



SERVICE DELIVERY AND STAFFING STUDY

VOLUME 1 OF 3: TECHNICAL REPORT

PORTLAND FIRE & RESCUE

MAY 17, 2022



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VOLUME 2 of 3 – Map Atlas (Separately Bound)

VOLUME 3 of 3 – Risk Assessment (Separately Bound)

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Executive Summary



EXECUTIVE SUMMARY

Portland Fire & Rescue (PF&R) retained Citygate Associates, LLC (Citygate) to perform a Service Delivery and Staffing Study. This study included reviewing the adequacy of the existing deployment system of apparatus and personnel from the current fire station locations, testing deployment scenarios to improve coverage, and analyzing the workload per unit. This report is presented in three volumes. The Technical Report (**Volume 1**) contains: this Executive Summary which contains a summary of our analysis and suggested next steps; Sections 1–7, which contain the deployment and SOC portions of the study; Section 8, which focuses on the headquarters service capacity review; and Section 9, which discusses next steps and summarizes the findings and recommendations. A Map Atlas of deployment coverage measures is provided in **Volume 2**, and a comprehensive Community Risk Assessment is provided in **Volume 3**.

Throughout this report, Citygate makes key findings and, where appropriate, specific action item recommendations. Overall, there are 62 key findings and 49 specific action item recommendations.

POLICY CHOICES FRAMEWORK

As the City of Portland (City) Mayor and Council of Commissioners understands, there are no mandatory federal or state regulations directing the level of fire service response times and outcomes. The level of service and resultant costs is a local community choice in the United States. The body of regulations on the fire service suggests that if fire services are provided, they must be provided with the safety of the firefighters and citizens in mind. Thus, there is often a constructive tension between the desired level of fire services and the level that can be funded, and many communities may not have the level of fire services they desire. Portland’s investments in fire services over the past decades serve as its baseline commitment today.

This study identifies that additional investment in fire services is still necessary in the near term, and expanded and additional services from PF&R are needed as Portland continues to evolve. The fundamental policy choices are derived from two key questions:

1. What outcomes are desired for the emergencies to which PF&R responds? Is the desire to keep a building fire to the room, building, or block of origin, and to provide emergency medical care in time to lessen the possibility of preventable death and severe disability?
2. Should equitable response time coverage be provided to all neighborhoods with similar risks to protect? Once the desired outcomes are determined, the fire and emergency medical services (EMS) first responder deployment must be designed to cover the most geography in the fewest minutes to meet the stated outcome goals. In a large fire and EMS agency with multiple neighborhoods such as Portland, it

must be determined whether similarly populated areas should receive similar response time performance from a fire services unit.

CITYGATE’S OVERALL OBSERVATIONS ON PF&R’S FIRE CREW DEPLOYMENT

PF&R’s service area is marked by a diverse population, land use, and public road pattern that in some areas is geographically challenged with rivers, open spaces, and/or a lack of major cross-connecting roadways, impacting PF&R’s response travel times. Population drives service demand, and development brings population. As different areas develop and increase population density, PF&R’s services will need adjustment and investment just to *maintain*, much less improve, response times across the geography, and even more so when simultaneous incidents occur at peak hours of the day.

In the most densely developed areas of Portland, while the substantial growth in EMS incidents over the past decade seems all-consuming, there is still a need for the foreseeable future for both a first-due firefighting unit and multiple-unit Effective Response Force (ERF) coverage consistent with current best practices. This enables PF&R to limit the risk of fire to only part of an affected building, and to keep small, outside fires within the initial attack force’s capabilities, thereby preventing large, wildland–urban interface fires. Stated this way, *all communities need a stand-by and readily available firefighting force* that can respond when fires break out regardless of peak-hour EMS workload.

Response times should be established around the acceptable risk tolerance of the City and the outcomes desired. If this is the goal, Portland should implement the recommendations in this study to add appropriate deployment resources. Doing so will stabilize and improve response times given current population and employment growth projections.

Fire services deployment, simply stated, is about the **speed** and **weight** of the response. **Speed** calls for first-due, all-risk intervention units (engines, ladder trucks, and specialty units) strategically located across a jurisdiction responding within an effective travel time. These units are tasked with controlling routine-to-moderate emergencies and preventing an incident from escalating to greater size or complexity, because that unnecessarily depletes resources as multiple requests for service occur. **Weight** is about multiple-unit response for more serious emergencies, such as a room-and-contents building fire, a multiple-patient medical incident, a vehicle accident with extrication required, or a heavy-rescue incident. In these situations, enough firefighters must be assembled within a reasonable timeframe to safely control the emergency, thereby keeping it from escalating.

Citygate’s analysis of prior response statistics and use of geographic mapping tools reveals that PF&R currently does not have best practice response times across all areas of the City. The current deployment system cannot completely meet best practices for the geography and incident demands. PF&R’s current deployment system performance is described in detail by the maps

provided in **Volume 2** and the corresponding text explanation beginning in Section 4.2 of this volume.

Across our deployment and headquarters services review, Citygate found three broad areas where PF&R is challenged to meet the needs of the City.

Challenge #1: High-Volume EMS Incident Demands

As the response unit workloads by time-of-day show, EMS incidents comprise 54.86 percent of the total incident demand, and much of that demand occurs during daylight hours and in clusters of simultaneous incidents. So even if fire stations are appropriately located, at peak hours units are committed to one call and the next closest unit handles the second or third call in the same area. This can cause cascading delays on unit travel times as responding units travel across the City to handle the incidents.

PF&R's new Community Health Division includes Portland Street Response (PSR) and Community Health Assess and Treat (CHAT) teams, representing a pilot project which can substantially reform this issue in Portland while improving care and support for individuals and families not needing acute 9-1-1 EMS care. The programs began in 2021 via a grant from CareOregon and funding from the City of Portland. The rollout of the teams is attached as Appendix A to this study. The initial, combined budget for year one is approximately six million dollars, with ongoing support and funding necessary to hire, train, deploy, and manage up to 86 personnel. While this is a significant cost, it is *far less expensive* and results in better overall care than addressing these incidents with four-person firefighter crews on fire engines, adding more ambulances, and increased demand on the City's emergency rooms. The City and hospitals will control costs going forward by moving to this system of care.

If the Community Health programs are successful in migrating low-acuity 9-1-1 calls as expected, and if they receive permanent funding, some of the fire deployment recommendations in this study (e.g., adding stations and personnel) may not be needed.

Challenge #2: Insufficient Overhead / Administrative Staffing for Program Management

Citygate reviewed the current PF&R headquarters support organization and evaluated lines of authority, span of control, and workload capacity gaps. We then formulated findings relative to that evaluation and provided recommendations for consideration by PF&R executive management to improve the overall efficacy of the PF&R's headquarters organization.

Given that almost 55 percent of PF&R's incident responses are to EMS events, it is critical that, as a health care provider, the paramedics and Emergency Medical Technicians (EMTs) providing patient care be trained to standards and then, with quality oversight, ensure care standards are met.

This includes the new Community Health teams that need training, supervision, and quality-of-care oversight ensuring standards are met.

Citygate’s analysis and review found almost every headquarters unit moderately to seriously understaffed after years of budget reductions. It sounds easy to cut headquarters expenses and keep fire stations open. However, at some point the risks of failure of care are *increased with a lack of training, equipment, leadership, and quality oversight*. Citygate also found a headquarters organizational structure not designed to effectively operate an agency of PF&R’s size.

Overall, we found the headquarters programs across three levels of priority needed an additional 35 full-time positions as summarized in Section 8.9.5. In the Immediate (Critical) phase there is a need for 16 full-time positions and a revised organizational design structure as shown in Section 8.9.6.

Challenge #3: Insufficient Fire Station Coverage

PF&R’s service area is challenging because it includes areas of valley floor in addition to hilly areas typical of the northern Willamette Valley area of Oregon. Some areas of the City developed in flatter locations, with more traditional, right-angle, or grid road designs. However, other areas developed over time by following natural land contours, open spaces, and rivers. The road networks outside of the core City have more curvilinear streets with more limited major cross-connecting roadways. Fire station locations in such curvilinear road networks need tighter station-to-station spacing as the units cannot cover as many public street miles as quickly as they can in a grid road network.

Much of the eastern and southeastern areas of Portland were annexed in the 1980s and 1990s. These areas had previously been served by fire districts, and the annexed fire stations were located farther apart and were not part of an urban area master plan. The spacing of stations in this area and the southwest hills that annexed in the 1940s to the 1960s, has not been improved upon.

Therefore, today, outside of the urban core where station spacing is based on best practice response times, the outlying stations have long response times, worsened at peak hours by high-volume EMS demand. As the traffic congestion portion of the geographic mapping study shows in Section 4.2, peak-hour traffic congestion, which also occurs during high-incident demand hours, slows response travel times significantly. PF&R has a goal of responding to emergencies within 4:00 minutes of reception; however, peak-hour traffic lowers first-due unit coverage 17 percent from 57 percent to only 40 percent of the City’s public road miles. The multiple-unit coverage falls 25 percent from 29 percent coverage during off-peak hours to only four percent during periods of traffic congestion.

Traffic congestion compounds the effects of the road network over topography and simultaneous incidents. This study’s review of workload by station area and by hour identified two groups that are “Deployment Priority Improvement Areas.” These stations all have high workloads and are

frequently covering for each other or are pulling even more stations into these areas during simultaneous incidents.

The high workload areas need either (a) more response units, or (b) a reduction in non-acute EMS workload, which would be more cost-effective, to stabilize and likely improve response times and availability for serious fire, EMS, and technical incidents.

In other words, Portland’s human services needs for non-acute medical and other incidents do not need a paramedic firefighter engine company and a two-person paramedic ambulance for a ride to an emergency room. PF&R is well suited to be an alternative human crisis response agency with specialized responders in addition to PF&R’s firefighters. Such an alternative response system is needed Citywide and, although it is a new expense, overall, it will be more cost-effective than adding fire units. Portland “*needs its fire department capacity back.*”

RECOMMENDED DEPLOYMENT IMPROVEMENTS SUMMARY

The following summarizes PF&R’s deployment needs:

- ◆ The eastern station areas are too large and need at least two stations to relieve pressure from Station 7.
- ◆ Six stations’ Fire Management Areas (FMAs) are very busy and will need rescues and/or low-acuity units first.
- ◆ Station 23 needs to have a responding fire engine restored.
- ◆ Overall, the City is short six fire stations if 4:00-minute first-unit travel is a goal to be funded.
- ◆ Station 7 is too busy to also house the cross-staffed hazardous materials response unit and will require a Capital Improvement Plan (CIP) to relocate.

Given the scope of the needs, Citygate recommends these deployment improvement priority tiers:

Tier One—(Essential) Fire Service Historic Deployment Standards

- ◆ Add a station *northwest* of Station 7.
- ◆ Move the hazardous materials units out of Station 7 as soon as possible.
- ◆ Restore Engine 23 with full staffing.
- ◆ Obtain permanent funding for the new low-acuity response Community Health program units. If that program is not funded beyond 2022, and is not successful in lowering EMS demand on PF&R fire crews, proceed to Tier Two, adding the following fire crew staffed alternative deployment and peak-hour activity units:

Tier Two—Alternative Deployment Improvement and Peak Activity Units

- ◆ Add a minimum of eight medical low-acuity two-person units.
 - Immediately, PF&R needs two units, at a minimum, in the City core, one on each side of the river, 24/7/365.
 - Immediately, PF&R needs two more units, at a minimum, either northwest or southeast of Station 7, 24/7/365.
 - In a second phase with funding, the following units should be added:
 - During peak hours, add two more units in the above areas (core and Station 7).
 - Add two more units, one each in Battalions 2 and 4, 24/7/365.
- ◆ Add three engine Peak Activity Units (PAUs).
 - These three PAUs would be four-person fire engines, one each in Battalions 2, 3, and 4 for peak-hour simultaneous incident and training out-of-service coverage.
 - These would need to operate 10:00 am to 8:00 pm weekdays and on special event weekends.

HEADQUARTERS SERVICES FINDINGS AND RECOMMENDATIONS SUMMARY

Best practices and federal and state safety laws 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 operation are ever increasing, so the proper hiring, training, and supervision of operational personnel requires a significant leadership and general management commitment.

Headquarters findings and recommendations can be briefly summarized in the following bullets.

- ◆ Overall, Citygate finds PF&R's current administrative/management capacity *barely adequate* to support the organization and to meet PF&R goals and responsibilities.
- ◆ Based on Citygate's analysis of the PF&R administration team, we recommend phased full-time equivalent (FTE) personnel additions be made as follows: Immediate (Critical) – 16 FTEs; Near-Term – 16 FTEs; Longer-Term – 3 FTEs.

- The Logistics Section includes many recommended positions, including three Immediate (Critical) positions.
- ◆ Pursuant to this review and preceding findings and recommendations, Citygate recommends organizational re-structuring to provide improved lines of authority, coordination, communications, and span of control.

NEXT STEPS

As a first step, the City Council should adopt updated, clearly measurable response time goals for PF&R based on best practices, with the 9-1-1 call receipt in fire dispatch as the start time. The Council will also need to provide accountability for PF&R personnel to meet those standards. The goals identified in Recommendation #20 are consistent with national best practices and risks to be protected in PF&R's service area. Measurement and planning, as PF&R continues to evolve, will be necessary for PF&R to meet these goals.

Based on this evaluation, Citygate offers these likely next steps to move PF&R forward:

- ◆ Adopt a set of updated response time policies.
- ◆ Obtain permanent funding for the new low-acuity Community Health teams to operate 24/7 Citywide with a higher presence in the City's core and the southeast.
- ◆ As needed, based on the Community Health teams' ability to remove 9-1-1 calls from fire crews, identify the funding over time to add the fire crew deployment enhancements identified in this study.
- ◆ Begin to fund multiple-year Capital Improvement Plan (CIP) projects for one or more added fire station(s) and the relocation of Fireboat 6.

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Section 1

*Introduction and
Background*



SECTION 1—INTRODUCTION AND BACKGROUND

Citygate Associates, LLC’s (Citygate) detailed work product for Portland Fire & Rescue (PF&R) is presented in this volume. Citygate’s scope of work and corresponding Work Plan were developed consistent with Citygate’s Project Team members’ experience in fire administration. Citygate utilizes various National Fire Protection Association (NFPA) publications as best practice guidelines, along with best practices from the criteria of the Commission on Fire Accreditation International (CFAI).

1.1 REPORT ORGANIZATION

This report is comprised of three volumes. The Map Atlas is found in **Volume 2** and the Risk Assessment is found in **Volume 3**. **Volume 1** consists of the following sections:

- Executive Summary: A summary of our analysis and suggested next steps.
- Section 1 Introduction and Background: An introduction to PF&R and background facts.
- Section 2 Standards of Coverage Introduction: An introduction to the SOC (deployment) process and methodology used by Citygate in this review.
- Section 3 Deployment Goals, Measures, and Risk Assessment: An in-depth examination of PF&R’s ability to deploy firefighters and apparatus to meet the risks, expectations, and emergency needs of its constituents.
- Section 4 Staffing and Geo-Mapping Analysis: A review of: (1) the critical tasks that must be performed to achieve PF&R’s desired fire and emergency medical services (EMS) emergency outcomes; and (2) PF&R’s existing fire station and apparatus locations as well as needed future locations.
- Section 5 Statistical Analysis: A statistical data analysis of PF&R’s incident responses.
- Section 6 Specialty Emergency Response Programs: A description of specialty emergency response services that have to be provided, in addition to firefighting, in any metropolitan area.
- Section 7 Firefighting Deployment Evaluation and Recommendations: An integrated summary of deployment priorities and an overall deployment recommendation.
- Section 8 Headquarters Service Capacity Review: A review of the administration, technical services, support, and logistics programs.
- Section 9 Next Steps: A summary of recommended next steps and a list of all findings and recommendations.

1.1.1 Goals of the Report

This study will cite findings and make recommendations, if appropriate, that relate to each finding. Findings and recommendations are numbered sequentially. Section 9 of this report brings attention to the highest priority needs and recommended next steps.

This document provides technical information about the way fire services are provided and legally regulated and the way PF&R currently operates. This information is presented in the form of recommendations and policy choices so the City Council can determine how to proceed.

1.2 PROJECT SCOPE OF WORK

1.2.1 Standards of Coverage (Deployment) and Services Reviews

The scope of this SOC deployment review includes the following elements:

- ◆ Modeling the response time ability of the current fire station locations. Although this is not an assessment of fire departments adjacent to PF&R, the assessment does consider the impacts of PF&R's automatic/mutual aid agreements common throughout the area.
- ◆ Updating performance goals for PF&R consistent with the local risks to be protected, national best practices, and guidelines from the NFPA and the CFAI.
- ◆ Using the incident response time analysis program StatsFD™ to review the incident response statistics of historical performance.
- ◆ Using the geographic mapping response time measurement tool FireView™ to measure fire unit driving coverages from PF&R's current fire stations.

SOC Review Questions

This assessment addresses the following questions:

- ◆ Is the type and quantity of apparatus and personnel adequate for PF&R's deployment to emergencies?
- ◆ What is the recommended deployment to provide adequate emergency response times as growth continues?

1.2.2 Headquarters Services Reviews

The headquarters services reviews include the following elements:

- ◆ Reviewing and evaluating the responsibilities, capabilities, staffing levels, and workload of PF&R's Chief's Office, Management Services Division, Community

Health Division, Fire Prevention Division, Emergency Operations Division, and Medical Services & Training Division.

1.3 PORTLAND FIRE & RESCUE OVERVIEW

This review of PF&R’s field services deployment must be completed in the context of the risks and areas served by PF&R. While PF&R exists to provide firefighting and rescue services, the provision of First Responder EMS by PF&R now dominates the emergency incident volume as illustrated by calendar year 2020 when **54.86 percent** of all incidents were a medical emergency. The following facts illustrate the PF&R service area and resultant services system:

- ◆ 653,842 residents
- ◆ 145 square miles
- ◆ 190,822 acres of wildland open spaces
- ◆ Nearly 300,000 dwelling units
- ◆ 38,241 other buildings
- ◆ 298 miles of river and open stream channels
- ◆ Over 64,000 acres of all types of open spaces
- ◆ A shared station with the City of Gresham
- ◆ Total real property values (2021/22) assessed at \$1,723,885,770
- ◆ Dozens of tourist venues, many with worldwide status
- ◆ Large, nationally significant employers
- ◆ A total City budget of \$5.7 billion
- ◆ 31 fire stations with 28 staffed engine companies
- ◆ Eight ladder truck companies
- ◆ Two quint pumper/ladder trucks
- ◆ One squad unit
- ◆ Four rescue units
- ◆ Four Battalion Chiefs and one Deputy Chief for daily incident command
- ◆ Fire station personnel are also cross-trained to respond in specialty apparatus, such as PF&R’s trench rescue van, hazardous materials truck, brush units, all-terrain vehicles, fireboats, rescue boats, and water tenders

- ◆ Daily staffing of 169 personnel
- ◆ 750 total PF&R employees

All sworn PF&R personnel are trained to either the EMT level to provide Basic Life Support (BLS) pre-hospital emergency medical care or to the EMT-Paramedic (EMT-P) level to provide Advanced Life Support (ALS) pre-hospital emergency medical care. Patient transportation is provided by private contractor ALS ambulances managed Countywide by the County's EMS Agency. When needed, air ambulance transport services are provided by local hospital-based providers.

Section 2

Standards of Coverage

Introduction



SECTION 2—STANDARDS OF COVERAGE INTRODUCTION

2.1 STANDARDS OF COVERAGE REVIEW PROCESSES

The core methodology used by Citygate in the scope of its deployment analysis work is the *Community Risk Assessment: Standards of Cover* 5th and 6th editions, which is a systems-based approach to fire crew deployment as published by the CFAI. This approach uses local risk and demographics to determine the level of protection best fitting an agency's service area needs.

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

In the United States, there are no federal or state government requirements for a minimum level of fire services. Fire services levels are an issue for each community to consider and fund in protecting its risks as it chooses. Rather than a one-size-fits-all prescriptive formula, the SOC systems approach to deployment allows for local determination. In this comprehensive approach, each agency 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 considered, 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 SOC process consists of the following eight elements.

Table 1—Standards of Coverage Process Elements

Element	Meaning
Existing Deployment Policies	Reviewing the deployment goals, the agency has in place today
Community Outcome Expectations	Reviewing the expectations of the community for response to emergencies
Community Risk Assessment	Reviewing the assets at risk in the community
Critical Task Study	Reviewing the tasks that must be performed and the personnel required to deliver the stated outcome expectation for the Effective Response Force (ERF)
Distribution Study	Reviewing the spacing of first-due resources (typically engines) to control routine emergencies
Concentration Study	Reviewing the spacing of fire stations so that building fires can receive sufficient resources in a timely manner (First-Alarm Assignment or the ERF)
Reliability and Historical Response Effectiveness Studies	Using prior response statistics to determine the percent of compliance the existing system delivers
Overall Evaluation	Proposing Standards of Coverage statements by risk type as necessary

Fire services deployment, simply stated, is about the **speed** and **weight** of the attack. **Speed** calls for first-due, all-risk intervention units (engines, ladder trucks, and specialty units) strategically located across an agency’s service area responding in an effective travel time. These units are tasked with controlling moderate emergencies without the incident escalating to second alarm or greater size, which would unnecessarily deplete the agency’s resources as multiple requests for services occur. **Weight** is about multiple-unit response for serious emergencies, such as a room-and-contents structure fire, a multiple-patient incident, a vehicle accident with extrication required, or a heavy-rescue incident. In these situations, enough firefighters must be assembled within a reasonable time frame to safely control the emergency, thereby keeping it from escalating to greater alarms.

This deployment design paradigm is reiterated in the following table.

Table 2—Fire Services Deployment Simplified

Element of Attack	Meaning	Purpose
<u>Speed of Attack</u>	Travel time of first-due, all-risk intervention units strategically located across a jurisdiction.	Controlling moderate emergencies without the incident escalating in size or complexity.
<u>Weight of Attack</u>	Number of firefighters in a multiple-unit response for serious emergencies.	Assembling enough firefighters within a reasonable time frame to safely control the emergency.

Thus, small fires and medical emergencies require a single- or two-unit response (engine and specialty unit) with a quick response time. Larger incidents require more crews. In either case, if the crews arrive too late or the total personnel sent to the emergency are too few for the emergency type, they are drawn into a losing and more dangerous battle. The science of fire crew deployment is to spread crews out across a community for quick response to keep emergencies small with positive outcomes without spreading the crews so far apart that they cannot amass together quickly enough to be effective in major emergencies.

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Section 3

*Deployment Goals,
Measures, and Risk
Assessment*



SECTION 3—DEPLOYMENT GOALS, MEASURES, AND RISK ASSESSMENT

3.1 ***HOW DOES PF&R DELIVER EXISTING FIRE CREW DEPLOYMENT SERVICES?***

3.1.1 Existing Response Time Policies and Goals – What Are PF&R’s Goals?

The City has not ever adopted response time performance measures. Doing so would meet the best practice recommendations from the CFAI. The City’s Comprehensive General Plan 2035 in *Chapter 8 – Public Facilities and Services* only says in Policy 8.4, “Supporting Facilities and Systems – Maintain supporting facilities and systems, including public buildings, technology, fleet, and internal service infrastructure, to enable the provision of public facilities and services.”

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

**Note: This is an overview of Element 1.
The detail is provided in Section 3.5.*

In PF&R’s annual budget submittal, incident response time performance is reported using these measures which are partially consistent with national best practices:

- ◆ Per the Fiscal Year (FY) 20–21 budget measures on page 182, PF&R is not reporting dispatch time as part of the response time to high-priority incidents. However, PF&R does report for first-responder EMS a first-unit travel and crew turnout time of 7:12 minutes over the previous five years.
- ◆ PF&R’s goal for a first-due apparatus, staffed with three firefighters and one officer (four personnel), is 5:20 minutes, consisting of crew turnout and travel time. The first-due unit will be capable of providing 500 gallons of water, at 1,250 gallons per minute (gpm) pumping capacity, initiating command/safety, providing two-in/two-out for firefighter safety, and advancing the first attack line flowing a minimum of 150 gpm.
- ◆ PF&R’s goal for a multiple-unit ERF is reaching 90 percent of all apartment structure fires, with an ERF staffed with 26 firefighters and officers in 10:10 minutes, including crew turnout and travel time segments. The minimum initial deployment assignment is four engines, two trucks, and two Battalion Chiefs.
- ◆ PF&R’s goal for a residential ERF is 26 firefighters in 17:34 minutes, including crew turnout and travel time segments, with a minimum deployment of four engines, two trucks, and two Battalion Chiefs.

PF&R has a long history of striving to provide a level of service that is evidenced in the number and types of fire companies and minimum daily staffing. Thus, even without formal City Council

response time goals, PF&R has requested funding for a level of service to meet the City’s risks-to-be-protected needs.

This report will assist City leadership in improving the specificity of its response time goals. Nationally recognized standards and best practices call for a response timeline with several important measurements that include a definition of all aspects of response time. In this SOC assessment, Citygate recommends revised response time goals to include dispatch process time, crew turnout and travel time equaling Total Response Time to all risks, including fire, EMS, hazardous materials, and technical rescue responses. The goals are consistent with the CFAI and NFPA systems approach to response.

Per the current NFPA Standard 1221 for dispatching, 9-1-1 emergency calls without language barriers to the most acute calls should be dispatched in 60 seconds, 90 percent of the time. Prior versions of this best practice were 90 seconds, absent language barriers. As for crew turnout time, for years the NFPA and CFAI have believed, without extensive research, that turnout could take 60 to 90 seconds. In Citygate’s experience with hundreds of fire services clients in the past 20 years, it is very difficult to don the protective clothing mandated by the Occupational Safety and Health Administration (OSHA), be seated, and have a seat belt secured in less than 2:00 minutes, 90 percent of the time. These times are also challenged by some station designs and the differences between waking and sleeping hours.

As for travel time, since the NFPA first published its recommended Standard 1710 for career fire services deployment, the travel time goal in urban areas has been 4:00 minutes. However, this time was a goal as part of an overall response time measure. The 4:00-minute travel time was “believed possible” across a traditional grid, right-angle road network. There was no empirical research on differing road network designs or topography. In Citygate’s experience, few clients can deploy to meet a 4:00-minute travel time outside of urban core downtown areas *with a grid street network and adequate fire station spacing*.

3.1.2 Existing Outcome Expectations

SOC ELEMENT 2 OF 8
COMMUNITY OUTCOME
EXPECTATIONS

The SOC process begins by reviewing existing emergency services outcome expectations. This entails determining the purpose for which the response system exists and if the governing body adopted any response performance measures. If so, the time measures used must be understood

and good data must be collected.

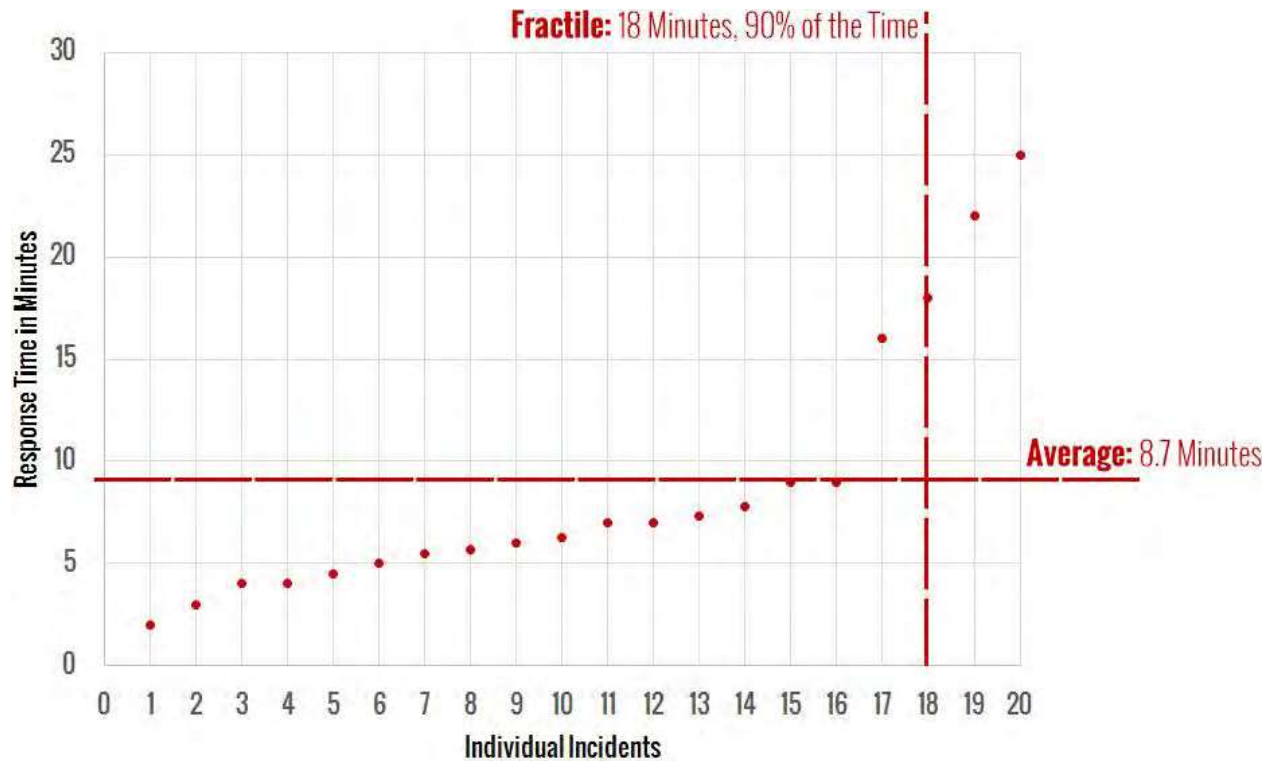
The current national best practice is to measure percent completion of a goal (e.g., 90 percent of responses) instead of an average measure. Mathematically this is called a fractile measure.¹ This practice is used because an average measure only identifies the central or middle point of response time performance for all calls for service in the data set. Using an average makes it impossible to know how many incidents had response times that were significantly above or nominally above the average.

For example, Figure 1 shows response times for a fictitious fire agency. This agency is small and receives 20 calls for service each month. Each response time has been plotted on the graph from shortest to longest response time.

Figure 1 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 that 20 percent of responses are far too slow, and this jurisdiction has a potentially life-threatening service delivery problem. Average response time as a measurement tool for fire services 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 responses in mind, this small jurisdiction has a response time of 18:00 minutes, 90 percent of the time. This fractile measurement is far more accurate at reflecting the service delivery situation of this small agency.

¹ 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 1—Fractile Response Time Chart

More importantly within the SOC process, positive outcomes are the goal, and from that, crew size and response time can be calculated to allow efficient fire station spacing (distribution and concentrations). Emergency medical incidents have the most severe time constraints. The brain can only live between 4:00 and 8:00 minutes without oxygen. Heart attacks, other trauma events that cause severe blood loss, or a respiratory emergency can all cause oxygen deprivation to the brain; drowning, choking, trauma constrictions, or other similar events have the same effect. In a building fire, a small incipient fire can grow to involve the entire room in 8:00 to 10:00 minutes. If fire services 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 leaves the room of origin.

Thus, from the time of 9-1-1 receiving 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 the fire has grown to the point of leaving the room of origin and becoming very serious. Thus, PF&R needs a first-due response goal that is within a range that can give hope for a positive outcome. It is important to note that the fire or medical emergency continues to deteriorate from the time of inception, not the time the fire engine starts to be driven on 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, 1:30 minutes. Crew notification and travel time then take additional minutes. Once arrived, the crew must walk to the patient or emergency, assess the situation, and 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 apartments or office complexes, or shopping center buildings such as those found in parts of Portland.

Unfortunately, there are times the emergency becomes too severe, even before the 9-1-1 notification or PF&R response, for the responding crew to reverse; however, when an appropriate response time policy is combined with a well-designed system, only issues like bad weather, poor traffic conditions, or multiple emergencies will slow the response system down. Consequently, a properly designed system will give 9-1-1 callers the hope of a positive outcome for their tax-dollar expenditure.

For this report, total response time is the sum of the dispatch processing, crew turnout, and road travel time steps. This is consistent with the recommendations of the CFAI.

Finding #1: The City Council has not adopted a performance measure, including specialty response measures for all-risk emergency responses, that is sufficiently specific, is based on best practices, and includes the beginning time measure from the point of the Bureau of Emergency Communications dispatch receiving the 9-1-1 phone call, nor do the current goals reflect risks and outcome expectations. Clarifying PF&R's deployment goals will meet the best practice recommendations of the Commission on Fire Accreditation International.

3.2 RISK ASSESSMENT

The third element of the SOC process is a community risk assessment. This section summarizes a very detailed Risk Assessment contained in **Volume 3** of this study.

Within the context of an SOC review, the objectives of a community risk assessment are to:

- ◆ 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.

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

- ◆ 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.

3.2.1 Values to Be Protected

Broadly defined, *values at risk* are those 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, and natural resources.

3.2.2 Overview of Values at Risk and Hazards in PF&R's Service Area

Citygate's evaluation of the values at risk and hazards likely to impact PF&R's service area yields the following conclusions.

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 of age, the elderly, people housed in institutional settings, households below the federal poverty level, and people living unsheltered. The following table summarizes key demographic data.

Table 3—Key Demographic Data – City of Portland

Demographic	2021
Population	653,842
Under 10 years	10.20%
10–14 years	5.00%
15–64 years	69.90%
65–74 years	9.20%
75 years and older	5.80%
Median age	38.1
Daytime population	740,513
Housing Units	298,524
Owner-Occupied	49.50%
Renter-Occupied	44.20%
Vacant	6.30%
Average Household Size	2.28
Median Home Value	\$476,132
Ethnicity	
White	72.70%
Hispanic/Latino (counted as White)	10.70%
Asian	8.90%
Black/African American	6.50%
Other	11.90%
Education (Population over 24 Years of Age)	475,810
High School Graduate or Equivalent	93.40%
Undergraduate Degree	52.70%
Graduate/Professional Degree	22.10%
Employment (Population over 15 Years of Age)	386,940
In Labor Force	93.00%
Unemployed	7.00%
Median Household Income	\$75,237
Population below Poverty Level	12.3%
Disabled Population	12.0%
Population without Health Insurance Coverage	6.6%

Source: Esri and U.S. Census Bureau.

Of note from the previous table is the following:

- ◆ Slightly more than 25 percent of the population is under 10 or over 65 years of age.
- ◆ The City’s population is predominantly White (73 percent), followed by Hispanic/Latino (11 percent and counted as White), other ethnicities (12 percent), Asian (9 percent), and Black / African American (7 percent).
- ◆ Of the population over 24 years of age, more than 93 percent has completed high school or equivalency.
- ◆ Of the population over 24 years of age, nearly 53 percent has an undergraduate, graduate, or professional degree.
- ◆ Of the population over 15 years of age, 93 percent is in the workforce; of those, 7 percent are unemployed.
- ◆ The median household income is slightly more than \$75,000.
- ◆ The population below the federal poverty level is slightly more than 12 percent.
- ◆ Only 6.6 percent of the population does not have health insurance coverage.

The City’s Comprehensive Plan projects slightly more than 112,000 new households by 2035.²

Buildings

The City has nearly 300,000 residential housing units³ and 38,241 other buildings⁴ housing manufacturing, research, technology, office, professional services, retail sales, restaurants/bars, motels, churches, schools, storage, government facilities, healthcare facilities, and other occupancies.

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 Portland Bureau of Emergency Management identified 1,510 critical facilities and infrastructure in its 2016 Mitigation Action Plan. A hazard occurrence with significant consequence severity

² Portland 2035 Comprehensive Plan, Growth Scenarios Report (July 2015), Proposed Comprehensive Plan Scenario Table 10.

³ Esri Community Analyst – Community Profile (2021).

⁴ Portland Fire & Rescue Community Risk Assessment (2020), Table 4.

affecting one or more of these facilities would likely adversely impact critical public or community services.

Economic Resources⁵

The City’s 2035 Comprehensive Plan goals include vigorous economic growth and a healthy, diverse economy that supports prosperity and equitable access to employment opportunities for an increasingly diverse population. Major employers include:

- ◆ Intel Corporation
- ◆ Providence Health and Services
- ◆ Oregon Health and Science University (OHSU)
- ◆ Nike, Inc.
- ◆ Legacy Health
- ◆ Kaiser Foundation Health Plan of the Northwest
- ◆ Fred Meyer
- ◆ City of Portland
- ◆ Portland Public Schools
- ◆ Beaverton School District
- ◆ U.S. Government

Natural Resources⁶

Natural resources within the City include:

- ◆ 298 miles of river and open stream channels, including the:
 - Columbia River
 - Willamette River
- ◆ Smith Lake
- ◆ 2,520 acres of wetlands
- ◆ 8,000 acres of parks, including Forest Park

⁵ City of Portland 2035 Comprehensive Plan and Comprehensive Annual Financial Report (June 2020).

⁶ Portland Plan, Natural Resource Inventory (December 2010).

- ◆ 23,150 acres of riparian resources
- ◆ 17,840 acres of wildlife habitat
- ◆ 13,225 acres of special habitat

Cultural/Historic Resources

As a vibrant multicultural city, Portland boasts a large inventory of cultural and historic resources, including:

- ◆ Portland Art Museum
- ◆ Oregon Center for Contemporary Art
- ◆ Center for Native American Art
- ◆ Portland Theater
- ◆ Portland Center Stage at the Armory
- ◆ Portland libraries

Special/Unique Resources

The following facilities are special or unique resources to be protected:

- ◆ Portland International Airport
- ◆ MAX Light Rail
- ◆ Portland Aerial Tram
- ◆ University of Portland
- ◆ Oregon Health and Science University
- ◆ Port of Portland
- ◆ Riverfront risks

3.2.3 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. The 2016 Portland Mitigation Action Plan identifies the following eight hazards likely to impact the City:

1. Severe weather
2. Earthquake

3. Landslide
4. Wildfire
5. Flood
6. Volcanic activity
7. Dam failure
8. Drought

In addition, PF&R conducted a comprehensive internal Community Risk Assessment in December 2020 that evaluated the following hazards:

- ◆ Fire
- ◆ EMS
- ◆ Hazardous materials
- ◆ Technical rescue

Although PF&R has no legal authority nor responsibility to mitigate any hazards other than possibly for wildfire, it does provide services related to many hazards, including fire suppression, emergency medical services, technical rescue, and hazardous materials response.

3.2.4 Risk Assessment Summary

Hazards Evaluated

Subsequent to review and evaluation of the hazards identified in the City’s Mitigation Action Plan, the 2020 internal PF&R Community Risk Assessment, and the fire and non-fire hazards as identified by the CFAI as they relate to services provided by PF&R, Citygate evaluated the following six 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

Risk Assessment

Citygate’s evaluation of the values at risk and hazards likely to impact the City of Portland yields the following:

1. PF&R serves a very diverse urban population with densities ranging from less than 3,000 to more than 30,000 people per square mile over a varied urban land use pattern.
2. The City’s population is projected to grow approximately 40 percent by 2035.
3. The City has a large inventory of residential and non-residential buildings to protect.
4. The City also has significant economic and other resource values to be protected, as identified in this assessment.
5. The Portland Bureau of Emergency Management has multiple mass emergency notification options available to effectively communicate emergency information to the public in a timely manner.
6. The City’s risk for six hazards related to emergency services provided by PF&R range from **Low** to **Extreme** as summarized in the following table.

Table 4—Overall Risk by Incident Type

Hazard		Sub-Hazard Type	Risk Rating
1	Building Fire	Chimney/Fireplace/Stove	Low
		Single-Family Residential	High
		Multi-Family Residential	High
		Commercial	High
2	Vegetation/ Wildland Fire	Grass/Bark Dust/Tree	Low
		Brush (<5 acres)	Moderate
		Wildfire/WUI (5–25 acres)	High
		Wildfire/WUI (>25 acres)	High
3	Medical Emergency	BLS only	Low
		BLS/ALS	High
		ALS	High
		Mass Casualty Incident	High
		Weapon of Mass Destruction	Extreme
4	Hazardous Materials	Alarm/Odor Investigation	Low
		HazMat Level 1	Moderate
		HazMat Level 2 Biological/Chemical Threat Natural Gas Leak	High
		HazMat Level 3 Biological/Chemical Release Railroad incident	High
		Explosion / Weapon of Mass Destruction	Extreme
5	Technical Rescue	Elevator Rescue	Low
		Trauma / Pin-In / Potential Jumper Rope Rescue	Moderate
		Confined Space / Trench / Water Rescue	Moderate
		Building Collapse / Natural Disaster	Extreme
6	Marine Risk	Water Rescue	High
		Small Boat Fire/Rescue	Low
		Large Pleasure Craft Fire/ Rescue	Moderate
		Ship Fire	High
		Marina Fire	High

3.3 EXISTING PF&R DEPLOYMENT

3.3.1 Existing Deployment Situation – What PF&R Currently Has in Place

As the City of Portland has not adopted sufficiently specific fire and emergency medical service response time policies, this assessment will benchmark PF&R against the response time recommendations of NFPA 1710 for career fire services deployment, as well as PF&R self-reported goals. These are:

- ◆ Travel time of 4:00 minutes for the first-due unit to all types of emergencies.
- ◆ Travel time of 8:00 minutes for multiple units needed at serious emergencies (First Alarm).

PF&R’s current daily staffing plan is summarized in the following table.

Table 5—Current Daily Minimum Staffing per Unit for PF&R

Primary Units	Minimum Staffing Per Unit	Extended Minimum
28 Engine Companies	4	112
8 Aerial Ladder Trucks	4	32
2 Quint Pumper/Aerial Ladder Units	4	8
4 Rescue Units	2	8
1 Squad	4	4
4 Battalion Chiefs and 1 Deputy Chief	1	5
Total Minimum 24/7/365 Fire Station Staffing		169

These daily personnel also “cross-staff” other specialty response units: five wildland fire engines; three water tenders for non-hydrant areas; one heavy technical rescue squad; one hazardous materials unit; one smaller hazardous material reconnaissance unit; two rehabilitation/breathing air refill units; one firefighting foam unit; several apparatus that carry tools and equipment for biological, radiological, nuclear, and high-yield explosives responses; three firefighting boats; two rescue boats; one trench rescue unit; one urban search and rescue (USAR) unit; one mobile command unit; and four all-terrain vehicles.

This total daily staffing is adequate for the immediate response needs presented in the most built-up, urban areas of PF&R—without the mandatory use of neighboring agency automatic aid forces for daily typical incident types.

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

**Note: Continued from Section 3.1.*

Services Provided

PF&R provides an all-risk response, providing the public with services that include structure, wildland, and marine fires, Basic and Advanced Life Support (BLS and ALS) first responder EMS, technical rescue, and hazardous materials response, as well as other services.

Given these risks, the City’s Bureau of Emergency Communications uses a tiered approach of dispatching different types of apparatus to each incident category. The center selects the closest and most appropriate resource type for each incident. As an example, the following table shows the resources dispatched to common risk types.

Table 6—Resources Dispatched to Common Risk Types

Risk Type	<u>Minimum</u> Number and Type of Resources Sent	Initial PF&R Personnel Sent
One-Patient EMS	One Engine or Ladder Truck	4
Auto Fire	One Engine	4
Building/Residential Fire	Four Engines, Two Ladder Trucks, Two Battalion Chiefs	26
Commercial Building Fire	Four Engines, Two Ladder Trucks, One Squad, Two Battalion Chiefs	30
Technical Rescue	Two Engines, One Ladder Truck, One Squad, One Battalion Chief	17
Hazardous Materials Spill, Initial	One Engine or One Ladder Truck or One Squad, One Battalion Chief	5

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Section 4

*Staffing and Geo-Mapping
Analysis*



SECTION 4—STAFFING AND GEO-MAPPING ANALYSIS

4.1 CRITICAL TASK TIME MEASURES – WHAT MUST BE DONE OVER WHAT TIME FRAME TO ACHIEVE THE STATED OUTCOME EXPECTATION?

SOC ELEMENT 4 OF 8
CRITICAL TASK TIME
STUDY

SOC studies use task time information to determine the number of firefighters needed within a time frame to accomplish the desired fire control objective on moderate residential fires and modest emergency medical incidents.

4.1.1 Firefighting Critical Tasks

PF&R's ERF, or First Alarm Assignment, to initial reports of a residential structure fire in urban areas includes four engines, two ladder trucks, and two Battalion Chiefs for an ERF total of **26** personnel.

The following table shows what a force of 26 can accomplish. The larger the force (weight of attack), the faster the tasks are completed.

Scenario: *The following is a simulated one-story residential working structure fire with no rescue situation. Responding companies received dispatch information as typical for a witnessed fire. Upon arrival, they were told approximately 1,000 square feet of the home was involved in fire.*

Table 7—First Alarm Working Structure Fire – 26 Personnel

Company Level Tasks
First Arriving Engine and Ladder
1. Stretch the 200-foot, 1¾-inch hose line to the point of access for search and rescue.
2. Operate the pump to supply water and attach hydrant supply line.
3. Assume command of initial operations.
4. Conduct search and rescue.
Second Arriving Engine
1. If necessary, lay in a hydrant supply line.
2. Stretch a second 200-foot hose line as a back-up line and for fire attack.
3. Establish two-in/two-out safety team.
Third Arriving Engine and Second Ladder
1. Forcible entry if needed, primary rescue search if needed.
2. Ladder the building.
3. Ventilation of the structure.
Fourth Arriving Engine
1. Assist with rescue as/if needed. Secure utilities.
2. Staff the Rapid Intervention Crew.
3. Remove any obstructions or debris that would hinder fire ground operations.
First Arriving Battalion Chief
1. Establish exterior command and initial scene safety.
Second Arriving Battalion Chief
1. Scene Safety Officer or Division Group Supervisor.

Grouped together, these duties form an ERF or First Alarm Assignment. These tasks must be performed simultaneously and effectively to achieve the desired outcome; arriving on-scene does not stop the escalation of the emergency. While firefighters accomplish these tasks, the incident progression clock keeps running.

Fire spread in a structure can double in size during its *free-burn* period before firefighting starts. Many studies have shown that a small fire can spread to engulf an entire room in fewer than 6:00 to 8:00 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 attack and search 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 danger to both firefighters and any occupants of the building.

4.1.2 Emergency Medical Services Critical Tasks

PF&R responded to 44,694 EMS incidents in 2020. These incidents included car accidents, childbirths, strokes, heart attacks, difficulty breathing, falls, and many other medical emergencies.

Some EMS calls require treatment for more than one patient. These calls include vehicle accidents, chemical exposures, construction or industrial accidents, and any other event that occurs with several people in proximity. Patient conditions can range from minor cuts and bruises to life-threatening injuries.

The City’s Bureau of Emergency Communications dispatchers are responsible for screening calls to establish the correct initial response. The first fire officer on scene can amend the response once conditions have been assessed. Standard operating procedures are used to request adequate personnel and resources.

The following critical task table reviews the tasks required on a critical response to a single illustrative cardiac arrest incident.

Table 8—Cardiac Arrest – Engine Crew (Four Personnel) and EMT Ambulance (Two Personnel)

Task	Personnel Required	Type of Treatment Administered
Compressions	1–2	Compression of chest to circulate blood
Ventilate/oxygenate	1–2	Bag-valve-mask, apply O ₂
Airway control	1–2	Manual techniques/intubation/cricothyrotomy
Defibrillate	1–2	Electrical defibrillation of dysrhythmia
Establish I.V.	1–2	Peripheral or central intravenous access
Interpret ECG	2	Identify type and treat dysrhythmia
Administer drugs	1	Administer appropriate pharmacological agents
Patient charting	1–2	Record vitals, treatments administered, etc.
Hospital communication	1–2	Receive treatment orders from physician
Scene management	1	Safety, security, and communications
Quality assurance	1	Medical Service Officer oversight
Treat en route	2–3	Continue to treat/monitor/transport patient
Total	6	

4.1.3 Critical Task Analysis and Effective Response Force Size

What does a deployment assessment derive from a critical task analysis? The total task needs (as displayed in Table 7 and Table 8) to stop the escalation of an emergency must be compared to outcomes. When flashover occurs after approximately 6:00 to 8:00 minutes of free burning, the entire room is engulfed, the structure becomes threatened, and human survival near or in the fire room becomes impossible. Additionally, brain death begins to occur within 6:00 to 8:00 minutes of the heart having stopped. Thus, the ERF must arrive in time to stop these catastrophic events from worsening.

PF&R, given its size, is staffed with enough firefighters to deliver multiple ERFs of 26 firefighters, each without the use of automatic aid, to a building fire. 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, the emergency will worsen instead of improving. The outcome times will be longer with less desirable results if the arriving force is later or smaller.

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 well require the initial firefighters needing to rescue trapped or immobile occupants. If a lightly staffed force arrives, it cannot simultaneously conduct rescue and firefighting operations.

Fires and complex medical incidents require that the other 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. In the critical tasks identified previously, PF&R can perform well in terms of staffing. However, in situations where fire stations are spaced too far apart, such as when one unit must cover another unit’s area or multiple units are needed, these units can be too far away.

Previous critical task studies conducted by Citygate, the National Institute of Standards and Technology (NIST), and NFPA Standard 1710 find that all units must arrive with 17 or more firefighters within 11:30 minutes from the time of call at a residential room-and-contents structure fire to be able to *simultaneously and effectively* perform the tasks of rescue, fire attack, and ventilation.⁷

If fewer firefighters arrive, most likely the search team will be delayed, as will ventilation. The attack lines will only consist of two firefighters, which does not allow for rapid movement above the first-floor deployment. Rescue is conducted with only 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** (*firefighters*) of the attack.

⁷ NIST Technical Note 1661, Report on Residential Fireground Field Experiments (April 2010).

Twenty-six initial firefighters could handle a moderate-risk, confined house fire; however, even an ERF of 26 will be seriously slowed if the fire is above the first floor, in a low-rise apartment building, or in a commercial/industrial building. This is where the capability to add units to the standard response (as PF&R does) becomes important.

The fact that PF&R First Alarm plan (ERF) delivers 26 personnel to a moderate risk building fire reflects PF&R’s goal to confine serious building fires to or near the room of origin. This is a typical desired outcome in built-out areas and requires more firefighters, more quickly than the typical rural outcome of keeping the fire contained to the parcel of origin.

PF&R’s current physical response to building fires is, in effect, PF&R’s de facto deployment measure to built-up urban/suburban areas. Thus, this becomes the baseline policy for the deployment of firefighters.

4.2 DISTRIBUTION AND CONCENTRATION STUDIES – HOW THE LOCATION OF FIRST-DUE AND FIRST-ALARM RESOURCES AFFECTS THE OUTCOME

PF&R is currently served by 31 fire stations fielding engine companies, ladder truck companies, specialty units, and Chief Officers for incident command. It is appropriate to understand what the existing stations do and do not cover, if there are any coverage gaps needing additional 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 stop routine emergencies.
- ◆ Concentration – the clustering of fire stations in proximity of each other so that building fires can receive sufficient resources from multiple fire stations quickly. This is known as the ERF or, more commonly, the First Alarm Assignment.

To analyze first-due fire unit travel time coverage, Citygate used the geographic mapping tool FireView™ to measure theoretical travel time over the street network. For this calculation, Citygate used the base map and street travel speeds calibrated to actual fire company travel times from previous responses to simulate real-world coverage. A second model was built that uses traffic congestion data to slow the fire unit responses at peak traffic periods. Using these tools, Citygate ran several deployment tests and measured impacts on various parts of PF&R’s service area. The first-due unit travel time measure initially used was 4:00 minutes and 8:00 minutes for multiple units over the road network, which is consistent with the benchmark recommendation in NFPA 1710 and desirable outcomes in critical emergencies.

SOC ELEMENT 5 OF 8 **DISTRIBUTION STUDY**

SOC ELEMENT 6 OF 8 **CONCENTRATION STUDY**

In all the geographic information system (GIS) models described, care was taken to add into the model as many of the newest streets as possible. The following described maps can be found in **Volume 2**. Due to Portland’s size, the maps that feature response time coverage (Map Series #3 through #8) have three views—Citywide, east, and west. There is some overlap between east and west views to help maintain orientation. Map Series #3 through #8 also feature a letter designation—a, b, or c—to differentiate between the types of coverage shown—uncongested, congested, or combined (i.e., showing both uncongested and congested). Each Map Series with an “a” designation (e.g., Map #3a) shows uncongested coverage in green street segments in east and west views (not Citywide). Each Map Series with a “b” designation shows traffic-congested coverage, also in green street segments (not Citywide). Each Map Series with a “c” designation shows combined coverage, with traffic-congested coverage in brown street segments overlaid on uncongested green street segments, in east, west, and Citywide views. This is further clarified in the description of Map Series #3 below, with a clear discussion of what the a, b, and c views each show.

4.2.1 Base Maps – Existing Coverage

Map #1 – General Geography and Station Locations

Map #1 shows the existing City fire station locations. This is a reference map for the other maps that follow.

Map #2a – Fire Management Areas

These areas are the primary coverage responsibility for each fire station. In large departments such as Portland they serve as measurement areas for the listing of risks and response times.

Map #2b – Population Density

This map shows the current population densities in the City. Zoning across the communities allows for differing population clusters. For EMS events in particular, population drives 9-1-1 requests for medical assistance. It is important to understand where the highest density areas are in relation to the actual incident demand to be mapped later in this series.

Map #2c – Critical Facilities

Map #2c shows the location of the critical facilities as identified by City records. A hazard occurrence with significant impact severity affecting one or more of these facilities would likely adversely impact critical public or community services and local economics.

Map #3a/b Series – First-Due Unit Distribution: 4:00-Minute Engine Travel

Using green street segments, Map Series #3a shows in east and west views the *distribution* of fire stations per a response goal of a 4:00-minute *travel* time recommended by best practices. Therefore, green indicates the locations an engine could reach within this time *assuming* it is in its

station and encounters no unusual traffic delays. In addition, the computer mapping tool uses actual fire company speed limits per roadway type. Thus, the green projection is realistic for engines with normal traffic conditions.

Given the design of the road network, topographical barriers, and the current fire station locations, it is apparent there are significant gaps in coverage of the public streets when applying a 4:00-minute travel time goal for each station.

Similarly, Map Series #3b shows in east and west views the 4:00-minute travel time coverage; however, green indicates the locations an engine could reach *with reduced travel time coverage at peak morning/evening traffic congestion hours*.

Map #3c Series – First-Due Unit Distribution: 4:00-Minute Engine Travel – Traffic Congestion Combined

Map Series #3c uses brown coverage to represent the reduced travel time coverage at peak morning/evening traffic congestion hours, which is overlaid on green uncongested coverage. This Map Series is shown in Citywide, east, and west views. Severe traffic congestion can hamper fire unit travel time, even with traffic signal preemption technology. The impact is the largest in the more travelled major road and commercial corridors.

The purpose of this geographic mapping is to determine response time coverage across a community's geography to balance station locations. This geographic mapping design is then checked against actual dispatch time data, which reflects real response times. There should be some overlap between station areas so that a second-due unit has a chance of an adequate response time when it covers a call in another fire company's first-due area.

As Section 5 will detail, the *travel* time to 90 percent of the core fire and EMS incidents is 6:13 minutes Department-wide in report year 2020. This is supported by the GIS model that shows that 4:00 minutes for travel does not fully cover the road network, more so during periods of traffic congestion.

Map #3c West – With and Without Station 23

Station 23 was closed prior to this study. Since November 2017, Station 23 has had one engine on B-shift and since November 11, 2019, it has had a two-firefighter Rapid Response Vehicle (RRV). Since there has not been a firefighting engine in this station, these two maps show the 4:00-minute fire engine coverage with and without an engine. As can be seen without an engine, there is a significant coverage gap for first-due firefighting.

Map #3d Citywide – First-Due Unit Distribution: 4:00- vs. 5:00-Minute Engine Travel

Map #3d shows the 4:00-minute first-due unit coverage featured in Map #3 Series A, using green street segments overlaid on 5:00-minute first-due unit coverage in purple. The impact of 5:00-minute travel is significant, as will be further discussed in Section 4.2.3.

Map #4 Series – ISO 1.5-Mile Travel Coverage Areas

This map set displays the Insurance Services Office (ISO) requirement that stations cover a 1.5-mile *distance* response area. Depending on the road network in an agency, 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 more conservative ISO coverage also does not cover all the public road miles and has many of the same gaps as the 4:00-minute travel time model. In other areas, the ISO coverage is slightly better than the 4:00-minute travel time model. This is likely due to traffic congestion, traffic calming, and topography challenges.

Map #5 Series – Citywide Residential Building Fire – ERF – 8:00-Minute Travel Concentration (First Alarm)

The first map set in Map Series #5 (Map #5a–#5c) shows the *concentration*, or massing, of fire crews for serious fire or rescue calls. Building fires require 17 or more firefighters to a house fire or 28 personnel to a smaller commercial building fire (per NFPA 1710⁸) arriving within a reasonable time frame to work together and effectively stop the escalation of an emergency. Otherwise, if too few firefighters arrive, or if they arrive too late in the fire’s progress, the result is a greater-alarm fire, which is more dangerous to the public and the firefighters.

The concentration map displays PF&R’s ability to initially send a *minimum* of four engines, two ladder trucks, and two Battalion Chief units to residential building fires within an 8:00-minute travel time (11:30 minutes from 9-1-1 dispatch receipt). This measure ensures that a *minimum* of 26 personnel (four firefighters per engine and ladder truck, plus two command chiefs) can arrive on scene to work *simultaneously* and effectively to begin to stop the spread of a serious building fire.

This map set shows in green where PF&R’s current fire station system should deliver the ERF. The dark brown color is the smaller coverage due to traffic congestion. As can be seen, delivering this coverage is quite challenging, except where the “core stations” can respond inward to the center of a multiple-station area. There is not even uncongested coverage east of Station 19.

The limiting factor in this coverage is the second ladder truck and second Battalion Chief. The rest of Map Series #5 (Map #5d–#5f) measures the coverage with only one ladder truck and chief

⁸ NFPA 1710, 2020 Edition, Section 5.2.4.1.1.

officer. This can be considered an *initial* ERF and could still deliver 21 personnel in 8:00 minutes of travel time.

As can be seen, in both congested and uncongested models, the uncongested coverage is much improved Citywide, except for Stations 29 and 31. The congested coverage is better than the full ERF model and does cover the most populated areas of the City.

The next three map series will show the ERF coverage by separate unit type: engines, ladders, and chiefs.

Map #6 Series – Four-Engine ERF Coverage – 8:00-Minute Travel

This map set shows the streets covered in an 8:00-minute travel time by only the four engines from the Map #5 series. The uncongested coverage is substantial except for the hard-to-serve corners of the City which have multiple units.

The congested coverage as before, materially lowers the coverage.

Map #7 Series – Ladder Trucks – 8:00-Minute Travel

This map set shows the combined two- and single-ladder truck coverage from the residential fire ERF Map #5a set. The uncongested single ladder truck coverage is still not complete in the southwest and southeast sections of the City. The congested single- and two-ladder truck coverage area is very limited.

Map #8 Series – One Battalion Chief – 8:00-Minute Travel

This map set shows that when two Battalion Chiefs are needed, during both normal and congested traffic, there is significant reduction to the chief officer coverage to only the downtown areas. The single Battalion Chief coverage is better than the single ladder truck coverage due to the locations of the chief officers.

Map #9 – All Incident Locations

This map shows the exact location for all incident types across a five-year period. It is apparent that there is a need for fire services on almost every developed street segment of the service area. This incident plot and the others to follow also show where PF&R units respond outside of its area on regional mutual aid incidents.

Map #10 – Emergency Medical Services and Rescue Incident Locations

This map shows only the emergency medical and rescue call locations. With most of the calls for service being emergency medical, virtually all areas of the City need emergency medical services coverage.

Map #11 – All Fire Type Locations

This map identifies the location of all fires in the City for the five-year assessment period. All fires include any type of fire call, from auto to dumpster to building. There are obviously fewer fires than medical or rescue calls. Even given this, it is evident that all first-due engine districts experience fires although the fires are more concentrated where the buildings are older or more densely spaced due to zoning and historic growth. Major road arterials can also be seen due to the occurrence of vehicle fires.

Map #12 – Structure Fire Locations

This map shows all structure fire locations. While the structure fire quantity is a smaller subset of the total fire quantity, there are two meaningful findings from this map. First, there are still structure fires in every fire station district. The location of many of the building fires parallels the areas where it is more common to find older and higher-risk building types. These areas and buildings pose a significant fire- and life-loss risk to the communities. Second, fires in the more complicated building types must be controlled quickly or the losses can be very large; thus, again, the core area must have an available, effective multiple-unit response capacity.

Map #13 – Wildland Fire Densities

This map shows wildland fires separately, similar to how structure fires were shown. While the more serious wildfires have occurred in the more rugged terrain areas of the City, many station areas experience wildfires year over year.

Map #14 – Emergency Medical Services and Rescue Incident Location Densities

This map examines by mathematical density where clusters of EMS incident activity occurred. The darkest color plots the highest concentration of all incidents and shows the location of frequent workload, which is more meaningful than simply mapping the locations of all EMS incidents as was done for Map #10.

This perspective is important because the deployment system must include an overlap of units to ensure the delivery of multiple units when needed for serious incidents or to handle simultaneous calls for service. It is obvious there are multiple areas that generate a much higher demand for emergency medical services. Therefore, crew workload planning must consider actual incident demand by hour, not just population density in general.

Map #15 – All Fire Location Densities

This map is like Map #11 but shows the hot spots of activity for all types of fires. As with EMS incidents, fire density is more concentrated in the higher populated, most developed, older areas of the City.

Map #16 – Structure Fire Densities

This map shows only the building fire workload by density. While the density is greater in the oldest areas, each battalion has smaller clusters of structure fires in a three-year period, pointing to the need for a successful ERF to building fires in every battalion.

Map #17 – Wildland Fire Densities

This map shows the wildland fire workload by density. While smaller in total count than building fires, importantly, many are in the western hills, with a high risk for wildfire. In these areas, the fires must be suppressed quickly during dangerous fire weather, or they become catastrophic events.

Map #18 – EMS Acuity Census Tracts Map

Citygate teamed with the EMS system medical director and staff to obtain clinical treatment data on the EMS incidents over the same five data years as used for the fire crew analysis. The clinical data was then broken down into treatment type categories by small census tract areas. The analysis was to determine how many low-acuity incidents there are Citywide and if there are pockets of very low- or very high-acuity demand to which the response system can be engineered. The results verified that there are many low-acuity patients and there are small clusters of high-volume, low-acuity demand, as featured in Map #18 in red, yellow, blue, and grey shaded areas. This analysis is discussed further in Section 6.1.

4.2.2 Coverage Scenarios for Growth Areas

Given the 4:00-minute travel time coverage gaps of the existing station network, as evidenced in both the normal and congested travel maps and the historical incident response travel time records in Section 5, Citygate worked with Portland’s GIS staff to map the planned growth areas.

Maps #19/20 – Population Growth

Citygate took all the future growth and statistically found where the “mean” growth was occurring. We then plotted higher-than-average growth areas past the mean at 1.5 to 2.5 standard deviations. Map #19 shows, by census block grouping, the areas to experience the most resident population growth. Map #20 overlays the current first-due fire unit travel time coverage at 4:00 minutes.

All the stations in these high growth areas are already the busiest, most overworked in the City. Over the years as the growth occurs, unless non-acute EMS is provided by personnel other than firefighters, these fire stations and/or areas will need additional responding units.

4.2.3 Road Mile Coverage Measures

In addition to the visual views of coverage provided by maps, the GIS software allows the miles of public streets covered at 4:00, 5:00, or 8:00 minutes to be measured. The following table provides these metrics to compare the existing normal coverage to congested coverage.

Table 9—Road Mile Coverage First Due and ERF

Travel Time Measure	Total Public Road Miles	Miles Covered Non-Congested	Percent of Total Miles Covered	Miles Covered Congested	Percent of Total Miles Covered	Net Percent Loss Due to Congestion
4:00-Minute 1 st -Due	3,287	1,862	57%	1,322	40%	29%
5:00-Minute 1 st -Due	3,287	2,602	79%	2,138	65%	18%
8:00-Minute ERF ¹	3,287	1,892	58%	668	20%	65%
8:00-Minute ERF ²	3,287	943	29%	138	4%	85%

¹ ERF = 4 Engines, 1 Truck, 1 Battalion Chief.

² ERF = 4 Engines, 2 Trucks, 2 Battalion Chiefs.

The current fire station spacing for first-due units only covers 57 percent of the City’s public road miles. The fire station spacing in the center and eastern City is just too large. This dynamic was created decades ago as areas were annexed including fire district stations. But as growth occurred, no improvements were materially made. At present, traffic congestion, and more curvilinear streets rather than a right-angle grid system, contribute to a traffic congestion coverage of only 40 percent.

- ◆ As for multiple-unit ERF coverage, the coverage is even weaker at 29 percent for uncongested and it falls to four percent for congested—for all four engines, two trucks, and two Battalion Chiefs.
- ◆ However, the effect of using a **5:00**-minute travel time goal is *significant*. The first-due unit coverage increases to 79 percent and congested only falls to 65 percent.
- ◆ The existing fire station network is *weak* in many sections of the City, outside of the downtown core areas.

4.2.4 Closed Fire Station 23 Analysis

As Map #3c shows, the closure of Station 23 at this site has opened a significant gap in fire engine coverage. Squads, rescues, and aerial ladder trucks do not provide firefighting water and on building fires a delay in this can be critical. As the population density map shows (Map #2b), there is a significant population per square mile. In total, in Fire Station Area 23 (known as Fire

Management Area or FMA⁹) there are approximately 11,886 residents and during daytime, 16,422 employees. There are a total of 5,015 buildings with an assessed valuation of \$1.8 billion.

During the five data years of this study, FMA 23 needed 4,906 fire engine responses. While many responses were EMS, there were 150 building fires in the five years, for an average of three per month. There were another 398 fires of all types.

4.2.5 GIS Mapping Findings

- | | |
|--------------------|--|
| Finding #2: | There are significant gaps in coverage of the public streets within a 4:00-minute travel time of a station. |
| Finding #3: | With Fire Station 23 closed, there is a significant coverage gap for first-due firefighting, as the travel time, population density, and historical incident demand all identify. |
| Finding #4: | Delivering Effective Response Force coverage is quite challenging, except where the “core stations” can respond inward to the center of a multiple-station area. There is no <i>uncongested</i> Effective Response Force coverage east of Station 19. |
| Finding #5: | The uncongested single ladder truck coverage is still not complete in the southwest and southeast sections of the City. The congested single- and two-ladder truck coverage area is even more limited. |
| Finding #6: | The higher concentrations of added residential growth all occur near the busiest, most overworked fire stations in the City. Over the years as the growth occurs, unless non-acute EMS is provided by personnel other than firefighters, these Fire Management Areas (FMAs) will need additional responding units. |

⁹ For this assessment, Citygate utilized 31 planning zones corresponding with established City Fire Management Areas (FMA) and fire station first-due response areas.

Finding #7: The current fire station spacing for first-due units only covers 57 percent of the City’s public road miles. The fire station spacing in the center and eastern City is just too large. As for multiple-unit Effective Response Force coverage, the coverage is even weaker at 29 percent for uncongested and falls to four percent for congested—when all four engines, two trucks, and two Battalion Chiefs are needed.

Finding #8: The existing fire station coverage is *weak* in many sections of the City, outside of the downtown core areas. However, the impact of using a **5:00**-minute travel time goal is *significant*. The first-due unit uncongested coverage increases to 79 percent and congested only falls to 65 percent which is still better than the 4:00-minute *uncongested* coverage.

Section 5

Statistical Analysis



R.J. TEMPLETON ASSOCIATES
Manufacturers' Representatives
C PW
COMMERCIAL PARTS
WAREHOUSE

SECTION 5—STATISTICAL ANALYSIS

5.1 HISTORICAL EFFECTIVENESS AND RELIABILITY OF RESPONSE – WHAT STATISTICS SAY ABOUT THE EXISTING SYSTEM PERFORMANCE

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

The maps described in Section 4 show the GIS-projected response coverage given perfect conditions with no competing calls and units all in place. Examination of the actual response time data provides a picture of coverage in the real world of simultaneous calls, rush hour traffic conditions, units out of position, and delayed travel time

for events such as periods of severe weather.

5.1.1 Data Set Identification

The City provided records management system (RMS) apparatus response data for the period of January 1, 2016, through December 31, 2020. This data was converted into unique incidents for the purpose of this study. Over the five years of the study, there were 433,787 unique fire incidents recorded in the RMS.5.1.2 Analysis Period and Data Organization.

For this analysis, data was assembled into the following five calendar years:

- ◆ 2016
- ◆ 2017
- ◆ 2018
- ◆ 2019
- ◆ 2020

For purposes of this analysis, local incidents were associated with 31 fire stations. These fire stations were organized into four battalions. The following table shows the battalions and the stations assigned to each battalion.

Table 10—Battalion Assignment of Each Fire Station

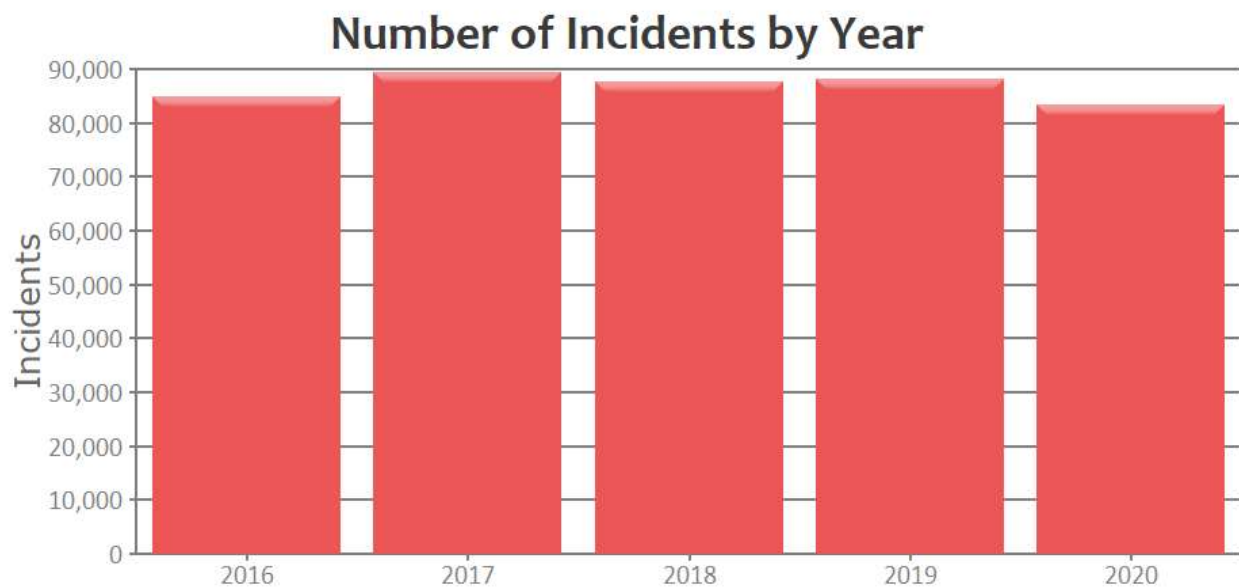
Battalion	Assigned Stations
Battalion 1	Stations 3, 4, 5, 10, 15, 16, 18, 27
Battalion 2	Stations 6, 8, 14, 17, 21, 22, 24, 26
Battalion 3	Stations 2, 7, 11, 19, 29, 30, 31
Battalion 4	Stations 1, 9, 12, 13, 20, 23, 25, 28

5.2 SERVICE DEMAND

In 2020, PF&R responded to 83,358 incidents, which equates to a daily demand of 228 incidents; 4.55 percent were fire incidents, 54.86 percent were EMS incidents, and 40.59 percent were other incident types. During this same period, there were 105,782 apparatus responses by PF&R and other agencies for an average of 1.27 apparatus responses per incident.

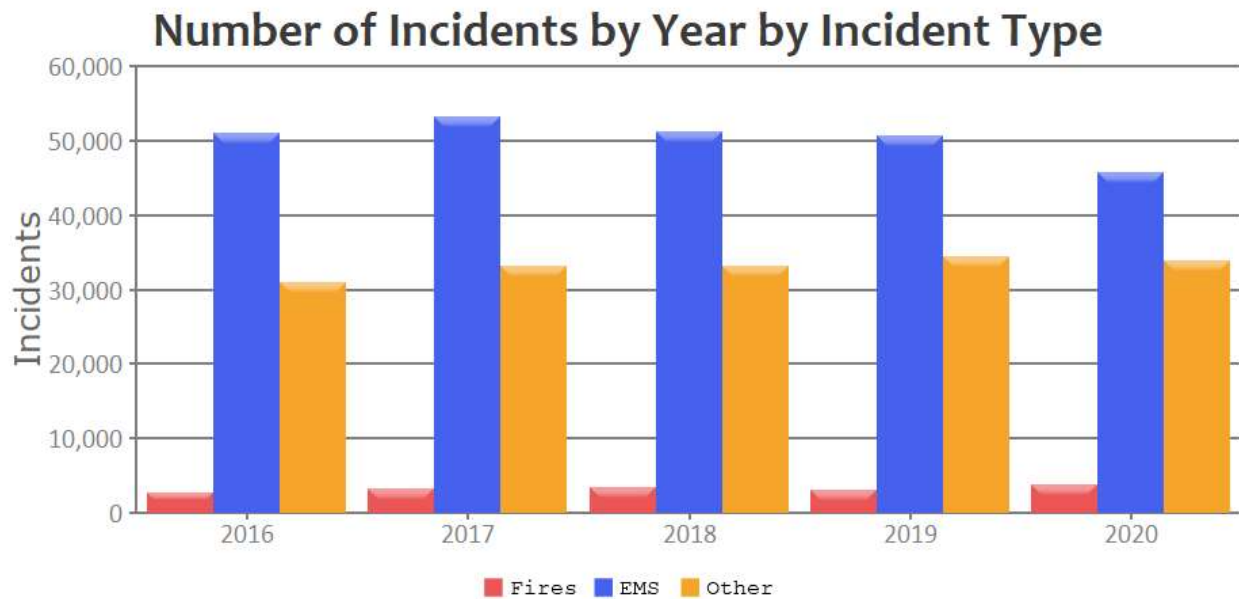
The following figure shows that over the past five years PF&R has remained well above 80,000 incidents per year, with a high reached in 2017.

Figure 2—Number of Incidents by Year



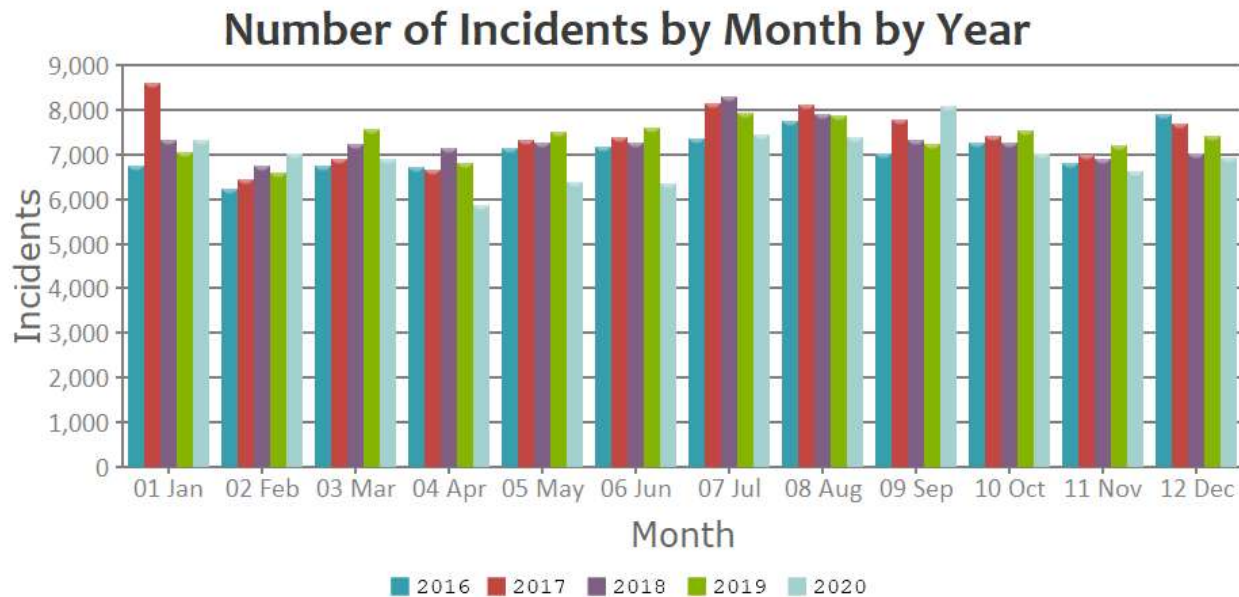
The following figure illustrates the number of incidents by incident type. In 2020, because of a realignment with call types, PF&R saw a significant reduction in the number of EMS incidents. Over the last two years, fires grew from 3,139 in 2019 to 3,792 in 2020. Both movements are largely attributable to the separate issues of COVID-19 and policing protests.

Figure 3—Number of Incidents by Year by Incident Type



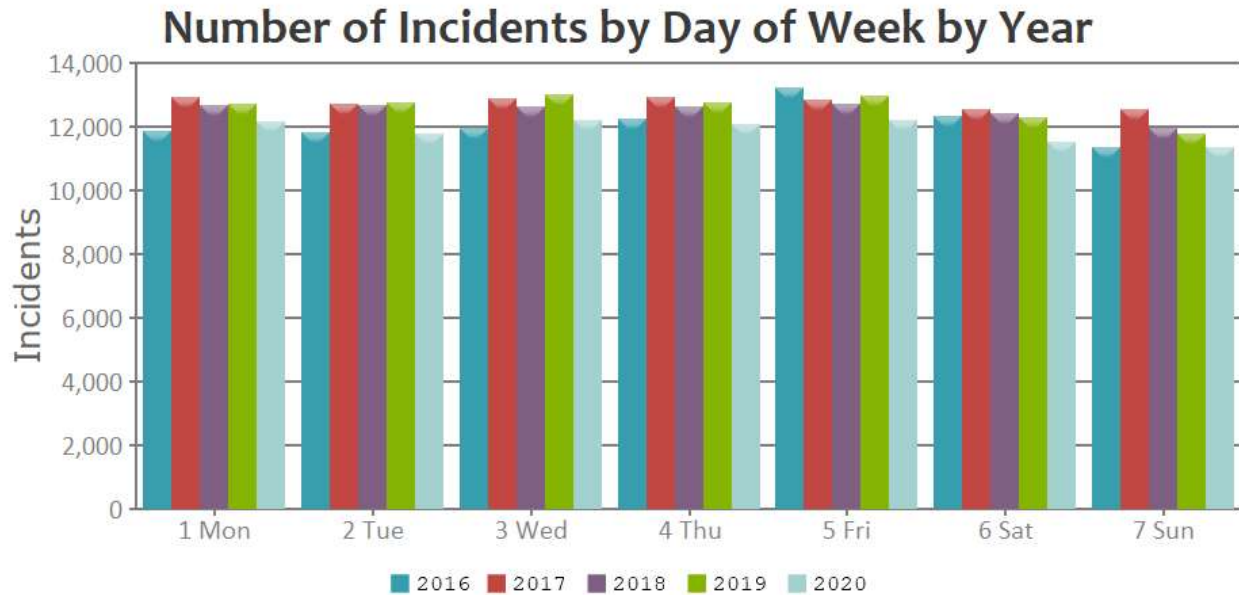
The following figure shows the number of incidents by month by year. The number of incidents tends to be consistent month to month, with a slight increase in activity in the summer.

Figure 4—Number of Incidents by Month by Year



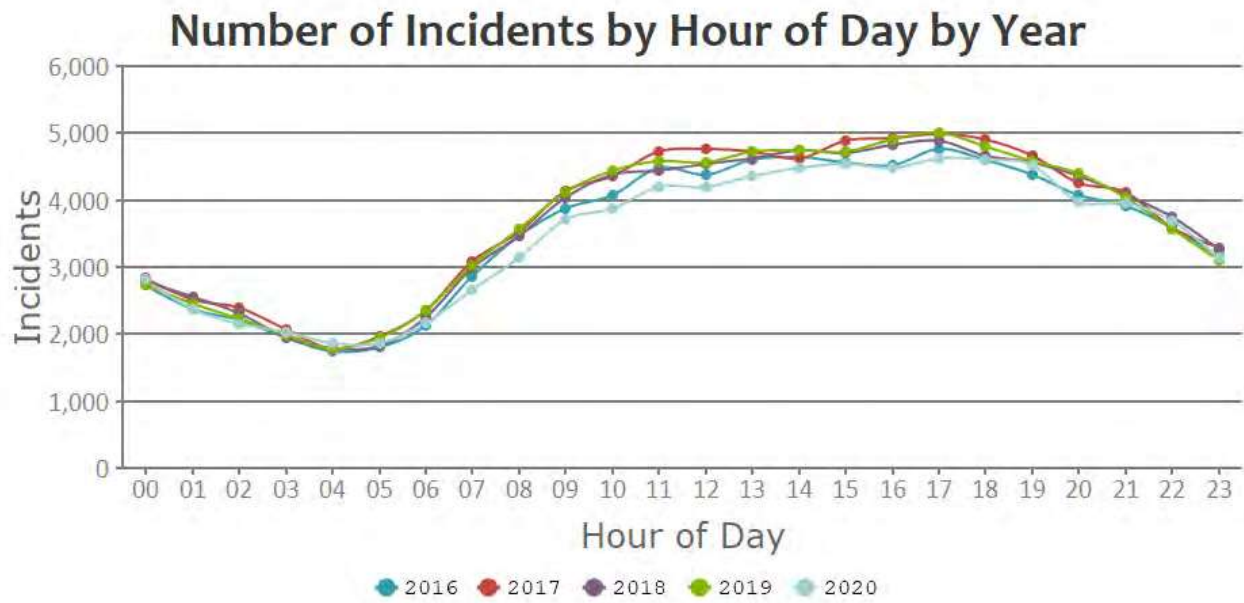
The following figure shows the number of incidents by day of week by year. The number of incidents by day of week tends to be steady, with a slight increase on Friday and Thursday and a slight decrease on Sunday.

Figure 5—Number of Incidents by Day of Week by Year



The following figure breaks down incidents by hour of the day by year. There is only a slight variance in annual hourly volume, with 2020 showing a measurable decrease during business hours (likely due to COVID-19).

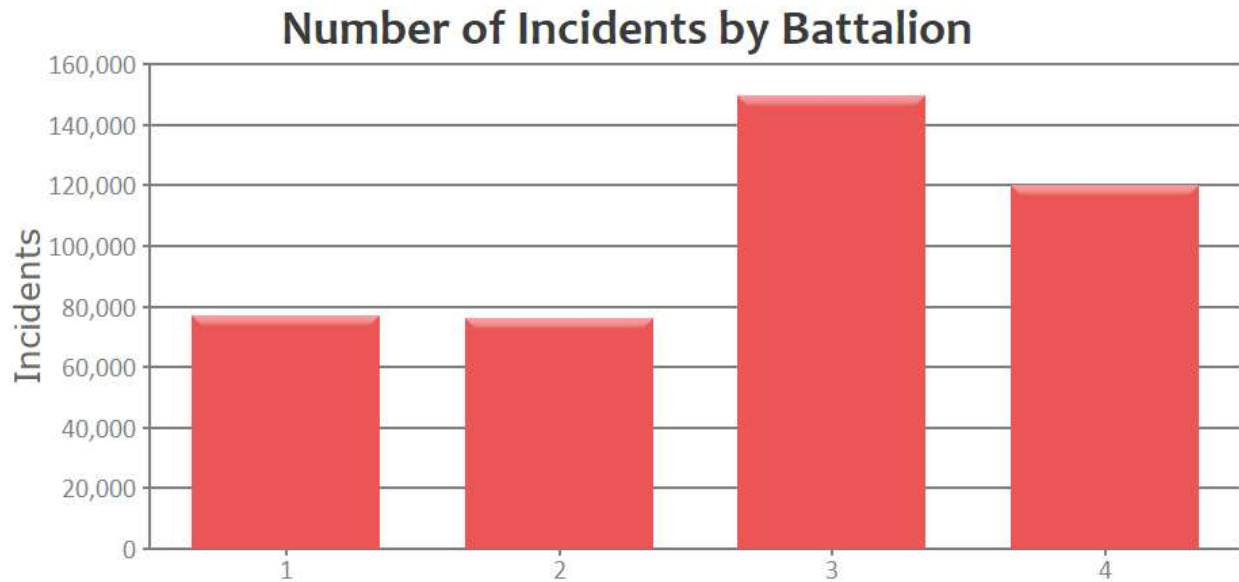
Figure 6—Number of Incidents by Hour of Day by Year



Finding #9: PF&R’s time-of-day, day-of-week, and month-of-year calls for service demands occur in consistent, predictable patterns. PF&R’s service demand is always sufficiently high in all areas, requiring an all-day, year-round response system.

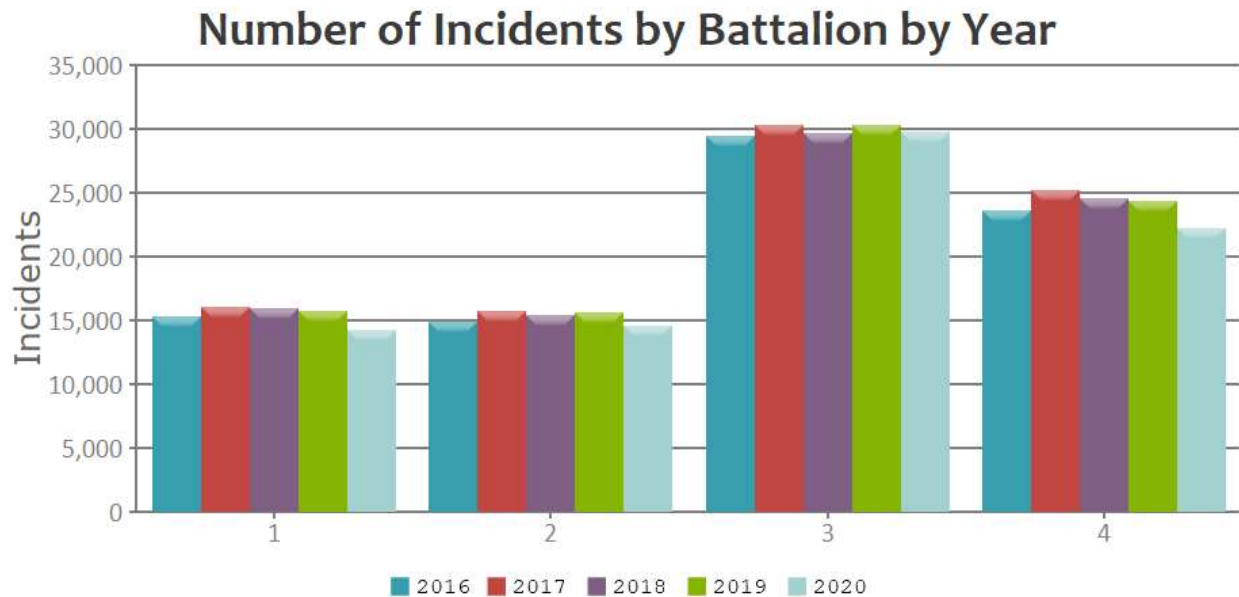
The following figure illustrates the number of incidents by battalion for the five-year study period. Battalion 3 had the highest volume of activity. Battalions 1 and 2 had the lowest volumes.

Figure 7—Number of Incidents by Battalion



The following figure breaks down the number of incidents by battalion by year. Battalion 4 had the largest decrease in incident activity in 2020.

Figure 8—Number of Incidents by Battalion by Year



The following table illustrates the number of incidents by station. While there were 433,787 incidents in the five-year study period, there were 422,924 incidents that occurred within local

PF&R station areas. The most active stations are listed first. Stations 1 and 7 have the highest incident activity. Station 7 in the southeastern City has too large an area for one station and it also houses the cross-staffed hazardous materials specialty response apparatus.

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Table 18—Incident Quantity – by Station by Year

Station	2016	2017	2018	2019	2020	Total
Station 01	7,757	8,308	7,566	6,961	5,982	36,574
Station 07	7,028	7,196	6,948	7,078	7,048	35,298
Station 04	4,889	5,322	5,446	5,526	4,632	25,815
Station 03	4,946	5,351	5,350	5,211	4,633	25,491
Station 13	4,683	4,971	5,165	5,166	4,827	24,812
Station 11	4,810	5,075	4,763	4,992	4,885	24,525
Station 31	3,852	3,958	4,052	4,051	3,709	19,622
Station 30	3,441	3,486	3,494	3,421	3,634	17,476
Station 25	3,337	3,405	3,440	3,539	3,316	17,037
Station 19	3,449	3,390	3,330	3,392	3,276	16,837
Station 14	2,897	2,927	2,720	2,906	2,748	14,198
Station 12	2,563	2,937	2,886	2,905	2,759	14,050
Station 09	2,665	2,877	2,741	2,945	2,651	13,879
Station 28	2,407	2,568	2,611	2,655	2,648	12,889
Station 24	2,195	2,427	2,429	2,503	2,257	11,811
Station 29	2,186	2,222	2,265	2,365	2,361	11,399
Station 21	2,164	2,458	2,366	2,253	1,821	11,062
Station 22	2,098	2,207	2,174	2,056	2,053	10,588
Station 08	2,066	2,120	2,095	2,043	2,084	10,408
Station 02	2,122	2,062	1,977	2,111	2,083	10,355
Station 18	2,070	1,930	1,902	1,914	1,783	9,599
Station 20	1,575	1,754	1,832	1,938	1,703	8,802
Station 26	1,707	1,723	1,669	1,793	1,680	8,572
Station 17	1,353	1,428	1,510	1,601	1,533	7,425
Station 23	1,160	1,324	1,173	1,199	1,154	6,010
Station 05	1,216	1,275	1,166	1,172	1,103	5,932
Station 16	793	751	733	700	651	3,628
Station 10	596	558	559	557	579	2,849
Station 15	517	574	515	442	588	2,636
Station 06	388	405	414	456	415	2,078
Station 27	268	268	252	228	251	1,267
Total	83,198	87,257	85,543	86,079	80,847	422,924

5.2.1 Incident Quantities by Incident Types

The following table ranks incidents by incident quantity and type. EMS incidents rank strongly. Incidents cancelled en route also rank high on the list. Building fires rank in nineteenth place by volume.

Table 11—Incident Quantity by Year by Incident Type – Greater Than 500 Count

Incident Type	2016	2017	2018	2019	2020	Total
300 Rescue, emergency medical call (EMS) call, other	28,233	27,748	24,922	23,346	16,474	120,723
311 Medical assist, assist EMS crew	11,300	12,911	13,012	13,993	14,882	66,098
321 EMS call, excluding vehicle accident with injury	9,040	10,279	11,172	11,031	12,352	53,874
611 Dispatched and canceled en route	9,622	10,495	9,918	10,584	9,427	50,046
700 False alarm or false call, other	2,007	2,302	2,383	2,445	2,777	11,914
600 Good intent call, other	2,004	2,315	2,368	2,592	2,579	11,858
561 Unauthorized burning	748	948	1,177	1,434	2,078	6,385
740 Unintentional transmission of alarm, other	1,033	997	1,071	1,204	1,120	5,425
324 Motor vehicle accident no injuries	1,026	1,043	1,004	1,122	973	5,168
743 Smoke detector activation, no fire – unintentional	1,159	1,186	1,032	915	781	5,073
531 Smoke or odor removal	831	833	919	784	717	4,084
500 Service call, other	776	766	810	745	853	3,950
150 Outside rubbish fire, other	719	735	820	656	602	3,532
554 Assist invalid	990	501	698	560	473	3,222
322 Vehicle accident with injuries	771	642	579	648	516	3,156
745 Alarm system sounded, no fire – unintentional	627	654	581	625	508	2,995
552 Police matter	542	594	564	534	543	2,777
111 Building fire	484	532	497	431	456	2,400
463 Vehicle accident, general cleanup	536	498	479	420	381	2,314
151 Outside rubbish, trash or waste fire	244	397	422	534	715	2,312
510 Person in distress, other	406	500	445	479	452	2,282
622 No incident found on arrival of incident address	242	277	442	605	615	2,181
553 Public service	413	472	452	437	349	2,123
733 Smoke detector activation due to malfunction	364	432	368	378	353	1,895
550 Public service assistance, other	271	353	432	403	394	1,853

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Incident Type	2016	2017	2018	2019	2020	Total
444 Power line down	555	414	231	238	353	1,791
651 Smoke scare, odor of smoke	214	290	365	336	404	1,609
631 Authorized controlled burning	192	237	279	365	451	1,524
154 Dumpster or other outside trash receptacle fire	233	250	309	279	435	1,506
131 Passenger vehicle fire	303	298	289	260	351	1,501
744 Detector activation, no fire – unintentional	316	297	262	269	224	1,368
160 Special outside fire, other	195	217	268	255	300	1,235
735 Alarm system sounded due to malfunction	230	265	227	231	232	1,185
671 Hazmat release investigation w/ no hazmat	219	264	202	237	254	1,176
412 Gas leak (natural gas or LPG)	240	243	220	225	190	1,118
520 Water problem, other	170	250	193	192	197	1,002
730 System malfunction, other	201	215	161	201	205	983
511 Lock-out	209	218	200	193	153	973
661 EMS call, party transported by non-fire agency	240	220	198	163	125	946
100 Fire, other	140	165	138	181	168	792
323 Motor vehicle/pedestrian accident (MV Ped)	153	144	162	163	123	745
353 Removal of victim(s) from stalled elevator	133	150	148	176	135	742
142 Brush, or brush and grass mixture fire	113	135	162	122	134	666
652 Steam, vapor, fog or dust thought to be smoke	119	119	135	131	129	633
381 Rescue or EMS standby	88	142	93	117	178	618
900 Special type of incident, other	97	114	114	144	133	602
400 Hazardous condition, other	151	132	104	105	96	588
736 CO detector activation due to malfunction	97	83	111	140	129	560
522 Water or steam leak	106	145	98	97	92	538
911 Citizen complaint	83	58	70	89	236	536
551 Assist police or other governmental agency	114	117	90	94	91	506

5.2.2 Simultaneous Analysis

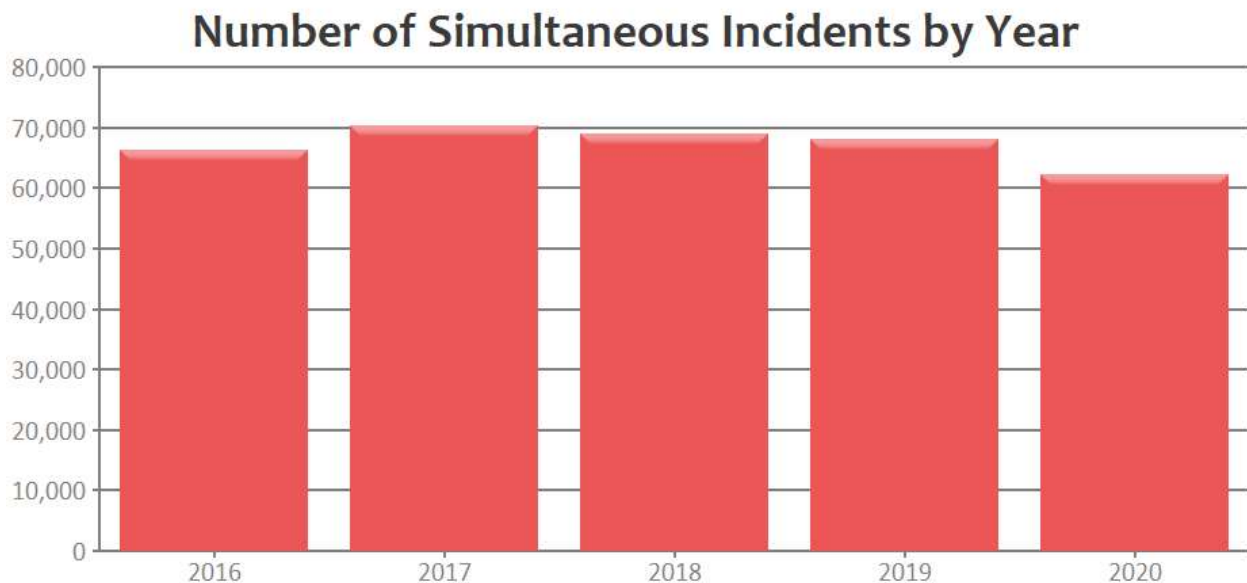
Simultaneous incidents occur when other incidents are underway at the time a new incident begins. During 2020, about 75 percent of the City’s incidents occurred while one or more other incidents were underway. The following table shows the percentage of simultaneous incidents broken down by number of simultaneous incidents.

Table 12—Percentages of Simultaneous Incidents by Number of Simultaneous Incidents – 2020

Number of Simultaneous Incidents	Percentage
1 or more	74.74%
2 or more	58.35%
3 or more	39.27%
4 or more	23.06%
5 or more	12.00%
6 or more	5.66%
7 or more	2.50%
8 or more	1.13%
9 or more	0.58%

The following figure shows the number of simultaneous incidents varying year by year.

Figure 9—Number of Simultaneous Incidents by Year



In a metropolitan fire department, simultaneous incidents in different station areas 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 table illustrates the number of single-station simultaneous incidents by station area by year. Station 7 (*Hazardous Materials Apparatus*) and Station 1 had the most single-station simultaneous incidents over the five-year study. Station 27 had the fewest.

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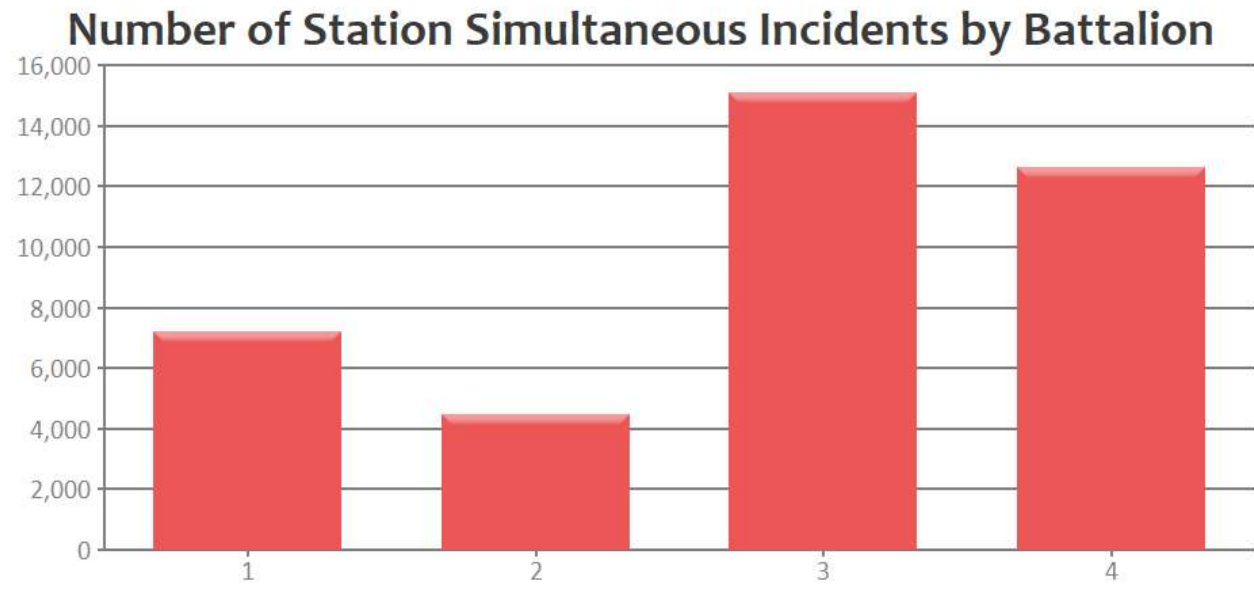
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Table 13—Number of Single-Station Area Simultaneous Incidents by Station by Year

Station	2016	2017	2018	2019	2020	Total
Station 7	1,126	1,253	1,098	1,122	1,008	5,607
Station 1	1,129	1,307	1,103	907	711	5,157
Station 13	610	676	711	692	568	3,257
Station 3	604	705	708	684	513	3,214
Station 4	549	643	700	654	423	2,969
Station 11	510	612	516	533	560	2,731
Station 25	286	332	282	331	294	1,525
Station 19	357	313	267	291	244	1,472
Station 31	169	207	402	378	311	1,467
Station 30	282	306	294	276	289	1,447
Station 14	264	259	215	224	183	1,145
Station 9	210	243	239	217	215	1,124
Station 12	159	236	206	199	171	971
Station 28	183	172	198	176	186	915
Station 22	177	178	164	136	136	791
Station 24	139	164	146	153	126	728
Station 29	132	141	133	164	146	716
Station 2	145	157	125	143	145	715
Station 18	127	122	109	111	99	568
Station 8	125	97	103	81	119	525
Station 21	97	134	109	95	69	504
Station 20	93	109	81	106	94	483
Station 26	87	87	79	85	79	417
Station 17	63	63	90	84	65	365
Station 5	58	55	38	44	35	230
Station 23	30	59	36	29	38	192
Station 16	26	26	17	20	11	100
Station 10	16	10	20	14	9	69
Station 15	17	14	6	3	17	57
Station 6	8	6	4	7	3	28
Station 27	4	3	1	2	4	14
Total	7,782	8,689	8,200	7,961	6,871	39,503

The following figure illustrates the number of single-station simultaneous incidents for the five years of this study, grouped by battalion. Battalion 3 had the greatest number of single-station simultaneous incidents. While Battalions 1 and 2 had similar overall call volumes, Battalion 2 had far fewer single-station simultaneous incidents.

Figure 10—Number of Single-Station Simultaneous Incidents by Battalion – 2020



Finding #10: Battalions 3 and 4 have the greatest number of single-station simultaneous incidents. This is one of the reasons travel times are remaining longer than desired.

5.2.3 Station Demand Percentage – *Fire and EMS Incidents Only*

The following table, which only reflects local fire station incidents, summarizes 2020 activity percentages by station. The percentage listed is the percentage of likelihood that a particular station is involved in an incident at any given hour. This number considers not only the number of incidents but also the duration of those incidents. Only the top 10 busiest stations are listed.

Table 14—Station Hour Demand – 10 Busiest Fire Stations – 2020

Hour	Station 7	Station 1	Station 13	Station 11	Station 3	Station 4	Station 31	Station 30	Station 25	Station 19
00:00	14.51%	10.44%	12.94%	11.34%	10.74%	11.38%	10.14%	6.97%	7.90%	5.82%
01:00	18.19%	11.59%	8.54%	8.16%	7.38%	17.56%	7.03%	5.61%	6.06%	5.38%
02:00	12.67%	10.84%	6.60%	8.74%	6.63%	6.01%	7.63%	6.45%	7.22%	6.38%
03:00	10.01%	11.12%	8.25%	7.28%	11.48%	6.48%	5.73%	4.37%	5.52%	4.48%
04:00	10.30%	7.66%	7.56%	10.07%	7.11%	7.08%	5.01%	5.87%	5.58%	5.26%
05:00	9.78%	7.76%	7.43%	8.03%	6.41%	4.83%	5.94%	5.06%	5.02%	7.26%
06:00	9.90%	7.93%	8.72%	6.47%	6.18%	8.83%	7.33%	4.79%	6.62%	5.12%
07:00	13.49%	10.30%	9.42%	10.59%	9.04%	8.49%	7.65%	5.99%	7.16%	6.96%
08:00	17.43%	13.15%	12.48%	10.77%	12.69%	10.30%	9.88%	8.71%	8.34%	8.09%
09:00	20.13%	12.67%	13.02%	15.47%	16.30%	12.93%	13.08%	10.56%	9.67%	10.41%
10:00	22.64%	13.40%	15.44%	15.18%	13.35%	10.63%	9.90%	10.78%	9.96%	10.33%
11:00	20.86%	14.40%	15.09%	14.44%	14.56%	14.96%	12.42%	11.88%	12.11%	10.83%
12:00	20.02%	15.96%	16.80%	14.42%	15.77%	14.20%	12.65%	12.57%	10.50%	13.13%
13:00	23.14%	15.45%	16.32%	14.79%	15.20%	16.16%	13.87%	12.99%	10.70%	10.09%
14:00	23.02%	15.92%	17.37%	16.49%	15.03%	14.28%	12.78%	17.98%	11.24%	11.76%
15:00	24.01%	16.78%	16.16%	16.54%	15.66%	13.68%	14.35%	14.35%	13.38%	11.72%
16:00	24.00%	17.61%	18.06%	17.04%	16.52%	13.68%	14.83%	13.26%	12.70%	13.56%
17:00	24.87%	20.04%	17.38%	18.62%	14.89%	12.38%	14.25%	13.30%	12.64%	10.48%
18:00	23.96%	31.83%	16.59%	18.64%	15.63%	14.83%	15.51%	11.65%	14.13%	13.10%
19:00	20.66%	21.63%	18.48%	16.87%	18.33%	13.66%	13.85%	11.74%	11.41%	11.28%
20:00	23.75%	16.71%	16.45%	16.94%	14.65%	12.70%	12.95%	11.40%	11.24%	10.79%
21:00	17.51%	15.79%	17.96%	15.00%	13.59%	14.95%	12.91%	12.44%	10.33%	9.87%
22:00	19.81%	17.81%	15.09%	13.56%	13.42%	11.75%	10.56%	12.18%	9.59%	11.01%
23:00	17.91%	13.08%	11.79%	10.17%	10.39%	10.65%	8.55%	7.17%	7.78%	8.35%

5.2.4 Unit-Hour Utilization

The unit-hour utilization (UHU) percentage for apparatus is calculated by two primary factors: the number of responses and the duration of responses.

What should the maximum utilization percentage on a firefighting unit be? When crews on a 24-hour shift must also pay attention to apparatus checkout, station duties, training, public education, paperwork, as well as required physical training and meal breaks, Citygate believes the maximum

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commitment UHU per hour across the normal workday should not exceed 30 percent. Beyond that, the most important duty to suffer will be training hours and employee health and wellness.

For a dedicated unit, such as an ambulance or low-acuity unit *working less than* a 24-hour shift, UHU can rise to 40 to 50 percent at a maximum. At that UHU level, Peak Activity Units (PAUs) must then have additional duty days specifically for training, during which they are not responding to incidents, to meet their annual requirements for continuing education and training hours. The following table summarizes UHU for the 10 busiest PF&R engine companies. The busiest engines are listed first.

Table 15—Unit-Hour Utilization – 10 Busiest Engine Companies – 2020

Hour	E19	E11	E07	E13	E03	E28	E04	E31	E12	E01
00:00	9.16%	10.94%	9.48%	11.73%	9.50%	7.27%	10.23%	10.17%	6.80%	8.29%
01:00	7.29%	8.05%	14.49%	8.34%	10.49%	4.42%	29.63%	5.83%	5.90%	9.12%
02:00	8.59%	10.08%	8.13%	6.42%	5.96%	7.10%	6.56%	7.28%	5.46%	7.07%
03:00	6.14%	6.86%	6.76%	5.87%	6.87%	4.04%	5.37%	4.81%	4.33%	6.64%
04:00	7.26%	9.10%	5.53%	5.12%	5.31%	4.58%	4.08%	6.09%	5.51%	5.70%
05:00	10.28%	7.45%	5.23%	6.17%	6.19%	4.39%	4.94%	6.70%	5.35%	6.00%
06:00	7.17%	7.76%	6.35%	6.01%	5.89%	5.22%	7.43%	6.17%	5.70%	6.05%
07:00	8.82%	8.88%	7.31%	7.78%	7.59%	7.23%	6.23%	6.08%	6.41%	6.51%
08:00	10.76%	9.37%	10.54%	10.12%	7.21%	11.23%	7.10%	8.17%	8.53%	8.33%
09:00	12.19%	13.97%	12.60%	8.32%	10.38%	8.57%	9.84%	9.40%	7.43%	7.02%
10:00	11.24%	12.67%	10.90%	11.18%	8.88%	10.20%	6.62%	9.00%	8.99%	10.02%
11:00	11.87%	11.56%	10.41%	11.54%	11.32%	9.90%	9.73%	9.98%	9.23%	10.49%
12:00	14.75%	14.11%	11.76%	11.57%	13.81%	12.08%	10.25%	9.49%	10.04%	10.14%
13:00	14.51%	12.07%	14.26%	12.56%	10.33%	11.09%	9.41%	10.28%	9.77%	9.06%
14:00	14.28%	13.46%	14.71%	12.06%	10.64%	13.85%	9.21%	9.83%	12.21%	9.83%
15:00	15.79%	13.73%	16.21%	11.95%	11.74%	13.14%	10.70%	12.30%	11.48%	10.59%
16:00	15.68%	16.20%	14.44%	11.81%	11.89%	8.74%	8.82%	12.24%	11.02%	8.89%
17:00	14.81%	14.39%	14.83%	12.03%	10.62%	10.66%	8.80%	11.05%	10.23%	9.10%
18:00	16.38%	16.17%	13.24%	11.69%	17.11%	12.60%	9.11%	11.62%	9.76%	11.39%
19:00	15.38%	15.97%	13.48%	11.98%	12.31%	10.83%	8.59%	10.21%	11.20%	9.73%
20:00	12.60%	13.89%	13.45%	11.17%	10.60%	9.87%	9.29%	10.18%	8.89%	10.66%
21:00	13.19%	12.78%	13.12%	11.56%	10.70%	10.13%	9.93%	9.81%	20.52%	10.95%
22:00	11.92%	12.02%	12.44%	10.91%	9.87%	11.65%	7.82%	10.07%	9.53%	9.97%
23:00	12.25%	10.34%	12.32%	12.65%	10.35%	9.36%	7.93%	7.16%	8.06%	9.78%

The following table summarizes UHU for the 10 busiest PF&R truck companies. The busiest trucks are listed first.

Table 16—Unit-Hour Utilization – 10 Busiest Truck Companies – 2020

Hour	T07	T08	T13	T03	T04	T25	T01	T02	T22	T10
00:00	9.65%	6.57%	6.22%	6.09%	7.84%	5.92%	4.56%	3.48%	2.58%	1.98%
01:00	13.19%	6.71%	4.52%	10.85%	21.74%	3.65%	5.12%	8.07%	2.39%	8.15%
02:00	9.22%	7.38%	5.60%	5.67%	4.19%	4.07%	4.20%	3.81%	2.16%	0.54%
03:00	5.10%	4.51%	4.46%	4.07%	3.62%	2.76%	4.23%	1.89%	1.60%	1.00%
04:00	6.52%	7.28%	3.74%	2.79%	3.70%	3.75%	2.71%	1.29%	1.98%	0.81%
05:00	6.71%	7.21%	3.93%	4.49%	4.18%	3.89%	2.84%	4.39%	3.65%	0.49%
06:00	5.83%	4.82%	5.35%	4.31%	5.59%	4.29%	4.46%	3.24%	1.76%	1.41%
07:00	7.70%	6.37%	6.79%	4.20%	4.54%	4.33%	3.62%	3.99%	2.11%	1.93%
08:00	9.71%	9.85%	7.11%	6.63%	5.06%	6.42%	4.90%	3.72%	2.04%	2.37%
09:00	10.69%	8.79%	8.07%	7.39%	5.37%	7.71%	4.52%	5.00%	4.01%	5.59%
10:00	12.49%	10.53%	10.40%	6.85%	5.15%	6.99%	5.32%	5.64%	5.32%	3.64%
11:00	13.14%	12.46%	9.33%	9.73%	7.24%	8.12%	7.21%	4.96%	5.34%	5.98%
12:00	10.99%	9.50%	9.37%	7.88%	7.07%	6.24%	6.76%	5.53%	3.62%	3.85%
13:00	13.94%	10.67%	8.90%	8.19%	8.76%	7.40%	4.93%	4.50%	3.81%	3.56%
14:00	14.25%	11.53%	10.28%	9.60%	6.22%	8.32%	7.23%	6.79%	3.44%	3.39%
15:00	14.34%	12.78%	8.91%	8.03%	7.73%	7.07%	8.49%	6.15%	4.29%	4.65%
16:00	13.87%	12.20%	12.22%	9.31%	6.74%	7.70%	6.52%	4.21%	4.90%	2.57%
17:00	12.44%	10.93%	10.13%	7.70%	7.17%	6.95%	6.21%	4.64%	3.43%	2.95%
18:00	11.84%	10.80%	9.49%	8.50%	7.78%	8.60%	5.60%	4.08%	4.39%	3.88%
19:00	13.35%	12.70%	10.54%	8.28%	7.27%	6.55%	6.75%	4.95%	4.53%	3.85%
20:00	13.26%	11.46%	9.94%	8.84%	6.30%	7.36%	7.55%	5.78%	3.69%	2.06%
21:00	10.35%	8.32%	12.60%	6.69%	7.57%	6.05%	5.48%	8.37%	3.81%	2.24%
22:00	11.65%	8.85%	8.26%	6.58%	8.27%	4.88%	7.29%	4.79%	2.21%	2.01%
23:00	10.91%	8.15%	9.13%	6.54%	7.75%	6.64%	5.82%	3.45%	4.61%	1.92%

Finding #11: The engine company unit-hour utilization measures for daylight hours are not yet close to nor exceeding 30 percent. Based on this measure alone, no station needs a second “reliever” company.

5.3 DISTRIBUTION RESPONSE TIME PERFORMANCE

This sub-section reports performance for the first apparatus to arrive on the scene of emergency incidents. Measurements are the number of minutes and seconds necessary for 90 percent completion of:

- ◆ Call processing
- ◆ Turnout
- ◆ Travel
- ◆ Dispatch to arrival
- ◆ Call to arrival

Each one of these components starts with a year-to-year comparison followed by a graph breaking down compliance with a stated goal by hour of day. For these measurements, the station area is defined by the home station of the first apparatus to arrive on the scene.

5.3.1 Call Processing

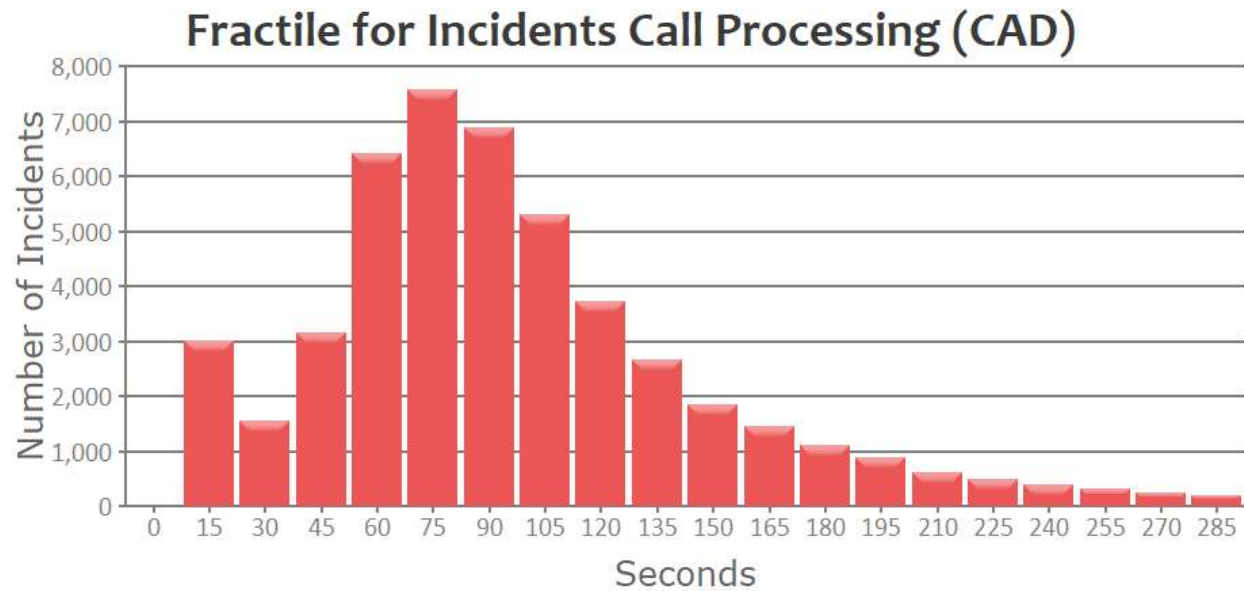
The following table shows that 90 percent call processing performance improved from 2016 to 2017 and in 2018 remained just within the goal of 90 seconds.

Table 17—Call Processing Analysis – 90 Percent Performance

Station	2016	2017	2018	2019	2020
Department-Wide	02:27	02:28	02:29	02:32	02:41
Battalion 1	02:34	02:35	02:34	02:36	02:47
Battalion 2	02:23	02:23	02:26	02:29	02:37
Battalion 3	02:25	02:24	02:26	02:30	02:40
Battalion 4	02:29	02:31	02:32	02:34	02:42

The following figure illustrates a peak performance percentage at 1:15 minutes, or 75 seconds. This graph is right shifted, with a significant number of requests taking longer than 2:00 minutes.

Figure 11—Fractile for Incidents Call Processing (CAD) – 90 Percent Performance – 2020



Citygate processed fractile 90 percent performance raw data for five years and PF&R and Bureau of Emergency Communications (BOEC) confirmed we used the appropriate time stamps for “off-hook” answer to crew notify for only those incidents coded as NFIRS fire and EMS call types.

However, BOEC reports dispatch processing time from answer (off-hook) to dispatch queue where the actual fire unit dispatcher must process the request and alert the responding units. Thus, the legacy BOEC call processing time is only stating part of the entire process. Best practices and true customer service is to measure from answer to fire unit notified (dispatched).

Additionally, while Citygate only measures fire and EMS incident dispatches (not other and non-urgent events), not every fire or EMS call is immediately life-threatening. Therefore, in the previous figure, the immediate life-threatening calls are likely dispatched within 1:30 minutes.

Finding #12: Call processing times to 90 percent of the fire and EMS incidents at 2:41 minutes are slower than Citygate’s and the National Fire Protection Association’s recommendation of 1:30 minutes where no language or location identification barriers exist.

Finding #13: The Bureau of Emergency Communications and PF&R should adopt dispatch performance measures for 90 percent of fire and EMS incidents from “off hook” answer to fire unit notified to respond. Doing so will meet national best practices.

5.3.2 Turnout

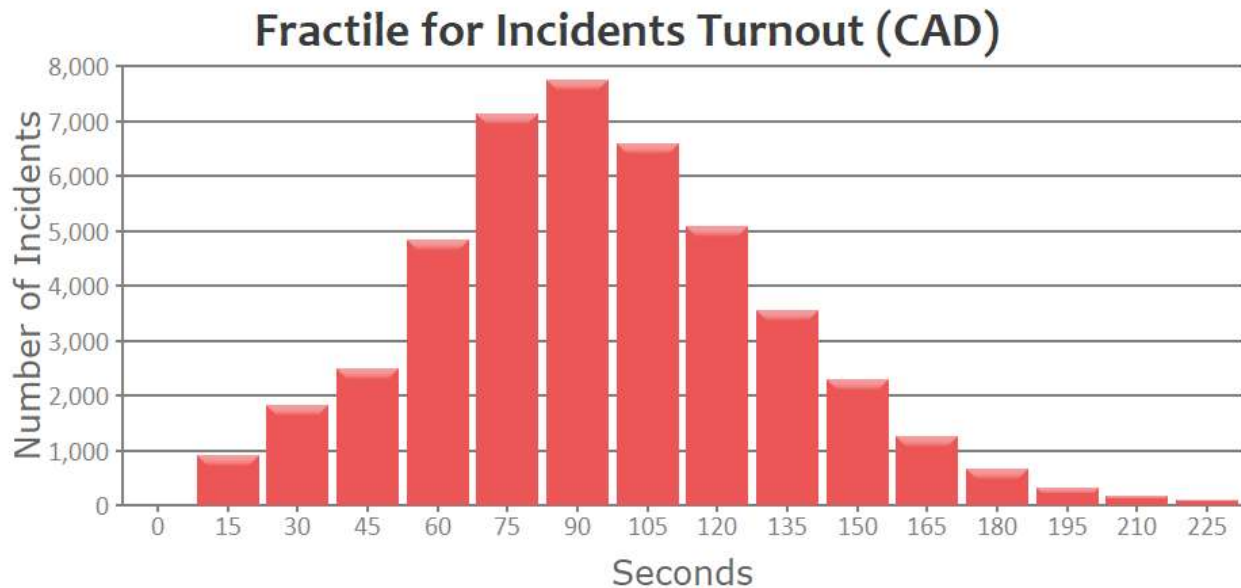
Turnout measures the time from apparatus notification until apparatus start traveling to the scene. A Citygate-recommended 2:00-minute goal is used for measurement. This goal is missed by more than 18 seconds and has been getting slower over time. All that is needed to remedy this is a refocused effort on prompt turnout times.

Table 18—Turnout Analysis – 90 Percent Performance

Station	2016	2017	2018	2019	2020
Department-Wide	02:05	02:06	02:08	02:13	02:18
Battalion 1	02:06	02:07	02:10	02:16	02:23
Battalion 2	01:59	02:04	02:04	02:12	02:14
Battalion 3	02:05	02:06	02:08	02:10	02:17
Battalion 4	02:08	02:07	02:08	02:16	02:20

The following figure illustrates fractile turnout performance. There are a few incidents with the time from dispatch to unit responding between 15 and 30 seconds. These may well be dispatches when the apparatus is already on the road. Performance peaks at 90 seconds, but there are still several emergency incidents in which response took longer than 2:00 minutes.

Figure 12—Turnout Performance in 15-Second Increments – 2018



While the CFAI and the NFPA best practice advice recommends 60 to 80 seconds (fire or EMS) for turnout, it is a standard rarely met in practical experience. Crews hear the dispatch message and don the appropriate personal protective clothing mandated by the Occupational Safety and Health Administration for the type of emergency. Due to this and the floorplan design of some stations, Citygate has long recommended that agencies can reasonably achieve a 2:00-minute crew turnout to 90 percent of emergency incidents. Turnout times are also slowest during sleeping hours. Citygate suggests agencies adopt a split turnout time goal of 1:30 minutes during waking hours and 2:00 minutes during overnight hours.

Finding #14: The turnout times for 90 percent of the fire and EMS incidents at 2:18 minutes is only slightly longer than the 2:00 minutes recommended by Citygate.

5.3.3 Travel

Travel measures time to travel to the scene of the emergency. In most urban and suburban fire departments, a 4:00-minute travel time 90 percent of the time would be considered highly desirable. The following table shows Department-wide overall travel times greater than 6:00 minutes. Battalion 4 has the best performance, reaching 90 percent overall performance at 5:40 minutes. Battalion 3 follows closely, reaching 90 percent compliance overall at 5:59 minutes.

Table 19—Travel Analysis – 90 Percent Performance

Station	2016	2017	2018	2019	2020
Department-Wide	06:10	06:13	06:01	06:07	06:13
Battalion 1	06:46	06:56	06:42	06:49	06:53
Station 3	05:30	05:32	05:29	05:22	05:36
Station 4	06:19	06:32	06:14	06:32	06:11
Station 5	07:06	07:16	06:59	07:06	07:07
Station 10	07:30	07:43	07:35	07:42	08:27
Station 15	08:00	08:33	07:57	07:30	07:15
Station 16	07:32	07:56	07:30	08:12	07:50
Station 18	07:03	07:48	07:21	07:42	07:43
Station 27	11:51	09:31	09:13	08:37	09:46

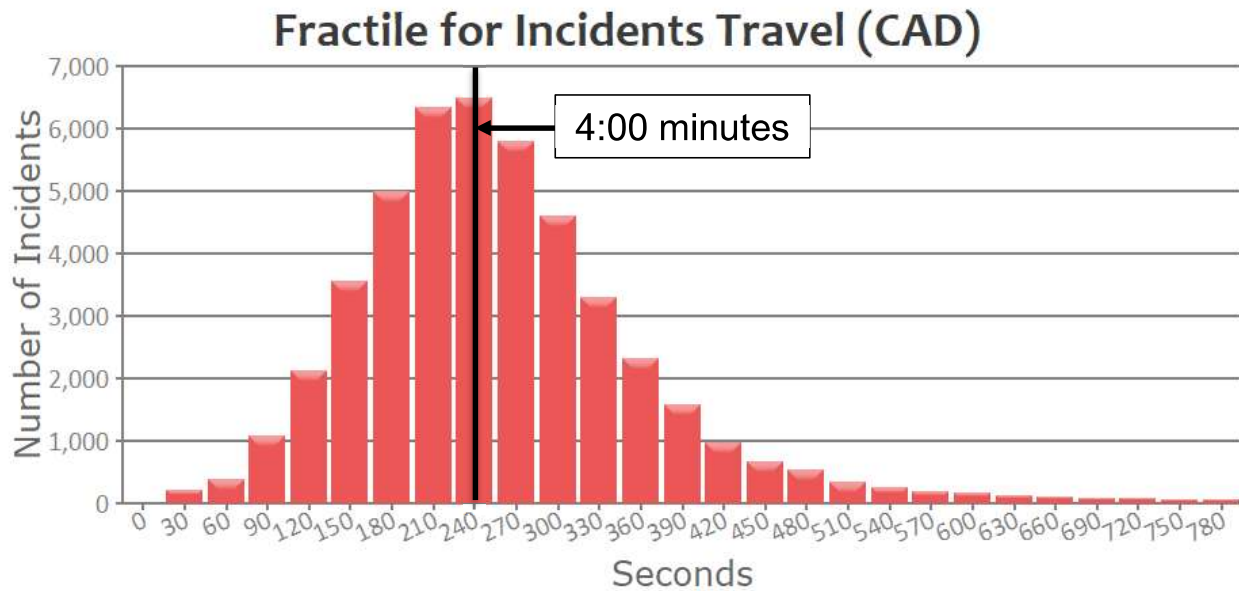
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Station	2016	2017	2018	2019	2020
Battalion 2	06:23	06:28	06:16	06:26	06:34
Station 6	06:15	06:17	06:34	06:06	06:18
Station 8	05:25	05:31	05:13	05:22	05:46
Station 14	06:19	06:36	06:24	06:07	06:27
Station 17	08:38	08:35	08:49	09:00	09:09
Station 21	05:35	05:44	05:13	05:24	05:36
Station 22	07:29	08:01	07:42	07:43	07:36
Station 24	05:14	05:24	05:11	05:40	05:54
Station 26	05:35	05:44	05:32	05:34	05:42
Battalion 3	06:00	06:03	05:51	05:56	06:06
Station 2	06:42	06:37	05:56	05:56	06:14
Station 7	05:28	05:38	05:31	05:49	06:05
Station 11	05:47	05:58	05:54	05:48	06:02
Station 12	06:28	06:37	06:31	06:52	06:30
Station 19	05:26	05:37	06:01	05:49	05:39
Station 29	06:54	06:37	06:17	06:24	06:45
Station 30	06:16	05:51	05:39	05:46	06:08
Station 31	05:51	06:22	05:22	05:27	05:37
Battalion 4	05:46	05:45	05:32	05:38	05:38
Station 1	05:04	04:56	04:56	05:01	05:05
Station 9	05:42	05:45	05:25	05:29	05:27
Station 13	05:21	05:21	05:22	05:22	05:34
Station 20	06:58	06:57	06:49	06:41	06:56
Station 23	06:51	06:39	05:27	05:41	05:44
Station 25	06:19	06:08	06:04	06:07	05:57
Station 28	05:44	05:52	05:36	05:43	05:32

The following figure illustrates fractile travel performance. The peak segment for travel performance is 240 seconds, or 4:00 minutes. However, there is a very slow decrease in volume after the 240-second mark. This indicates that while many incidents can be reached at or under 4:00 minutes, there are still a significant number of incidents that require much longer travel times.

Figure 13—Fractile for Incidents Travel in 30-Second Increments – 2018



NFPA Standard 1710 recommends a 4:00-minute travel time goal in urban and suburban areas. However, given the topography and traffic congestion in PF&R’s service area as shown in the GIS mapping analysis section of this report, this goal is not cost-effectively achievable to 90 percent of the incidents. Just over 70 percent of the incidents are reached in 4:00 minutes.

Finding #15: PF&R’s fire unit travel times are higher than the National Fire Protection Association’s urban best practice recommendation of 4:00 minutes, but PF&R’s station spacing with difficult topography and traffic congestion challenges could be sized to deliver 5:00-minute travel to 90 percent of the public street road network as the GIS models in this study indicate is more feasible.

5.3.4 Call to Arrival

Call to arrival measures time from receipt of the request for assistance until the apparatus arrives on the scene. A best-practice-based and Citygate-recommended goal for PF&R would be 1:30 minutes for call processing, 2:00 minutes for turnout, and 4:00 minutes for travel, for a total of 7:30 minutes, or 450 seconds.

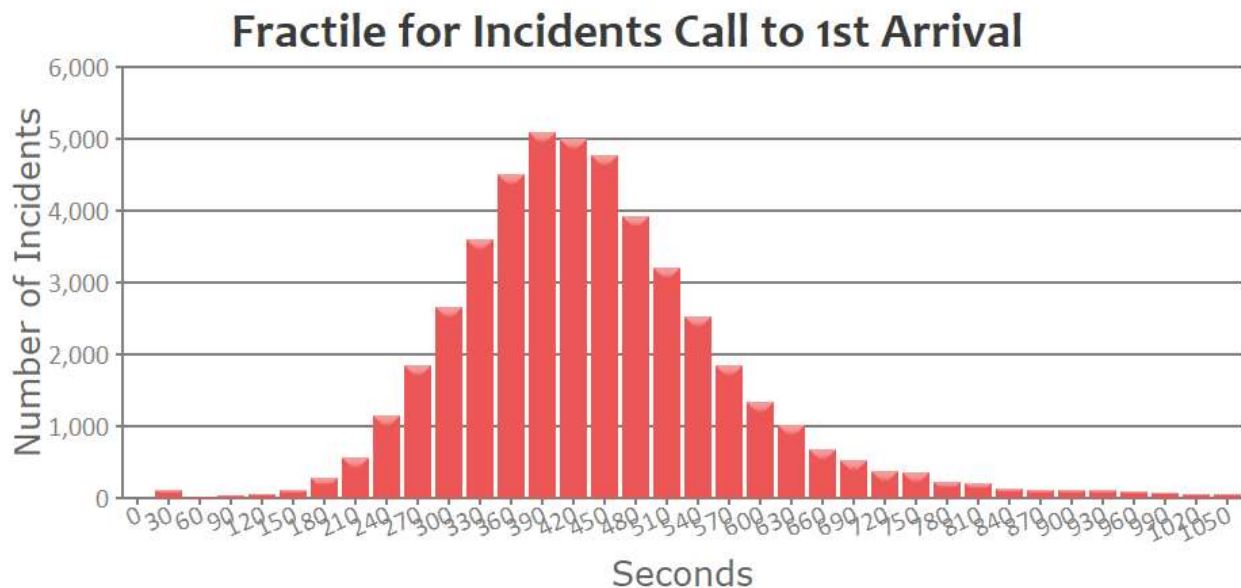
The following table illustrates that PF&R does not meet this goal, with call processing and travel taking significantly longer than the goal recommended by NFPA 1710.

Table 20—Call to Arrival Analysis – 90 Percent Performance

Station	2016	2017	2018	2019	2020
Department-Wide	09:16	09:24	09:15	09:29	09:50
Battalion 1	09:52	10:02	09:57	10:13	10:23
Battalion 2	09:23	09:39	09:28	09:48	10:08
Battalion 3	09:11	09:17	09:08	09:18	09:45
Battalion 4	08:55	08:58	08:47	09:00	09:16

The following figure illustrates fractile call to arrival performance. The peak segment is 390 seconds, or 6:30 minutes. The slightly right-shifted graph indicates a slow drop-off in the number of longer call to arrival times.

Figure 14—Call to First-Arrival Performance in 30-Second Increments – 2020



Finding #16: First-due unit call to arrival times to fire and EMS incidents at 9:50 minutes are longer than a best practices goal of 7:30 minutes.

5.3.5 Distribution and Concentration Measurements for Building Fires

Moving from first-due unit analysis to multiple units for building fires, an agency should not spread its stations so far apart that it cannot mass an ERF, or First Alarm, to serious, emerging building fires. Best practices recommendations for the ERF in urban areas is that all the needed

units arrive within an 8:00-minute travel time. When 1:30 minutes for dispatch and 2:00 minutes for turnout are added, the call receipt to ERF arrival becomes 11:30 minutes.

For a typical house fire, minimum best practices recommend a force of 17 or more firefighters, including at least one chief officer for command/safety functions. PF&R serves a metropolitan area consisting of many diverse risk types. The current PF&R ERF for a residential building fire is four engines, two ladder trucks, and two Battalion Chiefs for a total of **26 personnel**. These numbers provide for faster, safer, on-scene multiple task completion.

However, for PF&R to deliver eight units in an 8:00-minute travel time or less to 90 percent of the service area is very challenging. Again, the ERF measure is primarily a concern of station spacing.

For this analysis, Citygate models travel times for PF&R's current minimum ERF response of four engines and two ladder trucks. Given their limited numbers Citywide (4), Battalion Chief response is not reflected in the following tables. Given that PF&R staffs engines and ladder trucks with four personnel, PF&R ERF does deliver 24 firefighters so that critical firefighting tasks can be performed simultaneously and effectively until one or more command chiefs can arrive. Citygate's recommended travel time for this level of a six-unit ERF is 8:00 minutes.

The following table illustrates the time-over-distance travel time challenges of multiple-unit responses. The number of ERF incidents in any one year is small in some areas, so the table shows the incident quantity in parenthesis alongside the travel time to show when a small sample size might lead to statistical volatility.

Table 21—Distribution Overall Travel Time Analysis – ERF – Four Engines and Two Trucks

Station	2016	2017	2018	2019	2020
Department-Wide	11:24 (103)	11:24 (135)	10:33 (136)	10:38 (122)	10:42 (130)
Station 1	06:39 (3)	07:40 (7)	06:43 (3)	08:12 (5)	08:40 (5)
Station 2	08:06 (6)	09:01 (3)	08:40 (3)	08:38 (3)	11:27 (1)
Station 3	05:19 (2)	08:02 (8)	08:09 (2)	07:27 (5)	07:44 (4)
Station 4	09:53 (2)	14:19 (4)	11:54 (2)	07:06 (6)	09:39 (5)
Station 5	10:58 (2)	13:07 (4)	12:00 (3)	10:24 (1)	11:06 (3)
Station 6	None	09:44 (1)	07:52 (2)	None	None
Station 7	09:06 (8)	10:32 (12)	08:40 (11)	10:21 (11)	09:01 (13)
Station 8	10:24 (4)	10:15 (7)	08:30 (4)	10:08 (7)	08:56 (8)
Station 9	11:31 (3)	10:58 (3)	09:41 (4)	08:41 (4)	08:47 (5)
Station 10	10:06 (1)	None	None	None	None
Station 11	08:42 (8)	08:06 (16)	08:55 (16)	08:25 (11)	06:34 (7)
Station 12	10:41 (2)	11:53 (9)	11:10 (8)	10:37 (2)	11:04 (3)
Station 13	08:31 (2)	09:25 (4)	13:31 (4)	10:43 (5)	08:46 (5)
Station 14	10:32 (15)	12:13 (10)	13:18 (5)	09:56 (11)	09:16 (11)
Station 15	None	07:29 (2)	09:52 (1)	08:50 (1)	16:17 (3)
Station 16	None	None	08:53 (1)	None	10:03 (1)
Station 17	11:42 (1)	None	10:09 (1)	12:24 (2)	09:45 (1)
Station 18	None	13:05 (1)	10:40 (2)	10:24 (1)	None
Station 19	11:38 (12)	09:10 (8)	08:28 (16)	11:33 (12)	08:31 (9)
Station 20	18:07 (3)	11:39 (3)	08:47 (1)	None	None
Station 21	07:30 (3)	06:56 (4)	06:28 (1)	None	08:12 (4)
Station 22	17:57 (3)	16:50 (4)	13:31 (4)	15:01 (3)	12:10 (4)
Station 23	06:48 (1)	09:32 (5)	08:07 (4)	08:37 (2)	07:54 (2)
Station 24	08:12 (7)	11:50 (2)	09:53 (1)	07:28 (4)	08:22 (5)
Station 25	08:00 (4)	10:57 (5)	10:15 (7)	09:15 (8)	10:56 (7)
Station 26	09:19 (1)	11:54 (2)	10:22 (3)	10:19 (5)	18:06 (5)
Station 28	13:48 (2)	09:18 (3)	09:44 (11)	09:21 (7)	09:01 (9)
Station 29	08:43 (3)	09:09 (3)	08:57 (6)	10:04 (3)	09:27 (1)
Station 30	09:29 (4)	10:56 (5)	07:25 (10)	06:49 (3)	07:10 (9)
Station 31	13:17 (1)	None	None	None	None

Even a six-unit ERF within an 8:00-minute travel time is challenging in several sections of the City. However, for a large fire department, fielding a minimum ERF of 24–26 personnel is highly commendable and provides a robust response.

Finding #17: An Effective Response Force of four engines and two ladder trucks reached 90 percent of the building fires in 2020 with a travel time of 10:42 minutes. While this does not meet a recommended Effective Response Force travel time of 8:00 minutes, it is credible given the use of six units across the topography and traffic congestion challenges in many areas of the City.

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Section 6

*Specialty Emergency
Response Programs*



SECTION 6—SPECIALTY EMERGENCY RESPONSE PROGRAMS

This section describes and reviews PF&R’s specialty emergency response services that must be provided in addition to firefighting in any metropolitan area.

6.1 LOW-ACUITY EMERGENCY MEDICAL INCIDENTS

It is well understood at this time in American EMS that many of the medical help requests that come to 9-1-1 are not in fact acute medical emergencies requiring a fire paramedic crew, paramedic ambulance, and a resultant transport to an Emergency Room. PF&R understood this, and pilot tested several alternative response plans. All such plans start with trained dispatchers in the 9-1-1 center to triage EMS calls to send a response different than a fire or ambulance unit.

In this study, Citygate teamed with the EMS system medical director and staff to obtain clinical treatment data on the EMS incidents over the five data years of the fire crew analysis. The clinical data was then broken down into treatment type categories by small census tract areas. The analysis was to determine how many low-acuity incidents there are Citywide and if there are pockets of very low- or very high-acuity demand to which the response system can be engineered.

The Medical Director organized the clinical skills and medicines used into the groupings listed in the following table.

Table 22—Clinical Skills and Medicines by Acuity Level

High Acuity			
Clinical Syndrome <ul style="list-style-type: none"> Cardiac Arrest STEMI Alert Stroke Alert Sepsis Alert Trauma Alert Pediatric Code 3 Return Newborn Delivery (actual delivery) GI Bleed Shock (SBP < 90 or MAP < 65 NOT Calculated) Overdose Requiring Airway Support Severe Hypoglycemia (CBG < 60) Seizures Requiring Treatment with Midazolam Transport to Burn Center 	Physiological <ul style="list-style-type: none"> O2 Saturation < 90 % SBP < 90 mm Hg RR > 30 per minute GCS <= 11 Procedure <ul style="list-style-type: none"> CPR Intubation EZIO Advanced Airway Defibrillation Cardioversion CPAP Surgical Cricothyrotomy Pacing Tourniquet Hemostatic dressing Pelvic Splint Needle Decompression 	Medicines <ul style="list-style-type: none"> Epinephrine Amiodarone Atropine Calcium Gluconate Lidocaine Esmolol Succinylcholine Vecuronium Etomidate TXA Dexamethasone Nitroglycerin (IV) Furosemide Dextrose (IV) Glucagon Behavioral Health <ul style="list-style-type: none"> Midazolam + Geodon Process <ul style="list-style-type: none"> Code 3 Transport to Hospital 	
Medium Transported	Medium Low-Acuity Transported	Low Acuity	Non-Acute / No Transport
Treated with any medication not in the high-acuity list, or restrained	Transport codes I and IV, (no medications), and bandaging, splinting, or any other treatment not listed in the high acuity list	Transport code I and no treatments, with procedures only including diagnostics: Capnography, EKG, Pulse Ox, Blood Glucose	ALL non-transports with no treatment- (that did not have any treatments

The results were studied, both statistically and using GIS mapping, across all of Portland. The results verified that there are many low-acuity patients and there are small clusters of high-volume, low-acuity demand. In summary, Citywide:

- ◆ Across five years there were 167,509 low- and non-acute fire/EMS response incidents.
- ◆ At an average of 33,502 per year (including the COVID-19 years) that is a rate of 92 per day, including incidents where an ambulance responded without a fire truck.

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- ◆ This average rate in 2019 pre COVID-19 was roughly two-thirds the total PF&R EMS volume of 48,930 fire/EMS responses.¹⁰
- ◆ There are 10 census tracts that ranked far higher for low acuity and/or high acuity by volume, as shown in the following table.

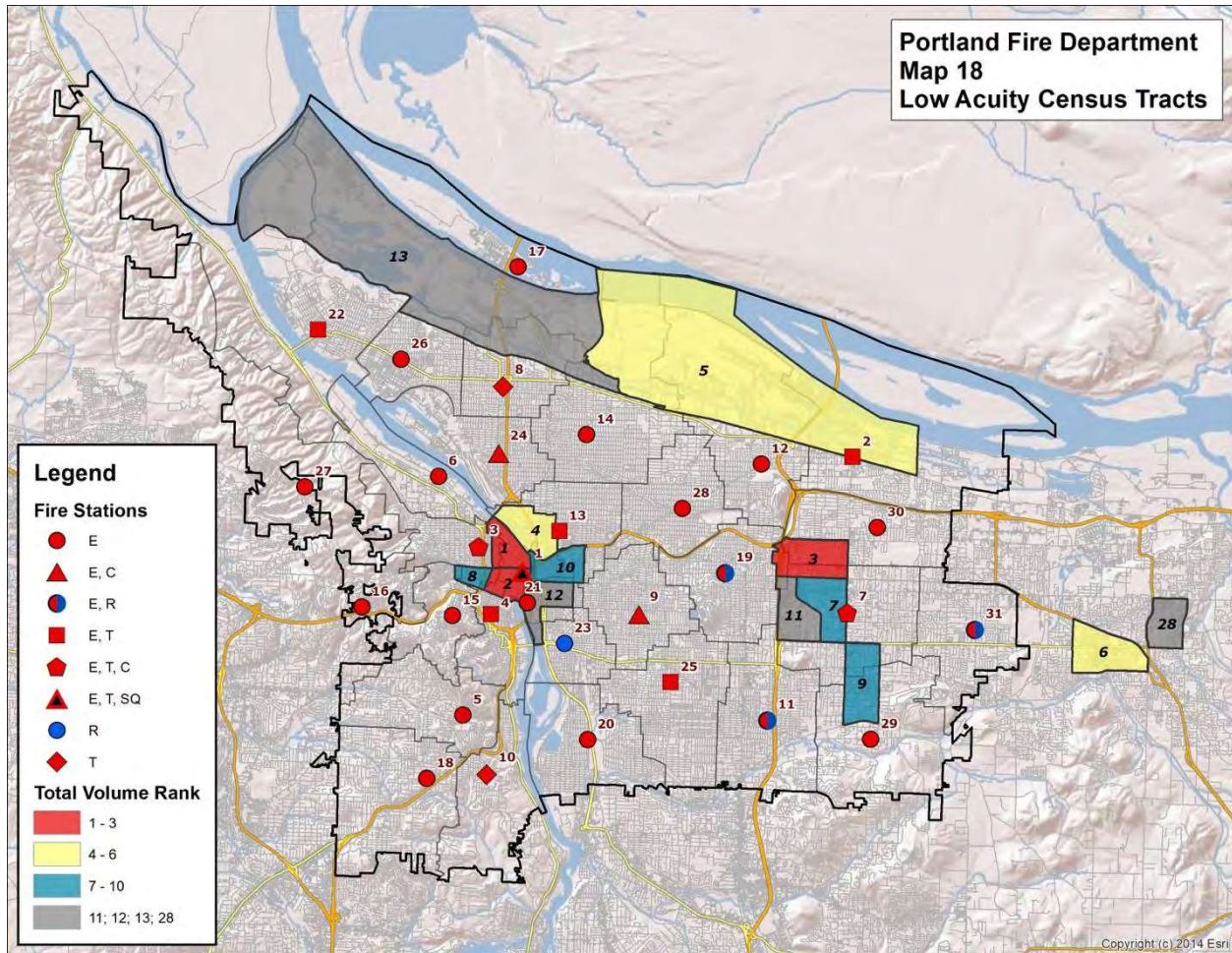
Table 23—Census Tract Acuity Rankings

Census Tract Location	Acuity	Volume Rank	Five-Year Count	Fire Stations
Old Town Chinatown	High/Low/No Trans	1	26,261	1,3,6
Pioneer Square Courthouse	High/Low/No Trans	2	23,722	1,3,4
Gateway Transit Center	High/Low	3	13,631	7,19,30
Lloyd Center	Low/No Trans	4	12,107	1,13
Portland International Airport	No Trans	5	9,951	2,12,14
Gresham Center (Gresham)	Low/No Trans	6	8,414	Outside City
Russellville East	Low	7	7,165	7
Providence Park	Low	8	7,010	3,4,15
West of Powell Butte Nature Park	High	9	6,956	7,29
E. Burnside & Grand	No Trans	10	6,429	1,13

Just these top ten focus areas totaled 121,646 incidents or **47.8 percent** of all EMS system incidents during the five years. On an annual basis, these areas average 24,392 per year, or 67 per day. These areas are shown on the following map.

¹⁰ Based on County EMS data for all ambulance responses, some without PF&R.

Figure 15—EMS Acuity Census Tracts Map



These areas are around all the City’s busiest fire stations. These calls for help need a response different than that of a fire and ambulance unit. If these calls were removed from PF&R 9-1-1 workload, there would be a significant increase in capacity of fire units for critical emergencies and improved response times to those critical emergencies.

Finding #18: The City must implement a Citywide low-acuity medical / crisis response program that will regain firefighting and acute EMS capacity and response time for PF&R.

6.2 TECHNICAL RESCUE

PF&R deploys a multiple-unit heavy rescue squad from Station 1 staffed with 12 personnel, and a heavy rescue squad at Station 12 cross-staffed as needed by the four on-duty Engine 12 personnel also trained to the Oregon Department of Public Safety Standards and Training (DPSST) Rescue Technician level. PF&R also has an Urban Search and Rescue (USAR) engine and trench rescue trailer with additional specialized equipment cross-staffed as needed by Station 1. The Technical Rescue unit maintains a 75 percent minimum certification staffing standard.



Citygate finds this level of on-duty technical rescue capacity comparable to other large metropolitan cities of similar size, and appropriate for the technical rescue risk exposure in Portland. We do note, however, that this specialized capacity is divided among only two of PF&R's 31 stations over a 145-square-mile service area, and two-thirds of that capacity is assigned to Station 1, the busiest station in the City with more than 20 calls for service per day on average. To improve response coverage of this specialized low-frequency / high-risk capacity over the large service area, Citygate recommends PF&R consider spreading the minimum daily rescue technician capacity across three or four stations with lower call volume to provide enhanced first-unit technical rescue availability and response throughout the City.

In addition, Citygate notes a significant gap in PF&R's technical rescue training and capability below the rescue technician level, and suggests that PF&R consider providing enhanced confined space, trench, and swift water training conforming with NFPA 1006¹¹ for all truck company personnel to create a tiered technical capacity to provide:

- ◆ Mitigation of less complex technical rescue situations without always needing to deploy rescue technicians.
- ◆ Quicker deployment of basic rescue systems to emergency incidents requiring technical rescue.

¹¹ NFPA 1006 – Standard for Technical Rescue Personnel Professional Qualifications.

- ◆ Quicker initial technical size-up of more complex rescue incidents to ensure appropriate response capability and capacity.
- ◆ Additional assistance and support of PF&R’s technical rescue team as needed.

Unlike the hazardous materials program, the technical rescue program does not have a designated program coordinator and is instead managed by a battalion chief. A portion of the technical rescue program’s training and equipment is not supported in PF&R’s annual budget; however, PF&R has been successful with obtaining grant funding to support training and equipment improvements in recent years. PF&R’s technical rescue capacity might also benefit from being part of a regional response capability similar to the hazmat program.

6.2.1 Technical Rescue Program Findings

During this review, Citygate established the following findings relative to PF&R’s technical rescue program.

Finding #19: PF&R’s technical rescue resources are deployed from Stations 1 and 12 only, for a 145-square-mile service area coverage.

Finding #20: Immediate technical rescue response availability and ongoing training are challenged due to the high daily call volume at Stations 1 and 12.

Finding #21: PF&R’s technical rescue program is heavily reliant on federal funding to support ongoing training and equipment needs.

Finding #22: There is a large gap in basic technical rescue capacity and skills below the rescue technician level.

Finding #23: The technical rescue program lacks a designated person/function to coordinate all program training, equipment, and logistics.

6.2.2 Technical Rescue Program Recommendations

Following are Citygate’s recommendations relative to PF&R’s technical rescue program.

Recommendation #1: Consider spreading the available on-duty rescue technicians and related specialized equipment across three or four stations throughout the City to improve response coverage.

- | | |
|---------------------------|--|
| Recommendation #2: | Prioritize ongoing training of technical rescue personnel to build and maintain specialized low-frequency / high-risk skills. |
| Recommendation #3: | Ensure technical rescue program training and equipment needs are supported with appropriate dedicated funding. |
| Recommendation #4: | Establish a dedicated Technical Rescue Coordinator to coordinate program training, equipment, and logistics. |
| Recommendation #5: | Consider training all truck company personnel to the National Fire Protection Association Confined Space, Trench Rescue, and Swiftwater Operations levels to provide additional tiered technical rescue response capability. |

6.3 HAZARDOUS MATERIALS RELEASE/SPILL RESPONSE

All PF&R response personnel are trained to the U.S. Department of Transportation First Responder Operations (FRO) level. PF&R deploys a two-unit cross-staffed hazardous materials response team from Station 7 with certified hazardous materials technicians who have received more than 160 hours of didactic and manipulative training providing them the knowledge and skills to mitigate all types of hazardous material incidents. PF&R also deploys a cross-staffed squad from Station 24 equipped with specialized chemical, biological, radiological, nuclear, and explosive (CBRNE) equipment. The hazmat team responds to hazmat emergencies throughout the City of Portland and Multnomah County as needed.

PF&R's hazardous material (hazmat) program is administered by a Deputy Chief, managed by a designated operations Battalion Chief (Chief 3, Platoon A), with training and certification of team members coordinated by a staff Lieutenant who is also a certified hazmat technician. There are eight technicians assigned to each shift at Station 7, with a minimum daily staffing level of six technicians. Current Federal Emergency Management Agency (FEMA) National Incident Management System (NIMS) hazmat best practices recommend a minimum of eight technicians for any incident requiring Hazmat Protection Level A (fully encapsulated chemical protective suit, positive pressure self-contained breathing apparatus, inner and outer chemical resistant gloves, and chemical-resistant safety boots). To meet this standard, when only six technicians are on duty, PF&R would require mutual aid from Tualatin Valley Fire Rescue or the Gresham City Fire Department for any complex hazmat incident requiring a Level A entry.

PF&R hazmat team personnel are challenged to meet ongoing specialized training requirements due to the total volume of emergency responses at Station 7. This volume also precludes immediate

availability of the hazmat unit if either Engine 7 or Truck 7, which provide the cross-staffing for the hazmat unit, is committed to an active incident. Because of this and Station 7 being quite distant from the riverfront and industrial areas of the City with the highest risk, Citygate recommends relocating this unit to a less busy station nearer the higher hazmat risk locations.

In addition, PF&R's hazmat training and equipment budgets are partially dependent on Department of Homeland Security grants and Oregon state hazmat team and oil company funding.

From interviews with several PF&R executive staff members, a review of PF&R's organizational chart, and comparison to other large metropolitan fire agencies, it is Citygate's opinion that the Special Operations Deputy Chief's responsibilities should be realigned to focus solely on PF&R's specialized response programs, including hazmat, technical rescue, marine operations, Bureau of Emergency Communications liaison, and wildland fire operations.

6.3.1 Hazardous Materials Program Findings

From this review, Citygate makes the following findings relative to PF&R's hazardous material response program.

Finding #24: Ongoing hazardous material technician training is challenged due to the sheer volume of Station 7 emergency responses.

Finding #25: The high volume of Station 7 emergency incident responses impacts the immediate availability of the cross-staffed hazmat unit whenever Engine 7 and/or Truck 7 are committed to an incident.

Finding #26: PF&R's hazmat program heavily depends on federal, state, and private funding to support ongoing training and equipment purchases.

Finding #27: The current minimum daily staffing of six hazardous material technicians is insufficient to meet recognized recommended best practice staffing standards for a hazardous material response resource.

Finding #28: The Special Operations Deputy Chief has numerous collateral responsibilities which impede their ability to provide an appropriate level of leadership and management of PF&R's specialty response programs.

6.3.2 Hazardous Materials Program Recommendations

Following are Citygate’s recommendations relative to PF&R’s hazardous material response program.

Recommendation #6: Ensure City-provided funding is available to support hazmat training and equipment needs.

Recommendation #7: Consider relocating the hazardous material team from Station 7 to a less-busy station closer to the waterfront and heaviest industrial risks.

Recommendation #8: Consider amending the minimum daily hazardous material unit staffing to eight technicians in conformance with nationally recognized recommended best practices.

Recommendation #9: Consider reorganizing Special Operations to focus solely on PF&R’s hazmat, technical rescue, marine operations, Bureau of Emergency Communications liaison, and wildland programs.

6.4 WILDLAND FIRE RESPONSE

As outlined in the Community Risk Assessment (**Volume 3**) element of this study, Portland is designated as a Community-at-Risk (CAR) for wildfire prevention and response and is also a wildland–urban interface (WUI) community with human development and habitation interfaced or intermixed with wildland fuels. In addition, the following 18 specific areas of the City are particularly vulnerable to a wildfire¹²:

- ◆ Skyline Ridge
- ◆ Mount Tabor



¹² Multnomah County Community Wildfire Protection Plan – Are You Ready (2011), Chapter 4.

- ◆ Kelly Butte
- ◆ Powell Butte
- ◆ Johnson Creek Watershed
- ◆ Oaks Bottom
- ◆ Springwater and Flavel
- ◆ Sullivan’s Gulch
- ◆ Willamette Bluffs Escarpment
- ◆ Forest Heights
- ◆ Smith/Bybee Lake
- ◆ Forest Park
- ◆ Linnton
- ◆ NW Portland—Pittock Mansion Area
- ◆ Tryon Creek
- ◆ Terwilliger Curves
- ◆ Zoo and Hoyt Arboretum
- ◆ Riverdale

The two largest areas are Forest Park and Powell Butte, which have been identified as high risk by the Oregon Department of Forestry and PF&R due to high-density commercial and residential development immediately adjacent to these areas. Most if not all of these hazard areas also have limited or no access for wildland fire apparatus, and maintenance of available access routes is not under the control of PF&R.

Citygate’s wildland fire risk assessment evaluated probability of occurrence, probable (not worst case) consequence severity, and impact severity on PF&R’s ability to provide an appropriate ERF, while also being able to maintain concurrent sufficient response capacity throughout the City to control other concurrent incidents within desired response goals. Evaluation of previous response data revealed 1,483 vegetation/wildland fire responses from January 2016 through December 2020, or 0.34 percent of total service demand. The following table summarizes Citygate’s assessment of Portland’s vegetation/wildfire risk.

Table 24—Vegetation/Wildfire Risk Assessment

Vegetation/Wildfire Risk	Incident Type				
	Grass / Weeds / Bark Dust	Brush (< 5 acres)	Forest/Woods/ Wildfire/WUI (5–25 Acres)	Wildfire/WUI (> 25 Acres)	WUI Fire (Red Flag Conditions)
Probability of Occurrence	<i>Frequent</i>	<i>Frequent</i>	<i>Frequent</i>	<i>Possible</i>	<i>Possible</i>
Consequence Severity	<i>Minor</i>	<i>Minor</i>	<i>Moderate</i>	<i>Major</i>	<i>Major</i>
Impact Severity	<i>Insignificant</i>	<i>Minor</i>	<i>Moderate</i>	<i>Major</i>	<i>Extreme</i>
Overall Risk	Low	Moderate	High	High	Extreme

6.4.1 Wildland Fire Hazard Mitigation

In addition to requiring fire resistive construction materials and methods in High Fire Hazard Areas, the City and PF&R have completed or are continuing the following wildfire mitigation measures:¹³

- ◆ Procured funding for management of vegetated natural areas with high wildfire danger, including public and private properties.
- ◆ Provided wildfire management training to PF&R personnel.
- ◆ Amended the Portland Plant List and other related City plant lists and landscaping guides to include/identify fire-resistant native plants and planting strategies that could be encouraged or required in local landscaping.
- ◆ Integrated, as appropriate, fire prevention goals and provisions into City policies, plans, and codes.
- ◆ Identified conditions of approval and mitigation strategies that could be applied to new development or redevelopment in high-risk areas.
- ◆ Identified new construction areas subject to wildfires and are communicating this information to affected landowners.
- ◆ Adopted the National Fire Danger Rating System and installed signs at key points in the City.

¹³ 2016 City of Portland Mitigation Action Plan, Section 19.

- ◆ Conducted systematic review of Portland’s large, publicly owned wildland tracts regarding fire safety and ecological health to ensure informed land management decisions.
- ◆ Implemented a neighborhood wildland interface disaster planning program.
- ◆ Reviewed and refined the City’s contract specifications for machinery operations during *Red Flag* weather conditions.
- ◆ Convened a standing wildland interface fire tactical group.
- ◆ Indexed City wildfire mitigation plans and activities.
- ◆ Developed and implemented a protocol for defining and mapping WUI Zones and developed recommended policies, regulations, and landscape options for incorporation into City plans and programs.
- ◆ Identified water-grid engineering requirements for firefighting in wildfire areas.
- ◆ Reviewed the feasibility of adopting portions of nationally recognized wildland interface codes to strengthen building standards in wildfire risk areas.
- ◆ Designed and conducted a study to determine the effectiveness of maintenance agreements that are established when new land divisions are approved to manage vegetation in open space tracts.
- ◆ Act on all mitigation actions outlined in the Wildfire GAP Analysis Report.

6.4.2 Wildland Fire Response Capacity and Deployment Plan

PF&R deploys five Type-6 wildland engines cross-staffed with two on-duty personnel as needed at Stations 14, 18, 22, 27, and 29, and three 3,000-gallon water tenders cross-staffed as needed at Stations 13, 16, and 31. Additional wildland response resources are available by mutual aid from other local/regional/state fire agencies. Aerial wildland fire suppression capacity, as needed, is available through federal fire agencies from Medford, Oregon or Olympia, Washington. Other specialized wildland suppression resources such as bulldozers, tree fallers, skidders, etc. may be available from local/regional private-sector contractors.

PF&R’s tactical deployment plan for wildland fires includes the following:

- ◆ Single and multiple-company responses to grass, brush, and wildland fires
- ◆ Upstaffing during high fire-danger periods, as needed
- ◆ Neighborhood-specific wildfire mitigation projects
- ◆ Park patrols

- ◆ Mutual aid to neighboring jurisdictions
- ◆ Multnomah County strike team or task force mobilizations
- ◆ Participation in Oregon State Fire Marshal (OSFM) Incident Management Team deployments

Approximately 75 percent of PF&R’s response personnel have been trained to the Oregon Department of Public Safety Standards and Training (DPSST) and National Wildfire Coordinating Group (NWCG) Wildland Firefighter Type-2 level (FFT2). PF&R’s goal is to have 110 firefighters certified at the Wildland Firefighter Type-1 (FFT1) level, 30 officers at the Engine Boss (ENGB) level, and 10 Battalion Chiefs at the Strike Team/Task Force Leader (STEN/TFLD) level,¹⁴ although PF&R struggles to maintain this capacity. All response personnel are expected to complete a wildland fire refresher training course (RT-130) each year, coordinated through the National Wildfire Coordinating Group (NWCG) in October and provided to PF&R response personnel by PF&R’s Medical Services & Training Division with assistance from others as needed.¹⁵ There is currently no City nor regional incident management team¹⁶ capacity to manage larger-scale emergency incidents.

The Regional Disaster Preparedness Organization (RDPO) Fire-EMS Workgroup has received funding and initiated the first two phases (hazard/risk assessment and gap analysis) of a four-phase project to enhance regional WUI response capacity. Funding for the final two phases (incident management and response capacity) will be requested using results from the first two phases.

6.4.3 Worst-Case Scenario

A worst-case wildland fire scenario would most likely occur during critical fire weather conditions. The National Weather Service (NWS) identifies the following primary *Red Flag* criteria as likely to produce extreme fire behavior and rapid-fire spread:

- ◆ Relative Humidity (RH) less than 15 percent with sustained surface winds, or frequent gusts, of 25 miles per hour or higher. Both conditions must occur simultaneously for at least three hours in a 12-hour period.
- ◆ Widely scattered (or more) dry thunderstorms, 15 percent or more coverage, constituting a Lightning Activity Level (LAL) of 6. A thunderstorm is considered “dry” if it produces less than 0.10 inches of rainfall.

¹⁴ Portland Fire and Rescue Operational Guidelines Section 6.25 – Wildland Fire Planning Cycle and Response (June 2020).

¹⁵ Portland Fire and Rescue Operational Guidelines Section 6.25 – Wildland Fire Training (June 2020).

¹⁶ National Incident Management System (NIMS) Type-3 All-Hazard Incident Management Team (AHIMT) comprised of 10–20 personnel representing multiple disciplines who manage a local major or complex emergency incident requiring a significant number of local, regional, state, or tribal resources over multiple operational periods.

Contributing *Red Flag* factors include:

- ◆ First significant lightning occurrence after a hot and dry period.
- ◆ Significant cold frontal passage expected to cause strong sustained and gusty winds and an abrupt wind shift.
- ◆ Any combination of weather and fuel conditions that would create a critical fire control situation or extensive wildfire outbreak, including long-term drought, much higher-than-normal maximum temperatures coupled with very low humidity, low fuel moisture, poor nighttime RH recovery, high Energy Release Component (ERC) or Burning Index (BI), Haines Index of 5 or 6, etc.

While the probability of a worst-case wildfire in Portland is low, the right combination of weather and fuel conditions could produce extreme fire behavior and rapid fire spread in the wildfire prone areas of the City, potentially resulting in a catastrophic event similar to the 1991 Oakland, California Firestorm, the 2018 Camp Fire in Paradise, California, the 2020 Creek Fire in Fresno County, California, and the December 2021 Marshall Fire in Boulder County, Colorado.

6.4.4 Wildland Fire Program Findings

Pursuant to the wildland fire risk assessment, review of ongoing wildland fire mitigation initiatives, and PF&R’s wildland response capacity and deployment plan, Citygate makes the following findings relative to Portland’s wildfire risk and response capacity.

Finding #29: Coordination and oversight of wildland fire-related programs and functions has historically fallen to multiple PF&R positions/functions as a collateral responsibility with no single designated coordination point.

Finding #30: There is no City or regional incident management team capacity to manage larger-scale or more complex incidents.

Finding #31: PF&R has limited funding to host wildland fire training or to send response personnel to external wildland fire training opportunities.

Finding #32: PF&R lacks an organized approach to obtaining and maintaining desired wildland fire training certifications.

Finding #33: Station 14, where some of the wildland units are based, is not proximal to any designated wildfire hazard area.

Finding #34: There are no wildland response resources currently deployed in immediate proximity of the Tryon Creek wildfire hazard area.

Finding #35: PF&R's current wildland response apparatus (Type-6) have very limited pump, water tank, fire hose, and crew capacity.

6.4.5 Wildland Fire Program Recommendations

Pursuant to this review, Citygate offers the following recommendations to enhance the City's ability to mitigate a serious wildland fire event.

Recommendation #10: Designate a single position/function to coordinate and oversee all wildland fire-related programs, functions, and responsibilities to include suppression and pre-event mitigation/prevention.

Recommendation #11: Support efforts to develop and maintain a local or regional Incident Management Team as soon as possible.

Recommendation #12: Budget training to maintain desired wildland fire capacity and credentials.

Recommendation #13: Support wildland fire training for chief officers without requiring position/function credentialing.

Recommendation #14: Consider relocating Brush 14 to Station 9, 25, or 19 to provide more proximal wildfire response capacity for the Mount Tabor and Kelly Butte hazard areas.

Recommendation #15: Consider deploying an additional cross-staffed wildland response resource at Station 10 to provide more proximal wildfire response capacity for the Tryon Creek hazard area.

Recommendation #16: Consider utilizing larger Type-3 wildland engines if suitable access to wildland hazard areas is available.

Recommendation #17: Consider expanding existing mutual aid agreement(s) or pre-approved contracts to include specialized wildland resources not available within City resources (e.g., wildland bulldozer, hand crews, helicopter, fallers, skidders, etc.). The agreement should include response times and notification procedures.

6.5 MARINE FIREFIGHTING AND RESCUE

Given the rivers on both sides of the City, with their multiple uses, from recreation to commercial vessel and cargo work as well as bridge overcrossings, PF&R has long maintained an ability to be on the rivers to deliver firefighting, emergency medical services, technical rescue, and support to shoreline emergencies from the waterside of an incident.



Any delivery of emergency services on the water takes not just a boat with a qualified operator, but also a crew with specialized training and equipment on anything from firefighting to retrieving victims from the water, to assisting a vessel in distress, such as when it is taking on water. The deployment of marine fire rescue services is very much like on land—time over distance matters. Some emergencies are very time sensitive, such as an attempted suicide jump from a bridge or a boat on fire with its occupants needing to evacuate.

There are also risks on land and at berth—small pleasure vessels, commercial vessels, and even United States Navy (Navy) vessels under repair. Adjoining repair service or cargo buildings are combustible and need firefighting access from the waterside. In times of very large fires or earthquake damage to the public water mains, fireboats can pump large quantities of water ashore.

There are several commercial vessel ports along both rivers, and where there is industrial zoning there are specialty risks on land to be protected, such as flammable liquid and petroleum tank farms and large ship repair work, including welding hot work that increases the risk of fire aboard a vessel. There are also a variety of dry-bulk cargos moving through the ports such as grain, containers, and auto-transport ships. The tank farms also receive and transfer fuel to “lighter” barges that use the rivers to move fuel out to larger ships.

Vigor, the largest shipyard, has three drydocks and 13 cranes on 15 piers across 60 acres. This shipyard is one of largest and most capable shipyards on the West Coast. In addition to ship repair

and shipbuilding, the facility is used to build bridges, aerospace components, and other steel structures. The Navy contracts at this shipyard for repairs for vessels up through the frigate class, and the facility also handles mid-sized cruise ship repairs.

In the different commercial cargo and ship repair businesses along the rivers, there are no private fire brigades. All these businesses depend on PF&R for the full range of emergency incident protection. There is a Maritime Fire Safety Association (MFSA) and advisory council for the entire river complex, including the City. PF&R is a member of this association, and it coordinates quarterly training for all responders along the rivers. There is some maritime mutual aid available from other agencies.

While the Coast Guard is present, by national policy the Coast Guard does not provide shipboard firefighting because that is the responsibility of the vessel owner under the direction of the ship's master and its crew. As such, these vessels depend on the local fire department for support when the incident exceeds the on-board equipment or staffing capabilities. The Coast Guard requires commercial ships to have an emergency plan that is provided to outside responders upon their arrival. Given shipyard fires and losses over recent years, the Navy is now coordinating drills and training with municipal fire departments and, in some cases, paying for joint training. Both the Navy and the Vigor shipyard offer and support training with PF&R.

6.5.1 Current Deployment, Staffing, and Training

Stations 6, 17, and 21 deploy fireboats and smaller rescue boats from three stations along the rivers. Four marine cross-trained firefighters, including at least one paramedic per crew, staff each boat per shift in addition to the station's engine, switching from land to boat response as needed. Station 6 is north of downtown on the Willamette River, and Station 21 is just south of downtown on the Willamette River. Station 17 is on the Columbia River in the northern portion of the City. Two of PF&R's three large fireboats are newer and multiple-mission capable.

- ◆ Station 6 deploys one fireboat.
- ◆ Station 21 deploys a fireboat and a smaller rescue boat.
- ◆ Station 17 deploys two fireboats and a smaller rescue boat.

Station 24 is a land-based marine firefighting company for overall marine and specialty response. It is north of downtown and a little east of the Willamette River. This station consists of Engine 24 and a heavy squad apparatus for response to shipyard, high-rise buildings, chemical, biological, radiological, nuclear, and explosive incidents. Personnel assigned to Station 24 are additionally trained in on-board vessel fires and rescues. Both the engine and heavy squad carry specialized equipment to accomplish their multiple missions. These specialty units also carry larger smoke movement fans for high-rise building fire ventilation, as well as some CO₂-extinguishing agent

capacity and bulk medical supplies for mass causality incidents. The station also houses a 1,000-gallon firefighting foam concentrate unit.

For personnel assigned to marine station and boat duties, the firefighters are provided additional training for maritime operations. Best practice sources are used from the NFPA and the International Fire Service Training Association, as well as maritime associations. Assigned PF&R personnel are given task books to document their training and certifications for specialty operations. Locally, the first responders on the rivers strive for quarterly mutual aid training.

Marine program leadership comes from a Battalion Chief who works shifts as a responding chief officer. Training, assisting new personnel, and coordinating with the ports and businesses are all completed in addition to daily supervision of crews and incidents in their battalions.

6.5.2 Service Capability Challenges

PF&R's specialty programs and marine operations regarding boats are challenged by the current staffing plan. There are three overlapping issues that make the maritime response fragile:

1. While the daily staffing per marine fireboat or land-based crew is four, at times it is decreased to three marine certified personnel due to leave. The person on leave could be replaced on overtime with a person without marine certifications.
2. None of the marine boat and land-based specialty response units are staffed with any dedicated personnel. All these crews cross-staff an engine company, and those units are committed frequently, every day, to EMS incidents and fires. During these periods, there is no immediate fireboat response capability.
3. The number of marine-qualified personnel is low and only sufficient to staff those stations. Elsewhere across the City, daily, there are no other maritime-trained supplemental personnel on duty. When there is a marine staffing crew shortage or a large incident, marine-qualified personnel must be recalled from home, which is never a rapid response.

6.5.3 Fireboat Station Challenges

Two of the fireboat station locations have different but substantial challenges with design and long-term location.

Station 6 is sited in a small channel just off the Willamette River. The channel is filling with sediment, and the boat is at risk of being trapped at the berth at low tides. The surrounding land is a superfund site, and redevelopment has not progressed to allow for a permanent station relocation nor improvement. Because it is a superfund site, dredging is not a solution.

Station 17 operates two fireboats, one on the North Portland Harbor immediately adjacent to the fire station and one on the Columbia River. Covering two waterways with two fireboats from a

single station requires travel from the station to one of the boats. Station 17 is located on the North Portland Harbor, which has the greatest fire load and life-loss potential. The area is a residential area, and a co-joined station and fireboat berth parcel has not been available.

6.5.4 Marine Firefighting and Rescue Findings

From this review, Citygate makes the following findings relative to the PR&R's marine firefighting and rescue capabilities.

Finding #36: Continuing to cross-staff the fireboats from three stations is necessary to provide adequate response times to all the risks on both rivers.

Finding #37: Station/Fireboat 6 has a physically compromised site and needs a long-term relocation plan before the fireboat berth becomes impassible.

6.4.5 Marine Firefighting and Rescue Recommendation

Pursuant to this review, Citygate offers the following recommendation to enhance the City's marine firefighting and rescue capabilities.

Recommendation #18: Identify a solution pathway and funding to relocate the berth for the fireboat at Station 6.

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Section 7

*Firefighting Deployment
Evaluation and
Recommendations*



SECTION 7—FIREFIGHTING DEPLOYMENT EVALUATION AND RECOMMENDATIONS

7.1 OVERALL DEPLOYMENT EVALUATION

SOC ELEMENT 8 OF 8 **OVERALL EVALUATION**

PF&R’s service area is marked by a diverse population, land use, and public road pattern that in some areas is geographically challenged with rivers, open spaces, and/or a lack of major cross-connecting roadways, limiting PF&R’s quick response times. Population drives service demand, and development brings population. As different areas develop and add increased population density, PF&R’s services will need adjustment to just *maintain*, much less improve, response times across the geography, more so when simultaneous incidents occur at peak hours of the day.

In the most densely developed parts of Portland, while the substantial growth in EMS incidents over the past decade seems all-consuming, there is still a need for the foreseeable future for both a first-due firefighting unit and multiple-unit Effective Response Force (ERF) coverage consistent with current best practices to limit the risk of fire to only part of an affected building and keep wildland fires small within the initial attack force’s capabilities. Stated this way, *all communities need a stand-by and readily available firefighting force* that can respond when fires break out, regardless of peak-hour EMS workload.

Throughout the previous deployment sections of this report (Sections 1–6), Citygate has conducted in-depth analysis of response times, station locations, and types of apparatus. This analysis, based on the mapping and incident statistics, all combine to present Citygate’s opinions and overall deployment findings and recommendations in this section.

The effective deployment of fire and EMS first responder units across Portland is confronted by three issues that make cost-effective deployment more difficult: geography and road network design, high-volume EMS incident demands, and insufficient fire station coverage.

7.1.1 Issue #1: Geography and Road Network Design

PF&R’s service area spreads across both valley floor and hill areas typical of the northern Willamette Valley area of Oregon. Some areas of the City developed in flatter areas, with more traditional, right-angle, or grid road designs. However, others had to develop following natural land contours, open spaces, and rivers. The road networks outside of the core City have more curvilinear streets with more limited major cross-connecting roadways. Fire station locations in such curvilinear road networks need tighter station-to-station spacing as the units cannot cover as many public street miles as quickly as they can in a grid road network.

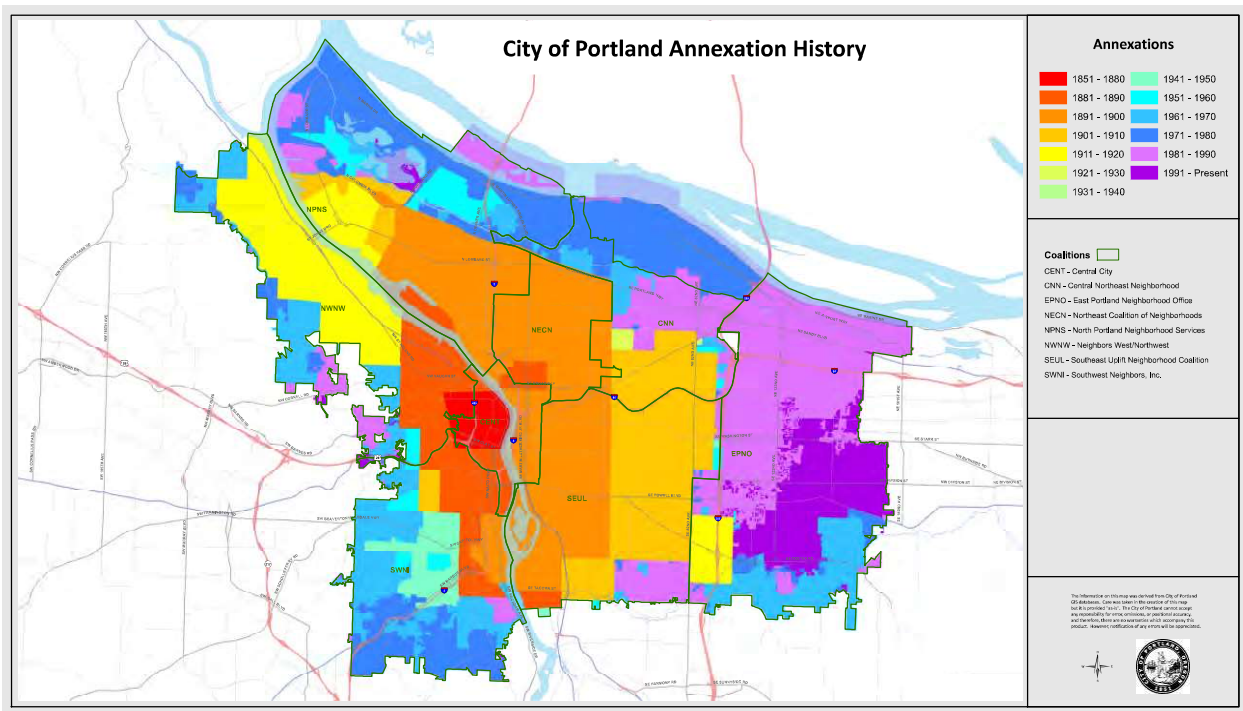
7.1.2 Issue #2: High-Volume EMS Incident Demands

As the response unit workloads by time-of-day show, EMS incidents comprise 54.86 percent of the total incident demand, and much of that demand occurs during daylight hours and in clusters of simultaneous incidents. So even if fire stations are appropriately located, at peak hours units are committed to one call and the next closest unit handles the second or third call in the same area. This can cause cascading delays on unit travel times as responding units travel across the City to handle the incidents.

7.1.3 Issue #3: Insufficient Fire Station Coverage

Much of the eastern and southeastern areas of Portland were annexed in the 1980s and 1990s. These areas had been served by fire districts, and the annexed fire stations were farther apart and were not part of an urban area master plan. The spacing of stations in this area and in the southwest hills that annexed in the 1940s to the 1960s, has not been improved upon.

Figure 16—City of Portland Annexation History



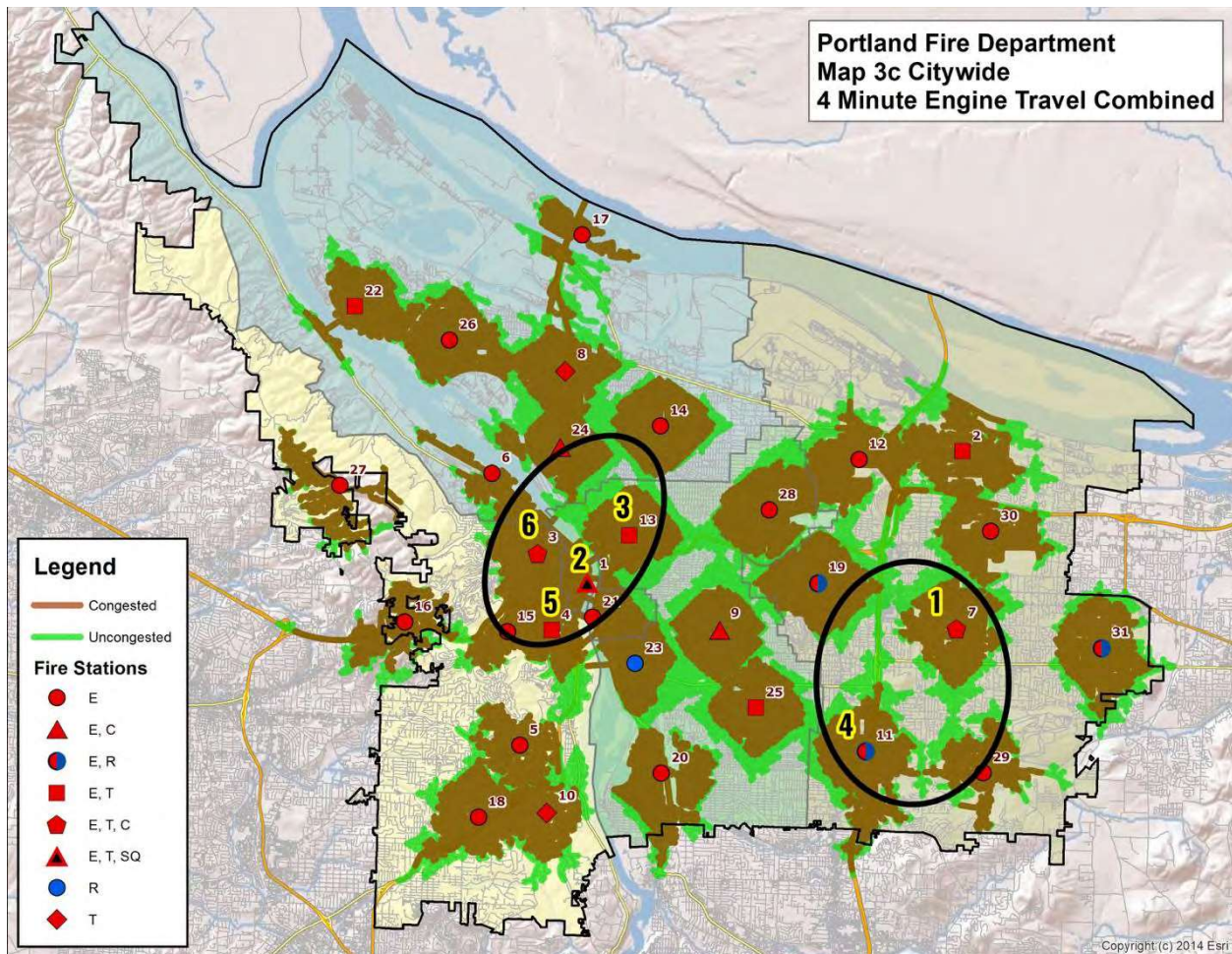
Therefore, today outside of the urban core where station spacing is closer to best practice response time delivery, the outer stations have long response times, worsened at peak hours by high-volume EMS demand.

As the traffic congestion portion of the GIS mapping study shows in Section 4.2, peak-traffic-hour congestion, which also occurs during high-incident demand hours, slows travel times. PF&R has

a goal of responding to emergencies within 4:00 minutes of reception; however, peak-hour traffic lowers first-due unit coverage 17 percent, from 57 percent to only 40 percent, of the City’s public road miles. The multiple-unit coverage falls 25 percent, from 29 percent coverage during off-peak hours, to only four percent during times of congestion.

Traffic congestion compounds the effects of the road network over topography and simultaneous incidents. This study’s review of workload by station area and by hour identified two groups that are “Deployment Priority Improvement Areas.” These stations all have high workloads and are frequently covering for each other or are pulling even more stations into these areas during simultaneous incidents. The areas are shown in the following map:

Figure 17—Deployment Priority Improvement Areas Map



Multiple factors were used to quantify the areas under the most deployment strain. In the following table, place points represent highest demand (1st) and 6 is lowest (6th). Lowest total score is the most impacted.

Table 25—Station Areas Under the Most Deployment Strain

Station	Station UHU Impact	Unit UHU Impact	Simultaneous % Impact	First Travel Impact	Building Fire Impact	EMS Rate Impact	Square-Mile Impact	Total
7	1	3	1	2	1	2	1	11
1	2	-	2	6	4	1	6	21
13	3	4	3	3	5	3	3	24
11	4	2	6	5	2	5	2	26
4	6	-	4	1	6	6	5	28
3	5	6	4	4	3	4	4	30

The high workload areas need either (a) more response units, or (b) a reduction in non-acute EMS workload, which would be more cost-effective, to stabilize and likely improve response times and availability for serious fire, EMS, and technical incidents.

In other words, Portland’s human services needs for non-acute medical and other incidents do not need a paramedic firefighter engine company and a two-person paramedic ambulance for a ride to an emergency room. PF&R is well suited to be an alternative human crisis response agency with specialized responders in addition to PF&R’s firefighters. Such an alternative response system is needed Citywide and, although it is a new expense, overall, it will be more cost-effective than adding fire units. Portland “*needs its fire department capacity back.*”

7.1.4 Recommended Deployment Improvements

The following summarizes Citygate’s findings and recommendation related to deployment improvements. Not all of the measures in the following findings and recommendations are based on the prior Table 25.

Finding #38: The eastern station areas are too large and need at least two stations to relieve pressure from Station 7.

Finding #39: The Fire Management Areas (FMAs) for six stations are very busy and will need rescues and/or low-acuity units first.

Finding #40: Station 23 needs to have a responding fire engine restored.

Finding #41: Overall, the City is short six fire stations if 4:00-minute first-unit travel is a goal to be funded.

Finding #42: Station 7 is too busy to also house the cross-staffed hazardous materials response unit and will require a Capital Improvement Plan (CIP) to relocate.

Given the scope of the needs, Citygate recommends PF&R establish deployment improvement tiers. The following recommendation provides an overview of the recommended tiers and improvements, with the tiers explained in further detail after the recommendation.

Recommendation #19: PF&R should make deployment improvements according to these two priority tiers:

Tier One—(Essential) Fire Service Historic Deployment Standards

Add a station *northwest* of Station 7.

Move the hazardous materials units out of Station 7 as soon as possible.

Restore Engine 23 with full staffing.

Obtain permanent funding for the new low-acuity response Community Health program units. If that program is not funded beyond 2022, and is not successful in lowering EMS demand on PF&R fire crews, proceed to Tier Two:

Tier Two—Alternative Deployment Improvement and Peak Activity Units

Add a minimum of eight medical low-acuity two-person units.

Add three engine Peak Activity Units (PAUs).

This two-tiered system is further explained and justified as follows.

Tier One—(Essential) Fire Service Historic Deployment Standards

- ◆ Add a station *northwest* of Station 7 for these reasons:
 - Four combined low/high acuity EMS pockets.

- Weak second-due ladder truck coverage east of Stations 19 and 11.
- Fire and EMS hotspot clusters northwest of Station 7.
- Station 7 ranks first for having the highest station area UHUs at peak hours.
- Engine 7 ranks third for having the highest engine UHUs at peak hours.
- Truck 7 ranks first for having the highest UHU at peak hours.
- Station 7 ranks first for total incidents per station in 2019.
- Station 7 ranks first for having the highest simultaneous incident rates.
- Battalion 3, where Station 7 is located, ranks first for having the highest simultaneous incident rates.
- Rescue 19 is the busiest rescue in the City.
- Station 7's travel time across five years is 5:43 minutes.
- Station 7's call to arrival time across five years is 9:10 minutes.
- ◆ Move the hazardous materials units out of Station 7 as soon as possible.
- ◆ Restore Engine 23 with full staffing.
 - Engine 23 backs up two low/high acuity pockets and would keep Engine 4 in district more.
 - Station 25 is the ninth highest station area for UHU demand.
 - Station 9 is the twelfth highest station area for UHU demand.
 - Stations 25 and 20 have travel times of 6:07 and 6:51 minutes, respectively.
 - Station 23 is the second- or third-due to the entire south area east of the water.
- ◆ Obtain permanent funding for the new low-acuity response Community Health program units. If that program is not funded beyond 2022, and is not successful in lowering EMS demand on PF&R fire crews, proceed to Tier Two, adding the following fire crew staffed alternative deployment and peak-hour activity units:

Tier Two—Alternative Deployment Improvement and Peak Activity Units

- ◆ Add a minimum of eight medical low-acuity two-person units.
 - Immediately, PF&R needs two units, at a minimum, in the City core, one on each side of the river, 24/7/365.

- Immediately, PF&R needs two more units, at a minimum, either northwest or southeast of Station 7, 24/7/365.
- In a second phase with funding, the following units should be added:
 - During peak hours, add two more units in the above areas (core and Station 7).
 - Add two more units, one each in Battalions 2 and 4, 24/7/365.
- ◆ Add three engine Peak Activity Units (PAUs).
 - These three PAUs would be four-person fire engines, one each in Battalions 2, 3, and 4 for peak-hour simultaneous incident and training out-of-service coverage.
 - These would need to operate 10:00 am to 8:00 pm weekdays and on special event weekends.

7.2 NEAR-TERM DEPLOYMENT RECOMMENDATIONS

Based on the technical analysis and findings contained in this study, Citygate offers the following near-term deployment recommendations:

Recommendation #20: Adopt City Council Deployment Measure Policies:

The Council should consider adopting complete performance measures that begin with BOEC call answering and end with PF&R arriving on scene. The measures of time should be designed to save patients and to keep small but serious fires from becoming greater alarm fires. With this in mind, Citygate recommends:

- 20.1: Distribution of Fire Stations:** To treat medical patients and control small fires, the first-due unit should arrive within 8:30 minutes, 90 percent of the time from the receipt of the 9-1-1 call in the fire dispatch center. This equates to a 90-second dispatch time, 2:00-minute company turnout time, and 5:00-minute travel time.

- 20.2:** Multiple-Unit Effective Response Force for Serious Emergencies: To confine fires near the room of origin and to treat up to five medical patients at once, a multiple-unit response of a *minimum* of four engines, one ladder truck, and one Battalion Chief, totaling a minimum of 21 personnel, should arrive within 11:30 minutes from the time of 9-1-1 call receipt in fire dispatch, 90 percent of the time. This equates to 90-second dispatch time, 2:00-minute company turnout time, and 8:00-minute travel time spacing for multiple units.
- 20.3:** Hazardous Materials Response: To meet the fundamental mission of PF&R’s response, which is to minimize or halt the release of a hazardous substance, so it has minimal impact on the community, PF&R needs to provide hazardous materials response designed to protect the community from the hazards associated with uncontrolled release of hazardous and toxic materials. The first responder unit should arrive to investigate a hazmat release at the operations level within 8:30 minutes, which equates to a 90-second dispatch time, 2:00-minute company turnout time, and 5:00-minute travel time in the urban population areas. After assessment and scene evaluation is completed, a determination will be made whether to request additional resources from PF&R’s multiple-agency hazardous materials response partnership.
- 20.4:** Technical Rescue: To respond to technical rescue emergencies as efficiently and effectively as possible with enough trained personnel to facilitate a successful rescue, the first company in urban to suburban areas to arrive for assessment of the rescue should achieve a 5:00-minute travel time, 90 percent of the time. Additional resources capable of initiating a rescue should be assembled within a total response time of 11:30 minutes, 90 percent of the time, with the result being the safe and complete rescue/extrication to ensure delivery of patients to a definitive care facility.

Recommendation #21: Reduce turnout times to 2:00 minutes or less, 90 percent of the time.

Recommendation #22: Reduce dispatch processing time for acute emergencies to 90 seconds or less, 90 percent of the time.

Recommendation #23: Given the topographic challenges of current fire station locations, work with City Council to adopt a fire station spacing measure of a 5:00-minute travel time, assuring the Council understands the risk such change involves to the community.

Recommendation #24: Identify and assess the cost for when resources can be added.

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Section 8

*Headquarters Service
Capacity Review*



SECTION 8—HEADQUARTERS SERVICE CAPACITY REVIEW

As an element of this Service Delivery and Staffing Study, Citygate was tasked to review and evaluate PF&R’s headquarters support organization relative to overall organization, lines of authority, span of control, and workload capacity.

For overall fire department administration, NFPA 1201¹⁷ 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 operation are increasing, so the proper hiring, training, and supervision of operational personnel requires a significant leadership and general management commitment.

8.1 ASSESSMENT METHODOLOGY

Citygate reviewed the current PF&R headquarters support organization and evaluated its lines of authority, span of control, and workload capacity gaps, if any. We then made findings relative to that evaluation and provide recommendations for consideration by PF&R executive management to improve the overall efficacy of PF&R’s headquarters organization.

Our methodology for this review included:

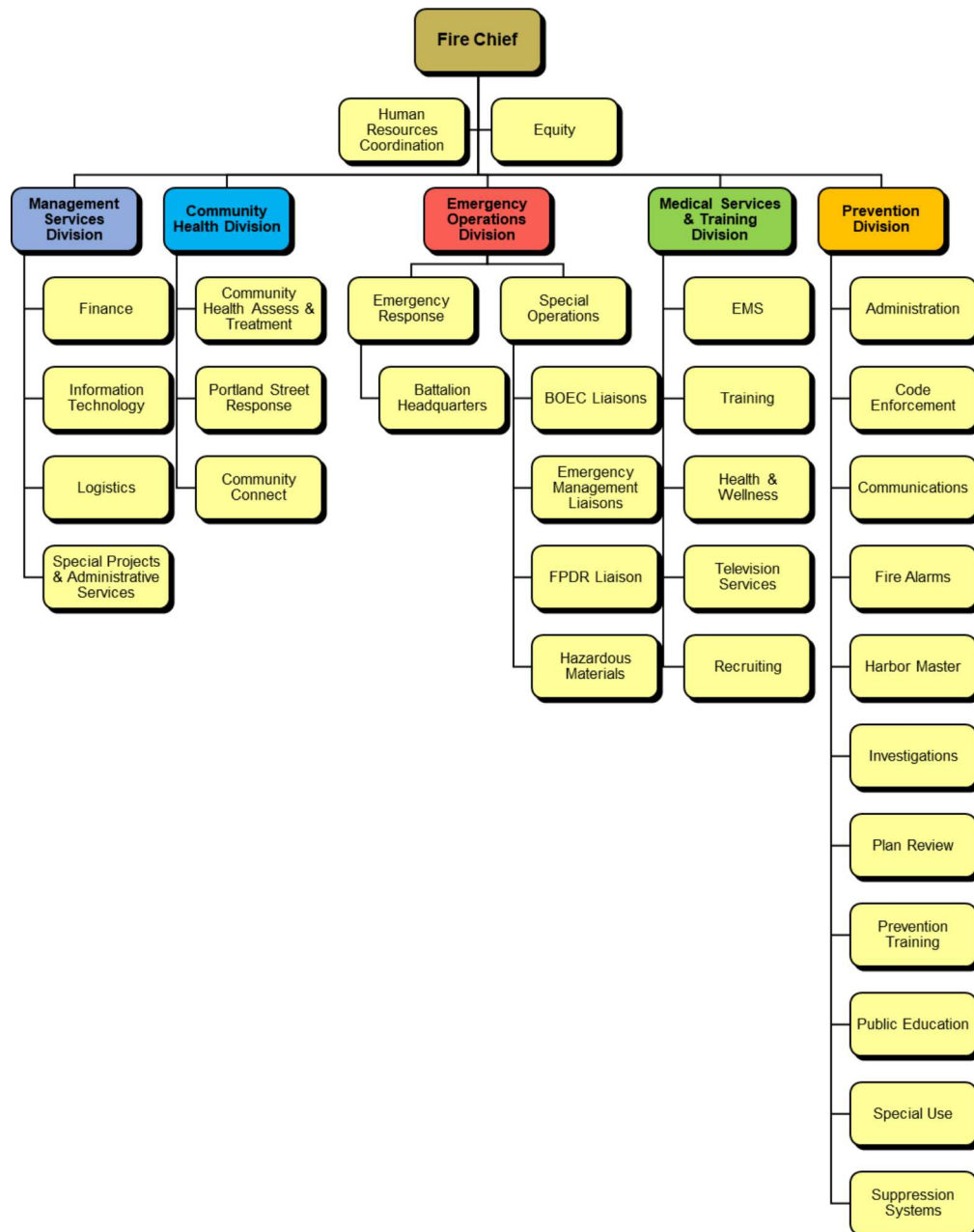
- ◆ Review of relevant position descriptions to understand primary responsibilities and expectations for each function or position.
- ◆ One-on-one or workgroup interviews.
- ◆ Identification of current workload capacity gaps, if any, to include what key responsibilities/expectations are not being completed at all or are not being completed to the desired/expected levels or timelines.
- ◆ Estimation of the additional workload capacity needed, if any, in full-time equivalent (FTE) personnel to close identified workload capacity gaps and eliminate or minimize any single points of failure.
- ◆ Recommended structural changes to improve overall organizational efficacy, communications, coordination, and supervisory span of control.

¹⁷ NFPA 1201 – Standard for Providing Emergency Services to the Public (2015 Edition).

8.2 ADMINISTRATIVE SUPPORT ORGANIZATION

Portland’s Fiscal Year (FY) 2021–22 adopted budget authorizes 130.25 FTE headquarters/administrative support positions for PF&R organized into five divisions as shown in the following chart. This administrative organization is responsible for the overall administration and management of all PF&R programs and services and most administrative functions to support the 602 operational response personnel providing direct services to the City.

Figure 18—Portland Fire & Rescue Administrative Support Organization



8.3 CHIEF'S OFFICE

PF&R Chief's Office includes the Fire Chief, an Equity Manager (Manager I), a Policy Advisor (Communications Coordinator I), and one Administrative Assistant III for a total of four FTEs. The Bureau of Human Resources also has an assigned PF&R Coordinator.

8.3.1 Key Programs and Responsibilities

Key Chief's Office programs and responsibilities include:

- ◆ Overall vision, leadership, direction, and administration of PF&R.
- ◆ Management of the following core services within the Chief's Office:
 - Equity and inclusion.
 - Professional standards and labor relations.
- ◆ Implementation of PF&R's strategic plan and progress toward achievement of strategic goals.
- ◆ Ensuring PF&R's alignment with Council and community goals and expectations.

8.3.2 Workload Capacity Assessment

Citygate's review and assessment of the Chief's Office finds that while the Fire Chief has a manageable span of supervisory control, that position is directly involved in the day-to-day management of PF&R as currently organized and is challenged to have the capacity needed to focus on higher-level issues associated with a large metropolitan city fire and rescue department, including long-range planning, coordination/collaboration with other City departments to collectively address Citywide problems and City Council goals and objectives.

In Citygate's experience with other large fire agencies, an executive management team with one to three subordinates directly below the Fire Chief handling the day-to-day management of the organization is a highly effective model providing the capacity needed for the Fire Chief to be able to focus on higher level community-wide and organizational issues, goals, and objectives.

8.3.3 Findings and Recommendations

Pursuant to this review and assessment, Citygate makes the following findings and recommendations relative to PF&R's Chief's Office.

Finding #43: PF&R's Chief's Office lacks sufficient capacity for the Fire Chief to focus on higher level community-wide and organizational issues, goals, and objectives.

Recommendation #25: PF&R should consider a reorganization of the Chief's Office to establish two Assistant Chief positions to handle the day-to-day administration of PF&R.

8.4 MANAGEMENT SERVICES DIVISION

The Management Services Division includes 15 personnel, including two current vacancies, organized into the following four sections under the Management Services Division Manager (Manager III).

- ◆ Finance
- ◆ Information Technology
- ◆ Logistics
- ◆ Special Projects and Administrative Services



8.4.1 Finance Section

The Finance Section includes nine personnel responsible for the following key programs and responsibilities within PF&R. The supervisory Business Operations Manager position was eliminated in Fall 2021.

- ◆ Accounting
- ◆ Budgeting
- ◆ Payroll
- ◆ Performance and data analytics
- ◆ Personnel action, processing, and Family and Medical Leave Act (FMLA) coordination
- ◆ Ordinances and contracts
- ◆ Grants
- ◆ Performance and data analytics

◆ Position management

Workload Capacity Assessment

Citygate’s review of the Finance Section finds the current staffing capacity to be *insufficient* to meet program responsibilities and expectations. The recent attrition and elimination of the Finance and Data Manager (Manager I) and Accounting Manager key positions (Analyst III) has resulted in insufficient direct supervision/oversight of accounting and procurement staff, finance and analytics staff, technical project management, and position management. As a result, the Management Services Division Manager has had to assume many of the critical tasks and responsibilities of these eliminated positions due to the lack of any other available Division capacity, thus significantly impacting capacity available to provide overall leadership, administration, and direction of the entire Management Services Division as well as oversight of PF&R-wide initiatives, strategies, and programs. To address this gap, the Management Services Division Manager has reclassified a vacant Analyst position to a Manager I level to fill this critical need; however, the position reclassification now leaves capacity gaps in the finance and budget functions.

Findings and Recommendations

Citygate makes the following findings and recommendations pursuant to its review and evaluation of the Finance Section.

Finding #44: The staffing level and associated workload capacity of the Finance Section is *insufficient* to meet all program responsibilities and expectations.

Finding #45: The elimination of two key Finance Section positions has resulted in the Management Services Division Manager having to assume many of the critical daily tasks and responsibilities of the two positions due to a lack of any other available staff. This has significantly impacted the Management Services Division Manager’s available capacity to provide overall leadership, administration, and direction of the entire Division.

Recommendation #26: The City should consider restoring the Analyst III position in the PF&R Finance Section as soon as fiscally feasible.

8.4.2 Information Technology Section

The Information Technology Section includes one Business Systems Analyst III responsible for management of all technology hardware and software for PF&R. Additionally, PF&R has three City Bureau of Technology Services (BTS) employees dedicated to system programming. PF&R pays BTS for the services of these employees. There is a currently a vacant Administrative Specialist II position in the Section. PF&R has numerous technology solutions in various stages of consideration, piloting, and implementation; however, PF&R does not have dedicated project managers. The project management of the new technologies is often delegated to operational personnel, who assume these responsibilities in addition to their regular duties. This approach is not sustainable and there are risks to having informal project management of critical systems. In the past, the former Manager I (Finance Manager), who had a background in data systems, stepped in to help with technology project management; however, that was an arrangement based on the individual filling that role at that time. When the Finance Manager left PF&R in 2021, it created gaps in finance, technology, and data analytics. Additionally, when the Data Analyst Program Manager (Analyst III) position was cut from PF&R's budget in FY 21-22, this further eroded capacity to manage PF&R data and technology projects.

Workload Capacity Assessment

Citygate's review of the Information Technology Section finds the current staffing capacity to be *insufficient* to meet key program responsibilities and expectations.

Findings and Recommendations

Citygate makes the following findings and recommendations pursuant to its review and evaluation of the Information Technology Section.

Finding #46: The staffing level and associated workload capacity of the Information Technology Section is *insufficient* to meet all current and anticipated near-term key program responsibilities and expectations.

Recommendation #27: PF&R should consider reclassifying a vacant Administrative Specialist II position in the Management Services Division as a Technology Coordinator to provide needed additional workload capacity in the Information Technology Section.

Recommendation #28: Consider adding needed dedicated technology project management capability/resources to the Information Technology Section.

8.4.3 Logistics Section

The Logistics Section includes 21.0 FTE for the following key programs and responsibilities within PF&R:

- ◆ Procurement, maintenance, and repair of specialized fire service apparatus, equipment, and uniforms.
- ◆ Procurement, maintenance, and repair of PF&R facilities.



Workload Capacity Assessment

Citygate’s review of the Logistics Section finds the current staffing capacity to be *insufficient* to meet key program responsibilities and expectations. Specifically, the Section lacks sufficient capacity to keep up with facility maintenance demand, fleet maintenance, uniform services, and self-contained breathing apparatus (SCBA) maintenance and testing. PF&R’s Logistics Section is uniquely qualified to ensure the City’s firefighters have the specialized equipment, vehicles, and facilities needed to perform their assigned jobs. In the past, the City has considered centralizing the functions of Fleet and Facilities; however, in Citygate’s experience across many fire departments, this has not proven to provide the timely and technical proficiency needed to maintain optimal emergency response fleet serviceability, safety, and reliability.

Findings and Recommendations

Citygate makes the following findings and recommendation pursuant to its review of the Logistics Section.

Finding #47: The Logistics Sections lacks sufficient staffing and associated workload capacity to meet all current and anticipated near-future program responsibilities.

Recommendation #29: Provide needed additional staffing capacity for PF&R’s Logistics Section as soon as fiscally feasible in the following priority order:

Immediate Critical Need

SCBA/Respiratory Technician 1.0 FTE

EMS Supplies 1.0 FTE

Admin. Asst./Specialist 1.0 FTE

Near-Term

Carpenter 1.0 FTE

Staff Firefighter (Uniforms) 1.0 FTE

8.4.4 Special Projects and Administrative Services

The Special Projects and Administrative Services Section includes one Analyst III (.75 FTE), and two Administrative Specialist IIs (one position is currently vacant) responsible for the following key programs and responsibilities:

- ◆ Liaison to other City bureaus
- ◆ PF&R reception functions
- ◆ Coordinate general order updates and policy changes
- ◆ Enact Citywide policies and initiatives
- ◆ Strategic planning and direction
- ◆ Office supplies
- ◆ Meeting room scheduling
- ◆ Fire code appeals
- ◆ Annual performance plan
- ◆ Ergonomics coordination
- ◆ Space coordination

Workload Capacity Assessment

Citygate’s review of the Special Projects and Administrative Services Section finds the current staffing capacity to be *insufficient* to meet current and anticipated near-term key program responsibilities and expectations. Specifically, PF&R lacks dedicated long-range/strategic planning and project management, records management (including retention and public records requests), and PF&R-wide policy coordination.

Findings and Recommendations

Citygate makes the following findings and recommendations pursuant to its review of the Special Projects and Administrative Services Section.

Finding #48: The staffing level and associated workload capacity of the Special Projects and Administrative Services Section is *insufficient* to meet current and anticipated near-term key program responsibilities and expectations.

Recommendation #30: Consider adding the following needed FTE capacity at the appropriate position classifications in the Special Projects and Administrative Services Section.

Planning Officer	1.0 FTE
Professional Standards Compliance Officer	2.0 FTE
Policy Coordinator	1.0 FTE

8.5 COMMUNITY HEALTH DIVISION

This new Division was formed to manage one ongoing function, one innovative restructured function, and one entirely new and innovative function. All three programs are designed to offer human care services to those in need of care or assessment outside of an institution. The three programs are:

- ◆ Portland Street Response – ongoing
- ◆ Community Connect – *restructured*
- ◆ Community Health Assess and Treat – *new*

8.5.1 Portland Street Response (PSR) – Ongoing

This team began in 2021 with four personnel: one Manager I, one EMS Specialist, one Community Health Worker, and one Mental Health Crisis Clinician. PSR was set up to provide first response crisis intervention for non-criminal, non-life-threatening 9-1-1 calls pertaining to mental health, substance use / intoxication, and welfare check calls.

In its first stage of development, it operated solely in the Lents neighborhood for a full year. For the first six months of the pilot year, it deployed a team of four responders: one Firefighter

Paramedic, one Mental Health Crisis Clinician, and two Community Health Workers. Six months later a second team was added to include Peer Support Specialists. PSR offers these services:

- ◆ First Response – An EMT-B co-responds with a Mental Health Crisis Clinician to non-emergency, non-life-threatening 9-1-1 calls for assistance pertaining to mental health, substance use / intoxication, and welfare check calls. Services this team provides include:
 - Crisis counseling
 - Conflict resolution
 - Grief and loss
 - Substance use / intoxication
 - Intervention to services
 - First aid and non-emergency medical care
 - Transportation to treatment services

8.5.2 Community Connect – Restructured

Prior to the creation of the Community Health Division, PF&R had two personnel who focused on high utilizers of the 9-1-1 system. These personnel—one Firefighter Specialist and one EMS Specialist—were set up to provide peer support and connection to services. With the creation of the Community Health Division in 2021, these personnel were assigned to the newly formed “Community Connect” program. Community Connect personnel work on the following issues:

- ◆ Resource connection and referrals for housing
- ◆ Resource connection and referrals for mental health and substance use
- ◆ Transportation to services
- ◆ Meds on Wheels (MOWs)
- ◆ Mobile Vaccination Teams (MVTs)
- ◆ Community Resource Center (CRC)
- ◆ Referral and Outreach (R&O)
- ◆ Community Education

8.5.3 Community Health Assess and Treat (CHAT) – New

PF&R is partnering with CareOregon to create a new response model that allows PF&R to provide healthcare in the community by responding to medical emergencies in the pre-hospital and post-hospital settings. This response model is called CHAT, or “Community Health Assess and Treat.” Together CHAT, PSR, and Community Connect make up the Community Health Division of PF&R.

Pillar One – Community Health Assess and Treat (CHAT)

Timeline: Program start date – January 2022 thru October 2022

The aim of Phase One of this project is to assess the viability of utilizing CHAT teams to respond to specific low-acuity call types traditionally responded to by PF&R units, which average 26,000 low-acuity medical calls a year. CHAT teams will respond with the goal of assessing and treating, using established community health response protocols, and treating in the community setting rather than unnecessarily transporting patients to the Emergency Department (ED). The CHAT teams will provide four deliverables per incident (as noted below):

Operations: Working under the direction of the Medical Director and a Supervising Nurse, a daily minimum of two and a maximum of four units will be operational in each of the high-density, low-acuity call zones within the City.

Objectives: Respond – By the Bureau of Emergency Communications (BOEC) dispatch, units will respond to low-acuity prioritized calls. Call types include sick person, back injury, overdose, abdominal issues, etc.

Assess – Perform physical and mental health assessment.

Treat – Utilizing PF&R-designated community health protocols, initiate treatment care plan.

Coordinate Care – Chart in designated charting system and document deliverables.

Follow Up – Arrange follow-up visits as necessary within 24 hours of initial response.

Outcomes:

- ◆ CHAT will respond to 2,500 low-acuity medical calls per quarter.

- ◆ CHAT units that arrive on scene and make patient contact will complete the established deliverables 75 percent of the time.

Pillar Two – Portland Street Response (PSR)

Operations: Working under the supervision of a manager, six PSR units comprised of a Mental Health Clinician, an EMT, and a Community Health Worker or Peer Support Specialist will be operational in the City of Portland.

Objectives: There is one main objective of PSR:

1. Units will respond to mental/behavioral health, substance use / intoxication, and welfare check emergency and non-emergency calls for service.

Respond – By the BOEC dispatch, units will respond to mental health/behavioral, substance use / intoxication calls, and welfare check calls.

Assess – Perform a physical and mental health assessment.

Treat – Create a client-centered care plan for follow-up and case management services when applicable.

Outcomes:

- ◆ Respond to 5,000 9-1-1 calls for mental health, substance use, intoxication, and welfare check calls for service in year one.
- ◆ Provide a gap analysis of mental health, housing, and substance use and addiction treatment providers in the City of Portland.

Pillar Three – Community Connect

Operations: Function as an extension service between PF&R community health programs and community members.

- ◆ Meds on Wheels (MOWs) – Medication prescription pick-up and delivery service of vital, life-sustaining medications, including controlled substances. The program is specifically geared toward individuals whose health or circumstance makes obtaining medication challenging.
- ◆ Mobile Vaccination Teams (MVTs) – Four-person vaccination teams deployable to designated locations in the community setting. PF&R has ten vaccination teams available. The teams can stand up both walk-up and drive-through vaccination sites.

Deployment of the MVT will be directed by PF&R and CareOregon to assess higher risk contacts identified in the community setting.

- ◆ Community Resource Center (CRC) – PF&R resource center will maintain active and up-to-date collection of community health related services and agencies to be used within PF&R or disseminated to the community.
- ◆ Referral and Outreach (R&O) – PF&R’s emergency operation high utilizer referral program that connects the patient to resources and outreach.
- ◆ Community Education – Specific community health-based programs to be delivered to community based on need (e.g., diabetic education at the local community center for underserved populations who struggle with diabetes control).

Summary of Expected Outcomes for Project Phase One

Quarterly reports will be provided to stakeholders outlining PF&R’s results (performance indicators) compared to the funding parameters.

8.6 FIRE PREVENTION DIVISION

The Fire Prevention Division includes 11 units and in FY 21–22 had a total of 60.7 FTE positions in both technical and support classifications. The Division is led by a Fire Marshal and two Assistant Fire Marshals. Most of the sworn staff are Inspectors, a rank requiring additional training and certifications beyond the firefighter position. Direct supervision is generally provided by Senior Fire Inspectors. One Assistant Fire Marshal leads the Code Enforcement, Special-Use Permits, and Harbor Master Sections. Another Assistant Fire Marshal leads the Plan Review Section and special projects. The Investigations Section is composed of five fire cause / arson Investigators who are dually certified as law enforcement officers and firefighters.

All fire prevention divisions are built to provide the community with prevention programs designed to save lives, property, and the environment by preventing fires before they start. They are also built to identify the cause and origin of fires. These goals are accomplished using a multi-disciplinary approach that includes education, engineering, and enforcement.

The Division’s largest commitment is to inspecting high-priority existing occupancies at least once every two years and promptly following up on violations with reinspections.

8.6.1 Major Programs

Major Division business units include:

- ◆ New Construction – plan review, fire alarms, fire-suppression systems, hazardous materials inspection

- ◆ Maintenance of existing buildings – permit support, code enforcement/inspections, code enforcement support, Harbor Master, and training for fire prevention personnel
- ◆ Fire Investigations
- ◆ Public Education
- ◆ Departmental communications/public affairs

Major Division activities include:

- ◆ Adoption and enforcement of the City and state fire codes.
- ◆ Review of all proposed 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.
- ◆ Inspection of designated building occupancies for conformance with applicable fire and life safety codes, ordinances, and regulations.
- ◆ Certificate of Occupancy inspections.
- ◆ Code enforcement and hazard abatement.
- ◆ Public fire and life safety education.
- ◆ Fire/arson investigations.
- ◆ Division and Department public affairs.

8.6.2 Inspection Workload Assessment

Workload across the Division has been gradually increasing for new construction. PF&R is designated by the Oregon State Fire Marshal as an exempt jurisdiction. With this authority, PF&R performs, with few exceptions, all the activities assigned by Oregon law to the State Fire Marshal. Due to COVID-19 the existing building inspections were significantly lower in FY 20–21. Workload measures from the Division’s FY 21–22 budget submittal follow.

Table 26—Fire Prevention Workload Measures

Workload Measure	Actuals FY 18–19	Actuals FY 19–20	Actuals FY 20-21
Number of code enforcement inspections	26,625	28,870	18,000
Number of code enforcement reinspections	7,150	8,047	7,000
Number of plan review and permits	8,384	6,982	8,850

The FY 18–19 adopted budget provided \$350,000 in funding for a new fire inspection software to improve code enforcement operations. The new software will allow Inspectors to access information and enter data while in the field, provide a customer portal for access to fire inspection data, and prioritize inspections based on risk. Selection and procurement of a software vendor was completed in FY 18–19 and product development is in progress.

At present, the new and existing building inspections workload is managed by dividing the City into 14 districts, each of which has one General Inspector. In addition, special event permits and as needed on-site supervision uses another two Inspectors. Public institutions like health care also require two Inspectors.

However, this staffing will soon be insufficient as all minor existing building inspections are being reassigned to the Division from the fire crews. This is due to the high incident volume on many of the stations, along with the time needed for other activities such as training. Citygate and the Fire Marshal both believe that at a *minimum* six additional Fire Inspectors may be needed to maintain these inspections even at two- to three-year intervals depending on the implementation and capacity of CivicGov to assimilate the inspections. The six positions add just under one Inspector to every 2.3 fire inspection districts.

8.6.3 Fire Investigations

Fire Investigations caseload has been increasing, not just due to COVID-19 and police unrest. There are a multitude of reasons that create accidental and arson fires. All must be investigated to determine, in the accidental cases, if the fire codes must be improved or, in the case of arson, to hold people accountable and lower insurance fraud. Investigation caseload includes consultations, responses to scenes, investigations, and telephone police report intakes.

At present there are four NFPA-certified Fire Investigators on a 42-hour work week. In 2013, due to fiscal pressure, three Investigator positions were cut. There is a fifth Investigator who is working alongside Portland Police detectives and assisting the supervising unit.

In FY 20–21 the primary caseload was 2,026 incidents, which was higher than usual due to civil unrest:

- ◆ 339 fires were determined to be accidental.
- ◆ 498 fires were determined to be incendiary.
- ◆ 879 fires were undetermined in cause/nature after the investigation.
- ◆ 12 incidents were explosion related.
- ◆ 9 juveniles were associated with investigations.
- ◆ 287 incidents were in the “other” category. This included: Engine Company Assists with Fire Watch, Follow Up Investigations, Explosive Disposal Unit Assists, Mental Health Calls, etc.

In the same year, the investigations that were initially coordinated with Portland Police and the court system were:

- ◆ 612 total police reports authored for the City of Portland were arson related.
- ◆ 537 initial police investigative reports were authored by Fire Investigators.
- ◆ 118 reports – arson – structure occupied.
- ◆ 63 reports – arson – structure vacant.
- ◆ 238 reports – burning – non-structure (vehicles, dumpsters, portable toilets, etc.).
- ◆ 193 reports – arson – all other (debris, monetary loss less than \$750).
- ◆ 444 cases suspended (due to a lack of tangible leads, insufficient evidence, lack of resources, not a crime, etc.).
- ◆ 132 cases cleared by arrest.
- ◆ 76 cases resulted in felony charges.
- ◆ 44 cases were adjudicated as misdemeanor.
- ◆ 7 cases were cite and release.

In late 2021, the Investigations Unit was on track for almost 1,000 calls for service per year. If realized that equals 200 primary incidents per shift investigator. While this is 50 percent fewer than in 2020, it is still a high severity caseload per investigator.

8.6.4 Public Education

PF&R’s strategic plan recognizes the role of prevention in public education and outreach given these specific projects in the 2020–2023 Strategic Plan:

- ◆ Educate the community on core services and emergency preparedness.

- ◆ Use data and risk modeling to strategically direct public education efforts.
- ◆ Increase the number of community relationships and partnerships to develop community-specific health and safety solutions.

However, the current PF&R public education staffing for Citywide programs is shared with PF&R’s overall community communication functions. There is only one public education position and most of the work is done via engine companies. For a city of Portland’s size this is a bare-minimum effort. When resources allow, there should at least be one more public education position added.

8.6.5 Findings and Recommendations

Citygate’s analysis of Fire Prevention Division workload yielded two significant workload capacity gaps that should be addressed over time:

Finding #49: The transfer of fire engine crew fire inspection caseload to the Fire Prevention Division may generate the need for additional Fire Inspectors depending on the ability of proposed software (CivicGov) to assimilate this workload.

Finding #50: Because the Fire Investigation Unit has a large caseload per Investigator, the unit cannot meet the needs of the City.

Recommendation #31: There is the near-term need to add one Fire Investigator and six Fire Inspectors. Longer term, one Program Coordinator should be added to public education.

8.7 EMERGENCY OPERATIONS DIVISION

The headquarters support staff for the Emergency Operations Division consists of three shift-based Deputy Chiefs with collateral administrative and programmatic responsibilities over the Emergency Response Program, and one 40-hour Special Operations Deputy Chief. The A-Shift Deputy Chief currently manages the Marine Response Program, as well as the Battalion Headquarters office. The B-Shift Deputy Chief manages the Technical Rescue Program and is also the Urban Search and Rescue Team coordinator. The C-Shift Deputy Chief coordinates wildland response. The Special Operations Deputy Chief oversees the Hazardous Materials Coordinator, the Regional Fire Working Group, the PF&R staff Fire Lieutenant Liaisons to the Bureau of Emergency Communications (BOEC), PF&R’s Liaison to the Portland Bureau of Emergency

Management (PBEM), PF&R's Liaison to the Fire and Police Disability and Retirement (FPDR), the Urban Area Security Initiative (UASI) Coordinator, and other special projects as assigned.

8.7.1 Workload Capacity Assessment

Citygate's review of the Emergency Operations Division finds it to be *understaffed* to meet current and near-term key program responsibilities and expectations. Specifically, in addition to managing PF&R's Hazardous Materials Coordinator, the Special Operations Deputy Chief position has become the catch-all for special project management and other responsibilities including all hazard response planning, special events coordination, Fire and Police Disability Liaison duties, oversight of PF&R's BOEC and PBEM Liaisons, Wildland–Urban Interface (WUI) planning and coordination including grant application and management, multiple-bureau coordination, regional fire working group, and Urban Area Security Initiative (UASI) Coordinator.

In Citygate's experience and opinion, this number of programs and responsibilities is much too high for a single position, as was validated in our interviews with the Special Operations Deputy Chief and Emergency Operations Division Chief. As a result of this review and evaluation, Citygate recommends the Special Operations Deputy Chief position be re-aligned to focus solely on managing PF&R's Special Hazard Response Programs including hazardous materials, technical rescue, and marine operations; and re-assign the other responsibilities or add additional capacity as prioritized to maintain the other programs and responsibilities elsewhere in the PF&R organization.

8.7.2 Findings and Recommendations

Following are Citygate's findings and recommendations pursuant to review and evaluation of PF&R's Emergency Operations Division.

Finding #51: PF&R's Emergency Operations Division is *understaffed* to meet current and anticipated near-term program needs and expectations.

Recommendation #32: Re-align the responsibilities assigned to the Special Operations Deputy Chief to focus solely on managing PF&R's Special Hazard Response Programs, including hazardous materials, technical rescue, and marine operations.

Recommendation #33: Add a dedicated Wildland Fire Program Manager as soon as possible to provide critical coordination and oversight of all PF&R wildland fire-related programs, functions, and responsibilities, including suppression and pre-event mitigation/prevention.

Recommendation #34: Add two staff Fire Lieutenants over the near-term as funding allows to provide needed 24/7/365 PF&R Liaison coverage at the Bureau of Emergency Communications.

Recommendation #35: Add one staff Fire Lieutenant over the near-term as funding allows to provide needed seven-day operational staffing coordination in the Battalion Headquarters Office.

Recommendation #36: Add one Deployment Analyst over the longer-term as funding allows to provide implementation support of planned technical analytic tools and systems (ImageTrend/CivicGov/Intterra and a pre-fire program which is to be determined).

Recommendation #37: Add one Administrative Assistant/Specialist over the longer-term as funding allows to provide needed administrative clerical support for the Emergency Operations Division.

8.8 MEDICAL SERVICES & TRAINING DIVISION

8.8.1 Training Section

Recruit Firefighter Training

Entry-level Recruit Firefighters are provided 1,040 hours (26 weeks) of didactic and manipulative training at the Training Academy Center (TAC) on a 40-hour, four-day workweek, followed by a 26-week assignment at Fire Station 2 on a 52.5-hour shift schedule to complete the full 52-week training curriculum. Due to classroom size, training staff limitations, and the number of training apparatus available, TAC classes are limited to a maximum of 20 students with an average class size of 12 students. With the current 26-week TAC curriculum, PF&R is limited to two academies per year with a maximum annual throughput of 40 Recruit Firefighters. With 79 current operational

vacancies and an estimated 10–12 annual service retirements, the current Recruit Firefighter Training model is challenged to meet PF&R’s needs to maintain full operational staffing.

Comparative Fire Agency Training Academy Survey

Citygate’s executive level review of PF&R’s Recruit Firefighter Training Academy program included a survey of other large fire agency training academies as summarized in the following table.

Table 27—Comparative New Recruit Training Academy Survey Summary

Agency	Basic Academy		Lateral Academy		HazMat First Responder Operations (24 hrs.)	Confined Space Awareness (24 hrs.)	Low-Angle Rope Rescue (24 hrs.)	Rescue Systems 1 (40 hrs.)	EMT (160 hrs.)	Driver / Operator (hrs.)	Truck Operations (hrs.)
	Weeks	Hours	Weeks	Hours							
Portland Fire & Rescue	24	960	N/A	N/A	Yes	Unknown	No	No	No	120	48
Tualatin Valley Fire Rescue	17 ²	680	4 ³	160	Yes	Yes	Yes	No	No	N/A	Yes
Lost Angeles City	14 ¹	560	Unknown	Unknown	Yes	Yes	Unknown	No	No	N/A	Yes
Los Angeles County	17	680	8	320	Yes	Yes	No	No	Prerequisite	40	40

¹ Reduced from 22 weeks in December 2021 to increase graduate throughput to offset increased workforce attrition.

² Four months.

³ As needed.

N/A – Not applicable.

As the previous table shows, other surveyed fire agency academies range from 14 to 17 weeks in duration compared to PF&R’s 24 weeks. Also, of the agencies surveyed, only Tualatin Valley Fire Rescue and Los Angeles County currently accept lateral transfer applicants.

Incumbent Training

The Training Section is also responsible for coordination and delivery of all federal and state-mandated training, and PF&R-specific training for incumbent fire and EMS personnel. The Training Section includes one staff Fire Captain, five staff Fire Lieutenants (three at West Wing and two at TAC), three Fire Fighter Specialists, and one Driving Instructor for both recruit and incumbent training.

Workload Capacity Assessment

Citygate’s review of the Training Section finds it to be *understaffed* to meet current and near-term key program responsibilities and expectations. Specifically, this Section lacks appropriate supervisory-level capacity at the Training Center, as well as sufficient instructor/course coordination capacity.

Findings and Recommendations

Following are Citygate’s findings and recommendations pursuant to review and evaluation of PF&R’s Training Section.

Finding #52: PF&R’s Recruit Firefighter Training Program has a maximum annual throughput of 40 firefighters due to available classroom space, training staff, and training apparatus.

Finding #53: Average annual recruit firefighter training throughput is 24–26 firefighters with training program attrition.

Finding #54: PF&R is unique among comparable fire agencies in not having a separate Engineer or Driver/Operator classification; all Recruit Firefighters are certified and compensated as Apparatus Operators upon completion of the 52-week training program.

Finding #55: PF&R’s current recruit training model requires Recruit Firefighters be assigned to a two-company engine/truck station to complete the second half of their training curriculum.

Finding #56: Only Station 2 is utilized as a training station for the second half of the training curriculum.

Finding #57: PF&R is *challenged* to meet current and anticipated future Recruit Firefighter throughput needed to maintain full authorized operational staffing with its current training model and resources.

Finding #58: PF&R’s Training Section is *understaffed* to meet current and anticipated near-term training program requirements.

Recommendation #38: Provide additional classroom space and apparatus at the Training Academy Center.

Recommendation #39: Add one staff Fire Captain as soon as possible to provide needed supervisory capacity at the Training Academy Center.

Recommendation #40: Add one staff Fire Lieutenant as soon as possible to provide needed instructor/course coordination capacity at the Training Academy Center.

Recommendation #41: Consider adding two-company station(s) for Phase Two academy training.

Recommendation #42: A deeper forensic analysis of PF&R’s recruit training curriculum compared to other agencies is needed to identify additional opportunities to condense the Training Academy Center and Phase Two curriculum.

Recommendation #43: Consider a regional multi-agency fire academy.

Recommendation #44: Consider a shorter modified training curriculum for lateral hires.

Recommendation #45: Consider increased utilization of the current retire-rehire program.

Recommendation #46: Consider partnering with a local Community College to provide a one-semester Fire Academy providing the basic knowledge, skills, and abilities common to local/regional fire agencies.

8.8.2 Emergency Medical Services Section – Training and Clinical Oversight

Given that almost 55 percent of PF&R’s incident responses are to EMS events, it is critical that as a health care provider, the paramedics and EMTs providing patient care be trained to standards and then with quality oversight, ensure care standards are met. The Emergency Medical Services (EMS) Section is responsible for PF&R’s clinical care delivery on medical incidents. The EMS Section provides oversight and management of the training, certifications, policies, and procedures necessary to function as EMS first responders.

The continuous quality improvement process reviews responses to ensure medical services are provided effectively and equitably. In addition, the EMS Section supports the Bureau of Emergency Communications’ efforts to implement Medical Priority Dispatch and a nurse triage system, which is a key long-term strategy for managing call volume. The EMS Section is also piloting a new electronic patient healthcare records system.

All of this EMS training program delivery, tracking of certifications and oversight for the quality of care, is done by just five personnel: one Battalion Chief, one Fire Captain, and three EMS

specialists. In the FY 20–21 budget an Administrative Specialist II was transferred from the EMS Section to the Management Services Division. This further strained the ability of just four personnel to support over 500 care givers. Given that EMS care is heavily regulated by state and federal regulations, PF&R provides this care at the same standards as a hospital or clinic.

The challenges are evidenced by:

- ◆ One specialist is dedicated to clinical quality improvement (patient care oversight).
- ◆ One specialist is dedicated to providing medical supplies.
- ◆ The Fire Captain must coordinate training programs, both continuing and academy.
- ◆ The Battalion Chief must handle everything else including programs management, policy updates, coordination with County EMS, controlled substances oversight, maintenance of licenses and certifications.
- ◆ Actual training delivery is via field personnel for on-going and fire academy.
- ◆ The prior EMS incident software was crippling to use for quality oversight. Researching one incident for quality of care could take upwards of 90 minutes. PF&R has selected and is converting to new EMS incident software, but that will take at least the remainder of FY 21-22 before it will be in use across PF&R.
- ◆ Given the above staffing and software challenges, the clinical case review rate over prior years has only been approximately 35 percent.
- ◆ There is no way one person can come close, even with new software, to providing quality assurance and as-needed follow-up to the caregivers for approximately 46,500 incidents per year.

In other agencies comparable to Portland for EMS training and quality oversight, there would be easily double the number of personnel and that would include EMS Nurse Educators to deliver training and conduct clinical oversight. At one point in EMS there were six EMS Specialists, not two. By any measure, the Section needs an additional EMS Captain and two EMS Specialists as well as a Data-Tracking Coordinator.

In some respects, it seems that EMS in PF&R is a secondary concern for training and quality oversight. However, patient care is the single largest service provided by PF&R. It must be taken as seriously as it would be in a hospital. In a large Southern California fire department operating just over 1,000 firefighter paramedics and EMTs handling about 131,000 incidents per year, their EMS Division consisted of 17 personnel. In comparison to PF&R:

- ◆ Ratio of caregivers per EMS Division personnel – 64 versus 125 in PF&R.

- ◆ Ratio of EMS incidents per EMS Division personnel – 6,308 versus 11,461 in PF&R.
- ◆ If PF&R were to add EMS personnel to match 64 personnel per FTE it would need 7.8 additional FTEs.
- ◆ If PF&R were to add EMS personnel to match 6,308 per FTE it would need 7.2 additional FTEs.

Findings and Recommendation

Finding #59: The staffing of the EMS Section in PF&R is completely inadequate for the volume of caregivers and EMS incidents to be managed.

Finding #60: PF&R has not placed a high enough priority on the training and oversight of EMS services as required for regulated patient care.

Recommendation #47: There is the immediate need to add one staff Lieutenant and one Employee Assistance Program (EAP) Coordinator. In the near term, add one EMS Specialist and one Administrative Assistant. Adding a total of four FTEs brings the Section to eight FTEs total.

8.8.3 Recruitment Section

The Recruitment Section currently consists of a single staff Fire Lieutenant who is responsible for all recruitment, testing, and hiring of new firefighters. The Recruitment Section, in partnership with the Equity Manager, also ensures that PF&R attracts a diverse workforce dedicated to the vision and mission of PF&R and the City of Portland. Along with Communications and the Public Education Section in Prevention, the Recruitment Section plays an important part in PF&R's community outreach efforts.

Workload Capacity Assessment

Citygate's review of the Recruitment Section finds the current staffing capacity to be *insufficient* to meet current and near-term recruitment needs. Specifically, the Section needs at least one additional uniformed staff Fire Lieutenant Recruiter to provide additional needed capacity to develop and maintain effective recruitment channels and relationships, and to expand the current firefighter recruitment to include qualified lateral applicants to help address PF&R's ongoing recruitment challenges.

Findings and Recommendations

Following are Citygate’s findings and recommendations pursuant to review and evaluation of PF&R’s Recruitment Section.

Finding #61: PF&R’s Recruitment Section is *understaffed* to meet current and anticipated near-term recruitment program needs and expectations.

Recommendation #48: Add one staff Fire Lieutenant over the near-term as funding allows to provide additional needed recruitment capacity.

8.9 HEADQUARTERS SERVICES REVIEW SUMMARY

Citygate’s assessment of PF&R’s administrative support organization yielded the following summary results:

8.9.1 Strengths

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

8.9.2 Weaknesses/Gaps

- ◆ Significantly understaffed to meet the regulatory requirements of running a fire department.
- ◆ Succession planning/training.
- ◆ Organizational structure does not enable leadership to focus on strategic and long-term priorities, but keeps leadership operating on a tactical, reactive level.

8.9.3 Opportunities

- ◆ Community Health Program and alternative response system to low-acuity acute emergencies.

8.9.4 Threats

- ◆ Single points of failure due to short staffing in administration of critical business functions/processes/services.
- ◆ Continuity of administrative leadership/management absent succession plan/training.

8.9.5 Overall Findings and Recommendations

Finding #62: Overall, Citygate finds PF&R’s current administrative/management capacity *barely adequate* to support the organization and to meet PF&R goals and responsibilities.

Recommendation #49: Based on Citygate’s analysis of the PF&R administration team, we recommend phased personnel additions be made as follows: Immediate (Critical) – 16 FTEs; Near-Term – 16 FTEs; Longer-Term – 3 FTEs.

The following tables outline the recommended phased personnel additions.

Portland Fire & Rescue—Service Delivery and Staffing Study

Volume 1—Technical Report

Table 28—Additional Headquarters Staffing Needed – Immediate (Critical)

Priority	Division	Function/Section	Position Classification / Skill Level Needed	Estimated FTEs
Immediate (Critical)	Office of the Fire Chief	Assistant	Assistant Chief	1.0*
	Emergency Operations	Wildland	Coordinator/Mitigate/Response	1.0
	Management Services	Compliance	Professional Standards	2.0
		Communications	Coordinator II – Internal	1.0
		IT	Project Manager – Contracted	1.0
		Budget	Analyst III	1.0
		Policy	Coordinator II – Policy Update	1.0
		Planning	Deputy Chief	1.0
		Logistics / Apparatus Maintenance	Logistics EMS Supplies	1.0
			SCBA/Respiratory Technician	1.0
			Admin. Asst./Specialist	1.0
	Medical Services & Training	EMS	Staff Lt. EMS/Train	1.0
			EAP Coordinator	1.0
		Training	Fire Captain – Academy	1.0
			Lieutenant	1.0
Subtotal				16.0

* Another FTE is being added based on realignment of the Management Services Division.

Table 29—Additional Headquarters Staffing Needed – Near-Term

Priority	Division	Function/Section	Position Classification / Skill Level Needed	Estimated FTEs
Near-Term	Executive Management	Planning/Project Mgmt.	Project Manager	1.0
	Emergency Operations	BOEC Fire Liaison 24/7/365	Lieutenant	2.0
		Battalion Staffing	Lieutenant	1.0
	Fire Prevention	Investigations	Investigator – 40/hr.	1.0
		Field Inspectors	Inspector	6.0
	Management Services	Facilities Maintenance	Carpenter	1.0
		Uniforms/PPE	Firefighter	1.0
	Medical Services & Training	EMS	EMS Specialist/CQI	1.0
		EMS	Admin. Asst.	1.0
		Training	Lieutenant – Recruiter	1.0
Subtotal				16.0

Table 30—Additional Headquarters Staffing Needed – Longer-Term

Priority	Division	Function/Section	Position Classification / Skill Level Needed	Estimated FTEs
Longer-Term	Emergency Operations	Deployment Planning/Adjustment	Deployment Analyst (ImageTrend/CivicGov/Intterra)	1.0
			Admin. Asst./Specialist	1.0
	Fire Prevention	Public Education	Program Coordinator	1.0
Subtotal				3.0

The following table summarizes the recommended phased positions.

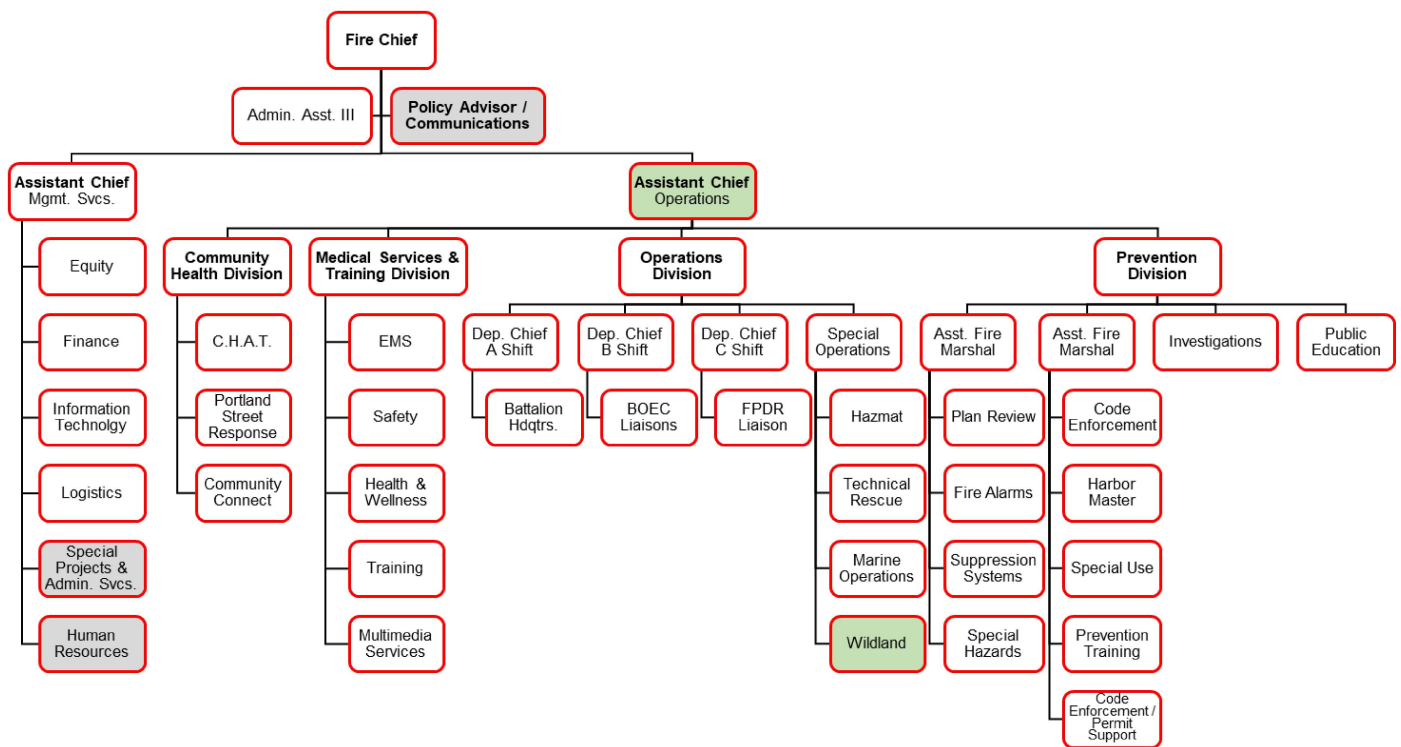
Table 31—Additional Headquarters Staffing Needed – Grand Total

Priority	Estimated FTEs
Immediate (Critical)	16
Near-Term	16
Longer-Term	3
Total	35

8.9.6 Suggested Organizational Re-Structure

Pursuant to this review and preceding findings and recommendations, Citygate offers the following organizational re-structure for consideration by PF&R’s executive management team to provide improved lines of authority, coordination, communications, and span of control. The shaded boxes represent new positions (green), or re-assigned positions (gray).

Figure 19—Suggested PF&R Headquarters Organizational Structure



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Section 9

*Next Steps and List of
Findings and
Recommendations*



SECTION 9—NEXT STEPS AND LIST OF FINDINGS AND RECOMMENDATIONS

9.1 NEXT STEPS

The purpose of this assessment is to compare PF&R’s current performance against the local risks to be protected in Portland and against nationally-recognized best practices. This analysis of performance forms the basis from which to make recommendations for changes, if any, in fire station locations, equipment types, and staffing.

As a first step, the City Council should adopt updated, clearly measurable response time goals for PF&R based on best practices, with the 9-1-1 call receipt in fire dispatch as the start time. The Council will also need to provide accountability for PF&R personnel to meet those standards. The goals identified in Recommendation #20 are consistent with national best practices and risks to be protected in PF&R’s service area. Measurement and planning, as PF&R continues to evolve, will be necessary for PF&R to meet these goals.

Based on this evaluation, Citygate offers these likely next steps to move PF&R forward:

- ◆ Adopt a set of updated response time policies.
- ◆ Obtain permanent funding for the new low-acuity Community Health teams to operate 24/7 Citywide with a higher presence in the City’s core and the southeast.
- ◆ As needed, based on the Community Health teams’ ability to remove 9-1-1 calls from fire crews, identify the funding over time to add the fire crew deployment enhancements identified in this study.
- ◆ Begin to fund multiple-year Capital Improvement Plan (CIP) projects for one or more added fire station(s) and the relocation of Fireboat 6.

9.2 LIST OF FINDINGS AND RECOMMENDATIONS

Overall, there are 62 key findings and 49 specific action item recommendations contained in the body of the report. These are now presented in a comprehensive list for ease of reference.

9.2.1 Deployment Findings

Finding #1: The City Council has not adopted a performance measure, including specialty response measures for all-risk emergency responses, that is sufficiently specific, is based on best practices, and includes the beginning time measure from the point of the Bureau of Emergency Communications dispatch receiving the 9-1-1 phone call, nor do the current goals reflect risks and outcome expectations. Clarifying PF&R’s

deployment goals will meet the best practice recommendations of the Commission on Fire Accreditation International

- Finding #2:** There are significant gaps in coverage of the public streets within a 4:00-minute travel time of a station.
- Finding #3:** With Fire Station 23 closed, there is a significant coverage gap for first-due firefighting, as the travel time, population density, and historical incident demand all identify.
- Finding #4:** Delivering Effective Response Force coverage is quite challenging, except where the “core stations” can respond inward to the center of a multiple-station area. There is no *uncongested* Effective Response Force coverage east of Station 19.
- Finding #5:** The uncongested single ladder truck coverage is still not complete in the southwest and southeast sections of the City. The congested single- and two-ladder truck coverage area is even more limited
- Finding #6:** The higher concentrations of added residential growth all occur near the busiest, most overworked fire stations in the City. Over the years as the growth occurs, unless non-acute EMS is provided by personnel other than firefighters, these Fire Management Areas (FMAs) will need additional responding units.
- Finding #7:** The current fire station spacing for first-due units only covers 57 percent of the City’s public road miles. The fire station spacing in the center and eastern City is just too large. As for multiple-unit Effective Response Force coverage, the coverage is even weaker at 29 percent for uncongested and falls to four percent for congested—when all four engines, two trucks, and two Battalion Chiefs are needed.
- Finding #8:** The existing fire station coverage is *weak* in many sections of the City, outside of the downtown core areas. However, the impact of using a **5:00**-minute travel time goal is *significant*. The first-due unit uncongested coverage increases to 79 percent and congested only falls to 65 percent which is still better than the 4:00-minute *uncongested* coverage.
- Finding #9:** PF&R’s time-of-day, day-of-week, and month-of-year calls for service demands occur in consistent, predictable patterns. PF&R’s service demand is always sufficiently high in all areas, requiring an all-day, year-round response system.
- Finding #10:** Battalions 3 and 4 have the greatest number of single-station simultaneous incidents. This is one of the reasons travel times are remaining longer than desired.

- Finding #11:** The engine company unit-hour utilization measures for daylight hours are not yet close to nor exceeding 30 percent. Based on this measure alone, no station needs a second “reliever” company.
- Finding #12:** Call processing times to 90 percent of the fire and EMS incidents at 2:41 minutes are slower than Citygate’s and the National Fire Protection Association’s recommendation of 1:30 minutes where no language or location identification barriers exist.
- Finding #13:** The Bureau of Emergency Communications and PF&R should adopt dispatch performance measures for 90 percent of fire and EMS incidents from “off hook” answer to fire unit notified to respond. Doing so will meet national best practices.
- Finding #14:** The turnout times for 90 percent of the fire and EMS incidents at 2:18 minutes is only slightly longer than the 2:00 minutes recommended by Citygate.
- Finding #15:** PF&R’s fire unit travel times are higher than the National Fire Protection Association’s urban best practice recommendation of 4:00 minutes, but PF&R’s station spacing with difficult topography and traffic congestion challenges could be sized to deliver 5:00-minute travel to 90 percent of the public street road network as the GIS models in this study indicate is more feasible.
- Finding #16:** First-due unit call to arrival times to fire and EMS incidents at 9:50 minutes are longer than a best practices goal of 7:30 minutes.
- Finding #17:** An Effective Response Force of four engines and two ladder trucks reached 90 percent of the building fires in 2020 with a travel time of 10:42 minutes. While this does not meet a recommended Effective Response Force travel time of 8:00 minutes, it is credible given the use of six units across the topography and traffic congestion challenges in many areas of the City.
- Finding #18:** The City must implement a Citywide low-acuity medical / crisis response program that will regain firefighting and acute EMS capacity and response time for PF&R.
- Finding #19:** PF&R’s technical rescue resources are deployed from Stations 1 and 12 only, for a 145-square-mile service area coverage.
- Finding #20:** Immediate technical rescue response availability and ongoing training are challenged due to the high daily call volume at Stations 1 and 12.
- Finding #21:** PF&R’s technical rescue program is heavily reliant on federal funding to support ongoing training and equipment needs.

- Finding #22:** There is a large gap in basic technical rescue capacity and skills below the rescue technician level.
- Finding #23:** The technical rescue program lacks a designated person/function to coordinate all program training, equipment, and logistics.
- Finding #24:** Ongoing hazardous material technician training is challenged due to the sheer volume of Station 7 emergency responses.
- Finding #25:** The high volume of Station 7 emergency incident responses impacts the immediate availability of the cross-staffed hazmat unit whenever Engine 7 and/or Truck 7 are committed to an incident.
- Finding #26:** PF&R's hazmat program heavily depends on federal, state, and private funding to support ongoing training and equipment purchases.
- Finding #27:** The current minimum daily staffing of six hazardous material technicians is insufficient to meet recognized recommended best practice staffing standards for a hazardous material response resource.
- Finding #28:** The Special Operations Deputy Chief has numerous collateral responsibilities which impede their ability to provide an appropriate level of leadership and management of PF&R's specialty response programs.
- Finding #29:** Coordination and oversight of wildland fire-related programs and functions has historically fallen to multiple PF&R positions/functions as a collateral responsibility with no single designated coordination point.
- Finding #30:** There is no City or regional incident management team capacity to manage larger-scale or more complex incidents.
- Finding #31:** PF&R has limited funding to host wildland fire training or to send response personnel to external wildland fire training opportunities.
- Finding #32:** PF&R lacks an organized approach to obtaining and maintaining desired wildland fire training certifications.
- Finding #33:** Station 14, where some of the wildland units are based, is not proximal to any designated wildfire hazard area.
- Finding #34:** There are no wildland response resources currently deployed in immediate proximity of the Tryon Creek wildfire hazard area.

- Finding #35:** PF&R's current wildland response apparatus (Type-6) have very limited pump, water tank, fire hose, and crew capacity.
- Finding #36:** Continuing to cross-staff the fireboats from three stations is necessary to provide adequate response times to all the risks on both rivers.
- Finding #37:** Station/Fireboat 6 has a physically compromised site and needs a long-term relocation plan before the fireboat berth becomes impassible.
- Finding #38:** The eastern station areas are too large and need at least two stations to relieve pressure from Station 7.
- Finding #39:** The Fire Management Areas (FMAs) for six stations are very busy and will need rescues and/or low-acuity units first.
- Finding #40:** Station 23 needs to have a responding fire engine restored.
- Finding #41:** Overall, the City is short six fire stations if 4:00-minute first-unit travel is a goal to be funded.
- Finding #42:** Station 7 is too busy to also house the cross-staffed hazardous materials response unit and will require a Capital Improvement Plan (CIP) to relocate.

9.2.2 Headquarters Service Findings

- Finding #43:** PF&R's Chief's Office lacks sufficient capacity for the Fire Chief to focus on higher level community-wide and organizational issues, goals, and objectives.
- Finding #44:** The staffing level and associated workload capacity of the Finance Section is *insufficient* to meet all program responsibilities and expectations.
- Finding #45:** The elimination of two key Finance Section positions has resulted in the Management Services Division Manager having to assume many of the critical daily tasks and responsibilities of the two positions due to a lack of any other available staff. This has significantly impacted the Management Services Division Manager's available capacity to provide overall leadership, administration, and direction of the entire Division.
- Finding #46:** The staffing level and associated workload capacity of the Information Technology Section is *insufficient* to meet all current and anticipated near-term key program responsibilities and expectations.

- Finding #47:** The Logistics Sections lacks sufficient staffing and associated workload capacity to meet all current and anticipated near-future program responsibilities.
- Finding #48:** The staffing level and associated workload capacity of the Special Projects and Administrative Services Section is *insufficient* to meet current and anticipated near-term key program responsibilities and expectations.
- Finding #49:** The transfer of fire engine crew fire inspection caseload to the Fire Prevention Division may generate the need for additional Fire Inspectors depending on the ability of proposed software (CivicGov) to assimilate this workload.
- Finding #50:** Because the Fire Investigation Unit has a large caseload per Investigator, the unit cannot meet the needs of the City.
- Finding #51:** PF&R's Emergency Operations Division is *understaffed* to meet current and anticipated near-term program needs and expectations.
- Finding #52:** PF&R's Recruit Firefighter Training Program has a maximum annual throughput of 40 firefighters due to available classroom space, training staff, and training apparatus.
- Finding #53:** Average annual recruit firefighter training throughput is 24–26 firefighters with training program attrition.
- Finding #54:** PF&R is unique among comparable fire agencies in not having a separate Engineer or Driver/Operator classification; all Recruit Firefighters are certified and compensated as Apparatus Operators upon completion of the 52-week training program.
- Finding #55:** PF&R's current recruit training model requires Recruit Firefighters be assigned to a two-company engine/truck station to complete the second half of their training curriculum.
- Finding #56:** Only Station 2 is utilized as a training station for the second half of the training curriculum.
- Finding #57:** PF&R is *challenged* to meet current and anticipated future Recruit Firefighter throughput needed to maintain full authorized operational staffing with its current training model and resources.
- Finding #58:** PF&R's Training Section is *understaffed* to meet current and anticipated near-term training program requirements.

Finding #59: The staffing of the EMS Section in PF&R is completely inadequate for the volume of caregivers and EMS incidents to be managed.

Finding #60: PF&R has not placed a high enough priority on the training and oversight of EMS services as required for regulated patient care.

Finding #61: PF&R’s Recruitment Section is *understaffed* to meet current and anticipated near-term recruitment program needs and expectations.

Finding #62: Overall, Citygate finds PF&R’s current administrative/management capacity *barely adequate* to support the organization and to meet PF&R goals and responsibilities.

9.2.3 Deployment Recommendations

Recommendation #1: Consider spreading the available on-duty rescue technicians and related specialized equipment across three or four stations throughout the City to improve response coverage.

Recommendation #2: Prioritize ongoing training of technical rescue personnel to build and maintain specialized low-frequency / high-risk skills.

Recommendation #3: Ensure technical rescue program training and equipment needs are supported with appropriate dedicated funding.

Recommendation #4: Establish a dedicated Technical Rescue Coordinator to coordinate program training, equipment, and logistics.

Recommendation #5: Consider training all truck company personnel to the National Fire Protection Association Confined Space, Trench Rescue, and Swiftwater Operations levels to provide additional tiered technical rescue response capability.

Recommendation #6: Ensure City-provided funding is available to support hazmat training and equipment needs.

Recommendation #7: Consider relocating the hazardous material team from Station 7 to a less-busy station closer to the waterfront and heaviest industrial risks.

Recommendation #8: Consider amending the minimum daily hazardous material unit staffing to eight technicians in conformance with nationally recognized recommended best practices.

- Recommendation #9:** Consider reorganizing Special Operations to focus solely on PF&R’s hazmat, technical rescue, marine operations, Bureau of Emergency Communications liaison, and wildland programs.
- Recommendation #10:** Designate a single position/function to coordinate and oversee all wildland fire-related programs, functions, and responsibilities to include suppression and pre-event mitigation/prevention.
- Recommendation #11:** Support efforts to develop and maintain a local or regional Incident Management Team as soon as possible.
- Recommendation #12:** Budget training to maintain desired wildland fire capacity and credentials.
- Recommendation #13:** Support wildland fire training for chief officers without requiring position/function credentialing.
- Recommendation #14:** Consider relocating Brush 14 to Station 9, 25, or 19 to provide more proximal wildfire response capacity for the Mount Tabor and Kelly Butte hazard areas.
- Recommendation #15:** Consider deploying an additional cross-staffed wildland response resource at Station 10 to provide more proximal wildfire response capacity for the Tryon Creek hazard area.
- Recommendation #16:** Consider utilizing larger Type-3 wildland engines if suitable access to wildland hazard areas is available.
- Recommendation #17:** Consider expanding existing mutual aid agreement(s) or pre-approved contracts to include specialized wildland resources not available within City resources (e.g., wildland bulldozer, hand crews, helicopter, fallers, skidders, etc.). The agreement should include response times and notification procedures.
- Recommendation #18:** Identify a solution pathway and funding to relocate the berth for the fireboat at Station 6.

Recommendation #19: PF&R should make deployment improvements according to these two priority tiers:

Tier One—(Essential) Fire Service Historic Deployment Standards

Add a station northwest of Station 7.

Move the hazardous materials units out of Station 7 as soon as possible.

Restore Engine 23 with full staffing.

Obtain permanent funding for the new low-acuity response Community Health program units. If that program is not funded beyond 2022, and is not successful in lowering EMS demand on PF&R fire crews, proceed to Tier Two:

Tier Two—Alternative Deployment Improvement and Peak Activity Units

Add a minimum of eight medical low-acuity two-person units.

Add three engine Peak Activity Units (PAUs).

Recommendation #20: **Adopt City Council Deployment Measure Policies:** The Council should consider adopting complete performance measures that begin with BOEC call answering and end with PF&R arriving on scene. The measures of time should be designed to save patients and to keep small but serious fires from becoming greater alarm fires. With this in mind, Citygate recommends:

20.1: Distribution of Fire Stations: To treat medical patients and control small fires, the first-due unit should arrive within 8:30 minutes, 90 percent of the time from the receipt of the 9-1-1 call in the fire dispatch center. This equates to a 90-second dispatch time, 2:00-minute company turnout time, and 5:00-minute travel time.

20.2: Multiple-Unit Effective Response Force for Serious Emergencies: To confine fires near the room of origin and to treat up to five medical patients at once, a multiple-unit response of a *minimum* of four engines, one ladder truck, and one Battalion Chief, totaling a minimum of 21 personnel, should arrive within 11:30 minutes from the time of 9-1-1 call receipt in fire dispatch, 90 percent of the time. This equates to 90-second dispatch time, 2:00-minute company turnout time, and 8:00-minute travel time spacing for multiple units.

20.3: Hazardous Materials Response: To meet the fundamental mission of PF&R's response, which is to minimize or halt the release of a hazardous substance, so it has minimal impact on the community, PF&R needs to provide hazardous materials response designed to protect the community from the hazards associated with uncontrolled release of hazardous and toxic materials. The first responder unit should arrive to investigate a hazmat release at the operations level within 8:30 minutes, which equates to a 90-second dispatch time, 2:00-minute company turnout time, and 5:00-minute travel time in the urban population areas. After assessment and scene evaluation is completed, a determination will be made whether to request additional resources from PF&R's multiple-agency hazardous materials response partnership.

20.4: Technical Rescue: To respond to technical rescue emergencies as efficiently and effectively as possible with enough trained personnel to facilitate a successful rescue, the first company in urban to suburban areas to arrive for assessment of the rescue should achieve a 5:00-minute travel time, 90 percent of the time. Additional resources capable of initiating a rescue should be assembled within a total response time of 11:30 minutes, 90 percent of the time, with the result being the safe and complete rescue/extrication to ensure delivery of patients to a definitive care facility.

Recommendation #21: Reduce turnout times to 2:00 minutes or less, 90 percent of the time.

Recommendation #22: Reduce dispatch processing time for acute emergencies to 90 seconds or less, 90 percent of the time.

Recommendation #23: Given the topographic challenges of current fire station locations, work with City Council to adopt a fire station spacing measure of a 5:00-minute travel time, assuring the Council understands the risk such change involves to the community.

Recommendation #24: Identify and assess the cost for when resources can be added.

9.2.4 Headquarters Service Recommendations

Recommendation #25: PF&R should consider a reorganization of the Chief's Office to establish two Assistant Chief positions to handle the day-to-day administration of PF&R.

Recommendation #26: The City should consider restoring the Analyst III position in the PF&R Finance Section as soon as fiscally feasible.

Recommendation #27: PF&R should consider reclassifying a vacant Administrative Specialist II position in the Management Services Division as a Technology Coordinator to provide needed additional workload capacity in the Information Technology Section.

Recommendation #28: Consider adding needed dedicated technology project management capability/resources to the Information Technology Section.

Recommendation #29: Provide needed additional staffing capacity for PF&R’s Logistics Section as soon as fiscally feasible in the following priority order:

Immediate Critical Need

SCBA/Respiratory Technician	1.0 FTE
EMS Supplies	1.0 FTE
Admin. Asst./Specialist	1.0 FTE

Near-Term

Carpenter	1.0 FTE
Staff Firefighter (Uniforms)	1.0 FTE

Recommendation #30: Consider adding the following needed FTE capacity at the appropriate position classifications in the Special Projects and Administrative Services Section.

Planning Officer	1.0 FTE
Professional Standards Compliance Officer	2.0 FTE
Policy Coordinator	1.0 FTE

Recommendation #31: There is the near-term need to add one Fire Investigator and six Fire Inspectors. Longer term, one Program Coordinator should be added to public education.

Recommendation #32: Re-align the responsibilities assigned to the Special Operations Deputy Chief to focus solely on managing PF&R’s Special Hazard Response Programs, including hazardous materials, technical rescue, and marine operations.

Recommendation #33: Add a dedicated Wildland Fire Program Manager as soon as possible to provide critical coordination and oversight of all PF&R wildland

fire-related programs, functions, and responsibilities, including suppression and pre-event mitigation/prevention.

- Recommendation #34:** Add two staff Fire Lieutenants over the near-term as funding allows to provide needed 24/7/365 PF&R Liaison coverage at the Bureau of Emergency Communications.
- Recommendation #35:** Add one staff Fire Lieutenant over the near-term as funding allows to provide needed seven-day operational staffing coordination in the Battalion Headquarters Office.
- Recommendation #36:** Add one Deployment Analyst over the longer-term as funding allows to provide implementation support of planned technical analytic tools and systems (ImageTrend/CivicGov/Intterra and a pre-fire program which is to be determined).
- Recommendation #37:** Add one Administrative Assistant/Specialist over the longer-term as funding allows to provide needed administrative clerical support for the Emergency Operations Division.
- Recommendation #38:** Provide additional classroom space and apparatus at the Training Academy Center.
- Recommendation #39:** Add one staff Fire Captain as soon as possible to provide needed supervisory capacity at the Training Academy Center.
- Recommendation #40:** Add one staff Fire Lieutenant as soon as possible to provide needed instructor/course coordination capacity at the Training Academy Center.
- Recommendation #41:** Consider adding two-company station(s) for Phase Two academy training.
- Recommendation #42:** A deeper forensic analysis of PF&R's recruit training curriculum compared to other agencies is needed to identify additional opportunities to condense the Training Academy Center and Phase Two curriculum.
- Recommendation #43:** Consider a regional multi-agency fire academy.
- Recommendation #44:** Consider a shorter modified training curriculum for lateral hires.

- Recommendation #45:** Consider increased utilization of the current retire-rehire program.
- Recommendation #46:** Consider partnering with a local Community College to provide a one-semester Fire Academy providing the basic knowledge, skills, and abilities common to local/regional fire agencies.
- Recommendation #47:** There is the immediate need to add one staff Lieutenant and one Employee Assistance Program (EAP) Coordinator. In the near term, add one EMS Specialist and one Administrative Assistant. Adding a total of four FTEs brings the Section to eight FTEs total.
- Recommendation #48:** Add one staff Fire Lieutenant over the near-term as funding allows to provide additional needed recruitment capacity.
- Recommendation #49:** Based on Citygate’s analysis of the PF&R administration team, we recommend phased personnel additions be made as follows: Immediate (Critical) – 16 FTEs; Near-Term – 16 FTEs; Longer-Term – 3 FTEs.

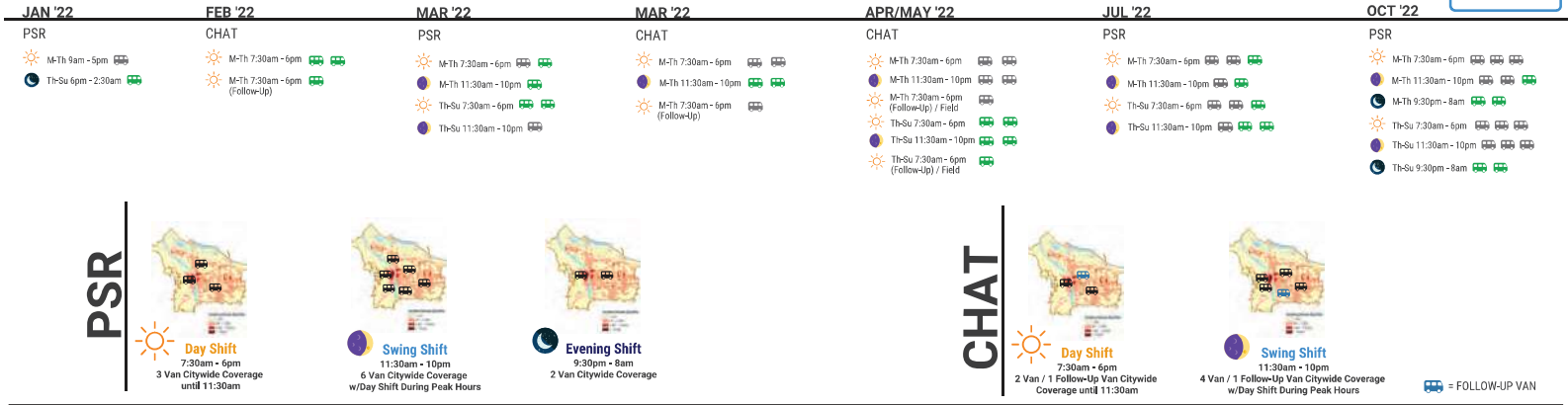
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APPENDIX A

COMMUNITY HEALTH DIVISION ROLLOUT OF PORTLAND STREET RESPONSE AND COMMUNITY HEALTH ASSESS AND TREAT

(OVERVIEW GRAPHIC FOLLOWED BY ENLARGED GRAPHIC VIEWS)

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PSR

CHAT

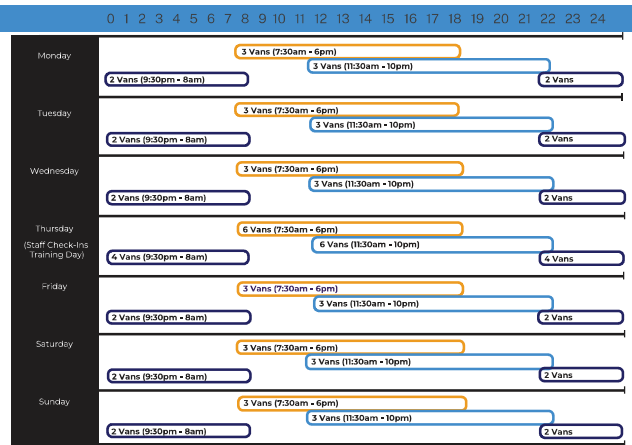
Position	2021	March 2022	July 2022	Oct 2022
Program Manager	1		1	
Supervisor		2	2	2
Community Health Medic		6	5	5
Mental Health Crisis Responder I	1	2	4	3
Mental Health Crisis Responder II	1	2	1	2
Community Health Worker	2	3		
Peer Support Specialist	2	2		2
Communications Manager	1			
Data Analyst	1			
Analyst II		1		
Analyst I			1	
Admin Specialist II			1	
Admin Specialist III			1	
Coordinator II for Engagement			1	
On-Call Mental Health Crisis Responder I	4	4	2	
TOTAL	9 FTE / 4 On-Call	18 FTE / 4 On-Call	17 FTE / 2 On-Call	14 FTE

58 FTE

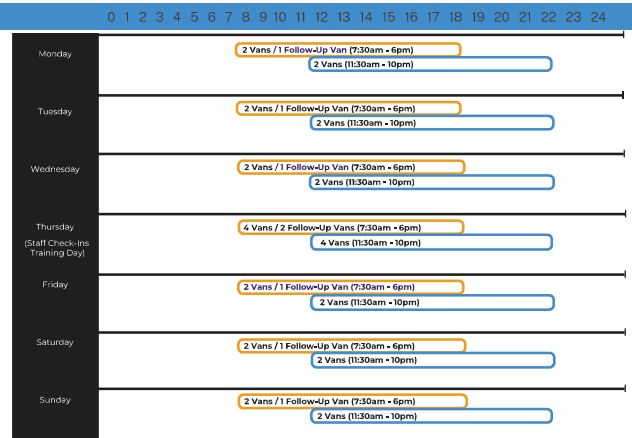
Position	Jan 2022	February 2022	March 2022	April/May 2022
Program Manager	1			
Supervisor			1	3
RN			1	2
Community Health Medic		7	3	10
TOTAL	1 FTE	7 FTE	5 FTE	15 FTE

28 FTE

PSR Citywide Expansion Schedule



CHAT Citywide Expansion Schedule



Training Calendar

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		1	2	3	4	5
				COHORT 1 4 FTE / (Field)		
6	7	8	9	10	11	12
	COHORT 1 4 FTE / (Field)	COHORT 1 4 FTE / (Field)	COHORT 1 4 FTE / (Field)	COHORT 1 4 FTE / (Field)		
13	14	15	16	17	18	19
	COHORT 1 4 FTE / (Field)	COHORT 1 4 FTE / (Field)	COHORT 1 4 FTE / (Field)	COHORT 1 7 FTE / (Classroom)		
20	21	22	23	24	25	26
	COHORT 1 7 FTE / (Classroom)	COHORT 1 7 FTE / (Classroom)	COHORT 1 7 FTE / (Classroom)	COHORT 1 7 FTE / (Classroom)		
27	28					
	COHORT 1 7 FTE / (Classroom)					

























SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		1	2	3	4	5
		COHORT 1 7 FTE / (Half Days)	COHORT 1 7 FTE / (Half Days)	COHORT 1 7 FTE / (Half Days)		
6	7	8	9	10	11	12
	COHORT 1 7 FTE / (Half Days)	COHORT 1 7 FTE / (Half Days)	COHORT 1 7 FTE / (Half Days)	COHORT 1 7 FTE / (Half Days)		
	COHORT 2 9 FTE / (Classroom)	COHORT 2 9 FTE / (Classroom)	COHORT 2 9 FTE / (Classroom)	COHORT 2 9 FTE / (Classroom)		
13	14	15	16	17	18	19
	COHORT 2 9 FTE / (Classroom)	COHORT 2 9 FTE / (Half Day)	COHORT 2 9 FTE / (Half Day)	COHORT 2 9 FTE / (Half Day)		
20	21	22	23	24	25	26
	COHORT 2 9 FTE / (Half Day)	COHORT 2 9 FTE / (Half Day)	COHORT 2 9 FTE / (Half Day)	COHORT 2 9 FTE / (Half Day)		
27	28	29	30	31		

































Proposed Citywide Expansion

FY '22-'23

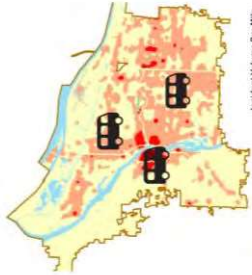
 = EXISTING

 = NEW

JAN '22	FEB '22	MAR '22	MAR '22
PSR	CHAT	PSR	CHAT
 M-Th 9am - 5pm 	 M-Th 7:30am - 6pm 	 M-Th 7:30am - 6pm 	 M-Th 7:30am - 6pm 
 Th-Su 6pm - 2:30am 	 M-Th 7:30am - 6pm   M-Th 7:30am - 6pm (Follow-Up) 	 M-Th 11:30am - 10pm   Th-Su 7:30am - 6pm   Th-Su 11:30am - 10pm 	 M-Th 11:30am - 10pm   M-Th 7:30am - 6pm (Follow-Up) 

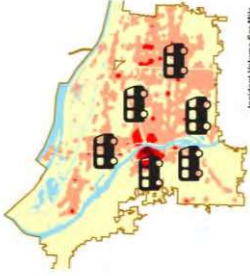
APR/MAY '22	JUL '22	OCT '22
CHAT	PSR	PSR
 M-Th 7:30am - 6pm 	 M-Th 7:30am - 6pm 	 M-Th 7:30am - 6pm 
 M-Th 11:30am - 10pm 	 M-Th 11:30am - 10pm 	 M-Th 11:30am - 10pm 
 M-Th 7:30am - 6pm (Follow-Up) / Field 	 Th-Su 7:30am - 6pm 	 M-Th 9:30pm - 8am 
 Th-Su 7:30am - 6pm 	 Th-Su 11:30am - 10pm 	 Th-Su 7:30am - 6pm 
 Th-Su 11:30am - 10pm 		 Th-Su 11:30am - 10pm 
 Th-Su 7:30am - 6pm (Follow-Up) / Field 		 Th-Su 9:30pm - 8am 

PSR



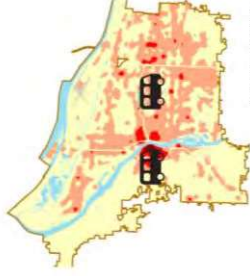
Day Shift

7:30am - 6pm
3 Van Citywide Coverage
until 11:30am



Swing Shift

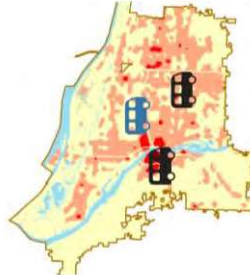
11:30am - 10pm
6 Van Citywide Coverage
w/Day Shift During Peak Hours



Evening Shift

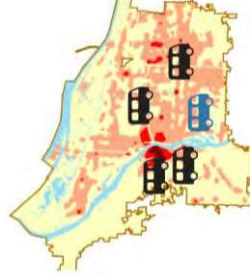
9:30pm - 8am
2 Van Citywide Coverage

CHAT



Day Shift

7:30am - 6pm
2 Van / 1 Follow-Up Van Citywide
Coverage until 11:30am



Swing Shift

11:30am - 10pm
4 Van / 1 Follow-Up Van Citywide Coverage
w/Day Shift During Peak Hours

 = FOLLOW-UP VAN

PSR

Postion	2021	March 2022	July 2022	Oct 2022
Program Manager	1		1	
Supervisor		2	2	2
Community Health Medic		6	5	5
Mental Health Crisis Responder I	1	2	4	3
Mental Health Crisis Responder II	1	2	1	2
Community Health Worker	2	3		
Peer Support Specialist	2	2		2
Communications Manager	1			
Data Analyst	1			
Analyst II		1		
Analyst I			1	
Admin Specialist II			1	
Admin Specialist III			1	
Coordinator II for Engagement			1	
On-Call Mental Health Crisis Responder I	4	4	2	
TOTAL	9 FTE / 4 On-Call	18 FTE / 4 On-Call	17 FTE / 2 On-Call	14 FTE

58

FTE

CHAT

Postion	Jan 2022	February 2022	March 2022	April/May 2022
Program Manager	1			
Supervisor			1	3
RN			1	2
Community Health Medic		7	3	10
TOTAL	1 FTE	7 FTE	5 FTE	15 FTE

28

FTE

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
0	0	1	4	9	16	25	36	49	64	81	100	121	144	169	196	225	256	289	324	361	400	441	484	529	576	625
1	1	2	5	8	13	18	25	34	44	55	68	82	97	112	128	145	163	182	202	223	245	268	292	317	343	370
2	4	5	10	16	23	32	42	53	65	78	92	107	123	140	158	177	197	218	240	263	287	312	338	365	393	422
3	9	8	17	26	37	50	64	80	97	115	134	154	175	197	220	244	269	295	322	350	379	409	440	472	505	539
4	16	13	26	37	50	65	82	101	121	142	164	187	212	238	265	293	322	352	383	415	448	482	517	553	590	628
5	25	23	37	50	65	82	101	121	142	164	187	212	238	265	293	322	352	383	415	448	482	517	553	590	628	667
6	36	32	50	65	82	101	121	142	164	187	212	238	265	293	322	352	383	415	448	482	517	553	590	628	667	707
7	49	44	64	82	101	121	142	164	187	212	238	265	293	322	352	383	415	448	482	517	553	590	628	667	707	748
8	64	55	81	101	121	142	164	187	212	238	265	293	322	352	383	415	448	482	517	553	590	628	667	707	748	789
9	81	68	97	115	134	154	175	197	220	245	268	292	317	343	370	398	427	457	487	518	549	580	611	642	673	705
10	100	82	107	123	140	158	177	197	218	240	263	287	312	338	365	393	422	452	482	513	544	575	606	637	668	700
11	121	97	115	134	154	175	197	220	245	268	292	317	343	370	398	427	457	487	518	549	580	611	642	673	705	737
12	144	112	123	140	158	177	197	220	245	268	292	317	343	370	398	427	457	487	518	549	580	611	642	673	705	737
13	169	134	140	158	177	197	220	245	268	292	317	343	370	398	427	457	487	518	549	580	611	642	673	705	737	769
14	196	158	158	177	197	220	245	268	292	317	343	370	398	427	457	487	518	549	580	611	642	673	705	737	769	801
15	225	177	177	197	220	245	268	292	317	343	370	398	427	457	487	518	549	580	611	642	673	705	737	769	801	

Day	Shift	Vans
Monday	3 Vans (7:30am - 6pm)	2 Vans
	2 Vans (9:30pm - 8am)	2 Vans
Tuesday	3 Vans (7:30am - 6pm)	2 Vans
	2 Vans (9:30pm - 8am)	2 Vans
Wednesday	3 Vans (7:30am - 6pm)	2 Vans
	2 Vans (9:30pm - 8am)	2 Vans
Thursday (Staff Check-Ins Training Day)	6 Vans (7:30am - 6pm)	4 Vans
	4 Vans (9:30pm - 8am)	4 Vans
Friday	3 Vans (7:30am - 6pm)	2 Vans
	2 Vans (9:30pm - 8am)	2 Vans
Saturday	3 Vans (7:30am - 6pm)	2 Vans
	2 Vans (9:30pm - 8am)	2 Vans
Sunday	3 Vans (7:30am - 6pm)	2 Vans
	2 Vans (9:30pm - 8am)	2 Vans

CHAT Citywide Expansion Schedule

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Monday	<div>2 Vans / 1 Follow-Up Van (7:30am - 6pm)</div> <div>2 Vans (11:30am - 10pm)</div>																								
Tuesday	<div>2 Vans / 1 Follow-Up Van (7:30am - 6pm)</div> <div>2 Vans (11:30am - 10pm)</div>																								
Wednesday	<div>2 Vans / 1 Follow-Up Van (7:30am - 6pm)</div> <div>2 Vans (11:30am - 10pm)</div>																								
Thursday (Staff Check-Ins Training Day)	<div>4 Vans / 2 Follow-Up Vans (7:30am - 6pm)</div> <div>4 Vans (11:30am - 10pm)</div>																								
Friday	<div>2 Vans / 1 Follow-Up Van (7:30am - 6pm)</div> <div>2 Vans (11:30am - 10pm)</div>																								
Saturday	<div>2 Vans / 1 Follow-Up Van (7:30am - 6pm)</div> <div>2 Vans (11:30am - 10pm)</div>																								
Sunday	<div>2 Vans / 1 Follow-Up Van (7:30am - 6pm)</div> <div>2 Vans (11:30am - 10pm)</div>																								

Training Calendar

FEBRUARY 2022						
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		1	2	3 COHORT 1 4 FTE / (Field)	4	5
6	7 COHORT 1 4 FTE / (Field)	8 COHORT 1 4 FTE / (Field)	9 COHORT 1 4 FTE / (Field)	10 COHORT 1 4 FTE / (Field)	11	12
13	14 COHORT 1 4 FTE / (Field)	15 COHORT 1 4 FTE / (Field)	16 COHORT 1 4 FTE / (Field)	17 COHORT 1 7 FTE / (Classroom)	18	19
20	21 COHORT 1 7 FTE / (Classroom)	22 COHORT 1 7 FTE / (Classroom)	23 COHORT 1 7 FTE / (Classroom)	24 COHORT 1 7 FTE / (Classroom)	25	26
27	28 COHORT 1 7 FTE / (Classroom)					

MARCH 2022

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		1 COHORT 1 7 FTE / (Half Days)	2 COHORT 1 7 FTE / (Half Days)	3 COHORT 1 7 FTE / (Half Days) COHORT 2 9 FTE / (Classroom)	4	5
6	7 COHORT 1 7 FTE / (Half Days) COHORT 2 9 FTE / (Classroom)	8 COHORT 1 7 FTE / (Half Days) COHORT 2 9 FTE / (Classroom)	9 COHORT 1 7 FTE / (Half Days) COHORT 2 9 FTE / (Classroom)	10 ★ COHORT 1 LAUNCH! COHORT 2 9 FTE / (Classroom)	11	12
13	14 COHORT 2 9 FTE / (Classroom)	15 COHORT 2 9 FTE / (Half Day)	16 COHORT 2 9 FTE / (Half Day)	17 COHORT 2 9 FTE / (Half Day)	18	19
20	21 COHORT 2 9 FTE / (Half Day)	22 COHORT 2 9 FTE / (Half Day)	23 COHORT 2 9 FTE / (Half Day)	24 ★ COHORT 2 LAUNCH!	25	26
27	28	29	30	31		