



# COMMUNITY RISK ASSESSMENT AND STANDARDS OF COVER STUDY

**VOLUME 1 OF 2: TECHNICAL REPORT**

**CITY OF MONTEREY**

**APRIL 29, 2022**



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**VOLUME 2 of 2 – Map Atlas (separately bound)**

## **EXECUTIVE SUMMARY**

The City of Monterey (City) Fire Department (Department) retained Citygate Associates, LLC (Citygate) to conduct a comprehensive Community Risk Assessment and Standards of Cover (CRA/SOC) Study to assist the City and Department in ensuring a safe, effective, and appropriately sized response force for fires, medical emergencies, and other events requiring a specialized emergency response throughout the Cities of Monterey, Pacific Grove, Carmel-by-the-Sea, and Sand City, as well as the Monterey Regional Airport, Naval Support Activity Monterey, and La Mesa Village military housing. In addition to the CRA/SOC, the City's Request for Proposals (RFP) also requested a review and evaluation of administration, support, and operational staffing levels relative to its ability to adequately support its mission and meet community fire services and emergency medical services (EMS) delivery expectations.

The goal of this assessment is to identify both current services and desired service levels, and then to assess the City's ability to provide them. After understanding any possible gaps in operations and resources, Citygate provides recommendations to improve Department operations and services over time. Citygate utilized various industry-recognized best practice guidelines and criteria in the field of deployment analysis, including National Fire Protection Association (NFPA) standards, the self-assessment criteria of the Commission on Fire Accreditation International (CFAI), Insurance Services Office (ISO) schedules, and federal and state mandates relative to emergency services.

This report is presented in four parts, including this Executive Summary outlining all findings and recommendations, the fire station/crew deployment analysis supported by maps and response statistics, the administrative support and staffing review, and the community hazards and risk assessment (**Appendix A**). A separate Map Atlas (**Volume 2**) contains maps referenced throughout this report. Overall, this assessment resulted in 29 findings and eight action recommendations.

### ***POLICY CHOICES FRAMEWORK***

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There are no mandatory federal or state regulations directing the level of fire service staffing, response times, nor outcomes. Thus, the level of fire protection services provided is a *local policy decision*. Communities have the level of fire services they can afford, which may not always be the level desired. However, if services are provided at all, local, state, and federal regulations relating to firefighter and citizen safety must be followed.

### ***RESPONSE TIME SUMMARY***

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Citygate finds that the Department is well organized to accomplish its mission to serve a diverse urban population across a varied municipal land-use pattern. The Department is using best practices and is data driven, as necessary. Due to the City's oceanfront location and nationally

recognized pier, the Department protects a large tourist population at times, in an area recognized worldwide.

Fire service deployment, simply summarized, is about the *speed* and *weight* of response. *Speed* refers to initial (first-due) response of all-risk resources (engines, ladder trucks, rescues, and ambulances) strategically deployed across a jurisdiction for response to emergencies within a time interval to achieve desired outcomes. *Weight* refers to multiple-unit (Effective Response Force or ERF) responses to more serious emergencies, such as building fires, multiple-patient medical emergencies, vehicle collisions with extrication required, or technical rescue incidents. In these situations, enough firefighters must be assembled within a time interval to safely control the emergency and prevent it from escalating into a more serious event.

If desired outcomes include limiting building fire damage to only part of the inside of an affected building and/or minimizing permanent impairment from a medical emergency, the City should formally adopt a response policy that the initial units should arrive within 7:30 minutes from 9-1-1 notification, and a multiple-unit ERF should arrive within 11:30 minutes of 9-1-1 notification at the Monterey County Emergency Communications Center, all at 90 percent or better reliability. Total response time to emergency incidents includes three separate components: (1) 9-1-1 call processing/dispatch time, (2) crew turnout time, and (3) travel time. The following table summarizes the Department’s response performance over the four-year period from January 1, 2017, through December 31, 2020.

**Table 1—90<sup>th</sup> Percentile Response Performance Summary (See Table 29)**

Response Component	Best Practice		90 <sup>th</sup> Percentile Performance	Performance vs. Best Practice
	Time	Reference		
Call Processing / Dispatch	1:30	Citygate	1:39	10%
Crew Turnout	2:00	Citygate	1:53	-6%
First-Due Travel	4:00	NFPA/Citygate	4:30	13%
First-Unit Call to Arrival	7:30	Citygate	6:42	-11%
ERF Call to Arrival	11:30	Citygate	10:37	-8%

***OVERALL FIRE SERVICE DEPLOYMENT SUMMARY***

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The Department serves a diverse urban population with a mixed residential and non-residential land-use pattern typical of central California coastal cities. Because the service area is located on the Monterey Peninsula, the Department protects a large tourism population at times, in addition to its service area residents, business owners, and employees.



Citygate finds the Department's response apparatus types to be appropriate to protect against the hazards likely to impact the service area, and the total daily staffing of 25 response personnel provides a minimum ERF of 16 personnel for one moderate-risk building fire or other emergency requiring a multiple-unit response with additional reserve response capacity for simultaneous single-unit incidents.

While the state fire code now requires fire sprinklers even in residential dwellings, it will be many more decades before enough homes are replaced or remodeled with automatic fire sprinklers. If desired outcomes include limiting building fire damage to only part of the inside of an affected building and/or minimizing permanent impairment resulting from a medical emergency, then the City will need both first-due unit and multiple-unit ERF coverage in all neighborhoods consistent with a Citygate response performance recommendation of first-due arrival within 7:30 minutes from 9-1-1 dispatch notification and an ERF arrival within 11:30 minutes of 9-1-1 notification, all at 90 percent or better reliability, which it is currently providing from its existing six fire station locations.

In Citygate's more than 20 years of conducting fire service deployment studies, very few client agencies have met all the key best practice response performance measures to the same degree as the Monterey Fire Department. This reflects a Department with stations appropriately spaced throughout the service area to provide both first-due unit and ERF travel times meeting best practice goals to facilitate desired outcomes, and dispatch center staff's and response personnel's ongoing commitment to excellent response performance.

Overall, Citygate finds the Department to be appropriately staffed and deployed to protect the jurisdictions it serves against the hazards likely to impact them, with response performance meeting recognized best practice goals.

### ***OVERALL FIRE DEPARTMENT ADMINISTRATIVE SUPPORT STAFFING CAPACITY SUMMARY***

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Citygate's assessment of the Fire Department's administrative support staffing capacity yielded the following summary results:

#### **Strengths**

- ◆ Very highly qualified, professional, and dedicated personnel with a strong commitment to serve the organization and the community.
- ◆ Strong administrative and analytic skills.
- ◆ Strong work ethic / culture.
- ◆ High-quality customer service.

**Weaknesses/Gaps**

- ◆ Insufficient administrative support capacity for the Administration and Operations Divisions.
- ◆ Insufficient Fire Prevention Division staffing capacity to meet workload demand.
- ◆ Insufficient capacity to adequately support the City Emergency Operations Center (EOC) / Emergency Management function.
- ◆ Significant ongoing administrative workload capacity gaps.

**Opportunities**

- ◆ Potential to narrow or resolve ongoing workload capacity gaps across multiple divisions by restoring the 2.75 full-time equivalent (FTE) positions currently vacant/frozen due to COVID-19 economic impacts.

**Threats**

- ◆ Multiple single points of failure, due to dependance on a single person/position.
- ◆ Insufficient capacity to conduct state-mandated fire prevention inspections in key occupancies.
- ◆ Significant ongoing administrative workload capacity gaps.

Citygate’s assessment further found that even prior to COVID-19-related staffing reductions, the Department lacked sufficient capacity for the workload. After COVID-19 staffing reductions and resignation of the part-time Emergency Manager, the Department has additional ongoing administrative workload capacity gaps that equal more than the 2.75 FTE capacity lost through the COVID-19 staffing reductions as summarized in the following table.

**Table 2—Headquarters Workload Capacity Gap Analysis Summary (From Table 30)**

Division	Estimated Total Annual Hours	Equivalent FTE Capacity <sup>1</sup>
Administration	2,940 – 5,570	1.5 – 2.8
Operations – Administrative Support	2,500 – 4,680	1.25 – 2.4
Training/Safety	1,758 – 2,863	.90 – 1.5
Fire Prevention	1,470 – 1,960	.75 – 1.0
<b>Total</b>	<b>8,668 – 15,073</b>	<b>4.4 – 7.7</b>

<sup>1</sup> FTE = full-time equivalent capacity assuming 1 FTE = 1,960 annual hours

## ***FINDINGS AND RECOMMENDATIONS***

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Following are the findings and recommendations presented throughout this report.

### **Deployment Findings**

- Finding #1:** The Department's physical response unit types are appropriate to protect against the hazards likely to impact its service area.
- Finding #2:** The Department's minimum daily staffing of 25 personnel provides an Effective Response Force for one moderately serious incident with some remaining capacity for concurrent single-unit incidents.
- Finding #3:** The Monterey City Council *has not* adopted specific response performance measures by policy resolution or in a General Plan policy consistent with best practice recommendations.
- Finding #4:** The Department has a standard response plan that considers risk and establishes an appropriate initial response for each incident type; each type of call for service receives the combination of engines, trucks, specialty units, and command officers customarily needed to effectively control that type of incident based on Department experience.
- Finding #5:** The Department's six fire station locations provide *very good* 4:00-minute first-unit travel time coverage at 89 percent of total public road miles, and *excellent* coverage at 92 percent of total miles with automatic aid.
- Finding #6:** The Department's six fire station locations also provide *excellent* 8:00-minute ERF travel time coverage at 90 percent of total public road miles.
- Finding #7:** At least one or more simultaneous incidents are occurring 50 percent of the time, predominantly impacting Station 11.
- Finding #8:** The annual number of simultaneous incidents has varied over the past four years with 2019 and 2020 approximately 15 percent and 13 percent higher, respectively, than the previous year. As simultaneous incidents increase, the coverage provided by the busiest companies to their own and to adjacent station areas diminishes, which further shifts workload to other companies.
- Finding #9:** Call processing/dispatch performance *is generally meeting* Citygate's recommended best practice goal of 1:30 minutes at 90 percent or better reliability.

- Finding #10:** Crew turnout performance is *meeting* Citygate’s recommended 2:00-minute goal except during early morning sleep hours, when it is only slightly slower.
- Finding #11:** At 4:30 minutes, 90<sup>th</sup> percentile first-unit travel time performance is only *slightly slower* (13 percent) than the Citygate- and NFPA-recommended 4:00-minute goal for urban areas to facilitate desired outcomes, which is very good performance.
- Finding #12:** At 6:42 minutes, 90<sup>th</sup> percentile first-unit call-to-arrival performance is 11 percent (48 seconds) *faster* than a Citygate-recommended best practice goal of 7:30 minutes for urban areas.
- Finding #13:** At 10:37 minutes, 90<sup>th</sup> percentile ERF (First Alarm) call-to-arrival performance is eight percent *faster* than the 11:30-minute Citygate-recommended best practice goal for urban areas.
- Finding #14:** Overall, Citygate finds the Department to be appropriately staffed and deployed to protect the jurisdictions it serves against the hazards likely to impact them, with response performance meeting recognized best practice goals.
- Finding #15:** The Monterey Peninsula Airport District Master Plan’s intended relocation of Station 16 to the north side of the two runways *will* impact the Department’s response capacity and related response performance to the eastern areas of the City outside the airport grounds, specifically the Fisherman’s Flats, Deer Flats, Olmsted/Monhollan Road, and Ryan Ranch areas of the City.

## **Deployment Recommendations**

**Recommendation #1:**     **Adopt Deployment Policies:** The City Council should adopt complete performance measures to aid deployment planning and to monitor performance. The measures of time should be designed to deliver outcomes that will save patients, when possible, upon arrival and to keep small but serious fires from becoming more serious. With this in mind, Citygate recommends the following measures:

- 1.1   Distribution of Fire Stations:** To treat pre-hospital medical emergencies and control small fires, the first-due unit should arrive within 7:30 minutes, 90 percent of the time from the receipt of the 9-1-1 call at the Monterey County dispatch center. This equates to a 1:30-minute dispatch time, a 2:00-minute company turnout time, and a 4:00-minute travel time.

- 1.2 Multiple-Unit Effective Response Force for Serious Emergencies:** To confine building fires near the room of origin, keep vegetation fires under one acre in size, and treat multiple medical patients at a single incident, a multiple-unit ERF of at least **16** personnel, including at least one Division Chief, should arrive within 11:30 minutes from the time of 9-1-1 call receipt at the Monterey County dispatch center 90 percent of the time. This equates to a 1:30-minute dispatch time, 2:00-minute company turnout time, and 8:00-minute travel time.
- 1.3 Hazardous Materials Response:** To provide hazardous materials response designed to protect from the hazards associated with uncontrolled release of hazardous and toxic materials, the fundamental mission of the Department's response is to isolate the hazard, deny entry into the hazard zone, and minimize impacts on the community. This can be achieved with a first-due total response time of 7:30 minutes or less to provide initial hazard evaluation and/or mitigation actions. After the initial evaluation is completed, a determination can be made whether to request additional resources to mitigate the hazard.
- 1.4 Technical Rescue:** To respond to technical rescue emergencies as efficiently and effectively as possible with enough trained personnel to facilitate a successful rescue, with a first-due total response time of 7:30 minutes or less to evaluate the situation and initiate rescue actions, additional resources should assemble as needed within a total response time of 11:30 minutes to safely complete rescue/extrication and delivery of the victim to the appropriate emergency medical care facility.

### **Administrative Support Staffing Capacity Assessment Findings**

**Finding #16:** Prior to COVID-19 staffing reductions, the Department lacked sufficient headquarters staffing capacity to meet workload demand.

**Finding #17:** After COVID-19-related staffing reductions, the Department has ongoing headquarters administrative staffing capacity gaps and single points of failure that will require an additional 4.4 to 7.7 FTE at the appropriate skill level to close.

**Finding #18:** Current Administration Division workload precludes any capacity for strategic/long-term planning, goal setting, and program evaluation.

- Finding #19:** The Administration Division lacks sufficient staffing capacity to adequately meet its emergency management responsibilities.
- Finding #20:** Insufficient clerical-level support capacity has significantly impacted the Administration Division’s ability to achieve many of its higher-level goals and objectives involving research, data collection, analysis, program evaluation, planning, and special projects.
- Finding #21:** There is insufficient clerical-level capacity to support all Department divisions and programs.
- Finding #22:** The lack of adequate office support capacity means some Department personnel are working below job specifications performing lower-level tasks, and/or some lower-level tasks (e.g., records management) are not performed adequately or at all.
- Finding #23:** The Administration Division lacks redundant capacity for critical Department-level business processes and services, including accounts payable/receivable, payroll time keeping, personnel management, and emergency management.
- Finding #24:** The Administration Division has ongoing workload capacity gaps that would require 1.5–2.8 additional FTE capacity to resolve.
- Finding #25:** The Assistant Chief typically works 12–14 hours each scheduled workday and is frequently required or expected to attend meetings and/or perform administrative tasks on his scheduled days off.
- Finding #26:** The Operations Division Chiefs average approximately 15–20 percent of their scheduled work time performing lower-level administrative tasks typically performed by an Administrative Assistant (clerical)-level position.
- Finding #27:** The current Training Officer vacancy resulting from a COVID-19 budget reduction has shifted operational training and safety program responsibilities to the three shift Division Chiefs with no overall coordination nor annual needs assessment/plan to ensure coordination of effort, procedures, record-keeping, or regulatory conformance.
- Finding #28:** The Department lacks sufficient EMS program management, training, quality of care oversight, and administrative support capacity to meet its mandated/delegated responsibilities and to minimize the City’s legal liabilities as related to the provision of emergency medical services.

**Finding #29:** Current and anticipated near-term future workload *exceeds* current staffing capacity; workload is triaged each day and only immediate priorities to maintain business continuity, such as new construction plan reviews and inspections, are being completed. All other workload, such as mandated inspections, is either significantly deferred or not completed at all.

### **Administrative Support Staffing Capacity Assessment Recommendations**

**Recommendation #2:** As fiscal resources allow, the City should consider providing an additional 4.4–7.7 FTE headquarters staffing capacity as identified in this report to relieve critical ongoing workload capacity gaps, provide redundant capacity to eliminate identified single points of failure, and provide additional chief officer depth.

**Recommendation #3:** As fiscal resources allow the City should consider restoring/adding 1.0–2.0 FTE Administrative Assistant-level capacity to relieve critical workload capacity gaps and to provide redundant capacity for critical business services and processes.

**Recommendation #4:** As fiscal resources allow the City should consider providing .33–.75 FTE capacity for emergency management/preparedness management.

**Recommendation #5:** As fiscal resources allow; the City should consider adding 1.0 FTE Battalion/Division Chief capacity to provide appropriate management of the Department’s critical training and safety programs and additional chief officer capacity.

**Recommendation #6:** As fiscal resources allow; the City should consider adding .5 to .85 FTE at the appropriate level to provide overall EMS program management, quality of care oversight, EMSA coordination, and coordination/delivery of EMS-specific training.

**Recommendation #7:** As fiscal resources allow; the City should consider restoring the .75 FTE Administrative Assistant position currently vacant/frozen to provide needed clerical-level support capacity for the Operations Division.

**Recommendation #8:** As fiscal resources allow, the City should consider restoring the currently vacant/frozen 1.0 FTE Fire Prevention Plans Examiner/Inspector position, or equivalent capacity, to provide critically needed technical support in the Fire Prevention Division.

## ***NEXT STEPS***

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### **Near Term**

- ◆ Review and absorb the content, findings, and recommendations of this report.
- ◆ Adopt revised response performance goals as recommended.
- ◆ Provide additional administrative support staffing capacity as recommended in this report as fiscal resources allow.
- ◆ Monitor response time performance and unit workload at least annually.
- ◆ Monitor simultaneous incident activity impacts.



## SECTION 1—INTRODUCTION AND BACKGROUND

The City of Monterey (City) Fire Department (Department) retained Citygate Associates, LLC (Citygate) to conduct a Community Risk Assessment and Standards of Cover (CRA/SOC) Study to assist the City and Department in ensuring a safe, effective, and appropriately sized response force for fires, medical emergencies, and other events requiring a specialized emergency response throughout the Cities of Monterey, Pacific Grove, Carmel-by-the-Sea, and Sand City, as well as the Monterey Regional Airport, Naval Support Activity Monterey, and La Mesa Village military housing. In addition to the CRA/SOC, the City’s Request for Proposals (RFP) also requested a review and evaluation of administration, support, and operational staffing levels relative to its ability to adequately support its mission and meet community fire and EMS delivery expectations.

Citygate’s CRA/SOC studies conform with the methodology outlined in *Standards of Response Coverage* (fifth and sixth editions) as published by the CFAI and address all the elements of the City’s requested scope of work. The study also incorporates guidelines and best practices in the field of deployment and risk analysis from the National Fire Protection Association (NFPA), the Insurance Services Office (ISO), the CFAI, the California Occupational Safety and Health Administration (Cal/OSHA), relevant federal and state laws and regulations, and other recognized industry best practices.

### 1.1 REPORT ORGANIZATION

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This report is organized into the following sections. **Volume 2—Map Atlas** is separately bound.

- |                          |   |
|--------------------------|---|
| <b>Executive Summary</b> | Summarizes fire service policy choices and all findings and recommendations that can be used to strategically guide the City’s and Department’s efforts.  |
| <b>Section 1</b>         | <b>Introduction and Background:</b> Describes Citygate’s project approach, methodology, and scope of work, and provides an overview of the City and Department.   |
| <b>Section 2</b>         | <b>Standards of Cover Analysis:</b> Describes Citygate’s service demand and response performance analysis in detail, as well as our findings and recommendations for each Standards of Cover element.     |
| <b>Section 3</b>         | <b>Administrative Support Staffing Assessment:</b> Describes Citygate’s review and evaluation of the Department’s administrative support organization, staffing levels, and workload capacity assessment. |

**Appendix A**                      **Community Risk Assessment:** Provides a comprehensive analysis of the fire and non-fire hazards likely to impact the City.

### 1.1.1 Goals of the Report

Throughout this report, Citygate cites findings and makes recommendations as appropriate related to each finding. Findings and recommendations are sequentially numbered. A complete list of these same findings and recommendations is provided in the Executive Summary.

This document provides technical information about how fire services are provided and legally regulated and about the way the Department currently operates. This information is presented in the form of recommendations and policy choices for consideration by the Department and City.

The result is a strong technical foundation upon which to understand the advantages and disadvantages of the choices facing Department and City leadership regarding the best way to provide fire services and, more specifically, at what level of desired outcome and expense.

### 1.1.2 Limitations of Report

In the United States, there are no federal or state regulations requiring a specific minimum level of fire services. Each community, through the public policy process, is expected to understand the local fire and non-fire risks and its ability to pay, and to then choose its level of fire services. *If* fire services are provided at all, federal and state regulations specify how to safely provide them for the public and for the personnel providing the services.

While this report and technical explanation can provide a framework for the discussion of Department services, neither this report nor the Citygate team can make the final decisions, nor can they cost out every possible alternative in detail. Once final strategic choices receive policy approval, City staff can conduct any final costing and fiscal analyses as typically completed in its normal operating and capital budget preparation cycle.

## 1.2 PROJECT APPROACH AND SCOPE OF WORK

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### 1.2.1 Project Approach and Methodology

At the start of this study, Citygate requested and reviewed relevant background data and information to better understand current service levels, costs, and the history of service level decisions, including prior studies.

Citygate subsequently reviewed demographic information about the cities served and the potential for future growth and development within the entire service area. Citygate also obtained map and response data from which to model current and projected fire service deployment, with the goal to identify the location(s) of stations and crew quantities required to best serve the City and its contract jurisdictions as they currently exist, and to facilitate future deployment planning.

Once Citygate gained an understanding of the Department’s service area and its fire and non-fire risks, the Citygate team developed a deployment model that was tested against the travel time mapping and prior response data to ensure an appropriate fit. Citygate also evaluated future growth and service demand by risk type. This resulted in Citygate proposing an approach to address current and long-range needs with effective and efficient use of existing resources. The result is a framework for enhancing Department services while meeting community expectations and fiscal realities.

### **1.2.2 Scope of Work**

Citygate’s approach to this Community Risk Assessment and Standards of Cover Study included all the scope of work elements described in the City’s RFP including:

- ◆ Reviewing relevant information data and information provided by the Department and City.
- ◆ Interviewing internal City and Department study team members and stakeholders.
- ◆ Providing a general summary of the City and service area, and services provided by the Fire Department.
- ◆ Conducting a CRA/SOC study consistent with guidelines by the CFAI, the NFPA, the ISO, Cal/OSHA, federal and state laws, and recognized industry best practices, including the Department’s historic reliability and response effectiveness analysis as well as its distribution and concentration analysis.
- ◆ Reviewing and evaluating administration, support, and operational staffing levels.
- ◆ Preparing a comprehensive report that includes analysis-based findings and recommendations, including an executive summary presentation of the written report for City stakeholders.

In addition, Citygate took the following into account in conducting the CRA/SOC as outlined in the RFP:

- ◆ The communities served by Monterey Fire should be evaluated separately for their risk and the service they receive from Monterey Fire; the study should also look at the entire coverage area as a whole.
- ◆ The Cities of Seaside and Marina recently completed CRA/SOC studies and those findings should be evaluated to determine how they may factor into Monterey Fire’s service area. The consultant shall consider how regional approaches may work to meet fire services challenges.

- ◆ The Monterey Regional Airport is considering relocating its fire station to the north side of the airfield and the consultant must consider the impacts such a relocation would have on fire service delivery.
- ◆ The Presidio of Monterey has recently terminated its contract with Monterey for fire services and the Presidio Fire Department has established a fire station staffed with a four-person engine company in the garrison; the impacts of this action should be reflected in the study.

### **1.3 SERVICE AREA OVERVIEW**

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The City of Monterey, incorporated as a charter city in 1890, is a central California coastal city 116 miles south of San Francisco on the southern end of Monterey Bay. Encompassing 12.3 square miles with a resident population of 30,000, the City is a popular tourist destination and home to the U.S. Army Defense Language Institute, the Naval Postgraduate School, Middlebury Institute of International Studies, Monterey Peninsula College, and the Monterey Bay Aquarium. Operating under a Council-City Manager form of government with five council members elected at large to staggered four-year terms, Monterey provides a full range of urban community services including police, fire, refuse and recycling, streets, parking, planning, building, engineering, parks, economic development, library, recreation, and cultural services. The City has a diversified economy led by tourism, retail trade, and services. The City attracts several hundred thousand visitors annually and is home to more than 2,800 businesses.

The City of Monterey provides contractual fire protection services to the Cities of Carmel-by-the-Sea, Pacific Grove, and Sand City, as well as the Monterey Peninsula Regional Airport and the La Mesa Village military housing community. Naval Support Activity Monterey (Naval Postgraduate School) is physically located within the City of Monterey and receives fire protection services at no cost to the federal government under the concept of “concurrent jurisdiction.” The Department’s entire service area encompasses 24 square miles with a resident population of approximately 50,000 and a daytime population of approximately 65,000 people.

#### **1.3.1 Future Growth and Development**

The Association of Monterey Bay Area Governments (AMBAG) projects population increases for the cities included in this study as summarized in the following table.<sup>1</sup>

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<sup>1</sup> 2014 Regional Growth Forecast, Appendix A (Table 10)

**Table 3—Projected Growth**

City	2020 Population <sup>1</sup>	2035 Population <sup>2</sup>	Projected Growth
Carmel-by-the-Sea	3,807	3,917	2.89%
Monterey	28,223	30,647	8.59%
Pacific Grove	15,249	17,030	11.68%
Sand City	367	1,550	322.34%
<b>Total</b>	<b>47,646</b>	<b>53,144</b>	<b>11.54%</b>

<sup>1</sup> Source: Esri Community Analyst (2020)

<sup>2</sup> AMBAG 2014 Regional Growth Forecast

## 1.4 FIRE DEPARTMENT OVERVIEW

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### 1.4.1 Organization

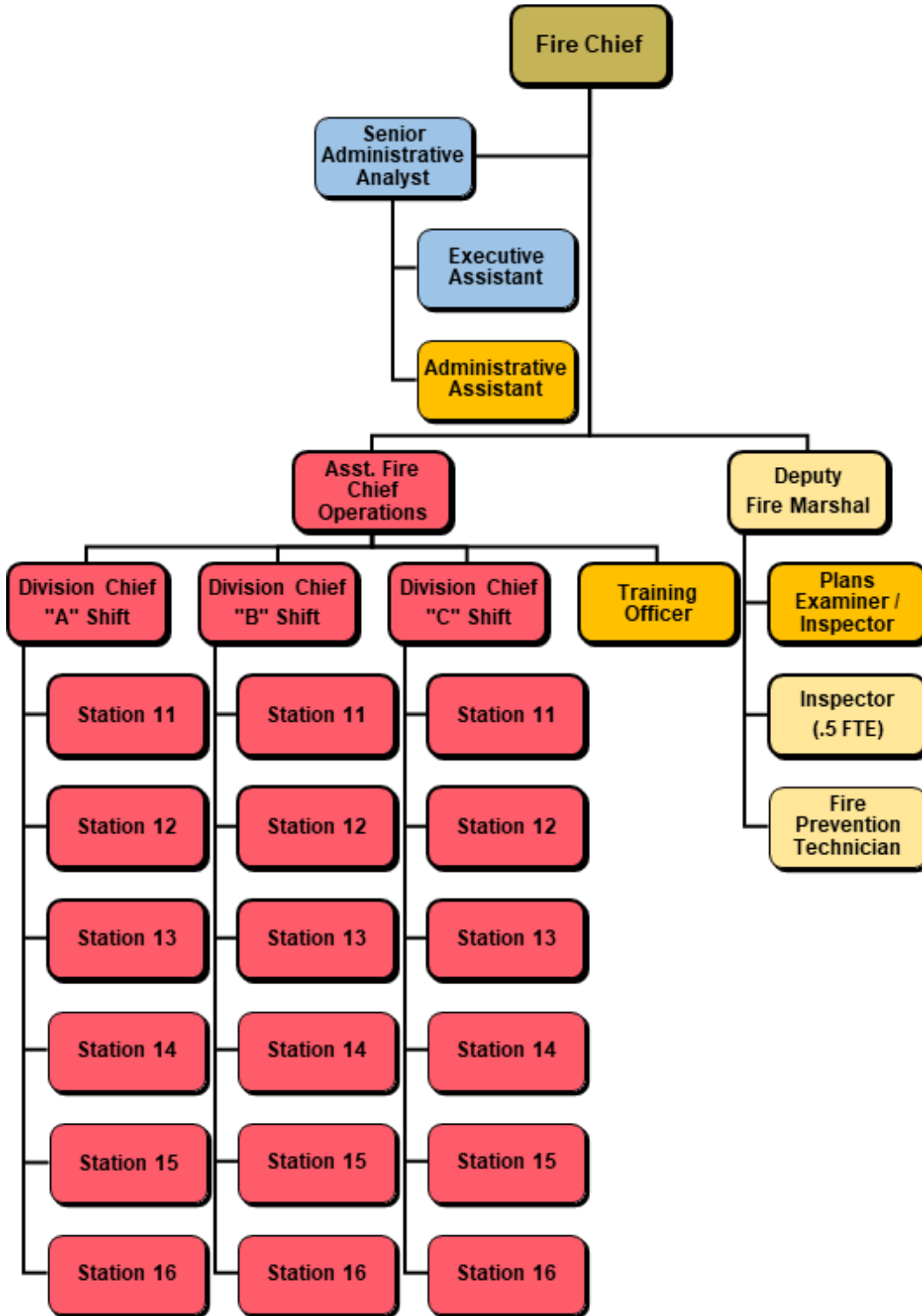
The Monterey Fire Department provides fire suppression, Advanced Life Support (ALS), and Basic Life Support (BLS) pre-hospital emergency medical, initial hazardous material release and technical rescue, aircraft rescue firefighting (ARFF), fire prevention, community education, and related fire and life safety services with a staff of 85 personnel organized into four divisions as summarized in the following table and organization chart.

**Table 4—Budgeted FTE – Fire Department**

Division	Budgeted Positions
Administration	5
Operations	78
Training	1
Prevention	1
Emergency Management	0
<b>Total</b>	<b>85</b>

Source: City of Monterey Fiscal Year 2021–22 Adopted Budget

**Figure 1—Fire Department Organization**



Note: orange shading denotes a vacant/frozen position

## 1.4.2 Facilities and Resources

The Department provides services from six fire stations, one marina at the Coast Guard Pier, and one administrative building with a minimum daily staffing of 25 personnel as summarized in the following table.

**Table 5—Fire Department Facilities, Resources, and Daily Response Staffing**

Station	Address/Location	Year Built	Assigned Resources <sup>1</sup>	Minimum Daily Staffing
11	600 Pacific Street Monterey	1959; Renovations in 1991 and 2002	Medic Engine 11 Truck 11 Division Chief	<b>3</b> <b>3</b> <b>1</b>
12	582 Hawthorne Street Monterey	1951; Renovations in 1993 and 2006	Engine 12	<b>3</b>
13	401 Dela Vina Avenue Monterey	1951; Renovations in 1993 and 2006	Medic Engine 13	<b>3</b>
14	601 Pine Avenue Pacific Grove	1948; Renovations in 1971 and 1990	Engine 14	<b>3</b>
15	6 <sup>th</sup> Avenue at Mission Street Carmel-by-the-Sea	1937	Engine 15 <i>Ambulance 7166<sup>2</sup></i>	<b>3</b> <b>2<sup>2</sup></b>
16	150 Olmstead Way Monterey	1971	Engine 16 <i>ARFF 16</i>	<b>3</b> <b>1</b>
Marina	32 Cannery Row Monterey	N/A	Boat 12**	<b>**</b>
<b>Total Minimum Daily Core Staffing</b>				<b>22</b>
<b>Specialty Unit Staffing<sup>3</sup></b>				<b>3</b>

<sup>1</sup> Staffed resources are shown in **bold**

<sup>2</sup> *City of Carmel-by-the-Sea ambulance and firefighter-paramedic personnel (supervised by Fire Department staff)*

<sup>3</sup> *ARFF 16 and Ambulance 7166 are not available for response outside of their assigned jurisdiction*

\*\* Cross-staffed as needed by on-duty Station 12 personnel

Minimum daily staffing on Engine 11 and Engine 13 includes at least one EMT-Paramedic on each engine.

## 1.4.3 Service Capacity

Service capacity refers to the Department’s available response force; the size, types, and condition of its response fleet and any specialized equipment; core and specialized performance capabilities and competencies; resource distribution and concentration; availability of automatic or mutual aid; and any other agency-specific factors influencing its ability to meet current and prospective future service demand relative to the risks to be protected.

Response personnel work a 48/96-hour shift schedule of two consecutive 24-hour days on duty, followed by four days off duty. The Department provides services with six engines, one aerial ladder truck, one aircraft rescue firefighting (ARFF) apparatus, and one Division Chief. Minimum daily staffing also includes one paramedic ambulance that primarily serves just the City of Carmel-by-the-Sea, but also provides mutual aid outside the City as requested by American Medical Response (AMR), the Monterey County Exclusive Operating Area ambulance contractor. The Department also has a fire boat moored at the Coast Guard Pier and a Type-3 wildland engine at Station 13 that are cross-staffed by designated station personnel as needed.

All response personnel are trained to either the emergency medical technician (EMT) level, capable of providing Basic Life Support (BLS) pre-hospital emergency medical care, or EMT-Paramedic (Paramedic) level, capable of providing Advanced Life Support (ALS) pre-hospital emergency medical care. Engines 11 and 13 are staffed with one paramedic each, and the remainder of the staffed resources provide BLS-level EMS care. Ground ambulance services are provided by the Carmel ambulance in the City of Carmel-by-the-Sea and by AMR throughout the remainder of the service area. Air ambulance services, when needed, are provided by REACH/CALSTAR from Gilroy, Stanford Life Flight from Palo Alto, or the California Highway Patrol. Community Hospital of the Monterey Peninsula (CHOMP) in Monterey provides emergency room services, and Natividad Medical Center in Salinas is a Level II trauma center.

Response personnel are also trained to the U.S. Department of Transportation Hazardous Material First Responder Operational (FRO) level to provide initial hazardous material incident assessment, hazard isolation, and decontamination support for the Monterey County Regional Hazardous Material Response Team jointly operated by the Salinas and Seaside Fire Departments.

All response personnel are further trained in Confined Space Awareness. The Department also has 11 personnel trained to the Rescue Systems 1 and Rescue Systems 2 levels who are members of the Monterey County Regional Urban Search and Rescue (USAR) Team jointly operated by the City of Monterey Fire Department and the Monterey County Regional and North Monterey County Fire Districts.

The Department has automatic mutual aid agreements with the City of Seaside, Pebble Beach Community Services District, Cypress Fire District, and the Presidio of Monterey, and is also a signatory to the Monterey County Fire Mutual Aid Plan and California Master Mutual Aid Agreement. The City of Seaside Fire Department provides the fourth engine for ERF responses into Stations 13 and 16 response areas; the Presidio of Monterey Fire Department engine assigned to the Defense Language Institute provides the fourth engine for ERF responses into the Station 12 response area; and the Pebble Beach Community Services District/Cypress Fire District provides the fourth engine for ERF responses into Stations 11, 14, and 15 response areas.



**Finding #1:** The Department's physical response unit types are appropriate to protect against the hazards likely to impact its service area.

**Finding #2:** The Department's minimum daily staffing of 25 personnel provides an Effective Response Force for one moderately serious incident with some remaining capacity for concurrent single-unit incidents.

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## SECTION 2—STANDARDS OF COVER ANALYSIS

This section provides a detailed analysis of the Department’s current ability to deploy and mitigate hazards within its service area. The response analysis uses prior response statistics and geographic mapping to help the Department and the community visualize what the current response system can and cannot deliver.

### 2.1 STANDARDS OF COVER PROCESS OVERVIEW

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The core methodology used by Citygate in the scope of its deployment analysis work is *Standards of Cover*, fifth and sixth editions, which is a systems-based approach to fire department deployment published by the CFAI. This approach uses local risk and demographics to determine the level of protection best fitting a community’s needs.

The SOC method evaluates deployment as part of a fire agency’s self-assessment process. This approach uses risk and community expectations regarding outcomes to help elected officials make informed decisions on fire and EMS deployment levels. Citygate has adopted this multiple-part systems approach as a comprehensive tool to evaluate fire station locations. Depending on the needs of the study, the depth of the components may vary.

In contrast to a one-size-fits-all, prescriptive formula, such a systems approach to deployment allows for local determination. In this comprehensive approach, each jurisdiction can match local needs (risks and expectations) with the costs of various levels of service. In an informed public policy debate, a governing board “purchases” the fire and emergency medical service levels the community needs and can afford.

While working with multiple components to conduct a deployment analysis is admittedly more work, it yields a much better result than using only a singular component. For instance, if only travel time is considered and frequency of multiple calls is not, the analysis could miss over-worked companies. If a risk assessment for deployment is not considered and deployment is based only on travel time, a community could under-deploy to incidents.

The following table describes the eight elements of the SOC process.

**Table 6—Standards of Coverage Process Elements**

SOC Element		Description
1	Existing Deployment System	Overview of the community served, authority to provide services, and current deployment model and performance measures
2	Community Outcome Expectations	Review of the community’s expectations relative to response services provided by the agency
3	Community Risk Assessment	Description of the values to be protected within the service area, and analysis of the fire and non-fire risks likely to impact the service area
4	Critical Task Analysis	Review of the essential tasks that must be performed and the personnel required to deliver a stated outcome for an Effective Response Force (ERF)
5	Distribution Analysis	Review of the spacing of initial response (first-due) resources (typically engines) to control routine emergencies to achieve desired outcomes
6	Concentration Analysis	Review of the spacing of fire stations so that larger or more complex emergencies receive sufficient resources in a timely manner (ERF) to achieve desired outcomes
7	Reliability and Historical Response Effectiveness Analysis	Using recent prior response statistics, determining the percentage of conformance to established response performance goals the existing deployment system delivers
8	Overall Evaluation	Proposing Standards of Coverage statements by risk type as appropriate

Source: CFAI “Standards of Cover,” Fifth Edition

Fire service deployment, simply summarized, is about the *speed* and *weight* of response. *Speed* refers to initial response (first-due) of all-risk intervention resources (e.g., engines, ladder trucks, rescues, ambulances) strategically deployed across a jurisdiction for response to emergencies within a travel time sufficient to control routine to moderate emergencies without the incident escalating to greater size or severity. *Weight* refers to multiple-unit responses for more serious emergencies, such as building fires, multiple-patient medical emergencies, vehicle collisions with extrication required, or technical rescue incidents where more firefighters must be assembled within a time interval to safely control the emergency and prevent it from escalating into an even more serious event. The following table illustrates this deployment paradigm.

**Table 7—Fire Service Deployment Paradigm**

Element	Description	Purpose
<b><i>Speed of Response</i></b>	Response time of initial all-risk intervention units strategically located across a jurisdiction	Controlling routine to moderate emergencies without the incident escalating in size or complexity
<b><i>Weight of Response</i></b>	Number of firefighters in a multiple-unit response for serious emergencies	Assembling enough firefighters within a reasonable time frame to safely control a more complex emergency without escalation

Thus, smaller fires and less complex emergencies require a single- or two-unit response (engine and/or specialty resource) within a relatively short response time. Larger or more complex incidents require more units and personnel to control. In either case, if the crews arrive too late or the total number of personnel is too few for the emergency, they are drawn into an escalating and more dangerous situation. The science of fire crew deployment is to spread crews out across a community or jurisdiction for quick response to keep emergencies small with positive outcomes without spreading resources so far apart that they cannot assemble quickly enough to effectively control more serious emergencies.

## 2.2 CURRENT DEPLOYMENT

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**SOC ELEMENT 1 OF 8**  
**EXISTING DEPLOYMENT**  
**POLICIES**

Nationally recognized standards and best practices suggest using three incremental measurements to define response time: dispatch center call processing time, crew alerting and response unit boarding (commonly called turnout time), and travel (driving) time.<sup>2</sup> Ideally, the clock start time is when the 9-1-1 dispatcher receives the emergency call. In some

cases, the call must then be transferred to a separate fire dispatch center. In this setting, the response time clock starts when the fire center receives the 9-1-1 call into its computer-aided dispatch (CAD) system.

The following table summarizes current response performance standards for each service area jurisdiction.<sup>3</sup> The City Councils within the service area, however, have not adopted a performance measure by policy. Monterey’s General Plan Safety Element references “Maintain a cost-effective, high level of fire protection service”<sup>4</sup>; Pacific Grove’s General Plan references “Maintain an

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<sup>2</sup> Reference: NFPA 1710 Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments (2020 Edition)

<sup>3</sup> Source: City of Monterey Fire Department staff

<sup>4</sup> Reference: City of Monterey General Plan Safety Element policy d.3 (page 81)

average response time of three minutes for Priority 1 (emergency) calls”<sup>5</sup>; and the City of Carmel-by-the-Sea’s General Plan only cites “respond to emergencies rapidly.”<sup>6</sup> None of the cities reference fire department performance measures in their adopted budget documents.

**Table 8—Current Response Performance Standards**

<b>Jurisdiction</b>	<b>Response Performance Standard<sup>1</sup> (Minutes)</b>	<b>Percentage Reliability Measure</b>
<b>Monterey</b>	<b>6:00</b>	90%
<b>Pacific Grove</b>	<b>5:00</b>	90%
<b>Carmel-by-the-Sea</b>	<b>5:00</b>	90%
<b>Monterey Airport</b>	<b>3:00<sup>2</sup></b>	100%

<sup>1</sup> Starting point of response measure not defined (i.e., receipt of 9-1-1 call, receipt of dispatch notification, or start of travel)

<sup>2</sup> To midpoint of furthest runway

The most recent published NFPA best practices<sup>7</sup> have decreased the dispatch processing time to 1:00 minute for events with an imminent threat to life or significant property damage, and 1:30 minutes for hazardous materials or technical rescue incidents, joint response with law enforcement involving weapons, or for language barriers. In Citygate’s experience, however, very few dispatch centers can achieve this level of performance, and Citygate thus continues to recommend 1:30 minutes as an achievable call processing performance goal.

Further, for crew turnout time, 60 to 80 seconds is recommended, depending on the type of protective clothing that must be donned. Again, in Citygate’s experience, very few fire agencies can achieve this level of performance, and Citygate thus recommends 2:00 minutes as an achievable crew turnout performance goal.

Best practice for travel time performance in urban areas is 4:00 minutes or less for the first arriving unit, and 8:00 minutes or less for the multiple-unit Effective Response Force for more serious emergencies.<sup>8</sup>

If the travel time measures recommended by the NFPA and Citygate are added to Citygate’s recommended dispatch call processing and crew turnout performance goals, then a realistic 90

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<sup>5</sup> City of Pacific Grove General Plan, Chapter 10 Health and Safety, Policy 21

<sup>6</sup> City of Carmel-by-the-Sea General Plan, Environmental Safety Element, Objective 08-2

<sup>7</sup> NFPA 1221 – Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems (2019 Edition).

<sup>8</sup> NFPA 1710 Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments (2020 Edition)

percent first-unit response performance goal is 7:30 minutes from the time the regional fire dispatch center in Salinas receives the call. This includes a 1:30-minute call processing/dispatch, 2:00-minute crew turnout, and 4:00-minute travel time.

**Finding #3:** The Monterey City Council *has not* adopted specific response performance measures by policy resolution or in a General Plan policy consistent with best practice recommendations.

### **2.2.1 Current Deployment Model**

#### ***Resources and Staffing***

The Department’s current deployment model provides the recommended 16–17 personnel and appropriate response unit types to effectively resolve moderate-risk building fires<sup>9</sup> and other emergencies requiring a multiple-unit response, with additional response capacity for simultaneous incidents.

#### ***Response Plan***

The Department is an all-risk fire agency providing the population it protects with services that include fire suppression; pre-hospital BLS and ALS emergency medical services; initial hazardous material and technical rescue response; open water response; and other non-emergency services, including fire prevention, community outreach, and other related services.

Given these risks, the Department utilizes a tiered response plan calling for different types and numbers of resources depending on incident/risk type. The Monterey County Emergency Communications Department’s CAD system selects and dispatches the closest and most appropriate resource(s) pursuant to the Department’s response plan as summarized in the following table.

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<sup>9</sup> NFPA 1710 Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments (2020 Edition)

**Table 9—Response Plan by Type of Emergency**

Incident Type	Response	Total Staffing
<b>Structure–Commercial</b>	4 Engines, 1 Truck, 1 Chief Officer (1 Engine is Auto-Aid)	16
<b>Structure–Residential</b>	4 Engines, 1 Truck, 1 Chief Officer (1 Engine is Auto-Aid)	16
<b>Medical Emergency</b>	1 Engine	3
<b>Vegetation Fire</b>	2 Engines, 1 Chief Officer	7
<b>Vehicle Fire</b>	1 Engine	3
<b>Commercial Vehicle Fire</b>	2 Engines, 1 Chief Officer	7
<b>Vehicle Collision</b>	1 Engine, 1 Truck, 1 Chief Officer	7
<b>Hazardous Materials</b>	1 Engine, 1 Truck, 1 Chief Officer, County Haz-Mat Team (if confirmed)	3 (15)
<b>Technical Rescue</b>	1 Engine, 1 Truck, 1 Chief Officer, (County US&R Team if significant)	7 (14)
<b>Aircraft Crash</b>	1 ARFF, 4 Engines, 1 Truck, 1 Chief Officer (1 Engine is Auto-Aid)	17
<b>Water Rescue</b>	1 Engine, 1 Truck, 1 Chief Officer, 1 Boat, 1 State Parks Lifeguard	11

Source: Monterey Fire Department staff

**Finding #4:** The Department has a standard response plan that considers risk and establishes an appropriate initial response for each incident type; each type of call for service receives the combination of engines, trucks, specialty units, and command officers customarily needed to effectively control that type of incident based on Department experience.

### 2.3 OUTCOME EXPECTATIONS

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**SOC ELEMENT 2 OF 8  
 COMMUNITY OUTCOME  
 EXPECTATIONS**

The Standards of Cover process begins by reviewing existing emergency services outcome expectations. This includes determining for what purpose the response system exists and whether the governing body has adopted any response performance measures. If it has, the time measures used must be understood and reliable data must be available.



Current national best practice is to measure percent completion of a goal (e.g., 90 percent of responses) instead of an average measure. Mathematically, this is called a fractile measure.<sup>10</sup> Measuring the average only identifies the central or middle point of response time performance for all calls for service in the data set, making it impossible to know how many incidents had response times that were far above the average or just above.

For example, the following figure shows response times for a hypothetical small fire department that receives 20 calls for service each month. Each response time has been plotted on the graph from shortest response time to longest response time.

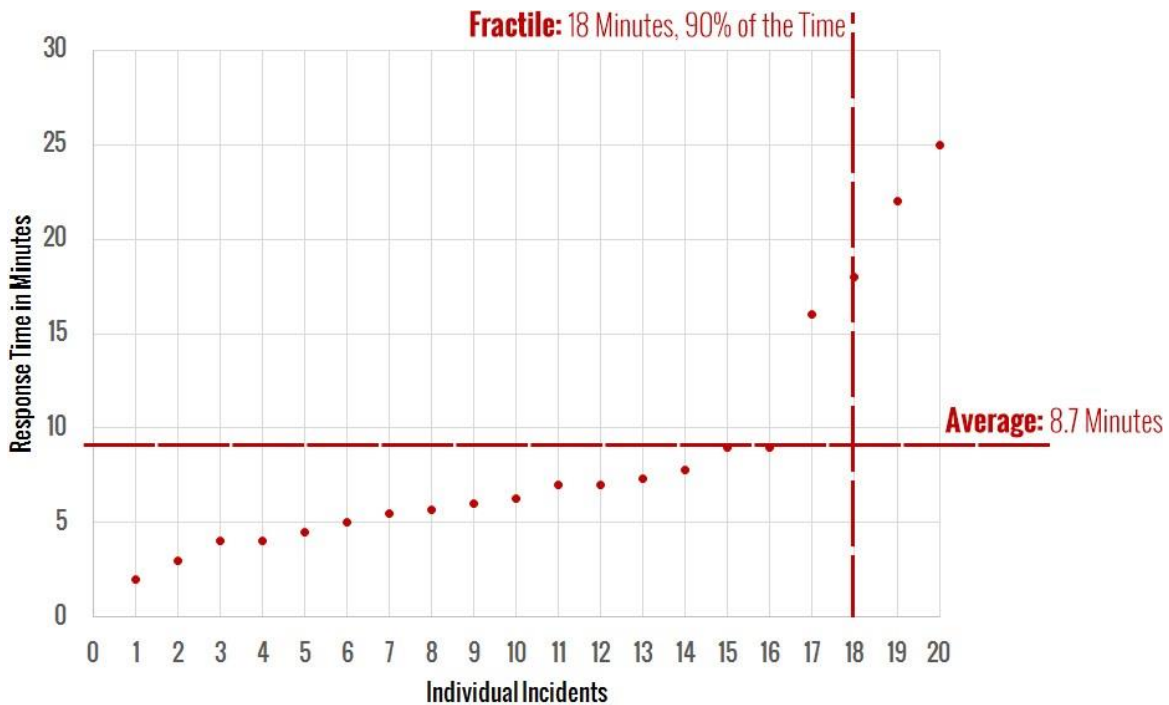
The following figure shows that the average response time is 8.7 minutes. However, the average response time fails to properly account for four calls for service with response times far exceeding a threshold in which positive outcomes could be expected. In fact, it is evident in the figure that 20 percent of responses are far too slow, and that this hypothetical jurisdiction has a potential life-threatening service delivery problem. Average response time as a fire service delivery measurement is simply not sufficient. This is a significant issue in larger cities if hundreds or thousands of calls are answered far beyond the average point.

By using the fractile measurement with 90 percent of all responses, this hypothetical jurisdiction has a response time of 18:00 minutes, 90 percent of the time. Stated another way, 90 percent of all responses are 18:00 minutes or less. This fractile measurement is far more accurate at reflecting the service delivery situation of this small agency.

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<sup>10</sup> A *fractile* is that point below which a stated fraction of the values lies. The fraction is often given in percent; the term percentile may then be used.

**Figure 2—Fractile versus Average Response Time Measurements**



More importantly, within the SOC process, positive outcomes are the goal. From that, crew size and response time can be calculated to provide appropriate fire station spacing (distribution and concentration) to achieve the desired goal(s). Emergency medical incidents include situations with the most severe time constraints. The brain can only survive 4:00 to 6:00 minutes without oxygen. Cardiac arrest and other events can cause oxygen deprivation to the brain. Cardiac arrests make up a small percentage, with drowning, choking, trauma constrictions, or other similar events having the same effect. In a building fire, a small incipient fire can grow to involve the entire room in 6:00 to 8:00 minutes, spreading rapidly horizontally and vertically to involve other rooms and threatening the safety of any occupants who have not already evacuated. If fire service response is to achieve positive outcomes in severe emergency medical situations and incipient fire situations, *all* responding crews must arrive, assess the situation, and deploy effective measures before brain death occurs or the fire spreads beyond the room of origin.

From the time 9-1-1 receives the call, an effective deployment system is *beginning* to manage the problem within a 7:00- to 8:00-minute total response time. This is right at the point that brain death is becoming irreversible, and a building fire has grown to the point of leaving the room of origin and becoming very serious. Thus, the City needs a first-due response goal that is within a range that gives hope for a positive outcome. It is important to note that fire or medical emergency events continue to deteriorate from the time of inception, not from the time the fire engine or ambulance starts to drive the response route. Ideally, the emergency is noticed immediately and the 9-1-1 system is activated promptly. This step of awareness—calling 9-1-1 and giving the dispatcher

accurate information—takes, in the best of circumstances, 1:00 minute. Crew notification and travel time take additional minutes. Upon arrival, the crew must approach the patient or emergency, assess the situation, and appropriately deploy its skills and tools. Even in easy-to-access situations, this step can take 2:00 minutes or more. This time frame may be increased considerably due to long driveways, apartment buildings with limited access, multiple-story buildings, or enclosed shopping centers.

Unfortunately, there are times when the emergency has become too severe, even before the 9-1-1 notification and/or fire department response, for the responding crew to reverse. However, when an appropriate response time policy is combined with a well-designed deployment system, only anomalies like bad weather, poor traffic conditions, or multiple emergencies slow down the response system. Consequently, a properly designed system will give citizens the hope of a positive outcome for their tax dollar expenditure.

For this assessment, total response time is the sum of the call processing/dispatch, crew turnout, and road travel time intervals, which is consistent with CFAI best practice recommendations.

## 2.4 COMMUNITY RISK ASSESSMENT

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The third element of the Standards of Coverage (SOC) process is a community risk assessment. Within the context of an SOC study, the objectives of a community risk assessment are to:

**SOC ELEMENT 3 OF 8**  
**COMMUNITY RISK**  
**ASSESSMENT**

- ◆ Identify the values at risk to be protected within the community or service area.
- ◆ Identify the specific hazards with the potential to adversely impact the community or service area.
- ◆ Quantify the overall risk associated with each hazard.
- ◆ Establish a foundation for current/future deployment decisions and risk-reduction / hazard-mitigation planning and evaluation.

A hazard is broadly defined as a situation or condition that can cause or contribute to harm. Examples include fire, medical emergency, vehicle collision, earthquake, flood, etc. Risk is broadly defined as the *probability of hazard occurrence* in combination with the *likely severity of resultant impacts* to people, property, and the community as a whole.

### 2.4.1 Risk Assessment Methodology

The methodology employed by Citygate to assess community risks as an integral element of an SOC study incorporates the following elements:

- ◆ Identification of geographic planning sub-zones (risk zones) appropriate to the community or jurisdiction.
- ◆ Identification and quantification, to the extent data is available, of the specific values at risk to various hazards within the community or service area.
- ◆ Identification of the fire and non-fire hazards likely to impact the community or service area relative to services provided by the fire agency.
- ◆ Determination of the probability of occurrence for each hazard.
- ◆ Determination of the *likely* impact severity for each hazard by planning zone.
- ◆ Determination of overall risk by hazard considering probability of occurrence and likely impact severity according to the following table.

**Table 10—Overall Risk**

Probability of Occurrence	Impact Severity				
	Insignificant	Minor	Moderate	Major	Catastrophic
Rare	Low	Low	Low	Moderate	High
Unlikely	Low	Low	Low	Moderate	High
Possible	Low	Low	Moderate	High	Extreme
Probable	Low	Low	Moderate	High	Extreme
Frequent	Low	Moderate	High	Extreme	Extreme

### 2.4.2 Values to Be Protected

Broadly defined, *values* are those tangibles of significant importance or value to the community or jurisdiction that are potentially at risk of harm or damage from a hazard occurrence. Values at risk typically include people, buildings, critical facilities/infrastructure, and key economic, cultural, historic, and/or natural resources.

#### *People*

Residents, employees, visitors, and travelers in a community or jurisdiction are vulnerable to harm from a hazard occurrence. Particularly vulnerable are specific at-risk populations, including those unable to care for themselves or self-evacuate in the event of an emergency. At-risk populations typically include children younger than 10 years, the elderly, and people housed in institutional settings. Key demographic data for the Department’s service area includes the following:<sup>11</sup>

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<sup>11</sup> Source: Esri Community Profile (2020 data) and U.S. Census Bureau American Community Survey (ACS) data

- ◆ The population under 10 years or over 65 years of age ranges from slightly more than 24 percent in Sand City to nearly 48 percent in Carmel-by-the-Sea.
- ◆ The cities' populations are predominantly Caucasian, including Hispanic/Latino.
- ◆ Of the population over 24 years of age, the percentage with a high school or equivalent education ranges from 77 percent in Sand City to more than 97 percent in Carmel-by-the-Sea.
- ◆ Of the population over 24 years of age, the percentage with an undergraduate, graduate, or professional degree ranges from nearly 21 percent in Sand City to nearly 69 percent in Carmel-by-the-Sea.
- ◆ Of the population older than 15 years of age, the percentage in the workforce ranges from 76 percent in Sand City to 89 percent in Carmel-by-the-Sea. The unemployment rate ranges from nearly 24 percent in Sand City to nearly 11 percent in Carmel-by-the-Sea.
- ◆ Per capita income ranges from nearly \$23,000 in Sand City to nearly \$86,000 in Carmel-by-the-Sea.
- ◆ The population below the federal poverty level ranges from just over 16 percent in Sand City to slightly less than three percent in Carmel-by-the-Sea.
- ◆ The population without health insurance coverage ranges from slightly above eight percent in Sand City to just over one percent in Carmel-by-the-Sea.

### ***Buildings***

The Department's service area has more than 25,600 housing units and more than 4,300 businesses, including offices, professional services, retail sales, restaurants/bars, motels, churches, schools, government facilities, healthcare facilities, and other business types as described in **Appendix A**.

### ***Critical Infrastructure / Key Resources***

The U.S. Department of Homeland Security defines Critical Infrastructure / Key Resources as those physical assets essential to the public health and safety, economic vitality, and resilience of a community, such as lifeline utilities infrastructure, telecommunications infrastructure, essential government services facilities, public safety facilities, schools, hospitals, airports, etc. The 2015 Monterey County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) identifies 70 critical facilities and infrastructure within the service area where a hazard occurrence with significant impact severity would likely adversely impact critical public or community services.

### *Cultural, Economic, Historic, and Natural Resources*

The service area includes more than 4,300 businesses employing more than 40,000 people, as well as numerous cultural, historic, and natural resources to protect as identified in **Appendix A**.

#### **2.4.3 Hazard Identification**

Citygate utilized prior risk studies where available, fire and non-fire hazards as identified by the CFAI, and agency-/jurisdiction-specific data and information to identify the hazards to be evaluated for this study. Following review and evaluation of the hazards identified in the 2015 Monterey County Multi-Jurisdictional Hazard Mitigation Plan and the fire and non-fire hazards as identified by the CFAI as they relate to services provided by the Department, Citygate evaluated the following seven hazards for this risk assessment:

1. Building fire
2. Vegetation/wildland fire
3. Medical emergency
4. Hazardous material release/spill
5. Technical rescue
6. Marine incident
7. Aircraft incident

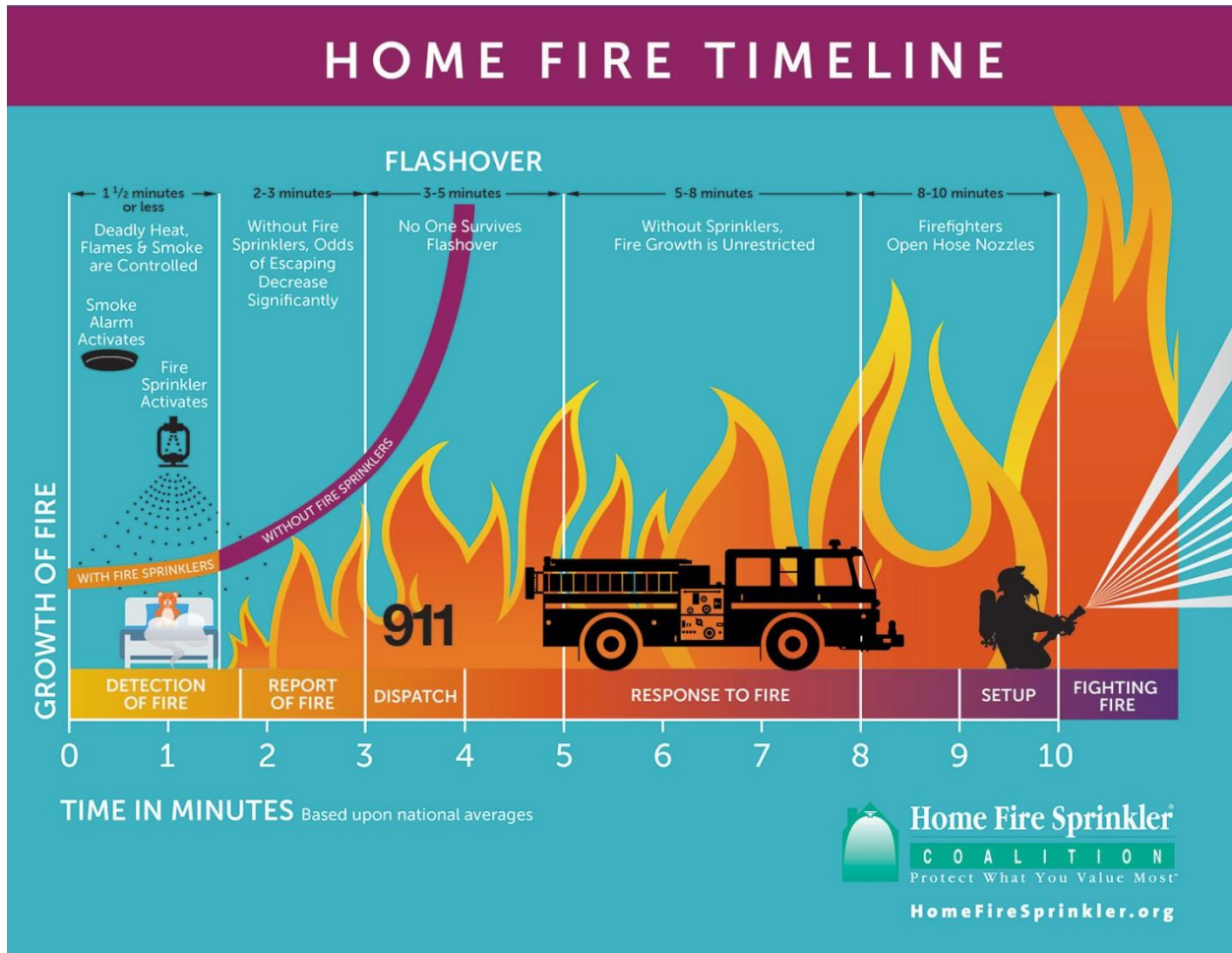
Because building fires and medical emergencies have the most severe time constraints if positive outcomes are to be achieved, following is a brief overview of building fire and medical emergency risk. **Appendix A** contains the full risk assessment for all seven hazards.

#### *Building Fire Risk*

One of the primary hazards in any community is building fire. Building fire risk factors include building size, age, construction type, density, occupancy, number of stories above ground level, required fire flow, proximity to other buildings, built-in fire protection/alarm systems, available fire suppression water supply, building fire service capacity, fire suppression resource deployment (distribution/concentration), staffing, and response time.

The following figure illustrates the building fire progression timeline and shows that flashover, which is the point at which the entire room erupts into fire after all the combustible objects in that room reach their ignition temperature, can occur as early as three to five minutes from the initial ignition. Human survival in a room after flashover is extremely improbable.

**Figure 3—Building Fire Progression Timeline**

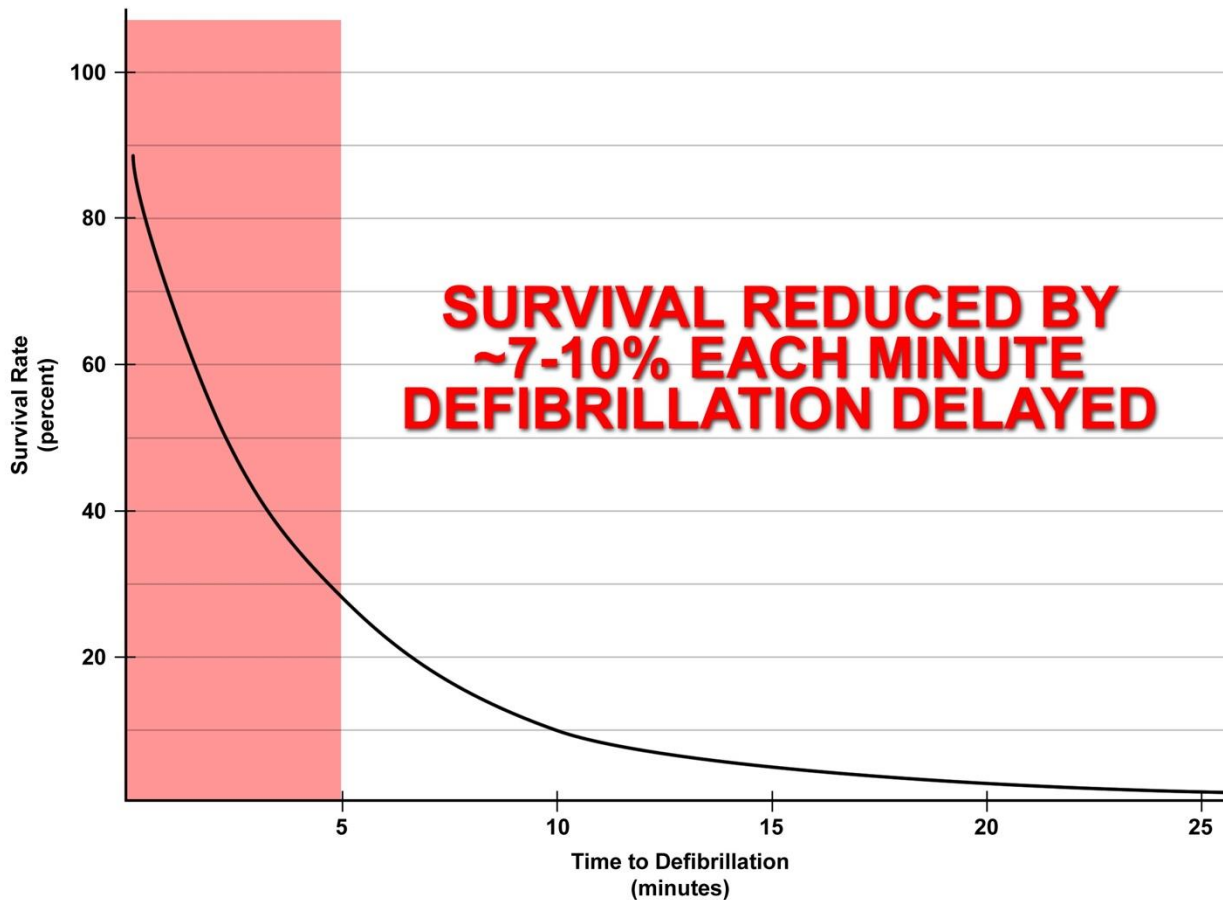


Source: <http://www.firesprinklerassoc.org>

**Medical Emergency Risk**

Fire agency service demand in most jurisdictions is predominantly for medical emergencies. The following figure illustrates the reduced survivability of a cardiac arrest victim as time to defibrillation increases.

**Figure 4—Survival Rate versus Time of Defibrillation**



Source: [www.suddencardiacarrest.org](http://www.suddencardiacarrest.org)

The Department currently provides BLS and ALS pre-hospital emergency medical services, with operational personnel trained to the EMT or EMT-Paramedic level.

#### 2.4.4 Risk Assessment Summary

Citygate's evaluation of the values at risk and hazards likely to impact the Department's service area yields the following:

- ◆ The Department serves a diverse urban population with densities ranging from less than 1,000 to more than 10,000 people per square mile over a widely varied land-use pattern.
- ◆ The cities' populations are projected to increase modestly over the next 14 years to 2035.
- ◆ The cities have a large inventory of residential and non-residential buildings to protect as identified in this assessment.



- ◆ The cities also have significant economic and other resource values to be protected, as identified in this assessment.
- ◆ Monterey County has a mass emergency notification system to effectively communicate emergency notifications and information to the public in a timely manner.
- ◆ The Department’s overall risk for seven hazards related to emergency services provided by the Fire Department range from **Low** to **High**, as summarized in the following table.

**Table 11—Overall Risk by Hazard**

Hazard		Planning Zone					
		Station 11	Station 12	Station 13	Station 14	Station 15	Station 16
1	Building Fire	High	Moderate	High	Moderate	Moderate	Moderate
2	Vegetation/Wildland Fire	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
3	Medical Emergency	High	High	High	High	High	High
4	Hazardous Materials	Moderate	Moderate	Moderate	Moderate	Moderate	Low
5	Technical Rescue	High	Moderate	Moderate	High	Moderate	Moderate
6	Marine Incident	Moderate	Moderate	Moderate	Moderate	Moderate	Low
7	Aircraft Incident	Low	Low	Low	Low	Low	Moderate

**2.5 CRITICAL TASK TIME MEASURES—WHAT MUST BE DONE OVER WHAT TIME FRAME TO ACHIEVE THE STATED OUTCOME EXPECTATION?**

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**SOC ELEMENT 4 OF 8**  
**CRITICAL TASK TIME**  
**STUDY**

SOC studies use critical task information to determine the number of firefighters needed within a timeframe to achieve desired objectives on fire and emergency medical incidents. The following tables illustrate critical tasks typical of building fire and medical emergency incidents, including the minimum number of personnel required to complete each task. These tables are composites from Citygate clients in urban/suburban departments similar to Monterey, with units staffed with three personnel per engine or ladder truck. It is important to understand the following relative to these tables:

- ◆ It can take considerable time after a task is ordered by command to complete the task and achieve the desired outcome.
- ◆ Task completion time is usually a function of the number of personnel that are *simultaneously* available. The fewer firefighters available, the longer some tasks

will take to complete. Conversely, with more firefighters available, some tasks are completed concurrently.

- ◆ Some tasks must be conducted by a minimum of two firefighters to comply with safety regulations. For example, two firefighters are required to search a smoke-filled room for a victim.

### **2.5.1 Critical Firefighting Tasks**

The following table illustrates the critical tasks required to control a common single-family dwelling fire with six response units for a total ERF of **16** personnel (four engines, one ladder truck, and one chief officer). These tasks are taken from typical fire departments' operational procedures, which are consistent with the customary findings of other agencies using the SOC process. No conditions exist to override the Occupational Safety and Health Administration (OSHA) two-in/two-out safety policy, which requires that firefighters enter atmospheres that are immediately dangerous to life and health, such as building fires, in teams of two while two more firefighters are outside and immediately ready to rescue them should trouble arise.

**Scenario:** *Simulated approximately 2,000 square-foot, two-story, residential fire with unknown rescue situation. Responding companies receive dispatch information typical for a witnessed fire. Upon arrival, they find approximately 50 percent of the second floor involved in fire.*

**Table 12—First Alarm Residential Fire Critical Tasks – 16 Personnel**

Critical Task Description		Personnel Required
<b>First-Due Engine (3 Personnel)</b>		
1	Conditions report	1
2	Establish supply line to hydrant	2
3	Deploy initial fire attack line to point of building access	1–2
4	Operate pump and charge attack line	1
5	Or skip the above and establish incident command	1
6	Conduct primary search within OSHA regulations	2
<b>Second-Due Engine (3 Personnel)</b>		
1	If necessary, establish supply line to hydrant	1–2
2	Deploy an attack or backup attack line	1–2
3	Establish Initial Rapid Intervention Team (IRIT)	2
<b>First-Due Truck (3 Personnel)</b>		
1	Conduct initial search and rescue, if not already completed	2
2	Deploy ground ladders to roof	1–2
3	Establish horizontal or vertical building ventilation	1–2
4	Open concealed spaces as required	2
<b>Chief Officer</b>		
1	Transfer of incident command from first- or second-in Captain	1
2	Establish exterior command and incident safety	
<b>Third- and Fourth-Due Engines (6 Personnel)</b>		
1	Establish full Rapid Intervention Crew	4
2	Secure utilities	1
3	Deploy second attack line(s) as needed	2
4	Conduct secondary search	2
5	Support First-Due engine and Truck or other tasks as assigned	2

Grouped together, the duties in the previous table form an ERF, or First Alarm Assignment. These distinct tasks must be performed to effectively achieve the desired outcome; arriving on scene does not stop the emergency from escalating. While firefighters accomplish these tasks, the incident progression clock continues to run.

Fire in a building can double in size during its free-burn period before fire suppression is initiated. Many studies have shown that a small fire can spread to engulf an entire room in fewer than 4:00

to 5:00 minutes after free burning has started. Once the room is completely superheated and involved in fire (known as flashover), the fire will spread quickly throughout the structure and into the attic and walls. For this reason, it is imperative that fire suppression and search/rescue operations commence before the flashover point occurs if the outcome goal is to keep the fire damage in or near the room of origin. In addition, flashover presents a life-threatening situation to both firefighters and any building occupants.

### **2.5.2 Critical Medical Emergency Tasks**

The Department responds to more than 4,000 EMS incidents annually, including vehicle accidents, strokes, heart attacks, difficulty breathing, falls, childbirths, and other medical emergencies. For comparison, the following table summarizes the critical tasks required for a cardiac arrest patient.

**Table 13—Cardiac Arrest Critical Tasks – 1 Engine/Truck + ALS Ambulance (Total 5 Personnel)**

Critical Task		Personnel Required	Critical Task Description
1	Chest compressions	1–2	Compression of chest to circulate blood
2	Ventilate/oxygenate	1–2	Mouth-to-mouth, bag-valve-mask, apply O <sub>2</sub>
3	Airway control	1–2	Manual techniques/intubation/cricothyroidotomy
4	Defibrillate	1–2	Electrical defibrillation of dysrhythmia
5	Establish I.V.	1–2	Peripheral or central intravenous access
6	Control hemorrhage	1–2	Direct pressure, pressure bandage, tourniquet
7	Splint fractures	2–3	Manual, board splint, HARE traction, spine
8	Interpret ECG	2	Identify type and treat dysrhythmia
9	Administer drugs	2	Administer appropriate pharmacological agents
10	Spinal immobilization	2–5	Prevent or limit paralysis to extremities
11	Extricate patient	3–4	Remove patient from vehicle, entrapment
12	Patient charting	1–2	Record vitals, treatments administered, etc.
13	Hospital communication	1–2	Receive treatment orders from physician
14	Treat en route to hospital	2–3	Continue to treat/monitor/transport patient

### **2.5.3 Critical Task Analysis and Effective Response Force Size**

The time required to complete the critical tasks necessary to stop the escalation of an emergency (as shown in the previous tables) must be compared to outcomes. As shown in nationally published fire service time-versus-temperature tables, a building fire will escalate to the point of flashover after approximately 4:00 to 5:00 minutes of free burning in an enclosed room. At this point, the

entire room is engulfed in fire, the fire extends rapidly both horizontally and vertically, and human survival near or in the room of fire origin becomes impossible. Additionally, brain death begins to occur within 4:00 to 6:00 minutes of the heart stopping. Thus, the ERF must arrive in time to prevent these emergency events from becoming worse.

The Department's daily staffing provides an ERF of 16 firefighters to a building fire—if they can arrive in time—which the statistical analysis of this report will discuss in depth. Mitigating an emergency event is a team effort once the units have arrived. This refers to the *weight* of response analogy; if too few personnel arrive too slowly, then the emergency will escalate instead of improve. The outcome times, of course, will be longer and yield less-desirable results if the arriving force is smaller or arrives later.

The quantity of staffing and the arrival time frame can be critical in a serious fire. Fires in older and/or multiple-story buildings could require the initial firefighters to rescue trapped or immobile occupants. If the ERF is too small, rescue and firefighting operations *cannot* be conducted simultaneously.

Fires and complex medical incidents require that additional units arrive in time to complete an effective intervention. Time is one factor that comes from *proper station placement*. Good performance also comes from *adequate staffing* and training. However, where fire stations are spaced too far apart, and one unit must cover another unit's area or multiple units are needed, these units can be too far away, and the emergency will escalate and/or result in a less-than-desirable outcome.

Previous critical task studies conducted by Citygate, the National Institute of Standards and Technology (NIST), and NFPA find that all units need to arrive with 15+ firefighters within 11:30 minutes (from the time of 9-1-1 call) at a moderate-risk building fire to be able to *simultaneously and effectively* perform the tasks of rescue, fire suppression, and ventilation.

A question one might ask is, “If fewer firefighters arrive, *what* from the list of tasks mentioned would not be completed?” Most likely, the search team would be delayed, as would ventilation. The attack lines would only consist of two firefighters, which does not allow for rapid movement of the hose line above the first floor in a multiple-story building. Rescue is conducted with at least two-person teams; thus, when rescue is essential, other tasks are not completed in a simultaneous, timely manner. Effective deployment is about the **speed** (*travel time*) and the **weight** (*number of firefighters*) of the response.

Sixteen initial response personnel can handle a moderate risk confined building fire; however, even this ERF will be seriously slowed if the fire is above the first floor in a low-rise apartment building or commercial/industrial building. This is where the capability to add additional personnel and resources to the standard response becomes critical.

Given that the Department’s ERF plan delivers 16 personnel to a building fire, it reflects a goal to confine serious building fires to or near the room of origin and to prevent the spread of fire to adjoining buildings. This is a typical desired outcome in urban/suburban areas and requires more firefighters more quickly than the typical rural outcome of keeping the fire contained to the building, not room, of origin.

The Department’s current physical response to building fires is, in effect, its de-facto deployment measure—if those areas are within a reasonable travel time from a fire station. Thus, this becomes the baseline policy for the deployment of firefighters.

## 2.6 DISTRIBUTION AND CONCENTRATION STUDIES—HOW THE LOCATION OF FIRST-DUE AND FIRST ALARM RESOURCES AFFECTS EMERGENCY INCIDENT OUTCOMES

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### SOC ELEMENT 5 OF 8 DISTRIBUTION STUDY

### SOC ELEMENT 6 OF 8 CONCENTRATION STUDY

The Department’s service area is served by six fire stations deploying the resources and staffing identified in Table 5. It is appropriate to understand, using geographic mapping tools, what the existing stations do and do not cover within specified travel time goals, if there are any coverage gaps needing one or more stations, and what, if anything, to do about them.

In brief, there are two geographic perspectives to fire station deployment:

- ◆ **Distribution** – the spacing of first-due fire units to control routine emergencies before they escalate and require additional resources.
- ◆ **Concentration** – the spacing of fire stations sufficiently close to each other so that more complex emergency incidents can quickly receive sufficient resources from multiple fire stations. As indicated, this is known as the **Effective Response Force (ERF)**, or, more commonly, the First Alarm Assignment—the collection of a sufficient number of firefighters on scene, delivered within the concentration time goal to stop the escalation of the problem.

To analyze first-due fire unit travel time coverage, Citygate used FireView™, a geographic mapping tool that can measure theoretical travel time over a street network. For this calculation, Citygate used the base map and street travel speeds calibrated to actual fire apparatus travel times from previous responses to simulate real-world travel time coverage. Using this tool, Citygate ran several deployment tests and measured their impact on the service area. A 4:00-minute first-due and 8:00-minute ERF travel time were used for this analysis consistent with best practice response performance goals for positive outcomes in urban areas.

## 2.6.1 Deployment Baselines

All maps referenced can be found in **Volume 2—Map Atlas**.

### ***Map #1 – General Geography, Station Locations, and Response Resource Types***

Map #1 shows City boundaries and fire station locations. This is a reference map for other maps that follow. Station symbols denote the type of staffed fire apparatus at each station. All engines and the truck are staffed with a minimum of three personnel each.

### ***Map #2 – Risk Assessment: Risk Planning Zones***

This map shows the six planning zones, which correlate with each fire station’s first-due response area, used for the risk assessment element of this study.

### ***Map #2a – Risk Assessment: Population Density***

Map #2a shows the population density throughout the service area by census block. As the map illustrates, the population density ranges from fewer than 1,000 to more than 10,000 people per square mile.

### ***Map #3 – Station Distribution: 4:00-Minute First-Due Travel Time Coverage***

This map shows in green the 89 percent of the service area’s total public road miles that should be expected to be reached within 4:00 minutes of travel time from the Department’s six fire station locations *without traffic congestion*, assuming the responding unit is in station. In Citygate’s experience, this level of first-unit travel time coverage is *very good*.

The purpose of response time modeling is to determine response time coverage across a jurisdiction’s geography and station locations. This geo-mapping design is then validated against actual response data to reflect actual travel times. There should be some overlap between station areas so that a second-due unit can have a chance of an acceptable response time when it responds to a call in a different station’s first-due response area.

### ***Map #3a – Station Distribution: 4:00-Minute First-Due Travel Time Coverage with Automatic Aid***

Map #3a shows the three percent increase in 4:00-minute first-due travel time coverage with automatic aid from the City of Seaside, Presidio of Monterey Fire Department, Pebble Beach Community Services District, and Cypress Fire District. At 92 percent of total public road miles, this level of first-unit coverage is *excellent* in Citygate’s experience.

### ***Map #4 – Station Distribution: Insurance Services Office (ISO) 1.5-Mile Coverage***

This map displays the ISO recommendation that urban fire stations be spaced three miles apart to cover a 1.5-mile *distance* response area. Depending on a jurisdiction’s road network, the 1.5-mile

measure usually equates to a 3:30- to 4:00-minute travel time. However, a 1.5-mile measure is a reasonable indicator of station spacing and overlap. As can be seen, the 1.5-mile ISO coverage is very close to the 4:00-minute *travel time* coverage in Map #3.

***Map #5 – Station Concentration: 8:00-Minute Effective Response Force (ERF) Travel Time Coverage***

Map #5 shows, in green, the 90 percent of the service area public road miles that *should* be reachable within 8:00 minutes of travel time for a minimum initial ERF of four engines, one ladder truck, and one chief officer *without traffic congestion*. In Citygate’s experience, this is *excellent* ERF travel time coverage, and demonstrates that the Department’s stations are spaced to provide a full ERF within a travel time goal that facilitates desired community outcomes.

***Map #6 – 8:00-Minute Ladder Truck Travel Time Coverage from Station 11***

This map shows that the Department’s single ladder truck can be expected to reach nearly all the public road segments in the service area within 8:00 minutes of travel time from Station 11 except to the very western edges of Pacific Grove, the southern end of Carmel-by-the-Sea, and Ryan Ranch.

***Map #7 – 8:00-Minute Division Chief Travel Time Coverage from Station 11***

Map #7 shows that the duty Division Chief can also be expected to reach nearly all the public road segments in the service area within 8:00 minutes of travel time from Station 11 except to the very western edges of Pacific Grove, the southern end of Carmel-by-the-Sea, and Ryan Ranch.

***Map #8 – All Incident Locations***

This map shows the location of all incident responses from January 1, 2018, through December 31, 2020, which occurred on nearly every street segment in the service area.

***Map #9 – Emergency Medical Services and Rescue Incident Locations***

Map #9 illustrates the location of only the emergency medical and rescue incident locations over the same three-year period. With most of the calls for service being medical emergencies, virtually all road segments of the service area utilized pre-hospital emergency medical services. This data is consistent with the population densities in Map #2a since humans drive EMS calls for service.

***Map #10 – All Fire Locations***

This map displays the location of all fires within the service area over the same period, which includes any type of fire call, from vehicle, to dumpster, to building. There are obviously fewer fires than medical or rescue calls. Even given this fact, it is evident that fires occur in all fire station response areas.



***Map #11 – Building Fire Locations***

Map #11 shows the locations of all building fire incidents. While the number of building fires is obviously a smaller subset of total fires, it shows that building fires occurred in all six fire station response areas.

***Map #12 – Emergency Medical Services and Rescue Incident Location Densities***

This map displays, by mathematical density, where clusters of EMS and rescue incident activity occurred over the three-year study period. In this set, the darker density color plots the highest concentration of EMS and rescue incidents. This type of map makes the location of frequent workload more meaningful than simply mapping the locations of all EMS and rescue incidents, as was shown in Map #9.

This perspective is important because the deployment system needs an overlap of units to ensure the delivery of multiple units when needed for more serious incidents or to handle simultaneous calls for service, as is evident for the higher medical incident density areas of the service area.

***Map #13 – Fire Incident Location Densities***

Map #13 shows the hot spots for all types of fire incidents (shown in Map #10).

***Map #14 – Building Fire Incident Location Densities***

This map shows the hot spots for building fire incidents (shown in Map #11).

**2.6.2 Travel Time Road Mile Coverage Measures**

In addition to the visual displays of coverage that maps provide, the following table summarizes travel time coverage.

**Table 14—Travel Time Coverage Summary**

Map Number	Travel Time Measure	Total Road Miles	Road Miles Covered	Percentage of Total Miles Covered
3	4:00-Minute First-Due	281	251	<b>89.32%</b>
3a	4:00-Minute First-Due with Auto Aid	281	259	<b>92.17%</b>
5	8:00-Minute ERF	281	254	<b>90.39%</b>

As the previous table shows, while 4:00-minute first-due unit coverage is *very good* at 89 percent of total public road miles without automatic aid, it is improved to 92 percent with automatic aid, which is *excellent* in Citygate’s experience. In addition, the 90 percent 8:00-minute ERF travel time coverage is also *excellent* in Citygate’s experience and reflects station spacing that enables

the full ERF to arrive at serious emergencies in a travel time that allows desired community outcomes to be achieved.

**Finding #5:** The Department’s six fire station locations provide *very good* 4:00-minute first-unit travel time coverage at 89 percent of total public road miles, and *excellent* coverage at 92 percent of total miles with automatic aid.

**Finding #6:** The Department’s six fire station locations also provide *excellent* 8:00-minute ERF travel time coverage at 90 percent of total public road miles.

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## **2.7 STATISTICAL ANALYSIS**

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The maps described in Section 2.6 and presented in **Volume 2—Map Atlas** show the ideal situation for response times and the response effectiveness given no competing calls, no units out of place, nor any simultaneous calls for service. Examination of the response time data provides a picture of actual response performance with simultaneous calls, rush hour traffic congestion, units out of position, and delayed travel time for events such as periods of severe weather.

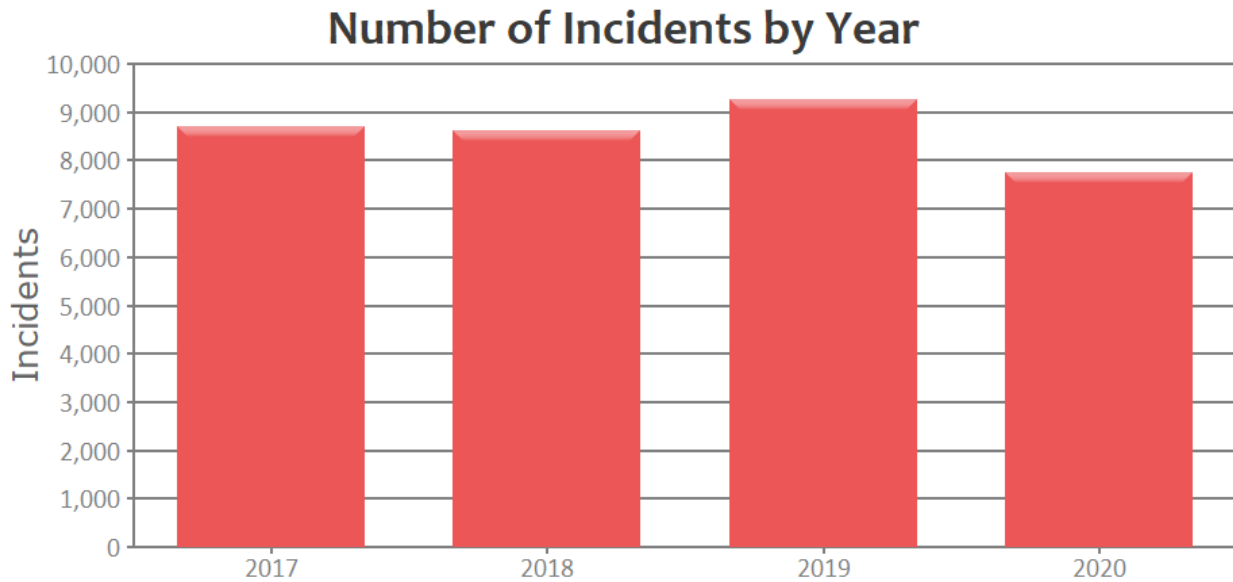
**SOC ELEMENT 7 OF 8**  
**RELIABILITY &**  
**HISTORICAL RESPONSE**  
**EFFECTIVENESS**  
**STUDIES**

The following subsections provide summary statistical information regarding the Department and its services.

### **2.7.1 Demand for Service**

The Department provided four years of data for this analysis from multiple sources covering the period from January 1, 2017, through December 31, 2020, including more than 34,000 incidents as summarized in the following figure.

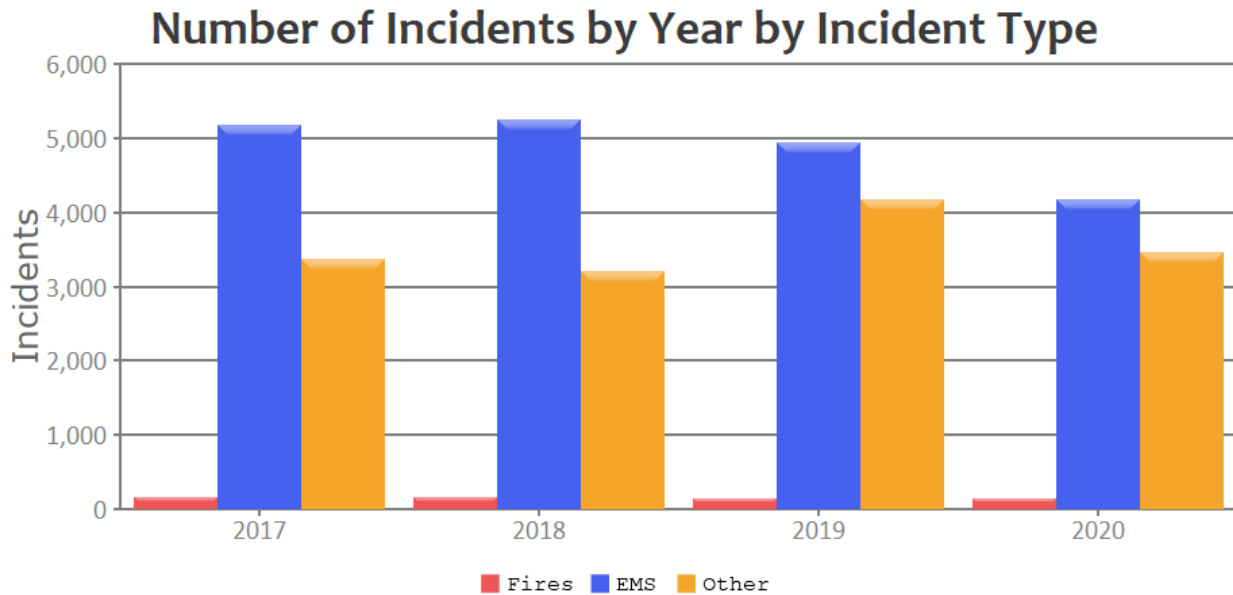
**Figure 5—Total Service Demand by Year**



As the previous figure shows, total annual service demand decreased slightly in 2018 from 2017, increased approximately 7.5 percent in 2019, and then decreased again by about 16 percent in 2020. Of the 7,767 incidents in 2020, 1.83 percent were fires, 53.68 percent were EMS incidents, and the remaining 44.49 percent were other incident types. During that same year, there were 9,989 total apparatus responses for an average of 1.28 apparatus responses per incident.

The following figure shows annual service demand by incident type.

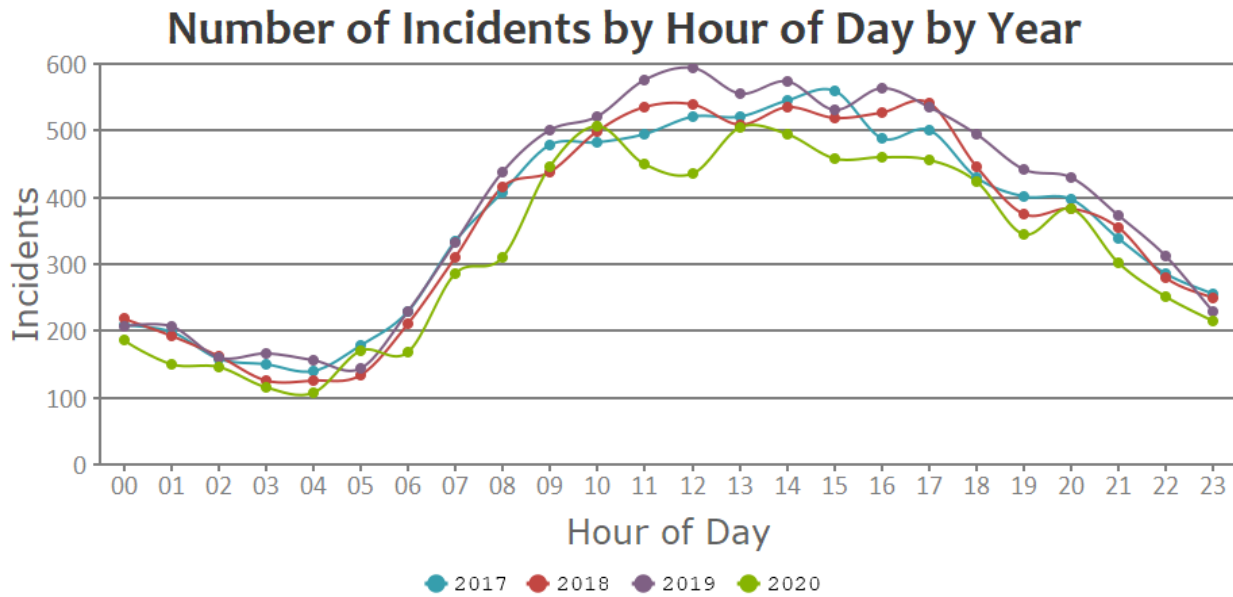
**Figure 6—Annual Service Demand by Incident Type**



As the previous figure shows, EMS incidents peaked in 2018 and declined nearly 21 percent over the following two years. Over the same four-year period, other non-emergent incident types decreased slightly in 2018 from 2017, then increased significantly in 2019 before decreasing in 2020.

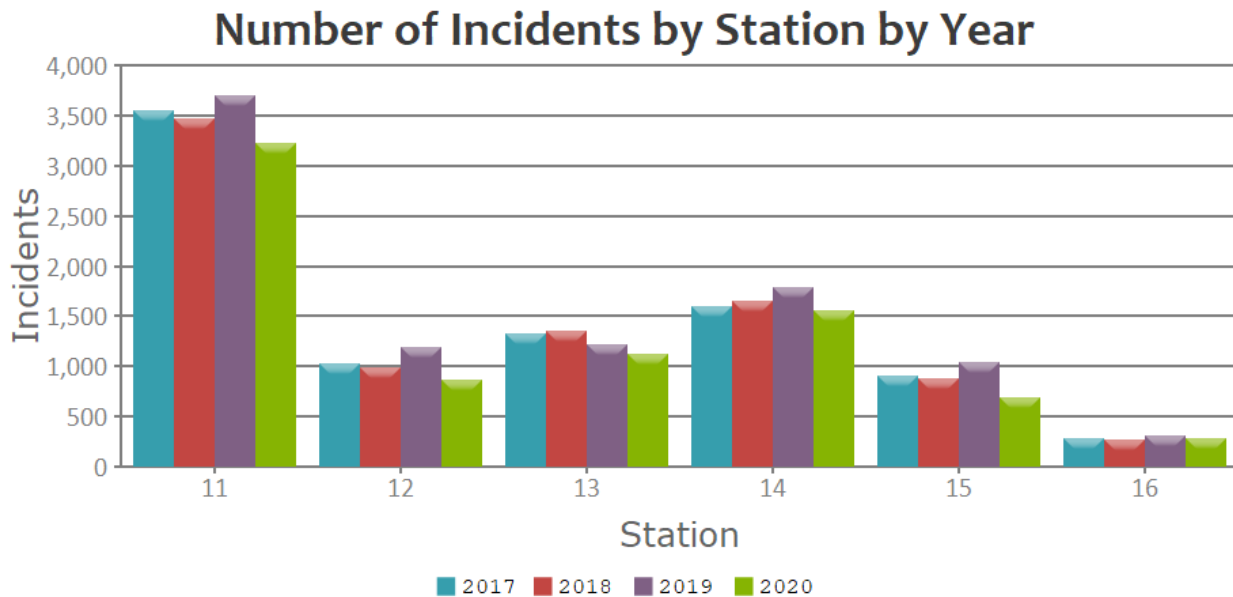
The following figure shows service demand by hour of day by year, illustrating peak incident activity spanning mid-morning through late evening hours and a decrease in late morning and early afternoon as well as late evening volume in 2020.

**Figure 7—Service Demand by Hour of Day and Year**



The following figure shows service demand by station area by year and shows a decrease in 2020 from 2019, most likely due to COVID-19.

**Figure 8—Service Demand by Station Area by Year**



The following table lists service demand by incident type for the four-year study period, with the corresponding percentage of total service demand over the same period. Only incident types with

more than 150 calls for service over the four years are shown. Note that 58 percent of the incidents listed are EMS-related.

**Table 15—Service Demand by Incident Type (2017–2020)**

Incident Type	Four-Year Total	Percent of Total
321 EMS call, excluding vehicle accident with injury	15,117	43.99%
311 Medical assist, assist EMS crew	2,646	7.70%
622 No incident found on arrival of incident address	2,219	6.46%
611 Dispatched & canceled en route	1,727	5.03%
554 Assist invalid	1,335	3.88%
553 Public service	1,193	3.47%
324 Motor vehicle accident no injuries	849	2.47%
745 Alarm system sounded, no fire - unintentional	837	2.44%
743 Smoke detector activation, no fire - unintentional	630	1.83%
522 Water or steam leak	572	1.66%
661 EMS call, party transported by non-fire agency	520	1.51%
552 Police matter	503	1.46%
322 Vehicle accident with injuries	429	1.25%
733 Smoke detector activation due to malfunction	428	1.25%
735 Alarm system sounded due to malfunction	412	1.20%
510 Person in distress, other	299	0.87%
551 Assist police or other governmental agency	219	0.64%
444 Power line down	218	0.63%
440 Electrical wiring/equipment problem, other	206	0.60%
744 Detector activation, no fire - unintentional	196	0.57%
651 Smoke scare, odor of smoke	168	0.49%
463 Vehicle accident, general cleanup	159	0.46%
412 Gas leak (natural gas or LPG)	153	0.45%

The following table illustrates service demand by property use. Only property uses with more than 200 calls for service over the four-year period are shown. Note that nearly 37 percent of service demand is related to residential property use, while nearly 16 percent is related to street or outdoor uses.

**Table 16—Service Demand by Property Use (2016–2020)**

Property Use	Total	Percent of Total
419 1 or 2 family dwelling	<b>7,800</b>	22.70%
429 Multifamily dwellings	<b>3,620</b>	10.53%
311 24-hour care Nursing homes, 4 or more persons	<b>3,076</b>	8.95%
962 Residential street, road or residential driveway	<b>2,025</b>	5.89%
963 Street or road in commercial area	<b>1,887</b>	5.49%
900 Outside or special property, other	<b>1,632</b>	4.75%
449 Hotel/motel, commercial	<b>1,449</b>	4.22%
459 Residential board and care	<b>1,166</b>	3.39%
965 Vehicle parking area	<b>885</b>	2.58%
161 Restaurant or cafeteria	<b>726</b>	2.11%
961 Highway or divided highway	<b>690</b>	2.01%
340 Clinics, Doctors offices, hemodialysis centers	<b>653</b>	1.90%
631 Defense, military installation	<b>370</b>	1.08%
519 Food and beverage sales, grocery store	<b>364</b>	1.06%
331 Hospital - medical or psychiatric	<b>332</b>	0.97%
937 Beach	<b>331</b>	0.96%
938 Graded and cared-for plots of land	<b>310</b>	0.90%
599 Business office	<b>302</b>	0.88%
549 Specialty shop	<b>279</b>	0.81%
215 High school/junior high school/middle school	<b>264</b>	0.77%
580 General retail, other	<b>260</b>	0.76%
931 Open land or field	<b>223</b>	0.65%
500 Mercantile, business, other	<b>221</b>	0.64%

### **2.7.2 Simultaneous Incident Activity**

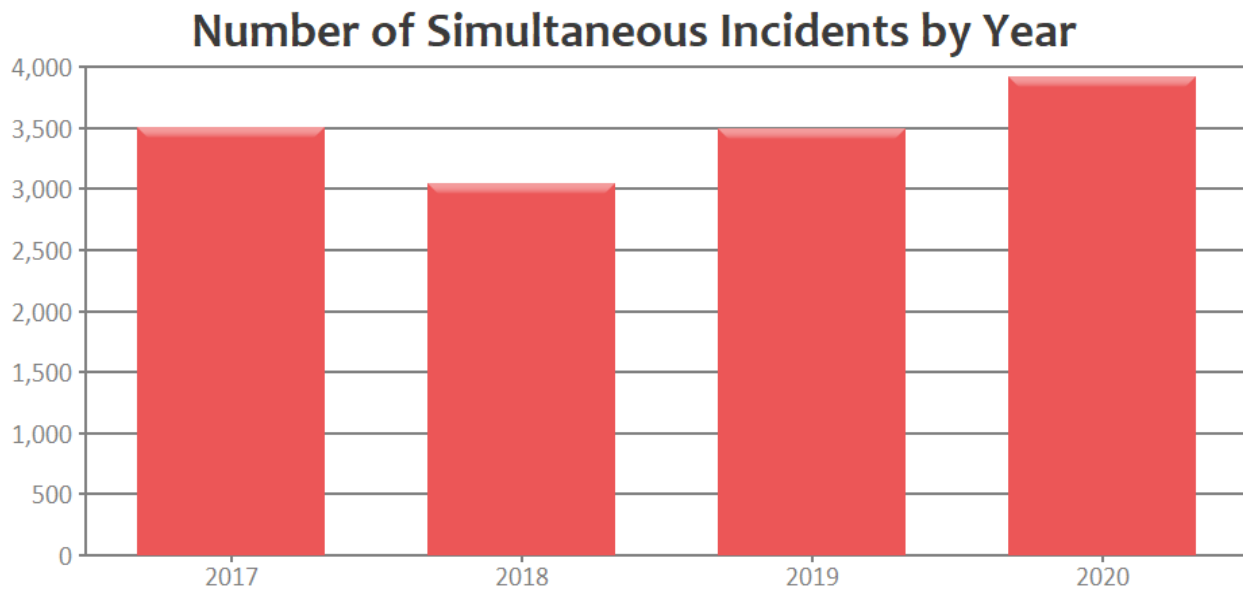
Simultaneous incidents occur when other incidents are underway at the time a new incident begins. During 2020, 50.44 percent of incidents occurred while one or more other incidents were underway. Following is a breakdown of simultaneous incident activity for 2020.

**Table 17—Simultaneous Incident Activity (2020)**

Number of Simultaneous Incidents	Percentage
1 or more	50.44%
2 or more	24.32%
3 or more	10.94%
4 or more	03.14%
5 or more	00.72%

The following figure shows total simultaneous incident activity by year, which increased by approximately 15 percent from 2018 to 2019 and 13 percent from 2019 to 2020.

**Figure 9—Number of Simultaneous Incidents by Year**

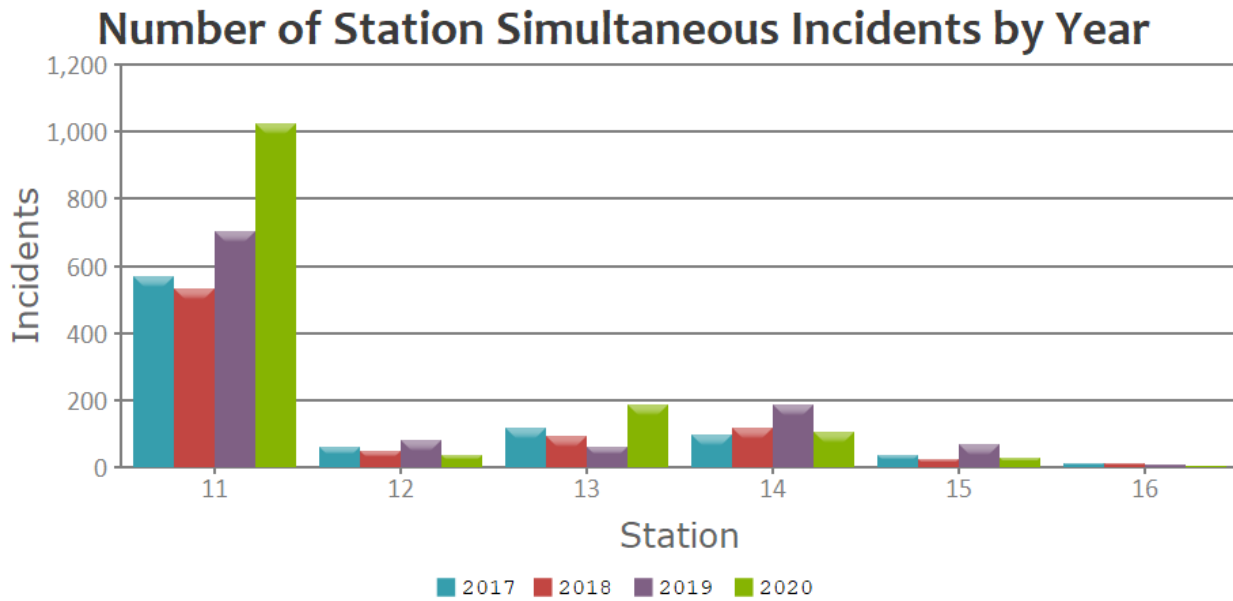


In a larger jurisdictions, simultaneous incidents in different station areas typically have very little operational consequence. However, when simultaneous incidents occur within a single station area, there can be significant delays in response times.

The following figure illustrates the number of single-station simultaneous incidents by station area by year. Station 11 had the highest number of single-station area simultaneous incidents by far, followed by Stations 13 and 14.



**Figure 10—Number of Single-Station Simultaneous Incidents by Station by Year**



**Finding #7:** At least one or more simultaneous incidents are occurring 50 percent of the time, predominantly impacting Station 11.

**Finding #8:** The annual number of simultaneous incidents has varied over the past four years with 2019 and 2020 approximately 15 percent and 13 percent higher, respectively, than the previous year. As simultaneous incidents increase, the coverage provided by the busiest companies to their own and to adjacent station areas diminishes, which further shifts workload to other companies.

### 2.7.3 Apparatus Deployment – Simultaneous Incident Impact

The following table illustrates primary **apparatus** responses for 2020. The **columns** show the home station for primary responding apparatus resources. The **rows** identify the station area where the incidents occurred. Multiple-company stations will have multiple apparatus assigned under that Station ID.

To better understand this, remember that stations do not respond to calls—the apparatus assigned to the stations respond. Station 11 has two primary apparatus: a paramedic engine and a truck company.

Highlighted cells indicate apparatus operating in their home station area. The first row shows Station 13 contributed 118 apparatus responses to Station 11’s response area. Similarly, Station 11

contributed 184 apparatus responses to Station 13’s area. This table includes emergency incidents only (Code-3 response with red lights and siren). The purpose of the analysis is to show service demand *within a station area zone, regardless of where the responding apparatus originated.*

**Table 18—Apparatus Responses by Station Response Area – Emergencies Only (2020)**

Station Area	Assigned Station Apparatus						Total
	Station 11	Station 12	Station 13	Station 14	Station 15	Station 16	
Station 11	1,665	79	118	79	54	34	2,029
Station 12	97	345	13	48	12	3	518
Station 13	184	19	424	33	12	65	737
Station 14	159	87	31	543	18	13	851
Station 15	56	15	12	16	184	13	296
Station 16	39	4	23	13		74	153
<b>Total</b>	<b>2,200</b>	<b>549</b>	<b>621</b>	<b>732</b>	<b>280</b>	<b>202</b>	<b>4,584</b>

### 2.7.4 Unit-Hour Utilization

The Unit-Hour Utilization (UHU) percentage is calculated using the number of responses and the duration of those responses to show the percentage of time a unit is committed to an active incident during a given hour of the day. In Citygate’s experience, a UHU of 30 percent or higher over *multiple* consecutive hours becomes the point at which other responsibilities, such as training, do not get completed. The following two tables show UHU for engine companies for 2019, and 2020, respectively, with the busiest engines listed first. Note that no engine companies are nearing the 30 percent saturation rate.

**City of Monterey, CA Fire Department**  
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**Table 19—Unit-Hour Utilization – Engines (2019)**

Hour of Day	ME-11	E-12	E-14	E-13	E-15	E-16
00:00	7.97%	2.77%	3.57%	3.61%	1.41%	0.31%
01:00	14.42%	3.68%	2.32%	2.82%	2.36%	0.76%
02:00	6.90%	2.49%	2.22%	2.34%	1.40%	0.52%
03:00	5.64%	2.55%	2.71%	4.05%	1.75%	1.67%
04:00	6.77%	2.57%	1.97%	1.97%	2.40%	0.93%
05:00	7.43%	2.12%	2.50%	1.76%	1.07%	0.36%
06:00	6.56%	3.72%	5.05%	2.43%	2.58%	0.64%
07:00	10.89%	5.14%	6.35%	3.37%	4.01%	0.92%
08:00	14.34%	7.25%	6.90%	5.64%	4.87%	2.69%
09:00	16.22%	9.75%	9.19%	5.67%	5.30%	3.75%
10:00	14.15%	11.56%	9.99%	6.15%	6.02%	2.88%
11:00	16.62%	9.67%	9.11%	9.77%	5.39%	3.81%
12:00	17.80%	11.37%	7.18%	7.69%	8.38%	6.77%
13:00	16.92%	11.15%	8.13%	7.26%	4.58%	4.38%
14:00	16.02%	9.74%	9.75%	7.75%	4.70%	5.44%
15:00	17.60%	7.94%	9.18%	7.98%	5.65%	4.55%
16:00	17.42%	9.18%	9.03%	8.79%	5.09%	8.36%
17:00	17.55%	8.51%	8.93%	10.42%	3.64%	4.84%
18:00	15.21%	7.58%	8.28%	7.01%	5.46%	4.95%
19:00	15.15%	5.37%	7.24%	5.56%	3.72%	1.96%
20:00	13.51%	9.12%	7.09%	6.26%	5.17%	1.83%
21:00	12.74%	7.18%	4.99%	5.05%	3.86%	1.47%
22:00	10.93%	4.56%	6.46%	3.78%	2.61%	1.14%
23:00	7.66%	3.41%	3.73%	3.57%	2.68%	1.37%
<b>Overall</b>	<b>12.77%</b>	<b>6.60%</b>	<b>6.33%</b>	<b>5.45%</b>	<b>3.92%</b>	<b>2.76%</b>

**City of Monterey, CA Fire Department**  
*Community Risk Assessment and Standards of Cover Study*

**Table 20—Unit-Hour Utilization – Engines (2020)**

Hour of Day	ME-11	E-14	E-13	E-12	E-15	E-16
00:00	6.84%	2.50%	2.93%	2.19%	0.99%	0.75%
01:00	6.76%	2.40%	1.45%	3.25%	0.95%	0.22%
02:00	6.40%	1.89%	3.10%	2.59%	1.37%	1.06%
03:00	4.12%	2.82%	2.19%	2.47%	0.43%	0.35%
04:00	4.58%	2.35%	1.72%	2.04%	0.94%	0.76%
05:00	6.66%	5.70%	1.82%	1.92%	1.77%	0.67%
06:00	8.22%	4.87%	2.48%	2.23%	1.29%	1.17%
07:00	11.65%	4.53%	3.33%	4.39%	3.34%	0.49%
08:00	12.21%	5.71%	5.57%	3.85%	5.42%	1.54%
09:00	23.39%	10.25%	7.58%	5.38%	3.51%	6.97%
10:00	17.71%	8.59%	7.87%	6.49%	5.19%	3.76%
11:00	15.76%	10.82%	5.55%	6.95%	5.02%	3.51%
12:00	19.23%	10.28%	5.15%	6.60%	3.21%	2.98%
13:00	16.90%	11.19%	14.12%	7.78%	5.13%	2.62%
14:00	15.82%	8.58%	6.68%	7.45%	5.59%	4.70%
15:00	14.87%	9.26%	7.45%	6.11%	2.61%	2.90%
16:00	22.55%	8.71%	10.07%	7.70%	4.44%	3.69%
17:00	16.63%	6.78%	5.87%	6.38%	3.80%	3.37%
18:00	15.03%	8.28%	5.93%	5.87%	4.13%	9.36%
19:00	11.03%	9.43%	6.79%	4.70%	2.53%	1.92%
20:00	15.93%	6.76%	5.44%	5.46%	3.77%	1.87%
21:00	11.35%	5.54%	4.57%	4.53%	3.42%	1.32%
22:00	9.45%	4.46%	6.02%	5.39%	1.96%	0.66%
23:00	9.19%	4.75%	3.26%	3.21%	1.64%	1.14%
<b>Overall</b>	<b>12.59%</b>	<b>6.52%</b>	<b>5.29%</b>	<b>4.79%</b>	<b>3.02%</b>	<b>2.41%</b>

The following two tables show UHU for the truck company for 2019 and 2020, respectively.

**Table 21—Unit-Hour Utilization – Truck (2019)**

Hour of Day	T-11
0:00	2.03%
1:00	2.91%
2:00	2.62%
3:00	3.08%
4:00	1.85%
5:00	3.19%
6:00	2.63%
7:00	5.06%
8:00	6.14%
9:00	7.85%
10:00	9.25%
11:00	9.44%
12:00	10.64%
13:00	8.51%
14:00	9.11%
15:00	8.92%
16:00	9.99%
17:00	11.18%
18:00	8.82%
19:00	5.83%
20:00	7.55%
21:00	6.61%
22:00	5.09%
23:00	2.78%
<b>Overall</b>	<b>6.30%</b>

**Table 22—Unit-Hour Utilization – Truck (2020)**

Hour of Day	T-11
00:00	2.06%
01:00	1.06%
02:00	4.13%
03:00	1.16%
04:00	2.78%
05:00	2.06%
06:00	2.09%
07:00	7.98%
08:00	4.31%
09:00	7.31%
10:00	10.28%
11:00	10.94%
12:00	7.05%
13:00	8.07%
14:00	7.98%
15:00	7.87%
16:00	7.82%
17:00	15.01%
18:00	6.60%
19:00	6.65%
20:00	7.08%
21:00	5.47%
22:00	3.21%
23:00	3.22%
<b>Overall</b>	<b>5.92%</b>

### 2.7.5 Operational Performance

Measurements for the operational response performance of the first response apparatus to arrive at emergency incidents are the number of minutes and seconds necessary for 90 percent completion of the following response components:

- ◆ Call processing/dispatch

- ◆ Crew turnout
- ◆ Travel
- ◆ Call to arrival

The following response performance analysis includes only Code-3 (lights and siren) fire and EMS emergency responses, which are the most time-sensitive and severe threat-to-life calls for service.

### ***Call Processing/Dispatch***

Call processing measures the time interval from receipt of the 9-1-1 call until completion of the dispatch notification. Call processing performance depends on what is being measured. If the first incident timestamp takes place at the time the Public Safety Answering Point (PSAP) physically answers the 9-1-1 call (at times, calls can be briefly held in queue) then call processing begins at *PSAP Time*. If a later time stamp is used well into the dispatcher listening to the caller, such as *Alarm Time* (typically when information has been entered into the computer and the *Enter* key is pressed, or the call is transferred to a separate fire dispatch center), the processing time segment only represents a portion of the entire processing operation.

In addition, not all requests for assistance are received via landline 9-1-1. Generally, there are numerous ways requests for assistance are received, including landline telephone, cellular telephone, SMS text message, fire or police officer-initiated requests, TTY/TDD operator, etc., with each having a separate timestamp at a different point in the processing operation. This is not as much of a factor if the vast majority of requests are received via 9-1-1 PSAP. The Monterey County Emergency Communications Center is the PSAP for all jurisdictions within the Department's service area except for the Carmel-by-the-Sea, where the Police Department Communications Center is the 9-1-1 PSAP, and fire/EMS calls are transferred to the Monterey County Emergency Communications Center for dispatching.

It is important to note that although Citygate continues to use a 1:30-minute best practice goal for call processing/dispatch performance, the most recent NFPA best practice recommendation for dispatch processing time for high-priority fire and EMS emergencies with a significant threat to life or property loss is 1:00 minute, 90 percent of the time.<sup>12</sup>

The following table shows call processing/dispatch performance from time of call receipt at the Monterey County Emergency Communications Center, which is very good performance and only slightly slower than the Citygate-recommended 1:30-minute goal.

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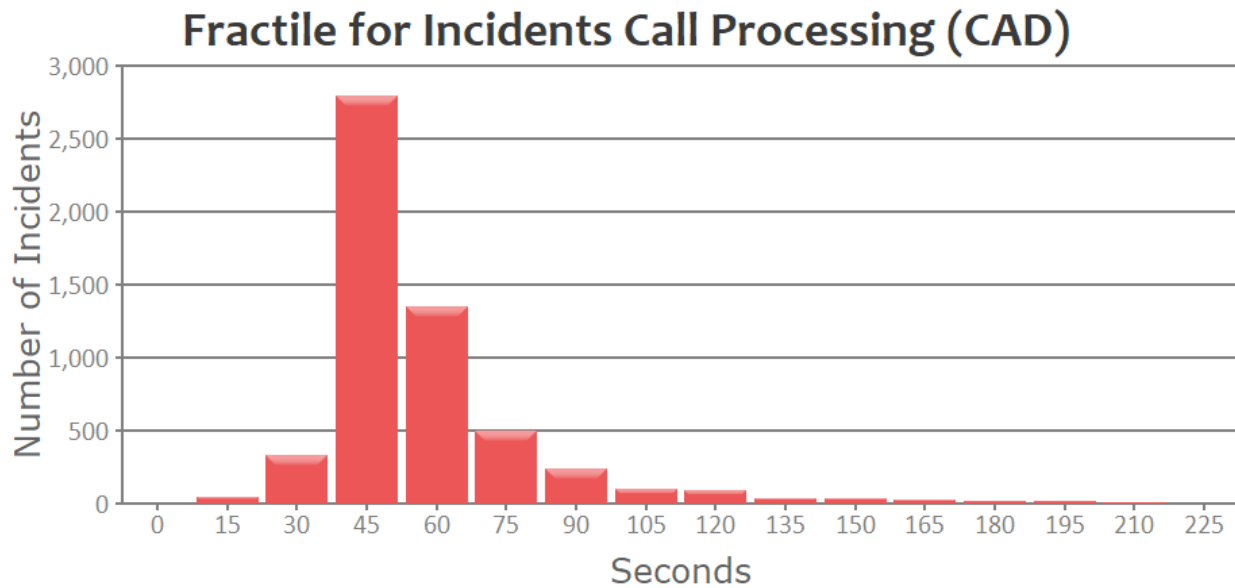
<sup>12</sup> NFPA 1221 – Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems (2019 Edition).

**Table 23—90<sup>th</sup> Percentile Call Processing/Dispatch Performance**

Station	Overall	2017	2018	2019	2020
Department-Wide	01:39	02:33	01:21	01:18	01:18

The following figure shows that call processing for most incidents occurs within 45 to 60 seconds.

**Figure 11—Fractile Call Processing Performance (2020)**



**Finding #9:** Call processing/dispatch performance *is generally meeting* Citygate’s recommended best practice goal of 1:30 minutes at 90 percent or better reliability.

***Crew Turnout***

Crew turnout performance measures the time from completion of the dispatch notification until the start of apparatus response travel. While the most recent NFPA recommendation<sup>13</sup> for crew turnout performance is 1:00 minute at 90 percent reliability for EMS incidents and 1:20 minutes at 90 percent reliability for fire incidents, Citygate has found in over hundreds of fire department studies that few, if any departments are able to achieve this level of performance. Citygate has thus, for many years, recommended a 2:00-minute best practice goal for crew turnout at 90 percent

<sup>13</sup> NFPA 1710 – Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments (2020 Edition).



or better reliability. The following table summarizes Monterey’s crew turnout performance by year and shows overall performance over the four-year study period is *better* than the 2:00-minute goal.

**Table 24—90<sup>th</sup> Percentile Crew Turnout Performance**

Station	Overall	2017	2018	2019	2020
Department-Wide	01:53	02:13	01:53	01:47	01:46

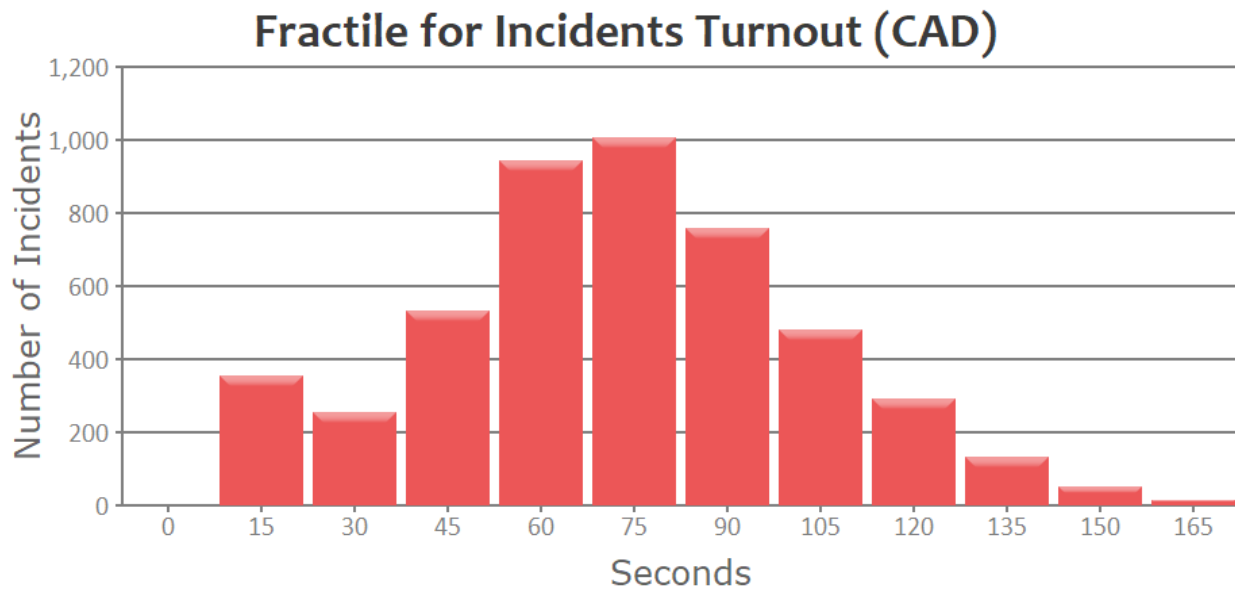
The following table shows turnout performance by time of day: AM1 is midnight to 5:59 am, AM2 is 6:00 am to 11:59 am, PM1 is noon to 5:59 pm, and PM2 is 6:00 pm to 11:59 pm. As the following table shows, the Department *is meeting* Citygate’s recommended 2:00-minute turnout goal except during early morning hours where performance averages approximately 2:20 minutes, 17 percent slower than the 2:00-minute goal, which is *very good* performance from sleep to apparatus movement.

**Table 25—90<sup>th</sup> Percentile Crew Turnout Performance by Six-Hour Time Blocks (2020)**

Station	AM1	AM2	PM1	PM2
11	02:11	01:38	01:26	01:39
12	02:21	01:56	01:38	01:55
13	02:14	01:43	01:32	01:48
14	02:20	01:52	01:36	01:55
15	02:23	01:50	01:34	01:51
16	02:27	02:02	01:56	02:18

The following figure shows that peak crew turnout is occurring at 1:15 minutes, with only a small percentage exceeding the 2:00-minute goal.

**Figure 12—Fractile Crew Turnout Performance (2020)**



**Finding #10:** Crew turnout performance is *meeting* Citygate’s recommended 2:00-minute goal except during early morning sleep hours, when it is only slightly slower.

**Fire Station Distribution: First-Unit Travel**

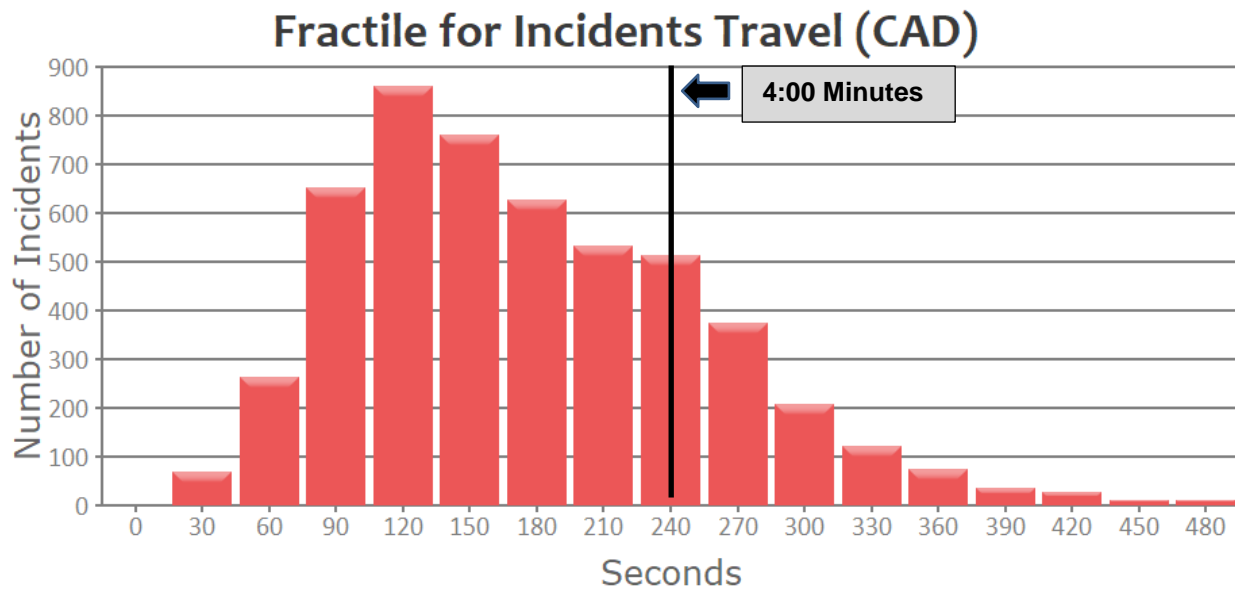
Travel performance measures the time interval from start of first-due unit apparatus movement to arrival at the emergency incident. For most urban/suburban jurisdictions, a 4:00-minute first-due unit travel time 90 percent of the time would be considered highly desirable. As the following table illustrates, the Department’s 90<sup>th</sup> percentile first-due unit travel time performance is only *slightly slower* (13 percent) than the Citygate- and NFPA-recommended 4:00-minute goal for urban areas.

**Table 26—90<sup>th</sup> Percentile First-Unit Travel Time Performance**

Station	Overall	2017	2018	2019	2020
Department-Wide	<b>04:30</b>	04:31	04:27	04:31	04:30

The following figure illustrates fractile travel time performance and shows the peak segment for travel performance is 120 seconds, or 2:00 minutes, with only a small percentage of calls taking longer than 270 seconds, or 4:30 minutes.

**Figure 13—Fractile First-Due Travel Performance**



**Finding #11:** At 4:30 minutes, 90<sup>th</sup> percentile first-unit travel time performance is only *slightly slower* (13 percent) than the Citygate- and NFPA-recommended 4:00-minute goal for urban areas to facilitate desired outcomes, which is very good performance.

**Fire Station Distribution: Call to First-Unit Arrival**

Call to first-unit arrival performance is a fire agency’s primary customer service metric that measures time from receipt of the 9-1-1 call in the regional fire dispatch center until the first unit arrives at the emergency incident. For urban population areas, Citygate recommends a 7:30-minute first-unit call-to-arrival goal at 90 percent compliance.<sup>14</sup> As the following table shows, the Department’s 90<sup>th</sup> percentile call-to-arrival performance, at 6:42 minutes, is 11 percent *faster* than the recommended 7:30-minute goal, which is *excellent* performance.

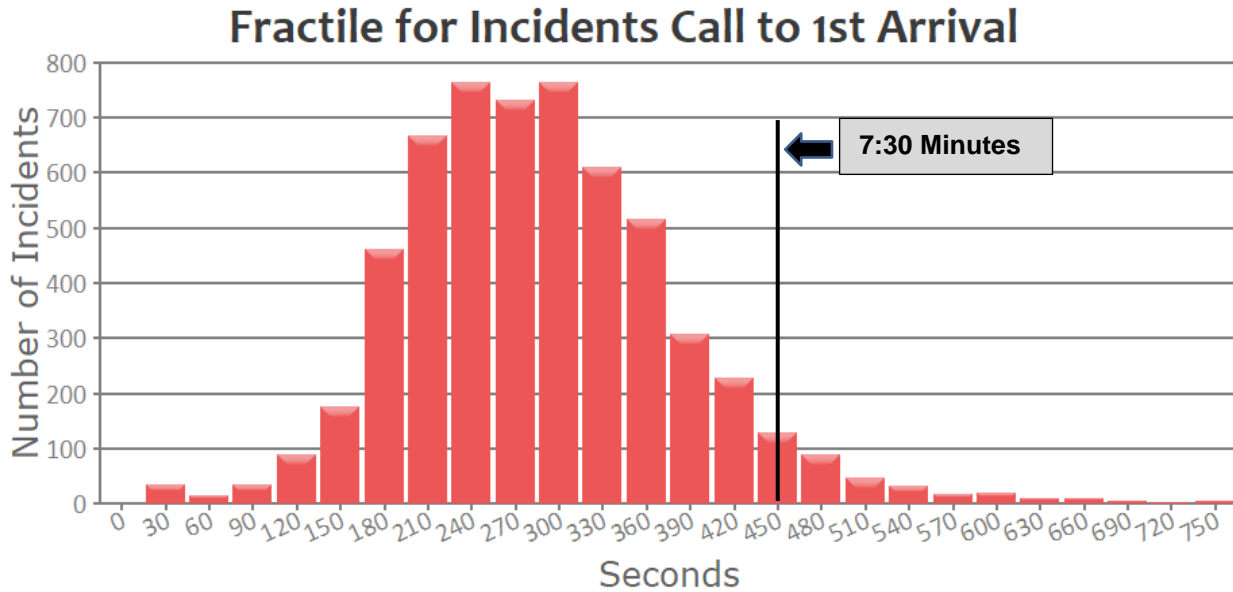
**Table 27—90<sup>th</sup> Percentile First-Unit Call to Arrival Performance (2017–2020)**

Station	Overall	2017	2018	2019	2020
Department-Wide	06:42	07:12	06:31	06:34	06:35

<sup>14</sup> The 7:30-minute call to first-unit arrival goal in urban areas includes 1:30 minutes of call processing/dispatch time, 2:00 minutes of crew turnout time, and 4:00 minutes of travel time.

The following figure shows peak call to first-unit arrival occurring at 5:00 minutes (300 seconds), with only a small number of incidents with call-to-arrival time longer than the 7:30-minute goal.

**Figure 14—Fractile Call to First-Unit Arrival Performance (2017–2020)**



**Finding #12:** At 6:42 minutes, 90<sup>th</sup> percentile first-unit call-to-arrival performance is 11 percent (48 seconds) *faster* than a Citygate-recommended best practice goal of 7:30 minutes for urban areas.

***Fire Station Concentration: Effective Response Force (First Alarm) Call to Arrival***

The Department’s ERF for building fires includes four engines (one automatic aid), one ladder truck, and one Division Chief for a total of 16 personnel. Over the four-year study period, there were only 31 incidents for which the entire ERF arrived, with a 90<sup>th</sup> percentile dispatch-to-arrival performance of 10:37 minutes, which is 53 seconds (eight percent) *faster* than Citygate’s recommended 11:30-minute goal for urban areas.

**Table 28—90<sup>th</sup> Percentile ERF Call-to-Arrival Performance (2017–2020)**

Station	Overall	2017	2018	2019	2020
Department-Wide	<b>10:37</b>	10:08	10:37	10:03	12:10

**Finding #13:** At 10:37 minutes, 90<sup>th</sup> percentile ERF (First Alarm) call-to-arrival performance is eight percent *faster* than the 11:30-minute Citygate-recommended best practice goal for urban areas.

***Response Performance Summary***

The following table summarizes the Department’s operational response performance over the four-year study period relative to recognized best practices. As the table illustrates, response performance was excellent across the board, ranging from slightly slower than best practice for first-due unit and ERF travel performance to 11 percent faster than best practice for first-unit call to arrival, which is the primary customer service measure.

**Table 29—90<sup>th</sup> Percentile Response Performance Summary**

Response Component	Best Practice		90 <sup>th</sup> Percentile Performance	Performance vs. Best Practice
	Time	Reference		
Call Processing / Dispatch	1:30	Citygate	1:39	10%
Crew Turnout	2:00	Citygate	1:53	-6%
First-Due Travel	4:00	NFPA/Citygate	4:30	13%
First-Unit Call to Arrival	7:30	Citygate	6:42	-11%
ERF Call to Arrival	11:30	Citygate	10:37	-8%

**2.8 OVERALL DEPLOYMENT EVALUATION**

**SOC ELEMENT 8 OF 8**  
**OVERALL EVALUATION**

The Department serves a diverse urban population with a mixed residential and non-residential land-use pattern typical of central California coastal cities. Due to the service area’s location on the Monterey Peninsula, the Department protects large tourism population densities at times, in addition to service area residents, businesses, and employees.

Citygate finds the Department’s response apparatus types to be appropriate to protect against the hazards likely to impact the service area. Citygate also asserts that the total daily staffing of 25 fire response personnel provides a minimum Effective Response Force (ERF) of 16 personnel for one moderate-risk building fire or other emergency requiring a multiple-unit response with additional reserve response capacity for simultaneous single-unit incidents. It should also be noted that the Monterey Peninsula Airport District’s Master Plan calls for the relocation of Station 16 to the north side of the two runways and to staff it with private sector contract personnel for Federal Aviation Administration-required ARFF response to aircraft emergencies. This *will* impact the

Department's response capacity and related response performance to the eastern areas of the City outside the airport grounds, specifically the Fisherman's Flats, Deer Flats, Olmsted/Monhollan Road, and Ryan Ranch areas of the City.

While the state fire code now requires fire sprinklers even in residential dwellings, it will be many more decades before enough homes are replaced or remodeled with automatic fire sprinklers. If desired outcomes include limiting building fire damage to only part of the inside of an affected building and/or minimizing permanent impairment resulting from a medical emergency, then the City will need both first-due unit and multiple-unit ERF coverage in all neighborhoods consistent with a Citygate response performance recommendation of first-due arrival within 7:30 minutes from 9-1-1 dispatch notification and an ERF arrival within 11:30 minutes of 9-1-1 notification, all at 90 percent or better reliability, which it is currently providing from its existing six fire station locations.

In Citygate's more than 20 years of conducting fire service deployment studies, very few client agencies have met all the key best practice response performance measures to the same degree as the Monterey Fire Department. This reflects a Department with stations appropriately spaced throughout the service area to provide both first-due unit and ERF travel times meeting best practice goals to facilitate desired outcomes, and dispatch center staff and response personnel's ongoing commitment to excellence in response performance.

Overall, Citygate finds the Department to be appropriately staffed and deployed to protect the jurisdictions it serves against the hazards likely to impact them, with response performance meeting recognized best practice goals.

**Finding #14:** Overall, Citygate finds the Department to be appropriately staffed and deployed to protect the jurisdictions it serves against the hazards likely to impact them, with response performance meeting recognized best practice goals.

**Finding #15:** The Monterey Peninsula Airport District Master Plan's intended relocation of Station 16 to the north side of the two runways *will* impact the Department's response capacity and related response performance to the eastern areas of the City outside the airport grounds, specifically the Fisherman's Flats, Deer Flats, Olmsted/Monhollan Road, and Ryan Ranch areas of the City.

### **2.8.1 Deployment Recommendations**

Based on the technical analysis and findings contained in this assessment, Citygate offers the following deployment recommendations.

**Recommendation #1: Adopt Deployment Policies:** The City Council should adopt complete performance measures to aid deployment planning and to monitor performance. The measures of time should be designed to deliver outcomes that will save patients, when possible, upon arrival and to keep small but serious fires from becoming more serious. With this in mind, Citygate recommends the following measures:

**1.1 Distribution of Fire Stations:** To treat pre-hospital medical emergencies and control small fires, the first-due unit should arrive within 7:30 minutes, 90 percent of the time from the receipt of the 9-1-1 call at the Monterey County dispatch center. This equates to a 1:30-minute dispatch time, a 2:00-minute company turnout time, and a 4:00-minute travel time.

**1.2 Multiple-Unit Effective Response Force for Serious Emergencies:** To confine building fires near the room of origin, keep vegetation fires under one acre in size, and treat multiple medical patients at a single incident, a multiple-unit ERF of at least **16** personnel, including at least one Division Chief, should arrive within 11:30 minutes from the time of 9-1-1 call receipt at the Monterey County dispatch center 90 percent of the time. This equates to a 1:30-minute dispatch time, 2:00-minute company turnout time, and 8:00-minute travel time.

**1.3 Hazardous Materials Response:** To provide hazardous materials response designed to protect from the hazards associated with uncontrolled release of hazardous and toxic materials, the fundamental mission of the Department's response is to isolate the hazard, deny entry into the hazard zone, and minimize impacts on the community. This can be achieved with a first-due total response time of 7:30 minutes or less to provide initial hazard evaluation and/or mitigation actions. After the initial evaluation is completed, a determination can be made whether to request additional resources to mitigate the hazard.

**1.4 Technical Rescue:** To respond to technical rescue emergencies as efficiently and effectively as possible with enough trained personnel to facilitate a successful rescue, with a first-due total response time of 7:30 minutes or less to evaluate the situation and initiate rescue actions, additional resources should assemble as needed within a total response time of 11:30 minutes to safely complete rescue/extrication and delivery of the victim to the appropriate emergency medical care facility.



## SECTION 3—ADMINISTRATIVE SUPPORT STAFFING ASSESSMENT

The City’s Request for Proposals’ (RFP) scope of work included review and assessment of the Department’s administrative support capacity. Citygate’s assessment evaluated the administrative support organization’s ability to adequately support the Department’s mission, including the following specific support functions:

- ◆ General administrative support
- ◆ Operations
- ◆ Training and safety
- ◆ EMS program
- ◆ Fire prevention
- ◆ Emergency management / disaster preparedness
- ◆ Public information and education

NFPA 1201<sup>15</sup> states, in part, “the [Department] shall have a leader and organizational structure that facilitates efficient and effective management of its resources to carry out its mandate as required [in its mission statement].” Best practices call for a management organization and headquarters programs with adequate staffing to provide a properly trained, equipped, and supported response force to ensure prompt response and safe, competent service delivery. Compliance regulations for fire services operations are increasing, so the proper hiring, training, and supervision of operational personnel requires a significant leadership and general management commitment.

### 3.1 ASSESSMENT METHODOLOGY

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For this assessment, Citygate reviewed all administrative support position descriptions, administered a Workload Analysis Survey to each administrative staff position, and conducted follow-up interviews with individual personnel as needed to assess function/program Strengths, Weaknesses, Opportunities, and Threats (SWOT), and to identify and evaluate:

- ◆ Key primary and secondary responsibilities for each administrative support position.
- ◆ Approximate amount/percentage of time spent annually on each responsibility.

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<sup>15</sup> NFPA 1201 – Standard for Providing Emergency Services to the Public (2015 Edition)

- ◆ Critical workload capacity gaps, including what key responsibilities/expectations are not being performed or are not being performed to the desired/expected levels or timeline.
- ◆ Available redundant critical business services capability (e.g., Departmental-level timecard/payroll processing, accounts payable, personnel issues tracking, etc.).
- ◆ Single points of failure, if any, for critical business functions, processes, and/or services.
- ◆ Workload capacity gaps relative to critical business systems and assigned key primary and secondary responsibilities.
- ◆ Annual hours and related full-time equivalent (FTE) capacity needed to close identified workload capacity gaps.

### **3.2 ADMINISTRATIVE SUPPORT STAFFING ASSESSMENT SUMMARY**

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Citygate’s administrative support staffing assessment yielded the following summary results:

#### **3.2.1 Strengths**

- ◆ Very highly qualified, professional, and dedicated personnel with a strong commitment to serve the organization and the community.
- ◆ Strong administrative and analytic skills.
- ◆ Strong work ethic / culture.
- ◆ High-quality customer service.

#### **3.2.2 Weaknesses/Concerns**

- ◆ Insufficient administrative support capacity for the Administration and Operations Divisions.
- ◆ Insufficient Fire Prevention Division staffing capacity to meet workload demand.
- ◆ Insufficient capacity to adequately support the City Emergency Operations Center (EOC) / Emergency Management function.
- ◆ Significant ongoing administrative workload capacity gaps.

#### **3.2.3 Opportunities**

- ◆ Potential to narrow or resolve ongoing workload capacity gaps across multiple divisions by restoring the 2.75 FTE positions currently vacant/frozen due to COVID-19 economic impacts.

### 3.2.4 Threats

- ◆ Multiple single points of failure, due to dependance on a single person/position.
- ◆ Insufficient capacity to conduct state-mandated fire prevention inspections in key occupancies.
- ◆ Significant ongoing administrative workload capacity gaps.

Citygate’s assessment further found that even prior to COVID-19-related staffing reductions, the Department lacked sufficient capacity for the workload. After COVID-19 staffing reductions and the resignation of the part-time Emergency Manager, the Department has additional ongoing administrative workload capacity gaps as summarized in the following table and evaluated in detail throughout this section. It should be noted that FTE capacity needed to close these capacity gaps equals more than the 2.75 FTE capacity lost through the COVID-19 staffing reductions.

**Table 30—Headquarters Workload Capacity Assessment Gap Analysis Summary**

Division	Estimated Total Annual Hours	Equivalent FTE Capacity <sup>1</sup>
Administration	2,940 – 5,570	1.5 – 2.8
Operations – Administrative Support	2,500 – 4,680	1.25 – 2.4
Training/Safety	1,758 – 2,863	.90 – 1.5
Fire Prevention	1,470 – 1,960	.75 – 1.0
<b>Total</b>	<b>8,668 – 15,073</b>	<b>4.4 – 7.7</b>

<sup>1</sup> FTE = full-time equivalent capacity assuming 1 FTE = 1,960 annual hours

**Finding #16:** Prior to COVID-19 staffing reductions, the Department lacked sufficient headquarters staffing capacity to meet workload demand.

**Finding #17:** After COVID-19-related staffing reductions, the Department has ongoing headquarters administrative staffing capacity gaps and single points of failure that will require an additional 4.4 to 7.7 FTE at the appropriate skill level to close.

**Recommendation #2:** As fiscal resources allow, the City should consider providing an additional 4.4 to 7.7 FTE headquarters staffing capacity as identified in this report to relieve critical ongoing workload capacity gaps, provide redundant capacity to eliminate identified single points of failure, and provide additional chief officer depth.

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### **3.3 ADMINISTRATIVE SUPPORT ORGANIZATION**

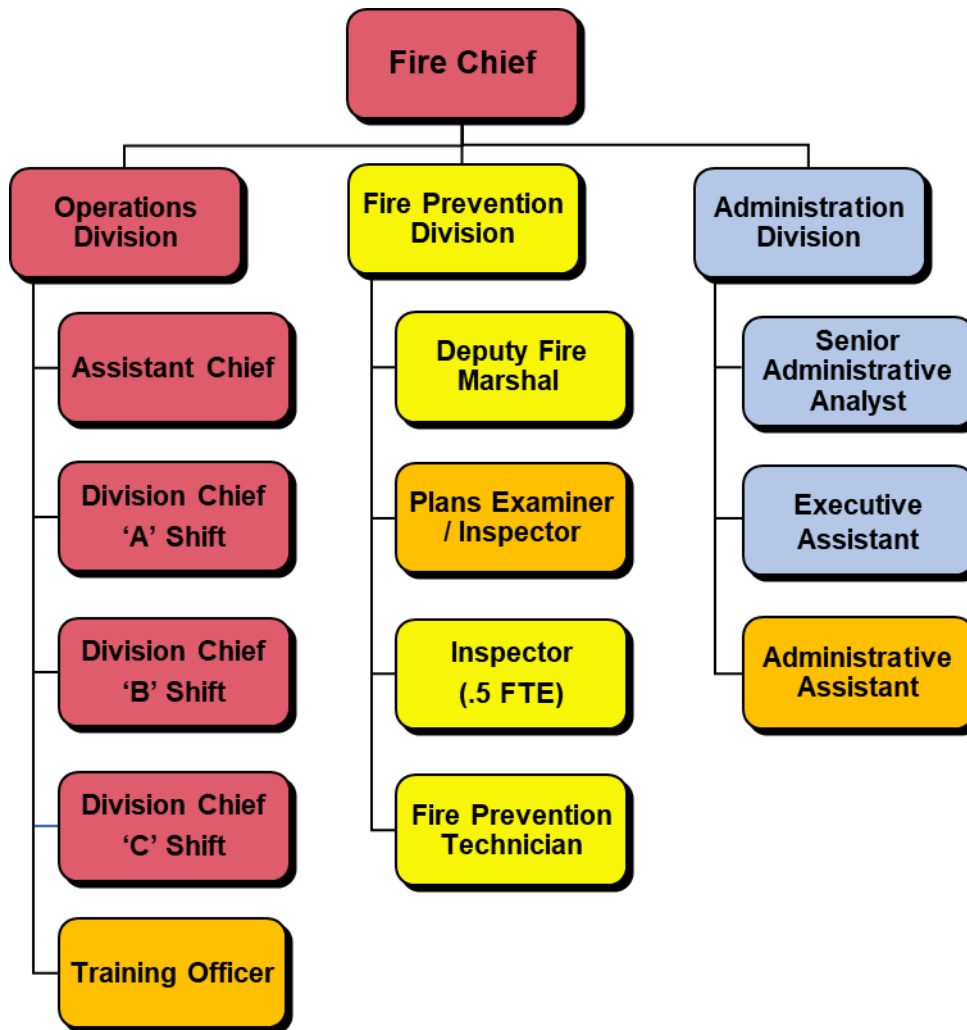
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The Department’s administrative support organization is responsible for the overall administration and management of all Department programs and services, and most administrative support functions, including general Department administration, fire prevention, training, health and safety, emergency preparedness and management, public education/information, policies and procedures, coordination with other local/regional service providers/stakeholders, and other related administrative and program support responsibilities.

The City’s Fiscal Years 2019–2021 biennium budget authorizes 8.75 FTE administrative support positions as summarized in the following figure. Due to negative Citywide economic impacts resulting from COVID-19, the following positions, totaling 2.75 FTEs, are currently vacant/frozen:

- ◆ Training Officer (1.0 FTE)
- ◆ Fire Prevention Plans Examiner/Inspector (1.0 FTE)
- ◆ Administrative Assistant (.75 FTE)

**Figure 15—Fire Department Administrative Support Organization Chart**



Note: orange shading denotes a vacant/frozen position

### 3.4 ADMINISTRATION DIVISION

The Administration Division includes the Fire Chief, a Senior Administrative Analyst, an Executive Assistant, and one Administrative Assistant (currently vacant/frozen). The Division previously included a part-time (.5 FTE) Emergency Manager from approximately 2012 to November 2019.

#### 3.4.1 Key Program and Position Responsibilities

##### *Key Administration Division Program Responsibilities*

- ◆ Budget and fiscal policy
- ◆ Administrative systems and procedures

- ◆ Timecard/payroll processing
- ◆ Labor/management issues
- ◆ Strategic planning
- ◆ Risk management
- ◆ Emergency planning and EOC operations

***Key Fire Chief Responsibilities<sup>16</sup>***

- ◆ Plan, organize, direct, and coordinate all five jurisdictions' (Monterey, Pacific Grove, Carmel-by-the-Sea, Sand City, Monterey Regional Airport) functions and services.
- ◆ Provide highly responsible and technical staff assistance to four City Managers, City Councils, and the airport Executive Director and Board of Directors.
- ◆ Direct development and implementation of Department goals, objectives, priorities, policies, procedures, and operating guidelines.
- ◆ Develop and manage the Department budget.
- ◆ Prepare fire protection plans.
- ◆ Represent the City in relationships with the public, community groups, professional organizations, and outside agencies.

***Key Senior Administrative Analyst Responsibilities<sup>17</sup>***

- ◆ Assist executives and/or Departmental managers with complex interdepartmental and intergovernmental programs and projects; evaluate and develop recommendations on policies, procedures, standards, and rules.
- ◆ As a member of the Department's management team, assist in developing goals, objectives, policies, procedures, work standards, and administrative control systems.
- ◆ Coordinate, oversee, and perform complex, professional-level administrative support work in such areas as program development and oversight, project coordination, public information, budget preparation and development, financial administration and reporting, purchasing, contract administration, personnel

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<sup>16</sup> Reference: City of Monterey Fire Chief position description

<sup>17</sup> Reference: City of Monterey Senior Administrative Analyst position description

administration and training, management analysis, database management, automation, and program evaluation.

- ◆ Monitor and coordinate daily operation of assigned program area; perform detailed administrative work; maintain appropriate records and statistics; monitor progress and evaluate work measurement of programs.
- ◆ Develop and analyze quantitative data for management; prepare summary reports.
- ◆ Perform program, contract, and/or budget audits and analysis.
- ◆ Handle special projects as assigned.

***Key Executive Assistant Responsibilities<sup>18</sup>***

- ◆ Provide information upon inquiry from the public, City and Department staff, or Council members, or refer them to an appropriate source.
- ◆ Prepare workers' compensation documentation, review and check records, forms, and other documents for accuracy, completeness, and conformance to rules and regulations.
- ◆ Prepare Departmental payroll time records.
- ◆ Review invoices and process purchase orders.

***Key Administrative Assistant Responsibilities***

- ◆ Provide general administrative and technical support, and customer service for entire Department as assigned.

***Emergency Management Responsibilities***

- ◆ Maintain the City Emergency Operations Plan.
- ◆ Provide EOC staff training.
- ◆ Serve as the City liaison for the Monterey County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) update.
- ◆ Serve as the EOC Manager during an EOC activation.
- ◆ Serve as the City liaison for Alert Monterey County.

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<sup>18</sup> Reference: City of Monterey Executive Assistant position description

- ◆ Develop and provide public education emergency preparedness information and programs.

### 3.4.2 Administration Division Workload Assessment

Citygate's assessment of the Administration Division's workload yields the following workload capacity gaps.

**Finding #18:** Current Administration Division workload precludes any capacity for strategic/long-term planning, goal setting, and program evaluation.

**Finding #19:** The Administration Division lacks sufficient staffing capacity to adequately meet its emergency management responsibilities.

**Finding #20:** Insufficient clerical-level support capacity has significantly impacted the Administration Division's ability to achieve many of its higher-level goals and objectives involving research, data collection, analysis, program evaluation, planning, and special projects.

**Finding #21:** There is insufficient clerical-level capacity to support all Department divisions and programs.

**Finding #22:** The lack of adequate office support capacity means some Department personnel are working below job specifications performing lower-level tasks, and/or some lower-level tasks (e.g., records management) are not performed adequately or at all.

### 3.4.3 Administration Division Single Points of Failure

A single point of failure is defined for the purpose of this assessment as the lack of sufficient and/or redundant capacity to perform any *critical* Department function, business process, or service. Citygate's assessment identified the following single points of failure within in the Administration Division.

- ◆ Accounts payable/receivable
- ◆ Timecard/payroll processing
- ◆ Personnel management
- ◆ Emergency management



**Finding #23:** The Administration Division lacks redundant capacity for critical Department-level business processes and services, including accounts payable/receivable, payroll time keeping, personnel management, and emergency management.

### 3.4.4 Administration Division Workload Capacity Gap Analysis

Citygate’s assessment of the Administration Division’s workload yielded the following capacity gaps and estimated annual hours and equivalent FTE capacity required to close those gaps. The identified functions/tasks are currently performed by the administrative staff to the best of their ability and capacity, consist mostly of tasks below their position classification/skill level, and significantly impact their ability to accomplish their normal assigned/expected functions/tasks within a typical workday or week.

**Table 31—Administration Division Workload Capacity Gap Analysis Summary – Ongoing Capacity Gaps**

Responsibilities	Estimated Additional Annual Hours Required
Primary front counter/reception/telephone/mail	520 – 1,040
Timecard/payroll processing	260 – 520
Accounts payable/receivable	260 – 520
Finance / Human Resources communications/documentation	130 – 260
Meeting agendas/packets/minutes	120 – 260
City Hall coordination	90 – 135
Data entry/reports/records management	780 – 1,170
Supply ordering/distribution	130 – 195
Emergency management/preparedness program management	650 – 1,470
<b>Total Annual Hours</b>	<b>2,940 – 5,570</b>
<b>Equivalent FTE Capacity<sup>1</sup></b>	<b>1.5 – 2.8</b>

<sup>1</sup> FTE = full-time equivalent capacity assuming 1 FTE = 1,960 annual hours

**Finding #24:** The Administration Division has ongoing workload capacity gaps that would require 1.5–2.8 additional FTE capacity to resolve.

**Recommendation #3:** As fiscal resources allow the City should consider restoring/adding 1.0–2.0 FTE Administrative Assistant-level capacity to relieve critical workload capacity gaps and to provide redundant capacity for critical business services and processes.

**Recommendation #4:** As fiscal resources allow the City should consider providing .33–.75 FTE capacity for emergency management/preparedness management.

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### **3.5 OPERATIONS DIVISION**

The Operations Division administrative organization includes the Assistant Fire Chief, three Division Chiefs, each assigned to a 56-hour shift schedule with collateral operational responsibilities, and one Training Officer (currently vacant/frozen). The Administrative Assistant position in the Administration Division (currently vacant/frozen) provides clerical support for the Operations Division in addition to other assigned responsibilities.

#### **3.5.1 Key Program and Position Responsibilities**

##### ***Key Operations Division Program Administrative Responsibilities***

- ◆ Employee training and development
- ◆ Operational readiness
- ◆ Risk management
- ◆ Implementation of best practices

##### ***Key Assistant Fire Chief Responsibilities<sup>19</sup>***

- ◆ Plan, organize, direct, and coordinate all Operations Division functions and services.
- ◆ Provide highly responsible and technical staff assistance to the Fire Chief, City Manager, and City Council.
- ◆ Direct development and implementation of Division goals, objectives, priorities, policies, procedures, and operating guidelines.
- ◆ Assist with the development and management of the Department budget.

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<sup>19</sup> Reference: City of Monterey Assistant Fire Chief position

- ◆ Represent the City in relationships with the public, community groups, professional organizations, and outside agencies.

***Key Operations Division Chief Administrative Responsibilities<sup>20</sup>***

- ◆ Perform professional administrative and managerial duties for assigned shift.
- ◆ Provide staff development training.
- ◆ Work with other management staff to maintain, revise, and improve overall Department operations.
- ◆ Prepare all platoon forms, reports, schedules, recommendations, and other administrative duties.
- ◆ Supervise, train, schedule, and evaluate assigned staff.
- ◆ Research and prepare reports for presentations, maintain records and manuals, and develop and revise programs as assigned.
- ◆ Manage sub-department program(s) as assigned.
- ◆ Handle special projects as assigned.
- ◆ Serve as Department Duty Chief as assigned.
- ◆ Continually improve relationships with contract agencies.

***Key Training Officer Responsibilities***

- ◆ Conduct annual training needs assessment.
- ◆ Prepare annual training plan.
- ◆ Develop and deliver mandated and best practice training to operational response personnel.
- ◆ Serve as Department representative to the Monterey County Fire Training Officers Association.
- ◆ Prepare and manage annual program budget.
- ◆ Maintain Department training records.
- ◆ Prepare reports and presentations.

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<sup>20</sup> Reference: City of Monterey Fire Division Chief Position Description

- ◆ Conduct annual facility safety inspections.
- ◆ Develop/maintain Department Health and Wellness Program.
- ◆ Serve as Department Safety Officer and Infectious Disease Control Officer.
- ◆ Provide additional/relief/surge Chief Officer capacity.

***EMS Program Management Responsibilities***

- ◆ Review patient care reports (PCR) for quality control/quality improvement (QC/QI).
- ◆ Review patient care concerns with affected employees.
- ◆ Conduct annual training needs assessment.
- ◆ Prepare annual EMS training plan.
- ◆ Develop and coordinate delivery of mandated and best practice EMS training.
- ◆ Monitor controlled substance inventory and use.
- ◆ Track required EMS certifications.
- ◆ Maintain EMS-related Department policies and procedures.
- ◆ Order and maintain EMS supply inventory.
- ◆ Serve as Department liaison to Monterey County Emergency Medical Services Agency (EMSA).

**3.5.2 Operations Division Workload Assessment**

Citygate’s assessment of the Operations Division’s administrative workload capacity yields the following findings.

**Finding #25:** The Assistant Chief typically works 12–14 hours each scheduled workday and is frequently required or expected to attend meetings and/or perform administrative tasks on his scheduled days off.

**Finding #26:** The Operations Division Chiefs average approximately 15–20 percent of their scheduled work time performing lower-level administrative tasks typically performed by an Administrative Assistant (clerical)-level position.

**Finding #27:** The current Training Officer vacancy resulting from a COVID-19 budget reduction has shifted operational training and safety program responsibilities to the three shift Division Chiefs with no overall coordination nor annual needs assessment/plan to ensure coordination of effort, procedures, record-keeping, or regulatory conformance.

**Finding #28:** The Department lacks sufficient EMS program management, training, quality of care oversight, and administrative support capacity to meet its mandated/delegated responsibilities and to minimize the City’s legal liabilities as related to the provision of emergency medical services.

### **3.5.3 Operations Division Single Points of Failure**

Citygate’s assessment of the Operations Division identified the following single points of failure:

- ◆ Operational training administration and coordination
- ◆ Adequate EMS program quality of care oversight

### **3.5.4 Operations Division Workload Capacity Gap Analysis**

Citygate’s assessment of the Operations Division’s administrative workload yielded the following ongoing workload capacity gaps and estimated annual hours and equivalent FTE capacity required to close those gaps. The identified functions/tasks are currently being performed by the Assistant Chief and Division Chiefs to the best of their abilities and available capacities in addition to their regular responsibilities and are significantly impacting their abilities to accomplish their normal assigned/expected functions/tasks within a typical workday/workweek.

**Table 32—Operations Division Capacity Gap Analysis Summary – Ongoing Administrative Support Capacity Gaps**

Responsibilities	Estimated Additional Annual Hours Required
Public and staff communications	104 – 208
Maintain department training records and course rosters	208 – 416
Invoicing, cost reconciliation; maintain financial records; prepare fiscal reports	208 – 416
EMS program management and quality of care oversight	650 – 980
EMS training	196 – 392
EMS program coordination with Monterey County EMSA	50 – 100
EMS supplies management	104 – 208
EMS administrative clerical support	490 – 980
Division Chief administrative clerical support	490 – 980
<b>Total Annual Hours</b>	<b>2,500 – 4,680</b>
<b>Equivalent FTE Capacity<sup>1</sup></b>	<b>1.3 – 2.4</b>

<sup>1</sup> FTE = full-time equivalent capacity assuming 1 FTE = 1,960 annual hours

**Table 33—Operations Division Workload Capacity Gap Analysis Summary – Training/Safety Program Management – Ongoing Capacity Gaps**

Responsibilities	Estimated Additional Annual Hours Required
Conduct annual training needs assessment; develop annual training plan; develop/coordinate delivery of mandated and best practice training curricula; conduct drills to ensure operational readiness; coordinate/manage new employee training academy; prepare/manage program budget	980 – 1,307
Conduct annual facility safety inspections; develop/maintain Department Health/Wellness Program; serve as Department Safety Officer and Infectious Disease Control Officer	490 – 980
Provide relief shift duty Chief Officer / emergency incident management	288 – 576
<b>Total Annual Hours</b>	<b>1,758 – 2,863</b>
<b>Equivalent FTE Capacity<sup>1</sup></b>	<b>.9 – 1.5</b>

<sup>1</sup> FTE = full-time equivalent capacity assuming 1 FTE = 1,960 annual hours

**Recommendation #5:** As fiscal resources allow; the City should consider adding 1.0 FTE Battalion/Division Chief capacity to provide appropriate management of the Department’s critical training and safety programs and additional chief officer capacity.

**Recommendation #6:** As fiscal resources allow; the City should consider adding .5 to .85 FTE at the appropriate level to provide overall EMS program management, quality of care oversight, EMSA coordination, and coordination/delivery of EMS-specific training.

**Recommendation #7:** As fiscal resources allow; the City should consider restoring the .75 FTE Administrative Assistant position currently vacant/frozen to provide needed clerical-level support capacity for the Operations Division.

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### **3.6 FIRE PREVENTION DIVISION**

The Fire Prevention Division consists of a Deputy Fire Marshal, one Fire Prevention Plans Examiner/Inspector (currently vacant/frozen), one 0.5 FTE Fire Inspector, and a Fire Prevention Technician.

#### **3.6.1 Key Program and Position Responsibilities**

##### ***Key Fire Prevention Division Program Responsibilities***

- ◆ Adoption and enforcement of the California Fire Code.
- ◆ Review of all new development projects and building permits for conformance with applicable fire and life safety codes, ordinances, and regulations.
- ◆ Inspection of new building construction for conformance with applicable fire and life safety codes, ordinances, and regulations.
- ◆ Plan review and inspection of fire protection and detection systems for conformance with applicable codes, ordinances, and regulations; and for appropriate design, installation, and operation.
- ◆ Regular inspection of designated building occupancies for conformance with applicable fire and life safety codes, ordinances, and regulations.
- ◆ Vegetation management.

- ◆ Code enforcement; hazard abatement.
- ◆ Public fire safety education.
- ◆ Fire investigation.

***Key Deputy Fire Marshal Responsibilities<sup>21</sup>***

- ◆ Plan, organize, direct, and evaluate all Fire Prevention Division functions and services.
- ◆ Provide responsive technical and administrative management of a comprehensive program of fire prevention, loss management, and hazardous materials/environmental protection.
- ◆ Review building and fire protection system plans and specifications, and advise builders and developers.
- ◆ Oversee public relations and education programs.
- ◆ Manage the City's weed abatement program.
- ◆ Conduct fire cause and origin investigations.

***Key Fire Plans Examiner/Inspector Responsibilities<sup>22</sup>***

- ◆ Perform building and fire protection/detection systems plan reviews to ensure compliance with technical codes, applicable laws, state regulations, and City ordinances.
- ◆ Assist Fire Prevention Inspectors in resolving life safety, fire protection, and detection system problems, as well as the storage and/or use of hazardous materials.

This position is currently frozen.

***Key Fire Prevention Inspector Responsibilities<sup>23</sup>***

- ◆ Perform technical inspections and investigative work to enforce compliance with applicable laws, ordinances, and regulations pertaining to the prevention and control of fires.

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<sup>21</sup> Reference: City of Monterey Deputy Fire Marshal position description

<sup>22</sup> Reference: City of Monterey Fire Plans Examiner position description

<sup>23</sup> Reference: City of Monterey Fire Prevention Inspector position description



### ***Key Fire Prevention Technician Responsibilities<sup>24</sup>***

- ◆ Provide administrative and technical support for Fire Prevention and Fire Administration.
- ◆ Compile/coordinate release of fire incident reports and permits.
- ◆ Provide information and assistance in conformance with Departmental and City policies and procedures.

### **3.6.2 Fire Prevention Division Workload Assessment**

Citygate’s assessment of the Fire Prevention Division workload yields the following finding.

**Finding #29:** Current and anticipated near-term future workload *exceeds* current staffing capacity; workload is triaged each day and only immediate priorities to maintain business continuity, such as new construction plan reviews and inspections, are being completed. All other workload, such as mandated inspections, is either significantly deferred or not completed at all.

### **3.6.3 Fire Prevention Division Single Points of Failure**

Citygate’s assessment of the Fire Prevention Division identified the following single point of failure:

- ◆ State-mandated occupancy inspections

### **3.6.4 Fire Prevention Division Workload Capacity Gap Analysis**

Citygate’s assessment of the Fire Prevention Division’s workload yielded the following ongoing workload capacity gaps and estimated annual hours and equivalent FTE capacity required to close those gaps. The identified functions/tasks are currently being performed by the Deputy Fire Marshal, part-time Inspector, and other administrative support personnel to the best of their abilities and available capacities in addition to their regular responsibilities and are significantly impacting their abilities to accomplish their normal assigned/expected functions/tasks within a typical workday/workweek.

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<sup>24</sup> Reference: City of Monterey Fire Prevention Technician position description

**Table 34—Fire Prevention Division Workload Capacity Gap Analysis Summary – Ongoing Capacity Gaps**

Responsibilities	Estimated Additional Annual Hours Required
Front counter transactions/telephone/mail	280 – 390
Data entry	140 – 180
Reports / staff work	140 – 180
Implementation and preparation of new programs	220 – 280
Plan reviews	300 – 400
Inspections	300 – 400
Investigations	90 – 130
<b>Total Annual Hours</b>	<b>1,470 – 1,960</b>
<b>Equivalent FTE Capacity<sup>1</sup></b>	<b>.75 – 1.0</b>

<sup>1</sup> FTE = full-time equivalent capacity assuming 1 FTE = 1,960 annual hours

**Recommendation #8:** As fiscal resources allow, the City should consider restoring the currently vacant/frozen 1.0 FTE Fire Prevention Plans Examiner/Inspector position, or equivalent capacity, to provide critically needed technical support in the Fire Prevention Division.

## APPENDIX A—RISK ASSESSMENT

### A.1 COMMUNITY RISK ASSESSMENT

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The third element of the Standards of Coverage (SOC) process is a community risk assessment. Within the context of an SOC study, the objectives of a community risk assessment are to:

**SOC ELEMENT 3 OF 8**  
**COMMUNITY RISK**  
**ASSESSMENT**

- ◆ Identify the values at risk to be protected within the community or service area.
- ◆ Identify the specific hazards with the potential to adversely impact the community or service area.
- ◆ Quantify the overall risk associated with each hazard.
- ◆ Establish a foundation for current/future deployment decisions and risk-reduction/hazard-mitigation planning and evaluation.

A hazard is broadly defined as a situation or condition that can cause or contribute to harm. Examples include fire, medical emergency, vehicle collision, earthquake, flood, etc. Risk is broadly defined as the *probability of hazard occurrence* in combination with the *likely severity of resultant impacts* to people, property, and the community as a whole.

#### A.1.1 Risk Assessment Methodology

The methodology employed by Citygate to assess community risks as an integral element of an SOC study incorporates the following elements:

- ◆ Identification of geographic planning sub-zones (risk zones) appropriate to the community or jurisdiction.
- ◆ Identification and quantification (to the extent data is available) of the specific values at risk to various hazards within the community or service area.
- ◆ Identification of the fire and non-fire hazards to be evaluated.
- ◆ Determination of the probability of occurrence for each hazard.
- ◆ Evaluation of *probable* impact severity for each hazard by planning zone using agency/jurisdiction-specific data and information.
- ◆ Determination of overall risk by hazard as outlined in the following figure.

**Table A-1—Overall Risk**

<b>Probability of Occurrence</b>	<b>Impact Severity</b>				
	Insignificant	Minor	Moderate	Major	Catastrophic
Rare	Low	Low	Low	Moderate	High
Unlikely	Low	Low	Low	Moderate	High
Possible	Low	Low	Moderate	High	Extreme
Probable	Low	Low	Moderate	High	Extreme
Frequent	Low	Moderate	High	Extreme	Extreme

Citygate used the following data sources for this study to understand the hazards and values to be protected in the City:

- ◆ U. S. Census Bureau population and demographic data
- ◆ City and County Geographical Information Systems (GIS) data
- ◆ City General Plan and Zoning information
- ◆ County Hazard Mitigation Plan
- ◆ Fire Department data and information

### **A.1.2 Risk Assessment Summary**

Citygate’s evaluation of the values at risk and hazards likely to impact the Department’s service area yields the following:

1. The Department serves a diverse urban population with densities ranging from less than 1,000 to more than 10,000 people per square mile over a widely varied land-use pattern.
2. The cities’ populations are projected to increase modestly over the next 14 years to 2035.
3. The cities have a large inventory of residential and non-residential buildings to protect as identified in this assessment.
4. The cities also have significant economic and other resource values to be protected, as identified in this assessment.
5. Monterey County has a mass emergency notification system to effectively communicate emergency notifications and information to the public in a timely manner.

6. The Department’s overall risk for seven hazards related to emergency services provided by the Fire Department range from **Low** to **High**, as summarized in the following table.

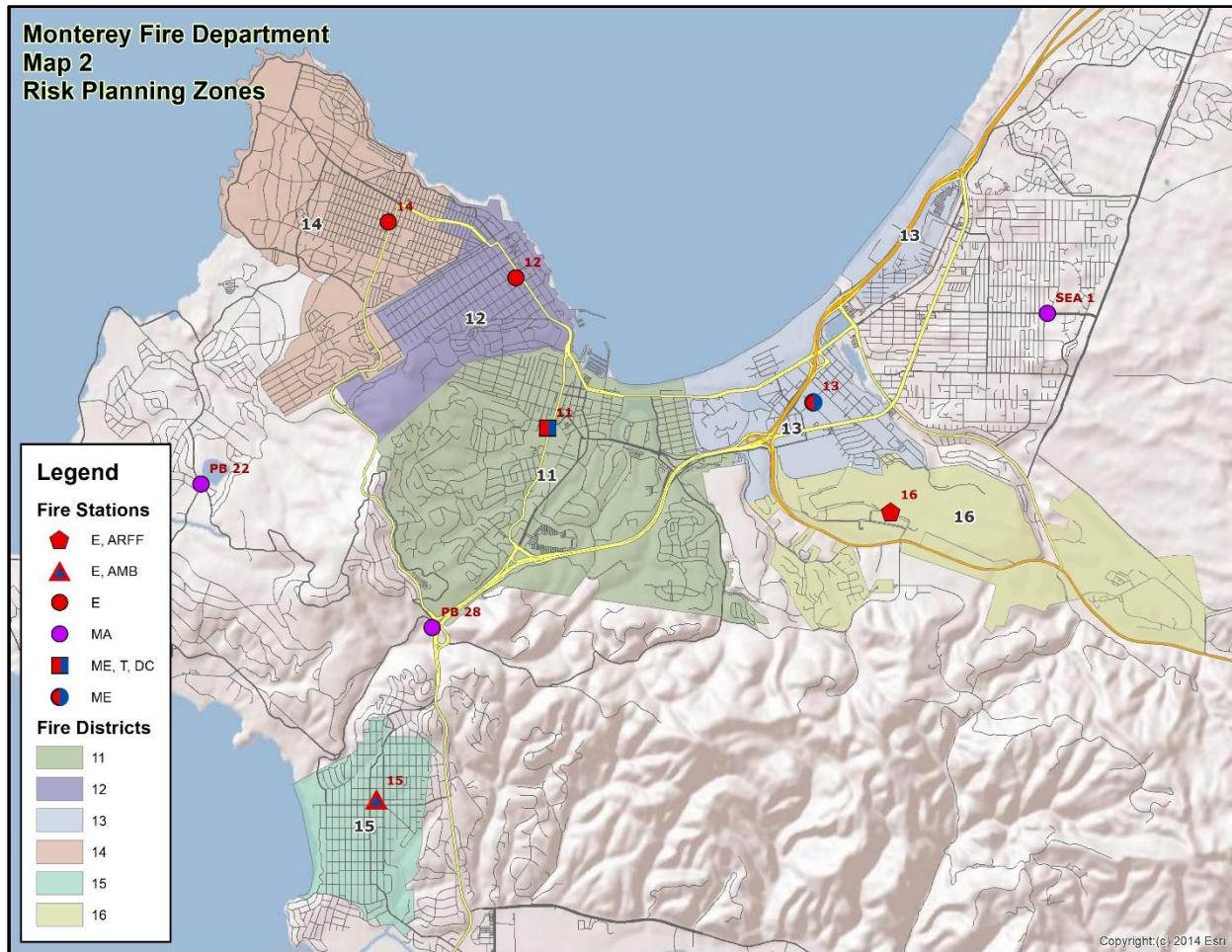
**Table A-2—Overall Risk by Hazard**

Hazard		Planning Zone					
		Station 11	Station 12	Station 13	Station 14	Station 15	Station 16
1	Building Fire	<i>High</i>	<i>Moderate</i>	<i>High</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>
2	Vegetation/Wildland Fire	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>
3	Medical Emergency	<i>High</i>	<i>High</i>	<i>High</i>	<i>High</i>	<i>High</i>	<i>High</i>
4	Hazardous Materials	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Low</i>
5	Technical Rescue	<i>High</i>	<i>Moderate</i>	<i>Moderate</i>	<i>High</i>	<i>Moderate</i>	<i>Moderate</i>
6	Marine Incident	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Low</i>
7	Aircraft Incident	<i>Low</i>	<i>Low</i>	<i>Low</i>	<i>Low</i>	<i>Low</i>	<i>Moderate</i>

### A.1.3 Planning Zones

The Commission on Fire Accreditation International (CFAI) recommends jurisdictions establish geographic planning zones to better understand risk at a sub-jurisdictional level. For example, portions of a jurisdiction may contain predominantly moderate risk building occupancies, such as detached single-family residences, while other areas may contain high- or maximum-risk occupancies, such as commercial and industrial buildings with a high hazard fire load. If risk were to be evaluated on a jurisdiction-wide basis, the predominant moderate risk could outweigh the high or maximum risk and may not be a significant factor in an overall assessment of risk. If, however, high- or maximum-risk occupancies are a larger percentage of the risk in a smaller planning zone, they become a more significant risk factor. Another consideration in establishing planning zones is that the jurisdiction’s record management system must also track the specific zone for each incident to appropriately evaluate service demand and response performance relative to each specific zone. For this assessment, Citygate utilized six planning zones corresponding with each fire station’s first-due response area, as shown in the following figure.

**Figure A-1—Risk Planning Zones**



#### A.1.4 Values at Risk to Be Protected

*Values at risk*, broadly defined, are tangibles of significant importance or value to the community or jurisdiction potentially at risk of harm or damage from a hazard occurrence. Values at risk typically include people, critical facilities/infrastructure, buildings, and key economic, cultural, historic, or natural resources.

##### *People*

Residents, employees, visitors, and travelers in a community or jurisdiction are vulnerable to harm from a hazard occurrence. Particularly vulnerable are specific at-risk populations, including those unable to care for themselves or self-evacuate in the event of an emergency. At-risk populations typically include children under the age of 10, the elderly, and people housed in institutional settings. The following tables summarize key demographic data for Monterey, Pacific Grove, Carmel-by-the-Sea, and Sand City.

**City of Monterey, CA Fire Department**  
*Community Risk Assessment and Standards of Cover Study*

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**Table A-3—Key Demographic Data – Monterey**

Demographic	2020
<b>Population</b>	<b>28,382</b>
Under 10 years	8.80%
10–14 years	4.00%
15–64 years	67.50%
65–74 years	10.40%
75 years and older	9.20%
Median age	38.7
Daytime population	43,729
<b>Housing Units</b>	<b>13,819</b>
Owner-Occupied	34.00%
Renter-Occupied	56.50%
Vacant	9.50%
Average Household Size	2.07
Median Home Value	\$873,125
<b>Ethnicity</b>	
Caucasian	75.10%
Hispanic/Latino (counted as Caucasian)	18.00% of Caucasian
Asian	8.70%
Black/African American	2.80%
Other	13.40%
<b>Education (Population over 24 years of age)</b>	<b>20,771</b>
High School Graduate	93.70%
Undergraduate Degree	54.50%
Graduate/Professional Degree	25.20%
<b>Employment (Population over 15 years of age)</b>	<b>14,241</b>
In Labor Force	84.20%
Unemployed	15.80%
Per Capita Income	\$49,562
Population below Poverty Level	10.90%
Population without Health Insurance Coverage	3.90%

Source: Esri Community Analyst and U.S. Census Bureau

**Table A-4—Key Demographic Data – Pacific Grove**

Demographic	2020
<b>Population</b>	<b>15,536</b>
Under 10 years	7.70%
10–14 years	4.30%
15–64 years	59.40%
65–74 years	15.70%
75 years and older	13.00%
Median age	49.9
Daytime population	15,011
<b>Housing Units</b>	<b>8,240</b>
Owner-Occupied	41.60%
Renter-Occupied	45.00%
Vacant	13.40%
Average Household Size	2.09
Median Home Value	\$931,901
<b>Ethnicity</b>	
Caucasian	81.80%
Hispanic/Latino (counted as Caucasian)	14.60% of Caucasian
Asian	6.50%
Black/African American	1.40%
Other	10.30%
<b>Education (Population over 24 years of age)</b>	<b>12,044</b>
High School Graduate	96.90%
Undergraduate Degree	55.30%
Graduate/Professional Degree	27.00%
<b>Employment (Population over 15 years of age)</b>	<b>8,179</b>
In Labor Force	86.70%
Unemployed	13.30%
Per Capita Income	\$59,478
Population below Poverty Level	6.50%
Population without Health Insurance Coverage	3.70%

Source: Esri Community Analyst and U.S. Census Bureau



**Table A-5—Key Demographic Data – Carmel-by-the-Sea**

Demographic	2020
<b>Population</b>	<b>4,023</b>
Under 10 years	4.10%
10–14 years	2.30%
15–64 years	49.80%
65–74 years	24.40%
75 years and older	19.40%
Median age	62.6
Daytime population	5,155
<b>Housing Units</b>	<b>3,440</b>
Owner-Occupied	36.60%
Renter-Occupied	25.60%
Vacant	37.70%
Average Household Size	1.78
Median Home Value	\$1,497,748
<b>Ethnicity</b>	
Caucasian	91.60%
Hispanic/Latino (counted as Caucasian)	6.60% of Caucasian
Asian	3.50%
Black/African American	0.30%
Other	4.60%
<b>Education (Population over 24 years of age)</b>	<b>3,392</b>
High School Graduate	97.40%
Undergraduate Degree	68.70%
Graduate/Professional Degree	29.80%
<b>Employment (Population over 15 years of age)</b>	<b>1,768</b>
In Labor Force	89.10%
Unemployed	10.90%
Per Capita Income	\$85,839
Population below Poverty Level	2.90%
Population without Health Insurance Coverage	1.10%

Source: Esri Community Analyst and U.S. Census Bureau

**Table A-6—Key Demographic Data – Sand City**

Demographic	2020
<b>Population</b>	<b>385</b>
Under 10 years	15.80%
10–14 years	7.90%
15–64 years	68.00%
65–74 years	5.70%
75 years and older	2.60%
Median age	33.2
Daytime population	1,477
<b>Housing Units</b>	<b>155</b>
Owner-Occupied	35.50%
Renter-Occupied	56.10%
Vacant	8.40%
Average Household Size	2.52
Median Home Value	\$529,762
<b>Ethnicity</b>	
Caucasian	46.30%
Hispanic/Latino (counted as Caucasian)	63.80% of Caucasian
Asian	7.30%
Black/African American	3.40%
Other	43.00%
<b>Education (Population over 24 years of age)</b>	<b>231</b>
High School Graduate	77.50%
Undergraduate Degree	20.80%
Graduate/Professional Degree	6.90%
<b>Employment (Population over 15 years of age)</b>	<b>185</b>
In Labor Force	76.20%
Unemployed	23.80%
Per Capita Income	\$22,721
Population below Poverty Level	16.50%
Population without Health Insurance Coverage	8.40%

Source: Esri Community Analyst and U.S. Census Bureau

Of note from the previous tables is the following:

- ◆ The population under 10 years or over 65 years of age ranges from slightly more than 24 percent in Sand City to nearly 48 percent in Carmel-by-the-Sea.
- ◆ The cities' populations are predominantly Caucasian, including Hispanic/Latino.
- ◆ Of the population over 24 years of age, the percentage with a high school or equivalent education ranges from 77 percent in Sand City to more than 97 percent in Carmel-by-the-Sea.
- ◆ Of the population over 24 years of age, the percentage with an undergraduate, graduate, or professional degree ranges from nearly 21 percent in Sand City to nearly 69 percent in Carmel-by-the-Sea.
- ◆ Of the population older than 15 years of age, the percentage in the workforce ranges from 76 percent in Sand City to 89 percent in Carmel-by-the-Sea. The unemployment rate ranges from nearly 24 percent in Sand City to nearly 11 percent in Carmel-by-the-Sea.
- ◆ Per capita income ranges from nearly \$23,000 in Sand City to nearly \$86,000 in Carmel-by-the-Sea.
- ◆ The population below the federal poverty level ranges from just over 16 percent in Sand City to slightly less than three percent in Carmel-by-the-Sea.
- ◆ The population without health insurance coverage ranges from slightly above eight percent in Sand City to just over one percent in Carmel-by-the-Sea.

The Association of Monterey Bay Area Governments (AMBAG) projects population increases for the cities included in this study as summarized in the following table.<sup>25</sup>

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<sup>25</sup> 2014 Regional Growth Forecast, Appendix A (Table 10)

**Table A-7—Projected Growth**

City	2020 Population <sup>1</sup>	2035 Population <sup>2</sup>	Projected Growth
Carmel-by-the-Sea	3,807	3,917	2.89%
Monterey	28,223	30,647	8.59%
Pacific Grove	15,249	17,030	11.68%
Sand City	367	1,550	322.34%
<b>Total</b>	<b>47,646</b>	<b>53,144</b>	<b>11.54%</b>

<sup>1</sup> Source: Esri Community Analyst (2020)  
<sup>2</sup> AMBAG 2014 Regional Growth Forecast

***Buildings***

The four study area cities collectively have more than 25,600 housing units and more than 4,300 businesses including offices, professional services, retail sales, restaurants/bars, motels, churches, schools, government facilities, healthcare facilities, and other business types.<sup>26</sup>

***Building Occupancy Risk Categories***

The CFAI identifies the following four risk categories that relate to building occupancy:

**Low Risk** – includes detached garages, storage sheds, outbuildings, and similar building occupancies that pose a relatively low risk of harm to humans or the community if damaged or destroyed by fire.

**Moderate Risk** – includes detached single-family or two-family dwellings; mobile homes; commercial and industrial buildings fewer than 10,000 square feet without a high hazard fire load; aircraft; railroad facilities; and similar building occupancies where loss of life or property damage is limited to the single building.

**High Risk** – includes apartment/condominium buildings; commercial and industrial buildings more than 10,000 square feet without a high hazard fire load; low-occupant load buildings with high fuel loading or hazardous materials; and similar occupancies with potential for substantial loss of life or unusual property damage or financial impact.

**Maximum Risk** – includes buildings or facilities with unusually high risk requiring an Effective Response Force (ERF) involving a significant augmentation of resources and personnel and where a fire would pose the potential for a catastrophic event involving large loss of life or significant economic impact to the community.

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<sup>26</sup> Source: Esri Community Analyst Business Summary (2020).

Evaluation of the cities’ building inventory identified 1,015 high/maximum-risk building uses as they relate to the CFAI building fire risk categories as summarized in the following table.

**Table A-8—Building Inventory by Risk Category**

Occupancy Classification		Building Inventory				Total Inventory <sup>1</sup>	Risk Category <sup>2</sup>
		Carmel-by-the-Sea	Monterey	Pacific Grove	Sand City		
A-1	Assembly	5	7	1	0	13	<i>Maximum</i>
H	Hazardous	0	6	5	1	12	<i>Maximum</i>
I	Institutional	2	29	14	0	45	<i>High</i>
R-1	Hotel/Motel	44	68	34	0	146	<i>High</i>
R-2	Multi-Family Residential	48	539	212	0	799	<i>High</i>
<b>Total</b>		<b>99</b>	<b>649</b>	<b>266</b>	<b>1</b>	<b>1,015</b>	

<sup>1</sup> Source: City of Monterey Fire Department

<sup>2</sup> CFAI Standards of Cover (Fifth Edition)

### *Critical Facilities*

The U.S. Department of Homeland Security defines critical infrastructure and key resources (CIKR) as those physical assets essential to the public health and safety, economic vitality, and resilience of a community, such as lifeline utilities infrastructure, telecommunications infrastructure, essential government services facilities, public safety facilities, schools, hospitals, airports, etc. The 2015 Monterey County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) identifies 70 critical facilities and infrastructure for the study area as shown in the following table. A hazard occurrence with significant impact severity affecting one or more of these facilities would likely adversely impact critical public or community services.

**Table A-9—Critical Facilities**

Critical Facility Type	Carmel-by-the-Sea	Monterey	Monterey Airport	Pacific Grove	Sand City	Total
Care Facility	1	16	0	5	0	22
Community Services	0	1	0	3	0	4
Education	1	13	0	9	0	23
Government Services	1	1	0	1	2	5
Healthcare	0	2	0	0	0	2
Public Safety	2	5	2	2	1	12
Transportation	0	0	1	0	0	1
Utility	0	0	0	0	1	1
<b>Total</b>	<b>5</b>	<b>38</b>	<b>3</b>	<b>20</b>	<b>4</b>	<b>70</b>

Source: 2015 Monterey County Multi-Jurisdictional Hazard Mitigation Plan (Appendix I, O, P, R and U)

***Economic Resources***

Key economic resources within the study area include:

**Carmel-by-the-Sea**

- ◆ Carmel Plaza Shopping Center

**Monterey**

- ◆ Del Monte Shopping Center
- ◆ Cannery Row
- ◆ Fisherman’s Wharf
- ◆ Mercedes-Benz of Monterey
- ◆ The Clement Monterey Hotel
- ◆ Monterey Plaza Hotel and Spa
- ◆ Portola Hotel & Spa
- ◆ Monterey Conference Center
- ◆ Hyatt Regency Monterey Hotel and Spa
- ◆ Monterey Marriott

- ◆ Monterey Bay Aquarium
- ◆ Monterey Sports Center

**Pacific Grove**

- ◆ Asilomar Conference Center
- ◆ Country Club Gate Center
- ◆ Monterey Bay Aquarium

**Sand City**

- ◆ Edgewater Shopping Center
- ◆ Sand Dollar Shopping Center

***Natural Resources***

Key natural resources within the study area include:

**Carmel-by-the-Sea**

- ◆ Carmel Beach
- ◆ Mission Trail Park
- ◆ Robinson Jeffers Tor House

**Monterey**

- ◆ Lake El Estero
- ◆ Del Monte Beach
- ◆ San Carlos Beach
- ◆ Monterey Bay
- ◆ Veteran's Memorial Park

**Pacific Grove**

- ◆ George Washington Park
- ◆ Rip Van Winkle Open Space
- ◆ Monterey Bay
- ◆ Lovers Point Park

### ***Cultural/Historic Resources***

Key cultural/historic resources within the study area include:

#### **Carmel-by-the-Sea**

- ◆ Forest Theater
- ◆ Golden Bough Playhouse
- ◆ Sunset Center

#### **Monterey**

- ◆ Colton Hall Museum
- ◆ Historic Adobes
- ◆ Monterey Museum of Art

#### **Pacific Grove**

- ◆ Pacific Grove Museum of Natural History
- ◆ Point Pinos Lighthouse
- ◆ Monarch Butterfly Sanctuary

### ***Special/Unique Resources***

The following facilities are special or unique resources within the study area to be protected:

- ◆ Middlebury Institute of International Studies
- ◆ Naval Postgraduate School
- ◆ Monterey Bay Aquarium
- ◆ Monterey County Fairgrounds
- ◆ Fleet Numerical Meteorology and Oceanographic Center
- ◆ National Weather Service Monterey

#### **A.1.5 Hazard Identification**

Citygate utilized prior risk studies where available, fire and non-fire hazards as identified by the CFAI, and agency/jurisdiction-specific data and information to identify the hazards to be evaluated



for this study. The 2016 Monterey County MJHMP identified and analyzed the following 12 hazards with potential to impact the County.<sup>27</sup>

1. Agricultural Emergencies
2. Coastal Erosion
3. Dam Failure
4. Drought
5. Earthquake
6. Flood
7. Hazardous Materials Release/Spill
8. Landslide
9. Sea Level Rise
10. Tsunami
11. Wildland Fire
12. Windstorm

Although the Fire Department has no legal authority nor responsibility to mitigate any of these hazards other than possibly for wildfire, it does provide services related to each hazard, including fire suppression, emergency medical services, technical rescue, and hazardous materials response.

The CFAI groups hazards into fire and non-fire categories, as shown in the following table. Identification, qualification, and quantification of the various fire and non-fire hazards are important factors in evaluating how resources are or can be deployed to mitigate those risks.

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<sup>27</sup> 2016 Monterey County Multi-Jurisdictional Hazard Mitigation Plan, Table 4–1

**Figure A-2—Commission on Fire Accreditation International Hazard Categories**

Fire	EMS	Hazardous Materials	Technical Rescue	Disasters
One and Two Family Residential Structures	Medical Emergencies	Transportation	Confined Space	Natural
Multi-Family Structures			Swift-Water Rescue	
Commercial Structures	Motor Vehicle Accidents	Fixed Facilities	High and Low Angle	
Mobile Property	Other		Structural Collapse and Trench Rescue	
Wildland				

Source: CFAI *Standards of Cover* (Fifth Edition).

Subsequent to review and evaluation of the hazards identified in the County MJHMP and the fire and non-fire hazards as identified by the CFAI as they relate to services provided by the Department, Citygate evaluated the following seven hazards for this risk assessment:

1. Building fire
2. Vegetation/wildland fire
3. Medical emergency
4. Hazardous material release/spill
5. Technical rescue
6. Marine incident
7. Aircraft incident

### **A.1.6 Service Capacity**

Service capacity refers to the Department’s available response force; the size, types, and condition of its response fleet and any specialized equipment; core and specialized performance capabilities and competencies; resource distribution and concentration; availability of automatic or mutual aid; and any other agency-specific factors influencing its ability to meet current and prospective future service demand relative to the risks to be protected.

Response personnel work a 48/96-hour shift schedule of two consecutive 24-hour days on duty, followed by four days off duty. The Department provides services with six engines, one aerial ladder truck, one aircraft rescue firefighting (ARFF) apparatus, and one Division Chief. Minimum daily staffing also includes one paramedic ambulance that primarily serves just the City of Carmel-by-the-Sea, but also provides mutual aid outside the City as requested by American Medical Response (AMR), the Monterey County Exclusive Operating Area ambulance contractor. The Department also has a fire boat moored at the Coast Guard Pier and a Type-3 wildland engine at Station 13 that are cross-staffed by designated station personnel as needed.

All response personnel are trained to either the emergency medical technician (EMT) level, capable of providing Basic Life Support (BLS) pre-hospital emergency medical care, or EMT-Paramedic (Paramedic) level, capable of providing Advanced Life Support (ALS) pre-hospital emergency medical care. Engines 11 and 13 are staffed with one paramedic each, and the remainder of the staffed resources provide BLS-level EMS care. Ground ambulance services are provided by the Carmel ambulance in the City of Carmel-by-the-Sea and by AMR throughout the remainder of the service area. Air ambulance services, when needed, are provided by REACH/CALSTAR from Gilroy, Stanford Life Flight from Palo Alto, or the California Highway Patrol. Community Hospital of the Monterey Peninsula (CHOMP) in Monterey provides emergency room services, and Natividad Medical Center in Salinas is a Level II trauma center.

Response personnel are also trained to the U.S. Department of Transportation Hazardous Material First Responder Operational (FRO) level to provide initial hazardous material incident assessment, hazard isolation, and decontamination support for the Monterey County Regional Hazardous Material Response Team jointly operated by the Salinas and Seaside Fire Departments.

All response personnel are further trained in Confined Space Awareness. The Department also has 11 personnel trained to the Rescue Systems 1 and Rescue Systems 2 levels who are members of the Monterey County Regional Urban Search and Rescue (USAR) Team jointly operated by the City of Monterey Fire Department and the Monterey County Regional and North Monterey County Fire Districts.

The Department has automatic mutual aid agreements with the City of Seaside, Pebble Beach Community Services District, Cypress Fire District, and the Presidio of Monterey, and is also a signatory to the Monterey County Fire Mutual Aid Plan and California Master Mutual Aid

Agreement. The City of Seaside Fire Department provides the fourth engine for ERF responses into Stations 13 and 16 response areas; the Presidio of Monterey Fire Department engine assigned to the Defense Language Institute provides the fourth engine for ERF responses into the Station 12 response area; and the Pebble Beach Community Services District/Cypress Fire District provides the fourth engine for ERF responses into Stations 11, 14, and 15 response areas.

### **A.1.7 Probability of Occurrence**

*Probability of occurrence* refers to the probability of a future hazard occurrence during a specific period. Because the CFAI agency accreditation process requires annual review of an agency’s risk assessment and baseline performance measures, Citygate recommends using the 12 months following completion of an SOC study as an appropriate period for the probability of occurrence evaluation. The following table describes the five probability of occurrence categories and related characteristics used for this analysis.

**Table A-10—Probability of Occurrence Categories**

Probability	General Characteristics	Expected Frequency of Occurrence
<b>Rare</b>	<ul style="list-style-type: none"> <li>• Hazard <b>may occur</b> under exceptional circumstances.</li> </ul>	25+ years
<b>Unlikely</b>	<ul style="list-style-type: none"> <li>• Hazard <b>could occur</b> at some time.</li> <li>• No recorded or anecdotal evidence of occurrence.</li> <li>• Little opportunity, reason, or means for hazard to occur.</li> </ul>	5–24 years
<b>Possible</b>	<ul style="list-style-type: none"> <li>• Hazard <b>should occur</b> at some time.</li> <li>• Infrequent, random recorded or anecdotal evidence of occurrence.</li> <li>• Some opportunity, reason, or means for hazard to occur.</li> </ul>	1–4 years
<b>Probable</b>	<ul style="list-style-type: none"> <li>• Hazard will <b>probably occur</b> occasionally.</li> <li>• Regular recorded or strong anecdotal evidence of occurrence.</li> <li>• Considerable opportunity, reason, or means for hazard to occur.</li> </ul>	1–12 months
<b>Frequent</b>	<ul style="list-style-type: none"> <li>• Hazard is <b>expected to occur</b> regularly.</li> <li>• High level of recorded or anecdotal evidence of regular occurrence.</li> <li>• Strong opportunity, reason, or means for hazard to occur.</li> <li>• Frequent hazard recurrence.</li> </ul>	1–4 weeks

Citygate’s SOC assessments use recent multiple-year hazard response data to determine the probability of hazard occurrence for the ensuing 12-month period.

### **A.1.8 Impact Severity**

Impact severity refers to the extent a hazard occurrence impacts people, buildings, lifeline services, the environment, and the community as a whole. The following table summarizes the five impact severity categories and related general criteria used for this analysis.

**Table A-11—Impact Severity Categories**

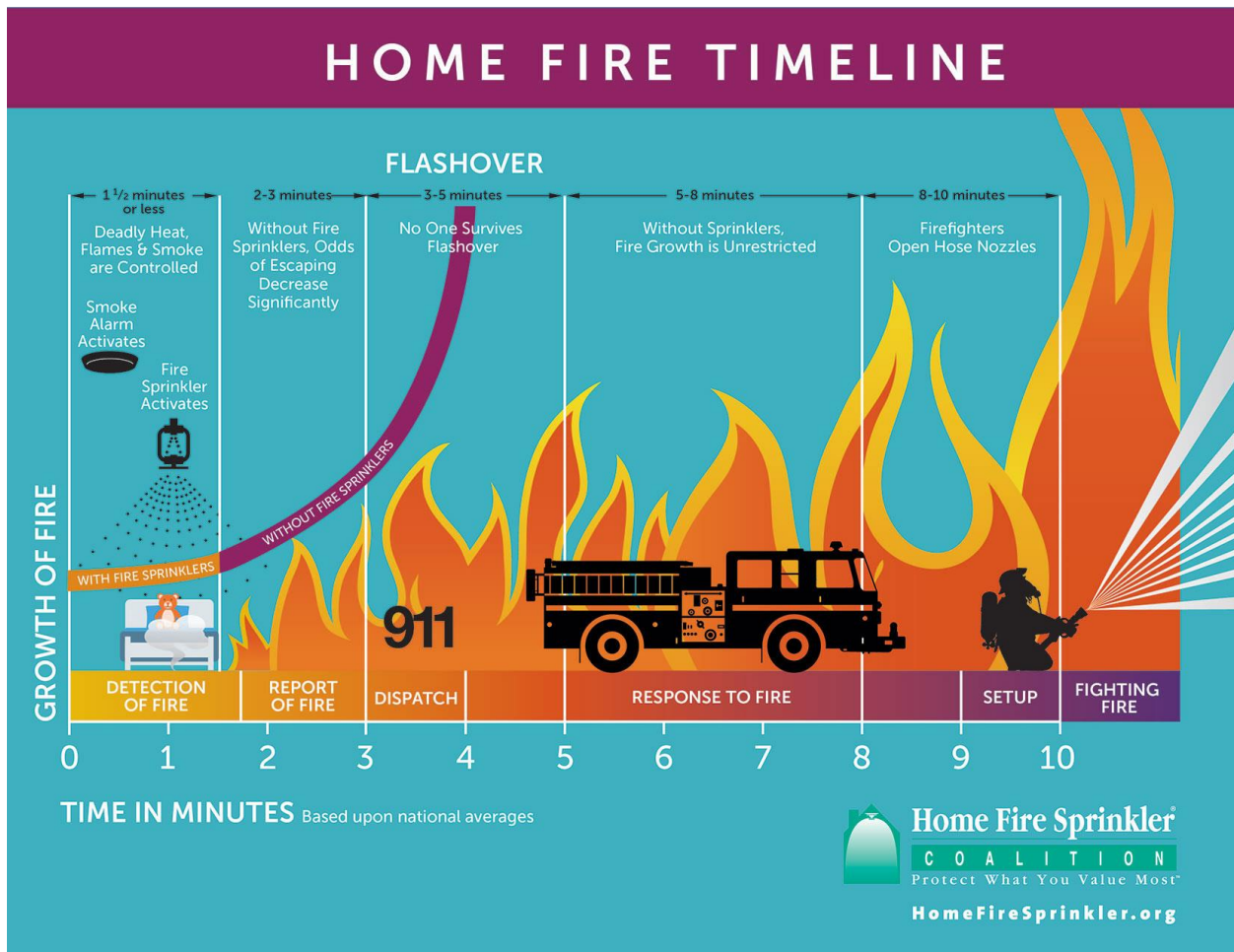
Impact Severity Category	Characteristics
<b>Insignificant</b>	<ul style="list-style-type: none"> <li>• No injuries or fatalities</li> <li>• None to few persons displaced for short duration</li> <li>• Little or no personal support required</li> <li>• None to inconsequential damage</li> <li>• None to minimal community disruption</li> <li>• No measurable environmental impacts</li> <li>• None to minimal financial loss</li> <li>• No wildland Fire Hazard Severity Zones (FHSZ)</li> </ul>
<b>Minor</b>	<ul style="list-style-type: none"> <li>• Few injuries; no fatalities; minor medical treatment only</li> <li>• Some displacement of persons for less than 24 hours</li> <li>• Some personal support required</li> <li>• Some minor damage</li> <li>• Minor community disruption of short duration</li> <li>• Small environmental impacts with no lasting effects</li> <li>• Minor financial loss</li> <li>• No wildland Fire Hazard Severity Zones</li> </ul>
<b>Moderate</b>	<ul style="list-style-type: none"> <li>• Medical treatment required; some hospitalizations; few fatalities</li> <li>• Localized displacement of persons for fewer than 24 hours</li> <li>• Personal support satisfied with local resources</li> <li>• Localized damage</li> <li>• Normal community functioning with some inconvenience</li> <li>• No measurable environmental impacts with no long-term effects, or small impacts with long-term effect</li> <li>• Moderate financial loss</li> <li>• Less than 25% of area in <i>Moderate</i> or <i>High</i> wildland FHSZ</li> </ul>
<b>Major</b>	<ul style="list-style-type: none"> <li>• Extensive injuries; significant hospitalizations; many fatalities</li> <li>• Large number of persons displaced for more than 24 hours</li> <li>• External resources required for personal support</li> <li>• Significant damage</li> <li>• Significant community disruption; some services not available</li> <li>• Some impact to environment with long-term effects</li> <li>• Major financial loss with some financial assistance required</li> <li>• More than 25% of area in <i>Moderate</i> or <i>High</i> wildland FHSZ; less than 25% in <i>Very High</i> wildland FHSZ</li> </ul>
<b>Catastrophic</b>	<ul style="list-style-type: none"> <li>• Large number of severe injuries requiring hospitalization; significant fatalities</li> <li>• General displacement for extended duration</li> <li>• Extensive personal support required</li> <li>• Extensive damage</li> <li>• Community unable to function without significant external support</li> <li>• Significant impact to environment and/or permanent damage</li> <li>• Catastrophic financial loss; unable to function without significant support</li> <li>• More than 50% of area in <i>High</i> wildland FHSZ; more than 25% of area in <i>Very High</i> wildland FHSZ</li> </ul>

### A.1.9 Building Fire Risk

One of the primary hazards in any community is building fire. Building fire risk factors include building size, age, construction type, density, occupancy, number of stories above ground level, required fire flow, proximity to other buildings, built-in fire protection/alarm systems, available fire suppression water supply, building fire service capacity, fire suppression resource deployment (distribution/concentration), staffing, and response time. Citygate used available data from the Department and the U.S. Census Bureau to assist in determining the cities' building fire risk.

The following figure illustrates the building fire progression timeline and shows that flashover, which is the point at which the entire room erupts into fire after all the combustible objects in that room reach their ignition temperature, can occur as early as three to five minutes from the initial ignition. Human survival in a room after flashover is extremely improbable.

**Figure A-3—Building Fire Progression Timeline**



Source: <http://www.firesprinklerassoc.org>.

### ***Population Density***

Population density within the four cities ranges from fewer than 1,000 to more than 10,000 people per square mile.<sup>28</sup> Although risk analysis across a wide spectrum of other Citygate clients shows no direct correlation between population density and building fire *occurrence*, it is reasonable to conclude that building fire *risk* relative to potential impact on human life is greater as population density increases, particularly in areas with high density, multiple-story buildings.

### ***Water Supply***

A reliable public water system providing adequate volume, pressure, and flow duration in close proximity to all buildings is a critical factor in mitigating the potential impact severity of a community’s building fire risk. Potable water is provided by the California American Water Company, and according to Fire Department staff, firefighting water supply is sufficient throughout the service area except in the following areas:

- ◆ Downtown Carmel-by-the-Sea
- ◆ Beach tract area of Pacific Grove
- ◆ Upper portions of New Monterey

### ***Building Fire Service Demand***

For the three-year study period from January 1, 2018, through December 31, 2020, the Department responded to 179 building fire incidents, comprising 0.70 percent of total service demand over the same period, as summarized in the following table.

**Table A-12—Building Fire Service Demand**

Hazard	Year	Planning Zone						Total	Percent of Total Service Demand
		Station 11	Station 12	Station 13	Station 14	Station 15	Station 16		
Building Fire	2018	25	5	17	11	14	5	<b>77</b>	0.89%
	2019	15	4	16	9	10	6	<b>60</b>	0.65%
	2020	12	0	11	5	10	4	<b>42</b>	0.54%
<b>Total</b>		<b>52</b>	<b>9</b>	<b>44</b>	<b>25</b>	<b>34</b>	<b>15</b>	<b>179</b>	<b>0.70%</b>
Percent of Total Service Demand		0.50%	0.30%	1.19%	0.50%	1.29%	1.73%	<b>0.70%</b>	

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<sup>28</sup> Source: Esri Community Analyst 2020 Daytime Population Density

As the previous table shows, building fire service demand decreased 22 percent from 2018 to 2019, and decreased 30 percent from 2019 to 2020. In addition, building fire incidents in Monterey exceeded the number of building fires in the other three cities combined. Overall, building fire service demand is very low, comprising less than one percent of all calls for service, which is similar to other California jurisdictions of similar size and demographics.

***Building Fire Risk Assessment***

The following table summarizes Citygate’s assessment of the Department’s building fire risk by planning zone.

**Table A-13—Building Fire Risk Assessment**

Building Fire Risk	Planning Zone					
	Station 11	Station 12	Station 13	Station 14	Station 15	Station 16
Probability of Occurrence	<i>Frequent</i>	<i>Probable</i>	<i>Frequent</i>	<i>Probable</i>	<i>Probable</i>	<i>Probable</i>
Probable Impact Severity	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>
<b>Overall Risk</b>	<b><i>High</i></b>	<b><i>Moderate</i></b>	<b><i>High</i></b>	<b><i>Moderate</i></b>	<b><i>Moderate</i></b>	<b><i>Moderate</i></b>

**A.1.10 Vegetation/Wildland Fire Risk**

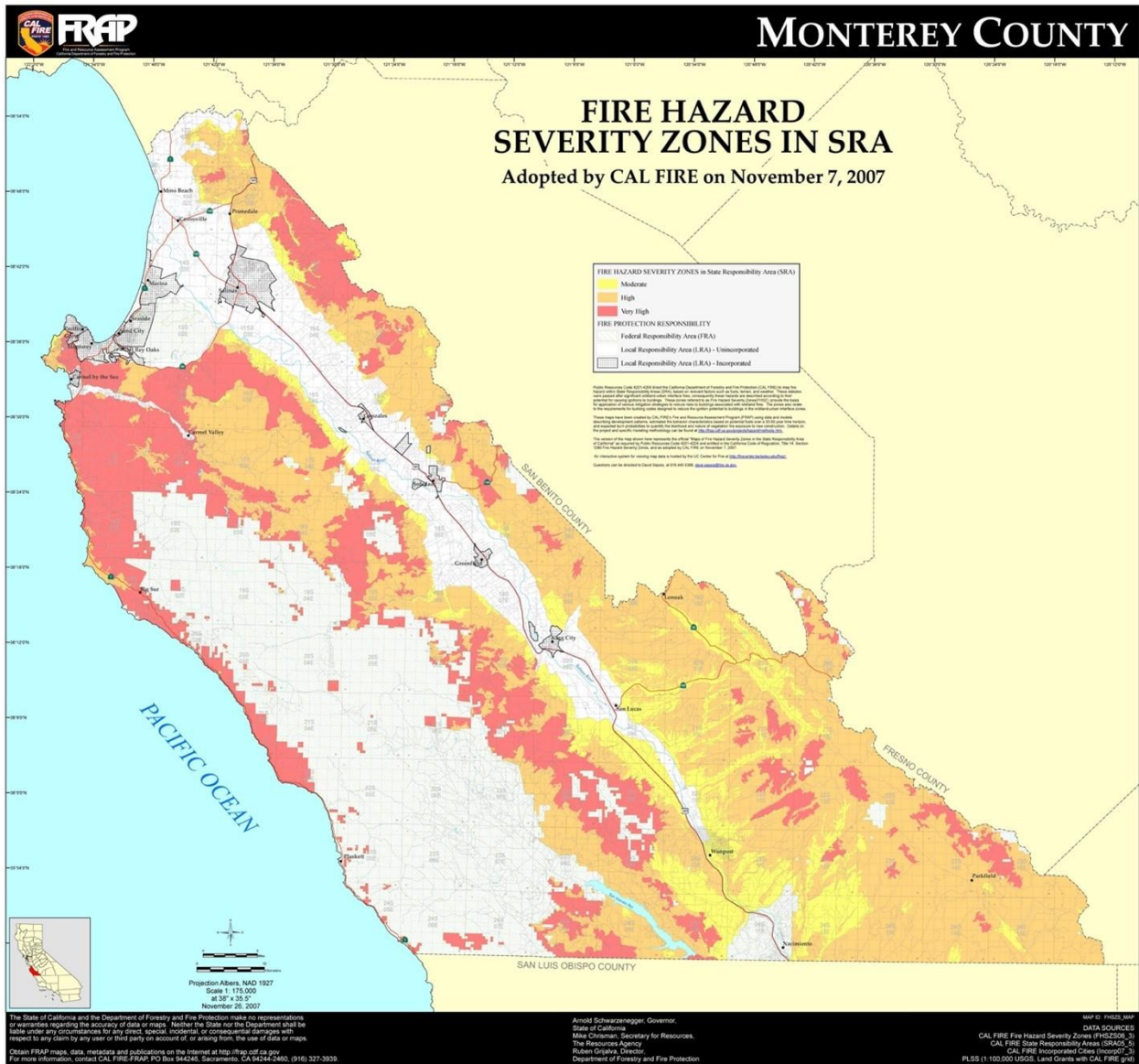
Many areas within and adjacent to the Department’s service area are susceptible to a vegetation/wildland fire. Vegetation/wildland fire risk factors include vegetative fuel types and configuration, weather, topography, prior fires, water supply, mitigation measures, and vegetation fire service capacity.

***Wildland Fire Hazard Severity Zones***

CAL FIRE designates wildland Fire Hazard Severity Zones (FHSZ) throughout the state based on analysis of multiple wildland fire hazard factors and modeling of potential wildland fire behavior. For State Responsibility Areas (SRAs) where CAL FIRE has fiscal responsibility for wildland fire protection, CAL FIRE designates ***Moderate***, ***High***, and ***Very High*** FHSZs by county as shown in yellow, orange, and red, respectively, in the following map for Monterey County. Note the ***High*** and ***Very High*** zones between Monterey and Carmel-by-the-Sea.

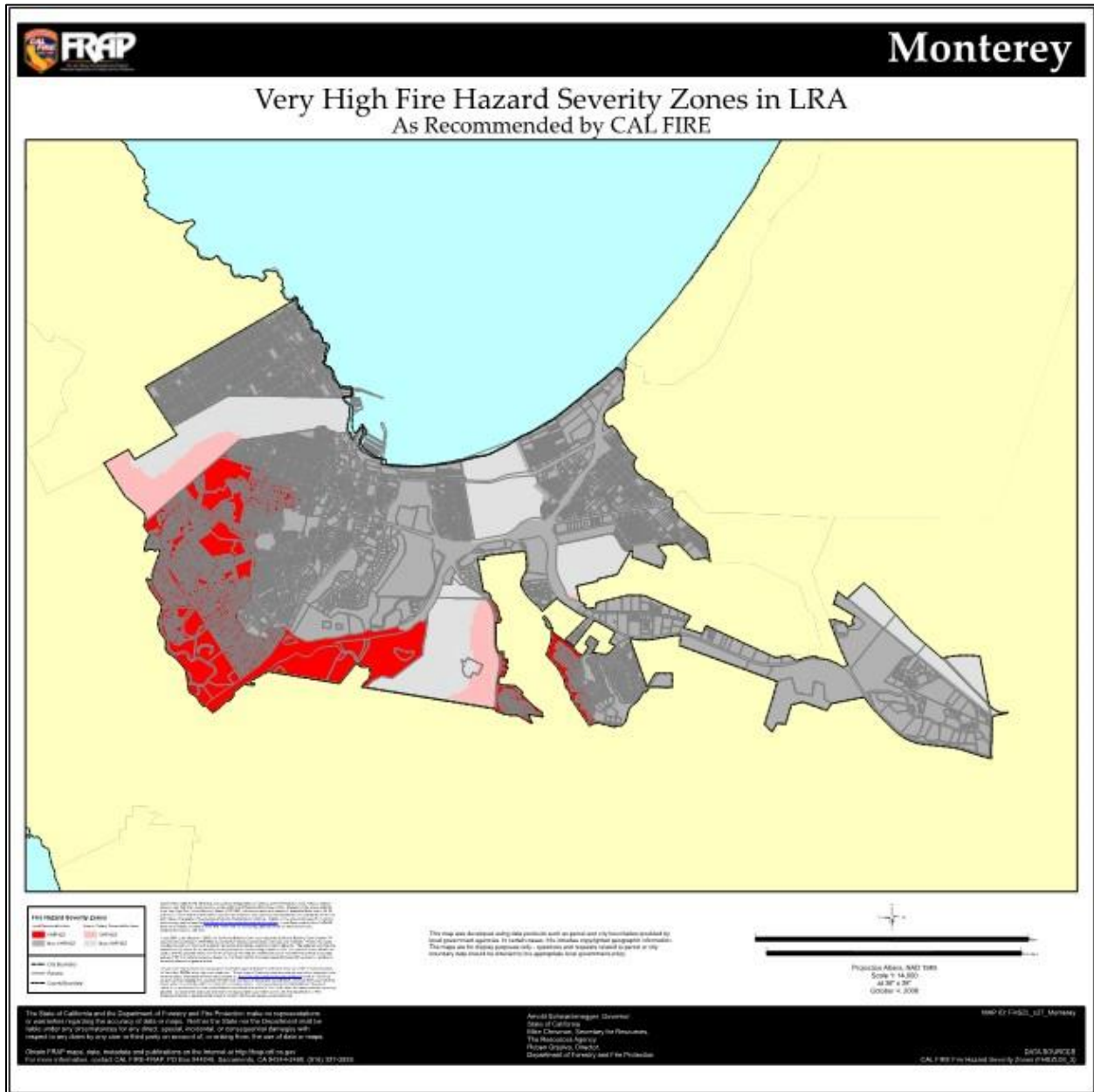


**Figure A-4—Wildland Fire Hazard Severity Zones in SRA – Monterey County**

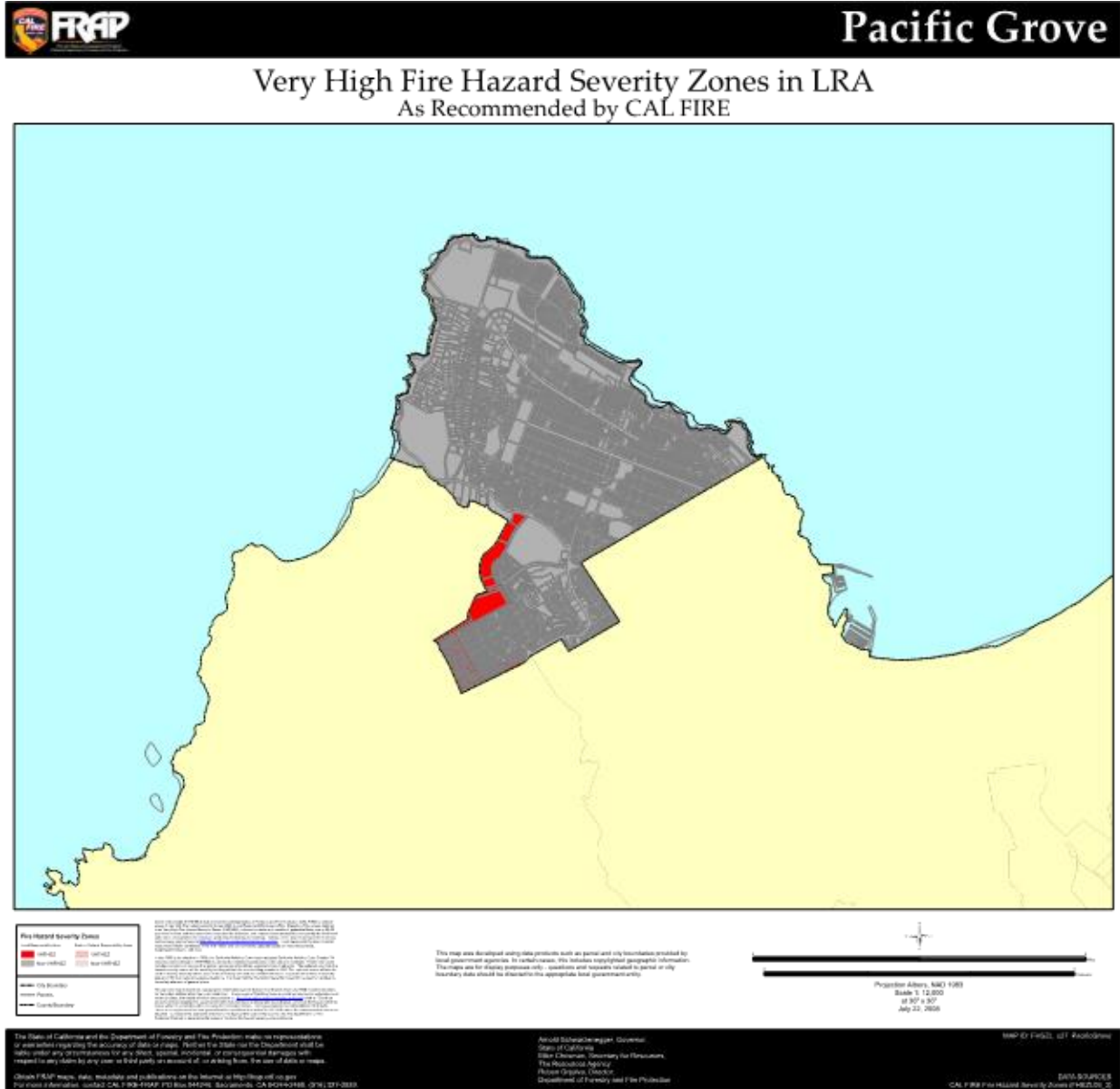


CAL FIRE also identifies recommended **Very High** FHSZs for Local Responsibility Areas (LRAs) where the local jurisdiction is responsible for wildland fire protection, including incorporated cities, as shown in red in the following maps for Monterey, Pacific Grove, and Carmel-by-the-Sea.

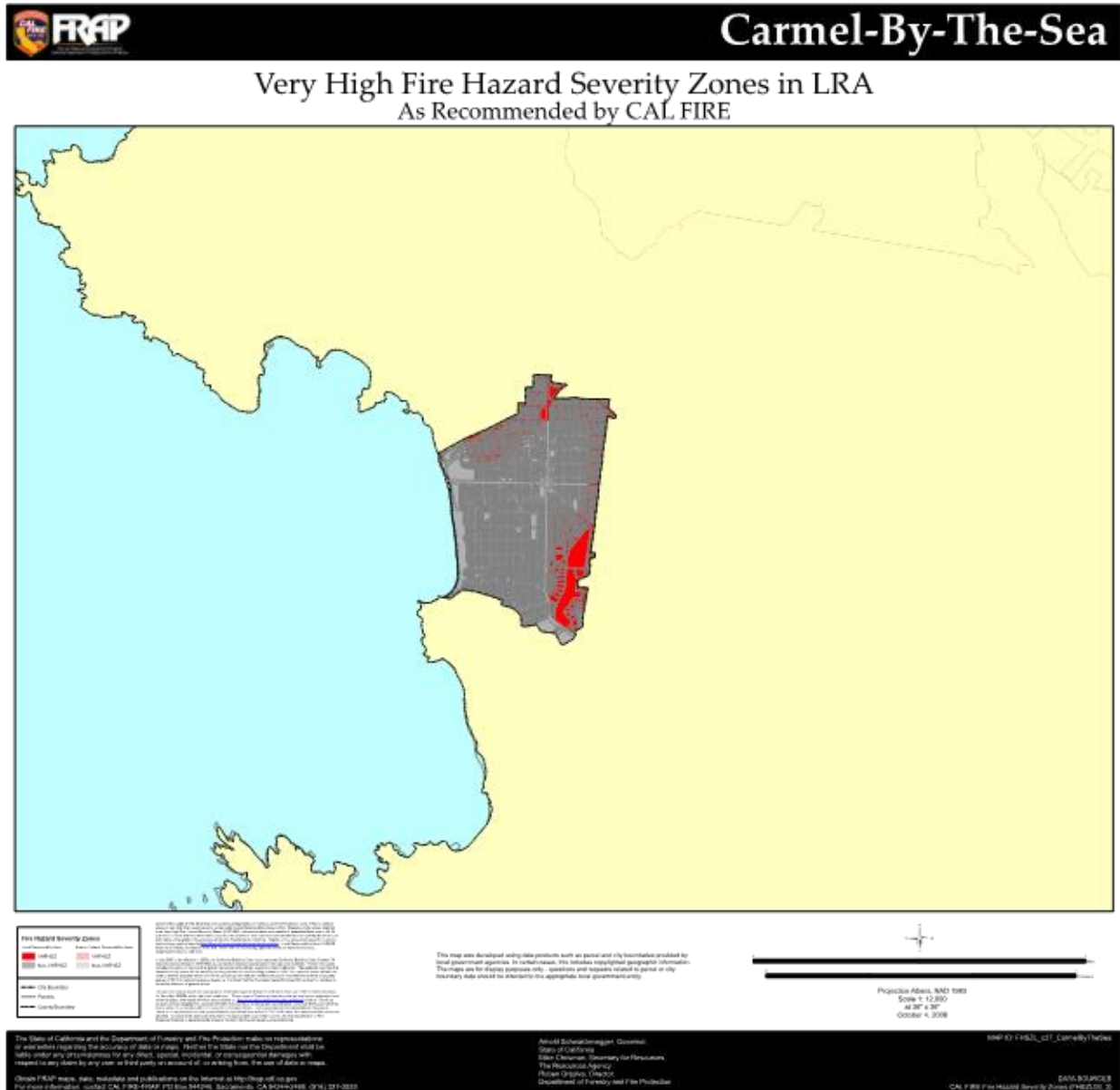
**Figure A-5—Very High Wildland Fire Hazard Severity Zones in LRA – Monterey**



**Figure A-6—Very High Wildland Fire Hazard Severity Zones in LRA – Pacific Grove**



**Figure A-7—Very High Wildland Fire Hazard Severity Zones in LRA – Carmel-by-the-Sea**



**Vegetative Fuels**

Vegetative fuel factors influencing fire intensity and spread include fuel type (vegetation species), height, arrangement, density, and moisture. In addition to decorative landscape species, vegetative fuels within the Department’s service area consist of a mix of annual grasses and weeds, brush, and deciduous and evergreen tree species including cypress, pine, and eucalyptus. Once ignited, vegetation fires can burn intensely and contribute to rapid fire spread under the right fuel, weather, and topographic conditions.

### ***Weather***

Weather elements including temperature, relative humidity, wind, and lightning, also affect vegetation/wildland fire potential and behavior. High temperatures and low relative humidity dry out vegetative fuels, creating a situation where fuels will more readily ignite and burn more intensely. Wind is the most significant weather factor influencing vegetation/wildland fire behavior, with higher wind speeds increasing fire spread and intensity. Fuel and weather conditions most conducive to vegetation/wildland fires occur generally from approximately mid-April through October in Monterey County.

### ***Topography***

Vegetation/wildland fires tend to burn more intensely and spread faster when burning uphill and up-canyon, except for a wind-driven downhill or down-canyon fire. Many sections of the studied service area have hilly terrain that contributes to vegetation/wildland fire behavior and spread.

### ***Water Supply***

Another significant vegetation fire impact severity factor is water supply immediately available for fire suppression. According to Department staff, available fire flow is adequate throughout the service area except for in downtown Carmel-by-the-Sea, the beach tract area of Pacific Grove, and upper portions of New Monterey.

### ***Vegetation/Wildland Fire Hazard Mitigation***

Hazard mitigation refers to specific actions or measures taken to prevent a hazard from occurring or to minimize the severity of impacts resulting from a hazard occurrence. While none of the hazards subject to this study can be entirely prevented, measures *can* be taken to minimize the impacts when those hazards do occur. In addition to requiring fire-resistive construction materials and methods in High Fire Hazard Zones, the cities investigate all fire hazard complaints and take appropriate actions as authorized by City ordinances and regulations to eliminate or mitigate identified fire hazards. The cities also perform ongoing annual fuel reduction in greenbelts and open spaces and the Department conducts annual defensible space inspections.

### ***Vegetation/Wildland Fire Service Demand***

The Department responded to 114 vegetation fires over the three-year study period, comprising 0.44 percent of total service demand over the same period as summarized in the following table.

**Table A-14—Vegetation/Wildland Fire Service Demand**

Hazard	Year	Planning Zone						Total	Percent of Total Service Demand
		Station 11	Station 12	Station. 13	Station. 14	Station 15	Station. 16		
Vegetation/Wildland Fire	2018	10	1	20	5	0	0	36	0.42%
	2019	12	0	8	2	2	2	26	0.28%
	2020	23	1	21	2	4	1	52	0.67%
<b>Total</b>		<b>45</b>	<b>2</b>	<b>49</b>	<b>9</b>	<b>6</b>	<b>3</b>	<b>114</b>	<b>0.44%</b>
Percent of Total Service Demand		0.43%	0.07%	1.32%	0.18%	0.23%	0.35%	<b>0.44%</b>	

***Vegetation/Wildland Fire Risk Assessment***

The following table summarizes Citygate’s assessment of the Department’s vegetation/wildland fire risk by planning zone.

**Table A-15—Vegetation/Wildland Fire Risk Assessment**

Vegetation/Wildland Fire Risk	Planning Zone					
	Station 11	Station 12	Station 13	Station 14	Station 15	Station 16
Probability of Occurrence	<i>Probable</i>	<i>Possible</i>	<i>Probable</i>	<i>Probable</i>	<i>Probable</i>	<i>Possible</i>
Probable Impact Severity	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>
<b>Overall Risk</b>	<b><i>Moderate</i></b>	<b><i>Moderate</i></b>	<b><i>Moderate</i></b>	<b><i>Moderate</i></b>	<b><i>Moderate</i></b>	<b><i>Moderate</i></b>

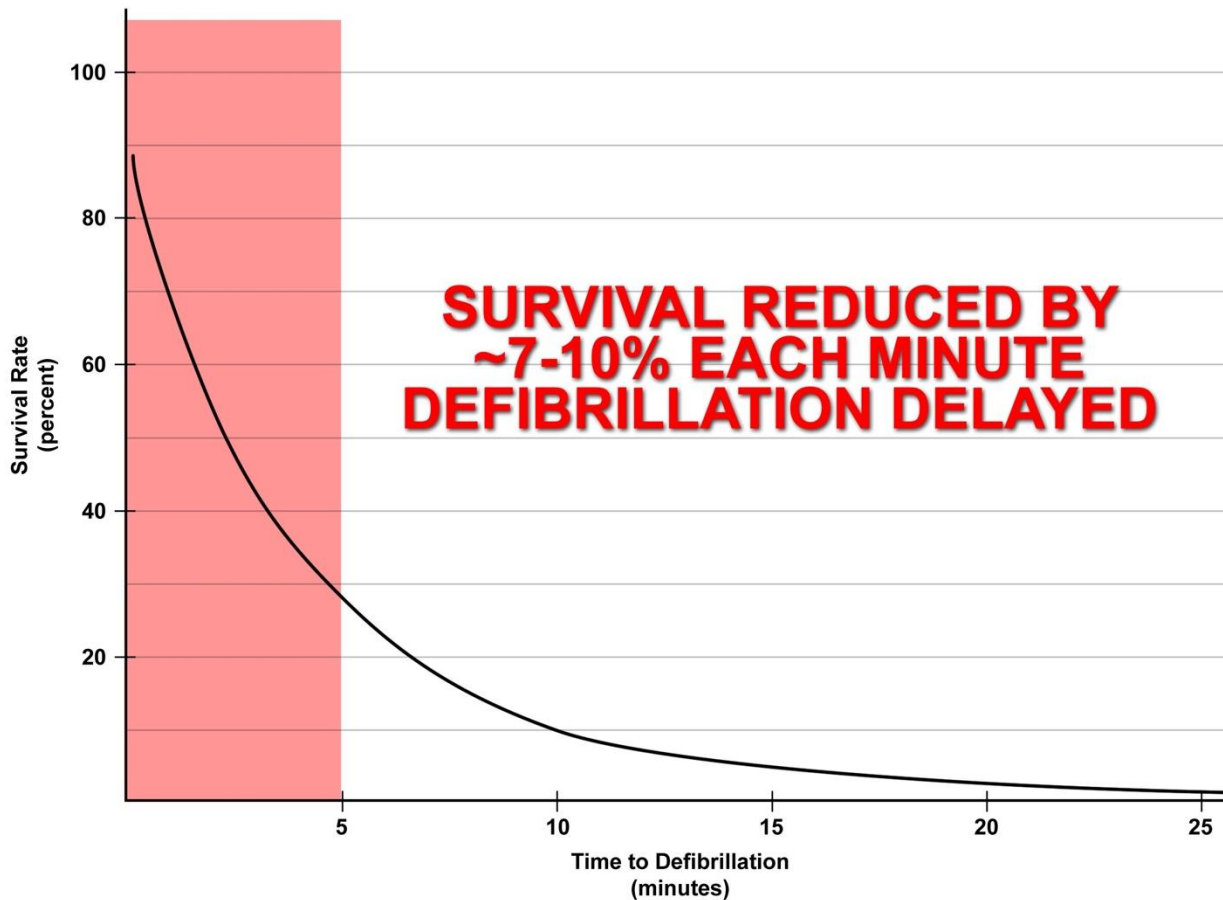
**A.1.11 Medical Emergency Risk**

Medical emergency risk in most communities is predominantly a function of population density, demographics, violence, health insurance coverage, and vehicle traffic.

Medical emergency risk can also be categorized as either a medical emergency resulting from a traumatic injury or a health-related condition or event. Cardiac arrest is one serious medical emergency among many where there is an interruption or blockage of oxygen to the brain.

The following figure illustrates the reduced survivability of a cardiac arrest victim as time to defibrillation increases. While early defibrillation is one factor in cardiac arrest survivability, other factors can influence survivability as well, such as early CPR and pre-hospital advanced life support interventions.

**Figure A-8—Survival Rate Versus Time to Defibrillation**



Source: [www.suddencardiacarrest.org](http://www.suddencardiacarrest.org).

### **Population Density**

Population density within the four cities ranges from fewer than 1,000 to more than 10,000 people per square mile as shown in Map #2a Population Density by Block Group (**Volume 2—Map Atlas**). Risk analysis across a wide spectrum of other Citygate clients shows a direct correlation between population density and the *occurrence* of medical emergencies, particularly in high urban population density zones.

### **Demographics**

Medical emergency risk tends to be higher among older, poorer, less educated, and uninsured populations. As shown in Tables A-3 through A-6, over 24 percent of the service area population is 65 and older, only about five percent of the population over 24 years of age has less than a high

school education or equivalent, just under nine percent of the population is at or below poverty level, and less than four percent of the population does not have health insurance coverage.<sup>29</sup>

***Vehicle Traffic***

Medical emergency risk tends to be higher in areas of a community with high daily vehicle traffic volume, particularly areas with high traffic volume traveling at high speeds. The service area transportation network includes State Routes 1, 68, and 218 carrying an aggregate annual average daily traffic volume of more than 108,000 vehicles, with a peak-hour load of more than 11,000 vehicles.<sup>30</sup>

***Medical Emergency Service Demand***

Medical emergency service demand over the three-year study period includes more than 14,000 calls for service, comprising slightly more than 55 percent of total service demand over the same period as summarized in the following table.

**Table A-16—Medical Emergency Service Demand**

Hazard	Year	Planning Zone						Total	Percent of Total Service Demand
		Station 11	Station 12	Station 13	Station 14	Station 15	Station 16		
Medical Emergency	2018	2,318	644	708	948	403	159	<b>5,180</b>	60.05%
	2019	2,261	657	585	777	402	159	<b>4,841</b>	52.24%
	2020	1,898	471	581	768	261	128	<b>4,107</b>	52.94%
<b>Total</b>		<b>6,477</b>	<b>1,772</b>	<b>1,874</b>	<b>2,493</b>	<b>1,066</b>	<b>446</b>	<b>14,128</b>	<b>55.08%</b>
Percent of Total Service Demand		62.25%	58.10%	50.65%	49.92%	40.47%	51.38%	<b>55.08%</b>	

As the previous table shows, medical emergency service demand varies significantly by planning zone and has decreased nearly 21 percent over the three-year study period. Overall, the Department’s medical emergency service demand is typical of other jurisdictions with similar demographics.

***Medical Emergency Risk Assessment***

The following table summarizes Citygate’s assessment of medical emergency risk by planning zone.

<sup>29</sup> Source: Esri Community Analyst Community Profile (2020) and U. S. Census Bureau.

<sup>30</sup> Source: California Department of Transportation (2019).



**Table A-17—Medical Emergency Risk Assessment**

Medical Emergency Risk	Planning Zone					
	Station 11	Station 12	Station 13	Station 14	Station 15	Station 16
Probability of Occurrence	<i>Frequent</i>	<i>Frequent</i>	<i>Frequent</i>	<i>Frequent</i>	<i>Frequent</i>	<i>Frequent</i>
Probable Impact Severity	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>
<b>Overall Risk</b>	<b>High</b>	<b>High</b>	<b>High</b>	<b>High</b>	<b>High</b>	<b>High</b>

### A.1.12 Hazardous Material Risk

Hazardous material risk factors include fixed facilities that store, use, or produce hazardous chemicals or waste; underground pipelines conveying hazardous materials; aviation, railroad, maritime, and vehicle transportation of hazardous commodities into or through a jurisdiction; vulnerable populations; emergency evacuation planning and related training; and specialized hazardous material service capacity.

#### *Fixed Hazardous Materials Facilities*

No data was made available regarding occupancies or facilities requiring a state or county hazardous material operating permit or a Hazardous Materials Business Plan.

#### *Transportation-Related Hazardous Materials*

The service area also has transportation-related hazardous material risk because of its road transportation network, including State Routes 1, 68, and 218 with heavy daily truck traffic volume, many carrying hazardous commodities, as summarized in the following table.

**Table A-18—Average Annual Daily Truck Traffic**

Highway	Crossing	AADT <sup>1</sup>	Truck AADT by Axles				Percentage of Truck AADT by Axles			
			2	3	4	5+	2	3	4	5+
<b>SR-1</b>	SR-68	4,230	2,707	931	337	255	64.00%	22.01%	7.97%	6.03%
<b>SR-68</b>	Asilomar	160	131	22	3	4	81.88%	13.75%	1.88%	2.50%
<b>SR-218</b>	SR-68	1,575	988	164	218	205	62.73%	10.41%	13.84%	13.02%
<b>Total</b>		<b>5,965</b>	<b>3,826</b>	<b>1,117</b>	<b>558</b>	<b>464</b>	<b>64.14%</b>	<b>18.73%</b>	<b>9.35%</b>	<b>7.78%</b>

<sup>1</sup> Average Annual Daily Trips  
Source: California Department of Transportation (2018)

### ***Population Density***

Because hazardous material emergencies have the potential to adversely impact human health, it is logical that the higher the population density, the greater the potential population exposed to a hazardous material release or spill. As shown in Map #2a Population Density by Block Group (**Volume 2—Map Atlas**), the population density within the four cities ranges from fewer than 1,000 to more than 10,000 people per square mile.

### ***Vulnerable Populations***

Persons vulnerable to a hazardous material release/spill include individuals or groups unable to self-evacuate, generally including children under the age of 10, the elderly, and persons confined to an institution or other setting where they are unable to leave voluntarily. As shown in Tables A-3 through A-6, approximately 32 percent of the service area population is under age 10 or is 65 years and older.

### ***Emergency Evacuation Planning, Training, Implementation, and Effectiveness***

Another significant hazardous material impact severity factor is a jurisdiction's shelter-in-place / emergency evacuation planning and training. In the event of a hazardous material release or spill, time can be a critical factor in notifying potentially affected persons, particularly at-risk populations, to either shelter-in-place or evacuate to a safe location. Essential to this process is an effective emergency plan that incorporates one or more mass emergency notification capabilities, as well as pre-established evacuation procedures. It is also essential to conduct regular, periodic exercises involving these two emergency plan elements to evaluate readiness and to identify and remediate any planning or training gaps to ensure ongoing emergency incident readiness and effectiveness.

Although the cities do not have a formal emergency evacuation plan, they all participate in Alert Monterey County, a free subscription and reverse 9-1-1-based mass emergency notification system that can provide emergency alerts, notifications, and other emergency information to email accounts, cell phones, smartphones, tablets, and landline telephones. The County also utilizes Nixle, social media, the Integrated Public Alert & Warning System (IPAWS), Wireless Emergency Alerts (WEA), the Emergency Alert System (EAS), and the National Weather and Atmospheric Administration (NOAA) Weather Radio to provide timely emergency information and alerts. Within the service area, emergency notifications can be initiated by designated Fire or Police Department personnel. The City of Monterey also conducts regular Emergency Operations Center training.

***Hazardous Material Service Demand***

The Department responded to 373 hazardous material incidents over the three-year study period, comprising just over one percent of total service demand over the same period as summarized in the following table.

**Table A-19—Hazardous Material Service Demand**

Hazard	Year	Planning Zone						Total	Percent of Total Service Demand
		Station 11	Station 12	Station 13	Station 14	Station 15	Station 16		
Hazardous Material	2018	52	20	19	25	23	5	144	1.67%
	2019	38	20	16	29	20	8	131	1.41%
	2020	30	10	13	19	18	8	98	1.26%
<b>Total</b>		<b>120</b>	<b>50</b>	<b>48</b>	<b>73</b>	<b>61</b>	<b>21</b>	<b>373</b>	<b>1.45%</b>
Percent of Total Service Demand		1.15%	1.64%	1.30%	1.46%	2.32%	2.42%	<b>1.45%</b>	

As the table shows, hazardous material service demand varies by planning zone and decreased nearly 32 percent over the three-year study period.

***Hazardous Materials Risk Assessment***

The following table summarizes Citygate’s assessment of hazardous materials risk by planning zone.

**Table A-20—Hazardous Materials Risk Assessment**

Hazardous Materials Risk	Planning Zone					
	Station 11	Station 12	Station 13	Station 14	Station 15	Station 16
Probability of Occurrence	<i>Frequent</i>	<i>Frequent</i>	<i>Frequent</i>	<i>Frequent</i>	<i>Frequent</i>	<i>Probable</i>
Probable Impact Severity	<i>Minor</i>	<i>Minor</i>	<i>Minor</i>	<i>Minor</i>	<i>Minor</i>	<i>Minor</i>
<b>Overall Risk</b>	<b>Moderate</b>	<b>Moderate</b>	<b>Moderate</b>	<b>Moderate</b>	<b>Moderate</b>	<b>Low</b>

**A.1.13 Technical Rescue Risk**

Technical rescue risk factors include active construction projects; structural collapse potential; confined spaces, such as tanks and underground vaults; bodies of water, including rivers and streams; industrial machinery use; transportation volume; and earthquake, flood, and landslide potential.

### ***Construction Activity***

There is ongoing residential, commercial, industrial, and infrastructure construction activity occurring within the Department's service area.

### ***Confined Spaces***

There are multiple confined spaces within the service area, including tanks, vaults, and open trenches.

### ***Bodies of Water***

Bodies of water within the service area include the Pacific Ocean/Monterey Bay, Carmel Bay, Lake El Estero, and multiple small ponds.

### ***Transportation Volume***

Another technical rescue risk factor is transportation-related incidents requiring technical rescue. This risk factor is primarily a function of vehicle, railway, maritime, and aviation traffic. Vehicle traffic volume is the greatest of these factors within the service area, with State Routes 1, 68, and 218 carrying an aggregate annual average daily traffic volume of more than 108,000 vehicles, with a peak-hour load of more than 11,000 vehicles.

### ***Earthquake Risk<sup>31</sup>***

Most earthquakes in Monterey County have originated along the San Andreas Fault, which runs through the southeastern section of the County. The 1989 magnitude 7.0 Loma Prieta Earthquake in Santa Cruz County resulted in 63 deaths. Since 2007, there have been 47 earthquake events in Monterey County, however none were greater than magnitude 4.4 nor resulted in any damage nor injuries. Other active faults in Monterey County include the Palo Colorado-San Gregorio fault zone and the Monterey Bay-Tularcitos fault zone.

Recent U.S. Geological Survey (USGS) research shows a 21 percent probability of a magnitude 6.7 or greater earthquake by 2032 along the San Andreas fault, and a 10 percent probability along the Palo Colorado-San Gregorio Fault. Because Monterey County experiences small earthquakes annually, the overall probability of an earthquake occurrence of some degree is high.

### ***Flood Risk<sup>32</sup>***

Two types of flooding occur in Monterey County: riverine flooding due to excessive rainfall, and coastal flooding due to wave run-up. Localized flooding can occur outside of recognized drainage channels or floodplains due to a combination of heavy local precipitation, increased surface runoff,

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<sup>31</sup> Reference: 2015 Monterey County Multi-Jurisdictional Hazard Mitigation Plan, Section 4.3.5 and appendices

<sup>32</sup> Reference: 2015 Monterey County Multi-Jurisdictional Hazard Mitigation Plan, Section 4.3.6 and appendices

and inadequate drainage facilities/conveyances. Coastal flooding is generally associated with Pacific Ocean storms from November through February that work in conjunction with high tides and strong winds to cause significant coastal flooding.

Review of the 2015 MJHMP reveals flooding risk in the service area is predominantly from wave run-up along the coastline; however, small areas of Monterey are also subject to flooding from Arroyo del Rey.

***Technical Rescue Service Demand***

Over the three-year study period, there were 170 technical rescue incidents comprising 0.66 percent of total service demand as summarized in the following table.

**Table A-21—Technical Rescue Service Demand**

Hazard	Year	Planning Zone						Total	Percent of Total Service Demand
		Station 11	Station 12	Station 13	Station 14	Station 15	Station 16		
Technical Rescue	2018	11	7	19	13	5	7	<b>62</b>	0.72%
	2019	27	15	6	19	4	5	<b>76</b>	0.82%
	2020	5	4	8	7	6	2	<b>32</b>	0.41%
<b>Total</b>		<b>43</b>	<b>26</b>	<b>33</b>	<b>39</b>	<b>15</b>	<b>14</b>	<b>170</b>	<b>0.66%</b>
Percent of Total Service Demand		0.41%	0.85%	0.89%	0.78%	0.57%	1.61%	<b>0.66%</b>	

***Technical Rescue Risk Assessment***

The following table summarizes Citygate’s assessment of technical rescue risk by planning zone.

**Table A-22—Technical Rescue Risk Assessment**

Technical Rescue Risk	Planning Zone					
	Station 11	Station 12	Station 13	Station 14	Station 15	Station 16
Probability of Occurrence	<i>Frequent</i>	<i>Probable</i>	<i>Probable</i>	<i>Frequent</i>	<i>Probable</i>	<i>Probable</i>
Probable Impact Severity	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>
<b>Overall Risk</b>	<b>High</b>	<b>Moderate</b>	<b>Moderate</b>	<b>High</b>	<b>Moderate</b>	<b>Moderate</b>

**A.1.14 Marine Incident Risk**

Marine incident risk impact severity factors include surf and near-shore recreational activity, and watercraft storage and use in District waterways.

***Waterways***

Service area waterways include the Pacific Ocean/Monterey Bay, Carmel Bay, and multiple small ponds and seasonal drainages.

***Monterey Harbor***

Monterey Harbor, owned and operated by the City of Monterey, has approximately 500 slips as well as approximately 100 additional open-water moorings. In addition to recreational vessels, Monterey Harbor is home to a significant commercial fishing fleet as well as The U.S. Coast Guard and the Monterey Bay Aquarium Research Institute.

***Recreational Activity***

Monterey Bay is very popular for near-shore water recreation activities including swimming, snorkeling, diving, fishing, surfing, paddle boarding, and hang gliding.

***Marine Incident Service Capacity***

The Department’s marine safety service capacity consists of one 34-foot aluminum fireboat powered by dual 200-HP outboard motors. The fireboat is cross-staffed as needed by the three on-duty personnel from Station 12, located approximately 0.7 miles from the boat’s slip on the Coast Guard Pier.

***Marine Incident Service Demand***

Over the three-year period evaluated for this study, the Department responded to 79 marine incidents comprising 0.31 percent of total service demand over the same period as shown in the following table.

**Table A-23—Marine Incident Service Demand**

Hazard	Year	Planning Zone						Total	Percent of Total Service Demand
		Station 11	Station 12	Station 13	Station 14	Station 15	Station 16		
Marine Incident	2018	4	2	3	13	4	0	<b>26</b>	0.30%
	2019	4	13	2	8	4	0	<b>31</b>	0.33%
	2020	1	5	3	10	3	0	<b>22</b>	0.28%
<b>Total</b>		<b>9</b>	<b>20</b>	<b>8</b>	<b>31</b>	<b>11</b>	<b>0</b>	<b>79</b>	<b>0.31%</b>
Percent of Total Service Demand		0.09%	0.66%	0.22%	0.62%	0.42%	0.00%	<b>0.31%</b>	

***Marine Incident Risk Assessment***

The following table summarizes Citygate’s assessment of marine incident risk by planning zone.

**Table A-24—Marine Incident Risk Assessment**

Marine Incident Risk	Planning Zone					
	Station 11	Station 12	Station 13	Station 14	Station 15	Station 16
Probability of Occurrence	<i>Probable</i>	<i>Probable</i>	<i>Probable</i>	<i>Probable</i>	<i>Probable</i>	<i>Rare</i>
Probable Impact Severity	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Minor</i>
<b>Overall Risk</b>	<b><i>Moderate</i></b>	<b><i>Moderate</i></b>	<b><i>Moderate</i></b>	<b><i>Moderate</i></b>	<b><i>Moderate</i></b>	<b><i>Low</i></b>

**A.1.15 Aircraft Incident Risk**

Aircraft incident risk factors include commercial or general aviation activity into, from, and over a community or jurisdiction.

The Monterey Regional Airport, located on the eastern side of the City, is a commercial and general aviation facility with two parallel runways and a staffed Federal Aviation Administration (FAA) control tower. Alaska, Allegiant, American, United, and JSX provide service for more than 400,000 passengers annually. Two Fixed Base Operators, two flight training businesses, and two charter air carriers also operate out of the Monterey Regional Airport.

***Aircraft Incident Service Demand***

Over the three-year study period, there were 14 aircraft incidents comprising just 0.05 percent of total service demand for the same period as summarized in the following table.

**Table A-25—Aircraft Incident Service Demand**

Hazard	Year	Planning Zone						Total	Percent of Total Service Demand
		Station 11	Station 12	Station 13	Station 14	Station 15	Station 16		
Aircraft Incident	2018	0	0	0	0	0	4	4	0.05%
	2019	0	0	0	0	0	3	3	0.03%
	2020	0	0	0	0	0	7	7	0.09%
<b>Total</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>14</b>	<b>14</b>	<b>0.05%</b>
Percent of Total Service Demand		0.00%	0.00%	0.00%	0.00%	0.00%	1.61%	<b>0.05%</b>	

As the table shows, aircraft incident service demand is extremely low with all the activity occurring at Station 16 on the airport grounds.

***Aircraft Incident Risk Assessment***

The following table summarizes Citygate’s assessment of aircraft incident risk by planning zone.

**Table A-26—Aircraft Incident Risk Assessment**

Aircraft Incident Risk	Planning Zone					
	Station 11	Station 12	Station 13	Station 14	Station 15	Station 16
Probability of Occurrence	<i>Unlikely</i>	<i>Unlikely</i>	<i>Unlikely</i>	<i>Unlikely</i>	<i>Unlikely</i>	<i>Probable</i>
Probable Impact Severity	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>
<b>Overall Risk</b>	<b>Low</b>	<b>Low</b>	<b>Low</b>	<b>Low</b>	<b>Low</b>	<b>Moderate</b>