

Running Head: RESPONSE TIMES

An Analysis of Response Times for the Colerain Township Department of Fire & EMS

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### Certification Statement

I hereby certify that this paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of another.

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## Abstract

The problem for the Colerain Township Department of Fire and EMS (Colerain Fire & EMS) was no quantifiable comparison for response time data, as compared to other standards or benchmarks, had been undertaken. The purpose of the Applied Research Project (ARP), using descriptive research, was to conduct a comparison against other standards or benchmarks in order to measure the potential impact of staffing reductions or station closures. The research focused on five questions: (a) what nationally recognized or locally adopted definitions exist for response time? (b) what nationally recognized standards or locally adopted performance measures exist for response time? (c) what current trends exist for Colerain Fire & EMS response times? (d) what factors significantly influence response times for Colerain Fire & EMS?, and (e) what impact may be realized for response times if staffing reductions or station closures became a reality? Principle procedures used included a review of the literature, analysis of data, a focus group, structured interviews, and three survey instruments. Results found Colerain Fire & EMS was under tremendous operational pressure and a reduction in resources would further erode the ability to provide emergency services according to long-standing, operationally tested benchmarks. Recommendations included redefining response time and adopting attainable benchmarks, placing mobile data computers (MDC's) in the transport units, using status buttons on the MDC's, ensuring accuracy of reporting, evaluating response time distribution for scheduling training activities, incorporating of Geographical Information System (GIS) capabilities, enhancing the current deployment and staffing model, and completing the accreditation process.

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## Introduction

Life safety, incident stabilization, property conservation, and customer stabilization have long been the priorities of the American fire service. The public then expects help to arrive quickly when they phone 911, regardless of the nature of the call. Response time, as we know it though, can be our ultimate ally or our fiercest enemy. If we arrive within normal and accepted practices we are faced with a greater probability of minimizing loss of life, keeping an incident to a minimum of alarms in order to control, property loss amounts that are nominal, and a return to normalcy as quickly as possible for our customer. If we arrive outside of normal accepted practices we are confronted with a greater probability of increased loss of life, incidents which may go to multiple alarms in order to control, property loss amounts that may be staggering, or the possibility that the customer may never be returned to a state of normalcy.

### **Statement of the Problem**

The problem is that no quantifiable comparison for response time data, as compared to nationally recognized standards or locally adopted performance measures, has been undertaken by Colerain Fire & EMS.

### **Purpose of the Study**

Therefore the purpose of this ARP is to conduct a quantifiable comparison for response time data against nationally recognized standards as well as locally adopted performance measures in order to measure the potential impact of staffing reductions or station closures.

### **Research Questions**

The following questions will be answered by the descriptive method of research: (a) what nationally recognized or locally adopted definitions exist for the term response time? (b) what nationally recognized standards or locally adopted performance measures exist for response

time? (c) what current trends exist for Colerain Fire & EMS response times? (d) what factors significantly influence response times for Colerain Fire & EMS?, and (e) what impact may be realized for response times if staffing reductions or station closures became a reality?

### Background and Significance

Colerain Township, located in northwestern Hamilton County, is the largest township in the state of Ohio geographically encompassing 42.9 square miles of land area and 0.3 square miles of water area. Population wise, Colerain Township is the second largest township in the state of Ohio with 58,499 permanent residents. It's estimated that the township population can exceed 100,000 during regular business hours.

Colerain Township is a local form of government in the state of Ohio governed by four elected officials: three trustees and a fiscal officer. A township administrator handles day-to-day operations within the township. Colerain Township is a full service township providing Administration, Police, Fire and EMS, Planning and Zoning, Parks and Services, Public Works, and a Community Center.

The topography of the township provides several challenges from an emergency services perspective. The terrain is generally rolling with the northwestern and western sections being moderately hilly. This terrain provides for an ill-defined north-south, east-west road network system. Secondly, access to properties and structures has been identified as a paramount concern in areas of moderately hilly terrain. Although this terrain is attractive for those seeking solace and seclusion, little consideration has been given for rapid fire or EMS response.

The Great Miami River bounds the township to the north and west. According to Public Services Director Kevin Schwartzhoff, the Great Miami River has approximately 11.3 miles of navigable waterway (personal communication, November 15, 2012). Access by the fire

department can be limited during times of minor and major flooding by the river and its tributaries thereby increasing response times.

Figure 1

*Colerain Township Topographical Map*



Colerain Fire & EMS is the sole provider of fire and EMS to Colerain Township.

Colerain Fire & EMS is a *combination* fire department consisting of 53 career and 134 part-time paid personnel, two career and one part-time paid civilian personnel. Colerain Fire & EMS maintains an Insurance Services Office (ISO) Class 2 rating. Colerain Fire & EMS was the first

township fire department in the State of Ohio to achieve a Class 4 (1975), Class 3 (1985) and Class 2 (1997) ISO ratings. Coincidentally, we were reevaluated in 2011 by ISO and successfully maintained our Class 2 rating. However, it was determined by ISO that Colerain Fire & EMS was in need of a sixth station, Appendix A; also, a second ladder company, Appendix B.

Maximum daily staffing is 33 personnel with 15 career and 18 part-time paid personnel. Colerain Fire & EMS provides emergency services from five strategically placed fire stations which include five Advanced Life Support (ALS) engine companies, one Basic Life Support (BLS) ladder company, four BLS ambulances, two ALS chase units, one heavy rescue, and two water tankers. Figure 1 is a graphical representation of the current fire station locations and their respective first due response areas. Table 1 details the current personnel deployment for Colerain Fire & EMS.

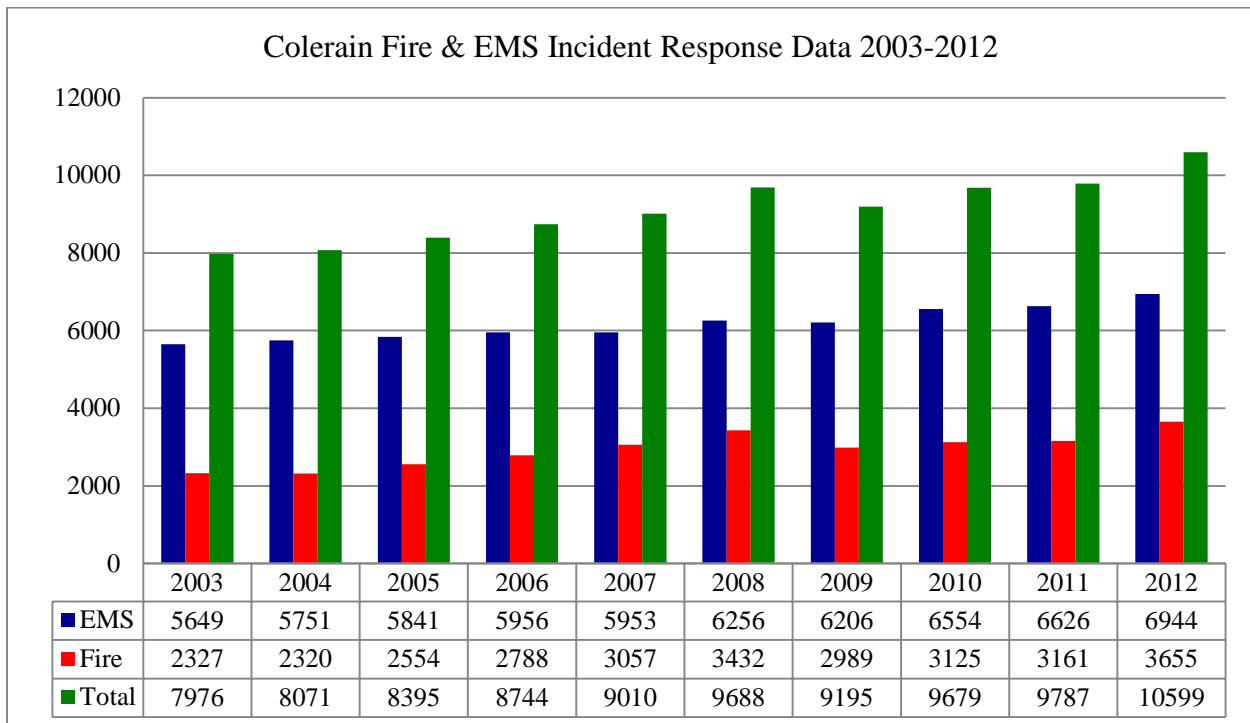


Apparatus at Colerain Fire & EMS is cross-staffed. The definition for cross-staffed are personnel being assigned to multiple units: an example being assigned to Squad 25 and Engine 25 simultaneously. By doing so only four personnel, two for Squad 25 and two for Engine 25, are required rather than six personnel, two for Squad 25 and four for Engine 25. Cross-staffing effectively reduces the number of personnel required to be on duty thereby reducing personnel expenditures.

From 2003 to 2012 Colerain Fire & EMS has realized a 25% increase in combined incident responses. EMS incident responses have increased by 19% and fire incident responses have increased by 36%. Figure 3 details incident responses from 2003 through 2012.

Figure 3

*Incident Responses 2003-2012*



Realistic and attainable performance measures are an important indicator of an organizations ability to meet its responsibility to provide an effective service. Previous

performance measurements for Colerain Fire & EMS have included a goal of 90% of incident responses within four minutes, as established by the township board of trustees in 1999. This was deemed neither practical nor cost effective by the administrative staff. Appendix C illustrates the graphic location of the required number of fire stations in order to meet 90% of incident responses within four minutes. In the *Colerain Township Department of Fire & EMS Master Plan Report 2001 – 2010* a more attainable performance measurement of 90% of incident responses within four to six minutes was deemed realistic (Cook, Fortunski, Koeniger, & Miller, 2001). Present day, Colerain Fire & EMS utilizes a performance measurement of 79% of incident responses in less than six minutes.

However, whilst conducting the research for this ARP, and in preparation for a presentation detailing alternate staffing plans while comparing 2003 and 2012 EMS response times, it was determined that our methodology for calculating our performance measurement was imperfect. Previously, reports were generated to include the six-minute mark. However, it was determined that the six-minute mark included all incidents up to six minutes and fifty-nine seconds. Therefore, we have long been calculating an additional minute into our performance standard. This in of itself has had a drastic effect on our stated performance measurement of 79% of incident responses in less than six minutes. As an example in 2003 it was calculated that 85% of EMS incidents were reached in less than six minutes; 77% is the correct total. In 2012 it was calculated that 77% of EMS incidents were reached in less than six minutes; 63% is the correct total. This will be explored further in the results section of this ARP.

Reductions in state revenue as part of the 2011 biennial budget has eliminated three major sources of funding from the township general fund. The Local Government Fund has been cut by 50% or approximately \$400,000 annually. The Estate Tax will be eliminated in 2013 or

approximately \$1,200,000 annually. Finally, the Tangible Personal Property Tax will be eliminated in 2013 or approximately \$32,000 annually (Rowan, 2013). This has resulted in a number of significant changes to the township in respect to services provided, in particular those that are funded via the general fund. Colerain Fire & EMS operates within the confines of voted upon tax levies and does not utilize monies from the general fund.

The Colerain Fire & EMS budget proposal for 2013 was \$12,365,540. A 7.34% increase over 2012. \$750,000 of the proposed budget increase was for replacement of a 1989 Emergency One (E-One) Hush pumper and a 1993 E-One Hush pumper. However, the replacement of these two frontline pumpers has been placed on hold indefinitely.

Monies are generated from two voted upon tax levies with an effective millage rate of 9.06 mills. One mill generates approximately \$1,138,464.67. Additional revenue is generated via EMS billing, donations, grants, and revenue sharing partnerships with other organizations.

Colerain Fire & EMS has had a history of being prudent with taxpayer dollars as evidenced by its ability to stretch tax levies beyond their expected cycle. In 1990 a tax levy was passed and no additional funds were requested until 2000. In 2010 a five-year plan was developed and agreed upon with a minimal increase of .83 mills that was approved by voters.

Not unlike many other safety service organizations since the economic downturn in 2008, Colerain Fire & EMS has been impacted by a number of economic factors including declining property values and changes in funding at the local government level. Property devaluation at the time of the 2010 levy resulted in a loss of approximately \$500,000 annually, which essentially negated the .83 mill increase. Loss of revenue from elimination of the Tangible Personal Property Tax is estimated to be \$750,000 annually. Therefore Colerain Fire & EMS has realized a \$1,250,000 annual loss in revenue. This has resulted in a number of cost saving

measures in an attempt to maintain our operational capabilities. Vacated positions have remained unfilled or been eliminated, additional career personnel have not been hired, apparatus replacements have not taken place, career personnel forewent contractual pay raises for two years, and other measures have been implemented to streamline the department while demands for service have increased.

Early in the spring of 2012 Colerain Fire & EMS was tasked with conducting a benchmarking study with a selected peer group of 13 departments within the states of Ohio and Kentucky. While conducting the benchmarking study we were directed to include in our final version a plan to reduce the annual fire and EMS budget by \$1,000,000 annually (Chief B. Smith, personal communication, 5/9/2012). The outcome of this project culminated with a presentation to the township Financial Advisory Committee (FAC) on May 16, 2012.

Following this Colerain Fire & EMS was tasked with conducting a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis. The outcome of this project culminated in a presentation to the Board of Trustees on August 6, 2012. It was noted in this presentation that a reduction in the fire and EMS budget by \$1,000,000 annually could result in personnel reductions, station closures, and a reduction in the quality and efficiency of service provided.

The next step in the process was to develop alternate staffing plans in order to show what the department would look like with an annual budget reduction of \$1,000,000; \$1,500,000; \$2,000,000, and \$2,500,000. Work on this project commenced in early December 2012 and culminated with a presentation to the Board of Trustees on May 28, 2013 and a Town Hall meeting on June 4, 2013. Results of this project determined Colerain Fire & EMS could be

required to cut staffing from anywhere between seven and eighteen positions daily and close at least one station depending upon the level of funding reduction.

Therefore the purpose of this Applied Research Project (ARP) will be to define for the reader the definition of response time, quantify existing standards and performance measurements, measure our own data, and review contributing factors in order to quantitatively measure the effect of staffing reductions or station closures on response times.

### **EFOP Course Linkage**

This (ARP) is relevant to the following unit presented in the National Fire Academy's *Executive Analysis of Fire Service Operations in Emergency Management* course: Unit 1: Terminal objective, "The students will be able to analyze their department's and community's level of preparedness" (USFA, EAFSOEM SM, p. 1-1).

This ARP is relevant to the USFA Strategic Plan Fiscal Years 2010-2014 Goal Two "Improve local planning and preparedness", Objectives "Increase fire service personnel participation in local planning and preparedness processes", "Expand the use of modern data and information analysis in planning and preparedness", and "Enhance the fire and emergency services' performance in response to all hazards" (USFA, n.d., p. 23).

### Literature Review

This literature review will focus on the following fundamental themes. First, defining the term response time and its components for the purposes of this ARP. Second, reviewing the current scope of standards and performance measures relative to response time. Lastly, what factors may influence response times either positively or negatively.

According to *TheFreeDictionary* response time is defined as "the time that elapses between a stimulus and the response to it" and the time interval is "a definite length of time

marked off by two instants” (2013). Universal and consistent application should yield comparable results amongst separate entities. However, the term response time is plausibly one of the most inconsistently applied measurement periods in the fire service. When comparing “apples to apples” it proves difficult to do so amongst organizations when a term can have more than one definition or several different components.

The 2010 edition of the National Fire Protection Association (NFPA) 1710: Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments contains several terms directly related to response times as well as a definition for total response time:

**3.3.53.1 Alarm Answering Time.** The time interval that begins when the alarm is received at the communication center and ends when the alarm is acknowledged at the communication center.

**3.3.53.2 Alarm Handling Time.** The time interval from the receipt of the alarm at the primary PSAP until the beginning of the transmittal of the response information via voice or electronic means to emergency response facilities (ERFs) or the emergency response units (ERUs) in the field.

**3.3.53.3 Alarm Processing Time.** The time interval from when the alarm is acknowledged at the communication center until response information begins to be transmitted via voice or electronic means to emergency response facilities (ERFs) and emergency response units (ERUs).

**3.3.53.4 Alarm Transfer Time.** The time interval from the receipt of the emergency alarm at the PSAP until the alarm is first received at the communication center.

**3.3.53.5\* *Initiating Action/Intervention Time.*** The time interval from when a unit arrives on the scene to the initiation of emergency mitigation.

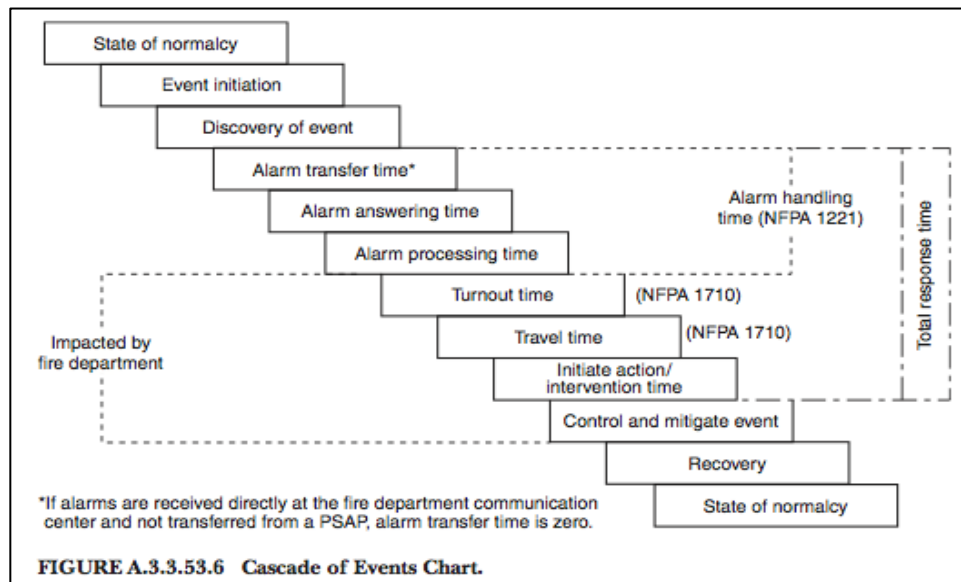
**3.3.53.6\* *Total Response Time.*** The time interval from the receipt of the alarm at the primary PSAP to when the first emergency response unit is initiating action or intervening to control the incident.

**3.3.53.7 *Travel Time.*** The time interval that begins when a unit is en route to the emergency incident and ends when the unit arrives at the scene.

**3.3.53.8 *Turnout Time.*** The time interval that begins when the emergency response facilities (ERFs) and emergency response units (ERUs) notification process begins by either an audible alarm or visual annunciation or both and ends at the beginning point of travel time. (NFPA, 2009, p. 7)

NFPA 1710 is not based upon a research foundation, but is a consensus standard with a majority vote. Membership is voluntary and fire departments are not required to adhere to the terminology nor definition for total response time contained within NFPA 1710. However, NFPA 1710 has become the *de facto* benchmark for the fire service community. Figure 4 is the cascade of events chart found within NFPA 1710. The chart clearly defines total response time and that portion of total response time directly impacted by the fire department.

Figure 4



Source: NFPA 1710: Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments; 2009.

The Commission on Fire Accreditation International (CFAI) uses a similar methodology as NFPA 1710 for its terminology and definition for total response time:

**Event Initiation** – the point at which factors occur that may ultimately result in an activation of the emergency response system. Precipitating factors can occur seconds, minutes, hours, or even days before a point of awareness is reached. A patient who ignores chest discomfort for days until it reaches a critical point, at which the patient makes a decision (Point of Awareness) to seek assistance. Rarely is it possible to quantify the point at which event initiation occurs.

**Emergency Event** – The point at which an awareness of conditions exists that requires an activation of the emergency response system. Considered the Point of Awareness, it may be the recognition by an individual that assistance is needed, or it may consist of a mechanical or electronic recognition of an event such as smoke or heat detector activation.

**Alarm** – the point at which emergency response system activation is initiated. The transmittal of a local or central alarm to public safety answering point is an example of this time point. Again it is difficult to determine with any degree of reliability the time interval during which this process occurs.

**Notification** – the time point at which an alarm is received and acknowledged at a communications center. This transmittal may take the form of an electronic or mechanical notification to the point at which a call is received and answered in the public safety answering point.

**Alarm Processing** – the time interval from when the alarm is acknowledged at the communications center until response information begins to be transmitted via voice or electronic means to emergency response facilities (ERFs) and emergency response units (ERUs.) The benchmark for this element of time is 60-seconds for 90% of events.

**Turnout Time** – the time interval that begins when the emergency response facilities (ERFs) and emergency response units (ERUs) notification process begins by either an audible or visual annunciation or both and ends at the beginning point of travel time. For staffed fire stations the benchmark is 80 seconds for fire and special operations response and 60 seconds for EMS response, for 90% of events.

**Travel Time** – the time interval that begins when a unit is en route to the emergency and ends when the unit arrives at the scene. This can generally be interpreted as from wheels rolling to wheels stopped. When conducting simulated analysis, travel time is based upon 35 mph average or 53.1 feet/second. The benchmark for travel time, is 240 seconds or less travel time for the arrival of the first engine company at a fire suppression incident and 480 seconds or less travel time for the deployment of an initial full alarm assignment

at a fire suppression incident; 240 seconds or less travel time for the arrival of a unit with first responder with automatic defibrillator (AED) or higher capability at an emergency medical incident. The benchmark performance is 90% achievement of travel time objectives.

**On-Scene Time** – time point at which the responding unit arrives on the scene.

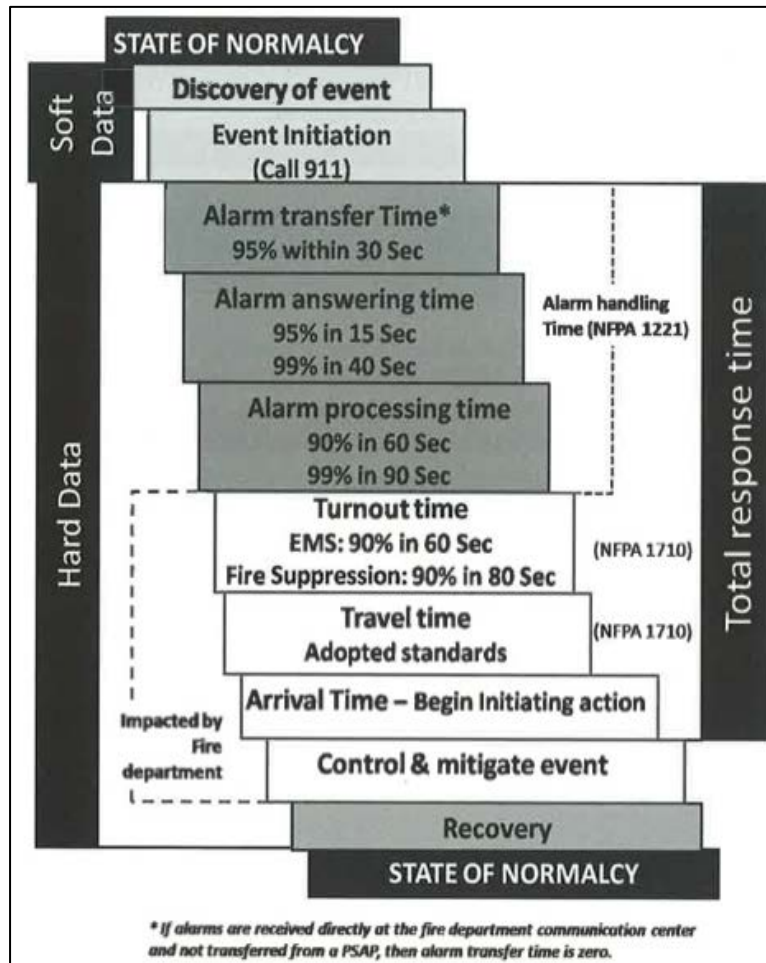
**Initiating Action** – the time interval from when a unit arrives on the scene to the initiation of emergency mitigation. May include size-up, resource deployment, etc.

**Termination of Incident** – time point at which unit(s) have completed the assignment and are available to respond to another assignment or emergency request.

**Total Response Time** – the time interval from the receipt of the alarm at the primary PSAP to when the first emergency response unit is initiating action or intervening to control the incident. (Center for Public Safety Excellence [CPSE], 2009, pp. 68-69)

Figure 5 is the cascade of events chart used by CFAI, which once again is similar in nature to the NFPA 1710 cascade of events chart.

Figure 5



Source: CPSE: Fire & Emergency Service Self-Assessment Manual; 8<sup>th</sup> Edition; 2009.

For accreditation purposes response time is signified as alarm answering time through arrival on the scene. Three definitive components are included: alarm handling, turnout, and travel time (CPSE, 2009). While only a small fraction of organizations have gone through the accreditation process more and more organizations are focusing on the creation of a “standards of coverage” document. CFAI makes no explicit recommendations but rather encourages a thorough risk assessment of the community, examines public expectations and determines what

resources would be required to meet the given risks. In addition, a portion of the methodology is to look at what other similar communities may be doing. The cascade of events chart clearly defines total response time and that portion of total response time directly impacted by the fire department.

Further review of the literature found that Bruegman (2009) uses the following measurement continuum that is comprised of 11 different phases:

*Event initiation point.* The point at which factors occur that may ultimately result in an activation of the emergency response system. Precipitating factors can occur seconds, minutes, hours, or even days before a point of awareness is reached. An example is the patient who ignores chest discomfort for days until it reaches a critical point at which he or she makes the decision to seek assistance.

*Emergency event awareness.* The point at which a human being or technological sentinel (i.e., smoke alarm, infrared heat detector, etc.) becomes aware that conditions exist requiring an activation of the emergency response system.

*Alarm.* The point at which awareness triggers notification of the emergency response system. An example of this point is the transmittal of a local or central alarm to a public safety answering point. Again, it is difficult to determine the time interval during which this process occurs with any degree of reliability. The alarm transmission interval lies between the awareness point and the alarm point. This interval can be significant, as when the alarm is transmitted to a distant commercial alarm monitoring organization, which then retransmits the alarm to the local 9-1-1 dispatch facility. When there is an automatic transmission of the signal, the fire department gains valuable time in controlling the event. An example of this situation occurs in many jurisdictions when 9-

1-1 is called from a hard-wired monitored smoke detector, which often goes to a central answering point and is then rerouted to the appropriate dispatch center.

*Notification.* The point at which an alarm is received by the public safety answering point (**PSAP**). This transmittal may take the form of electronic or mechanical notification received and answered by the PSAP.

*9-1-1 dispatch time.* The time between the first ring of the 9-1-1 telephone at the dispatch center and the time the computer-aided dispatch (CAD) operator activates station and/or company alerting devices (also referred to as the **alarm processing time**). This can, if necessary, be broken down into two additional parameters: *call taker interval* (the interval from the first ring of the 9-1-1 telephone until the call taker transfers the call to the fire department dispatcher) and *dispatcher interval* (the interval from the time when the call taker transfers the call to the dispatcher until the dispatcher/CAD operator activates station and/or company alerting devices).

*Turnout time.* The interval between the activation of the station and/or company alerting devices and the time when the responding crew are aboard the apparatus and the apparatus is beginning to roll toward the call, as noted by the mobile computer terminal by voice to dispatch that the company is responding.

*Travel time.* The point at which the responding apparatus signals the dispatch center that it is responding to the alarm and ends when the responding unit notifies the dispatcher that it has arrived on scene (again, via voice or mobile computer terminal notification).

*On-scene time.* The point at which the responding unit arrives on the scene of the emergency.

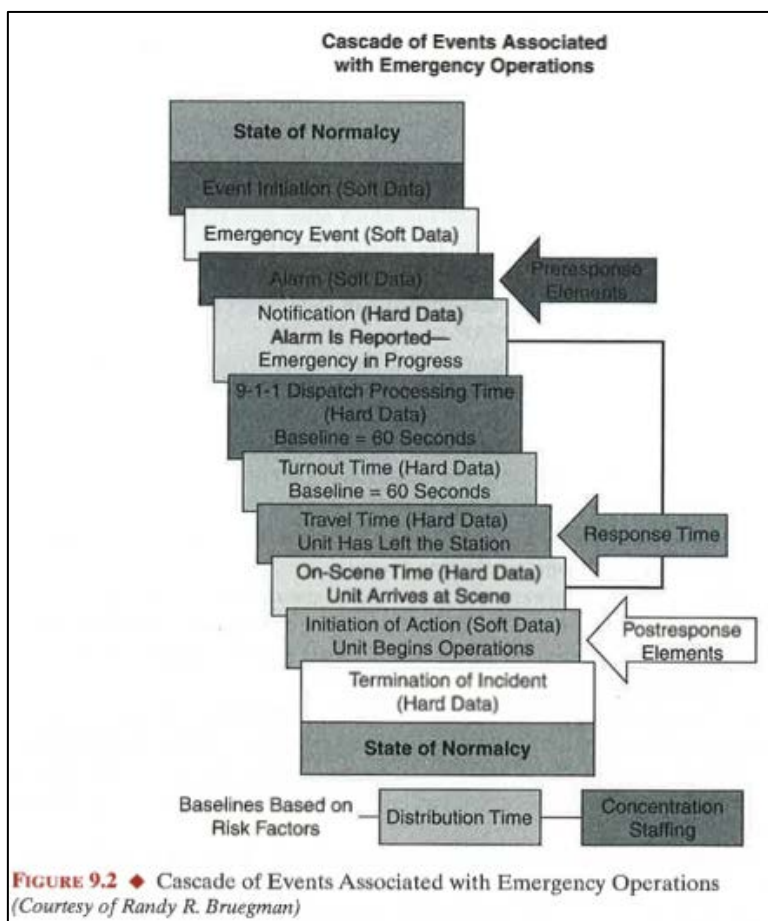
*Initiation of action.* The point at which operations to mitigate the event begin. This may include size-up, resource deployment, and so forth.

*Termination of incident.* The point at which the unit(s) have completed the assignment and are available to respond to another request for service.

*Total response time.* Alarm processing time plus turnout time plus travel time. (pp. 405-406)

Figure 6 is the cascade of events chart associated with emergency operations as prescribed by Bruegman.

Figure 6



Source: Bruegman: Fire Administration; 2009.

The cascade of events chart is comprised of preresponse, response, and postresponse elements. Total response time is defined as alarm processing + turnout time + travel time.

Additional review found that Ammons (2009) partitions response time into five distinct segments:

*Dispatch time*, during which the call is received, the message interpreted, and appropriate units selected and dispatched;

*Turnout time*, during which crews receive the information and prepare to leave the station;

*Travel time*, from the station to the scene (i.e. from “wheel start to wheel stop”);

*Access time*, the interval required to climb stairs, reach the interior of a mall, and so forth;

*Set-up time*, involving crew deployment and apparatus placement. (p. 122)

Organizations may combine or alter portions of this strategy for their own reporting purposes. For example, 911 call for help to dispatch of an emergency unit and dispatch of an emergency unit to its arrival at the scene of the emergency.

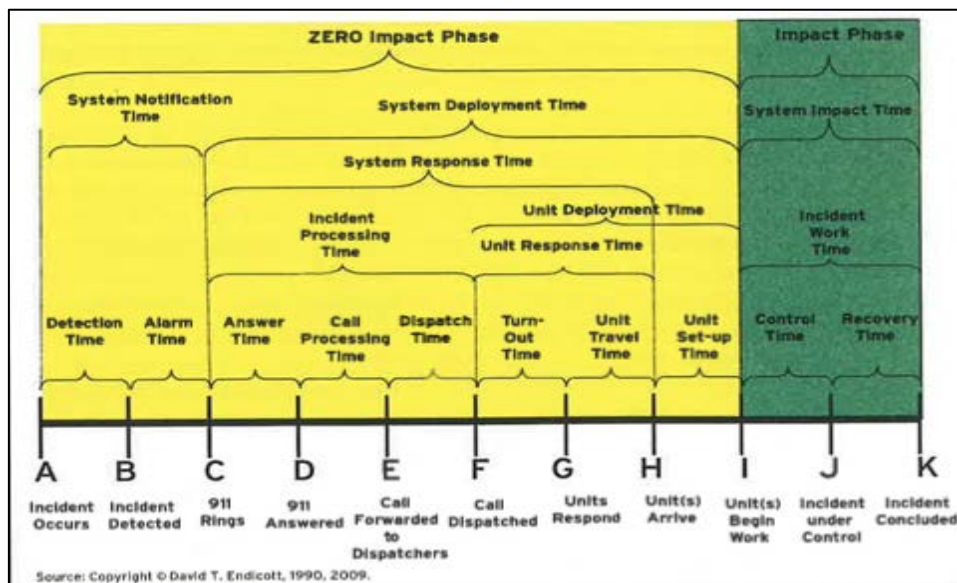
Continued review found that Thiel & Jennings (2012) use a slightly different approach that is more customer based (p. 403) than NFPA (2009); CPSE (2009); Bruegman (2009); or Ammons (2009). Eleven critical data points are identified:

- Incident occurs
- Incident is detected
- Incident is reported (911 rings)
- Call is answered
- Call is transferred to dispatcher
- Call is dispatched

- Unit(s) respond(s)
- Unit(s) arrive(s)
- Unit(s) set(s) up and begin(s) work
- Incident is under control
- Incident ends (pp. 402-403).

Rather than focusing on elements that may be easy for an organization to collect, the attention here is customer focused. The reporting emphasis is based upon the “expectation clock” of the customer. Figure 7 is a sample emergency incident time line and associated intervals.

Figure 7



Source: Thiel & Jennings: Managing Fire and Emergency Services; 2012.

Each interval may have established performance expectations and tracking of each will allow a better understanding of where deficiencies may exist within the system. Although some elements may be difficult to track, by doing so it may more accurately depict the customer’s

interpretation of response time; one in which the only time that matters is from when the phone rings in the communications center to when help arrives at their side.

Finally, the Insurance Services Office (ISO) (2007) does not have a definition for response time nor does it measure or use historical data for response times because, “Many fire departments lack accurate and reliable response-time information, and there is no standardized national recordkeeping system ...” (para. 7).

In review, terminology used is somewhat consistent throughout the literature search in respect to response time (NFPA, 2009; CPSE, 2009; Bruegman 2009; Ammons, 2009; Thiel & Jennings, 2012). The definition of total response time differs amongst sources to a varying degree (NFPA, 2009; CPSE, 2009; Bruegman 2009; Ammons, 2009; Thiel & Jennings, 2012). ISO does not have a response time definition nor measure response times; instead a distribution system is used for engine and ladder-service companies (ISO, 2007). The terminology within response time that can be directly controlled by the fire department includes turnout time, travel time, initiation of action, and mitigation of the incident.

Alarm handling is that portion of total response time according to the literature search that Colerain Fire & EMS does not report nor control. For the purposes of this ARP total response time shall be defined as dispatch of the emergency unit and its arrival on the scene of the emergency incident. The two components of response time included in this definition are turnout time and travel time.

The ability to positively influence the outcome of a structure fire or cardiac arrest is indisputable and predictable. Studies have shown that fires contained to the object or room of origin benefit from quicker response times (United States Department of Homeland Security, 2006). Appendix K is the time versus products of combustion curve that is based upon national

averages. However, new data may indicate that time to flashover is potentially shorter than noted. Furthermore, Ludwig (2004) stated, “a victims chances of survival are reduced by 7%-10% with every minute that passes without defibrillation and advanced life support intervention” (para. 7). A time versus defibrillation success chart predictably shows patients who receive no such treatment within ten minutes typically experience “brain death”, with survival rates near zero percent. So, while the speed of response is not directly indicative of outcome or quality, response times do affect the value of property losses averted and the number of lives saved.

The next step then in the literature search was to review what current standards or performance measures exist for response time. NFPA 1710 is the most widely recognized standard used in response time analysis. The 2010 edition uses the following objectives in its standard for career departments for alarm handling, turnout, and travel time based upon a cascade of events:

**4.1.2.1** The fire department shall establish the following objectives:

- (1) Alarm handling time to be completed in accordance with 4.1.2.3.
- (2) 80 seconds for turnout time for fire and special operations response and 60 seconds turnout time for EMS response
- (3)\*240 seconds or less travel time for the arrival of the first arriving engine company at a fire suppression incident and 480 seconds or less travel time for the deployment of an initial full alarm assignment at a fire suppression incident
- (4) 240 seconds or less travel time for the arrival of a unit with first responder with automatic external defibrillator (AED) or higher-level capability at an emergency medical incident

(5) 480 seconds or less travel time for the arrival of an advanced life support (ALS) unit at an emergency medical incident, where this service is provided by the fire department provided a first responder with AED or basic life support (BLS) unit arrived in 240 seconds or less travel time. (NFPA, 2009, p. 7)

Dispatching of calls is broadened in 4.1.2.3 with the following:

**4.1.2.3.1** The fire department shall establish a performance objective of having an alarm answering time of not more than 15 seconds for at least 95 percent of the alarms received and not more than 40 seconds for at least 99 percent of the alarms received, as specified by NFPA 1221.

**4.1.2.3.2** When the alarm is received at a public safety answering point (PSAP) and transferred to a secondary answering point or communication center, the agency responsible for the PSAP shall establish a performance objective of having an alarm transfer time of not more than 30 seconds for at least 95 percent of all alarms processed, as specified by NFPA 1221.

**4.1.2.3.3** The fire department shall establish a performance objective of having an alarm processing time of not more than 60 seconds for at least 90 percent of the alarms and not more than 90 seconds for at least 99 percent of the alarms, as specified by NFPA 1221.

**4.1.2.4** The fire department shall establish a performance objective of not less than 90 percent for the achievement of each turnout time and travel time objective specified in 4.1.2.1. (p.7)

In order to evaluate the efficacy in the level of service provided, NFPA 1710 recommends the following annual assessments:

**4.1.2.5.1\*** The fire department shall evaluate its level of service and deployment delivery and alarm handling time, turnout time, and travel time objectives on an annual basis.

**4.1.2.5.2\*** The evaluations shall be based on emergency incident data relating to level of service, deployment, and the achievement of each time objective in each geographic area within the jurisdiction of the fire department.

**4.1.2.6** The fire department shall provide the AHJ with a written report annually.

**4.1.2.6.1** The annual report shall define the geographic areas and/or circumstances in which the requirements of this standard are not being met.

**4.1.2.6.2** The annual report shall explain the predictable consequences of these deficiencies and address the steps that are necessary to achieve compliance. (NFPA, 2009, p. 7)

CFAI has published response times as well. The eighth edition of the Fire and Emergency Self-Assessment Manual was published in 2009. Response time objectives are likewise based upon a cascade of events. CFAI differs from NFPA in that various baselines and benchmarks exist rather than a one size fits all approach. According to CPSE (2009) response time is defined as alarm handling + turnout time + travel time. Alarm handling has a 60 second/90% benchmark, 90 second/90% baseline; turnout time a 80 second/90% benchmark fire and special operations, 60 second/90% benchmark EMS, 90 second/90% baseline; and travel time based upon risk categories for service area and/or population density (p. 70). Several service area categories exist with urban, suburban and rural service areas being pertinent for this ARP. Table 2 is a compilation of these three service areas.

Table 2

<b>Urban</b> – an incorporated or unincorporated area with a population of over 30,000 and/or a population density over 2,000 people per square mile.				
	<b>1<sup>st</sup> Unit</b>	<b>2<sup>nd</sup> Unit</b>	<b>Balance of a 1<sup>st</sup> Alarm</b>	<b>Performance</b>
Benchmark	4 minutes	8 minutes	8 minutes	90%
Baseline	5 minutes / 12 seconds	10 minutes / 24 seconds	10 minutes / 24 seconds	90%
<b>Suburban</b> – an incorporated or unincorporated area with a population of 10,000 to 29,999 and/or any area with a population density of 1,000 to 2,000 people per square mile.				
	<b>1<sup>st</sup> Unit</b>	<b>2<sup>nd</sup> Unit</b>	<b>Balance of a 1<sup>st</sup> Alarm</b>	<b>Performance</b>
Benchmark	5 minutes	8 minutes	10 minutes	90%
Baseline	6 minutes / 30 seconds	10 minutes / 24 seconds	13 minutes	90%
<b>Rural</b> - an incorporated or unincorporated area with total population less than 10,000 people, or with a population density of less than 1,000 people per square mile.				
	<b>1<sup>st</sup> Unit</b>	<b>2<sup>nd</sup> Unit</b>	<b>Balance of a 1<sup>st</sup> Alarm</b>	<b>Performance</b>
Benchmark	10 minutes	14 minutes	14 minutes	90%
Baseline	13 minutes	18 minutes / 12 seconds	18 minutes / 12 seconds	90%

Source: CPSE: Fire & Emergency Service Self-Assessment Manual; 8<sup>th</sup> Edition; 2009.

ISO (2007) uses a distribution system for fire companies based upon the developed areas of the community. A first-due engine company should be located within 1.5 road miles and a ladder-service company within 2.5 road miles of the community’s developed area (para. 1). The standard arrival time based upon these criteria is 3.2 minutes for an engine company and 4.9 minutes for a ladder-service company (para. 2). The RAND Corporation based these times upon a formula. Taken into consideration with the formula is “average terrain, average traffic, weather, and slowing down for intersections” (para. 3). The formula is contained in Table 3.

Table 3

$T = 0.65 + 1.7D$
T = time in minutes to the nearest 1/10 of a minute
0.65 = a vehicle acceleration constant for the first 0.5 mile traveled
1.7 = a vehicle-constant validated for response distances ranging from 0.5 miles to 8.0 miles.
D = distance
Example: for a response of 2.5 miles $T = 0.65 + 1.7(2.5) = 4.9$ minutes

Source: ISO, 2007.

Additional standards include NFPA 1221: Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems. NFPA 1221 is referenced in NFPA 1710 sections 4.1.2.3.1 through 4.1.2.3.3 (NFPA, 2009). Also, the Association of Public Safety Commission Officials (APCO) serves the needs of public safety communication centers and operators. The mission of APCO is “an international leader committed to providing complete public safety communications expertise, professional development, technical assistance, advocacy and outreach to benefit our members and the public” (n.d.). According to Shawn Cruze (personal communication March 7, 2013), Technical Services Manager for the Hamilton County Communications Center (HCCC), the national standard prescribed by APCO is the standard used for fire and emergency medical dispatching in Hamilton County. The benchmark allowable time is 90 seconds measured from call to dispatch. The average call time for emergency medical incidents is 65 seconds. Minimums of three percent of EMS incidents are reviewed each month and one fire incident per employee is reviewed bi-monthly.

The major emphasis to this point in the literature search has been fire related emergency incident response times. However, EMS responses are approximately 85% of the total incident responses at Colerain Fire & EMS and therefore worthy of review also. Keys to the mission then are level of service provided and the time required for delivery of the service.

Ludwig (2004) noted “there is no federal law regarding response times, and, after doing thorough research, I cannot find any state laws that pertain to response times” (para. 2). Political subdivisions and private EMS providers enter into the majority of contractual agreements and ordinances that do exist regarding response times. What actually influences fire department based EMS response time philosophy is consensus standards (para. 3).

NFPA 1710: Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments is a consensus standard for response times to medical operations. According to NFPA (2009) all EMS calls should have a turnout time of one minute and a first responder unit or higher level arrive within four minutes or less 90 percent of the time. Furthermore, an ALS unit should arrive within eight minutes 90 percent of the time if ALS service is provided.

The National Institutes of Health (NIH) according to Buckman (2006) has promulgated standards as well for first response units and ALS units. “As a rule of thumb, a first responder should arrive on the scene less than 5 minutes from the time of dispatch on 90% of such calls. This will generally result in a median first responder response time of 2 to 3 minutes” (p. 387). ALS unit response should be “90% of all top priority calls in all sectors of a city should receive an ALS response to the scene in less than 8 minutes from the time of dispatch. This generally results in a median response time of 4 to 5 minutes” (p.387).

Time is of the essence for sudden cardiac arrest (SCA). The American Heart Association (AHA) 2005 guidelines for Cardiopulmonary Resuscitation (CPR) emphasize the importance of shortening response times to suspected SCA. Furthermore, EMS systems should identify delays in response and reduce them when practical by a process of ongoing quality improvement (2005).

The eight-minute response for 90 percent of EMS incidents standard was derived from a study in 1979 involving nontraumatic cardiac arrest patients (Pons et al., 2005). EMS delivery has henceforth evolved and the eight-minute response time has essentially become the *de facto* standard for EMS. In a study conducted within the Denver area Pons et al found that “response time  $\leq 8$  minutes were not associated with survival to hospital discharge ... However, a survival benefit was identified if the response time was  $\leq 4$  minutes” (p. 599).

Newgard et al. (2010) in a secondary analysis of trauma patients “evaluated EMS intervals (activation, response, on-scene, transport, and total time) ... (p.235). The sample population was  $\geq 15$  years of age and met the predetermined study criteria. Newgard et al. concluded, “Among injured patients with physiologic abnormality prospectively sampled from a diverse group of sites and EMS systems across North America, there was no association between EMS intervals and mortality” (p. 246).

It may seem then that the interpretation of response time is an expectation driven concept rather than evidence based. However, Wilde (2009) stated:

“In this paper I have resolved an empirical puzzle within the previous literature, which found only mixed and limited evidence that shorter response times improve outcomes, despite policy-makers long-held assumption that this was true. This is the first paper to clearly demonstrate the importance of response times for patients suffering from noncardiac conditions as well as for any demographic subgroups”.

(p. 44)

Al-Shaqsi (2010) concluded, “it is time to incorporate other outcome-focused performance indicators along with RT in order to present a full picture of EMS performance to the public” (p. 2). Finally, Fitch (2007) stated:

“The importance of EMS response times is no myth. It's common sense. 911 callers expect a response as reliable (and almost as quick) as opening the tap for water. The actual time benchmark used by systems is not as important as consistently and accurately measuring performance. Matching supply and demand, improving component times, responding appropriately, harnessing technology and ensuring transparency are all essential to improving response time performance”. (p. 6)

In review, consensus standards such as NFPA 1710 and NFPA 1221 (NFPA, 2009) are the *de facto* standards for fire and EMS response times. Essentially the one-size fits all approach is taken. NFPA 1710 clearly defines the standard for turnout time, travel time, and balance of the first alarm. CPSE (2009) has various service area categories depending upon population and/or population density. The standard of coverage involves a thorough community risk assessment, reviewing what other similar communities have in place and what the public expectations for service are. Based upon the standard of coverage travel time may vary for the first and second arriving units as well as the arrival of the balance of the first alarm. ISO (2007) uses a distribution system based upon built upon areas of the community and distance from engine or ladder/service companies; 1.5 miles for the first due engine company and 2.5 miles for the first due ladder/service company (para. 1). The expected arrival time is 3.2 minutes for the engine company and 4.9 minutes for the ladder/service company (para. 2).

EMS response times on the other hand are somewhat contradictory. NFPA 1710 (NFPA, 2009) is once again the *defacto* standard with clearly defined turnout times and travel times for BLS and ALS units respectively. NIH (Buckman, 2006) uses a similar approach to NFPA 1710 with eight minutes for the arrival of ALS seemingly the break over time. AHA (2005) stressed

the importance of shortening response times to SCA and using a process of ongoing quality improvement to identify delays in response and reduce when practical in order to have the full picture of EMS.

Recent research based information though points to the fact though that the eight-minute response time is possibly an arbitrary number assigned from one study of nontraumatic cardiac arrest patients from 1979 and response times of  $\leq 4$  minutes should be the benchmark (Pons et al., 2005). Wilde (2009) casts doubt though on the findings of Pons et al., whereas Newgard (2010) appears to substantiate the findings of Pons et al. by finding no association with EMS response times and survivability. With most guidelines then based upon the cardiac arrest model, and the four-minute response time the only time shown to be of benefit, it is certainly debatable then when your family member is on the floor from cardiac arrest (Dr. Don Locasto, personal communication, August 15, 2013). Al-Shaqsi (2010) and Fitch (2007) felt a holistic approach to EMS delivery was required and not just focusing on response time alone. This would allow for a universal approach to measuring system performance.

The final step in the literature review was to review factors that may positively or negatively influence response times. The distribution of companies is undoubtedly the single most effective way to minimize response times. However, cost may be the limiting factor for a community in respect to the level of service it can provide. Madrid (2012) noted that “Ultimately, what would improve response time is building new fire stations and hiring more fighters” (para. 18) when questioning Don Williams, a shift commander for the Phoenix Fire Department. A previous performance measurement for Colerain Fire & EMS was 90% of incident responses in four minutes that was deemed impractical and not cost effective. In order to achieve this goal no less than twenty-nine fire stations would have been required.

Emergency vehicle preemption (EVP) systems are an alternative to improving response times. Benefits include quicker response times, greater safety and reduced liability, savings in planning for fire/rescue and EMS planning, and reduced fire insurance premiums (Intelligent Transportation Systems, n.d.). By ensuring that an emergency vehicle will encounter a green light at an intersection all the while giving a red light to conflicting approaches, seconds to even minutes, may be reduced from a response. Colerain Fire & EMS is not immune to congestion as evidenced by an article in the Forgrave (2003) which stated “Colerain Avenue makes even brave drivers flinch: Bumper-to-bumper traffic in a four-mile crawl. Hundreds of cars vying to turn in and out of hundreds of businesses. More advertising and shop signs than anyone cares to count” (para. 1). Traffic counts on this stretch of Colerain Avenue average between 25,000 and 50,000 vehicles per day (Ohio Department of Transportation, 2009). Henceforth, numerous improvements have been made to control traffic and congestion including an EVP system on the Colerain Avenue corridor.

Automatic Vehicle Locators (AVL) and closest unit dispatching provide an opportunity to decrease response times. “Getting the closest fire company or ambulance to you can mean the difference between life and death. But that quick response is more likely in Columbus than Cincinnati, because of how fire and ambulance companies are dispatched” (Hirsh, 2012). With thirty-nine fire and EMS departments within the confines of Hamilton County, jurisdictional boundary lines are an impediment to faster response as opposed to Columbus and its suburbs. “Columbus has is called AVL ... With AVL, dispatch can tell where each and every fire truck and ambulance is, and dispatch it from wherever ...” (Hirsh, 2012). By sending the closest unit regardless of jurisdiction response times can be minimized.

Supplemental protection systems do not necessarily provide for decreased response times but buy the fire department additional time to arrive by controlling the fire in the incipient stage. Early on the morning of April 4, 2008 Colerain Fire & EMS responded to an automatic fire alarm in a single-family dwelling that was subsequently upgraded to a structure fire. The residence was seven tenths of a mile from the first responding unit, which had a response time of ten minutes and fifty-nine seconds. Firefighters were met with rapidly changing conditions and Captain Robin Broxterman and Firefighter Brian Schira died in the line of duty following a collapse of the first floor and falling into the basement. A factor that is believed to have directly contributed to their deaths was “A delayed arrival at the incident scene that allowed the fire to progress significantly... (Colerain Fire & EMS, 2010, p. 4). According to the following recommendation from the *Investigation Analysis of the Squirrelsnest Lane Firefighter Line of Duty Deaths*, “Fire departments should support building codes that promote residential automatic fire sprinkler systems, both in multi-family as well as single-family residential buildings” (Colerain Fire & EMS, 2010, p. 51), it is possible that the fire could have been controlled in the incipient stage buying the fire department additional time to respond and mitigate the situation without the added loss of life.

Turnout time can influence overall response time positively or negatively. Madrid (2012) when questioning Don Williams, a shift commander for the Phoenix Fire Department, found that “The only place we could impact response time was how we reacted in the station. You need to drop what you’re doing and get on the truck” (para. 13). A one-minute turnout time can shave vital seconds off of a response. We shouldn’t though encourage unsafe practices in order to reach the vehicle. A number of things may impact turnout times adversely though according to Haden (2012) including “stairs, detour to the restroom, policy for signaling en route, opening

ERF bay doors, policy for gathering response information, level of station wear required ...

(para. 26). Therefore, turnout time can be a double-edged sword.

Increased response times may be caused by a number of factors including response reliability, traffic calming devices, false alarms, and urban sprawl. As response reliability decreases and substituting units respond from and into places other than their first due response areas, travel time increases and therefore response time increases (CPSE, 2009). According to Division Chief Greg Brown, Colerain Fire & EMS, in 2012 there were 2,226 occurrences when two EMS units were on simultaneous calls, 967 occurrences when three EMS units were on simultaneous calls, and 545 occurrences when all four EMS units were on simultaneous calls (personal communication, May 8, 2013). These occurrences serve to exacerbate the difficulty in maintaining any adopted performance measure.

Speed bumps, speed humps, traffic circles, medians, and curb extensions all pose difficulty when trying to minimize response times. The Local Government Commission stated:

There is no denying that poorly thought-out traffic calming projects have created headaches for emergency responders. This is because the two tools most commonly provided when neighborhoods complain about traffic speeds – speed humps and stop signs – have the potential to increase response times, and can be hard on equipment. (n.d.)

Colerain Fire & EMS has speed bumps, medians, curb extensions, and interstate highway cable barriers within the response district. Alternatives exist to make traffic calming devices more emergency responder friendly but coordinated planning amongst agencies is paramount. With township roads, county roads, state roads, and interstate highways in the response district

interagency cooperation and planning for response friendly traffic calming devices may be an afterthought.

False alarms, be it malicious or otherwise, plague fire departments on a daily basis. Considerable resources may be required, companies are taken out of their first due response area or tied up unnecessarily and response times to other calls may increase response (Ruckriegel, 2011). Several communities have adopted ordinances to try and rein in the rising rate of false alarms.

An additional source of increasing response times is urban sprawl and fringe area residential development. According to Geoffrey Milz, Planning and Zoning Director for Colerain Township, within the confines of the township boundaries characteristics of an urban, suburban, rural, and ex-urban geographical areas exist. As development continues and homeowners seek solace and solitude:

sprawl influences firefighting outcomes in the U.S., and it may be a factor in delayed fire response, leading, in turn, to property loss and human deaths. In this sense, sprawl creates a risk to one's property and, more importantly, to one's life. (Lambert, Srinivasan & Katirai, 2012, p. 982)

Urban sprawl and fringe development likewise hold true for increased EMS response times (Lambert & Meyer, 2006; 2008).

In summarization, the literature review has influenced the research by providing a definition of response time and its components (NFPA, 2009; CPSE, 2009; Bruegman 2009; Ammons, 2009; Thiel & Jennings, 2012). Has detailed relevant standards and performance measures for fire and EMS related responses (NFPA, 2009; CPSE, 2009; ISO, 2007; APCO, n.d.; Ludwig, 2004; Buckman, 2006; AHA 2005). Noted discrepancies in the importance of

EMS response times (Pons et al., 2005; Wilde, 2009; Newgard et al., 2010) and found the importance of a system wide focus for EMS rather than a single focus on response times (Fitch, 2007; Al-Shaqsi, 2010). And finally, brought forth factors that may decrease or increase response times (Madrid, 2012; Intelligent Transportation Systems, n.d.; Forgrave, 2003; Hirsh, 2012; Colerain Fire & EMS, 2010; Haden, 2012; CPSE, 2009; Local Government Commission, n.d.; Ruckriegel, 2011; Lambert, Srinivasan & Katirai, 2012; Lambert & Meyer, 2006; 2008). The remainder of the research will be driven by a focus group, a structured interview, and three survey documents.

### Procedures

Descriptive research methods were used to evaluate response times for Colerain Fire & EMS. The procedures involved concentrated on answering the five ARP questions. First, what nationally recognized or locally adopted definitions exist for the term response time? Second, what nationally recognized standards or locally adopted performance measures exist for response time? Third, what current trends exist for the Colerain Township Department of Fire & EMS response times? Fourth, what factors significantly influence response times for the Colerain Township Department of Fire & EMS? Fifth, what impact may be realized for response times if staffing reductions or station closures became a reality? The *Executive Fire Officer Program Operational Policies and Procedures Applied Research Guidelines* October 1, 2009 edition, and the *American Psychological Association* 6<sup>th</sup> edition text were utilized to prepare the ARP.

The research for this project was accomplished in eight definitive steps. The first step began with a literature search and review at the Learning Resource Center (LRC) in Emmitsburg, Maryland on January 27 and January 28, 2013. The literature search and review was used to guide the direction of the research and assist with formulating the research questions. In

addition, a search of the World Wide Web (WWW) was commenced utilizing the search engines *Google* and *Bing* as an additional means of acquiring current literature for the ARP. Additional information was found with the aid of the WWW that was not readily available at the LRC. Finally, textbooks, news sources, email correspondence, EMS incident reporting software, and fire incident reporting software provided invaluable information for the ARP.

The next step was to begin the collection, importation, and analysis of response time data for Colerain Fire & EMS. The time frame selected for analysis was determined to be January 1, 2008 through December 31, 2012. Data from the fire incident reporting system and the EMS incident reporting system were imported into Microsoft Excel 2011 for sorting and analysis. Data were sorted and analyzed to determine average turnout time and average response time for EMS responses, fire responses, and combined responses. Incident responses not included for analysis were non-emergency responses, disregards, mutual aid responses, and automatic aid responses. Table 4 is a compilation of the incident response totals fitting the stated criteria for analysis.

Table 4

*Incident Response Analysis Totals*

Year	EMS Incidents	Fire Incidents	Total Incidents
2008	6,055	830	6,885
2009	6,022	636	6,658
2010	6,353	624	6,977
2011	5,913	663	6,576
2012	6,456	776	7,273
Total	30,799	3,529	34,369

In addition, responses were banded according to times (mm:ss) into 00:00 through 03:59, 04:00 through 05:59, 06:00 through 09:59, and 10:00 and greater in order to compare Colerain Fire & EMS's ability to meet its performance measurement of 79% of responses in under six

minutes. Figure 8 is an example of fire incident response data that has been sorted and analyzed and Figure 9 is an example of EMS incident response data that has been sorted and analyzed.

Figure 8

*Fire Incident Data Analysis Example*

DOS	District	Alarm Type	Dispatch Time	Enroute Time	On Scene Time	Turnout	Travel	Response
01/01/09	26	Detector activation, no fire - unintentional	16:58:16	17:00:13	17:07:35	▲ 0:01:57	0:07:22	◆ 0:09:19
01/01/09	26	Smoke detector activation, no fire - unintentional	11:30:22	11:32:38	11:35:39	◆ 0:02:16	0:03:01	▲ 0:05:17
01/01/09	109	Building fire	03:54:47	04:00:24	04:00:27	◆ 0:05:37	0:00:03	▲ 0:05:40
01/02/09	102	False alarm or false call, Other	14:40:48	14:40:48	14:46:37	● 0:00:00	0:05:49	▲ 0:05:49
01/03/09	109	Smoke detector activation, no fire - unintentional	12:25:48	12:27:52	12:31:48	◆ 0:02:04	0:03:56	◆ 0:06:00
01/04/09	103	Smoke detector activation, no fire - unintentional	16:43:19	16:45:31	16:52:42	◆ 0:02:12	0:07:11	◆ 0:09:23
01/07/09	25	Heat from short circuit (wiring), defective/worn	11:03:00	11:03:00	11:11:00	● 0:00:00	0:08:00	◆ 0:08:00
01/07/09	25	Central station, malicious false alarm	17:57:00	18:00:00	18:04:00	◆ 0:03:00	0:04:00	◆ 0:07:00
01/08/09	109	No Incident found on arrival at dispatch address	19:28:14	19:29:21	19:31:12	● 0:01:07	0:01:51	● 0:02:58
01/10/09	103	Smoke detector activation, no fire - unintentional	19:58:15	20:00:08	20:04:00	▲ 0:01:53	0:03:52	▲ 0:05:45
01/10/09	25	Unintentional transmission of alarm, Other	19:40:52	19:43:05	19:46:42	◆ 0:02:13	0:03:37	▲ 0:05:50
01/16/09	102	Water or steam leak	11:21:04	11:21:04	11:26:31	● 0:00:00	0:05:27	▲ 0:05:27
01/16/09	25	Smoke detector activation, no fire - unintentional	17:12:16	17:14:09	17:18:15	▲ 0:01:53	0:04:06	▲ 0:05:59
01/16/09	26	Smoke detector activation due to malfunction	00:16:21	00:18:43	00:21:25	◆ 0:02:22	0:02:42	▲ 0:05:04
01/16/09	103	Smoke detector activation due to malfunction	04:25:15	04:27:50	04:31:26	◆ 0:02:35	0:03:36	◆ 0:06:11
01/17/09	25	Passenger vehicle fire	18:35:00	18:35:00	18:42:00	● 0:00:00	0:07:00	◆ 0:07:00
01/17/09	26	Smoke detector activation, no fire - unintentional	21:31:25	21:32:56	21:34:45	▲ 0:01:31	0:01:49	● 0:03:20
01/18/09	103	Alarm system sounded due to malfunction	10:22:55	10:22:55	10:29:37	● 0:00:00	0:06:42	◆ 0:06:42
01/19/09	25	Passenger vehicle fire	00:30:00	00:34:00	00:38:00	◆ 0:04:00	0:04:00	◆ 0:08:00

Figure 9

*EMS Incident Data Analysis Example*

DOS	Pick Up Location	Dispatch Time	Enroute Time	On Scene Time	Turnout	Travel	Response
1/1/09		0:55:00	0:56:00	1:07:00	● 0:01:00	0:11:00	◆ 0:12:00
1/1/09		2:40:00	2:42:00	2:47:00	◆ 0:02:00	0:05:00	◆ 0:07:00
1/1/09		3:54:00	4:00:00	4:02:00	◆ 0:06:00	0:02:00	◆ 0:08:00
1/1/09		7:26:00	7:29:00	7:33:00	◆ 0:03:00	0:04:00	◆ 0:07:00
1/1/09		10:28:00	10:30:00	10:37:00	▲ 0:02:00	0:07:00	◆ 0:09:00
1/1/09		13:16:00	13:18:00	13:23:00	▲ 0:02:00	0:05:00	◆ 0:07:00
1/1/09		14:30:00	14:33:00	14:37:00	◆ 0:03:00	0:04:00	◆ 0:07:00
1/1/09		16:57:00	16:58:00	17:05:00	● 0:01:00	0:07:00	◆ 0:08:00
1/1/09		16:57:00	16:58:00	17:05:00	● 0:01:00	0:07:00	◆ 0:08:00
1/1/09		21:22:00	21:24:00	21:26:00	▲ 0:02:00	0:02:00	● 0:04:00
1/1/09		22:53:00	22:54:00	22:57:00	● 0:01:00	0:03:00	● 0:04:00
1/2/09		0:49:00	0:51:00	0:55:00	◆ 0:02:00	0:04:00	▲ 0:06:00
1/2/09		1:48:00	1:50:00	1:54:00	◆ 0:02:00	0:04:00	▲ 0:06:00
1/2/09		2:58:00	2:59:00	3:05:00	● 0:01:00	0:06:00	◆ 0:07:00
1/2/09		4:42:00	4:45:00	4:49:00	◆ 0:03:00	0:04:00	◆ 0:07:00
1/2/09		5:15:00	5:17:00	5:22:00	▲ 0:02:00	0:05:00	◆ 0:07:00
1/2/09		5:50:00	5:53:00	5:58:00	◆ 0:03:00	0:05:00	◆ 0:08:00
1/2/09		6:29:00	6:31:00	6:34:00	▲ 0:02:00	0:03:00	▲ 0:05:00
1/2/09		7:41:00	7:42:00	7:45:00	● 0:01:00	0:03:00	● 0:04:00

Turnout time is emphasized with a green circle for times equal to 01:30 or less, a yellow triangle for times equal to 02:00 and greater than 01:30, and a red quadrangle for times equal to

02:01 and greater. Response time is emphasized with a green circle for time equal to 03:59 or less, a yellow triangle for times equal to or less than 05:59 and equal to or greater than 04:00, and a red quadrangle for times 06:00 or greater. Assistant Chief Tom Turner of the Loveland-Symmes Fire Department provided the Microsoft Excel template in order to conduct the analysis.

The next step in the process was the development of a set of structured interview questions for the Colerain Township Trustees and the Township Administrator. The purpose of the structured interview was to receive feedback on communication of the methodology for calculating response times by Colerain Fire & EMS, determining their definition of when response time starts and ends, if they were aware of a performance measurement for Colerain Fire & EMS, should that measurement be universally applied, and what their expectation of response time is for Colerain Fire & EMS in minutes and seconds. Following approval of the structured interview questions (Appendix D) by Chief Don Cox, ARP evaluator, interviews were scheduled. The president of the Board of Trustees, Dennis Deters was interviewed on April 10, 2013 at four o'clock in the afternoon, Township Administrator James Rowan was interviewed on April 12, 2013 at nine o'clock in the morning, and Township Trustee Jeffrey Ritter was interviewed on April 25, 2013 at seven o'clock in the morning. Each interview was approximately 30 minutes in length. The Vice President of the Board of Trustees, Melinda Rhinehart did not respond to an email request for a structured interview.

The next step in the process was the development of a set of questions for a focus group with the Hamilton County Communications Committee. The purpose of the focus group was to determine the authority vested in the Hamilton County Communications Committee, determining the committee members definition of when response time starts and ends, whether or not a universal definition is utilized by all fire departments in Hamilton County, whether or not a

universal definition should be adopted by in Hamilton County, whether or not a universal definition would lead to greater transparency and better assess the adequacy of response county wide, and whether or not a universal definition could be adopted by the Hamilton County Fire Chiefs Association. Following approval of the focus group questions (Appendix E) by Chief Don Cox, ARP evaluator, the initial date was set for the focus group on March 12, 2013. However, due to cancellation of the meeting it was rescheduled for April 9, 2013. The focus group meeting lasted for approximately 30 minutes.

The next step in the process was the development of a local survey document for each of the 39 fire departments in Hamilton County (Appendix F). The purpose of this survey was to determine whether or not the surveyed organization had a performance measurement that existed, their definition of when response time starts and ends, whether or not a universal measurement existed jurisdiction wide, the basis of the performance measurement, how that measurement is reported, whether or not the findings are published at least annually, if findings are published is response time defined for the reader, if a universal measurement is published or separate measurements, does the department meet its performance measurement, how is it measured, and what incident types are not included in the calculation. Following approval of the local survey document questions by Chief Don Cox, ARP evaluator, the survey was created with *SurveyMonkey* (Appendix G) to provide for ease of dissemination and tracking of the responses. The survey was emailed to all participants with a hyperlink for access May 1, 2013.

The next step in the process was the development of a survey document to explore the impact to departments since the economic downturn in 2008. The purpose of this survey document was to determine whether or not the surveyed organizations had experienced personnel reductions or station closures since 2008, the impact to the organization if personnel reductions

or station closures took place, if personnel reductions took place were they reinstated, if stations closed were they reopened, were the impacts fact based or anecdotal in nature, and any additional impacts to the organization not noted in the survey.

In 2012, Colerain Fire & EMS was directed to benchmark against a peer group of organizations, in order to determine best practices in those agencies that provide the same, or similar, services or functions as Colerain Fire & EMS. Similar township government jurisdictions and fire department agencies were the basis of the selection. Agencies were located within the state of Ohio and northern Kentucky. In early 2013, Colerain Fire & EMS was directed to expand upon the earlier benchmarking effort and departments in Michigan and Ohio were selected as well. Finally, Colerain Fire & EMS was directed to benchmark against *Best in Class* organizations and four *Class 1* fire departments with similar characteristics as Colerain Fire & EMS, two from the state of Illinois, one from Connecticut, and one from Oklahoma were selected. The organizations then deemed best for this survey document, in order to determine impacts since the 2008 economic turndown, were those whom Colerain Fire & EMS had benchmarked against within the past year (Appendix H).

Following approval of the impacts survey document questions by Chief Don Cox, ARP evaluator, the survey was created with *SurveyMonkey* (Appendix I) to provide for ease of dissemination and tracking of the responses. The survey was emailed to all participants with a hyperlink for access June 5, 2013. A follow up email was sent to agencies that had not responded on July 8, 2013.

The next step in the process was to develop an internal survey document for Colerain Fire & EMS. The purpose of this survey document was to explore what impacts existed for Colerain Fire & EMS response times. Communication factor reliability, electronic mapping reliability,

traffic control devices, geography, simultaneous calls, training activities, physical fitness activities, public education activities, station design factors, cross-staffing of apparatus, turnout time, standard operating guidelines (SOG), means by which to decrease response times, and other factors were all explored in order to determine the effects upon response times.

Following the initial design of the survey it was sent for validation to Colerain Fire & EMS employees Captain Tim Beach (Ohio Fire Executive (OFE) graduate), Captain Shawn Stacy (Executive Fire Officer (EFO) graduate), and Captain Darian Edwards (EFO student) on July 16, 2013. Following review suggestions were made to improve the survey questions and pertinent changes were made and resent on July 17, 2013 to Captain Beach, Captain Stacy, and Captain Edwards for validation. It was determined the survey population would be operational personnel with the rank of firefighter through Battalion Chief. Upon validation the survey was created with *SurveyMonkey* (Appendix J) to provide for ease of dissemination and tracking of the responses. The survey was emailed to 187 participants with a hyperlink for access July 20, 2013.

### **Limitations**

The procedures for this research do contain limitations. Data extrapolated from the reporting software is only as good as the data that is entered into it. The fire incident reporting software captures time in hh:mm:ss whereas the ems reporting software only captures time in the hh:mm format. It can only be assumed that each intended email recipient for each of the three surveys did in fact receive the email; the return rate combined for each of the three surveys averaged 34%. The attached hyperlinks for the surveys could have easily been forwarded and completed by someone other than the intended recipient. Finally, it can only be assumed that the survey questions were answered in an unbiased and objective manner.

## Results

*What nationally recognized or locally adopted definitions exist for the term response time?*

According to the literature search NFPA 1710 is the industry recognized standard and another nationally recognized source being CFAI. Others published sources exist (Bruegmen, 2009; Ammons, 2009; Thiel & Jennings, 2012) and somewhat mirror NFPA 1710 and CFAI. At the local level the focus group, consisting of members of the Hamilton County Fire Chiefs Communications Committee, agreed they are vested by the Hamilton County Fire Chiefs as to their ability to recommend new policies and procedures. Most agreed that response time starts upon the dispatch of the emergency unit and their arrival at the scene of the emergency. For EMS incidents it was stated, “patient contact is realistic for time keeping and some have advocated recording both arrival on the scene and with the patient”. There was some difference in opinion regarding universal application of the term response time in Hamilton County. In a dissenting opinion it was stated, “through benchmarking participation, I know folks do different things”. Others felt that there was universal application because we use a “common communications center and the same database”. It was agreed by all that a universal definition should exist and it would provide an “apples to apples” comparison for assessing the adequacy of emergency response. All agreed that a universal definition for response time could be successfully adopted because “we have a successful committee capable of forming the changes”.

*What nationally recognized standards or locally adopted performance measures exist for response time?*

The literature review contained several standards for response time with NFPA 1710 once again being the industry recognized standard. CFAI has various baselines and benchmarks

that exist based upon service areas including metropolitan, urban, suburban, and rural (CPSE, 2009). ISO uses a distribution system for companies rather than response times for its methodology. The literature review included contradictory results for EMS response times with four minutes for a first responder and AED and eight minutes for ALS the most widely recognized standard. At the local level a survey instrument was delivered electronically to all thirty-nine fire departments in Hamilton County with a response rate of 15(38%) of departments.

Figure 10

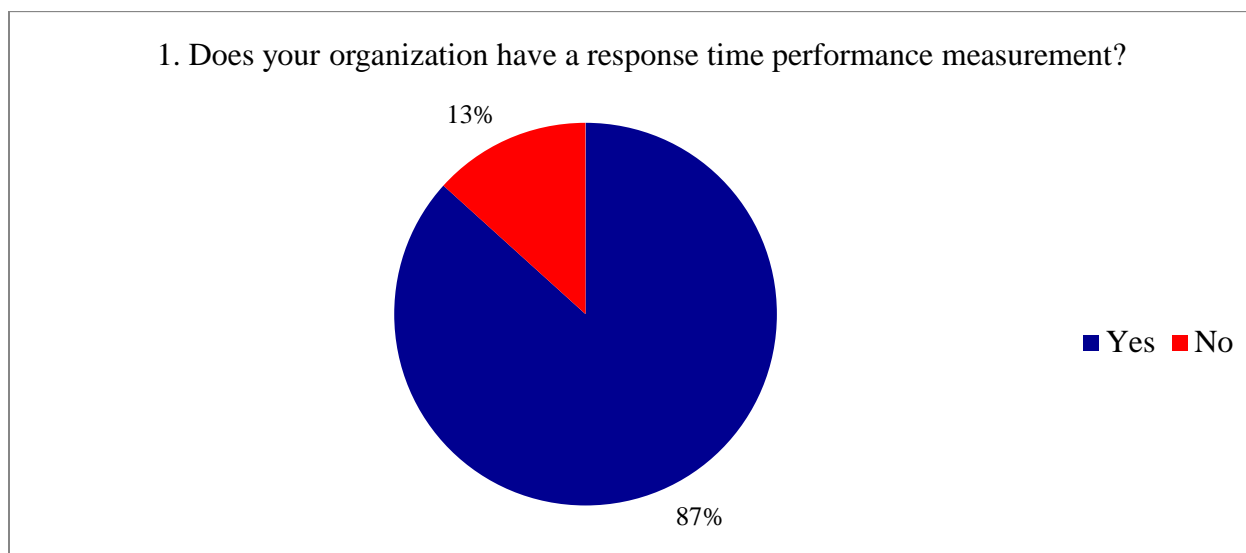


Figure 10 is the results of question number one. Eighty-seven percent of respondents have adopted a response time performance measurement.

Figure 11

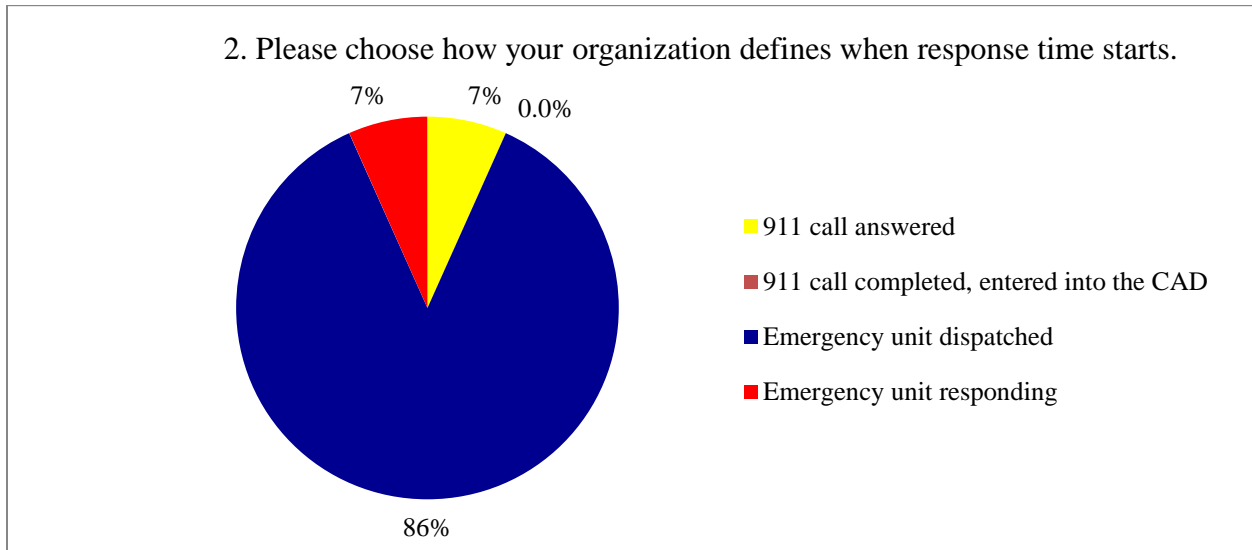


Figure 11 is the results of question number two. Some variation exists amongst the thirty-nine departments in Hamilton County when defining the start of response time. Eighty-six percent do define the starting point as the emergency unit being dispatched

Question number three explored when response time ends. Fifteen (100%) of the respondents were in agreement that it is arrival on the scene of the emergency incident.

Figure 12

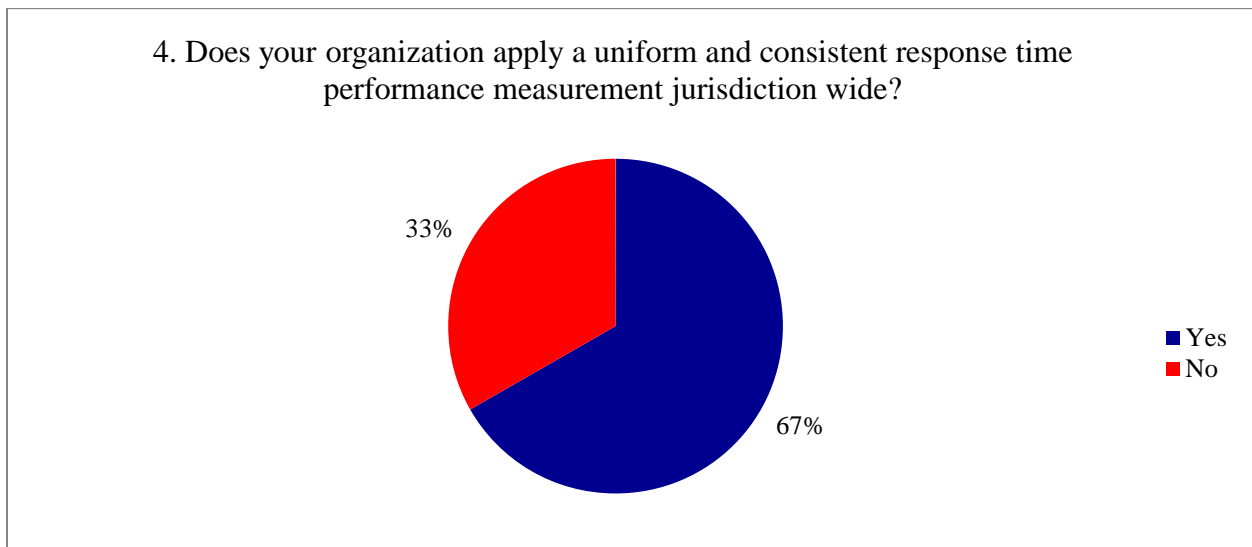


Figure 12 is the results of question number four. Sixty-seven percent of the respondents maintain a jurisdiction wide performance measurement.

Figure 13

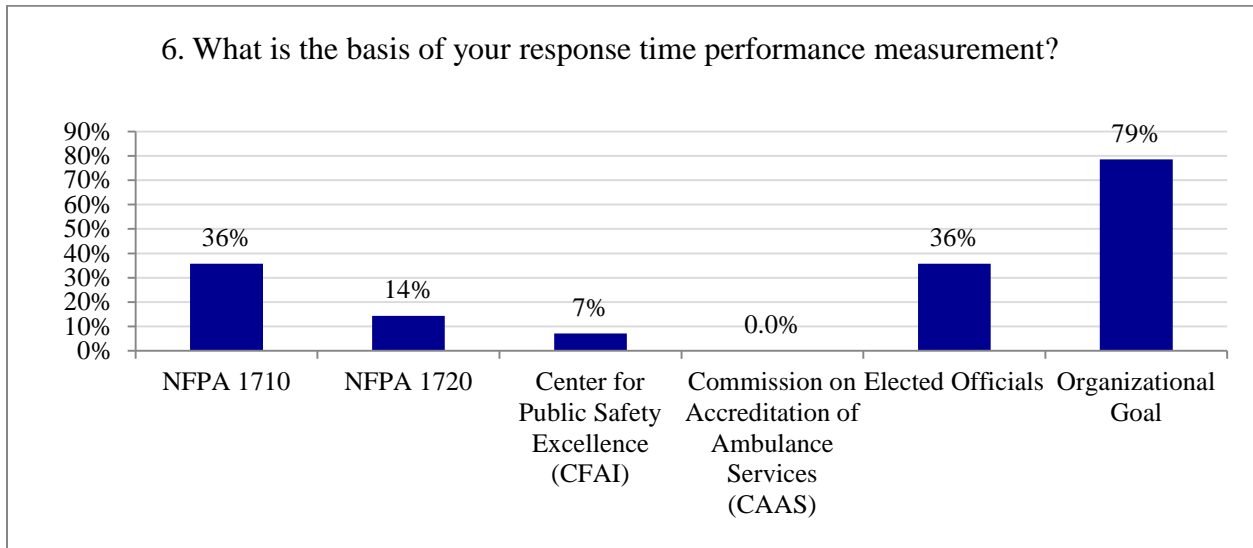


Figure 13 is the results of question number six. Variation exists as to the basis of measurement with an organizational goal (79%) as the primary means followed by elected officials (36%), NFA 1710 (36%), NFA 1720 (14%), and the Center for Public Safety Excellence (7%).

Figure 14

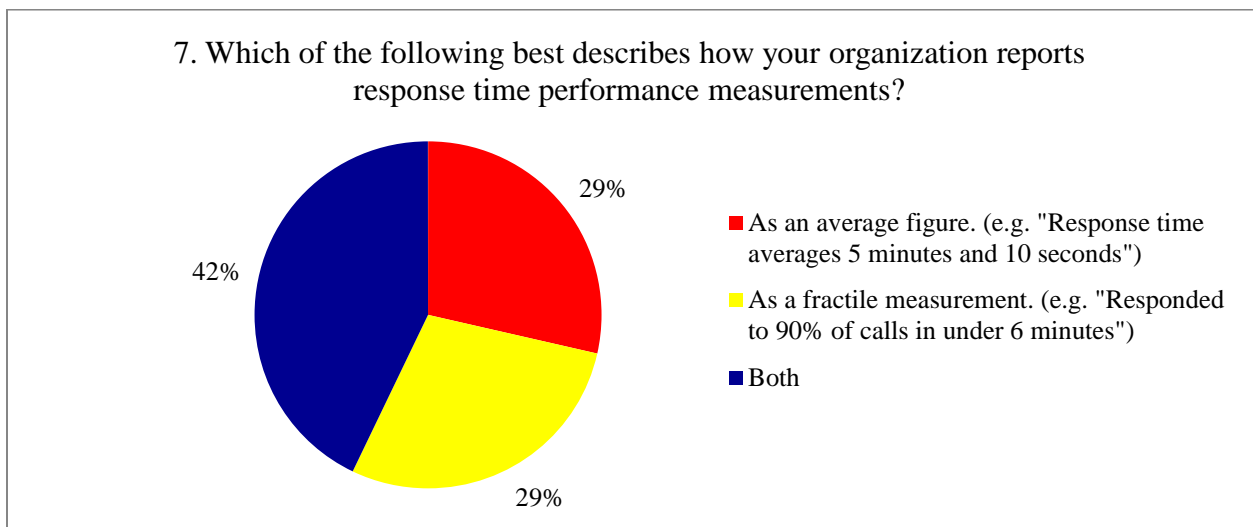


Figure 14 is the results of question number seven. Forty-two percent of respondents report both an average figure and a fractal measurement. For those agencies that only report a single measurement it is split evenly between average response time and a fractal measurement.

Figure 15

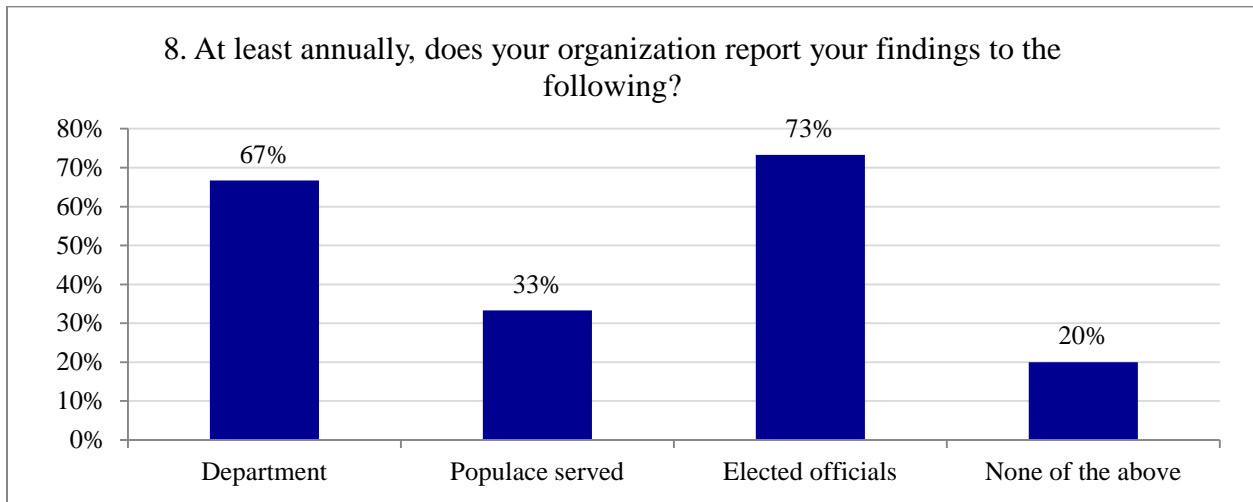


Figure 15 is the results of question number eight. Elected officials, department personnel, populace served, and none of the above is the respective order for whom results are reported to.

Figure 16

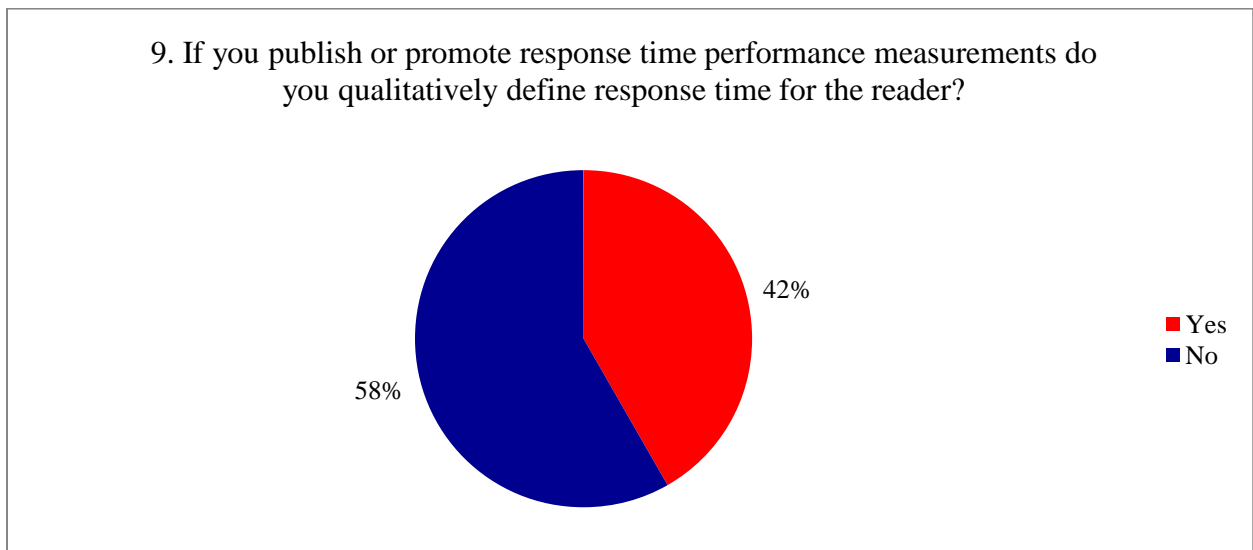


Figure 16 is the results of question number nine. Fifty-eight percent of the respondents ensure that they qualitatively define when response time starts and ends with published data.

Figure 17

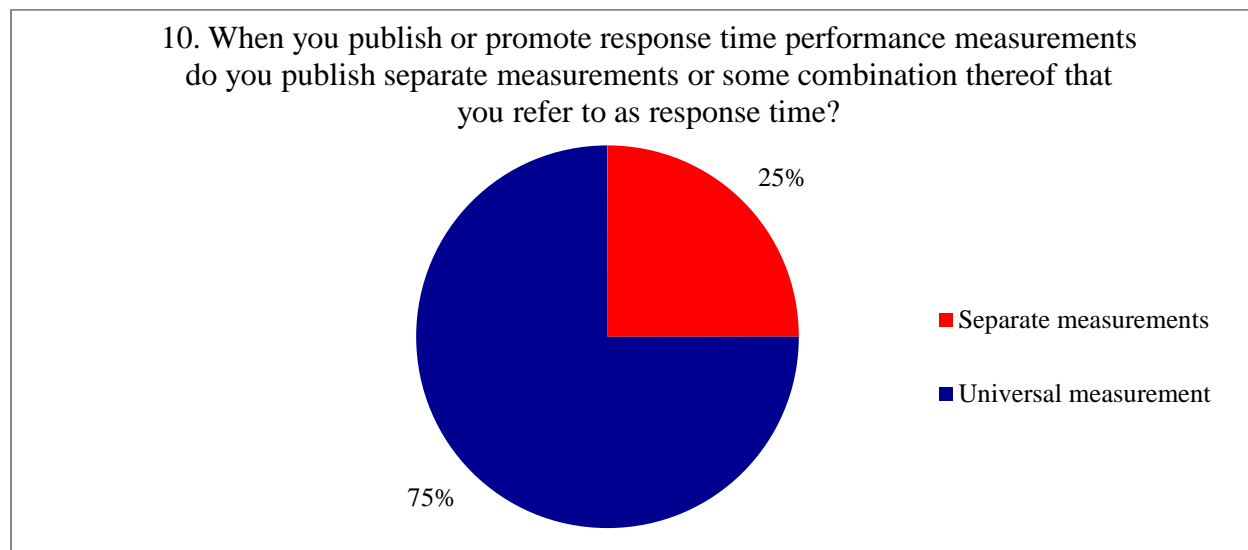


Figure 17 is the results of question number ten. Seventy-five percent of the respondents only provide a universal measurement for response.

Figure 18



Figure 18 is the results of question number eleven. Seventy-nine percent of the respondents meet their performance goal.

Question number twelve asked respondents to state their performance measurement standard. The following are a sampling of the results received:

- “90% in 4 min or less for EMS and 6 min or less for Fire”
- “90 % -- 6 minutes emergency runs only in primary jurisdiction”
- “On-duty out the door in 1 minute for EMS and less than 2 for Fire”
- “We are concerned at 7 minutes....”
- “For EMS 4 min average (in district), for Fire 5 min average (in district)”
- “To complete ninety (90) percent of the emergency responses within the City in five (5) minutes or less”
- “90% under 5 minutes”
- “5 minutes”
- “Dispatch to On Scene/Less than 5 minutes/90% of time”

Figure 19

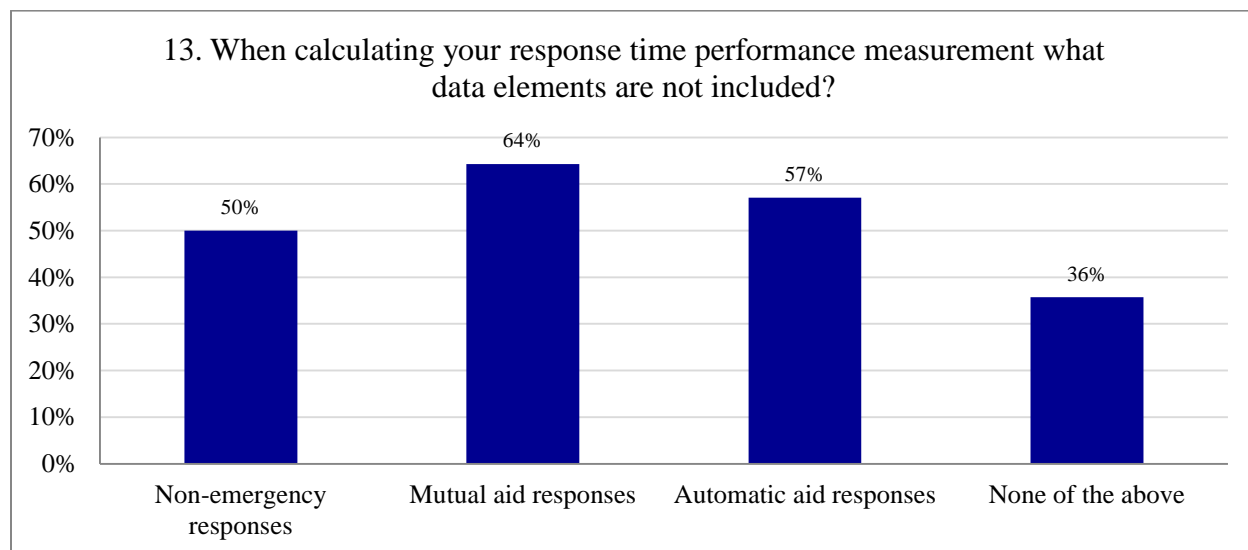


Figure 19 is the results of question number thirteen. The majority of respondents do not include mutual aid (64%), automatic aid (57%), and non-emergency responses (50%) for the purposes of determining their response time performance measurement.

Structured interviews were conducted with two of the three Township Trustees as well as the Township Administrator in order to assess adequacy of the communication of the methodology for calculating response times by Colerain Fire & EMS, determining their definition of when response time starts and ends, if they were aware of a performance measurement for Colerain Fire & EMS, should that measurement be universally applied, and what their expectation of response time is for Colerain Fire & EMS in minutes and seconds.

Two of the three interviewed were in agreement that Colerain Fire & EMS had adequately communicated the methodology for determining response times with the other interviewee stating a resounding “no”. Two of the three interviewed stated their understanding of when response time started was “dispatch of an emergency unit”, which is the methodology utilized by Colerain Fire & EMS. The third interviewee stated it was the “911 call completed and entered into the CAD”. Two of three interviewed stated response time stopped when “the emergency unit arrived on the scene”. The third interviewee stated “upon patient contact or commencement of operations”. All interviewees were in agreement that a response time performance measurement should exist for Colerain Fire & EMS and all were aware of a response time performance measurement that existed for Colerain Fire & EMS. Two of the three interviewed felt a uniform and consistent response time performance measurement should be applied within the township boundaries. The third interviewee felt the response time performance measurement needed to be geographically based.

*What current trends exist for the Colerain Township Department of Fire & EMS*

*response times?*

Table 5 is previously reported data with the imperfect methodology for calculating the stated performance measurement of 79% of incident responses in less than six minutes.

Table 5

*Incorrect Calculation for Incidents 00:00 thru 05:59*

Year	Fire Percent Less than Six Minutes	EMS Percent Less than Six Minutes	Combined Percent Less than Six Minutes
2008	78%	76%	77%
2009	77%	73%	75%
2010	79%	75%	77%
2011	76%	73%	75%
2012	80%	77%	78%

Table 6 is the correct methodology for calculating the stated performance measurement of 79% of incident responses in less than six minutes. This has made a dramatic impact on the ability to meet the performance objective of 79% of incident responses in less than six minutes.

Table 6

*Correct Calculation for Incidents 00:00 thru 05:59*

Year	Fire Percent Less than Six Minutes	EMS Percent Less than Six Minutes	Combined Percent Less than Six Minutes
2008	64%	62%	63%
2009	62%	57%	60%
2010	66%	59%	62%
2011	63%	58%	60%
2012	67%	63%	65%

Figures 20 through 34 represent combined responses, fire responses, and EMS responses in the banded measurements of 00:00 through 03:59, 04:00 through 05:59, and other. Colerain Fire & EMS, based upon national averages, considers green (00:00 through 03:59) to provide the

greatest probability for life saving measures and protection of property, yellow (04:00 through 05:59) the second greatest probability, and red (>06:00) the least greatest probability.

Figure 20

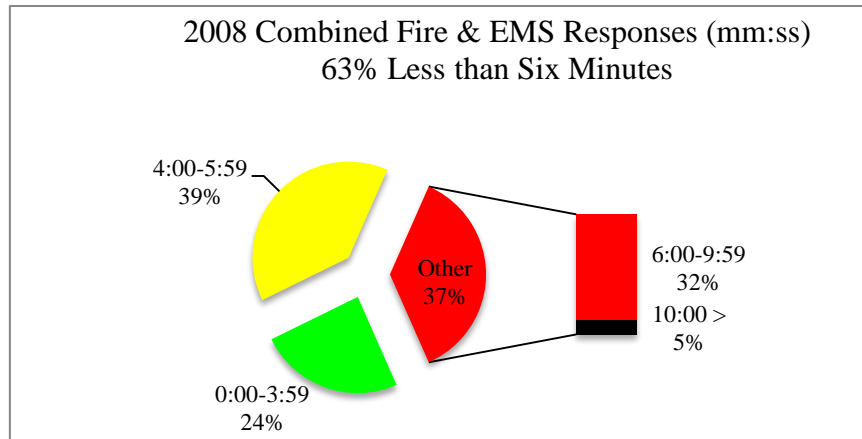


Figure 21

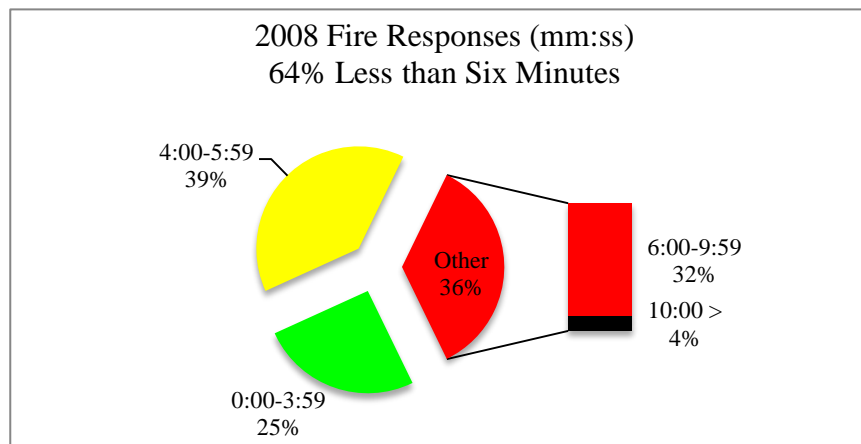


Figure 22

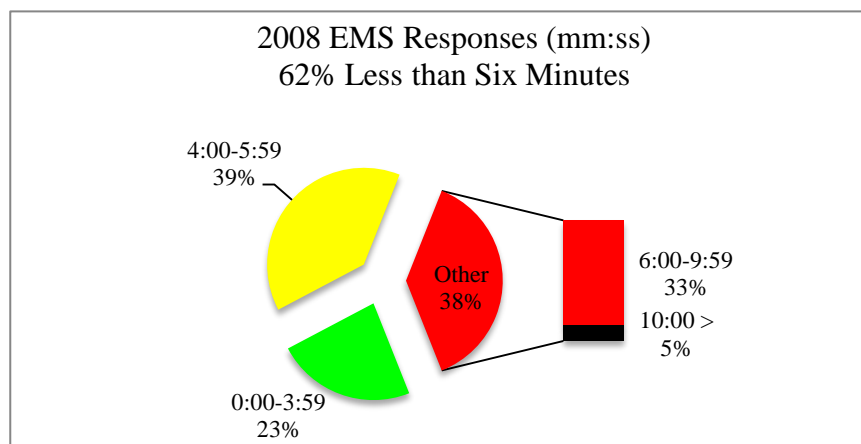


Figure 23

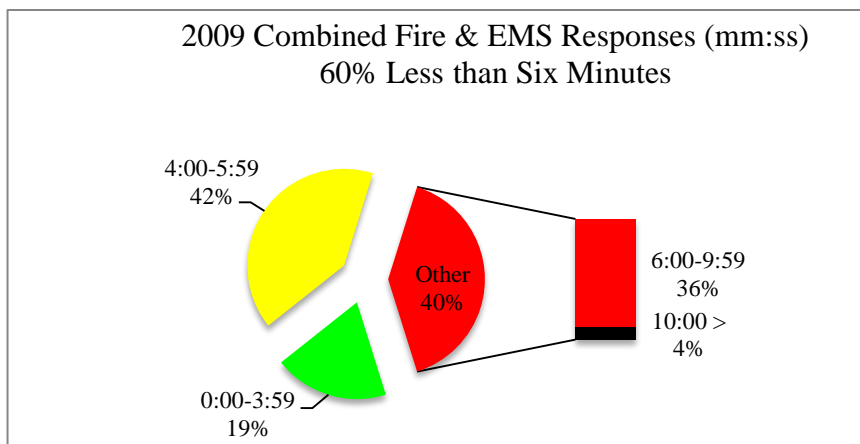


Figure 24

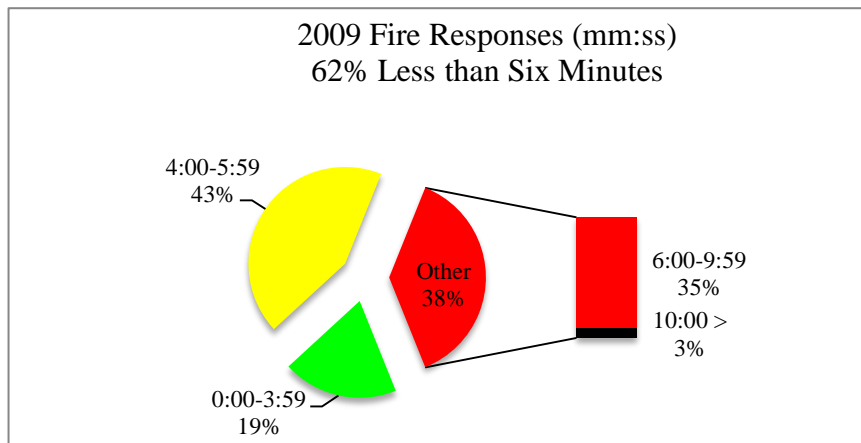


Figure 25

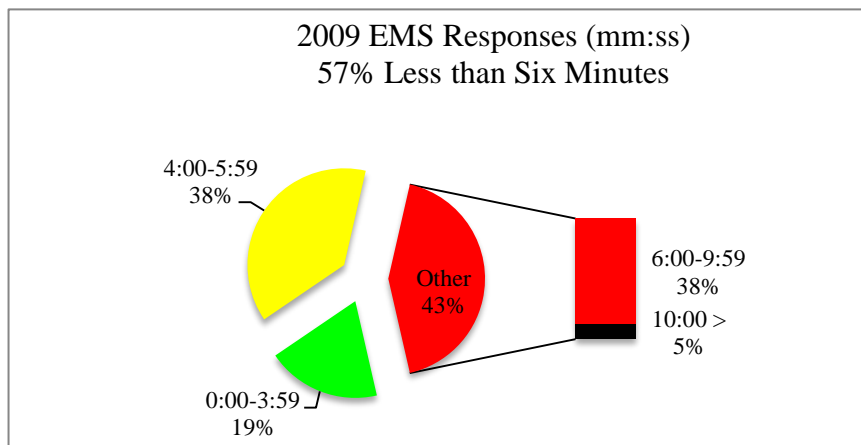


Figure 26

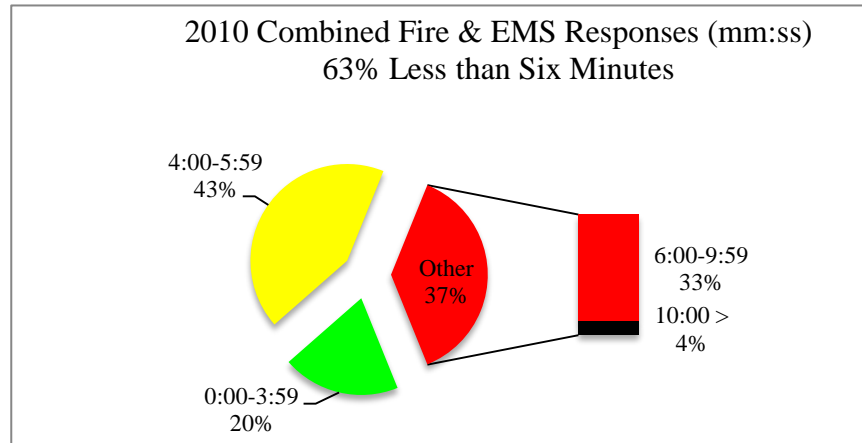


Figure 27

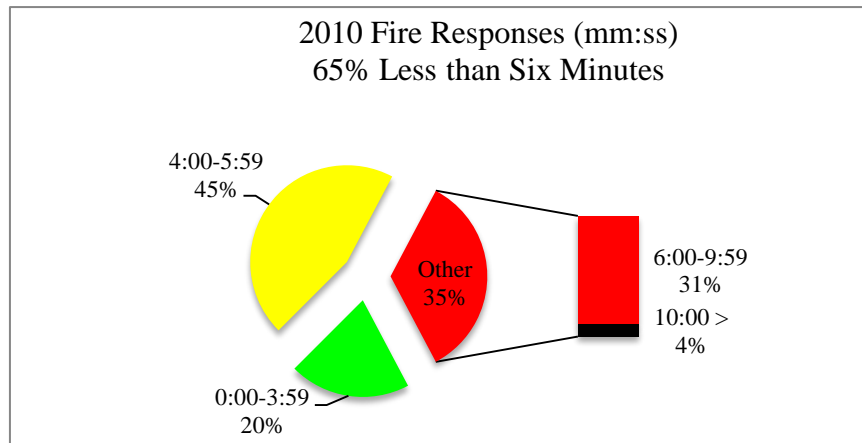


Figure 28

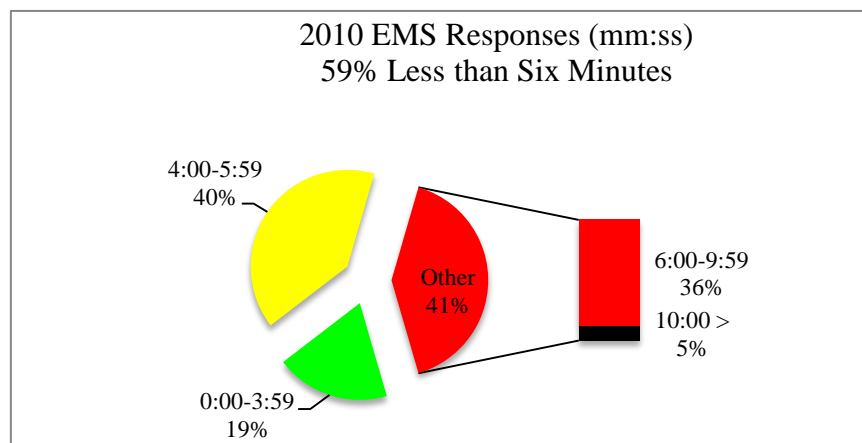


Figure 29

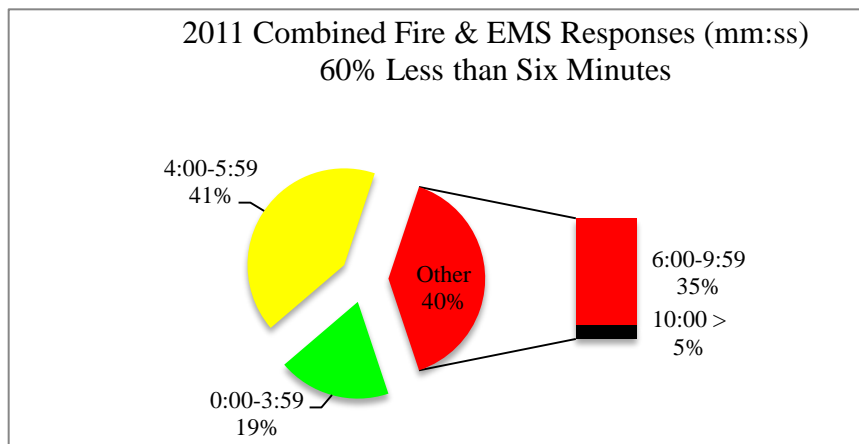


Figure 30

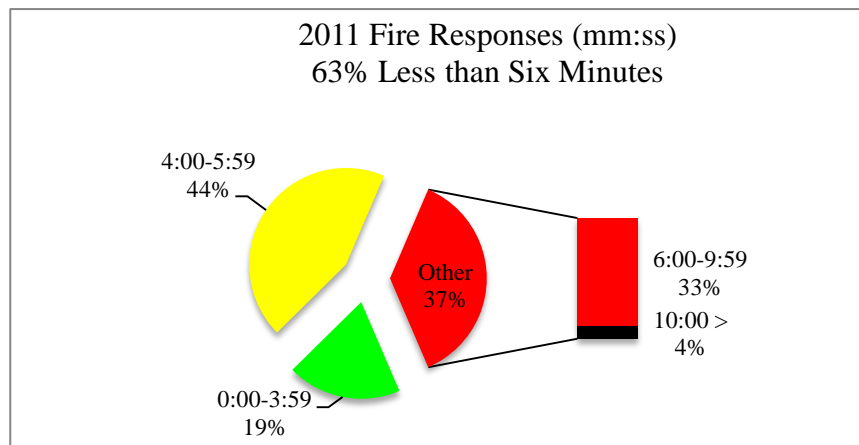


Figure 31

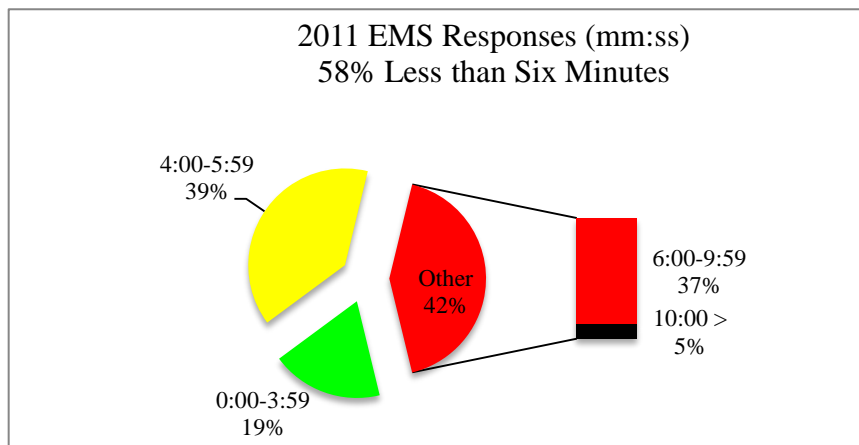


Figure 32

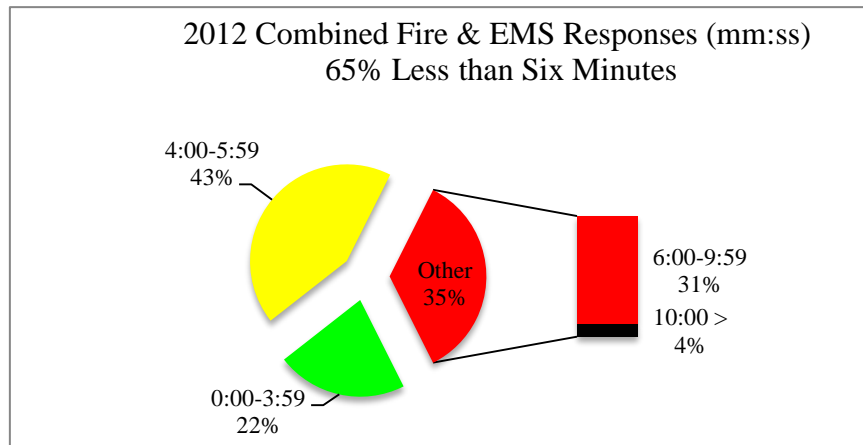


Figure 33

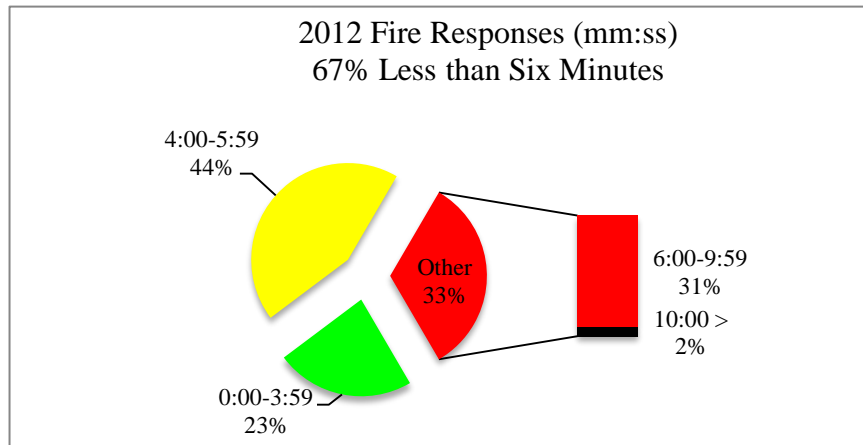
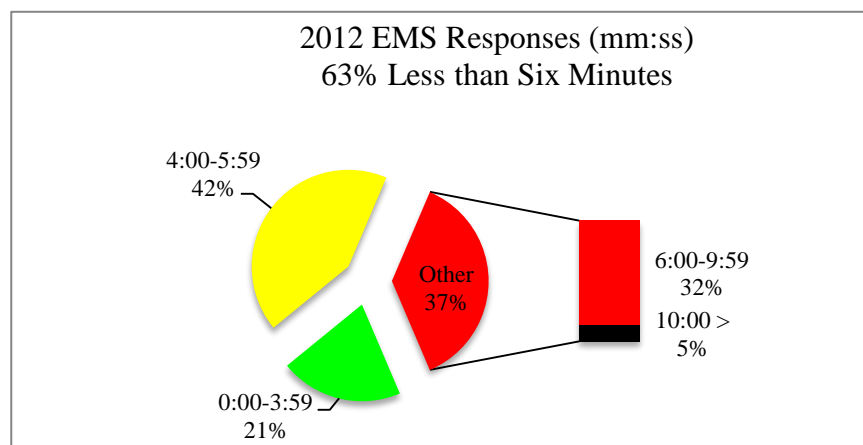


Figure 34



Tables 7 through 11 represent 2008 through 2012 response type, average turnout time, and average response time.

Table 7

*2008 Average Turnout Time and Response Time*

Response Type	Average Turnout Time	Average Response Time
Combined	01:18	05:15
Fire	01:06	05:23
EMS	01:31	05:07

Table 8

*2009 Average Turnout Time and Response Time*

Response Type	Average Turnout Time	Average Response Time
Combined	01:29	05:28
Fire	01:27	05:35
EMS	01:31	05:21

Table 9

*2010 Average Turnout Time and Response Time*

Response Type	Average Turnout Time	Average Response Time
Combined	01:30	05:26
Fire	01:24	05:32
EMS	01:37	05:19

Table 10

*2011 Average Turnout Time and Response Time*

Response Type	Average Turnout Time	Average Response Time
Combined	01:30	05:26
Fire	01:29	05:39
EMS	01:30	05:14

Table 11

*2012 Average Turnout Time and Response Time*

Response Type	Average Turnout Time	Average Response Time
Combined	01:34	05:20
Fire	01:45	05:25
EMS	01:24	05:14

Table 12

*First Arriving Engine Company for Fire Suppression Incidents (emergency response)*

	2008	2009	2010	2011	2012
Total Number of Incidents (NFIRS codes 100-173)	206	192	171	158	173
Average turnout time (mm:ss)	1:21	1:22	1:26	1:37	1:51
% of responses that meet NFPA 1710 turnout time objective (<=80s)	46%	45%	50%	35%	24%
Average travel time (mm:ss)	4:29	4:06	4:05	4:04	5:33
% of responses that meet NFPA 1710 travel time objective (<=240s)	48%	55%	58%	55%	60%
% of responses that meet NFPA 1710 total response time objective (<=380s)	50%	52%	53%	51%	51%

*Note: Assumes average call-processing time of sixty-five seconds by Hamilton County Communications Center.*

Table 12 is an analysis of the first arriving engine company at fire suppression incidents as compared to NFPA 1710. Greater processing time than sixty-five seconds would further degrade the percent of responses in the total response time objective category.

Table 13

*First Arriving Engine Company for Emergency Medical Incidents (emergency response)*

	2008	2009	2010	20011	2012
Total Number of Incidents (NFIRS codes 300, 311, 320, 321))	1218	1189	1276	1305	1524
Average turnout time (mm:ss)	1:20	1:38	1:40	1:37	1:38
% of responses that meet NFPA 1710 turnout time objective (<=60s)	38%	23%	21%	23%	14%
Average travel time (mm:ss)	4:03	3:57	4:01	4:04	3:49
% of responses that meet NFPA 1710 travel time objective (<=240s)	56%	57%	59%	56%	61%
% of responses that meet NFPA 1710 total response time objective (<=360s)	50%	44%	43%	43%	48%

*Note: Average call-processing time of sixty-five seconds by Hamilton County Communications Center.*

Table 13 is an analysis of the first arriving engine company at emergency medical incidents as compared to NFPA 1710.

Figure 35

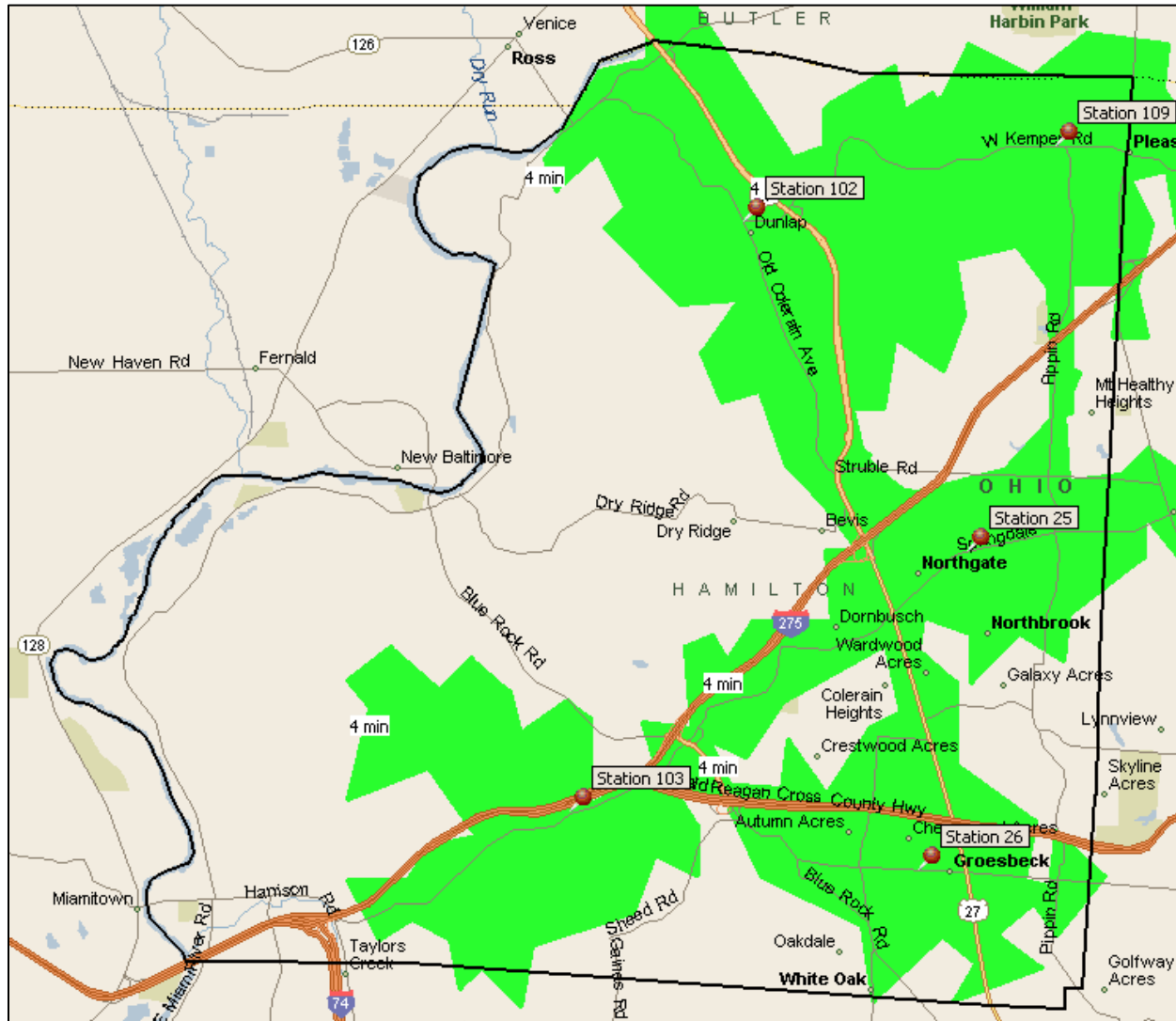


Figure 35 illustrates the geographical area that can be reached within a four-minute travel time as compared to NFPA 1710.

Figure 36

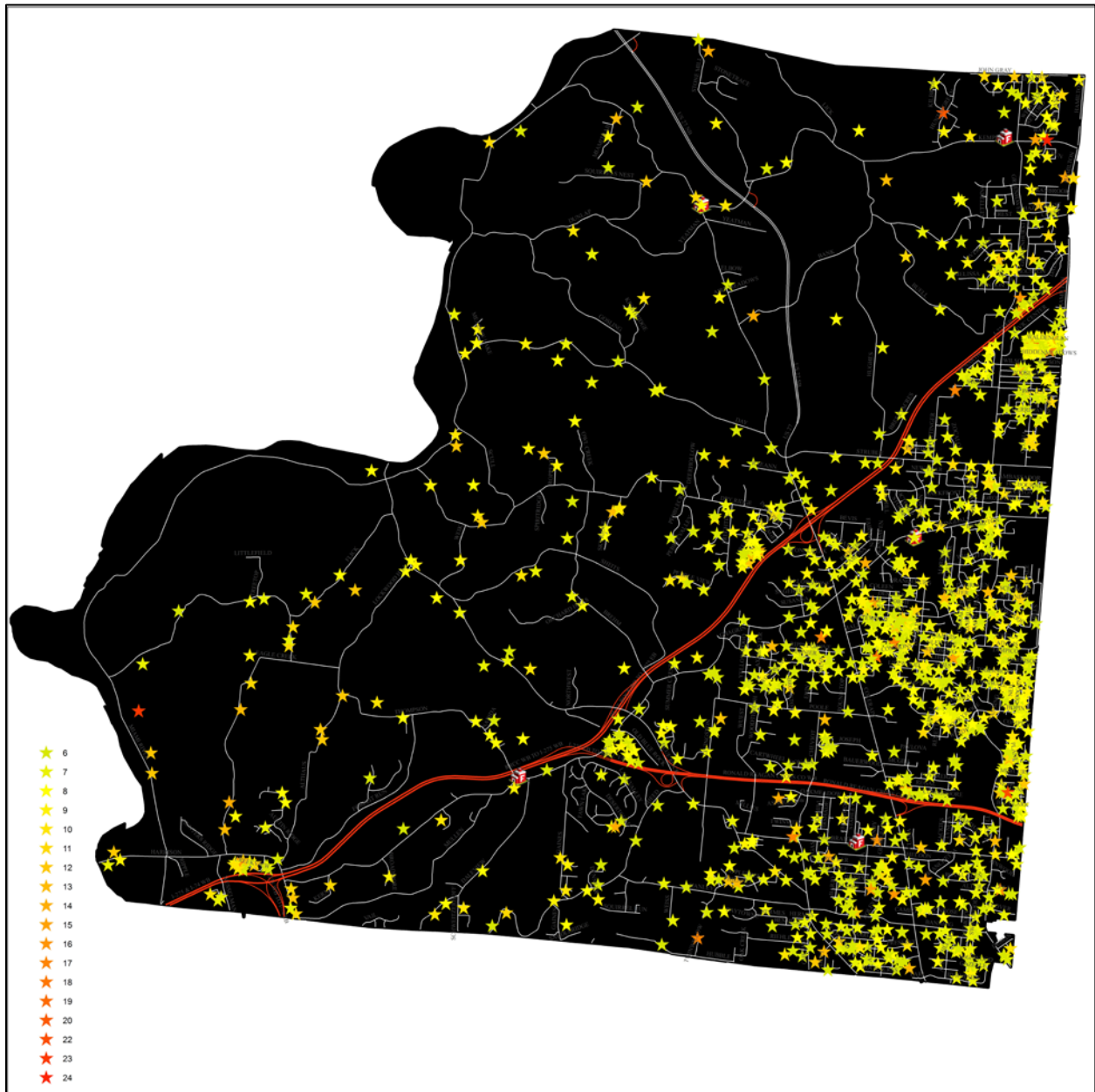


Figure 36 represents 2012 EMS incidents with a response time of six minutes and greater.

Figure 37

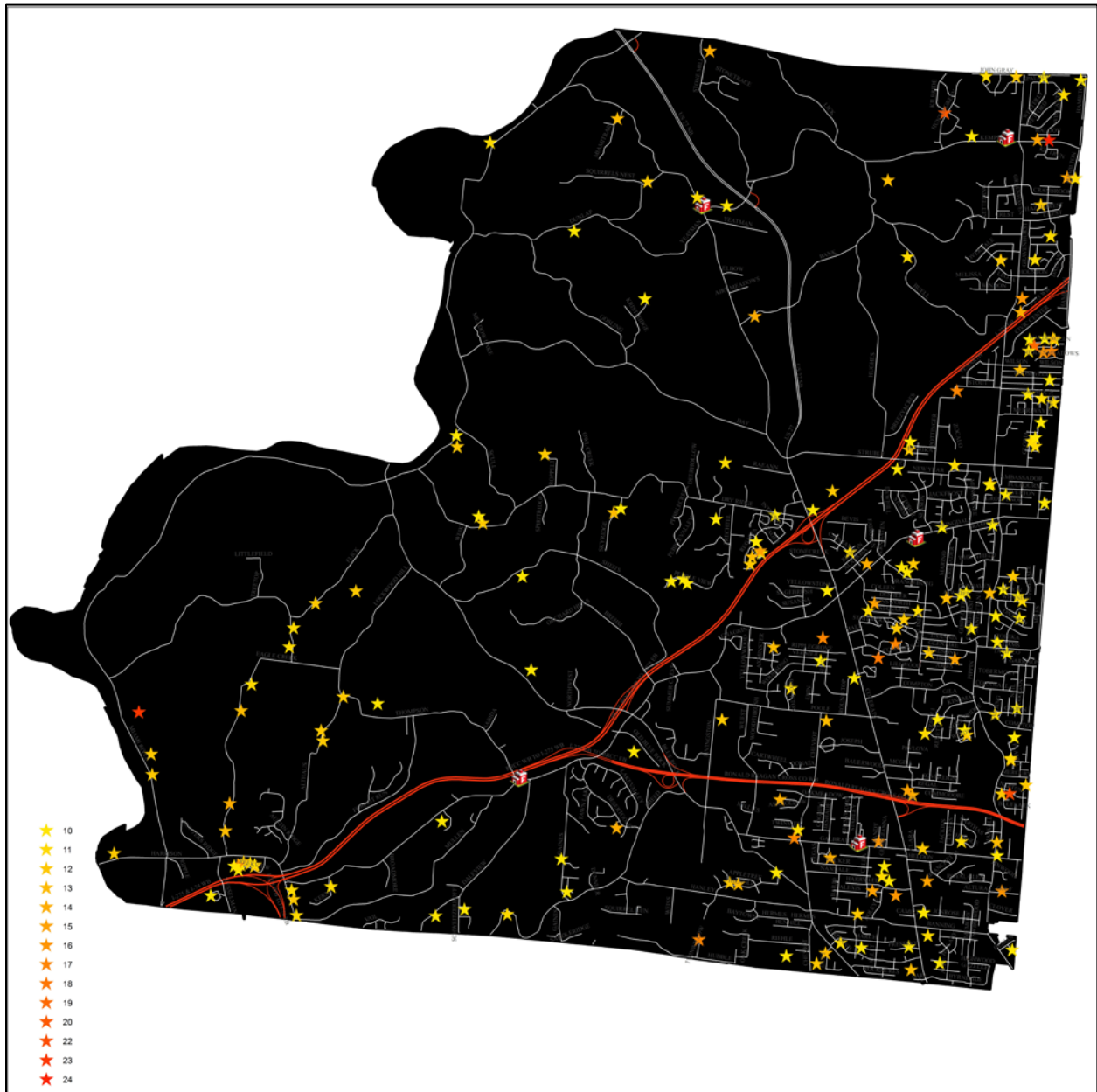


Figure 37 represents 2012 EMS incidents with a response time of ten minutes and greater.

*What factors significantly influence response times for the Colerain Township*

*Department of Fire & EMS?*

In order to investigate the factors that significantly influence response times a survey document was constructed in order to discover what impacts existed for Colerain Fire & EMS response times. Communication factor reliability, electronic mapping reliability, traffic control devices, geography, simultaneous calls, training activities, physical fitness activities, public education activities, station design factors, cross-staffing of apparatus, turnout time, standard operating guidelines (SOG), means by which to decrease response times, and other factors were all explored in order to determine the effects upon response times. At the local organizational level a survey instrument was delivered electronically to all 187 operational personnel with a response rate of 49(26%).

Figure 38

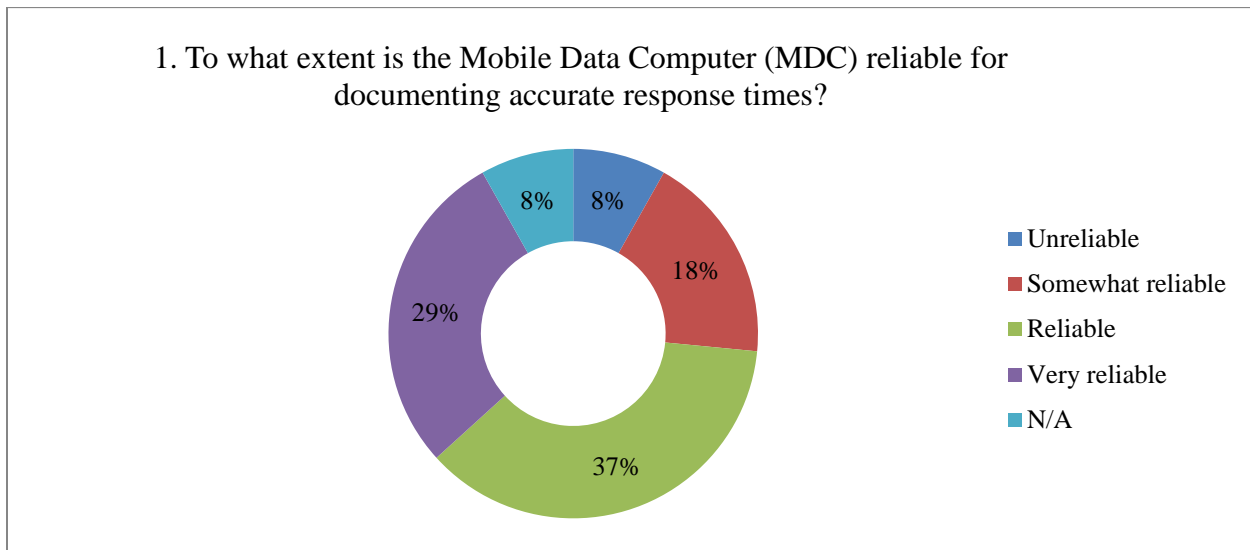


Figure 38 is the results of question number one. Sixty-six percent of respondents felt the MDC was reliable or very reliable.

Figure 39

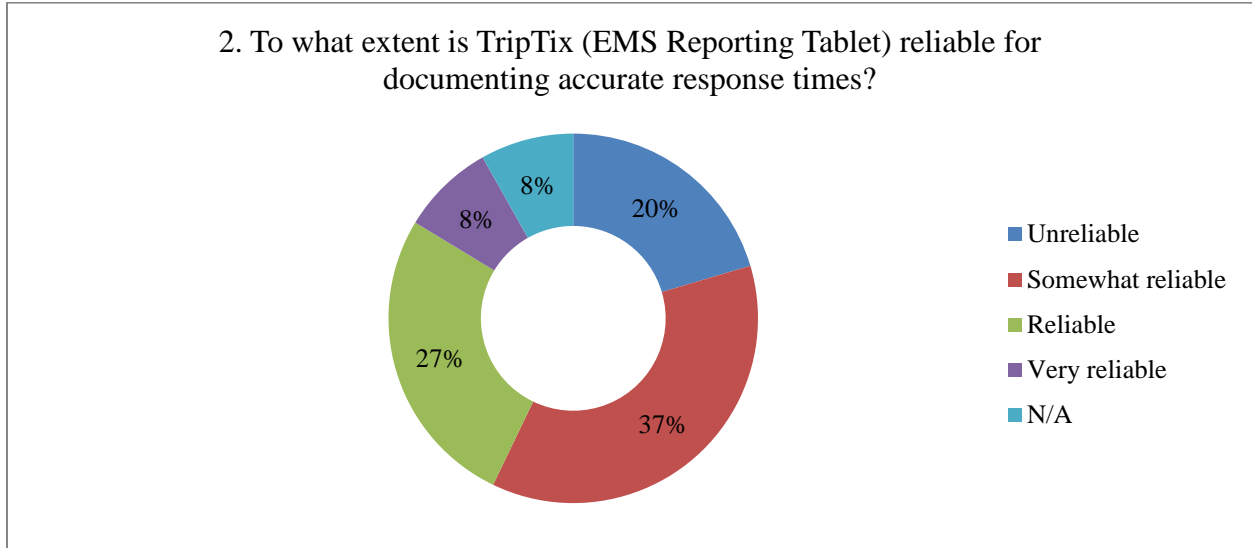


Figure 39 is the results of question number two. Fifty-seven percent of the respondents felt TripTix was somewhat reliable or unreliable.

Figure 40

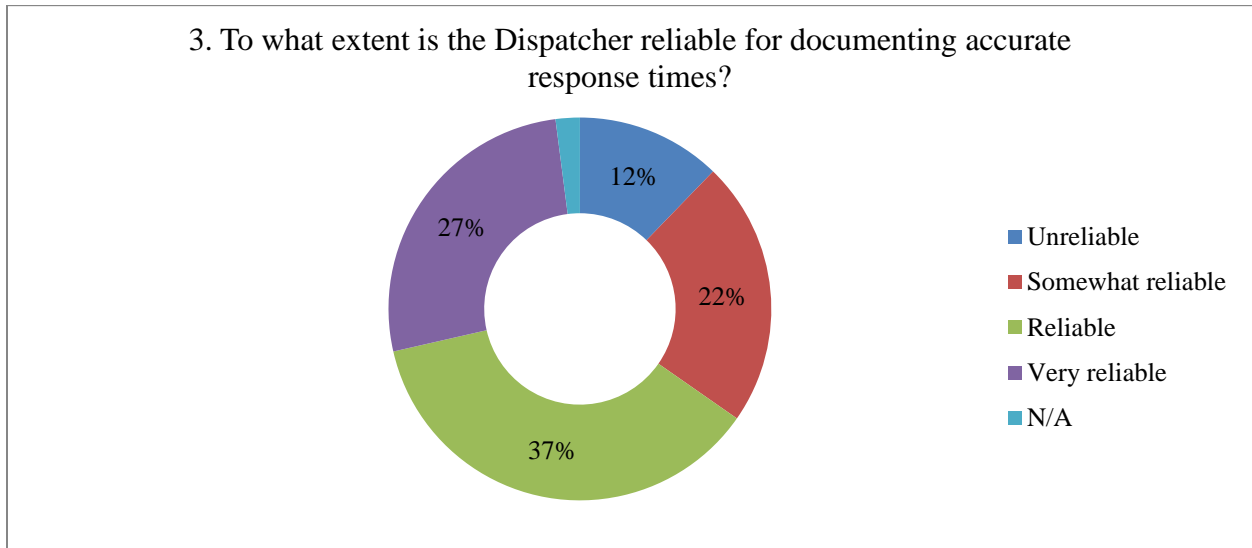


Figure 40 is the results of question number three. Sixty-four percent of respondents felt the dispatcher was reliable or very reliable.

Figure 41

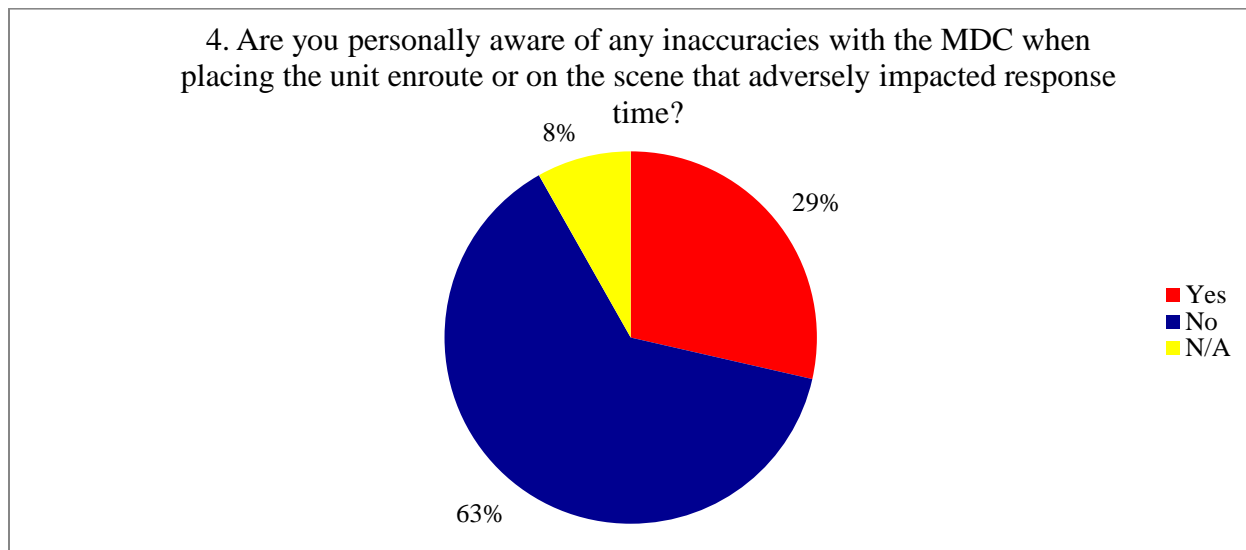


Figure 41 is the results of question number four. Sixty-three percent of respondents are not aware of any inaccuracies with the MDC. Twenty-nine percent of respondents are aware of inaccuracies. A sampling of comments is provided:

- “Sometimes the MDC will pick up the response but sometimes you may need to hit the button multiple times or refresh the detail on the screen before it will appear.”
- “MDC just don't work all of the time...you can hit your en route button and you wait for your status to change....sometimes it won't change then you pick up the mic and tell dispatch you are responding then they give you a time after you may have been responding for 1 min. or so.”
- “Sometimes it will not accept when the en route button is used.”
- “Going en route via MDC and action not recorded/status not changed with county.”
- “Sometimes the MDC will pick up the response but sometimes you may need to hit the button multiple times or refresh the detail on the screen before it will appear.”

Figure 42

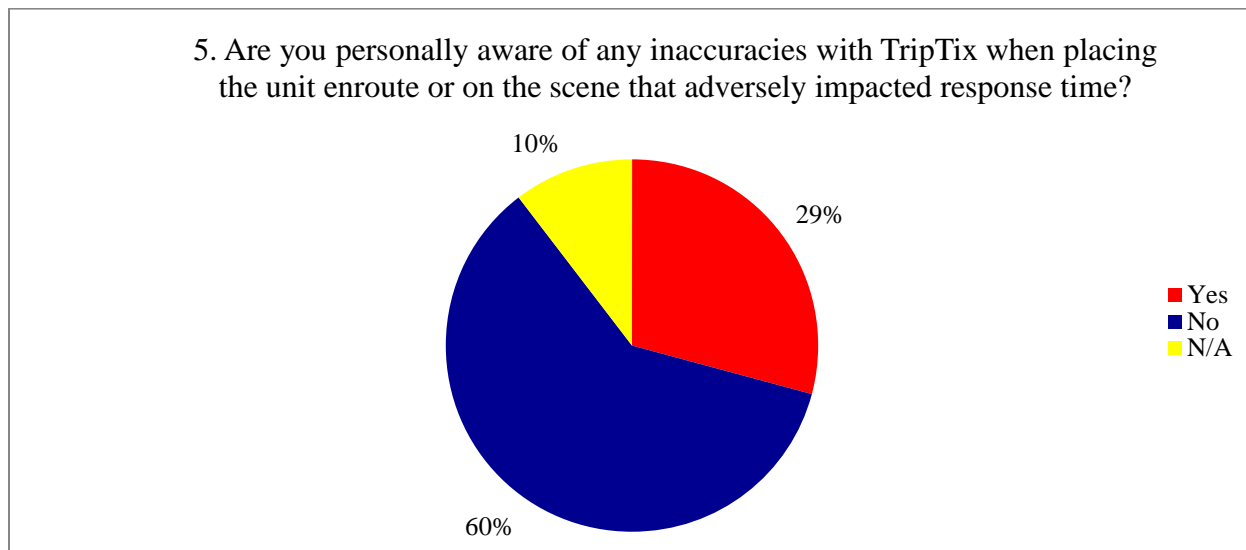


Figure 42 is the results of question number five. Sixty percent of respondents are not aware of any inaccuracies with TripTix. Twenty-nine percent of respondents are aware of inaccuracies. A sampling of comments is provided.

- “Must log into tablet and wait for it to prepare for the run before you can begin to enter times etc., sometimes it opens quickly and other times it may be a few minutes before tablet is ready to use.”
- “Differences in time between dispatch set time, tablet times, even vehicle times.”
- “When we check mark the appropriate box but because we are in a hurry we forget to make sure the check mark was captured and the current time was logged.”
- “Tablet time is different than dispatch time.”
- “The times are only as good as the person inputting the information and could vary based upon which clock or method he/she uses.”

Figure 43

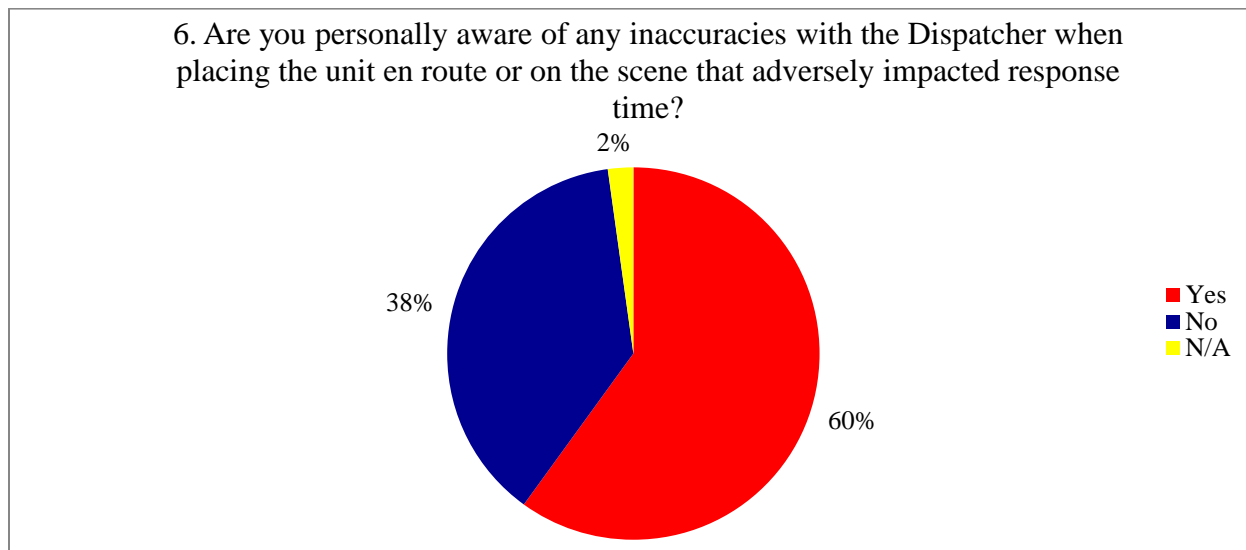


Figure 43 is the results of question number six. The dispatcher has the greatest percentage of inaccuracies when placing the unit en route or on the scene. A sampling of comments is given:

- “Too much radio traffic causing a delay in the dispatcher’s response.”
- “They log it when they get a chance, not when you say it.”
- “If they are busy with other units it may be two or three minutes before you can get through on radio. At times it is quicker to just call the dispatch center and advise.”
- “Dispatch is inundated with multiple calls which contribute to inaccurate postings.”
- “I have noticed that my times differ greatly from the time I recorded the dispatcher gave me versus what was on an MDC log.”

Figure 44

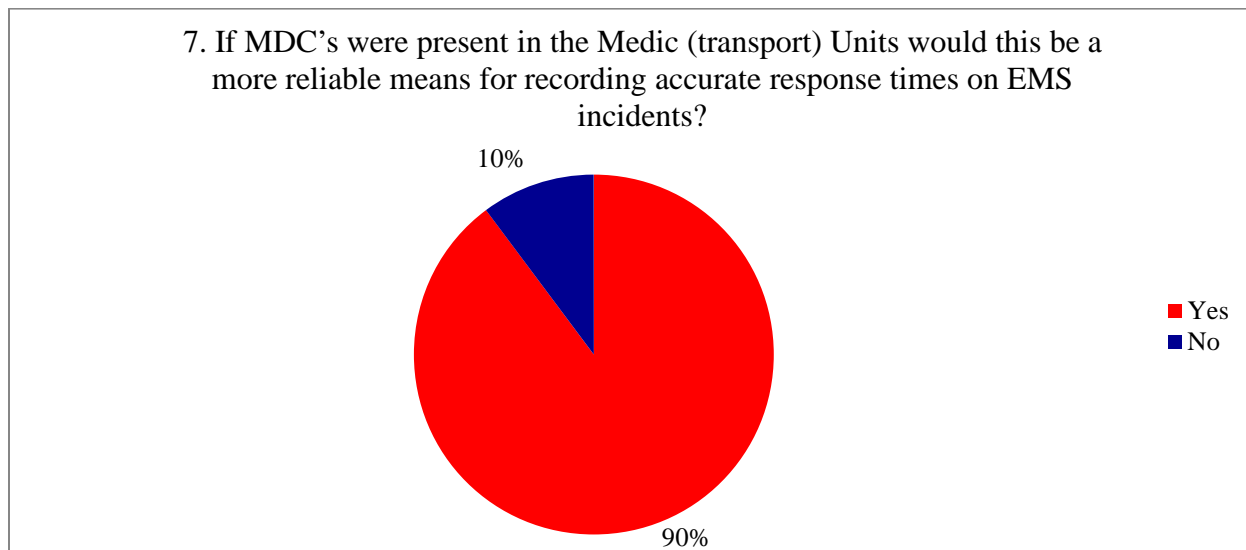


Figure 44 is the results of question number seven. Ninety percent of respondents felt that EMS times could be more accurate with the installation of MDC's in the medic units.

Figure 45

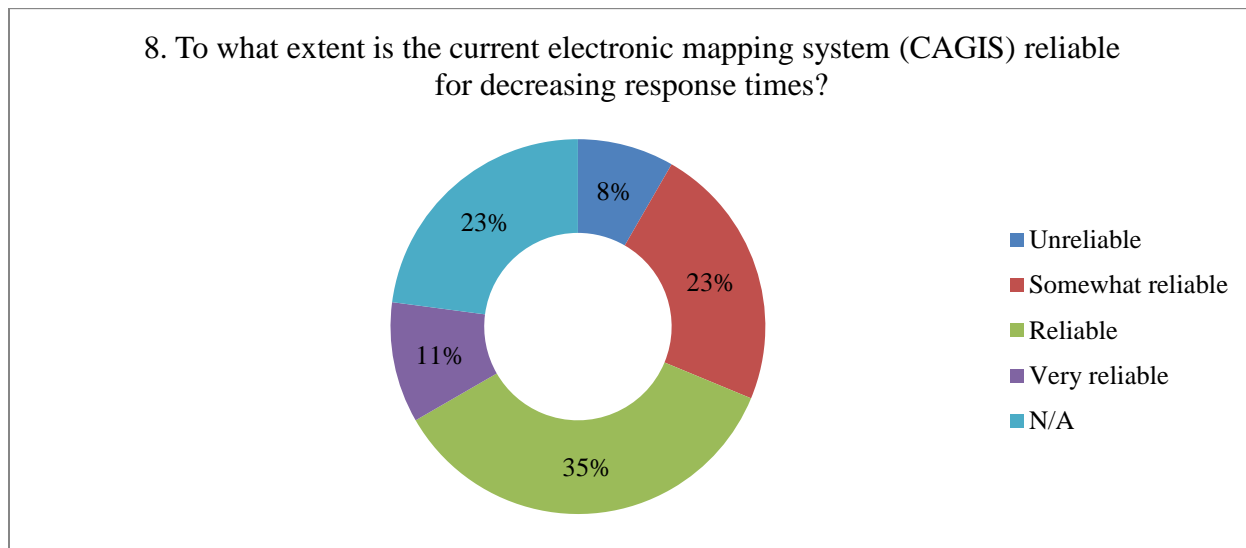


Figure 45 is the results of question number eight. Forty-six percent of respondents felt that CAGIS was reliable or very reliable for decreasing response times.

Figure 46

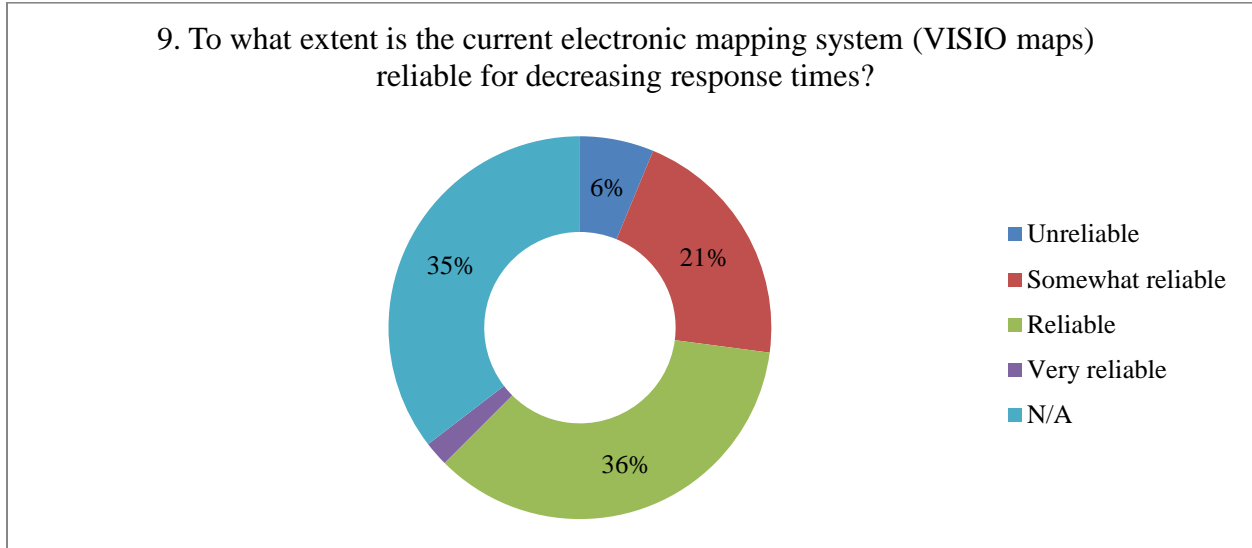


Figure 46 is the results of question number nine. Thirty-eight percent of respondents felt that VISIO was reliable or very reliable for decreasing response times.

Figure 47

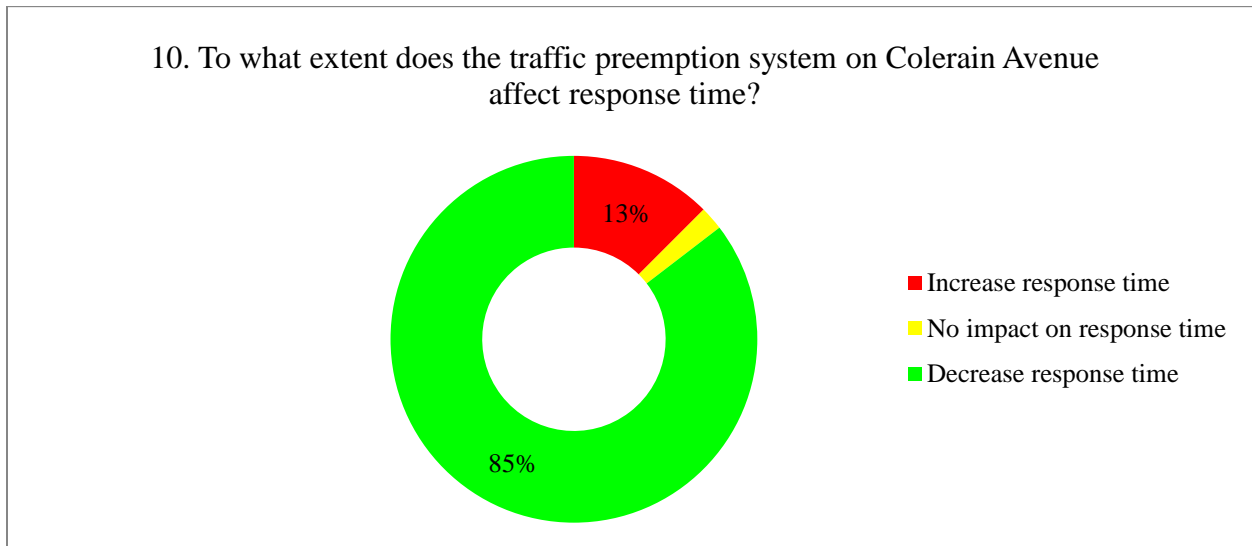


Figure 47 is the results of question number ten. Eight-five percent of respondents felt that the EVP system on Colerain Avenue has decreased response times.

Figure 48

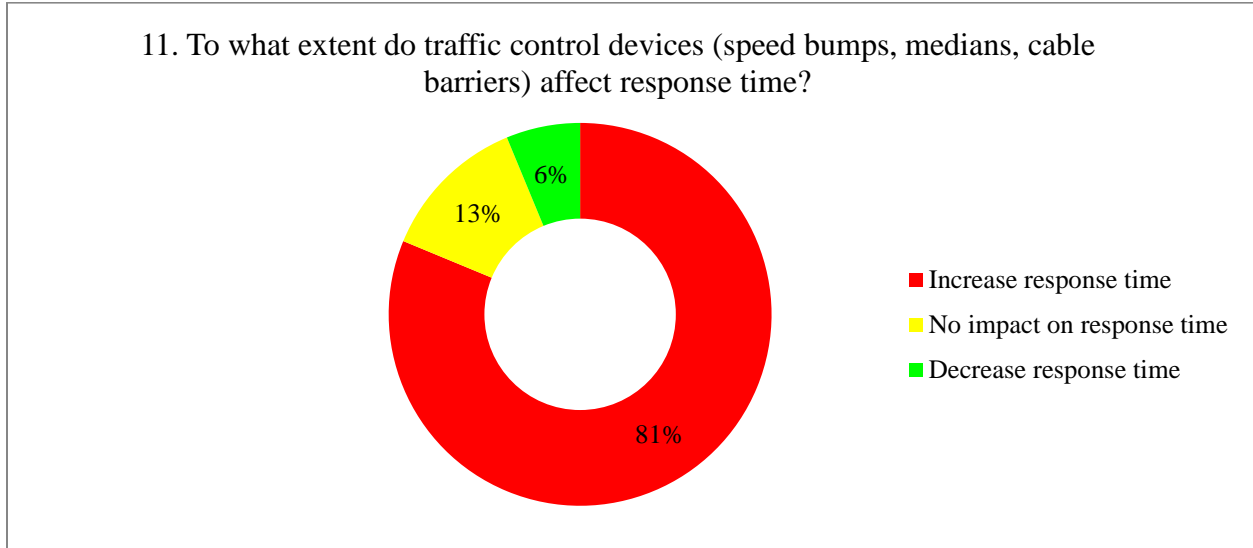


Figure 48 is the results of question number eleven. Eighty-one percent of the respondents felt that traffic-calming devices increase response time.

Figure 49

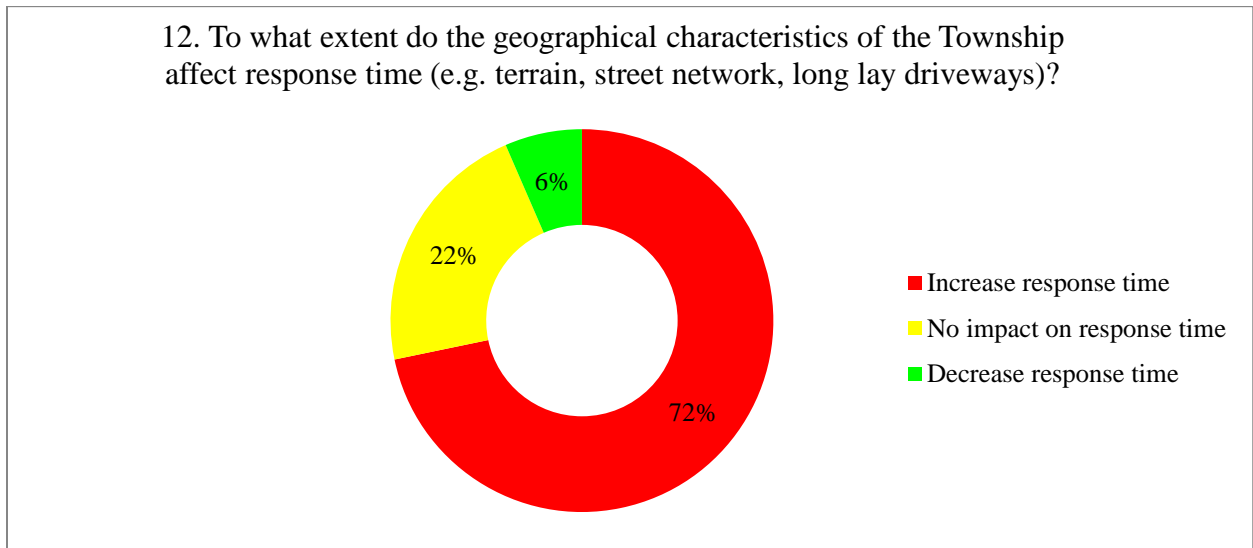


Figure 49 is the results of question number twelve. Seventy-two percent of respondents felt that the geographical characteristics of the township increase response time.

Figure 50

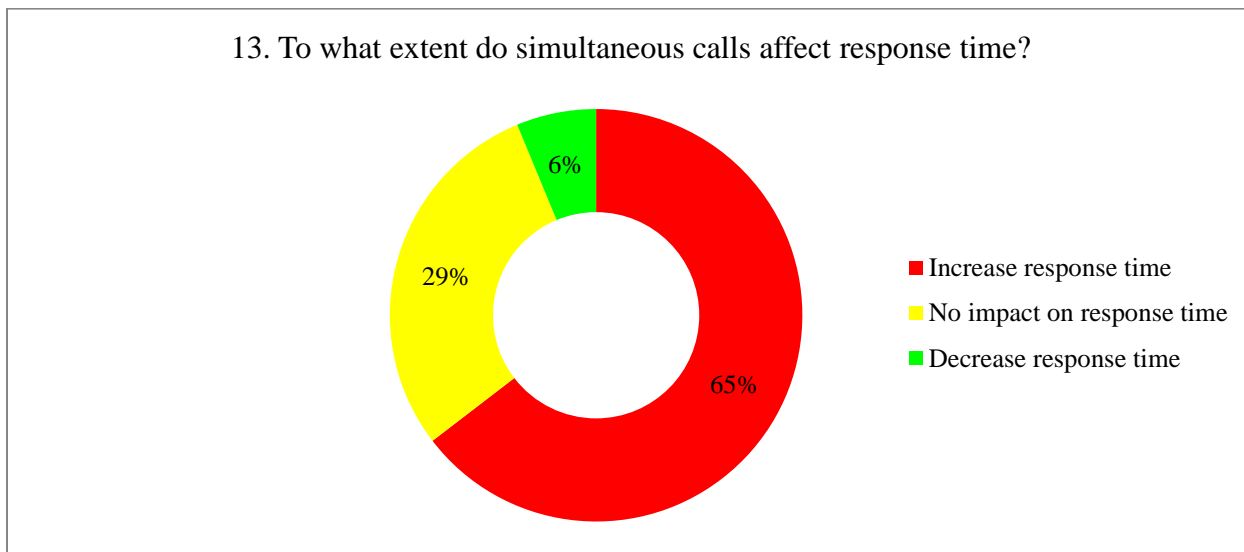


Figure 50 is the results of question number thirteen. Sixty-five percent of respondents felt that simultaneous calls increase response time.

Questions fourteen through sixteen explored the role that training activities, physical fitness, and public education activities have on response times.

Figure 51

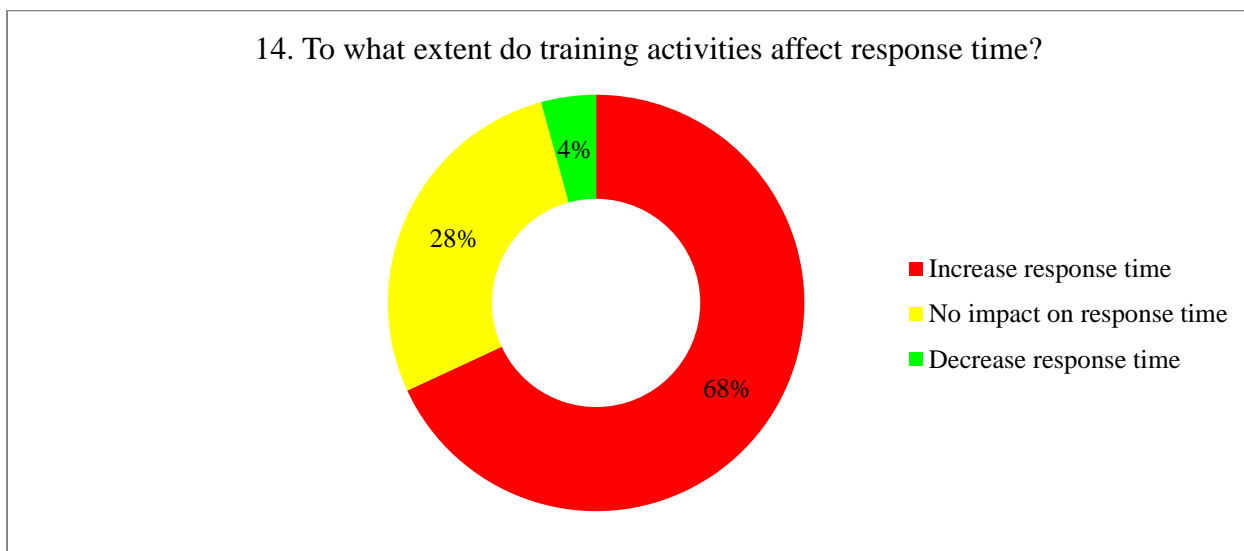


Figure 51 is the results of question number fourteen. Sixty-eight percent of respondents felt that training activities increase response times.

Figure 52

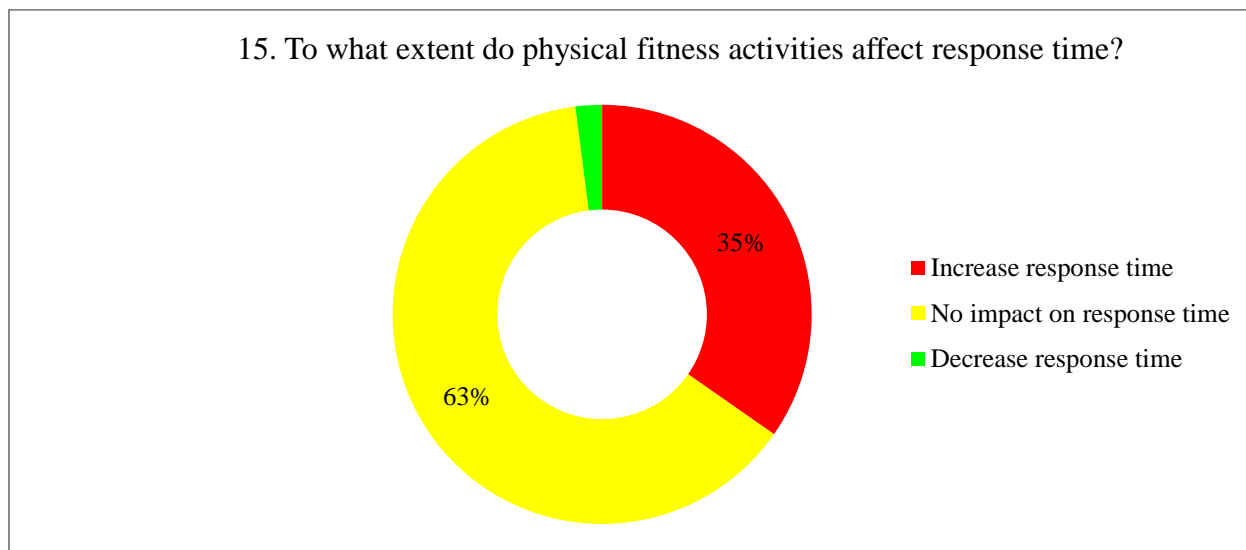


Figure 52 is the results of question number fifteen. Sixty-three percent of respondents felt there was no impact on response times with physical fitness activities.

Figure 53

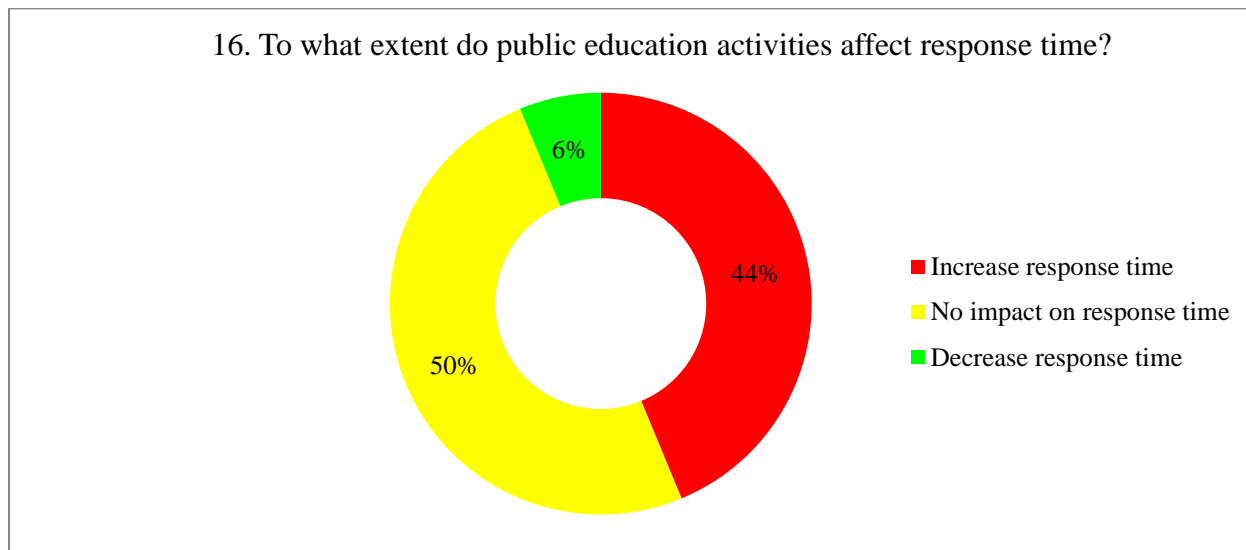


Figure 53 is the results of question number sixteen. Fifty percent of respondents felt there was no impact on response times with public education activities.

Figure 54

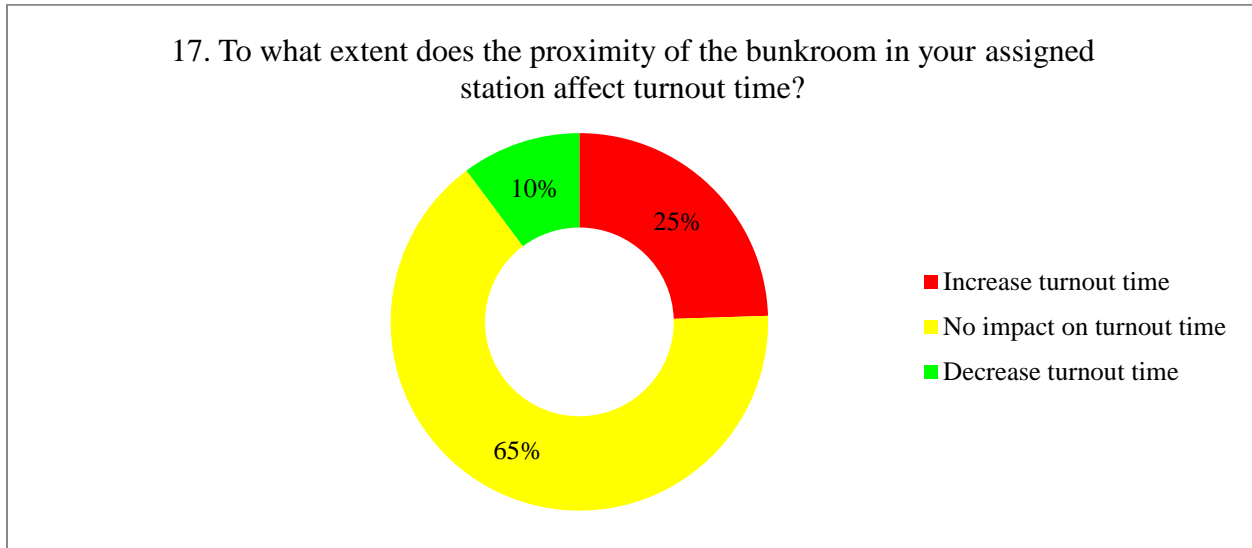


Figure 54 is the results of question number seventeen. Sixty-five percent of respondents felt that bunkroom location had no impact on turnout time.

Figure 55

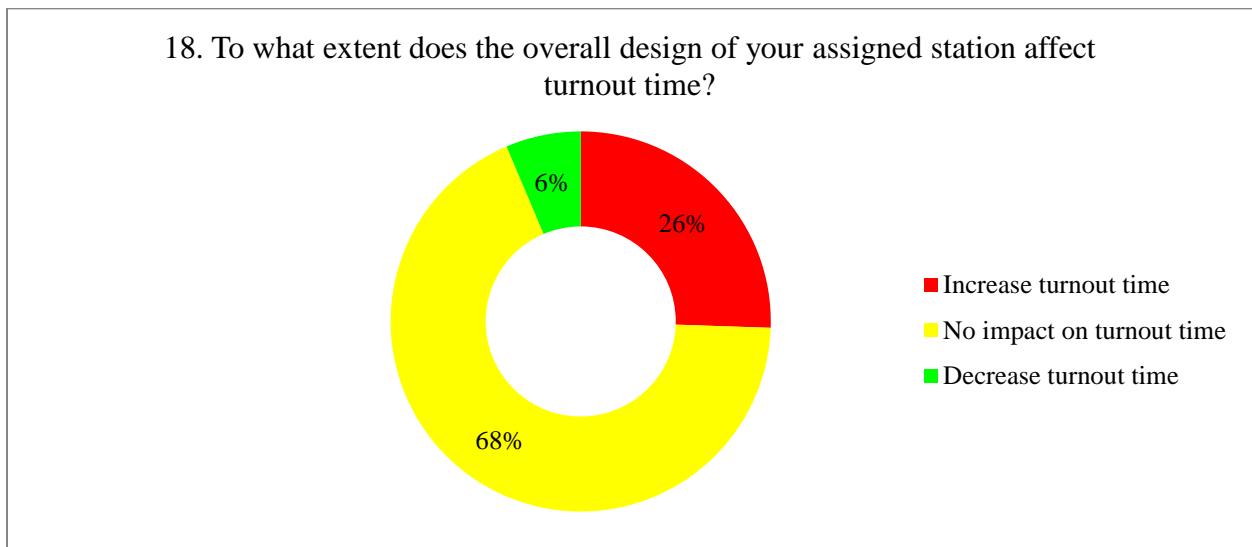


Figure 55 is the results of question number eighteen. Sixty-eight percent of respondents felt that station design had no impact on turnout time.

Figure 56

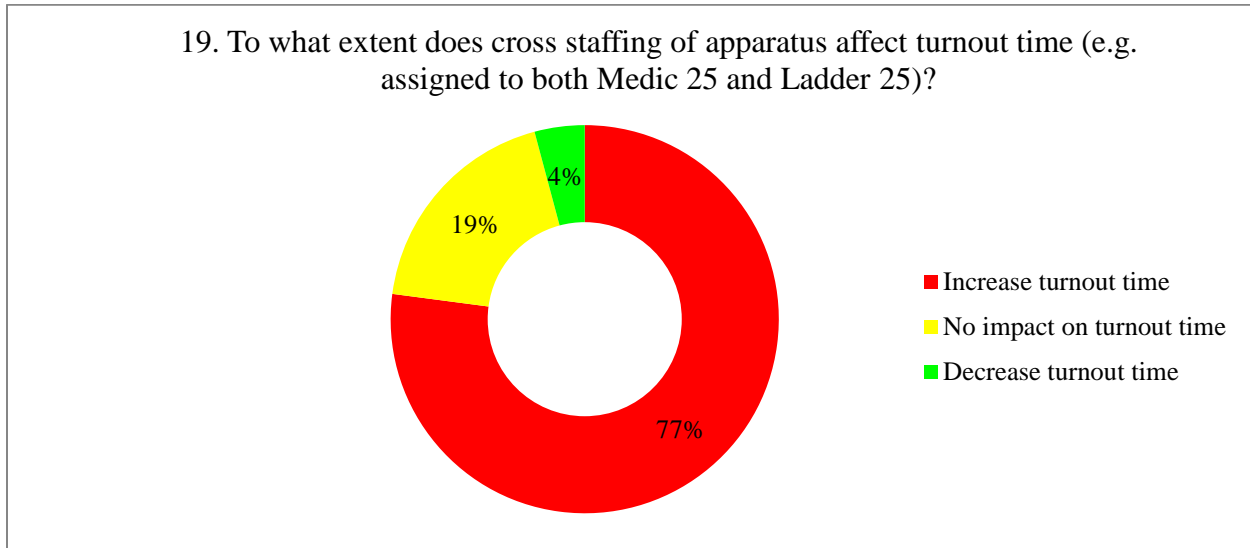


Figure 56 is the results of question number nineteen. Seventy-seven percent of respondents felt that cross staffing of apparatus increased response time.

Figure 57

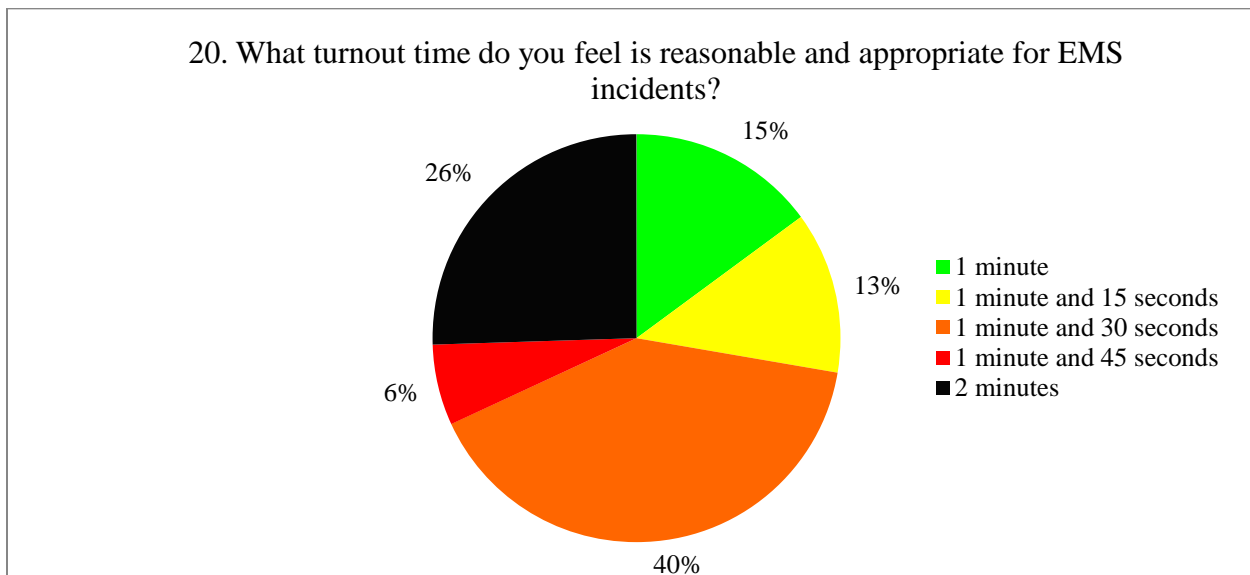


Figure 57 is the results of question number twenty. Forty percent of respondents felt that one minute and thirty seconds is a reasonable and appropriate turnout time for EMS incidents.

Figure 58

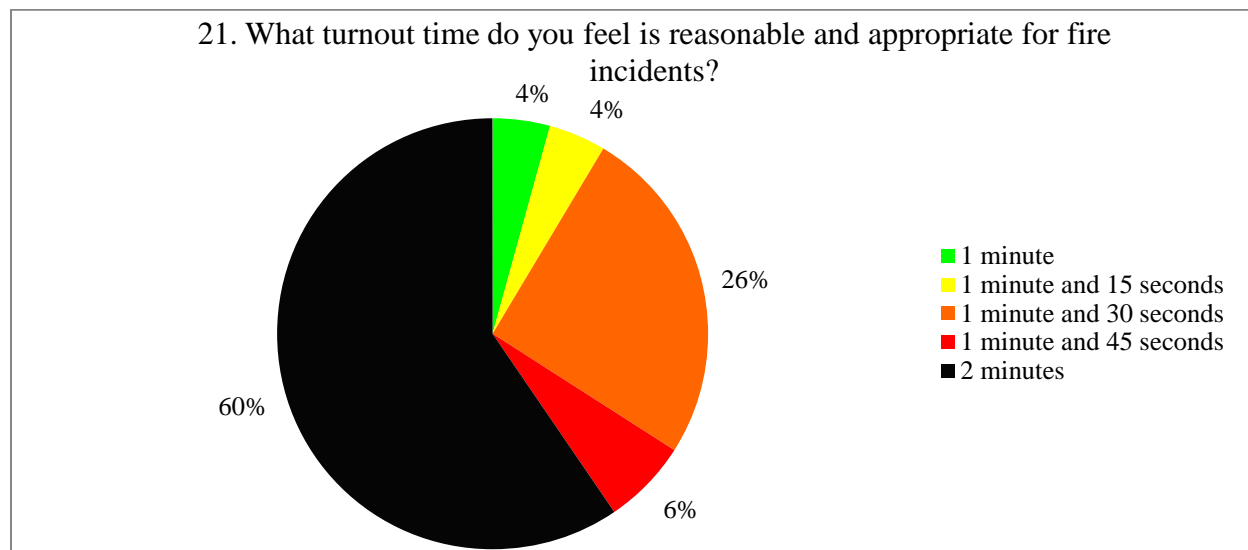


Figure 58 is the results of question number twenty-one. Sixty percent of respondents felt that two minutes is a reasonable and appropriate turnout time for fire incidents.

Question twenty-two asked the regularly assigned station of the respondent with seventy-three percent of the respondents being from the two busiest stations.

Figure 59

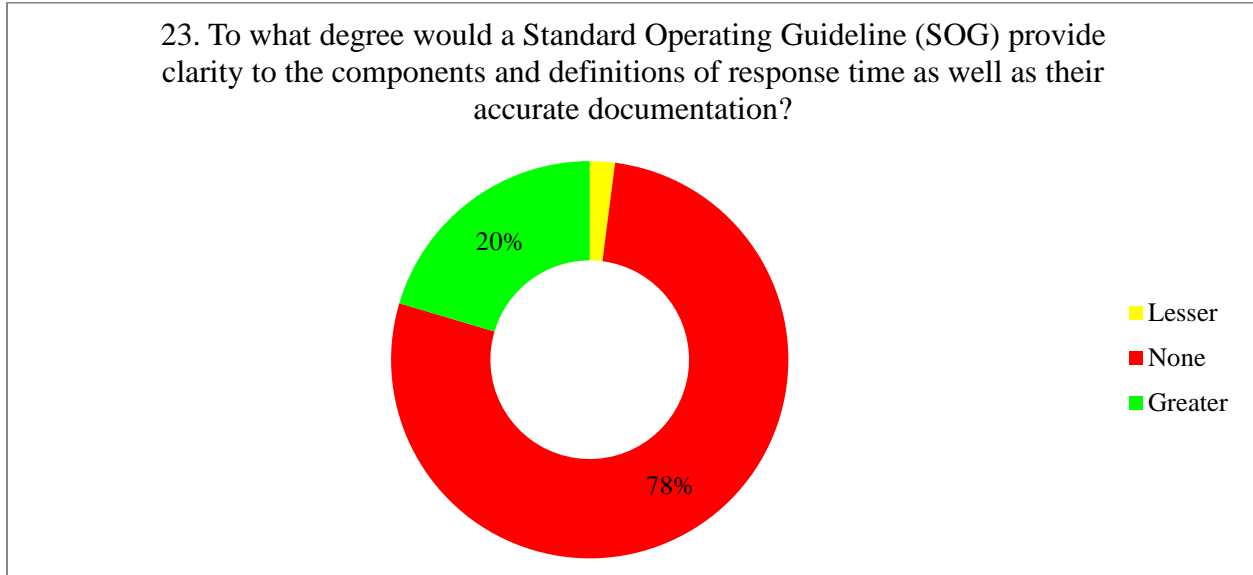


Figure 59 is the results of question twenty-three. Seventy-eight percent of respondents felt that a SOG would bring no additional clarity to response time definitions and documentation.

Figure 60

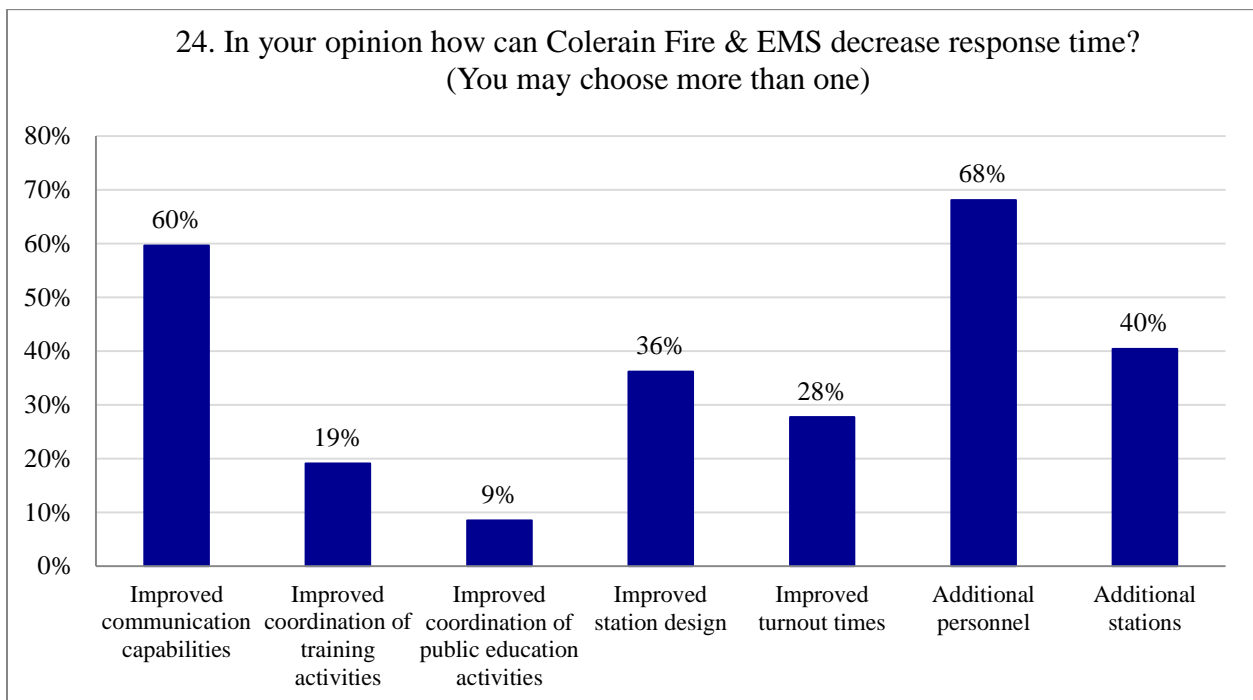


Figure 60 is the results of question twenty-four. Sixty-eight percent of respondents felt that additional personnel would help to decrease response time followed by, improved communication, additional stations, improved station design, improved turnout times, improved coordination of training activities, and improved coordination of public education activities. A sampling of other responses is provided:

- “Increased the sense of urgency in personnel.”
- “Increase manpower and provide all employees with some sort of dispatch device (pagers, minitor) I’ve seen several times were someone has looked at their pager and just went back to work and the call was for the person next to them.”
- “Raise expectations, station specific tones.”
- “MDCs in the Medic units.”
- “Stop any activity that takes an in-service emergency unit out of service.”

Finally, question number twenty-five asked for feedback on any other factors which may affect response times. A sampling of responses is provided:

- “I don't think the crews are getting out slowly. I think the problem is with the inconsistent documentation of them.”
- “Any activities that take us away from the close proximity of the units or systems malfunction (i.e. MDC's, CAGIS, or preemption system not working) is going to increase time.”
- “Many times during response preemption system changes all of green lights to red right before we get to the intersection so you have to stop / wait for them to change back to green.”

- “The two biggest have already been mentioned. Cross staffing of vehicles and training (due to having equipment off the trucks when the run comes in or being fully geared up and in the middle of some sort of scenario when the run comes in).”
- “The orientation of the bunk, training, and weight room at station 25 make it difficult decrease our turn out times. It just takes time physically) to make it down stairs in an efficient manner. At least, compared to the other stations.”
- “Personnel aren’t machines that always function the same. After long hours on a busy shift, expect EVERYTHING to be impacted.”
- “Drivers knowledge of Response Area.”
- “Single station dispatch. It is pointless to wake up everybody in the township for an EMS run. I wait to see if it is me or not. That burns time. If I knew that when the tones dropped it was me that would save a lot of time. On top of that it might add some time to my life. Tons of studies out there that say each tone takes a few seconds off your life.”
- “Individual house tones so if there is a run you automatically run to the truck because you know it’s your run.”
- “No. Our guys do a great job getting out of the house and on scene in a timely fashion.”
- “We need MDC's in the squads for a number of reasons. (SAFETY being #1)”
- “Road work/construction, high traffic during peak hours (occasionally rendering the preemption system useless).”

*What impact may be realized for response times if staffing reductions or station closures became a reality?*

In order to explore potential impacts of staffing reductions or station closures a survey document was constructed in order to determine if personnel reductions or station closures had occurred since 2008, the impact to the organization if personnel reductions or station closures had taken place, if personnel reductions had taken place were they reinstated, if stations were closed had they been reopened, were the impacts fact based or anecdotal in nature, and were there any additional impacts to the organization not noted in the survey?

Twenty-seven agencies were surveyed with a response rate of 13(37%). Question number two asked whom completed the survey with Chief Officers accounting for 13(100%) of the respondents.

Figure 61

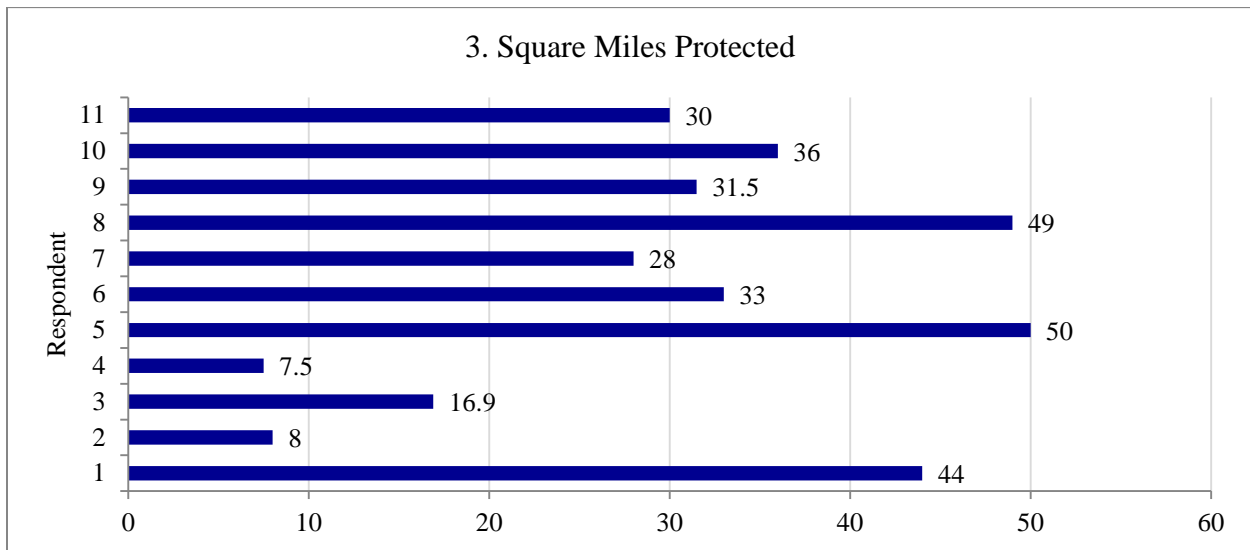


Figure 61 is the results of question number three. Responding departments protected an average of 30 square miles.

Figure 62

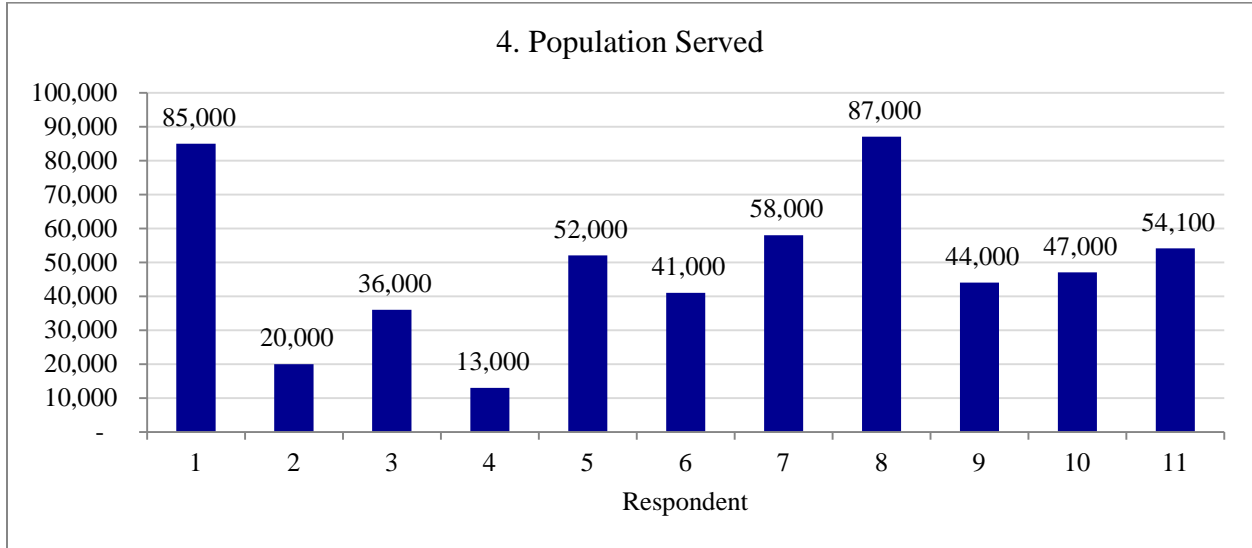


Figure 62 is the results of question number four. Responding departments had an average resident population served of 48,827.

Figure 63

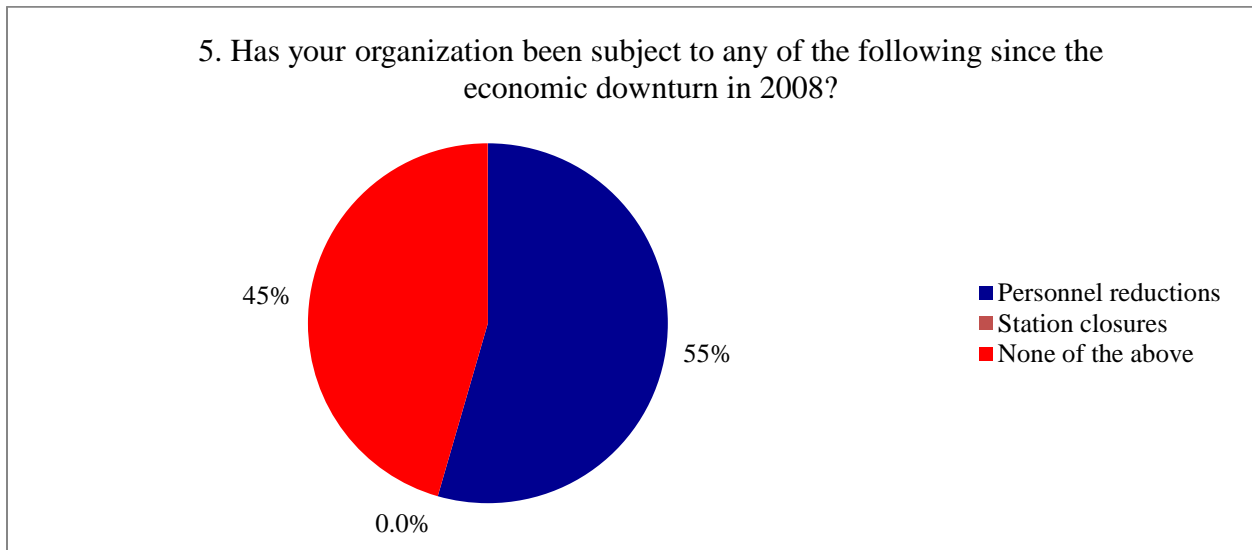


Figure 63 is the results of question number five. Fifty-five percent of the respondents have experienced personnel reductions since 2008. Station closures have not occurred amongst the respondents.

Figure 64

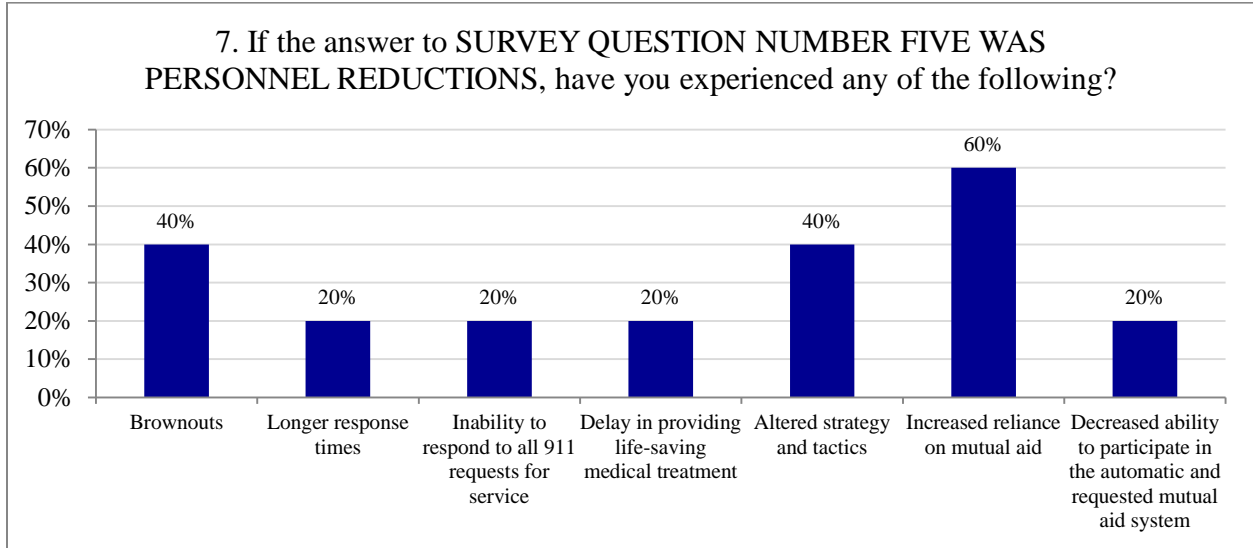


Figure 64 is the results of question number seven. Personnel reductions have resulted in increased reliance on mutual aid, altered strategy and tactics, brownouts, longer response times, the inability to respond to all 911 requests for service, a delay in providing life-saving medical treatment, and a decreased ability to participate in the requested automatic and mutual aid system.

Question number eight asked if personnel reductions had taken place were they reinstated with none of the respondents reporting reinstatement of lost positions.

Figure 65

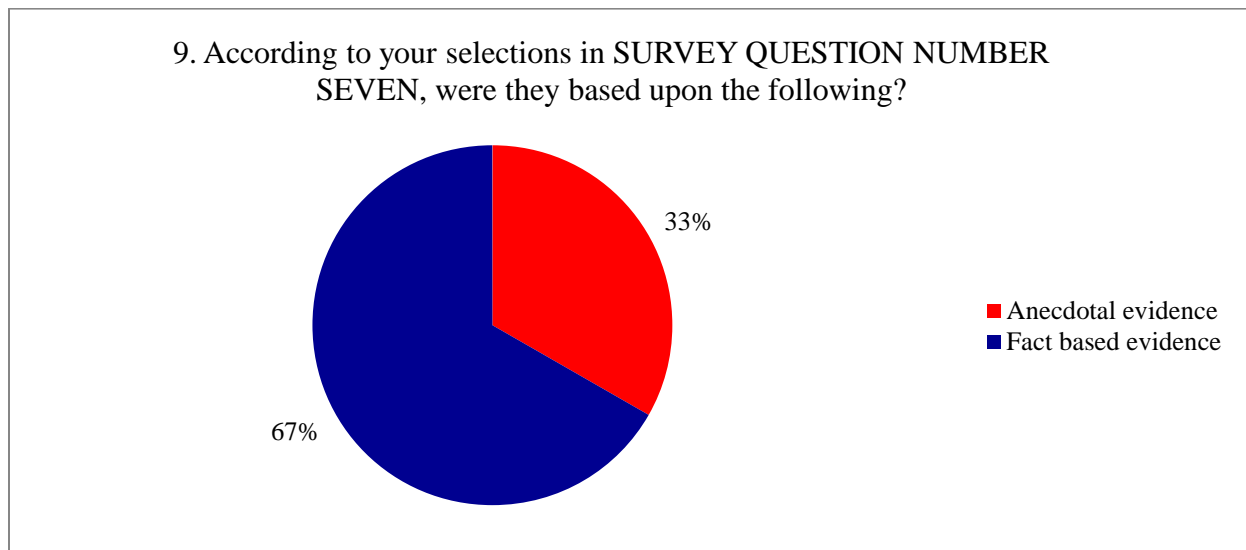


Figure 65 is the results of question number nine. Sixty-seven percent of the respondents report the answers to question seven to be fact based and not anecdotal in nature.

Question number ten asked if the respondents would be willing to contact the researcher in order to share their fact-based evidence. Three (75%) who answered the question would be willing to do so.

Questions eleven through fourteen were relative to station closures with 11(100%) not reporting any station closures.

Figure 66

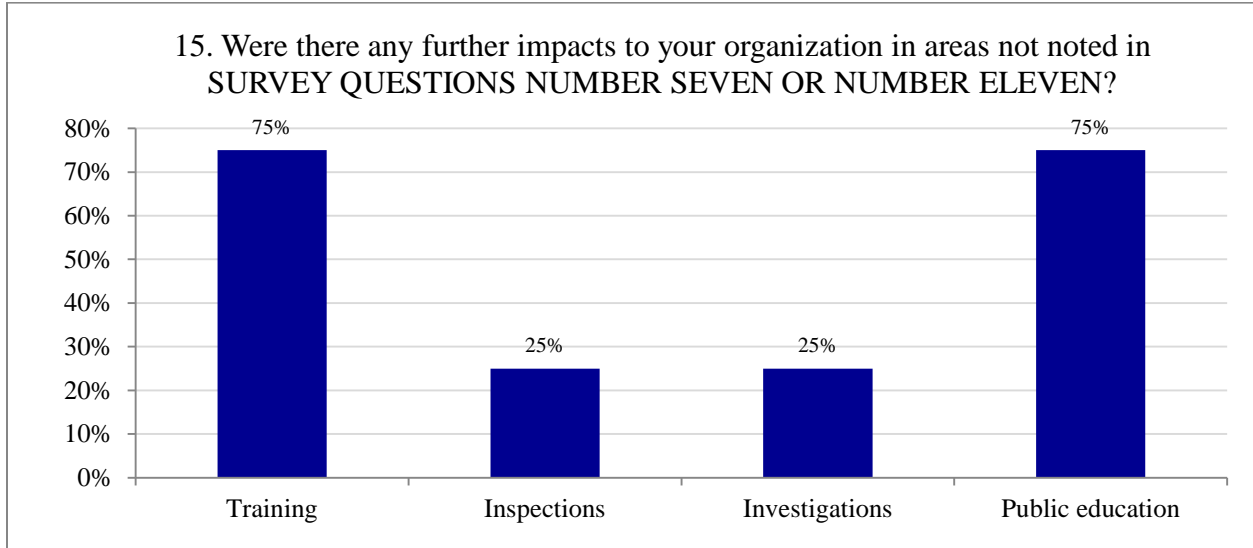


Figure 66 is the results of question number fifteen. Training, public education, inspections, and investigations have all been impacted.

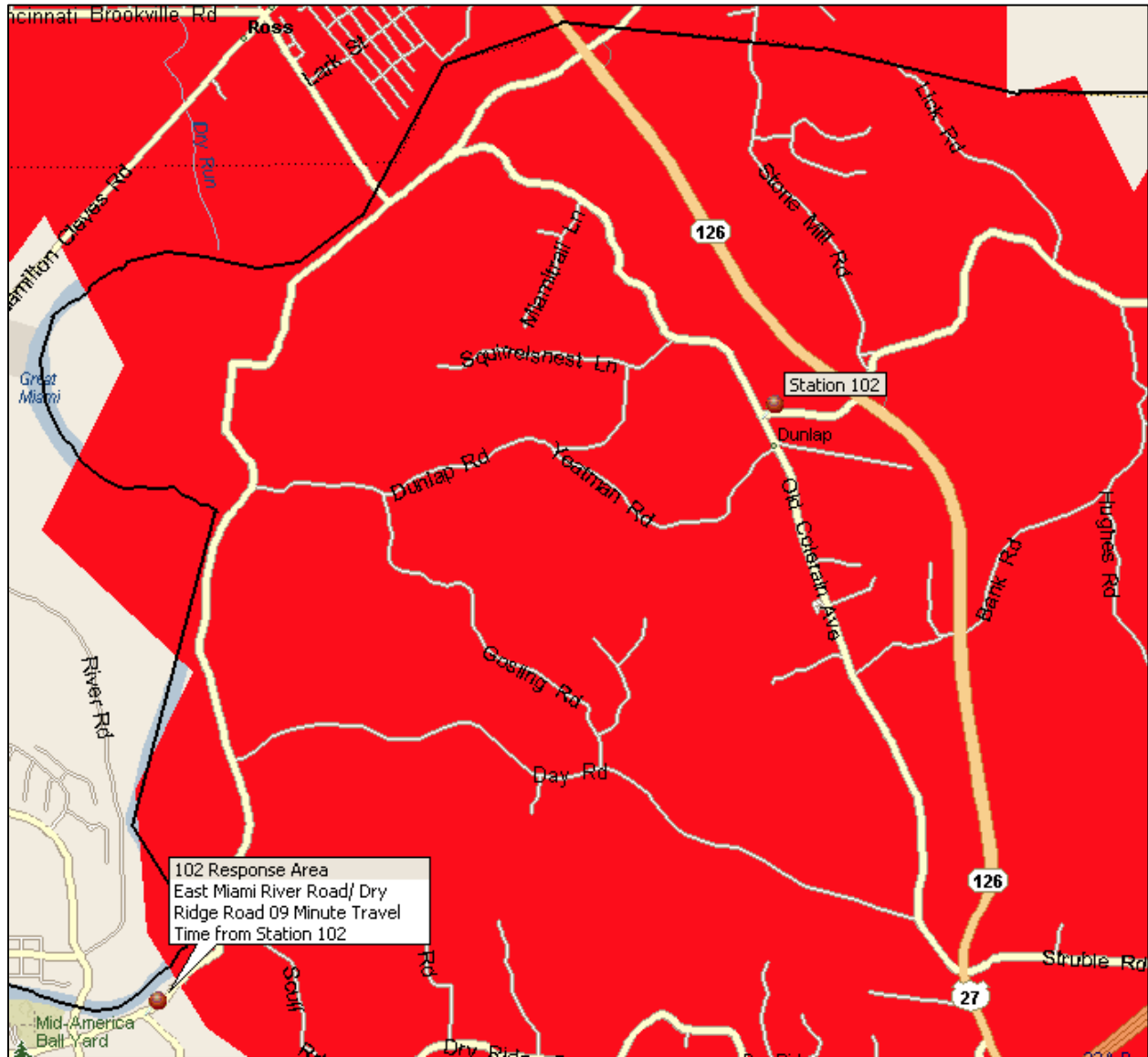
Question number sixteen asked if any further impacts were noted either pro or con. The following are a sampling of the answers received.

- “State funding to local governments has diminished to the point that it impacts the fire department budget.”
- “Financial struggles were realized but planning and vision of the department heads and the fiscal officer helped to lessen the impact at the ground level. The fire department was in need of a levy and passed one; had it not passed the department would have lost eight full time positions.”
- “The department has deferred vehicle and equipment replacements, some non-critical facility and vehicle maintenance, and the purchase of some equipment. We have controlled overtime for several years, but are taking an even more critical look at ways to reduce OT without impacting staffing.”

For the most part, the department has "dodged the bullet." We may still have to consider a reduction in force and subsequent closing of a station during 2013 to survive until the next infusion of "new money." The Trustees may allow another tax levy effort in 2014, but have not yet made the decision."

- "Vehicle replacement, turnout gear replacement, air monitoring replacement, soon it will impact SCBA replacement."
- "Unchanged ISO rating, wage/benefit reductions, enhanced mutual aid pacts."
- "Changes to minimum staffing, increased responses by chief officers."
- "None that impeded operations."

Figure 67



Station 102 is unarguably the least busy station in the township averaging approximately 350 total incident responses per year. The furthest point in Station 102’s first due response district is approximately a nine-minute travel time as evidenced by Figure 67. Station 102 has been the subject of discussion for closure during alternative staffing modeling or realignment of apparatus assigned to Station 102.

Table 14

*Travel Time Comparison*

Station	Address	Travel Time
102	Dry Ridge Road and East Miami River Road	9 minutes
109	Dry Ridge Road and East Miami River Road	14 minutes
25	Dry Ridge Road and East Miami River Road	12 minutes
103	Dry Ridge Road and East Miami River Road	9 minutes
26	Dry Ridge Road and East Miami River Road	12 minutes
Station	Address	Travel Time
102	Heritage Park	5 minutes
109	Heritage Park	10 minutes
25	Heritage Park	13 minutes
103	Heritage Park	13 minutes
26	Heritage Park	16 minutes
Station	Address	Travel Time
102	East Miami River Road and U.S. 27	5 minutes
109	East Miami River Road and U.S. 27	8 minutes
25	East Miami River Road and U.S. 27	10 minutes
103	East Miami River Road and U.S. 27	14 minutes
26	East Miami River Road and U.S. 27	14 minutes

Source: Google Maps; 2013 (Quickest route was selected for travel time).

Table 14 is a travel time comparison to points within Station 102’s first response district. Dry Ridge Road and East Miami River Road are the farthest point travel wise within the first response district and is located in the southwest quadrant. Additional travel time realized would be between zero and five minutes depending on the responding station. Heritage Park is the

largest township park and is located in the northwest quadrant of the first response district. Additional travel time realized would be between five and eleven minutes depending on the responding station. East Miami River Road and U.S. 27 is a major intersection located at the farthest point northward within the first response district. Additional travel time realized would be between three and nine minutes depending on the responding station. Overall, if Station 102 were to be closed total response time increases could be between four and eleven additional minutes.

Finally, in order to draw comparisons in the structured interview for the potential impact of cuts on response times the administrator and elected officials were asked to state a desired performance measurement. One interviewee stated, “six minutes”, the second interviewee stated, “it should be determined by the fire department administration”, and the third interviewee stated, “80% in less than six minutes”.

### Discussion

The purpose of this ARP was to conduct a quantifiable comparison for response time data against nationally recognized standards as well as locally adopted performance measures in order to measure the potential impact of staffing reductions or station closures. Brunacini (2013) stated “... the mother and father of disaster are “too little” and “too late.” I guess we could also say that the mother and father of effective service are “enough” and “on time” (p. 38). When the public dials 911 they expect help to arrive quickly regardless of the nature of their emergency. Based upon the literature review and research Colerain Fire & EMS has not been meeting its internal performance standard for response times let alone meeting national standards such as NFPA 1710, other local performance measures adopted by other jurisdictions in Hamilton County, or a desired performance measure, as stated in the structured interview, with one of the

township trustees. Staffing levels have held constant for the last thirteen years while incident responses have steadily increased. “For the past decade, we have cut out all the fat, and all that is left is bone. Any current reduction causes structural damage to how we deliver service” (p.38).

A plethora of definitions and terms exist for response time with NFPA 1710, the industry standard, containing standardized terminology. The matrix contained within CFAI for alarm handling, turnout time, and travel time is based upon existing standards such as NFPA 1710 and NFPA 1720 (CFAI, 2009). Additional definitions and terms exist according to the literature search, and although they may somewhat mirror NFPA 1710 and CFAI, they may not be as well known. NFPA 1710 and CFAI define total response time as alarm processing + turnout time + travel time. Colerain Fire & EMS neither controls nor reports alarm processing which is done under the auspices of the HCCC.

Locally, some disagreement exists as to when response time starts and stops. Generally, it is defined as the emergency unit dispatched to their arrival at the emergency scene. There was disagreement amongst the elected officials and administrator as to the starting and stopping point for response time. Interestingly, the two whom were interviewed that stated we had done an adequate job of communicating our methodology were incorrect when asked to provide a definition. The other who gave a grade of “F” for communicating our methodology gave the correct definition for response time.

For EMS incidents it was stated that some have advocated recording arrival on the scene, as well as time to the patient’s side, which could fluctuate dramatically. No reference was made to recording arrival on the scene to initiation of operations at fire or rescue incidents. This serves to reinforce that “the manner by which departments report response times varies widely”

(Yeomans, 2011, p. 4). However, a universal definition should exist and it would allow for an “apples to apples” comparison for assessing emergency response. This would seemingly coincide with a citizen-initiated project in Burlington, Iowa in 2001 that determined they would prefer a performance measure for the fire department that measured the total response time (Ho & Coates, 2004).

Nationally, NFPA 1710 is the industry wide adopted consensus standard for fire and EMS protection that consists of a “one size fits all” approach to response times. Alarm processing, turnout time, and travel time have established parameters. CFAI bases response benchmarks and baselines on service area, population and/or population density, and a community risk assessment. Locally, the majority (87%) of respondents stated they had adopted a performance measurement that is uniformly and consistently applied (67%). The majority was based upon an internal organizational goal (79%) followed by NFPA 1710 (36%) and what was determined for them by their elected officials (36%).

Average times and fractal measurements were split evenly (29%) if a single form of reporting took place. Forty-two percent reported both forms of measurement. The fractal form of measurement is the most accurate means and follows the industry standard (CFAI, 2009). Fractal measurement “defines expected response times, clearly states when the clock starts and stops, and states how frequently that goal is expected to be met (Sullivan, 2013, p. 35). Only 33% of respondents reported their findings to the public with elected officials (73%) and internal reporting (67%) leading the way. Published times are only defined by 58% of respondents and 75% provide a universal measurement.

Seventy-nine percent of the respondents meet their annual performance measurement.

Based upon the research Colerain Fire & EMS is falling short of its performance measurement as well as the industry wide standard NFPA 1710. Barr & Eversole (2003) stated:

If however, it appears that a system is continually falling below standards, the system should be analyzed to determine the cause(s) of the problem. Once the cause has been identified, a plan should be developed to correct the problem and monitored for effectiveness after it is implemented. (p. 914)

The elected officials and administrator were in agreement that a performance measurement should exist, were aware that one did exist for Colerain Fire & EMS, but disagreed in universal application of one.

A review of response time data found some stark evidence. Although it appeared we were close to meeting our performance standard, after a review of the methodology for reporting, it was realized it was imperfect. Table 5 and Table 6 compare and contrast the simple reality of where we stand in regards to meeting our established performance standard. In 2003, 77% of EMS responses were made in less than six minutes, but in 2012 only 63% of EMS responses were made in less than six minutes. In addition, call activity increased from 7,976 responses in 2003 to 10,599 responses in 2012 a 25% increase (Colerain Township, 2013). The baseline over the years of review for this ARP for meeting the performance measurement held at near 64% for fire responses with an increase to 67% in 2012; fifty-nine percent for EMS responses with an increase to 63% in 2012, and 61% for combined responses with an increase to 65% in 2012. The decline points to a system according to Barr & Eversole that is in need of analysis for the root cause(s) of the problem(s) (2003).

Average turnout time has some unsettling trends particularly for total fire responses. In 2008 the average turnout was 01:06 but in 2012 the average turnout time increased to 01:45. Upon further review it appears the turnout times are suspect due to faulty data entry. In 2008 52% of reported turnout times were 00:00, in 2009 37% of reported turnout times were 00:00, in 2010 35% of reported turnout times were 00:00, in 2011 31% of reported turnout times were 00:00, and in 2012 only 11% of reported turnout times were 00:00.

It appears that due diligence was paid in 2012 when entering CAD data into the reporting software so that dispatch time and turnout time were not the same which would equal 00:00. This has the untoward affect then of increasing travel time; dispatch to arrival would remain the same. For EMS responses average turnout time over the course of review for this ARP averaged 01:31. However, TripTix reports data in the hh:mm form not hh:mm:ss and would therefore average to the lower minute not the closest second.

When comparing turnout time to the NFPA 1710 standard of 60 seconds for turnout time 90% of the time for EMS responses and 80 seconds 90% of the time for fire responses, turnout times are well below the recognized standard. Upson & Notorianni (2010), in the study *Quantitative Evaluation of Fire and EMS Mobilization Times*, say that the objectives of NFPA 1710 though “may be unrealistically short in today’s fire service environment ... and encourage unsafe practices in an effort to meet ... turnout objectives” (pp. 3-4). The recorded times for 90% compliance were 123 seconds for fire responses and 109 seconds for EMS responses (2010).

An evaluation (Table 12) was conducted in order to compare and contrast Colerain Fire & EMS responses to NFPA 1710. First arriving engine company response for fire suppression incidents and EMS incidents were examined. In short, Colerain Fire & EMS meets the overall

response time objective of 380 seconds 90% of the time in only 51% of the responses as an average over the five years of review for this ARP. For EMS responses, Colerain Fire & EMS meets the overall response time objective of 360 seconds 90% of the time in only 46% of the responses as an average over the five years of this ARP. The desire to meet NFPA 1710 is a goal to strive for but “is not being widely met at this point, because of financial difficulties and because of how much resources are needed...” said Al Gillespie (Bialik, 2012). Figure 35 is representative then of what portion of the township can be reached within a four-minute travel time.

A number of factors can impact response time positively or negatively. Reliability of communication devices is one of those for accuracy in recording times. The research indicates that the MDC is most reliable for accuracy followed by the dispatcher and the EMS reporting tablet. This is reinforced by Assistant Chief Niehaus encouraging personnel to make every effort to use the status buttons on the MDC’s in conjunction with voice traffic as the dispatcher will not change a time recorded by the status buttons (personal communication, February 15, 2013). This is then reflected by data that states only 29% of persons are aware of inaccuracies with the MDC but 60% of persons are aware of inaccuracies with the dispatcher. The EMS reporting tablet (TripTix) is not immune from its own inaccuracies as 90% say that MDC’s in the transport units would help to better validate EMS response times.

Neither of the electronic mapping systems have widespread reliability for reducing response times. Both are installed on the MDC’s that are only readily available on the fire apparatus. Combined, only 42% feel they are helpful in reducing response times. Twenty-nine percent of respondents have not used either of the mapping programs because of their inaccessibility.

EVP systems and traffic calming devices have contrasting effects on response times (Intelligent Transportation Systems, n.d.; Local Government Commission, n.d.). This is verified by the research with 85% of respondents stating the EVP system on Colerain Avenue has decreased response times whereas 81% of the respondents stated that traffic-calming devices have increased response times. Colerain Avenue has been known for its gridlock (Forgrave, 2003) and the EVP system has been one of many upgrades.

Ex-urban sprawl and development negatively impact fire and EMS response times (Lambert, Srinivasan & Katirai, 2012; Lambert & Meyer, 2006; 2008). The general characteristics of the township include that of urban, suburban, rural, and ex-urban development (Geoffrey Milz, personal communication, March 13, 2013). Seventy-two percent of the respondents are of the opinion that the geographical characteristics of the township (terrain, street network, and long lay driveways) increase response time. As residents seek quiet and solitude the negative impact on response times can be dramatic.

Simultaneous calls impact response times negatively as units are responding out of their first due response area or back into their first due response area (CPSE, 2009). Sixty-five percent of respondents felt that simultaneous calls increased response times. Data provided by Division Chief Greg Brown shows the number of times EMS units are on simultaneous calls (personal communication, May 8, 2013). Increased travel time equals increased response times.

Figures 36 and 37 are representative of this trend. It would be expected in the more rural areas of the township to see increased response times. However, a large percentage of EMS incidents with response times greater than six minutes or ten minutes are in the more urbanized areas of the township. This data may also serve to reinforce the ISO recommendation of a sixth

station, which would be located in the urbanized area where a large proportion of incidents have response times in excess of six or ten minutes.

Training activities, physical fitness, and public education activities play a role in increased response times according to the research. Training activities play a significant role in response times. According to the research, 68% of respondents felt that training activities increased response times followed by public education activities (44%) and physical fitness activities (35%). Better coordination of activities may help to alleviate the impact as companies are moved out of their first due response area or are taken out of service.

Inefficient station design according to Upson and Notarianni can negatively affect turnout time (2010). Proximity of the bunkroom and overall station design were surveyed to determine the impact on turnout time. Twenty-five percent of the respondents felt it increased turnout time, 65% felt there was no impact, and 10% felt it increased turnout time in respect to location of the bunkroom. Twenty-six percent felt overall station design increased turnout time, 68% felt there was no impact on turnout time, and 6% felt it increased turnout time. Station design appears to have little effect on turnout time for this ARP. Cross staffing of apparatus though increases turnout time according to 77% of respondents as personnel don turnout gear and shuffle from vehicle to vehicle.

Turnout times according to NFPA 1710 are 60 seconds 90% of the time for EMS incidents and 80 seconds 90% of the time for fire incidents (NFPA, 2009). The same holds true for CFAI (CPSE, 2009). According to the respondents a reasonable and appropriate turnout time for EMS incidents is 90 seconds (40%) followed by 120 seconds (26%), 60 seconds (15%), 75 seconds (13%) and 105 seconds (6%). A reasonable and appropriate turnout time for fire incidents is 120 seconds (60%) followed by 90 seconds (26%), 105 seconds (6%) and 60 and 75

seconds were tied (4%). Upson and Notarianni (2010) found actual times for 90% of EMS incidents were 109 seconds and for fire incidents 123 seconds; mean average turnout time fell within the 60 and 80 second mark though. Obviously longer turnout times, equals shorter travel times in order to arrive within normal and accepted practices, which means more fire stations placed closer together. In light of economic concerns it seems the best practice would be to keep turnout times to a minimum. No comparison was made in this ARP between daytime and nighttime turnout times.

In an effort to determine how to decrease response times for Colerain Fire & EMS 68% felt additional personnel were necessary, 60% felt improved communication capabilities, 40% felt additional stations were required, 36% felt improved station design, 28% felt turnout times could be improved, 19% felt improved coordination of training, and 9% felt improved coordination of public education activities. Goldfeder (2006) stated “More firehouses and more staffing reduce response times, as does keeping duty crews in the firehouse” (para. 13), which corresponds with the respondents opinions of increased staffing, additional stations, and better coordination of training and public education activities. Station design efficiency corresponds with the findings of Upson and Notarianni (2010). Turnout time corresponds to Madrid (2012). Therefore, the literature search supports the ways and means of reducing response times according to the survey.

The final aspect of the ARP was to determine what impact maybe realized if staffing reductions or station closures were to become a reality. Brunacini (2013) stated, “if we assume that the level of resource capability ... before the recession was adequate ... then we must realize that when that level is reduced, there must logically be some reduction in effectiveness” (p. 38). Following on the heels of this a survey document was used to ascertain the impact to

organizations, following the great recession, which Colerain Fire & EMS had benchmarked against within the last year. Fifty-five percent of the respondents had suffered personnel reductions; none had been subject to station closures. Sixty percent had an increased reliance on mutual aid, 40% altered strategy and tactics as well as had brownouts, 20% longer response times, 20% an inability to respond to all 911 requests for service, 20% a delay in providing life-saving medical treatment, and 20% a decreased ability to reciprocate in automatic or mutual aid. No personnel reductions have been reinstated and 67% of the respondents had fact-based evidence to support their findings.

Surveyed organizations were asked if further impacts were noted with reductions in training (75%), public education (75%), investigations (25%), and inspections (25%).

Additional impacts included deferred vehicle replacement, critical looks at overtime, turnout gear replacement, wage/benefit concessions, and changes to minimum staffing to name a few.

It would seem apparent that following the research for this ARP Colerain Fire & EMS is a system that has bent but not broken. Response times are on the decline and every attempt has been made to reduce costs in order to prevent structural changes to the operational capabilities of the organization. Wage concessions have been made by IAFF Local 3915, non-operational positions have gone unfilled, additional career personnel have not been hired, apparatus purchases have been deferred, cuts have been made to training, inspections, and public education, brownouts have taken place, all the while income has been decreased due to cuts in funding and property devaluation.

Public support remains widespread for Colerain Fire & EMS as evidenced by Appendix L, which are the results from a Town Hall Meeting on January 22, 2013. Seventy-five percent of the respondents felt the staffing and services offered by Colerain Fire & EMS are excellent.

Only 26% of the respondents felt Colerain Fire & EMS was overstaffed. The greatest value per tax dollars spent was on Colerain Fire & EMS. A follow-up Town Hall Meeting was held on June 4, 2013. Results are contained in Appendix M. Seventy-nine percent of respondents placed a rating of 5 on the value of Colerain Fire & EMS services. Only 6% of the respondents felt Colerain Fire & EMS was overstaffed. Colerain Fire & EMS has proposed a plan to stretch funds from a levy passed in 2010 an additional three years through 2018 with 55% of the respondents saying the greatest value to them was for Colerain Fire & EMS to make no further cuts.

Based upon the research further budgetary cuts that include personnel reductions or station closures will further degrade the operational capabilities of Colerain Fire & EMS. “Resource input directly relates to service delivery output. If we fiddle with the front end ... it will directly affect ... the back end (Brunacini, 2013, p. 38). This includes the probability of increased reliance on mutual aid, further brownouts, altered strategy and tactics, further degradation in response times, delays in providing lifesaving medical treatment, the inability to respond to all 911 requests for service, and a decreased ability to reciprocate in the requested automatic and mutual aid system.

In closing, it is only through research such as this ARP that changes can be promulgated. Colerain Fire & EMS has a track record of excellence in its delivery of service to the community, a longstanding history of innovation and firsts, proven ability for financial prudence, and has widespread support within the community. Therefore, the author intends to use the literature search, review of response time data, and results of the focus group, structured interview, and survey documents to formulate a set of recommendations.

## Recommendations

Following the literature search and accompanying research specific recommendations have been developed:

1. Redefine response time and its parameters; define the benchmarks for each and the methodology for reporting.

911 call to arrival time provides the opportunity for greater transparency, follows the predominant perception the public has for response time, coincides with elected official's desire for comprehensive response time measures, and provides Colerain Fire & EMS the benefit of all-inclusive measures in assessing the adequacy of our emergency response.

Monthly reporting to the elected officials and township administrator via the dashboard as well as annual reporting via the township and fire department annual reports should include the following parameters:

- Alarm-processing
- Turnout time
- Travel time
- Total response time
- Fractal form of measurement

In addition, clearly defined and attainable benchmarks according to deployment standards for each parameter are crucial for determining the adequacy of emergency response.

Average response times do not provide an adequate indication of performance for the majority of situations. When considering an average response time in relation to the "less than six minute" benchmark, the question to be asked is "what is the significance of the average time?" If the average response time is reported as five minutes and twenty-one seconds, then it

appears that the objective is being met. In reality, the five minute and twenty-one second average could be achieved with all of the reported response times under six minutes or with less than half of the response times in less than six minutes.

Distribution of response times can then be misleading in the calculation of the average response time. If a number of responses are in an area with short response times, the average goes down. If a number of responses are in an area with longer response times, the average goes up. Consequently, fractal measurements provide the greatest opportunity to assess the adequacy of emergency response in Colerain Township and the focus should be on this form of measurement.

2. Immediately place MDC's in the medic units and discontinue the practice of using TripTix for calculating response times on EMS incidents.

TripTix for EMS responses does not provide for accuracy in calculation of response times. TripTix records EMS responses in the hh:mm format, not the hh:mm:ss format. A turnout time of fifty-nine seconds would be recorded as zero by TripTix. A travel time of three minutes and fifty-eight seconds would be recorded as three minutes, and therefore a response time of four minutes and fifty-seven seconds would be recorded as four minutes. In addition, the time(s) are not synchronized to the HCCC and may be manually entered therefore increasing the probability for errors in reporting.

3. Utilize the status buttons on the MDC's for recording the most accurate response times.

The time in which someone may enunciate a status change and when the HCCC actually logs it may differ. The dispatcher will not change a time that has already been recorded by the

status buttons on the MDC's. This will allow for near complete accuracy of response times and the status buttons may be used in conjunction with voice traffic.

4. Ensure the accurate, uniform, and consistent recording of data.

Once response time is redefined, the parameters set, the methodology for reporting reformed, MDC's placed in the medic units, and the status buttons on the MDC's are consistently used the next rational recommendation is accurate, uniform, and consistent recording of data. The age-old axiom of "garbage in, garbage out" rings true. In order to provide reliable and verifiable data, 100% accuracy must become the recognized standard. Computer aided dispatch (CAD) times may be retrieved, printed via the MDC's, and recorded in the appropriate software program(s) in 100% of incident responses. This will serve to limit any discrepancies in reporting thereby bringing the added value of transparency, authentication, and validation to response times.

5. Evaluate response time distribution by time of day and schedule training activities at the training tower during the time period(s) of lowest distribution.

Training is a compulsory factor in the process of continuous quality improvement for the individual, company, and the organization. However, a balance needs to exist in providing for continuous quality improvement at any level, all the while meeting our operational obligations, in a timely fashion. Following review of our response time distribution a formal policy should be developed to ensure that training activities and operational needs are not in conflict with one another, whenever possible, while companies are moved from their first due area to the training tower.

6. Incorporate GIS capabilities in order to optimize emergency services delivery in Colerain Township.

The mission of Colerain Fire & EMS is to provide the highest quality fire prevention and suppression, emergency medical services, and public education with resources available to the department. With ever increasing demands, Colerain Fire & EMS must utilize the best tools, techniques, and training methods to meet public expectations. One emerging tool that can help Colerain Fire & EMS optimize its emergency services delivery is GIS technology. With the aid of the Planning and Zoning Department incident analysis, travel time modeling, future fire station location planning, resource allocation, and emergency management are some of the critical functions that GIS technology can play a role in. When defending the value of an organization to the community a tool such as GIS technology can help bridge the gap from perceived anecdotal misinformation to fact based evidence.

7. Continued operation of the five strategically placed fire stations, maintain staffing at a minimum of thirty-three persons, and realign the first due response areas in order to better distribute run volume and maintain response times at a minimum.

Each fire station serves a distinct geographical area within the township and fits into the response system as one component of the overall emergency services delivery system. Simply removing one piece of the system has a cascade effect on the entire emergency services delivery system. As evidenced in the research we fail to meet our own performance benchmark or industry standard NFPA 1710, and system demand continues to increase. It can be expected then that closure of any station and or a decrease in staffing will further erode the capacity of Colerain Fire & EMS to provide an effective, efficient, and reliable service.

Secondarily to this a thorough review of the first due response areas and response modeling with GIS software should be undertaken. This should allow for improvement of the current emergency services delivery system by spreading the distribution of responses more

uniformly and keeping busier companies in closer proximity to where the greatest activity is. By doing so we can expectantly maintain, or possibly improve our ability to meet stated performance standards.

8. Complete the CFAI accreditation process.

In early 2005 Colerain Fire & EMS began the accreditation process and became an applicant agency. Henceforth, a number of departmental events, including the tragic events of April 4, 2008, supplanted the accreditation process as an organizational priority. In hindsight, the value that completion of the accreditation process would have brought to the organization in recent months is immeasurable in light of benchmarking, SWOT, and the presentation of alternate staffing plans.

Through the CFAI model, Colerain Fire & EMS could demonstrate that it is a credible organization that meets or exceeds industry best practices. As described by CFAI, the process would do the following:

- Assure colleagues and the public that they have definite missions and objectives that are appropriate for the jurisdictions they serve
- Provide a detailed evaluation of the services they provide to the community
- Identify areas of strength and weakness within the department
- Create methods or systems for addressing deficiencies while building organizational success
- Encourage professional growth for both the department and its personnel
- Provide a forum for the communication of organizational priorities
- Foster national recognition by colleagues and the public
- Create a mechanism for developing strategic and program action plans (CPSE, n.d.)

This would serve to solidify the role the organization has in the vision of Colerain Township, which is: *Delivering Excellence to a “Best in Class Community”*.

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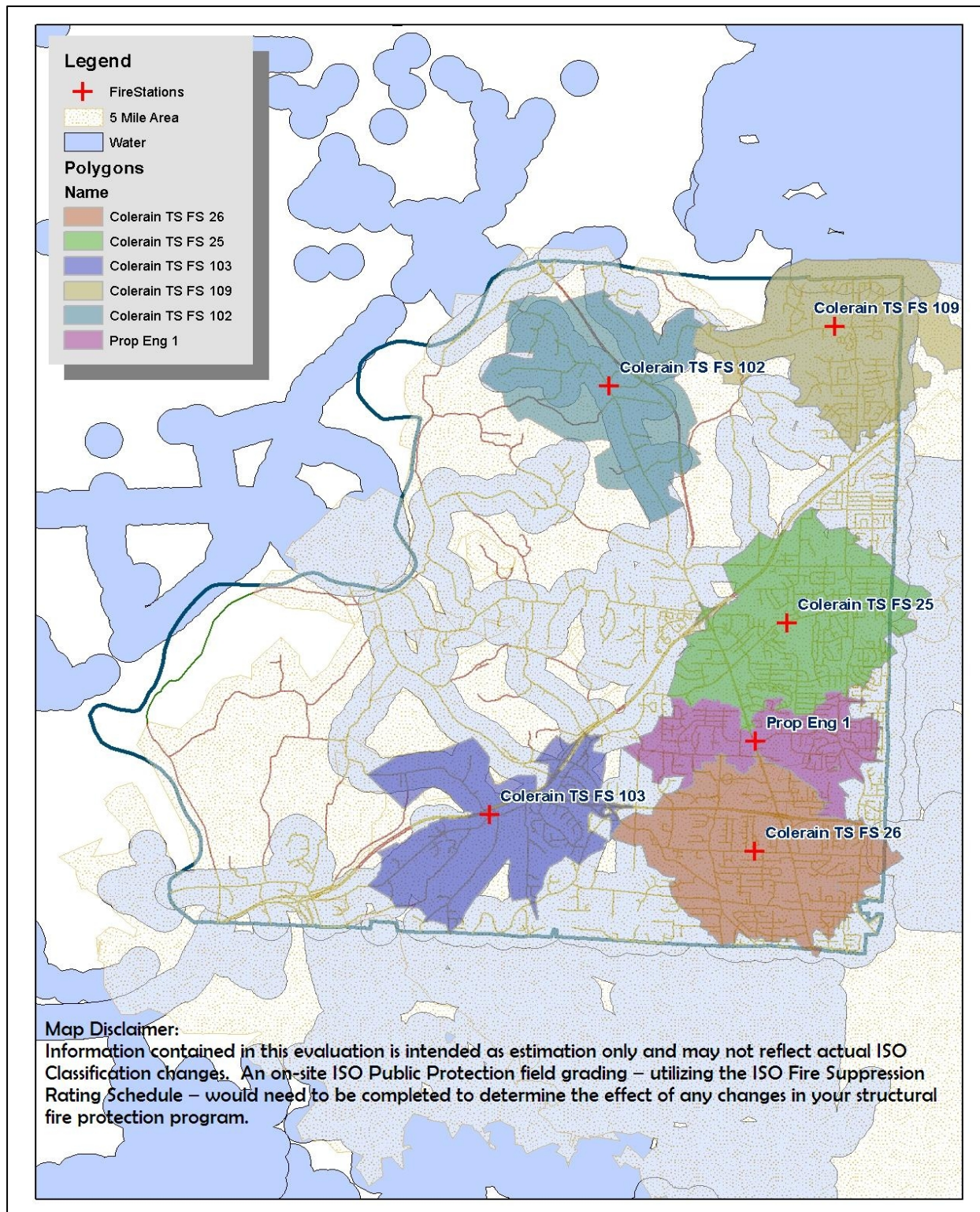
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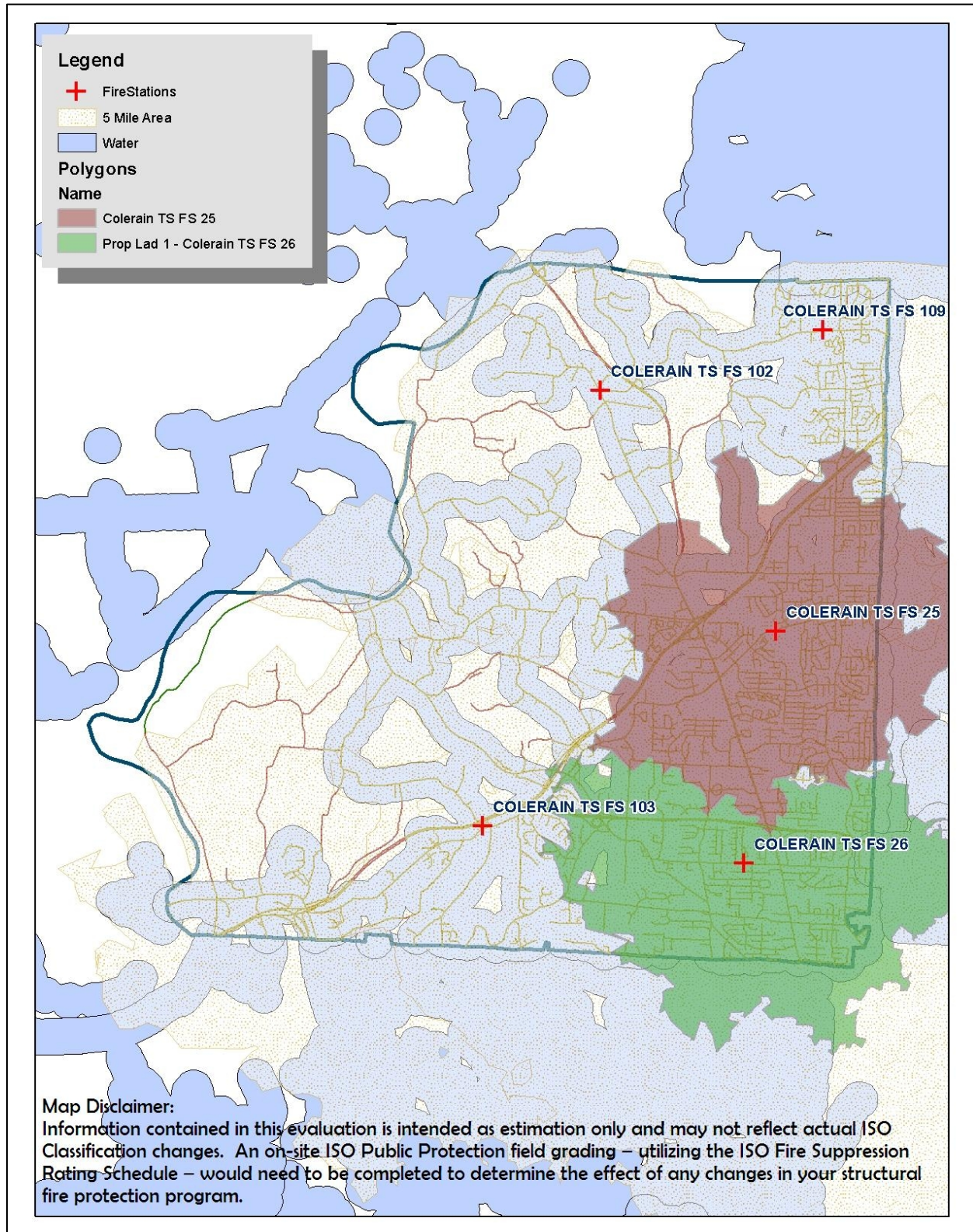
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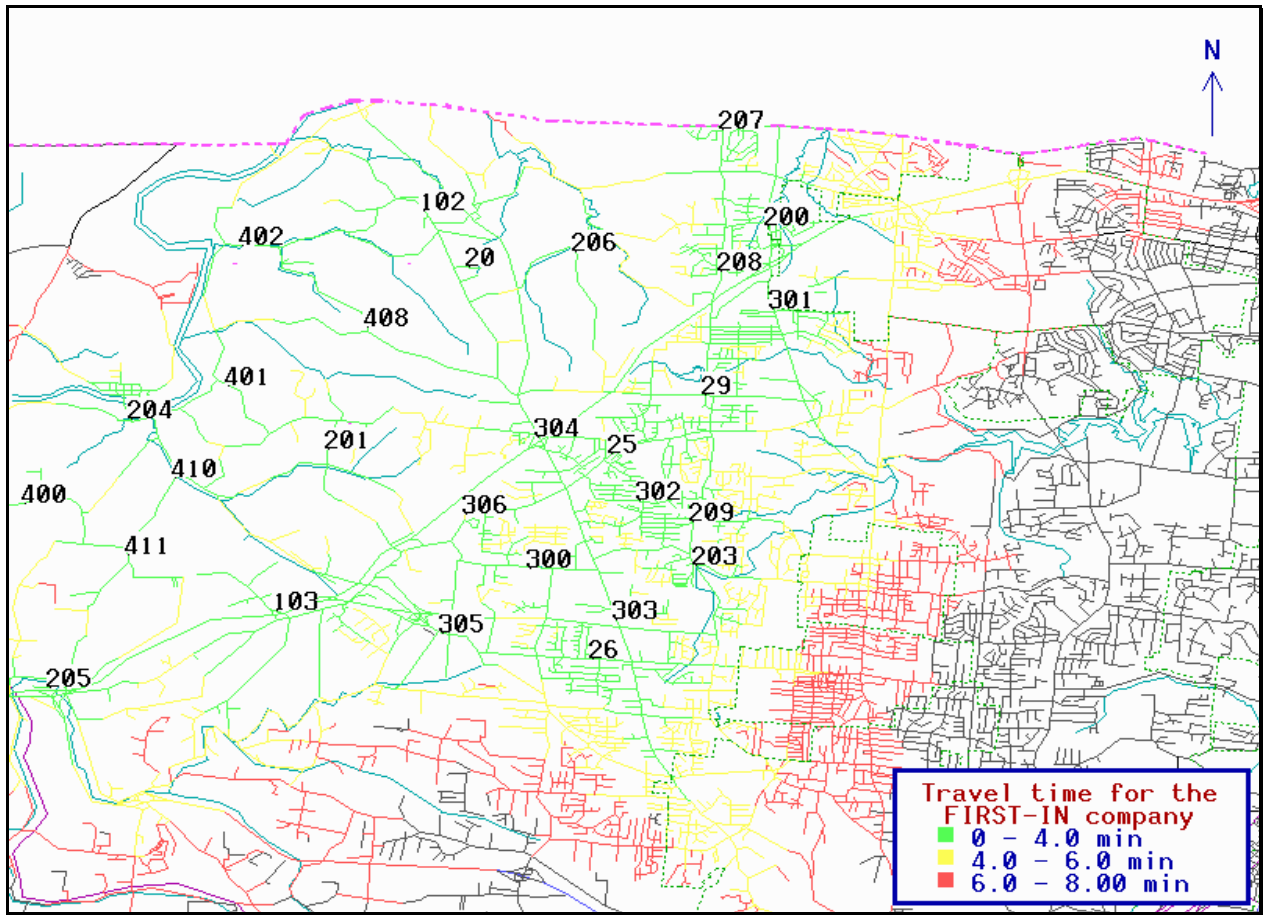
## Appendix A



## Appendix B



### Appendix C



## Appendix D

1. Has the Colerain Township Department of Fire & EMS adequately communicated to you as a Board Member or Administrator what methodology is used for analysis and reporting of response times?
2. Which definition below best fits your understanding then of response time for the Colerain Township Department of Fire and EMS?
  - a. Response time starts:
    - i. 911 answered
    - ii. 911 call completed, entered into CAD
    - iii. Emergency unit dispatched
    - iv. Emergency unit responding
  - b. Response time stops:
    - i. Arrival on scene
    - ii. Patient contact/begin operations
3. Should a response time standard or performance measurement exist (in minutes and seconds) for the Colerain Township Department of Fire and EMS?
4. Are you aware then of any response time standard or performance measurement (in minutes and seconds) that exists for the Colerain Township Department of Fire & EMS?
5. Should there be varied response time goals for different geographical areas of the Township or should all citizens expect a consistent and universally applied response time goal?
6. Can you provide your expectation in minutes and seconds, based upon your selection of the definition for response time in question number two, for the Colerain Township Department of Fire & EMS?

## Appendix E

1. By what authority does the Communications Committee have vested in it to recommend new policies and procedures?
2. Using the descriptions below for starting and stopping can you please provide me with your definition of response time?
  - a. Response time starts:
    - i. 911 answered
    - ii. 911 call completed, entered into CAD
    - iii. Emergency unit dispatched
    - iv. Emergency unit enroute
  - b. Response time stops:
    - i. Arrival on scene
    - ii. Patient contact/begin operations
3. Do you feel that a universal response time definition is used by all Hamilton County Fire Departments?
  - a. If your answer was no, why did you answer it that way?
  - b. If your answer was yes, why did you answer it that way?
4. Do you feel a universal definition for response time should be adopted countywide?
  - a. If your answer was no, why did you answer it that way?
  - b. If your answer was yes, why did you answer it that way?
5. Would it seem appropriate then that a universal definition for response time would allow for greater transparency and better assist fire departments in assessing the adequacy of emergency response?
  - a. If your answer was no, why did you answer it that way?
  - b. If your answer was yes, why did you answer it that way?
6. Do you feel a universal definition for response time could be successfully adopted and implemented by the Hamilton County Fire Chiefs Association?
  - a. If your answer was no, why did you answer it that way?
  - b. If your answer was yes, why did you answer it that way?

## Appendix F

<b>Department Name</b>	<b>Address</b>	<b>City</b>	<b>State</b>	<b>Zip Code</b>
Amberley Village Fire Department	7149 Ridge Road	Cincinnati	OH	45237
Anderson Township Fire Department	7850 Five Mile Road	Cincinnati	OH	45230
Blue Ash Fire Department	10647 Kenwood Road	Blue Ash	OH	45242
Cheviot Fire Department	3814 Harrison Avenue	Cheviot	OH	45211
Cincinnati Fire Department	430 Central Avenue	Cincinnati	OH	45202
Colerain Township Department of Fire & EMS	3251 Springdale Road	Cincinnati	OH	45251
Crosby Township Fire Department	9139 Baughman Road	Harrison	OH	45030
Deer Park-Silverton Joint Fire District	7050 Blue Ash Road	Cincinnati	OH	45236
Delhi Township Fire Department	697 Neeb Road	Cincinnati	OH	45233
Elmwood Place Fire Department	300 Maple Street	Elmwood Place	OH	45216
Evendale Fire Department	10500 Reading Road	Evendale	OH	45241
Forest Park Fire Department	1201 W. Kemper Road	Forest Park	OH	45240
Glendale Fire Department	30 Village Square	Cincinnati	OH	45246
Golf Manor Fire Department	6450 Wiehe Road	Cincinnati	OH	45237
Green Township Fire Department	6303 Harrison Avenue	Cincinnati	OH	45247
Greenhills Volunteer Fire Department	11000 Winton Road	Greenhills	OH	45218
Harrison Fire Department	200 Harrison Avenue	Harrison	OH	45030
Lincoln Heights Fire Department	1201 Steffens Avenue	Cincinnati	OH	45215
Little Miami Joint Fire District	6904 Murray Avenue	Cincinnati	OH	45227
Lockland Fire Department	101 N. Cooper Avenue	Lockland	OH	45215
Loveland-Symmes Fire Department	126 S. Lebanon Road	Loveland	OH	45140
Madiera-Indian Hill Joint Fire District	7205 Drake Avenue	Cincinnati	OH	45243
Mariemont Fire Department	6907 Wooster Pike	Cincinnati	OH	45227
Miami Township Fire Department	4938 E. Miami River Road	Cleves	OH	45002
Montgomery Fire Division	10150 Montgomery Road	Montgomery	OH	45242
Mt. Healthy Fire Department	7700 Perry Street	Mt. Healthy	OH	45231
North College Hill Fire Department	1646 W. Galbraith Road	Cincinnati	OH	45239
Norwood Fire Department	4725 Montgomery Road	Norwood	OH	45212
Reading Fire Department	1000 Market Street	Reading	OH	45215
Sharonville Fire Department	11637 Chester Road	Sharonville	OH	45246
Springdale Fire Department	12147 Lawnview Avenue	Springdale	OH	45246
Springfield Township Fire Department	9150 Winton Road	Cincinnati	OH	45231
St. Bernard Fire Department	5116 Vine Street	St. Bernard	OH	45217
Sycamore Township Fire and EMS	8540 Kenwood Road	Cincinnati	OH	45236
Terrace Park Fire Department	428 Elm Avenue	Terrace Park	OH	45174
Whitewater Township Fire Department	PO Box 133	Hooven	OH	45033
Woodlawn Fire Department	10121 Springfield Pike	Cincinnati	OH	45215
Wyoming Fire and EMS	600 Grove Avenue	Wyoming	OH	45215

## Appendix G

### Executive Analysis of Fire Service Operations in Emergency Management -

**1. Does your organization have a response time performance measurement?**

- Yes
- No

**2. Please choose how your organization defines when response time starts.**

- 911 call answered
- 911 call completed, entered into the CAD
- Emergency unit dispatched
- Emergency unit responding

**3. Please choose how your organization defines when response time stops.**

- Arrival on the scene
- Patient contact/commencement of operations

Other (please specify)

**4. Does your organization apply a uniform and consistent response time performance measurement jurisdiction wide? (e.g. some organizations may have multiple response time measurements based upon geography, population density, community risk assessment, etc.)**

- Yes
- No

**5. If your answer to question 4 was NO please explain, otherwise leave blank and proceed to question 6.**

## Executive Analysis of Fire Service Operations in Emergency Management -

### 6. What is the basis of your response time performance measurement? (more than one may be selected)

- NFPA 1710
- NFPA 1720
- Center for Public Safety Excellence (CFAI)
- Commission on Accreditation of Ambulance Services (CAAS)
- Elected Officials
- Organizational Goal

Other (please specify)

### 7. Which of the following best describes how your organization reports response time performance measurements?

- As an average figure. (e.g. "Response time averages 5 minutes and 10 seconds")
- As a fractile measurement. (e.g. "Responded to 90% of calls in under 6 minutes")
- Both

Other (please specify)

### 8. At least annually, does your organization report your findings to the following? (more than one may be selected)

- Department
- Populace served
- Elected officials
- None of the above

### 9. If you publish or promote response time performance measurements do you qualitatively define response time for the reader? (e.g. when time starts and when time stops)

- Yes
- No

## Executive Analysis of Fire Service Operations in Emergency Management -

**10. When you publish or promote response time performance measurements do you publish separate measurements or some combination thereof that you refer to as response time? (e.g. some may review call processing, turnout time, travel time, or patient contact/commencement of operations individually, some may apply a universal measurement)**

- Separate measurements  
 Universal measurement

**11. Annually, does your organization meet your performance measurement for response time?**

- Yes  
 No

**12. What is your performance measurement? (e.g. may be an average of minutes and seconds, a fractile measurement such as 90% in under six minutes, or both)**

**13. When calculating your response time performance measurement what data elements are not included? (more than one may be selected)**

- Non-emergency responses  
 Mutual aid responses  
 Automatic aid responses  
 None of the above

Other (please specify)

## Appendix H

<b>Department Name</b>	<b>Address</b>	<b>City</b>	<b>State</b>	<b>Zip Code</b>
Anderson Township Fire Department	7850 Five Mile Road	Cincinnati	OH	45230
Beavercreek Township Fire Department	851 Orchard Lane	Beavercreek	OH	45434
Blue Ash Fire Department	10647 Kenwood Road	Blue Ash	OH	45242
Bowling Green Fire Department	625 East 6th Street	Bowling Green	KY	42101
Covington Fire Department	638 Madison Avenue	Covington	KY	41011
Deerfield Township Fire Department	4900 Parkway Drive Suite 150	Mason	OH	45040
Fishers Fire Department	2 Municipal Drive	Fishers	IN	46038
Green Township Fire Department	6303 Harrison Avenue	Cincinnati	OH	45247
Hamilton Fire Department	77 Pershing Avenue	Hamilton	OH	45011
Jackson Township Fire Department	7383 Fulton Drive NW	Massillon	OH	44646
Lisle-Woodridge Fire Protection District	1005 School Street	Lisle	IL	60532
Macomb Township Fire Department	16820 25 Mile Road	Macomb	MI	48042
Miami Valley Fire District	2710 Lyons Road	Miamisburg	OH	45342
Midwest City Fire Department	8201 East Reno Street	Midwest City	OK	73110
Milford Fire Department	72 New Haven Avenue	Milford	CT	6460
Novi Fire Department	45125 W. Ten Mile Road	Novi	MI	48375
Pike Township Fire Department	4881 71st Street	Indianapolis	IN	46268
Plain Township Fire Department	2600 Easton Street NE	Canton	OH	44721
Sharonville Fire Department	11637 Chester Road	Sharonville	OH	45246
Skokie Fire Department	7424 Niles Center Road	Skokie	IL	60077
Springfield Township Fire Department	9150 Winton Road	Cincinnati	OH	45231
Sycamore Township Fire and EMS	8540 Kenwood Road	Cincinnati	OH	45236
Taylor Fire Department	23345 Goddard Road	Taylor	MI	48180
Union Township Fire Department	4312 Glen Este-Withamsville Road	Cincinnati	OH	45245
Washington Township Fire Department	8320 McEwen Road	Dayton	OH	45458
West Chester Township Fire Department	9119 Cincinnati-Dayton Road	West Chester	OH	45069
Ypsilanti Township Fire Department	222 South Ford Boulevard	Ypsilanti	MI	48198

## Appendix I

### Executive Analysis of Fire Service Operations in Emergency Management

**1. Name and address of the organization?**

Name:

Company:

Address:

Address 2:

City/Town:

State:

ZIP:

Country:

Email Address:

Phone Number:

**2. Rank of the person completing the survey?**

Chief Officer

Company Officer

Firefighter

Other (please specify)

**3. Square miles protected?**

**4. Population served?**

**5. Has your organization been subject to any of the following since the economic downturn in 2008? (you may select more than one)**

Personnel reductions

Station closures

None of the above

## Executive Analysis of Fire Service Operations in Emergency Management

### 6. Was your answer to SURVEY QUESTION NUMBER FIVE "None of the Above"?

- Yes (PROCEED TO SURVEY QUESTION NUMBER SIXTEEN)
- No (PROCEED TO SURVEY QUESTION NUMBER SEVEN)

### 7. If the answer to SURVEY QUESTION NUMBER FIVE WAS PERSONNEL REDUCTIONS, have you experienced any of the following? (please select all that apply)

- Brown outs
- Longer response times
- Inability to respond to all 911 requests for service
- Delay in providing life-saving medical treatment
- Longer time to assemble an effective firefighting or rescue force
- More severe fire conditions and potential to spread to adjacent occupancies
- Altered strategy and tactics
- Increased annual total dollar property loss
- Increased firefighter injuries
- Increased civilian injuries or deaths
- Increased reliance on mutual aid
- Decreased ability to participate in the automatic and requested mutual aid system

### 8. If personnel reductions took place, have they been reinstated?

- Yes
- No

Other (please specify)

### 9. According to your selections in SURVEY QUESTION NUMBER SEVEN, were they based upon the following?

- Anecdotal evidence
- Fact based evidence

Other (please specify)

## Executive Analysis of Fire Service Operations in Emergency Management

**10. If your answer to SURVEY QUESTION NUMBER NINE WAS FACT BASED EVIDENCE, would you be willing to contact the researcher and share the information?**

- Yes  
 No

**11. If the answer to SURVEY QUESTION NUMBER FIVE WAS STATION CLOSURES, have you experienced any of the following? (please select all that apply)**

- Brown outs  
 Longer response times  
 Inability to respond to all 911 requests for service  
 Delay in providing life-saving medical treatment  
 Longer time to assemble an effective firefighting or rescue force  
 More severe fire conditions and potential to spread to adjacent occupancies  
 Altered strategy and tactics  
 Increased annual total dollar property loss  
 Increased firefighter injuries  
 Increased civilian injuries or deaths  
 Increased reliance on mutual aid  
 Decreased ability to participate in the automatic and requested mutual aid system

**12. If station closures took place, have they been reopened?**

- Yes  
 No

Other (please specify)

**13. According to your selections in SURVEY QUESTION NUMBER ELEVEN, were they based upon the following?**

- Anecdotal evidence  
 Fact based evidence

Other (please specify)

## Executive Analysis of Fire Service Operations in Emergency Management

**14. If your answer to SURVEY QUESTION NUMBER THIRTEEN WAS FACT BASED EVIDENCE, would you be willing to contact the researcher and share the information?**

Yes

No

**15. Were there any further impacts to your organization in areas not noted in SURVEY QUESTIONS NUMBER SEVEN OR NUMBER ELEVEN?**

Training

Inspections

Investigations

Public education

Other (please specify)

**16. Were there any additional impacts (pro or con) that your organization has experienced since the economic downturn in 2008?**

## Appendix J

### Colerain Fire & EMS Response Time Factors

Colerain Fire & EMS defines "Response Time" as the elapsed time from dispatch of a fire or emergency medical unit until its arrival at the scene of the emergency incident.

Response time is comprised of two components:

1. "Turnout Time" = The elapsed time from dispatch of a fire or emergency medical unit to the unit responding to the emergency incident.
2. "Travel Time" = The elapsed time from a fire or emergency medical unit responding to the emergency incident until its arrival at the scene of the emergency incident.

Therefore for the purposes of this survey:

Turnout Time + Travel Time = Response Time

**1. To what extent is the Mobile Data Computer (MDC) reliable for documenting accurate response times?**

Unreliable      Somewhat reliable      Reliable      Very reliable      N/A

**2. To what extent is TripTix (EMS Reporting Tablet) reliable for documenting accurate response times?**

Unreliable      Somewhat reliable      Reliable      Very reliable      N/A

**3. To what extent is the Dispatcher reliable for documenting accurate response times?**

Unreliable      Somewhat reliable      Reliable      Very reliable      N/A

**4. Are you personally aware of any inaccuracies with the MDC when placing the unit enroute or on the scene that adversely impacted response time?**

- Yes  
 No  
 N/A

Please provide a brief description if your answer was YES.

## Colerain Fire & EMS Response Time Factors

**5. Are you personally aware of any inaccuracies with TripTix when placing the unit enroute or on the scene that adversely impacted response time?**

- Yes  
 No  
 N/A

Please provide a brief description if your answer was YES.

**6. Are you personally aware of any inaccuracies with the Dispatcher when placing the unit enroute or on the scene that adversely impacted response time?**

- Yes  
 No  
 N/A

Please provide a brief description if your answer was YES.

**7. If MDC's were present in the Medic (transport) Units would this be a more reliable means for recording accurate response times on EMS incidents?**

- Yes  
 No

**8. To what extent is the current electronic mapping system (CAGIS) reliable for decreasing response times?**

Unreliable      Somewhat reliable      Reliable      Very reliable      N/A

**9. To what extent is the current electronic mapping system (VISIO maps) reliable for decreasing response times?**

Unreliable      Somewhat reliable      Reliable      Very reliable      N/A

**10. To what extent does the traffic preemption system on Colerain Avenue affect response time?**

Increase response time      No impact on response time      Decrease response time

## Colerain Fire & EMS Response Time Factors

**11. To what extent do traffic control devices (speed bumps, medians, cable barriers) affect response time?**

Increase response time                      No impact on response time                      Decrease response time

**12. To what extent do the geographical characteristics of the Township affect response time (e.g. terrain, street network, long lay driveways)?**

Increase response time                      No impact on response time                      Decrease response time

**13. To what extent do simultaneous calls affect response time?**

Increase response time                      No impact on response time                      Decrease response time

**14. To what extent do training activities affect response time?**

Increase response time                      No impact on response time                      Decrease response time

**15. To what extent do physical fitness activities affect response time?**

Increase response time                      No impact on response time                      Decrease response time

**16. To what extent do public education activities affect response time?**

Increase response time                      No impact on response time                      Decrease response time

For Questions 15 through 19:

Turnout Time = The elapsed time from dispatch of a fire or emergency medical unit to the unit responding to the emergency incident.

**17. To what extent does the proximity of the bunkroom in your assigned station affect turnout time?**

Increase turnout time                      No impact on turnout time                      Decrease turnout time

**18. To what extent does the overall design of your assigned station affect turnout time?**

Increase turnout time                      No impact on turnout time                      Decrease turnout time

**19. To what extent does cross staffing of apparatus affect turnout time (e.g. assigned to both Medic 25 and Ladder 25)?**

Increase turnout time                      No impact on turnout time                      Decrease turnout time



## Colerain Fire & EMS Response Time Factors

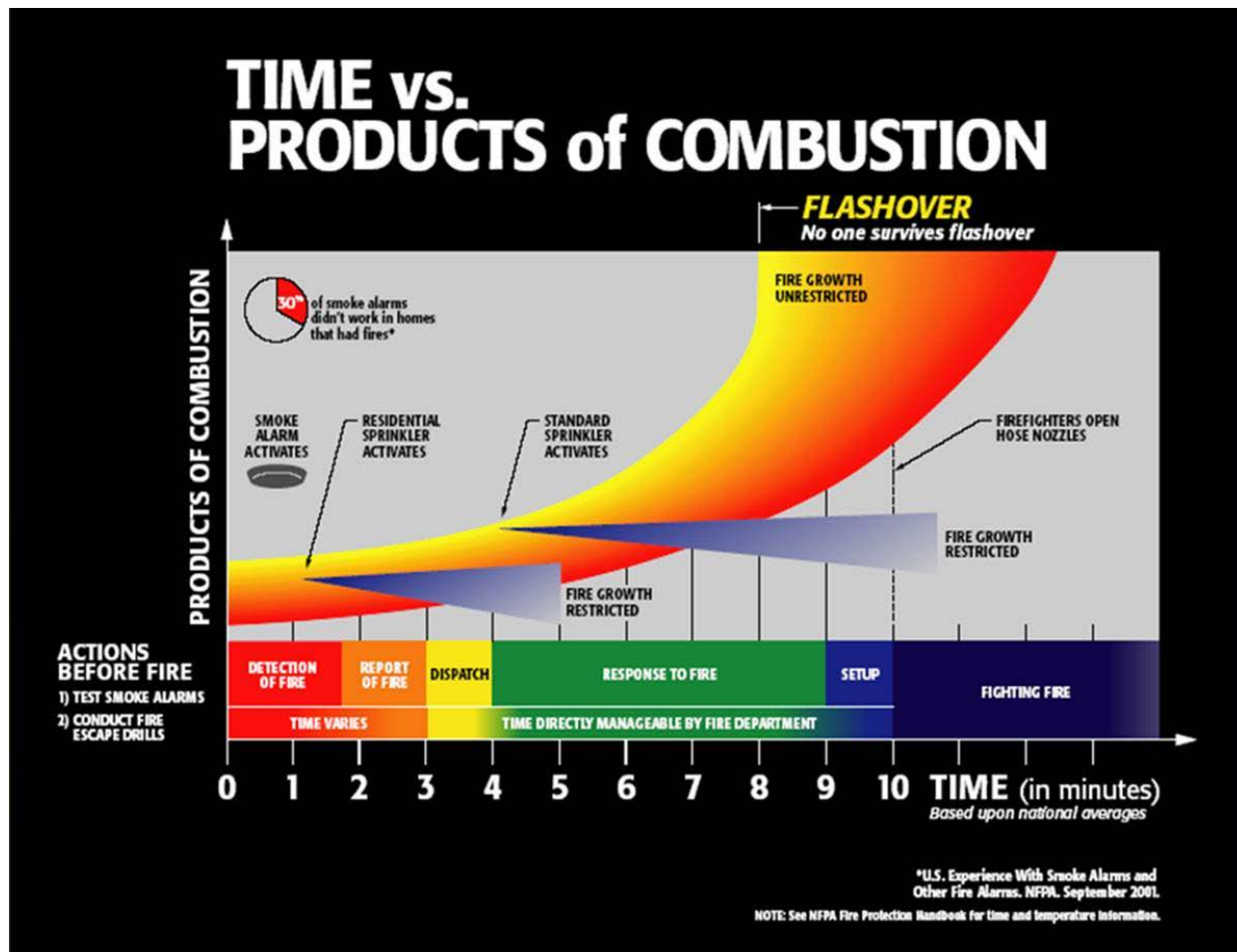
**24. In your opinion how can Colerain Fire & EMS decrease response time? (You may choose more than one)**

- Improved communication capabilities
- Improved coordination of training activities
- Improved coordination of public education activities
- Improved station design
- Improved turnout times
- Additional personnel
- Additional stations

Other (please specify)

**25. Are there any other factors that significantly impact response time for Colerain Fire & EMS not mentioned above?**

## Appendix K



## Appendix L

### Colerain Township Summary

#### Town Hall Meeting Questions 1/22/13

	<u>Total</u>	<u>%</u>
<b>1 Please rate how you perceive the image of Colerain Township:</b>		
Excellent	16	10.3%
<b>Good</b>	<b>99</b>	<b>63.9%</b>
Fair	34	21.9%
Poor	6	3.9%
<b>2 How would you rate the government services in Colerain Township:</b>		
Excellent	27	17.8%
<b>Good</b>	<b>91</b>	<b>59.9%</b>
Fair	30	19.7%
Poor	4	2.6%
<b>3 As a resident of Colerain Township, do you feel safe when it comes to police, Fire, and EMS services?</b>		
<b>Yes</b>	<b>151</b>	<b>96.8%</b>
No	5	3.2%
<b>4 Colerain police is an accredited agency providing comprehensive police protection for the residents and businesses of Colerain Township. Do you think the staffing and services offered by the Colerain Township Police department are:</b>		
<b>Excellent</b>	<b>87</b>	<b>55.8%</b>
Good	57	36.5%
Fair	11	7.1%
Poor	1	0.6%
<b>5 Colerain Fire/EMS Department is considered one of the best departments in the region. Do you think the staffing and services offered by the Colerain Township Fire/EMS departments are:</b>		
<b>Excellent</b>	<b>118</b>	<b>74.7%</b>
Good	35	22.2%
Fair	4	2.5%
Poor	1	0.6%
<b>6 Do you think staffing and coverage provided by the Colerain Police Department are:</b>		
Understaffed	64	40.8%
<b>Adequate</b>	<b>87</b>	<b>55.4%</b>
Overstaffed	6	3.8%
<b>7 Do you think staffing and coverage provided by the Colerain Fire EMS department are:</b>		
Understaffed	37	23.7%
<b>Adequate</b>	<b>78</b>	<b>50.0%</b>
Overstaffed	41	26.3%

8 As a resident of Colerain township, please rate which services provide you with the most value for your tax dollars on a scale of 1-5 with 1 representing the highest value and 5 representing the lowest value

**Cumulative total, with lowest score representing highest value:**

Police Services	281
<b>Fire and Emergency Medical Services</b>	<b>274</b>
Road Maintenance & Road Resurfacing	477
Parks & Recreation	573
Community Center serving our senior citizens	621

9 The police department is beginning year 6 of a 5 year levy and will not be out of money at the end of 2013. Would you be supportive of the township placing a new levy on the ballot in November to fund our police department? This would require new taxes

<b>Yes</b>	<b>132</b>	<b>85.7%</b>
No	22	14.3%

10 The \$1.5 million loss in state revenue creates a significant strain on our parks, roads, and community center. Would you be supportive of the township placing a new levy on the ballot in 2014 to fund a road program and provide funding to maintain our parks systems? This would require new taxes

<b>Yes</b>	<b>100</b>	<b>65.8%</b>
No	52	34.2%

11 If the township were to combine 2 existing levels (Police and Fire) with a replacement Public Safety one that could be used for both departments would you be supportive? No New Taxes

Yes	37	24.2%
<b>No</b>	<b>116</b>	<b>75.8%</b>

## Appendix M

Colerain Township  
Summary

Town Hall Meeting Questions 6/4/13

	<u>Total</u>	<u>%</u>
<b>1 What value do you place on our Senior/Community Center as a quality of life component within our community? (1 = Minimum Value 5 = Maximum Value)</b>		
1	1	1.2%
2	4	4.9%
3	19	23.2%
4	27	32.9%
5	31	37.8%
<b>2 What value do you place on our Parks System as a quality of life component within our community? (1 = Minimum Value 5 = Maximum Value)</b>		
a. Community Events such as Concerts, Movies, Taste of Colerain		
1	2	2.4%
2	2	2.4%
3	20	24.4%
4	26	31.7%
5	32	39.0%
b. Access to Playgrounds, Spraygrounds, Walking Paths, Shelters, etc.		
1	2	2.6%
2	0	0.0%
3	11	14.3%
4	26	33.8%
5	38	49.4%
c. Dealing with Nuisance Issues such as Tall Grass, Litter, etc.		
1	7	9.1%
2	3	3.9%
3	6	7.8%
4	25	32.5%
5	36	46.8%
<b>3 What value do you place on our Public Works Department within our community? (1 = Minimum Value 5 = Maximum Value)</b>		
a. Street Repair/Maintenance		
1	0	0.0%
2	2	2.4%
3	9	10.8%
4	31	37.3%
5	41	49.4%
b. Snow Removal		
1	0	0.0%
2	2	2.5%
3	11	13.8%
4	24	30.0%
5	43	53.8%

**4 What value do you place on our Police Protective Services  
(1 = Minimum Value 5 = Maximum Value)**

1	4	4.8%
2	1	1.2%
3	5	6.0%
4	12	14.5%
5	61	73.5%

**5 Do you think the staffing and coverage provided by the Colerain  
Police Department are:**

Understaffed	21	25.9%
Adequate	47	58.0%
Overstaffed	13	16.0%

**6 Colerain Police is operating in year 6 of a 5 year levy. Please  
circle the option that provides the most value to you**

a. Cut staffing/programs \$500,000 per year	3	4.6%
b. Cut staffing/programs by \$1,000,000 per year	6	9.2%
c. Consider a 1.5 mill levy (would cost the owner of a \$100,000 home \$45.94 a year) in 2013 to maintain current services and provide for the transition of reserves to paid officers	33	50.8%
d. Use \$1 million of the Township's cash reserve to fund the Police Department next year and consider a 1.75 to 2.00 mill levy in 2014	23	35.4%

**7 What value do you place on our Fire/EMS Services?  
(1 = Minimum Value 5 = Maximum Value)**

1	0	0.0%
2	3	3.6%
3	3	3.6%
4	12	14.3%
5	66	78.6%

**8 Do you think the staffing and coverage provided by the Colerain  
Fire/EMS Department are:**

Understaffed	16	19.8%
Adequate	60	74.1%
Overstaffed	5	6.2%

**9 Colerain Fire Department plans to stretch the levy passed in  
2010 an additional 3 years until 2018. Please circle the option  
that provides the most value to you.**

a. Implement proposed cuts while maintaining current level of responders	20	26.0%
b. Make no cuts	42	54.5%
c. Reduce response time by increasing responders throughout the township	15	19.5%

**10 Do you support the concept of an earnings tax (JEDD) being  
placed on non-residents working in the Township?**

a. Yes	65	84.4%
b. No	12	15.6%

**11 Do you support the balanced approach discussed this evening in achieving financial sustainability (i.e. mix of spending cuts and revenue enhancements)?**

a. Yes	43	67.2%
b. No	21	32.8%

**12 Are you a Colerain Township Resident?**

a. Yes	80	96.4%
b. No	3	3.6%

**If answered yes to Question 12, please circle your neighborhood:**

Bevis	12	16.2%
Colerain Heights/Northgate	12	16.2%
Dunlap	7	9.5%
Great Miami Valley	4	5.4%
Groesbeck	10	13.5%
Hillendale	0	0.0%
Lake Hills	5	6.8%
Northbrook	2	2.7%
Pleasant Run	3	4.1%
Taylor Creek	2	2.7%
Skyline	0	0.0%
White Oak	5	6.8%
Dry Ridge	2	2.7%
Other	10	13.5%

**13 Are you, or do you have a family member who is, an employee of Colerain Township?**

a. Yes	15	20.8%
b. No	57	79.2%