.2 | 4.3 | 28 | 0.1 |
| **Other Total** | **22.6** | **336.5** | **16.2** | **55.3** | **894** | **2.4** |
| **Total** | **28.5** | **2,077.6** | **100.0** | **341.5** | **4,381** | **12.0** |

## Observations:

### *Overall*

- Total deployed time for the year was 2,077.6 hours. The daily average was 5.7 hours for all units combined.
- There were 4,381 runs, including 377 runs dispatched for canceled calls, 489 runs dispatched for automatic aid calls, and 28 runs dispatched for mutual aid calls. The daily average was 12.0 runs.

### *EMS*

- EMS runs accounted for 59 percent of the total workload.
- The average deployed time for EMS runs was 28.3 minutes. The deployed time for all EMS runs averaged 3.4 hours per day.

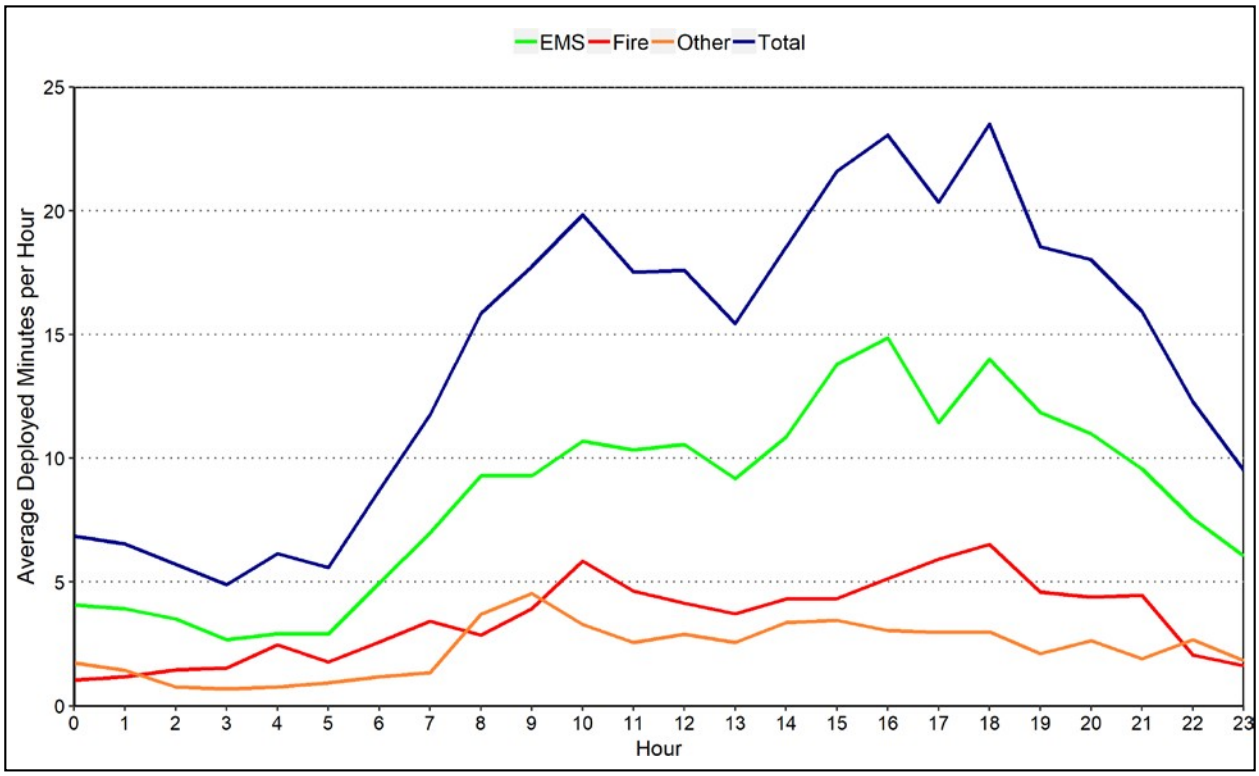
### *Fire*

- Fire runs accounted for 25 percent of the total workload.
- The average deployed time for fire runs was 34.7 minutes. The deployed time for all fire runs averaged 1.4 hours per day.
- There were 151 runs for structure and outside fire calls combined, with a total workload of 150.5 hours. This accounted for 7 percent of the total workload.
- The average deployed time for outside fire runs was 86.0 minutes per run, and the average deployed time for structure fire runs was 31.8 minutes per run.
- One outside fire call on July 30, 2019 lasted approximately 22 hours and involved 7 runs. Excluding this call's runs lowers the average deployed time for outside fire runs to 49.8 minutes per run.

## TABLE 7-5: Average Deployed Minutes by Hour of Day

| Hour | EMS | Fire | Other | Total |
|---|---|---|---|---|
| 0 | 4.1 | 1.0 | 1.7 | 6.9 |
| 1 | 3.9 | 1.2 | 1.4 | 6.5 |
| 2 | 3.5 | 1.5 | 0.8 | 5.7 |
| 3 | 2.7 | 1.5 | 0.7 | 4.9 |
| 4 | 2.9 | 2.5 | 0.8 | 6.1 |
| 5 | 2.9 | 1.8 | 0.9 | 5.6 |
| 6 | 4.9 | 2.7 | 1.2 | 8.7 |
| 7 | 6.9 | 3.5 | 1.3 | 11.8 |
| 8 | 9.3 | 2.9 | 3.7 | 15.9 |
| 9 | 9.1 | 4.1 | 4.5 | 17.7 |
| 10 | 10.5 | 6.0 | 3.3 | 19.8 |
| 11 | 10.3 | 4.7 | 2.6 | 17.5 |
| 12 | 10.6 | 4.2 | 2.9 | 17.6 |
| 13 | 9.2 | 3.7 | 2.6 | 15.4 |
| 14 | 10.8 | 4.3 | 3.4 | 18.5 |
| 15 | 13.8 | 4.4 | 3.5 | 21.6 |
| 16 | 14.9 | 5.1 | 3.0 | 23.0 |
| 17 | 11.4 | 5.9 | 3.0 | 20.3 |
| 18 | 14.0 | 6.5 | 3.0 | 23.5 |
| 19 | 11.8 | 4.6 | 2.1 | 18.5 |
| 20 | 11.0 | 4.4 | 2.6 | 18.0 |
| 21 | 9.6 | 4.5 | 1.9 | 15.9 |
| 22 | 7.6 | 2.1 | 2.7 | 12.3 |
| 23 | 6.1 | 1.6 | 1.8 | 9.5 |
| **Total** | **201.6** | **84.5** | **55.3** | **341.4** |

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




## Observations:

- Hourly deployed time was highest during the day from 10:00 a.m. to 8:00 p.m., averaging between 19 minutes and 24 minutes.
- Average deployed time peaked between 6:00 p.m. and 7:00 p.m., averaging 24 minutes.
- Average deployed time was lowest between 3:00 a.m. and 4:00 a.m., averaging 5 minutes.

## Workload by Location

Table 7-6 breaks down the workload of QCFMD by location of the call. Table 7-7 provides further detail on the workload associated with structure and outside fire calls, also broken down by location.

### TABLE 7-6: Annual Workload by Location

| Location | Calls | Pct. Annual Calls | Runs | Avg. Runs per Day | Avg. Deployed Min. per Run | Total Annual Hours | Pct. Annual Workload | Avg. Deployed Min. per Day |
|---|---|---|---|---|---|---|---|---|
| Queen Creek | 3,020 | 78.3 | 3,431 | 9.4 | 27.0 | 1,544.7 | 74.3 | 253.9 |
| Gilbert | 329 | 8.5 | 356 | 1.0 | 27.0 | 160.0 | 7.7 | 26.3 |
| Unincorporated (in fire district) | 291 | 7.5 | 347 | 1.0 | 43.9 | 254.2 | 12.2 | 41.8 |
| Mesa | 160 | 4.1 | 185 | 0.5 | 29.4 | 90.6 | 4.4 | 14.9 |
| Unincorporated (out of fire district) | 52 | 1.3 | 58 | 0.2 | 24.6 | 23.8 | 1.1 | 3.9 |
| Other | 4 | 0.1 | 4 | 0.0 | 65.6 | 4.4 | 0.2 | 0.7 |
| **Total** | **3,856** | **100.0** | **4,381** | **12.0** | **28.5** | **2,077.6** | **100.0** | **341.5** |

**Note:** The four "Other" calls include one call in Apache Junction, one call in Chandler, and two calls in Tempe.

### TABLE 7-7: Structure and Outside Fire Runs by Location

| Location | Structure Fire Runs | Structure Fires Average Deployed Min. per Run | Outside Fire Runs | Outside Fires Average Deployed Min. per Run | Total Annual Hours for Structure and Outside Fires | Pct. of Structure and Outside Fire Workload |
|---|---|---|---|---|---|---|
| Queen Creek | 56 | 28.4 | 55 | 47.5 | 70.0 | 32.1 |
| Gilbert | 20 | 49.2 | 7 | 19.0 | 18.6 | 8.5 |
| Unincorporated (in fire district) | 22 | 73.7 | 27 | 156.6 | 97.4 | 44.6 |
| Mesa | 3 | 40.5 | 12 | 132.0 | 28.4 | 13.0 |
| Unincorporated (out of fire district) | 4 | 44.2 | 2 | 24.7 | 3.8 | 1.8 |
| **Total** | **105** | **42.8** | **103** | **83.5** | **218.3** | **100.0** |

## Observations:

### *Queen Creek*

- Total deployed time for the year was 1,544.7 hours, or 74.3 percent of the total annual workload. The daily average was 4.2 hours for all units combined.
- There were 3,431 runs, including 259 runs dispatched for canceled calls. The daily average was 9.4 runs.

### *Gilbert*

- Total deployed time for the year was 160.0 hours, or 7.7 percent of the total annual workload. The daily average was 26.3 minutes for all units combined.
- There were 356 runs, including 28 runs dispatched for canceled calls. The daily average was 1.0 runs.

### *Unincorporated (In Fire District)*

- Total deployed time for the year was 254.2 hours, or 12.2 percent of the total annual workload. The daily average was 41.8 minutes for all units combined.
- There were 347 runs, including 16 runs dispatched for canceled calls. The daily average was 1.0 runs.

### *Mesa*

- Total deployed time for the year was 90.6 hours, or 4.4 percent of the total annual workload. The daily average was 14.9 minutes for all units combined.
- There were 185 runs, including 56 runs dispatched for canceled calls. The daily average was 0.5 runs.

### *Unincorporated (Out of Fire District)*

- Total deployed time for the year was 23.8 hours, or 1.1 percent of the total annual workload. The daily average was 3.9 minutes for all units combined.
- There were 58 runs, including 15 runs dispatched for canceled calls. The daily average was 0.2 runs.

### *Other*

- There were 4 calls in other cities, including one call in Apache Junction, one call in Chandler, and two calls in Tempe.
- Total deployed time for the year was 4.4 hours, or 0.2 percent of the total annual workload. The daily average was 0.7 minutes for all units combined.
- There were 4 runs, including 3 runs dispatched for canceled calls.

## Workload by Unit

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

### TABLE 7-8: Call Workload by Unit

| Station | Unit ID | Unit Type | Avg. Deployed Min. per Run | Total Annual Hours | Avg. Deployed Min. per Day | Total Annual Runs | Avg. Runs per Day |
|---|---|---|---|---|---|---|---|
| 411 | B411 | Battalion chief | 32.9 | 184.2 | 30.3 | 336 | 0.9 |
| | E411 | Engine | 24.1 | 745.0 | 122.5 | 1,853 | 5.1 |
| | GTR411 | Special event unit | 612.6 | 61.3 | 10.1 | 6 | 0.0 |
| | R411 | Ambulance | 210.9 | 31.6 | 5.2 | 9 | 0.0 |
| | T411 | Tanker | 377.7 | 31.5 | 5.2 | 5 | 0.0 |
| | **Total** | | **28.6** | **1,053.6** | **173.2** | **2,209** | **6.1** |
| 412 | BR412 | Brush truck | 155.7 | 28.5 | 4.7 | 11 | 0.0 |
| | E412 | Engine | 28.4 | 370.9 | 61.0 | 784 | 2.1 |
| | E4111 | Engine | 46.5 | 8.5 | 1.4 | 11 | 0.0 |
| | **Total** | | **30.4** | **407.9** | **67.1** | **806** | **2.2** |
| 413 | E413 | Engine | 26.0 | 480.0 | 78.9 | 1,107 | 3.0 |
| | **Total** | | **26.0** | **480.0** | **78.9** | **1,107** | **3.0** |
| Temp 415 | E414 | Engine | 31.5 | 136.2 | 22.4* | 259 | 0.7* |
| | **Total** | | **31.5** | **136.2** | **22.4*** | **259** | **0.7*** |
| **Total** | | | **28.5** | **2,077.6** | **341.5** | **4,381** | **12.0** |

**Note for Tables 7-8 to 7-10:** Interim Station 5 opened on March 1, 2019. In Table 7-8, we calculated the values with an asterisk assuming that E414 was at the station for the full year covered by this study. This allows the total runs per day and deployed minutes per day to add properly. The final observation on the page following Table 7-10 recalculates the average deployed minutes per day and average runs per day for this engine accounting for the fact that the station was only in service for part of the year covered by the study.

## TABLE 7-9: Total Annual Runs by Run Type and Unit

| Station | Unit ID | Unit Type | EMS | False Alarm | Good Intent | Hazard | Outside Fire | Public Service | Structure Fire | Automatic Aid | Canceled | Mutual Aid | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 411 | B411 | Battalion chief | 161 | 1 | 4 | 22 | 11 | 12 | 15 | 71 | 34 | 5 | 336 |
| | E411 | Engine | 1,271 | 116 | 11 | 33 | 21 | 156 | 14 | 54 | 167 | 10 | 1,853 |
| | GTR411 | Special event unit | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 6 |
| | R411 | Ambulance | 5 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 9 |
| | T411 | Tanker | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 1 | 0 | 1 | 5 |
| | **Total** | | **1,437** | **117** | **15** | **55** | **34** | **179** | **29** | **126** | **201** | **16** | **2,209** |
| 412 | BR412 | Brush truck | 1 | 0 | 0 | 0 | 4 | 2 | 0 | 1 | 3 | 0 | 11 |
| | E412 | Engine | 474 | 33 | 3 | 16 | 16 | 108 | 25 | 49 | 55 | 5 | 784 |
| | E4111 | Engine | 3 | 0 | 0 | 0 | 0 | 1 | 0 | 7 | 0 | 0 | 11 |
| | **Total** | | **478** | **33** | **3** | **16** | **20** | **111** | **25** | **57** | **58** | **5** | **806** |
| 413 | E413 | Engine | 521 | 48 | 15 | 23 | 17 | 72 | 12 | 302 | 91 | 6 | 1,107 |
| | **Total** | | **521** | **48** | **15** | **23** | **17** | **72** | **12** | **302** | **91** | **6** | **1,107** |
| Temp 415 | E414 | Engine | 169 | 17 | 3 | 3 | 7 | 21 | 7 | 4 | 27 | 1 | 259 |
| | **Total** | | **169** | **17** | **3** | **3** | **7** | **21** | **7** | **4** | **27** | **1** | **259** |
| **Total** | | | **2,605** | **215** | **36** | **97** | **78** | **383** | **73** | **489** | **377** | **28** | **4,381** |

## TABLE 7-10: Daily Average Deployed Minutes by Run Type and Unit

| Station | Unit ID | Unit Type | EMS | False Alarm | Good Intent | Hazard | Outside Fire | Public Service | Structure Fire | Automatic Aid | Canceled | Mutual Aid | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 411 | B411 | Battalion chief | 12.7 | 0.1 | 0.4 | 3.2 | 2.1 | 1.3 | 1.5 | 7.4 | 0.7 | 0.9 | 30.3 |
| | E411 | Engine | 91.9 | 5.4 | 0.4 | 3.5 | 3.0 | 7.8 | 1.4 | 4.4 | 3.4 | 1.2 | 122.5 |
| | GTR411 | Special event unit | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.1 | 0.0 | 0.0 | 0.0 | 0.0 | 10.1 |
| | R411 | Ambulance | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 5.2 |
| | T411 | Tanker | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 0.4 | 0.0 | 0.3 | 0.0 | 0.5 | 5.2 |
| | **Total** | | **105.7** | **5.5** | **0.8** | **6.7** | **9.1** | **23.8** | **2.9** | **12.2** | **4.1** | **2.5** | **173.2** |
| 412 | BR412 | Brush truck | 0.1 | 0.0 | 0.0 | 0.0 | 3.5 | 0.5 | 0.0 | 0.4 | 0.2 | 0.0 | 4.7 |
| | E412 | Engine | 41.8 | 1.7 | 0.1 | 2.1 | 2.4 | 5.1 | 1.9 | 4.3 | 1.2 | 0.4 | 61.0 |
| | E4111 | Engine | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.1 | 0.0 | 0.0 | 1.4 |
| | **Total** | | **42.0** | **1.7** | **0.1** | **2.1** | **5.9** | **5.6** | **1.9** | **5.9** | **1.4** | **0.4** | **67.1** |
| 413 | E413 | Engine | 39.0 | 2.1 | 1.0 | 2.6 | 2.2 | 3.8 | 0.9 | 24.7 | 1.8 | 0.8 | 78.9 |
| | **Total** | | **39.0** | **2.1** | **1.0** | **2.6** | **2.2** | **3.8** | **0.9** | **24.7** | **1.8** | **0.8** | **78.9** |
| Temp 415 | E414* | Engine | 15.6 | 1.0 | 0.2 | 0.8 | 1.2 | 1.5 | 0.7 | 0.3 | 0.6 | 0.5 | 22.4 |
| | **Total** | | **15.6** | **1.0** | **0.2** | **0.8** | **1.2** | **1.5** | **0.7** | **0.3** | **0.6** | **0.5** | **22.4** |
| **Total** | | | **202.3** | **10.3** | **2.1** | **12.1** | **18.4** | **34.7** | **6.4** | **43.1** | **8.0** | **4.3** | **341.5** |

**Note**: The values for E414 are calculated assuming that the unit was at Interim Station 5 for the entire year covered by the study.

## Observations:

- On a station level, Station 1made the most runs (2,209, or an average of 6.1 runs per day) and had the highest total annual deployed time (1,053.5 hours, or an average of 2.9 hour per day).
  - EMS calls accounted for 65 percent of runs and 61 percent of total deployed time.
  - Structure and outside fire calls accounted for 3 percent of runs and 7 percent of total deployed time.
- On a station level, Station 3 made the second-most runs (1,107, or an average of 3.0 runs per day) and had the second-highest total annual deployed time (480.0 hours, or an average of 1.3 hours per day).
  - EMS calls accounted for 47 percent of runs and 49 percent of total deployed time.
  - Structure and outside fire calls accounted for 3 percent of runs and 4 percent of total deployed time.
- On a unit level, E411 made the most runs (1,853, or an average of 5.1 runs per day) and had the highest annual deployed time (745.0 hours, or an average of 2.0 hours per day).
  - EMS calls accounted for 68 percent of runs and 75 percent of total deployed time.
  - Structure and outside fire calls accounted for 2 percent of runs and 4 percent of total deployed time.
- On a unit level, E413 made the second-most runs (1,107 or an average of 3.0 runs per day) and had the second-highest total annual deployed time (480.0 hours, or an average of 1.3 hours per day).
  - EMS calls accounted for 47 percent of runs and 49 percent of total deployed time.
  - Structure and outside fire calls accounted for 3 percent of runs and 4 percent of total deployed time.
- E414 began operating out of Temporary Station 5 on March 1, 2019 and was therefore in service for 122 days during the year covered by this study.
  - During these 122 days, E414 averaged 2.1 runs per day, and was deployed for an average of 67.0 minutes per day.

## ANALYSIS OF BUSIEST HOURS

There is significant variability in the number of calls from hour to hour. One special concern relates to the resources available for hours with the heaviest workload. We tabulated the data for each of the 8,760 hours in the year. Table 7-11 shows the number of hours in the year in which there were zero to four or more calls during the hour. Table 7-12 examines the number of times a call within a station's first due area overlapped with another call in the same area. Table 7-13 examines the availability of a unit at a station to respond to calls within its first due area. Table 7-14 shows the 10 one-hour intervals which had the most calls during the year. Tables 7-11 through 7-14 are limited to calls where at least one Queen Creek unit responded, while Tables 7-12 and 7-13 are further limited to calls within Queen Creek's fire district.

### TABLE 7-11: Frequency Distribution of the Number of Calls

| Calls in an Hour | Frequency | Percentage |
|---|---|---|
| 0 | 5,784 | 66.0 |
| 1 | 2,234 | 25.5 |
| 2 | 620 | 7.1 |
| 3 | 106 | 1.2 |
| 4+ | 16 | 0.2 |
| **Total** | **8,760** | **100.0** |

### TABLE 7-12: Frequency of Overlapping Calls

| Station | Scenario | Number of Calls | Percent of All Calls | Total Hours |
|---|---|---|---|---|
| 411 | No overlapped call | 1,590 | 81.1 | 1,185.5 |
| | Overlapped with one call | 328 | 16.7 | 125.2 |
| | Overlapped with two calls | 39 | 2.0 | 8.0 |
| | Overlapped with three calls | 4 | 0.2 | 0.8 |
| 412 | No overlapped call | 579 | 92.3 | 528.0 |
| | Overlapped with one call | 44 | 7.0 | 26.3 |
| | Overlapped with two calls | 4 | 0.6 | 0.4 |
| 413 | No overlapped call | 490 | 97.2 | 375.6 |
| | Overlapped with one call | 14 | 2.8 | 5.0 |
| Temp 415 | No overlapped call | 195 | 92.4 | 165.1 |
| | Overlapped with one call | 15 | 7.1 | 4.9 |
| | Overlapped with two calls | 1 | 0.5 | 0.1 |

### TABLE 7-13: Station Availability to Respond to Calls

| Station | Calls in Area | First Due Responded | First Due Arrived | First Due First | Percent Responded | Percent Arrived | Percent First |
|---|---|---|---|---|---|---|---|
| 411 | 1,805 | 1,562 | 1,543 | 1,413 | 86.5 | 85.5 | 78.3 |
| 412 | 576 | 460 | 456 | 421 | 79.9 | 79.2 | 73.1 |
| 413 | 475 | 427 | 409 | 394 | 87.8 | 86.1 | 82.9 |
| Temp 415 | 191 | 130 | 124 | 117 | 68.1 | 64.9 | 61.3 |
| **Total** | **3,047** | **2,569** | **2,532** | **2,345** | **84.3** | **83.1** | **77.0** |

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

### TABLE 7-14: Top 10 Hours with the Most Calls Received

| Hour | Number of Calls | Number of Runs | Total Deployed Hours |
|---|---|---|---|
| 8/1/2018, 11:00 a.m. to noon | 4 | 6 | 2.5 |
| 4/15/2019, 3:00 p.m. to 4:00 p.m. | 4 | 6 | 1.6 |
| 8/12/2018, 6:00 p.m. to 7:00 p.m. | 4 | 5 | 1.6 |
| 4/12/2019, 11:00 a.m. to noon | 4 | 5 | 1.4 |
| 6/25/2019, 11:00 a.m. to noon | 4 | 5 | 1.3 |
| 4/30/2019, 10:00 a.m. to 11:00 a.m. | 4 | 4 | 2.4 |
| 3/4/2019, 4:00 p.m. to 5:00 p.m. | 4 | 4 | 2.2 |
| 11/1/2018, 6:00 p.m. to 7:00 p.m. | 4 | 4 | 2.0 |
| 7/17/2018, 4:00 p.m. to 5:00 p.m. | 4 | 4 | 2.0 |
| 2/22/2019, 7:00 p.m. to 8:00 p.m. | 4 | 4 | 1.9 |

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

## Observations:

- During 16 hours (0.2 percent of all hours), four or more calls occurred, the department responded to four or more calls in an hour roughly once every 23 days.
  - The highest number of calls to occur in an hour was 4, which happened 16 times.
- One of the hours with the highest number of calls and related runs was 11:00 a.m. to noonon August 1, 2018.
  - The hour's 4 calls involved 6 individual dispatches resulting in 2.5 hours of deployed time. These 4 calls included two seizure and unconsciousness calls, one automatic aid call, and one cardiac and stroke call.
- Another hour with the highest number of calls and related runs was 3:00 p.m. to 4:00 p.m. on April 15, 2019.
  - The hour's 4 calls involved 6 individual dispatches resulting in 1.6 hours of deployed time. These 4 calls included two public service calls, one good intent call, and one overdose and psychiatric call.

# RESPONSE TIME

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

In this analysis, in order to compute response times that accurately reflect the amount of time a resident in QCFMD's fire district could expect to wait when calling for emergency fire or EMS services, we included all calls in QCFMD's jurisdiction, and did not limit ourselves to calls where a QCFMD unit responded. We also excluded canceled calls, non-emergency calls, and calls with a total response time of more than 30 minutes. Finally, we focused on units that had complete time stamps, that is, units with all components recorded, so that we could calculate each segment of response time.

Based on the methodology above, of the 3,476 calls in QCFMD's district, we excluded 276 canceled calls, 91 calls where no units recorded a valid on-scene time, 11 calls where the first arriving unit response was greater than 30 minutes, 1,012 non-emergency calls, and 84 calls where one or more segments of the first arriving unit's response time could not be calculated due to missing data. As a result, in this section, a total of 2,002 calls are included in the analysis.

## Response Time by Type of Call

Table 7-15 provides the average dispatch, turnout, travel, and total response time for the first arriving unit to each call in QCFMD's fire district, broken out by the location of the call. Table 7-16 gives the 90th percentile response times broken out in the same manner. A 90th percentile time means that 90 percent of calls had response times at or below that number. For example, Table 7-16 shows a 90th percentile response time of 9.7 minutes, which means that 90 percent of the time a call had a response time of no more than 9.7 minutes.

Table 7-17 provides average dispatch, turnout, travel, and total response time for the first arriving unit to each call in the city, broken out by call type. Figures 7-8 and 7-9 illustrate the same information, and Table 7-18 gives the 90th percentile time broken out in the same manner.

### TABLE 7-15: Average Response Time of First Arriving Unit, by Location

| Location | Call Type | Time (Min.) | | | | Number of Calls |
|---|---|---|---|---|---|---|
| | | Dispatch | Turnout | Travel | Total | |
| Queen Creek | EMS | 0.8 | 1.1 | 4.4 | 6.3 | 1,637 |
| | Fire | 0.8 | 1.1 | 4.6 | 6.5 | 195 |
| | **Total** | **0.8** | **1.1** | **4.5** | **6.3** | **1,832** |
| Unincorporated (in fire district) | EMS | 0.7 | 1.2 | 4.9 | 6.8 | 146 |
| | Fire | 1.1 | 1.0 | 5.3 | 7.4 | 24 |
| | **Total** | **0.8** | **1.1** | **5.0** | **6.9** | **170** |
| **Total** | | **0.8** | **1.1** | **4.5** | **6.4** | **2,002** |

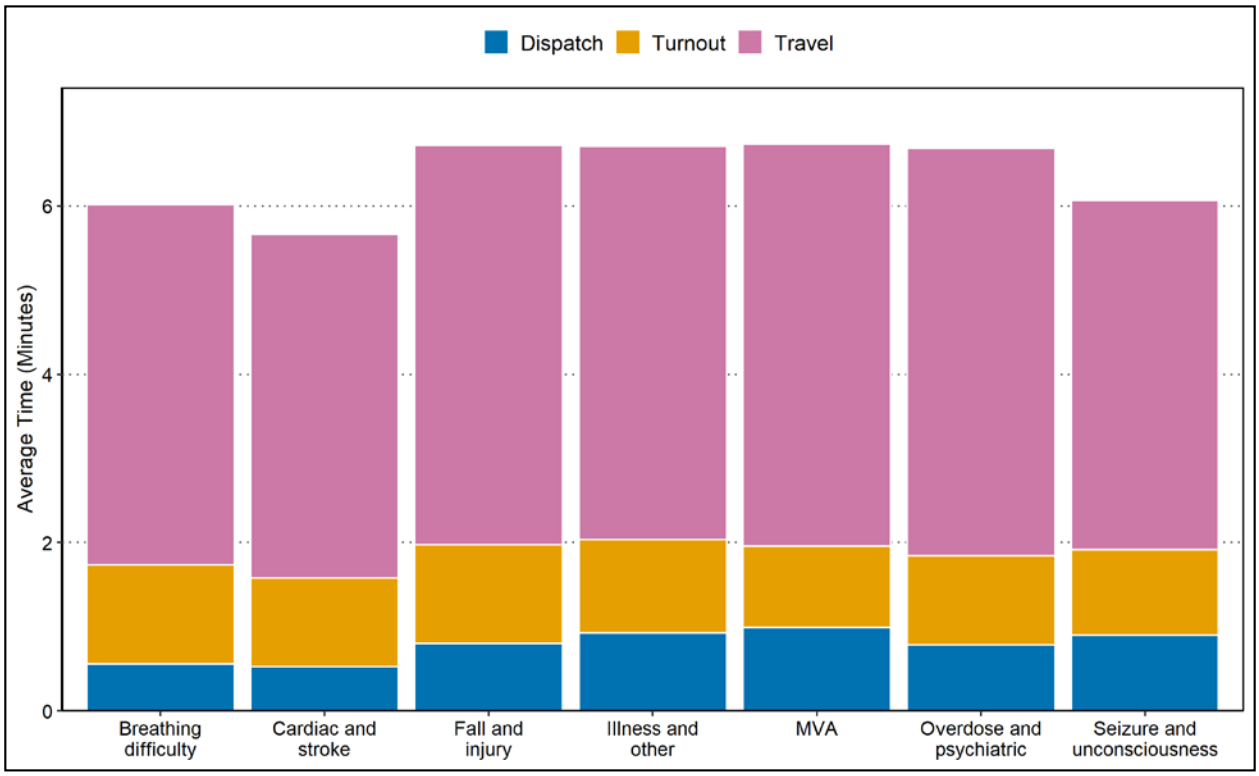
## TABLE 7-16: 90th Percentile Response Time of First Arriving Unit, by Location

| Location | Call Type | Time (Min.) | | | | Number of Calls |
|---|---|---|---|---|---|---|
| | | Dispatch | Turnout | Travel | Total | |
| Queen Creek | EMS | 1.4 | 1.8 | 7.4 | 9.7 | 1,637 |
| | Fire | 1.4 | 2.0 | 7.4 | 10.0 | 195 |
| | **Total** | **1.4** | **1.8** | **7.4** | **9.7** | **1,832** |
| Unincorporated (in fire district) | EMS | 1.4 | 1.8 | 7.5 | 9.3 | 146 |
| | Fire | 3.0 | 1.7 | 7.3 | 10.6 | 24 |
| | **Total** | **1.4** | **1.8** | **7.5** | **9.3** | **170** |
| **Total** | | **1.4** | **1.8** | **7.4** | **9.7** | **2,002** |

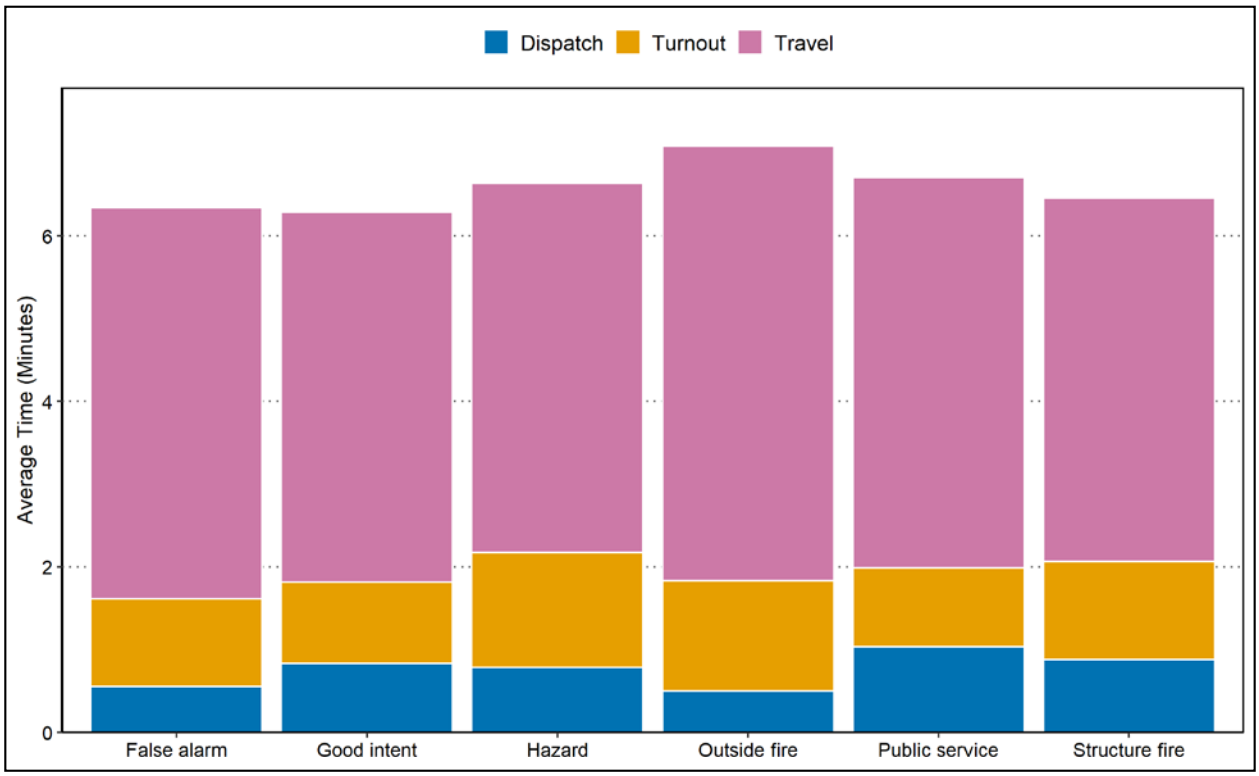
## TABLE 7-17: Average Response Time of First Arriving Unit, by Call Type

| Call Type | Time (Min.) | | | | Number of Calls |
|---|---|---|---|---|---|
| | Dispatch | Turnout | Travel | Total | |
| Breathing difficulty | 0.6 | 1.2 | 4.3 | 6.0 | 157 |
| Cardiac and stroke | 0.5 | 1.1 | 4.1 | 5.7 | 294 |
| Fall and injury | 0.8 | 1.2 | 4.7 | 6.7 | 263 |
| Illness and other | 0.9 | 1.1 | 4.7 | 6.7 | 249 |
| MVA | 1.0 | 1.0 | 4.8 | 6.7 | 394 |
| Overdose and psychiatric | 0.8 | 1.1 | 4.8 | 6.7 | 95 |
| Seizure and unconsciousness | 0.9 | 1.0 | 4.1 | 6.1 | 331 |
| **EMS Total** | **0.8** | **1.1** | **4.5** | **6.4** | **1,783** |
| False alarm | 0.6 | 1.1 | 4.7 | 6.3 | 44 |
| Good intent | 0.8 | 1.0 | 4.5 | 6.3 | 19 |
| Hazard | 0.8 | 1.4 | 4.5 | 6.6 | 35 |
| Outside fire | 0.5 | 1.3 | 5.3 | 7.1 | 31 |
| Public service | 1.0 | 1.0 | 4.7 | 6.7 | 63 |
| Structure fire | 0.9 | 1.2 | 4.4 | 6.5 | 27 |
| **Fire Total** | **0.8** | **1.1** | **4.7** | **6.6** | **219** |
| **Total** | **0.8** | **1.1** | **4.5** | **6.4** | **2,002** |

## FIGURE 7-8: Average Response Time of First Arriving Unit, by Call Type – EMS




## FIGURE 7-9: Average Response Time of First Arriving Unit, by Call Type – Fire



## TABLE 7-18: 90th Percentile Response Time of First Arriving Unit, by Call Type

| Call Type | Time (Min.) | | | | Number of Calls |
|---|---|---|---|---|---|
| | Dispatch | Turnout | Travel | Total | |
| Breathing difficulty | 0.9 | 1.9 | 6.7 | 8.3 | 157 |
| Cardiac and stroke | 0.9 | 1.7 | 6.5 | 8.3 | 294 |
| Fall and injury | 1.5 | 2.1 | 7.8 | 9.8 | 263 |
| Illness and other | 1.8 | 2.0 | 7.8 | 10.2 | 249 |
| MVA | 1.8 | 1.6 | 7.8 | 10.7 | 394 |
| Overdose and psychiatric | 1.5 | 2.0 | 8.4 | 10.0 | 95 |
| Seizure and unconsciousness | 1.4 | 1.8 | 7.2 | 9.3 | 331 |
| **EMS Total** | **1.4** | **1.8** | **7.4** | **9.6** | **1,783** |
| False alarm | 1.2 | 1.9 | 7.7 | 10.6 | 44 |
| Good intent | 1.7 | 1.4 | 9.9 | 11.8 | 19 |
| Hazard | 1.4 | 2.4 | 7.0 | 10.6 | 35 |
| Outside fire | 0.8 | 2.0 | 8.8 | 11.1 | 31 |
| Public service | 2.3 | 1.7 | 7.1 | 9.5 | 63 |
| Structure fire | 2.3 | 2.2 | 7.3 | 10.1 | 27 |
| **Fire Total** | **1.5** | **1.9** | **7.4** | **10.1** | **219** |
| **Total** | **1.4** | **1.8** | **7.4** | **9.7** | **2,002** |

## Observations:

- The average dispatch time was 0.8 minutes.
- The average turnout time was 1.1 minutes.
- The average travel time was 4.5 minutes.
- The average total response time was 6.4 minutes.
- The average response time was 6.4 minutes for EMS calls and 6.6 minutes for fire calls.
- The average response time was 7.1 minutes for outside fires and 6.5 minutes for structure fires.
- The 90th percentile dispatch time was 1.4 minutes.
- The 90th percentile turnout time was 1.8 minutes.
- The 90th percentile travel time was 7.4 minutes.
- The 90th percentile total response time was 9.7 minutes.
- The 90th percentile response time was 9.6 minutes for EMS calls and 10.1 minutes for fire calls.
- The 90th percentile response time was 11.1 minutes for outside fires and 10.1 minutes for structure fires.

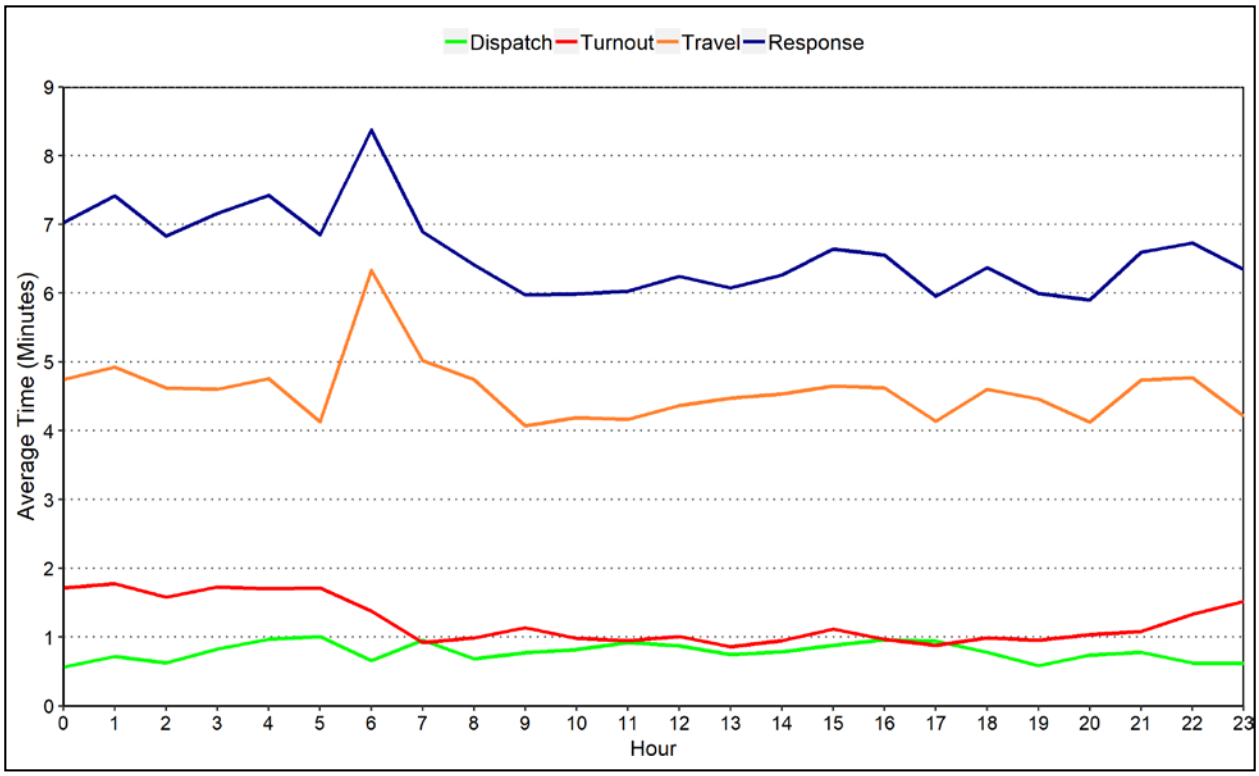
## Response Time by Hour

Average dispatch, turnout, travel, and total response time by hour for calls are shown in the following table and figure. The table also shows 90th percentile response times.

### TABLE 7-19: Average and 90th Percentile Response Time of First Arriving Unit, by Hour of Day

| Hour | Time (Min.) | | | | | Number of Calls |
|---|---|---|---|---|---|---|
| | Dispatch | Turnout | Travel | Response | 90th Percentile Response | |
| 0 | 0.6 | 1.7 | 4.7 | 7.0 | 9.2 | 34 |
| 1 | 0.7 | 1.8 | 4.9 | 7.4 | 10.6 | 30 |
| 2 | 0.6 | 1.6 | 4.6 | 6.8 | 9.0 | 17 |
| 3 | 0.8 | 1.7 | 4.6 | 7.2 | 10.7 | 25 |
| 4 | 1.0 | 1.7 | 4.8 | 7.4 | 9.7 | 25 |
| 5 | 1.0 | 1.7 | 4.1 | 6.8 | 9.1 | 32 |
| 6 | 0.7 | 1.4 | 6.3 | 8.4 | 14.3 | 43 |
| 7 | 1.0 | 0.9 | 5.0 | 6.9 | 10.2 | 75 |
| 8 | 0.7 | 1.0 | 4.7 | 6.4 | 9.7 | 101 |
| 9 | 0.8 | 1.1 | 4.1 | 6.0 | 9.0 | 89 |
| 10 | 0.8 | 1.0 | 4.2 | 6.0 | 9.0 | 137 |
| 11 | 0.9 | 0.9 | 4.2 | 6.0 | 8.6 | 119 |
| 12 | 0.9 | 1.0 | 4.4 | 6.2 | 9.9 | 113 |
| 13 | 0.7 | 0.9 | 4.5 | 6.1 | 9.6 | 96 |
| 14 | 0.8 | 0.9 | 4.5 | 6.3 | 9.6 | 122 |
| 15 | 0.9 | 1.1 | 4.6 | 6.6 | 10.7 | 142 |
| 16 | 1.0 | 1.0 | 4.6 | 6.6 | 10.6 | 154 |
| 17 | 0.9 | 0.9 | 4.1 | 6.0 | 9.1 | 137 |
| 18 | 0.8 | 1.0 | 4.6 | 6.4 | 9.9 | 132 |
| 19 | 0.6 | 1.0 | 4.5 | 6.0 | 8.2 | 104 |
| 20 | 0.7 | 1.0 | 4.1 | 5.9 | 9.0 | 96 |
| 21 | 0.8 | 1.1 | 4.7 | 6.6 | 9.8 | 77 |
| 22 | 0.6 | 1.3 | 4.8 | 6.7 | 9.3 | 68 |
| 23 | 0.6 | 1.5 | 4.2 | 6.3 | 8.8 | 34 |
| **Total** | **0.8** | **1.1** | **4.5** | **6.4** | **9.7** | **2,002** |

**FIGURE 7-10: Average Response Time of First Arriving Unit, by Hour of Day**




## Observations:

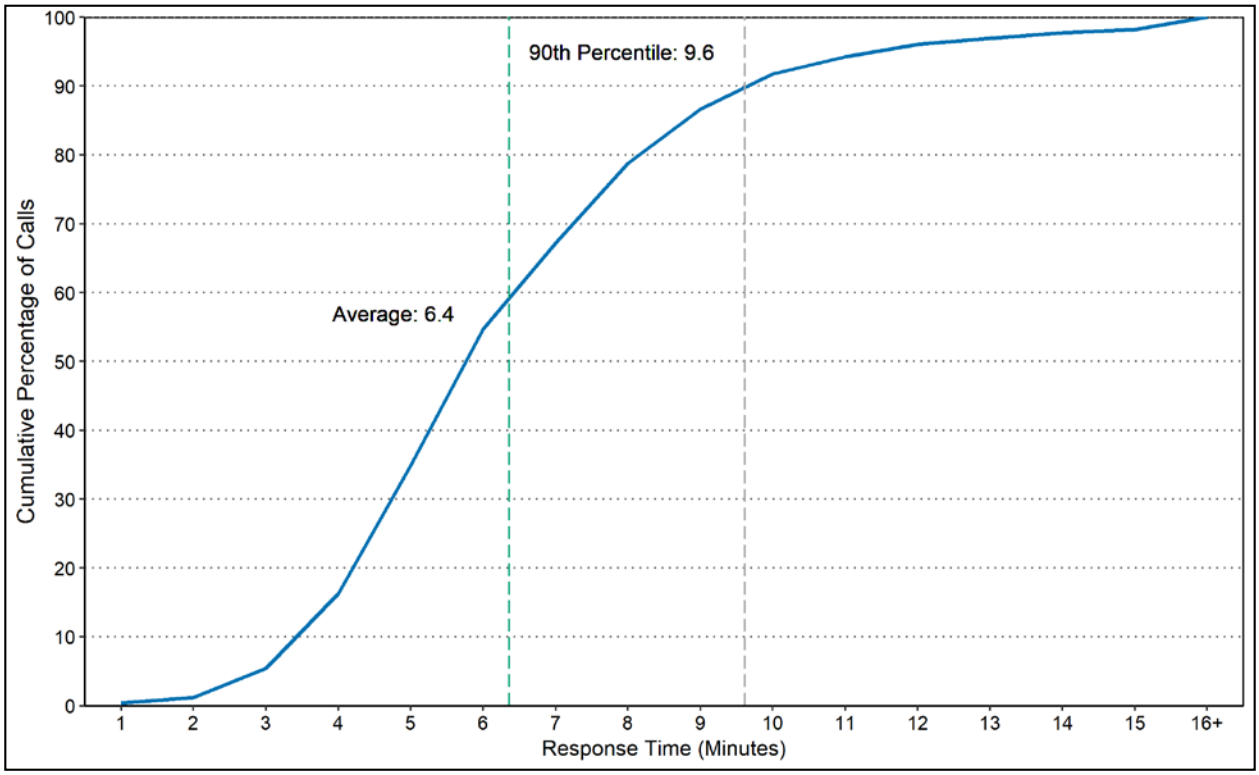
- Average dispatch time was between 0.6 minutes (midnight to 1:00 a.m.) and 1.0 minutes (5:00 a.m. to 6:00 a.m.).
- Average turnout time was between 0.9 minutes (1:00 p.m. to 2:00 p.m.) and 1.8 minutes (1:00 a.m. to 2:00 a.m.).
- Average travel time was between 4.1 minutes (9:00 a.m. to 10:00 a.m.) and 6.3 minutes (6:00 a.m. to 7:00 a.m.).
- Average response time was between 5.9 minutes (8:00 p.m. to 9:00 p.m.) and 8.4 minutes (6:00 a.m. to 7:00 a.m.).
- The 90th percentile response time was between 8.2 minutes (7:00 p.m. to 8:00 p.m.) and 14.3 minutes (6:00 a.m. to 7:00 a.m.).

## Response Time Distribution

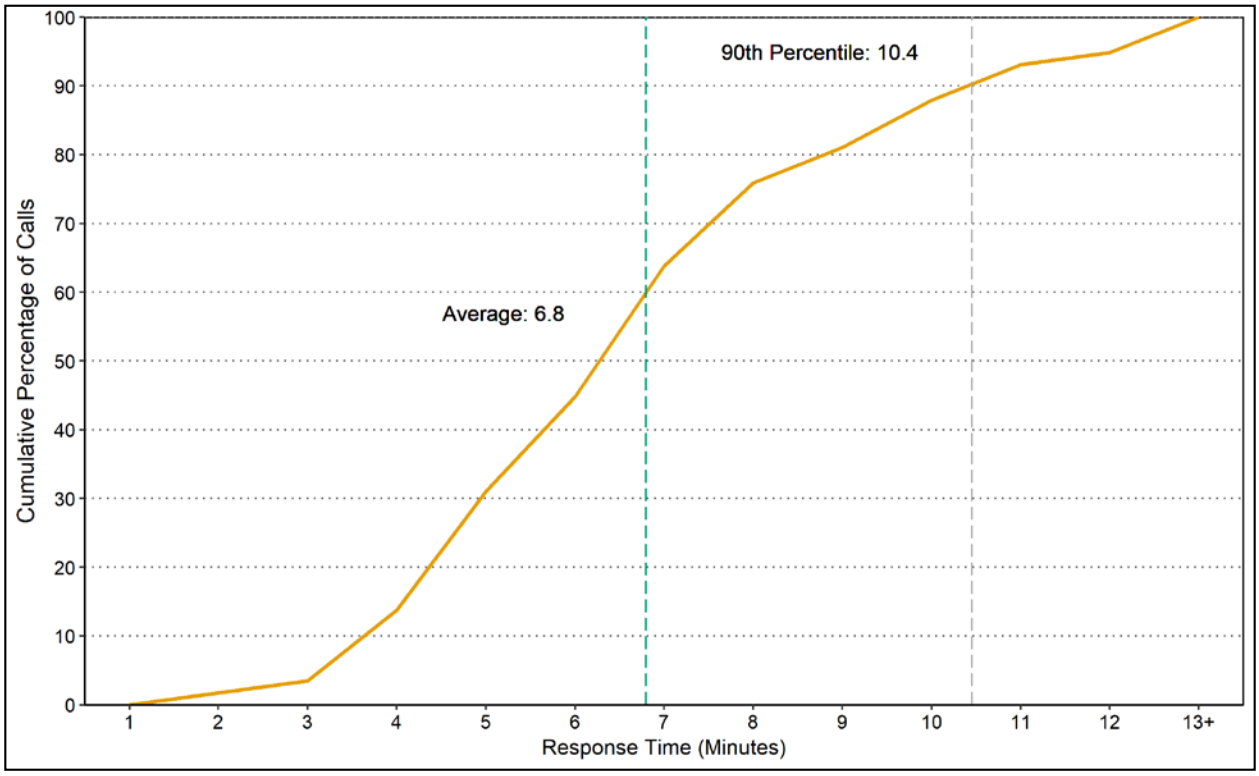
Here, we present a more detailed look at how response times to calls are distributed. The cumulative distribution of total response time for the first arriving unit to EMS calls is shown in Figure 7-11 and Table 7-20. Figure 7-11 shows response times for the first arriving unit to EMS calls as a frequency distribution in whole-minute increments, and Figure 7-12 shows the same for the first arriving unit to outside and structure fire calls.

The cumulative percentages here are read in the same way as a percentile. In Figure 7-11, the 90th percentile of 9.6 minutes means that 90 percent of EMS calls had a response time of 9.6 minutes or less. In Table 7-20, the cumulative percentage of 78.8, for example, means that 78.8 percent of EMS calls had a response time under 8 minutes.

### FIGURE 7-11: Cumulative Distribution of Response Time – First Arriving Unit – EMS



## FIGURE 7-12: Cumulative Distribution of Response Time – First Arriving Unit – Outside and Structure Fires




## TABLE 7-20: Cumulative Distribution of Response Time – First Arriving Unit – EMS

| Response Time (Min.) | Frequency | Cumulative Percentage |
|---|---|---|
| 1 | 7 | 0.4 |
| 2 | 14 | 1.2 |
| 3 | 76 | 5.4 |
| 4 | 194 | 16.3 |
| 5 | 331 | 34.9 |
| 6 | 354 | 54.7 |
| 7 | 222 | 67.2 |
| 8 | 207 | 78.8 |
| 9 | 140 | 86.7 |
| 10 | 91 | 91.8 |
| 11 | 44 | 94.2 |
| 12 | 33 | 96.1 |
| 13 | 15 | 96.9 |
| 14 | 15 | 97.8 |
| 15 | 8 | 98.2 |
| 16+ | 32 | 100.0 |

### TABLE 7-21: Cumulative Distribution of Response Time – First Arriving Unit – Outside and Structure Fires

| Response Time (Min.) | Frequency | Cumulative Percentage |
|---|---|---|
| 1 | 0 | 0.0 |
| 2 | 1 | 1.7 |
| 3 | 1 | 3.4 |
| 4 | 6 | 13.8 |
| 5 | 10 | 31.0 |
| 6 | 8 | 44.8 |
| 7 | 11 | 63.8 |
| 8 | 7 | 75.9 |
| 9 | 3 | 81.0 |
| 10 | 4 | 87.9 |
| 11 | 3 | 93.1 |
| 12 | 1 | 94.8 |
| 13+ | 3 | 100.0 |

## Observations:

- For 79 percent of EMS calls, the response time of the first arriving unit was less than 8 minutes.
- For 76 percent of outside and structure fire calls, the response time of the first arriving unit was less than 8 minutes.

# TRANSPORT CALL ANALYSIS

American Medical Response (AMR) is contracted by the Town of Queen Creek to provide medical transportation for patients. In this section, we present an analysis of QCFMD calls in QCFMD's fire district that involved transporting patients, and the variations by hour of day.

We identified transport calls by requiring that at least one responding medical unit had recorded both 'beginning to transport' time and 'arriving at hospital' time. We limited ourselves to transport calls within QCFMD's jurisdiction that had a QCFMD unit on the call. As such, we excluded 9 transport calls that only had AMR ambulances on the call, and another 61 transport calls that had both AMR ambulances and non-QCFMD units, but no QCFMD units, on the call. Based on these criteria, note that 6 non-EMS calls that resulted in transports are included in this analysis.

## Transport Calls by Type

The following table shows the number of calls by call type broken out by transport and non-transport calls.

### TABLE 7-22: Transport Calls by Call Type

| Call Type | Number of Calls | | | Conversion Rate |
|---|---|---|---|---|
| | Non-transport | Transport | Total | |
| Breathing difficulty | 47 | 115 | 162 | 71.0 |
| Cardiac and stroke | 78 | 214 | 292 | 73.3 |
| Fall and injury | 116 | 254 | 370 | 68.6 |
| Illness and other | 146 | 289 | 435 | 66.4 |
| MVA | 305 | 139 | 444 | 31.3 |
| Overdose and psychiatric | 66 | 200 | 266 | 75.2 |
| Seizure and unconsciousness | 99 | 254 | 353 | 72.0 |
| **EMS Total** | **856** | **1,465** | **2,321** | **63.1** |
| **Fire & Other Total** | **983** | **6** | **989** | **0.6** |
| **Total** | **1,840** | **1,471** | **3,311** | **44.4** |

## Observations:

- Overall, 44 percent of EMS calls in Queen Creek that had a QCFMD unit on the call involved transporting one or more patients.
- On average, there were approximately 4 calls per day that involved transporting one ormore patients.

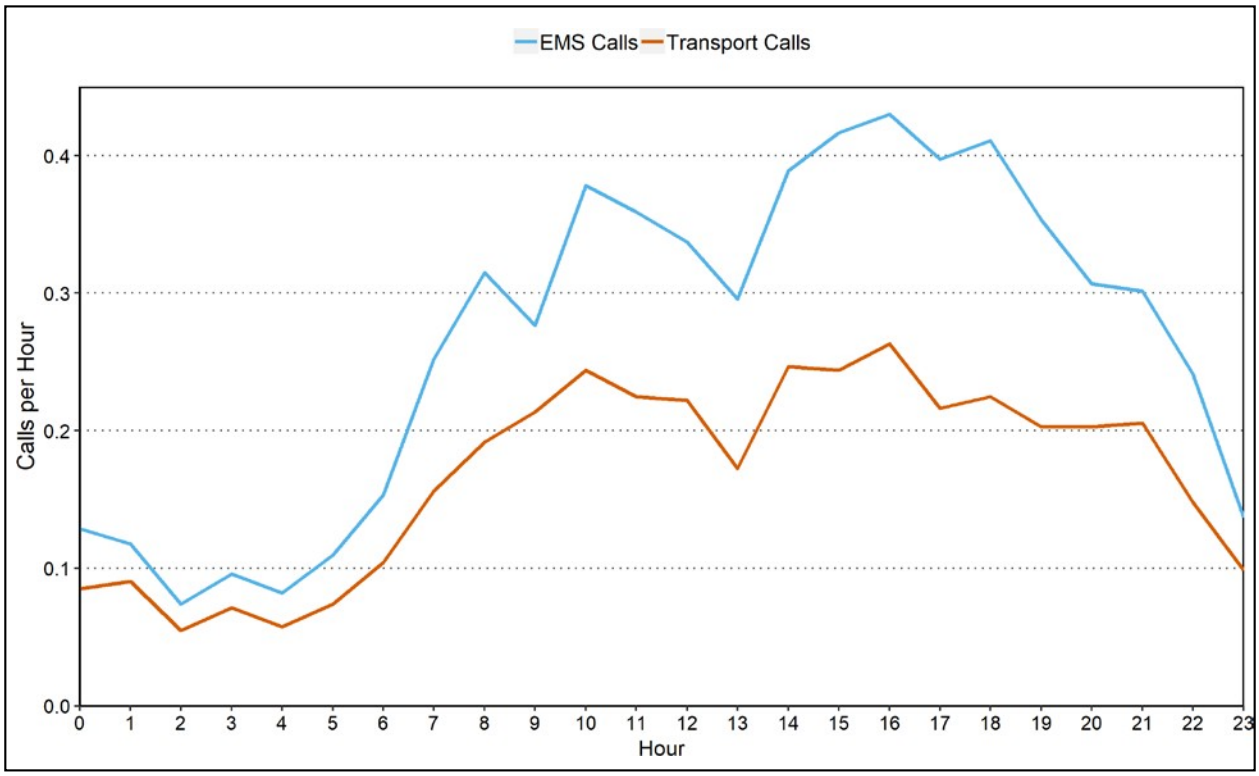
## Average Transport Calls per Hour

The following table and figure show the average number of EMS calls received each hour of the day over the course of the year and the average number of transport calls. Transport calls categorized as fire, mutual aid, or canceled have been excluded from the table.

### TABLE 7-23: Transport Calls per Day, by Hour

| Hour | Number of EMS Calls | Number of Transport Calls | Transport Calls per Day | EMS Calls per Day | Conversion Rate |
|---|---|---|---|---|---|
| 0 | 47 | 31 | 0.1 | 0.1 | 66.0 |
| 1 | 43 | 33 | 0.1 | 0.1 | 76.7 |
| 2 | 27 | 20 | 0.1 | 0.1 | 74.1 |
| 3 | 35 | 26 | 0.1 | 0.1 | 74.3 |
| 4 | 30 | 21 | 0.1 | 0.1 | 70.0 |
| 5 | 40 | 27 | 0.1 | 0.1 | 67.5 |
| 6 | 56 | 38 | 0.2 | 0.1 | 67.9 |
| 7 | 92 | 57 | 0.3 | 0.2 | 62.0 |
| 8 | 115 | 70 | 0.3 | 0.2 | 60.9 |
| 9 | 101 | 78 | 0.3 | 0.2 | 77.2 |
| 10 | 138 | 89 | 0.4 | 0.2 | 64.5 |
| 11 | 131 | 82 | 0.4 | 0.2 | 62.6 |
| 12 | 123 | 81 | 0.3 | 0.2 | 65.9 |
| 13 | 108 | 63 | 0.3 | 0.2 | 58.3 |
| 14 | 142 | 90 | 0.4 | 0.2 | 63.4 |
| 15 | 152 | 89 | 0.4 | 0.2 | 58.6 |
| 16 | 157 | 96 | 0.4 | 0.3 | 61.1 |
| 17 | 145 | 79 | 0.4 | 0.2 | 54.5 |
| 18 | 150 | 82 | 0.4 | 0.2 | 54.7 |
| 19 | 129 | 74 | 0.4 | 0.2 | 57.4 |
| 20 | 112 | 74 | 0.3 | 0.2 | 66.1 |
| 21 | 110 | 75 | 0.3 | 0.2 | 68.2 |
| 22 | 89 | 54 | 0.2 | 0.1 | 60.7 |
| 23 | 50 | 36 | 0.1 | 0.1 | 72.0 |

## FIGURE 7-13: Average Transport Calls per Day, by Hour




## Observations:

- Average hourly transport calls per day peaked between 4:00 p.m. and 5:00 p.m., averaging 0.3 calls per day.
- Average hourly transport calls per day was lowest between 2:00 a.m. and 3:00 a.m., averaging less than 0.1 calls per day.

## ATTACHMENT I: ACTIONS TAKEN ANALYSIS

### TABLE 7-24: Actions Taken Analysis for Structure and Outside Fire Calls

| Action Taken | Number of Calls | |
|---|---|---|
| | Outside Fire | Structure Fire |
| Assistance, other | 0 | 3 |
| Control fire (wildland) | 1 | 0 |
| Enforce codes | 0 | 3 |
| Establish fire lines (wildfire) | 1 | 0 |
| Extinguishment by fire service personnel | 28 | 11 |
| Fire control or extinguishment, other | 4 | 7 |
| Fires, rescues & hazardous conditions, other | 0 | 1 |
| Incident command | 0 | 2 |
| Investigate | 5 | 5 |
| Investigate fire out on arrival | 4 | 8 |
| Provide advanced life support (ALS) | 3 | 0 |
| Provide apparatus | 5 | 7 |
| Provide information to public or media | 1 | 1 |
| Provide manpower | 3 | 4 |
| Provide water | 1 | 0 |
| Restore fire alarm system | 0 | 2 |
| Salvage & overhaul | 9 | 5 |
| Search | 0 | 1 |
| Transport person | 1 | 0 |
| Ventilate | 0 | 2 |

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

## Observations:

- Out of 44 outside fires, 28 were extinguished by fire service personnel, which accounted for 63.6 percent of outside fires.
  - All outside fires burned less than one acre.
- Out of 39 structure fires, 11 were extinguished by fire service personnel, which accounted for 28.5 percent of structure fires.

QCFMD responded to 5 calls with NFIRS incident type 111 (building fire), and 1 call with NFIRS incident type 112 (fire in structure other than a building) in QCFMD's fire district during the year studied. In this section, we analyze these six incidents in further detail.

**TABLE 7-25: Structure Fire Details**

| Incident Date | Incident Type | Structure Type | Building Height (stories) | Stories Damaged by Flame | Fire Confined To |
|---|---|---|---|---|---|
| September 23, 2018 | 111 | Enclosed building | 1 | 0 | Floor of origin |
| October 2, 2018 | 111 | Enclosed building | 2 | 0 | Building of origin |
| January 17, 2019 | 111 | Enclosed building | 1 | 0 | Room of origin |
| February 18, 2019 | 112 | Other type of structure | 0 | 0 | * |
| May 1, 2019 | 111 | Enclosed building | 2 | 0 | Object of origin |
| June 8, 2019 | 111 | Enclosed building | 1 | 0 | Room of origin |

**Note:** The 'fire confined to' field was not filled in for the incident.

## Observations

- Of the 5 fires in an enclosed building, the fire was confined to the object of origin once (20 percent of the time), the room of origin twice (40 percent of the time), the floor of origin once (20 percent of the time), and to the building of origin once (20 percent of the time).
  - The 5 fires in an enclosed building each involved only one building.

# ATTACHMENT II: ADMINISTRATIVE WORKLOAD

## TABLE 7-26: Workload of Administrative Units

| Unit ID | Unit Type | Annual Hours | Annual Runs |
|---|---|---|---|
| C411 | Fire Chief | 0.5 | 1 |
| C412 | Operations Chief | 14.2 | 13 |

## ATTACHMENT III: FIRE LOSS

### TABLE 7-27: Content and Property Loss – Structure and Outside Fires

| Call Type | Property Loss | | Content Loss | |
|---|---|---|---|---|
| | Loss Value | Number of Calls | Loss Value | Number of Calls |
| Outside fire | $121,651 | 18 | $24,101 | 11 |
| Structure fire | $191,326 | 11 | $78,276 | 10 |
| **Total** | **$316,977** | **29** | **$102,377** | **21** |

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

### TABLE 7-28: Total Fire Loss Above and Below $20,000

| Call Type | No Loss | Under $20,000 | $20,000 plus |
|---|---|---|---|
| Outside fire | 24 | 19 | 1 |
| Structure fire | 26 | 9 | 4 |
| **Total** | 50 | 28 | 5 |

## Observations:

- Out of 44 outside fires, 18 had recorded property loss, with a combined $125,651 in losses.
- 11 outside fires had content loss with a combined $24,101 in losses.
- The highest total loss for an outside fire was $70,000.
- Out of 39 structure fires, 11 had recorded property loss, with a combined $191,326 in losses.
- 10 structure fires had content loss with a combined $78,276 in losses.
- The average total loss for structure fires with loss was $20,739.
- The highest total loss for a structure fire was $170,000.

## ATTACHMENT IV: FIRE INJURIES AND DEATHS

### TABLE 7-29: Civilian and Firefighter Injuries and Deaths Through Fire Responses

| Type of Person | Injuries | Deaths |
|---|---|---|
| Civilian | 0 | 1 |
| Firefighter | 0 | 0 |

## Observations:

- There were no recorded injuries, and no recorded firefighter deaths.
- There was one recorded civilian death, on May 4, 2019, on an outside fire call.

# ATTACHMENT V: MUTUAL AND AUTOMATIC AID

QCFMD has automatic aid agreements with all municipalities and several fire districts in the Phoenix metropolitan area, and a mutual aid agreement with Rural/Metro. In this section, we look at calls that involved aid given or aid received. Here, we define an aid given call as a call outside of QCFMD's jurisdiction that a QCFMD unit responded to. An aid received call is a call within QCFMD's jurisdiction that a unit from another fire department responded to. This analysis does not include canceled calls.

## TABLE 7-30: Aid Given Calls by Call Type

| Call Type | Automatic Aid | Mutual Aid |
|---|---|---|
| Breathing difficulty | 24 | 1 |
| Cardiac and stroke | 33 | 1 |
| Fall and injury | 65 | 0 |
| Illness and other | 62 | 0 |
| MVA | 66 | 11 |
| Overdose and psychiatric | 15 | 0 |
| Seizure and unconsciousness | 34 | 1 |
| **EMS Total** | **299** | **14** |
| False alarm | 24 | 0 |
| Good intent | 0 | 1 |
| Hazard | 31 | 0 |
| Outside fire | 12 | 2 |
| Public Service | 61 | 1 |
| Structure Fire | 16 | 1 |
| **Fire Total** | **144** | **5** |
| **Total** | **443** | **19** |

## TABLE 7-31: Aid Received Calls by Call Type

| Call Type | QCFMD Units Responded | | No QCFMD Units Responded | Total |
|---|---|---|---|---|
| | Automatic Aid | Mutual Aid | Automatic Aid | |
| Breathing difficulty | 0 | 0 | 11 | 11 |
| Cardiac and stroke | 8 | 0 | 20 | 28 |
| Fall and injury | 3 | 0 | 11 | 14 |
| Illness and other | 6 | 0 | 10 | 16 |
| MVA | 34 | 2 | 10 | 46 |
| Overdose and psychiatric | 1 | 1 | 9 | 11 |
| Seizure and unconsciousness | 3 | 2 | 18 | 23 |
| **EMS Total** | **55** | **5** | **89** | **149** |
| False alarm | 0 | 0 | 10 | 10 |
| Good intent | 2 | 0 | 1 | 3 |
| Hazard | 32 | 0 | 1 | 33 |
| Outside fire | 7 | 0 | 1 | 8 |
| Public Service | 9 | 0 | 53 | 62 |
| Structure Fire | 12 | 0 | 0 | 12 |
| **Fire Total** | **62** | **0** | **66** | **128** |
| **Total** | **117** | **5** | **155** | **277** |

**Note**: There were no mutual aid received calls in QCFMD's fire district without a responding QCFMD unit. For most of the report, these 155 calls were excluded. Aid given calls were included within the response time section.

# ATTACHMENT VI: CALL TYPE DISTRIBUTION

When available, NFIRS data serves as our primary source for assigning call categories. For 3,850 of the 3,856 calls, NFIRS incident type codes were used to identify EMS and canceled calls, and to assign call types to fire calls and to motor vehicle accidents (Table 7-32). The remaining 6 calls were not in the NFIRS data, so we instead used the type description from the computer-aided dispatch (CAD) data to assign a call category (Table 7-34).

To further assign subcategories to medical calls, we first used information found in the NFIRS EMS module (Table 7-33). When this information was either missing or vague (i.e., for 'general medical' or 'unknown medical/injury' calls), we instead used the type description from the CAD data if available (Table 7-34); otherwise the medical call was classified as 'illness and other.'

Mutual and automatic aid given calls were then identified using the mutual aid codes in the NFIRS data. Canceled aid given calls were categorized as canceled calls.

## TABLE 7-32: NFIRS Call Type Descriptions

| Call Type | Incident Type | Incident Type Description | Count |
|---|---|---|---|
| Canceled | 321* | EMS call, excluding vehicle accident with injury | 1 |
| | 611 | Dispatched & cancelled en route | 236 |
| | 6110 | Structure Fire - Cancelled en route | 6 |
| | 6111 | Vehicle Fire - Cancelled en route | 1 |
| | 6112 | System or Detector Malfunction - Cancelled en route | 2 |
| | 6113 | Unintentional System/Detector - Cancelled en route | 9 |
| | 6115 | Smoke Check - Cancelled en route | 1 |
| | 6117 | Medical Call (Non Vehicle Acc) - Cancelled en route | 4 |
| | 621 | Wrong location | 2 |
| | 622 | No Incident found on arrival at dispatch address | 86 |
| False alarm | 700 | False alarm or false call, Other | 34 |
| | 730 | System malfunction, Other | 4 |
| | 731 | Sprinkler activation due to malfunction | 2 |
| | 733 | Smoke detector activation due to malfunction | 19 |
| | 734 | Heat detector activation due to malfunction | 1 |
| | 735 | Alarm system sounded due to malfunction | 80 |
| | 736 | CO detector activation due to malfunction | 5 |
| | 740 | Unintentional transmission of alarm, Other | 20 |
| | 7401 | Unintentional transmission of alarm, medical | 3 |
| | 743 | Smoke detector activation, no fire - unintentional | 23 |
| | 744 | Detector activation, no fire - unintentional | 6 |
| | 745 | Alarm system activation, no fire - unintentional | 9 |

**Note 1:** For EMS calls (calls with a 321 incident type in NFIRS), we further classified the type of call using the description of the call found in the NFIRS EMS module, when available. This call was further classified as canceled in the NFIRS EMS module.

| Call Type | Incident Type | Incident Type Description | Count |
|---|---|---|---|
| Good intent | 600 | Good intent call, Other | 23 |
| | 631 | Authorized controlled burning | 1 |
| | 651 | Smoke scare, odor of smoke | 4 |
| | 652 | Steam, vapor, fog or dust thought to be smoke | 2 |
| | 6531 | Warming Fire | 1 |
| Hazard | 220 | Overpressure rupture from air or gas, Other | 1 |
| | 243 | Fireworks explosion (no fire) | 1 |
| | 400 | Hazardous condition, Other | 10 |
| | 410 | Combustible/flammable gas/liquid condition, other | 1 |
| | 412 | Gas leak (natural gas or LPG) | 21 |
| | 413 | Oil or other combustible liquid spill | 4 |
| | 421 | Chemical hazard (no spill or leak) | 1 |
| | 424 | Carbon monoxide incident | 2 |
| | 440 | Electrical wiring/equipment problem, Other | 5 |
| | 441 | Heat from short circuit (wiring), defective/worn | 1 |
| | 442 | Overheated motor | 1 |
| | 444 | Power line down | 2 |
| | 462 | Aircraft standby | 1 |
| Illness and other | 331 | Lock-in (if lock out, use 511) | 11 |
| | 353 | Removal of victim(s) from stalled elevator | 1 |
| | 381 | Rescue or EMS standby | 2 |
| MVA | 321* | EMS call, excluding vehicle accident with injury | 33 |
| | 322 | Motor vehicle accident with injuries | 219 |
| | 323 | Motor vehicle/pedestrian accident (MV Ped) | 11 |
| | 324 | Motor vehicle Accident with no injuries | 181 |
| Outside fire | 130 | Mobile property (vehicle) fire, Other | 1 |
| | 131 | Passenger vehicle fire | 8 |
| | 137 | Camper or recreational vehicle (RV) fire | 1 |
| | 140 | Natural vegetation fire, Other | 2 |
| | 142 | Brush or brush-and-grass mixture fire | 11 |
| | 143 | Grass fire | 2 |
| | 150 | Outside rubbish fire, Other | 4 |
| | 151 | Outside rubbish, trash or waste fire | 3 |
| | 154 | Dumpster or other outside trash receptacle fire | 9 |
| | 160 | Special outside fire, Other | 1 |
| | 162 | Outside equipment fire | 2 |

**Note 2:** For EMS calls (calls with a 321 incident type in NFIRS), we further classified the type of call using the description of the call found in the NFIRS EMS module, when available. These 33 EMS calls were classified as motor vehicle accidents in the NFIRS EMS module.

| Call Type | Incident Type | Incident Type Description | Count |
|---|---|---|---|
| Public service | 500 | Service Call, other | 75 |
| | 510 | Person in distress, Other | 3 |
| | 511 | Lock-out | 26 |
| | 512 | Ring or jewelry removal | 2 |
| | 520 | Water problem, Other | 1 |
| | 5201 | Hydrant Leaking/Damaged | 3 |
| | 531 | Smoke or odor removal | 14 |
| | 540 | Animal problem, Other | 6 |
| | 5401 | Animal Problem, Snake Removal | 30 |
| | 5402 | Animal Problem, Bees | 21 |
| | 541 | Animal problem | 5 |
| | 542 | Animal rescue | 5 |
| | 550 | Public service assistance, Other | 28 |
| | 551 | Assist police or other governmental agency | 9 |
| | 552 | Police matter | 7 |
| | 553 | Public service | 1 |
| | 554 | Assist invalid | 59 |
| | 561 | Unauthorized burning | 17 |
| | 571 | Cover assignment, standby, moveup | 22 |
| | 5718 | Move Back to Home Station | 13 |
| | 812 | Flood assessment | 2 |
| | 900 | Special type of incident, Other | 1 |
| Structure fire | 110 | Structure fire, Other (conversion only) | 1 |
| | 111 | Building fire | 4 |
| | 112 | Fires in structure other than in a building | 1 |
| | 113 | Cooking fire, confined to container | 14 |
| | 117 | Commercial Compactor fire, confined to rubbish | 1 |
| | 118 | Trash or rubbish fire, contained | 18 |

## TABLE 7-33: NFIRS Medical Descriptions

| Call Type | NFIRS EMS Description | Count |
|---|---|---|
| Breathing difficulty | Respiratory (difficulty breathing, choking) | 133 |
| Canceled | Canceled (en route, on-scene, staged) | 1 |
| Cardiac and stroke | Cardiac arrest | 43 |
| | Cardiac problem (chest pains, heart attack) | 150 |
| | Stroke | 47 |
| Fall and injury | Abrasions or lacerations | 2 |
| | Amputation | 1 |
| | assault | 34 |
| | Bites or stings (w/no allergic reaction) | 9 |
| | Bites or stings (with envenomation) | 1 |
| | Burns or scalds | 3 |
| | Chest injury | 3 |
| | Extremity injury or pain | 35 |
| | Fall | 242 |
| | Fractures | 2 |
| | Invalid assist | 4 |
| | Neck or back pain or injury | 4 |
| | Pelvic or hip pain or injury | 2 |
| | Shooting | 4 |
| Illness and other | Abdominal | 58 |
| | Allergic reaction | 23 |
| | Back pain | 34 |
| | Bleeding | 29 |
| | Childbirth | 4 |
| | Deceased (dnr, obvious death protocol) | 4 |
| | Diabetic problem | 37 |
| | Drowning or near drowning | 4 |
| | Environmental emergencies (heat, cold, dehydration) | 7 |
| | Flu-like symptoms | 22 |
| | General medical* | 89 |
| | Hanging | 1 |
| | Head pain or injury | 12 |
| | Ob-gyn | 3 |
| | Other or not specified* | 11 |
| | Pain | 16 |
| | Taser or pepper spray | 2 |
| | Unknown injury/unknown medical* | 18 |
| | Verbal refusal | 1 |
| | Vomiting | 10 |
| | Weakness | 27 |
| | Welfare check or citizen assist | 7 |

| Call Type | NFIRS EMS Description | Count |
|---|---|---|
| MVA | Motor vehicle accident | 33 |
| Overdose and psychiatric | Psychological | 193 |
| | Toxicology (drug/alcohol od or poisoning) | 69 |
| Seizure and unconsciousness | aloc | 121 |
| | Loss or altered level of consciousness | 58 |
| | Seizures | 110 |
| | syncope | 28 |

**Note:** For calls with a NFIRS ems description of 'general medical,' 'other or not specified,' or 'unknown injury/unknown medical,' if the CAD type description (Table 7-34) contained more detailed medical information, we instead used the call type associated with the CAD type description. If no more information was found in CAD, these calls were assigned an 'illness and other' call type.

## TABLE 7-34: CAD Call Types

| Call Type | CAD type | Count |
|---|---|---|
| Breathing difficulty | CHILD CHOKING ALS | 1 |
| | DIFFICULTY BREATHING ALS | 26 |
| | INFANT CHOKING ALS | 1 |
| | PERSON CHOKING ALS | 1 |
| Cardiac and stroke | CHEST PAIN ALS | 28 |
| | HEART PROBLEMS – ALS | 23 |
| | STROKE ALS | 1 |
| Fall and injury | FALL AND INJURY ALS | 5 |
| | FALL AND INJURY BLS | 1 |
| | INJURED PERSON ALS | 5 |
| | INJURED PERSON BLS | 10 |
| | LIFT ASSIST – BLS RESPONSE | 1 |
| Hazard | CHECK HAZARD | 1 |
| Illness and other | ABDOMINAL ISSUE BLS | 5 |
| | ALLERGIC REACTION ALS | 1 |
| | BACK ISSUE ALS | 2 |
| | BACK ISSUE BLS | 1 |
| | DIABETIC ALS | 1 |
| | DIABETIC ISSUE BLS | 1 |
| | HEAT RELATED ISSUES BLS | 1 |
| | ILL PERSON ALS | 13 |
| | ILL PERSON BLS | 67 |
| | INTERNAL BLEEDING ALS | 3 |
| | MEDICAL ALARM | 4 |
| | NOSEBLEED BLS | 1 |
| | PERSON DOWN ALS | 2 |
| | UNKNOWN MEDICAL ISSUE ALS | 5 |
| Overdose and psychiatric | OVERDOSE ALS | 1 |
| | PSYCHOLOGICAL ISSUE BLS | 3 |
| Public service | SPECIAL EVENT STANDBY | 2 |
| Seizure and unconsciousness | ALTER LEVEL OF CONS ALS | 27 |
| | SEIZURE ALS | 5 |
| | UNCONSC PERSON ALS | 3 |

**Note:** The count in this table reflects the number of calls that were given their call types from these CAD type descriptions, and does not reflect the total number of calls that had these CAD type descriptions.

*- END -*