Lawrence – Douglas County
Fire Medical

COMMITTED TO SAVING AND PROTECTING LIVES AND PROPERTY.

STATION OPTIMIZATION ANALYSIS

2020

Lawrence – Douglas County Fire Medical

Fire Chief Shaun Coffey

"If everyone is moving **FORWARD TOGETHER**, then **SUCCESS** takes care of itself."
-Henry Ford

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Letter from Shaun Coffey – Fire Chief

Hello, and I would like to thank you for taking the time to review the 2020 Station Optimization Analysis project. This planning project is the most recent for the organization since the February 1996 Public Safety Report, the same year as the merger between the Lawrence Fire Department and the Douglas County Ambulance Service. This analysis is the culmination of the in-depth analysis of many agencies' information and input besides the Lawrence – Douglas County Fire Medical (LDCFM). I am grateful and appreciative of their participation and support.

The mission of LDCFM states, "Committed to Serving and Protecting Lives and Property" for all residents of Douglas County. LDCFM provides fire protection and technical rescue to the citizens of Lawrence and Emergency Medical Services and HazMat response to all of Douglas County residents. This analysis is an effort to ensure we continue to meet the expectations of our citizens.

The February 1996 Public Safety Report brought forward the vision of the current response model. Using the Insurance Services Office model of travel, related to response based upon street mileage, LDCFM began to implement the 1996 plan and was completed in 2006.

While the 1996 Public Safety Report has served the citizens of Douglas County exceptionally well, it is time for an updated look. In 2006 which concluded the implementation of the 1996 Public Safety Report, LDCFM responded to 8,964 calls. In 2019, we responded to 13,006 calls. This increase in call volume is creating a direct impact on the delivery of service to our citizens. This increase in calls for service has contributed to the travel time elongation to High-Risk EMS and fire calls. When compared to response performance in 2006, travel time on fire-related events is nearly 2:00 minutes longer in 2019.

Your fire medical department has used the industry best practice national consensus standard *NFPA 1710 Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public Career Fire Departments* as a performance measure that has identified the benchmark of 4:00 minutes at the 90th percentile in populated urban areas. Travel time is defined as the time between when fire/medical units start en-route to an incident and when they arrive at the scene. LDCFM's travel time is now over 6:00 minutes at the 90th percentile.

As you think of 2:00 minutes, please do so in the context of survivability of individuals who are not breathing or trapped in fires and savable property.

Sincerely,

Shaun Coffey
Fire Chief

LMH Health | Emergency Dept. | 325 Maine Street, Lawrence, Kansas 66044 | (785) 505-5000

Since its inception, EMS has been primarily about patient care. It was a physician in Napoleon's army named Jean Dominique Larrey who organized a system to treat and transport injured French soldiers. It was the treatment of injured patients in the Civil War era that led the development of civilian EMS systems. It was a governmental focus on heart disease and stroke in the 1960s that created a milieu which would birth interest in designing systems of care to combat these illnesses. It was a 1966 report which led to governmental oversight of these organizations focused on patient care. The medical advances of the late 1960s (CPR, defibrillation, cardioversion, etc.) combined with the return of military-trained medics who possessed a keen interest in patients with traumatic injuries, cemented the birthplace of EMS as part of the house of medicine.

This history of EMS is informative to us today. EMS has become a system that provides emergency medical care (organized on national and state levels, but implemented on a local basis) to all patients who request it. Once this system is activated because of serious illness or injury, the focus of EMS is emergency medical care of the patient(s). EMS systems are designed to be ready for every kind of emergency, every day of the year. While EMS providers are often not able to provide definitive care for every condition, they play a key public health role by being the primary gatekeepers of the door in the house of medicine by helping sort out patients and route them to appropriate levels of healthcare.

The goal of reducing the burden of heart disease, stroke and trauma was a major force in the development of EMS systems and had led to specific regionalization of healthcare. While many reasons for EMS activation are not time-sensitive, let us consider these specific disease states as well as sepsis (those seriously ill with an infection). Over one million Americans died of cardiovascular disease, trauma, stroke, and sepsis in 2019 - each of these are time-sensitive diagnoses. As hospitals centers of excellence for heart or stroke care, there are surrogate “golden hours”:

- door-to-needle in < 60 minutes for tPA (drug of choice) treatment of ischemic stroke
- door-to-puncture in < 90 minutes for endovascular treatment of large vessel occlusion (LVO) stroke
- door-to-balloon times of < 90 minutes for STEMI (ST elevation myocardial infarction - the type of heart attack requiring an emergency procedure to open a blocked artery).

In each of these emergencies, rapid diagnosis, stabilization, and transport to an appropriate facility is associated with improved care and outcomes. In critically ill patient with sepsis (septic shock), every hour delay in getting antibiotics is associated with a 7-8% increase in mortality. Research demonstrates twice as many survivors of STEMI when EMS personnel made the decision to transport directly to a percutaneous coronary intervention (PCI)-capable hospital. EMS is involved in the care of 85% of stroke patients and is associated with an improvement in onset to treatment time of therapy (OTT), particularly tPA). This is critical, as patient outcome in acute ischemic stroke improves with every 15-minute improvement in OTT and because we know every minute in which a large vessel ischemic stroke is untreated, the average patient loses 1.9 million neurons, 13.8 billion synapses, and 12 km (7 miles) of axonal fibers. Clearly a more affected brain leads to poorer outcomes.

Although trauma, stroke, STEMI and sepsis differ in etiology, as well as presentation and treatment priorities, common themes in best practices should be incorporated into EMS systems to improve outcomes for patients experiencing any of these time-sensitive emergencies. EMS is an intricate system, and each component of this system has an essential role to perform as part of a coordinated and seamless system of emergency medical care. As a primarily medical entity that delivers care for patients, rather than a transport company, EMS functions within the existing healthcare system and requires the oversight of at least a physician. This physician is not merely someone who is familiar with the care constraints of a particular system, but this doctor functions as EMS medical director and helps steer the care of patients in the prehospital setting.

Regarding our own EMS system, we have areas of improvement as it relates to seamless communication and continued coordination of care. As painstakingly detailed in the 2006 IOM Report, "The Future of Emergency Care in the United States Health System", we have challenges related to workforce, reimbursement, etc. However, in the end, EMS is about patient care and the delivery of healthcare. This must be our focus as we move forward beyond 2020.

As leaders, we must ask ourselves the tough questions such as the following:

- How can we leverage our current position to improve upon patient care?
- How can we ensure that our workforce, our physical layout, and even our systems of care are properly and thoughtfully designed to care for patients when minutes matter?
- Should we invest in a mobile integrated health program[1] with EMS at the center?
- What presuppositions of EMS need to go?

EMS does not exist in isolation within a community but is integrated with other governmental services and systems intended to maintain and enhance the community's health and safety. EMS systems are important in the delivery of healthcare and contribute to the well-being of society. While understanding the past, as leaders we look forward to the challenges ahead and keep the focus right where it belongs - on the patient.

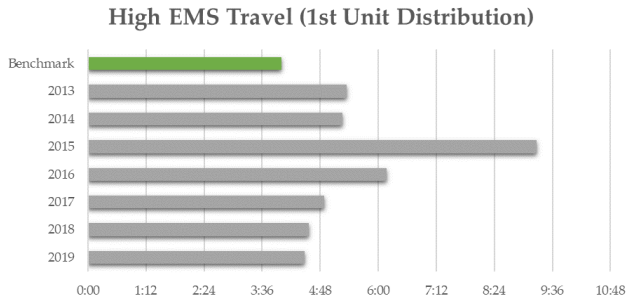
Respectfully,

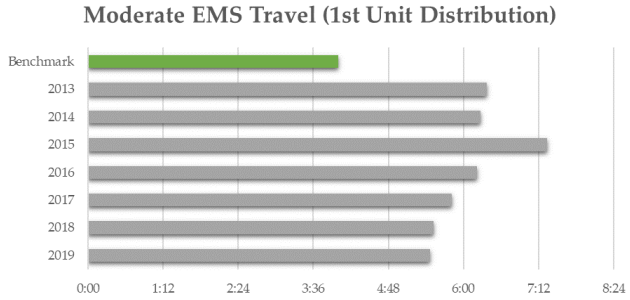
Caleb J. Trent, MD
Physician, LMH Health Emergency Department
Medical Director, Lawrence-Douglas County Fire-Medical Services
caleb.trent@lmh.org / 785.550.6162 in the ED / 901.485.65653 cell

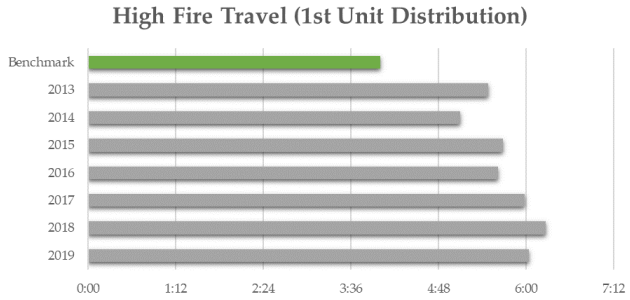
1 - While not time-sensitive, mobile integrated health/ community paramedicine is another possible future role as a value-added service of EMS to its' community. While waiting for the true emergencies, there is much medical care that can be provided in the pre-hospital setting which has benefits for communities. As leaders empower it, research supports it can be an integral tool in a public health system that seeks to deliver high-quality and cost-effective care.

Executive Summary

The City of Lawrence and its partnering agencies collect substantial amounts of data related to provisions, projects, processes, and people. Capitalizing on available community information and the intrinsic drive to better serve the community and its support systems, Lawrence – Douglas County Fire Medical (LDCFM) initiated a task force team to construct a "data geosphere". The collection of diverse data has the prospect to not only impact emergency resources and deployment, but also other projects, initiatives, and plans for other agencies moving forward. Based on this analysis, LDCFM is recommending a station optimization which relocates and expands resources to provide more equitable emergency services to the community. This new model not only balances response capabilities but elevates fire medical response performance county-wide. The reconfigured response model increases population coverage by 10,465 people in urban areas and $1,078,868,690 in assessed property value. This data-informed realignment sets a stage for more efficient and effective operations transcending towards long-term community change and an improved quality of life for residents and visitors to Douglas County and the City of Lawrence.





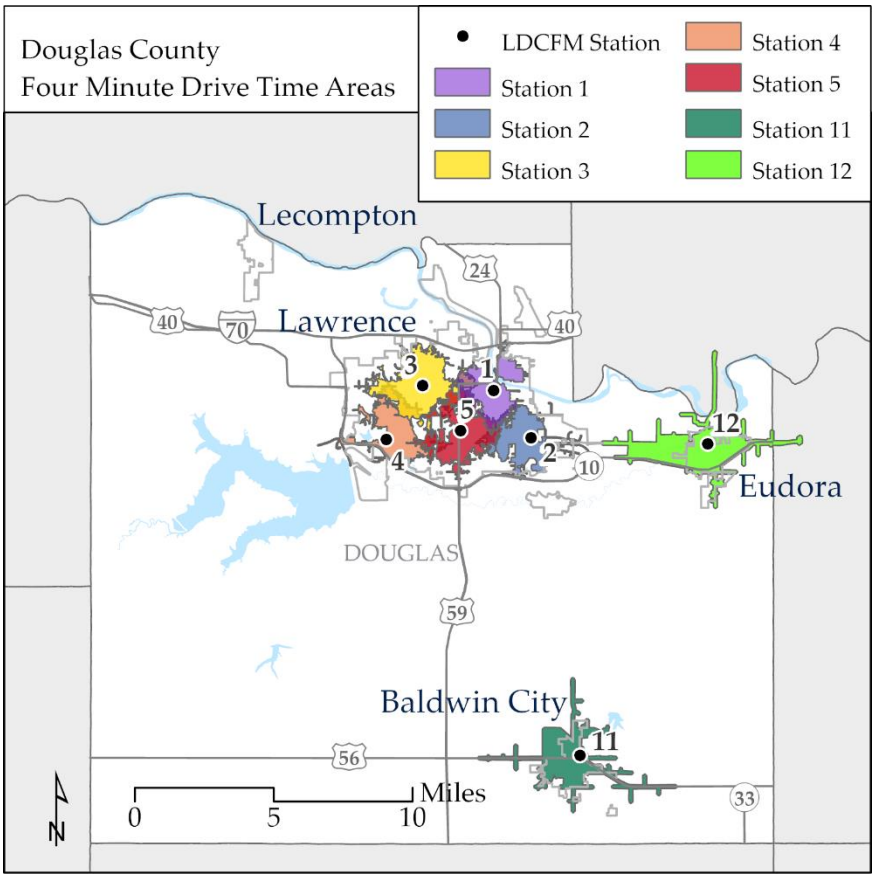


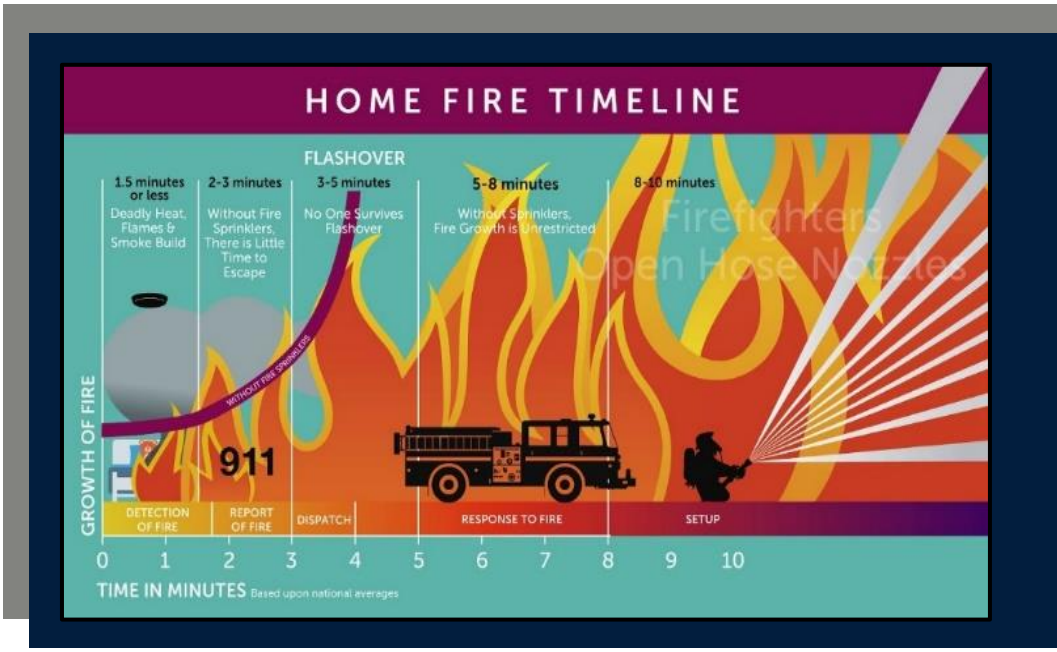
Douglas County and the City of Lawrence are changing both outward and inward. These changes are impacting the reliability of the deployment systems of the fire medical department. With elongating response travel times and an increasing amount of incidents, several gaps in valuable community coverage has been identified. LDCFM stands behind having the responsibility to openly, and clearly, depict the services and actual service levels that are being provided. With this, the department would like to highlight not only the gaps but also possible solutions.

Total response time is a critical factor when reflecting on performance, response capability, and LDCFM's ability to minimize loss to lives and property. To more precisely evaluate total response time, it is broken down into three segments (Alarm Handling Time, Turnout Time, and Travel Time). These time segments can be evaluated and studied individually to find

possible influences and/or potential deterrents. The focus of this study is to identify opportunities to enhance the department's ability to provide equitable, reliable, and predictable travel time performance consistent with industry best-practice. Opportunities exist to reduce other time-related elements, such as Alarm Handling, however, this study focuses on the segment of travel time, and the capabilities of fire medical resources. Recommendations for alarm handling can be found in the department's recent Accreditation Report, published in 2018. The National Fire Protection Association (NFPA) establishes numerous consensus standards which transcend multiple industries. The *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* has established the benchmark for Travel Time in urban populated areas as 4:00 minutes at the 90th percentile and is considered best practice.

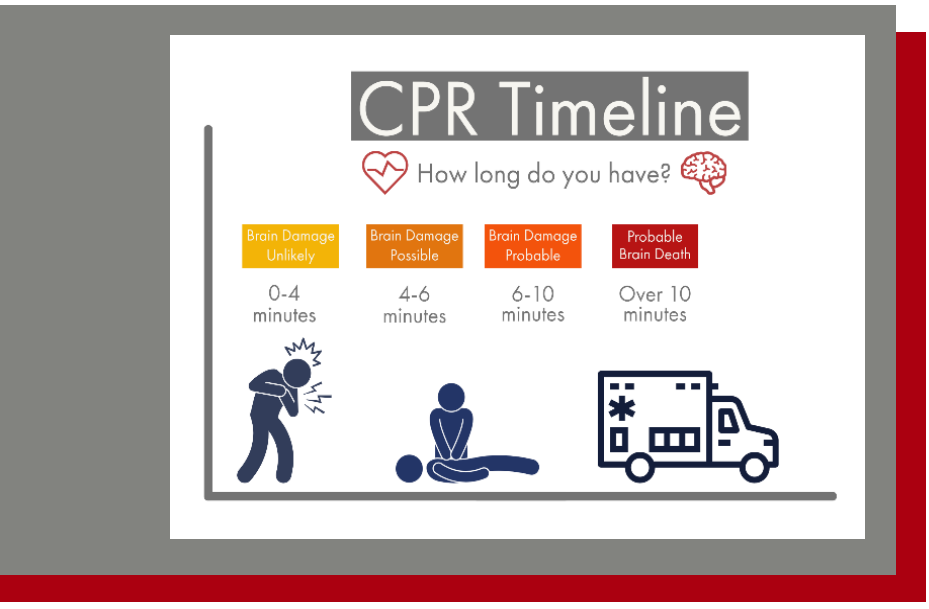
Response time directly impacts not only fire-related events but medical incidents as well. As the emergency medical service provider for all of Douglas County, LDCFM responds to approximately 9,000 EMS incidents per year. Like structure fires, the outcome of emergency medical events are correlated directly with time and intervention. During a medical emergency, the patient's comfort and medical outcome are directly influenced by the time of intervention of responders. Based on the department's skill level, advanced emergency medical technicians and paramedics are capable of providing medical procedures to immediately impact the survivability of an emergency medical event. Patient care outcomes are not only dependent on the department's ability to provide intervention in a timely manner, but also to transport patients and arrive at specialized hospitals within a timely manner.





During fire events, there is a relationship between flame spread and response time. The department's ability to effectively complete critical tasks on a structure fire (such as rescuing entrapped victims or fire control to stop property loss) is not only dependent on firefighter skill but the size of the fire when it is reported and at the time of the department's arrival. Firefighters cannot remove fire destruction once it has occurred; they can only perform rescues and stop flame spread when placed in a position to do so.

To provide more efficient and effective services to a broader community associated with disadvantaged populations, population density, property value, and requests for emergency services, LDCFM has composed this station optimization analysis report to more align with industry best-practice standards. This analysis considers social community and public health data, published City of Lawrence planning data, local crime data, and fire medical data. These recommendations will improve fire medical performance and outcomes and balance emergency resource deployment to a more broad population, resulting in a more safe and secure community.



Introduction

Purpose Statement and Objectives

The purpose of this report is to provide critical information to stakeholders and guide emergency response travel time adaption of more equitable community-wide coverage and higher quality outcomes. LDCFM has identified elongating response times trended over the past several years. Of the several time segments evaluated when responding to an emergency, resource travel time is the longest and has the most extended deviation from industry best practice standards.

1) Analyze the department's station location capabilities relative to key community risk factors including but not limited to population density, disadvantaged populations, assessed property value, future population projections, and historical response fire medical department performance.
2) Using key community risk factors, data modeling, and modern mapping technology, identify strategic locations to provide emergency travel time capability based on industry best practice standards.
3) Provide a data-informed recommendation for the adaption fire medical response capability through station relocation/expansion for improved community-wide value (more equitable service levels, higher quality of life for all residents and visitors, and improved outcomes to lives and property).

Background and Department Overview

LDCFM currently serves a large geographical area of 475 square miles and 134,917 people (based on planning projections). The City of Lawrence currently has a total area of 34.85 square miles. Containing two universities, an aging population, multiple bodies of water, and an extensive/developing infrastructure, Lawrence's risk level is substantial; having a population of 108,620. Having an isolated deployment model within Douglas County, the management of emergency resources is crucial to reliable service countywide. Recognizing the risk associated with these characteristics creates a strong need for agile management and deployment. Proactive decision-making combats risk while maximizing opportune programs. Being equipped with valuable resources, like data, boost

150 Sworn Members

Stations: **7**
Ambulances: **7**
Fire Apparatus: **6**

the ability to tackle hazards and stay resilient. LDCFM has realized the vast availability of data resources to conduct an analysis for station optimization.

LDCFM is composed of 7 in-service ambulances and 6 in-service fire apparatus 24/7/365. Staffing these units, the department has 39 responders daily. LDCFM provides EMS coverage to the county (475 square miles). These resources provide the City of Lawrence coverage for Fire, EMS, Hazardous Materials, and Technical Rescue. The department is comprised of 5 Fire/EMS stations located in the City of Lawrence and 2 EMS stations located in Baldwin City (Station 11) and the City of Eudora (Station 12).

LDCFM is an accredited agency through the Center for Public Safety Excellence (CPSE). First being accredited in 2008, the department has depended on accurate data collection and analysis. With the accreditation process focusing on the importance of reliable data, communication, and the drive to continuously improve, LDCFM has embodied the undertaking of the process as a whole. In order to fully complete this task, a comprehensive review is necessary of all fundamental factors, characteristics, and elements throughout Lawrence. Understanding and incorporating the extensive network and connections within the city, community, and county enables the department to not only collaborate but also to have further insight on facets that make up the community that is being served.

Following the accreditation reviews in 2018, CPSE and the Commission on Fire Accreditation International (CFAI), made several recommendations for LDCFM. One recommendation was related to resource reliability and effective response coverage.

"Rapid response to emergency fire and medical calls in all geographic areas of the community. Respond to medical emergency and fire calls within response times. Quick response times."

External Stakeholder No. 1 Priority Community Group Expectations - verbatim
2016-2021 Community-Driven Strategic Plan

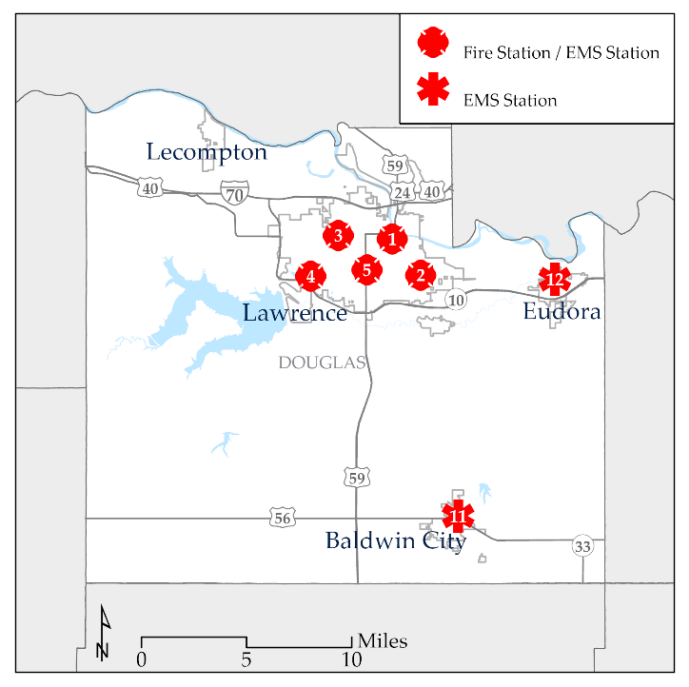
CFAI Category II – Assessment and Planning
CORE COMPTENCY, Category II, Criteria C, Performance Indicator 5: The agency has identified the total response time components for delivery of services in each service program area and found those services consistent and reliable within the entire response area.

CFAI Recommendation: "It is recommended that the department continue its ongoing efforts to add a station in the northwest area of the city."

LDCFM has determined two primary objectives to address the recommendation.

1) The department should closely analyze the resiliency of fire medical apparatus within high demand areas of the city. In addition, the department should communicate needs to retain resource reliability in those areas. These resources would also assist with the arrival of the effective response force on higher risk incidents within the city.
2) Due to the rapid growth in the northwestern portion of the city, the department should secure a funding source for fire station #6 and other resources to provide reliable, effective response coverage, consistent with other areas of the city.

This document provides an overview of resource reliability and capability and includes plans of recommendations for improvement. The recommendations for improvement are intended to provide enhanced fire medical coverage, minimize the impact of the elongated response times to the community, and improve the efficiency, effectiveness, and reliability of resources.



Understanding Total Response Time

Total Response Time is the total time elapsed from when dispatch answers a 911 call to the time emergency responders arrive on scene. The entire timeframe can be broken down into three main segments – Alarm Handling Time, Turnout Time, and Travel Time. Alarm Handling Time begins when the emergency communication center answers the 911 call and ends when the dispatcher notifies first responders of the incident. Turnout Time begins at this point, and ends when first responders are in the apparatus and moving towards the incident's location. Travel Time encompasses the time of movement to the time of arrival on scene.

Having the ability to evaluate performance from a high level (Total Response Time) is valuable, however, to address potential gaps to improve, further analysis is necessary. Breaking the total time down into individual segments enables a deeper dive into the data. With each segment of the total time being mostly independent of one another, the time can be assessed by its influencing factors. Times are looked at, at the 90th percentile. This ensures that the data provides a precise, more predictable picture of actual performance, than compared to an average. Reviewing response data in the 90th percentile is an industry-wide, best practice standard that provides a consistent comparison tool between datasets, established by the NFPA.

2018 Lawrence – Douglas County Fire Medical Department Accreditation Report
Pages 16 and 17

"It is recommended that the department continue its ongoing efforts to add a station in the northwest area of the city."

"As previously described, the city has seen positive growth trends in population since 2000. … Due to the growth, travel times exceeded expectations organizationally both for the first due and ERF."

"The department resiliency is currently measured based on the reliability to provide a quality first due response on high risk events, specially fire and EMS."

Upon review of structure fire response times from 2008-2019, the total response time has lengthened. The elongation of response time can be contributed to a multitude of factors such as increased call volume, construction/road work, city infill, etc.

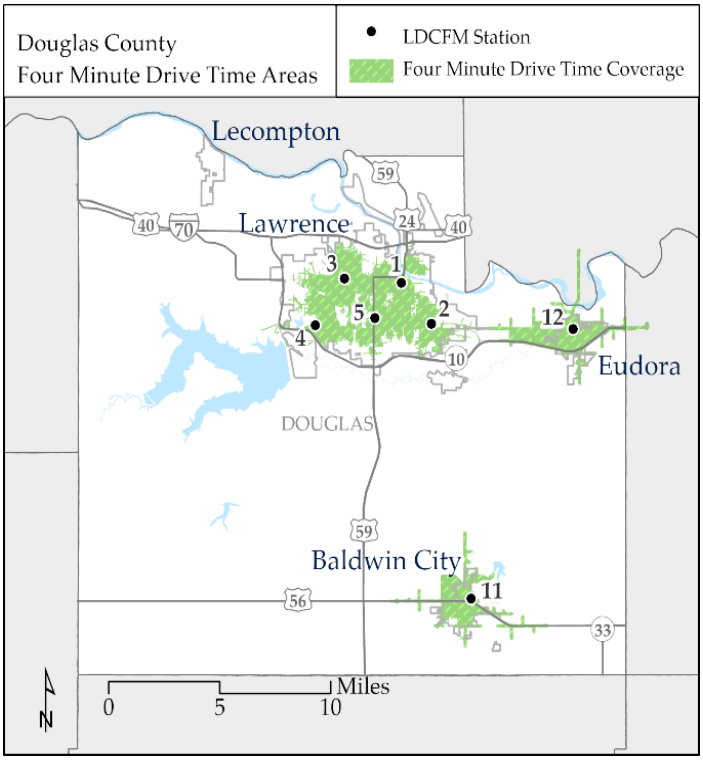
90th Percentile is your performance 9 times out of 10.

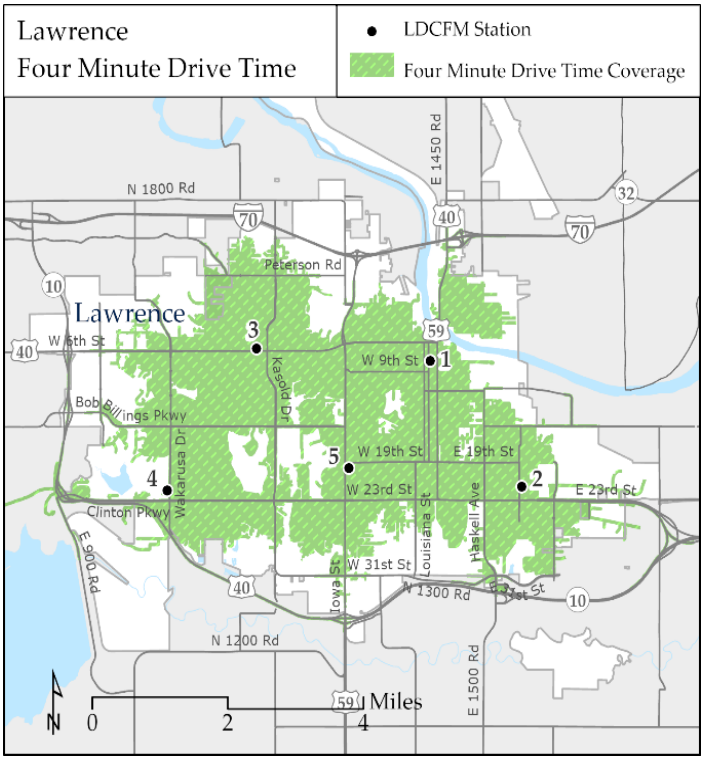
Industry-best practice for predictable performance measurement.

Scope of Work and Overall Methodology

A geographic information system (GIS) was used to compile geographical-based data and interlace it with other data sets that impinge factors related to emergency incidents and management. The review of response capability included an evaluation of the current allocation and placement of resources, historical demands / trends, forecast of future demands for service and population trends, and recommended changes to the current system. The City's Planning and Development Services staff provided information from Plan 2040.

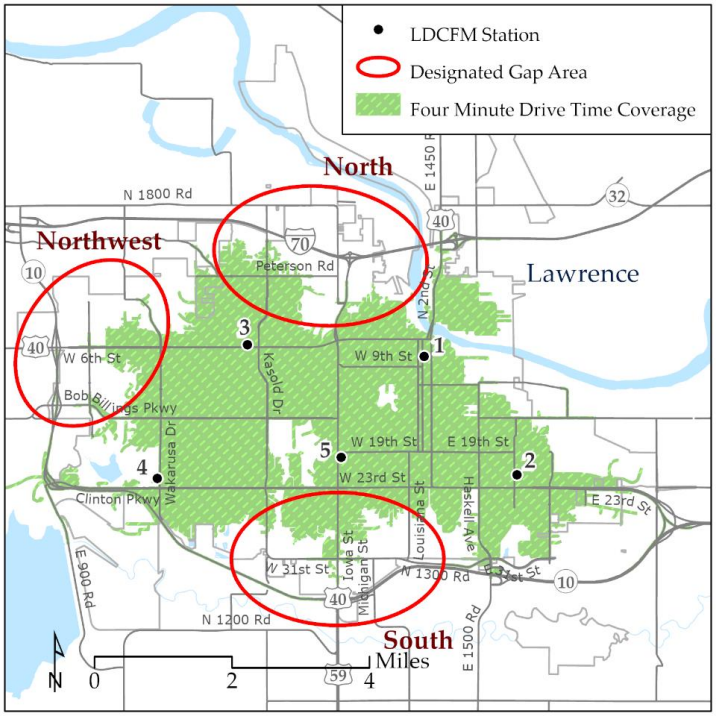
The research included finding possible correlations between various risk hazards and service / response areas. With the findings and a thorough review of the community as a whole, a community risk assessment was performed. To aid in this assessment, the already published 2017 Community Risk Assessment Standards of Cover (CRASOC) report was utilized. The CRASOC is a key accreditation document that involves a very in-depth study of the community. A community risk assessment, according to the Center for Public Safety Excellence (CPSE), is the evaluation of the community's fire and non-fire hazards and threats, taking into account all pertinent facts that increase or decrease risk in order to define standards of cover. The CPSE defines risk as, "the exposure or any chance of injury or loss". Because the CRASOC is very detailed, verified by a third party, and reviewed with the CPSE and commissioners, the department has utilized the CFAI model to assist in organizational evaluation and planning.

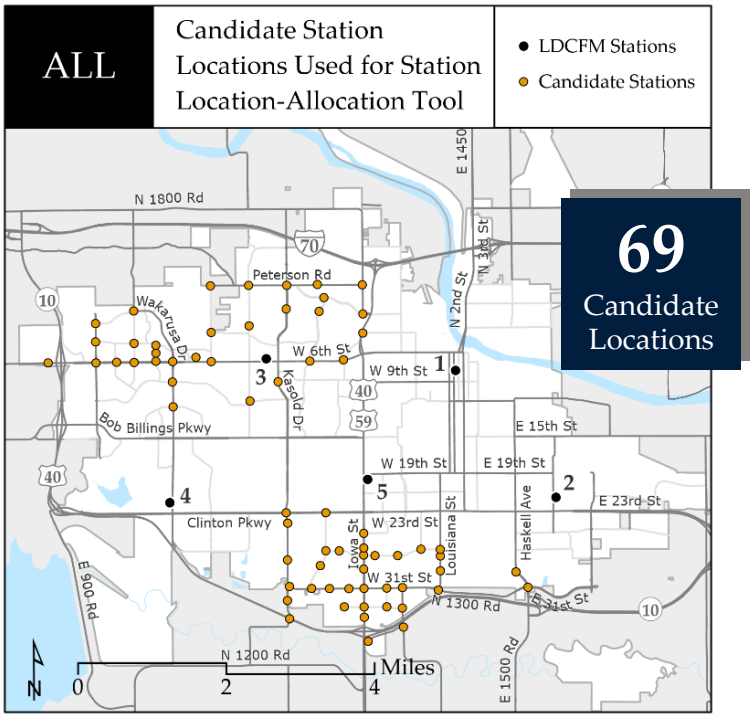




Using the current station locations and resources, the department performed a computer-simulated travel time or "drive time" analysis using Esri GIS technology to identify geographical coverage quality in areas of urban population density, theoretically capable of being reached in four minutes or less. This benchmark, of four minutes, is aimed to strive towards NFPA 1710 standards. The computer-simulated analysis identified geographical response gaps but did not account for additional factors influencing travel time quality. These additional factors, such as weather and service demand, influence the availability, reliability, resilience, and as an outcome of the overall effectiveness of responding units. The travel time analysis methodology used computer simulation to evaluate quality but should not be solely relied upon to reflect actual response capability. To supplement this analysis, actual historical response times were combined to give context of geographical performance gaps. By using both computer-simulation and actual performance data, this combination enhances the evaluation by creating a more realistic review of the department's current capability.

After the review of the modeling and mapping, designated gap areas were in the City of Lawrence with urban population densities that could not be reached in four minutes or less. These gaps were then further analyzed for correlations between various risk factors, levels, and hazards. The three designated gap areas were identified in areas to the North, Northwest, and South of the City of Lawrence.





Multiple dimensions were used to aid in creating more effective community-wide response coverage. These dimensions included current population density, disadvantaged populations, assessed property value, future population projections, and historical fire medical response performance. To further break down the fire medical response performance, each risk category (Fire, EMS, Hazmat, and Technical Rescue) was also analyzed separately through the Location – Allocation Network Analysis Tool. Considering several candidate sites, the tool determined the best location for a resource given the specified contributors, some of which were weighted. Throughout each run of the tool, a centralized or the "geographic center/mean center" location was determined based on all of the results. A total of 69 candidate station locations were utilized within the Location – Allocation Network Analysis Tool.

These candidate locations were selected by several different criteria with the first taking into account the current fire station locations and not including a distance within a quarter mile. The next criteria was placement based on major intersections within our road network. The final criteria was based on learned or inherent knowledge of the town itself and knowing areas where it would not make sense to put a fire station, like in the middle of a residential neighborhood. These 69 locations were chosen in the designated gap areas of the northwest, north central, and south parts of the Lawrence.

Each of these five risk dimensions were studied within the Esri ArcPro GIS software in a geoprocess called a Location – Allocation Network Analysis Tool. This geoprocess offers various ways to answer the specific questions we were looking for information on. The first step of the Location – Allocation Network Analysis Tool was adding a "Network Dataset" which in our case is built from our existing shared Road Centerline dataset with Douglas County GIS. Using our local road network over a premade national network allows for the most control in variables within the geoprocess and mimics the most real-world simulation possible.

The next step involved adding facility locations of the existing fire stations to be used per scenario, and all of the potential candidate locations. Stations we wanted to keep in place were marked as a required facility and depending on the scenario, Station #3 was either required or labeled as a candidate station. Then, each of the five risk dimensions were brought into the GIS software, processed from polygons to points, and then each added as "Demand" points within the Location – Allocation Network Analysis Tool. Each risk dimension was evaluated with each of the eight scenarios to determine the most ideal location based on those dimensions.

With evolving potential scenarios, given resource relocation or expansion, the tool was utilized to maximize coverage for the five dimensions of risk. This tool is most commonly used for fire stations, police stations, and other emergency response services.

Risk

To effectively analyze community risk, several dimensions were considered including community and LDCFM data. According to the *Community Risk Assessment: Standards of Cover 6th Edition* published by CPSE, *risk is the exposure or chance of injury or loss*. The objective was to identify risk locations based on intelligence gathered and review performance capabilities related to service level expectations to the community and its guests.

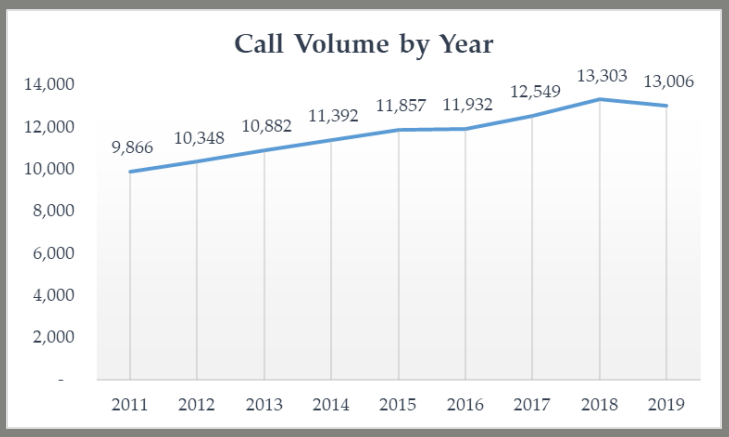
The department collaborated with the City of Lawrence Information Technology department to utilize Esri technology and local data to perform the analysis. The five risk dimensions utilized in the Esri Location – Allocation Network Analysis Tool include:

- **Disadvantaged Populations (Lawrence – Douglas County MPO)** This data set represents households with a person who has a disability, people who have less than a high school education, minorities, single parent households, zero vehicle households, population under 18 and over 65, and low-moderate income households. This community information was collected and incorporated into the transportation study, FFY 2021-2024 Transportation Improvement Program, published by the Lawrence – Douglas County Metropolitan Planning Organization.
- **Current City of Lawrence Population (City of Lawrence Planning and Development Services)** The current population for the City of Lawrence brings in a snapshot of where risk potential is probable and correlates to human systems, its demographic makeup, and density.
- **Projected City of Lawrence Population in 2040 (City of Lawrence Planning and Development Services)** Plan 2040, a comprehensive guide that the City of Lawrence is using to steer development and sustainability has produced projections based on census data. Using projected population counts and corresponding growth locations adds to the dimensions of analysis beyond a current snapshot.
- **Appraised Building Value (Douglas County Appraiser's Office)** The preservation of property and reduction of property loss during fires is a key component for the department mission. These values identify property value distributed across the City of Lawrence, reported in 2020.
- **Historical Lawrence – Douglas County Fire Medical Incident Locations (LDCFM)** All incidents have been geo-plotted, regardless of the call nature and incident risk level. Removing the Lawrence Memorial Hospital (LMH) transfers from the heat map allowed visualization of intensity of all other call types. With the LMH transfers included in a heat map, it overwhelmingly showed LMH as the singular hot spot of the region.

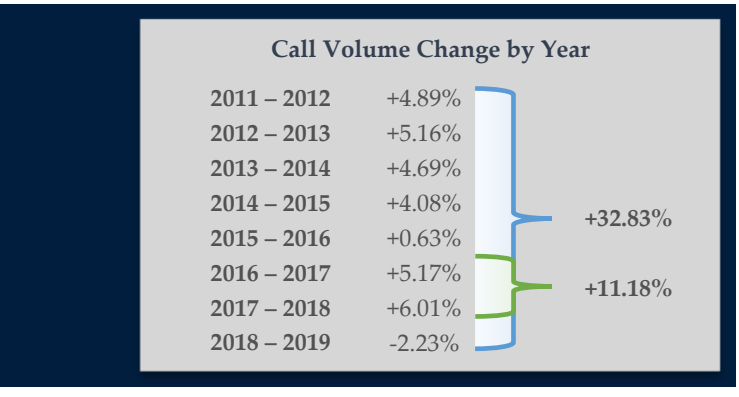
Demand

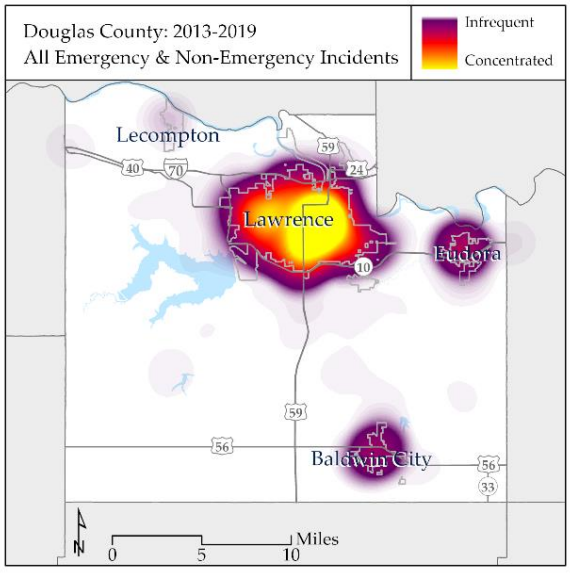
The department's calls for service have steadily increased over time. In high population density areas, trends have shown that there is a higher demand to be expected then in less populated areas. However, there is not a guarantee that low calls for service correlate to less risk. Various hazards, community demographics, socioeconomics, and infrastructure all play a part in risk potentiality. The frequency and concentration of calls for service can hinder the reliability and predictability of service quality. The capacity of the department can fluctuate minute to minute. The department's role in saving and protecting lives and property is an essential part of the community services and is a vital component to the critical infrastructure. Incidents are categorized into either Emergency or Non-Emergency depending on their nature at the time of dispatch. Emergency incidents are time-critical and have a higher risk potential, whereas Non-Emergency incidents usually result in a low consequence and impact. When analyzing demand, both Emergency and Non-Emergency incidents are included to create the total call volume. The total call volume can be used to assess availability of resources and frequency of risk in a community.

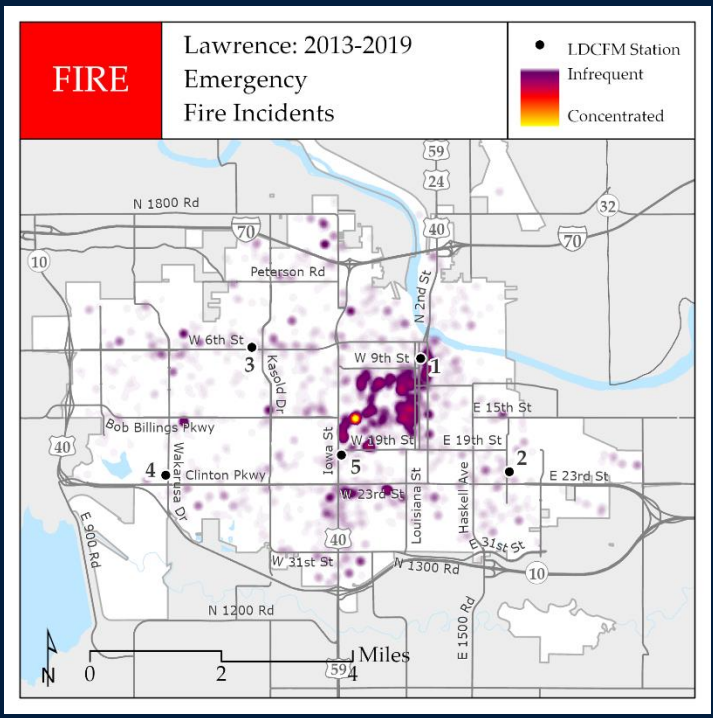
> The ability to mitigate and adapt to fluctuations in coverage is the key to providing reliable service levels.



Looking at the call volume by year, including all emergency and non-emergency incidents, there has been an approximate 32% increase in call volume from 2011 to 2019. The largest jump in call volume was from 2017 to 2018. This timeframe makes up 11.18% of the total increase during this since 2011.







Emergency Fire incidents of all risk levels have been plotted on the map to show the concentration and the dispersal of incidents throughout the City of Lawrence. The heat map can be utilized to identify hot spots, or areas of high concentration.

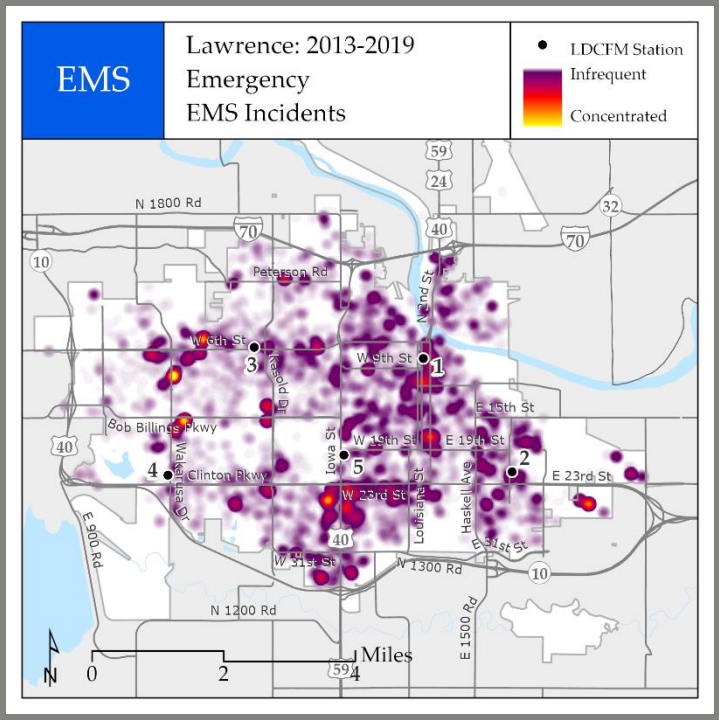
Example list of call types used in this map: Car Fire, Dumpster Fire, Semi Fire, Structure Fire, etc.

Heat Map Incident Count: 5,102

Emergency EMS incidents of all risk levels have been plotted on the map to show the concentration and the dispersal of incidents throughout the City of Lawrence. The heat map can be utilized to identify hot spots, or areas of high concentration.

Example list of call types used in this map: Breathing Problem, Alcohol Poisoning, Allergic Reaction, Cardiac Arrest, Chest Pain, Heart Problems, Sick Person, Stroke, Traumatic Injury, Unconscious, etc.

Heat Map Incident Count: 22,122



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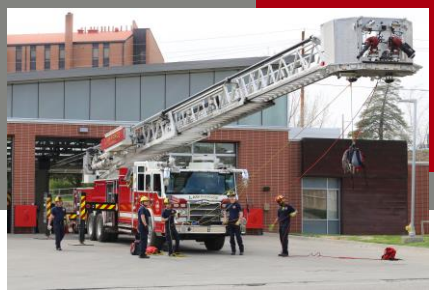
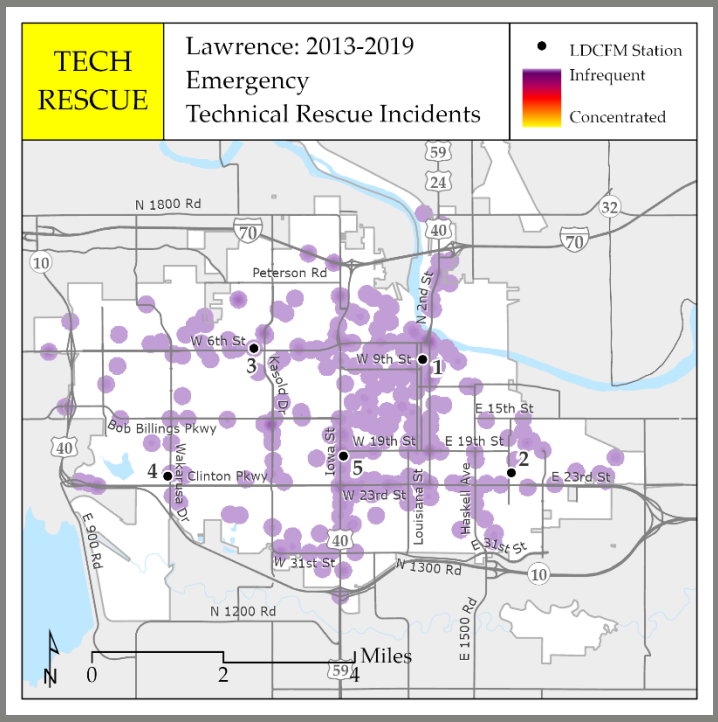
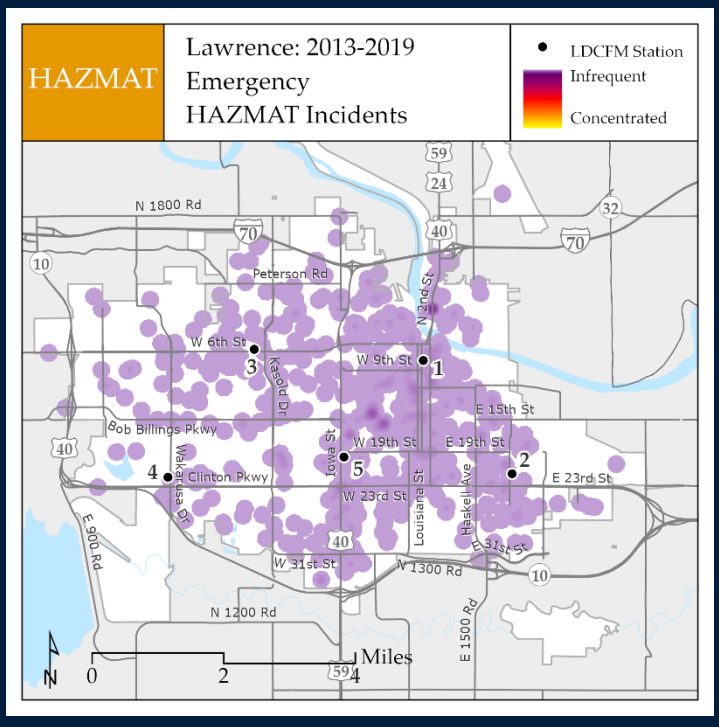
Emergency Technical Rescue incidents of all risk levels have been plotted on the map to show the concentration and the dispersal of incidents throughout the City of Lawrence. The heat map can be utilized to identify hot spots, or areas of high concentration.

Example list of call types used in this map: Confined Space, High Angle, Industrial Accident, Motor Vehicle Accident, Water Rescue, etc.

Heat Map Incident Count: 522







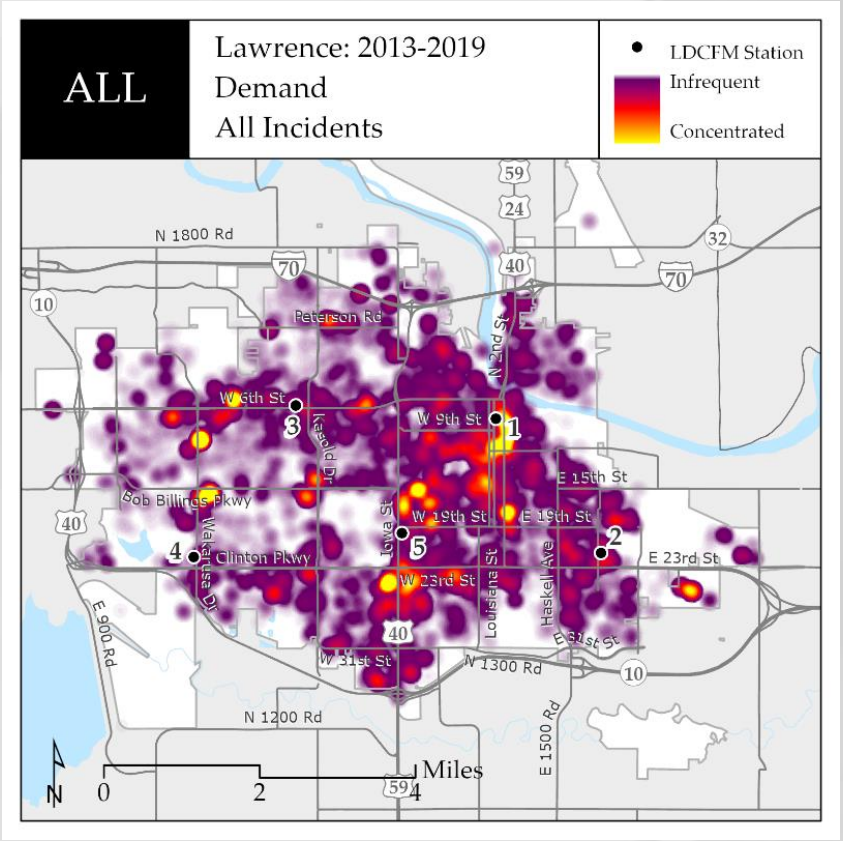
Emergency Hazardous Materials incidents of all risk levels have been plotted on the map to show the concentration and the dispersal of incidents throughout the City of Lawrence. The heat map can be utilized to identify hot spots, or areas of high concentration.

Example list of call types used in this map: Gas Leak, Gas Odor, Hazardous Materials, etc.

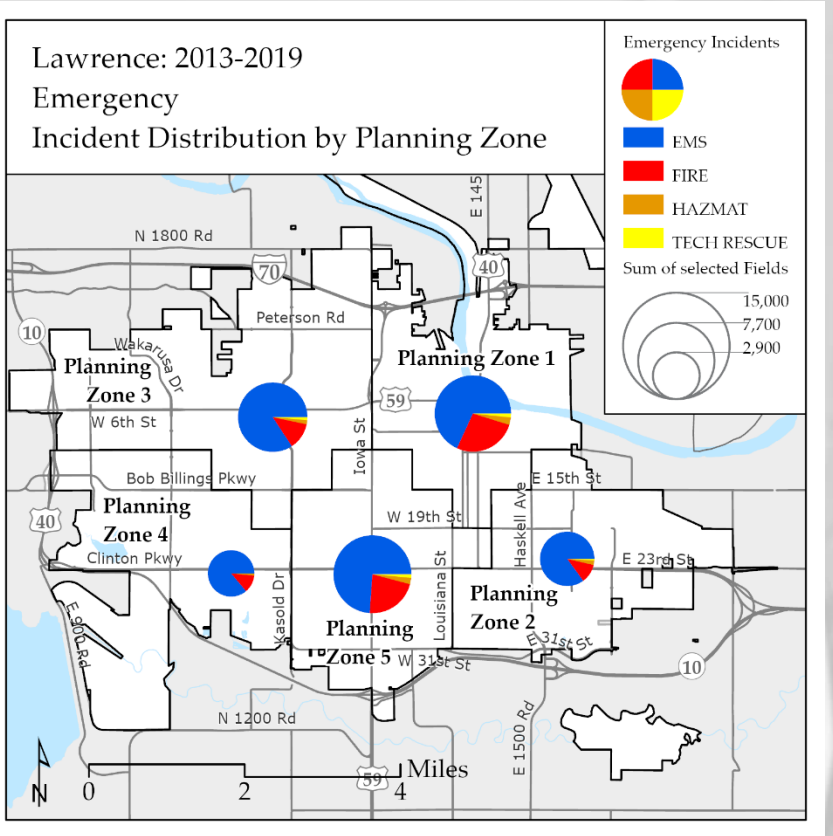
Heat Map Incident Count: 1,301

Emergency Fire, EMS, Technical Rescue, and Hazardous Materials incidents have been plotted on the map to show concentration and the dispersal of incidents throughout the City of Lawrence. There are concentrated areas, but calls do occur in distributed areas of the community.

Heat Map Incident Count: 29,047



Distribution of call types most frequently have been emergency medical services, fire-related, hazardous materials response, and then technical rescues.



Standards of Cover

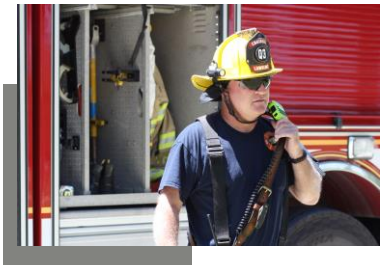
The green "blanket of cover" shows a conceptual analysis, using roadway networks and speed limits, of a four minute drive time polygon from each fire medical station. The drive time analysis represents the drive time capability of fire medical apparatus leaving the respective stations, without factoring in traffic conditions, road closures, weather, or other drive time inhibitors.

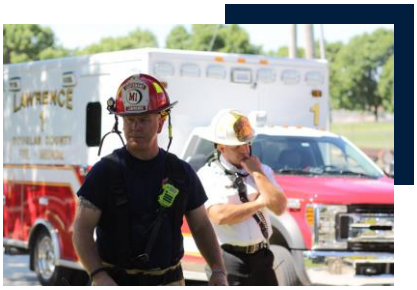
The distribution of fire medical resources throughout the community accounts for the risk consequence potential and their mitigation capabilities.

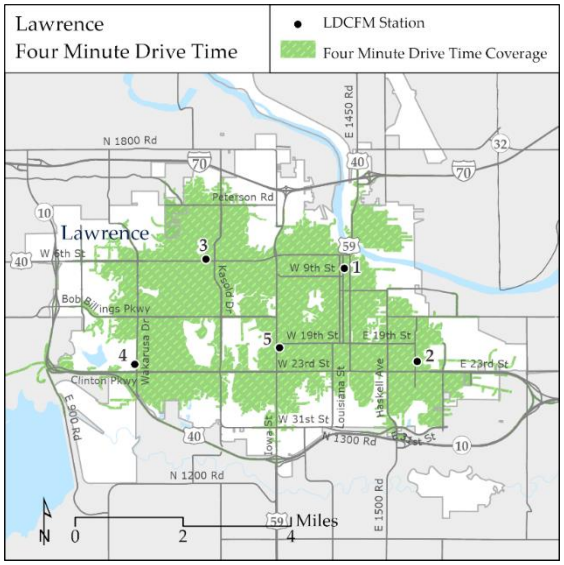
The City of Lawrence Standards of Cover map shows the five fire medical stations. Relative to each station, a four minute drive time polygon has been created. Theoretically, apparatus should be able to reach any location within the green "blanket of cover" in four minutes or less.

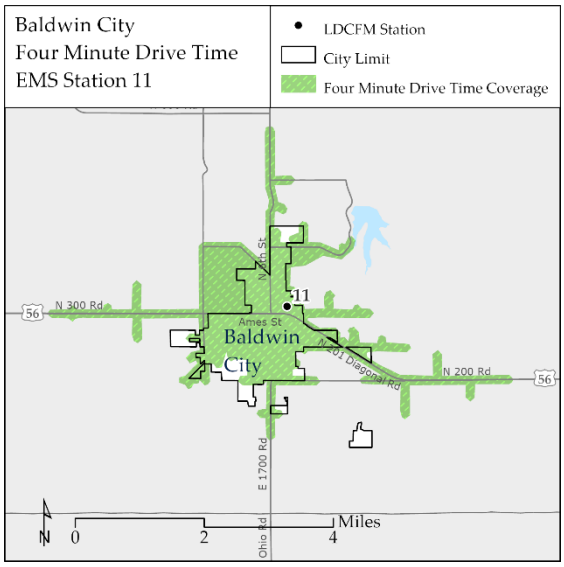
Baldwin City's four minute drive time analysis was based off of Station 11, which houses Medic 11's apparatus and crew. The green area is associated with EMS response only. Fire suppression is not provided by LDCFM in Baldwin City.

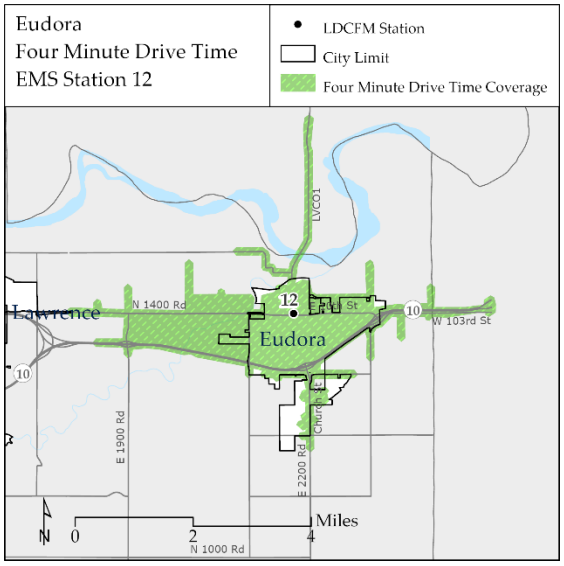
The City of Eudora's four minute drive time is based off of Medic 12's location – responding out of Eudora's Fire Station located near the downtown area. The City of Eudora provides its own fire suppression service, therefore the green coverage represents ems response only.











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Influence of Coverage Example

Below is an example of resource coverage given 2 simultaneous incidents: a Level 1 incident (Structure Fire Level 1) and a Level 3 incident (Breathing Problem). The green blanket of coverage illustrates the four minute drive time capability with the remaining available resources within the City of Lawrence.

Structure Fire Level 1 Deployment (Level 1)

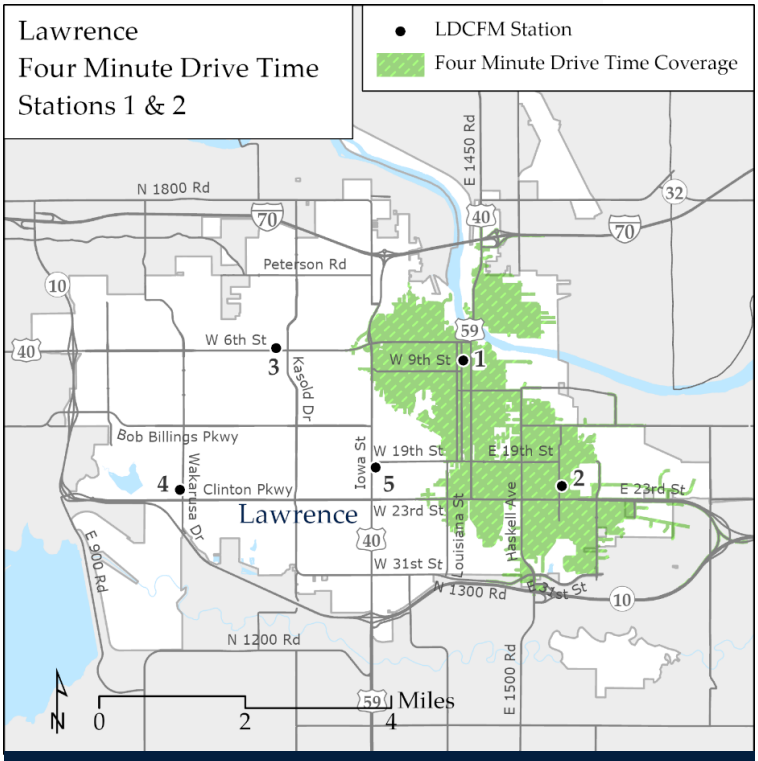
- (3) Fire Apparatus
- (2) Medic Units
- (1) Rescue Truck
- (1) Chief Officer

Breathing Problem Deployment (Level 3)

- (1) Fire Apparatus
- (1) Medic Unit

What's left in the City of Lawrence?

- (1) Fire Apparatus
- (2) Medic Units
- (1) Chief Officer



Station 1: (1) Medic Unit (1) Chief Officer
Station 2: (1) Fire Apparatus (1) Medic Unit

Deployment Model

Level 3
(Low Risk)
One Unit

Level 2
(Moderate Risk)
Two Units

Level 1
(High / Maximum Risk)
Three or More Units

Facts

- In 2019, the department ran **13,006 calls**.
- On average, that's **35.6 calls per day**!
- Calls may require multiple units and stations to respond and are committed for extended periods of time.

The Douglas County drive time analysis was conducted using a ten minute drive time standard. This standard was used instead of the four minute drive time standard which was used for the City of Lawrence, City of Eudora, and Baldwin City because of the mix of incorporated and unincorporated areas. The department's travel time benchmark for rural areas is set at ten minutes.

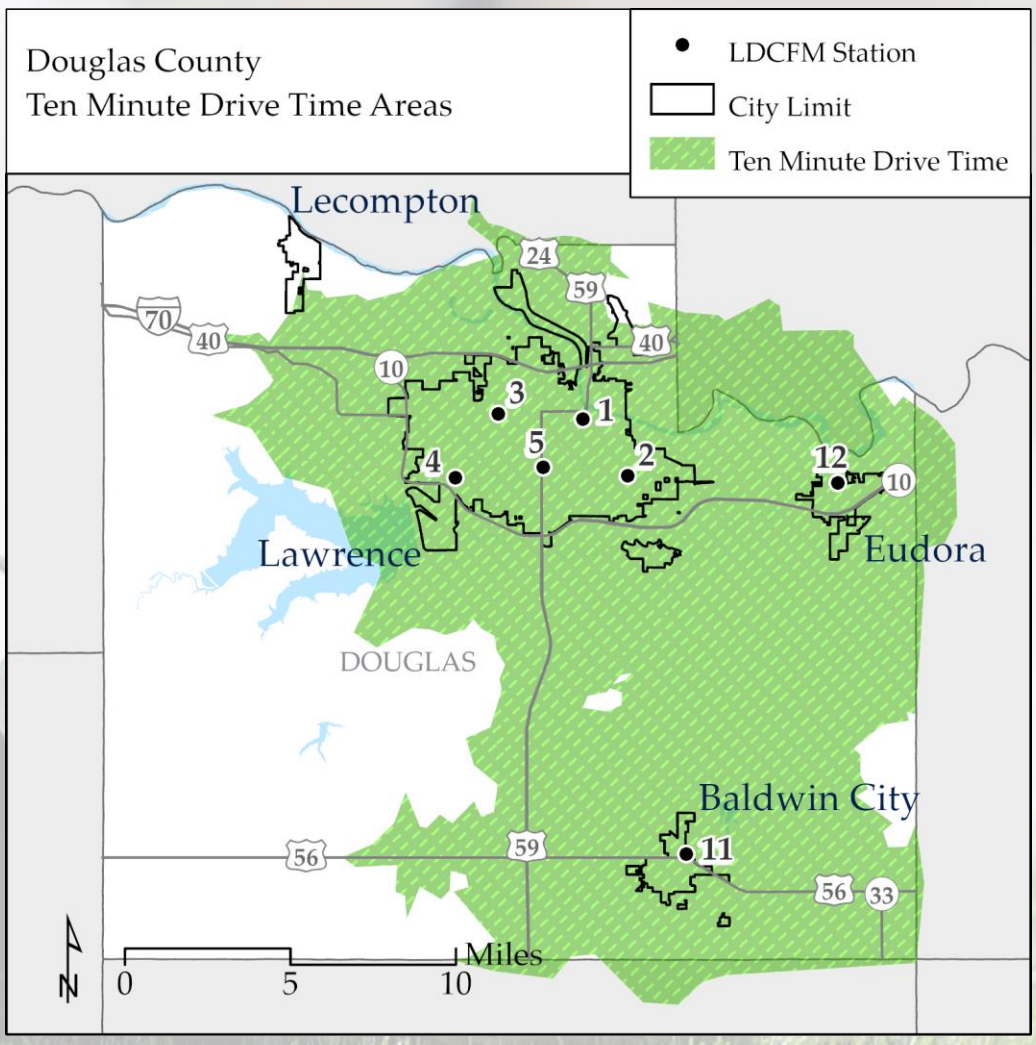
Douglas County

475 total square miles

283 square miles Covered Under a 10 Minute Travel Time

93.6% population Covered Under a 10 Minute Travel Time

Response performance objectives are designed based on population density. Within urban areas of Douglas County, travel time performance goals are set at 4:00 minutes and 10:00 minutes in rural areas. Outside the City of Lawrence, other agencies respond in addition to LDCFM.



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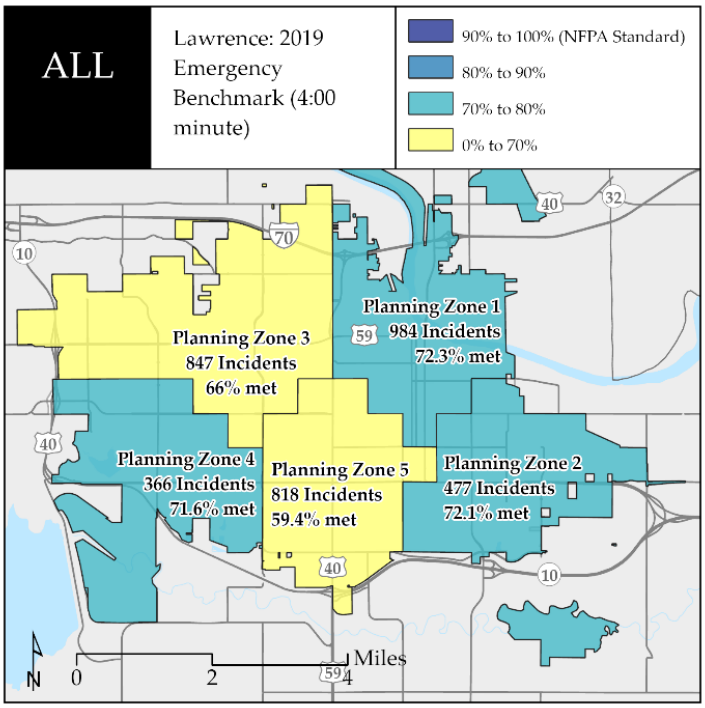
Current Performance (2019)

LDCFM's response time goals are identified as benchmarks. These benchmarks, both in urban and rural areas, designate the target for each response time segment. Response performance is segregated by risk category, classification, and planning zone. For urban population areas, the current travel time benchmark is set at four minutes. For rural areas, the benchmark is set for ten minutes. Within the City of Lawrence, incident response data can be displayed by planning zone.

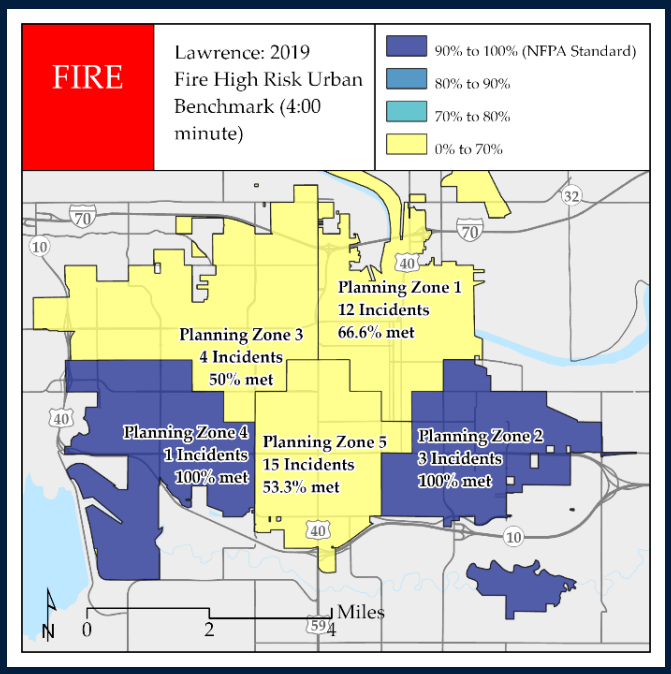


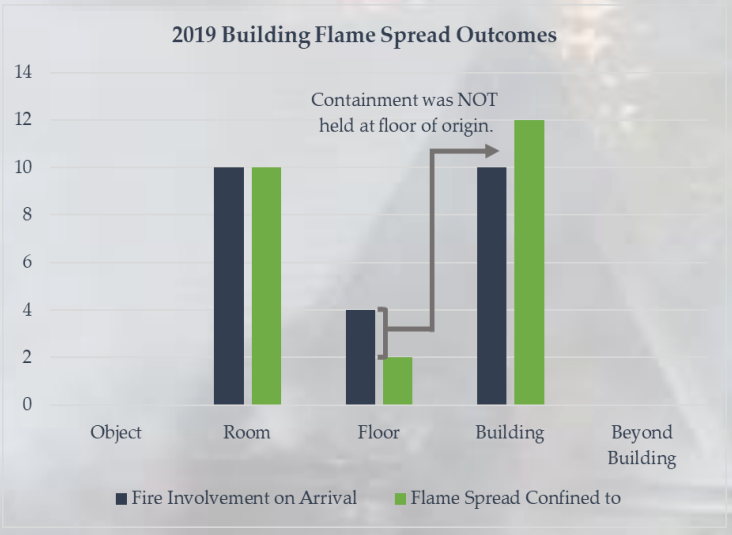
LDCFM organizes data by planning zone. Douglas County is divided into fourteen planning zones, seven designated as urban population density and seven designated as rural density. The City of Lawrence is comprised of five of the seven urban planning zones. The remaining two urban areas are in the Baldwin City and City of Eudora. Call data and response information can be sorted and studied within each zone and at a finer look with quarter-mile emergency service zones in some urban areas. Performance metrics are also used to assess event frequency distribution, density, and response time performance.

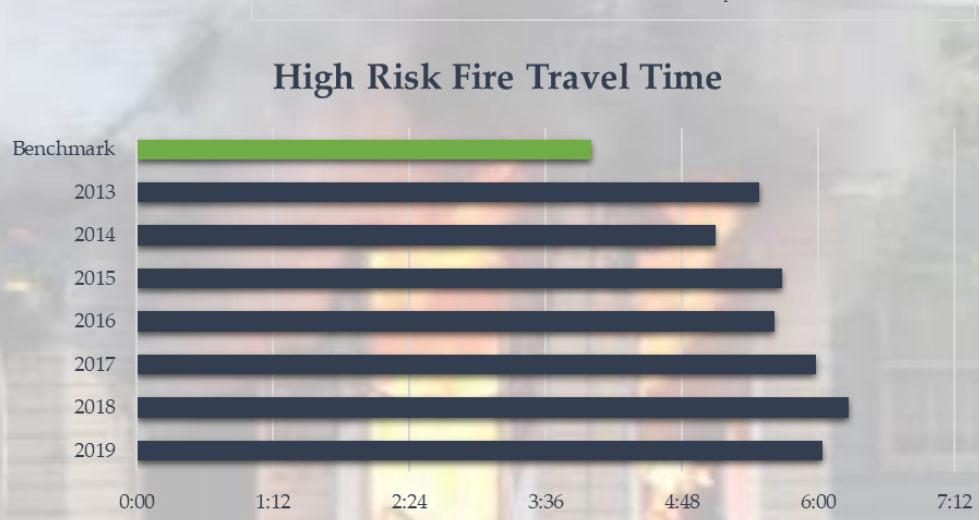
The table shown below delineates the various components of total response time, relative to the department-adopted benchmarks for each segment. Moderate EMS incidents are the most common types of calls for service. These call types might include Abdominal Pain, Medical Alarm, Alcohol Poisoning, Allergic Reaction, Breathing Problem, Convulsions / Seizure, Diabetic, Falls, Stroke, Traumatic Injury, etc. The department's performance related to Moderate EMS incidents is shown in the table below, along with High EMS and High Fire incident performance. High EMS incidents might include calls related to Cardiac Arrests, Drownings, Shootings, Stabbings, etc. High Fire incidents are Structure Fires.

LDCFM Response Time Performance 2019

	Mod Risk EMS	High Risk EMS	High Risk Fire
Alarm Handling	2:08	2:08	2:30
Benchmark	1:00	1:00	1:00
Turnout Time	1:46	1:34	1:47
Benchmark	1:30	1:30	1:30
Travel Time	5:28	4:29	6:02
Benchmark	4:00	4:00	4:00
Total Response Time	8:18	7:09	8:53
Benchmark	6:30	6:30	6:30







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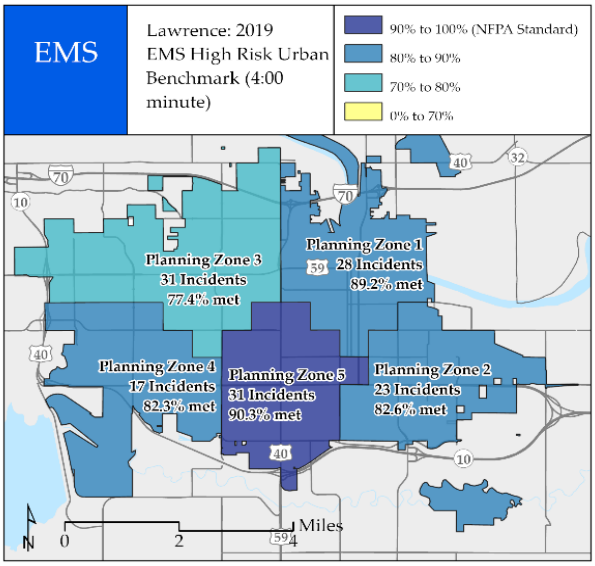
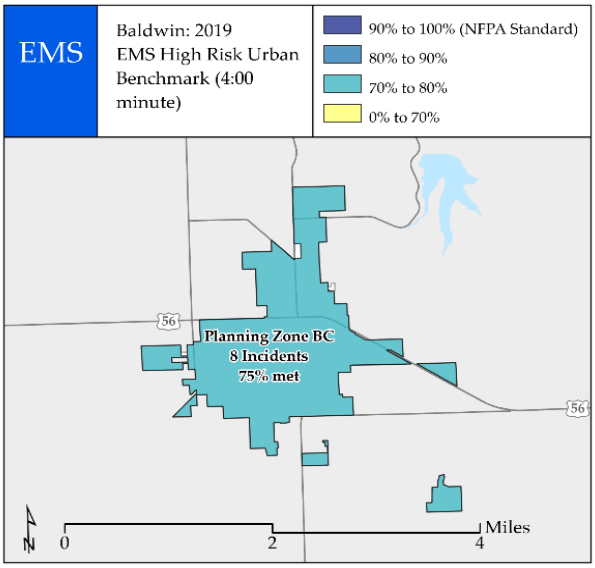
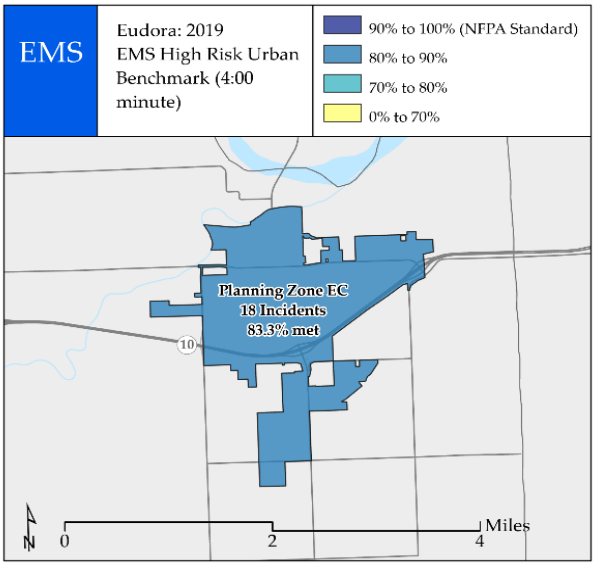






These maps show the actual performance in regards to travel time, for LDCFM emergency services to arrive on-scene of high risk emergency incidents, within urban areas. The City of Lawrence shows the five urban planning zones with the correlated travel time performance compared to the adopted NFPA standard. Baldwin City has one urban planning zone, as does the City of Eudora. The darker the zone, the better the actual travel time performance was in 2019.

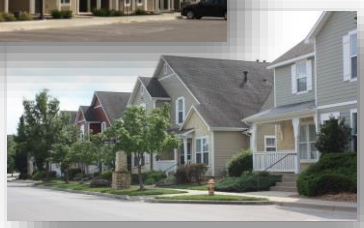
2019 Cardiac Arrest Statistics for Douglas County

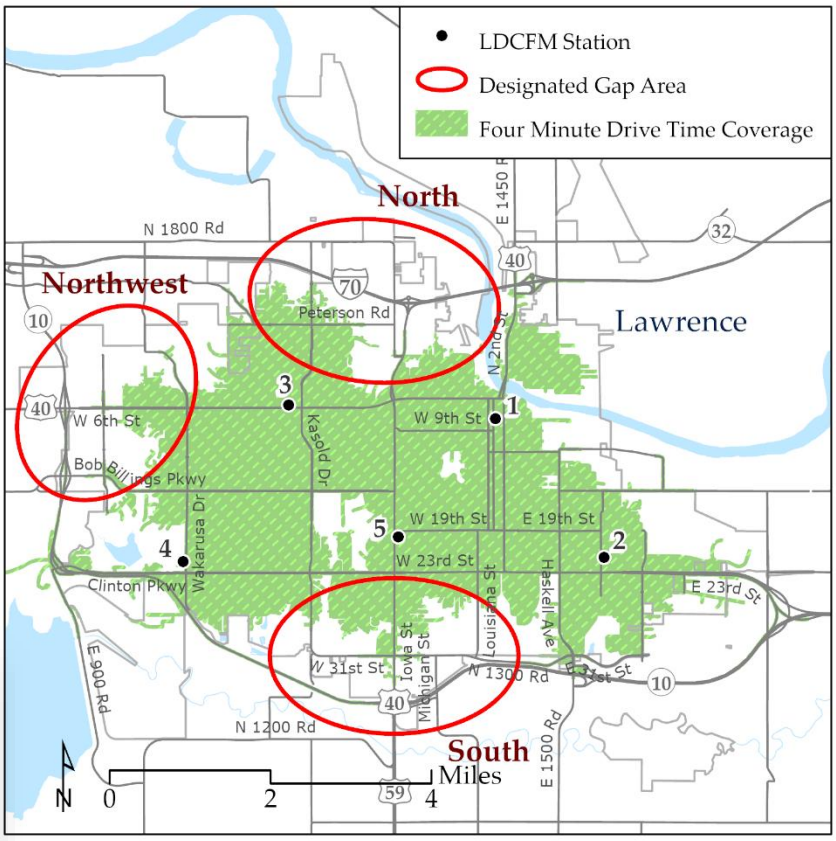
Appendix Item #4 – Cardiac Arrest Registry to Enhance Survival 2019 Summary

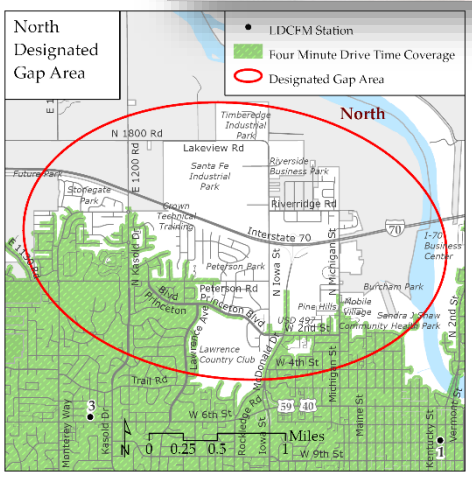
53 Total Cardiac Arrests	**66.8** Average Age	**35.8%** Female	**64.2%** Male
41.5% Sustained Return of Spontaneous Circulation			
34.0% Overall Survival to Hospital Administration	**18.9%** Overall Survival to Hospital Discharge	**26.7%** Utstein Survival	

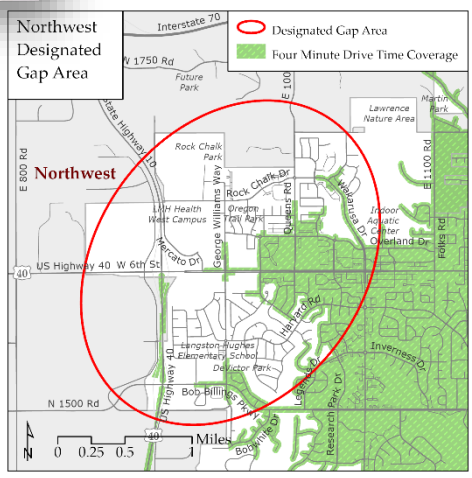
Geographical Response Gap Areas with Urban Population Density

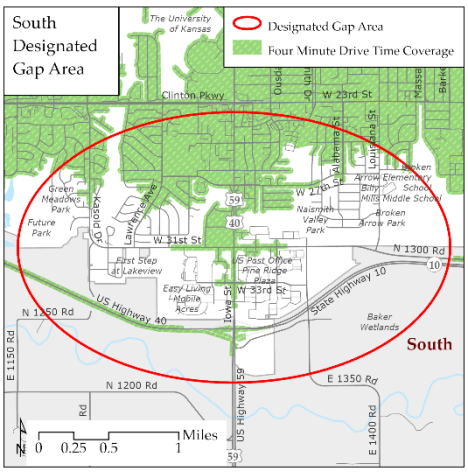
From the analysis, three key geographical gap areas have been identified. These gaps are in areas that do not lay within the current standards of cover (ability to be reached in 4:00 minutes from a current fire station) and show a strong presence of historical demands for service. The department has responded to these areas and the response times been regularly outside of benchmark response time goals. Relative to the dimensions of risk, these gaps create inconsistency on a multitude of levels. Community members that reside or spend time in these gaps are at greater risk for elongated response times. As a result, community members that are currently covered by the standards of cover are at risk for decreased reliability in service when units are pulled into other areas to respond. When units respond to calls for service around the City, the standards of cover shifts. The movement of available units creates gaps in typical standards of cover and can create larger gaps.





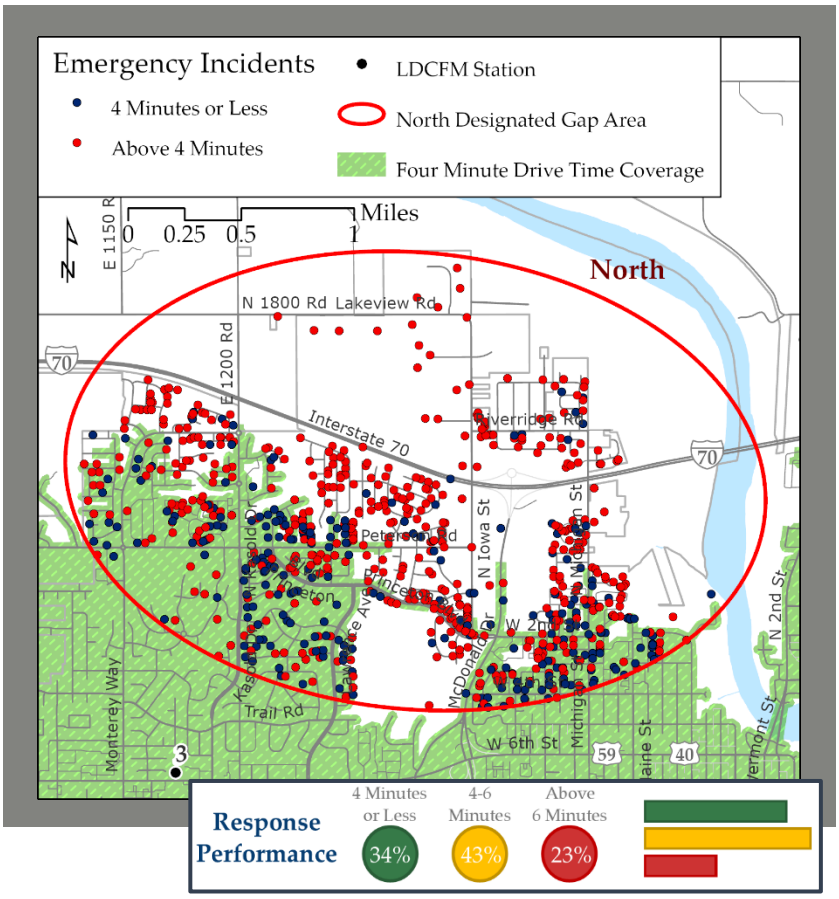






North Gap

2.25 square miles



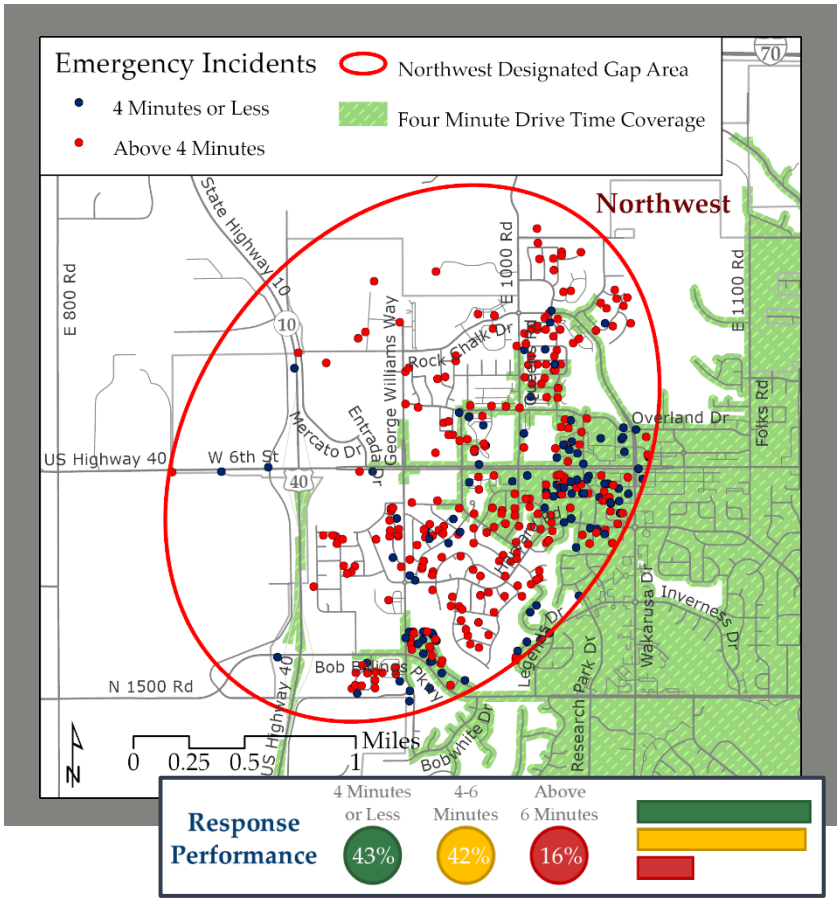
Key Facts

6,710 Population	34.0 Median Age		Seniors 65+	Adults 15 to 64	Children 14 & Under
2,898 Households	10.0% Unemployment		879 (13.1%)	4,590 (68.4%)	1,241 (18.5%)

2 Schools	6 Parks	110 Total Businesses	1,976 Total Employees	467 Households With Disability	9 Households Without Vehicle

Northwest Gap

2.24 square miles

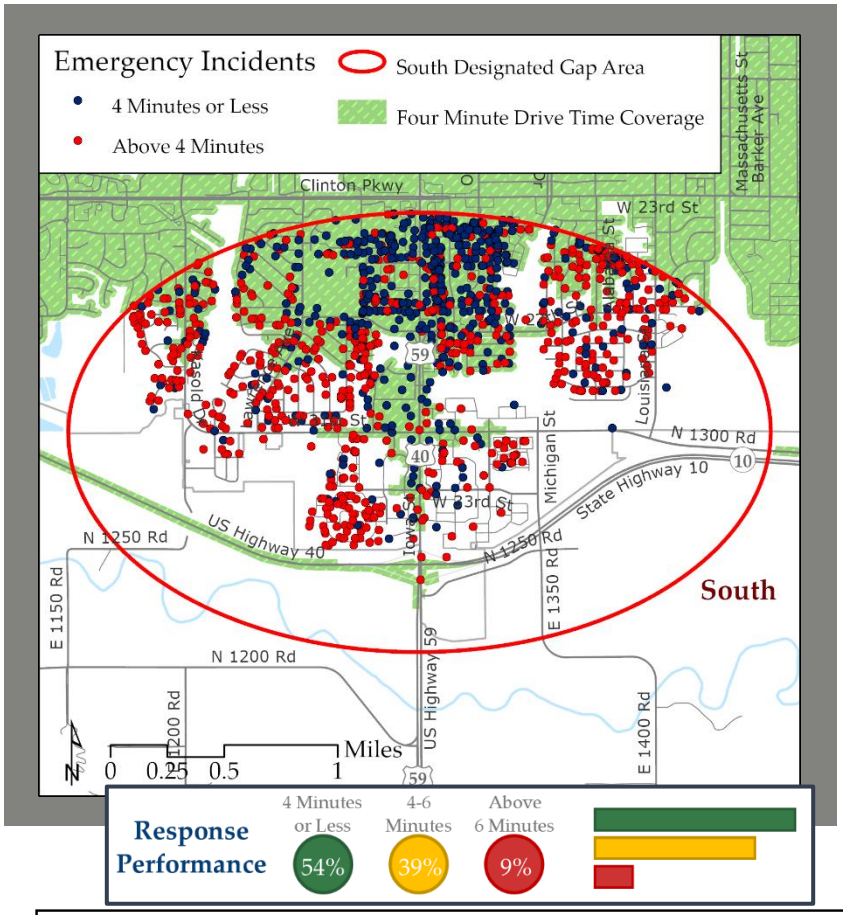


Key Facts

5,012 Population	36.8 Median Age		Seniors 65+	Adults 15 to 64	Children 14 & Under
2,001 Households	15.6% Unemployment		692 (13.8%)	3,438 (68.6%)	882 (17.6%)
2 Schools	3 Parks	46 Total Businesses	473 Total Employees	242 Households With Disability	0 Households Without Vehicle

South Gap

1.94 square miles



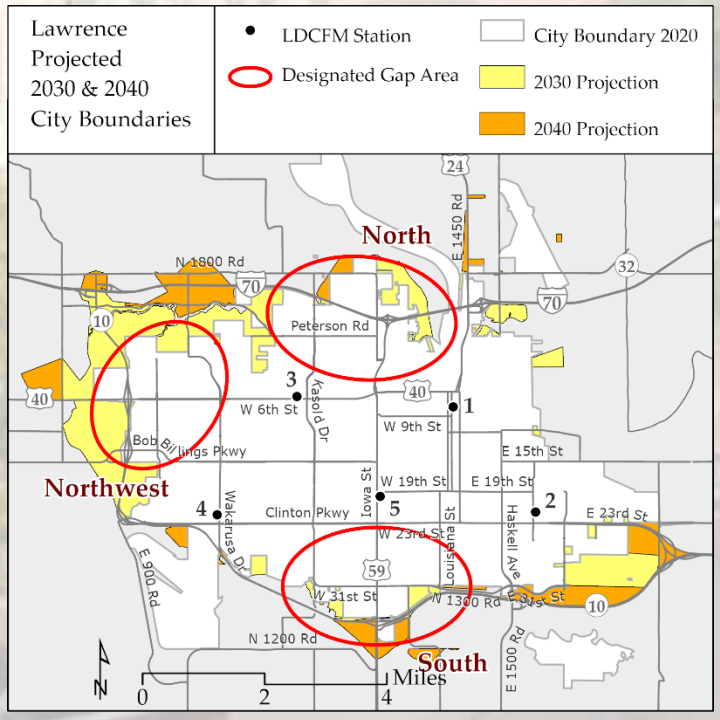
Key Facts

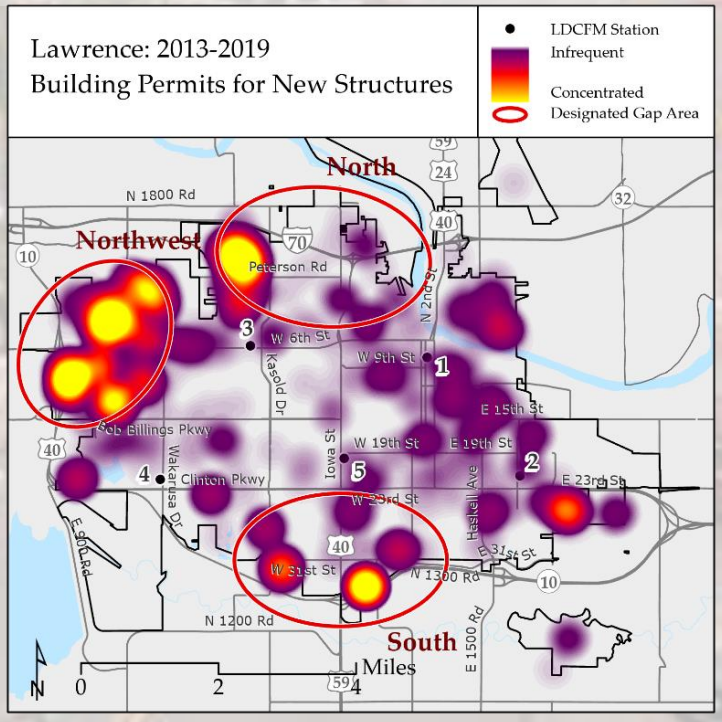
6,146 Population	28.2 Median Age		Seniors 65+	Adults 15 to 64	Children 14 & Under
2,327 Households	15.6% Unemployment		584 (9.5%)	4,683 (76.2%)	879 (14.3%)
2 Schools	4 Parks	188 Total Businesses	3,076 Total Employees	312 Households With Disability	6 Households Without Vehicle

Growth

The City of Lawrence has experienced a population growth of 10.9% from 2010 to 2018, per the population estimates on census.gov. Looking forward, the City Planning and Development Services department has projected possible areas of growth, annexation, and city expansion. Douglas County and the City of Lawrence created Plan 2040, a comprehensive plan that projects population growth and steers community development.

Geographical expansion may necessitate further research to explore opportunities to improve response performance.



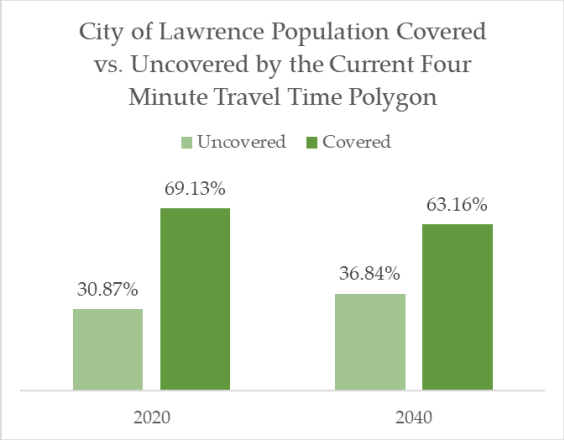


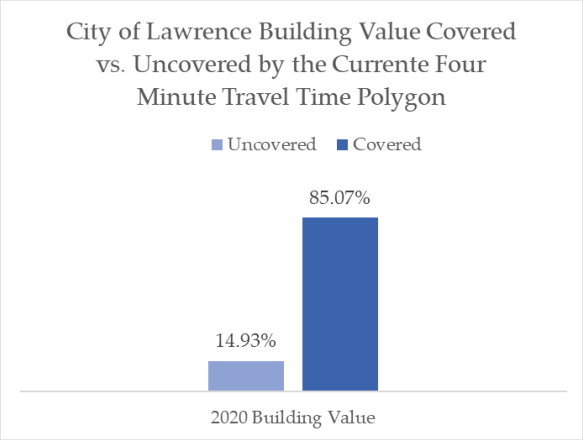
Population and Building Value

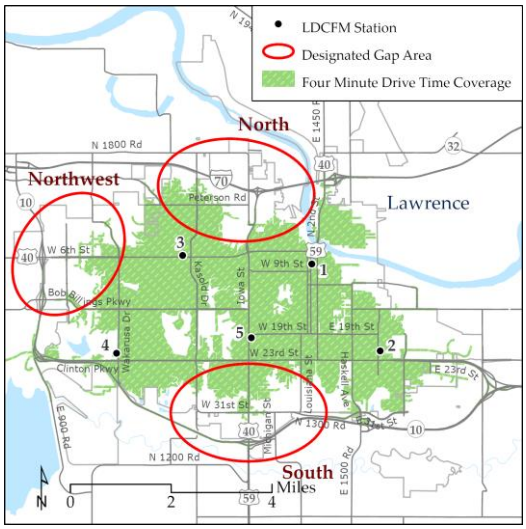
According to the 2010 census, Lawrence's population was 87,757. In the 2018 American Community Survey (ACS), the City of Lawrence's population was estimated to be 97,286. From 2010-2018 the population change was 10.9% based on estimates of growth. In 2018, 25.7% of the population was outside of the formulated four minute travel time coverage capability. With that, the building value totaled $853,789,250. Looking forward, using projection tools from Planning and Development Services in 2040, the projection tools show that 36.84% of the population will be outside the current four minute travel time coverage zone. When current emergency response coverage is compared to the projected annexation areas, the gap widens. Build-out plans for future development will continuously effect resource coverage and capabilities. Using the City's data related to build-out plans and infill areas enable proactive actions and planning.

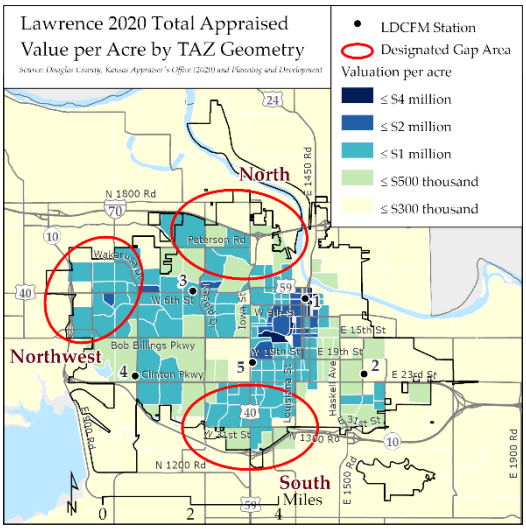
Planning and Development Services estimated in 2020 the population would be 108,620 and 30.87% would be outside the four minute travel time zone.

*Includes University of Kansas buildings



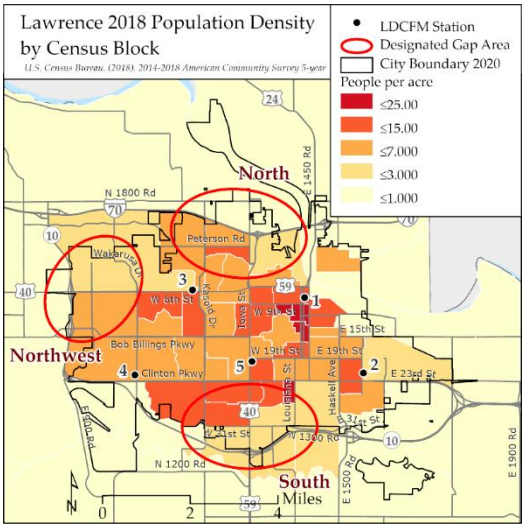


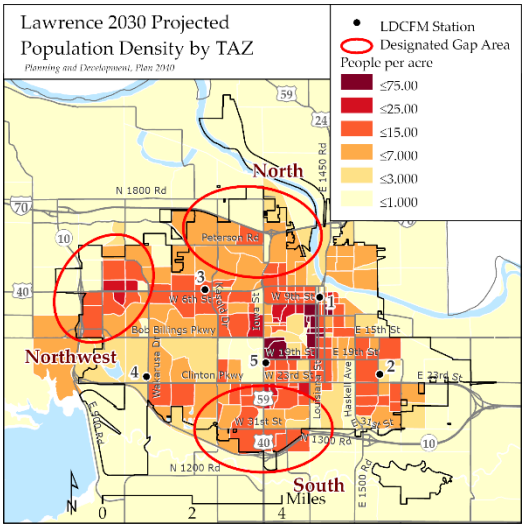


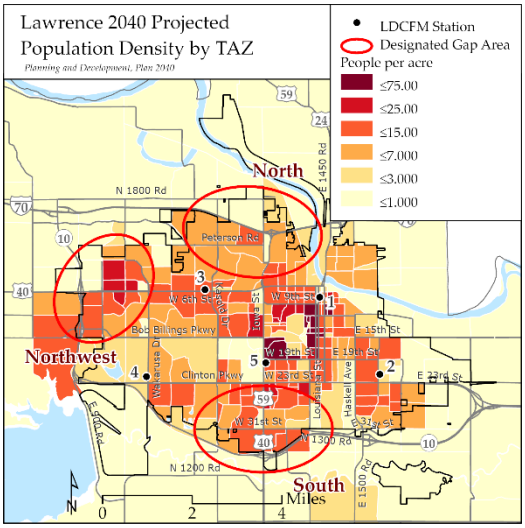


The population in the City of Lawrence is an essential metric to measure and consider when analyzing risk, monitoring community change, and evaluating emergency resource capability. Expansion of residential communities and commercial occupancies pose unique sets of characteristics that can relate to hazards and risk potentiality. For example, a machine-related traumatic injury may be more likely to happen in an industrial plant versus a residential neighborhood, whereas a high risk or other medical request may be more likely in a senior living facility.

The three maps show a gradual projection of the population change in the City of Lawrence. The darker the zone, the higher population density. The darker zones show a projection of city infill near the downtown area as well as expansion around the edge of the current city limits. The increased density in the Northwest, North, and South parts of the City align with the gaps of service performance and other metrics used in this study.







Having the capability of response coverage where population growth is happening is imperative for emergency services. Where there's people, there's risk.

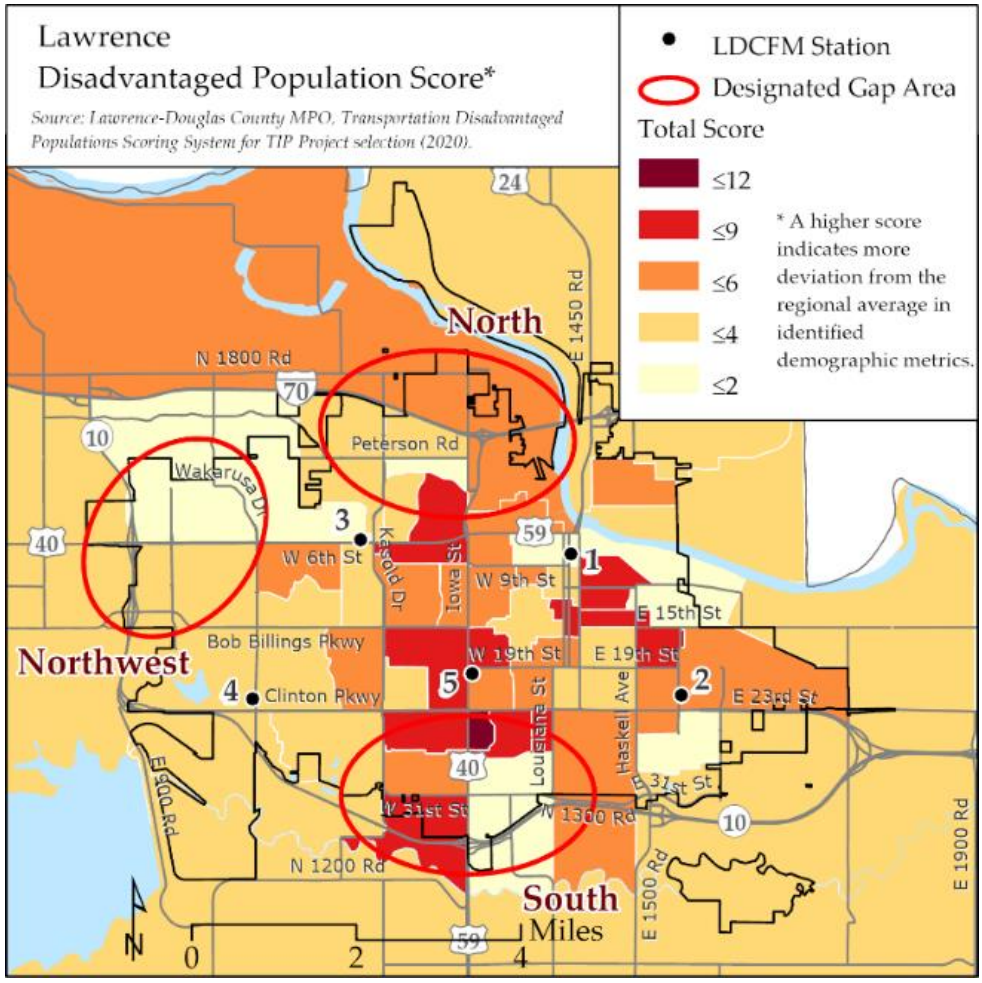
Community Data and Miscellaneous Risks

In order to take a complete, holistic approach to the analysis, various miscellaneous risks and factors have to be incorporated. These risks are in relation to the community and its characteristics. By collaborating with the various agencies, which are noted in the analysis contributor list, the data collection had more depth and diversity. The top miscellaneous risks that were determined and used during the study were infill development, community demographics, and socioeconomic factors.

The City Planning and Development Services department does not only forecast outward expansion of the City, but also infill. Infill development is pertinent to the analysis because it effects the City's growth in the upcoming years.

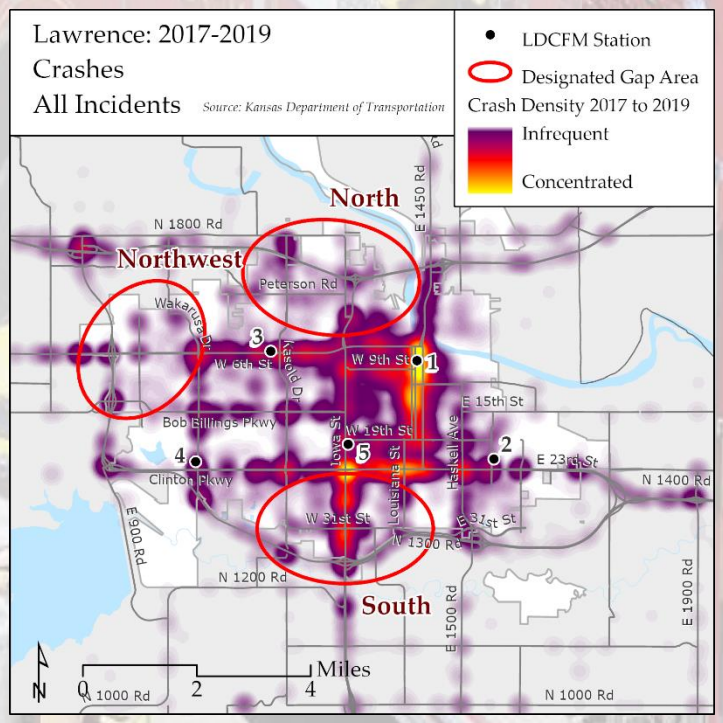
When visualizing numerous diverse data sets, there appears to be common service areas. This is an opportunity to identify root causes and identify additional resources which will reduce overall community risk.

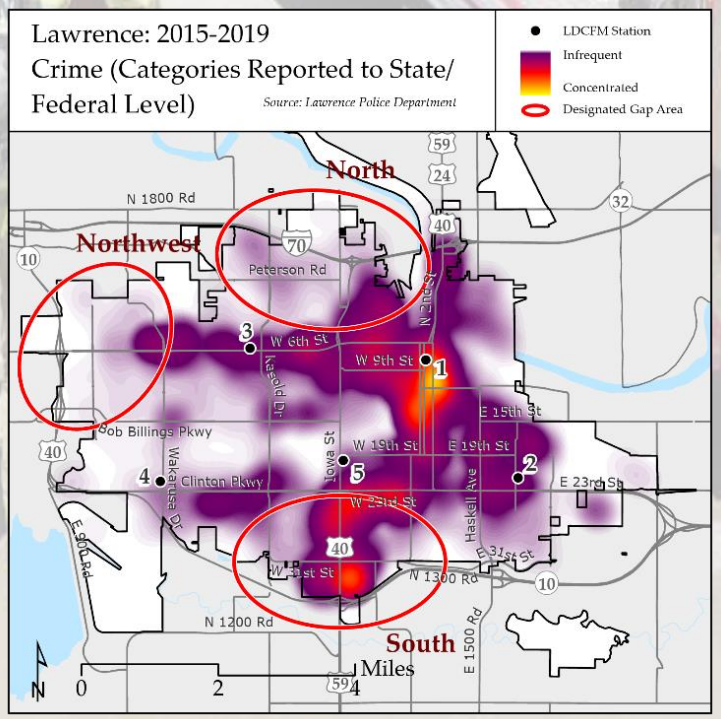
The Lawrence – Douglas County Metropolitan Planning Organization performed an analysis using several population characteristics to elevate equity. "These characteristics included: households with a person who has a disability, people who have less than a high school education, minorities, single parent households, zero vehicle households, population under 18 and over 65, and low income households. The regional average was found for each topic except for low-moderate income. Then one point was assigned if the block group was equal to or 20 percent higher than the regional average. Two points were attributed if the block group was 20 percent to 40 percent of the regional average. And three points were assigned if the block group was greater than 40 percent higher than the regional average. Low-moderate income data is the Community Development Block Grant (CDBG) identified low-moderate income areas. A block group is low-moderate income if the low-moderate income percentage for the block group is 51.0%. The 27 block groups that are considered low-moderate income were split into 3 groups of 9 and the highest percentage of low-moderate income in the block group were assigned three points, then two points, and lastly one point."



Collaboration is an essential piece of addressing health initiatives within the community. Data collection and data sharing more effectively informs stakeholders to influence positive change based on credible community intelligence. Finding common "hotspots" in various datasets highlights the necessity of purposeful attention. Collective actions in public health can improve health outcomes and health equity. Cooperating on initiatives with other emergency service agencies and health care entities increase effectiveness and have the potential to impact the community at a higher level than when conducted independently.

With additional information such as information collected from Lawrence-Douglas County Public Health, the City and County may be able to identify key risk factors which influence the need for emergency services.





Leading Causes of Death – All Ages
Douglas County, Kansas 2010-2015

Cancer	**22%**
Heart Disease	**20%**
Chronic Lower Respiratory Diseases	**6%**
Unintentional Injuries	**6%**
Stroke (Cerebrovascular Diseases)	**5%**
Other/Various	**41%**

2017 Douglas County Community Health Assessment
Page 14

"In addition to demography (things like one's sex, age, race, income, etc.), we know that health is greatly influenced by peoples' behavior, the health care they utilize, the quality of the physical environment around them, and other aspects of the community where they live."

2017 Douglas County Community Health Assessment
Page 17

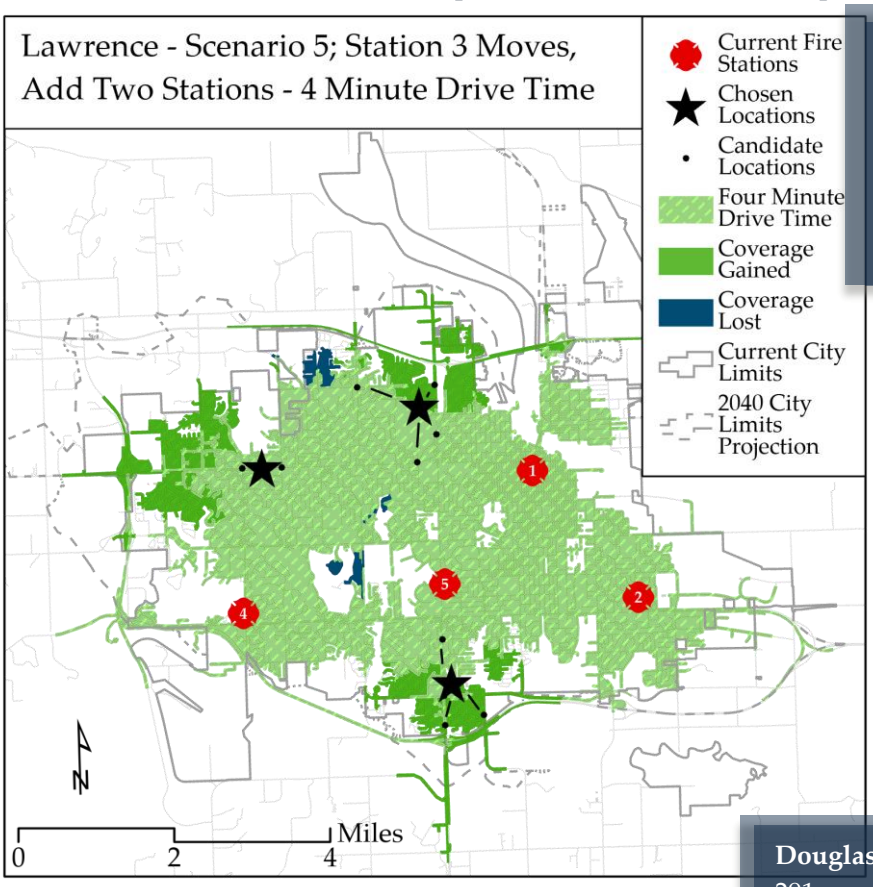
Analysis Recommendation

After evaluating multiple solutions to address current challenges, LDCFM is recommending the relocation of Fire Medical Station #3 and an expansion of 2 stations.

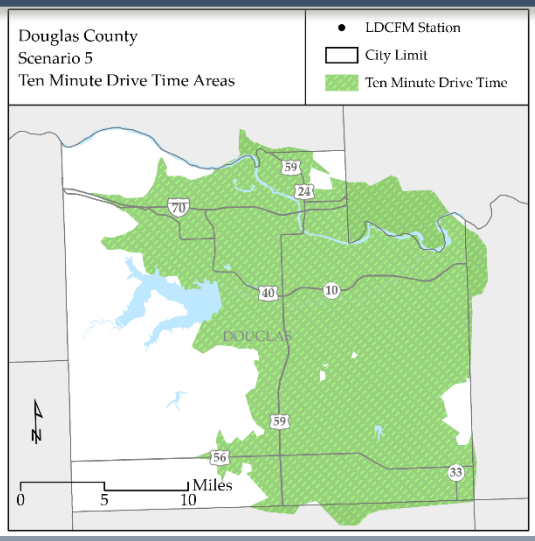
Several scenarios were considered to address the three designated gap areas to provide more equitable response capabilities throughout urban population areas of Douglas County and the City of Lawrence. The department took a fiscally-lean approach and evaluated 8 scenarios, each incrementally measured for community value resulting in the recommendation. Each of the 8 scenarios can be found in the appendix.

The department recommends an implementation plan of simultaneously constructing two new stations, one in the North and one in the Northwest. After construction, resources currently located at Fire Medical Station #3 should be relocated in the North and new expansion resources placed in the Northwest station. Prioritization of these areas are based on population and property value gained through improved coverage.

As soon as resources can be procured to address the gap in the South, construction should begin and additional resources placed in-service as soon as possible.



Additional Population Covered in Douglas County
+ 10,848 people
(+ 10,465 People in Urban Areas)
(+ 383 People in Rural Areas)
Additional Property Value in the City of Lawrence
+ $1,078,868,690



Douglas County
291 square miles Covered Under a 10 Minute Travel Time

Scenario 5 Overall Impact

Value Gained in the City of Lawrence

Additional Households Covered:
+ 3,787

Additional Population Covered:
+ 8,882

Additional Businesses Covered:
+ 161

Additional Property Value Covered:
+ $1,078,868,690

Additional Households With Disability Covered:
+ 490

Additional Households Without a Vehicle Covered:
+ 5

Additional Employees Covered:
+ 2,539

Value Lost in the City of Lawrence

Households:
- 267

Population:
- 605

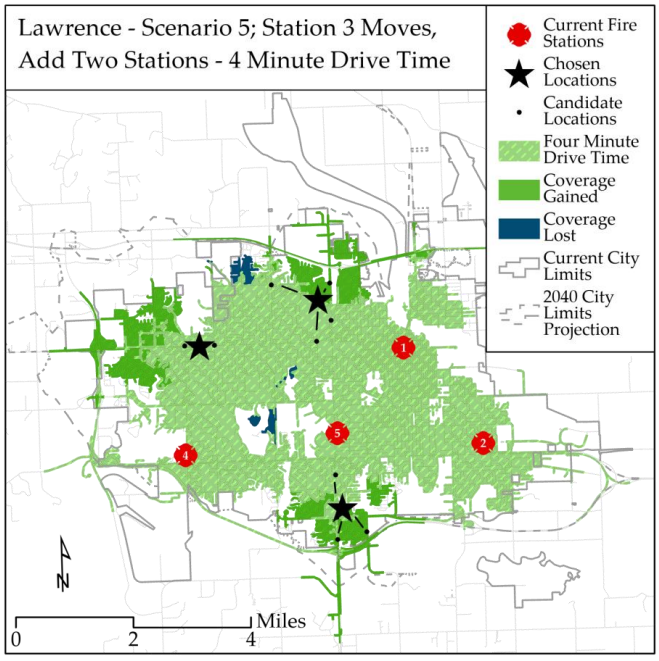
Businesses:
- 3

Property Value:
- $127,895,130

Households With Disability:
- 30

Households Without a Vehicle:
- 0

Employees:
- 18



North Gap Impacts

Additional Households Covered:

+ 1,944

Additional Population Covered:

+ 4,358

Additional Businesses Covered:

+ 59

Additional Property Value Covered:

+ $205,773,360

Additional Households With Disability Covered:

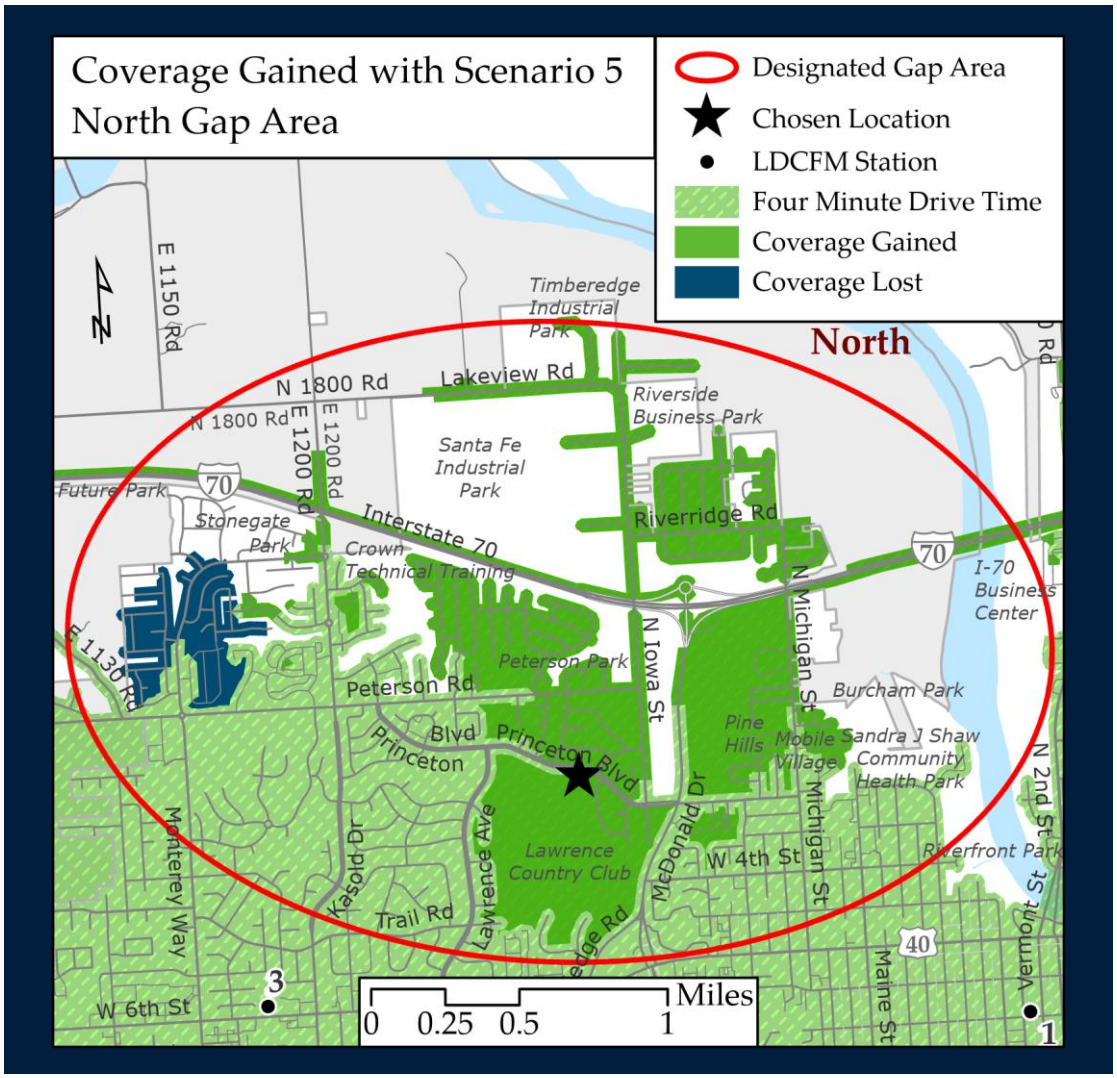
+ 297

Additional Households Without a Vehicle Covered:

+ 5

Additional Employees Covered:

+ 1,294



Northwest Gap Impacts

Additional Households Covered:

+ 1,497

Additional Population Covered:

+ 3,374

Additional Businesses Covered:

+ 20

Additional Property Value Covered:

+ $505,616,760

Additional Households With Disability Covered:

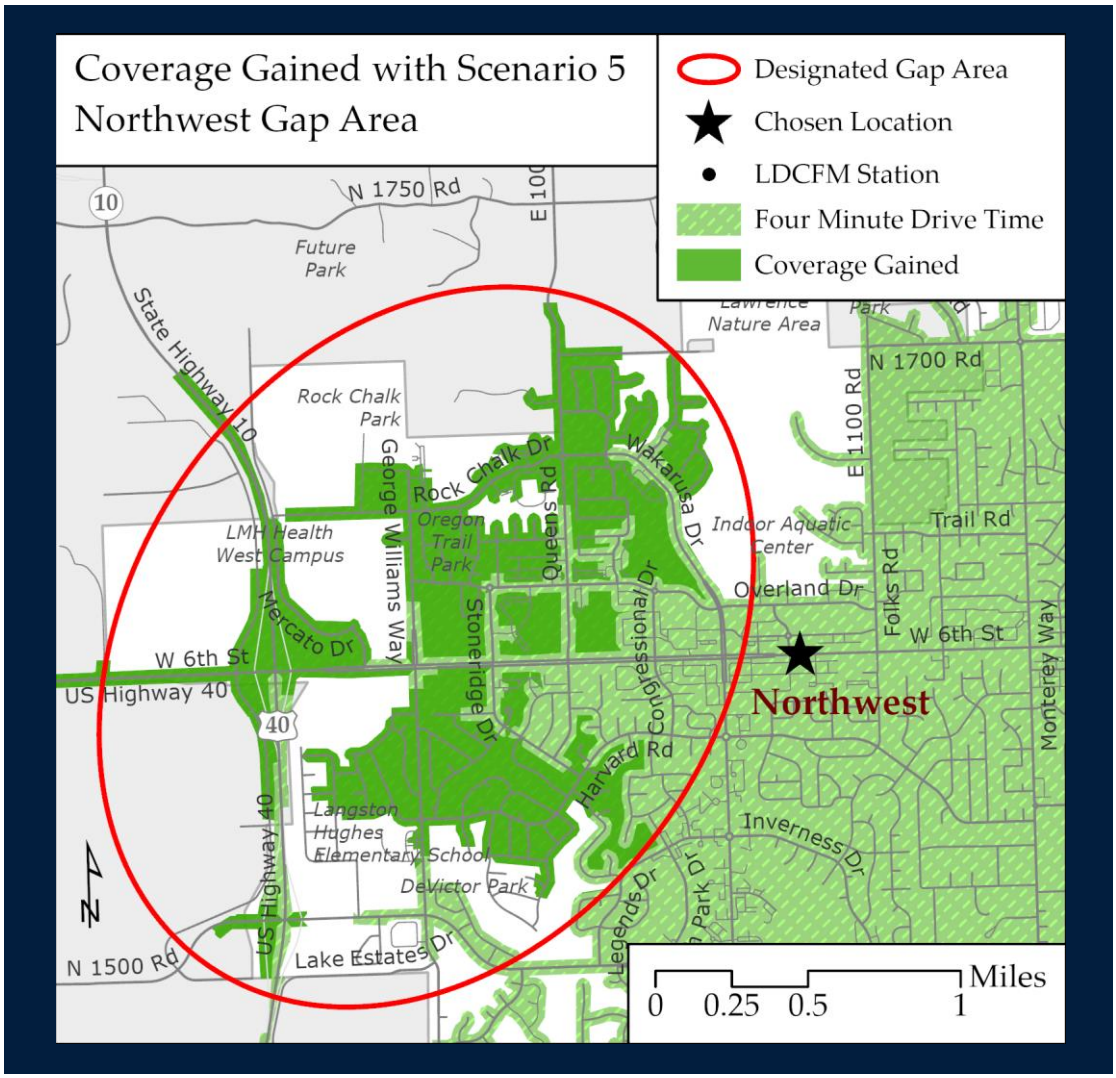
+ 144

Additional Households Without a Vehicle Covered:

+ 0

Additional Employees Covered:

+ 216



South Gap Impacts

Additional Households Covered:

+ 1,105

Additional Population Covered:

+ 2,733

Additional Businesses Covered:

+ 177

Additional Property Value Covered:

+ $367,478,570

Additional Households With Disability Covered:

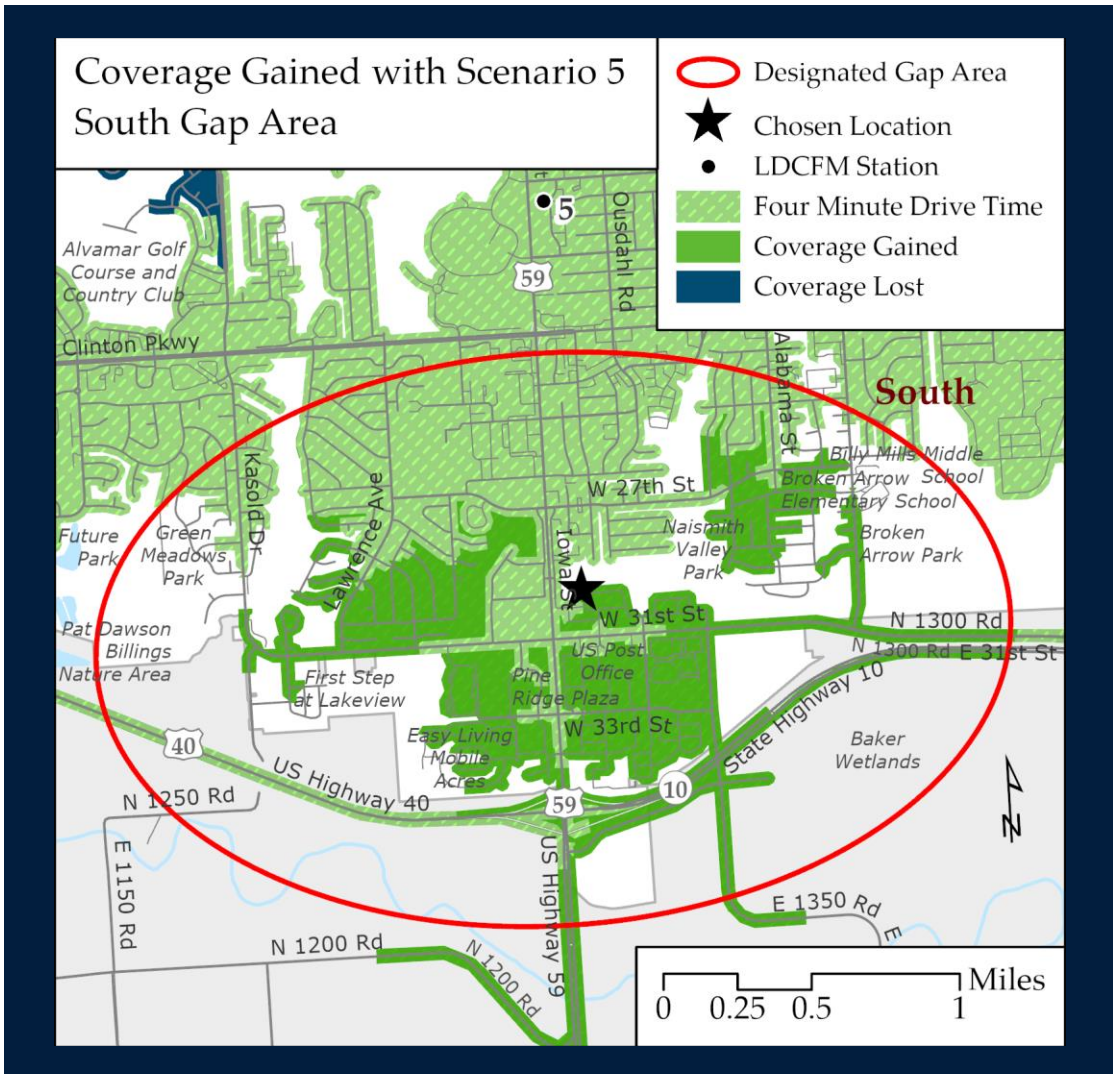
+ 138

Additional Households Without a Vehicle Covered:

+ 0

Additional Employees Covered:

+ 1,817



Appendix

Appendix A – GIS Geoprocessing Workflow Model

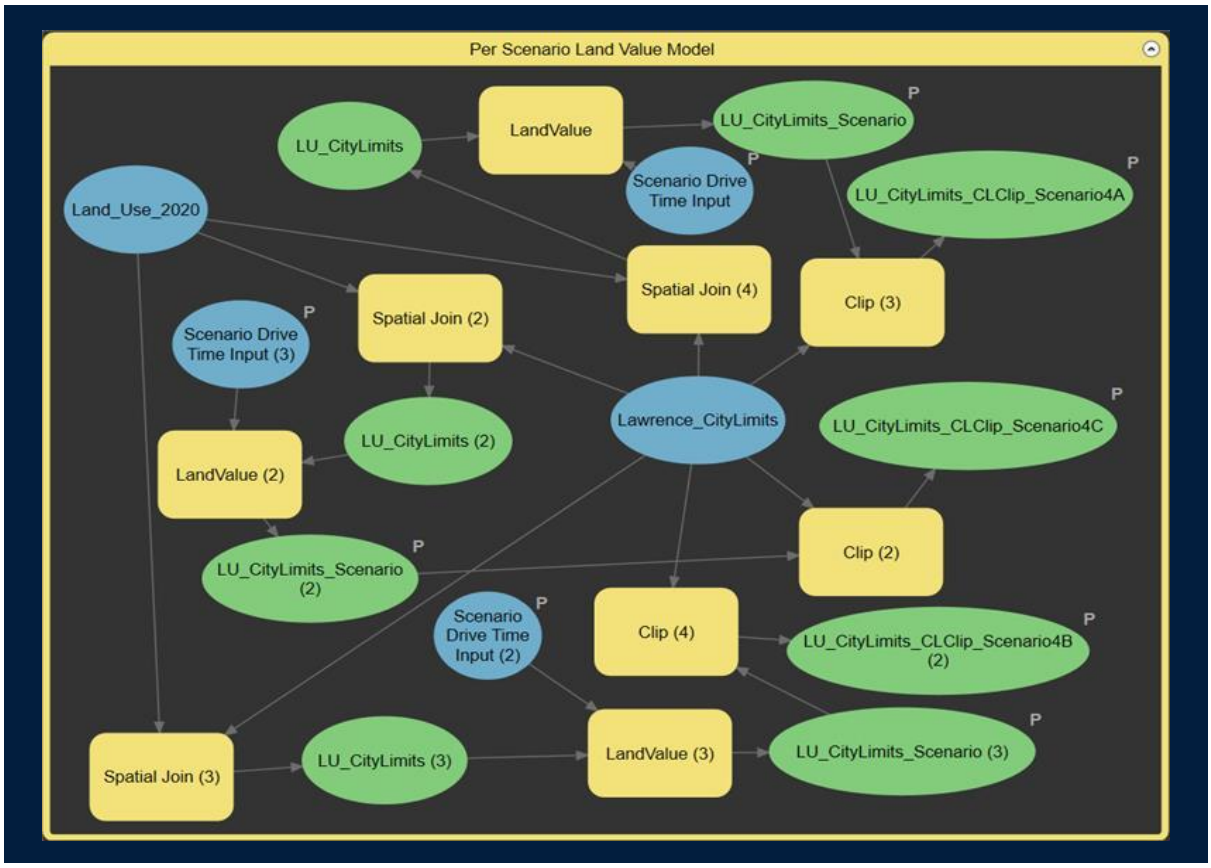
Appendix B – Accreditation Data

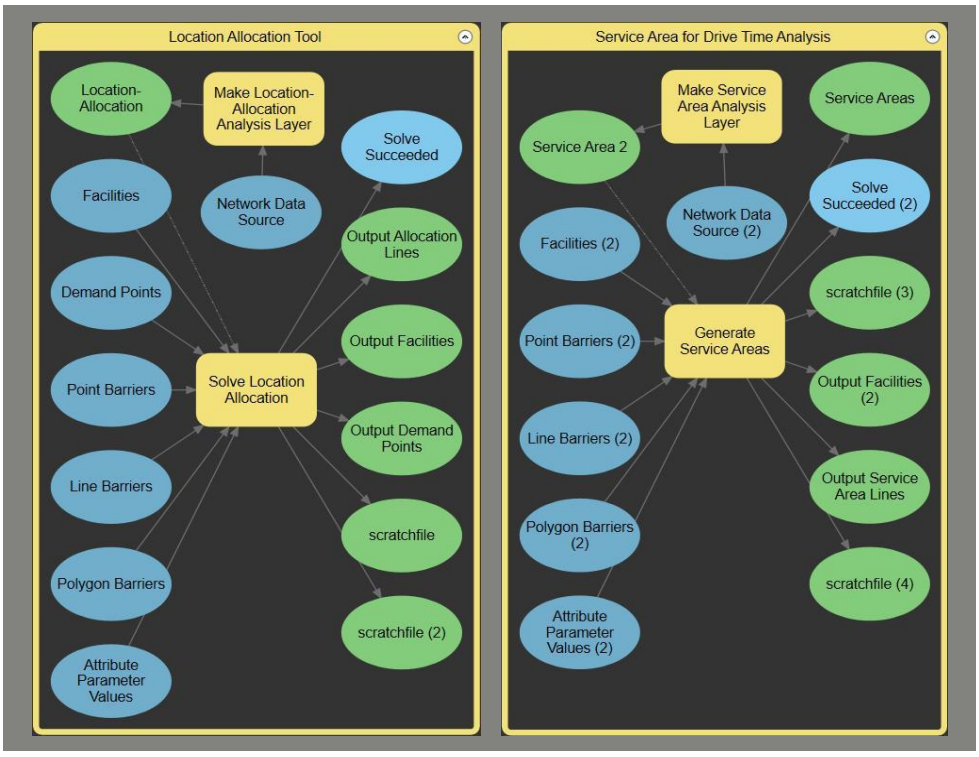
Appendix C – Conceptual Scenarios

Appendix D – Department Risk Methodology

Appendix E – Cardiac Arrest Registry to Enhance Survival

Appendix A – GIS Geoprocessing Workflow Model





Appendix B – Accreditation Data

Urban Population Density Areas

	2019	2018	2017	2016	2015	2014	2013
Benchmark	**4:00**	**4:00**	**4:00**	**4:00**	**4:00**	**4:00**	**4:00**
Travel Time High Risk EMS	4:29	4:34	4:53	6:10	9:16	5:16	5:21
Travel Time Moderate Risk EMS	5:28	5:31	5:49	6:13	7:20	6:16	6:22
Travel Time High Risk Fire	6:02	6:16	5:59	5:37	5:41	5:06	5:29

Appendix C – Conceptual Scenarios

The following pages show the results from each scenario.

Scenario 1 – Relocation of One Station, No Expansion

Scenario 2A – No Relocation, One Expansion

Scenario 2B – No Relocation, One Expansion

Scenario 3 – Relocation of One Station, One Expansion

Scenario 4A – No Relocation, Two Expansions

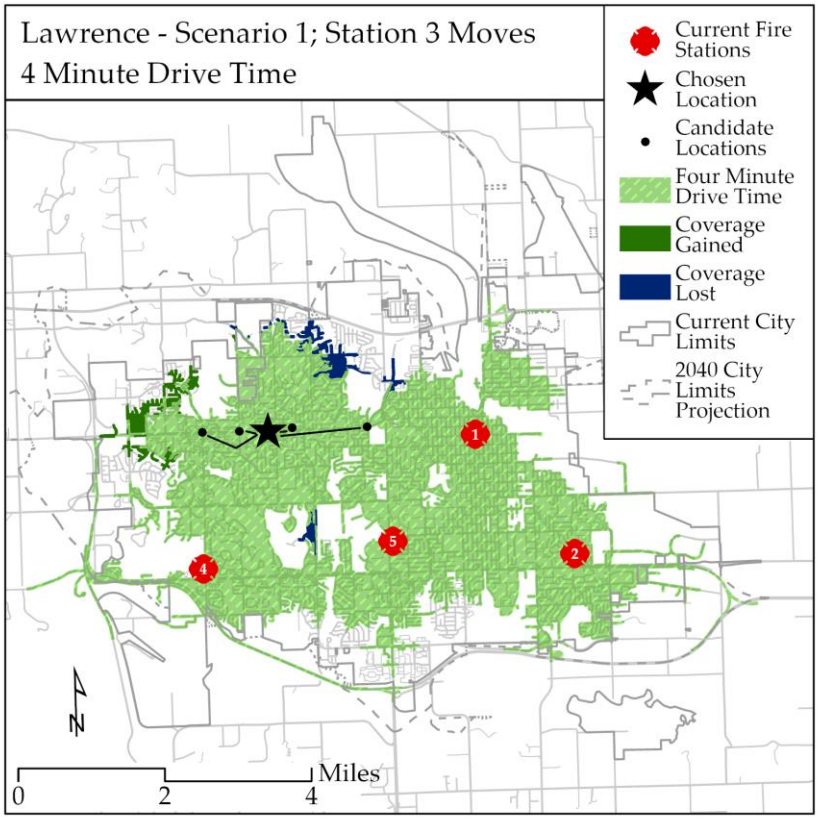
Scenario 4B – No Relocation, Two Expansions

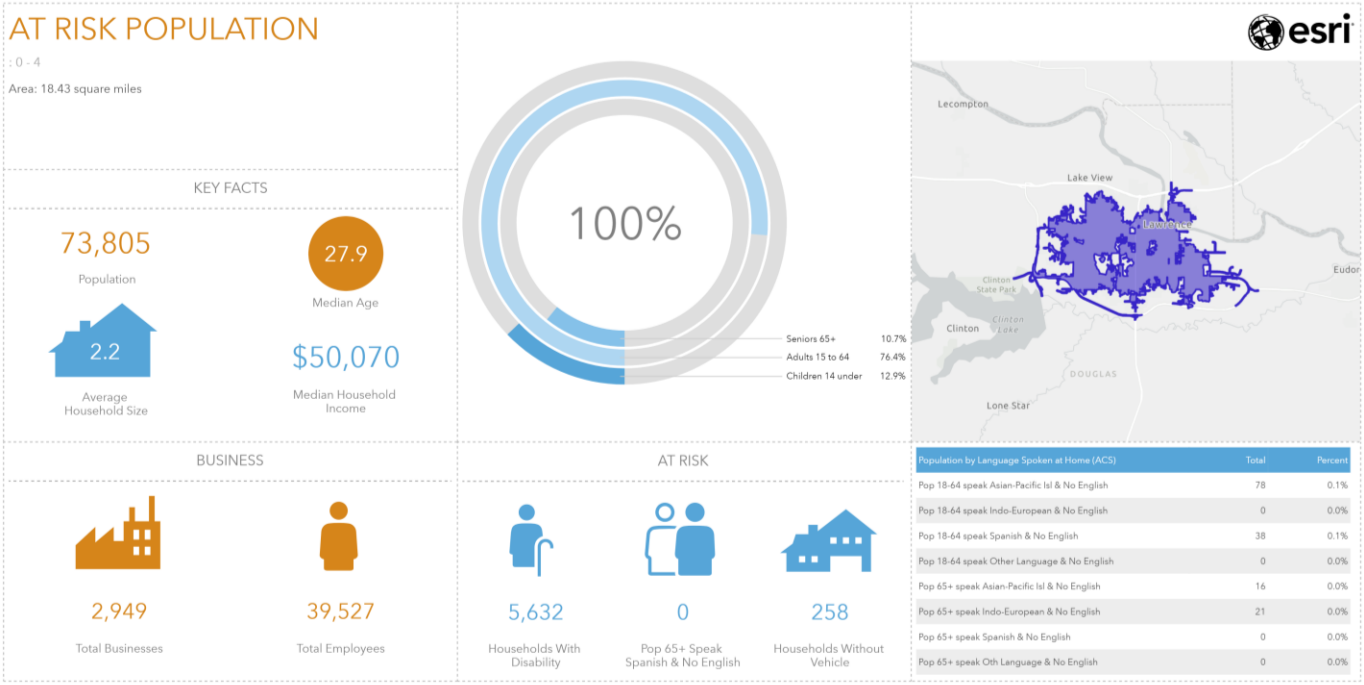
Scenario 4C – No Relocation, Two Expansions

Scenario 5 (Recommendation from LDCFM) – Relocation of One Station, Two Expansions

Scenario 1

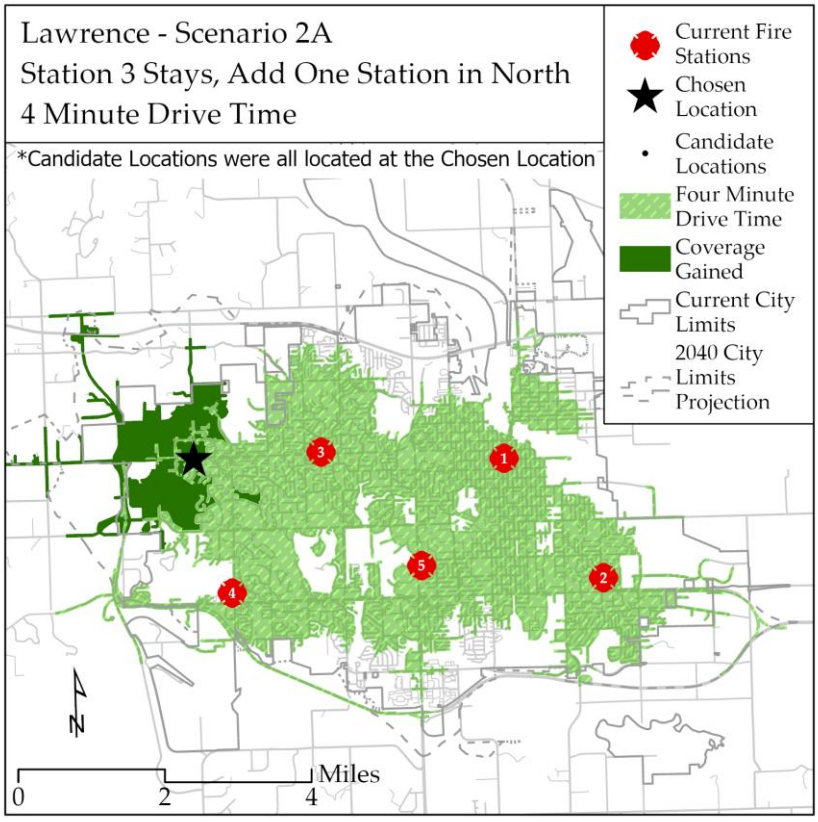
Relocation of One Station (Station 3), No Expansion

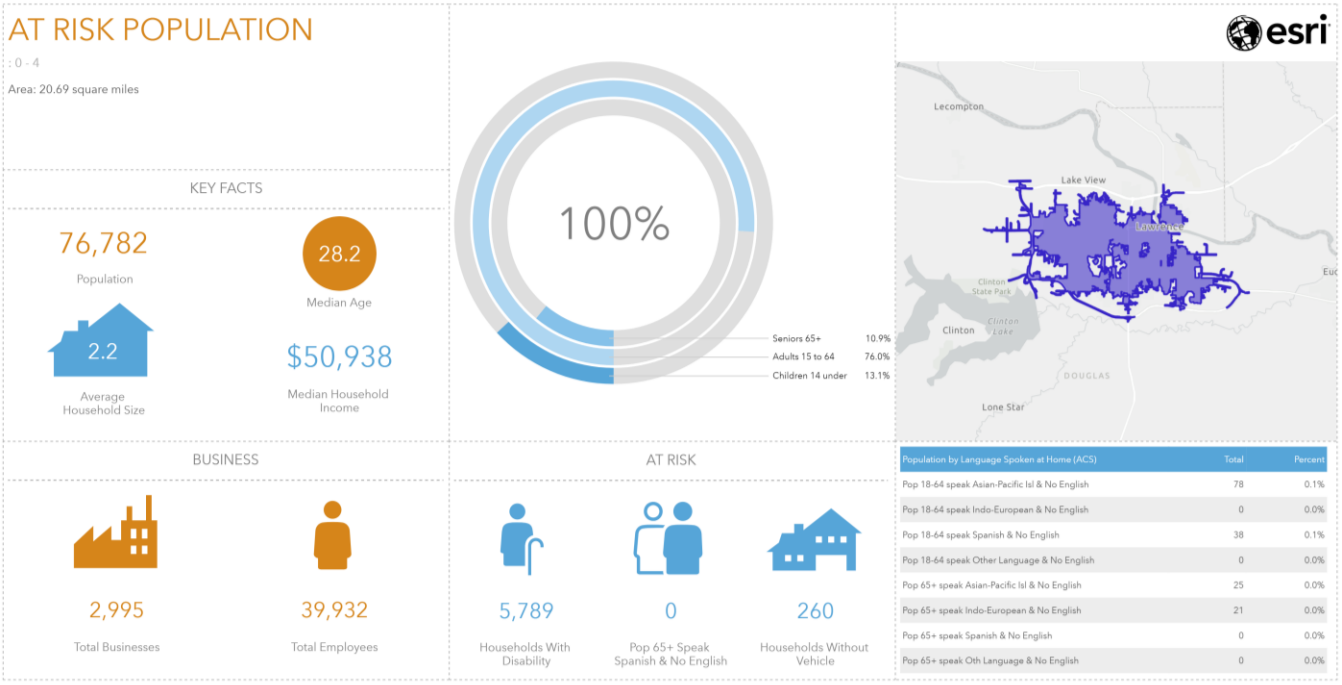




Scenario 2A

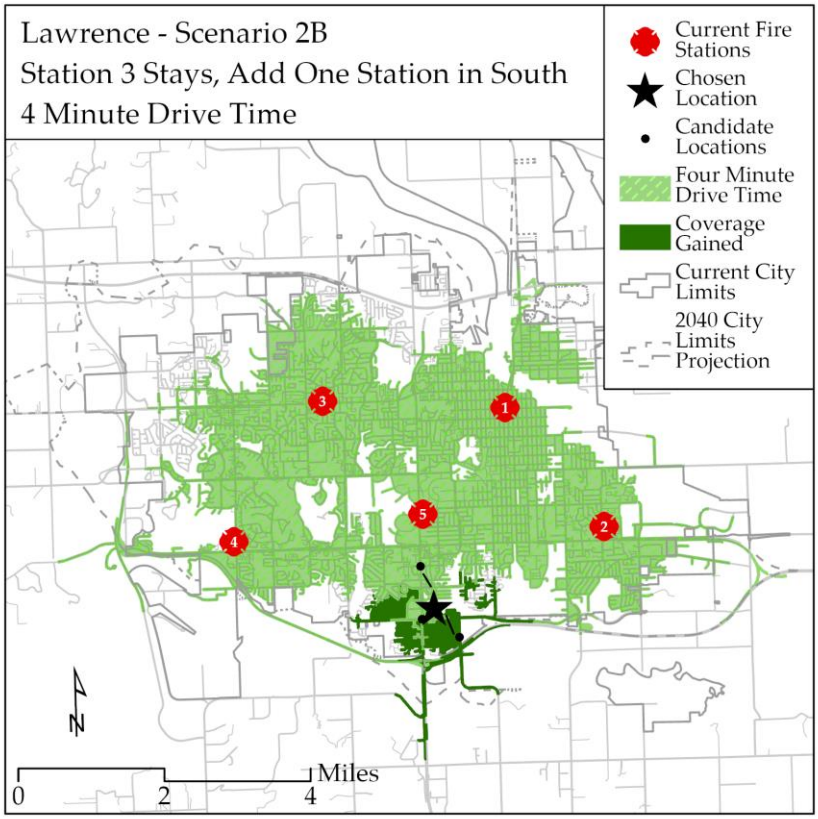
No Relocation, One Expansion

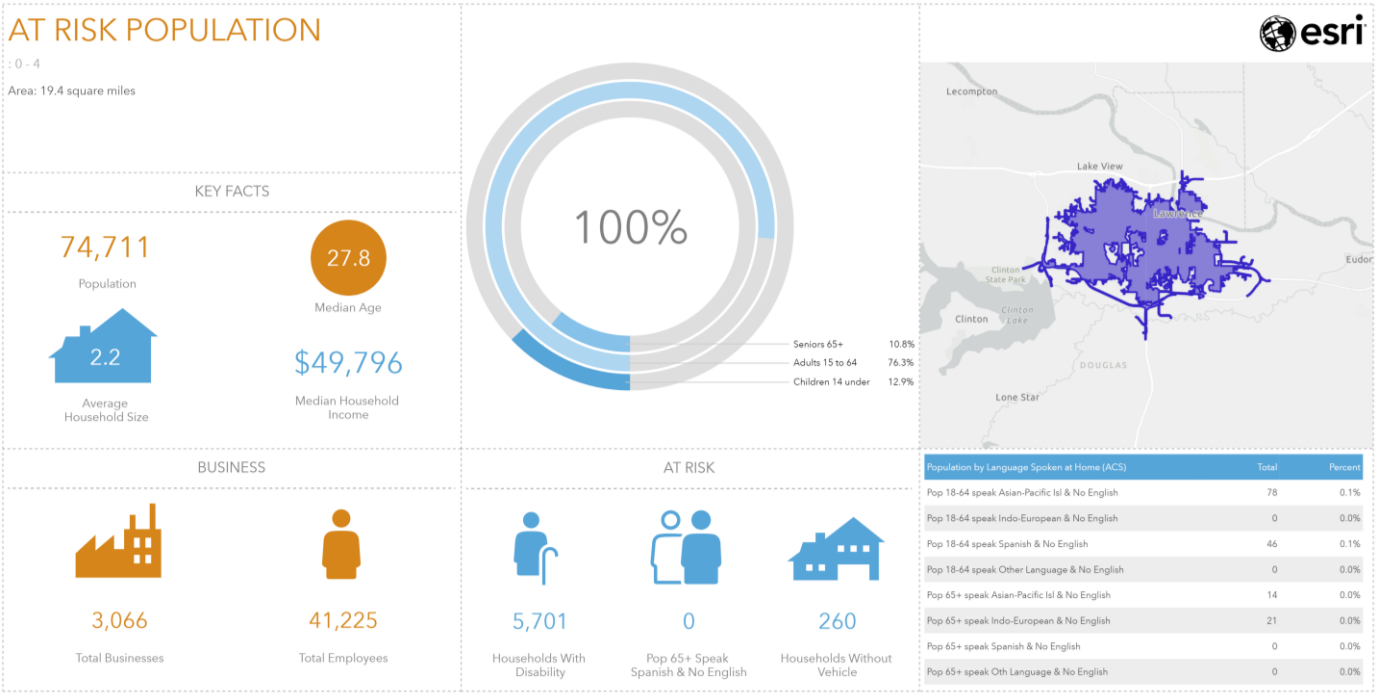




Scenario 2B

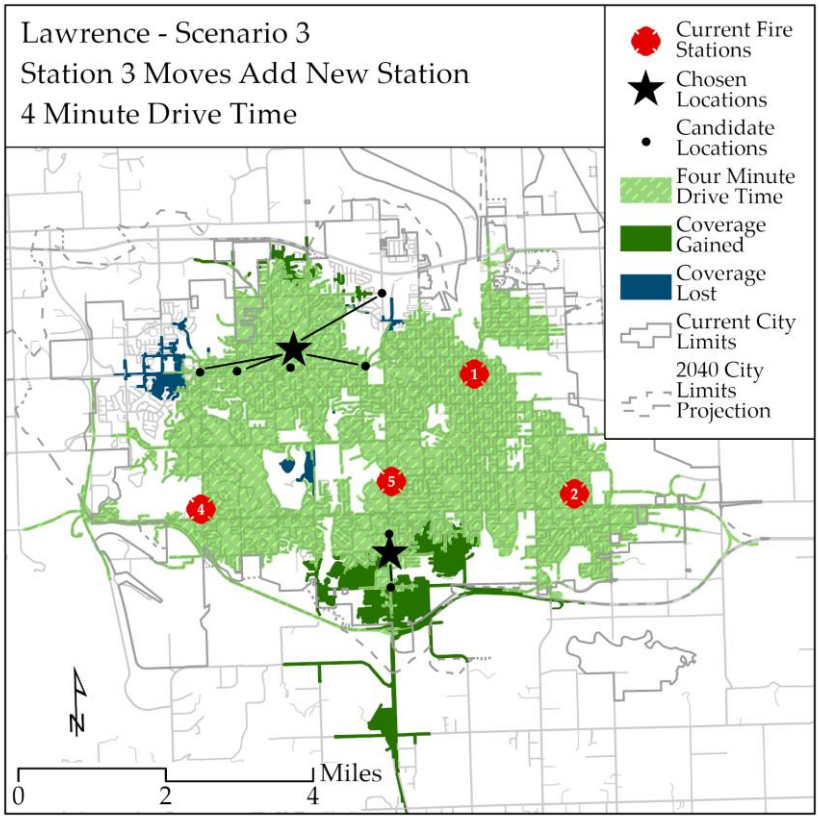
No Relocation, One Expansion

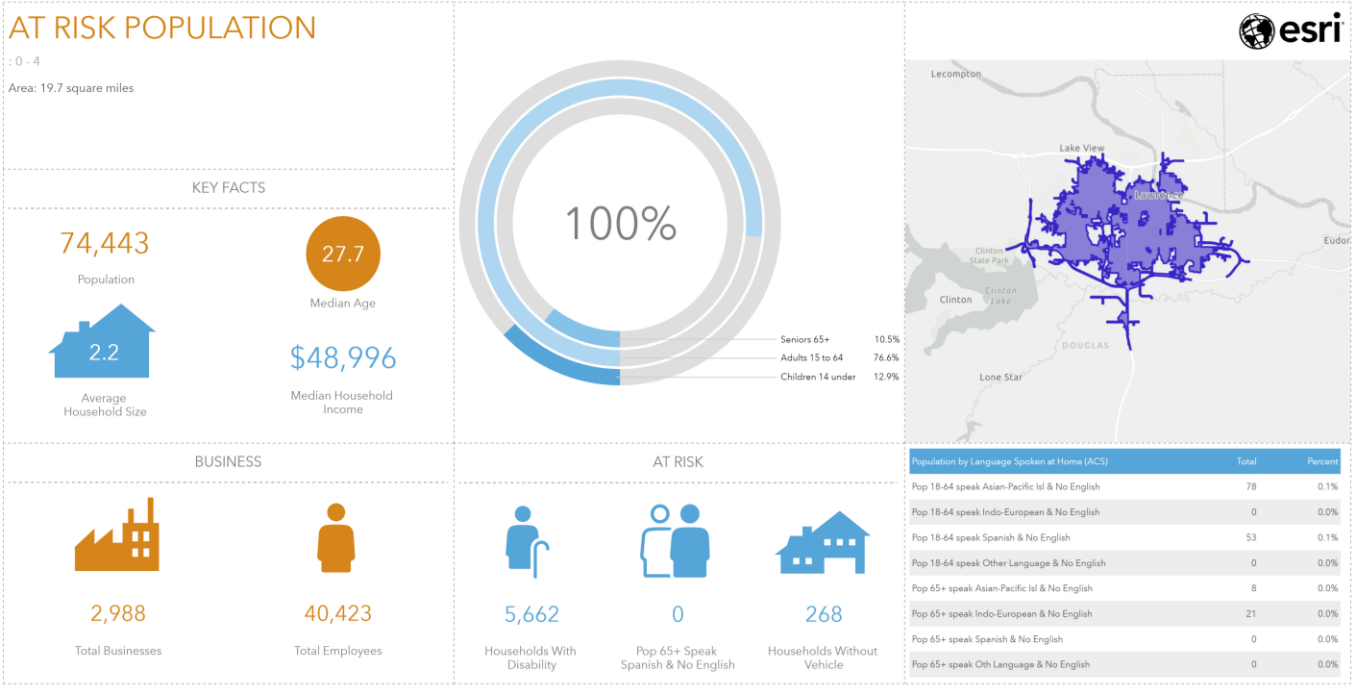




Scenario 3

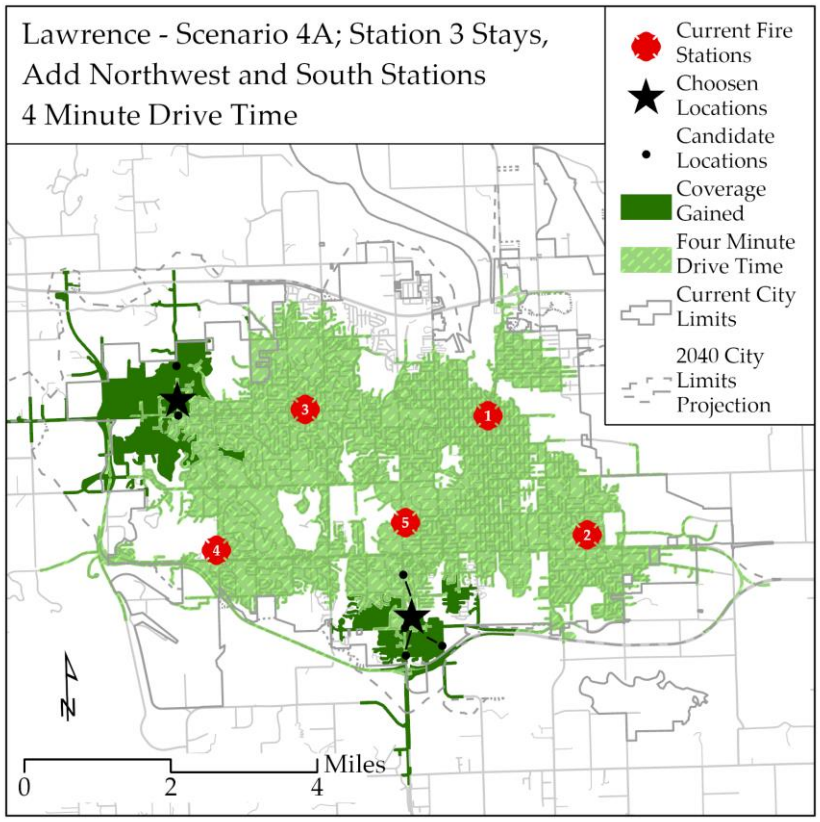
Relocation of One Station (Station 3), One Expansion

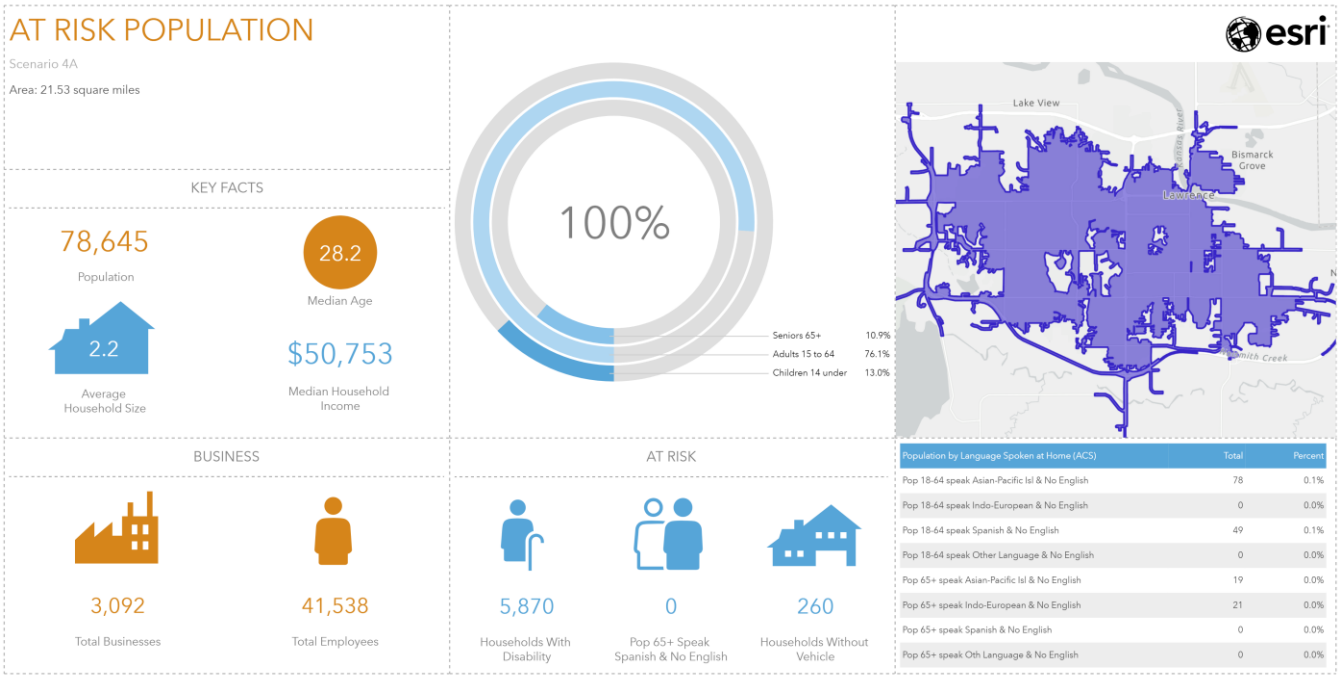




Scenario 4A

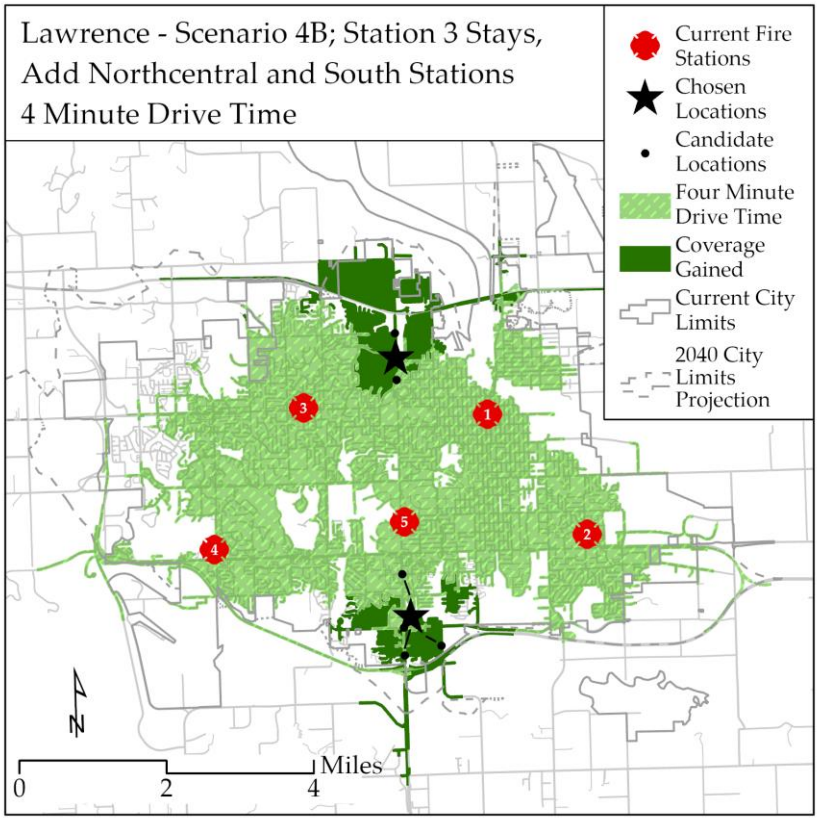
No Relocation, Two Expansions

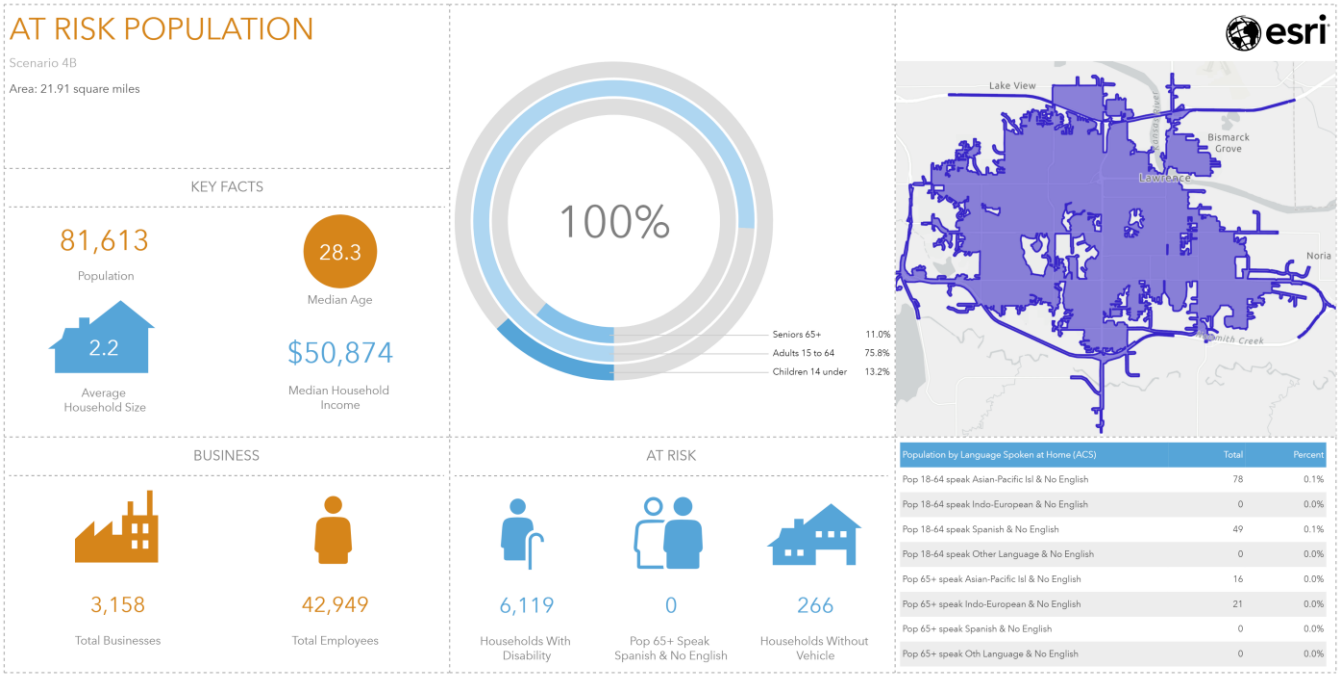




Scenario 4B

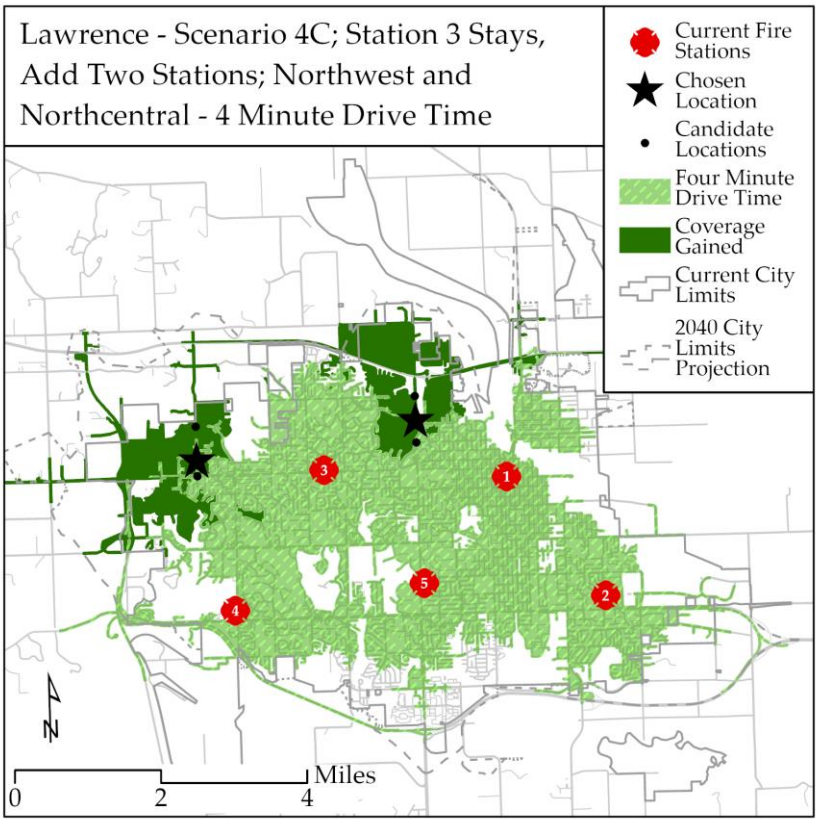
No Relocation, Two Expansions

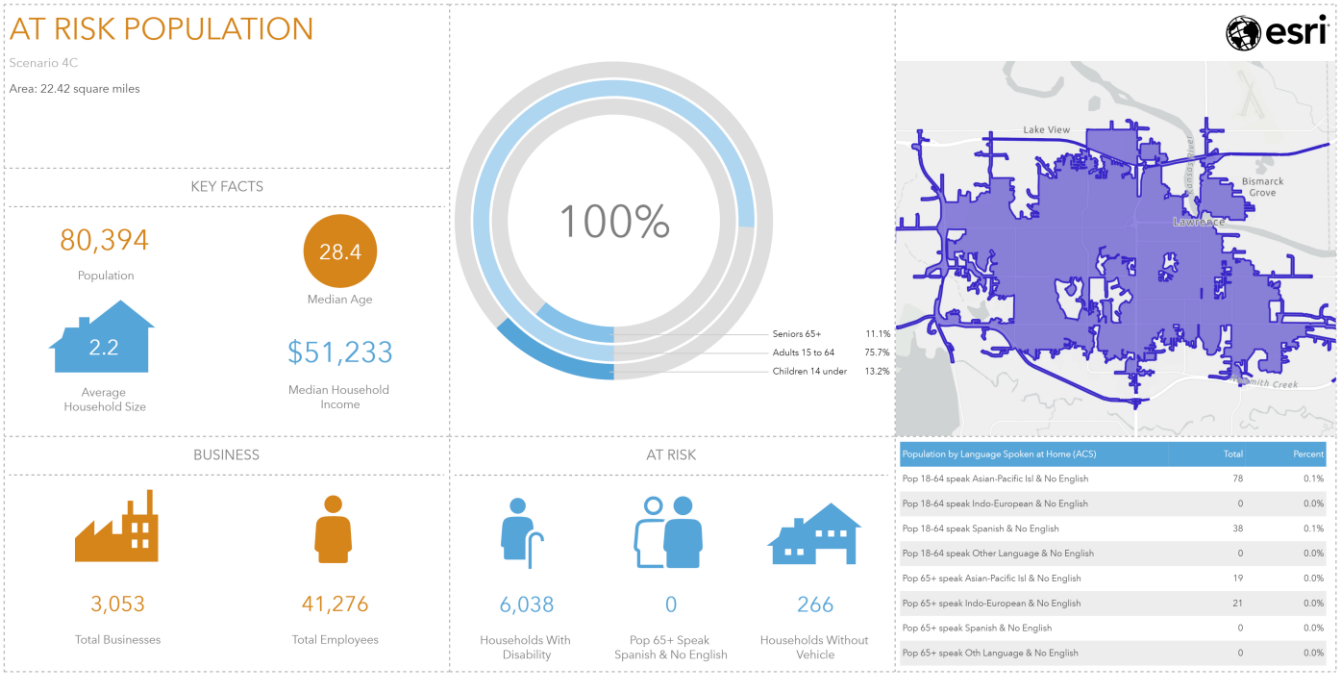




Scenario 4C

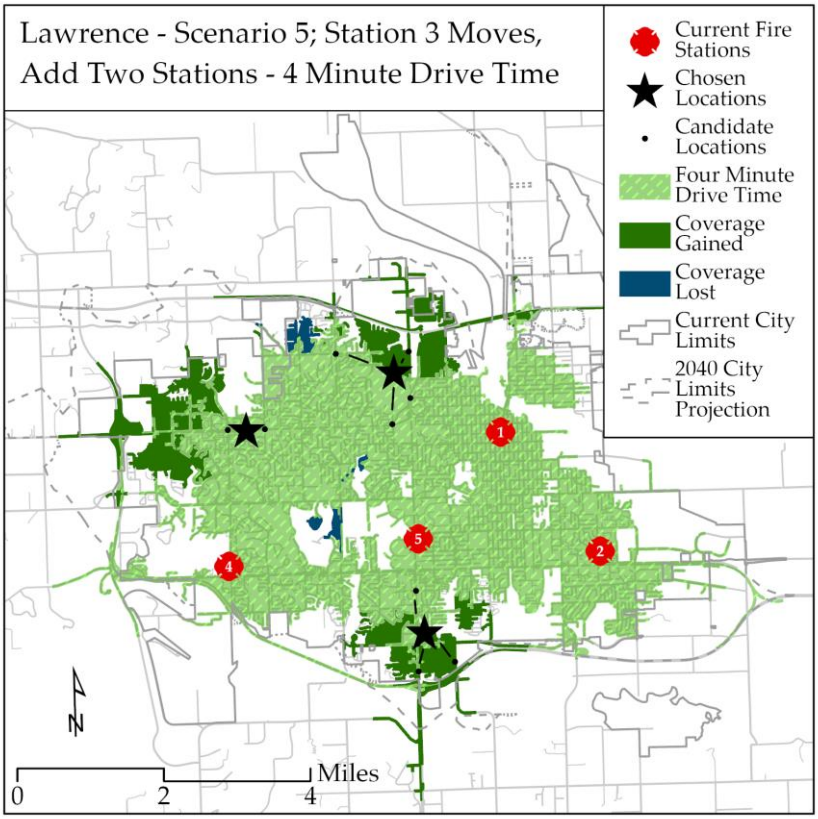
No Relocation, Two Expansions

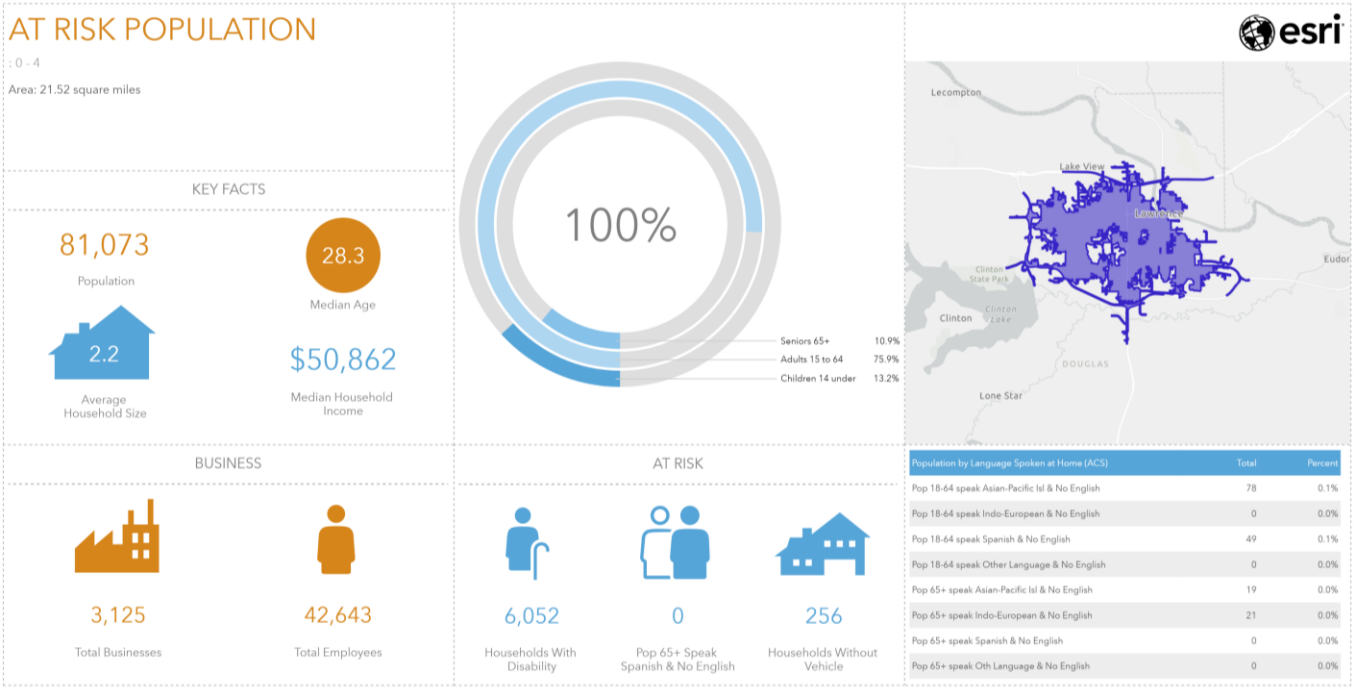




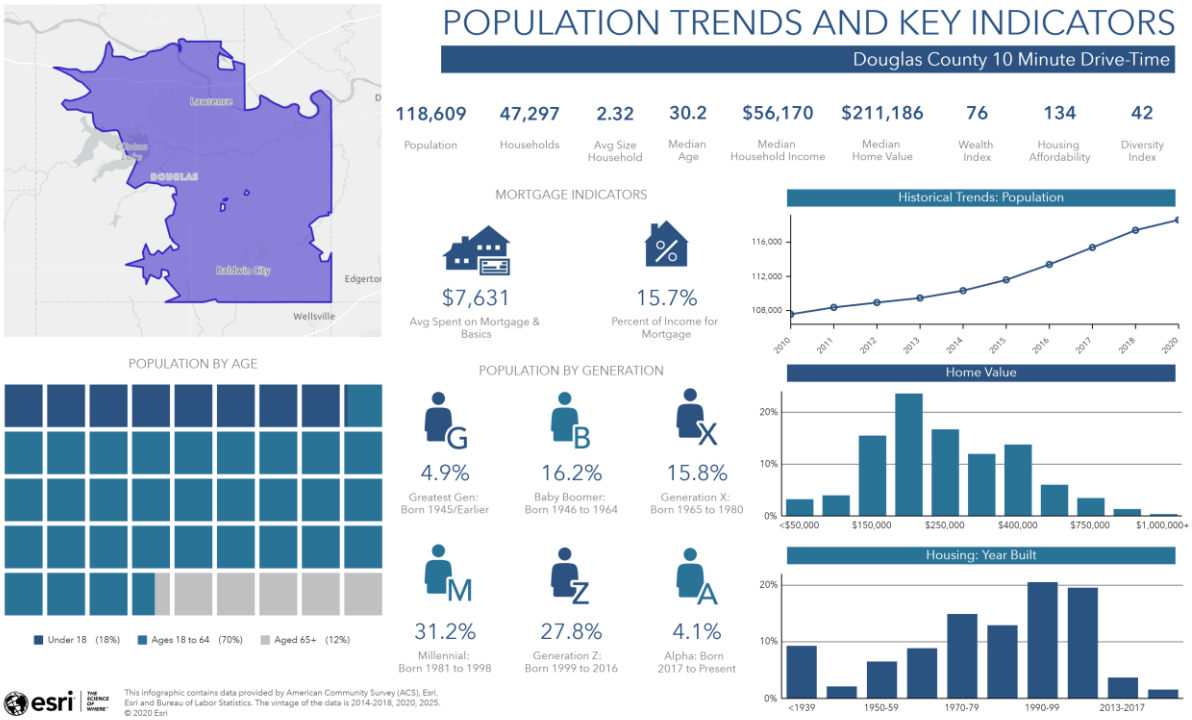
Scenario 5

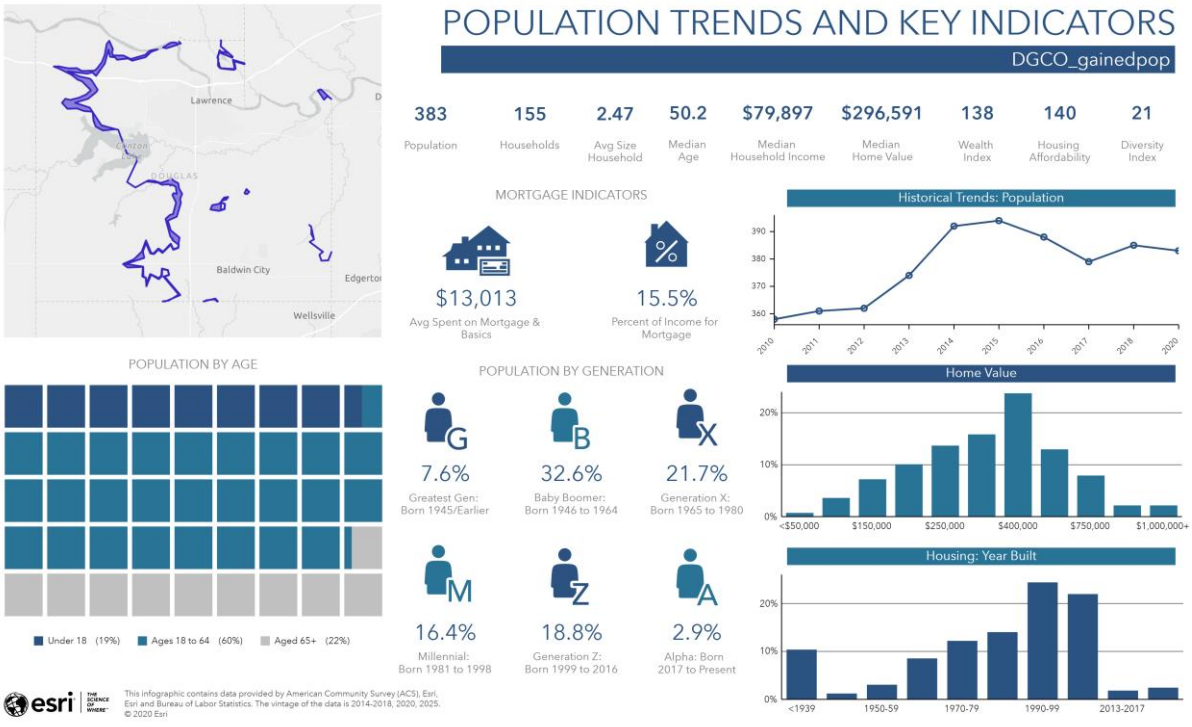
Relocation of One Station (Station #3), Two Expansions





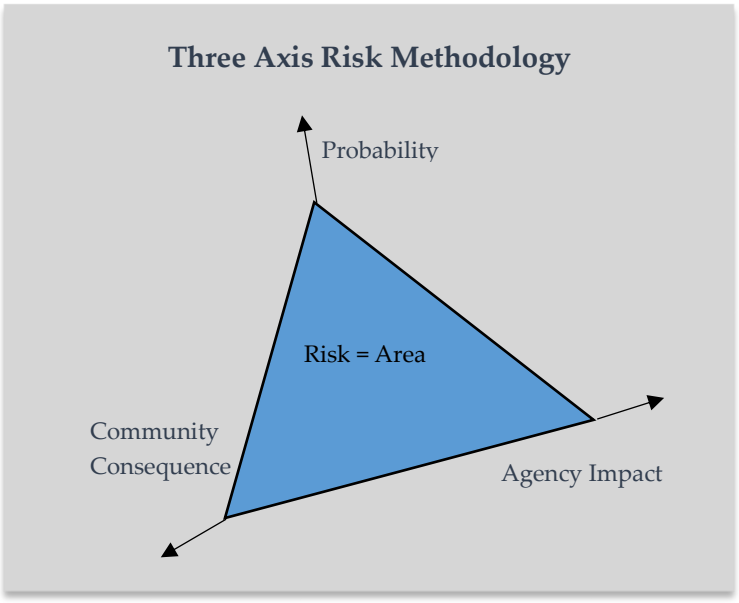
Scenario 5 County Influence





Appendix D – Department Risk Methodology

In order to measure the amount of risk relative to different emergency incident types, the department utilizes a risk assessment model. The model includes organizing risk into risk classifications (Fire, EMS, Hazmat, or Technical Rescue), then identifying the risk degree level or categories (Low, Moderate, High, or Maximum). Combining these classifications and categories of risk, an assessment of the risk impact can be measured. The methodology behind the risk assessment model includes assigning each response a score for the three risk areas: **probability**, **community consequence**, and **agency impact**. In the model, a score in each of the risk areas is expressed as a point on the axis. Each axis is scored on a scale of 2 to 10 (even numbers), where a 2 indicates a low risk and 10 is a high risk score. These numbers are then inserted into Heron's formula modified for tetrahedrons to calculate the risk rating for the response. Assigning a category of risk based on the degree (Low, Moderate, High, or Maximum) helps define the relationship between community requirements and commitment or resources. The magnitude of risk is determined by the greater the total area of mass, the greater the risk category level when assessing the Three Axis Risk Methodology tetrahedron. Additional information pertaining to risk scoring by incident type can be found in the 2017 Community Risk Assessment Standards of Cover.



Appendix E – Cardiac Arrest Registry to Enhance Survival

CARES Summary Report

Demographic and Survival Characteristics of OHCA

Non-Traumatic Etiology | Arrest Witness Status: All | Service Date: From 01/01/2019 Through 12/31/2019

Data	Lawrence-Douglas County Fire and Medical N=53	National N=100956
Age	**N=53**	**N=100923**
Mean	66.8	62.4
Median	69.0	65.0
Gender (%)	**N=53**	**N=100950**
Female	19 (35.8)	38128 (37.8)
Male	34 (64.2)	62822 (62.2)
Race (%)	**N=53**	**N=100914**
American-Indian/Alaskan	0 (0.0)	384 (0.4)
Asian	0 (0.0)	2134 (2.1)
Black/African-American	3 (5.7)	22750 (22.5)
Hispanic/Latino	0 (0.0)	6803 (6.7)
Native Hawaiian/Pacific Islander	0 (0.0)	439 (0.4)
White	45 (84.9)	50985 (50.5)
Unknown	5 (9.4)	17419 (17.3)
Location of Arrest (%)	**N=53**	**N=100955**
Home/Residence	37 (69.8)	71109 (70.4)
Nursing Home	6 (11.3)	10991(10.9)
Public Setting	10 (18.9)	18855 (18.7)
Arrest witnessed (%)	**N=53**	**N=100955**
Bystander Witnessed	32 (60.4)	38344 (38.0)
Witnessed by 911 Responder	0 (0.0)	12605 (12.5)
Unwitnessed	21 (39.6)	50006 (49.5)
Who Initiated CPR? (%)	**N=53**	**N=100948**
Not Applicable	0 (0.0)	51 (0.1)
Bystander	19 (35.8)	41962 (41.6)
First Responder	21 (39.6)	28207 (27.9)
Emergency Medical Services (EMS)	13 (24.5)	30728 (30.4)
Was an AED applied prior to EMS arrival? (%)	**N=53**	**N=100953**
Yes	23 (43.4)	29104 (28.8)
No	30 (56.6)	71849 (71.2)
Who first applied automated external defibrillator? (%)	**N=23**	**N=29069**
Bystander	5 (21.7)	6552 (22.5)
First Responder	18 (78.3)	22517 (77.5)
Who first defibrillated the patient?* (%)	**N=53**	**N=99622**
Not Applicable	28 (52.8)	68516 (68.8)
Bystander	1 (1.9)	1729 (1.7)
First Responder	8 (15.1)	6017 (6.0)
Responding EMS Personnel	16 (30.2)	23360 (23.4)
First Arrest Rhythm (%)	**N=53**	**N=100943**
Vfib/Vtach/Unknown Shockable Rhythm	21 (39.6)	19084 (18.9)
Asystole	23 (43.4)	50281 (49.8)
Idioventricular/PEA	6 (11.3)	22382 (22.2)
Unknown Unshockable Rhythm	3 (5.7)	9196 (9.1)
Sustained ROSC (%)	**N=53**	**N=100936**
Yes	22 (41.5)	31029 (30.7)
No	31 (58.5)	69907 (69.3)
Was hypothermia care provided in the field? (%)	**N=53**	**N=100954**
Yes	0 (0.0)	3395 (3.4)
No	53 (100.0)	97559 (96.6)
Pre-hospital Outcome (%)	**N=53**	**N=100953**
Pronounced in the Field	19 (35.8)	36730 (36.4)
Pronounced in ED	6 (11.3)	13392 (13.3)
Ongoing Resuscitation in ED	28 (52.8)	50831 (50.4)
Overall Survival (%)	**N=53**	**N=100956**
Overall Survival to Hospital Admission	18 (34.0)	28188 (27.9)
Overall Survival to Hospital Discharge	10 (18.9)	10641 (10.5)
With Good or Moderate Cerebral Performance	9 (17.0)	8569 (8.5)
Missing hospital outcome	0	174
Utstein[1] Survival (%)	**N=15** 26.7%	**N=11471** 33.2%
Utstein Bystander[2] Survival (%)	**N=8** 25.0%	**N=6948** 37.3%

Inclusion criteria: An out-of-hospital cardiac arrest where resuscitation is attempted by a 911 responder (CPR and/or defibrillation). This would also include patients that received an AED shock by a bystander prior to the arrival of 911 responders.

**This is a new question that was introduced on the 2011 form.*

[1]Witnessed by bystander and found in a shockable rhythm

[2]Witnessed by bystander, found in shockable rhythm, and received some bystander intervention (CPR by bystander and/or AED applied by bystander)

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