

**Performance Audit
Ambulance Response Time Reporting**

October 2012

City Auditor's Office

City of Kansas City, Missouri

CITY OF FOUNTAINS
HEART OF THE NATION



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October 10, 2012

Honorable Mayor and Members of the City Council:

This performance audit of the Fire Department's ambulance response time reporting was initiated by the city auditor pursuant to Article II, Section 216 of the city charter. We focused on the accuracy and completeness of reported ambulance response times.

We found that ambulance response time reports prepared by the Fire Department between May 2010 and June 2012, are reasonably accurate and complete regarding citywide response times. However, since December 2011, the department has been unable to measure response times by ambulance response district. In mid-December 2011, the department started recording fire response area information in the computer-aided dispatch (CAD) system data field previously used to record ambulance response district information.

The Fire Department's response time calculations generally use the appropriate data fields. Although not included in a written policy, the department has control practices in place over data entry and system access that provide reasonable assurance that data in the CAD system is reasonably complete, accurate, and not subject to inappropriate alteration.

While city code specifies response time performance requirements, it does not define how response time should be measured. The Fire Department starts the response time clock when the call-taker enters the first keystroke in the CAD system and stops it when the ambulance arrives at the incident, just as MAST did.

We found that ambulance response times reported by MAST and the Fire Department cannot be compared because MAST's contract and provisions in city code allowed them to exclude certain calls from the response time calculations. To make response times comparable over the review period we recalculated citywide response times for life threatening incidents using the raw data we obtained from the CAD system. Based on our calculations, MAST's and the Fire Department's ambulance response time performance was similar and relatively stable, ranging from 81 percent to 89 percent of ambulance responses arriving in 9 minutes or less between May 2008 and November 2011. Following a change in dispatch protocols in December 2011, the Fire Department's ambulance response time performance declined as response times increased by about one minute.

We make recommendations intended to improve the availability of data and how response time performance is measured and reported; maintain the accuracy of ambulance response time performance reports; further strengthen CAD system controls; and develop a clear definition of response time.

We shared a draft of this report with the interim fire chief and city manager on September 28, 2012. Their response is appended. We would like to thank Fire Department staff for their assistance and cooperation during this audit. The audit team for this project was Joan Pu, Julia Webb-Carter, Douglas Jones, and Deborah Jenkins.

Gary L. White
City Auditor

Ambulance Response Time Reporting

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Ambulance Response Time Reporting

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Introduction

Objectives

We conducted this audit of ambulance response time reporting under the authority of Article II, Section 216 of the Charter of Kansas City, Missouri, which establishes the Office of the City Auditor and outlines the city auditor's primary duties.

A performance audit provides findings or conclusions based on an evaluation of sufficient, appropriate evidence against stated criteria. Performance audits provide objective analysis to assist management and those charged with governance and oversight in using the information to improve program performance and operations, reduce costs, facilitate decision making, and contribute to public accountability.¹

This report is designed to answer the following question:

- Are reported ambulance response time data accurate and complete?

Scope and Methodology

Our review focuses on ambulance response time reporting. Our audit methods included:

- Reviewing the city's Charter and Code of Ordinances to identify ambulance response time requirements and reporting requirements.
- Reviewing Fire Department and MAST response time reports to understand the ambulance response time performance data that has been reported in the past.
- Interviewing Fire Department staff to understand how ambulance response time data is collected, calculated, and reported as well as the controls in place to ensure data are properly collected, recorded, and secured.

¹ Comptroller General of the United States, *Government Auditing Standards* (Washington, DC: U.S. Government Printing Office, 2011), p. 17.

- Interviewing and observing Fire Department dispatch center staff and listening to a small sample of calls to understand at what points in the process data is collected.
- Obtaining and analyzing ambulance response time data for life-threatening incidents from May 2008 to June 2012 to determine response time performance.

We conducted this performance audit 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. No information was omitted from this report because it was deemed privileged or confidential.

We assessed the reliability of the ambulance response time data we obtained from the computer-aided dispatch (CAD) system by interviewing Fire Department staff about general system controls and procedures related to data entry; reviewing the formulas used by the department to calculate response times and the query KCFD staff used to extract the data used in our analysis and examining the extracted data for reasonableness and completeness; and evaluating the sequence of records in the CAD system to evaluate the completeness of records in the system and the records extracted for our analysis. We determined that the data is sufficiently reliable for the purposes of this report.

Background

Before April 2010, the city contracted with the Metropolitan Ambulance Services Trust (MAST) for ambulance services. On April 25, 2010, ambulance services were integrated into the city's Fire Department (KCFD).²

City code establishes ambulance response time standards. City code establishes an ambulance response time performance standard for life threatening emergencies of nine minutes or less for 90 percent of those incidents on a citywide basis and nine minutes or less for 85 percent of

² Committee Substitute for Ordinance 100122, 2/25/2010 became effective on 4/25/2010.

those incidents in each ambulance response district,³ measured for a three-month running calendar period.⁴

City’s response to a medical emergency. The public’s call for an ambulance is initially answered by a 9-1-1 operator and then transferred to the Fire Department’s Communication Center. The call-taker at the communication center verifies the address and emergency, which begins the process of dispatching an ambulance to the emergency. (See Exhibit 1.)

Exhibit 1. Overview of the Ambulance Response Process

9-1-1 operator answers call	9-1-1 operator transfers call to KCFD for ambulance dispatch	KCFD call-taker verifies address and nature of emergency	CAD system evaluates emergency and enters ambulance request into dispatch queue	KCFD dispatcher assigns an ambulance to respond to the emergency	KCFD ambulance drives to emergency location	KCFD ambulance arrives at the emergency location
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Source: KCFD

Response time data is collected by the Fire Department’s computer-aided dispatch (CAD) system. After integration, the Fire Department began using the CAD system MAST had in place. The ambulance and Fire Department dispatch and communications systems were fully consolidated in December 2011. The CAD system captures data entered by KCFD staff as they process and handle calls for emergency services. KCFD’s CAD system does not collect any response time data from the 9-1-1 system.

³ According to the Code of Ordinances (Sec. 34-372(b)), the city is divided into four ambulance response districts: 1. the portion of the city north of the Missouri River; 2. the portion of the city lying west of Prospect Avenue and north of Gregory Boulevard; 3. the portion of the city lying east of Prospect and north of Gregory Boulevard; and 4. the portion of the city lying south of Gregory Boulevard.

⁴ Code of Ordinances, Kansas City, Missouri, Sec. 34-372(a).

Ambulance Response Time Reporting

Findings and Recommendations

Summary

Citywide ambulance response times reported by the Fire Department between May 2010 and June 2012, are reasonably accurate. However, since mid-December 2011, response times have not been measured by ambulance response district because the department started recording fire response area information in the CAD system rather than ambulance response district information. KCFD should continue its efforts to correct this issue and measure response time performance by ambulance response district as required by city code.

The response time calculations used by KCFD generally use the appropriate data fields. The department's controls over the CAD system provide reasonable assurance that data is reasonably complete and accurate. Written policies and procedures outlining system controls and the calculation methodology would further improve controls and the continuing accuracy of response time reports.

While city code specifies response time performance requirements, it does not define how response time should be measured. KCFD uses the same CAD system data fields as MAST did to start and stop the response time clock. Response time should be defined and clearly state when the response time clock starts and ends.

Ambulance response times reported by MAST and KCFD cannot be compared because MAST was allowed, by contract and city code, to exclude certain calls from the response time calculations. To make response times comparable, we re-calculated response times using data from the CAD system. Based on our calculations, MAST's and KCFD's citywide ambulance response time performance was similar and relatively stable between May 2008 and November 2011. Following a change in dispatch protocols in December 2011, KCFD's ambulance response time performance declined.

KCFD's Reported Ambulance Response Times Reasonably Accurate

The Fire Department's ambulance response time performance reports are reasonably accurate and complete regarding citywide response times. However, since mid-December 2011, the department stopped measuring response times by ambulance response district as required by city code. Controls over CAD data entry and system access provide reasonable assurance that CAD data are reasonably complete, accurate, and not subject to inappropriate alteration. City code specifies response time performance requirements, but does not define how response time should be measured.

Citywide Response Times Reported by KCFD Reasonably Accurate

KCFD's response time performance reports are reasonably accurate. We re-calculated citywide ambulance response times for life threatening incidents using data from the CAD system and compared our results to KCFD's reported response times between May 2010 and June 2012. Overall, our results were similar to those reported by the department except for December 2011, because that report was incomplete; covering only the first 13 days of the month. KCFD did not develop a response time report covering the remaining 18 days of the month. We also noted that KCFD has recently been reporting ambulance response time performance using a standard of 8 minutes and 59 seconds or less rather than the 9 minutes or less standard in city code. Although this difference has had a negligible impact on reported performance, if the number of responses equaling 9 minutes increased, the performance standard currently used by KCFD could result in reported performance being lower than actual performance.

To ensure the ongoing accuracy of response time reports, the interim fire chief should develop written policies and procedures directing that response time reports use the performance standard in city code when measuring performance.

KCFD Not Measuring Ambulance Response Times By District As Required

KCFD stopped recording ambulance response district data in the CAD system. City code establishes an ambulance response time standard of nine minutes or less for 85 percent of life threatening emergencies in each ambulance response districts as measured for a three-month running

calendar period.⁵ KCFD's ambulance response time reports have not included response times by ambulance response district since December 2011, because the CAD system no longer has the information needed to measure response times by ambulance response district. The lack of response time reporting by ambulance response district has been discussed at more than one Public Safety and Emergency Services Committee hearing.

Before the December 13, 2011, consolidation of ambulance and fire dispatch and communications operations, the CAD system recorded ambulance response district information in the 'response area' field. As part of the CAD consolidation, the Fire Department changed the 'response area' field to record fire response area information rather than ambulance response district information. Fire Department management reported they are working on correcting this issue.

To comply with the city code, the interim fire chief should take steps to ensure that the CAD system records ambulance response district information and that response times for ambulance response districts are measured.

KCFD's Response Time Calculations Reasonably Accurate

KCFD's response time calculation formulas use the appropriate CAD data fields with one exception. When a response is cancelled before an ambulance arrives at the scene, the CAD data fields that record the arrival time or staged time are blank.⁶ Rather than omitting this type of response when calculating response times, the department uses data from the 'time call cleared' data field as a replacement for either the arrival time or staged time.

We found this replacement value increased the total number of responses and slightly decreased overall response times. Because of the small number of these instances (about 2 percent of the records we reviewed), the overall effect on response times is not significant. However, if the number of cancelled calls without an arrival or staged time increased, the effect on response times could become more significant without a change to this calculation formula. While reasonably accurate, the department could improve the accuracy of its response time calculations by not using the time cleared field to replace arrival time or staged time when those fields are blank.

⁵ Code of Ordinances, Kansas City, Missouri, Sec. 34-372(a) and Sec. 34-372(b).

⁶ Arrival time is determined by an ambulance arriving at the incident scene or at a nearby 'staging' area because access to the incident scene is restricted due to safety concerns. The response time clock is stopped when an ambulance arrives at either location.

Although the calculation formulas are included in the queries used by the department, the overall method for calculating response times is not defined in a written policy. Defining the response time calculation methodology in a written policy helps ensure continuity if there is staff turnover and reduces the risk that future response times are not properly calculated.

To ensure the ongoing consistency and accuracy of response time reports, the interim fire chief should develop written policies and procedures outlining how response times are calculated and that response time calculation formulas not use the time cleared field to replace arrival time or staged time when those fields are blank.

CAD System Data Is Reasonably Accurate and Complete

The controls over CAD data entry and system access provide reasonable assurance that data in the CAD system is reasonably complete, accurate, and not subject to inappropriate alteration. We assessed the reliability of the ambulance response time data we obtained from the CAD system by interviewing KCFD staff about general system controls and procedures related to data entry. Fire Department staff enter information into the CAD system mostly through drop down menus or pop-up boxes rather than manual entries, which helps minimize data entry errors.

Although not included in a written policy, the department has practices in place to control access to the CAD system. The department uses passwords and different levels of system access, has activated the CAD system's edit history/audit trail⁷ function, and limited the number of staff members who have access to change data in the CAD system.

We also assessed the reliability of the data by reviewing the formulas used by KCFD staff to calculate response times and the query used to extract the data used in our analysis; examining the extracted data for reasonableness and completeness; and evaluating the sequence of records in the CAD system to evaluate the completeness of records in the system and the records extracted for our analysis. We determined that the data is sufficiently reliable for the purposes of this report.

To further strengthen controls over the CAD system, the interim fire chief should develop written policies and procedures outlining how the department protects the accuracy, completeness, and security of the data in the CAD system.

⁷ Audit trails show who has accessed an information system and what changes or actions a user performed.

City Code Does Not Define How to Measure Response Time

While city code specifies response time performance requirements, it does not define how response time should be measured. The Fire Department starts the response time “clock” when a call-taker enters the first keystroke into the CAD system after answering the call transferred by the 9-1-1 system. The response time clock stops when an ambulance arrives at the incident scene.

Multiple time segments can make up the emergency medical response process, but there is not a universally accepted definition of response time. Not all EMS systems start the response time clock at the same time in the process, making comparisons between emergency medical systems and response times difficult. For example, the National Fire Protection Association’s (NFPA) standard 1710 breaks EMS response time into time segments and defines performance levels for each. NFPA’s total EMS response time performance standard is 10 minutes 45 seconds from the time the phone is answered by a 9-1-1 operator to an ambulance arriving at the incident scene. The Fire Department measures response time from the time a call has been answered at the department’s Communication Center until an ambulance arrives at the incident scene. Fire management and the medical director reported that the closest thing to a national standard they are aware of is NFPA standard 1710. A detailed description of NFPA’s EMS response time standards is included in Appendix A.

To ensure the city’s ambulance response time performance is calculated as intended and measures the appropriate time interval, the city manager should define response time and clearly state when the response time clock starts and ends.

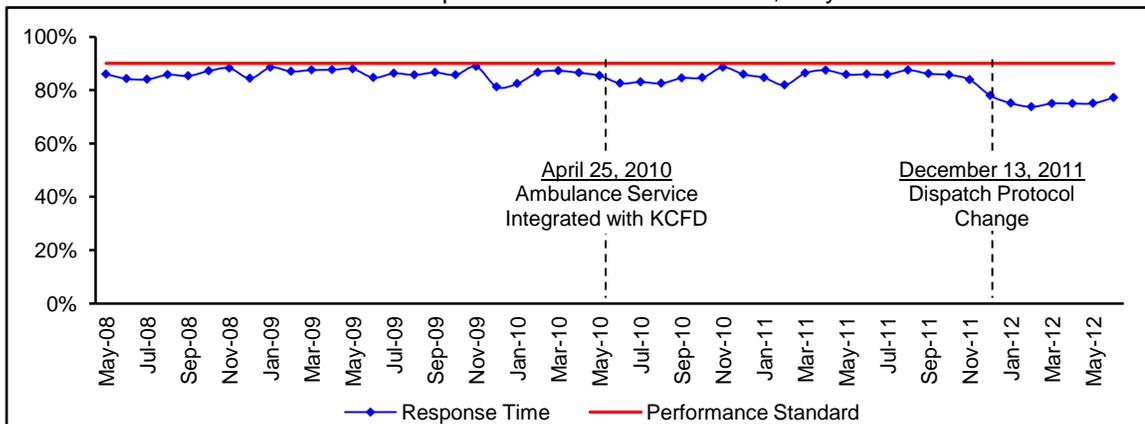
MAST and KCFD Had Similar Ambulance Response Times Until Dispatch Process Changed

MAST’s and KCFD’s ambulance response time performance was similar and relatively stable between May 2008 and November 2011. Following a change in dispatch protocols in December 2011, KCFD’s ambulance response time performance declined. Because MAST was allowed by contract and city code to exclude certain ambulance responses from its response time reports, response times reported by MAST and KCFD cannot be compared.

MAST and KCFD Had Similar Ambulance Response Time Performance When Calculated Using the Same Method

Citywide ambulance response time performance was relatively stable between May 2008 and November 2011, when calculated using the same method. (See Exhibit 2.) Ambulance response time performance reported by MAST and KCFD cannot be compared due to a difference in calculation methods. MAST’s contract and provisions in city code allowed them to exclude certain calls from the response time calculations. To make response times comparable over the review period we re-calculated citywide response times for life threatening incidents using the raw data we obtained from the CAD system. Based on our calculations, MAST’s response time performance ranged from 81 percent to 89 percent of ambulance responses arriving in 9 minutes or less between May 2008 and April 2010. KCFD’s response time performance ranged from 82 percent to 89 percent between May 2010 and November 2011. None of the monthly ambulance response times we calculated met the performance standard of 9 minutes or less for 90 percent of life threatening incidents.⁸ (See Appendix B for a description of how MAST, KCFD, and the City Auditor’s Office calculated response times and see Appendix C for response times by month and year.)

Exhibit 2. Percent of Ambulance Responses in 9 Minutes or Less, May 2008 – June 2012



Source: CAD data and City Auditor’s Office calculations.

Changes to EMS Dispatch Protocols Have Increased Response Times

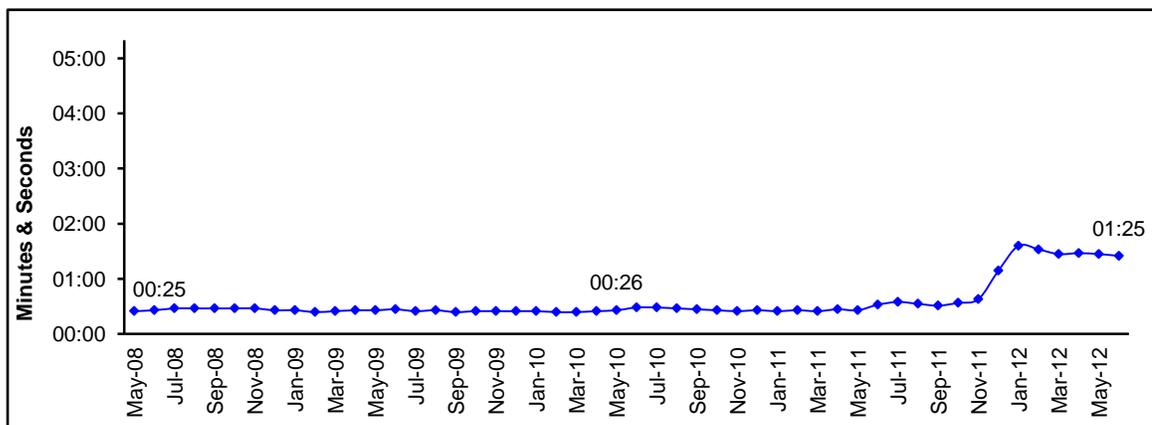
Beginning in December 2011, the Fire Department’s ambulance response time increased due to changes in dispatch protocols. We evaluated the dispatch, turnout, and drive time segments that make up response time to identify changes over time and the effect on response time performance

⁸ Code of Ordinances, Kansas City, Missouri, Sec. 34-372(a) (Ordinance 071380, 12/12/2007; Ordinance 100122, 2/25/2010).

following the integration of ambulance services into the Fire Department. After KCFD changed the ambulance dispatch protocols in December 2011, the median dispatch time increased. Following the integration of the ambulance and fire services on April 25, 2010, the median ambulance turn out time began to increase, but median drive time began to decrease.

Median⁹ dispatch time significantly increased after the ambulance dispatch protocol was changed. Dispatch time is the time between the first CAD system keystroke after a call is answered and an ambulance is dispatched. The median ambulance dispatch time ranged from 24 seconds to 38 seconds between May 2008 and November 2011, but sharply increased to 1 minute and 9 seconds in December 2011. Since December 2011, median dispatch times have ranged from 1 minute 9 seconds to 1 minute 36 seconds. By June 2012, the Fire Department’s median ambulance dispatch time was 1 minute slower than MAST’s May 2008, median dispatch time. (See Exhibit 3.) Even though the median dispatch time has increased, ambulances were dispatched to the majority of life threatening incidents before call-takers had finished talking with callers.

Exhibit 3. Median Ambulance Dispatch Time May 2008 – June 2012



Source: CAD data and City Auditor’s Office calculations.

The increase in the median dispatch time corresponds with a change in how the Fire Department dispatches ambulances. Previously ambulances were dispatched on a pre-alert basis which means within seconds of a call-taker receiving a request for assistance and verifying the incident address with the caller, the request for an ambulance was placed in the dispatch queue. Following the protocols in the Medical Priority Dispatch System (MPDS), call-takers continued to ask the caller a series of

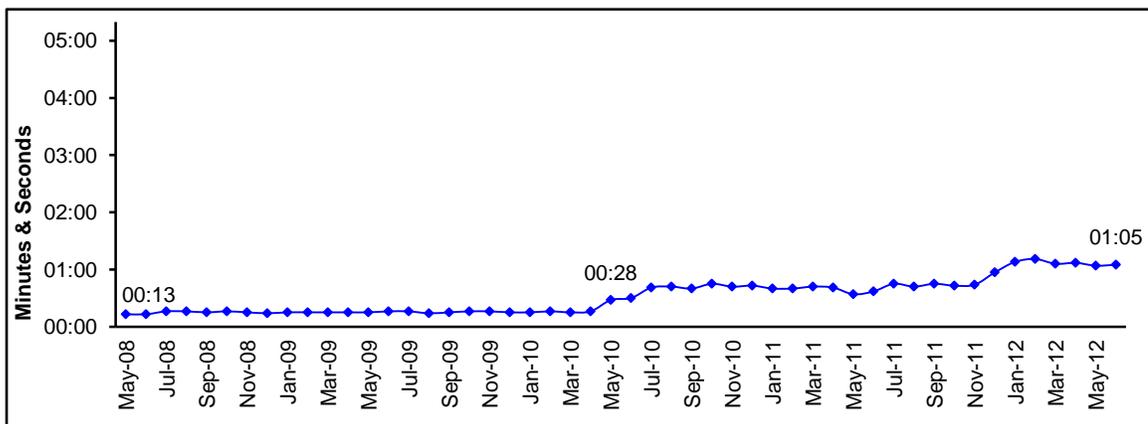
⁹ We use median values rather than averages to minimize the effect of outliers in the data. The median is the point where half of the response times are greater and half are less.

questions to collect vital information about the emergency and also provide instructions to the caller on what to do before help arrived.

On December 13, 2011, the department ceased the pre-alert ambulance dispatch policy in favor of using the capabilities of the MPDS system to assist with determining the appropriate EMS response to a given emergency. Call-takers verify the incident address and following the protocols in the MPDS ask the caller a series of questions to collect vital information about the emergency. The MPDS evaluates the information provided by the caller as the call taker enters it into the system and makes a determination on the appropriate EMS unit response (ambulance, fire truck, or both) and places suggested units into a queue for dispatch. The call-taker may still be collecting information from or providing instructions to the caller after the request has entered the dispatch queue and the appropriate unit dispatched to the incident scene. Fire Department management has acknowledged that the change in dispatch protocols has increased response times.

Median turnout time increased as the ambulance deployment model changed. Turnout time is the time between an ambulance being dispatched and an ambulance crew reporting they are en route. MAST’s median turnout time ranged from 13 seconds to 16 seconds during fiscal years 2009 and 2010. After integration, the median ambulance turnout time started increasing; 28 seconds in May 2010, 34 seconds in May 2011, and 1 minute and 4 seconds in May 2012. By June 2012, the Fire Department’s median turnout time was 52 seconds slower than MAST’s May 2008, median turnout time. (See Exhibit 4.)

Exhibit 4. Median Ambulance Turnout Time May 2008 – June 2012



Source: CAD data and City Auditor’s Office calculations.

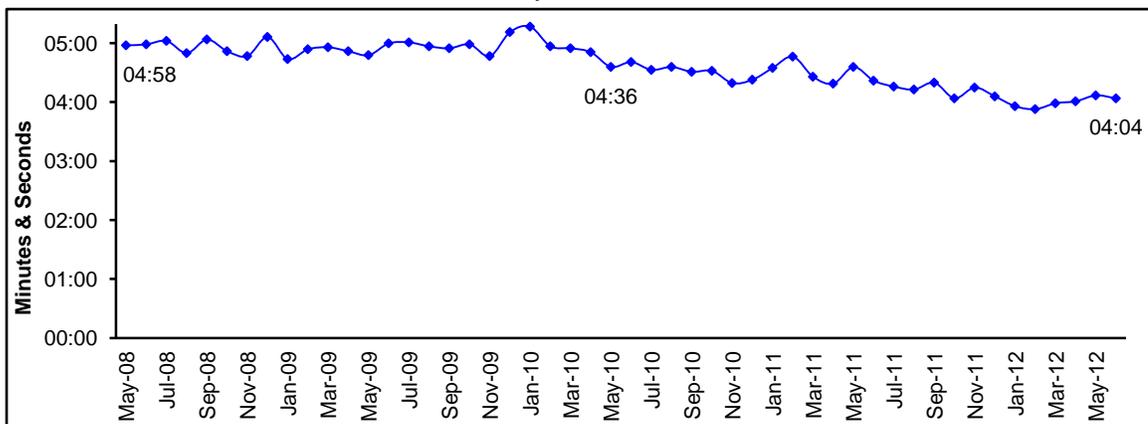
Following integration, the Fire Department phased in the use of static, 24-hour shifts and now has 22 ambulances on this type of shift. Ambulance crews on 24-hour shifts are posted to a specific fire station

rather than gas station or grocery store parking lots throughout the city.¹⁰ In addition to responding to emergencies, ambulance crews on 24-hour shifts re-stock their ambulance, clean the ambulance, perform light vehicle maintenance, or participate in training during their shift.

KCFD also has a number of dynamic posted ambulances on two types of shifts; 10 hours Monday through Thursday and 13.3 hours Friday through Sunday. There are generally seven dynamic posted ambulances in service on any given day and time of day. Crews in dynamic posted ambulances spend their shift in the ambulance and are moved to different fire stations in the urban core throughout their shift to meet the demand for ambulance services. Fire Department management said they recognized there would be some response delays due to increased turnout time with the changed deployment model.

Median ambulance drive time has been decreasing. Drive time is the time between an ambulance crew reporting they are en route and an ambulance crew reporting they have arrived at the scene. The median drive time for MAST in fiscal years 2009 and 2010, ranged from 4 minutes 44 seconds to 5 minutes 17 seconds. After integration, the median ambulance drive time started decreasing. Between fiscal years 2011 and 2012, KCFD’s median drive time ranged from 3 minutes 53 seconds to 4 minutes 46 seconds. By June 2012, the Fire Department’s median drive time was 54 seconds faster than MAST’s May 2008, median drive time. (See Exhibit 5.)

Exhibit 5. Median Ambulance Drive Time May 2008 – June 2012



Source: CAD data and City Auditor's Office calculations.

¹⁰ MAST posted ambulances in various locations, such as grocery store or gas station parking lots, throughout the city.

Recommendations

1. The interim fire chief should develop written policies and procedures directing that response time reports use the performance standard in city code when measuring performance.
2. The interim fire chief should take steps to ensure that the CAD system records ambulance response district information and that response times for ambulance response districts are measured.
3. The interim fire chief should develop written policies and procedures outlining how response times are calculated and specifying that the response time calculation formulas not use the time cleared field to replace arrival time or staged time when those fields are blank.
4. The interim fire chief should develop written policies and procedures outlining how the department protects the accuracy, completeness, and security of the data in the CAD system.
5. The city manager should define response time and clearly state when the response time clock starts and ends.

Appendix A

NFPA 1710 Response Time Segments and Performance Objectives for Emergency Medical Response

Ambulance Response Time Reporting

NFPA 1710 Response Time Segments and Performance Objectives for Emergency Medical Response

Time Segment	Definition	Performance Objective
Alarm Transfer Time	Begins with a call to the Public Safety Answering Point (PSAP)/9-1-1 and ends when the call is received at the communication center.	30 seconds, 95% achievement
Alarm Answering Time	Begins when the alarm is received at the communication center and ends when the alarm is acknowledged at the communication center.	15 seconds, 95% achievement 40 seconds, 99% achievement
Alarm Processing Time	Begins when the alarm is acknowledged at the communication center and ends when information is transmitted to the response facilities and units.	60 seconds, 90% achievement 90 seconds, 99% achievement
Turnout Time	Begins when the response facilities and units are notified and ends when the response units begin to travel.	60 seconds for EMS, 90% achievement
Travel Time	Begins when the response unit is en route and ends when the response unit arrives on the scene.	480 seconds for ALS unit, 90% achievement provided first responder AED/BLS unit arrived within 240 seconds, 90% achievement
Initiating Action/ Intervention Time	Begins after the response unit arrives on the scene and ends when emergency mitigation begins.	No performance objective set

Source: National Fire Protection Association 1710: Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments, 2010 Edition.

Definitions:

Advanced Life Support (ALS) – Emergency medical treatment beyond basic life support that provides for advanced airway management including intubation, advanced cardiac monitoring, defibrillation, establishment and maintenance of intravenous access, and drug therapy.

Basic Life Support (BLS) – A specific level of prehospital medical care provided by trained responders, focused on rapidly evaluating a patient's condition; maintaining a patient's airway, breathing, and circulation; controlling external bleeding; preventing shock; and preventing further injury or disability by immobilizing potential spinal or other bone fractures.

AED – Automatic External Defibrillator.

Ambulance Response Time Reporting

Appendix B

How MAST, KCFD, and the City Auditor's Office Calculated Ambulance Response Times

Ambulance Response Time Reporting

How Ambulance Response Times Were Calculated

MAST and KCFD calculated response times differently because MAST was allowed to exclude certain ambulance responses that exceeded the response time standard from its response time reports. MAST’s contract with the city included a provision allowing them to request the medical director consider excluding calls from the response time calculations due to weather related issues. The previous version of the city code identified reasons calls could be excluded, including unusual and unexpected adverse weather conditions, natural disaster, unusual and unexpected periods of extraordinary demand, or bridge closings and street closings that limited access.¹¹ These exclusions reduced the number of ambulance responses that exceeded the response time standard. The current city code does not include a provision allowing response time exclusions.

Fire Department management reported that other than the exclusions that MAST was allowed by city code and contract provisions, KCFD is using similar data queries and formulas to calculate ambulance response times. MAST and KCFD calculations both:

- used the same data fields to start and stop the response time clock
- excluded responses with a reassigned call disposition or were cancelled because of a closer unit or were test calls
- excluded responses from non-ambulance units

The department’s response time calculation is comprised of three time segments that are calculated and added together to determine total response time.

Response Time Intervals Used by KCFD

Time Interval	Description
Dispatch Time	The time between the first CAD keystroke after a call is answered and an ambulance is dispatched. Ambulance requests made through a CAD-to-CAD or radio request from another public safety entity bypass the call taking function and are placed directly in the dispatch queue. Dispatch time for those responses is the time between the request entering the dispatch queue and an ambulance being dispatched.
Turnout Time	The time between an ambulance being dispatched and an ambulance crew reporting they are en route.
Drive Time	The time between an ambulance crew reporting they are en route and an ambulance crew reporting they have arrived at the scene. Arrival time is determined by an ambulance arriving at the incident scene or being ‘staged’ nearby because access to the incident scene is restricted due to safety concerns. The response time clock is stopped when either of these conditions is met.

Source: KCFD.

We used MAST’s and KCFD’s method to re-calculate citywide ambulance response times with some slight differences. We did not exclude any ambulance responses as MAST, per contract and city code, was allowed to do. We did not use KCFD’s method of replacing values when the staged time or arrived time fields were blank. Our total response time calculation is based on the staged or arrived time less the time of the first CAD keystroke or the time the request entered the dispatch queue.

¹¹ Code of Ordinances, Kansas City, Missouri, Sec. 34-372(f) (*Ord. No. 071380, § 1, 12-13-07*).

Ambulance Response Time Reporting

Appendix C

Ambulance Response Time Performance, May 2008 - June 2012

Ambulance Response Time Reporting

Citywide Ambulance Response Time Performance, May 2008 – June 2012

Ambulance response time performance standard. Since 2007, Section 34-372 of the city code has required a citywide ambulance response time of nine minutes or less for 90 percent of all life threatening emergencies.¹²

City Auditor’s Office response time calculations. Because MAST’s and KCFD’s reported response times are not comparable, we re-calculated citywide ambulance response times for all responses to life threatening incidents from the raw data we obtained from the CAD system to make response times comparable over the review period. (See Appendix B for a more detailed description of how MAST, KCFD, and the City Auditor’s Office calculated response times.)

Ambulance Response Time Performance - Life Threatening Incidents - Fiscal Year 2009

Response Time (h:mm:ss)	May 2008	Jun 2008	Jul 2008	Aug 2008	Sep 2008	Oct 2008	Nov 2008	Dec 2008	Jan 2009	Feb 2009	Mar 2009	Apr 2009
0:01:00	0.4%	1%	0.5%	1%	1%	0.5%	1%	1%	2%	1%	1%	1%
0:02:00	2%	2%	2%	3%	2%	2%	2%	2%	3%	2%	2%	2%
0:03:00	7%	6%	6%	7%	7%	7%	6%	6%	7%	6%	6%	7%
0:04:00	17%	16%	15%	17%	16%	17%	16%	16%	19%	17%	16%	18%
0:05:00	32%	33%	30%	32%	30%	33%	34%	30%	36%	35%	34%	34%
0:06:00	49%	49%	48%	50%	48%	50%	52%	48%	54%	53%	52%	52%
0:07:00	66%	65%	63%	64%	64%	67%	69%	64%	70%	68%	66%	67%
0:08:00	78%	77%	75%	77%	76%	79%	81%	76%	81%	79%	79%	78%
0:09:00	86%	84%	84%	86%	85%	87%	88%	84%	89%	87%	88%	88%
0:10:00	91%	90%	89%	91%	90%	92%	92%	90%	93%	91%	92%	92%
0:11:00	94%	93%	93%	94%	94%	95%	95%	93%	96%	95%	95%	95%
0:12:00	96%	95%	95%	96%	96%	96%	97%	95%	97%	97%	97%	97%
0:13:00	97%	97%	97%	97%	97%	97%	98%	97%	98%	98%	98%	98%
0:14:00	98%	97%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%
0:15:00	98%	98%	98%	98%	98%	99%	98%	98%	99%	99%	99%	99%
0:16:00	99%	98%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
0:17:00	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
0:18:00	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
0:19:00	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	100%
0:20:00	99%	99%	100%	100%	100%	100%	100%	99%	99%	99%	99%	100%
0:25:00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
0:30:00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1:00:00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: CAD Data and City Auditor’s Office calculations.

¹² Ordinance 071380, 12/13/2007 and Ordinance 100122, 02/25/2010.

Ambulance Response Time Reporting

Ambulance Response Time Performance - Life Threatening Incidents - Fiscal Year 2010

Response Time (h:mm:ss)	May 2009	Jun 2009	Jul 2009	Aug 2009	Sep 2009	Oct 2009	Nov 2009	Dec 2009	Jan 2010	Feb 2010	Mar 2010	Apr 2010 ¹³
0:01:00	1%	2%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
0:02:00	2%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
0:03:00	7%	7%	6%	6%	7%	6%	7%	5%	5%	6%	7%	8%
0:04:00	17%	16%	16%	17%	18%	17%	17%	14%	14%	15%	17%	19%
0:05:00	34%	32%	30%	32%	34%	32%	36%	29%	28%	32%	34%	34%
0:06:00	52%	49%	48%	51%	51%	50%	55%	45%	45%	50%	51%	52%
0:07:00	68%	65%	65%	66%	68%	66%	70%	61%	62%	65%	67%	67%
0:08:00	80%	77%	78%	78%	79%	78%	82%	73%	75%	79%	79%	79%
0:09:00	88%	85%	86%	86%	87%	86%	89%	81%	82%	87%	87%	87%
0:10:00	92%	90%	91%	91%	91%	91%	94%	87%	88%	92%	92%	92%
0:11:00	95%	93%	94%	94%	94%	94%	96%	91%	92%	95%	95%	95%
0:12:00	97%	95%	96%	96%	96%	96%	97%	93%	95%	97%	97%	97%
0:13:00	98%	96%	98%	97%	97%	97%	98%	94%	96%	97%	98%	98%
0:14:00	98%	97%	98%	98%	98%	98%	99%	96%	97%	98%	98%	99%
0:15:00	99%	98%	99%	99%	98%	98%	99%	97%	98%	99%	98%	99%
0:16:00	99%	98%	99%	99%	99%	99%	99%	98%	98%	99%	99%	99%
0:17:00	99%	99%	99%	99%	99%	99%	99%	98%	99%	99%	99%	99%
0:18:00	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
0:19:00	100%	99%	99%	99%	99%	99%	100%	99%	99%	99%	99%	99%
0:20:00	100%	99%	100%	99%	99%	99%	100%	99%	99%	100%	99%	99%
0:25:00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
0:30:00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1:00:00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: CAD Data and City Auditor's Office calculations.

¹³ Ambulance services and the Fire Department were integrated on 04/25/2010.

Ambulance Response Time Performance - Life Threatening Incidents - Fiscal Year 2011

Response Time (h:mm:ss)	May 2010	Jun 2010	Jul 2010	Aug 2010	Sep 2010	Oct 2010	Nov 2010	Dec 2010	Jan 2011	Feb 2011	Mar 2011	Apr 2011
0:01:00	0.4%	0.4%	1%	0.3%	1%	1%	1%	1%	1%	1%	1%	1%
0:02:00	3%	2%	2%	1%	2%	2%	3%	2%	2%	2%	2%	3%
0:03:00	8%	6%	7%	6%	7%	7%	8%	7%	6%	7%	8%	9%
0:04:00	18%	16%	18%	18%	18%	18%	20%	20%	17%	19%	20%	22%
0:05:00	33%	31%	34%	33%	33%	33%	37%	37%	34%	34%	36%	38%
0:06:00	51%	48%	50%	48%	49%	50%	55%	52%	51%	48%	53%	56%
0:07:00	66%	62%	64%	62%	65%	63%	70%	67%	65%	62%	67%	69%
0:08:00	77%	74%	75%	74%	76%	76%	80%	79%	77%	74%	79%	80%
0:09:00	85%	83%	83%	83%	85%	85%	89%	86%	85%	82%	86%	87%
0:10:00	91%	88%	89%	90%	90%	90%	94%	92%	90%	88%	91%	92%
0:11:00	94%	92%	92%	93%	94%	94%	96%	95%	93%	92%	95%	95%
0:12:00	96%	94%	95%	96%	96%	96%	97%	97%	96%	94%	97%	97%
0:13:00	97%	96%	96%	97%	97%	97%	98%	98%	97%	96%	98%	98%
0:14:00	98%	97%	97%	98%	98%	98%	98%	98%	98%	97%	99%	98%
0:15:00	98%	98%	98%	98%	98%	99%	98%	98%	98%	97%	99%	99%
0:16:00	99%	98%	99%	98%	99%	99%	99%	99%	99%	98%	99%	99%
0:17:00	99%	99%	99%	98%	99%	99%	99%	99%	99%	98%	99%	99%
0:18:00	99%	99%	99%	99%	99%	99%	99%	99%	99%	98%	99%	99%
0:19:00	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	100%	99%
0:20:00	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	100%	99%
0:25:00	99%	100%	100%	99%	100%	100%	99%	100%	100%	99%	100%	100%
0:30:00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1:00:00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: CAD Data and City Auditor's Office calculations.

Ambulance Response Time Reporting

Ambulance Response Time Performance - Life Threatening Incidents - Fiscal Year 2012

Response Time (h:mm:ss)	May 2011	Jun 2011	Jul 2011	Aug 2011	Sep 2011	Oct 2011	Nov 2011	Dec 2011 ¹⁴	Jan 2012	Feb 2012	Mar 2012	Apr 2012
0:01:00	1%	1%	1%	0.5%	1%	1%	1%	0.4%	0.1%	0.2%	0.4%	0.3%
0:02:00	3%	2%	2%	2%	2%	2%	2%	1%	0.4%	1%	1%	1%
0:03:00	9%	8%	7%	8%	7%	6%	6%	3%	1%	2%	2%	2%
0:04:00	20%	21%	19%	22%	18%	21%	18%	11%	7%	7%	8%	8%
0:05:00	35%	37%	36%	38%	35%	38%	35%	25%	18%	19%	21%	20%
0:06:00	52%	53%	53%	55%	53%	56%	52%	41%	34%	35%	37%	36%
0:07:00	67%	67%	68%	69%	66%	68%	67%	55%	48%	49%	53%	52%
0:08:00	78%	78%	79%	79%	79%	78%	77%	68%	64%	64%	65%	64%
0:09:00	86%	86%	86%	88%	86%	86%	84%	78%	75%	74%	75%	75%
0:10:00	91%	92%	90%	92%	91%	92%	91%	85%	82%	81%	83%	82%
0:11:00	94%	94%	94%	94%	94%	95%	94%	89%	87%	87%	88%	87%
0:12:00	96%	96%	96%	96%	96%	97%	96%	91%	91%	90%	92%	90%
0:13:00	98%	97%	98%	97%	97%	98%	97%	93%	93%	93%	94%	93%
0:14:00	98%	98%	98%	98%	98%	99%	98%	94%	95%	95%	96%	94%
0:15:00	99%	98%	99%	98%	99%	99%	98%	95%	96%	96%	97%	96%
0:16:00	99%	99%	99%	99%	99%	99%	99%	96%	97%	97%	97%	97%
0:17:00	99%	99%	99%	99%	99%	99%	99%	97%	97%	97%	98%	97%
0:18:00	99%	99%	99%	99%	99%	100%	99%	97%	97%	98%	98%	97%
0:19:00	99%	99%	99%	99%	99%	100%	99%	98%	98%	98%	98%	98%
0:20:00	100%	99%	99%	99%	100%	100%	99%	98%	98%	98%	98%	98%
0:25:00	100%	100%	100%	100%	100%	100%	100%	99%	99%	99%	99%	99%
0:30:00	100%	100%	100%	100%	100%	100%	100%	99%	99%	99%	100%	99%
1:00:00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: CAD Data and City Auditor's Office calculations.

¹⁴ There is about a 3½ -hour period on December 13, 2011, without any CAD system records. This was the date the EMS and Fire CAD systems were consolidated.

Ambulance Response Time Performance - Life Threatening Incidents - Fiscal Year 2013

Response Time (h:mm:ss)	May 2012	Jun 2012
00:01:00	0.4%	0.3%
00:02:00	1%	1%
00:03:00	2%	2%
00:04:00	7%	7%
00:05:00	19%	20%
00:06:00	36%	36%
00:07:00	51%	54%
00:08:00	66%	67%
00:09:00	75%	77%
00:10:00	84%	85%
00:11:00	88%	90%
00:12:00	92%	93%
00:13:00	94%	95%
00:14:00	96%	95%
00:15:00	96%	97%
00:16:00	97%	97%
00:17:00	98%	98%
00:18:00	98%	98%
00:19:00	98%	98%
00:20:00	98%	99%
00:25:00	99%	99%
00:30:00	100%	100%
01:00:00	100%	100%

Source: CAD Data and City Auditor's Office calculations.

Ambulance Response Time Reporting

Appendix D

Interim Fire Chief's Response

Ambulance Response Time Reporting

CITY OF FOUNTAINS
HEART OF THE NATION



KANSAS CITY
MISSOURI

Interdepartmental Communications



Date: October 4, 2012

To: Gary White
City Auditor

From: Paul Berardi
Interim Chief of Department

Subject: Response To Auditor's Recommendations of Response Time Audit

KCFD appreciates the quality and detail of the work executed by the Auditor's staff in the preparation of this report and the crafting of its recommendation. We are in agreement with observations entered and the recommendations entered. To address each more specifically:

1. *The acting fire chief should develop policies and procedures directing that response time reports use the performance standard in city code when measuring performance.*

KCFD has reported these data regularly and will continue to do so. It is our intention to utilize the clarifications provided by this audit and its recommendations to ensure that such reports achieve and maintain full compliance and provide both utility and consistency in our efforts to progressively refine our system and enhance the service we deliver to our citizens. Specific policies will be developed and promulgated to memorialize that commitment and the processes required for reliable execution and delivery.

2. *The acting fire chief should take steps to ensure that the CAD system records ambulance response district information and that response times for ambulance response districts are measured.*

Modifications are currently underway to ensure that these data are recorded accurately and reliably retrievable from our data bases.

3. *The acting fire chief should develop written policies and procedures outlining how response times are calculated and specifying that the response time calculation formulas not use the cleared field to replace response time or staged time when those fields are blank.*

This recommendation will be implemented based on the City Manager's direction in implementing Recommendation 5. "Time cleared" will not be utilized as a proxy in those calculations.

4. *The acting fire chief should develop written policies and procedures outlining how the department protects the accuracy, completeness, and security of data in the CAD system.*

As the audit notes, existing practices are comprehensive and have been effective. These practices will be memorialized in written form to ensure continued efficacy and to allow for monitoring, refinement, and enhancement as indicated.

5. *The city manager should define response time and clearly state when the response time clock starts and ends.*

Establishing and maintaining both utility and consistency with respect to these data requires that workable, reliable, and replicable points be established to bracket the response time interval to be employed. The audit narrative notes the wide variability in intervals employed by various jurisdictions and the lack of uniformity in what standards and guidelines propose, and how changes in practices that shift these starting and stopping points rather than changes in performance have generated perceptions regarding response times in our system. Resolving this matter is a core element in allowing us to shift our focus toward enhancing the quality of the care we deliver, improving the outcomes we achieve through that care, and refining the efficiency and impact of the systems we use to deliver care to our citizens.

Utilizing the input and deliberation of the Emergency Medical Services Coordinating Committee and the Medical Director, a recommendation will be presented for the City Manager's consideration and adoption. Once the City Manager has established the parameters to be utilized, methods for measuring and reporting will be finalized in the form of written policies and procedures, implemented within the system, and reported regularly in appropriate venues.