Consolidated Fire District 2

Kansas

Standards of Cover

2015

Emergency Services
Consulting International

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Introduction

The following report serves as the Consolidated Fire District 2, KS "Integrated Risk Management Plan: Standards of Cover" document. The Center for Fire Accreditation International (CFAI) defines the process, known as "deployment analysis," as written procedures which determine the distribution and concentration of fixed and mobile resources of an organization. The purpose for completing such a document is to assist the agency in ensuring a safe and effective response force for fire suppression, emergency medical services, and specialty response situation in addition to homeland security issues.

Creating an Integrated Risk Management Plan: Standards of Cover requires that a number of areas be researched, studied, and evaluated. The following report will begin with an overview of both the community and the agency. Following this overview, the agency will discuss areas such as risk assessment, critical task analysis, agency service level objectives, and distribution and concentration measures. The agency will provide documentation of reliability studies and historical performance through charts and graphs. The report will conclude with policy recommendations.

Executive Summary

Consolidated Fire District No.2 of Northeast Johnson County provides fire and emergency services to approximately 65,000 residents in an area of 17.5 square miles and provides these services to Fairway, Mission, Mission Hills, Mission Woods, Prairie Village, Roeland Park, Westwood, and Westwood Hills. The department uses a variety of resources to deliver a full range of services including:

- Fire Suppression
- Emergency Medical Services
- Hazardous Materials Response
- Technical Rescue

The department operates from three stations and currently staffs three engine companies, one ladder company, and one battalion chief. Minimum staffing is set at 17 personnel per shift with a full staff roster of 21 per shift.

CFD2 has established response performance objectives based on its current capabilities and resources. The objectives are:

1. First unit arrival to priority incidents within the response area shall be achieved within 8:00 when measured at the 90th percentile.
2. Full effective response force arrival to structure fire incidents within the response area shall be achieved within 11:00 when measured at the 90th percentile.

CFD2 is currently meeting the established performance objectives for first unit arrival and effective response force, 7:57 and 10:59 respectively, measured at the 90th percentile.

The district, recognizing that continued improvement of fire and emergency services capability greatly benefits the community, has established a response time performance goal that calls for the arrival of a fire department response unit within 6:30 of receipt of the alarm on at least 90 percent of all emergency incidents. Similarly, a response performance goal for assembly of an effective response force has been established at 10:00 when measured at the 90th percentile. The achievement of these goals will be dependent upon the district's ability to fund needed improvement.

Each element of the response time continuum was evaluated in an effort to identify areas where improvements could be made. The three intervals of response time: dispatch time (call processing), turnout time, and travel time were individually evaluated.

1. The dispatch center required slightly more than the 60 second target (1:05) to process and dispatch incidents.
2. Response personnel were unable to consistently meet the target of initiating response within 60 seconds (1:38) of notification of an incident.
3. The time required for apparatus and personnel to travel to the incident consistently exceeded the target of 5:00 minutes (6:49).

The most significant of these is the travel time. Additional resources are needed to ensure a response unit is close enough to an incident if response time performance is to improve.

Additional stations are recommended to improve coverage. Several options are available as to the placement of these stations.

1. Option 1 – New station at 51st Street and Rainbow Dr.
2. Option 2 – New station at Del Mar Dr. and W. 75th Street.
3. Option 3 – Two new stations at Del Mar Dr. and W. 75h Street as well as at Neosho Lane and Wells Dr.

Component A – Description of Community Served

ORGANIZATION OVERVIEW

Consolidated Fire District No. 2 of Northeast Johnson County is the result of core changes that have taken place over the past 65 years. The first day of operations for the department, then known as Mission Township District No. 2, was January 1, 1947. It first operated out of a J.C. Nichols construction barn located at 70th and State Line Road. In July 1948, the department took occupancy in a station at its current location of 3921 W. 63rd Street.

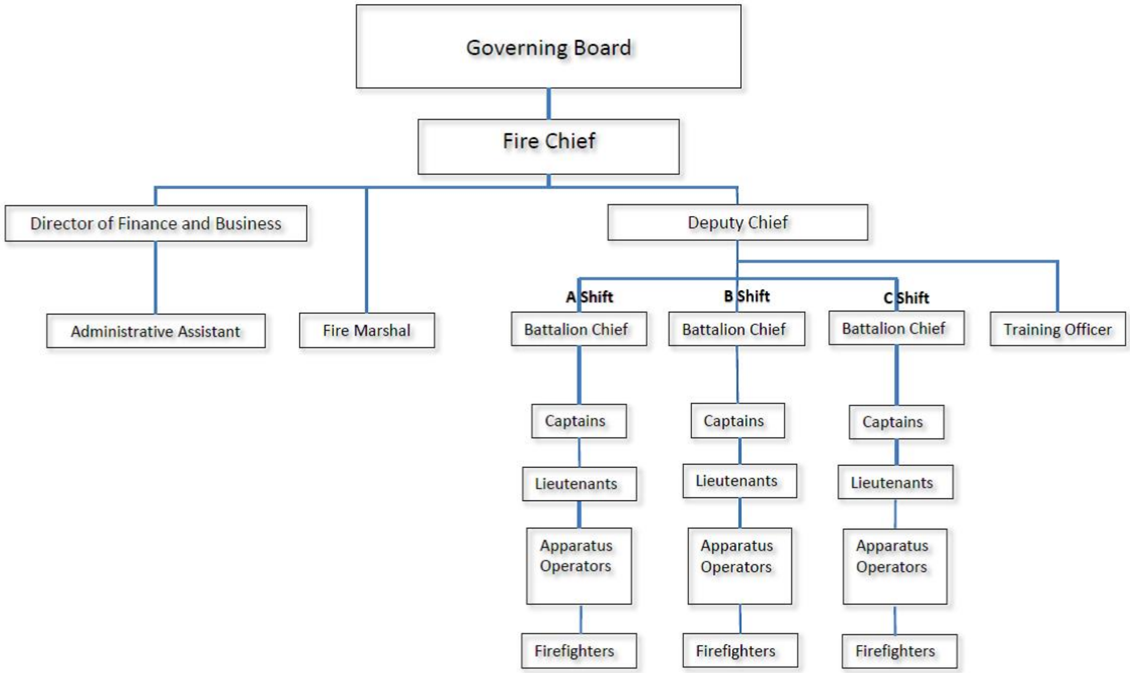
The second component of the District began with the birth of Fire District No. 3 in July, 1955. The newly formed District began service on January 1, 1956, and operated out of Woolf Barn, owned by J.C. Nichols and located at 81st and Mission Road. On August 1, 1956, District No. 3 moved into its newly completed quarters and current location at 9011 Roe. On February 21, 1962, the two Fire Districts merged to become Consolidated Fire District No. 2, and the newly formed District had two stations to serve the public.

The last piece of the present day District came from Mission Fire Department No. 1. Founded in 1939, the department was first known as the Mission Hills Acres Fire Department. Its first station was located on Maple Street. In 1944, the department moved to a larger facility on Johnson Drive. In 1954, the department moved to the Beverly station just South of Johnson Drive. In 1976, the fire department moved again, this time to its current location at 6400 Martway.

On October 1, 1988, Mission Fire District No. 1 and Consolidated Fire District No. 2 became Consolidated Fire District No. 2, Northeast Johnson County, Kansas (CFD2). With this final consolidation, the District was complete and has three stations to serve the public. Staffing has increased to 69 personnel with 21 on duty and a minimum staffing level of 17.

CFD2 provides fire protection, fire prevention, and an EMS first responder service to their primary service area as well as providing mutual aid response to surrounding communities including Kansas City, KS and Kansas City, MO. The figure below illustrates the organization structure of CFD2.

Figure 1: Organizational Structure



LEGAL BASIS

CFD2 is a legal subdivision of the State of Kansas. Chapter 19, Article 2, Section 70 of the Kansas Statutes define fire districts as special benefit districts as established by the local board of county commissioners. Chapter 80, Article 15, Section 40 of Kansas Statutes states, "The township board of any township may create a fire district as provided by this act. Such fire district may include a part or all of the townships and may include all or a part of any other township." CFD2 was formed in accordance with these state statutes.

SERVICE MILESTONES

In the spring of 1991, CFD#2 expanded their operational capabilities with the addition of a 75 foot quint in place of the central engine out of Station 2. Quint 252 was the heaviest run aerial apparatus in Johnson County, Kansas for several years after being put into service.

In 1991, CFD 2 entered into an agreement with Johnson County Medical Action for provision of advanced life support transport district wide. This agreement for medical transport allowed CFD2 to remove from service the last of the basic life support transport units and shift staffing to provide a full four-person crew for minimum staffing out of Station 2.

In the spring of 1991, CFD2 further expanded its aerial operations capability with the addition of a 100 foot elevated platform to the operations fleet. With this addition, the 75 foot aerial from Station 2 was moved to Station 3, and the newly purchased 100 foot elevated platform was placed in service at Station 1 due to the increased number of high density multi-family dwelling complexes in that response area.

In 1995, the fire service community in Johnson County took a collaborative turn. To enhance operations and reduce duplication of service in specialty operations areas, the Johnson County Chiefs Association took on an agreement to declare specialty operations areas and make them available for the entire county. CFD2 became one of only two emergency response organizations in the county to have dedicated staff and apparatus in place with technical level trench rescue capability.

In 1999, CFD2 enhanced its infrastructure by construction of a replacement for Station 2 and the addition of a headquarters building. Station 2 had been in operation since July of 1948 prior to this expansion and construction effort. The addition of the administrative headquarters building allowed for expansion of the fire prevention program by maintaining office space for the chief of fire prevention as well as a newly appointed fire marshal position.

In 1999, the special operations group at CFD2 expanded their trench collapse expertise to encompass a technician level structural collapse team. All technical rescue personnel at CFD2 are now certified in trench technician, as well as structural collapse and rope rescue.

In 2000, a team of both staff and company officers from CFD2 assembled a course curriculum for implementation of Rapid Intervention Team Training and submitted it to the University of Kansas, Fire Training Division. This outline and instructional guide was accepted by the University of Kansas as the statewide RIT curriculum and is still taught today by members of CFD2 statewide. CFD2 is committed to the fact that every fire response agency in the State of Kansas should have a working skillset to deal with a tragic incident such as a firefighter rescue. Through the inception of the program it is estimated that over 2000 firefighters from multiple states have received training at little to no expense.

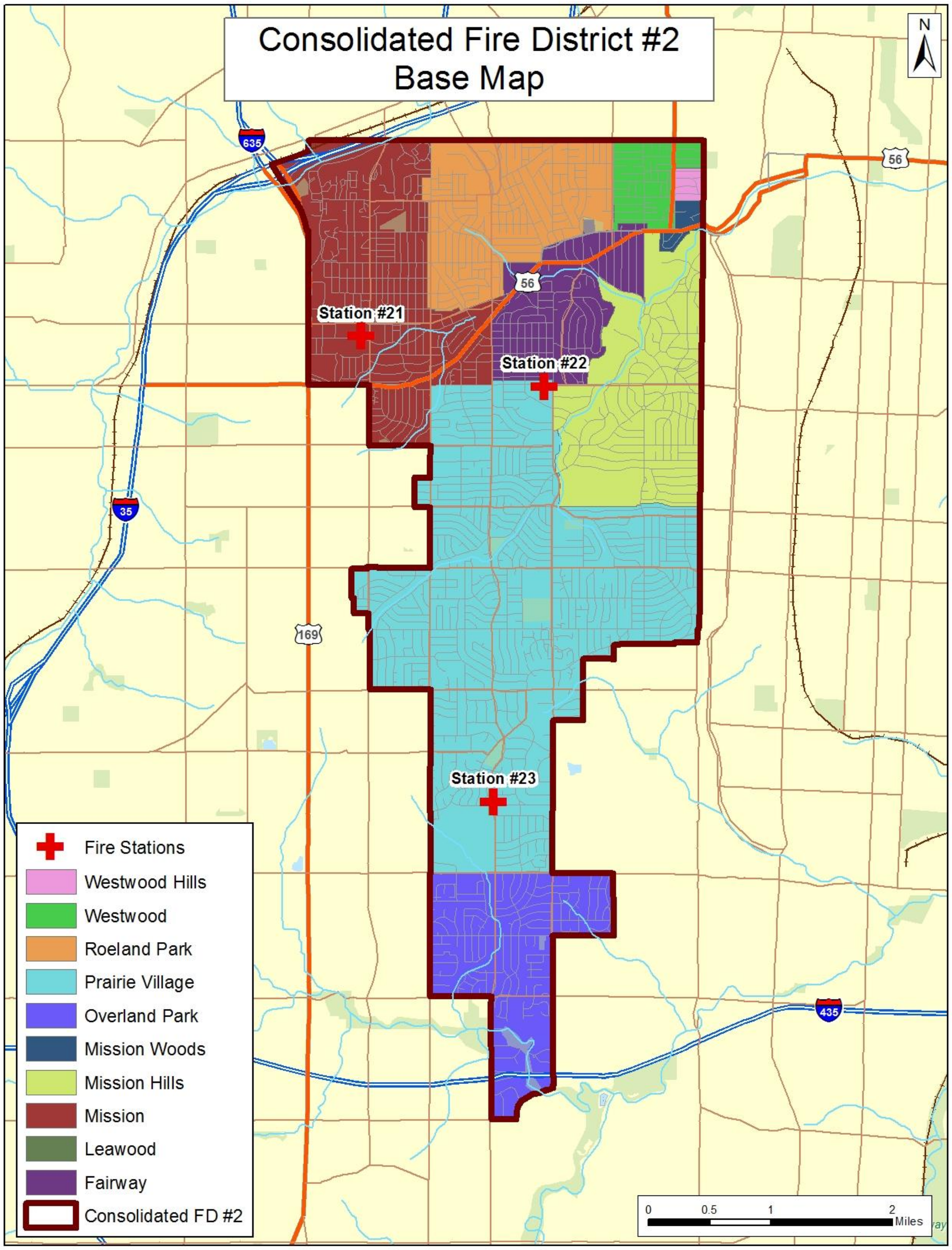
SERVICE AREA OVERVIEW

CFD2 provides service from three stations to the 17.5 square miles and 65,000 residents of the cities of:

- Fairway
- Mission
- Mission Hills
- Mission Woods
- Prairie Village
- Roeland Park
- Westwood
- Westwood Hills

The fire district is governed by a five-member Fire Board, comprised of members of cities within the district, all appointed by the Board of County Commissioners. The following figure illustrates the service area of the department. The area to the far south of the response area is a part of Overland Park, which, until December 31, 2014, was served by contract. For analysis purposes, the historical service demand and response performance analysis contained within this document includes that service area. All future strategies will omit that area.

Figure 2: Service Area Overview



Accounting for the number of municipalities that CFD2 provides services to, the following figure provides a summary of the area, population, and general description of each of those communities.

Figure 3: Summary of Communities Receiving Service from CFD2

Municipality	Total Area	2010 Population	2012 Population	Median Home Value
Fairway	1.15	3,882	3,939	$288,800
Mission	2.68	9,323	9,467	$160,100
Mission Hills	2.02	3,498	3,564	$859,700
Mission Woods	0.10	178	181	$619,000
Prairie Village	6.03	21,447	21,769	$208,600
Roeland Park	1.62	6,731	6,816	$158,400
Westwood	0.41	1,506	1,521	$199,000
Westwood Hills	0.07	359	362	$353,800
Total	**14.08**	**46,924**	**47,619**	**$355,925***

*Average home value for entire service area.

FINANCIAL BASIS

As a special benefit district under Kansas law, CFD2 operates as a taxing entity. As such, the organization levies taxes on real and personal property within the boundaries of the jurisdiction. The funds generated through this taxation are placed into the district's general fund for use during each fiscal year.

Component B – Review of Services Provided

CFD2 provides fire suppression and emergency medical services first response throughout the primary response area. The department deploys three engines, one truck/ladder, one rescue, one squad and several ancillary, support and reserve apparatus in three strategically placed stations. The following chart provides basic information on each of the department's core services, its general resource capability for that service, and information regarding staff resources for that service. Additional detail on service capabilities will also be provided throughout this document.

The department, through a community-oriented strategic planning process, has identified the following core programs and support services within the organization.

Core Services and Programs

- Fire Suppression
- Pre-Hospital Emergency Medical Care (Basic Life Support) First Responder
- Hazardous Materials Response – Operations Level
- Technical Rescue

Support Services and Programs

- Fire Prevention
- Code Enforcement
- Continuing Education and Training
- Public Service – Citizen Assistance, BP Checks, Public Relations,
- Fire Investigation

Figure 4: Summary of Services Provided

Service	General Resource/ Asset Capability	Basic Staffing Capability
Fire Suppression	3 Engines, 2 Trucks, 1 Battalion Chief, 1 Rescue	21 firefighters per shift, total of 63 not including administrative and support personnel
Emergency Medical Services	3 BLS Engines, 2 BLS trucks, 1 Battalion Chief, 1 Rescue, 1 Squad	21 emergency medical technicians per shift, total of 63 plus administrative staff
Hazardous Materials Response	3 Engines at Operations Level. Overland Park Technician Level	63 hazardous materials operations level
Technical Rescue	1 Rescue for Trench. Mutual Aid departments for other disciplines	23 Technician-level trench rescue personnel

ASSETS AND RESOURCES

While different fire departments may have different facility requirements, there are basic needs each fire station has to address—quick response time and housing of apparatus and equipment. Everything else depends on a particular department's budget and needs. Fire station designs are unlike any other type of project; many subtle elements and specialized systems go into a fire station.

Inadequate facilities for housing firefighters and apparatus detract from a department's mission. Limited space can significantly impact the available options for resource assignment, hinder the ability to maintain a well-trained and fit workforce, and may affect member and employee morale.

The primary functions that take place within the fire station environment should be closely examined and adequate, efficient space for all functions should be provided. Some examples include:

- Housing and cleaning of apparatus and equipment
- Administrative office duties where necessary
- Firefighter training
- Firefighter fitness
- Residential living that is gender compatible for on-duty members
- Operations that include enough room for community groups and parking

While this list may seem elementary, the lack of dedicated space compromises the ability of the facility to support these functions and can detract from its primary purpose. The following evaluation and general condition assessment was conducted at the department's facilities. It should be noted that this review was not a full facilities assessment as would be conducted by an engineer or architect. Such a study would be far more detailed than an evaluation conducted for this document. This focus is on operational conditions, efficiency, safety, and staff and apparatus space needs.

CFD2 operates from three strategically located fixed facilities (stations). The following figures identify those stations and the apparatus housed within each.

Facility and Apparatus Information

Station 21	
Facility use	Active response station
Address of Facility	6400 Martway Street
Year Facility Initially Constructed	1976
Number of Major Additions or Renovations	None

Construction Features

Building Square Feet	9,659
Apparatus Bays:	
Back-in, single unit	*1*
Back-in, used with stacked parking	*0*
Drive-through use, single unit	*3*
Drive-through capable, used with stacked parking	*0*
Building Height	Two-story
Construction Type	TYPE I-B--Fire Resistive Non-Combustible
Outside Finish	Brick veneer
Unusual Construction Features	None
Overall Construction Condition	Good condition
ADA Compliant	No
Building Code Issues Evident	None
Roof Type	Flat- membrane
Roof Age	1 to 10 years
Roof Condition	No known problems
Type of Heating System	Forced air- natural gas, Radiant- natural gas
Heating System Age	Original to building
Air Conditioning	Central air- living and administrative areas only
Known Maintenance or Disrepair Issues	None

Design Features

Overall Size of Facility Adequate for Current Use	Yes
Apparatus Exit	Exit to traffic flow safe and unimpeded
Building and Property Blend Well with Neighborhood	Yes
Building and Property Adaptable if Future Expansion Needed	Yes
Adequate Staff and Visitor Parking	Parking is adequate
Additional Design Comments	None

Safety Features

Automatic Door Stops on Overhead Doors Operating Properly	Yes
Adequate Fire Extinguishers (not on apparatus)	Yes
Cooking Equipment Central Shutdown	No
Automatic Fire Sprinklers Present	None
Alarm Systems Present	Local smoke detection only
Is Commercial Cooking Equipment Present	No
Flammable and Combustible Liquids Stored in Approved Cabinet	Yes
All Pressure Cylinders Stored Properly	Yes
SCBA Compressor System Present	No
Back-Up Generator Present	Yes, with auto transfer switch
Generator Fuel Type and Source	Diesel fuel, local tank

Environmental Features

Apparatus Exhaust Removal	Direct connect vacuum system, connected
Apparatus Floor Drain Oil Separators in Place	Oil separator in use

Station Staff Facilities and Features

Adequate Space for Working On or Around Apparatus	Space around apparatus is adequate
Apparatus Room Accommodates Working on Small Equipment	Space is small and limited
Personnel Can Move Quickly and Easily to Apparatus for Response	Yes
Adequate Space for Cooking and Eating	Yes
Adequate Space for Local Company Training and Drills	Compromised use day room for training
Are Compromises Necessary for Two-Gender Staffing	No
Adequate Space for Personal Hygiene	Yes
Adequate Space for Sleeping	Yes
Adequate Space for Storage	Yes
Facility Features	Separate watch room/station office, Day room/lounge, Kitchen, Coed dormitory

UNIT	MAKE	MODEL	YEAR	PUMP	TANK	LADDER
Engine 21	Pierce	Velocity	2010	1500	500	N/A
Engine 221	Ferrara	Inferno	2006	1250	500	N/A
Rescue 21	Ferrara	Rescue	2006	N/A	N/A	N/A
Truck 21	Sutphen	SPH100	2010	1500	500	100' Tower

Station 22

Facility use	Response, training, administrative, and support functions
Address of Facility	3921 W. 63rd Street
Year Facility Initially Constructed	2000
Number of Major Additions or Renovations	None

Construction Features

Building Square Feet	Unknown
Apparatus Bays:	Five back-in
Building Height	One-story
Construction Type	TYPE I-B--Fire Resistive Non-Combustible
Outside Finish	Brick veneer
Unusual Construction Features	None
Overall Construction Condition	Good condition
ADA Compliant	Yes
Building Code Issues Evident	None
Roof Type	Flat- membrane
Roof Age	Original to building
Roof Condition	Small, isolated leaks evident or reported
Type of Heating System	Forced air- natural gas, Radiant- natural gas
Heating System Age	Original to building
Air Conditioning	Central air- living and administrative areas only
Known Maintenance or Disrepair Issues	None

Design Features

Overall Size of Facility Adequate for Current Use	Yes
Apparatus Exit	Unimpeded by traffic. Utility pole in apron area.
Building and Property Blend Well with Neighborhood	Yes
Building and Property Adaptable if Future Expansion Needed	Yes
Adequate Staff and Visitor Parking	Parking is adequate
Additional Design Comments	None

Safety Features

Automatic Door Stops on Overhead Doors Operating Properly	Yes
Adequate Fire Extinguishers (not on apparatus)	Yes
Cooking Equipment Central Shutdown	No
Automatic Fire Sprinklers Present	Entire building
Fire Sprinkler System Type	Partial wet, partial dry
Alarm Systems Present	Sprinkler water flow, Local smoke detection only
Commercial Cooking Equipment Present	No
Flammable and Combustible Liquids Stored in Approved Cabinet	Yes
All Pressure Cylinders Stored Properly	Yes
Back-Up Generator Present	Yes, with auto transfer switch
Generator Fuel Type and Source	Natural gas, piped in

Environmental Features

Apparatus Exhaust Removal	Yes
Apparatus Floor Drain Oil Separators in Place	No

Station Staff Facilities and Features

Adequate Space for Working On or Around Apparatus	Yes
Apparatus Room Accommodates Working on Small Equipment	Yes
Personnel Can Move Quickly and Easily to Apparatus for Response	Yes
Adequate Space for Cooking and Eating	Yes
Adequate Space for Local Company Training and Drills	Yes
Are Compromises Necessary for Two-Gender Staffing	No
Adequate Space for Personal Hygiene	Yes
Adequate Space for Sleeping	Yes
Adequate Space for Storage	Yes

UNIT	MAKE	MODEL	YEAR	PUMP	TANK	LADDER
BC21	Ford	F-150	2010	N/A	N/A	N/A
Engine 22	Pierce	Velocity	2010	1500	500	N/A

Station 23	
Facility use	Active response station
Address of Facility	9011 Roe Avenue
Year Facility Initially Constructed	1956
Number of Major Additions or Renovations	One in 1998

Construction Features

Building Square Feet	6,313
Apparatus Bays:	
Back-in, single unit	*2*
Back-in, used with stacked parking	*0*
Drive-through use, single unit	*0*
Drive-through capable, used with stacked parking	*0*
Building Height	Two-story
Construction Type	TYPE I-B--Fire Resistive Non-Combustible
Outside Finish	Brick veneer
Unusual Construction Features	None
Overall Construction Condition	Worn paint or finishes
Does Structure Appear to be ADA Compliant	No
Building Code Issues Evident	None
Roof Type	Peaked- shingle
Roof Age	Over 10 years
Roof Condition	No known problems
Type of Heating System	Forced air- natural gas
Heating System Age	Over 10 years
Air Conditioning	Central air- living and administrative areas only
Other Known Maintenance or Disrepair Issues	None

Design Features

Overall Size of Facility Adequate for Current Use	Yes
Apparatus Exit	Signalization would be helpful but is not present
Building and Property Blend Well with Neighborhood	Yes
Building and Property Adaptable if Future Expansion Needed	No
Adequate Staff and Visitor Parking	Parking is adequate
Additional Design Comments	None

Safety Features

Automatic Door Stops on Overhead Doors Operating Properly	Yes
Adequate Fire Extinguishers (not on apparatus)	Yes
Cooking Equipment Central Shutdown	No
Automatic Fire Sprinklers Present	None
Alarm Systems Present	Local smoke detection only
Is Commercial Cooking Equipment Present	No
Flammable and Combustible Liquids Stored in Approved Cabinet	Yes
All Pressure Cylinders Stored Properly	Yes
SCBA Compressor System Present	No
Back-Up Generator Present	Yes, with auto transfer switch
Generator Fuel Type and Source	Natural gas, piped in

Environmental Features

Apparatus Exhaust Removal	Direct connect vacuum system, connected
Apparatus Floor Drain Oil Separators in Place	Oil separator in use

Station Staff Facilities and Features

Adequate Space for Working On or Around Apparatus	Space around apparatus cramped and movement is limited
Apparatus Room Accommodates Working on Small Equipment	Space is small and limited
Personnel Can Move Quickly and Easily to Apparatus for Response	Inadequate space
Adequate Space for Cooking and Eating	Yes
Adequate Space for Local Company Training and Drills	Compromised use day room for training
Are Compromises Necessary for Two-Gender Staffing	Yes
Two-Gender Compromises	Single shower facility or area, No private dressing area
Adequate Space for Personal Hygiene	Yes
Adequate Space for Sleeping	Yes
Adequate Space for Storage	Inadequate space
Identify any Additional Operational Compromises Made by Staff or Crew to Compensate for Facility Inadequacies	Female firefighters must use separate medic crew area
Facility Features	Separate watch room/station office, Day room/lounge, Kitchen, Coed dormitory, Shower/locker room(s), Dedicated exercise/workout area

UNIT	MAKE	MODEL	YEAR	PUMP	TANK	LADDER
Engine 23	Pierce	Velocity	2013	1500	500	N/A
Truck 23	Pierce	Dash	2006	1500	500	105' Straight

STAFFING INFORMATION

Fire and EMS organizations must provide adequate staffing in three key areas: emergency services, administration, and support. There are several North American standards that address staffing issues, particularly in regard to safety. Specifically, the U.S. *OSHA Respiratory Protection Standard 29 CFR 1910.134*; *NFPA 1710 Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations to the Public by Career Fire Departments; and NFPA 1500 Standard on Fire Department Occupational Safety and Health Programs* are frequently cited as authoritative documents. This section will address the organizational staffing structure of CFD2 and references the aforementioned documents where necessary.

Administrative and Support Staff

One of the primary responsibilities of a fire department's administrative and support staff is to ensure that the operational entities have the ability and means to accomplish their duties on the emergency incident. Efficient and effective administration and support are critical to the department's success. Without sufficient oversight, planning, documentation, training, and maintenance, the operational entities of a fire department will fail any operational test. Additionally, like any other part of a fire department, administration and support require appropriate resources to function properly.

Analyzing the administrative and support positions of a fire department facilitates an understanding of the relative number of resources committed to this important function. The appropriate balance of the administrative and support components to the operational component is critical to the success of a department's mission and responsibilities.

The following figure outlines the corporate, administrative, and/or support organizational structure and complement of the fire department.

Figure 5: Administrative and Support Staff Complement

Position	Assigned
Fire Chief	1
Division Chief	1 (Vacant)
Director of Finance and Business	1
Fire Marshal	1
Training Officer	1
Administrative Asst.	1
Total	**6 (1 Vacant)**

Emergency Services Staff

It takes an adequate and well-trained staff of emergency responders to put the appropriate emergency apparatus and equipment to its best use in mitigating incidents. Insufficient staffing at an operational scene decreases the effectiveness of the response and increases the risk of injury to all individuals involved. The following figure summarizes the personnel assigned to street-level service delivery as provided by the department.

Figure 6: Emergency Services Staff Complement

Position	Full Staffing
Battalion Chief	3
Captain	9
Lieutenant	6
Apparatus Operators	15
Firefighters	30
Total	**63**

Based on available staffing, each apparatus is assigned a certain number of staff. The following figure illustrates the full staffing plan as well as the minimum apparatus staffing plan.

Figure 7: Apparatus Staffing per Shift - Full and Minimum Levels

Apparatus	Full Staffing	Minimum Staffing
Battalion Chief	1	1
Engine 21	4	3
Truck 21	4	3
Engine 22	4	4
Engine 23	4	3
Quint 23	4	3
Total	**21**	**17**

Critical Tasking

CFD2's service area is a combination of densely populated suburban residential and light commercial areas and contains a variable number, density, and distribution of risks. As the actual or potential risk increases, the need for higher numbers of personnel and apparatus also increases. With each type of incident and corresponding risk, specific critical tasks need to be accomplished and certain numbers and types of apparatus should be dispatched. This section considers the community's identified risks and illustrates the number of personnel that are necessary to accomplish the critical tasks at an emergency.

Tasks that must be performed at a fire can be broken down into two key components: life safety and fire flow. Life safety tasks are based on the number of building occupants and their location, status, and ability to take self-preservation action. Life safety related tasks involve the search, rescue, and evacuation of victims. The fire flow component involves delivering sufficient water to extinguish the fire and create an environment within the building that allows entry by firefighters.

The number and types of tasks needing simultaneous action will dictate the minimum number of firefighters required to combat different types of fires. In the absence of adequate personnel to perform concurrent action, the command officer must prioritize the tasks and complete some in chronological order rather than concurrently. These tasks include:

- Command
- Scene safety
- Search and rescue
- Fire attack
- Water supply
- Pump operation
- Ventilation
- Backup/rapid intervention

Critical task analysis also applies to non-fire type emergencies, including medical, technical rescue, and hazardous materials emergencies. Numerous simultaneous tasks must be completed to effectively control an emergency. The department's ability to muster needed numbers of trained personnel quickly enough to make a difference is critical to successful incident outcomes.

CFD2 has developed the following Critical Task Analyses for various incident types. Further it has defined, based on current unit staffing levels, the number and type of apparatus needed to deliver sufficient numbers of personnel to meet the critical tasking identified. Review of the Critical Task Analysis indicates that all are in keeping with industry standards and provide the minimum number of personnel needed for effective incident operations.

Critical tasks are those activities that must be conducted in a timely manner by firefighters at emergency incidents in order to control the situation. The fire department is responsible for assuring that responding companies are capable of performing all of the described tasks in a prompt, efficient, and safe manner.

The figures below identify CFD2's personnel needs for specific incident types, based on the types of typical occupancies and risks within their community. Each regular alarm receives three engines, one aerial, one battalion chief, an ALS ambulance and an ALS BC with a total of 16 personnel. Each additional alarm receives two engines, one aerial, one battalion chief, one ALS ambulance, and one ALS BC with a total of 13 additional personnel.

Figure 8: Low Rise Residential Structure Fire

Task	Per Initial Alarm	Per model procedure
Command/Safety	2	2 Engines = 6
Pump Operations	1	1 Truck = 3
Attack Line	4	1 Battalion Chief = 1
Search and Rescue	3	1 EMS Battalion Chief = 1
Ventilation	2	1 ALS Ambulance = 2
RIT	3	
Other (hydrant)	1	
Total	**16**	**13**

High-rise structure fires response follow a model countywide plan that includes seven engines, four aerials, four chief officers (including at least one EMS officer), high pressure air supply, two ALS ambulances, MedAct Special Operations Rehab Response unit, communications unit, and Salvation Army response. Second alarm for a high-rise fire includes another eight fire companies of various types, four additional chief officers, and one ALS ambulance. For each additional alarm, eight fire companies of various types are responded as well as three chief officers and one ALS ambulance.

Figure 9: High Rise Residential Structure Fire

Task	Per Initial Alarm	Per model procedure
Command/Safety	2	7 Engines = 21
Pump Operations	1	4 Trucks = 12
Attack Line	4	4 Battalion Chief = 4
Search and Rescue	3	Air Unit = 1
Ventilation	2	2 ALS Ambulance= 4
RIT	3	ALS MCI = 2
Other	1	Command Vehicle = 1
Total	**16**	**45**

Figure 10: Moderate Risk Commercial Structure Fire

Task	Per Initial Alarm	ERF
Command/Safety	2	3
Pump Operations	1	2
Attack Line	4	6
Search and Rescue	3	4
Ventilation	2	6
RIT	3	4
Other	1	0
Total	**16**	**25**

Figure 11: High Risk Commercial Structure Fire

Task	Per Initial Alarm	ERF
Command/Safety	2	5
Pump Operations	1	3
Attack Line	4	10
Search and Rescue	3	6
Ventilation	2	6
RIT	3	8
Other	1	0
Total	**16**	**38**

Figure 12: Grass/Brush Fire

Task	Per Initial Alarm	ERF
Command/Safety	1	1
Pump Operations	1	1
Attack Line	2	2
Other	0	0
Total	**4**	**4**

Figure 13: Car Fire

Task	Per Initial Alarm	ERF
Command/Safety	1	1
Pump Operations	1	1
Attack Line	2	2
Other	0	0
Total	**4**	**4**

Figure 14: Emergency Medical

Task	Per Initial Alarm	ERF
Patient Management	1	1
Patient Care	2	2
Documentation	1	1
Total	**4**	**4**

Figure 15: Motor Vehicle Accident

Task	Per Initial Alarm	ERF
	Surface street	**Freeway/Interstate**
Scene Management	1	1
Patient Care	1	1
Extrication	2	2
Fire Protection	0	0
Documentation	0	0
Other	2	4
Total	**6**	**8**

A regular assignment for a hazardous materials incident includes three engines, one aerial, one battalion chief, one ALS ambulance, and one ALS BC for a total of 16 personnel. Additional hazardous materials response from Overland Park includes two engines, two aerials, two battalion chiefs, one rescue, one hazmat trailer, one hazmat EMS unit, two ALS ambulances and one communications unit for a total of 23 additional personnel.

Figure 16: Hazardous Materials

Task	Per Initial Alarm	ERF
Command/Safety	2	2
Entry Team	0	6
Backup Team	0	3
Decontamination	0	4
Research	0	4
Support	8	1
Other	0	2
Total	**10**	**22**

Component C – Review of Community Expectations and Performance Goals

The ultimate goal of any emergency service delivery system is to provide sufficient resources (personnel, apparatus, and equipment) to the scene of an emergency in time to take effective action to minimize the impacts of the emergency. This need applies to fires, medical emergencies, and any other emergency situation to which the fire department responds. Obtaining and understanding the desires and expectations of community stakeholders is an important first step. CFD2 is committed to incorporating the needs and expectations of residents and policy makers in the service delivery planning process. Prior to the development of this document, CFD2 conducted a strategic planning session that involved community members as well as departmental staff. The input received will help guide the department's vision, planning efforts, policy decisions, and service delivery.

COMMUNITY SERVICE LEVEL AREA CONSIDERATIONS

In many communities, it is appropriate to consider variations in the service levels and expectations of the community based on population densities. This is because rural areas often present lower risks than urban areas based on land use and structure types. In addition, rural area dwellers often have a different expectation of service delivery based on their geographic distance from service centers and the availability of lower revenue-producing assessed values found in rural areas. In the typical SOC process, the service area classifications are broken down into five categories:

- **Metropolitan**-geography with populations of over 200,000 people in total and/or a population density of over 3,000 people per square mile. These areas are distinguished by mid-rise and high-rise buildings, often interspersed with smaller structures.
- **Urban**-geography with a population of over 30,000 people and/or a population density of over 2,000 people per square mile.
- **Suburban**-geography with a population of 10,000 to 29,999 and/or a population density of between 1,000 and 2,000 people per square mile.
- **Rural**-geography with a total population of less than 10,000 people or with a population density of less than 1,000 people per square mile.
- **Wilderness/Frontier/Undeveloped**-geography that is both rural and not readily accessible by a publicly or privately maintained road.

An analysis of population density in the CFD2 response area reveals that much of the geographic area falls into the urban and suburban categories with areas around the fringe of the response area falling into the rural category. There are no wilderness areas within the CFD2 primary response area.

PERFORMANCE EXPECTATIONS

As a result of the analysis above, service delivery was established in this Standards of Cover that will accommodate the urban and suburban areas of the CFD2 response area.

Figure 17: Community Expectations

Service	Community Outcome Goal
Fire Suppression	*For all fire incidents, CFD2 shall arrive in a timely manner with sufficient resources to stop the escalation of the fire and keep the fire to the area of involvement. An effective concentration of resources shall arrive within time to be capable of containing the fire, rescuing at-risk victims, and performing salvage operations while providing for the safety of the responders and general public.*
Emergency Medical Services	*For all emergency medical incidents, CFD2 shall arrive in a timely manner with sufficiently trained and equipped personnel to provide medical services that will stabilize the situation; provide care and support to the victim; and reduce, reverse, or eliminate the conditions that have caused the emergency while providing for the safety of the responders.*
Technical Rescue	*For all technical rescue incidents, CFD2 shall arrive in a timely manner with sufficient training and equipped with resources to effectively rescue trapped victims while providing for the safety of the responders and the general public.*
Hazardous Materials Response	*For all hazardous materials incidents, CFD2 shall arrive in a timely manner with sufficiently trained and equipped resources to effectively mitigate the hazardous conditions until the arrival of technical and specialist level hazardous materials response teams while providing for the safety of the responders and the general public.*

As part of the department's planning process, the following mission and vision statements, core values and performance goals have been created.

MISSION STATEMENT

It is the mission of Consolidated Fire District No. 2 to serve the communities of Northeast Johnson County, Kansas by providing emergency operations, emergency medical services, fire prevention, and public education with pride and professionalism.

VISION STATEMENT

We, the members of Consolidated Fire District No. 2, envision that we will be widely recognized as an organization of respected professionals, committed to compassionate service with integrity and pride.

We will honor the traditions of the fire service and the fire district by demonstrating best practices in the delivery of progressive and efficient emergency services. This will be supported by the pursuit, achievement, and maintenance of international accreditation which independently validates our commitment to excellence.

Interaction and identification with our communities will be enhanced through new or improved external communications and public education initiatives. Better utilized internal communications methods will ensure an environment of teamwork throughout the entire department. Investments in our workforce through enhanced training and professional development will ensure continuous improvement in delivery of the highest quality emergency services. By utilizing a well-executed standards of cover and plan for financial sustainability, we will be better prepared to strategically deploy and meet the emergency response needs of our communities.

Through these united efforts, the needs and expectations of our community will be met or exceeded as we hold one another accountable for carrying out our mission, living our values, accomplishing our goals, and ensuring that this vision becomes reality by the close of 2018.

CORE VALUES

The Values by which we will serve:

- Integrity and Pride in all that we do.
- Committed and compassionate service to the community.
- Progressive and efficient emergency management through quality education and training.
- Honor the traditions of the fire service and the fire district.

PERFORMANCE GOALS

CFD2 has established the following service delivery targets for emergency response times.

Call Processing

Although CFD2 does not have direct control of the region's dispatch center, they have established a performance objective to process and dispatch all emergency incidents within 60 seconds when measured at the 95th percentile.

Turnout

CFD2 has established a variable turnout time performance objective based on hour of day. During daytime hours, a turnout time performance of 1:00 when measured at the 90th percentile has been established. For nighttime hours, a performance objective of 1:30 has been established when measured at the 90th percentile.

First Arriving Unit

CFD2's performance objective for first arriving unit at the scene of an emergency incident is established at 8:00 minutes when measured at the 90th percentile.

Effective Response Force Assembly

CFD2's performance objective is to deploy an initial full alarm assignment to arrive within 11:00 of total response time when measured at the 90th percentile.

Component D – Overview of Community Risk

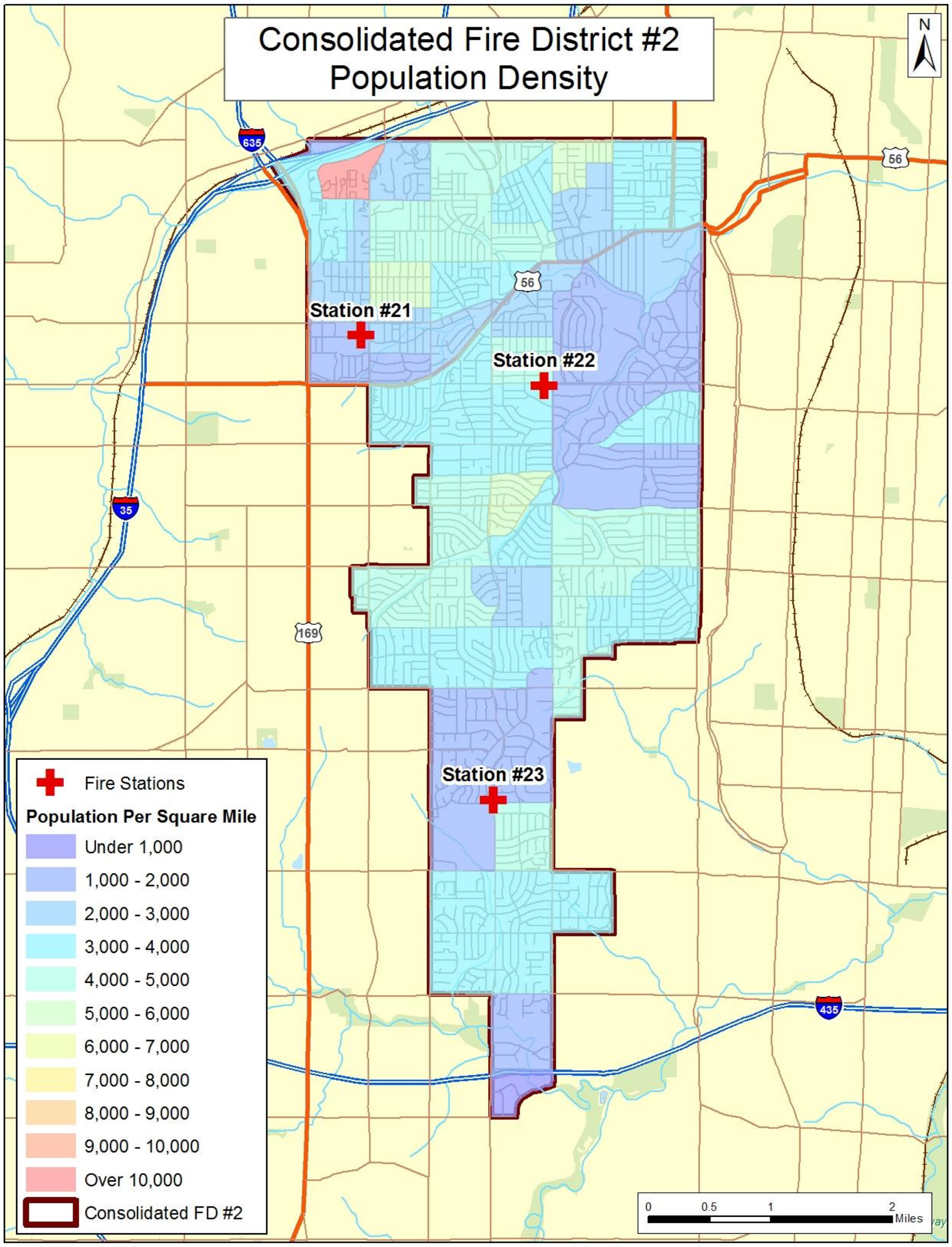
This section analyzes certain categorical risks that are present within the district that potentially threaten the persons and businesses within the community. These risks are identified to assist CFD2 in developing and evaluating mitigation plans should an emergency occur.

OVERALL GEOSPATIAL CHARACTERISTICS

The fire service assesses the relative risk of properties based on a number of factors. Properties with high fire and life risk often require greater numbers of personnel and apparatus to effectively mitigate a fire emergency. Staffing and deployment decisions should be made with consideration of the level of risk within geographic sub-areas of a community.

The primary response area is a varied mix of low, moderate and high risk properties with little in the way of pattern to the risk distribution. Thus, CFD2 must be prepared to deliver a wide array of services throughout the response area. Unlike medical responses that focus on human life, fire incidents are intended to protect property in addition to life. Typically, the most frequent occurrences of fires are in the more populated areas where structures are also denser. The following map illustrates how the varying levels of population density are distributed throughout the CFD2 response area.

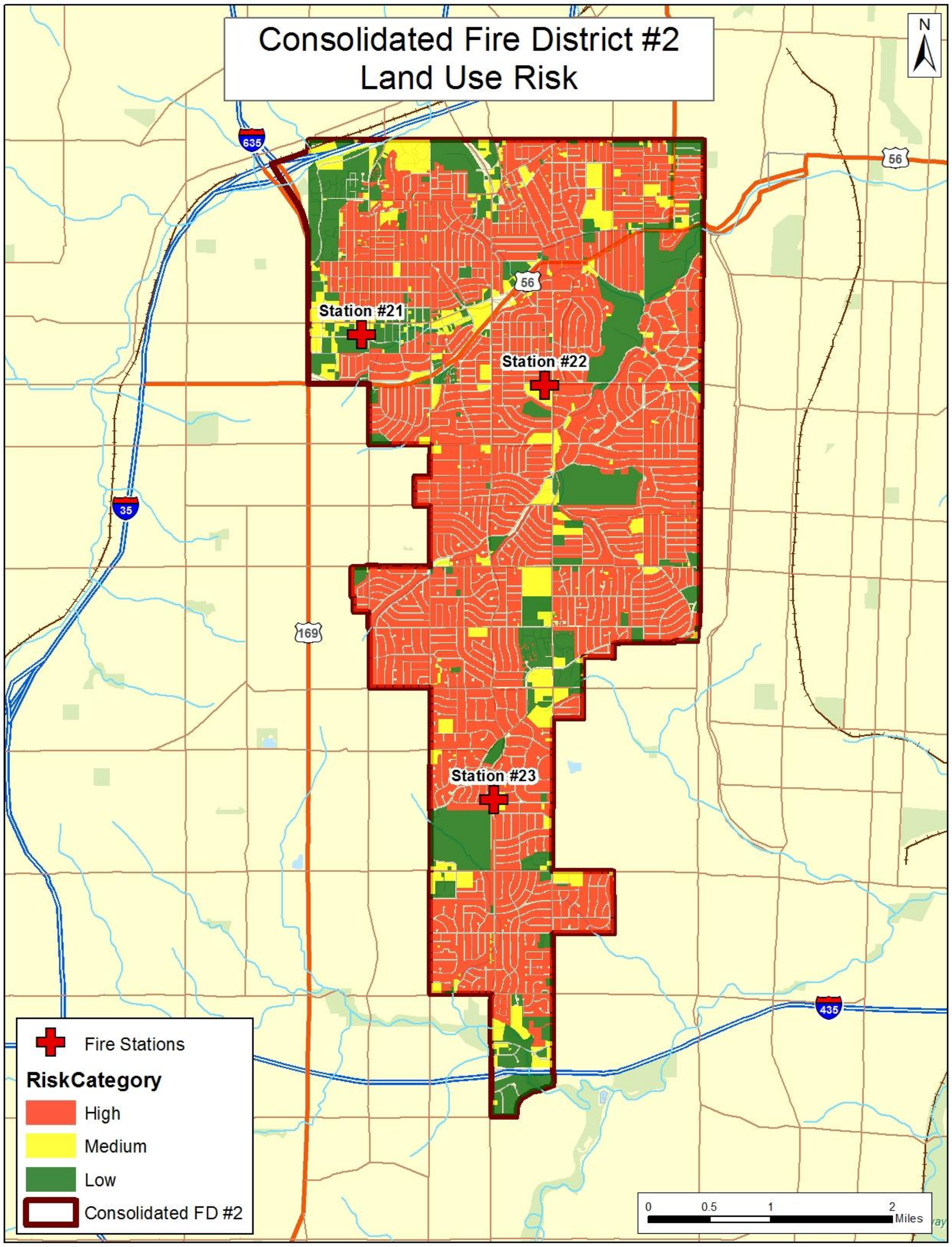
Figure 18: Population Density



As illustrated in the figure above, various population densities are scattered throughout the response area with the highest density located in a small area in the extreme north end of the district. All of the response area is over 1,000 persons per square mile, placing the entirety of CFD2 in an urban classification of density.

Although population density is an important factor in determining service demand, the types of land use within the response area can also identify specific risks. The following figure illustrates the land use within the CFD2 response area.

Figure 19: Land Use Risk



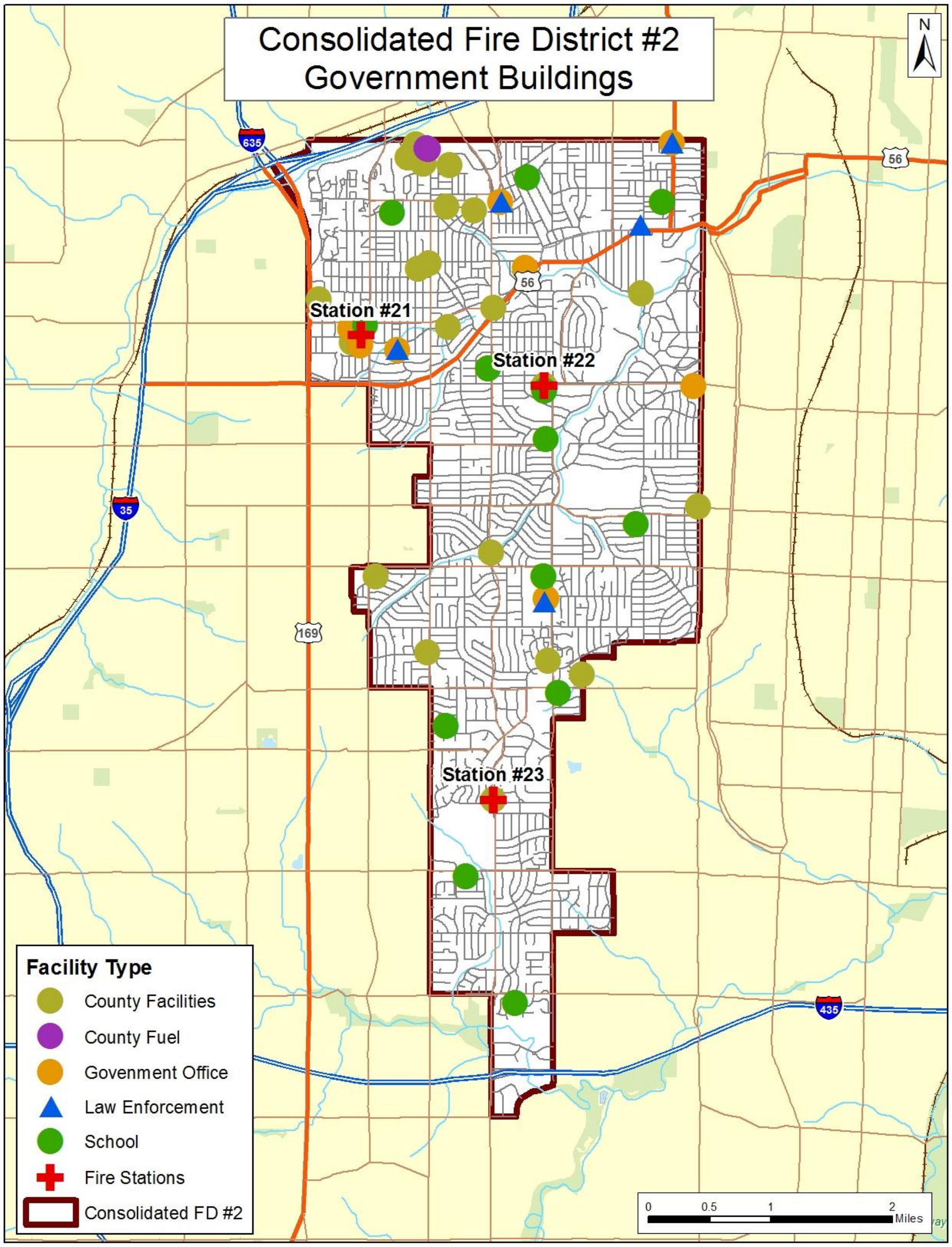
As can be seen in the figure above, a majority of the CFD2 response area is considered high risk in regard to land use with a scattering of medium and low use throughout the area.

PHYSICAL ASSETS PROTECTED

Government Buildings

Essential to the response, mitigation, and preservation of a community during and after an emergent event are government buildings. These are buildings which contain the equipment, staff, and archival records essential to the primary functions of government. These include most municipal, state, or federal offices; emergency services facilities; libraries; postal facilities; communication centers; and the Emergency Operations Center (EOC). The CFD2 response area contains government buildings including city and county offices, schools, post offices, and other support structures as illustrated in the following figure.

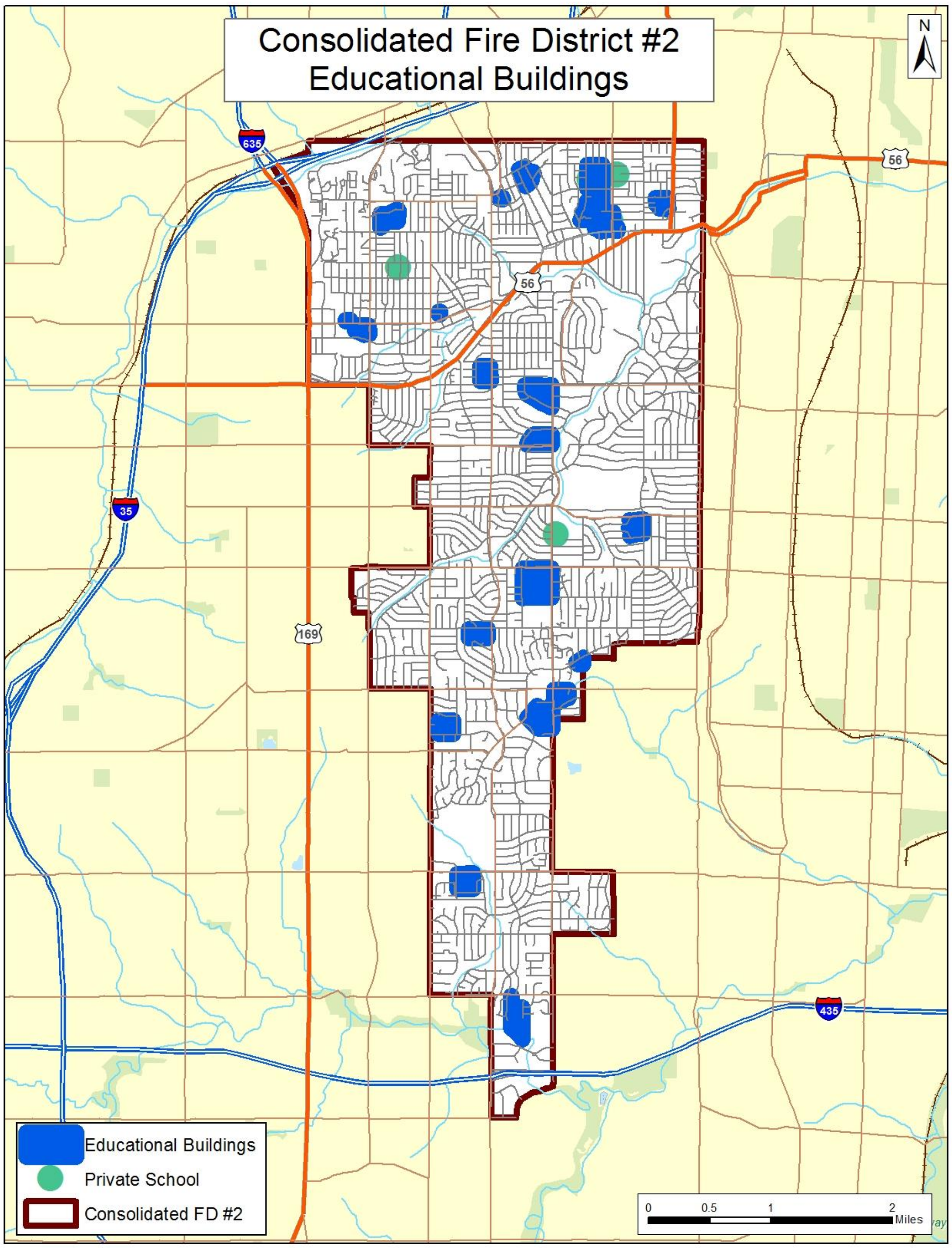
Figure 20: Government Buildings



Schools/Universities/Daycares

There are a number of educational institutions within the CFD2 response area. These facilities contain children and college-aged populations representing the future of the community and the region. Though primarily operational during the daytime hours, evening classes or athletic events create an environment in which many persons can occupy a property at varying hours of the day and early evening. Schools and daycares are scattered throughout the CFD2 response area as illustrated below.

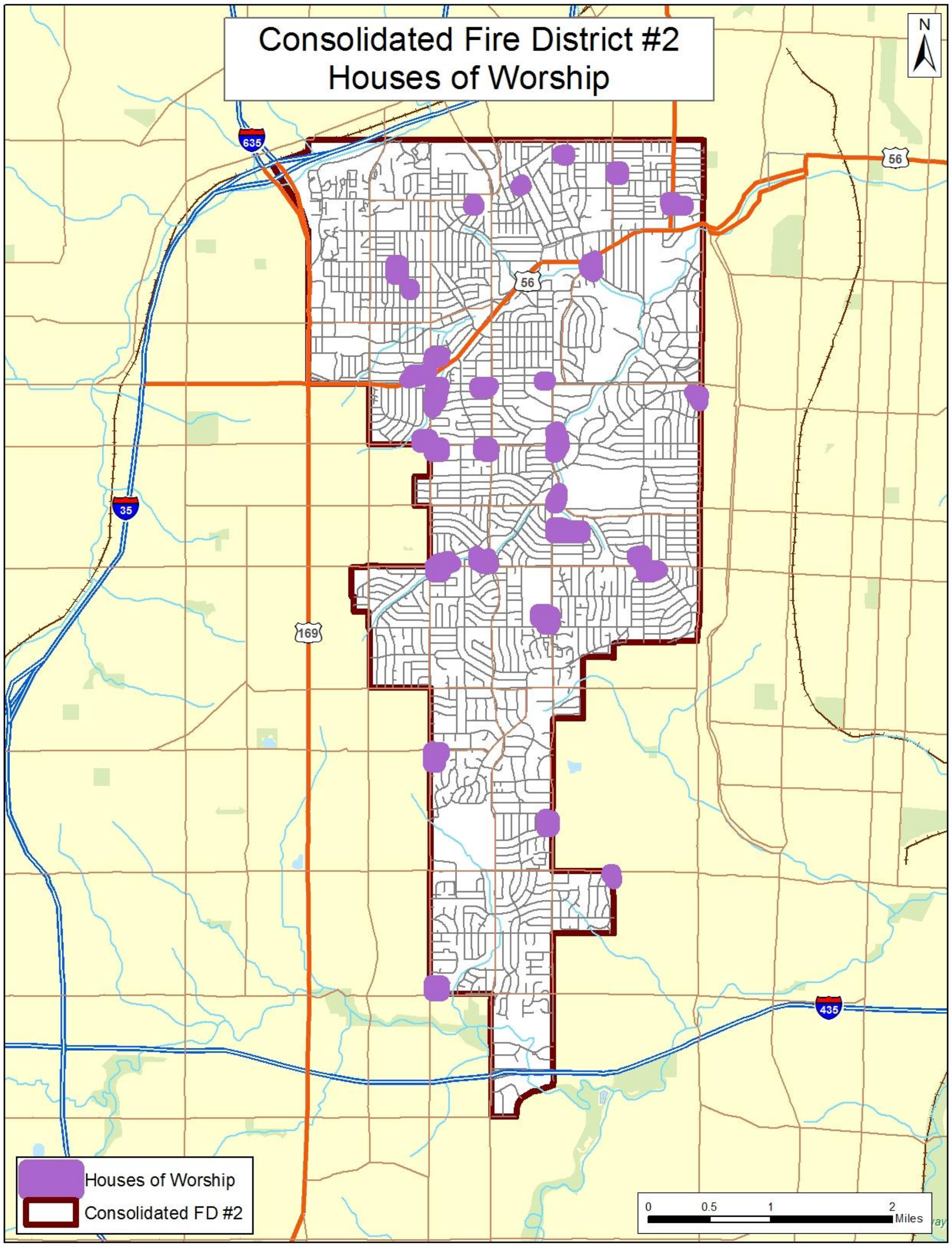
Figure 21: Educational Facilities



Houses of Worship

Churches, mosques, and temples are all a part of the local mosaic. There are houses of worship of many varieties located within the CFD2 response area and most host activities throughout the weekdays and evenings aside from scheduled worship services on weekends. Religious facilities, like academic institutions, are scattered throughout the primary response area.

Figure 22: Houses of Worship

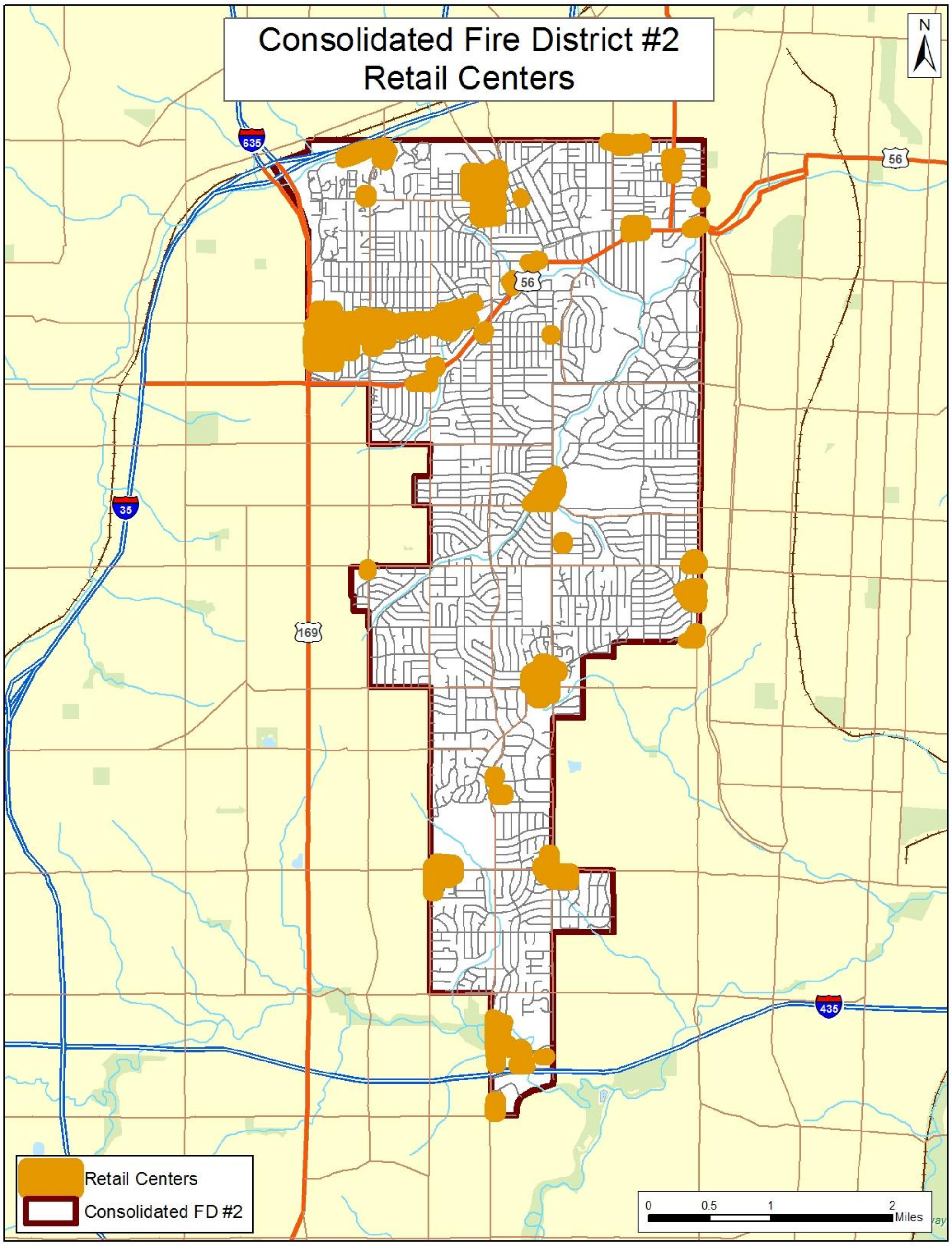


Retail Centers

Aside from thriving urban commercial centers, auto-dependent retail centers have proliferated throughout the communities served by CFD2. From department store-anchored strip malls to the enclosed pedestrian variety, these retail centers attract a large amount of shopping visitors to their properties, especially during holidays.

Not all retail centers can be mapped due either to lack of data or to the number of the facilities themselves. Buildings which are employment centers, social halls, and nightclubs have higher population density than residential areas and contribute significantly to the economic well-being of the community. As in most communities, the majority of the district's retail centers are located within more densely populated areas as illustrated in the following figure.

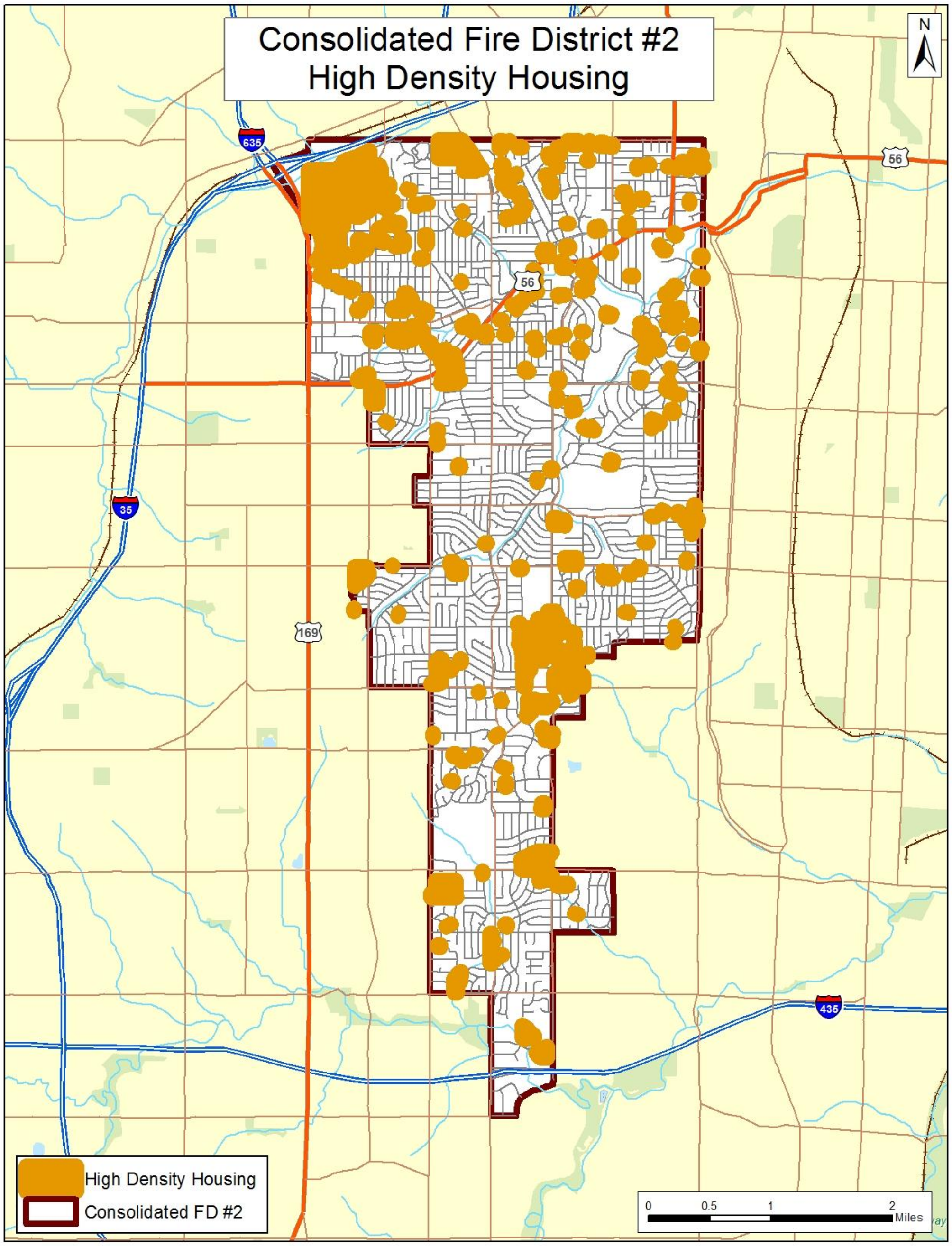
Figure 23: Retail Centers



High Density Housing

While single family units dominate the CFD2 response area, many forms of high density housing are found within the jurisdiction. Additionally, there is a high amount of public housing for low income persons that also have higher population densities. These types of housing have a higher risk for the loss of life and correlate with higher rates of multiple emergency responses compared to single family residential areas. The district's high density housing sites are illustrated below.

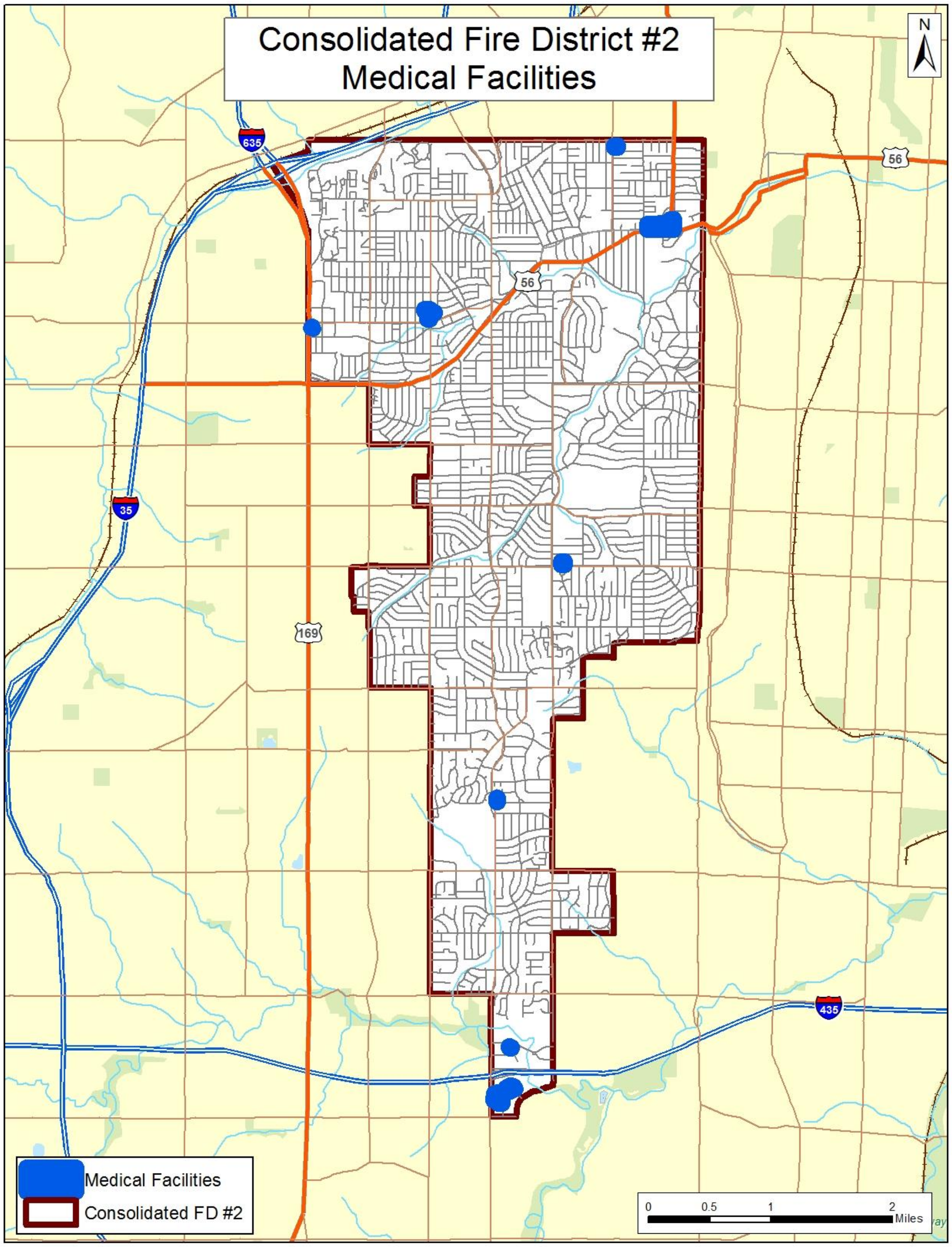
Figure 24: High Density Housing



Medical Facilities

Caring for the sick is every community's moral responsibility. However, when an emergency threatens the facilities that care for them or the community at large, this population must be assisted to reach a safe place that can continue to care for them. Identifiable facilities include hospitals, clinics (such as dialysis centers), nursing homes, and assisted living facilities. Additionally, the community should be aware of those who are disabled that live in residences throughout the city. The CFD2 response area does not contain any hospitals but does contain a number of residential assisted living and medical treatment centers as illustrated in the following figure.

Figure 25: Medical Facilities



Other Critical Infrastructure

In this section, other types of infrastructure critical to a community are discussed for the fire department to plan a response and mitigation plan in the event of an emergency.

Water Supply

The most obvious element of this system that affects the fire department is the hydrants. Additionally the water supply pipes, pumps, and facilities are essential to not only supplying water to suppress fires but the drinking supply and cooling processes in manufacturing. As this water is utilized, the waste or run-off into the sewer pipes is pumped to a wastewater treatment facility for processing. These processes are essential to the ecological and human health needs of a community.

Communications

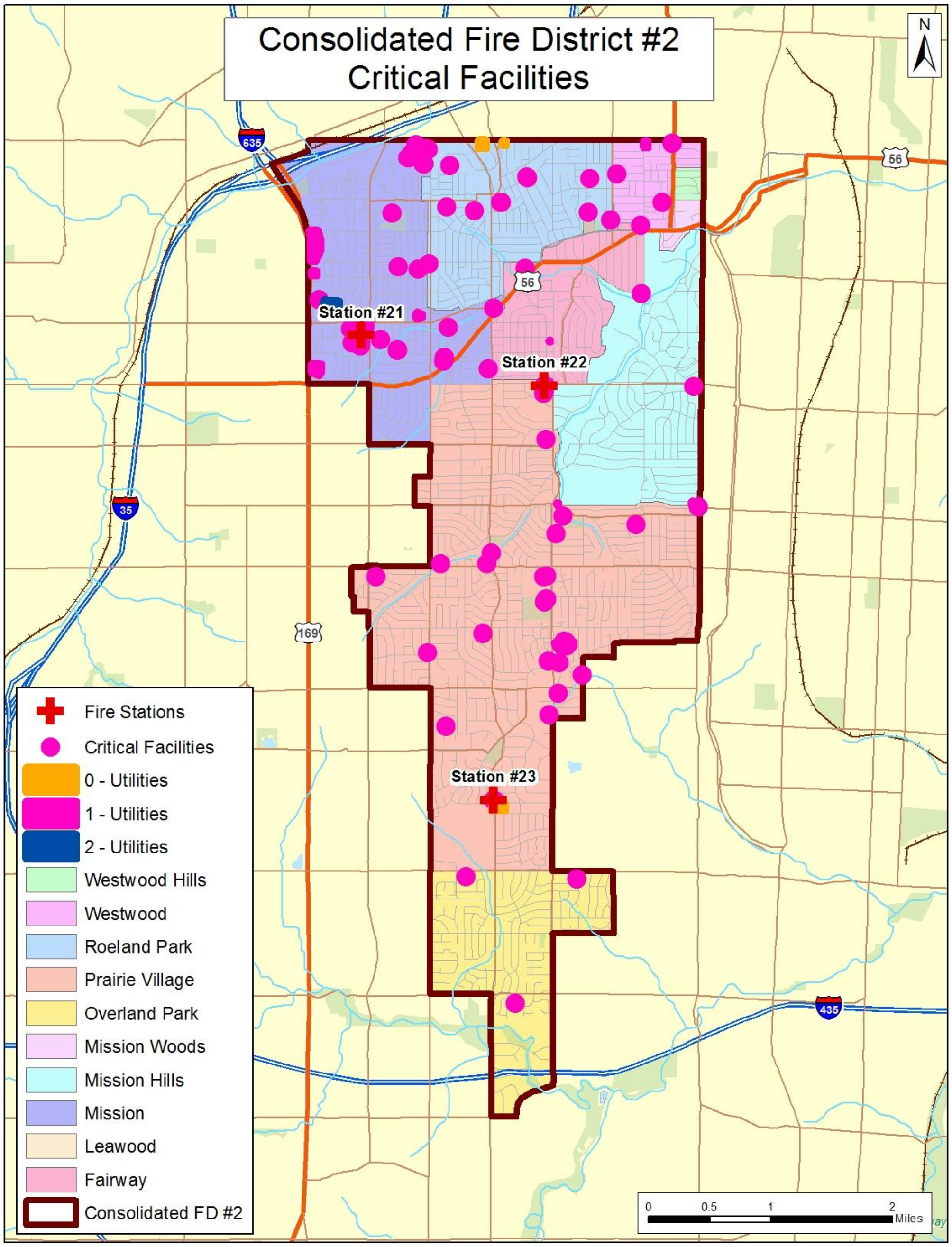
While it may be obvious that emergency communication centers and the transmitting and receiving equipment are essential, there are other communication facilities and equipment that are equally essential to the community and government operations. These are the central communication offices and lines of local telephone providers. Internet service providers, along with wireless cellular communication carriers, provide essential communication capabilities for the community as well as emergency personnel through their facilities and equipment.

Utilities

Community services from communications, to traffic signals, to normal civic operations require the use of energy. Whether it is fuel distribution and storage tanks to natural gas pipelines and regulator stations, the community is dependent upon energy sources. One of the most important energy elements is the electrical distribution infrastructure. This includes the generation facilities, the transmission lines, and the substations that are located across every community in the nation.

While the available data does not distinguish between the types of infrastructure, the following map illustrates the locations of critical infrastructure known throughout the response area.

Figure 26: Critical Infrastructure

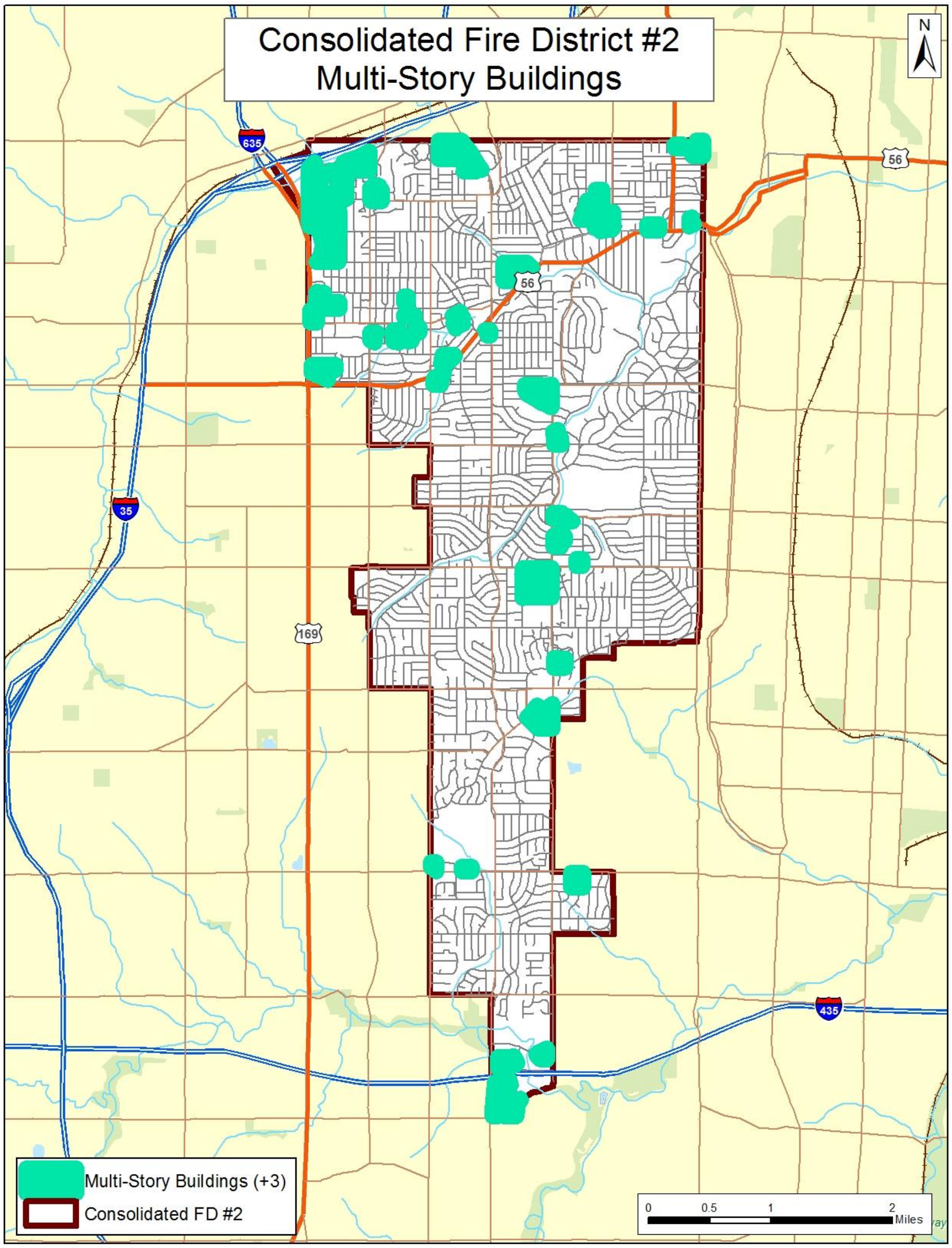


Other Structures

Buildings that are above two floors pose a special risk in an emergency. Fire on higher floors requires an aerial fire truck to be able to deliver water into the building that does not have standpipe infrastructure. Additionally, victims trapped on higher floors may be in need of rescue by its tall ladder.

Currently, CFD2 protects a limited number of high-rise structures predominantly consisting of apartments and senior living as identified below.

Figure 27: Multi-Story Buildings (Over Two Stories)



TOPOGRAPHIC AND WEATHER RELATED RISKS

Weather Risk

The region encompassing CFD2 is prone to a variety of weather events including severe storms, tornados, flash floods, periods of excessive heat, snow, ice storms, high winds, and drought. The city lies in the humid continental climate zone, with four distinct seasons, and moderate precipitation. Most of the Greater Kansas City metropolitan area sees a fairly mild climate for various periods in each season. However, there is also significant potential for extremes of hot and cold swings in temperature all year long. The warmest month of the year is July, with a 24-hour average temperature of 81.0 °F (27.2 °C). The summer months are warm but can get hot and moderately humid, with moist air riding up from the Gulf of Mexico, and high temperatures surpass 100 °F (38 °C) on 5.6 days of the year, and 90 °F (32 °C) on 47 days.[1, 2] The coldest month of the year is January, with an average temperature of 31.0 °F (−0.6 °C). Winters are cold, with 22 days where the high is at or below the freezing mark and 2.5 nights with a low at or below 0 °F (−18 °C).[1] The official record high temperature is 113 °F (45 °C), set on August 14, 1936 at Downtown Airport, while the official record low is −23 °F (−31 °C), set on December 22 and 23, 1989.[1] Normal seasonal snowfall is 13.4 inches (34 cm) at Downtown Airport and 18.8 in (48 cm) at Kansas City Int'l. The average window for freezing temperatures is October 31 to April 4, while for measurable (≥0.1 in/0.25 cm) snowfall, is November 27 to March 16 as measured at Kansas City Int'l. Precipitation, both in frequency and total accumulation, shows a marked uptick in late spring and summer.

The response area is situated on the edge of the "Tornado Alley", a broad region where cold air from the Rocky Mountains in Canada collides with warm air from the Gulf of Mexico, leading to the formation of powerful storms especially during the spring. A few areas of the Kansas City Metropolitan Area have had some severe outbreaks of tornadoes at different points in the past, including the Ruskin Heights tornado in 1957, and the May 2003 tornado outbreak sequence.[3] The region can also fall victim to sporadic ice storms during the winter months, such as the 2002 ice storm during which hundreds of thousands lost power for days and (in some cases) weeks. Certain areas of the district are also subject to flooding, including the Great Flood of 1993 and the Great Flood of 1951.

Tornado activity:

Historical tornado activity is above the Kansas state average. It is 198% greater than the overall U.S. average. On 5/20/1957, a category F5 (max. wind speeds 261-318 mph) tornado near CFD2’s response area killed 44 people and injured 207 people and caused between $500,000 and $5,000,000 in damages. On 5/22/1952, a category F4 (max. wind speeds 207-260 mph) tornado injured 3 people and caused between $50,000 and $500,000 in damages.

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[1] "NowData – NOAA Online Weather Data". National Oceanic and Atmospheric Administration.
[2] "Interpretation Of Skew-T Indices". Theweatherprediction.com.
[3] Kansas City Tornado Almanac, wdaftv4.com.

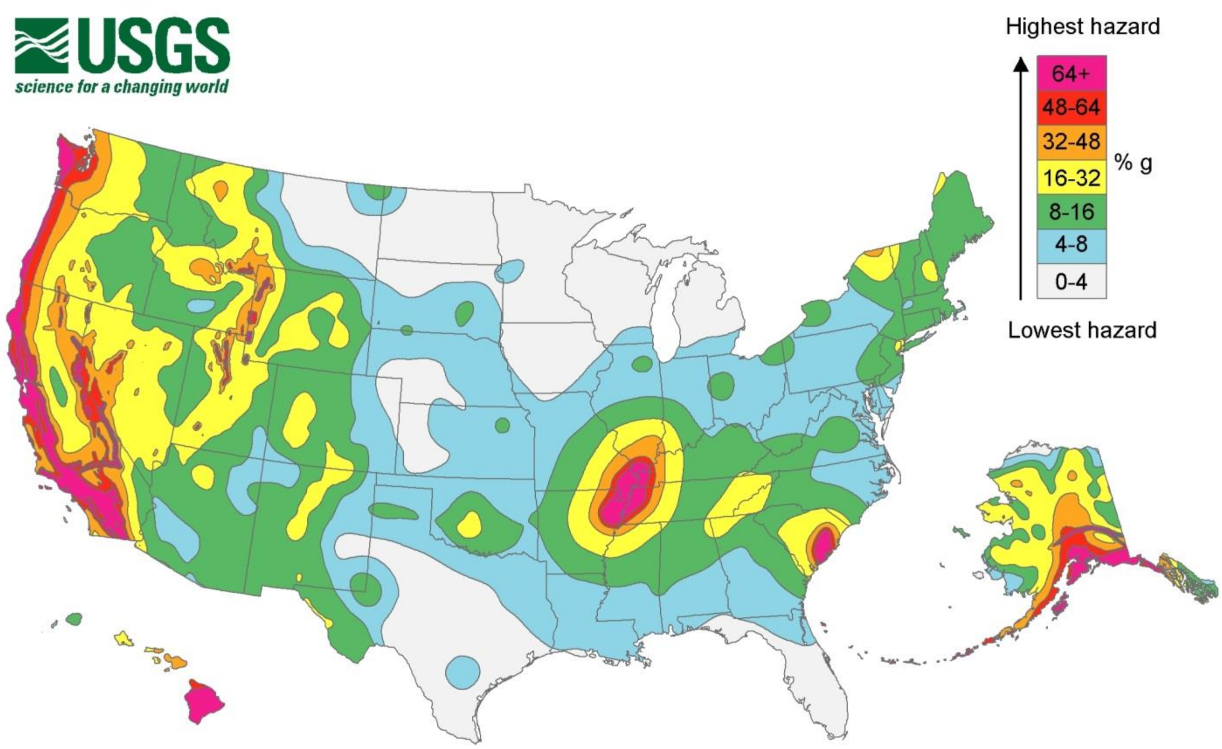
Natural disasters:

The number of natural disasters in Northeast Johnson County (20) is a lot greater than the US average (12). Major Disasters (Presidential) Declared: 16. Emergencies Declared: 4. Causes of natural disasters: Floods- 15, Storms- 13, Tornadoes- 4, Winter Storms- 2, Heavy Rain- 1, Drought- 1, Hurricane- 1, Ice Storm- 1 (Note: Some incidents may be assigned to more than one category).

Geographic/Geological Risk

Earthquakes are possible throughout the United States but certain areas have a higher probability of experiencing damaging ground motions caused by these quakes. The map below provides an idea of the likelihood of experiencing strong earthquake activity at various locations across the country.

Figure 28: Earthquake Risk[4]



Metropolitan Kansas City-area historical earthquake activity is significantly below Kansas state average. It is 95% smaller than the overall U.S. average. On 5/18/2005 at 19:59:42, a magnitude 3.3 (3.3 LG, Depth: 3.1 mi, Class: Light, Intensity: II - III) earthquake occurred 53.1 miles away from the city center of Kansas City. On 5/13/1999 at 14:18:22, a magnitude 3.0 (3.0 LG, Depth: 3.1 mi) earthquake occurred 7.9 miles away from city center. On 3/23/2007 at 08:15:49, a magnitude 3.1 (3.1 LG, Depth: 3.1 mi)

[4] U.S. Geological Survey. Earthquake Hazards Program. http://earthquake.usgs.gov/hazards/products/.

earthquake occurred 49.9 miles away from city center. Magnitude types: regional Lg-wave magnitude (LG).

TRANSPORTATION NETWORK

There are man-made barriers that also affect the response capability of emergency services and they are present in almost every community, and especially with urban areas. Unless elevated, limited access freeways and rail lines can interrupt street connectivity, forcing apparatus to negotiate a circuitous route to reach an emergency scene. While freeways and other arterials can have safety barriers or medians to separate opposing traffic lanes, cross-over or breaks are limited. Street-level rail lines can impede traffic even at crossings when the trains traverse through the city.

Roads

The suburban nature of much of the CFD2 response area leads to some areas with low volumes of traffic as well as other, more prominent arterial roadways, with very high traffic volumes. Studies have shown that areas with higher traffic volumes have a higher risk of motor vehicle collisions, potentially leading to personal injury, property damage, and hazardous response situations. While most of the response area has installed traffic control devices, the busyness of commuter traffic still sometimes leads to incidents. The figure below illustrates the 2013 traffic volume counts for the Kansas City, Kansas metro area including the CFD2 response area. Volumes range from 1,100 in the residential areas to as high as 16,000 daily counts on some of the more major thoroughfares.

Bridges

These structures provide essential crossings and unimpeded travel across physical and man-made barriers. In the event of an emergency, these are crucial along evacuation routes as well as for aid supplies to be brought into the area.

Major bridges within the CFD2 response area are primary routes that provide crossings for freeways. Other smaller bridges that cross creeks and small streams are scattered throughout the entirety of the response area. Many of these bridges are privately maintained and there is significant concern that many are not capable of supporting the weight of today's fire apparatus. CFD2 is working with local officials to address this concern.

Rail

CFD2 has limited rail service traversing the district. BNSF provides freight service parallel to Interstate 35 that carries typically long, slow-moving trains that could obstruct response routes. Many of the crossings are at grade level and the risk of train vs. automobile is high. In addition, these heavy freight trains carry various hazardous materials as they transport cargo from the upper Midwestern states to the southern states for processing and usage.

Airports

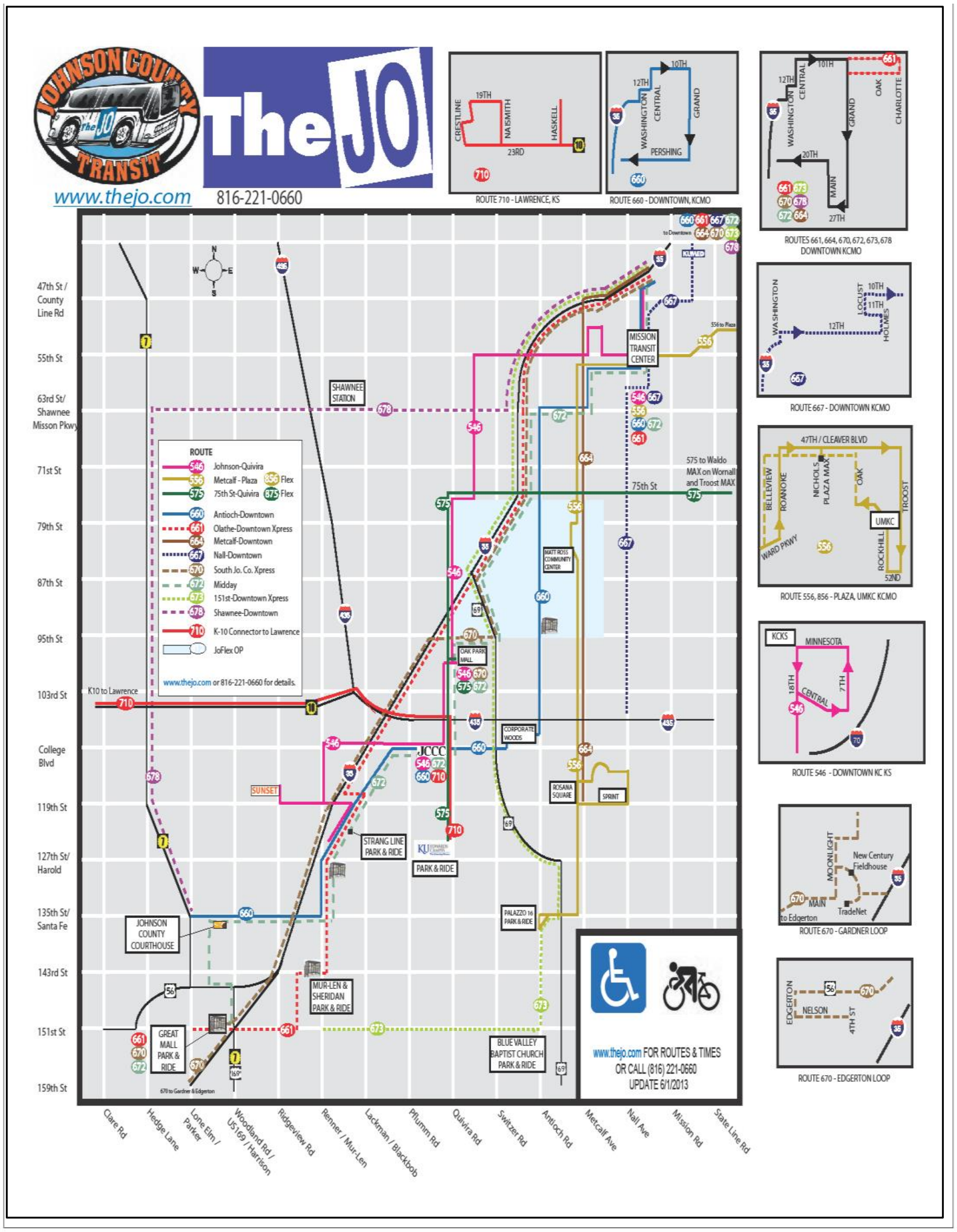
Airports serve as important transportation hubs for both people and materials, particularly for major metropolitan areas. This type of transportation, however, is not without risk. Aircraft emergencies of all kinds, fuel storage and spills, large numbers of people, criminal activity (terrorism), etc. must all be considered. Fortunately for CFD2, no major airport is located within the primary response area and Kansas City International Airport (MCI) is well outside the district. Johnson County also maintains an executive airport in the southwestern portion of the county but this facility has little impact on CFD2's response capabilities.

Bus

Bus service for the CFD2 response area (Northeast Johnson County) is provided by the Kansas City Area Transportation Authority (KCATA). This service, although widespread throughout the region, is limited within the CFD2 response area to parts of 7^{th} Street, Rainbow Avenue, and Strong Avenue (and its connectors) in the northern extent of the district.

In addition to KCATA, the district also receives bus service from Johnson County Transit, known as 'TheJO'. This system services a larger portion of the district than does KCATA and, therefore, poses a greater risk for the organization. While public transportation reduces traffic congestion, the slow-moving busses can impeded emergency response vehicles as well as become mass casualty incidents when involved in motor vehicle collisions. The following figure illustrates the system map for Johnson County Transit.

Figure 29: Johnson County Transit System Map[5]



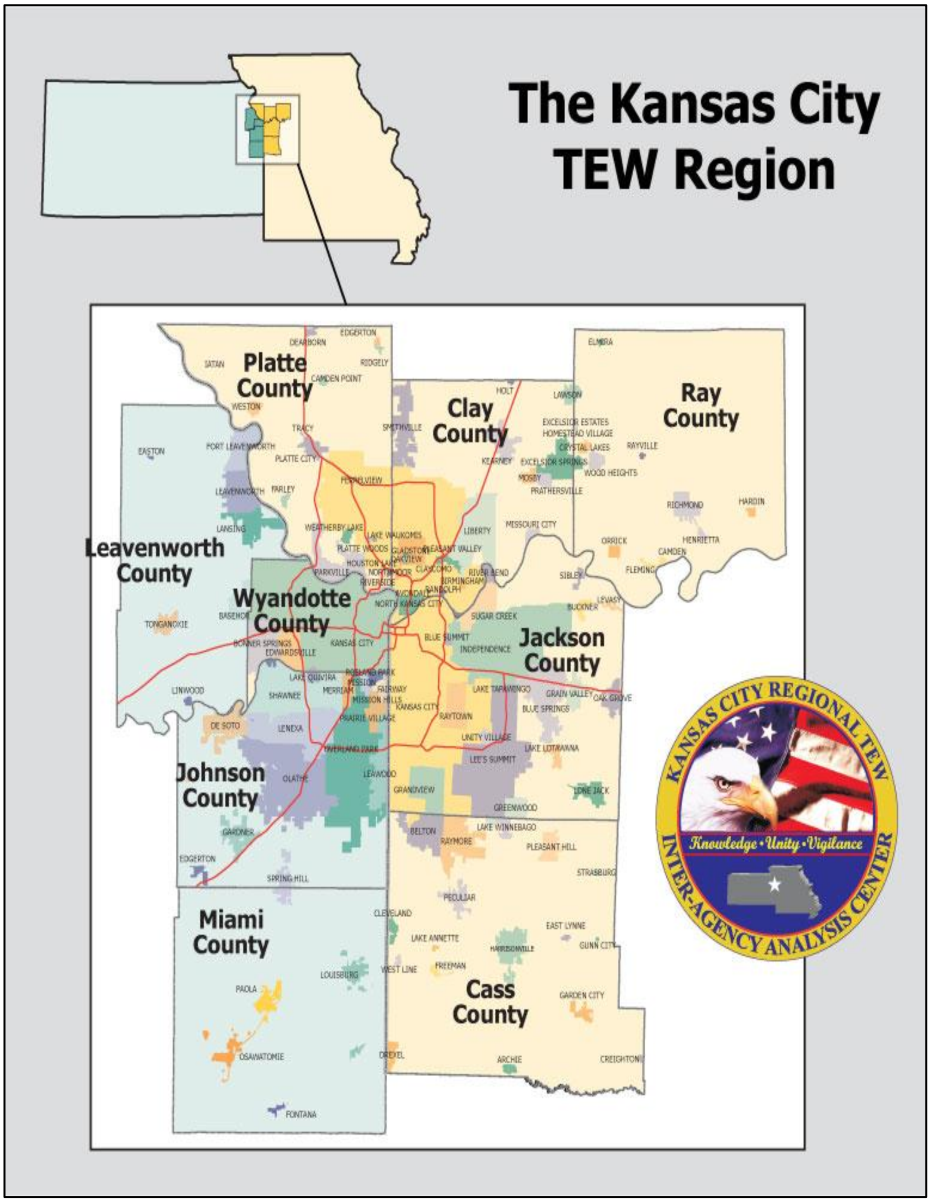
[5] Johnson County Transit Authority. http://www.jocogov.org/dept/transit/home.

Terrorism

The Kansas City Regional Terrorism Early Warning Group brings local, state, and federal public safety officials together with public and private organizations to detect, deter, and respond to terrorist threats in the Greater Kansas City community. Kansas City is one of 30 urban areas across the country to receive federal funds to support a TEW through the Urban Areas Security Initiative.

The TEW's Interagency Analysis Center collects information from a variety of sources. This data is evaluated and analyzed in an effort to identify potential trends or patterns of terrorist or criminal operations within the region.

Figure 30: Kansas City Terrorism Early Warning Region[6]

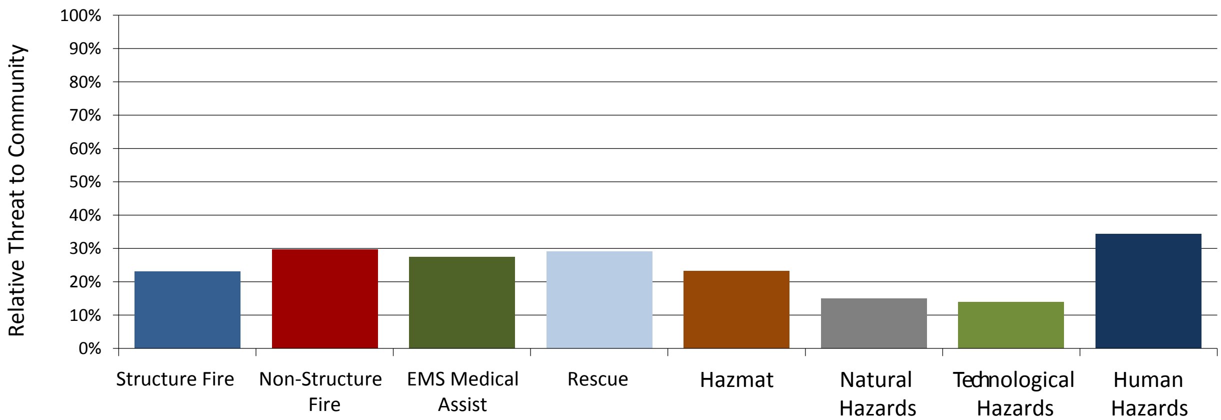


[6] Kansas City Regional Terrorism Early Warning, Interagency Analysis Center. http://www.kctew.org/.

Hazard Vulnerability Analysis

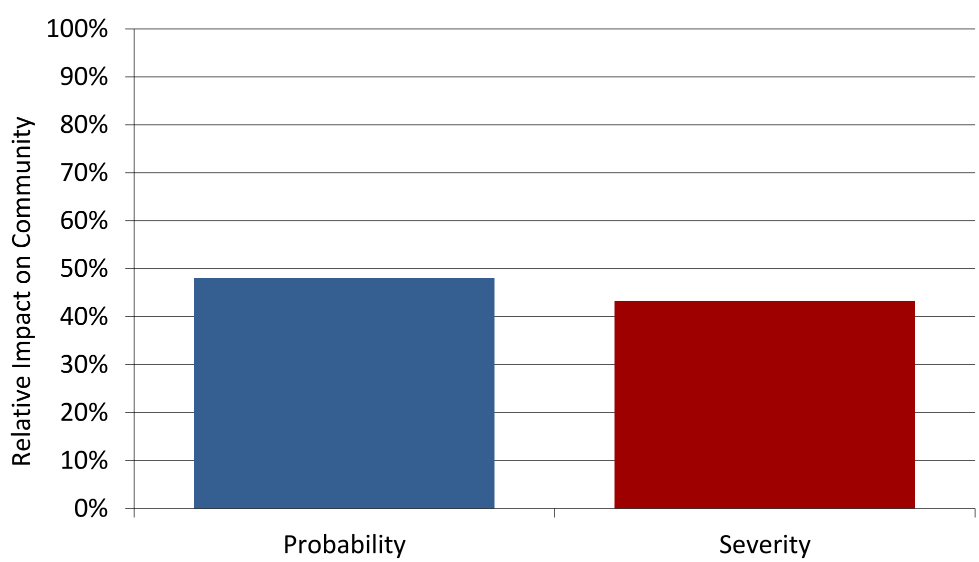
Based on the narrative descriptions of the various hazards commonly found throughout the CFD2 primary response area, a numerical ranking of community hazards was developed. Historical incident data as well an assessment of the community and its vulnerabilities was used to numerically rate each potential hazard. Community hazards were categorized as follows:

Figure 31: Relative Community Vulnerability



Based on the internal assessment of relative community vulnerability, human hazards such as multiple casualty incidents and bomb threats have been rated as the highest area of vulnerability, followed by non-structure fires, rescue incidents, and medical incidents. Given the completed hazard vulnerability analysis, the following representation of relative community risk was developed.

Figure 32: Relative Community Risk



Simply put, those incidents with the highest probability of occurrence are lower in severity than those with a lower probability of occurrence.

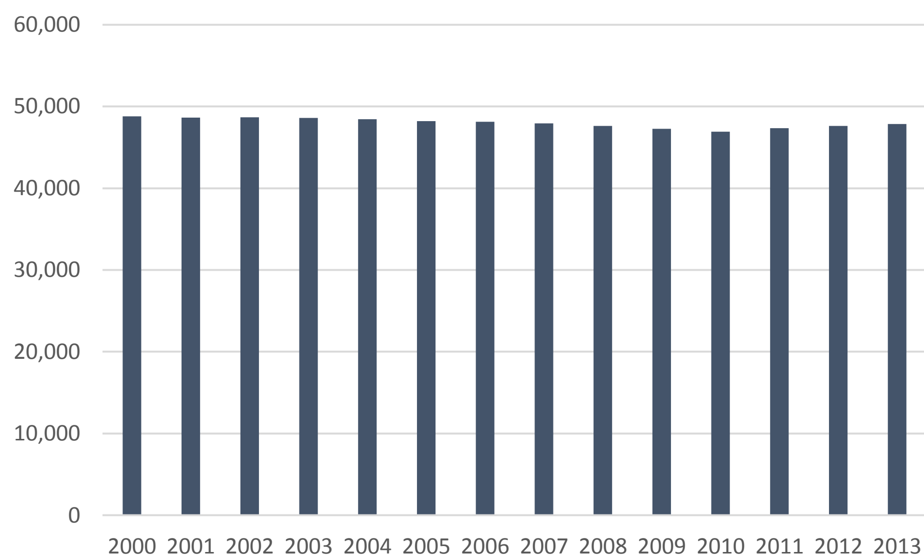
DEVELOPMENT AND POPULATION GROWTH

Current Population Information

Based on the 2013 U.S. Census estimates, there are approximately 47,871 people living within the municipalities served by CFD2. The district has a population density of 3,357 persons per square mile making it a very densely populated urban center. This information does not include the previously served area of Overland Park.

Over the past 13 years, the population of the service area has fluctuated mildly but remained relatively stagnant with an estimated change rate of -0.02 percent declining from 48,820 in 2000 to 47,871 in 2013 as illustrated below.

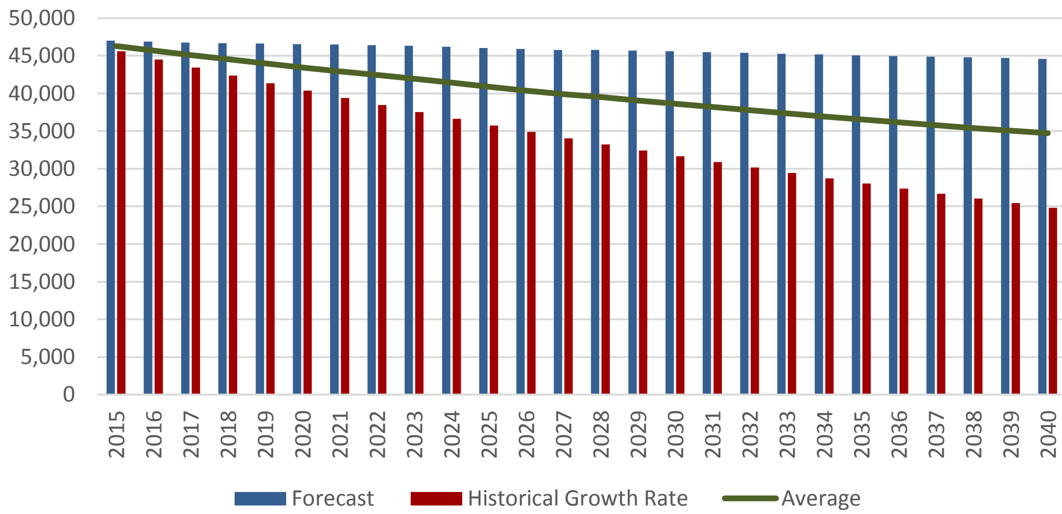
Figure 33: Population History



Population Growth Projections

Determining population growth in the future allows an emergency services organization to estimate how that growth will translate into future service demand. For this purpose, population growth projections were obtained through both the U.S. Census Bureau and from local agencies that plan for community development. The following figure illustrates the estimated growth through 2040.

Figure 34: Population Projections

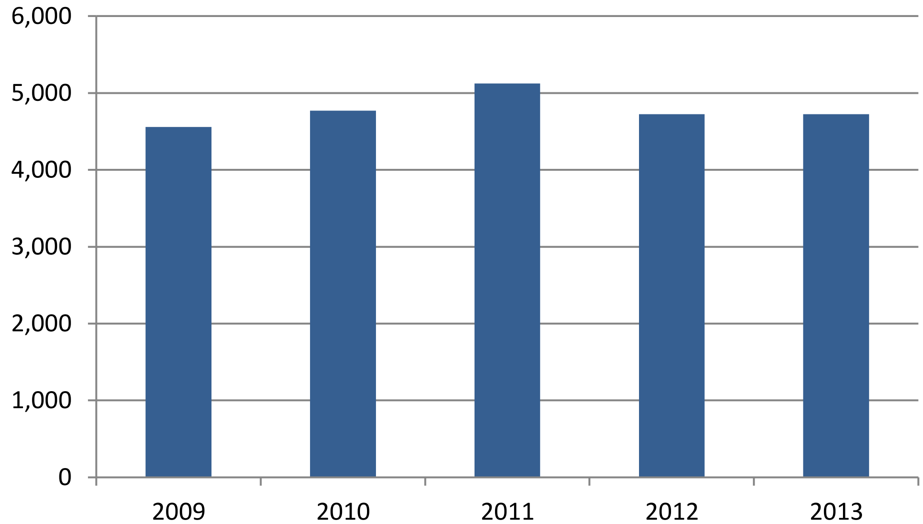


The figure above illustrates a mathematical forecast generated through Microsoft Excel capabilities, which indicates a growth rate of -5.318 percent while using historical growth rates in each of the covered municipalities indicates a growth rate of -46.883 percent over the next 25 years. An average of these figures results in a growth rate of -26.015 percent.

CALLS FOR SERVICE

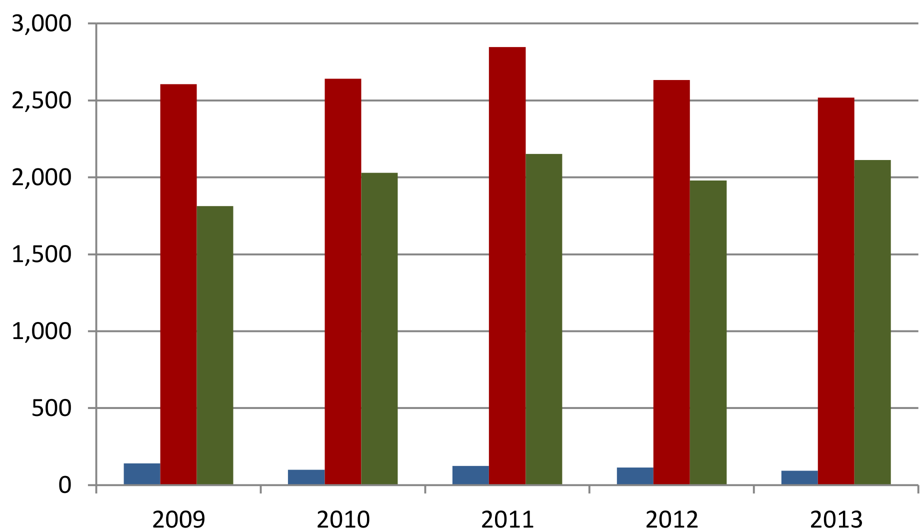
Demand is defined as the workload experienced by an emergency services organization. This workload can be emergency and/or non-emergency depending on the mission of the organization. Overall demand is provided in the following figure.

Figure 35: Historic Service Demand



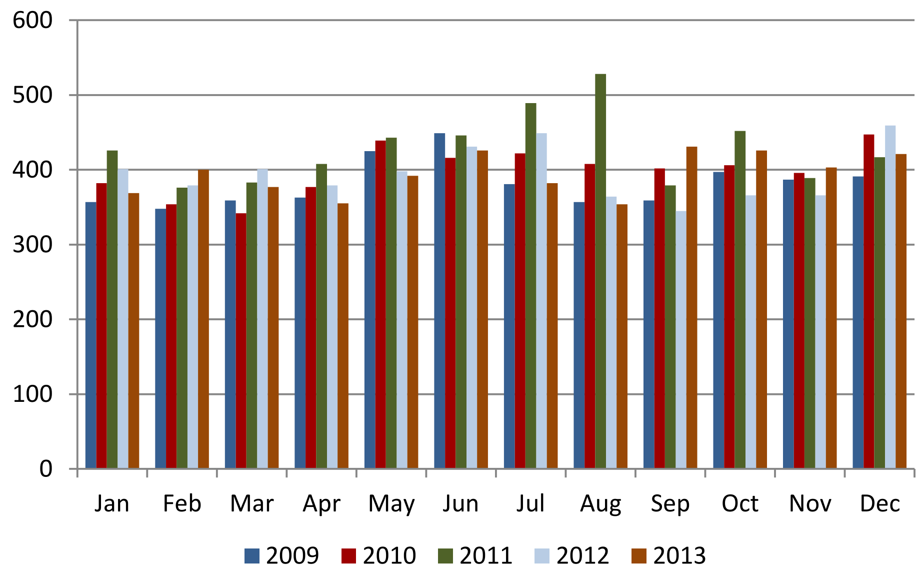
For CFD2, the majority of demand is related to medical incident responses as illustrated in the following figures.

Figure 36: Historic Service Demand by Type of Call



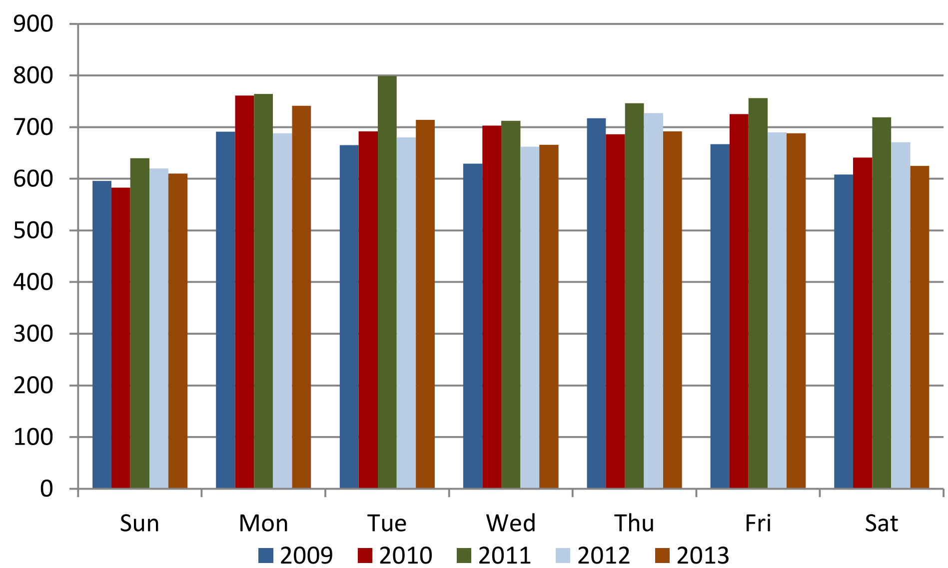
Service demand is not static, and CFD2's workload varies temporally. The following temporal variation figures illustrate how CFD2's service demand varies by month, day of week, and hour of day in order to identify any periods of time that pose significantly different risks and hazards. This analysis begins by evaluating service demand by month.

Figure 37: Service Demand by Month



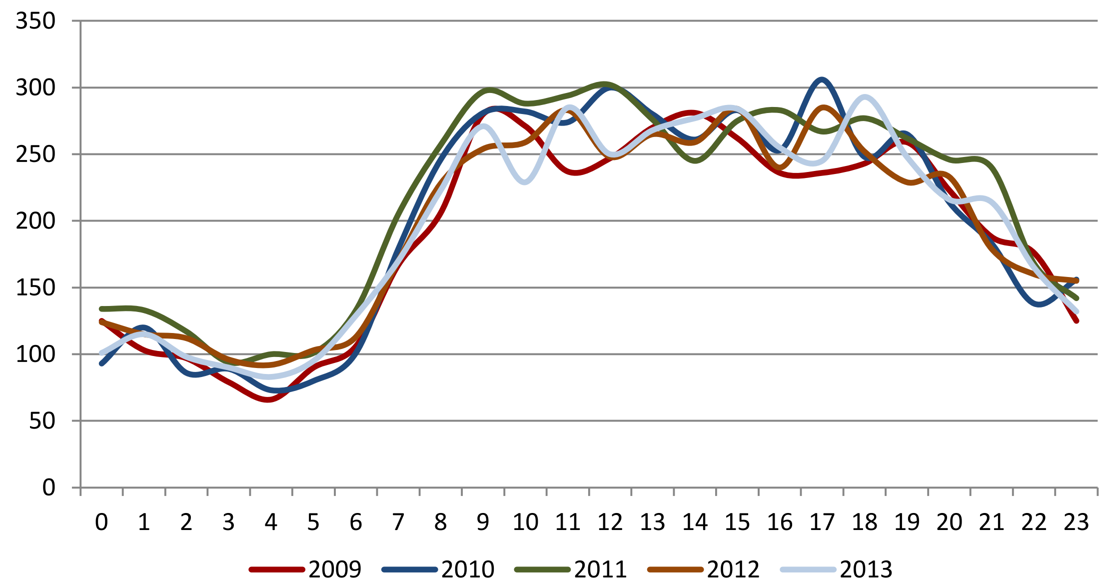
Service demand by month has been highly variable over the last five years. Generally, service demand is higher during the late spring and early summer months but peaks can also be seen during mid-winter. The next analysis reviews service demand by day of week.

Figure 38: Service Demand by Day of Week



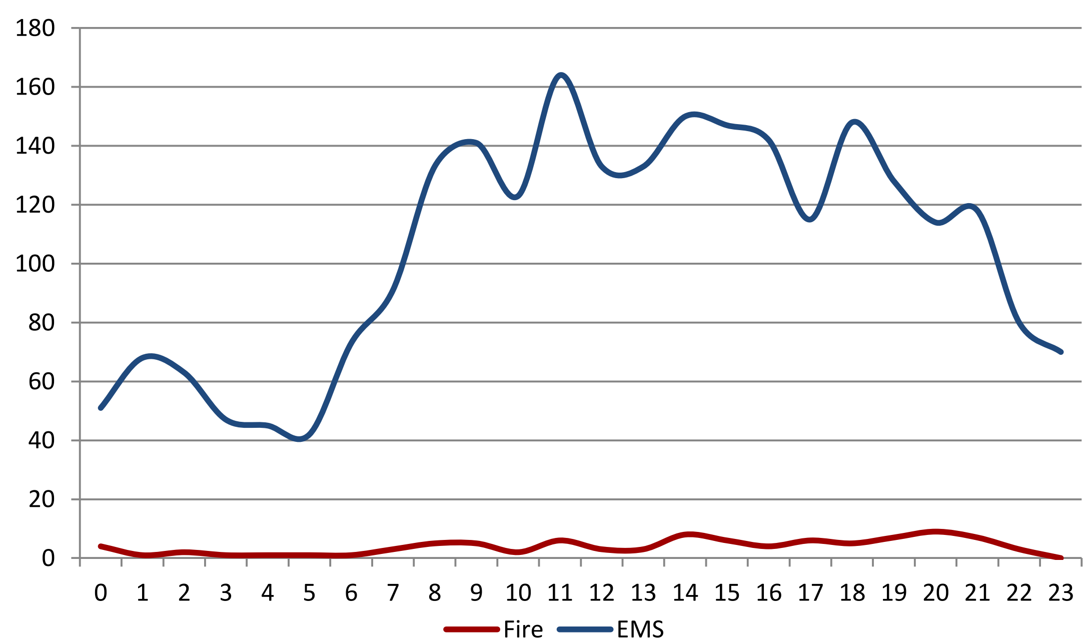
As with monthly service demand, demand by day of week is also highly variable with no distinguishing trend other than lower demand on Sundays. The final temporal analysis illustrates service demand by hour of day.

Figure 39: Service Demand by Hour of Day



As is the case with most emergency services providers that are involved in the provision of pre-hospital medical care, there is an obvious trend throughout the 24 hours of the day with regard to service demand. Following general human activity, service demand begins to increase between 6:00 a.m. and 7:00 a.m., peaking during the mid-day hours and then declining into the evening. How the types of service demand compare to each other is also of interest as illustrated below.

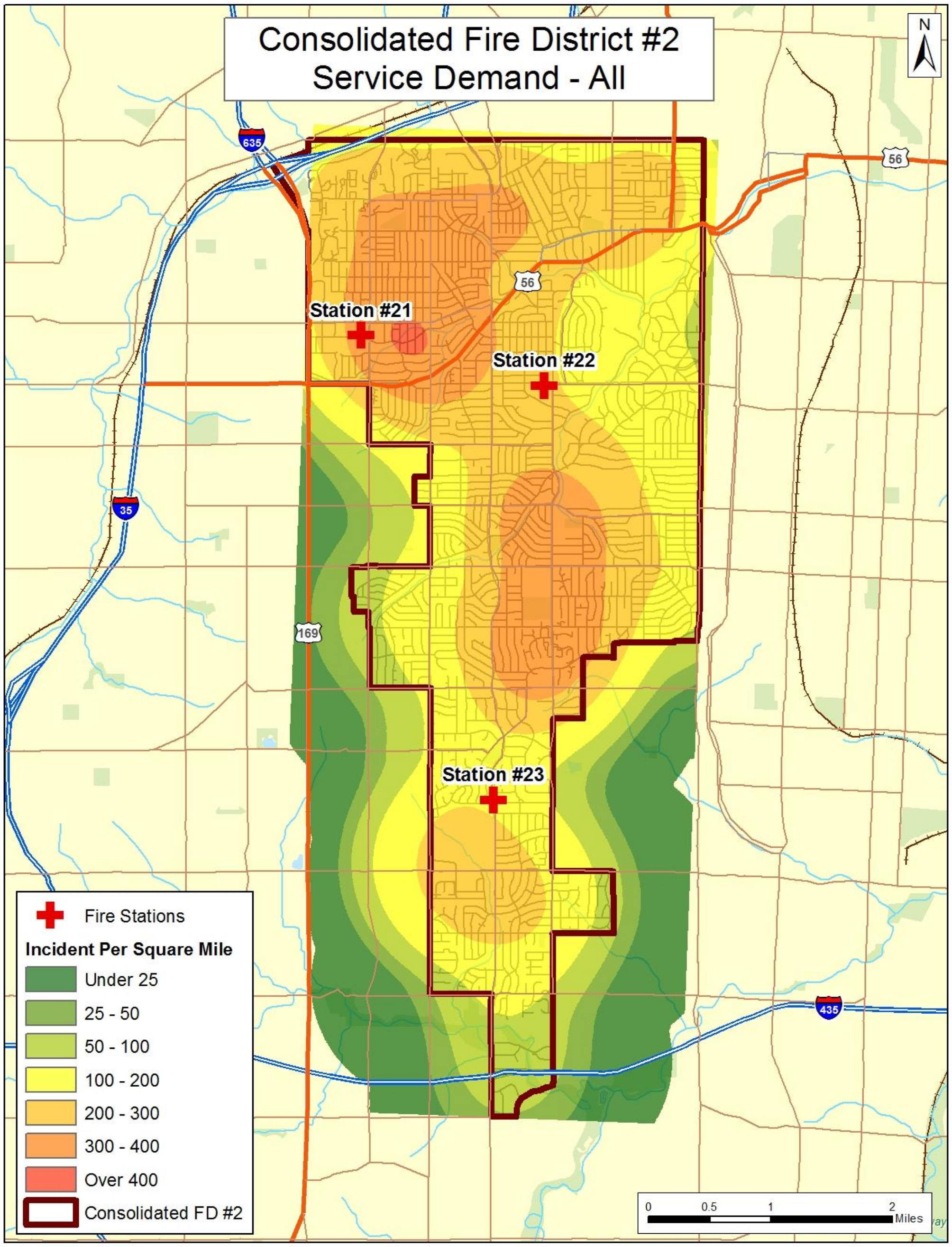
Figure 40: Comparison of Fire and Medical Service Demand by Hour of Day



The risk associated with fires, although sometimes driven by human activity, is usually static across most hours of the day while medical service demand, a completely human based type of demand, is much more dynamic. CFD has deployed resources to accommodate the fluctuation in service demand by staffing all apparatus with medically trained personnel.

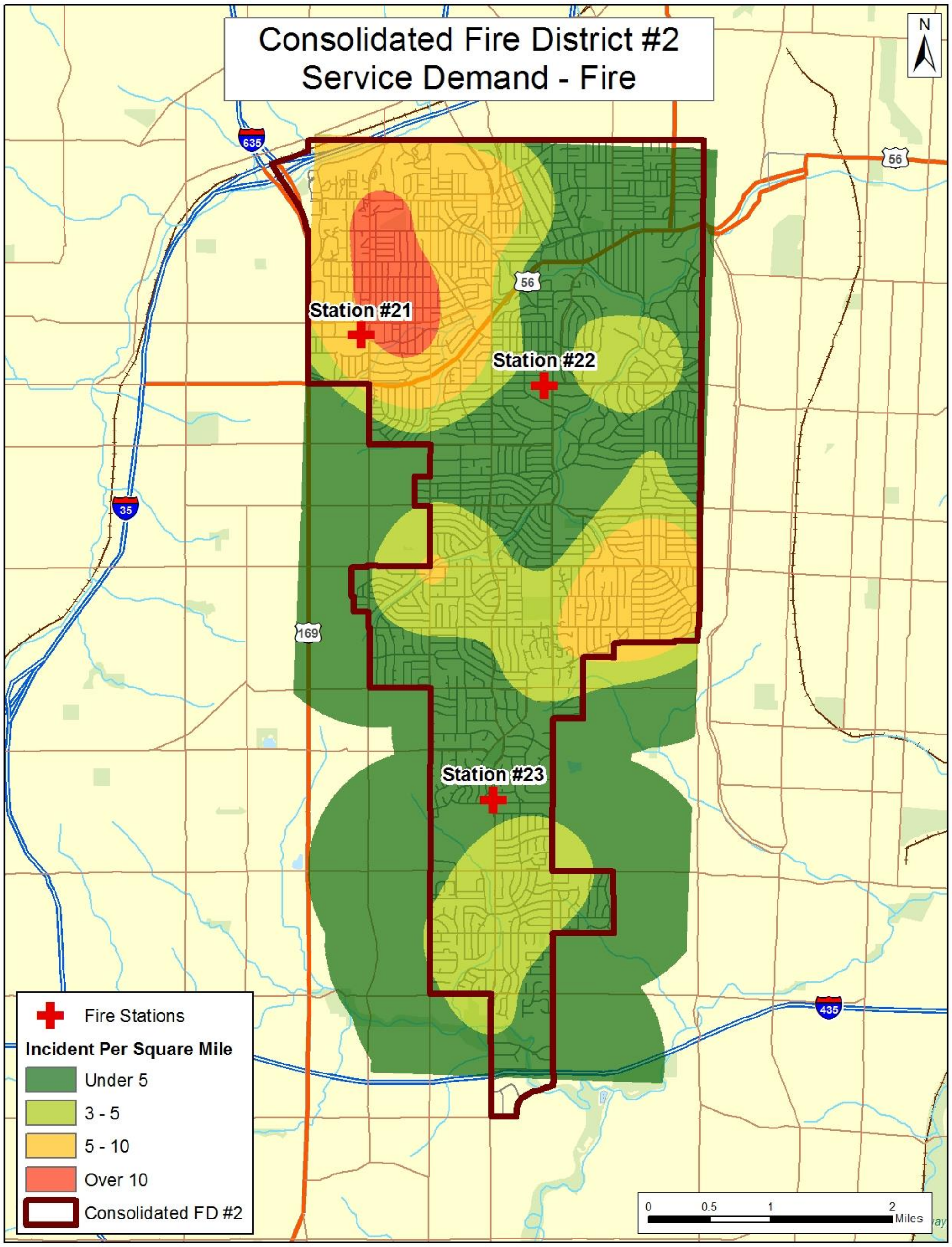
The final evaluation of service demand is geographical. The following maps illustrate total service demand for CFD2 for the data period.

Figure 41: Geographic Service Demand – All Incidents



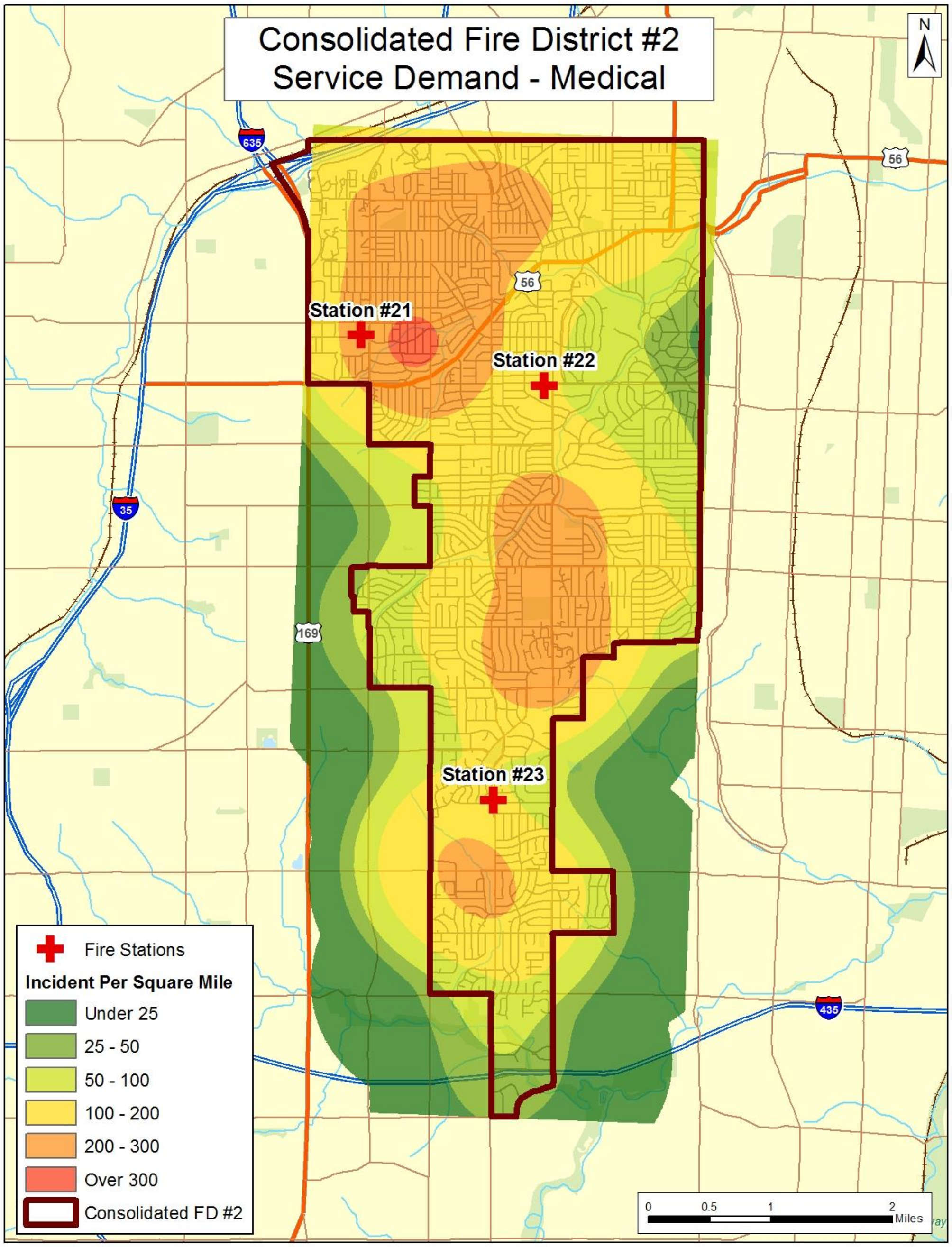
Based on the available data, service demand density is well-distributed across the response area and is more concentrated in areas with close proximity to current station locations. The next analysis evaluates the distribution of fire incidents compared to medical incidents.

Figure 42: Geographic Service Demand – Fire Incidents



Fire service demand is denser in the northern part of the response area and is concentrated in those areas with a higher population density. The density of medical service demand is illustrated in the following figure.

Figure 43: Geographic Service Demand – Medical Incidents



Much like fire service demand, medical incidents are concentrated in areas of higher population density and the higher levels of service demand are in close proximity to existing station locations.

Component E – Review of Historical System Performance

The total incident response time continuum consists of several steps, beginning with initiation of the incident and concluding with the appropriate mitigation of the incident. The time required for each of the components varies. The policies and practices of the fire department directly influence some of the steps, but two are only indirectly manageable. The parts of the continuum are:

1. **Detection:** The detection of a fire (or medical incident) may occur immediately if someone happens to be present or if an automatic system is functioning. Otherwise, detection may be delayed, sometimes for a considerable period.
2. **Report:** Today most emergency incidents are reported by telephone to the 9-1-1 center. Call takers must quickly elicit accurate information about the nature and location of the incident from persons who are apt to be excited. A citizen well trained in how to report emergencies can reduce the time required for this phase.
3. **Call Processing:** The dispatcher must confirm the incident address, enter information into the computer aided dispatching (CAD) system, and continue to update information about the emergency while the units respond. This step is enhanced by the current utilization of technology that expedites the process such as; computer aided dispatch and global positioning systems.
4. **Turnout:** Personnel must don appropriate equipment, assemble on the response vehicle, and begin travel to the incident. Good training and fire station design can minimize the time required for this step.
5. **Travel:** This is potentially the longest phase of the continuum. The distance between the fire station and the location of the emergency influences total response time the most. The quality and connectivity of streets, traffic, geography, and environmental conditions are also a factor. Travel time may be reduced with use of technology such as traffic control devices.

The application of water in time to prevent flashover or the timely initiation of potentially life-saving medical care is a serious challenge for any fire department. It is critical, though, as studies of historical fire loss data demonstrate. Portions of the total response time sequence that are within at least some control of CFD2 are evaluated in the following paragraphs.

CALL PROCESSING

Call processing is the sole responsibility of the Johnson County Emergency Communications Center. Communication Specialists receive training in Priority Dispatch and are expected to adhere to industry call processing standards. The following figure illustrates the communication center's historic call processing performance by incident type.

Figure 44: Historic Call-Processing Performance

	Average	95th
2009	0:00:24	0:00:49
2010	0:00:25	0:00:56
2011	0:00:25	0:00:56
2012	0:00:26	0:01:00
2013	0:00:27	0:01:05

NFPA 1221 is the published standard that provides guidance for the processing of calls received within an emergency communications center. Based on the standard, emergency calls should be received, processed and dispatched within 60 seconds when measured at the 95th percentile. Currently, the emergency communications center responsible for dispatching CFD2 resources is only slightly above the published standards.

TURNOUT

Turnout time is one area of the overall response time that field personnel have at least some ability to control. The following figure illustrates the department's historic turnout time performance annually and by incident type.

Figure 45: Historic Turnout Time Performance - Overall

	Average	90th
2009	0:00:59	0:01:32
2010	0:00:56	0:01:30
2011	0:00:58	0:01:31
2012	0:01:05	0:01:37
2013	0:01:04	0:01:38

Figure 46: Historic Turnout Time Performance by Type

	Fire		Medical	
	Average	90th	Average	90th
2009	0:00:59	0:01:31	0:00:59	0:01:32
2010	0:00:58	0:01:30	0:00:55	0:01:30
2011	0:01:00	0:01:30	0:00:57	0:01:31
2012	0:01:07	0:01:36	0:01:04	0:01:37
2013	0:01:06	0:01:37	0:01:03	0:01:38

NFPA 1710 provides guidance for turnout time performance and segregates that performance into two primary categories of emergency response, fire and medical. For medical responses, the standard recommends a performance of 60 seconds when measured at the 90th percentile. For fires, the standard recommends a performance of 80 seconds when measured at the 90th percentile. As illustrated in the figure above, turnout time performance for CFD2 is above the NFPA standard's recommended level of performance but only slightly.

TRAVEL

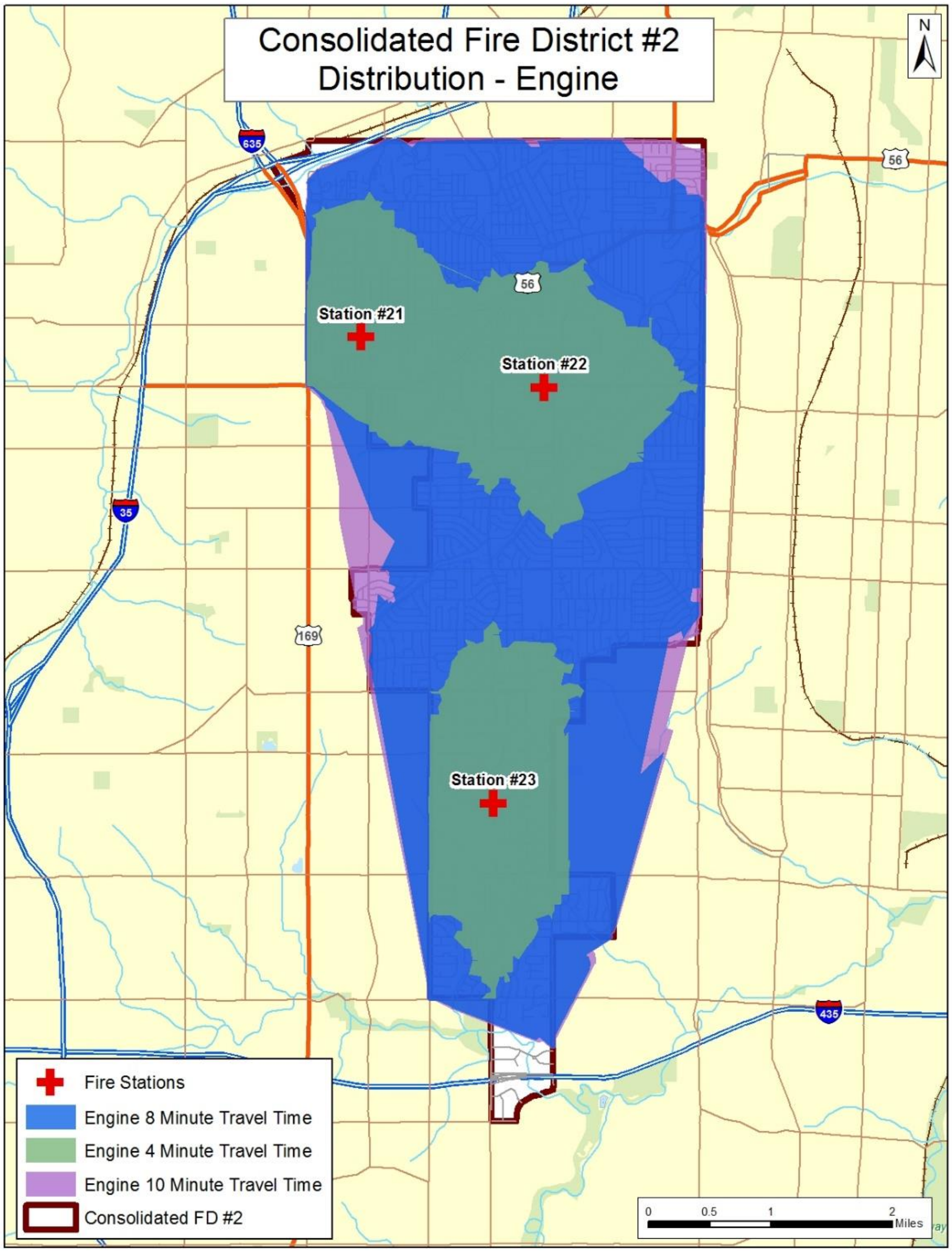
Travel time is one component of total response time that is rarely controllable by fire department personnel, except through wider distribution of a greater number of resources. Traffic congestion, intersections, construction, and distance all play crucial roles in travel time. Traffic control devices such as signal pre-emption devices allow responding apparatus to control traffic signals that they are approaching, thus enhancing response and reducing risk of collision. The following figure illustrates the department's historic travel time performance annually and by incident type.

Figure 47: Historic Travel Time Performance

	Average	90th
2009	0:04:01	0:06:12
2010	0:04:12	0:06:30
2011	0:04:15	0:06:41
2012	0:04:11	0:06:31
2013	0:04:22	0:06:49

The following figure illustrates the modeled travel time for CFD2.

Figure 48: Modeled Travel Time (Distribution)



Aside from resource distribution, travel time cannot be controlled by fire departments in most cases. Circumstances such as weather, traffic, and road construction can critically impact travel times. In regards to recommended travel time performance, NFPA 1710 recommends that resources be distributed such that response units have a travel time of four minutes or less to emergency incidents when measured at the 90th percentile. CFD2 is currently using this standard as its response time goal for fire incidents but, as seen in the figure above, travel times are slightly higher than the recommendation and the adopted performance goal.

FIRST ARRIVING UNIT

Upon evaluation of the data retrieved from both the CAD and incident reporting datasets, non-emergency responses and miscellaneous calls were removed in order to gain a full understanding of how well the system was performing for emergency incident first unit arrival times. The following figure illustrates the department's historic total response performance for first arriving apparatus.

Figure 49: Historic Total Response Performance

	Average	90th
2009	0:05:00	0:07:11
2010	0:05:07	0:07:28
2011	0:05:12	0:07:47
2012	0:05:12	0:07:39
2013	0:05:25	0:07:57

Based on a combined turnout time and travel time, fire department apparatus should be able to reach emergency incidents in 5:20 minutes for fire incidents and 5:00 minutes for medical incidents when responding as the initial first emergency responder.

EFFECTIVE RESPONSE FORCE

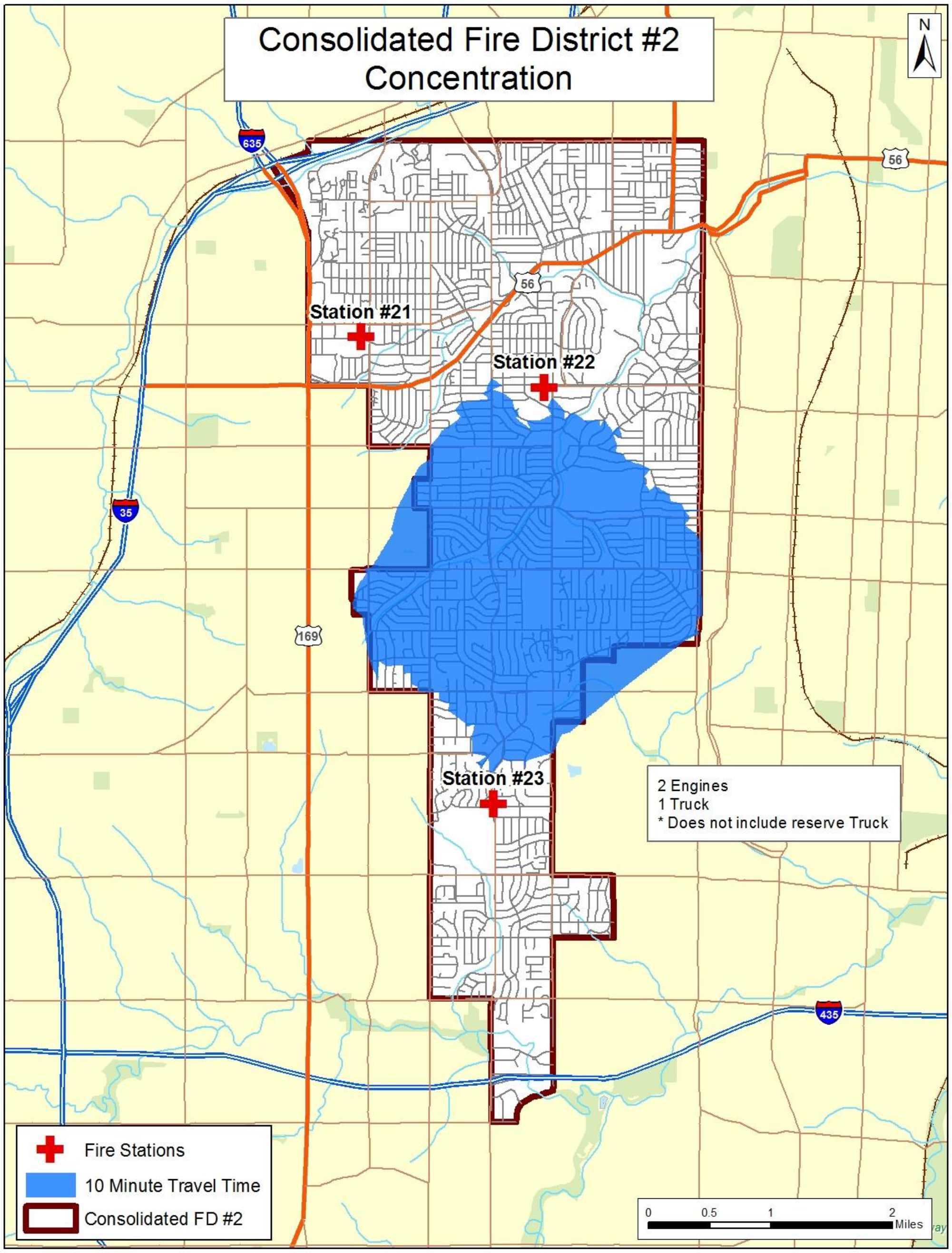
Effective Response Force (ERF) is the number of personnel required to be present on the scene of an emergency incident to safely perform the initial critical tasks necessary to initiate a fire attack and effectively mitigate the incident. The ERF specific to each individual type of incident may vary somewhat, as the initial critical tasks that must be performed can be different. However, for the purposes of this analysis an ERF assembly of two engines and one aerial ladder is used as this is consistent with the NFPA 1710 Standard for an initial attack force at a moderate risk structure fire. The following figure illustrates the department's historic ERF performance at this level for structure fires only.

Figure 50: Effective Response Force - Structure Fires

	Average	90th
2009	0:08:02	0:12:25
2010	0:08:41	0:14:41
2011	0:08:35	0:13:34
2012	0:08:51	0:11:56
2013	0:07:40	0:10:59

The figure below illustrates the modeled effective response force performance based on the existing street network.

Figure 51: Modeled Effective Response Force Assembly - Concentration



This analysis only evaluates those incidents that were recorded as building fires and received two engines and one aerial ladder response. This limits the dataset to 132 incidents over the five-year period. Other incidents received a higher number of resources but those were omitted from this analysis. Based on the low volume of working structure fires within the district combined with the current deployment and dispatch protocol for such incidents, CFD2 is performing very well at assembling an effective response force.

CALL CONCURRENCY AND RESOURCE DRAWDOWN

Another way to analyze resource workload is to examine the amount of time that multiple calls occur simultaneously. Calls for each year were examined to find the frequency with which fire department apparatus are handling multiple simultaneous calls. This is important because, as calls occur simultaneously, resources become committed and cause response times to extend due to apparatus responding from more distant locations. It is particularly important to review any trends in call concurrency over the years to identify whether or not call concurrency is likely to become an increasing factor in response time performance. The figure below illustrates how often multiple incidents are occurring simultaneously.

Figure 52: Incident Concurrency

	2009	2010	2011	2012	2013
Single	86.8%	85.4%	83.9%	86.0%	83.4%
2	12.0%	13.3%	14.0%	12.6%	14.8%
3	1.0%	1.3%	1.3%	1.3%	1.4%
4	0.2%	0.1%	0.5%	0.1%	0.3%
5	0.0%	0.0%	0.3%	0.0%	0.2%
6	0.0%	0.0%	0.0%	0.0%	0.1%
7	0.0%	0.0%	0.0%	0.0%	0.0%

As seen in the figure above, the vast majority of CFD2’s incidents occur singularly. A second simultaneous incident is occurring at a steady rate of between 12 and 15 percent. Additional simultaneous incidents are rare. It should also be understood, however, that many CFD2 incidents are responded to by multiple apparatus. Therefore, the following figure illustrates unit concurrency.

Figure 53: Unit Concurrency

	2009	2010	2011	2012	2013
Single	80.6%	79.2%	77.9%	80.3%	77.2%
2	15.8%	16.6%	17.1%	16.0%	17.5%
3	2.8%	3.4%	3.6%	3.1%	3.7%
4	0.7%	0.8%	0.9%	0.5%	1.1%
5	0.1%	0.1%	0.6%	0.1%	0.5%
6	0.0%	0.0%	0.0%	0.0%	0.1%
7	0.0%	0.0%	0.0%	0.0%	0.0%

Similar to incident concurrency, many units are responding alone for most requests for service. However, a higher rate of multiple unit responses is recording as compared to multiple incident responses. The rate of two-unit responses has remained relatively stable over the data period ranging from near 16 percent to 17.5 percent. Responses of three units or more should be closely matched to the rate of structure fires being experienced by CFD2 since those incidents require more resources than medical responses or non-structure fires.

Component F – Performance Objectives and Measures

DYNAMICS OF FIRE IN BUILDINGS

Most fires within buildings develop in a predictable fashion unless influenced by highly flammable material. Ignition, or the beginning of a fire, starts the sequence of events. It may take several minutes or even hours from the time of ignition until a flame is visible. This smoldering stage is very dangerous, especially during times when people are sleeping, since large amounts of highly toxic smoke may be generated during this phase.

Once flames do appear, the sequence continues rapidly. Combustible material adjacent to the flame heat and ignite which in turn heats and ignites other adjacent materials if sufficient oxygen is present. As the objects burn, heated gases accumulate at the ceiling of the room. Some of the gases are flammable and highly toxic.

The spread of the fire from this point continues quickly. Soon the flammable gases at the ceiling as well as other combustible material in the room of origin reach ignition temperature. At that point, an event termed "flashover" occurs; the gases and other material ignite, which in turn ignites everything in the room. Once flashover occurs, damage caused by the fire is significant and the environment within the room can no longer support human life.

Flashover usually occurs about five to eight minutes from the appearance of flame in typically furnished and ventilated buildings. Since flashover has such a dramatic influence on the outcome of a fire event, the goal of any fire agency is to apply water to a fire before flashover occurs.

Although modern codes tend to make fires in newer structures more infrequent, today's energy-efficient construction (designed to hold heat during the winter) also tends to confine the heat of a hostile fire. In addition, research has shown that modern furnishings generally burn hotter (due to synthetics).

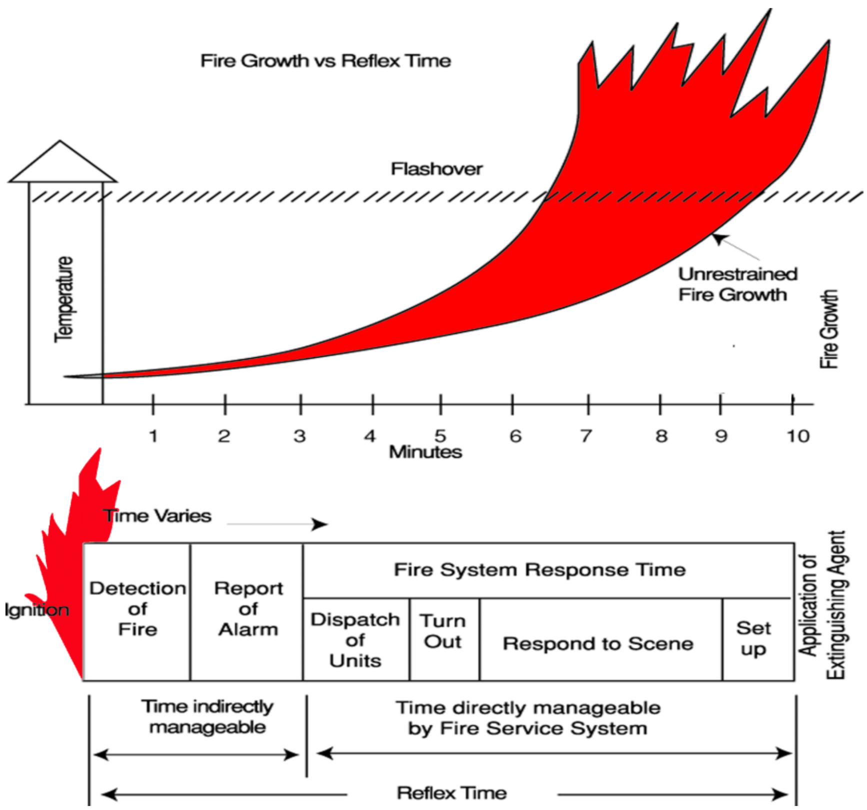
In the 1970s, scientists at the National Institute of Standards and Technology found that after a fire broke out, building occupants had about 17 minutes to escape before being overcome by heat and smoke. Today, that estimate is as short as three minutes.[7] The necessity of effective early warning (smoke alarms), early suppression (fire sprinklers), and firefighters arriving on the scene of a fire in the shortest span of time is more critical now than ever.

Perhaps as important as preventing flashover is the need to control a fire before it does damage to the structural framing of a building. Materials used to construct buildings today are often less fire resistive than the heavy structural skeletons of older frame buildings. Roof trusses and floor joists are commonly made with lighter materials that are more easily weakened by the effects of fire. "Light weight" roof trusses fail after five to seven minutes of direct flame impingement. Plywood I-beam joists can fail after as little as three minutes of flame contact. This creates a dangerous environment for firefighters.

[7] National Institute of Standards and Technology, *Performance of Home Smoke Alarms, Analysis of the Response of Several Available Technologies in Residential Fire Settings,* Bukowski, Richard, et al.

In addition, the contents of buildings today have a much greater potential for heat production than in the past. The widespread use of plastics in furnishings and other building contents rapidly accelerate fire spread and increase the amount of water needed to effectively control a fire. All of these factors make the need for early application of water essential to a successful fire outcome. A number of events must take place quickly to make it possible to achieve fire suppression prior to flashover. The figure below illustrates the sequence of events.

Figure 54: Fire Growth vs. Reflex Time



As is apparent by this description of the sequence of events, application of water in time to prevent flashover is a serious challenge for any fire department. It is critical, though, as studies of historical fire losses demonstrate.

The National Fire Protection Association found that fires contained to the room of origin (typically extinguished prior to or immediately following flashover) had significantly lower rates of death, injury, and property loss when compared to fires that had an opportunity to spread beyond the room of origin (typically extinguished post-flashover).

EMERGENCY MEDICAL EVENT SEQUENCE

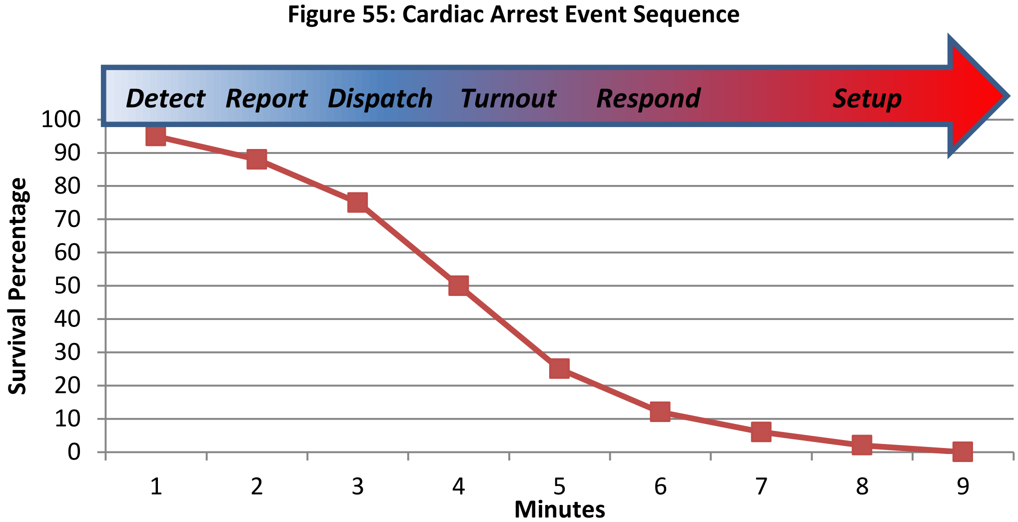
Cardiac arrest is the most significant life-threatening medical event in emergency medicine today. A victim of cardiac arrest has mere minutes in which to receive lifesaving care if there is to be any hope for resuscitation.

The American Heart Association (AHA) issued a set of cardiopulmonary resuscitation guidelines designed to streamline emergency procedures for heart attack victims, and to increase the likelihood of survival. The AHA guidelines include goals for the application of cardiac defibrillation to cardiac arrest victims.

Cardiac arrest survival chances fall by 7 to 10 percent for every minute between collapse and defibrillation. Consequently, the AHA recommends cardiac defibrillation within five minutes of cardiac arrest.

The following table illustrating cardiac arrest survivability was published in a 1998 study by the Emergency medical Directors Association of California and illustrates the value of early CPR and cardiac defibrillation.

Figure 55: Cardiac Arrest Event Sequence



The percentage of opportunity for recovery from cardiac arrest drops quickly as time progresses. The stages of medical response are very similar to the components described for a fire response. Recent research stresses the importance of rapid cardiac defibrillation and administration of certain medications as a means of improving the opportunity for successful resuscitation and survival.

FUTURE SERVICE DELIVERY GOALS

CFD2 has established the following service delivery targets for emergency response times.

Call Processing

Based on the standard, CFD2's performance objective is to have all fire and other emergency calls processed and dispatched within 70 seconds when measured at the 95th percentile.

Turnout

CFD2's performance goal is to have units en route to all emergency incidents within 80 seconds when measured at the 90th percentile.

First Unit Arrival

CFD2's performance goal is to have the first unit arrive on the scene of all emergency incidents within 6:30 when measured at the 90th percentile.

Effective Response Force Assembly

CFD2's performance goals is to assemble an effective response force of two engines and one aerial truck on the scene of all working structure fires within 10:00 when measured at the 90th percentile.

Component G – Overview of Compliance Methodology

The preceding sections of this report provide a detailed analysis of the historical performance of CFD2 resources. In order for this analysis to prove beneficial to decision-makers, continued analysis should be performed on a routine basis.

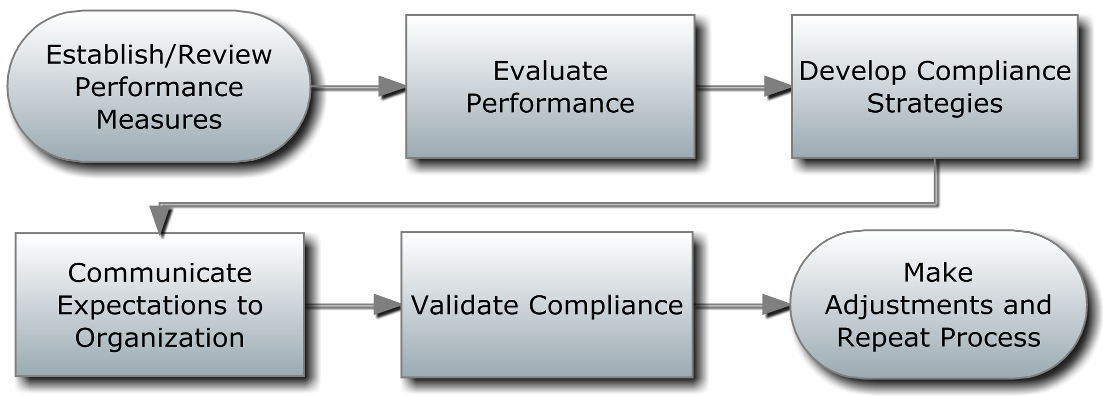
CFD2 is committed to a continual process of analyzing and evaluating actual performance against the adopted standards of cover and has adopted policies to enhance the data collection procedures of field operations personnel. Periodic review of the department's records management system reports will be necessary to ensure compliance and reliability of data.

Maintenance of effort requires that performance objectives and performance measures are evaluated and efforts are made to reach or maintain the established levels.

Compliance Model

Compliance is best achieved through a systematic approach. CFD2 has identified the following six-step compliance model.

Figure 56: Maintenance of Effort Compliance Model



Step 1: Establish/Review Performance Measures

1. Complete the initial Standard of Cover process. Conduct a full review of the performance measures every five years. This process is risk-based and evaluates:
   - Services provided are identified
   - Levels of service are defined
   - Levels of risk are categorized
   - Performance Objective and Measures developed:
     - Distribution Measures
     - Concentration Measures

Step 2: Evaluate Performance

1. Performance measures are applied to actual services provided:
    - System level
    - First Due Area level
    - Unit level

Step 3: Develop Compliance Strategies

1. Determine issues and opportunities:
    - Determine what needs to be done to close identified gaps
    - Determine if resources can or should be reallocated
    - Seek alternative methods to provide service at desired levels
    - Develop budget estimates as necessary
    - Seek additional funding commitment as necessary

Step 4: Communicate Expectations to Organization and Stakeholders

1. Communicate expectations:
    - Explain method of measuring compliance to personnel who are expected to perform the services
    - Provide feedback mechanisms
    - Define consequences of noncompliance
2. Train personnel:
    - Provide appropriate levels of training/direction for all affected personnel
    - Communicate consequences of noncompliance
    - Modify (remediate) internal processes, application systems, and technical infrastructure as necessary to comply

Step 5: Validate Compliance

1. Develop and deploy verification tools and/or techniques that can be used by divisions of the organization on an ongoing basis to verify that they are meeting the requirements:
    - Monthly evaluation:
        - Performance by Unit
        - Overall Performance
        - Review of performance by Division
    - Quarterly evaluation:
        - Performance by Unit

  - Performance by First Due
  - Overall Performance
  - Review of performance by Executive Management

2. Determine whether independent validation and verification techniques will be used to measure the performance, and solicit external assistance as necessary.

Step 6: Make Adjustments/Repeat Process

1. Review changes to ensure that service levels have been maintained or improved. Develop and implement a review program to ensure ongoing compliance:
   - Annual Review and Evaluation
     - Performance by Unit
     - Performance by First Due
     - Overall Performance
     - Review of performance by CFD2
     - Adjustment of performance standards by CFD2 as necessary
   - Five-Year Update of Standards
     - Performance by Unit
     - Performance by First Due
     - Overall Performance
     - Adoption of performance measures by CFD2
2. Establish management processes to deal with future changes in the CFD2 service area.

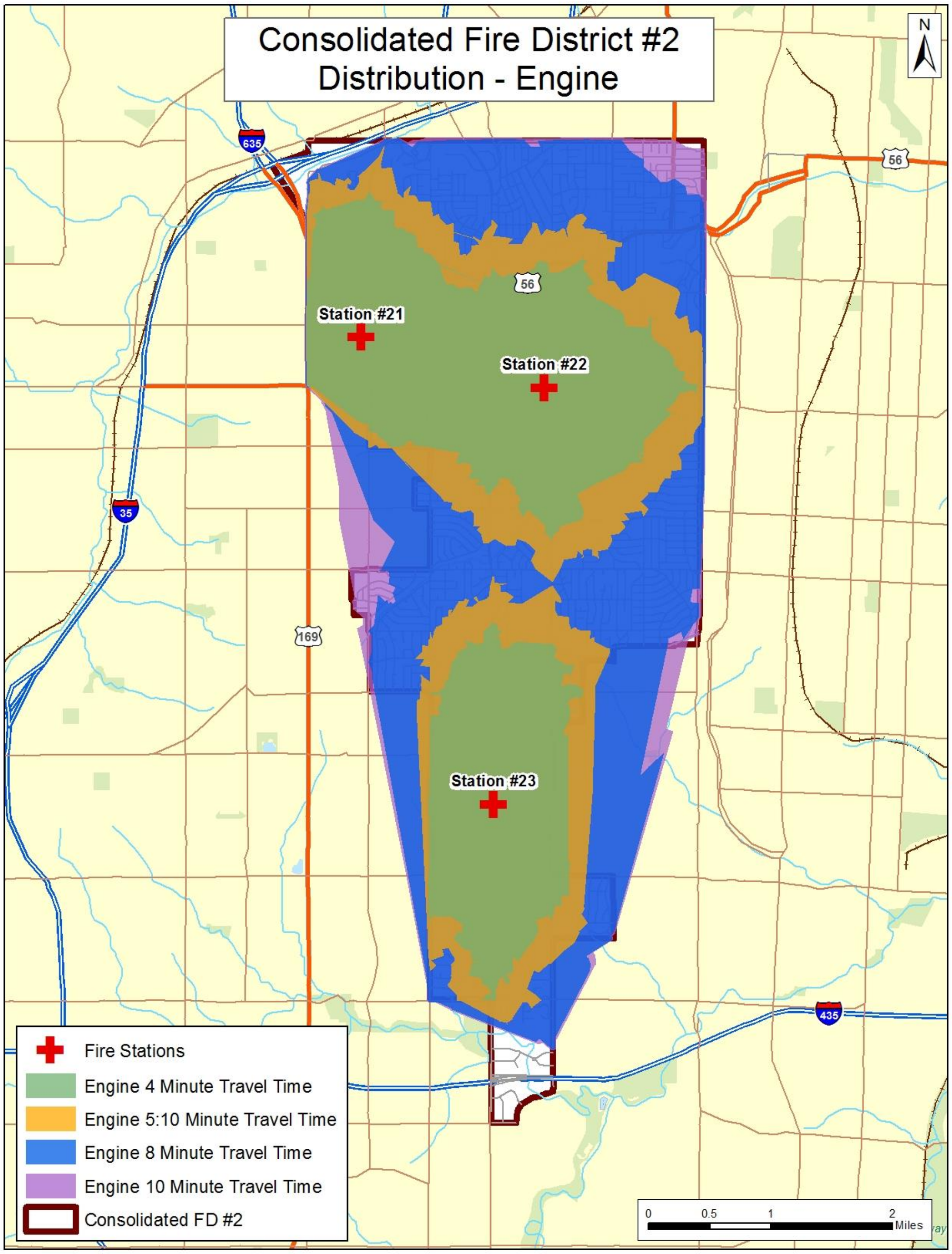
Component H – Overall Evaluation, Conclusions and Recommendations to Policy Makers

CFD2 has analyzed its current performance in comparison to its future service delivery goals in order to be able to present possible means of improvement to its policymakers. The discussion of the potential service improvements is provided here.

EVALUATION OF DEPLOYMENT DEFICIENCIES AND IMPROVEMENT INITIATIEVES

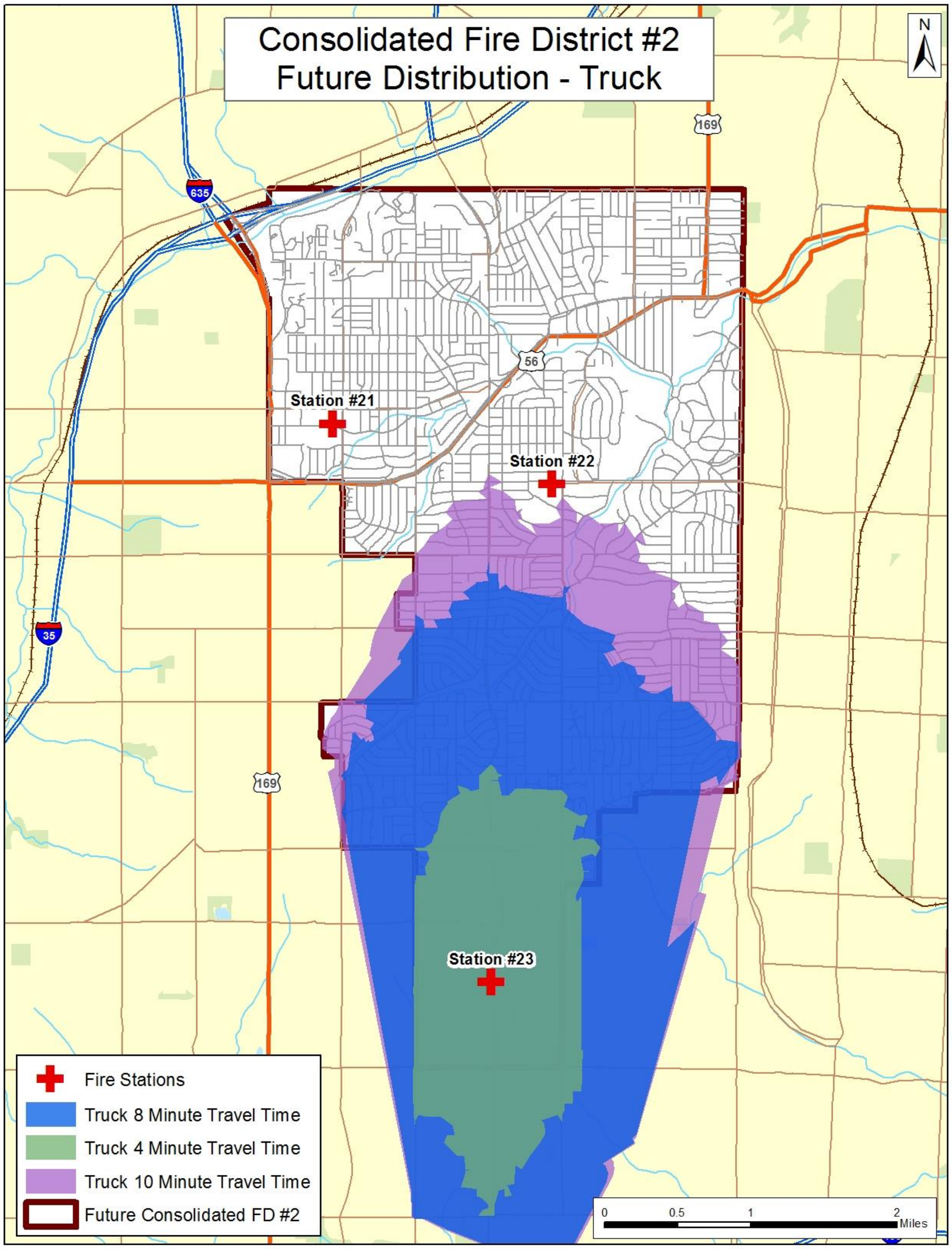
Improving or increasing the distribution of fire stations in a community often has the effect of reducing travel time to calls, since fire stations are typically added or relocated to areas of strong service demand. If, for future planning consideration, a turnout time of 80 seconds is assumed for both fire and medical incidents, travel time must then be reduced to 5:10 to at least 90 percent of incidents in the CFD2 response area. The following figure shows the areas of the district where the proposed travel time of an engine from an existing fire station can be achieved, using computer modeled travel time.

Figure 57: Modeled 5:10 Travel Time from Existing Stations



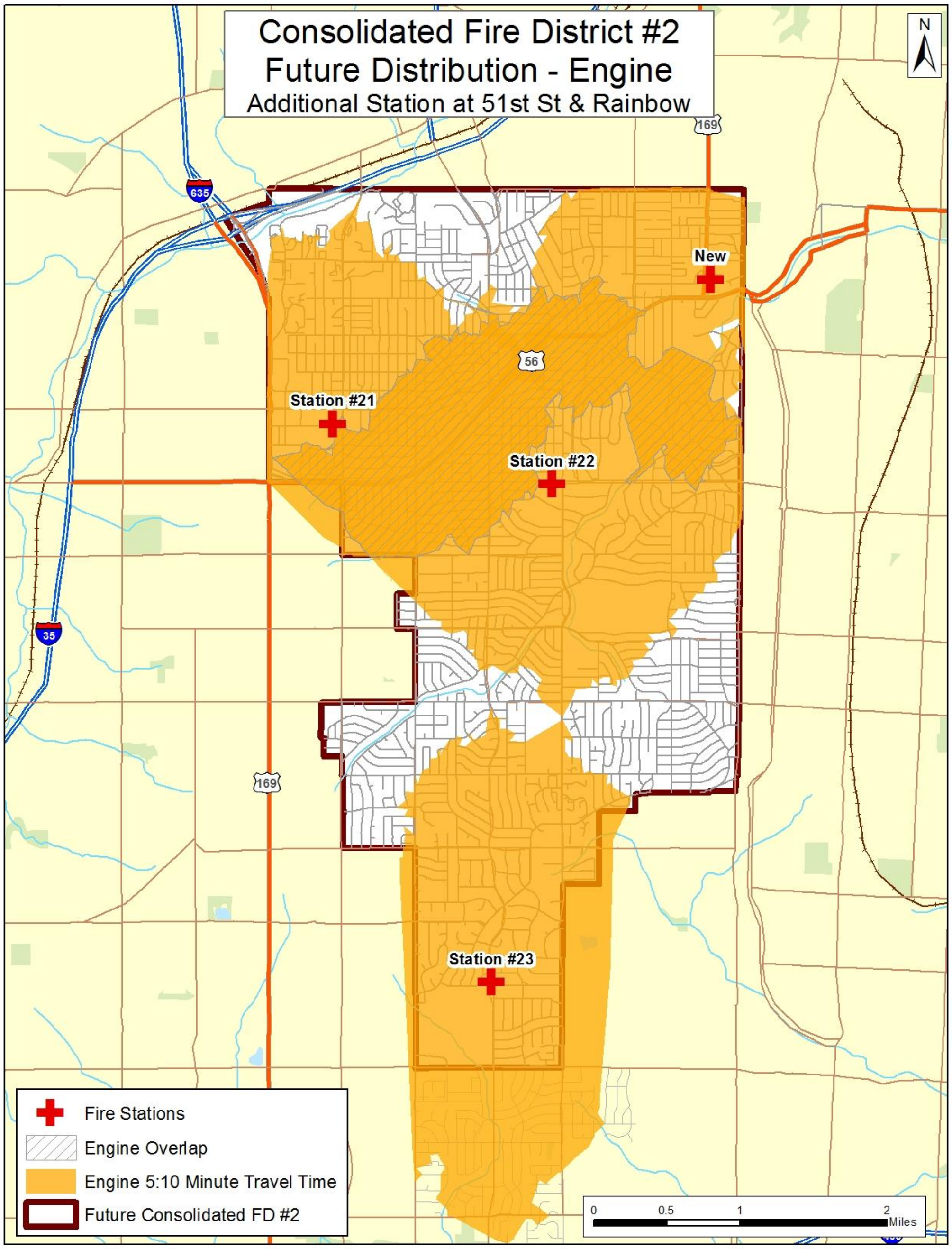
As can be seen in the figure above, a significant amount of the district is outside the 5:10 travel model. In fact, only 60.9 percent of historic service demand is within the 5:10 travel model. Coverage of truck is even less as illustrated below with only 24.14 percent of historic service demand within the 8:40 travel model.

Figure 58: Modeled Truck Coverage



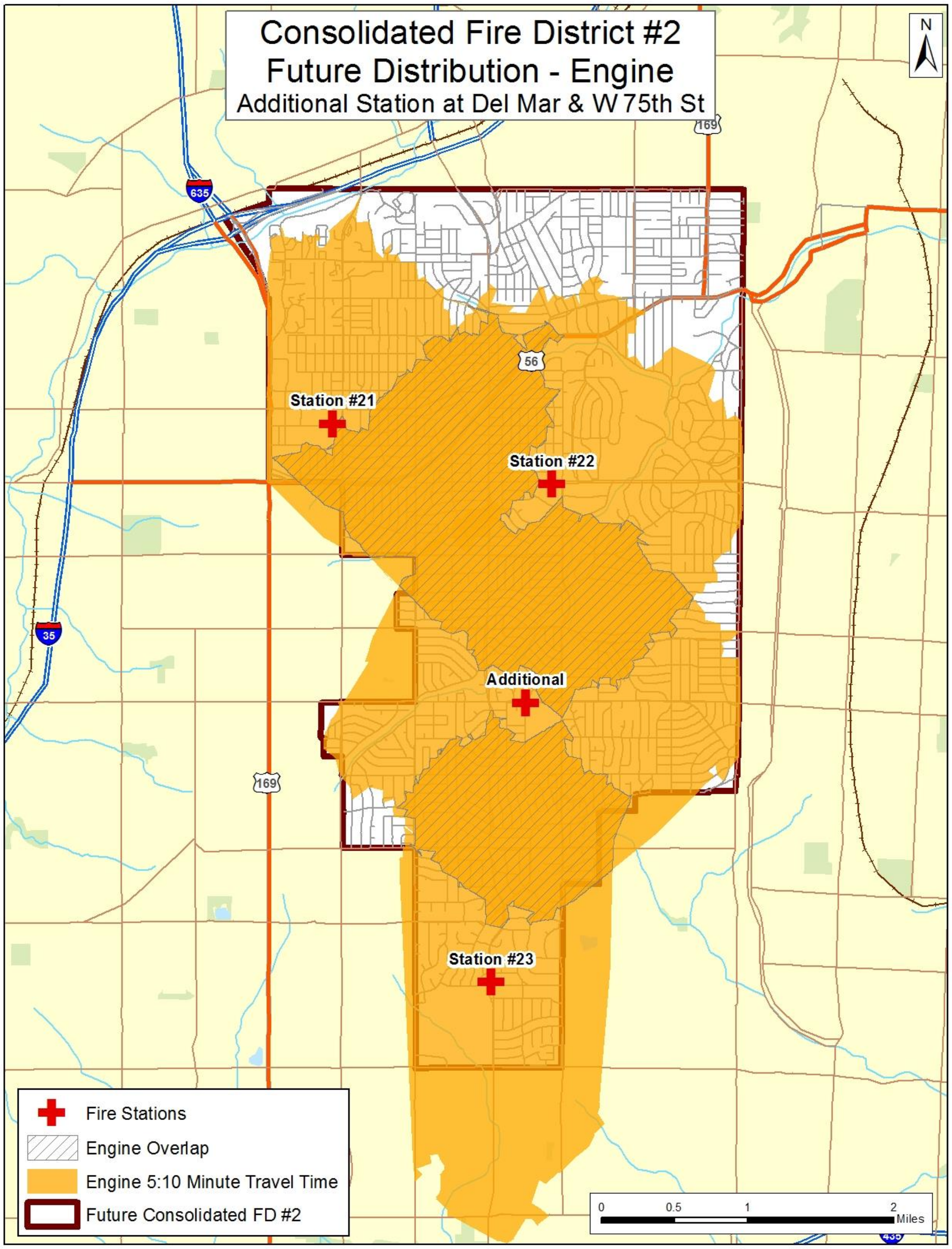
In order to address some of the current deficiencies, the department has identified two locations for potential future stations that will provide better coverage to the entire response area. The first location is in the northeast corner of the district and improves historic service demand coverage to 64.4 percent within the 5:10 travel model as illustrated below.

Figure 59: Additional Fire Station – Option 1



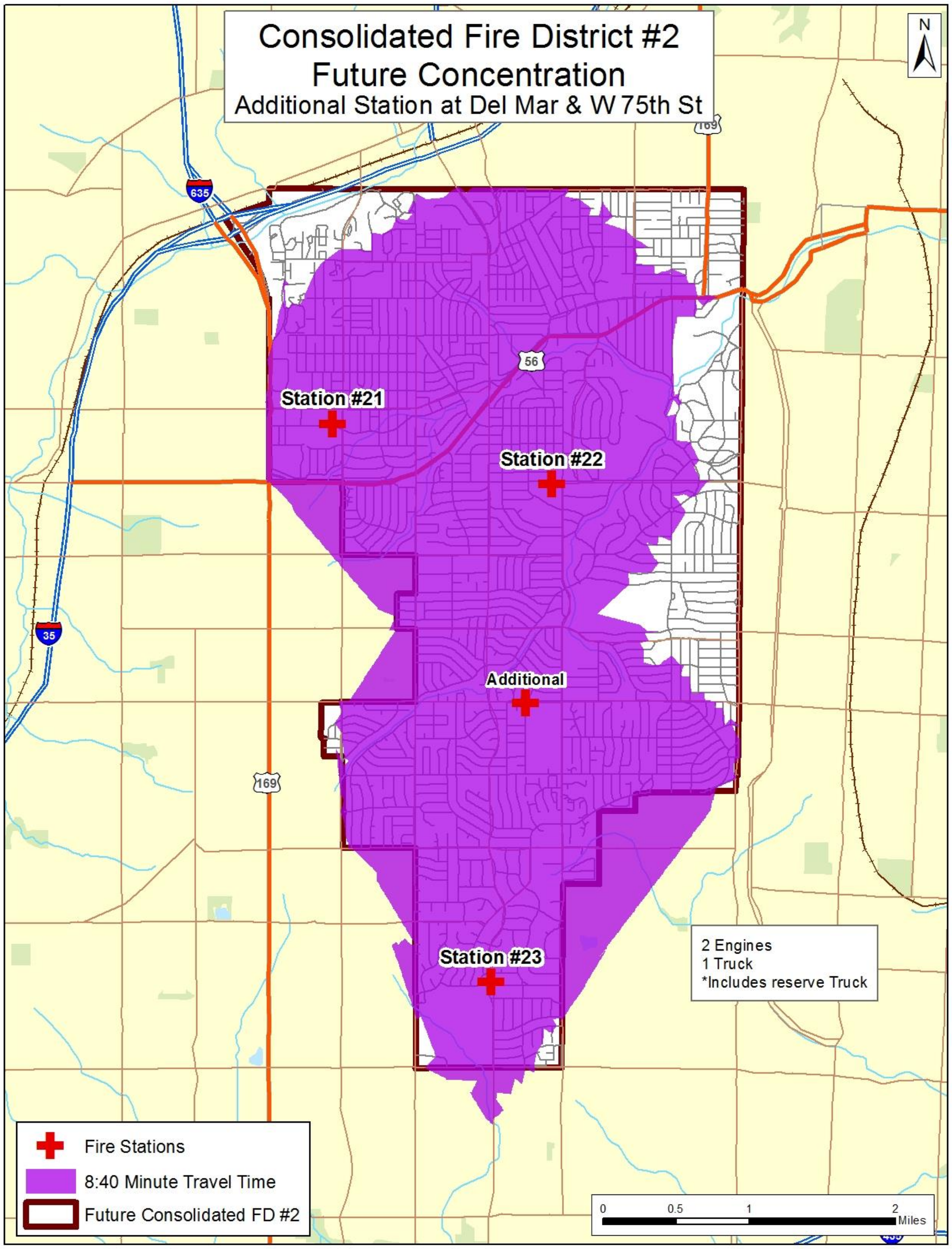
While providing coverage to a relatively high service demand area, the location in close proximity to the district boundary limits its total coverage area. A second option is to place a station in the center of the district to provide additional coverage as well as improvement in effective response force. The figure below illustrates the approximate location of an additional central station.

Figure 60: Additional Fire Station – Option 2



Although this station location increases redundancy in the central core of the district, the positive impact on effective response force should outweigh this redundancy as illustrated below.

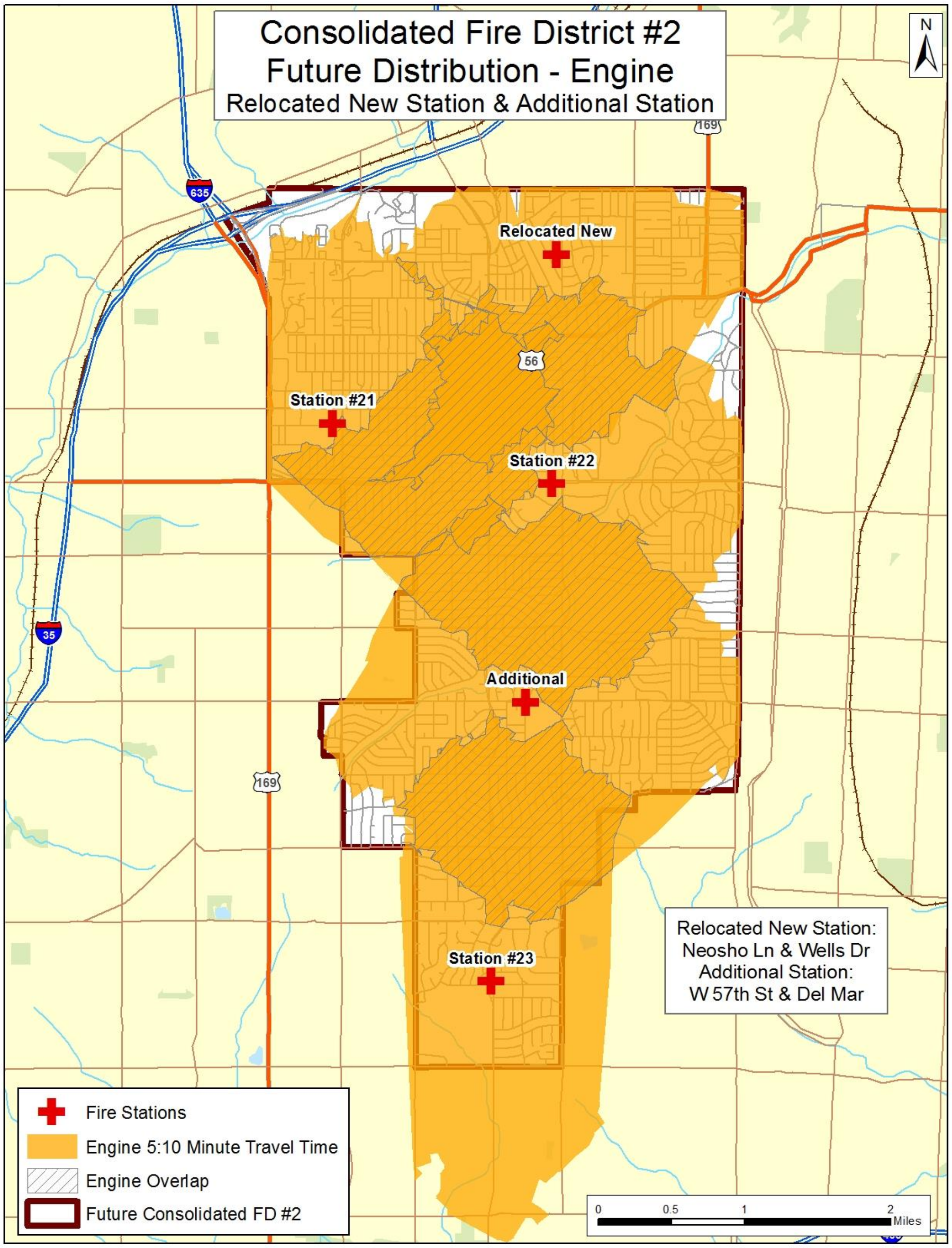
Figure 61: Effective Response Force - Option 2



Placement of an aerial apparatus at the new station, combined with the current deployment and utilization of the reserve aerial would accomplish 70.1 percent coverage within the 8:40 travel model, compared to 66.7 percent in Option 1.

While these options improve the overall performance of the organization, it still does not achieve the response performance objectives. In order to achieve these goals, additional stations would be necessary, along with additional apparatus and personnel. The figure below provides 93.1 percent coverage within 5:10.

Figure 62: Additional Fire Stations – Option 3



This distribution would also allow an effective response force to reach 74 percent of historic service demand within 8:40 as illustrated below.

Figure 63: Effective Response Force - Option 3