Police Response Time
Performance Audit

June 2014

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

Dennis J. Gallagher
Auditor
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Ms. Stephanie O’Malley, Executive Director of Safety  
Department of Safety  
City and County of Denver  

Dear Ms. O’Malley:

Attached is the Auditor’s Office Audit Services Division’s report of their audit of police response time. The purpose of the audit was to determine and assess response time trends. My office found that, from 2008 through 2013, average police response times have increased. Specifically, from the time a 911 call is answered to the time an officer arrives on scene, for Priority 0-2 calls, response times increased from an average of 11.4 minutes to 14.3 minutes. For Priority 3-6 calls, response times increased from an average of 20.5 minutes to 23.3 minutes. Although the law enforcement community has not established standards for response times, timely police response is important to the public. Other than through media reports, information regarding this increase in police response times was not proactively shared with the public. We believe the Department of Safety should reassess this policy decision and begin sharing police response times—from call pick up to officer arrival—with Denver’s citizens.

Our data analysis confirms that the majority of the increase in Denver’s police response times can be explained by the decreasing size of the City’s police force, which shrank by approximately 225 officers between 2008 through 2013. However, the Denver Police Department (DPD) has not determined the optimal number of police officers needed to accomplish the Department’s strategic goals, meet performance measures, and ensure that its community-oriented policing objectives are successfully implemented. Although hiring more officers will likely improve police response times, the Department’s 2014 authorized strength (of 1,431 officers) is not an accurate measure of DPD’s true resource needs. We strongly recommend that DPD determine its true resource needs and provide this information and estimated costs to key stakeholders in the City and to the citizens of Denver. My office estimates that these costs may range from approximately $5.49 million to as high as $70 million annually, depending on the Department’s strategic goals and citizen expectations. With the recent passage of Measure 2A and improvement in the City’s finances, we believe it is time to initiate an open and honest discussion regarding DPD’s strategic objectives and performance measures, as well as the expectations that Denver’s citizens have of the force that serves to protect them.

If you have any questions, please call Kip Memmott, Director of Audit Services, at 720-913-5000.

Sincerely,

Dennis J. Gallagher  
Auditor
To promote open, accountable, efficient and effective government by performing impartial reviews and other audit services that provide objective and useful information to improve decision making by management and the people.

We will monitor and report on recommendations and progress towards their implementation.

cc: Honorable Michael Hancock, Mayor
Honorable Members of City Council
Members of Audit Committee
Ms. Cary Kennedy, Deputy Mayor, Chief Financial Officer
Ms. Janice Sinden, Chief of Staff
Ms. Beth Machann, Controller
Mr. Scott Martinez, City Attorney
Ms. Janna Young, City Council Executive Staff Director
Mr. L. Michael Henry, Staff Director, Board of Ethics
AUDITOR’S REPORT

We have completed an audit of the City’s police response times, which encompasses two agencies: the Denver 911 Emergency Communications Center (Denver 911) and the Denver Police Department (DPD). The purpose of the audit was to determine and assess police response time trends from 2008 through 2013.

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.

The audit found that police response times during the audit period have increased, which can be largely explained by the decrease in Denver’s police force due to the cancelation of hiring academies and natural attrition. We also found that DPD does not use police response times as a key measure of the department’s performance. DPD’s primary performance focus is on successfully implementing community-oriented policing strategies and reducing crime. Regardless of how DPD measures its performance, response times and community policing are both heavily influenced by DPD’s available officers.

Despite the importance of accurately forecasting resource requirements, the Department has not finalized the number of officers it needs to achieve its goals. DPD’s current staffing approach, authorized strength, is based on evolving methodologies. Because of the significance and impact of accurately determining resource needs, DPD should confirm the number of sworn officers needed to accomplish its strategic objectives, meet various performance measures, and adequately support a community-oriented policing strategy by relying on an approach derived from workload- or data-based methodologies.

We extend our appreciation to the Department of Safety, DPD, Denver 911, and all personnel who assisted and cooperated with us during the audit.

Audit Services Division

Kip Memmott, MA, CGAP, CRMA
Director of Audit Services

To promote open, accountable, efficient and effective government by performing impartial reviews and other audit services that provide objective and useful information to improve decision making by management and the people.

We will monitor and report on recommendations and progress towards their implementation.
Background
The Denver 911 Emergency Communications Center (Denver 911) and the Denver Police Department (DPD) work together to ensure timely response for emergencies that require a police presence. From an internal operations standpoint, these functions are separate. However, from a citizen’s perspective, police response is one seamless period of time from when an individual places a call for emergency service until an officer arrives on scene. Denver 911 is tasked with call handling from call in to dispatching to an officer. Once dispatched to an officer, DPD is responsible for ensuring a police officer arrives in a timely manner.

Purpose
The purpose of the audit was to determine and assess police emergency response times. The audit team used data analytics to determine police response time trends and to assess causes for increases in response times. The analysis included a review of DPD’s community policing strategies.

Highlights
DPD has made the policy decision not to use police response times as a primary performance metric. DPD has focused on community-oriented policing, crime prevention, and crime reduction. Police response time became an issue of concern for citizens after increases were observed and reported through recent media coverage. We found that between 2008 and 2013, average response times from call pick-up to officer arrival for Priority 0-2 calls increased from 11.4 minutes to 14.3 minutes, and Priority 3-6 calls increased from 20.5 to 23.3 minutes. Priority 0-2 calls are defined as imminent danger or a life-threatening emergency, and Priority 3-6 calls are defined as quality of life and public need calls. Our analysis found that decreasing staffing levels is the primary cause for the increases in response times. Despite the significant impact that staffing has on response times, we found that DPD’s current staffing approach continues to evolve and DPD has not determined or been approved for the number of officers it needs to achieve its current goals. To promote openness in government and improve transparency, we recommend the City share police response times from call pick-up to officer arrival with Denver citizens, and DPD should determine the number of officers needed to accomplish its strategic objectives, meet various performance measures, and adequately support a community-oriented policing strategy by relying on a staffing approach derived from workload or data-based methodologies.
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INTRODUCTION & BACKGROUND

City Agencies Affecting Police Response Times

The Department of Safety (Safety) comprises Denver's Police, Fire, and Sheriff Departments, in addition to four administrative support functions, and is overseen by the Executive Director of Safety. Effective January 2014, the Mayor appointed a new Executive Director of Safety. Collectively, the Safety agencies provide prevention and intervention, emergency response, enforcement and investigation, and corrections services. For the purposes of this audit, which focused on police response times, the two primary Safety functions involved are the Denver 911 Emergency Communications Center and the Denver Police Department. Both functions must work together to ensure timely response for emergencies that require a police presence.

Denver 911 Emergency Communications Center

The Denver 911 Emergency Communications Center (Denver 911) is tasked with call intake handling and dispatching emergency responders. Denver 911 is staffed with more than one-hundred operators, dispatchers, and paramedics who handle both emergency and non-emergency calls. In 2013, Denver 911 received approximately 987,000 calls.1 For emergency calls originating within the geographic boundaries of Denver, 911 Call Intake Operators determine whether the call requires a police, fire, or medical response and assign a priority to the call based on the severity of the situation. High-priority calls are emergency calls for service where a person, property, or life faces imminent threat of danger, such as a robbery in progress; these calls are defined as Priority 0, 1, or 2. Low-priority calls are emergency calls for service where an officer is needed but the immediate threat of danger no longer exists, such as calls to report thefts not in progress or complaints regarding parking or loud music; these calls are defined as Priority 3, 4, 5, or 6.

Denver Police Department

In partnership with the community, the Denver Police Department (DPD) strives to keep the public safe through crime prevention and crime reduction by retaining professional employees and implementing modern practices for reaching the Department’s various strategic goals and initiatives.2 Organizationaly, DPD comprises two primary divisions: Administration and Police Operations. Administration oversees and manages the strategic direction of the Department through various units including Financial Services and the Data Analysis Unit. Police Operations oversees and manages police services, such as the six Citywide Patrol Districts, Major Crimes, and Special Operations.

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1 Not all 911 calls received require an emergency response.
In 2013, DPD’s approved budget was approximately $195 million. Including an approved authorized strength (permanent full-time uniformed officers) of 1,426, personnel costs accounted for approximately 93 percent of total expenditures.\(^3\) Since 2008, DPD has completed four recruiting academies (three of four occurred in calendar year 2013), and the Department plans to conduct two more academies in calendar year 2014.\(^4\) A basic academy consists of twenty-five to twenty-eight weeks of law enforcement training. Throughout the academy, recruits are required to complete several written and physical tests covering the course material, and recruits may be terminated from the program if they fail to pass various tests. Academy training is a stress-based program and covers a wide range of topics, which include but are not limited to:

- Patrol Procedures and Tactics
- Colorado State Statutes and Denver Revised Municipal Code review
- Computer Based Report Writing and DPD Forms
- Crime Scene Investigations and Interviewing
- Dealing with the Public and Community

DPD has divided the City into six districts, which are further divided into precincts. To prevent and reduce crime, each district reviews crime data on a daily, weekly, and monthly basis to ensure that resources are properly allocated to focus police activity on focus areas. Focus areas are identified based on an increase in specific criminal activity such as burglaries, motor vehicle theft, and assaults. Each district develops specific tactics to address the identified issues and monitors their efforts to ensure that the tactics are working effectively. Figure 1 shows DPD's 2014 district and precinct boundaries.

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\(^3\) Authorized strength does not include uniformed police officers at the Denver International Airport (DIA). There were fifty-three police officers funded through special revenue funds or funds covered by monies outside of the City’s General Fund. For budget year 2014, DPD’s (general funded) authorized strength increased to 1,431.

Although several DPD divisions must coordinate to address police response, patrol officers account for the majority of officers responding directly to emergency calls received. DPD officers respond to calls for a variety of situations. Forty-one percent of calls responded to by DPD officers are for alarms, disturbances, domestic violence, hit-and-run accidents, and burglaries/robberies/theft. The goals of the patrol districts include crime supervision, the protection of life and property, arresting violators of criminal activities, enforcing traffic laws, and recovering stolen property. District patrol may include uniformed police, specialized officers, High School Resource Officers, Neighborhood Street Crime Attack Teams, and Community Resource Officers, who work with neighborhood organizations to facilitate a positive relationship between DPD and the community.

Police Response Involves Coordinated Processes between Denver 911 and DPD

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5 Auditor analysis of the top five types of calls entered into CAD from 2008 through 2013.
Denver 911 and DPD are both integral to the process of getting a police officer to the scene after a call for emergency service is placed. From an internal operations standpoint, these functions are separate. Therefore, the speed with which Denver 911 handles initial call intake is dictated by Denver 911 operations, and the speed with which a DPD officer arrives at the scene is dictated by DPD operations. However, from the perspective of a citizen, police response is one seamless period of time: the time from when an individual places a call for emergency assistance until the officer arrives at the scene where assistance is required. Figure 2 shows the perspective of a citizen—the red line—compared to the actual behind-the-scenes processes—the blue lines.

Figure 2: Police Response Timeline and Process

Source: Generated by the Auditor’s Office

Expedient police officer response requires coordination between three functions: a 911 Call Intake Operator, a 911 Law Enforcement Dispatcher, and a Denver Police Officer. Each of these individuals plays an important role in what the public perceives as a seamless emergency response process. The following bullets describe each step of the process in greater detail.

911 Call Intake Operator—Tasked with initial triage of all calls received at Denver 911, a 911 Call Intake Operator (911-Operator) initially determines what type or types of emergency services are required: police, fire, or emergency medical response. 911-Operators are trained to address both emergency and non-emergency calls. Prior to electronically transferring the information to a 911 Law Enforcement Dispatcher (911-Dispatcher), the 911-Operator must complete at least four fields in the Computer Aided Dispatch (CAD) system—the software system used by Denver 911 to collect information and manage emergency calls. This is represented in Figure 2 as Pick-Up to Queue. Pick-Up to Queue is the time it takes a 911-Operator to transfer the information and call to a 911-Dispatcher.

6 The telephone number for the 911 non-emergency line is (720) 913-2000.
911 Law Enforcement Dispatcher—Once the necessary CAD fields are completed and it is determined that a police response is needed, the caller's information is made available to a 911-Dispatcher. In most instances, a 911-Dispatcher will not speak directly with the caller; the 911-Dispatcher’s primary responsibility is locating and assigning an available DPD officer to respond to the call. However, a 911-Operator will continue to stay on the line with the caller, gathering additional information in the CAD system—which is then made available on the officer’s mobile data terminal (MDT)—until the officer(s) arrives on scene. This is represented in Figure 2 as Queue to Assign. Queue to Assign covers the time it takes a 911-Dispatcher to locate an available officer and assign the officer(s) to the emergency call.7

Denver Police Officer—After receiving the necessary information from the 911-Dispatcher, the available DPD officer responds to the call. This is represented in Figure 2 as Assign to Arrive. Assign to Arrive is the passage of time between when the call has been assigned to an officer by a 911-Dispatcher and when the officer arrives on the scene.

No National Standards Exist for Police Response Times

Our research indicates that there are no national standards for police response times. In comparison, other safety-related responders, such as those providing fire and ambulatory services, must meet adopted national standards in their responses to emergency situations. This can be attributed in part to some fundamental differences between police operations and fire and ambulatory operations. While fire and ambulance responses are deployed from stationary areas, such as a hospital or fire house, police vehicles are rarely dispatched from a central location, making it difficult for the law enforcement community to establish national standards for police response times. Additionally, police are required to respond to a wide variety of emergency and non-emergency calls for service, which many other police departments, including DPD, categorize into priority types. Accordingly, if a police department chooses to use response times as one variable in measuring performance, response time goals must be tailored to the local community and take into consideration the department’s overall strategies, geography, demographics, and how emergency calls are prioritized.

DPD Primarily Focuses on Crime Prevention and Crime Reduction

During the audit period covering 2008 through 2013, the Department of Safety did not monitor response times from call pick-up at Denver 911 to when a police officer arrives on scene because DPD does not consider police response times highly correlated with crime reduction. This stance is based on industry-specific research performed by organizations including the Police Foundation and National Institute of Justice (NIJ). For example, the Police Foundation has indicated that police response times should not be the only performance measure for police departments, stating: “Shortening police

7 For additional analysis see Appendix D: Analysis of Queue to Assign and Arrive to Close Times.
response may have little effect on the chances of a burglar or robber being caught." Similarly, the NIJ has noted that investigations, problem solving, and careful forensic evidence collection can contribute more to arresting suspects than initial police response times. Additionally, in 2013, the NIJ indicated that focusing on specific geographic locations and times when crimes occur can decrease crime. Although DPD has not made reducing response times a strategic priority, the upward trend in Denver’s police response times has been highlighted through local media coverage on the topic. DPD has publicly acknowledged the importance of response times and identified steps that the Department has taken in recent years to improve police response times, such as Civilianization and Re-districting, which are defined in the following sub-section.

**Significant Policy Changes Were Implemented by the Chief of Police to Help Meet DPD’s Crime Prevention and Crime Reduction Goals**

A strategy used by DPD to prevent and deter crime is the concept of community-oriented policing. Community-oriented policing is used by many police departments across the nation to establish collaboration between a police department and the community to identify and solve problems. Through this approach, the community becomes an active partner with the police to enhance the safety and quality of neighborhoods. Patrol officers are critical to helping community members mobilize support and resources to solve problems within their neighborhoods. Community members are encouraged to voice their concerns, contribute advice, take action to address concerns, and become more willing to contact the police in order to prevent and deter crime.

Beginning in 2012, Denver’s Chief of Police appointed six new District Commanders and initiated several major policy changes to assist in implementing DPD’s community-oriented policing strategies. These policy changes included but were not limited to Civilianization, Team Policing, and Re-districting. Additionally, DPD requested that officers dedicate their proactive policing (discretionary) time to interacting with citizens, business owners, and community groups, as opposed to only responding to emergency calls or making arrests.

Following is an overview of the policy changes implemented by the Chief of Police.

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13 Community Oriented Police Services (COPS) defines *community policing* as the systematic use of partnerships and problem-solving techniques to proactively address the immediate conditions that give rise to public safety issues such as crime, social disorder, and fear of crime.
• **New District Commanders Selected**—In April 2012, six new command-level officers were selected and promoted to District Commander to oversee each of DPD’s six districts. Five additional Commanders were selected to oversee the Major Crimes Division, Investigative Support Division, Special Operations Division, Administrative Management Division, and the Operations Support Division.

• **Civilianization**—Initiated in August 2012, Civilianization assessed the capability of career service employees to perform certain police functions that did not require a sworn officer, thereby re-classifying positions as civilianized. Some positions that were civilianized included evidence technicians, fingerprint examiners, and statistical researchers, among others. The intent was to improve effectiveness and efficiency and dedicate sworn officers to patrol-related functions where feasible.

• **Team Policing**—Implemented in January 2013, Team Policing shifted officers from working independently to working with a consistent team of officers and a specific supervisor on a set schedule. Team Policing is designed to assign responsibility for a certain geographic area to a team of police officers who learn the neighborhood, get to know the citizens and specific issues within the community, and build a solid working relationship between patrol officers and their supervisors.

• **Re-districting**—In July 2013, Re-districting impacted the size of all DPD districts and precincts. District square mile changes ranged from a net loss of six miles to a net gain of four miles. The number of precincts Citywide decreased from seventy-eight to thirty-two. According to DPD, the intention behind Re-districting was to better align officer workload, crime patterns, geographical obstacles, and population changes, and to allow for greater coverage by available officers with the Team Policing and community-oriented policing concepts in mind.

During the course of these changes, DPD leadership has been communicating with DPD personnel regarding the potential impacts and benefits, as well as requesting employee feedback on proposed changes. Since these policies were adopted with the intention of moving DPD toward community-oriented policing, reducing crime, and improving public safety, we conducted an exploratory analysis to determine whether correlations exist between the aforementioned policies and crime reduction. Appendix B details our assessment of these policy changes, which shows preliminary correlations with crime reduction.

**DPD Has Initiated Several Other Community-Focused Policing Strategies**

In an effort to emphasize their focus on the community, DPD has implemented several technical and administrative policing strategies, which include the following:

• **Data-Driven Approaches of Crime and Traffic Safety (DDACTS) Program**—District 1 is the first district to pilot the DDACTS program. DDACTS correlates several variables and allows DPD to focus limited resources on reducing crime. DDACTS integrates location-based crime and traffic crash data to determine the most effective methods for deploying law enforcement and other resources. Drawing on the deterrent value of highly visible traffic enforcement and the knowledge
that crimes often involve motor vehicles, the goal of DDACTS is to reduce crime, crashes, and traffic violations. Using this information, the District has been able to deploy officers to certain precincts within the district in an effort to prevent or reduce crime. Because DDACTS is a data-driven methodology, it does not focus on demographic variables; instead officers are deployed based on data. Overall, this program combines predictive policing and community policing strategies.\textsuperscript{15}

- **Behavioral Analysis and Intelligence Resources (BAIR)**— BAIR Analytics is a web-based system that gives officers the ability to review crime and calls for service in an area, and provide detailed information about persons and vehicles related to each incident directly in the patrol car, which will allow them to be more effective in the community during their shifts. Without access to BAIR in the patrol car, an officer would need to access the information from the district station computers.

- **Report Writers**—DPD has hired six civilian report writers, who will be assigned to each police district. The report writers will be dispatched to non-emergency calls where there is no imminent danger. For example, if a citizen’s house was broken into and the burglar is no longer present, a report writer could be dispatched to take the incident report. Other assignments could include conducting neighborhood surveys, obtaining witness statements, and collecting evidence. Report writers will not be armed and their uniforms will differentiate them from police officers. According to DPD, report writers are a force multiplier.\textsuperscript{16} The addition of report writers is expected to free up patrol officers for higher priority calls that require a police response, increase availability of proactive policing (self-initiated) activities, and reduce response time for lower-priority calls for service.

- **Social Media Initiatives**—As highlighted in our *Citywide Social Media Usage* audit, DPD has made a concerted effort to become more involved in using several social media platforms, which it utilizes to facilitate transparency and improve communication with Denver citizens.\textsuperscript{17} These platforms include but are not limited to Facebook, YouTube, and Twitter. Recently, DPD has also begun utilizing podcasts to further its media focus and communications with the public.

**SCOPE**

The audit assessed the effectiveness and efficiency of response times as measured from:

1) Pick-Up to Queue—performed by 911-Operators and tracked by Denver 911;
2) Predictive policing, or evidence-based policing, is a philosophy that requires a police department to apply data resources to deploy officers in the most cost-effective and cost-efficient manner possible with a focus on balancing public safety, community service needs, available funds, and taxpayer expectations to help reduce and possibly prevent crime.

\textsuperscript{16} A force multiplier allows DPD to increase its effectiveness for less than the typical marginal increase in costs associated with hiring an additional officer(s) or deploying other cost-intensive resources.

Queue to Assign—performed by 911-Dispatchers and tracked by Denver 911; and 3) Assign to Arrive—performed by DPD Officers and tracked by DPD.

This assessment entailed analyzing practices implemented by both DPD and Denver 911. The audit included a review of management processes, performance measures, resource needs, administration, best practices, policies and procedures, standard operating procedures, and data systems utilized from January 2008 through March 10, 2014.

OBJECTIVE

The objective of the audit was to determine and assess DPD’s response times, trends, and causes for changes in response times. This analysis also included a review of DPD’s community-oriented policing strategies.

METHODOLOGY

The methodologies used in this audit to assess risks and to assist with developing and testing the audit objective included the following:

• Reviewing DPD’s Strategic Plan (July 15, 2013, revision) and 2013 Performance Based Staffing preliminary analysis presentation

• Measuring police response times from call pick-up to arrival using six years of DPD CAD call and vehicle data. The CAD call dataset provided by the DPD Data Analysis Unit included all Denver 911 calls from January 1, 2008, through February 12, 2014. A detailed overview of how this data was specifically analyzed is available in Appendices A, B, and C.

• Reviewing national research regarding police response times and police staffing best practices, studies, and standards from organizations including but not limited to the Commission on Accreditation for Law Enforcement (CALEA), federal Office of Community Oriented Policing Services (COPS), Police Executive Research Forum (PERF), International Association of Chiefs of Police (IACP), National Criminal Justice Reference Service (NCJRS), National Institute of Justice (NIJ), Municipal Research and Services Center of Washington (MRSC), Police Foundation, National Association of Police Organizations (NAPO), and International City/County Management Association (ICMA)

• Reviewing key DPD documents including but not limited to policies and procedures, processes, performance reports, and flowcharts
• Reviewing City websites for agencies including but not limited to DPD, the Budget and Management Office, the Department of Safety, Denver 911, and the Controller’s Office

• Reviewing financial information within the City’s Comprehensive Annual Financial Reports, City Budget Books, and the Department of Safety’s Budget Review Document

• Conducting interviews with DPD executive management, DPD District Commanders, Denver 911 executive management and staff, Department of Safety management, DPD Data Analysis Unit personnel, Denver Police Protective Association, and the Denver Independent Monitor

• Reviewing internal and external audits on relevant police department programs and police response times from around the country

• Evaluating budget and strategic planning documents to determine the expenditures, revenues, and performance measures for DPD. Budget documents included approved budgets for 2008 through 2013.

• Conducting observations of Denver 911, DPD’s roll-call process, DPD’s weekly Command Operations Review and Evaluation (CORE), and DPD patrol officers through ride-alongs

FINDING

Response Times Have Increased and the Denver Police Department Cannot Ensure Achievement of Strategic and Performance Goals

While the Denver Police Department (DPD) asserts that it conducts internal analysis on police response times, police response time became an issue of concern to Denver citizens after increases in police response times were released to the public through recent media coverage.18 Although police response time is neither a primary performance metric for DPD, nor is it tracked holistically by the City and reported to citizens, DPD has stated on several occasions that the Department is concerned with and will make efforts to reduce response times.19 Due to the documented increases in response times, the Auditor’s Office analyzed the factors that may have caused response times to increase. Our analysis found that DPD’s decreasing effective strength was the primary cause for the increases in police response times.20 From 2008 through


20 Effective strength is the number of sworn officers tasked to policing. Recruit officers in training either at the Denver Police Academy or with a Field Training Officer in a district are not counted in effective strength until they can perform the functions of a police officer without supervision.
2013, DPD’s effective strength declined by 225 officers. Despite the significant impact staffing has on police response times, DPD has not determined the number of officers it needs to meet strategic and performance goals. DPD has publicly acknowledged that the current authorized strength approach is not the proper methodology for determining officer staffing levels.21 A prior audit on Police Administration and our current assessment of police response times confirm that DPD’s approach to determine staffing needs using authorized strength continues to evolve, yet hiring to the currently approved staffing goal (of 1,431 officers) will prove insufficient to ensure that DPD achieves its various strategic and performance goals.22

Denver Police Response Times Have Increased

Figure 3 graphically presents the increase in police response times from 2008 through 2013 for calls by priority.23 Between 2008 and 2013, average police response times for Priority 0-2 calls increased from 11.4 minutes to 14.3 minutes (2.9 minutes) and average police response times for Priority 3-6 calls increased from 20.5 to 23.3 minutes (2.8 minutes).24

Figure 3: Monthly Average Response Times by Call Priority, 2008-2013

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21 Approved number of sworn officers derived from the City’s budget that DPD may employ for the year.
23 Figure 3 does not account for decreases in staffing during this period or other factors that may have contributed to increases in police response times—these variables are addressed in detail later in the Finding.
24 Priority 0-2 calls are defined as calls in which there is imminent danger or a life threatening emergency. Priority 0-2 calls are typically classified as critical, emergency, or urgent. Priority 3-6 calls are defined as quality of life and public need calls, are routine in nature, or require a police report.
Source: Auditors calculations were derived from response time data obtained from the City’s CAD system from 2008 through 2013. Note: Auditors used different methodology from the DPD Data Analysis Unit. As such, figures may be different from those reported by DPD.

The Department of Safety Should Begin Holistically Monitoring Response Times

Although both Denver 911 and DPD response times contribute to the overall experience of a citizen calling for emergency service, the Department of Safety does not conduct holistic measurement of response times. Neither Denver 911 nor DPD continuously monitor the passage of time from when a 911 call is answered by a 911 Call Intake Operator (911-Operator) to when a DPD officer arrives on scene. Instead, Denver 911 tracks 911-Operator (Pick-Up to Queue) times and 911-Dispatch (Queue to Assign) times, and DPD has periodically measured and publically released officer Assign to Arrive times. However, the two agencies have not collectively measured the combined total. Although it is important for each agency to focus on its respective segment of responsibility, the Department of Safety cannot sufficiently address the citizen’s perspective of police response times without understanding the full picture. Figure 4 represents the internal perspective of police response time contrasted against a citizen’s perspective of police response time.25

Figure 4: Three Segments of a Holistic Response Time

To address the overall performance of a holistic process, an organization must determine performance for each segment of the process. Our analysis found that, despite an overall increase in police response times, the Denver 911 segment of the process has been improving. Specifically, for Priority 0-2 calls, Pick-Up to Queue times have decreased from 1.9 minutes to 1.2 minutes, reflecting the improvement in call answering efficiency at Denver 911. The agency attributes this improvement to the implementation of and continual focus on performance metrics, including the following:

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25 See the Introduction and Background section of this report for greater detail regarding the definition of Pick-up to Queue, Queue to Assign, and Assign to Arrive.
- Requiring that 95 percent of calls be answered within 15 seconds
- Requiring that 99 percent of calls be answered within 40 seconds
- Reducing not ready status from 28 percent to 5 percent of scheduled available work hours
- Implementing a Work Force Management system, an automated staffing model that allows continual analysis of call volumes to appropriately staff call-taker stations

The increase in response time is predominately driven by the rise in time for the Queue to Assign and Assign to Arrive segments of the process. Queue to Assign times have increased by 2.5 minutes and Assign to Arrive times have increased by 0.5 minutes. Figure 5 shows the average duration of each segment of response time by year during the audit period.

**Figure 5:** Average Annual Response Time from Pick-Up to Arrive for Priority 0-2 and 3-6 Calls by Segment in Minutes, 2008-2013

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Not ready status is anytime, when scheduled, an operator is unavailable to take a call due to wrapping up a previous call, taking a bathroom or lunch break, or performing other administrative functions.
Response times have shown a related increase within each of the City’s six police districts. Figure 6 provides a breakdown of response times by district and year for Priority 0-2 calls. As depicted in the figure, Districts 3 and 4 have consistently had the longest response times; in 2013, response times for Priority 0-2 calls in Districts 3 and 4 were approximately 16 minutes. In comparison, Districts 1 and 6 have consistently had the shortest response times; in 2013, response times for Priority 0-2 calls in Districts 1 and 6 were 14 and 11 minutes, respectively.

**Figure 6: Average Annual Response Time from Pick-Up to Arrive for Priority 0-2 by District in Minutes, 2008-2013**

Figure 7 provides a geographic breakdown of average response times by district for 2013 for Priority 0-2 calls. The difference in district averages is most likely due to their varying geographic sizes. For instance, 2013 average response times for District 2 (13.36 minutes) and District 6 (11.46) were most likely the fastest because these two Districts have a smaller geographic area, which means responding officers in Districts 2 and 6 have shorter distances to travel than officers responding to calls in larger districts.27

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27 Figure 7 expresses CAD data as overlaid on 2014 DPD Districts and Precincts.
Figure 7: Average Response Time from Pick-Up to Arrive for Priority 0-2 by District in Minutes, 2013

District 1: 13.77 minutes
District 2: 13.36 minutes
District 3: 15.60 minutes
District 4: 16.32 minutes
District 5: 15.17 minutes
District 6: 11.46 minutes
Due to the documented increase in response times, the Safety Department should ensure the primary agencies tasked with overseeing the police response process, DPD and Denver 911, begin continuously monitoring and reducing response times. To assist in this effort, DPD and Denver 911 management should meet at least quarterly to update Department of Safety management on operational issues affecting emergency service, including a holistic evaluation of response times from call pick up to officer arrival. Further, to formally address increasing response times, the Executive Director of Safety should direct the Denver Police Department and the Denver 911 Emergency Communications Center to work together to analyze operational changes necessary to reduce response times and publicly present the results of the analysis with sufficient time for 2015 budget planning.

DPD Has Made the Policy Decision Not to Publicly Share Police Response Times

The Department has made the policy decision not to collect and share DPD response time information with the public voluntarily, unless formally requested through the provisions of the Colorado Criminal Justice Records Act (CCJRA). However, we found that several police departments have chosen to collect and share this data in various formats with the public. A number of jurisdictions—including the New York City Police Department, the City of San Diego Police Department, the City of Seattle Police Department, the Metropolitan Washington Police Department, the City of Portland Police Bureau, and the City of Dallas Police Department—distribute their police response time trends through a variety of media, such as annual reports, performance reports, and budget books. For example, the City of Seattle’s Police Department allows citizens to view CAD data directly on its website and the City of Dallas Police Department publishes the status of 911 calls to its website in real-time.

Several police departments that do not share police response times cite technology limitations as their primary reason. Conversely, through its Data Analysis Unit, DPD has the technical ability and internal data analysts to monitor and share police response times.

28 The Colorado Criminal Justice Records Act (C.R.S. §24-72-301) is similar to the Colorado Open Records Act (C.R.S. § 24-72-201). The main difference is that public records maintained or kept by an criminal justice agency is governed by the Criminal Justice Records Act while all other records maintained or kept by other government financed entities are governed by the Open Records Act.

addition, we observed several variations of presenting and sharing police response times that DPD could consider. This might include providing the average, mean, or a percentile basis of how long it takes DPD to respond to 70, 80, and 90 percent of calls. For example, the Department of Safety’s Denver Fire and Emergency Medical Services Departments already assess response times on an on-going basis using a percentile measurement. These agencies—and the practices used to review response times—may be leveraged as a low-cost, internal resource for DPD to follow.

Although some organizations in the law enforcement community recommend that police response time not be used as the highest or only performance measure of a police department, many of these same entities recognize that response time is the performance measure that is most visible to the public. In 1976, the U.S. Department of Justice released a highly cited groundbreaking study on citizen satisfaction with police response time. The report emphasized the importance of establishing realistic citizen expectations, stating:

> The comparison between citizen expectation and actual experience affects citizen’s satisfaction with police service. If response times are no longer than expected, they can be quite long without reducing satisfaction. If they are longer than expected, satisfaction may be reduced even though actual times might be fairly short....Police can use some of their resources to attempt to create more realistic citizen expectations for situations in which short response times cannot improve resolution of the particular matters at hand.\(^\text{30}\)

Rather than allowing the media and CCJRA requests to inform citizens about DPD’s response time trends, continually collecting, assessing, and reporting response times would allow DPD to provide accurate information. This type of proactive communication approach might include providing important context surrounding the reality of police response times, such as explaining geographic restrictions, resource limitations, and the prioritization of strategic goals and priority types that impact DPD’s response times. To promote openness in government, build trust through increased transparency, and provide information that is of interest and educational to Denver’s citizens, the Executive Director of Safety should request that DPD and Denver 911 begin working together to holistically measure and share at least annually response times with the public from the time a 911 call is picked up by a 911-Operator until an officer arrives on scene. 2014 response time data should be released by March 31, 2015, and by the end of the first quarter each year thereafter.

**Several Factors Contributed to the Increase in Police Response Times**

Overall, our analysis confirms that police response times have increased since 2008. Based on interviews with DPD and our review of studies on police response times, two specific variables were generally suggested as the primary contributors for the increase:

DPD staffing trends and major policy changes. We conducted a correlation and regression analysis that took into account the cumulative impact these specific contributing factors might have had on police response times. Our analyses found that decreasing effective strength is the most likely cause—accounting for approximately 69 percent of variance in response times in our model (Table 1)—and DPD policy initiatives are correlated with both increases and decreases in police response times.

**Decreasing Effective Strength Is the Most Likely Cause for Increased Police Response Times**

DPD uses three staffing measurements to account for its number of sworn officers. These measures identify the number of officers budgeted for the year, the number of officers on DPD’s payroll, and the number of officers actually deployed in the field. These staffing measurements are generally defined in the following manner:

- **Authorized Strength**—Approved number of sworn officers derived from the City’s budget that DPD may employ for the year.
- **Effective Strength**—Includes all sworn officers working in assigned positions regardless of rank or appointment status.
- **Patrol Strength**—Number of sworn officers who are assigned to the DPD Patrol Division and are predominately tasked with using police vehicles to conduct patrol-related policing activities.

DPD also uses the term *actual strength*, which is the total number of sworn officers on DPD payroll and may be above or below authorized strength. Not limited to DPD, the City faced budgetary constraints during the audit period due to the recession and a recovering tax base. This resulted in the suspension of DPD hiring academies until the fourth quarter of fiscal year 2013. Natural attrition from retirements, dismissals, and voluntary separations further reduced effective strength during this period. As shown in Figure 8, patrol strength has remained relatively steady; however, effective strength has fallen. Specifically, in January 2008, effective strength was 1,550 while in December 2013 it was as low as 1,332. In May 2011, effective strength fell below DPD’s authorized strength for the year of 1,445.

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31 Denver citizen’s voter approval of 2013 Tabor & Ballot Initiative 2A (Measure 2A) allowed DPD to begin planning for two recruit classes in 2013 and 2014, respectively.
Figure 8: DPD Authorized, Effective, and Patrol Strength, 2008-2013

Source: Auditors calculations for patrol strength were derived from data using the City’s CAD system from 2008 through 2013. Effective and authorized strength data was provided by DPD. Note: Auditors used different methodology from the DPD Data Analysis Unit. As such, figures may be different from those reported by DPD.

Since the Auditor’s Office found that response times and staffing are strongly correlated, we looked at response times for Priority 0-2 calls at different levels of effective strength. As shown in Figure 9, when DPD had a higher effective strength, response times were quicker, and when DPD had a lower effective strength, response times were slower. For example, Figure 9 shows that with an effective strength of approximately 1,425 or greater, average police response times would be about twelve minutes. In comparison, with an effective strength of approximately 1,400 or less, police response times would be twelve minutes or longer.
DPD Policy Initiatives Are Correlated with Both Increases and Decreases in Police Response Times

We ran four regression models to determine the impact that DPD policy initiatives—Civilianization, Team Policing, and Re-districting—may have had on police response times individually and cumulatively. Each policy decision we examined is described in more detail below.  

- **Civilianization**—Initiated in August 2012, Civilianization assessed the capability of career service employees to perform certain police functions that did not require a sworn officer.
- **Team Policing**—Implemented in January 2013, Team Policing shifted officers from working independently to working with a consistent and specific team of officers and a supervisor on a set schedule.
- **Re-districting**—Implemented in July 2013, Re-districting changed the size of all DPD districts and precincts to better align officer workload, crime patterns, geographical obstacles, and population changes. Re-districting also allows for greater area coverage of available officers with the Team Policing and community-oriented policing strategies in mind.

Source: Auditors calculations for patrol strength and response times were derived from data using the City’s CAD system from 2008 through 2013. Effective and authorized strength data was provided by DPD. Note: Auditors used different methodology from the DPD Data Analysis Unit. As such, figures may be different from those reported by DPD.
A regression analysis is a statistical process for estimating the impact that one variable has on another. To estimate the impact that different variables may have on police response times, we used regression analyses to estimate how much faster DPD might be able to respond to high priority (Priority 0-2) calls if more officers were available, and the impact that various policy decisions may have had on response times. The results of our analyses are presented in Table 1. Appendix C provides additional descriptions of the variables used in our regression analysis.

**Table 1: Regression Models – Estimated Impacts of Variables on Response Times in Minutes**

<table>
<thead>
<tr>
<th>Avg. Response Time of Priority 0, 1, and 2 Calls</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective Strength Per 10,000 People</td>
<td>-0.58*</td>
<td>-0.53*</td>
<td>-0.19*</td>
<td>-0.19*</td>
</tr>
<tr>
<td>Snow Fall (in inches)</td>
<td>-0.01</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Avg. Backfill, Over Time, and Off-Duty Worked</td>
<td>-0.00</td>
<td>0.01</td>
<td>0.04*</td>
<td>0.04*</td>
</tr>
<tr>
<td>Crime Per 10,000 Residents (Property/Persons)</td>
<td>-0.01</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
</tr>
<tr>
<td>Avg. Calls Responded To Per Officer</td>
<td>0.69*</td>
<td>0.14</td>
<td>0.14</td>
<td>0.14</td>
</tr>
<tr>
<td>Civilianization</td>
<td>-1.11*</td>
<td>1.11*</td>
<td>1.11*</td>
<td>1.11*</td>
</tr>
<tr>
<td>Team Concept &amp; 12 Hour Shift</td>
<td>-0.26</td>
<td>-0.63*</td>
<td>-2.00*</td>
<td>-2.00*</td>
</tr>
<tr>
<td>Re-districting</td>
<td>25.84*</td>
<td>21.49*</td>
<td>13.36*</td>
<td>13.36*</td>
</tr>
<tr>
<td>Observations</td>
<td>73</td>
<td>73</td>
<td>73</td>
<td>73</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.69</td>
<td>0.75</td>
<td>0.86</td>
<td>0.86</td>
</tr>
</tbody>
</table>

Source: Auditors’ calculations were derived using CAD data from 2008 through 2013. Note: Asterisk (*) illustrates a p-value <=0.05 which indicates statistical significance. Dash (-) indicates specific variable was not accounted for in the model. Note: Author used different methodology from the DPD Data Analysis Unit. As such, figures may be different from those reported by DPD.

- **Model 1**—As shown in Table 1, our first model, which only takes into account effective strength per 10,000 people and snow fall, demonstrates that for every additional officer added to the police force per 10,000 people, police response times will decrease by approximately 0.58 minutes (or about 35 seconds). The model also suggests that for every inch of snow the City receives, average response times will decrease by approximately 0.01 minutes (or about 0.6 seconds). As such, for winter months, when the City receives an average of approximately four inches of snow per month, the first model predicts that response times will slow by approximately 2.4 seconds. However, the amount of snow the City receives does not have a statistically significant impact on average police response times.
- **Model 2**—Model 2 shows that officer-fatigue factors, such as the number of hours worked outside of normal shifts, and the number of crimes perpetrated against persons and property do not have an impact on response times. However, we discuss the specific impacts fatigue may have on individual officers later in this Finding.

Model 2 does suggest that as the number of calls an officer must respond to increases, so do overall response times. For instance, the model suggests that as the average number of calls an officer must respond to increases, average response times will increase by approximately 0.69 minutes (or 41.4 seconds). As such, if call volume averages three calls per officer per month in 2013, but spikes to five calls per officer per month in 2014, the model predicts that response times will increase by 1.4 minutes.

- **Models 3 and 4**—Model 3 accounts for each policy initiative implemented by the Chief of Police independently from one another, while Model 4 takes into account the cumulative impact of all three policies. Based on these variables, Model 3 shows that Civilianization is the main policy initiative statistically correlated with an increase in police response times. In Model 4, we see that Civilianization is correlated with an increase in response times of approximately one minute. Combined, the three policy initiatives added two minutes to police response times. Although the Chief of Police’s initiatives may have impacted response times, they were not implemented with the intention of addressing response times as a strategic objective.

Figure 10 graphically presents the increase in police response times from 2008 through 2013 and overlays the three policy initiatives. For chronological purposes, the appointment of the Chief of Police and new Commanders in each of the six districts are also overlaid on the Figure. A cursory analysis of Figure 10—not considering the decrease in staffing that occurred during this period—suggests that the Chief of Police’s policy initiatives are correlated with both increases and decreases in police response times, depending on the strategic initiative. For example, Figure 10 can be interpreted in the following manner: the implementation of Civilianization and Team Policing resulted in minor increases in response times for Priority 0-2 calls; however, a plateau followed by a dip in police response times appears to occur with the implementation of Re-districting. Overall, our analysis found that a decrease in effective strength is the most heavily correlated cause for increases in police response times.
**Figure 10:** 2008 through 2013 Priority 0-2 and Priority 3-6 Monthly Average Response Times

![Graph showing monthly average response times for Priority 0-2 and Priority 3-6 from 2008 to 2013.](image)

Source: Auditors calculations were derived from response time data obtained from the City’s CAD system from 2008 through 2013. Note: Auditors used different methodology from the DPD Data Analysis Unit. As such, figures may be different from those reported by DPD.

**Other Factors Contributing to Increases in Response Times**

In addition to the primary causes addressed above, we assessed other factors that may have influenced response times since 2008. These included 911-Operator and 911-Dispatch staffing levels at Denver 911 and incomplete data due to officers not consistently recording their arrival time with Denver 911.

- **Although Denver 911 Call Intake Improved by One Minute, Dispatching to Police Worsened by Four Minutes**—While *Pick-up to Queue* times improved, *Queue to Dispatch* times worsened by four minutes due to the decrease in the number of available police officers. Because Denver 911 has a fixed number of Police Dispatch stations—where 911-Dispatchers sit to perform dispatch work—an increase in the number of Police Dispatch stations would not have improved response times, unless more officers were available to receive dispatch calls.³³

- **DPD Officers Often Fail to Notify Dispatch When They Arrive on Scene**—Between 2008 and 2013, we identified 530,000 CAD incidents (26 percent of all dispatched calls) where officers failed to record their on-scene arrival time (Code 6) either by radioing into dispatch or clicking the Code 6 button on the Mobile Dispatch Terminal (MDT) located in patrol vehicles.³⁴ DPD policy requires officers to notify

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³³ There is one 911-Dispatch station for each DPD district and there are two to three others, which serve as floaters to cover lunch breaks and other administrative duties.

³⁴ The CAD call dataset provided by DPD Data Analysis Unit included all 911 calls from January 1, 2008, through February 12, 2014. Our audit period covered January 1, 2008 through December 31, 2013. The data did not include any proactive calls, *Be On The Look Out* Calls, calls without an officer arrival time, or calls that took more than ten hours to respond to as measured by...
dispatch that they have arrived on scene. Of the 530,000 incidents that did not include a police arrival time, the majority of the incidents were Priority 3 calls, most occurred in 2011, and the calls were predominately for Districts 1 and 3.

In addition to ensuring the safety of officers and the public, Code 6 data is needed to assess police response times, since it designates when an officer arrived on scene. Without arrival information, response time cannot be calculated for these entries. Further, a high percentage of missing arrival times can skew response time analysis negatively or positively.\(^{35}\) DPD should update officers on Code 6 policy and the importance of recording their on-scene arrival time using the MDT or notifying 911-Dispatch. In addition to providing more reliable response time data for analysis in the CAD system, enforcing this policy will provide support for police officers and may improve public safety.

Despite the many factors that could have impacted response times, as noted above, our analysis strongly suggests that the primary influence has been the reduction in DPD’s effective strength since 2008. Response times will likely decrease as new officers join the force from 2013 hiring classes, due to the high correlation between increases in officers and response time improvement. However, the Department has yet to finalize the number of officers it needs to meet its strategic objectives and performance goals.

**Without Determining Actual Resource Needs DPD Cannot Ensure that the Department Will Meet Its Strategic Goals**

The Auditor’s Office determined that an improved approach for assessing DPD’s resource needs is required to ensure that the Department meets its strategic goals. DPD has used a variety of approaches in the past, but the updated staffing methodology should rely on a workload- or data-based approach that takes into account actual workload demand and the Department’s community-oriented focus when determining staffing needs. Decreasing staffing levels at DPD have led to increases in overtime and backfill hours, and studies external to DPD have shown that officers who work long hours may have increased levels of stress and fatigue. While it is essential that the Department determine the optimal number of officers needed to achieve strategic goals, meet current performance measures, limit overtime and backfill, and minimize officer fatigue, DPD should modify its performance measures and strategic goals to more accurately reflect staffing or budgetary realities.

**DPD Has Used Evolving Staffing Methodologies to Determine Resource Needs**

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\(^{35}\) An independent assessment of this missing data found that the average call pick up to dispatch queue time for the missing incidents did not vary from incidents used in our overall analysis. This indicates that entries without Code 6 information are not extraordinary events, but rather are likely a procedural issue.
Our research identified several available approaches that a police department can use to determine the appropriate number of officers needed on a police force. Following is an overview of methods frequently used by other police departments.36

- **Per Capita Approach**—Determines an optimum number of officers per person and then calculates the number of officers needed for the population of a jurisdiction. This approach does not account for the intensity of workload, variations in crime types between communities, seasonal fluctuations, or variations in policing style, service delivery, response to crime, or how police officers spend their time.

- **Minimum Staffing Approach**—Requires police supervisors and command staff to estimate a sufficient number of patrol officers that must be deployed at any one time to maintain officer safety and provide an adequate level of protection to the public. There are no objective standards for setting the minimum staffing level, yet many agencies may use this approach to determine the minimum staff level necessary using perceived need without relying on any factual basis in workload.

- **Authorized Level Approach**—Uses budget allocation to specify the number of officers. Although the authorized level may be determined through a formal staffing assessment, it is often driven by available resources and may be influenced by political decision-making. Authorized level does not typically reflect any identifiable criteria such as demand for service or community expectations, but may instead simply reflect budget negotiations based mainly on previous annual budgets as a baseline.

- **Workload-Based Approach**—Derives staffing needs based on demand for service. What differentiates this approach from the others is the requirement to systematically analyze and determine staffing needs based upon actual workload demand while accounting for service-style preferences and strategic initiatives such as community-oriented policing.

We found that DPD has blended several of the approaches outlined above over the years to determine authorized strength.37 Table 2 shows that this blended approach has led to fluctuations in authorized strength ranging from 1,426 to 1,446 officers. These fluctuations do not align with fluctuations in population, changes in policing strategy, or other variables. Rather, they are the result of using inconsistent methodology.

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**Table 2**: DPD Authorized Strength, 2008-2014

<table>
<thead>
<tr>
<th>Year</th>
<th>Authorized Strength</th>
<th>Effective Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>1,446</td>
<td>1,540</td>
</tr>
<tr>
<td>2009</td>
<td>1,446</td>
<td>1,526</td>
</tr>
<tr>
<td>2010</td>
<td>1,446</td>
<td>1,485</td>
</tr>
<tr>
<td>2011</td>
<td>1,445</td>
<td>1,439</td>
</tr>
<tr>
<td>2012</td>
<td>1,445</td>
<td>1,404</td>
</tr>
<tr>
<td>2013</td>
<td>1,426</td>
<td>1,354</td>
</tr>
<tr>
<td>2014</td>
<td>1,431</td>
<td>1,326</td>
</tr>
</tbody>
</table>

**Source**: Authorized Strength numbers were derived from the Budget and Management Office. Effective Strength numbers were derived from figures provided by DPD.

Auditors sought to calculate the number of additional officers that DPD would need to improve response times. Using the Per Capita Approach, which DPD has used in the past, with a 2014 Denver population estimate of 650,000 residents and an effective strength of 1,325 at year-end 2013, we determined that DPD would need to add approximately 451 officers to its effective strength to improve response times by approximately four minutes. Specifically, for Priority 0-2 calls, we estimate this would reduce average response times from the current average of approximately fourteen minutes to approximately ten minutes and would cost the City an estimated $27.5 million in annual salaries.\(^{38,39}\)

We estimate that 451 additional officers are needed because DPD’s effective strength has decreased by 225 officers since 2008 and since Denver’s population has grown by more than 50,000 residents during the same time period.\(^{40}\) Table 3 summarizes the Auditor’s Office’s estimates of how many officers would be needed to decrease average police response times for Priority 0-2 calls to twelve, ten, or eight minutes and the costs associated with each reduction.

**Table 3**: Officers Needed and Annual Costs Associated with Meeting Response Times

<table>
<thead>
<tr>
<th>Avg. Response Time for Priority 0-2 Calls</th>
<th>No. of Additional Officers Needed</th>
<th>Estimated Annual Base Salary Costs</th>
<th>Estimated Annual Average Salary Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 minutes</td>
<td>0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>12 minutes</td>
<td>225</td>
<td>$13.7 million</td>
<td>$23.3 million</td>
</tr>
<tr>
<td>10 minutes</td>
<td>451</td>
<td>$27.5 million</td>
<td>$46.8 million</td>
</tr>
<tr>
<td>8 minutes</td>
<td>675</td>
<td>$41.2 million</td>
<td>$70.0 million</td>
</tr>
</tbody>
</table>

**Source**: Auditors’ calculations. Note: Assumptions based on Denver population of 650,000 residents, effective strength at 1,325, and annual base salary of $46,913 per officer. DPD typically uses a

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\(^{39}\) Estimate based on a $46,913 starting officer salary plus applicable fringe benefits of approximately 30 percent ($14,074) = $60,987 x 451 officers = $27.5 million. Additionally, estimated annual expenditures will grow as officers’ years of service increase.

\(^{40}\) Population growth estimates are based on figures calculated by auditors using data from the City’s Comprehensive Annual Financial Report (CAFR).
starting officer’s base salary scale to determine the average salary with an estimated five to twenty-five year tenure. The "full cost" for an officer includes salary plus applicable fringe benefits, such as health care and retirement, of approximately 30 percent of salary ($47,000 + $14,074 = $60,987). Using the Department’s 2014 pay scale, the average salary was $79,826 ($79,826 + $23,948 = $103,774).

This exercise demonstrates the substantial expense associated with using the Per Capita Approach to adjust a police departments’ number of sworn officers. In past years, DPD’s approach to determining authorized strength, which incorporated the Per Capita Approach, did not consider other important variables for assessing resource needs such as demand for service and community expectations. In response to a prior audit, Police Administration, DPD recognized that it needs an updated staffing methodology.41 Additionally, several law enforcement and best practice organizations including the International Association of Chiefs of Police (IACP), Commission on Accreditation for Law Enforcement (CALEA), Police Foundation, and International City/County Management Association (ICMA), have recently recognized that staffing approaches strictly based on population assessments and budgetary limitations are ineffective.42

Hiring more officers will likely reduce police response times, especially if these officers are dedicated to patrol activities, but the Department’s 2014 authorized strength of 1,431 is not the most accurate representation of needed officers. Further, it will be 2015 before DPD meets or exceeds authorized strength based on the time it will take for new classes of officers to graduate from current academies. Since 2008, DPD has conducted several tentative staffing assessments, but these assessments never received final approval from DPD or the City’s Budget and Management Office. These assessments have led to estimates ranging from the current authorized strength of 1,431 to 1,975—a difference of more than 500 uniformed officers or an estimated $30.5 million in annual salaries.43 Although the law enforcement community has not established a standardized approach to determining optimal staffing, consensus does exist between the Police Foundation and ICMA that a Workload-Based Approach is a better staffing methodology for a community-oriented police department.

Accordingly, DPD should finalize the number of sworn officers needed to accomplish the Department’s strategic objectives, meet its various performance measures, and adequately support a community-oriented policing strategy by relying on an approach derived from workload- or data-based methodologies and provide this information to stakeholders including the Executive Director of Safety, Budget and Management Office, City Council, and the citizens of Denver. In addition, DPD and Denver 911 should work together to determine what, if any, impact an increase in authorized strength might have on the 911 dispatching process or the total number of 911 Dispatchers needed.

43 Estimate based on a $46,913 starting officer salary plus applicable fringe benefits of approximately 30 percent x 500 officers = $30.5 million. Additionally, estimated annual expenditures will grow as officers’ years of service increase.
DPD Will Need More than Authorized Strength to Reach its Current Performance Goals

DPD has established various performance goals that complement the Department’s community-oriented policing strategy. For instance, DPD recommends that patrol officers spend 35 percent of their time responding to dispatched calls and 35 percent of their time conducting proactive activities; the remaining 30 percent of an officer’s time is allowed for administrative items, including but not limited to car maintenance, radio repairs, supervisory meetings, Internal Affairs Bureau mandatory appointments, district or shooting range training, mandatory quarterly qualification at the shooting range, daily review of emails, subpoenas, returning attorney and citizen phone calls, testifying in court, and preparing for court.44

Proactive policing activities—referred to within DPD as Class 2 stops—are intended to decrease crime by fostering a relationship with the community and improving police presence in key areas of the City. For a community-focused police department, research supports DPD’s performance goal of 35 percent of time dedicated to proactive policing activities.45 However, failing to properly allocate or estimate officers needed to achieve this performance goal may lead to oversaturation—defined as officers dedicating more than 35 percent of their time responding only to Denver 911 calls.

Figure 11 shows that the percent of time DPD officers have spent responding to 911 calls has increased. For example, since 2011, DPD has been unable to reach its goal of officers dedicating 35 percent of their time conducting proactive policing activities. By December 2013, patrol officers spent approximately 44 percent of their time responding to 911 calls, and only 26 percent of their time was dedicated to conducting proactive policing. This indicates that patrol officers spent the majority of their time reacting to 911 calls for service as opposed to performing the proactive patrol activities that a community-oriented policing strategy requires.

44 DPD has established a separate case clearance (caseload versus clearance) performance goal for its investigation division to assist in crime prevention and crime reduction efforts.
Figure 11: Percent of Officer Time Spent on Proactive Work and 911 Calls, 2008-2013

Source: Calculations for time were derived from data using the City’s CAD system from 2008 through 2013. Note: Auditors used different methodology from the DPD Data Analysis Unit. As such, figures may be different from those reported by DPD. Auditors calculated percentages limiting data to the following: officers with patrol designated radio signals; hours counted if officer worked more than six days; officer counted if worked more than eleven days; formula for 911 Dispatch Time Percentage = Total Amount of Time Spent If Officer Worked More Than Six Days/Total Officers Responding to 911 Calls if Officer Worked More Than Eleven Days (Used 2,080 hour work year).

DPD cannot achieve its performance goal of 35 percent of time dedicated to proactive policing activities as the Department is currently organized, unless staffing allocations are changed or more officers are hired and specifically dedicated to proactive policing activities. DPD’s Data Analysis Unit estimates that for every ten officers added to the patrol force, the percent of time officers spend on 911 calls will decrease approximately one percent. Based on this analysis, DPD would need roughly ninety additional patrol officers to meet its goal of having officers dedicate no more than 35 percent of their time on 911 calls.46 In salary alone, hiring ninety patrol officers at the base-level rate would cost the City a minimum of $5.49 million annually.47 Additionally, while hiring ninety officers will assist DPD in meeting its performance goal of

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46 DPD estimates natural attrition (retirements, injuries, leaves of absence, or permanent departures) account for an average of 40 full-time equivalent (FTE) vacancies each year. Our estimate of ninety officers refers to the total number of officers hired less natural attrition.

47 Estimate based on a $46,913 starting officer salary plus applicable fringe benefits of approximately 30 percent of salary ($14,074) = $60,987 x 90 officers = $5.49 million.
35 percent proactive policing, we estimate ninety additional officers will only reduce response times for Priority 0-2 from the current average of 14 minutes to 13.21 minutes.\textsuperscript{48} We also estimate that hiring ninety officers will reduce monthly crime counts by approximately 270 counts each month. For further analysis on the correlation between effective strength and crime see Appendix B. However, if budget limitations or other factors prevent DPD from hiring the amount of officers required to meet the Department’s current performance measures and strategic goals, DPD should modify its performance measures and strategic goals to more accurately reflect staffing realities.

**Insufficient Staffing May Lead to Officer Fatigue and Other Consequences**

Some police departments have tried to minimize officer fatigue by discouraging mandatory overtime, limiting off-duty hours, and creating schedules and policies that minimize overtime and shift rotation. In a prior audit of DPD, the Auditor’s Office commended the Department’s efforts to establish daily and weekly scheduling limits that align with law enforcement best practices.\textsuperscript{49} DPD policy states that officers should not work more than sixteen hours in a twenty-four-hour period or sixty-four hours in one week, without prior approval.\textsuperscript{50} Our current audit did not identify any violations of this policy. Further, with the exception of mandatory overtime (when required), the Department recognizes that hours worked outside of an officer’s normal shift are voluntary, meaning an officer can volunteer to work extended hours at his or her discretion. We determined that the number of hours officers work in addition to their required hours has been increasing since 2008.

We looked at the total number of hours being worked by DPD officers because of research surrounding the potential negative effects on health, safety, and productivity of people who work long shifts. There is evidence that working a large number of consecutive hours, combined with sleep disruption, reduces worker productivity and performance.\textsuperscript{51} Additionally, a study conducted by the National Institute of Justice (NIJ) suggested that law enforcement officers commonly work extended hours through overtime, frequent shift rotations, and working a high number of off-duty/secondary employment hours.\textsuperscript{52} The study found that fatigue may impair an officer’s mental and physical ability, create a cycle of fatigue, limit job performance, and damage officers’ health. NIJ indicated that the effects of fatigue may lead to more sick leave, inappropriate uses of force, more vehicle accidents, and increased difficulty interacting with the community. More importantly, despite the impact that fatigue may have on officers, many will continue to work double shifts and second jobs if allowed by their

\begin{footnotesize}
\begin{itemize}
\item \textsuperscript{48} Auditor assumptions: 1) Denver Population of 650,000; and an effective strength of 1,325. Based on these assumptions, adding ninety officers would reduce response times from the current estimated average of 14.01 minutes to 13.21 minutes for Priority 0-2 call types.
\item \textsuperscript{50} Denver Police Department Operations Manual – 114.00 Employment Outside of the Department (3)(h).
\end{itemize}
\end{footnotesize}
employers. Figure 12 shows the average number of hours DPD officers worked outside of their required shift schedules each month, which we defined as the sum of overtime, backfill, and off-duty hours.53

**Figure 12:** Average Hours Worked Outside of Normal Officer Shifts, 2008-2013

![Graph showing average hours worked outside of normal officer shifts from 2008 to 2013.](image)

**Source:** Calculations were derived from data using the DPD Telestaff system from 2008 through 2013. Note: 1) The hourly spike observed in 2008 is attributed to the 2008 Democratic National Convention. 2) Auditors used different methodology from the DPD Data Analysis Unit. As such, figures may be different from those reported by DPD.

Table 4 highlights the total amount of overtime, backfill, and off-duty hours worked from 2008 through 2013 and associated payments made by DPD during this period. There is a notable spike in backfill between 2010 and 2011 and again between 2012 and 2013. Further, overtime and off-duty appear to be inversely related—as officers’ overtime hours worked decrease, off-duty hours worked increase.

---

53 Backfill is defined as a shift or partial shift that DPD management must fill with overtime. DPD has a separate budget for backfill hours. Backfill is always overtime, but overtime is not always backfill. Backfill has been used by DPD management to fill shifts to ensure minimum staffing levels are reached during shortfalls.
Table 4: Total Overtime, Backfill, and Off-duty Hours Worked, 2008-2013

<table>
<thead>
<tr>
<th>Year</th>
<th>Overtime Hours</th>
<th>Overtime Paid</th>
<th>Backfill Hours</th>
<th>Backfill Paid</th>
<th>Off-Duty Hours*</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>282,603</td>
<td>$15,096,668</td>
<td>1,015</td>
<td>$50,357</td>
<td>3,324</td>
</tr>
<tr>
<td>2009</td>
<td>145,840</td>
<td>$7,794,955</td>
<td>309</td>
<td>$15,971</td>
<td>249,244</td>
</tr>
<tr>
<td>2010</td>
<td>125,962</td>
<td>$6,792,150</td>
<td>3,461</td>
<td>$178,746</td>
<td>281,773</td>
</tr>
<tr>
<td>2011</td>
<td>127,499</td>
<td>$6,921,949</td>
<td>22,813</td>
<td>$1,262,236</td>
<td>288,454</td>
</tr>
<tr>
<td>2012</td>
<td>169,121</td>
<td>$9,945,605</td>
<td>21,220</td>
<td>$1,265,236</td>
<td>272,655</td>
</tr>
<tr>
<td>2013</td>
<td>148,396</td>
<td>$8,675,618</td>
<td>36,212</td>
<td>$2,106,882</td>
<td>293,624</td>
</tr>
<tr>
<td>Total</td>
<td>999,422</td>
<td>$55,226,945</td>
<td>85,030</td>
<td>$4,879,460</td>
<td>1,389,074</td>
</tr>
</tbody>
</table>

Source: Calculations were derived from data using the DPD Telestaff system from 2008 through 2013. Note: Auditors used different methodology from the DPD Data Analysis Unit. As such, figures may be different from those reported by DPD. Asterisk (*): Off-duty hours are not paid by the City. TeleStaff was implemented in 2008.

There are certain events or emergency situations that cannot be predicted or avoided that require officers to work overtime or backfill shifts. Based on our analysis, as additional recruits are hired the need for individual officers to work additional hours should decrease. However, given the potential risks associated with working extended hours, DPD should enhance monitoring efforts to ensure that officers are not working extensive overtime, backfill, and off-duty hours to avoid potential officer stress, fatigue, and other safety concerns as new recruits are hired.

DPD Policy Changes and Limited Resources Have Led to Longer Shifts in at Least One District

Community-oriented policing programs characteristically place greater demand on officers and require additional assignments and administrative practices. Studies suggest that community-oriented policing programs, similar to the one implemented by DPD, characteristically place greater demand on officers and require additional assignments and administrative practices. This trend has already manifested in DPD’s operations. In 2013, due to staffing limitations specific to District 6—which geographically encompasses the lower downtown area—the district moved from ten-hour shifts to twelve-hour shifts. We reviewed additional studies on shift lengths in the law enforcement community but found limited consensus on ideal shift length.

A 2013 ICMA survey of police departments from around the country noted wide variation in shift lengths offered to officers. Ten-hour shifts were generally reported to be the most

popular and well-liked by officers due to the work-life balance they provide.\textsuperscript{55} Officers working eight-hour shifts reported the worst quality of work-life balance.\textsuperscript{56} Furthermore, eight-hour shifts were shown to incur more overtime for the departments studied.\textsuperscript{57}

Two studies that focused specifically on shift lengths conducted by PERF and the Police Foundation found some risks associated with twelve-hour shifts that did not exist with ten- or eight-hour shifts. There is consensus that the longer the schedule worked by officers the less alert they appear, and police officers reported feeling significant levels of fatigue if they routinely worked more consecutive hours.\textsuperscript{58,59} This includes total hours worked on an officers’ required shift-schedule, backfill, and off-duty/secondary employment.

Because DPD based the decision to change required shift schedules in District 6 on staffing limitations—and the Department has initiated hiring academies since the shift change was implemented—DPD should reassess the staffing needs of District 6 to determine the number of uniformed personnel required to provide officers with an optional ten-hour shift schedule. The potential impact of shift-lengths on officers and the Department noted within this section further emphasizes the need for DPD to determine officer totals, as previously recommended, since shift-lengths are only one of many variables that must be considered when determining staffing requirements.

RECOMMENDATIONS

We offer the following recommendations to help the Department of Safety better determine and link resource needs to strategic initiatives and to reduce police response times.

1.1 \textbf{Response Times}—To formally address increasing response times, the Executive Director of Safety should direct the Denver Police Department and the Denver 911 Emergency Communications Center to work together to identify changes necessary to reduce response times and publicly present the results of the analysis with sufficient time for 2015 budget planning.

1.2 \textbf{Communicating Police Response Times}—To promote openness in government, build trust through increased transparency, and provide information that is of interest and educational to Denver’s citizens, the Executive Director of Safety should direct the Denver Police Department and the Denver 911 Emergency Communications Center to work together to holistically measure and share at least annually response times with the public from the time a 911 call is picked up by a 911 Call Intake Operator.

\textsuperscript{55} International City/County Management Association (ICMA), \textit{ICMA Police and Fire Personnel and Expenditures}, 2013.
\textsuperscript{57} The Police Foundation’s \textit{The Shift Length Experiment} found officers assigned to eight-hour shifts worked as much as five times more overtime than those assigned ten-hour shifts, and three times as much as those assigned twelve-hour shifts.
until an officer arrives on scene. 2014 response time data should be released by March 31, 2015, and by the end of the first quarter each year thereafter.

1.3 Operational Monitoring—The Executive Director of Safety should direct the Denver Police Department and Denver 911 Emergency Communications Center management to meet at least quarterly to update Department of Safety management on operational issues affecting emergency services, including a holistic evaluation of response times from call pick up to officer arrival.

1.4 DPD Staffing Level—The Executive Director of Safety should direct the Denver Police Department to finalize the number of sworn officers needed to accomplish the Department’s strategic objectives, meet its various performance measures, and adequately support a community-oriented policing strategy by relying on an approach derived from data- or workload-based methodologies. This information should be provided to stakeholders including the Executive Director of Safety, Budget and Management Office, City Council, and the citizens of Denver. If budget limitations or other factors prevent DPD from hiring the amount of officers required to meet the Department’s current performance measures and strategic goals, DPD should modify its performance measures and strategic goals to more accurately reflect staffing realities.

1.5 District 6 Staffing—The Executive Director of Safety should direct the Denver Police Department to reassess the staffing needs of District 6 to determine the number of uniformed personnel required to provide officers with an optional ten-hour shift schedule.

1.6 911 Dispatch Assessment—The Executive Director of Safety should direct the Denver Police Department and the Denver 911 Emergency Communications Center to work together to determine what, if any, impact an increase in authorized strength might have on the 911 dispatching process or the total number of 911-Dispatchers needed.

1.7 Overtime, Backfill, and Off-duty—The Executive Director of Safety should direct the Denver Police Department to enhance monitoring efforts to ensure that officers are not working extensive overtime, backfill, and off-duty hours to avoid potential officer stress, fatigue, and other safety concerns as new recruits are hired.

1.8 Code 6 Policy—The Executive Director of Safety should direct the Denver Police Department to update officers on Code 6 policy and the importance of recording their on-scene arrival time using Mobile Data Terminals or calling arrival time into 911-Dispatch.
APPENDIX A

Data Methodology

To measure police response times from call pick-up to officer arrival, the Auditor’s Office requested and received six years of Computer Aided Dispatch (CAD) call and vehicle data. The CAD call dataset provided by the Denver Police Department (DPD) Data Analysis Unit included all 911 calls from January 1, 2008, through February 12, 2014. The data did not include any proactive calls, Be On The Look Out Calls, calls without an officer arrival time, or calls that took more than ten hours to respond to as measured by Assign to Arrive. This raw dataset included nearly 1.5 million entries. To conduct a more accurate analysis of police response times, we determined that the following should be excluded: calls that required dual responses from another agency (e.g., fire, ambulance, or sheriff); calls coded as 911 hang ups; calls coded as welfare checks; calls not coded as needing a response within Districts 1 through 6; and calls with Assign-to-Arrive times greater than three standard deviations from the mean by priority. Lastly, we excluded all calls for which the CAD call arrival time did not match the officer arrival time from the CAD vehicle data we received. Our cleaned dataset of CAD calls included more than 1.1 million entries.

Actual and Predicted Response Times Based on Staffing

Overall, our regression models presented in Figure 13 suggest that response times for Priority 0-2 calls are heavily correlated with effective strength levels. Figure 13 overlays predicted response times at various effective strength levels and actual response times at various effective strength levels for hypothetical analyses. Our predictions of response times only take into account effective strength and seasonal variations. As demonstrated in Figure 13, staffing levels are a strong predictor of actual response times.

60 Calls that took longer than ten hours were excluded for several reasons. First and foremost, they were excluded because calls that last longer than ten hours are calls that are usually reopened due nature of the call. Second, calls that took longer than ten hours are typically errors within the data.
Figure 13: Predicted and Actual Response Times from Pick-Up to Arrive for Priority 0-2 Calls Based on Effective Strength Levels

Source: Auditors’ calculations for predicted response times were derived from data using the City’s CAD system from 2008 through 2013. Effective strength data was provided by DPD. Note: Auditors used different methodology from the DPD Data Analysis Unit. As such, figures may be different from those reported by DPD.
APPENDIX B

Impact of Denver Police Department Policy Changes

The Auditor’s Office’s preliminary analysis indicates that the three policy changes implemented by the Chief of Police (Chief) during the audit period—Civilianization, Team Policing, and Re-districting—have shown a correlation with a 600-count reduction in crimes against persons and property every month they have been in effect. Furthermore, the analysis suggests that response times are not correlated with crime. Table 5 provides the results of two regression models assessing the impact of these policy changes on crimes against persons and property.

Table 5: Impact of DPD Policy Changes, 2008-2013

<table>
<thead>
<tr>
<th>Crimes Against Persons &amp; Property</th>
<th>Model A</th>
<th>Model B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. Response Time to Priority 0-2 Calls</td>
<td>98.63</td>
<td>98.63</td>
</tr>
<tr>
<td>Avg. Response Time to Priority 3-6 Calls</td>
<td>39.70</td>
<td>39.70</td>
</tr>
<tr>
<td>Effective Strength</td>
<td>-3.05*</td>
<td>-3.05*</td>
</tr>
<tr>
<td>Number of 911 Calls</td>
<td>0.19*</td>
<td>0.19*</td>
</tr>
<tr>
<td>Snowfall (in inches)</td>
<td>-16.08*</td>
<td>-16.08*</td>
</tr>
<tr>
<td>Civilianization</td>
<td>-240.98</td>
<td>-240.98</td>
</tr>
<tr>
<td>Team Policing</td>
<td>-158.55</td>
<td>-399.53*</td>
</tr>
<tr>
<td>Re-districting</td>
<td>-192.59</td>
<td>-592.11*</td>
</tr>
<tr>
<td>Constant</td>
<td>4,639.82*</td>
<td>4,639.82*</td>
</tr>
<tr>
<td>Observations</td>
<td>73</td>
<td>73</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.66</td>
<td>0.66</td>
</tr>
</tbody>
</table>

Source: Calculations were derived using CAD data from 2008 through 2013 and crime data obtained from DPD’s website. Note: Auditors used different methodology from the DPD Data Analysis Unit. As such, figures may be different from those reported by DPD. Asterisks (*) indicates p-value <=0.05, which indicates statistical significance. The constant is the average monthly count of crime against persons and property when all variables are set to zero.

As shown in Model A, the Chief’s initiatives are associated with a decrease in crimes against persons and property; however, the associations are not statistically significant. Although not statistically significant, Model A does suggest the following:

- Civilianization reduced crime by
approximately 240 counts (shown in the table as \( -240.98 \); the negative number means that there was a decrease)

- Team Policing reduced crime by approximately 160 counts (shown in the table as \( -158.55 \))
- Re-districting reduced crime by approximately 200 counts (shown in the table as \( -192.59 \))

Model B takes into account the interactions between, or cumulative effects of, Civilianization, Team Policing, and Re-districting. Model B suggests that Civilianization did not have a statistically significant impact on crime reduction. However, Model B does suggest that the implementation of Team Policing and Re-districting reduced crime by nearly 600 counts each month the policies have been in effect (shown in the table as \( -592.11 \)).

Models A and B both suggest that effective strength and crimes are correlated—meaning both models predict that for every one officer added to DPD’s effective strength, crime will be reduced by approximately three counts. (This is shown in the table as \( -3.05^\ast \) for Model A and \( -3.05^\ast \) for Model B.) Additionally, both models suggest that crime is seasonal. For example, for every one inch of snow the City receives, crimes decrease by approximately sixteen counts. (This is shown in the table as \( -16.08^\ast \) for Model A and \( -16.08^\ast \) for Model B.) Lastly, both Model A and B suggest that police response times are not correlated with crime. (This is shown in the table twice each as 98.63 and 39.70, none of which have an asterisk, which would indicate statistical significance.)
APPENDIX C

Explanation of Regression Analysis Variables

The following variables were used in our regression analysis shown within the body of this report in Table 1:

- **Effective Strength Per 10,000 Residents** – Effective strength per 10,000 residents was calculated using effective strength figures provided by the Denver Police Department (DPD) and City and County of Denver population statistics from the Comprehensive Annual Financial Report (CAFR). Effective strength per 10,000 residents ranged from a low of 20.4 officers per 10,000 residents to a high of 26.0 officers per 10,000 residents during the audit period. From January 2008 through February 2014, the City had an average of 23.4 officers per effective strength per 10,000 residents.

- **Snow Fall (in inches)** – Monthly snow fall, as measured in inches, was obtained from the National Oceanic and Atmospheric Association.

- **Average Backfill, Overtime, and Off-Duty Hours Worked** – Average monthly hours of backfill, overtime, and off-duty hours worked per month per officer were calculated using effective strength figures and TeleStaff data provided by DPD. The formula used was:

\[
\frac{\text{Total Monthly Backfill Hours} + \text{Total Monthly Overtime Hours} + \text{Total Monthly Off-Duty Hours}}{\text{Monthly Effective Strength}}
\]

Average monthly backfill, overtime, and off-duty hours worked per month per officer ranged from a low of 9.2 hours to a high of 46.4 during the audit period. From January 2008 through February 2014, the average backfill, overtime, and off-duty hours worked per month per officer was 23.9 hours.

- **Crime per 10,000 Residents** – Crime per 10,000 residents was calculated using crime counts of crimes against persons and crimes against property published on the DPD website and City and County of Denver population statistics from the CAFR. Monthly crime counts against property and persons per 10,000 residents ranged from a low of 44.3 crimes per 10,000 residents to a high of 76.9 crimes per 10,000 residents during the audit period. From January 2008 through February 2014, monthly crime counts against property averaged 56.8 crimes per 10,000 residents.

- **Average Calls Responded to Per Officer** – Average calls responded to per officer per month was calculated using effective strength figures and Computer Aided Dispatch (CAD) data provided by DPD. The formula used was:

\[
\frac{\text{CAD Monthly Call Count}}{\text{Monthly Effective Strength}}
\]

Average calls responded to per officer per month ranged from a low of 3.0 calls per officer to a high of 4.8 calls per officer during the audit period. From January 2008 through February 2014, an officer responded to an average of 3.9 calls per month.
• Civilianization – Civilianization started in August 2008. Months prior to August 2008 were coded as 0. The months from August 2008 through February 2014 were coded as 1.

• Team Concept & 12-Hour Shift – Team Concept and 12-Hour Shift started in January 2013. Months prior to January 2013 were coded as 0. The months January 2013 through February 2014 were coded as 1.

• Re-districting – Re-districting started in July 2013. Months prior to July 2013 were coded as 0. The months from July 2013 through February 2014 were coded as 1.
APPENDIX D

Analysis of Queue to Assign and Arrive to Close Times

Figure 14 shows that, from 2008 through 2013, Arrive to Close rates increased while Queue to Assign times remained relatively steady. However, in technical terms, there is no correlation between Queue to Assign and Arrive to Close times. This means that even when officers are unavailable to respond to a call, 911-Dispatchers have still been able to locate another available officer in a reasonable amount of time. Additionally, we found no corresponding trend in the time it takes to assign officers to high priority emergency calls (Priority 0-2).

Figure 14: Average Arrive to Close and Queue to Assign Time in Minutes, 2008-2013

Source: Calculations were derived from response time data obtained from the City’s CAD system from 2008 through 2013. Note: Auditors used different methodology from the DPD Data Analysis Unit. As such, figures may be different from those reported by DPD.
May 30, 2014

Mr. Kip R. Memmott, MA, CGAP, CRMA
Director of Audit Services
Office of the Auditor
City and County of Denver
201 West Colfax Avenue, Dept. 705
Denver, Colorado 80202

Dear Mr. Memmott:

The Office of the Auditor has conducted a performance audit of Police Response Time.

This memorandum provides a written response for each reportable condition noted in the Auditor’s Report final draft that was sent to us on May 09, 2014. This response complies with Section 20-276 (b) of the Denver Revised Municipal Code (D.R.M.C.).

AUDIT FINDING 1
Response Times Have Increased and the Denver Police Department Cannot Ensure Achievement of Strategic and Performance Goals

RECOMMENDATION 1.1
Response Times—To formally address increasing response times, the Executive Director of Safety should direct the Denver Police Department and the Denver 911 Emergency Communications Center to work together to identify changes necessary to reduce response times and publicly present the results of the analysis with sufficient time for 2015 budget planning.

<table>
<thead>
<tr>
<th>Agree or Disagree with Recommendation</th>
<th>Target date to complete implementation activities (Generally expected within 60 to 90 days)</th>
<th>Name and phone number of specific point of contact for implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree and completed.</td>
<td>Completed</td>
<td>Deputy Chief Mary Beth Klee 720-913-6526</td>
</tr>
</tbody>
</table>

Narrative for Recommendation 1.1
The police department had already completed a comprehensive analysis of work load prior to the Audit which led to several new initiatives under Chief White. Those included redistricting, civilianization of sworn positions, the implementation of team policing, and the hiring of six Civilian Report Technicians. At the same time, DPD was authorized to hire 110 new officers in a series of three police academy training classes throughout 2013. Re-districting, team policing and the hiring of the CRTs required a working partnership with the Communications Center to insure a successful transition.
We believe the analysis and changes necessary to reduce response times are already complete and in place as proven by the below chart showing a reduction in response times from January-April 2014. The police department continually reviews and analyzes areas for improvement and will continue to do that especially in the area of technology implementation that saves officer time and makes them more efficient, such as the implementation of High Speed Internet in patrol cars that will be completed by the end of 2014. Other examples include:

- **Re-districting** resulted in new police district and precinct boundaries driven by workload data scaled to accommodate police force growth and area development while maintaining neighborhood integrity within the police district. In regards to police response times, keeping officers within their precincts (less distance driven to respond to calls for service) and balancing workload (fewer calls for service per officer because the workload is dispersed) will result in improved response times.

The preliminary evaluation of the impact of re-districting alone in Police District 6 showed increased officer productivity and a reduction of 24% in citizen initiated calls for police service and a 22% decrease in reported offenses. This decreased workload has resulted in improved response times in 2014.

- **Civilization** of positions not requiring a sworn police officer resulted in a net gain of 20 officers returned to the Patrol Division during 2012-14. This was in addition to the hiring of 110 officers in 2013. The hiring of six Civilian Report Writers assigned to the patrol districts to take cold property reports will free up officer time to respond to in-progress crimes and higher priority incidents. This results in an increase in equivalent effective strength and serves as a force multiplier. As the Audit clearly states numerous times, “our analysis strongly suggests that the primary influence impacting response times is DPD’s effective strength…” The police department’s actions to increase effective strength and improve workloads will continue to result in reduced response times.

The improved response time to date in 2014 is shown below in the data pulled by the DPD Data Analysis Unit:
Average Response Time in Minutes
For 911 Calls
From Phone Pickup to Arrive
Priority 0, 1, and 2 Calls
And DPD Effective Strength Staffing Numbers

<table>
<thead>
<tr>
<th>Month</th>
<th>Avg. Time in Minutes</th>
<th>Effective Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan-13</td>
<td>13.91</td>
<td>1383</td>
</tr>
<tr>
<td>Feb-13</td>
<td>13.99</td>
<td>1379</td>
</tr>
<tr>
<td>Mar-13</td>
<td>14.19</td>
<td>1372</td>
</tr>
<tr>
<td>Apr-13</td>
<td>14.73</td>
<td>1367</td>
</tr>
<tr>
<td>May-13</td>
<td>15.71</td>
<td>1358</td>
</tr>
<tr>
<td>Jun-13</td>
<td>15.36</td>
<td>1354</td>
</tr>
<tr>
<td>Jul-13</td>
<td>15.90</td>
<td>1351</td>
</tr>
<tr>
<td>Aug-13</td>
<td>15.85</td>
<td>1345</td>
</tr>
<tr>
<td>Sep-13</td>
<td>15.94</td>
<td>1340</td>
</tr>
<tr>
<td>Oct-13</td>
<td>15.29</td>
<td>1337</td>
</tr>
<tr>
<td>Nov-13</td>
<td>15.05</td>
<td>1335</td>
</tr>
<tr>
<td>Dec-13</td>
<td>15.43</td>
<td>1332</td>
</tr>
<tr>
<td>Jan-14</td>
<td>14.46</td>
<td>1325</td>
</tr>
<tr>
<td>Feb-14</td>
<td>14.42</td>
<td>1324</td>
</tr>
<tr>
<td>Mar-14</td>
<td>13.98</td>
<td>1383</td>
</tr>
<tr>
<td>Apr-14</td>
<td>12.76</td>
<td>1380</td>
</tr>
</tbody>
</table>

- **Team Policing** was implemented in January 2013. Adjustments to team policing staffing based on workload were implemented in January 2014 and staffing hours/days off will continue to be assessed in each police district moving forward. The team policing concept leads to improved accountability from each officer/sergeant and team, balances workload and staffing across the precinct by time of day and leads to better service through quicker response time.

- **911 Communications Center Goals** that will benefit officers and response times include the “answer to queue” metric. Employees at the Communications Center strive to provide a snapshot of the details of the event within 60 seconds from the time of answer, to dispatch queue (ready to be dispatched). The call-taker remains on the telephone to obtain additional information when warranted and provides supplemental information to the dispatcher until enough information has been gathered or first responders have made contact with the caller. 2013 was the first year we implemented the “answer to queue” metric. The goal was 60 seconds and the average time was 62.3 seconds.

Finally, the on-going analysis and resulting budget requests for the 2015 Budget will be presented during the usual budget process which includes multiple presentations, several of which are publicly televised.
RECOMMENDATION 1.2
Communicating Police Response Times—To promote openness in government, build trust through increased transparency, and provide information that is of interest and educational to Denver’s citizens, the Executive Director of Safety should direct the Denver Police Department and the Denver 911 Emergency Communications Center to work together to holistically measure and share at least annually response times with the public from the time a 911 call is picked up by a 911 Call Intake Operator until an officer arrives on scene. 2014 response time data should be released by March 31, 2015, and by the end of the first quarter each year thereafter.

<table>
<thead>
<tr>
<th>Agree or Disagree with Recommendation</th>
<th>Target date to complete implementation activities (Generally expected within 60 to 90 days)</th>
<th>Name and phone number of specific point of contact for implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>2014 data released by April 15, 2015</td>
<td>Director of Data Analysis Unit Chris Wyckoff</td>
</tr>
</tbody>
</table>

Narrative for Recommendation 1.2
A Response Time report will be released through the Executive Director of Safety’s Office by April 15th of each year beginning in 2015 and will also be placed on the police department website. (The two week delay is to manage DAU workload associated with numerous other end of quarter reports).

RECOMMENDATION 1.3
Operational Monitoring—The Executive Director of Safety should direct the Denver Police Department and Denver 911 Emergency Communications Center management to meet at least quarterly to update Department of Safety management on operational issues affecting emergency services, including a holistic evaluation of response times from call pick up to officer arrival.

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</thead>
<tbody>
<tr>
<td>Agree</td>
<td>First quarterly meeting will be held by August 30, 2014</td>
<td>Director of Communications Center Carl Simpson 720-913-2025</td>
</tr>
</tbody>
</table>

Narrative for Recommendation 1.3
The Director of the Communications Center will establish the dates, times, and locations of the quarterly meeting, send out the agenda to the appropriate staff, to the Executive Director’s designee, and to the Deputy Chief of Operations and the Deputy Chief of Administration. The Director will be responsible for creating the minutes of the meeting and distributing them with follow up plans or assignments for outstanding issues. As is current practice, any issues requiring immediate action will be brought to the appropriate chief or the director for resolution outside the quarterly meetings.
RECOMMENDATION 1.4

DPD Staffing Level—The Executive Director of Safety should direct the Denver Police Department to finalize the number of sworn officers needed to accomplish the Department’s strategic objectives, meet its various performance measures, and adequately support a community-oriented policing strategy by relying on an approach derived from data- or workload-based methodologies. This information should be provided to stakeholders including the Executive Director of Safety, Budget and Management Office, City Council, and the citizens of Denver. If budget limitations or other factors prevent DPD from hiring the amount of officers required to meet the Department’s current performance measures and strategic goals, DPD should modify its performance measures and strategic goals to more accurately reflect staffing realities.

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<tbody>
<tr>
<td>Disagree</td>
<td></td>
<td></td>
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</table>

Narrative for Recommendation 1.4

The police department has used both performance data and workload based methodologies in 2013 for the 2014 budget and will again for the 2015 budget to derive a range of staffing options necessary to meet the department’s strategic goals and performance measures. This work was presented to the BMO during the 2014 budget process. The Auditor was also provided the Performance Based Staffing PowerPoint created by the DPD Data Analysis Unit, as well as the 10 year staffing plan and staffing options for the police department. The staffing plans include a balance of increased civilianization and increased sworn staffing that fits within the overall city budget. The total number of officers required to meet department goals is dynamic as innovations such as civilian report technicians and technology become force multipliers.

The police department strongly believes that the department’s strategic plan, goals and performance measures are important yardsticks to measure our progress towards our long term goals. If our performance measures show that we fall short of our goals, the goal is assessed and the reason for the failure to meet the goal is analyzed and sometimes the goal or strategy is changed. We view our strategic plan as dynamic and evolving, not static. While we may not be able to meet our long-term performance goals as quickly as we would like due to staffing or other issues, we do not feel that those proposed goals should be modified. We create interim goals and expectations based on current and projected staffing levels.
### RECOMMENDATION 1.5

**District 6 Staffing**—The Executive Director of Safety should direct the Denver Police Department to reassess the staffing needs of District 6 to determine the number of uniformed personnel required to provide officers with an optional ten-hour shift schedule.

<table>
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</tr>
</thead>
</table>
| Agree                                 | Assessment is on-going and constant                              | Deputy Chief of Operations  
David Quinones  
720-913-6530                                                       |

**Narrative for Recommendation 1.5**

Staffing in each police district is constantly being assessed; both shift hours and staffing numbers. The current 12 hour shift schedule piloted at District 6 has been effective for the type of crime activity and hours of that activity specific to District 6 which includes the downtown area and an entertainment district. If the Chief decides to move District 6 from the 12 hour shifts currently being utilized he will work with the command staff and DAU to determine the number of officers required for whatever shift hours he decides best serve the district and community.

### RECOMMENDATION 1.6

**911 Dispatch Assessment**—The Executive Director of Safety should direct the Denver Police Department and the Denver 911 Emergency Communications Center to work together to determine what, if any, impact an increase in authorized strength might have on the 911 dispatching process or the total number of 911-Dispatchers needed.

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<tr>
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<th>Target date to complete implementation activities (Generally expected within 60 to 90 days)</th>
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</tr>
</thead>
</table>
| Agree                                 | *(see Narrative)*  
*July 30, 2015*                                                 | Carl Simpson  
Director of 911 Comm. Center  
720-913-2000                                                      |

**Narrative for Recommendation 1.6**

Staffing at Denver 911 is continuously assessed with regards to staffing numbers. The Department of Safety will collaborate with the DPD command staff and DAU to analyze various staffing models based on anticipated changes to officer availability and staffing levels within DPD. Denver 911 has already implemented scheduling software to analyze and optimize call volume and peak call days and times, as well as revise the agency’s scheduling process to insure the proper staffing levels based on anticipated call volume patterns.

Denver 911 is also exploring staffing options such as reallocating FTEs into “Dispatcher Assistant” roles to absorb the added workload anticipated with increased DPD staffing in patrol functions. While the staffing assessment is continuous and on-going, the Denver 911 study of the Dispatcher Assistant role, the exact job functions, and need for the position will be completed by *July 30, 2015* so that the evaluation can include the impact of the effective strength of both 2014 police academy classes.
RECOMMENDATION 1.7
Overtime, Backfill, and Off-duty—The Executive Director of Safety should direct the Denver Police Department to enhance monitoring efforts to ensure that officers are not working extensive overtime, backfill, and off-duty hours to avoid potential officer stress, fatigue, and other safety concerns as new recruits are hired.

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</thead>
<tbody>
<tr>
<td>Disagree</td>
<td>Completed, policy in place</td>
<td></td>
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</tbody>
</table>

Narrative for Recommendation 1.7
The police department has an extensive policy in place limiting the total number of hours officers can work both weekly and daily. The prior Administrative Audit conducted by the Auditor in 2013 recognized and commended the police department’s established policy that limits officers to no more than 16 hours in a twenty-four hour period or a combination of on duty, overtime and off duty hours of sixty-four hours in one week. Violations of the policy result in disciplinary action and suspension of all off duty work privileges for a period of 60 days for a first violation. Our current policy has proven to be effective and it should be noted that there are minimal violations of the policy.
RECOMMENDATION 1.8
Code 6 Policy—The Executive Director of Safety should direct the Denver Police Department to update officers on Code 6 policy and the importance of recording their on-scene arrival time using Mobile Data Terminals or calling arrival time into 911-Dispatch.

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</thead>
<tbody>
<tr>
<td>Agree</td>
<td>Policy update to officers completed, quarterly report begins July 15, 2014</td>
<td>Deputy Chief Mary Beth Klee 720-913-6526</td>
</tr>
</tbody>
</table>

Narrative for Recommendation 1.8
The Denver Police Operations Manual Policy was sent out to all patrol officers, supervisors and commanders through the Deputy Chief of Operations reminding them of the requirement. The reminder and policy was sent out on February 25, 2014. The Data Analysis Unit will provide quarterly updates containing the percentage of calls without a documented arrival time to both Deputy Chiefs beginning July 2014 for Quarter 2.

Please contact Deputy Director of Safety Laura Wachter at 720-913-6445, or Commander Matt Murray at 720-913-6192 with any questions.

Sincerely,

Stephanie O’Malley
Executive Director
Department of Public Safety

cc: Executive Director of Safety Stephanie O’Malley
Deputy Directors of Safety Laura Wachter and Christopher Lujan
Police Chief Robert C. White
Deputy Chief of Operations David Quinones
DPD Commander Matt Murray
DAU Director Chris Wyckoff
Communications Center Director Carl Simpson