AUDIT REPORT
Denver Fire Department
Resource Allocation Practices
November 2016

Office of the Auditor
Audit Services Division
City and County of Denver

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Denver Auditor

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November 17, 2016

AUDITOR'S REPORT

We have completed an audit of the Denver Fire Department's (DFD's) resource allocation practices. The purpose of the audit was to examine DFD's policies and procedures for resource allocation, and determine the effectiveness of the department in assessing and managing resource allocation risks.

As described in the attached report, our audit revealed that DFD needs to strengthen its decision-making processes to ensure that resource allocation keeps pace with the City's changing dynamics. By addressing growth-related resource allocation challenges and improving critical decision making processes, DFD will be better positioned to ensure the success of its resource allocation practices and mitigate risk to its operations. Our report lists several related recommendations.

This performance audit is authorized pursuant to the City and County of Denver Charter, Article V, Part 2, Section 1, *General Powers and Duties of Auditor*, and was conducted in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

We extend appreciation to DFD, the Department of Public Safety, and the personnel who assisted and cooperated with us during the audit.

Denver Auditor's Office

Timothy M. O'Brien, CPA
Auditor

REPORT HIGHLIGHTS

Denver Fire Department Resource Allocation
November 2016

Scope

This audit assessed the Denver Fire Department's (DFD's) resource allocation practices, including examining the effectiveness of the department's processes for identifying and managing resource allocation risks.

Background

First organized in 1866, DFD protects Denver and surrounding communities by providing emergency medical and fire services. The department also conducts a variety of prevention efforts and public education programs to promote fire safety and emergency preparedness.

Purpose

The purpose of this audit was to assess DFD's resource allocation practices, including analysis of policies and procedures to determine the extent to which they align with applicable laws, regulations, professional standards, and leading management practices. This audit also examined the effectiveness of DFD's processes for identifying and managing resource allocation risks.

Highlights

Resource allocation is a broad term used to describe the choices an organization makes to use resources in an effective manner to achieve its mission. DFD's resource allocation process revealed the department to be data-driven in nature, and continuously looking for ways to improve and incorporate the most advanced technologies to provide emergency services.

Despite these efforts, the audit found that DFD needs to strengthen its long-term decision-making processes to ensure that resource allocation keeps pace with Denver's changing dynamics. In our assessment of DFD's resource allocation practices, we identified three growth-related issues regarding resource allocation and three gaps in its long-term decision-making processes.

Growth-Related Issues—First, we found that DFD is unable to meet its fire safety inspection goals, as Denver has grown. Second, DFD's hiring practices are not keeping pace with firefighter attrition and increases in budgeted strength. Third, DFD has persistent coverage issues in the northeastern corridor of Denver.

Decision-Making Processes—First, we found that DFD does not have an updated formal strategic plan that guides its long-term decision-making. Second, DFD does not have a robust framework by which to systematically identify and address resource allocation risks. Third, the department's process for assessing the cost and benefits associated with its intergovernmental agreements is not well documented and is missing critical information that would better support decision-making.

By considering the findings of this audit and implementing our related recommendations, DFD will be better positioned to ensure the success of its resource allocation practices and mitigate risks to its operations.

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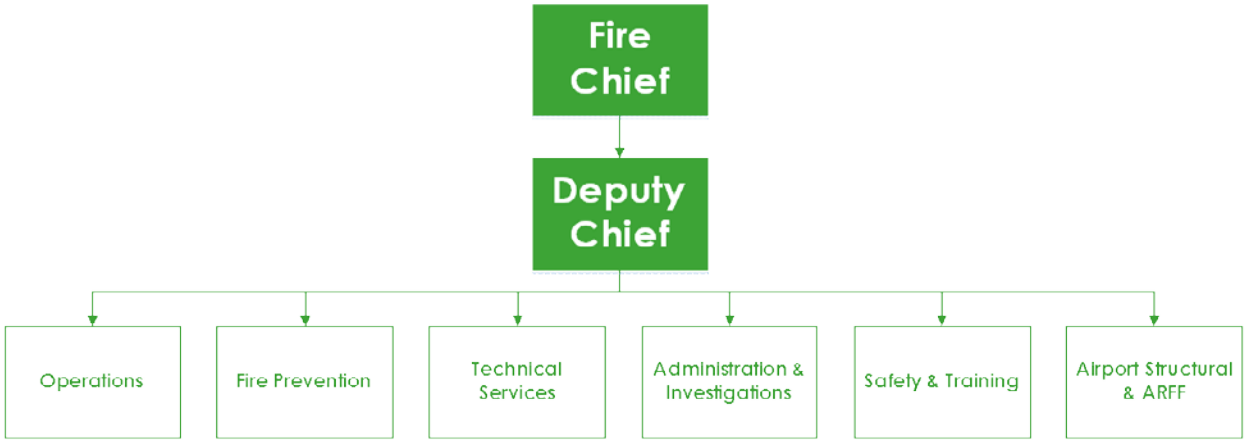
INTRODUCTION & BACKGROUND

City and County of Denver Fire Department

First organized in 1866, the City and County of Denver Fire Department (DFD) protects the Denver community and its citizens by providing emergency medical and fire services. The department also conducts a variety of prevention efforts and public education programs to promote fire safety and emergency preparedness.

DFD is led by the Chief of the Fire Department (Fire Chief), who is appointed by the Mayor and reports to the Manager of Public Safety.[1] As shown in Figure 1, the Deputy Chief of the Fire Department (Deputy Chief) reports to the Fire Chief and oversees all of the department's operations.

FIGURE 1. Denver Fire Department Organizational Chart



Source: City and County of Denver Fire Department.

The department is organized into six divisions: Operations; Fire Prevention; Technical Services; Administration and Investigations; Safety and Training; and Airport Structural and Aircraft Rescue and Firefighting (ARFF). Each division is led by a Division Chief who is responsible for all aspects of division operations, including managing the division budget and developing policies and procedures. See Appendix A for a more thorough description of each division's responsibilities.

DFD has established seven fire service districts within the City, each under the command of a District Chief.[2] The department operates 37 total fire stations—29 are geographically dispersed throughout the seven districts; four are located in the cities of Glendale, Sheridan, and Englewood; and four stations are located within the boundaries of Denver International Airport

[1] City and County of Denver Charter, § 2.6.6. The Fire Department shall be composed of the Chief of the Fire Department, who shall be appointed by the Mayor and such other subordinates appointed pursuant to Civil Service requirements and employees appointed pursuant to Career Service requirements, as may be necessary to protect the City and County against fire and to provide other emergency services as designated by the Manager of Safety.
[2] "About Us," Denver Fire Department, accessed October 4, 2016, https://www.denvergov.org/content/denvergov/en/fire-department-home/about-us.html.

(DIA).[3] In addition to fire stations, the department also operates support facilities, including a warehouse to store clothing and other supplies; the Rocky Mountain Fire Academy, which is used for departmental and regional training; and facilities for the department's Line Shop and Fleet Maintenance operations.

DFD Budget and Performance

As shown in Figure 2, DFD received nearly $148 million in appropriated funds to support its operations in 2016, including funding for approximately 1,030 Full Time Equivalent (FTE) civilian and uniform positions. This represents an approximately 40 percent increase over the department's $105.5 million in actual expenditures in 2010. The increased funding levels for 2015 and 2016 were, in part, due to an increase in Special Revenue Funds stemming from the creation of the Police/Fire Pension Fund in 2015.[4]

FIGURE 2. DFD Funding Levels, by General and Special Revenue Funds (2010 – 2016)

Source: City and County of Denver Auditor's Office analysis of the Mayor's Budget information, fiscal years 2010 through 2016.

***Note:** The amount shown for 2016 is based on appropriated funding levels, as opposed to the actual General and Special Revenue Fund expenditures as reported for 2010 through 2015. Appropriated funds are those set aside or delegated for the necessities of operations.

[3] "About Us," Denver Fire Department, accessed October 4, 2016, https://www.denvergov.org/content/denvergov/en/fire-department-home/about-us.html. As of the drafting of this audit report, there were four fire stations within the boundaries of DIA, but a fifth station, Fire Station 35, was being constructed and expected to open for operations at the end of 2016.

[4] Ordinance 20150841, approved on November 23, 2015, established a Police/Fire Pension Fund within the Public Safety Special Revenue Fund. The Police/Fire Pension Fund receives revenue generated by the Police and Fire Pension dedicated mill levy, and funds all annual payments for both police and fire pension payments— including the 8 percent employer contribution for current police officers and firefighters. This change eliminated the General Fund contribution for the City's new-hire police and fire pension.

General Fund—Of the funds allocated to the department in 2016, 87 percent were appropriations from the General Fund, totaling almost $129 million. Approximately 95 percent of these funds ($123 million) were set aside for personnel expenses, including salaries, overtime, retirement, insurance (e.g., medical, dental, vision, and disability), and workers' compensation claims. The remaining funds ($5.8 million) were dedicated to non-personnel-related expenses, including contractual services, supplies, capital equipment, internal services from other City agencies, and miscellaneous expenditures.

Special Revenue Fund—The remaining 13 percent of the funds allocated to DFD in 2016 were limited to expenditures for specific purposes as designated by law or administrative action. These *Special Revenue Funds* support specific fire administration and operations, including the following:

- **Fire Prevention and Investigation Donations**—Funded by contributions, donations, registration fees from seminars, and other private sources, this fund covers the cost for fire prevention and investigation programs, including life safety seminars to Denver Public Schools, local businesses, and City residences.
- **Police and Fire Pension Fund**—Funded by revenue generated by the Police and Fire Pension dedicated mill levy, this fund pays for all annual payments for both police and fire pensions.[5] The Fire and Police Pension Association, a statewide association, administers the City's fire and police pension plans.
- **Rocky Mountain Fire Academy Fund**—Provides funding for the operation and maintenance of the Fire Academy.[6]
- **Fire Regional Services Program**—Funded by payments from other fire jurisdictions that send firefighters to receive training at the Rocky Mountain Fire Academy, this fund pays for the construction, remodeling, repair, maintenance, and financing of the facility and other training-related costs.
- **Wildland Firefighting Reimbursement and Other Fee-Based Programs Funds**—Funded by fees, donations, and other financial transactions, this fund pays for operational costs associated with maintaining fire service assistance programs. These programs are coordinated through operational agreements with state and federal government agencies, including the State of Colorado Division of Fire Prevention and Control and the Colorado Task Force 1.[7]

Revenue—As shown in Figure 3, DFD generates revenue from use charges, fees, and services provided by the department to other organizations—both internal and external to the City. The

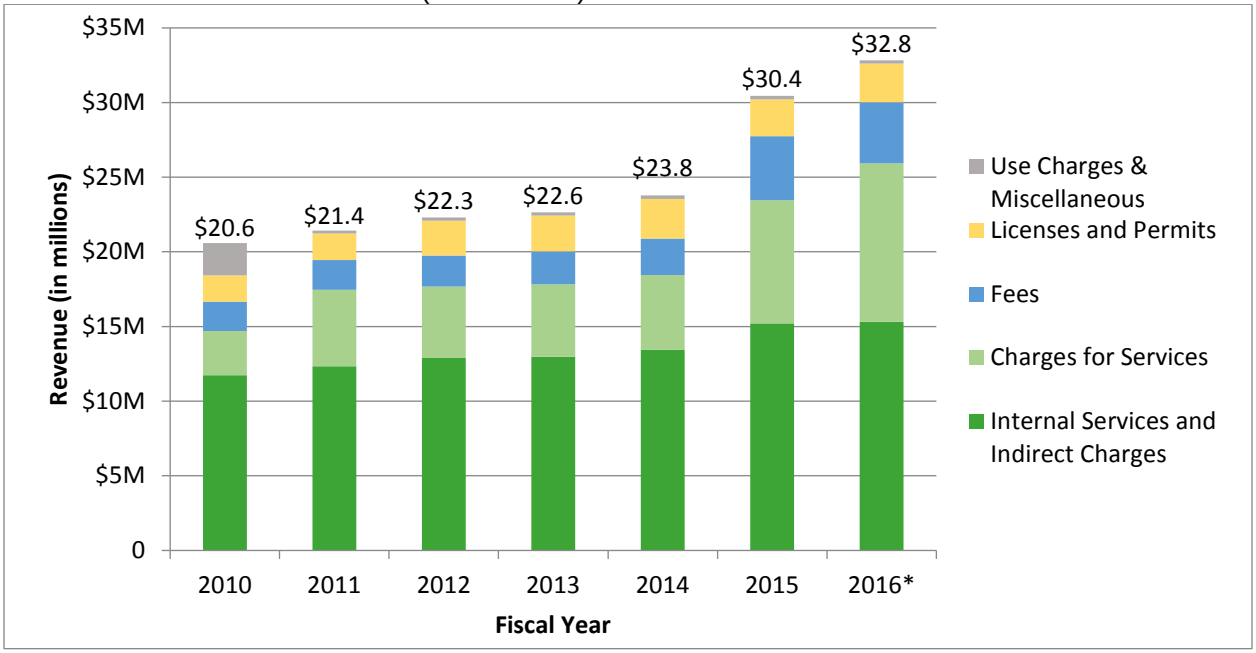
[5] "City and County of Denver Mayor's 2017 Proposed Budget." The establishment of the Police and Fire Pension Special Revenue Fund in 2016 eliminated the General Fund contribution for the City's new-hire Police and Fire Pension.

[6] "City and County of Denver Mayor's 2017 Proposed Budget." The Rocky Mountain Fire Academy was jointly operated and maintained by both the City and County of Denver and the City of Aurora until the end of 2015. As of January 1, 2016, the City and County of Denver is the sole proprietor of this facility. Funds received through transfers from the General Fund will be used to complete annual payment obligations for the fire burn building.

[7] Colorado Task Force 1 (CO-TF1) responds to disasters around the country, seeking to find and rescue people who are trapped in urban settings. CO-TF1 is sponsored by West Metro Fire Rescue and includes highly trained members, such as firefighters, paramedics, physicians, structural engineers, hazardous materials technicians, heavy rigging specialists, and canine handlers. Task force members have responded to a variety of emergencies, including the collapse of the World Trade Center in New York City on September 11, 2001, hurricanes, floods, and tornadoes.

revenue that DFD collects is deposited into the General Fund along with revenue generated by other City agencies. Through the City's budget process, DFD receives revenue to recover some of the cost of services that it provides.

FIGURE 3. DFD Revenue Sources (2010 – 2016)



Source: City and County of Denver Auditor's Office analysis of the Mayor's Budget information, fiscal years 2010 through 2016.

***Note:** The amount shown for 2016 is based on appropriated revenue, as opposed to the actual revenue as reported for 2010 through 2015.

Performance Information—In addition to financial information, the Mayor's budget also includes performance information for all City agencies. Each agency identifies and summarizes strategic goals and related performance measures that are used to monitor and evaluate its operations. Accordingly, the DFD budget book entry includes strategic goals and performance measures that assess the department's progress toward implementing those goals.

In addition to the inclusion of strategic goals in the budget book, DFD has identified other strategic goals through planning efforts that were not directly connected to the budget process. These efforts included the creation of a City and County of Denver Fire Facilities Master Plan in 2003, the drafting of a strategic plan in 2012, and goals related to process improvement under the guidance of the City's Peak Performance initiative. The effectiveness of DFD's approach toward implementing its variety of strategic goals is discussed in greater detail in our audit finding on the department's strategic planning efforts. See Appendix B for a more detailed summary of the department's performance information as presented in the budget.

DFD Guidance, Industry Standards, and Agreements

DFD relies on a collection of policies and procedures to manage Department operations. These policies and procedures, commonly referred to by the department as Standard Operating Guidelines (SOGs) and Department Directives, provide guidance for an array of administrative activities ranging from managing employees to handling equipment and assets. SOGs provide

guidance for department-wide operations while Department Directives apply to specific operating divisions.

In addition to SOGs and Department Directives, industry standards are integral to the way in which DFD manages and assesses its operations. These professional standards are established by the National Fire Protection Association, Insurance Services Office, and Center for Public Safety Excellence and represent best practice for fire departments. The following bullets summarize how these organizations provide direction for DFD:

- **National Fire Protection Association**—The National Fire Protection Association (NFPA) is an international nonprofit organization that provides consensus codes and standards, research, training, and education. As an authoritative source on public safety, the NFPA develops, publishes, and disseminates more than 300 standards intended to minimize the possibility and effects of fire and other risks. The City formally adopted emergency medical response standards promulgated by the 2004 NFPA Standard 1710. The City also relies on several other NFPA standards to guide different aspects of its operations.
- **Insurance Services Office**—The Insurance Services Office (ISO) analyzes information on municipal fire-protection efforts to help communities throughout the United States evaluate their public fire-protection services. ISO analyzes community-level data using its Fire Suppression Rating Schedule (FSRS) and assigns a Public Protection Classification (PPC), ranging from Class 1 to Class 10. A Class 1 rating represents the highest level of fire protection, and a Class 10 rating indicates that a community's fire protection efforts do not meet ISO's minimum standards. Of the more than 47,000 communities that ISO evaluated in 2011, Denver was one of 592 communities to receive a Class 2 rating—representing roughly 1 percent of the communities evaluated.[8] DFD officials stated that they rely on its PPC rating as an indicator of its compliance with industry and professional standards.
- **Center for Public Safety Excellence**—The Center for Public Safety Excellence (CPSE) is a nonprofit corporation that serves as a continuous improvement resource for fire and other emergency services professionals. CPSE provides the only accreditation program for fire service organizations in the world and has 13 accredited fire and rescue agencies in Colorado. CPSE's accreditation program is administered by the Commission on Fire Accreditation International (CFAI) and allows fire and emergency service organizations to compare their performance to industry best practices. Similar to the ISO, the accreditation allows fire and emergency services organizations to identify community risks and safety needs, evaluate department performance, and establish a method for achieving continuous improvement.[9]

DFD is also subject to several agreements, including a labor agreement, an operating agreement, and several intergovernmental agreements, that impact its operations. These agreements are summarized as follows:

[8] Almost 99 percent of the communities evaluated in 2011 received a class rating of 3 through 10. Only 61 communities (approximately one-tenth of one percent) received the highest class rating of 1.

[9] As of the issuance of this audit report, DFD officials stated that DFD is preparing to be reviewed by CFAI to obtain accreditation for the department.

- **Collective Bargaining Agreement**—Denver Firefighters - Local 858 of the International Association of Firefighters (Union) has entered into an agreement with the City to collectively bargain wages, pay rates, work hours, grievance procedures, and all other terms and conditions of firefighter employment.[10]

  During the negotiation of the 2013–2015 collective bargaining agreement (CBA), the City and the Union agreed to maintain staffing levels for all fire apparatus—vehicles that have been customized for use during firefighting operations—and all Aircraft Rescue and Firefighting (ARFF) units. The City and the Union agreed to maintain a minimum of four firefighters for all fire apparatus, as well as for all ARFF units, as is required by Federal Aviation Administration (FAA) standards.

- **Denver Health Operating Agreement**—In 1997, the City entered into an Operating Agreement with the Denver Health and Hospital Authority (Denver Health) to provide Emergency Medical Services (EMS) and other services related to public health. Broadly, EMS refers to the network of people, equipment, and procedures used to respond to medical emergencies.[11] Denver provides EMS through a two-tiered emergency medical response system that includes DFD and Denver Health. Under the Denver Health Operating Agreement, DFD is responsible for providing the first response function for most medical emergencies in the City. Denver's first response is designed to quickly provide Basic Life Support (BLS) care until an Advanced Life Support (ALS) unit arrives.[12] Most Denver firefighters are certified as Emergency Medical Technician (EMT)-Basic, enabling them to provide basic medical care.[13] However, DFD responds to medical emergencies in fire apparatus, which cannot be used to transport patients to the hospital.

  It should be noted that EMS calls have been a significant driver of DFD's emergency response workload for the past decade. The total number of calls to which DFD has responded has increased from nearly 80,000 calls in 2006 to more than 107,000 calls in 2015—an increase of approximately 34 percent. EMS calls make up well over half of the calls to which DFD responds, accounting for roughly 66 percent of all calls in 2006 and

[10] The International Association of Firefighters (IAFF) is associated with the American Federation of Labor and Congress of Industrial Organizations (AFL-CIO). According to the City's collective bargaining agreement with Denver Firefighters - Local 858, IAFF, AFL-CIO, the term "firefighter" refers to the members of the department's Classified Service, except any person holding the rank of Chief of the Fire Department, or any person assigned the duties of Deputy Fire Chief or Division Chief. Membership in Denver Firefighters - Local 858, IAFF, AFL-CIO is not mandatory, and membership may or may not be taken up at the firefighter's discretion. However, the Union provides benefits and services to all firefighters whether they are Union members or not.

[11] City and County of Denver Auditor's Office, "Performance Audit of The Emergency Medical Response System City and County of Denver," December 2008. EMS can be thought of as all medical services provided in an emergency setting, including emergency services provided by a hospital. For the purposes of this audit report, however, EMS will refer only to pre-hospital services provided, which may or may not include transporting patients involved in a medical emergency to the hospital.

[12] A two-tiered system is based on the premise that there are two types of emergency calls—ones in which the response time can directly impact patient outcomes and ones in which positive patient outcomes are based more on the skill level of the responder. Under a tiered emergency medical response approach, pre-hospital care is generally divided into two categories—Basic Life Support (BLS) and Advanced Life Support (ALS). In Denver, most life-threatening emergency medical calls require both BLS and ALS responses. Although Denver Health can provide both BLS- and ALS-level care, BLS is usually provided by DFD and ALS is exclusively provided by Denver Health.

[13] To practice as an EMT in Colorado, individuals must be certified by the state. An EMT-Basic is certified to provide basic emergency medical care, such as administering oxygen, performing cardiopulmonary resuscitation, splinting, managing bleeding, and taking vital signs. An EMT-Paramedic (EMT-P)—commonly referred to as a paramedic—is also trained in advanced assessment, airway management, and the treatment of a range of medical emergencies that may require the use of medication or advanced interventions. Certification at the EMT-Paramedic level includes additional training hours beyond that of EMT-Basic training and involves extensive clinical rotations in a hospital emergency department or an ambulance.

increasing to 70 percent of all calls in 2015. Furthermore, EMS calls have increased at a rate greater than other emergency service calls—increasing by 41 percent between 2006 and 2015.

- **Intergovernmental Agreements**—In addition to providing fire and emergency medical services to Denver, the City has entered into intergovernmental agreements (IGAs) with four adjacent communities—the cities of Glendale, Sheridan, and Englewood and the Skyline Fire District—to improve DFD's response times and level of service in areas where service gaps exist. These IGAs are discussed in greater detail in our audit finding about DFD's assessment of the cost and benefits associated with the terms and provisions of these agreements.

SCOPE

This audit assessed the effectiveness of the Denver Fire Department's (DFD's) resource allocation practices, including an assessment of DFD's policies and procedures for resource allocation, risk assessment, and risk management.

OBJECTIVE

The objective of this audit was to assess DFD's resource allocation practices, including analysis of policies and procedures to determine the extent to which they align with applicable laws, regulations, professional standards, and leading management practices. This audit also examined DFD's assessment and management of resource allocation risks.

METHODOLOGY

We applied multiple methodologies to gather and analyze information pertinent to the audit scope. These methodologies included the following:

- Reviewing DFD documents, including strategic plans, to identify and summarize policies and procedures that govern department operations, service delivery, and resource allocation
- Comparing DFD resource allocation practices to applicable laws, regulations, professional standards, and leading management practices
- Reviewing DFD risk assessment and management plans to summarize department efforts to identify and mitigate risk
- Comparing information contained in DFD's risk-related policies and procedures to professional standards and leading management practices
- Analyzing DFD financial and operational data to identify resource allocation and performance trends and anomalies
- Assessing the reliability of DFD data to determine the extent to which it was reasonably complete and accurate, was not subject to inappropriate alterations, and met our intended purpose
- Observing DFD operations through fire station tours and real-time observations of select work activities to obtain contextual information about how resources are used to deliver key services
- Interviewing officials from DFD, the Department of Public Safety, and other subject matter experts to confirm our understanding of DFD's resource allocation policies and procedures and plans for future efforts in these areas

FINDING

DFD Needs To Strengthen Its Decision-Making Processes To Ensure That Resource Allocation Keeps Pace with Denver's Changing Dynamics

Resource allocation is a broad term used to describe the choices an organization makes to use resources in an effective manner to achieve its mission. Appropriate resource allocation is critical to a fire department's success, and several professional organizations have established standards by which a fire department can measure the sufficiency of its resources. Specifically, the National Fire Protection Association (NFPA) provides guidance on the minimal resources requirements to perform critical activities such as fire suppression, emergency medical operations, and building inspections.[14,15] Further, the NFPA recognizes that the context within which a fire department operates will inevitably shift. This can be due to a change in population, budget fluctuations, or an expanded role, to name a few. Accordingly, fire department leaders must evaluate how those changes might impact the organization's ability to respond to emergency calls.[16] In light of how NFPA standards help fire departments allocate the appropriate amount of resources, in the right amount of time, to a specific location, this audit defines resource allocation as: having the right resources, at the right place, at the right time. For this audit report, this definition is applied across the fire department in all divisions as we examine the Denver Fire Department's (DFD) resource allocation practices and how effective those practices are at maintaining appropriate resource allocation in the face of a changing context.

In our assessment of DFD's resource allocation practices, we identified three growth-related issues regarding resource allocation and three gaps in its long-term decision-making processes. With regard to growth-related issues, first, we determined that DFD is unable to meet its fire safety inspection goals for structures in the City. Second, DFD's hiring practices are not keeping pace with firefighter attrition and increases in budgeted strength. Third, DFD has persistent coverage issues in the northeastern corridor of Denver.

With regard to the gaps in DFD's decision making processes, first, we found that DFD does not have a comprehensive strategic plan that aligns all of its planning efforts and outlines an approach for making decisions about long-term goals and objectives. Second, DFD does not have a robust framework by which to systematically identify and address long-term resource allocation risks. Third, the department's process for assessing the cost and benefits associated with its intergovernmental agreements (IGAs) is supported by fragmented documentation and is missing critical information that would better support decision-making. By considering the findings of this audit and implementing our related recommendations, DFD will be better positioned to ensure the success of its resource allocation practices and mitigate risks to its operations.

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[14] NFPA, "Standard 1710: Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments," (Quincy: The National Fire Protection Agency, 2010), 1710-1.

[15] NFPA, "Standard 1730: Standard on Organization and Deployment of Fire Prevention Inspection and Code Enforcement, Plan Review, Investigation, and Public Education Operations," (Quincy: National Fire Protection Agency, 2016), 1730-4.

[16] NFPA, "Fire Service Deployment: Assessing Community Vulnerability," High-Rise Implementation Guide, 2nd Edition (National Fire Protection Agency, not dated) 1-2.

Denver's Growth Puts Pressure on DFD's Resources

The City and County of Denver's Fire Facilities Master Plan (Master Plan) identified Denver's growth as one of the fire department's most significant long-term challenges. The audit team sought to determine whether DFD's operational responsibilities have increased in response to the City's economic and population growth. To do so, we analyzed data provided by DFD's fire suppression and fire prevention divisions and analyzed a report from the Insurance Services Office (ISO), which rates a fire department on a wide range of fire suppression capacities, including available personnel, apparatus, and water supply. The results of our analysis support the long-term challenges identified in the Master Plan, which were also reflected in audit interviews and reports provided to auditors by DFD. As demonstrated in the following subsections, DFD's operational responsibilities have increased along with Denver's growing population and economy, and these dynamics pose challenges to effective resource allocation.[17]

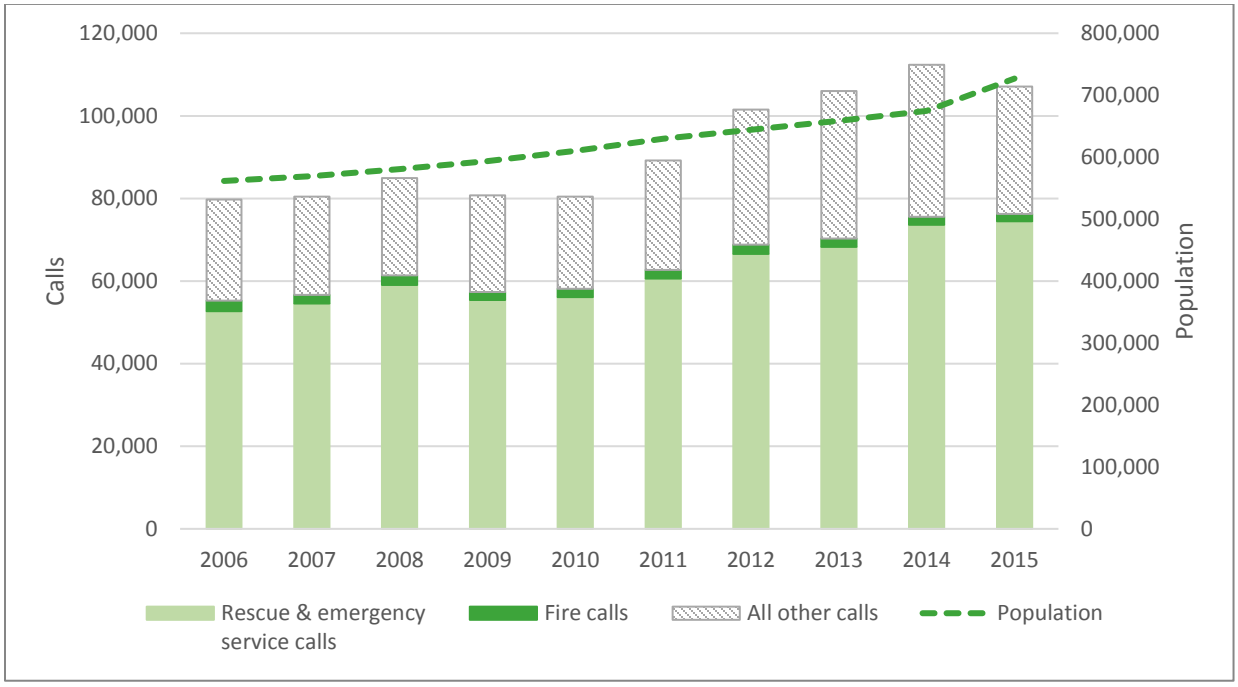
Calls for Service Have Increased by 34 Percent since 2006

The audit team's analysis of DFD's calls-for-service shows that the total number of calls has increased from approximately 80,000 in 2006 to more than 107,000 in 2015, a 34 percent increase (see Figure 4). This data also shows that rescue and emergency service calls are more frequent than fire-related calls, accounting for 66 percent of all calls in 2006 and 70 percent of all calls in 2015. Further, rescue and emergency service calls increased by 41 percent between 2006 and 2015, unlike fire-related calls, which decreased by 30 percent over the same time period. Fire-related calls accounted for only 3.2 percent of all calls in 2006 and 1.7 percent of all calls in 2015.[18]

[17] In the City and County of Denver 2003 Fire Facilities Master Plan, population and economic growth were identified as major drivers of calls for service.

[18] In 2015, 11 percent of calls were classified as good intent calls, 10 percent as false alarm and false call, 5 percent as service calls, and 3 percent as hazardous condition calls. The remaining calls were classified as special incident, overpressure rupture explosion, or severe weather and natural disaster calls.

FIGURE 4. Total DFD calls, including rescue and emergency service calls, and population (2006 – 2015)

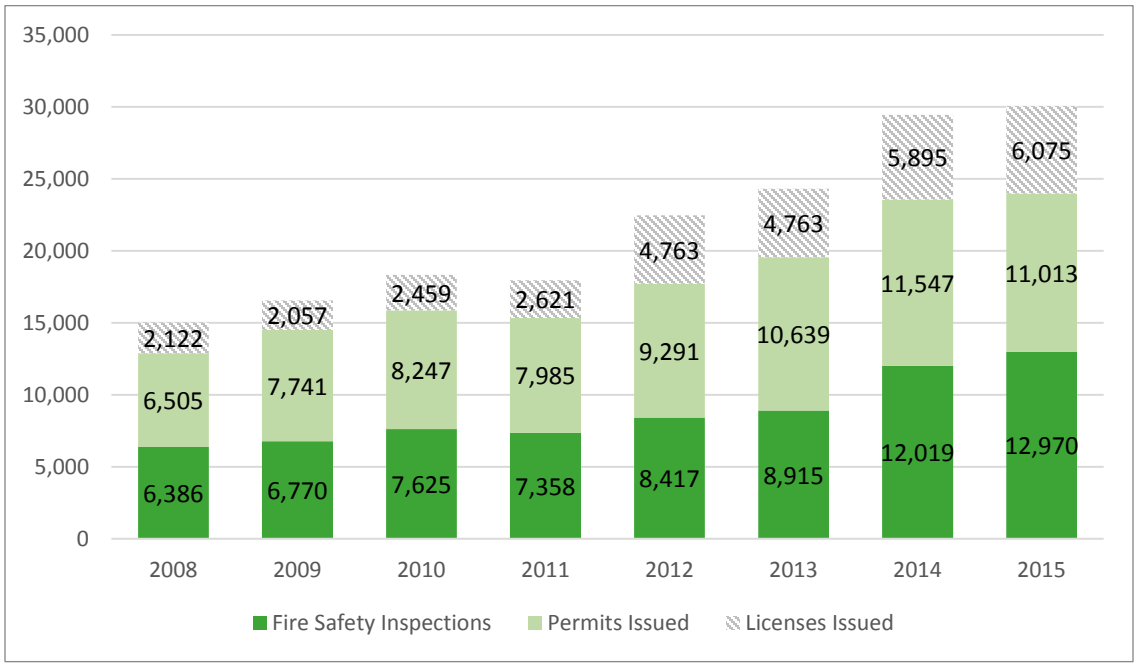


Source: City and County of Denver Auditor's Office analysis of Denver Fire Department and U.S. Census data.
***Note:** Population includes total population protected by DFD per Intergovernmental Agreement obligations.

DFD's Workload Related to Permitting, Licensing, and Inspections Has Increased Significantly since 2008

The auditor's analysis of the number of fire safety inspections assigned, permits issued, and licenses issued shows steady increases in the workload of the Fire Prevention division between 2008 and 2015. During the time period examined, the number of assigned inspections increased by 103 percent the number of permits issued increased by 69 percent, and the number of licenses issued increased by 186 percent. Figure 5 demonstrates these increases.

FIGURE 5. Fire Prevention Division Workload by Type (2008 – 2015)



Source: City and County of Denver Auditor's Office analysis of Denver Fire Department data.
Note: Annual fire safety inspections are completed by the Fire Prevention Division and by firefighters on-duty in the district firehouses. Only the fire safety inspections completed by the Fire Prevention Division are shown here and denoted as "Bureau Fire Safety Inspections".

Further, as shown in Figure 6, our analysis of DFD's annual fire safety inspection data shows an increase over time of the number of inspections that were not completed each year. Our analysis of uniformed fire prevention staff, total workload, and number of incomplete annual safety inspections shows that, as the number of assigned fire safety inspections per uniformed fire prevention staff has increased, the total number of inspections not completed has also increased.[19]

[19] Fire prevention is staffed by uniformed staff (i.e., trained firefighters) and traditional Career Service Authority staff. Uniformed staff conduct the majority of fire safety inspections. Analysis shows a strong and positive correlation (0.77) of the ratio of fire prevention uniformed staff and total inspections assigned to the fire prevention unit to the total number of incomplete inspections each year.

FIGURE 6. Fire Prevention Division Incomplete Inspections Compared to the Number of Fire Safety Inspections, per Uniformed Fire Prevention Staff (2006–2015)

Source: City and County of Denver Auditor's Office analysis of Denver Fire Department information.

DFD officials also stated that the complexity of some fire safety inspections has increased, which has also increased the amount of time required to complete inspections for some facilities.

DFD Loses Points in Recent Evaluation in Growth-Related Areas

Of the more than 47,000 communities that the Insurance Services Office (ISO) evaluated in 2011, Denver was one of 592 communities to receive a Class 2 rating—representing roughly 1 percent of the communities evaluated. However, as shown in Table 1, the majority of points that DFD lost in ISO's most recent evaluation were in categories the auditors defined as growth-related. For example, one category that we defined as growth-related is the number of personnel available to the City for fighting fires; one category that we defined as non-growth related is whether the telephone number to report a fire and the fire department business telephone number are listed under "Fire Department" in the public telephone directory.

TABLE 1. DFD Points Missed in Insurance Services Office Evaluation, by Non-growth and Growth-related Topics

	Average Percent of Credit Received	Total points missed credit	Number of Topics	Points missed, per topic
Non-growth related topics	90%	2.37	5	0.47
Growth-related topics	80%	15.99	9	1.78

Source: City and County of Denver Auditor's Office analysis of Insurance Services Office information.

These analyses demonstrate that the economic and population growth anticipated by the Master Plan in 2003 has resulted in increases in workload for DFD. While DFD has maintained a high level of emergency service, including reduced call response times, in the face of this growth, audit work identified three growth-related issues that need to be addressed.

Industry Standards Allow DFD Flexibility in Classifying Fire Safety Inspection Risks

As demonstrated in the above analysis, DFD has to perform more annual fire safety inspections, increasing the workload of individual DFD inspectors. Concurrently, the number of incomplete inspections per year is growing. DFD has responded to this issue by requesting more technician positions. However, our analysis of the Denver Building and Fire Code and NFPA standard 1730 indicates that DFD may be able to perform fewer inspections while still complying with inspection requirements. This would create better alignment with their current number of inspectors.

The 2016 Denver Building and Fire Code specifies how frequently certain buildings should be inspected for fire safety. Specifically, Section 104.6.2.1 of the code, regarding frequency of inspection, states that:

> Fire safety inspections for the specific property/operation shall be required at intervals established by the fire code official but not to exceed once every 12 months.

DFD has interpreted this provision to mean that every building must be inspected once per year. However, auditors interpret this provision differently: buildings shall not be inspected more frequently than once every 12 months. In other words, some buildings could be inspected once every two or three years and still be in compliance with section 104.6.2.1 of the building code.

NFPA 1730 contains a suggested Community Risk Assessment (CRA) to classify occupancy risks as low, moderate, high, and critical infrastructure. These classifications could be informative for DFD in determining which buildings still warrant annual inspection and when less frequent inspections would be satisfactory. We discuss these standards further in our audit finding on the department's long-term resource allocation risk.

DFD's Hiring Practices Are Not Keeping Pace with Attrition and Increases in Budgeted Strength

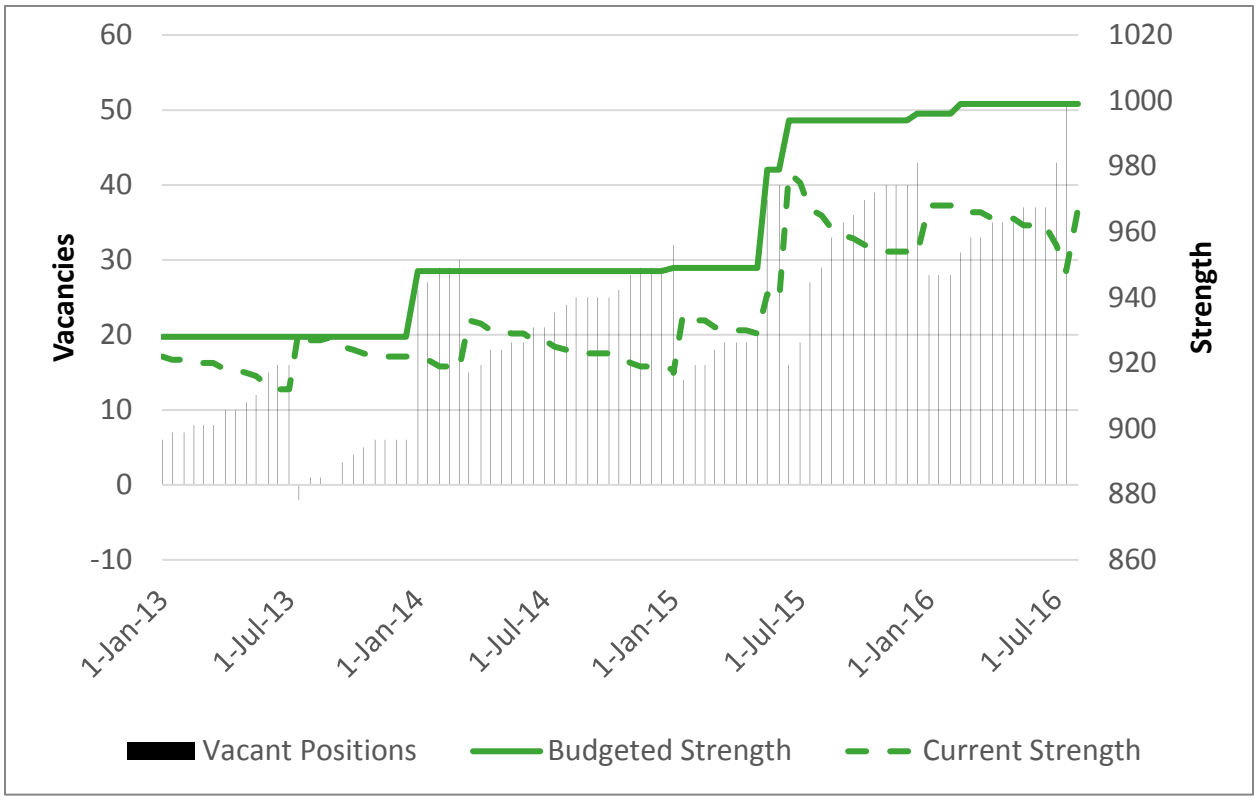
To determine whether DFD is sufficiently staffed to carry out its operations, we looked at data regarding DFD's available uniformed personnel and budgeted uniformed personnel from January 2013 through June 2016. Our analysis shows an increasing number of vacancies, meaning that DFD was employing fewer uniformed personnel than its budget allowed. This number increased from an average of 7 vacancies in 2013 to an average of 35 vacancies in 2016.[20] During this time period, a number of factors may have contributed to the gap between budgeted versus available personnel.

First, DFD increased its budgeted strength from 928 in 2013 to 999 in 2016.[21] Second, the department experienced attrition due to retirements and other firefighters leaving DFD for alternative employment. Finally, in 2013, DFD reduced the number of annual recruitment academies from two to one as a cost reduction measure. Figure 7 shows this trend over time, based on vacancies and budgeted versus actual positions.

[20] According to DFD projections, vacancies are likely to decrease with the addition of new recruits by the end of 2016.

[21] The number of full time equivalent (FTE) positions shown in Figure 7 is based on an analysis of data recorded in the City's PeopleSoft system for uniform personnel only. According to DFD officials, the number of FTE position shown in Figure 7 will differ from the number reported in the Mayor's Budget Book, as the number in the budget includes both uniform and non-uniform personnel.

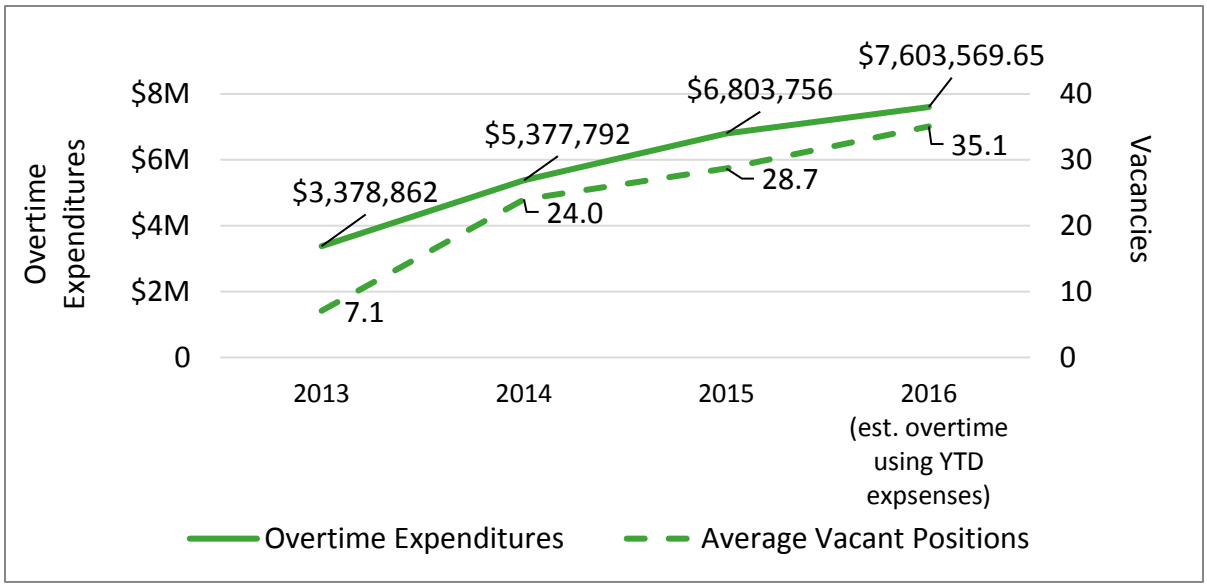
FIGURE 7. DFD Actual versus Authorized Strength and Number Vacant (2013 – 2016)



Source: City and County of Denver Auditor's Office analysis of Denver Fire Department data.

When the audit team looked at vacancies in the context of overtime expenditures, we found that by not staffing at its fully authorized strength level, DFD may be incurring increased payments to firefighters and administrative staff who are working overtime. Our analysis shows that as the number of personnel vacancies has increased, the amount of overtime expenditures has increased as well. This trend is represented in Figure 8.

FIGURE 8. DFD Overtime Expenditures and Personnel Vacancies (2013 – 2016)



Source: City and County of Denver Auditor's Office analysis of Denver Fire Department information.

The conclusions from these two analyses collectively demonstrate that DFD's recruitment practices are not keeping pace with DFD's attrition rate or increases in budgeted strength while contributing to an increase in overtime expenditures. To ensure that staffing levels keep pace with attrition and reduce reliance on overtime work, DFD should assess its hiring strategies to narrow the gap between vacant positions and the number of personnel authorized by the department's budget.

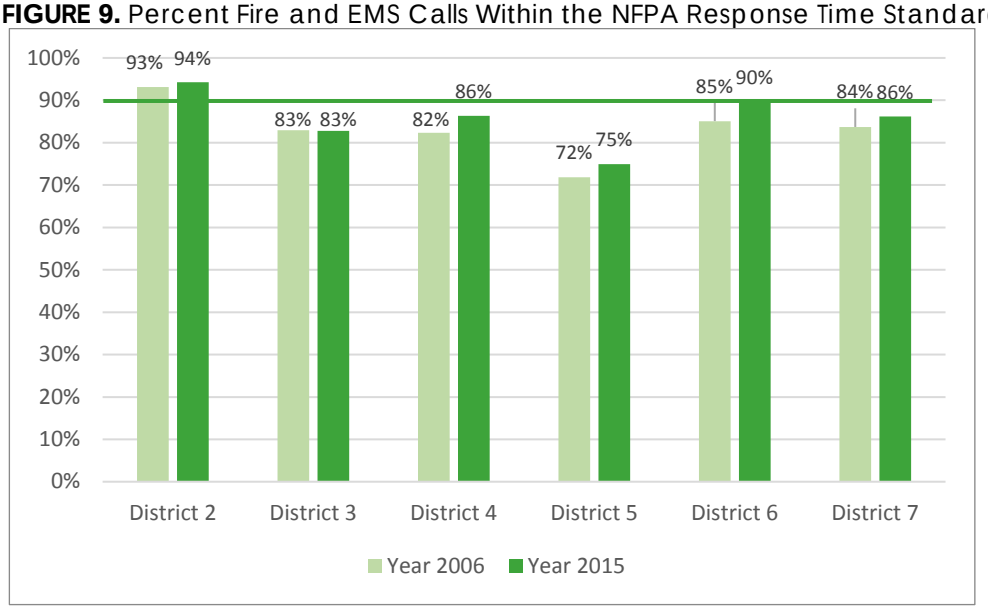
DFD Has a Persistent Coverage Gap in Northeast Denver

The final growth-related issue identified by the audit team is a persistent coverage gap in District 5, which is located in the northeastern-most section of the City. In 2003, DFD first identified a need for additional resources in this growing area, which contains Northfield, Montbello, Green Valley Ranch, and much of the Peña Boulevard corridor leading to DIA. Based on this established resource allocation concern, we sought to determine whether the issue has been addressed. Specifically, we analyzed response times from 2006 through 2015, including turn-out time and travel time to the scene, for Districts 2 through 7.[22]

[22] DFD does not have a District 1. District 8 was not included in the analysis because it encompasses Denver International Airport, and recorded response times there tend to be much higher due to the nature of the emergencies. For example, an incoming aircraft may notify the control tower that there is a medical emergency on board, allowing DFD advanced warning to be present when the aircraft lands. The pre-notification can start the response clock 10 to 15 minutes ahead of the aircraft's arrival and the clock is not stopped until the aircraft arrives.

The results of our analysis verify both DFD's reported overall improvements in the average response time for several districts as well as the persistent coverage issue in District 5.[23],[24] As shown in Figure 9, District 5 had the slowest response times in 2006 as well as in 2015.

FIGURE 9. Percent Fire and EMS Calls Within the NFPA Response Time Standard (2006 and 2015)



Source: City and County of Denver Auditor's Office analysis of Denver Fire Department data.

After comparing response times by district from 2006 to 2015, we then examined EMS and fire-related calls for each district and compared the response times to the NFPA standard for response times.[25] This analysis showed that DFD has a higher probability of responding to a call within the NFPA standard in every district when compared to District 5 response times. For example, DFD is 6.17 times more likely to respond to an EMS or fire-related call within the NFPA standard in District 2 than in District 5. Table 2 shows the difference in likelihood that DFD will respond to EMS and fire-related calls within NFPA standards in each district when compared to District 5. See Appendix C for the full results of the analysis.

[23] Outliers in the system were removed: those calls with a response time of less than 60 seconds or greater than 15 minutes were excluded to achieve a more accurate depiction of the average response under normal conditions.

[24] Auditors conducted a statistical test to compare response times between 2006 and 2015 for Districts 2 through 7, called a t-test. All changes in response time observed between 2006 and 2015 were significant at a confidence level greater than 99 percent, except for the change observed in District 3. The change observed in District 3 was not statistically significant.

[25] NFPA 1710 states the standard fire response time as 320 seconds (80 seconds for turnout time and 240 seconds for travel time).

TABLE 2. Comparison of Response Times to Districts 5

DFD District	Number of times more likely that DFD will respond to a call within NFPA standard compared to District 5
District 2	6.17 times more likely
District 3	1.99 times more likely
District 4	2.25 times more likely
District 6	2.91 times more likely
District 7	2.34 times more likely

Source: City and County of Denver Auditor's Office analysis of Denver Fire Department information.
Note: This analysis used only response times to EMS and fire related calls. Shown in Table 2 are the odds ratio, which is the impact of one variable on the outcome of interest (i.e., a response time within NFPA standard) when compared to another variable. In this case, Table 2 shows the relative impact of each fire district in Denver, when compared to District 5, on responding to a call within the response time defined by NFPA standards. See Appendix C for full logistic regression model.

DFD is aware of the response time deficiencies in District 5, based on internal analysis of current response times in the Northfield area. Accordingly, DFD has developed plans to build a new station in the Northfield area. In 2006, DFD proposed the addition of a new fire station in Northfield to address the coverage gap identified in the 2003 Fire Facilities Master Plan. However, the department has been unable to acquire funds for the Northfield station; accordingly, the project remains deferred.

Each of these growth-related issues highlights a long-term planning deficiency in DFD's approach to resource allocation. To identify the root cause of this deficiency, the audit team evaluated DFD's decision making processes with respect to strategic planning, risk management, and cost-benefit analyses. The next section discusses those efforts and the issues we identified within each.

DFD Does Not Have a Formal Strategic Plan To Guide Long-Term Decision-Making

Strategic plans are a starting point for setting organizational priorities and identifying the resources required to address those priorities. Since 2003, DFD has engaged in a variety of strategic planning activities to address its mission—including the development of the City and County of Denver Fire Facilities Master Plan (Master Plan), the City's Six-Year Capital Improvement Plans, and a draft departmental strategic plan. However, the audit team found that DFD does not have an updated, formal strategic plan to guide its long-term decision making.

Master Plan and Capital Improvement Plan—The City and County of Denver Fire Facilities Master Plan (Master Plan) has evolved over the years in response to the City's broader approach to planning for capital improvements. The Master Plan was developed in 2003 to assist DFD with making informed and logical decisions about resource allocation, not only for existing DFD facilities but also to support the development of new facilities that would be required to accommodate forecasted City growth. The Master Plan predicted that such growth would

place an increased demand on services and exacerbate traffic congestion, both of which would affect DFD's ability to navigate to fire and EMS calls. The Master Plan also identified 28 actions for the department to take to address these growth-related challenges—including building new fire stations in key areas of the City to improve response times, maintaining existing fire stations, and reconfiguring the use and function of existing facilities to better support DFD operations.

In 2013, the City consolidated its capital planning processes under the Capital Improvement Program (CIP). During this process, the Six-Year Capital Improvement Plan absorbed some fire facilities planning activities.[26] Specifically we determined that 3 of the 28 actions highlighted in the Master Plan were included in the Six-Year Capital Improvement Plan. As a result, DFD officials have stated that the department relies less on the Master Plan to guide its fire facilities planning, opting instead to work primarily with the City's Budget and Management Office to identify critical needs in this area and develop plans to address them. However, the Master Plan remains a relevant strategic document. For example, in the Mayor's budget for 2016 and proposed budget for 2017, DFD identifies monitoring and managing the Master Plan as a strategy for addressing the needs of new communities.

Draft Strategic Plan and Peak Performance—In 2010, the Mayor appointed a new Fire Chief, who initiated the development of a strategic plan to help the department achieve its mission through the establishment of long-term goals, objectives, and performance measures—at both the department and division levels. However, the plan was never formalized after being drafted in 2012. DFD officials explained to auditors that the strategic plan was placed on hold to realign the department's planning priorities with the City's Peak Performance framework.[27] DFD and Peak Performance personnel have worked together in recent years to establish metrics that can be used to measure the department's performance. However, this shift in strategic planning priorities has further delayed the finalization of the strategic plan, which remains in draft form as of the publication of this audit report.

Many authoritative sources provide guidance regarding best practice for strategic planning. Particularly instructive for strategic planning in the emergency management context, NFPA standards emphasize the importance of strategic planning to mitigate the impact of disaster, while protecting life and property. Specifically, the standards state that disaster and emergency management activities should be guided by a strategic planning process that defines an organization's vision, mission, goals, and objectives, and outlines an approach for achieving them.[28]

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[26] "City and County of Denver, Colorado, Elevate 2020, Six-Year Capital Improvement Plan 2015-2020." The City mandates a 6-year capital planning process. City agencies identify initiatives or objectives that could be accomplished within 6 years and list priority projects that support those objectives. This information is published in "Denver's The Six-Year Capital Improvement Plan." City agencies identify critical needs that are not currently funded and develop plans to address those needs in collaboration with the Budget and Management Office. It is the responsibility of the Budget and Management Office, the Mayor's Office, and City Council to identify projects that can be undertaken within funds available.

[27] City and County of Denver Auditor's Office, "Peak Academy Performance Audit," October 2015. In July 2011, Mayor Michael Hancock launched Denver's Peak Performance initiative. Peak Performance's goal is to transform government into a customer driven, creative, sustainable, and data-oriented environment and, in doing so, to improve efficiency and service delivery and identify cost savings. The first element of Denver's Peak Performance framework is strategic planning to enable City agencies to establish their vision of success.

[28] NFPA, "Standard 1600: Standard on Disaster/Emergency Management and Business Continuity Programs," (Quincy: National Fire Protection Agency, 2013), 1600-1 and 1600-7

Within the government context, the Government Finance Officers Association (GFOA) recommends that all governmental entities use some form of strategic planning to provide a long-term perspective for service delivery and budgeting. GFOA guidance also states that a strategic plan should be a systematic management tool designed to help organizations align resources "to bridge the gap between present conditions and the envisioned future." [29] Furthermore, guidance established by the U.S. Government Accountability Office (GAO) highlights the need for government organizations to establish a strategic plan that identifies pathways for meeting long-term strategic goals; discusses the impact of external factors (e.g., economic, demographic, social, technological, or environmental factors); defines results-oriented performance measures; and provides managers and decision-makers with a better understanding of how resource allocation affects the organization's ability to achieve its mission.[30]

Despite DFD's participation in a variety of planning activities, the department continues to lack an updated, formal strategic plan. Without the vision provided by a formal strategic plan, DFD officials and other decision-makers do not have the information required to ensure that resources and operations are focused on the correct goals and outcomes. Therefore, to guide and improve the department's long-term decision-making, DFD should update and formalize its draft strategic plan. In accordance with best practices for strategic planning, the formal strategic plan should identify pathways for meeting long-term strategic goals; discuss the impact of external factors; define results-oriented performance measures; and provide managers and decision-makers with a better understanding of how resource allocation affects the organization's ability to achieve its mission.

DFD Does Not Have a Framework for Systematically Identifying and Addressing Long-Term Resource Allocation Risks

Through various activities, DFD continuously seeks to identify, analyze, and respond to risks related to achieving its defined objectives, which are to protect the City against fire and to provide other emergency services in a quality, timely, and professional manner. The audit team's work determined that many of DFD's activities align with leading practices in risk management. However, we also found that DFD does not have a comprehensive and systematic enterprise risk management framework in place to determine the effectiveness of its long-term resource allocation efforts. In other words, DFD is responding to near-term risks that would keep the department from achieving its mission, but DFD does not know if those efforts are ensuring that they have the right resources in the right place at the right time in the future.

What Is Enterprise Risk Management?—Enterprise risk management (ERM) is an iterative process undertaken by an organization that enables it to successfully implement its strategies and reach its organizational goals. ERM builds on traditional risk management activities, which examine an entity's financial and legal liabilities, applying the concepts to risks that may prevent the entity from fully achieving its objectives.[31] When ERM is applied as a critical assessment of an organization's strategic plan, managers identify potential areas where a strategy can fail: these potential failures are called *risks*. When something occurs that limits the success of a strategy, this

[29] Government Finance Officers Association. "Establishment of Strategic Plans," March 2005.
[30] U.S. Government Accountability Office. "Agencies' Strategic Plans Under GPRA: Key Questions to Facilitate Congressional Review," GAO/GGD-10.1.16 (Washington, D.C.: May 1997).
[31] Committee of Sponsoring Organizations of the Treadway Commission (COSO). Richard M. Steinberg, Frank J. Martens, Miles E.A. Everson, and Lucy E. Nottingham, "Enterprise Risk Management – Integrated Framework," 2004, 2.

is called a *risk event*. Risk management is therefore the process of critically examining an organization's strategic plans for potential failures. Risk management includes two sub-processes: *risk assessment*, where individuals in the organization identify how a strategy or initiative may fail; and *risk management*, where individuals in the organization take appropriate action to minimize the chance of a risk event that could lead to a strategy's failure.[32,33]

Through interviews, observation, and analysis of documents, the audit team found multiple examples of risk assessment and risk management activities that DFD has engaged in to inform its resource allocation decisions. For example, we found that DFD strives to reduce response-time deficiencies, including the implementation of technologies to understand real-time coverage gaps and adjust personnel locations accordingly. DFD also conducted a pilot program for a medical unit, which would respond to medical-related calls only, thereby relieving fire company workload. Finally, we learned that DFD is partnering with the City's Technology Services department to optimize the location of fire chiefs throughout the City. In fact, our evaluation of DFD's resource allocation process revealed the department as data-driven in nature, continuously looking for ways to improve and incorporate the most advanced technologies to provide emergency services.

Despite these efforts, DFD still faces the following challenges related to population and economic growth:

- Insufficient coverage in the northeast corridor
- Incomplete fire safety inspections
- Vacant positions

In trying to determine why these challenges persist despite the presence of some risk assessment and risk management activities, we found that DFD does not have a well-defined and documented approach to comprehensively and systematically assessing and managing organizational risks. This seems particularly true for threats to achieving the department's long-term goals and related resource allocation needs.

GAO's internal control standards for government (Green Book) are again useful in demonstrating how risk activities should be optimally carried out. Specifically, the Green Book specifies that management should define objectives clearly to enable the identification of risks and define risk tolerances. In addition, management should identify, analyze, and respond to risks related to achieving the defined objectives. The NFPA echoes this stance through its standard on risk management, which states that a fire and emergency service organization should have a written policy statement that clearly reflects its commitment to risk management through the development, implementation, and administration of a risk management program.

DFD has taken numerous steps to identify and address risks and challenges, as described previously. However, DFD needs to better develop and document its risk management processes. Specifically, DFD should establish clearly defined risk tolerances or key risk indicators (KRIs) that could adversely impact department operations and required resources. The Committee of Sponsoring Organizations of the Treadway Commission (COSO), which develops guidance on ERM, has established a risk management framework that recognizes KRIs as a necessary component of risk management. According to COSO, establishing KRIs help an

[32] Ibid., 3-4.
[33] National Fire Protection Association, "Standard 1250: Recommended Practice in Fire and Emergency Service Organization Risk Management," 2015.

organization understand when a risk may arise and enables management to take steps in a timely manner to mitigate the risk or to avoid a risk event entirely.

Without an effective enterprise-level risk management framework, DFD is unable to evaluate the effectiveness of its long-term resource allocation efforts. Additionally, the lack of an effective risk management approach for long-term risks hampers the department's ability to appropriately respond to risks that could significantly impact its operations, particularly those associated with population and economic growth. Therefore, to systematically identify and address long-term resource allocation risks, DFD should develop a comprehensive and systematic risk management framework that will enable the department to identify, analyze, and respond to risks associated with its future resource allocation objectives. Specifically, DFD should clearly define risk tolerances and key risk indicators (KRIs) to identify relevant metrics that provide useful insights about potential risks that may have an impact on the achievement of the organization's objectives. Within these risk management efforts, DFD should consider NFPA 1730 with respect to conducting a Community Risk Assessment to determine whether there are alternative approaches to managing the department's fire safety inspection workload, while maintaining a high level of preparedness and safety for its firefighters. Alternative approaches could include aligning fire safety inspection frequencies with building occupancy risks. Further, DFD should include measures of risk and KRIs for the coverage issues identified in District 5 as a way to monitor and communicate the potential impact of the delayed development of the Northfield fire station.

One way that DFD has addressed potential coverage gaps and resource redundancy issues in the past has been through the execution of fire service intergovernmental agreements with surrounding municipalities. The audit team's examination of DFD's process for evaluating such agreements has led to the final finding of this audit report.

Documentation Of DFD's Cost-Benefit Analysis for Intergovernmental Agreements Is Fragmented and Lacks Critical Information To Support Decision-Making

DFD has entered into four intergovernmental agreements (IGAs) to provide fire service for the municipalities of Glendale, Sheridan, and Englewood and the Skyline Fire District (Skyline). DFD does not routinely seek out new IGA opportunities, but the department occasionally approaches other municipalities when it appears that a cooperative agreement would be mutually beneficial to the City and a nearby municipality with its own fire department. Audit work found that DFD performed a cost-benefit analysis when determining whether to establish its most recent IGA with the City of Englewood. DFD used the analysis to determine the financial impact to the department. The addition of a cost-benefit analysis to the decision-making process provides greater certainty that DFD is indeed entering into a mutually beneficial arrangement. However, DFD does not have documentation that this analysis occurred prior to entering into the other three IGAs—Glendale, Sheridan, and Skyline. Additionally, we found that the cost-benefit analysis framework utilized by DFD only considered direct costs of the agreement with Englewood, and did not document the impact of indirect costs and qualitative benefits and costs for which a dollar amount could not be assigned.

Cost-Benefit Analysis Process Has Not Been Consistently Documented

To fully understand how these IGAs benefit the City, the audit team asked DFD management to explain how they determined whether a potential IGA would be financially beneficial, neutral, or detrimental to the Department. We determined that the cost-benefit analysis that was used when developing a business case for entering into the IGA with the City of Englewood was not used leading up to the previous execution of IGAs with Glendale, Sheridan, and Skyline. DFD reported to the audit team that it performed similar analysis leading up to the decision to enter into these agreements. However, DFD could not provide evidence of this analysis for the Glendale, Sheridan, or Skyline IGAs. DFD explained that a former DFD Financial Manager had disposed of the physical files containing this evidence.

Because DFD was unable to provide documentation of their analysis of the costs and benefits associated with the Glendale, Sheridan, and Skyline IGAs, the audit team performed a simple comparison of the payments made to DFD to the estimated cost for DFD to provide the required services. Although this exercise was not intended to take the place of a more thorough cost-benefit analysis, all three IGAs appear to be financially beneficial to DFD.

Without a formal cost-benefit analysis, DFD may be unable to fully validate whether or not an agreement provides the best option for achieving certain of the department's strategic objectives. GAO has a Cost Estimating and Assessment Guide that positions a well-documented cost estimate as a best practice. Documenting any cost-benefit analysis performed would add transparency to DFD's decisions to enter into any future IGAs. Further, it would allow DFD to re-create or update an IGA cost-benefit analysis in the event that any key details change. Finally documenting work of this nature would allow DFD to analyze changes in cost assumptions that may necessitate an amendment to an existing IGA.

Auditors examined the four IGAs to identify opportunities for incorporating these principles with current, rather than only future, agreements. We noted that the IGAs with Sheridan and Glendale will expire on December 31, 2016, and December 31, 2017, respectively. The expiration of these agreements would be an ideal time to apply the cost-benefit analysis template that DFD used for the Englewood IGA to determine whether the Sheridan and Glendale IGAs should be renewed. The Skyline and Englewood IGAs do not expire until the end of calendar years 2025 and 2035, respectively. Due to the term length of these agreements, it would be beneficial for DFD to perform a periodic review of the City's arrangement to provide services to Skyline and Englewood to ensure that the cost structure has not increased to a degree that would necessitate an amendment. Therefore, to fully understand the full costs and benefits of intergovernmental agreements (IGAs) to the City, DFD should continue to use its cost-benefit analysis template for all future agreements, including those agreements pending renewal. DFD should also periodically review its cost-benefit analysis for longstanding multi-year agreements.

Cost-Benefit Analysis Documentation Did Not Include Indirect Costs and Qualitative Factors

Auditors examined the cost-benefit analysis model that was used by DFD in the business case development for the Englewood IGA for completeness and reasonableness. We found that the model accounted for the significant financial expenses for which DFD would be responsible, such as firefighter staffing costs and equipment depreciation. However, the analysis did not account for indirect costs and did not document other qualitative analysis that was considered when establishing the agreement.

Indirect costs are expenses shared by multiple groups or activities within an organization.[34] Examples of DFD's indirect costs are the personnel employed by DFD's human resources and accounting departments. Considered *shared services*, these services benefit all divisions of DFD, including those that serve Englewood. The cost of shared services was not factored into DFD's costing model for the Englewood IGA.

Qualitative analysis of costs and benefits requires subjective judgment based on non-quantifiable information.[35] Examples of qualitative costs and benefits within the context of IGA evaluation include the agreement's effect on call volume and the improved redundancy of coverage by adding an additional fire station. DFD has considered qualitative factors like resource redundancy and response time improvements in their IGA decisions and performed analysis to validate them. However, documentation of this analysis was fragmented, and there was no mention of the qualitative factors considered in the cost-benefit analysis documentation for the Englewood IGA.

Without a rigorous cost-benefit analysis of IGAs for fire service, DFD may be unable to fully validate the financial and operational viability of such agreements. Both the aforementioned GAO Cost Estimating and Assessment Guide and the U.S. Army's Cost Benefit Analysis Guide indicate that indirect costs and qualitative costs and benefits should be a part of a cost-benefit analysis. Therefore, DFD should include indirect costs in its cost calculations. Furthermore, DFD should include complete and comprehensive documentation of the qualitative factors that were considered, even if the costs and benefits cannot be quantified.

[34] Circular A-87, Revised 2004, United States Office of Management and Budget (OMB), Attachment A. Indirect cost are those costs incurred for a common or joint purpose benefitting more than one cost objective and not readily assignable to the cost objectives specifically benefitted, without effort disproportionate to the results achieved.

[35] Office of the Deputy Assistant Secretary of the Army (Cost and Economics), "U.S. Army Cost Benefit Analysis Guide," 3rd Edition, April 2013. Cost benefit analysis should include an analysis of both quantitative and qualitative results expected or resulting from the implementation of a project or initiative. Quantifiable results are those that have numeric values such as dollars, physical count of tangible items, or percentage change. Qualitative, or non-quantifiable results, are those that do not lend themselves to direct and quantitative measures. Examples of qualitative benefits include morale, compatibility, quality, security, and readiness. Although qualitative results are not impossible to quantify, the resources and methodologies required to produce a useful measure may be impractical for the scope of the cost-benefit analysis.

RECOMMENDATIONS

We offer the following recommendations to assist the Denver Fire Department (DFD) with addressing growth-related resource allocation issues and gaps in its long-term decision making processes:

1.1 To ensure that staffing levels keep pace with attrition and to reduce reliance on overtime, DFD should assess its hiring strategies to narrow the gap between vacant positions and the number of personnel authorized by the department's budget.

Auditee Response: Agree, Implementation Date – March 1, 2017

Auditee Narrative: DFD continually seeks ways to provide the highest level of service to the communities served within the parameters of budgeted authorized strength, the Collective Bargaining Agreement, and intergovernmental agreements. In an effort to ensure hiring strategies align with its goals for service, DFD will conduct an evaluation in consultation with the Executive Director of Safety's Office and the Budget and Management Office that focuses on three key areas:

- Academy class scheduling;
- Fiscal implications of force majeure; and
- Firefighter injuries and staffing effects.

1.2 To guide and improve the department's long-term decision-making, DFD should update and formalize its draft strategic plan. In accordance with best practices for strategic planning, the formal strategic plan should identify pathways for meeting long-term strategic goals; discuss the impact of external factors; define results-oriented performance measures; and provide managers and decision-makers with a better understanding of how resource allocation affects the organization's ability to achieve its mission.

Auditee Response: Agree, Implementation Date – July 1, 2017

Auditee Narrative: As the audit report noted, DFD is "data-driven in nature" and "continuously looking for ways to improve and incorporate the most advanced technologies." DFD participates in the Department of Public Safety planning sessions to create a strategic framework, which monitors value streams and performance metrics that align with the Mayor's strategic priorities. DFD also reports progress to the Mayor through its Peak Performance initiatives.

DFD will release a three-year strategic planning document that meets the requirements for accreditation through the Commission on Fire Accreditation International at the Center for Public Safety Excellence.

1.3 To systematically identify and address long-term resource allocation risks, DFD should develop a comprehensive and systematic risk management framework that will enable the department to identify, analyze, and respond to long-term risks associated

with its resource allocation objectives. Within these risk management efforts, DFD should:

- Consider National Fire Protection Association (NFPA) Community Risk Assessment guidelines to determine whether there are alternative approaches to managing the department's fire safety inspection workload, while maintaining a high level of preparedness and safety for its firefighters. Alternative approaches could include aligning fire safety inspection frequencies with building occupancy risks.

- Clearly define risk tolerances and key risk indicators (KRIs) to identify relevant metrics that provide useful insights about potential risks that may have an impact on the achievement of the organization's objectives. DFD should include key risk indicators for the coverage issues identified in District 5 as a way to monitor and communicate the potential impact of the delayed development of the Northfield fire station to stakeholders.

Auditee Response: Agree (in Part), Implementation Date – July 1, 2017

Auditee Narrative: Multiple governing bodies and industry groups influence DFD's policies for providing quality, timely, and professional emergency services in order to achieve the highest levels of preparedness and prevention. For instance, DFD looks to the National Fire Protection Association, the Insurance Services Office, the Center for Public Safety Excellence, the International Association of Fire Chiefs, and the International Association of Fire Fighters for guidance and leading practices. For instance, the 2003 Fire Facilities Master Plan identified population and economic growth as major drivers of calls for service; it also identified population and economic growth as major drives of calls for service; it also identified current and anticipated coverage gaps. Each day, DFD measures response times and turnout times in order to manage risk by suing real-time metrics for call types to maximize resource allocation.

DFD will release a three-year risk assessment and standard of coverage plan that meets the requirements for accreditation through the Commission on Fire Accreditation International at the Center for Public Safety Excellence. These documents represent how DFD will analyze and address long-term risks as conceptually recommended in this audit report. DFD only agrees in part with this recommendation because the risk management approach used may differ from the explicit language of the recommendation.

1.4 To fully understand the full costs and benefits of intergovernmental agreements (IGAs) to the City, DFD should continue to use its cost-benefit analysis template for all future agreements, including those agreements pending renewal. We also recommend that DFD periodically review its cost-benefit analysis for longstanding multi-year agreements.

Auditee Response: Agree, Implementation Date – March 1, 2017

Auditee Narrative: DFD will continue to use cost-benefit analysis for intergovernmental agreements and will establish a periodic review schedule of analyses developed for each IGA.

1.5 To understand the full costs and benefits of IGAs, DFD should include indirect costs in its cost calculations. Furthermore, DFD should include complete and comprehensive documentation of the qualitative factors that were considered, even if the costs and benefits cannot be quantified.

Auditee Response: Agree, Implementation Date – March 1, 2017

Auditee Narrative: In continuing cost-benefit analysis practices for intergovernmental agreements, DFD will include indirect costs and provide more written detail on qualitative factors—such as improved response times for Denver neighborhoods and bordering partner jurisdictions; regional efficiencies and economies of scale; firefighter safety; and force multipliers.

APPENDICES

Appendix A—City and County of Denver Fire Department Operating Divisions

As mentioned in the body of this report, the City and County of Denver Fire Department (DFD) is organized into two sections, Fire Administration and Fire Operations, that are further organized into six divisions: Operations, Fire Prevention, Technical Services, Safety and Training, and Airport Structural and Aircraft Rescue and Firefighting. Each division is led by a Division Chief who is responsible for all aspects of division operations, including managing the division budget and developing policies and procedures. Table 3 summarizes the functions of each of DFD's operating divisions.

TABLE 3. City and County of Denver Fire Department Operating Divisions

Division	Description
Operations	• Extinguishes all fires, responds to calls for medical assistance, hazardous materials incidents, automobile accidents, and other emergencies.
Fire Prevention	• Protects the public from fire or explosions caused by dangerous and hazardous materials, including responding to and providing abatement for hazardous materials. • Ensures the construction of safe buildings and structures through plan reviews, enforcement, and the issuance of occupancy permits. • Issues permits for pyrotechnic displays and fire protection systems. • Provides Fire Protection Engineers to the Department of Community Planning and Development (CPD) Development Services division.
Technical Services	• Line Shop maintains and services the entire Department's communications equipment including radios and handles installation of any electrical service needs. • Fleet Management purchases and maintains all motorized equipment, breathing apparatus, and miscellaneous tools. • Communication Center supports all communication activities, including emergency call dispatch and electronic recordkeeping. • Facility maintenance is responsible for the maintenance of all Fire Department facilities.
Administration & Investigations	• Administration provides oversight of the Department's staff scheduling functions, recruitment activities, and administers position management. • Fire Investigation identifies the origin and cause of all fires, collects evidence, interviews witnesses and suspects, and aids in criminal prosecution. • Reviews and follows up on injuries, investigation of internal matters involving discipline, grievances and serves as a liaison to the City Attorney's Office.
Safety & Training	• Provides training to all new firefighters and continuing

Division	Description
	education to all tenured fire firefighters. • Administers curriculums, video training, annual physicals, in-service training, and a safety program.
Airport Structural and Aircraft Rescue and Firefighting	• Provides emergency services at the airport and surrounding five-mile area, including evacuation, rescue, fire suppression, Emergency Medical Service (EMS) and operations level hazardous materials response training, and fulfills the Federal Aviation Administration (FAA) regulations and requirements for airport operations and safety.

Source: City and County of Denver Fire Department.

Note: DFD's Airport Structural and Aircraft Rescue and Firefighting Division is responsible for ensuring compliance with 14 CFR Part 139. These regulations require the Federal Aviation Administration to issue Airport Operating Certificates to designated airports to ensure safety in air transportation. To obtain a certificate, an airport must agree to certain operational and safety standards and provide for such resources as firefighting and rescue equipment. Requirements vary depending on the size of the airport and the types of flights available.

Appendix B—Denver Fire Department Mission and Strategic Goals

The Denver Fire Department's (DFD's) mission is to provide quality, timely, and professional emergency services to those who live in, work in, and visit the City and County of Denver; respecting each other through trust, pride, diversity, integrity, and training; and working together to achieve the highest levels of preparedness, prevention, and community involvement with a dedication to purpose. Through the City's budget process, DFD has identified a suite of strategic goals that align with the department's mission. Table 4 identifies and describes DFD's current strategic goals.

TABLE 4. Denver Fire Department Strategic Goals, Fiscal Year 2016

Strategic Goals
Mission-Level— • Improve turnout time through active management and oversight to identify possible improvements of instances when turnout times were greater than 60 seconds. • Improve response times through the use of handheld computers and global positioning system (GPS) technology to identify the exact location of an emergency. • Provide efficient and timely annual inspections to ensure that buildings are in compliance with standards that affect life safety and protection of buildings from fire. **Administration—** • Continue to monitor and manage the Fire Facilities Master Plan to address the needs of new communities built within the City's limits, to include a fire station in the Northfield and High Point neighborhoods. • Enhance development of a comprehensive total wellness and resiliency program to promote a healthy lifestyle and safe work environment, including a physical therapist/wellness coordinator to assist in rehabilitative services. • Revise directives and operational guidelines to ensure that information is current and immediately available in an electronic format. • Provide continuing education and training to meet industry standards and to ensure that firefighters continue to perform at the highest, safest, and most professional level. • Promote diversity by addressing recruiting activities and continuing to monitor progress. • Continue to refine the discipline process to ensure that discipline policies and guidelines are fair, are consistent, and promote trust and respect within the Fire Department as well as the community it serves. **Operations—** • Continuous review of the DFD response matrix to enhance fire response to all emergency incidents and affirm DFD's commitment to preserve lives, property, and a healthy environment for communities served. • Continue to pursue additional grant funding opportunities to offset the costs of required equipment, apparatus, and facilities, and increase participation in regional Homeland Security planning, training, and exercises to enhance response capabilities for firefighting, hazardous materials response, and urban search and rescue.

Source: City and County of Denver Auditor's Office analysis of the Mayor's Budget information.

Appendix C—Logistic Regression Output of the Likelihood of Success of an EMS or Fire Call Response Time Meeting National Fire Protection Association Standards

We constructed a Logit regression model to examine DFD's response times for EMS and Fire calls in 2006 and 2015. Included in the model was the date the call was received, the fire district in which the call originated, and whether or not DFD responded to the call within the standard time set by National Fire Protection Association (NFPA) Standard 1710. The model consisted of response times for 87,438 calls. The model was setup to compare the likelihood that DFD would respond within the standard time in 2006 to 2015 and between District 5 and all other districts. The output table below, Table 5, shows significant relationships between both year and district on the likelihood that DFD will respond to a call within the standard time. The *odds ratio* for each variable shows the difference in likelihood that DFD responds to a call within the standard between the variable and the comparison variable. For example, the odds ratio for District 2 is 6.17, which is interpreted as follows: the likelihood that DFD will respond to a call in District 2 within the standard goes up by a factor of 6.17 when compared to District 5.

TABLE 5. Logit regression model for fire and EMS call response times, 2006 and 2015

	Odds Ratio	Std. Err.	z	P>z	95% Confidence Interval	
Year						
2006	Comparison Year					
2015	1.215	0.0241	9.82	0.000	1.168916	1.263599
District						
District 5	Comparison District					
District 2	6.172	0.2261	49.68	0.000	5.7446	6.631788
District 3	1.987	0.0664	20.55	0.000	1.860903	2.121237
District 4	2.245	0.0720	25.22	0.000	2.108651	2.391154
District 6	2.910	0.1081	28.76	0.000	2.70587	3.129961
District 7	2.342	0.0811	24.58	0.000	2.188597	2.506722
_cons	2.189	0.0585	29.33	0.000	2.077692	2.307128
Other Information						
Observations	87,438					
Pseudo R-Squared	0.0416					

Source: City and County of Denver Auditor's Office analysis of Denver Fire Department information.

AGENCY RESPONSE

FIRE DEPARTMENT
DENVER PUBLIC SAFETY

Denver Fire Department
Office of the Chief

745 West Colfax Avenue
Denver, CO 80204
p: 720.913.3491
f: 720.913.3597
www.denvergov.org/fire

November 7, 2016

Auditor Timothy M. O'Brien, CPA
Office of the Auditor
City and County of Denver
201 West Colfax Avenue, Dept. 705
Denver, Colorado 80202

Dear Mr. O'Brien:

The Office of the Auditor has conducted an audit of the Denver Fire Department Resource Allocation Practices.

This memorandum provides a written response for each reportable condition noted in the Auditor's Report final draft that the Auditor's Office sent to us on October 28, 2016. This response complies with Section 20-276 (c) of the Denver Revised Municipal Code (D.R.M.C.).

AUDIT FINDING
DFD Needs To Strengthen Its Decision-Making Processes To Ensure That Resource Allocation Keeps Pace with Denver's Changing Dynamics

RECOMMENDATION 1.1
To ensure that staffing levels keep pace with attrition and to reduce reliance on overtime, DFD should assess its hiring strategies to narrow the gap between vacant positions and the number of personnel authorized by the department's budget.

Agree or Disagree with Recommendation	Target date to complete implementation activities (Generally expected within 60 to 90 days)	Name and phone number of specific point of contact for implementation
Agree	March 1, 2017	Todd Bower, Deputy Chief of Department 720-913-3445

Narrative for Recommendation 1.1
The Denver Fire Department (DFD) continually seeks ways to provide the highest levels of service to the communities served within the parameters of budgeted authorized strength, the Collective Bargaining Agreement, and intergovernmental agreements. In an effort to ensure hiring strategies align with its goals for service, DFD will conduct an evaluation in consultation with the Executive

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Director of Safety's Office and the Budget and Management Office that focuses on three key areas:

- Academy class scheduling;
- Fiscal implications of force majeure; and
- Firefighter injuries and staffing effects.

RECOMMENDATION 1.2

To guide and improve the department's long-term decision-making, DFD should update and formalize its draft strategic plan. In accordance with best practices for strategic planning, the formal strategic plan should identify pathways for meeting long-term strategic goals; discuss the impact of external factors; define results-oriented performance measures; and provide managers and decision-makers with a better understanding of how resource allocation affects the organization's ability to achieve its mission.

Agree or Disagree with Recommendation	Target date to complete implementation activities (Generally expected within 60 to 90 days)	Name and phone number of specific point of contact for implementation
Agree	July 1, 2017	Todd Bower, Deputy Chief of Department 720-913-3445

Narrative for Recommendation 1.2

As the audit report noted, DFD is "data-driven in nature" and "continuously looking for ways to improve and incorporate the most advanced technologies." DFD participates in the Department of Public Safety planning sessions to create a strategic framework, which monitors value streams and performance metrics that align with the Mayor's strategic priorities. DFD also reports progress to the Mayor through its Peak Performance initiatives.

DFD will release a three-year strategic planning document that meets the requirements for accreditation through the Commission on Fire Accreditation International at the Center for Public Safety Excellence.

RECOMMENDATION 1.3

To systematically identify and address long-term resource allocation risks, DFD should develop a comprehensive and systematic risk management framework that will enable the department to identify, analyze, and respond to long-term risks associated with its resource allocation objectives. Within these risk management efforts, DFD should:

- Consider National Fire Protection Association (NFPA) Community Risk Assessment guidelines to determine whether there are alternative approaches to managing the department's fire safety inspection workload, while maintaining a high level of preparedness and safety for its firefighters. Alternative approaches could include aligning fire safety inspection frequencies with building occupancy risks.
- Clearly define risk tolerances and key risk indicators (KRIs) to identify relevant metrics that provide useful insights about potential risks that may have an impact on the achievement of the organization's objectives. DFD should include key risk indicators for the coverage issues identified in District 5 as a way to monitor and communicate the potential impact of the

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delayed development of the Northfield fire station to stakeholders.		
Agree or Disagree with Recommendation	**Target date to complete implementation activities (Generally expected within 60 to 90 days)**	**Name and phone number of specific point of contact for implementation**
Agree in Part	July 1, 2017	Todd Bower, Deputy Chief of Department 720-913-3445

Narrative for Recommendation 1.3

Multiple governing bodies and industry groups influence DFD's policies for providing quality, timely, and professional emergency services in order to achieve the highest levels of preparedness and prevention. For instance, DFD looks to the National Fire Protection Association, the Insurance Services Office, the Center for Public Safety Excellence, the International Association of Fire Chiefs, and the International Association of Fire Fighters for guidance and leading practices. For instance, the 2003 Fire Facilities Master Plan identified population and economic growth as major drivers of calls for service; it also identified current and anticipated coverage gaps. Each day, DFD measures response times and turnout times in order to manage risk by using real-time metrics for call types to maximize resource allocation.

DFD will release a three-year risk assessment and standard of coverage plan that meets the requirements for accreditation through the Commission on Fire Accreditation International at the Center for Public Safety Excellence. These documents represent how DFD will analyze and address long-term risks as conceptually recommended in this audit report. DFD only agrees in part with this recommendation because the risk management approach used may differ from the explicit language of the recommendation.

RECOMMENDATION 1.4 To fully understand the full costs and benefits of intergovernmental agreements (IGAs) to the City, DFD should continue to use its cost-benefit analysis template for all future agreements, including those agreements pending renewal. We also recommend that DFD periodically review its cost-benefit analysis for longstanding multi-year agreements.		
Agree or Disagree with Recommendation	**Target date to complete implementation activities (Generally expected within 60 to 90 days)**	**Name and phone number of specific point of contact for implementation**
Agree	March 1, 2017	Todd Bower, Deputy Chief of Department 720-913-3445

Narrative for Recommendation 1.4

DFD will continue to use cost-benefit analysis for intergovernmental agreements and will establish a periodic review schedule of analyses developed for each IGA.

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RECOMMENDATION 1.5 To understand the full costs and benefits of IGAs, DFD should include indirect costs in its cost calculations. Furthermore, DFD should include complete and comprehensive documentation of the qualitative factors that were considered, even if the costs and benefits cannot be quantified.		
Agree or Disagree with Recommendation	**Target date to complete implementation activities (Generally expected within 60 to 90 days)**	**Name and phone number of specific point of contact for implementation**
Agree	March 1, 2017	Todd Bower, Deputy Chief of Department 720-913-3445

Narrative for Recommendation 1.5
In continuing cost-benefit analysis practices for intergovernmental agreements, DFD will include indirect costs and provide more written detail on qualitative factors – such as improved response times for Denver neighborhoods bordering partner jurisdictions; regional efficiencies and economies of scale; firefighter safety; and force multipliers.

Please contact Deputy Chief Todd Bower at 720-913-3445 with any questions.

Sincerely,

Eric C. Tade
Chief of Department

cc: Valerie G. Walling, CPA CMC, Deputy Auditor
LaKeshia Allen Horner, MPA, Audit Supervisor
Stephanie Y. O'Malley, Executive Director, Department of Public Safety

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