COLUMBUS

Fire and Rescue

2013 STANDARDS OF COVER 2018

COMMUNITY RISK ASSESSMENT

STANDARDS OF COVER INTRODUCTION

Community expectations demand that public service agencies provide programs and services that meet community needs in an effective, efficient and fiscally responsible manner. However, what performance metrics are used to measure program effectiveness and efficiency as well as define acceptable levels of service? Because each community differs in its size, demographics, risks, and resources; using a "one-size-fits-all" approach is not practicable.

The Commission on Fire Accreditation International (CFAI) utilizes the Standards of Cover as a systematic methodology for documenting fire agency performance in the delivery of its services taking into account the community's unique characteristics. CFAI defined Standards of Cover (SOC) as "those written procedures that determine the distribution and concentration of fixed and mobile resources of an organization" (CFAI, 2008). Within this definition are key words that are critical to an agency's performance; distribution and concentration. Distribution measures first due unit response taking into account location, response district, and time while concentration examines the effective response force comprised of secondary units which provide necessary equipment and staffing to mitigate the event. Why are these factors important? Simply, if initial resources (distribution) arrive too late or supporting units (concentration) are inadequate, the incident will continue to escalate endangering not only the general public but also department personnel.

The Standards of Cover will provide a comprehensive overview of the City of Columbus and Columbus Fire and Rescue. This report will identify specific hazards and risks found within the community, an analysis of critical tasking and effective response force determinations, distribution and concentration performance evaluations, the establishment of baseline and benchmark performance objectives, and compliance methodology. By evaluating these key components, CFR will be able to identify areas of concern and recommend solutions to maximize the effectiveness of services provided.

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EXECUTIVE SUMMARY

The development of the Standards of Cover presented Columbus Fire and Rescue with an exceptional opportunity to evaluate its programs and services based upon nationally recognized standards and industry best practices. Consisting of eight sections, the Standards of Cover examined the multiple factors that affected department operations and service delivery performance. The culmination of this report provided a foundation for organizational excellence by affording a continuous process of self-assessment and self-improvement.

The first step in this process involved a thorough review of the City of Columbus that provided an understanding of the characteristics and qualities which makes the city unique. This review provided key insight into specific factors that influence which services are provided and how these services are delivered. This influence was dictated by community needs, community expectations, and authority granted by the governing body. Included in this section was an overview of Columbus Fire and Rescue. A historical and agency milestone review traced the evolution of the department from its origin to its present day status. Today, the department offers a myriad of programs and services that remain consistent with its "all-hazard" philosophy of emergency response. Columbus Fire and Rescue is recognized as a progressive leader in public safety as well as "breaking new ground" by seeking to become Mississippi's first nationally accredited fire department.

A major section of the Standards of Cover was the Community Risk Assessment (CRA). The CRA was a comprehensive assessment that examined major risks that included residential and commercial properties, hazardous material sites, population and at-risk target group densities, and water system performance. Additionally, a disaster vulnerability assessment reflected the city's susceptibility to 12 natural events. The CRA was instrumental in establishing risk levels within each service delivery program. These risk levels were used to identify critical tasks and the resources that are necessary to stabilize and mitigate an emergency event. One of the most beneficial aspects of the CRA was the analysis of risks by fire management zones. This evaluation enabled the department to review risks by geographical zones, which was important in determining the adequacy of department infrastructure and resources.

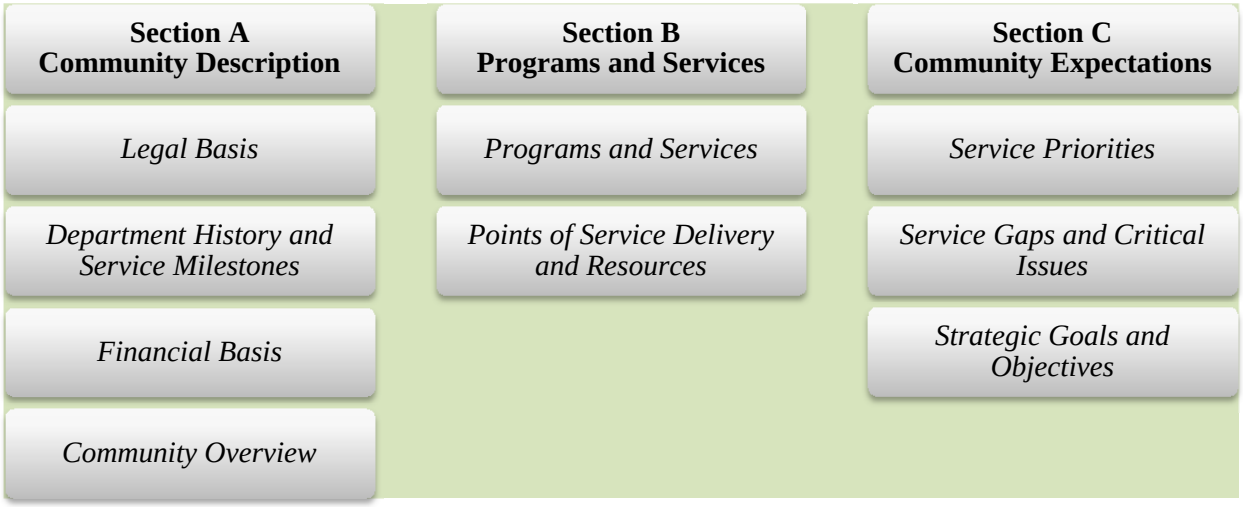
The Summary of System Performance reviewed the department's performance in terms of service delivery. The importance time plays in an emergency situation was keenly illustrated by the relationship between time critical events and agency intervention. Furthermore, every incident has a sequence of events from which response data is generated. These times provided hard data that are used for baseline response performance. Of significance was the relevance of four factors that measure specific aspects of department performance. These factors were distribution, concentration, reliability, and comparability. Using distribution and concentration response time performances, Dynamically Defined Districts (D3) generated mapping that illustrated areas where response time performance objectives are being met; but more importantly, areas of non-compliance.

Performance Measure Objective Adoption identified performance benchmarks based upon nationally recognized standards and/or industry best practices. Benchmark objectives established response time goals that the department will strive to meet or exceed. Benchmark objectives represent a continual self-improvement process.

The final two sections described the department's compliance methodology and overall evaluation. Methodology is used to verify and validate department response time compliance. The department will utilize a six step compliance methodology that will ensure performance is being monitored and processes are implemented in order for the department to meet or exceed performance objectives. The overall evaluation provided a summary or conclusions based upon the Standards of Cover document. These conclusions brought to light areas of where the department has excelled as well as areas where improvements may be made. These areas of weaknesses were addressed by seven recommendations to improve overall performance. These recommendations are in addition to the two changes CFR has already implemented to improve performance and safety.

Accreditation represents a major paradigm shift of department operation and culture. The Standards of Cover serves as a dynamic document guiding the department's efforts towards organizational excellence. This pursuit of excellence will benefit not only the department but also the community, the primary reason for our existence.

DESCRIPTION OF CURRENT DEPLOYMENT



A. Community Description

Section A provides a comprehensive overview of Columbus by examining four key features. These elements provide an understanding of city governance and legal authority, the department, and unique aspects of the community.

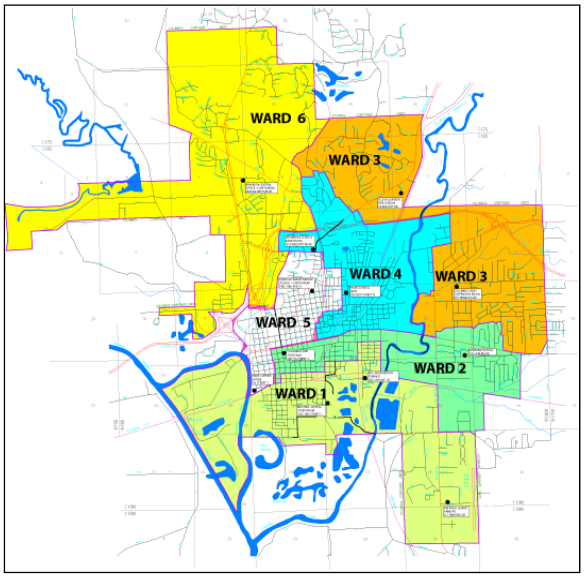
Legal Basis

Columbus was formally organized on March 8, 1884 under a special charter exclusive to the city. Included in this charter are the defined jurisdictional limits of the city and the vested authority of the mayor and council. Further governmental authority and responsibilities of individual departments are contained within the Columbus Code of Ordinances. Columbus is subject to the mandates established by the MS Municipal Code, MS Code Annotated as well as other state and federal statutes and regulations. The city is divided into six municipal wards that serve as districts for citizen representation. Columbus is managed by a mayor/council form of government. The mayor and council are elected to serve four year terms. The Mayor serves as the Chief Executive Officer overseeing the daily administration of city operations while the six council members serve as the primary point of contact for citizen concerns and to address problems within their respective wards. Major responsibilities of the mayor and council include enforcing/adopting ordinances, ensuring compliance with city and department policies,

department performance review, and establishing public policy through allocation of funds and adoption of the city budget. On the first and third Tuesday of each month, council meetings are held to conduct city business with resolution of issues being determined by a council majority vote. The mayor will vote only in the event of a tie.

The following individuals are the current elected officials for the City of Columbus:

Robert E. Smith, SR ……..…..Mayor
Gene A. Taylor ……..…..Ward 1
Joseph W. Mickens, SR ..……....Ward 2
Charlie Box ……..……..Ward 3
Marty Turner ……..Ward 4
Kabir Karriem …….Ward 5
Bill Gavin ..…….……Ward 6



Map A1: Columbus Ward Districts

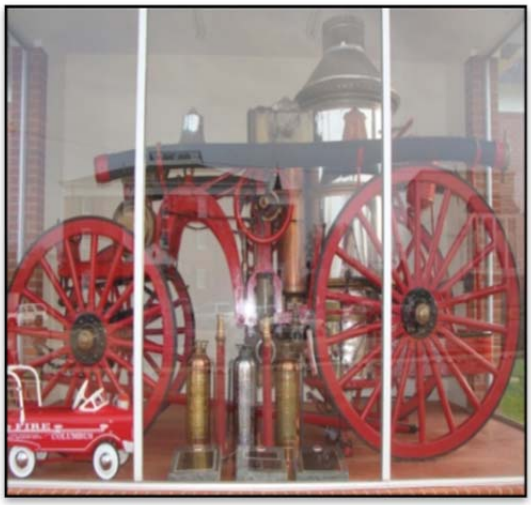
Senior administrative officials are appointed by the Mayor and Council. These officials include the Chief Operations Officer (COO), the Chief Financial Officer (CFO), and city department heads. Senior officials attend weekly meetings with the Mayor to discuss city and departmental issues. Department heads report to the Chief Operations Officer with the exception of the fire and police chiefs, who report directly to the Mayor.

The legal authority for Columbus Fire & Rescue (CFR) to provide emergency services is granted through state law, city charter, and local ordinance. MS Code Annotated 1972 §§ 21-25-3 grants legal authority to municipalities to provide for and maintain a fire department. This law is repeated in City of Columbus Charter Section 24; Part 13 which authorizes the city to organize, establish, and provide for a fire department. Columbus Code of Ordinances Section 12 further defines the authority and responsibilities of the department and fire chief. The department remains compliant with federal, state, and local regulations through adherence to Columbus Code of Ordinance, City of Columbus Personnel Handbook, Columbus Civil Service Handbook and CFR's Policy and Procedures Manual.

Agency History and Service Milestones

CFR History

The history of Columbus Fire and Rescue was traced through minutes recorded in the *Excerpts from City Minutes, City of Columbus Fire Department* found in the Local History and Records section of the Columbus Public Library. The origins of Columbus Fire Department date back to April 4, 1840 when the city council approved the purchase of its first fire apparatus and adopted general rules and duties that governed Engine Company 1. The department implemented its first fire prevention initiatives in 1844 that required building owners to supply fire buckets for each story of the building as well as allowing churches to ring their bells in "all cases of alarm of fire." By 1846, the department had added two more volunteer companies; Engine Company 2 and the Hercules Hook and Ladder Company. In 1850, the city council appropriated and assessed the first taxes to support and maintain the department. The first Superintendent/Chief Engineer of the department was appointed on November 21, 1866 to oversee department operations.



The fire steam engine Luxapalila

The department purchased its first steam fire engine, the Luxapalila, in 1872 to replace its hand-pump apparatus and complement the Hercules Hook and Ladder, the Coal Cart, and the Rough and Ready, the city's all-black volunteer contingent. One would be remiss not to mention the historical significance of these groups. Each took great pride in their ability and professionalism. Many "spirited" responses resulted because of their desire to arrive first and be recognized as the city's best. While highly competitive, these companies united to fight many memorable fires. To honor their legacy, the department restored and proudly displays the Luxapalila in a showroom located at Station 1. Additionally, the Luxapalila is featured in the department's uniform patch. Both demonstrations serve as symbols of the altruistic values of members past, present, and future. It is also worth noting that the Luxapalila serves as the city's seal.

During the 1900s, the department continued to grow in response to community needs. In July of 1901, the department had transitioned from an all-volunteer to a combination department with the hiring of three full-time firefighters. The department purchased its first motorized apparatus in 1918 which effectively ended the reign of the horse drawn steam engine. The importance of formalized training was recognized when the fire chief attended a 30 day Fireman's Training School course held in Jackson, MS in 1928. During the early 1930s, the department constructed its third station and had hired additional personnel which transitioned Columbus Fire from a combination to a career department. By 1960, the department had built Station 4, the department's oldest active station, to provide fire protection for East Columbus.

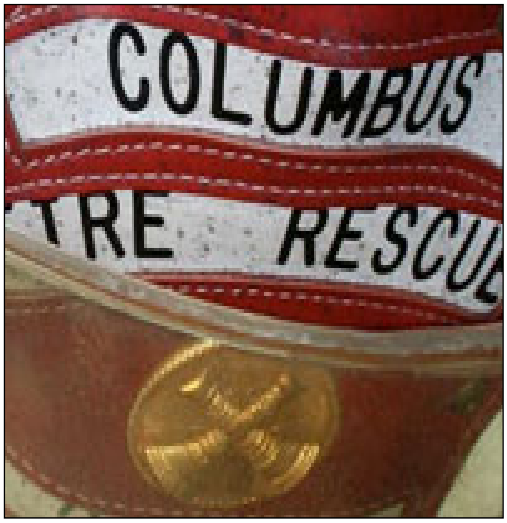
From 1980 through 2000, the department upgraded its infrastructure and added programs to meet community needs. In 1981, Station 1 was relocated to its current College Street location to serve as the administrative headquarters for the department and support departmental growth of personnel and apparatus. Station 5 was also constructed in 1981 due to the 1978-79 annexation that approximately doubled the size of East Columbus. The department dedicated a full time position for code enforcement and plans review in 1984. Prior to this time, the city's Building department was responsible for all code enforcement and plans reviews. By adding this position, the department assumed an active role in community fire prevention and safety. A major change occurred in 1988 when Columbus Fire Department, along with Starkville and West Point Fire Departments, formed the Golden Triangle Regional (GTR) Hazardous Materials Response Team. This tri-county alliance provided a multi-jurisdictional response and mitigation capability to highway, rail, and fixed facility hazardous materials incidents. Team equipment was purchased from funds appropriated from each city and county in which the departments were located. This collaboration provided a service that would have been fiscally unfeasible for a single agency.

In 1996 the department experienced a major paradigm shift with the addition of emergency medical response (EMR) to its services due to community gaps in pre-hospital care. The city's lone transport/care provider had significant travel times to certain areas within the city. Due to the distribution of stations throughout the city, response times were significantly reduced resulting in quicker pre-hospital care being initiated. Within the next year, the department upgraded this service to a basic life support (BLS) capability when personnel became certified as

Emergency Medical Technicians (EMTs). In 1998, the department added dive rescue to its services due to increased recreational use of area waterways and lakes. Prior to this time, dive rescue was a volunteer effort coordinated by the Lowndes County Emergency Management Agency. The necessity of this transition to the department was in response to the growing number of water related emergencies, faster team response, and greater access to training, equipment, and funding. Regarding apparatus, Engine 21 (now E24) was purchased in 1995 and Engine 25 was purchased in 1999.

Service Milestones

Major milestones have occurred since 2000. The Public Education Division was created in 2000 utilizing a full time Fire and Life Safety Educator to develop, implement, and deliver fire prevention and injury prevention programs. This division incorporates an "all risk" approach to fire and injury awareness/prevention targeting not only the general public but also specific risk groups such as K-6 and senior citizens. In 2002, the department added high angle and confined space rescue to assist industries in meeting compliance with OSHA 29 CFR 1910.146. In response to the city's 1995 annexation, Station 3 was relocated in 2000 to provide protection to the northwest / Highway 45 N areas. Station 2 was relocated in 2001 to provide protection for the north / Highway 12 areas. As part of its apparatus replacement program, the department replaced Engine 23 in 2001, Engine 21 in 2010, and Engine 22 in 2013. The department added Tanker 31 in 2009.



As a result of the terrorist attacks of September 11, 2001 and local weather events, the department adopted an all-hazard response philosophy. In 2004, the department became a member of Mississippi Task Force 2, a statewide mitigation response initiative implemented by the MS Office of Homeland Security. This system provides mutual aid to local jurisdictions during events that overwhelm local resources or capabilities. As a result of this mission change, Columbus Fire Department formally became Columbus Fire and Rescue in 2006. To support this

mission change, the department added capabilities in structural collapse (2006), overland search and rescue (2007), swift-water/flood (2009), and trench rescue (2009). To provide administrative oversight and coordinate team activities, the department created the Special Operations Chief command staff position in 2011. With the addition of these services, the department considerably upgraded its technical rescue equipment cache. The department constructed the Technical Rescue Equipment Building located at Station 2 in 2009 to store this added equipment. This building also serves as a central staging point for technical rescue team response.

Today, Columbus Fire and Rescue (CFR) is allotted a staffing level of 71 full time positions. From 5 stations, the department responds to approximately 2,550 incidents per year within the jurisdictional boundaries established by Section 1 of the City of Columbus Charter. CFR also responds to calls outside the jurisdiction for automatic and requested mutual aid. The department has achieved a Class 4 fire insurance rating based upon the Mississippi State Rating Bureau (MSRB) classification system. The MSRB system is based upon a point system evaluating water supply (1950 points / 39%), the fire department (1950 points / 39%), fire service communications (450 points / 9%), and fire safety controls (650 points / 13%).

Financial Basis

The Chief Financial Officer is responsible for the planning, preparation, and administrative oversight of city finances as mandated by MS Annotated Code §21 Chapter 35, Municipal Budget. The city follows the MS State Auditors Municipal Audit and Accounting Guide which adheres to Generally Accepted Accounting Principles (GAAP) guidelines. The city's operating budget is primarily funded through revenues from state sales taxes and city ad valorem assessments. Additional funding is provided through franchise fees, fines, and federal and state grants. The governing body establishes public policy by approving department programs and services through funding allocations. The annual budget cycle is represented by the following timeline:

- The development of the department's preliminary budget and completion of the Capital Improvement Plan begins in June. The budget is developed through input provided by personnel, the command staff, and a review of department annual program reports.

- Administrative budget hearings are conducted in July and August by the Mayor, Chief Operations Officer, and Chief Financial Officer. Department budgets are set based upon revenue projections and finalized to reflect a balanced budget.
- The final budget is published in September for public review and a date is set for public hearings.
- After the public hearing, the City Council adopts the budget. Once set, expenditures shall not exceed budget line item allocations (MS Code §21-35-15) unless adjusted through MS Municipal code allowances.

Although funded from the city's general fund the department receives supplemental funding from the MS State Fire Insurance Rebate Program as well as federal and state grants. The Fire Insurance Rebate fund, authorized by MS Code Annotated 1972 §§ 83-1-37, is based upon a percentage of appropriated funds determined by population. These funds are limited to fire suppression training and fire related capital improvements such as apparatus purchases and station construction. Through financial and strategic planning, appropriate funding levels are maintained to support program continuance and enable the department to accomplish its mission.

City of Columbus Overview

Columbus is located in Lowndes County in the east central region of the state. The city serves as the county's municipal seat. City boundaries are clearly defined in Section 1 of the City Charter. Along with the municipalities of Starkville and West Point, Columbus forms an area of the state known as the "Golden Triangle," a regional alliance dedicated to mutual economic growth and support.

Figure 1: City Location

Columbus has a long and storied past. Known originally as Possum Town, Columbus was founded on the Plymouth Bluff region in 1821 as a regional trading post. The establishment soon relocated to its current location to take advantage of the Tombigbee and Luxapalila River transportation routes. Columbus quickly prospered due to its river trade and area farming.

While changing through the years, the city has been able to maintain its rich heritage and warm southern tradition. Many historical assets exemplify this heritage such as the annual Pilgrimage Tour featuring the city's pre-Civil War antebellum homes, Friendship Cemetery which is recognized as the origin of Memorial Day, and Mississippi University for Women, the nation's first state funded university for women. The city is also recognized for its Market Street Festival. This annual event is one of the largest in the State and has been named as a Top 20 Event in the Southeast by the Southeast Tourism Society for the past 14 years. Market Street typically draws crowds in excess of 40,000 over the 2 day event. The cultural diversity of the city is prominently featured in several African-American community events that include Juneteenth and the Seventh Avenue Heritage Festival. Although outside the city limits, Columbus is home to the Columbus Air Force Base, an integral part of the community for over 70 years. Columbus has abundant natural resources that support recreational and sporting events. These resources include the Tennessee-Tombigbee Waterway and Columbus Lake, the Riverwalk, Propst Park, and the Columbus Municipal Soccer Complex.

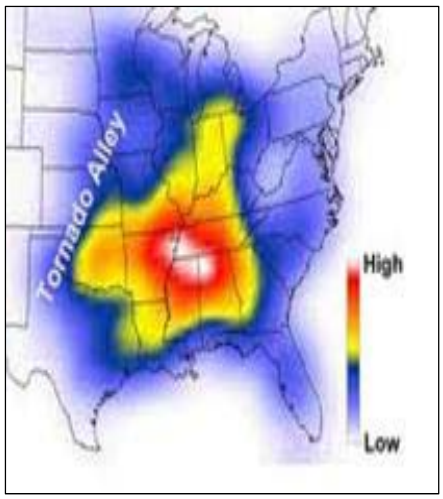
Geographic Profile

Topography

Sitting 217 feet above sea level, Columbus has a total area of 23.2 square miles. The northern part of the city has hills and bluffs typical of the Black Prairie/Northeastern Hills geographical region. However, the majority of the city lies in the relatively flat portion of the county common of floodplains characteristics. Columbus has both herbaceous and woody plant vegetation indigenous to the southeastern United States reflecting a deciduous/mixed forest makeup. Vegetation is mainly found in residential, recreational, and undeveloped areas of the city. Columbus is transected by two rivers and 2 rail lines. The Luxapalila River transects the city along a north/south axis dividing the city into two main areas; Columbus and East Columbus. There are four points of access connecting these two areas. The old Tombigbee River channel isolates "The Island." Access to this area is restricted to one access point. The Kansas City Southern rail-line transects the city along an east/west axis running along 7th Avenue S. and crosses Hwy 69 S. in East Columbus. The BNSF rail-line runs along a north/south axis running between 21st and 22nd Streets and crosses major roadways that include Main St., 7th Avenue N., and 14th Avenue N.

Environmental

Columbus has a climate typical of the southern region of the United States. The average low temperature is 33° F (January) while the average high is 93° F (July/August). The region experiences high humidity with heat index levels exceeding 105° F being common. The average annual rainfall is 55.45 inches with a monthly high of 6.07 inches (March) and a monthly low of 3.33 inches (August). Columbus has been affected by weather events that have resulted in significant damage. Columbus is located in FEMA's wind mapping Zone IV, which has historically experienced the greatest number of and strongest rated tornados. Columbus lies within the heart of the tornado zone known as "Dixie Alley." The city has experienced 3 straight-line wind and 2 tornados events since 2000. Since 1998, 6 tropical storms or hurricanes have tracked inland with the center of the storm passing within 50 miles of Columbus. Two of these events, Hurricanes Ivan and Katrina, resulted in federal damage declarations. To a lesser degree, the city has experienced localized flooding and snow/ice events. Even though Columbus has not experienced an earthquake, seismic hazard mapping by the United States Geological Survey shows the city is within the 10-12%g peak acceleration zone of the New Madrid fault line. A summary of weather related events may be found in Appendix A.



Dixie Alley Tornado Zone

Demographic Profile

Population

Columbus has a population of 23,640 (2010 U.S. Census). This total represents the second straight census in which the city has declined in population. From 1990 to 2000, the city lost 1,724 and another 2,329 between 2000 and 2010. These population declines represent a 6.2% and 8.9% drop respectively. The city's population decline is projected to be offset by expected economic growth during the next 5 years (see Table A4 on page 20). Statewide, Columbus is ranked 17th in municipal size. The city's daytime workforce of 10,500 increases the city's population by 40.5%. Table A1 provides a summary of the city's population.

Table A1: Columbus Population

Population: City of Columbus					
	Total	Percent			
Population	23,640	100			
Male	10860	45.9			
Female	12780	54.1			
Race					
White	8,842	37.4			
Black	14,187	60			
Other	611	2.6			
Median age	36.4				
Age Category	Total	Percent	Age Category	Total	Percent
Under 5 years	1,564	6.6	45 to 49 years	1,490	6.3
5 to 9 years	1,403	5.9	50 to 54 years	1,621	6.9
10 to 14 years	1,469	6.2	55 to 59 years	1,454	6.2
15 to 19 years	1,727	7.3	60 to 64 years	1,260	5.3
20 to 24 years	2,227	9.4	65 to 69 years	932	3.9
25 to 29 years	1,718	7.3	70 to 74 years	791	3.3
30 to 34 years	1,352	5.7	75 to 79 years	737	3.1
35 to 39 years	1,238	5.2	80 to 84 years	619	2.6
40 to 44 years	1,358	5.7	85 years and over	680	2.9

Of interest are the at-risk target groups (< 5 years of age and ≥ 65 years of age). Combined, these groups represent 5,323 or 22.4% of the population. These groups present a higher than normal risk potential to fire and safety related events. This is especially true of the elderly. According to the U.S. Fire Administration, mental and physical frailties, use of medication, and fixed incomes resulting in poor to poverty living conditions are factors listed for increasing fire risks.

From the previous census, the city's black population increased 5.6% while the white population experienced a decline of 6.2%. A slight increase has been seen in the Hispanic/Latino and Asian populations. The median age has also increased by 2.6 years. Columbus has a population density of 1,072 individuals per square mile. Population densities are further discussed in the Community Risk Assessment section.

Socio-economic Profile

Tables A2 through A5 provide a socio-economic profile for the city. These profiles provide insight into factors that has the potential to influence city services. Favorable conditions such as high employment rates, high household/family income, and affordable housing encourage economic stability and supports municipal growth through increased tax revenues. Conversely; low economic factors tend to stymie economic growth and place stressors on agencies through increased use of department services.

Income

Table A2 reflects household and family incomes for the city.

Table A2: Columbus Income Profile

Columbus Income Profile (2011)					
Total households: 9,635					
Household Income	Total	%	Household Income	Total	%
$0,000 to $14,999	953	9.9	$75,000 to $99,999	689	7.2
$15,000 to $24,999	1,549	16.1	$100,000 to $149,999	473	4.9
$25,000 to $34,999	1,233	12.8	$150,000 to $199,999	216	2.2
$35,000 to $49,999	1,164	12.1	$200,000 or more	248	2.6
$50,000 to $74,999	1,413	14.7			
Median household income:	$31,014		Mean household income:	$51,142	
Total Families: 5,621					
Family Income	Total	%	Family Income	Total	%
Less than $10,000	646	11.5	$50,000 to $74,999	884	15.7
$10,000 to $14,999	488	8.7	$75,000 to $99,999	556	9.9
$15,000 to $24,999	1,017	18.1	$100,000 to $149,999	378	6.7
$25,000 to $34,999	593	10.5	$150,000 to $199,999	156	2.8
$35,000 to $49,999	655	11.7	$200,000 or more	248	4.4
Median family income:	$36,020		Mean family income: $64,748		
Per capita income:	$21,455		Poverty Rate (2007 – 2011):	32.3%	

The median household income level for the city is below the state average of $38,718. However, per capita income is slightly above the state level ($20,521). The poverty rate is based on federal formulas using family size and income relative to set income threshold limits. The entire household is considered to be at the poverty level if family income is below this threshold limit. Columbus' poverty rate is significantly higher than the state poverty rate of 21.6%.

Employment Rate

Columbus has been affected by the economy more so than at the state and regional levels. The primary reason for this higher rate is that city residents work outside of Columbus and are affected by additional regional and state factors. Table A3 provides an unemployment rate comparison between the city, the Golden Triangle region, and the state (MS Department of Employment Security, 2013).

Table A3: Unemployment Trends

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Aver
2010 Unemployment Rate													
Mississippi	11.8	11.3	10.8	9.9	10.3	10.7	11.2	9.7	10.2	10	10.1	10.5	10.5
Golden Triangle PPD	15.6	14.7	14.3	12.8	13.5	14.5	14.9	13.1	13.2	12.7	12.8	13	13.7
Lowndes Co.	13.5	12.8	12.5	11.3	12	12.7	13.1	11.6	12.1	11.8	11.7	11.9	12.2
Columbus	**20.1**	**19.7**	**19.9**	**17.7**	**18.8**	**19.7**	**20.8**	**19**	**19.2**	**18.9**	**18.8**	**18.9**	**19.3**
2011 Unemployment Rate													
Mississippi	10.7	10.6	10.3	10	10.1	11.1	11.1	10.1	10.6	10.4	9.7	9.9	10.4
Golden Triangle PPD	13.5	13	12.6	12	12.2	13.9	14.1	12.4	12.8	12.6	12	12.3	12.8
Lowndes Co.	12.1	12.1	11.5	11.1	11.2	12.3	12.5	10.8	12	11.6	11	11.3	11.6
Columbus	**18.4**	**18.4**	**17.5**	**17.3**	**17.6**	**18.5**	**18.8**	**16.8**	**18.3**	**17.5**	**16.9**	**16.9**	**17.8**
2012 Unemployment Rate													
Mississippi	10	9.5	8.8	8.3	9.1	10	10.3	9.1	9	8.7	8	9.1	9.2
Golden Triangle PPD	11.9	11	10.3	9.6	10.8	12.1	12.4	10.8	10.6	10.3	9.7	11.1	10.9
Lowndes Co.	10.5	9.6	9	8.5	9.6	10.2	10.7	9.3	9.6	9.4	8.8	10	9.6
Columbus	**15.9**	**14.7**	**14.2**	**13.3**	**14.7**	**15.5**	**16.3**	**14.7**	**15.1**	**15.2**	**14.4**	**15.4**	**14.9**

The economic growth rate for the state in the next 5 years (2018) is projected to increase by 12.4%. The following job sectors are expected to lead this growth; professional / technical services (29.4%), health care / social assistance (24%), administrative support (22.8%), educational (21.2%), and construction (18.3%). Table A4 provides economic strength ratings for the city and surrounding areas. Lower numbers indicate economic growth (Politico.com, 2011).

Table A4: Golden Triangle Economic Strength Rankings

City	2011	2010	2009	2008	2007
Columbus	57	77	100	174	211
Starkville	150	120	218	233	165
West Point	406	355	481	467	466
Tupelo	104	124	84	60	58

Housing

The following table provides a summary of the single family residential housing stock within the city. The table documents total number of units, values, and date of construction.

Table A5: Housing Profile

Columbus Housing Demographic					
Total housing units: 11,289					
Occupied housing units: 9,635					
Vacant housing units: 1,654					
Median Value (dollars): $95,100					
Individuals per household: 2.3					
Years Structure Built	Total	%	Housing Unit Value	Total	%
Built 2005 or later	232	2.1	Less than $50,000	648	13.4
Built 2000 to 2004	587	5.2	$50,000 t0 $99,999	1,943	40.2
Built 1990 to 1999	661	5.9	$100,000 to $149,999	993	20.5
Built 1980 to 1989	1,482	13.1	$150,000 to $199,999	476	9.8
Built 1970 to 1979	2,960	26.2	$200,000 to $299,999	453	9.4
Built 1960 to 1969	2,064	18.3	$300,000 to $499,999	148	3.1
Built 1950 to 1959	1,384	12.3	$500,000 to $999,999	134	2.8
Built 1940 to 1949	886	7.8	$1,000,000 or more	41	.8
Built 1939 or earlier	1,033	9.2			

Several facts are of interest. First, 47.6% of home construction was prior to 1970 which means a significant number of structures are greater than 40 years of age. This percentage will increase significantly during the next decade as the homes constructed during the 1970s are added to the statistic. Second, the median home value is slightly lower than the state median of $99,200. Finally, approximately 1 in 6 homes (15%) are vacant. Home vacancies present additional hazards to the community, especially if not maintained.

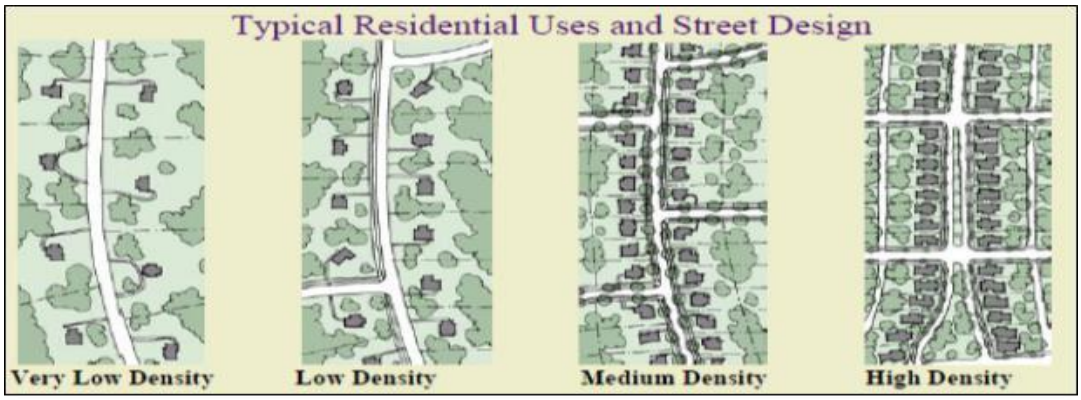
City Development and Land Use

The city development and land use section was taken from the *Columbus Mississippi Comprehensive Plan.* This plan serves as a public policy statement representing a 20 to 25 year strategic plan for city development. This plan was facilitated and written by the KPS Group. All maps and figures within this section were generated by the KPS Group.

Residential Development

Residential development is based upon existing patterns and future construction development. Residential densities are identified on Map A3: Columbus Land Use / Development (page 23). Residential uses are defined by gross housing densities that include:

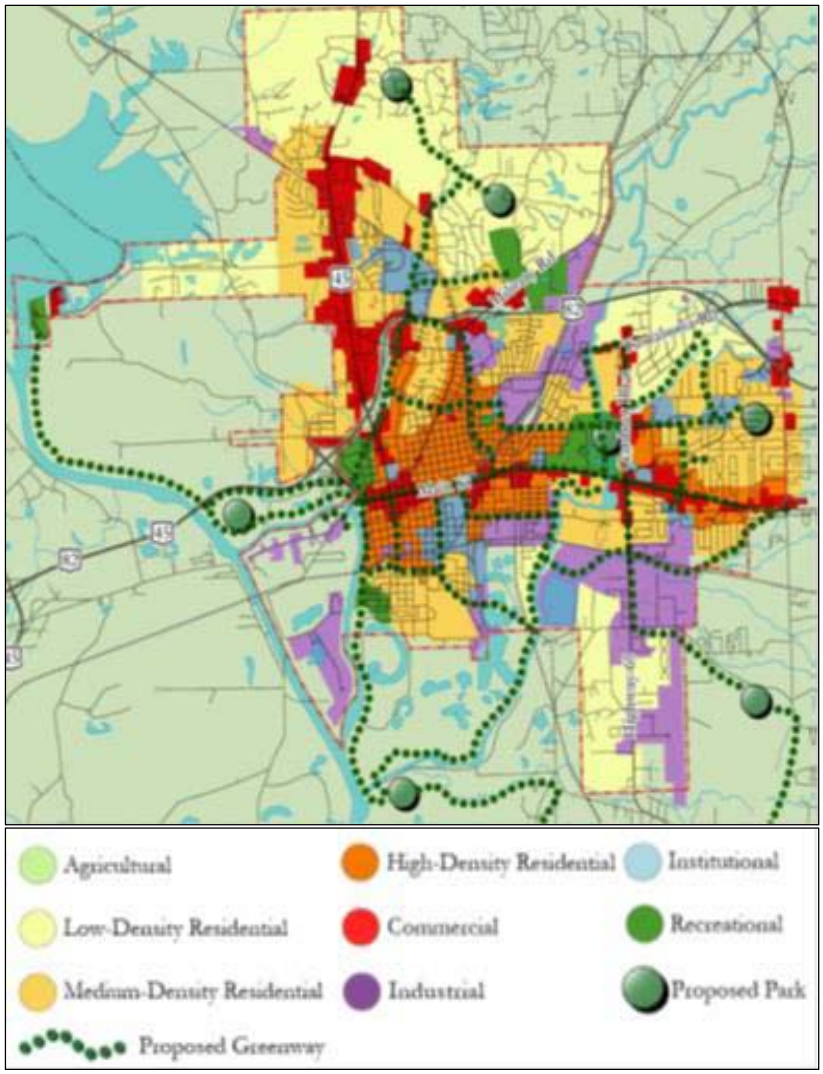
- High density (orange): more than 4 dwellings per acre
- Medium density (gold): 2 – 4 dwellings per acre
- Low density (light yellow): 1 home per .75 – 2 acres
- Very low density (light green): 1 home per 2 acres or more



High density neighborhoods are found in the Northside, Southside, Sandfield, and Queen City sections of the city. These neighborhoods represent the oldest residential structures within the city and are reflective of early city development in which residential construction occurred adjacent to the city's "downtown" business district. Construction is typically limited to single story structures less than 2,000 square feet. Medium density development is primarily found on Southside (south of 8th Ave. S.), Hughes and East Columbus neighborhoods, and development along Hwy 45 N (between 18th Ave. N. and Bluecutt Rd). Construction is typically limited to single story structures less than 2,500 square feet. Low density housing is found along Hwy 69 S. and the northern areas of the city. The more affluent neighborhoods are located in the northern areas of the city, especially in the Cady Hills, Holly Hills, and Fox Run subdivisions. Many of these homes were custom built, multi-story structures in excess of 3,000 sq. ft.

Commercial Development

Commercial development is controlled through the use of city zoning ordinances and recommendations of the City of Columbus Comprehensive Plan. Current development follows the Euclidian planning model that places restrictions on land use designations based upon adjacent zone compatibilities. These compatibility restrictions are outlined in the City of Columbus Zoning Ordinance, Chart of Uses Permitted. Future land development is based upon a strategy endorsed by the city's Comprehensive Plan recognizing not only current zoning restrictions but also projected growth based upon available and planned infrastructure improvements.

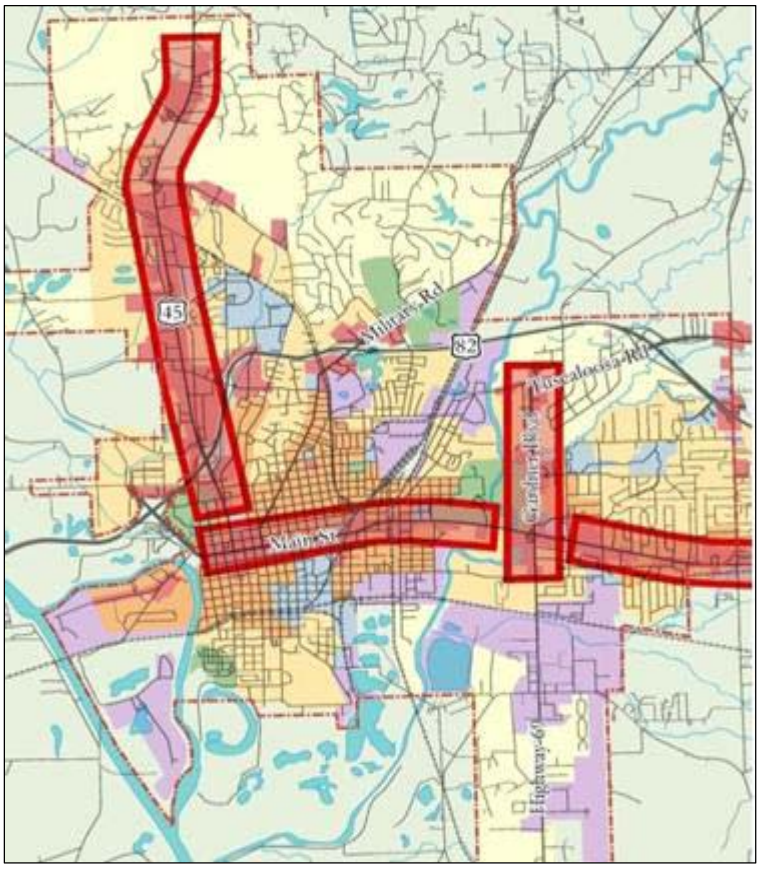


Map A2: Columbus Land Use / Development

The city's downtown business district is located at and around the intersection of the transportation corridors of Highways 45 and 182. Like many older municipalities, retail activity was located primarily in the general "downtown" business district prior to the 1950s. The majority of buildings in this district were constructed between 1880 – 1920 reflecting Commercial Italianate, Renaissance Revival, and late Victorian construction styles. The downtown business district peaked around 1947 with over 220 business establishments. After a period of decline (1970s – 1990s), this area is experiencing a revitalization based upon a commercial/residential mixed occupancy use concept. These mixed occupancies are restricted to Assembly 2, Business,

Mercantile, and Residential 2 occupancies. As a general rule, residential units are restricted from the 1st floors of these occupancies. The majority of the downtown business area is within the "fire district" as defined in city ordinance. The fire district is located between 3rd and 7th streets and between 2nd Ave. N and 4th Ave. S. Within this district is the National Register: Columbus Central Commercial Historic District and the local historic district. Approximately 145 buildings, recognized for historical and architectural importance, are found within these historical districts.

Much of the commercial and retail occupancies in Columbus are located along the Hwy 45/182 (Main Street) and Gardner Blvd. transportation corridors (red shaded areas). These commercial corridors feature malls, shopping centers, strip malls, restaurants, and stand alone businesses. The majority of these occupancies along Hwy 45 and Gardner Blvd. were built during/after the 1970s. Adjacent streets to these corridors support additional business development. Industrial development (purple shaded areas) is generally restricted to three areas; Yorkville Industrial Park complex in East Columbus (Hwy. 69 S), Military Road (Hwy 12), and the "Island." The Island currently represents the greatest industrial development area within the city due to available space and access to highway (Hwy 45 N and Hwy 82) and water (Tennessee-Tombigbee Waterway) transportation routes.



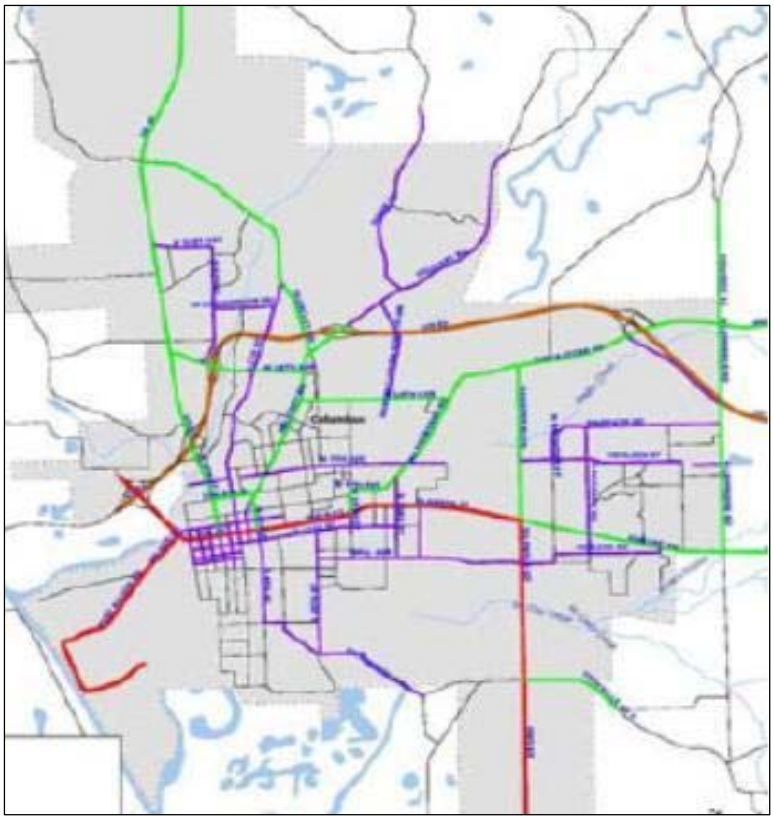
Map A3: Commercial and Industrial Land Use Areas

Recreation

Recreational areas (green shaded areas on Map A2) are divided into three general categories; sports parks, neighborhood parks, and special recreational uses. The two primary sport park areas are Propst Park (Main Street & 25th Street N) and the Columbus Soccer Sports Complex (Main Street & 2nd Street N). These parks provide for youth sport leagues and practice fields. These parks are located in areas where conflict with adjacent residential areas is limited. Neighborhood parks are dedicated to both active and passive recreation uses. These nine parks provide open spaces for neighborhood events and informal gatherings. These parks typically have playgrounds, small ball fields, shaded paths/areas, and activity centers. Several locations have gymnasiums as well. Special recreational areas include the Tennessee-Tombigbee River, Columbus Lake, and the Riverwalk, a three mile trek running alongside the Tombigbee River.

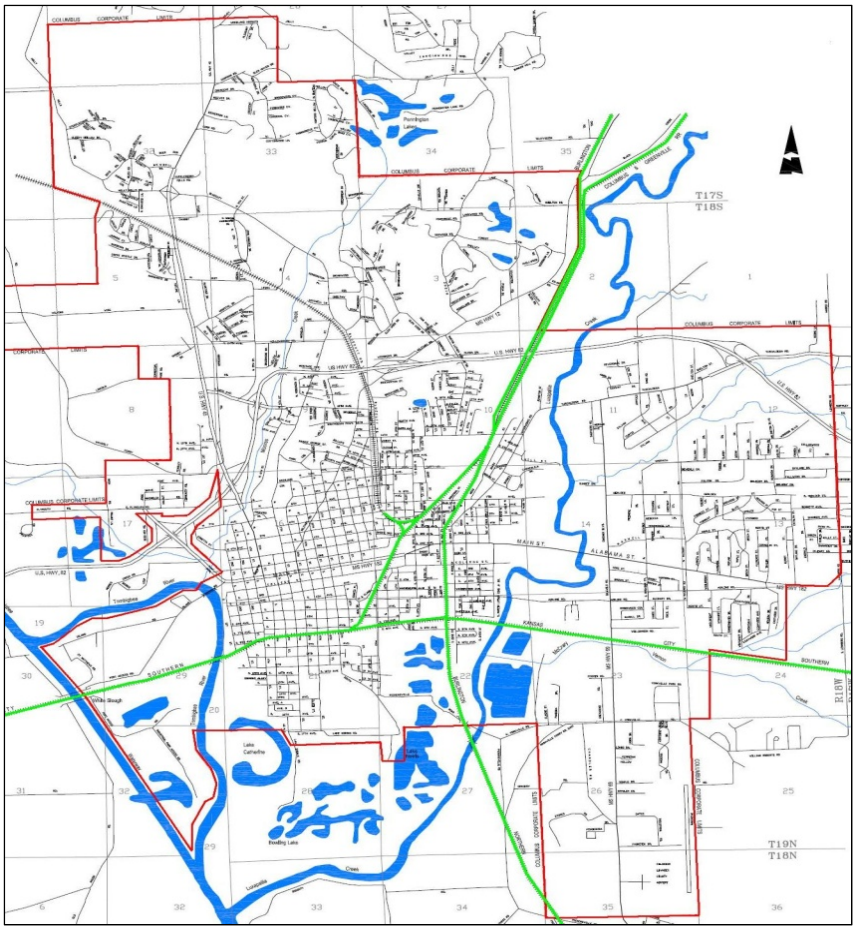
Transportation

Columbus has major highway and rail transportation routes running through the city limits. Highway transportation routes are classified as urban expressways (brown), urban principle arterials (red), urban minor arterials (green), urban collectors, and local streets (purple). Urban expressways and arterials are used primarily for mobility with limited city accessibility. Urban collectors offer limited mobility and access. Local streets offer restricted mobility and are used for direct access to residential property and trip end locations. There are approximately 237 road miles within city limits.



Map A4: Highway Transportation Routes

Columbus has three major rail lines that include BNSF, Kansas City Southern, and the Genesee & Wyoming. Regional rail providers include the Columbus-Greenville, the Luxapalila Valley (Genesee & Wyoming), Alabama Southern, Birmingham-Southern (Watco), and Golden Triangle Railroads. Regional lines lease track rights from the major three lines. Both hazardous and non-hazardous materials are transported on these rail lines. As can be seen from the map, these rail lines (green lines) transect the city on a north/south and east/west axis.



Map A5: Rail Transportation Routes

Columbus borders the Tennessee-Tombigbee River. This river is part of the Gulf Inter-coastal Waterway (GIWW) system. The GIWW connects the Gulf of Mexico with the Ohio River Basin waterway system. The "Island" serves as a local port access for the waterway. According to the Tennessee-Tombigbee Waterway Authority, the construction of an inter-modal facility in Demopolis, AL will result in increased tonnage being transported on the waterway in the future.

The Columbus-Lowndes County Airport is located within the city limits; however, traffic is limited to small private and corporate planes. The Golden Triangle Regional Airport, the states third largest commercial airport, is approximately 12 miles west of Columbus and serves as the regions primary commercial flight carrier. CFR serves as the primary back-up emergency fire response for the airport.

B. Programs and Services

Section B provides a description of the programs and services provided by the department as well as the infrastructure and resources that are required to perform these services.

Programs and Services

Columbus Fire & Rescue offers a myriad of services directed towards providing an all-hazards approach to emergency response and mitigation. These services and programs represent an evolution of the department over the past three decades to meet not only community and but also regional needs.

Fire Suppression

CFR responds to fire suppression emergencies that include structure fires, vehicle fires, woodland/grass fires, and rubbish/trash fires. To provide this service, the department utilizes four Class A engines, two Class A engines with 50' aerial devices, one 95' aerial platform, and one 2,500 gallon water tender. Each engine and the aerial platform have 1,250 gallon per minute pumps and minimum water tank capacities of 500 gallons with the exception of Engine 21 and Engine 22, which have a 750 gallon tank capacity. Engine 23 and Ladder 29 have an AFFF system as part of its water/pump system. Each apparatus carries a minimum of 1500' of 4" large diameter supply hose and 400' of both 2 ½" and 1 ¾" attack hose. The only exception to these hose loads is Ladder 29, which carries 1000' of 4" LDH. The department maintains a reserve apparatus when front line apparatus are taken out of service. This apparatus is fully equipped with equipment needed for suppression operations.

Medical

CFR provides non-transport, basic life support (BLS) emergency medical response. This service supports pre-hospital care provided by the city's lone health care provider, Baptist Memorial Hospital. The department is dispatched to five types of life threatening emergencies that include unconscious / unresponsive patients, cardiac and respiratory emergencies, excessive hemorrhaging, and motor vehicle accidents (MVAs) with injuries. Each engine company maintains a basic trauma kit, supplemental oxygen with air adjuncts, and an automatic external defibrillator (AED). The department equips two engines (Engines 23 and Engine 24) with extrication equipment (hydraulic spreaders, cutters, rams), stabilization systems / wooden

cribbing, power tools, and air bags necessary for extrication operations. An extrication equipped engine responds to all MVAs involving known or unknown entrapment. The department also responds to non-emergency medical incidents when requested. Examples of these calls include providing lifting assistance or providing patient care when advanced life support (ALS) transport units are delayed due to heavy call volume. The department requires all new firefighters to certify as a National Registered EMTs within the first year of employment.

Hazardous Materials

CFR provides technician level response and mitigation capabilities for highway, rail, and fixed facility hazardous material incidents. All department personnel are trained to the hazardous materials operations level as part of the basic firefighter curriculum taught at the MS State Fire Academy. All company officers are required to become Technician I certified. As of 2012, all department personnel are required to obtain Technician I level certification. This certification is on-going at this time. CFR is also the primary response agency for hazardous material events in Lowndes County. CFR also participates in regional response as part of the department's commitment to the Golden Triangle Hazardous Materials Response Team. The GTR Haz-mat team is a tri-county regional alliance involving the Starkville and West Point Fire Departments. This mutual aid agreement covers Clay, Lowndes, and Oktibbeha Counties and the municipalities within. The department also is available for statewide responses as part of the MS Homeland Security Task Force response system.

Technical Rescue

In adopting an "all-hazards" response philosophy, the department has added the following technical rescue programs to services provided; dive rescue, high angle / confined space, structural collapse, overland search and rescue, swift-water / flood, and trench rescue. The department provides technical rescue services based upon a three-tier response concept that involves initial response by engine company personnel, a second level response by on-shift technician personnel for incidents beyond engine company capabilities, and the third level response requiring a re-call of off-shift technician personnel. All engine company personnel are trained to the awareness and operations level of each technical rescue discipline to supplement technician level personnel. Each shift maintains technician level personnel in each technical

rescue discipline. Many of the department's technician level personnel are cross trained serving on multiple disciplines that allows for efficiency of personnel resources during emergency incidents and regional deployments. For overland search and rescue, the department acquired a canine asset that is certified in air and water scent tracking. The department also has access to a canine certified in cadaver land and water scent tracking. The department maintains a technical rescue equipment cache at the Technical Rescue Building located at Station 2. This equipment is stored on response trailers ready for rapid deployment. The department is the primary overland and search rescue agency for Lowndes County. The department is also the primary response agency for water related events on the Tennessee-Tombigbee waterway from the Lowndes / Monroe county line to the MS / AL state line. Other discipline teams respond locally through requested mutual aid. All team disciplines respond regionally through the MS State Mutual Aid Compact (SMAC) agreement and participation in MS Task Force 2. The Special Operations Chief provides administrative and operational oversight of specialty team operations. Each specialty team has a coordinator that is responsible for team training, equipment accountability, and preventative maintenance.

CFR Infrastructure and Resources

Current deployment provides a description of points of service delivery (stations) and the resources and staffing located at each station.

Points of Service Delivery

Columbus Fire and Rescue responds to emergency incidents from five stations. The department maintains two administrative offices for the Fire and Life Safety Educator, the Public Affairs Office, the Fire Marshal, and Special Operations Chief. These offices are located next to the Columbus Municipal Complex at 1501 Main Street. The Fire and Life Safety office doubles as a classroom for department and community training events. Stations are strategically placed taking into consideration recommendations from the MS State Fire Rating Bureau and to best meet community needs. Map B1 (pg. 34) provides station locations.

Station 1

Station 1	
Address	205 7th St. S.
Construction	1981
Sq. Ft.	9,000
Apparatus	E21 E30 Ladder 29 FD2

Station 2

Station 2	
Address	1804 MLK Jr. Dr.
Construction	2001
Sq. Ft.	6,700
Apparatus	E22 Tanker 31

Station 3

Station 3	
Address	416 31st Ave. N.
Construction	2000
Sq. Ft.	5,100
Apparatus	E23

Station 4

Station 5

Station 4	
Address	249 Airline Rd.
Construction	1960
Sq. Ft.	2,200
Apparatus	E24

Station 5	
Address	729 Lehmberg Rd.
Construction	1981
Sq. Ft.	3,200
Apparatus	E25

Table B1 provides a list of resources that are located at each station that includes the apparatus assigned, apparatus type and capability, and minimum personnel assigned by station. The technical rescue equipment cache stored in the Technical Rescue Building at Station 2 is not included in this table.

Table B1: CFR Station Resource Assignments

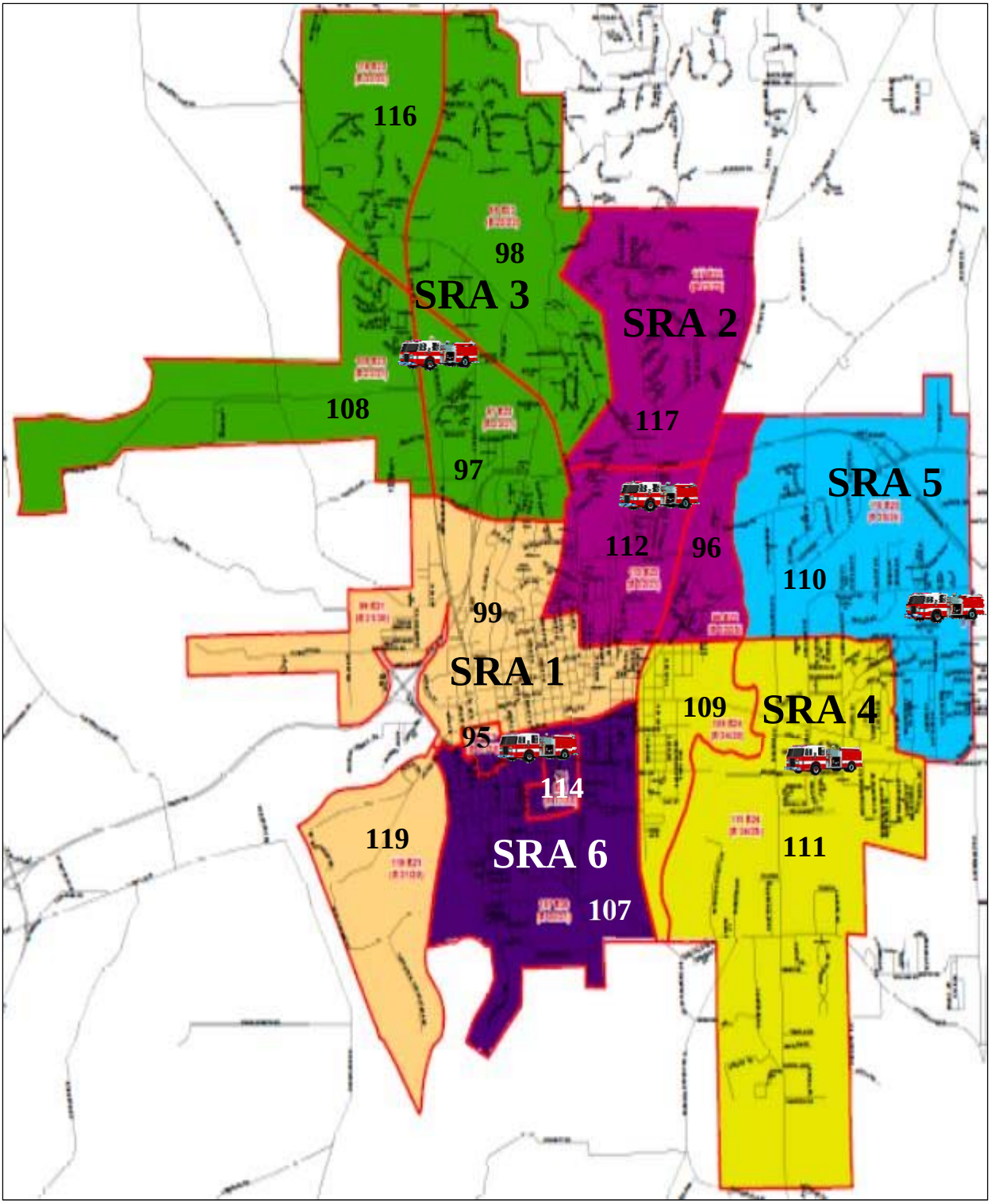
Station	Apparatus	Apparatus Year / Model / Capability	Staffing
1	Engine 21	2012 Pierce / 1250 gpm engine	3 (5)
	Engine 30	1987 Pierce / 1250 gpm engine	3 (4)
	Ladder 29	1991 Pierce / 95' aerial platform ladder	(E30 crew)
	FD 2	2008 Dodge Ram 2500 / 4X4 pickup	1
2	Engine 22	2010 Pierce / 1250 gpm engine	3
	Tanker 31	2008 Kenworth / 2,500 gallon water tender	(E22 crew)
3	Engine 23	2001 E-One 1250 gpm engine w/50' aerial device	3
4	Engine 24	1995 Pierce / 1250 gpm engine	3
5	Engine 25	1999 E-One / 1250 gpm engine w/50' aerial device	3

Columbus Fire and Rescue has divided the city into 6 primary points of service delivery. These response zones are known as station response areas (SRAs). SRAs are based upon first-due engine assignments and used for distribution performance. Station 1 has two SRAs; SRA 1 for Engine 21 and SRA 6 for Engine 30. SRAs are further sub-divided into 15 Emergency Service Number (ESN) districts that serve as fire management zones (FMZs). ESNs are based upon multi-unit response assignments and used for concentration performance. Table B2 provides a list of SRAs with corresponding ESNs. Map B1 illustrates the SRAs (color coded areas identified by SRA number) and ESNs (numbers between red borders). Distribution and concentration is extensively discussed in Section Station E.

Table B2: Station Response Area / Emergency Service Number

CFR SRA / ESN Zones			
Station	Station Response Areas	Map Color	Emergency Service Number
1	1	Tan	99, 119
	6	Purple	95, 107, 114
2	2	Magenta	96, 112, 117
3	3	Green	97, 98, 108, 116
4	4	Yellow	109, 111
5	5	Light Blue	110

Map B1: Station Response Areas and Emergency Service Numbers

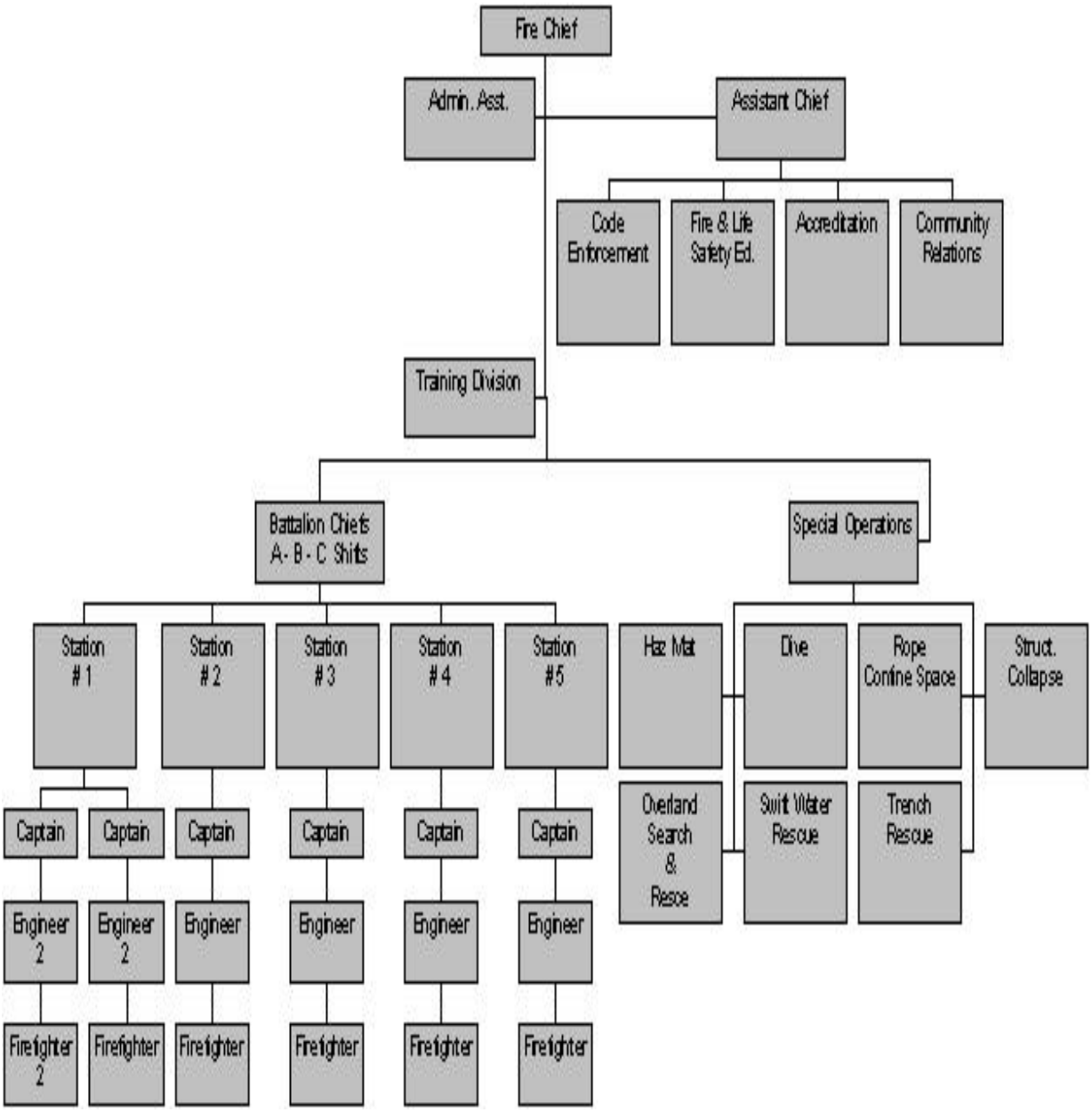


Personnel Resources

Columbus Fire and Rescue has an authorized staffing level of 71 personnel. This includes 70 uniformed personnel and 1 civilian. The Fire Chief is responsible for the overall management of the department. The department is divided into an operational and administrative organizational structure that supports the various services and programs provided by the department. The Fire Chief serves as the administrative head overseeing department operations. The administrative branch is composed of a command staff that includes an assistant chief, a chief of training, a special operations chief, a fire marshal, a fire and life safety educator, and an administrative assistant. The administrative branch supports department operations and manages department programs. The operations division is responsible for emergency and non-emergency response as well as other duties and responsibilities that include station, apparatus, and hydrant maintenance, pre-fire planning, conducting business inspections, assisting with public education programs, and participating in shift training activities. The organizational structure, as authorized by the governing authority, is outlined in CFR Policy 102.01. This structure supports the department's mission, goals, and objectives through program management. Job contexts, descriptions, and responsibilities for these positions are also outlined in Columbus Fire Rescue Policy 102.01.

Each shift has an authorized staffing level of 21 personnel with a minimum staffing level of 19 (includes the Battalion Chief). The Battalion Chief is responsible for the supervision of the shift and reports directly to the Fire Chief. The Battalion Chief serves as Incident Commander during emergency incidents. Each station is manned by a single engine company (captain, engineer, and firefighter) with the exception of Station 1 which houses 2 engine companies and the department's ladder truck. Ladder 29 is staffed by the crew of Engine 30 with response being dictated by incident location (ESN 95 and ESN 114) and occupancy type (i.e. hospital, shopping centers, industry, etc.). When the department is fully staffed, Station 1 has 3 additional personnel. However, these personnel are used to backfill positions due to vacation, training, or sick leave when required. Figure B1 reflects the organizational structure of the department.

Figure B1: Columbus Fire and Rescue Organizational Chart



C. Community Expectations

Service Priorities

CFR followed the concepts of a community-driven process to obtain information regarding community expectations during the creation of the Strategic Plan. Information was gathered from customers and stakeholders that included City of Columbus elected officials and senior administrative personnel, city and county emergency response agencies, industries, local businesses, and citizens. This information identified service priorities, gaps in service delivery, and critical issues affecting service delivery. An analysis may be found in CFR's Strategic Plan.

Customers and stakeholders rated the relative importance of each program and service based on a scale of 1 (Not Important) to 5 (Very Important). The Customer Rating percentage is based on the number of favorable responses (4 and 5) divided by the number of total responses (N=99). Each program was ranked based upon this percentage. Table C1 reflects the results of the survey.

Table C1: Program and Service Priorities

Program	Not Important			Very Important		Customer	Rank
	1	2	3	4	5	Rating	
Fire Suppression				10	89	100 %	1
Emergency Medical Response		1	4	11	83	94.9%	2
Fire Prevention			6	19	74	93.9%	3
Specialty Response	1	4	2	16	76	92.9%	4
Disaster Response	4	2	1	12	80	92.9%	4
Fire and Life Safety Education		2	7	15	75	91.1%	5

As can be seen from the results, the community views the programs offered by the department as being important.

As part of the strategic planning process and being able to meet community expectations, the department examined two critical roadblocks; service gaps and critical issues affecting service. These roadblocks directly and indirectly affect the department's ability to provide quality programs and services. Tables C2 and C3 identify service gaps and critical issues facing the department.

Service Gaps and Critical Issues

Table C2: Service Gaps

Response times above national standards • E-911 call processing • CFR turnout times • CFR 2nd unit travel times	**Internal Training** • Skill proficiency • Professional Development • Succession Planning	**External Training** • LCVFDs • Industry
Law Enforcement communication • Improved communication between law enforcement and CFR	**Human Resources** • Recruitment • Hiring • Retention • Promotion	**Infrastructure to support department operations** • Aging station • Training facility
Policies and Procedures	**Replacement of Front-Line Apparatus**	**Loss of experienced personnel**

Table C3: Critical Issues Affecting Service

Personnel • Recruitment • Retention • Promotional Process	**Training** • Professional Development • Succession Planning • Training Format	**Organizational Culture** • Communication • Mistrust
Compensation and Benefits • Internal • External	**Organizational Climate**	**Community Relations** • Program awareness • Additional programs
Infrastructure • New stations • Station relocation • Training facility	**Budget/Funding** • General funding • Alternative funding sources	**External Relationships**

Strategic Goals and Objectives

Using the information provided by customer surveys and stakeholder interviews, CFR's Strategic Planning Team developed eight goals and corresponding objectives to address identified service gaps and critical issues. These goals and objectives are listed in Table C4.

Table C4: Strategic Plan Goals and Objectives

Goal 1: Facilities, Apparatus, and Equipment

- Objective 1A: Conduct an analysis to determine current and future facility needs
- Objective 1B: Provide for preventative maintenance and repair on department
- Objective 1C: Replace Station 4 and construct a new training facility
- Objective 1D: Maintain or replace existing apparatus and support vehicles
- Objective 1E: Acquire and maintain equipment needed to meet department programs

Goal 2: Recruitment, Hiring, and Retention

- Objective 2A: Develop a recruitment strategy to create a broader, more diverse candidate hiring pool
- Objective 2B: Develop and implement a volunteer firefighter program
- Objective 2C: Develop a Junior Firefighter Program
- Objective 2D: Develop a probationary firefighter program for hiring evaluation
- Objective 2E: Establish a committee to participate in the interview process
- Objective 2F: Develop a retention strategy to prevent loss of experienced personnel

Goal 3: Training and Professional Development

- Objective 3A: Evaluate internal and external training curriculums that support department programs and services
- Objective 3B: Develop a career path for department personnel utilizing competency based development programs
- Objective 3C: Implement a training program involving Lowndes County Volunteer Fire Departments
- Objective 3D: Implement a training program involving City of Columbus and Lowndes County Industries
- Objective 3E: Implement a physical fitness program

Goal 4: Community Engagement

- Objective 4A: Include media in CFR training events
- Objective 4B: Conduct open house events at department stations
- Objective 4C: Develop and implement a Citizens Fire Academy
- Objective 4D: Make presentations to church groups
- Objective 4E: Maintain a social media presence
- Objective 4F: Improve the promotion of classes, special events, and CFR services
- Objective 4G: Maintain an active presence at community events

Goal 5: Service Delivery

- Objective 5A: Evaluate the fire suppression program for service delivery and customer expectations
- Objective 5B: Evaluate the EMS program for service delivery and customer expectations
- Objective 5C: Evaluate the technical rescue programs for service delivery and customer expectations
- Objective 5D: Evaluate the Public Education Program for service delivery and customer expectations
- Objective 5E: Identify outside agencies that support department programs and services
- Objective 5F: Evaluate the Code Enforcement and Business Inspection Program for service delivery and customer expectations
- Objective 5G: Evaluate Community Event programs for service delivery and customer expectations

Goal 6: Policies and Procedures

- Objective 6A: Develop an administrative oversight strategy for reviewing and developing policies and procedures
- Objective 6B: Review existing administrative policies and procedures and develop new policies and procedures based upon identified gaps
- Objective 6C: Review existing emergency operational policies and procedures and develop new policies and procedures based upon identified gaps
- Objective 6D: Identify other support/functional areas needed to support department operations

Goal 7: Culture and Core Values

- Objective 7A: Develop organizational core values and behavioral anchors necessary to achieve our mission
- Objective 7B: Determine the current level of understanding and adherence to the department's core values
- Objective 7C: Determine whether the department's organizational culture in becoming more or less consistent with the organization's core values and use the data to guide the appropriate action
- Objective 7D: Recognize and reward behavior that demonstrates adherence to the department's core values

Goal 8: Accreditation

- Objective 8A: Publish a community driven strategic plan
- Objective 8B: Conduct a community hazards and risks assessment and publish a CFR Standards of Cover
- Objective 8C: Conduct and document a self-assessment appraisal utilizing CPSE/CFAI Self-Assessment Manual
- Objective 8D: Achieve agency accreditation by CFAI
- Objective 8E: Maintain agency accreditation with the CFAI

CFR strives to meet customer expectations and deliver quality services. The department demonstrates this effort by publishing its Mission, Vision, and Core Value Statement. These statements are found on the city's website, posted at each station, and in CFR's Policy and Procedures Manual. These statements are illustrated below.

Columbus Fire and Rescue Mission Statement

Our mission is to protect life and property due to fire, medical and environmental emergencies within the community through public education, code management, and incident response.

Columbus Fire and Rescue Vision Statement

We, the members of the Columbus Fire and Rescue Department, have a shared commitment to professionalism, team work, quality leadership, mutual respect, integrity, effective communication, and safety as we endeavor to fulfill our mission.

Columbus Fire and Rescue Core Values

For the Community

We recognize that the community is the reason for our purpose.

We value the faith and trust of the community, and continually work to deserve that confidence through our attitude, conduct, and accomplishments.

Lives are more valuable than property.

The safety of the public is of paramount importance.

All members of the public are entitled to our best effort.

For the Department

We strive for excellence in everything we do.

Honesty, fairness, and integrity will not be compromised.

We continually seek effectiveness, efficiency, and economy.

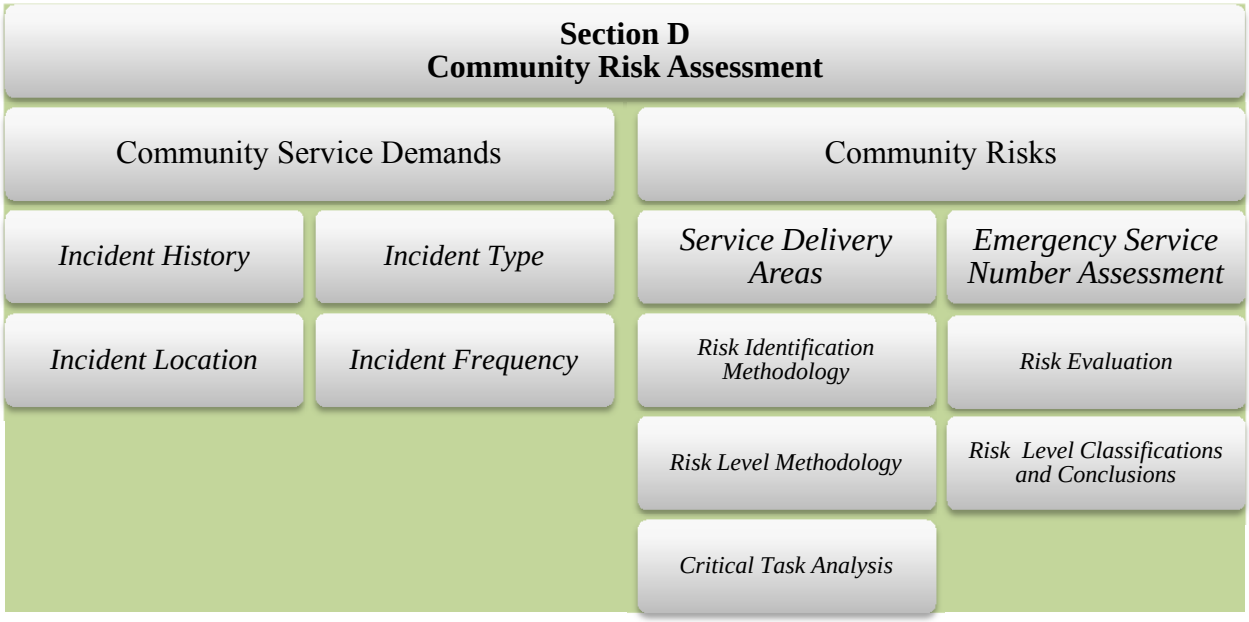
Unity and teamwork are stressed as being to our mutual advantage as individuals and as an organization.

Members are continually encouraged to improve themselves as individuals and employees.

The free exchange of ideas is encouraged.

We will provide professional and courteous service at all times.

We are sensitive to changing community needs



D. Community Risk Assessment

The community risk assessment was conducted to provide the department with an analysis of "real world" factors that present risks to the community. In conducting the risk assessment, the intended result was to produce a "quantification of risks" so that CFR could plan for and respond when necessary. The risk assessment process provided a scientific approach of examining the factors that push service needs to determine the capabilities required to adequately address the risks that are present. The risk assessment process was separated into two main components; community service demands and community risks. Both components provided data that was used to produce quantitative outputs. Outputs are defined as the direct work product from the analysis process. By conducting a risk assessment, the ultimate goal is to allocate resources that match the level of risk faced with an adequate response force to effectively manage the incident.

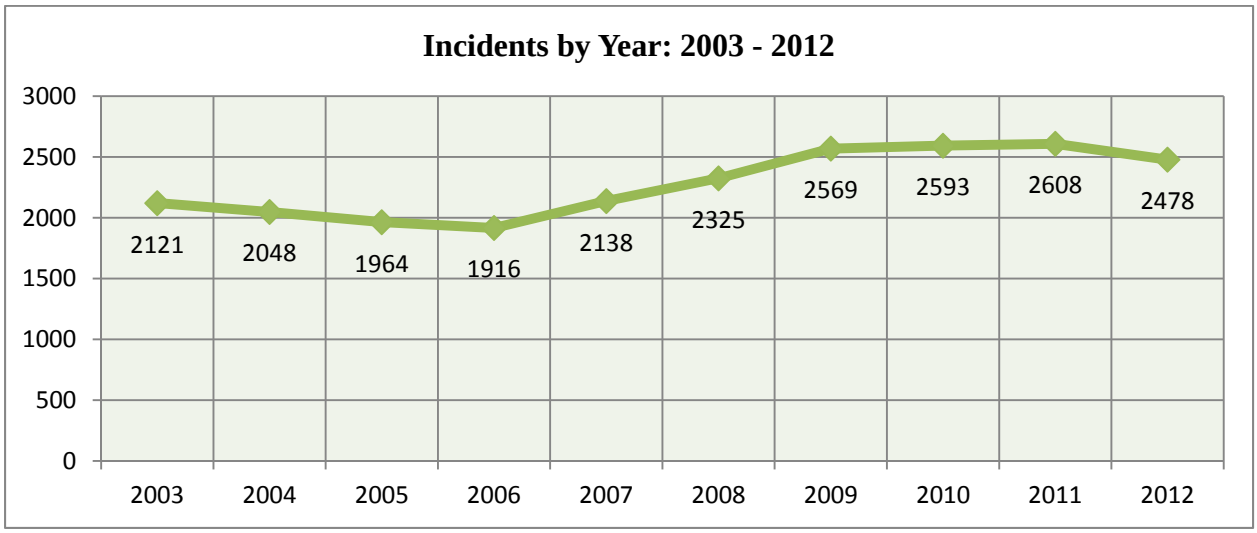
Community Service Demands

The use of historical data provides a good indicator of community needs in terms of incident risks. Incident analysis identifies incident frequency, location, and type of responses that, in turn, may be used to predict future service demands. The following graphs provide historical data reflecting incident history, incident types, and incident locations.

Incident History

Graph D1 revealed a cycle of incident increases and decreases. The first 3 years revealed a downward cycle followed by 5 continuous years of incident increases. Incident totals peaked during 2011. There was a decrease in 2012 and, based upon to-date incident totals for 2013, CFR appears to be in another downward cycle.

Graph D1: Incidents by Year

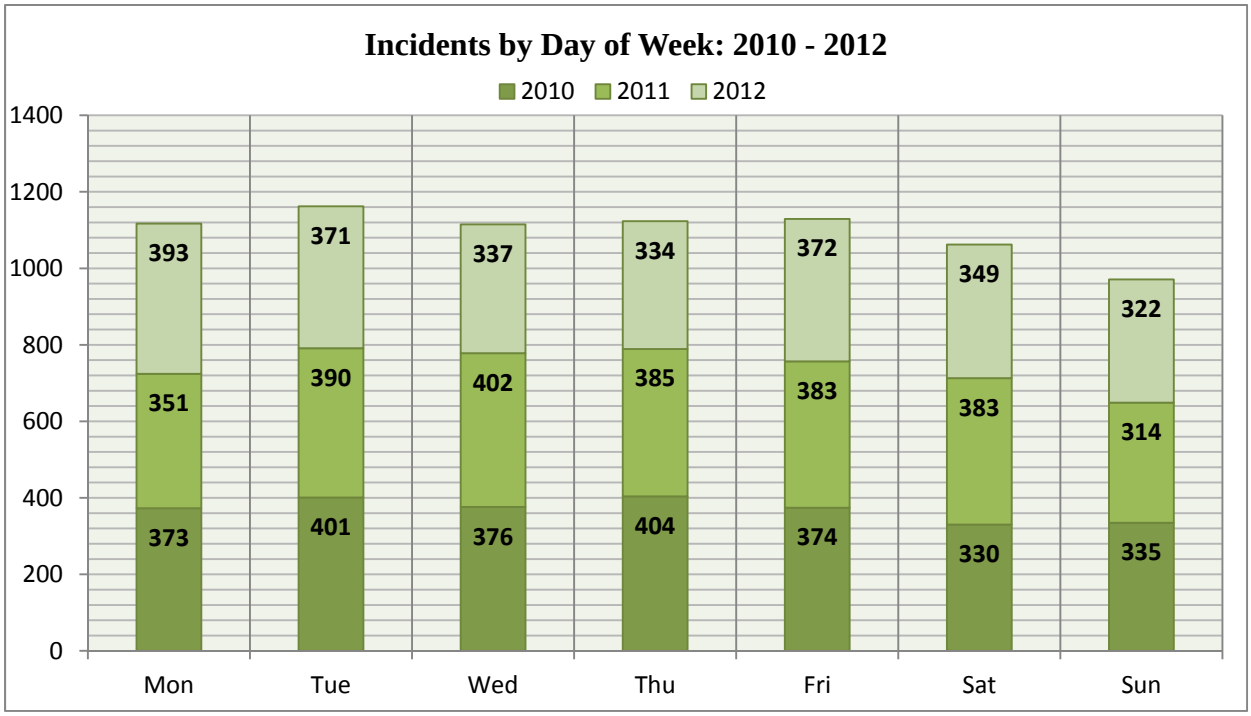


Graph D2: Incidents by Month (Average)

Regarding monthly trends, the department responded to approximately 200 incidents per month (± 10%). Spring and summer months have remained fairly consistent with a peak period occurring in July. Incident decreases are seen through the fall with October being the exception. Incidents increase during the winter months of December and January.

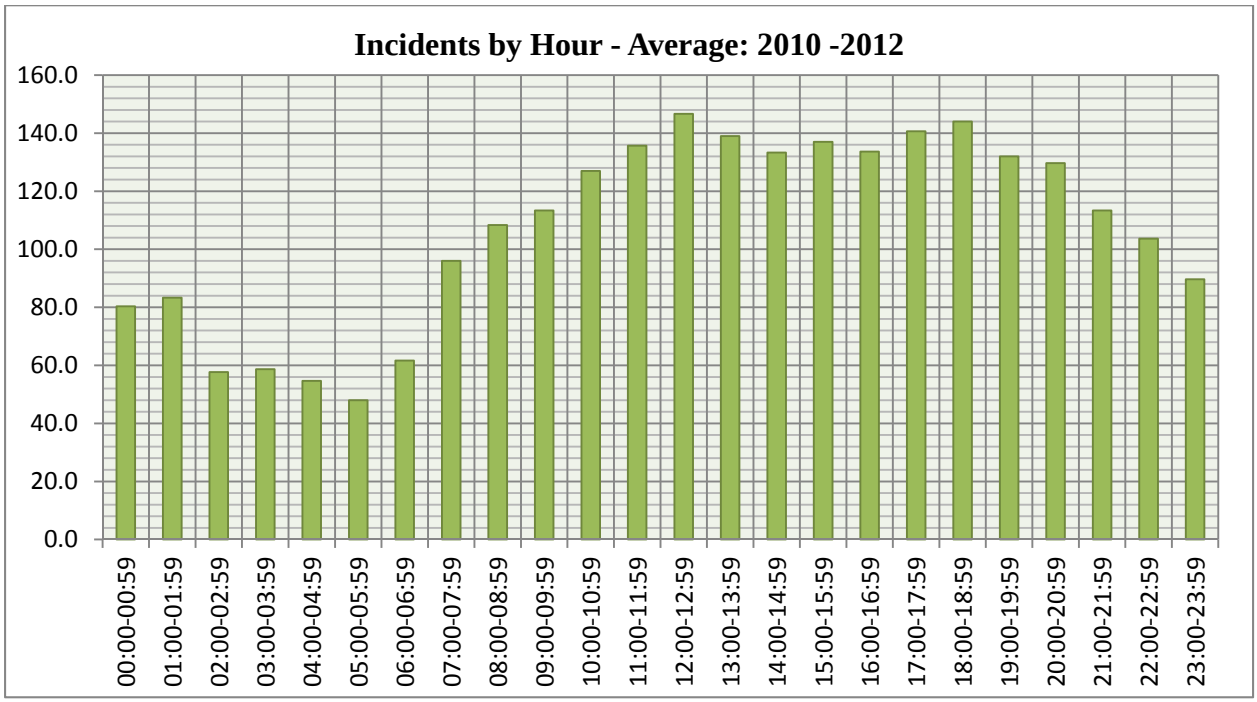
Graph D3 provides an illustration of incidents by day of the week. Based on total call volume, Tuesday and Friday were the busiest days followed by the remaining work days. Saturday and Sunday were the least busy.

Graph D3: Incidents by Day of Week



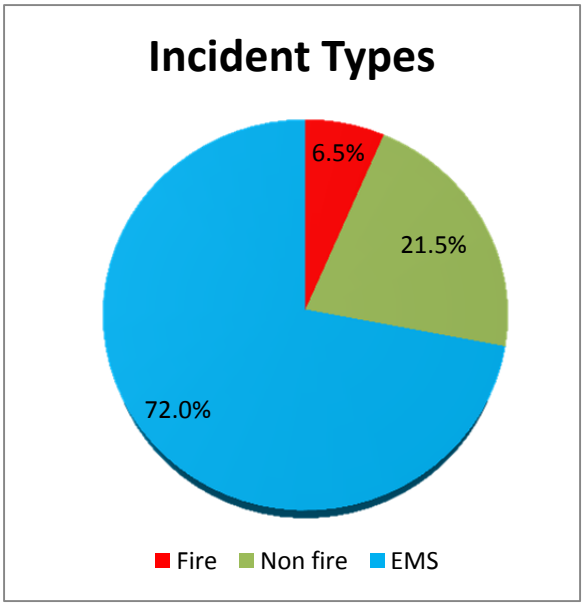
A review of incidents by hour isolates three distinct peak periods. Overall, incidents begin to decline from 7 p.m. through 6 a.m. However, a peak period occurred during the 1 a.m. to 2 a.m. period. An increase in the number of EMS and fire related incidents were observed (Graph D7). Additional peak periods are noted between 12 p.m. and 1 p.m. as well as 6 p.m. to 7 p.m. These peak periods occur during lunch, afternoon commuter travel, and dinner periods. An increase in EMS related incidents is noted during the lunch period while an increase in the number of non-fire incidents is noted during the 6 p.m. to 7 p.m. period (Graph D7).

Graph D4: Incidents by Hour (Average)



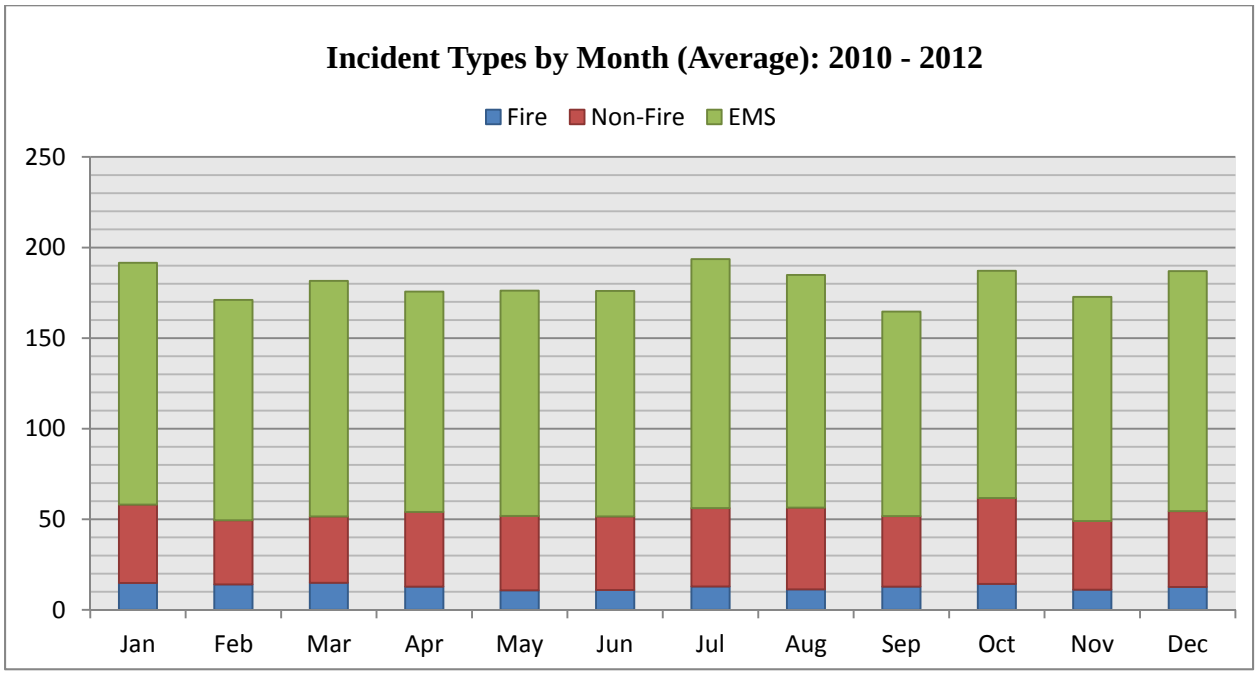
Incident Types

Graphs D5, D6, and D7 reflect incident types. As can be seen, EMS calls account for the majority of department responses. Approximately 72% of incidents have been EMS (300 series) related. Non-fire incidents represent 21.5% of calls with false alarms (700 series) representing 10.5% of this percentage. Fire related incidents (100 series) accounted for 6.5% of total incident volume. The frequency of fire incidents (Graphs D6 and D7) is quantified for the purpose of probability (predictability). While the number of fire incidents increase between noon and 6 p.m., the greatest number occurs between 5p.m. to 6 p.m. This timeframe corresponds with national averages due to cooking fires.

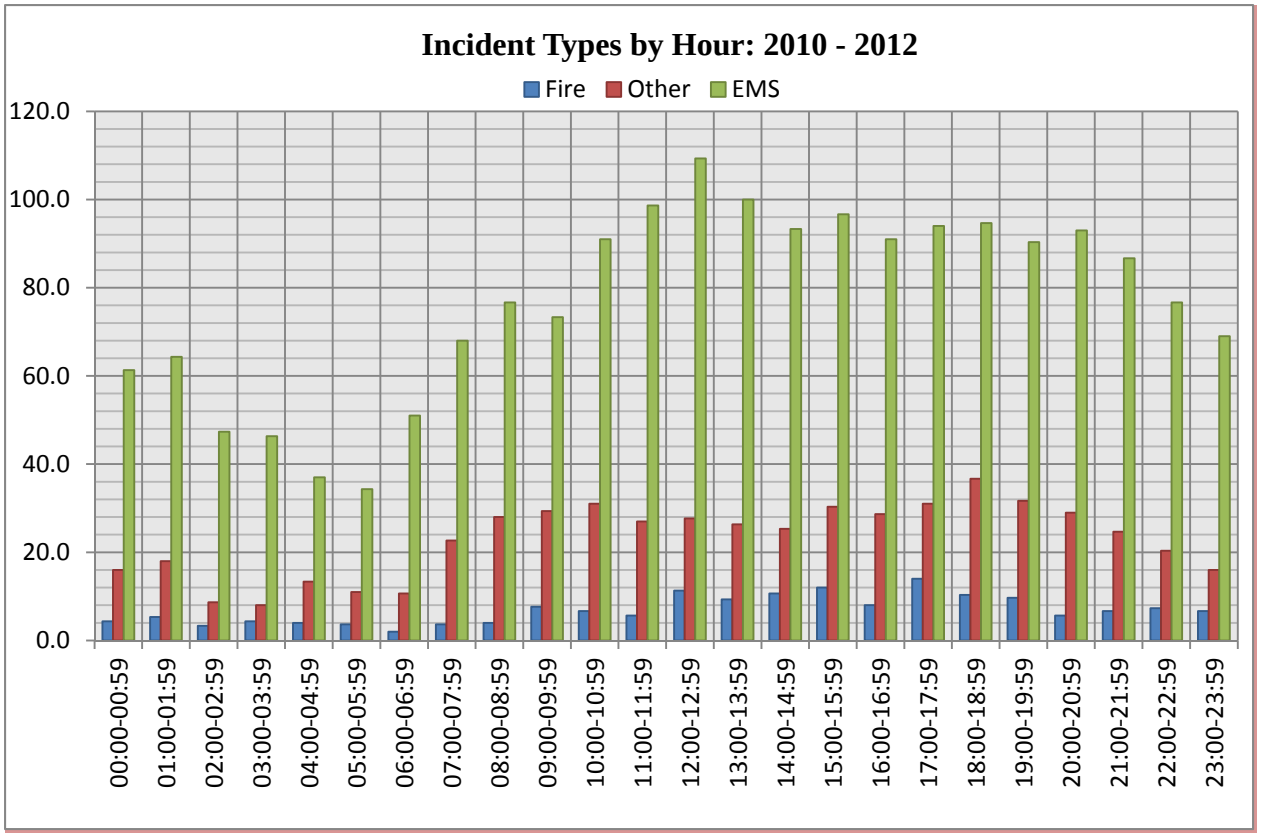


Graph D5: Incidents by Type: 2010 - 2012

Graph D6: Incident Type by Month



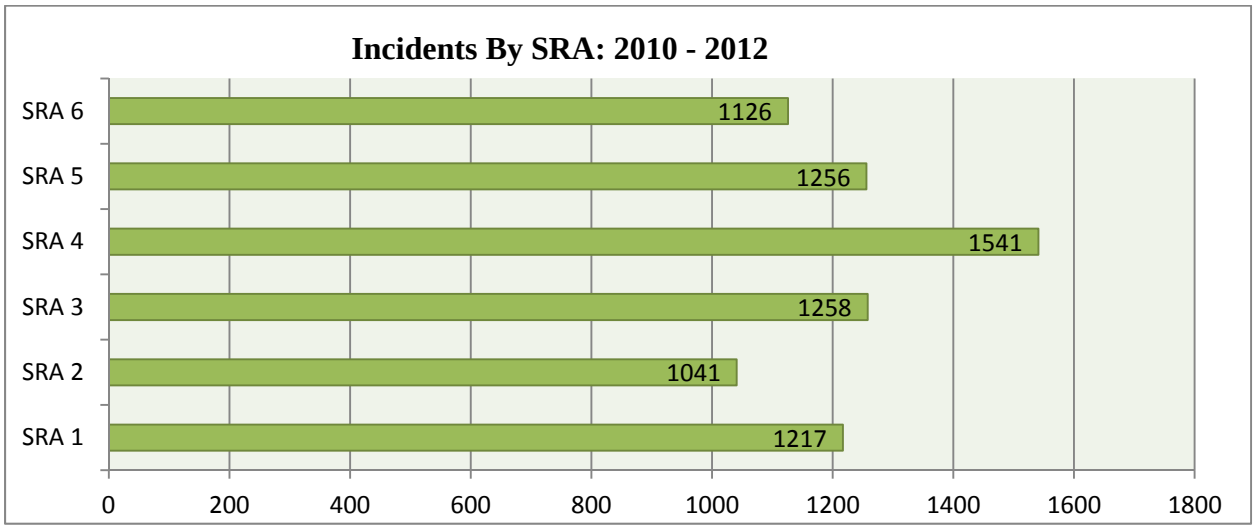
Graph D7: Incident Type by Hour



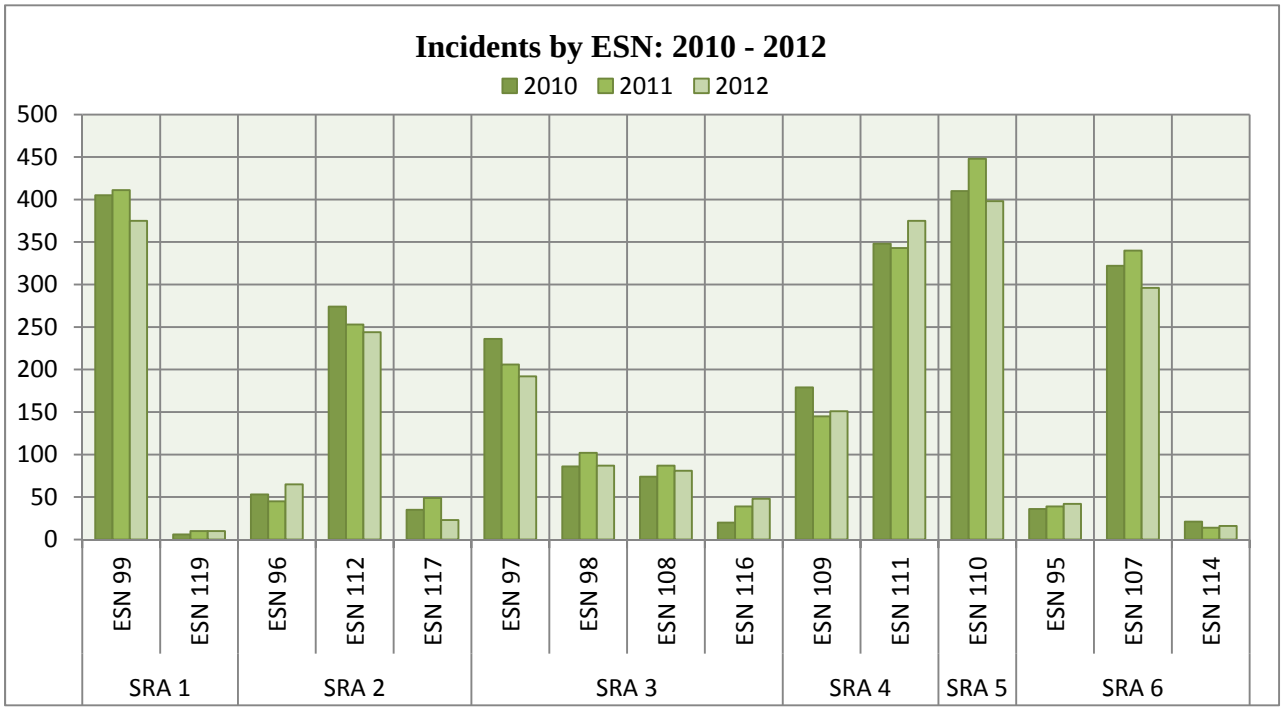
Incident Location

Incident location was analyzed from two perspectives; station response areas (SRAs) and emergency service numbers (ESNs). By analyzing incident locations, a better understanding may be gained of where incidents are occurring and where the majority of services are being utilized.

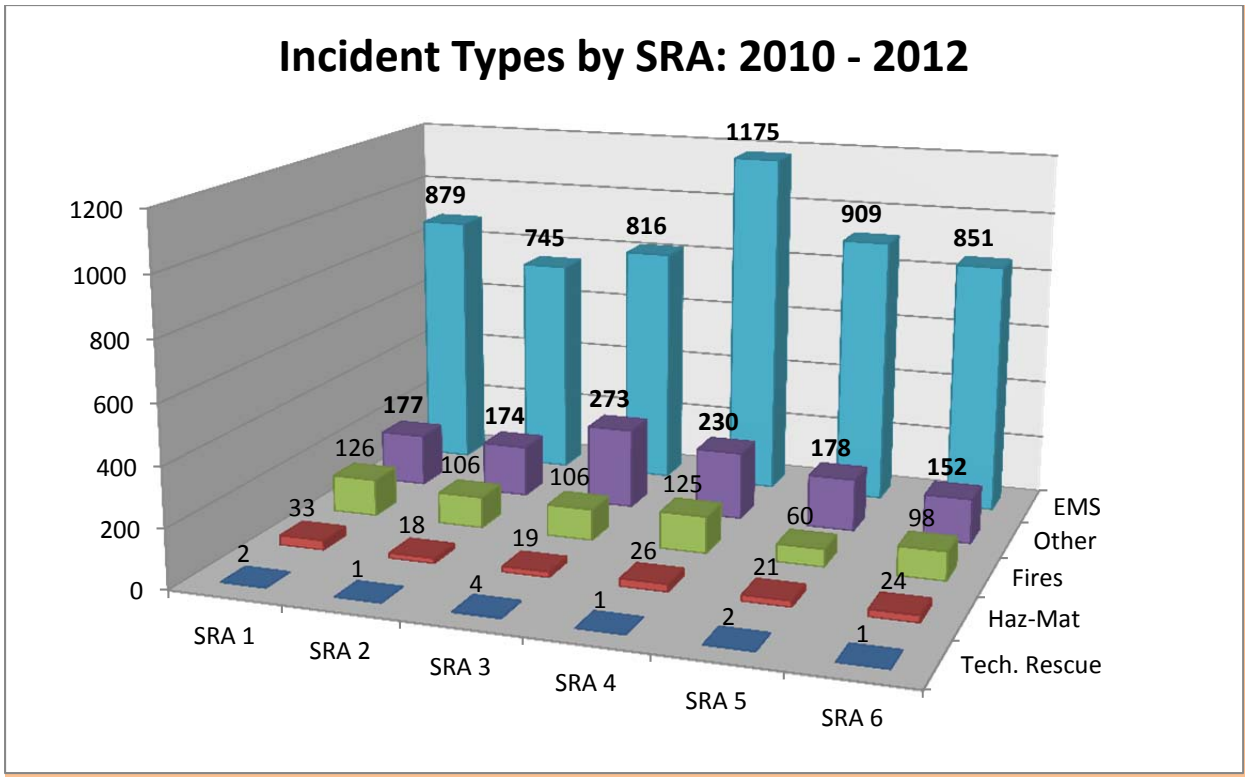
Graph D8: Incidents by Station Response Area



Graph D9: Incidents by ESN



Graph D10: Incident Types by SRAs: 2010 - 2012



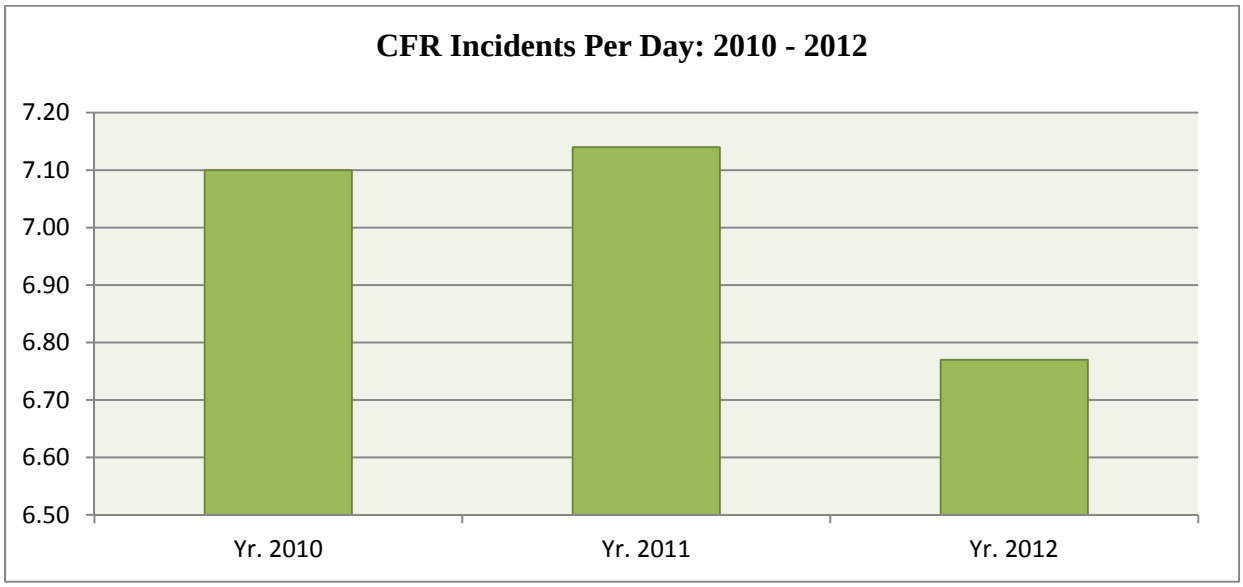
Graph D8 reflected call frequency by SRAs. Call frequency provides an understanding of call location and indicates if a particular station may be stressed. As can be seen, SRA 4 (Station 4) has the greatest call volume. Stations 3 and 5 are the next busiest. Station 1 is divided into two SRAs (SRA 1 and SRA 6). The least busy location was SRA 2.

Graph D9 illustrated call locations by ESN. This graph provides an indication of specific areas within the city where services are being provided. As can be seen, ESN 110, 111, and 99 has experienced the most incidents. Of interest are ESNs 110 and 111. Within these ESNs are three major assisted living facilities, two in ESN 110 and the other in ESN 111. Incidents to these facilities account for 46% of incidents in ESN 110 and 25% of incidents within ESN 111. Graph D10 also quantifies incident types responded to by SRA and provides an indication of incident type probability.

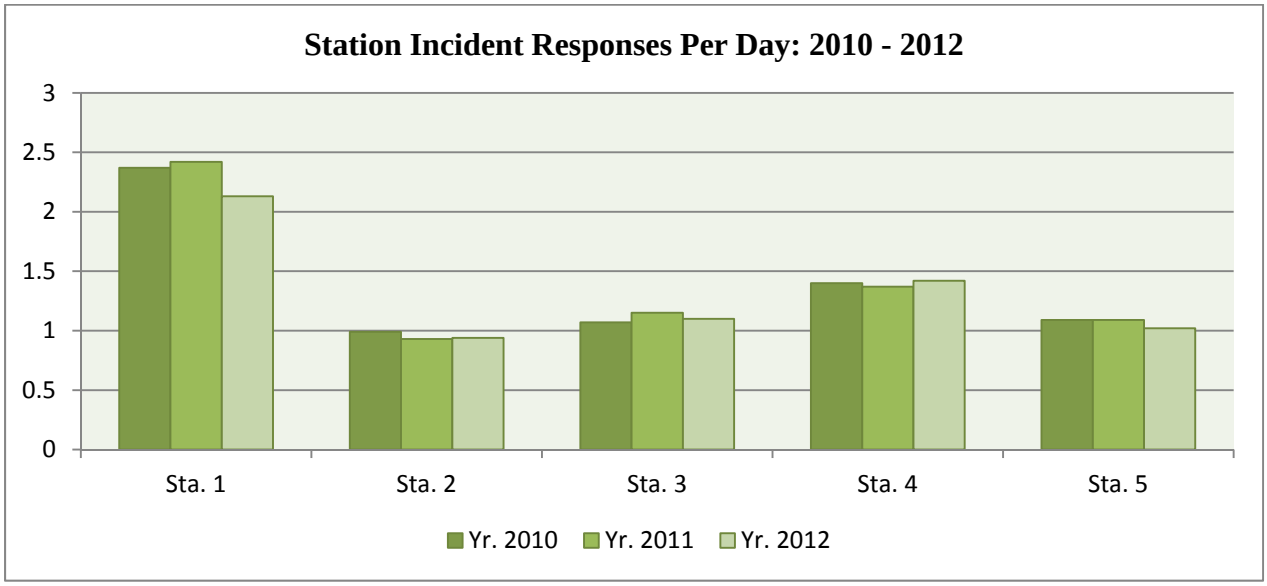
Incident Frequency

Incident frequency is important when assessing if the department or any particular station is being stressed by too many incidents. Graph D11 reflects the average number of incidents responded to by the department while Graph D12 illustrates the average number of incidents responded to by stations. The data in each graph was from 2010 through 2012.

Graph D11: CFR Incidents per Day



Graph D12: Station Incidents per Day: 2010 - 2012



<u>Community Risks</u>

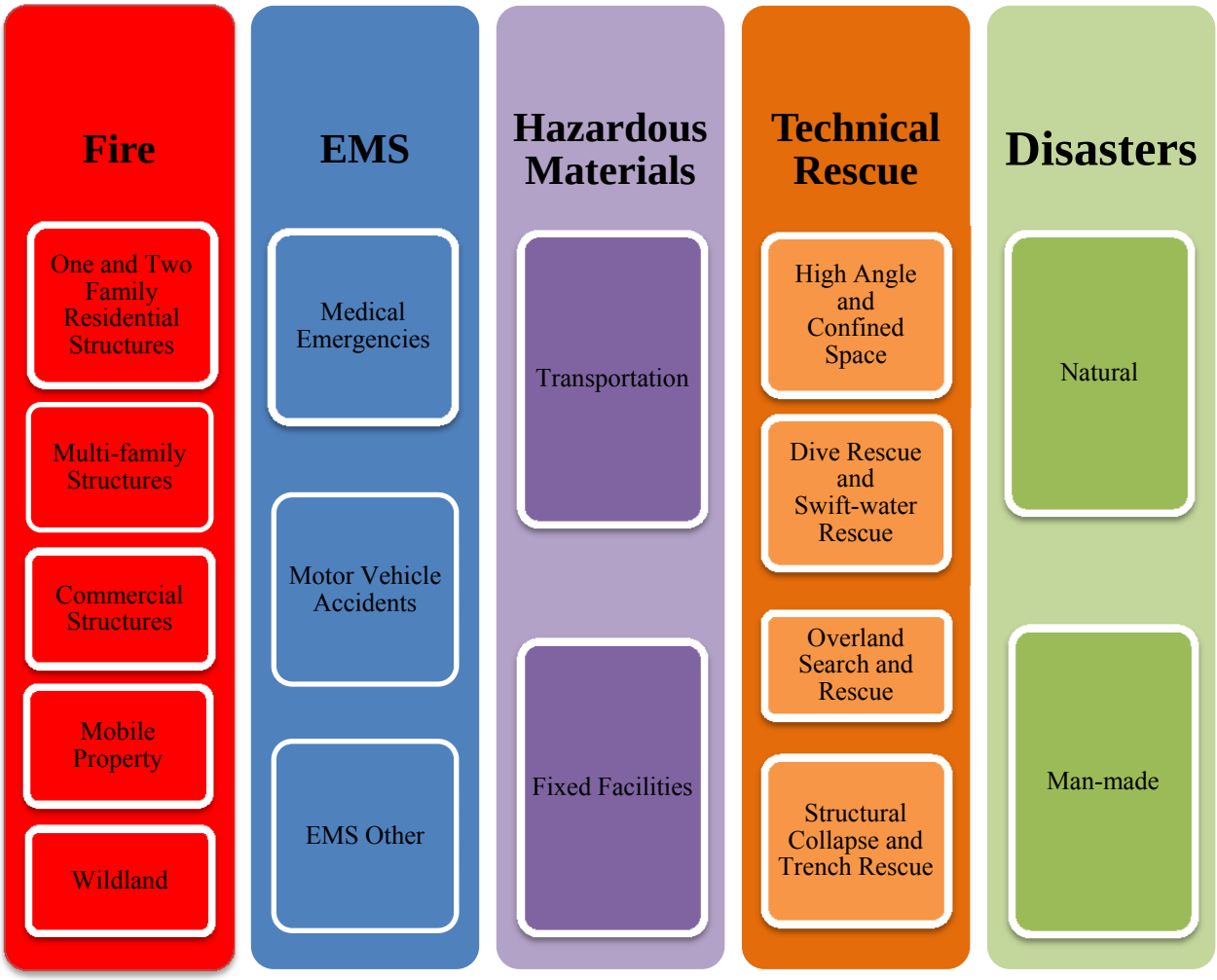
The second phase of the community risk assessment involved identifying community risks. These risks were evaluated by service delivery areas (programs offered) and station response areas and emergency service numbers (management zones).

Service Delivery Areas

Service delivery areas focused on three components; Risk Identification methodology, Risk Level classifications, and a Critical Task Analysis.

Risk Identification Methodology

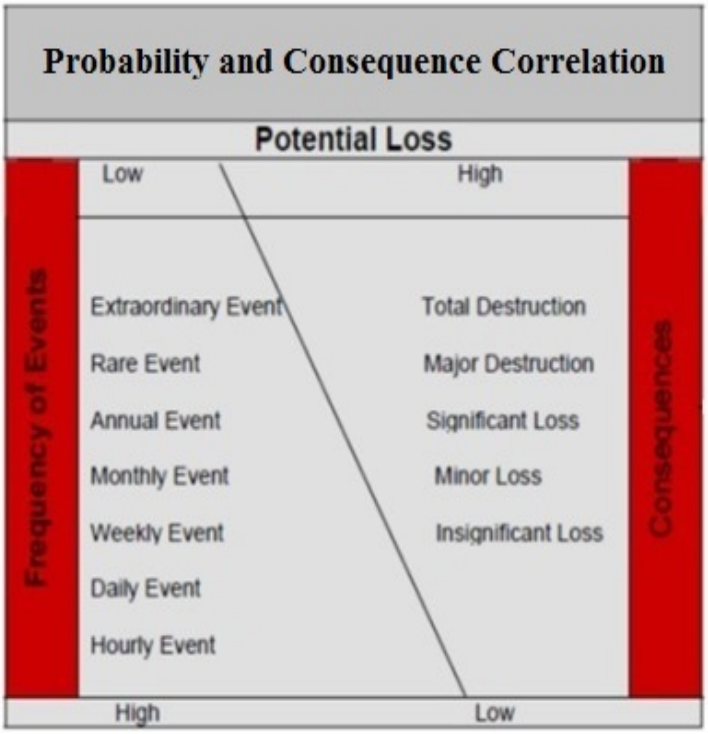
Risks levels were assigned to each program provided by the department. Each main program was listed in addition to sub-categories which present unique risks.



Risk Level Methodology

Risk is defined as an "exposure to a hazard based upon the probability of an outcome when combined with a given situation with a specific vulnerability" (CFAI, 2009). In other words, risk is a measurement of the probability of an occurrence taking into consideration the severity or consequences of the event. The deployment of adequate resources to successfully mitigate an incident is directly proportional to the level of risk encountered.

CFR will follow the concept of "Differential Response" taking into consideration the primary components of risk; probability and consequence. The concept of Differential Response is a tiered system where the number and type of resources deployed is based upon the severity or risk level of the incident.



Probability and Consequence Relationship

Probability of occurrence or event frequency is established through the quantification of national, state, and local historical incident data which may be used to predict future events. The consequence or severity of the event is determined through local factors that include fatalities and injuries, total life safety concerns, size of the occupancy, property values, fixed protection systems, and overall community impact.

There is an inverse relationship between probability and consequence. Typically, high frequency events (hourly/daily) result in minor or low losses. Conversely, infrequent (rare/extraordinary) events result in major losses. As a result of this relationship, consequences dictate the number of resource commitments more so than probability. Risk levels were categorized as low, moderate, high/special, and maximum.

Critical Task Analysis

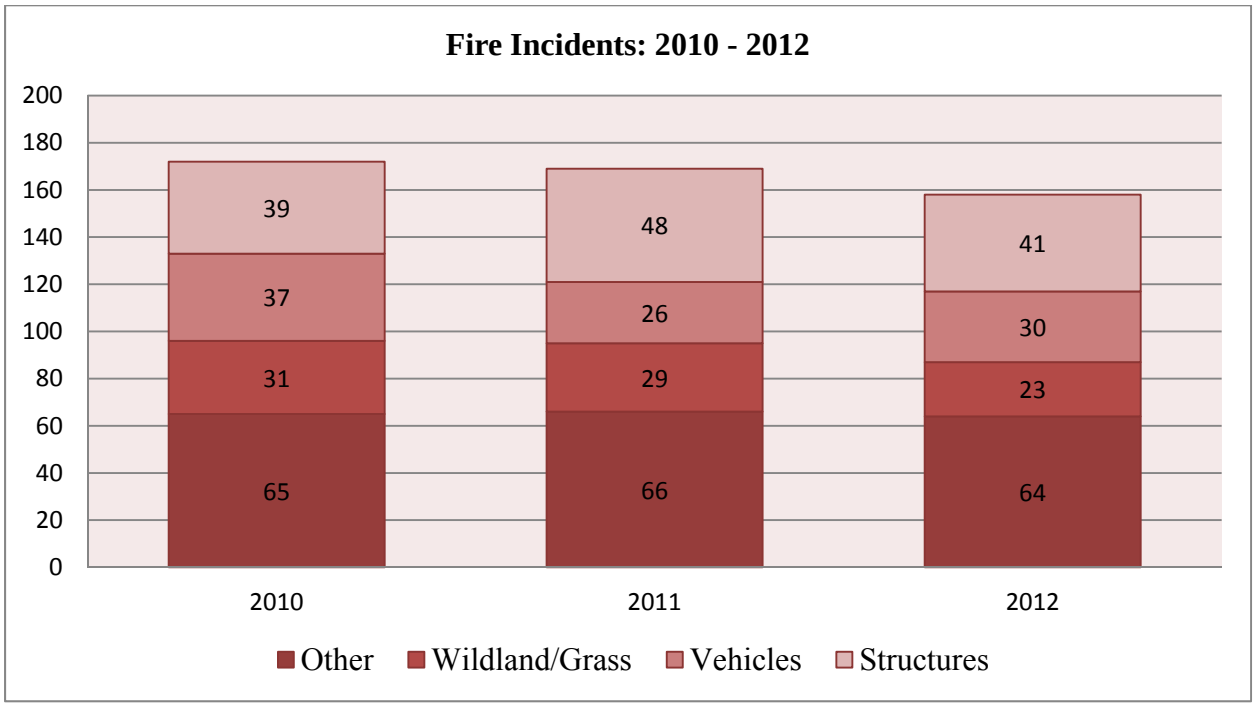
Critical tasks are the jobs that must be performed to successfully mitigate the incident. Critical tasking is dependent upon the severity or complexity of the event. Critical tasking not only requires the appropriate number of personnel but also requires the correct type of resources (i.e. apparatus, specialized equipment). Additionally, these resources must arrive within the accepted response time objectives. In the following sections, risk levels were determined for each program and critical tasks developed reflecting the jobs or assignments which must be completed to stabilize the incident.

Fire Risks

Fire risks represent a significant hazard to the city. There are certain risk factors that lead to susceptibility of an occurrence. Using data collected by the U.S. Fire Administration, elderly individuals, especially those above the age of 65, are more susceptible to fire events than the general public. Statistics indicate that the elderly are 2.6 times more likely to die in a fire than other age groups. Reasons for this vulnerability include mental and physical frailties and the greater use of medication that alters behavior. Children, specifically those 4 years of age or younger, are at risk as well. Using data provided by the U.S. Fire Administration's Topical Fire Series Report, 52% of fatalities involving children involve this age group. Furthermore, children 4 and under are more susceptible to injuries due to fire. Examining this problem one step further, African American children are at an increased risk than other ethic groups. Fatality rates for African American children were 2.6 times that of other races. Approximately 22.4% of Columbus' population is comprised of these at-risk age groups. In addition to age factors, individuals living on fixed income or in poverty conditions are at increased risk as well. The poverty level for the city (2007 – 2011) was 32.3%. When considering the risk factors, fire risks present a clear and present danger to the community.

CFR has experienced a total of 499 fire incidents from 2010 through 2012. This total represented approximately 6.5% of total call volume. Fire incidents have experienced a slight decline in each of the previous 3 years (172 to 158 incidents). Fire incidents were classified as structure, vehicle, wild-land/grass, and other. Graph D13 documents fire incidents during the analysis timeframe.

Graph D13: Fire Incidents



	2010	2011	2012	Totals
Structures	39	48	41	128
Vehicles	37	26	30	93
Wild-land / Grass	31	29	23	83
Other Fires	65	66	64	195

Fire events present a significant hazard to property. Table D1 shows the financial impact caused by fires.

Table D1: Financial Impact of Fire Events

Financial Impact of Fire Events				
	2010	2011	2012	Total
Dollar value of threatened property	26,588,869	68,365,902	131,487,082	226,441,853
Dollar loss of insured property	805,444	1,148,725	4,488,189	6,442,358
Dollar loss of uninsured property	129,273	690,650	349,995	1,169,918
Dollar value of property saved	25,654,152	66,526,527	126,648,898	218,829,577

Fire events were separated into six risk categories; one and two (single) family residential structures, multi-family residential structures, commercial structures, mobile, wild-land, and special considerations. Residential and commercial data (building totals, square footage, and values) were provided by the Lowndes County Tax Assessor's Office. CFR's engine companies performed a "windshield" assessment for multi-family complexes.

One and Two Family Residential

There was a discrepancy between data provided by the U.S. Census Bureau and the Tax Assessor's Office. For the purpose of this report, the data provided by the Tax Assessor's Office was used. One and two family residential structures accounted for approximately 7,623 buildings within the city. This total represented 74.1% of city structures.

Several factors may be used to determine probability. These factors include incident frequency, fire cause, area of origin, and time. There were 83 single family residential (SFR) fires that accounted for 77.8% of structure fires. According to the NFPA, statistics indicated that the leading causes of residential fires were cooking equipment and heating equipment. The top three areas of origin were the kitchen, bedroom, and chimneys. Using the department's RMS (Fire Programs) and analysis software (StatsFD), the leading causes of residential fires in Columbus were cooking equipment and appliances. The kitchen, bedroom, and laundry/storage were the top 3 areas of origin. As seen from the Graph D7 (pg. 47), the majority of fires occurred between 12 p.m. and 6 p.m. with the 5 p.m. to 6 p.m. period representing the most calls. As a result, the most probable type of fire event is cooking related occurring in the kitchen between 5 p.m. and 6 p.m. This probability mirrors national statistics.

Consequences consider property values/square footage, property losses, and fatality and injury potential and actual. SFRs have an assessed value of $472,697,510 with a combined square footage of 14,705,149. The average residential value is $79,921 with an average square footage of 2,151. There were 83 residential structure fires representing total losses (property and contents) of $3,111,000. This total averaged $37,500 per fire. The average home is occupied by 2.3 individuals. Residential fires have accounted for 6 injuries and 4 fatalities. SFR fires were rated as low probability with moderate consequences.

Multi-family Residential

Multi-family residential occupancy data was gathered through a windshield assessment conducted by the department's engine companies. Data was gathered that included total number of complexes, total number of buildings, total number of units, and total square footage. The following multi-family statistics were determined:

- 576 buildings
- 2800 units
- 2,950,885 square feet
- 6.5% of total structures

Not included in the above statistics were the multi-family structures found on the campus of MS University for Women. The following multi-family structures are found:

- 9 multi-family buildings: 106 units, 101,340 square feet
- 9 dormitories: 658 rooms, 447,675 square feet

Examining probability factors, there were 14 multi-family fires representing 12.3% of structure fires. Another factor must also be considered. There are 6 major multi-family complexes that are federally subsidized, low income housing. These complexes contain 197 buildings with 529 units. Combined, these structures total 593,130 square feet. The inhabitants of these complexes closely follow the characteristics of at-risk groups vulnerable to fire previously described. Similar to SFRs, cooking fires in the kitchen remained the leading cause and origin of fires.

These structures represented 6.5% of city structures with a combined 2.9 million square feet. There were 14 multi-family fires representing $262,600 in total losses (property and content) with an average loss of $18,757. There were no fatalities or injuries associated with these fires. Multi-family fires are rated as low probability with high consequences due to the increased potential for a loss of life, occupancy size, and increased property values. Additionally, the majority of these occupancies are unprotected (non-sprinkler).

Commercial

Commercial structures accounted for approximately 1,181 buildings within the city. This total represents 19.4% of city structures. An assessment was conducted on commercial occupancies based upon a risk model used by Jacksonville Naval Air Station Fire Department (NASJAX).

This model evaluated occupancies based upon 8 criteria that included life hazard, community impact, hazard index, water supply, building usage and construction, number of stories, and square footage. Following a scoring guide, engine companies were responsible for scoring the occupancies within their assigned areas as well as obtaining information to be used to determine fire flow rates. An Occupancy Vulnerability Assessment (OVA) score was assigned and occupancies were placed into maximum (21 – 24), significant (15 – 20), moderate (10 – 14), and low (9 or less) risk categories. The commercial OVA scoring guide may be found in Appendix B. Table D2 provides OVA data for commercial occupancy risk classification.

Table D2: Commercial Occupancy Vulnerability Assessment Scores

Commercial Occupancy Vulnerability Assessment Scores				
Station Response Area	Low	Moderate	Significant	Maximum
SRA 1	103	213	74	5
SRA 2	37	114	32	0
SRA 3	67	272	70	2
SRA 4	68	219	48	0
SRA 5	30	115	20	0
SRA 6	50	130	111	18
Total	355	1063	355	25

These structures have a combined square footage of 16,006,648 with an assessed value of $664,485,408. There were 12 fires representing 10.9% of structure fires. The probability of an event is low based upon the number of events that have occurred and the fixed protection systems that are required for many of the occupancies.

These fires accounted for approximately $4,123,900 in total losses (property and contents). Average losses per fire were $343, 658. Commercial fires are rated as low probability with high consequences due to the life safety factor, property values, and high consequences.

Mobile

Mobile property involves property that is designed to be movable, under its own power or towed. Mobile property is classified as passenger vehicles (cars, trucks, motorcycles), road freight or transport vehicles, recreational vehicles (motor homes), mass transit (buses), heavy equipment, off-road vehicles (tractors, ATVs), boats, planes, and trains. There are four basic modes of transportation that pertains to Columbus that includes highway, rail, air and water.
To determine risk levels, the department used factors such as incident history, property size, type, and value.

Highway vehicle fires accounted for approximately 90% of all vehicle fires in the United States (National Fire Data Center, 2011). Columbus has approximately 237 road miles. There were 80 passenger vehicle fires accounting for 95.3% of all mobile fires. Off-road/heavy equipment (3 / 3.6%) and road freight (1 / 1.1%) accounted for the remainder of highway mobile events. These events resulted in property losses totaling $323,000 with an average loss of $3,700. There were no deaths associated with these fires.

During the reporting period, the department experienced no fires associated with rail, water, or air. However, the potential for such events exists. Using data provided by the Federal Railroad Association (FRA), there have been 72 reported accidents in Mississippi. In Columbus, there are three major rail-lines as well as regional lines. There are numerous railway crossings of which several cross major thoroughfares. Also, a train derailment has the potential to cause a significant fire event. There have been 40 derailments in MS. There was one event in Columbus when an engine and several cars jumped the tracks but remained upright. There were no fires associated with any of these events. The consequences of an event would have a high risk potential due to the close proximity of these rail-lines with medium and density neighborhoods.

Columbus Fire and Rescue serves as the primary response agency for boat fires on the Tennessee Tombigbee Waterway from the Lowndes / Monroe county line to the state line. The department also responds to the Columbus Lake and marina and the Lowndes County water port. Since a significant majority of boat fires occur while docked, a potential exists at the Columbus marina. Additionally, the commercial tonnage shipped via the Tenn-Tom waterway is expected to increase with the completion of the intermodal container facility at Demopolis, AL. The

department responded to one boat fire (tug boat) within the past decade but none within the past three years. The consequences of an event range from minor to significant due to the potential of contamination or the blockage of a major inland waterway transportation system.

There are three air facilities in Lowndes County and Columbus. The Golden Triangle Regional Airport is located in the county. This airport is the state's third largest commercial facility. GTR Airport is able to support both commercial and private aircraft that includes both prop and jet aircraft. The airport has its own fire department; however, CFR is primary back-up for mutual aid support. There has been one private airplane crash within the past decade but no fire as a result. Columbus Air Force Base (CAFB) is located 8 miles north of Columbus. CAFB is home to the 14th Training Wing which uses both prop and jet aircraft. CAFB maintains its own fire department but uses the department as a secondary response resource. There have been events involving take-off and in-flight emergencies resulting in aircraft crashes. There have been no events within city limits. The Lowndes County / Columbus Municipal Airport is located within city limits. This airport is limited to small private aircraft. There have been no events at this airport. The consequences for an air event range from minor to significant. Crashes involving commercial jets or military aircraft crashing within city limits would have severe consequences. Mobile fires are rated as low probability with varying consequences depending upon the type, size, and location of the fires.

Wild-land and Grass

Wild-land and grass fires accounted for approximately 16.6% of fire events. The city's rural and suburban interface areas represent a significant hazard based upon the fuel loads provided by natural vegetation. The region has experienced drought or drought like periods which increases the risk of an event. Typically, wild-land and grass fires occur during two peak periods. Fires occurring in March through May (yard cleanup, burning garden plots, etc.) accounted for 24.8% of wild-land fires. Fires during the summer months of July and August (low rain periods / drought like conditions) represented 20.3% of these events. Areas where incidents most often occur include the north (Hwy 45 N / Military Rd.) and south eastern (Hwy 69 S.) areas of the city. Wild-land and grass fires are rated low probability with low consequences.

Fire Risk Conclusion

Based upon the fire risk analysis, fire events present a real and potential risk for the community in both terms of probability and consequence. Structure fires have remained fairly consistent over the analysis period. One important statistic revealed is the vulnerability of at-risk groups to fire events. The city's poverty rate and age demographics support increased fire risk potential. When reviewing the locations of where fires occur (see SRA/ESN assessment in Section E), a correlation exists between fires and at-risk factors (elderly, low income housing, poverty / fixed income). Additionally, the median values and square footage of these residences are much lower than those of the city as a whole, further indication that support at-risk group vulnerability. Multi-family and commercial fires also impact the community. While the probability of occurrence is lower, the consequences were or have the potential to be greater. This potential is realized by both overall property values and life safety concerns. Single and multi-family and small commercial occupancy fires are classified as a moderate fire risk. Multi-family and large commercial structures are classified as high due to the added size of the structure and increased life safety risk. As with any large structural fire, the incident may quickly escalate and exhaust on duty resources requiring off-duty support.

Mobile property fires also present a risk to the community. Mobile property fires have been limited to passenger, road freight, and off-road vehicles. Due to the consequence of the event, these fires were classified as low. Although no other mobile fire events were noted, the potential exists and must be considered. Wild-land and grass fires were also classified as low risk events. Several other specific fire events that were not discussed were added as a means of providing guidance for resource allocation.

Fire Risk Level Classifications

Fire risk level classifications were designated as low, moderate, high, special, and maximum. Fire alarms are treated as an actual fire event with deployments based upon occupancy type until determined otherwise. Using this methodology, the following fire risk levels were established:

- Low risk events present minor hazards requiring minimal response that includes electrical distribution (transformer, arcing lines), trash/rubbish fires, and passenger vehicle events.

- Moderate risk events present significant hazards requiring additional ERF units to assist with mitigation that includes single family residences and small commercial occupancies. Mobile fires involving road freight, aircraft, rail, and water is included due to the property loss and increased hazard potential.
- High risk events present major hazards and require maximum ERF deployments due to size, life safety, or community impact issues that include assisted living facilities, large commercial structures, multi-family occupancies, and ESN 114 fire events.
- Special risk events present major hazards above that appropriate to the risk, predominate in the surrounding area. Special risk occupancies include assisted living facilities, hospitals, correctional facilities, high risk industrial facilities.

Moderate	**High**
• Single family residential • Small commercial - Non -Sprinkler structures <10,000 sq. ft. - Sprinkler structures < 20,000 sq. ft. • Road freight, aircraft, rail, water events	• Multi-family residential • Large commercial structures - Non -Sprinkler structures >10,000 sq. ft. - Sprinkler structures > 20,000 sq. ft.
Low	**Special**
• Vehicle fires • Dumpster / trash fires • Electrical distribution system (transformers, lines arcing)	• Assisted living facilities • Hospitals • Correctional facilities • High risk Industries

Fire Critical Task Analysis

To effectively respond to the risk levels identified, the department must determine the type and appropriate number of resources that are needed to stabilize the event. This determination is known as a critical task analysis. An effective method to develop critical tasks is to determine the specific actions to be accomplished within an acceptable timeframe. For fire events involving operations in an IDLH atmosphere, certain tasks are required. For example, firefighters in this event are required to be in full protective gear and have, at a minimum, 1 3/4" hand-line. A RIT team must be designated and an incident command system in place. Additional tasks such as

pump operator, water supply, ventilation and back-up line must also be considered. Table D3 shows critical tasks for each fire risk level.

Table D3: Fire Event Critical Task List

Critical Task List and Effective Response Force Deployment		
Fire: Special		
Water supply	1	4 engine companies (12) 1 ladder company (3) Battalion Chief (1) Total: 16 Command staff
Pump operator	1	
Aerial operator	1	
Attack line # 1	2	
Backup line	2	
Rapid intervention crew	2	
Ventilation	2	
Rescue	2	
Ground Ladders	2	
IC	1	
Total	16	
Incident Safety Officer	Command Staff	
Other ICS Positions / Functions	Command Staff	

Fire: High		
Task	**Personnel Required**	**ERF Deployment**
Water supply	1	4 engine companies (12) 1 ladder company (3) Battalion Chief (1) Total: 16 Command Staff
Pump operator	1	
Aerial operator	1	
Attack line # 1	2	
Backup line	2	
Rapid intervention crew	2	
Ventilation	2	
Rescue	2	
Ground ladders	2	
IC	1	
Total	16	
Incident Safety Officer	Command Staff	
Other ICS Positions / Functions	Command Staff	

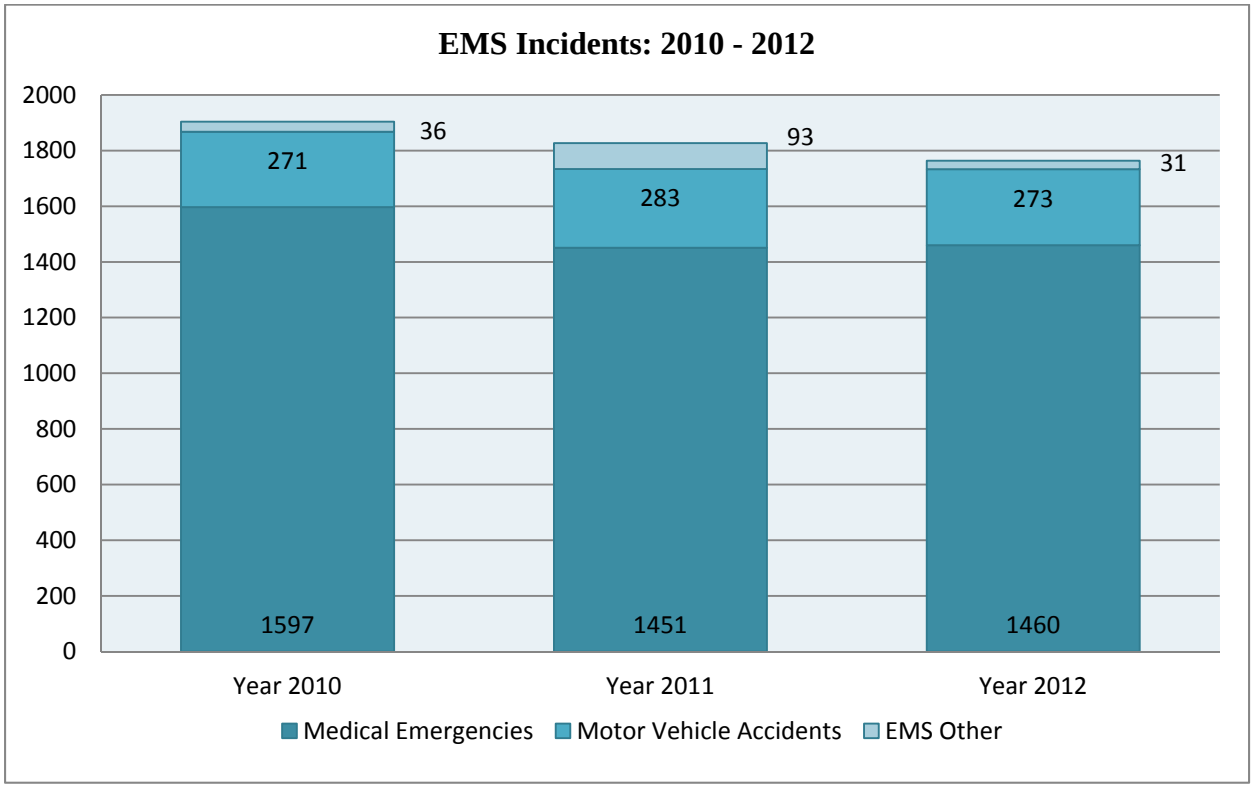
Fire: Moderate		
Structure Fires		4 engine companies (12) Or 3 engine companies (9) 1 ladder company (3) Battalion Chief (1) Total: 13 Command Staff
Water supply	1	
Pump operator	1	
Attack line # 1	2	
Backup line	2	
Rapid intervention crew	2	
Ventilation	2	
Rescue	2	
IC	1	
Total	13	
Incident Safety Officer	Command Staff	
Other ICS Positions / Functions	Command Staff	
Mobile Fires (Road freight, aircraft, rail, water)		2 engine companies (6) Battalion Chief (1) Total: 7 *Event severity will dictate additional ERF deployments
Water supply	1	
Pump operator	1	
Attack line # 1	2	
Backup line	2	
IC	1	
Total	7	
Incident Safety Officer	Command Staff	
Other ICS Positions / Functions	Command Staff	

Fire: Low		
Pump operator	1	1 engine company (3) Battalion Chief (1) Total: 4
Attack line	2	
IC (if required)	1	
Total	4	

EMS Risks

CFR provides non-transport Basic Life Support (BLS) pre-hospital care to the community in support of the local EMS system. EMS incidents represent the most calls responded to by the department comprising 72% of total call volume. The department separates EMS responses into three basic categories; medical emergencies (cardiac, respiratory, unconscious/unresponsive, excessive hemorrhage), motor vehicle accidents (MVAs), and EMS other (lifting assistance, EMS standby, etc.). Graph D14 reflects EMS responses from 2010 through 2012. Medical emergencies represented 82% of total responses while motor vehicle accidents (15%) and EMS other (3%) comprised the remaining calls.

Graph D14: EMS Incidents



	2010	2011	2012	Totals
Medical Emergencies	1597	1451	1460	4508
MVAs	271	283	273	827
EMS other	36	93	31	160

Medical Emergencies

The department responded to approximately 5,500 medical related emergencies in the analysis timeframe. Medical emergencies far exceeded any other type of EMS response in Columbus representing 82% of total EMS responses. The department responds to four basic types of EMS medical emergencies that include:

- Cardiac emergencies
- Respiratory emergencies
- Unconscious / unresponsive patients
- Excessive hemorrhage

In examining probability, there are factors that influence EMS calls. Similar to fire events, individuals living on fixed incomes or in poverty conditions are predisposed to using this service than other demographic groups. These individuals may use EMS services in lieu of traditional medical care. Furthermore, the elderly age group is more likely to utilize EMS services than other age groups. As shown from the tables in the socio-economic section, the city's median income is below the state median and Columbus' poverty rate of 32.3% is well above the state average. In Columbus, 15.8% of the population is comprised of those 65 years of age or higher. The median age in the city increased 2.6 years to its current age of 36.4. This increase indicated an aging city population. There are 4 major assisted living facilities in the city. Combined, assisted living facilities accounted for 17.7% of medical emergency incident responses. Considering that the population of these facilities is between 400 to 500 patients and represent only 2% of city population, this percentage is significant. Most EMS incidents occur in July and August, followed by January and February. EMS medical emergencies are rated as a high probability with low consequences.

Motor Vehicle Accidents (MVAs)

Motor vehicle accidents (MVAs) represent 15% of EMS responses. MVAs are the second leading cause of EMS responses. There were approximately 800 incidents involving MVAs over the analysis period. The probability of occurrence takes into consideration total road miles, major thoroughfares, and traffic volume. The city has approximately 237 road miles. Roads are sub-divided into functional classes based upon road use that include expressways, arterials, and

collectors. The city has four major transportation routes that include U.S. Highway 82 and Highway 45 and MS Highway 69 and Highway 50. Figure D1 shows the major functional classes with associated miles while Table D4 reflects daily traffic totals.

Figure D1: Major Road Functional Classes

Columbus Planning Area Major Roadway Route-Miles by Functional Class		
Functional Class	**Route-Miles**	**Percent of Total**
Urban Expressway	5.07	8.74
Urban Principal Arterial	7.67	13.23
Urban Minor Arterial	18.67	32.20
Urban Collector	26.57	45.83
Total	57.98	100.00

*Provided by KPS, Inc.

Table D4: Daily Traffic Flow

Road	Functional Class	Lanes	Daily Traffic Total
Hwy 82	Expressway	4	29,000
Hwy 45	Arterial	4	28,000
Alabama St	Arterial	2	19,000
Main St.	Arterial	4 / 2	16,000
Hwy 69 S	Arterial	2	14,000
Bluecutt Dr.	Arterial	2	13,000
Military Rd	Collector	2	12,000

*MS Department of Transportation

The consequences of MVAs may be determined by the number of accidents, injuries, and fatalities. CFR responded to 487 MVAs in which there were injuries. Of these incidents, 11 required extrication. There were an additional 292 incident responses where no injuries were recorded. In Mississippi, there were 1,271 fatalities in 2010 and 2011. During this same period, there were 14 fatalities in Lowndes County of which 4 were within city limits. MVAs are rated as high probability with moderate consequences.

EMS Other

EMS Other represents incidents such as calls for lifting assistance, EMS standbys, and incidents coded as rescue, EMS other (300). These calls represented only 3% of total EMS call volume. Probability and consequence is considered low due to the nature of the call.

EMS Risk Conclusions

The EMS risk assessment provided data indicating a real and potential risk to the community. Incident frequency supported the high probability of occurrence. EMS incident predisposition factors, specifically the elderly, were supported by the disproportionate percentage of responses to the city's assisted living facilities. Even though EMS responses have declined 7.5% in the previous two years, it is uncertain of the impact of this decline considering total department responses declined by 5% from the previous year. Further analysis is warranted.

Motor vehicle accidents will continue to present a continued risk. Major multi-lane thoroughfares and traffic volumes offer an increased probability in addition to the many secondary roads and intersections within the city. The consequences may be moderate as evidenced by the number of injuries and fatalities involved.

Other EMS events present low risk to the community. This risk level is supported by the infrequency of occurrence and the low consequences associated with the event. These events include calls for lifting assistance and EMS standbys.

There were other events not discussed that must be addressed in mitigation planning. These events include mass casualty incidents (MCIs) such as downed aircraft and natural events such as tornados. The occurrence of the events and high consequences place these events in the special risk category.

EMS Risk Level Classifications

EMS risk level classifications were made based upon the Probability and Consequence Matrix. Using this methodology, the following EMS risk levels were established:

- Low risk events represent a minor hazard and require minimum response. Low risk events include calls for assistance and EMS standbys

- Moderate risk events require Basic Life Support (BLS) intervention. These events can be mitigated by single unit responses. Events include single patient emergency medical calls and MVAs with no known entrapment
- High risk events represent an increased risk and additional units are required to mitigate the event. These events include MVAs with entrapment
- Special events represent significant hazards requiring the maximum ERF deployments due to the size, life safety, and unique challenges posed by the event. Special risk events include MCIs, tornado strikes, and other events that present unique challenges

Moderate	**High**
• Single patient medical emergencies • MVAs - no entrapment	• MVAs with entrapment
Low	**Special**
• Calls for lifting assistance • EMS standbys	• Specialized or multiple extrications • Mass casualty incidents

<u>EMS Critical Task Analysis</u>

To effectively respond to the risk levels identified, the department developed a list of tasks associated with EMS care, personnel required to accomplish the task, and ERF deployments.

Table D5: EMS Event Critical Task List

Critical Task List and Effective Response Force Deployment		
EMS: Special		
Critical Task	**Personnel Required**	**ERF Deployment**
Special Events (MCI)		4 engine companies (12) Battalion Chief (1) Total: 13 Limited command staff (as required)
Patient care / packaging / other	10	
Patient triage	2	
IC	1	
Total	13	
Incident Safety Officer ICS positions	1 As required	

EMS: Special cont.		
Critical Task	**Personnel Required**	**ERF Deployment**
Special / Multiple Extrications		3 engine companies (9) Battalion Chief (1) Limited command staff (as required) Total: 10 +
Extrication team # 1	2	
Extrication team # 2	2	
Extrication Leader	2	
Patient triage / patient care	3	
IC	1	
Total	10	
Incident Safety Officer	Command Staff	

EMS: High		
Extrication	2	2 engine companies (6) Battalion Chief (1) Total: 7
Extrication Leader	1	
Patient triage / patient care	2	
Report Documentation	1	
IC	1	
Total	7	

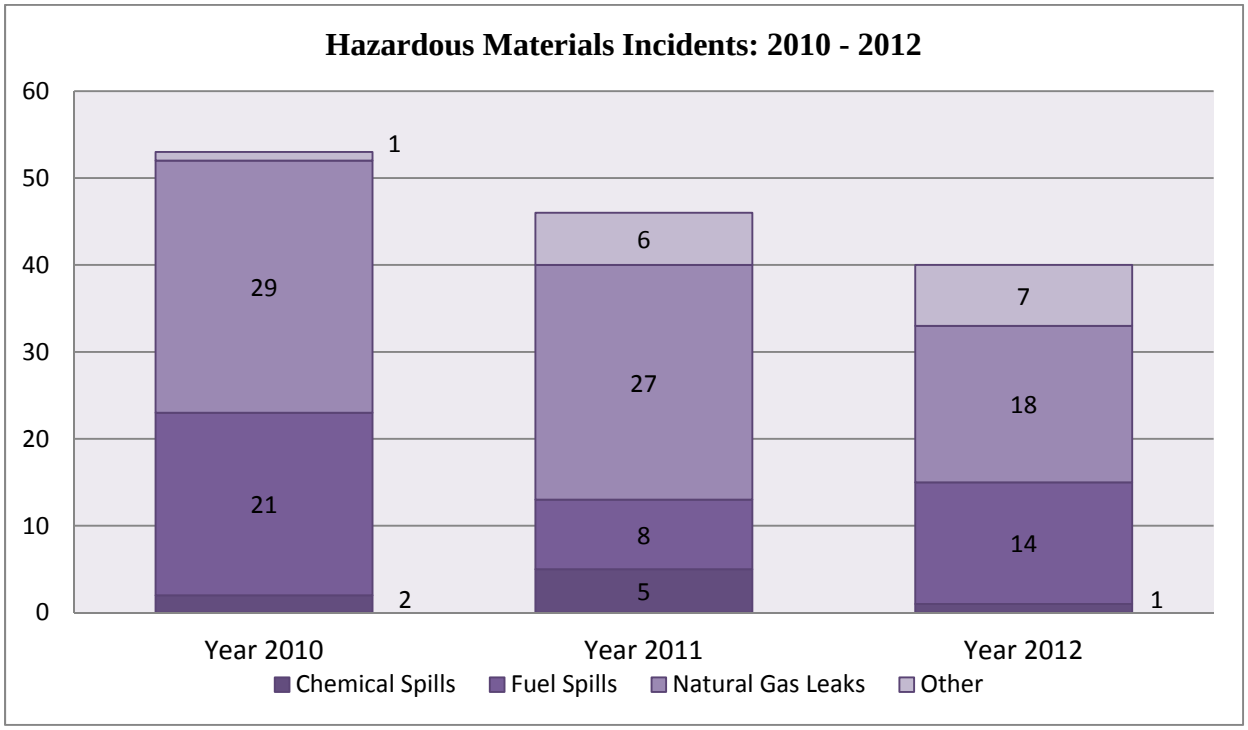
EMS: Moderate		
Patient care	2	1 engine companies (3) Total: 3
Report Documentation	1	
Total	3	

EMS: Low		
Tasks as needed	2	1 engine company (3) Total: 3
Report Documentation	1	
Total	3	

Hazardous Materials Risk

Hazardous materials, by the inherent nature of their existence, present a community risk. This risk may be realized due to an accidental or intentional release. Both of which may present a significant hazard on a small or large scale requiring evacuations of rooms, buildings, or city blocks. The most likely occurrence of a hazardous materials release is transportation and fixed facility related. Hazardous material incidents were classified as chemical spills, fuel spills, natural gas leaks, and other. The department responded to 139 hazardous material events during the analysis timeframe with 84.1% of incidents being natural gas leaks and fuel spills. The following table illustrates hazardous materials events. CFR is the primary agency for hazardous materials response within the city as well as Lowndes County.

Graph D15: Hazardous Materials Incidents



	2010	2011	2012	Totals
Chemical Spills	2	5	1	8
Fuel Spills	21	8	14	43
Natural Gas Leaks	29	27	18	74
Haz-Mat Other	1	6	7	14

Transportation

When considering probabilities of occurrence, factors include incident frequency and the opportunities for hazardous materials to be present within the city. There are major transportation modes within city limits that include highway, rail, water, and pipeline. Highway routes include U.S. Highway 82 and Highway 45, MS Highway 69 and Highway 50 and Military Road. U.S. Highway 82 is a major east/west transportation corridor. MS Highway 45 serves as the major north/south transportation corridor. From an internal analysis conducted in 2005, the most common commodities shipped via highway include petroleum products, caustic soda, sodium chloride, hydrogen peroxide, and compressed / cryogenic gases.

There are three major rail providers that include Burlington Northern Santa Fe (BNSF), Kansas City Southern (KCS), and the Genessee & Wyoming local rail-line. The BNSF and KCS are the major carriers of hazardous materials transporting a wide range of material classes. In Mississippi, there have been 40 derailments with 2 involving hazardous materials releases. In Columbus, there has been one incident where an engine and several cars jumped the tracks but no materials were released.

Commercial tonnage is shipped via the Tenn-Tom waterway. CFR is the primary response agency for incident on the waterway from the Lowndes and Monroe county line to the MS / AL state line. Commercial tonnage involved no hazardous materials; however, transportation of hazardous materials is expected to increase significantly with the completion of an intermodal container facility at Demopolis, AL. It is anticipated that hazardous material transport on the waterway will result due to intermodal container traffic. The Lowndes County Water Port is located on the Island. Several industrial sites are located adjacent to this facility and the potential to ship materials via the waterway exists. Atmos Energy maintains a high pressure supply pipeline system as well as a local customer distribution system for natural gas within the city.

The consequences of hazardous material events are significant due to the inherent risk of the product, the amount of commodities shipped, the potential impact to the environment, and life safety concerns. A release of these products could cause mass evacuations or force in-place sheltering. Rail and pipeline distribution systems pass through high and medium population

density neighborhoods. Additionally, Highway 82 passes within ½ mile of Baptist Memorial Hospital and three major assisted living facilities.

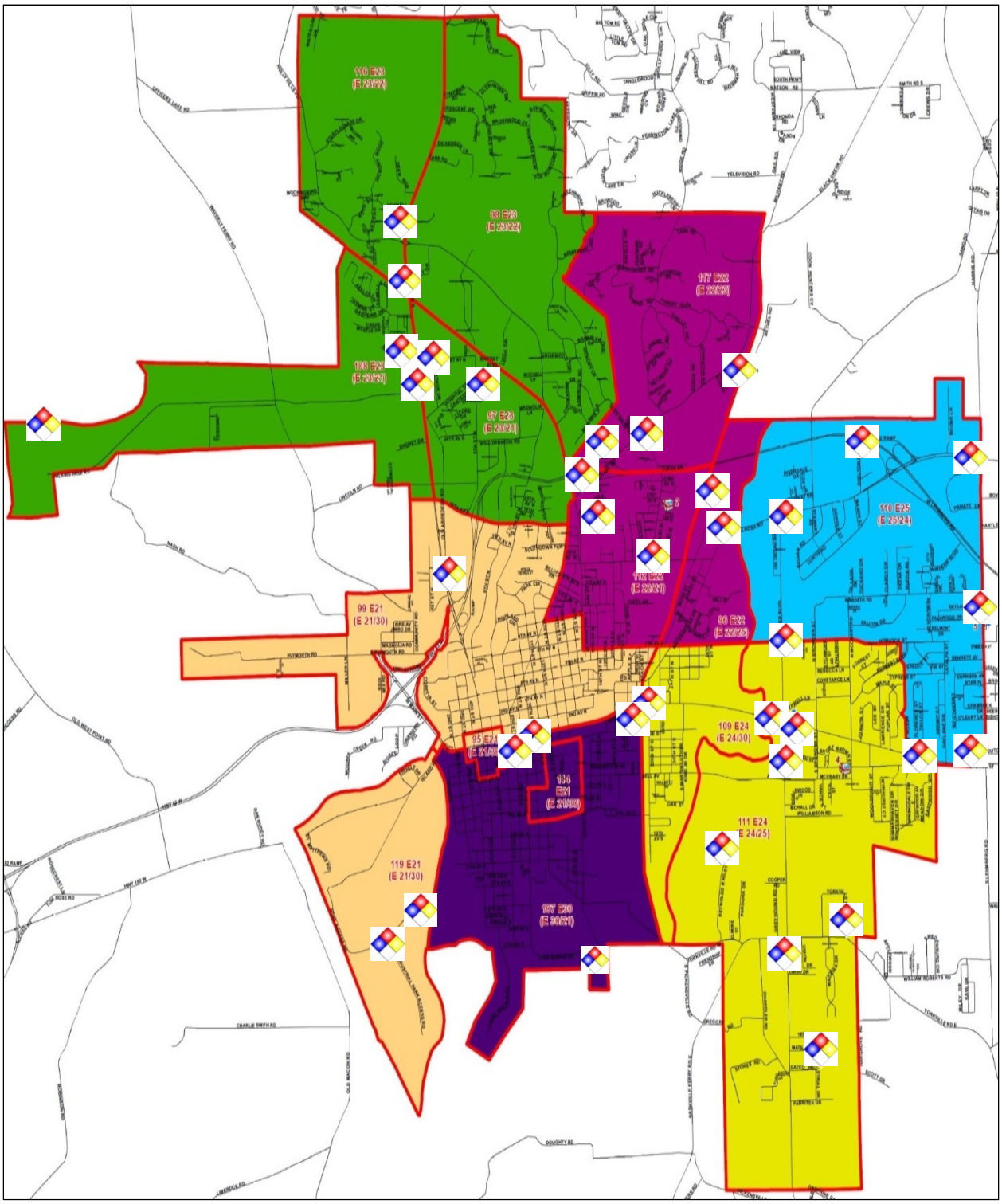
Fixed Facilities

Fixed facility locations include both business and industrial sites. The Lowndes County Emergency Management Agency maintains a list of facilities that have reportable quantities of extremely hazardous substances (EHS) as mandated by Title III of the Superfund Amendments and Reauthorization Act (SARA). In 2012 there were 39 facility sites that provided Tier II reports electronically via the Tier2Submit software. Of these sites, 18 were convenience store occupancies that supply fuel (gasoline, diesel) in above or underground tanks. The majority of hazardous material responses have been due to fuel spills at convenience store locations. The remaining fixed facility sites manufacture or store materials used in manufacturing processes. There have been no hazardous materials responses inside the city limits within the past 5 years that has required off-duty team activation or team equipment response. The majority of releases within the city have involved the designed venting of cryogenic gases. There have been 2 responses in Lowndes County that has required on-shift technicians and team equipment. There are several industrial facilities that produce hazardous materials. The consequences of a fixed facility event are the same as those of transportation incidents. Table D6 documents Tier II sites in the city with the corresponding ESN location. Map D1 illustrates these locations. Appendix C provides a detailed list of Tier II sites.

Table D6: Hazardous Material Tier II Locations

Hazardous Material Tier II Locations					
SRA	**ESN**	**Number of Sites**	**SRA**	**ESN**	**Number of Sites**
2	96	2	3	97	2
1	99	2	1	107	5
3	108	5	4	109	1
5	110	4	4	111	10
2	112	3	3	116	1
2	117	2	1	119	2

Map D1: Hazardous Material Tier II Sites



Hazardous Materials Risk Conclusions

The risk analysis revealed that a high potential for an event exists and the consequences of an event is directly proportional to the type, amount, and location of the incident. Columbus has experienced a total of 139 hazardous materials incidents during the analysis timeframe with the majority being natural gas leaks and flammable liquid (gasoline) spills.

In reference to transportation risks, the city has four modes of transportation; highway, rail, water, and pipeline distribution. These modes present a real potential for future occurrences. A significant amount of hazardous materials is transported via highway and rail. Highway accidents are significant due to the number of transits associated with the major transportation routes. While not as numerous, rail events are significant due to the quantity transported. There have been several leaks associated with motor carrier transits but cleanup of these incidents were handled by contracted vendors. The most common occurrence of hazardous materials response has been associated with leaks in the natural gas distribution system. These events account for 53.2% of total hazardous materials calls. Transportation risks are classified as low probability but high or special consequences due to the impact potential to the environment and life safety based upon the amount and location of the event.

Fixed facilities present a risk as well. There are 39 facilities that meet SARA Title III requirements. However, there are many businesses that warehouse and sell hazardous materials that are below the reportable quantities (i.e. farm co-op, paint supply stores, Wal-Mart). These occupancies present a definite risk to the community and the department, especially if coupled with other risk events such as fire. The second leading cause of hazardous materials events is fuel spills at convenience stores. These occupancies also present risk in fuel stored in above ground tanks. Additionally, there have been incidents of spills and leaks from facility systems or non-bulk packaging. Fixed facility incidents represent a low probability of occurrence and a moderate to high consequence based upon the amount of material released.

Hazardous Materials Risk Level Classifications

Hazardous materials risk level classifications were made based upon the probability of occurrence and the consequences of the event. Using this methodology, the following hazardous materials risk levels were established:

- Low risk events represent minimum response and involve single apparatus responses staffed with a minimum of one hazardous materials technician certified personnel. Responses include flammable liquid spills, carbon monoxide investigations, and hazardous materials investigations.
- Moderate risk events represent an increased response deployment of two apparatus staffed with a minimum of two hazardous materials technician certified personnel. The use of on-shift technicians with team equipment is indicated
- High risk events represent a major risk requiring both department technician level personnel and team equipment. This event requires the standby and potential recall of off-duty technician personnel.
- Special risk events represent a significant risk and maximum deployment of resources that include the use of on-duty technicians, a recall of off-duty personnel, and the activation of the Golden Triangle Hazardous Materials team.

Moderate	**High**
• Small spills / leaks from non-bulk packaging	• Highway bulk transportation leaks • Facility system leaks
Low	**Special**
• Flammable liquids spill (fuel spills) • Carbon monoxide investigations • Hazardous materials investigations	• Train derailments • Waterway incidents

Hazardous Materials Critical Task Analysis

To effectively respond to the risk levels identified, the following table reflects the tasks associated with hazardous materials events, personnel required to accomplish the tasks identified, and ERF deployments.

Table D7: Hazardous Materials Event Critical Task List

Critical Task List and Effective Response Force Deployment		
Hazardous Materials: Special		
Task	**Personnel Required**	**ERF Deployment**
IC	Special Ops Chief	2 engine companies (6) Special Ops Chief (1) Battalion Chief (1) On / off duty technicians (6) GTR Haz-mat Team (4) Total: 18 Command Staff (as required)
Haz-mat incident Safety Officer	Battalion Chief	
Recon Team 1 / Recon Team 2	4	
Entry Team 1 / Entry Team 2	4	
Backup team	2	
Research / technical	2	
Decontamination Leader / Team	4	
Team Logistics	1	
Total	18	
ICS positions	Command Staff	

Hazardous Materials: High		
IC	Special Ops Chief	2 engine companies (6) Special Ops Chief (1) Battalion Chief (1) On / off duty technicians (6) Limited command staff (as required) Total: 14
Haz-mat Safety Officer	Battalion Chief	
Recon Team	2	
Entry Team	4	
Backup team	2	
Research / technical	1	
Decontamination Leader/Team	3	
Total	14	

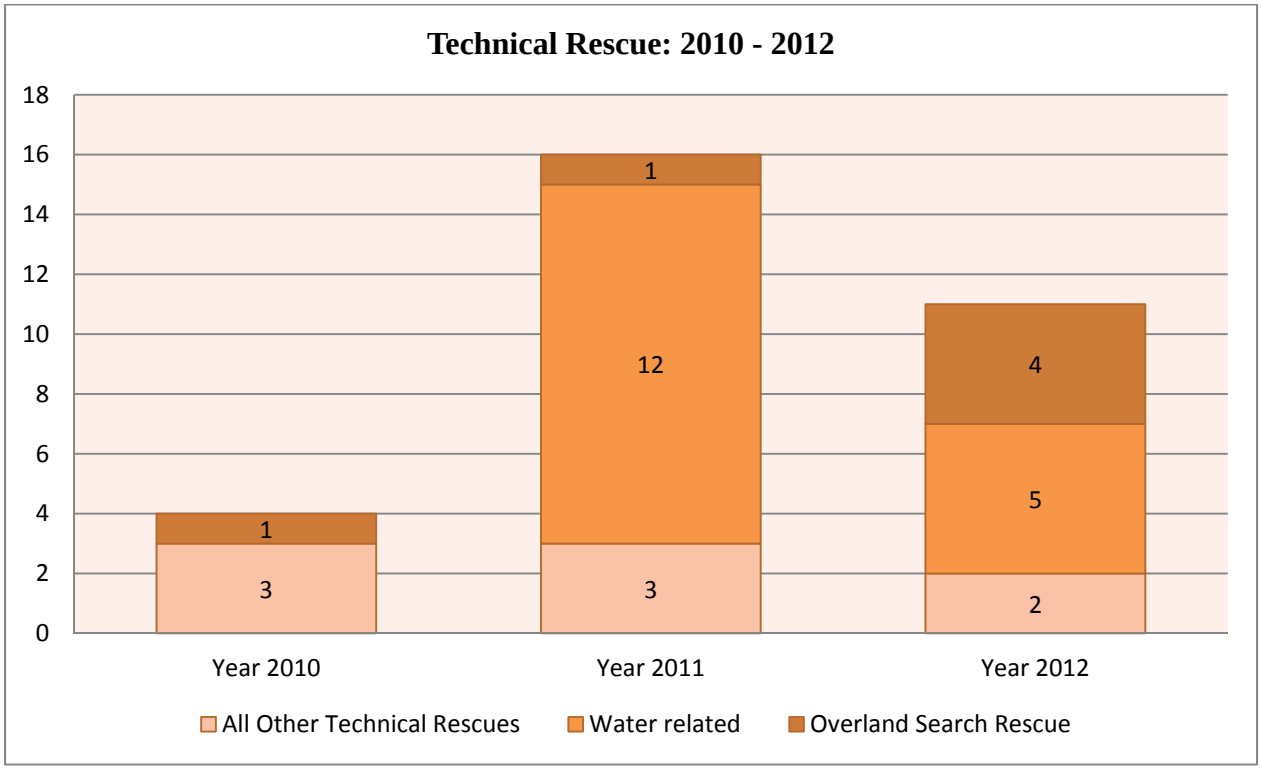
Hazardous Materials: Moderate		
IC	Special Ops Chief	2 engine companies (6) Special Ops Chief (1) Battalion Chief (1) On-shift technician (4) Limited command staff (as required) Total: 12
Haz-mat Safety Officer	Battalion Chief	
Recon Team	2	
Entry Team	2	
Backup team	2	
Research / technical	1	
Decontamination Leader/Team	3	
Total	12	

Hazardous Materials: Low		
Investigate / mitigate	3	1 engine company (3) Battalion Chief (1) Total: 4
IC	1	
Total	4	

Technical Rescue Risks

Columbus Fire and Rescue provides technical rescue services to the community. These services represent an evolution of the department to provide an "all hazards" response and mitigation capability. Technical rescue services include high angle (rope) and confined space rescue, dive rescue and recovery, structural collapse, overland search and rescue, swift-water rescue, and trench rescue. For the purpose of this report, similar technical rescues were grouped together (i.e. dive and swift-water, high angle (rope) and confined space). The department responded to 31 technical rescue events during the analysis period.

Graph D16: Technical Rescue Incidents



	2010	2011	2012
Overland SAR	1	1	4
Water Related	0	12	5
All Other Tech. Rescue	3	3	2
Totals	4	16	8

High Angle / Confined Space

Rope is defined as a rescue from limited access areas above or below grade that requires the use of rope or related equipment. Examples of high angle situations include cellular towers, silos, water tanks, steep embankments, and bridges. Due to similarities in equipment, confined space was grouped with high angle. Confined space is defined as a space, because of their size or dimensions, limit movement of those individuals who enter, work, or exit them. A confined space where health and safety hazards exists is referred to as a "permit required" confined space. These spaces are recognized by the following characteristics; contains or may have a hazardous atmosphere, inward walls or floors that slope downward or taper into a smaller area which could trap or asphyxiate an occupant, contains materials that may engulf an entrant, or possess other hazards deemed unsafe. Examples of confined spaces include manholes, tanks, tunnels, storage bins, and pits. The department maintains an equipment cache that supports this capability.

Probability of occurrence is based upon incident frequency and the potential for events. Bureau of Labor Statistics provided data that supported the consequences of high angle and confined spaced events. In Mississippi from 2010 – 2011, there were 7 fatalities due to exposures to harmful substances or environments which are typical of permit required confined space atmospheres. There have been no high angle or confined space events within city limits. From pre-fire planning and general knowledge of the community, there are several occupancies where high angle events may occur. Additionally, the department is the lead agency for these incidents within the county and for local industries that do not have industrial response brigades. CFR is also part of MS Task Force 2, the state's all-hazards response system to support local jurisdictions that are overwhelmed by an event or do not possess the technical rescue capability. High angle and confined space rescue probability of occurrence is considered low while the consequences is considered high due to the inherent risks of each incident.

Dive Rescue and Swift-water

Dive rescue and swift-water response are important components of the department's response capabilities. The department maintains an equipment cache that supports this capability. Mississippi Emergency Service Function (ESF) 9 defines a swift-water event as "a technical rescue specialty that consists of rescuing stranded and/or trapped victims from water that is

moving at speeds in excess of 1.5 knots. Swift-water operations can be conducted from the ground, with boats, and/or aerial assets."

The probability of occurrence is again based on incident frequency and potential. The department has responded to 17 water related events during the analysis timeframe. This total represents 54.8% of total technical rescue responses. There are several locations where a potential event may occur. These locations include Columbus Lake, the Tennessee-Tombigbee Waterway, the Luxapalila River, and Magbee Creek. Using statistics provided by the Centers for Disease Control, drowning is the sixth leading cause of fatalities in all age groups and the second leading cause for children between the ages of 1 to 14. The study also indicates that minorities are at greater risk than other races. This statement is supported from evidence showing that African American children between the ages of 5 to 14 drown at a rate 3.1 times more than white children in the same age group. Currently, 18.7% of the city's population is 14 years or younger. The department has responded to 8 drowning events (does not include swimming pools) since 2000, 4 inside the city and 4 in other jurisdictions.

Natural weather events have dictated swift-water responses. There have been 12 flood and flash flood events in the city since 2000 (see Weather Event Summary on pg. 86). Responses have primarily been in East Columbus and Southside, areas prone to flash flooding. The department has also responded on a regional and state level to swift-water related events. As can be seen, these events have high consequences. As a result, dive and swift-water events have a low probability and high consequence.

Overland Search and Rescue

Overland search and rescue was initiated in 2008 to add another capability in the all-hazards response philosophy. Using the definition provided by MS Emergency Service Function (ESF) 9, overland search and rescue consists of "a search of vacant structures, non-urban, and wilderness search and rescue activities which include, but are not limited to emergency incidents that involve locating downed aircraft and missing persons, extraction, and treating any victims upon rescue." CFR is the lead agency in Lowndes County for overland search and rescue operations.

Reviewing probability, the department has responded to 6 overland search and rescue events during the analysis timeframe. The potential for this need is supported when assessing the nature of past calls. Many of these responses have been for searches for elderly individuals suffering from dementia or Alzheimer conditions. Therefore, one may surmise that this service is linked with the at-risk elderly age group. As previously stated, 15.8% of the city's population is over the age of 65. This percentage is expected to increase, thus the potential for this service. However, another need also exists. There was one response for a lost child. This event is particularly relevant in the rural areas of the city where woods are located. This scenario cannot be dismissed as a non-factor. The probability of an event is low while the consequence or impact ranges from low to high based upon the singularity of those involved and the successful outcome of the events.

Structural Collapse and Trench Rescue

Structural collapse and trench rescue are the last two technical rescues discussed. Mississippi ESF 9 defines structural collapse (urban search and rescue) as "locating, extracting, and providing immediate emergency medical assistance to victims trapped in a collapsed structure." Trench rescue is defined as the "process of rescuing a victim that has become entrapped in a trench as a result of a cave-in or collapse at a construction site." In order to be considered a trench, the excavation is deeper than it is wide, but less than 15 feet wide.

There have been no structural collapse or trench rescue events during the data analysis timeframe. However, the occurrence of natural events has the potential to require this service. Columbus is located in FEMA's wind mapping Zone IV, which has historically experienced the greatest number of and strongest rated tornados. Furthermore, Columbus lies within the heart of the tornado zone known as "Dixie Alley." Since 2000, there have been 3 events (2 straight-winds and a F3 tornado) in which multiple buildings were damaged that necessitated the need for a structural collapse response. According to national weather analysis, natural weather events are continued to maintain or increase in frequency over the next decade. National statistics indicate the trench emergencies constitute a significant hazard. Trench emergencies are usually the result of utility repair or installation. The Bureau of Labor Statistics reported that from 2000 to 2009, 350 workers died as a result of excavation cave-ins.

The consequences related to these events are high due to the most likely outcome, especially in trench collapses where the fatality rate is extremely high. The probability of the event is considered low while the consequences are rated high.

Technical Rescue Conclusions

While actual responses have been low and constitute a very small percentage of department responses, the potential for and consequences associated with the event support the need for the services. CFR is the lead agency in overland search and rescue operations as well as being the primary response agency for technical rescue events in both the city and Lowndes County.

Probability based upon potential is supported due to factors that increases the possibility of the event occurring. With the likelihood of future weather events; swift-water and structural collapse will remain a needed service. Many industries do not maintain industrial response brigades. To remain OSHA compliant, these facilities depend on CFR for personnel and equipment resources for confined space response. Lost children and mentally impaired elderly patients support the need to an overland search and rescue capability.

As a result of Homeland Security grants; the department has been able to amass a technical rescue cache required to provide these services and enhanced team capabilities.

Technical Rescue Risk Level Classifications

Technical rescue risk level classifications were made based upon the probability of occurrence and the consequences or severity of the event. Risk level also considered the resources that would be needed in mitigating the event. Using this methodology, the following technical rescue risk levels were established:

- Low risk events present a minimum response involving awareness and operations level personnel with at least one technician certified personnel. Responses include overland search and rescue, stranded boat, and elevator entrapment.
- Moderate risk events present an increased technician and awareness/operations level response. Responses include dive recovery and trench rescue less than 4 feet deep.
- High risk events represent a significant response of technician level personnel as well as awareness and operations level personnel used for support functions. Events may require

the recall of off-duty technicians, especially for technical rescue events that require multiple operational periods. Responses include structural collapse, high angle / confined space rescue, dive rescue, swift-water rescue, and trench rescue over 4 feet deep.

Moderate	**High**
• Dive recovery • Trench rescue (< waist deep)	• Structural collapse • Rope / Confined space • Dive Rescue (per dive scene) • Swift-water / flood • Trench rescue (> 4 ft. deep)
Low	**Special**
• Overland search and rescue • Stranded boat • Elevator entrapment	

Technical Rescue Critical Task Analysis

To effectively respond to the risk levels identified, the following table reflects the number of technicians and operations level personnel that would be required to mitigate the event.

Table D8: Technical Rescue Event Critical Task List

Critical Task List and Effective Response Force Deployment		
Technical Rescue: High		
Technical Rescue	Technicians Required	Awareness / Operations Required
Structural Collapse	5	4
High angle / confined space	5	3
Dive rescue	3	3
Swift-water	4	3
Trench (> 4 ft. deep)	6	3

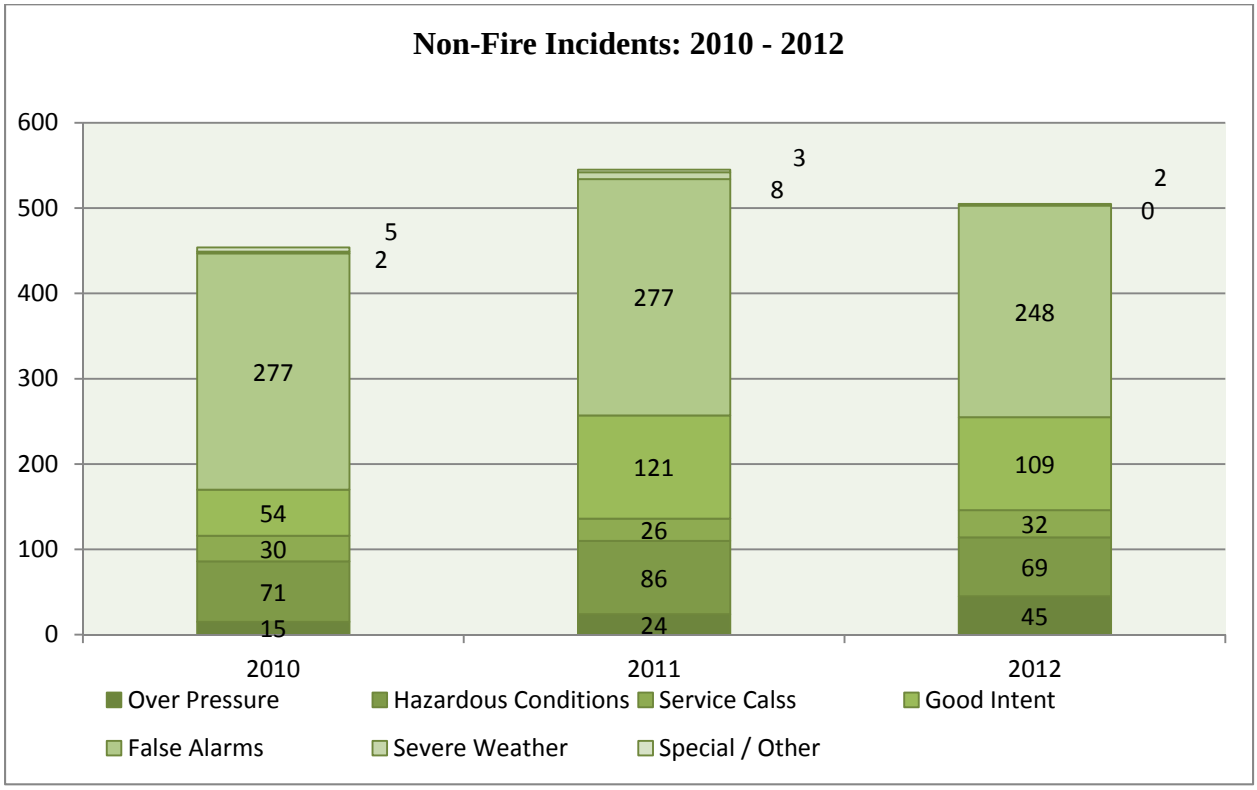
Technical Rescue: Moderate		
Dive Recovery	3	3
Trench rescue (< 4 ft. deep)	3	3

Technical Rescue: Low		
Overland search and rescue Stranded boat Elevator entrapment	1	2

Non-fire Events

Non-fire events were included to show the types of remaining responses by the department. Most of these responses use deployments similar to that of fire suppression responses. As can be seen, false alarms and good intent calls comprise the majority of non-fire incident responses. Weather events and special incidents represent the fewest responses.

Graph D17: Non-Fire Events



Disasters

An analysis of community risk would be incomplete without an assessment of the potential impact of disasters. The following section provides an analysis of natural disasters.

Natural Disasters

A natural disaster vulnerability assessment was conducted as part of the 2009 Lowndes County Hazard Mitigation Plan. Lowndes County contracted with the Golden Triangle Planning and Development District to write this plan. This assessment evaluated the city's vulnerability to 12 natural disaster events which were scored based upon 6 areas of impact. Each impact score was multiplied by the Probability of Occurrence Factor to determine an overall vulnerability risk level. This risk level was classified as low (0 – 15), medium (16 – 25), and high (> 25). The grading schedule may be found in Appendix D.

Table D9: Disaster Vulnerability Assessment

City of Columbus Vulnerability Assessment												
Type of Impact	Identified Hazards											
	Dams	**Droughts**	**Earthquakes**	**Expansive Soils**	**Floods**	**Hail**	**Hurricanes**	**Snow/Ice**	**Temp. Extreme**	**Thunderstorms**	**Tornados**	**Wildfires**
Area Impacted	1	4	4	1	1	2	1	1	1	2	2	1
Health and Safety Consequences	1	1	2	1	1	1	1	1	1	1	1	1
Property Damage	2	0	2	1	2	1	1	1	2	2	2	1
Environmental Damage	2	1	2	1	2	1	1	1	1	1	1	1
Economic Disruption	2	2	3	1	2	2	2	1	2	1	2	1
Total Risk Score	8	8	13	5	8	7	6	5	7	7	8	5
Probability of Occurrence	2	4	1	2	4	5	2	1	2	4	3	1
Total Risk Score	16	32	13	10	32	35	12	5	14	28	24	5
Comparative Ranking	6	2	8	10	2	1	9	11	7	4	5	11

Overall Vulnerability Risk Level				
Natural Hazard	**Risk Rank**		**Natural Hazard**	**Risk Rank**
Dams	Medium		Hurricane	Low
Droughts	High		Snow/Ice	Low
Earthquakes	Low		Temperature Extremes	Low
Expansive soils	Low		Thunderstorms	High
Floods	High		Tornados	Medium
Hail	High		Wildfires	Low

Table D10 provides a summary of weather events that have affected the city. Data was provided by the National Climatic Data Center, a service provided by the National Oceanic and Atmospheric Administration.

Table D10: Weather Event Summary

Weather Event Summary: 2000 - 2012					
Event	#	Notes	Event	#	Notes
Drought	6		Flash Flood	10	$3.3m damage
Thunderstorm Winds	43	$16.9m damage	Flood	2	$300k damage
Straight-line wind	2	$50k damage	Winter Weather	2	
Hail	20	$40k damage	Ice Storm	2	$402k damage
Tornados	2	$60.1m damage F1 & F3	Heavy Snow	5	$500k damage
Hurricanes (Ivan , Dennis, and Katrina)				3	$102.4m damage

As can be seen, the occurrence of events has validated the vulnerability risk assessment rankings. The most frequent natural hazards were thunderstorms, hail, and flooding. Thunderstorms have been frequent due to high afternoon temperatures coupled with high humidity and changing weather patterns resulting in earlier and longer lasting warming periods that interact with cold fronts. Hail commonly occurs as a result of thunderstorm activity. Additionally, thunderstorm super-cell activity has the potential to produce tornados and high wind events. Flash flooding is a result of excessive rainfall within a short period of time while flooding occurs over an extended period. Flooding and flash flooding is especially prominent in East Columbus (ESN 110) and

South-side (ESN 107). To a lesser extent, Columbus has been subjected to winter weather events and the remnants of hurricanes as they tracked inland. Future predictions indicate a continuance in the number and severity of weather events (Coppola, 2007). Appendix A provides a detailed listing of natural weather events.

2002 Tornado: MUW Campus

2011 East Columbus Flood

Station Response Areas and Emergency Service Numbers

The final analysis of the Community Risk section is an assessment of Columbus Fire and Rescue's management zones. This analysis was performed to meet the requirements of Performance Indicators 2B.3 and 2C.3 of the FESSAM (8th ED). CFR has divided the jurisdiction into 6 primary planning areas known as Station Response Areas (SRAs). SRAs are based upon single unit response areas. Station 1 has two SRAs; SRA 1for Engine 21 and SRA 6 for Engine 30. Station Response Areas are further sub-divided into 15 Emergency Service Number (ESN) zones that serve as fire management zones (FMZs). ESNs are based upon multi-unit ERF response assignments.

Using a methodology similar to NAS Jacksonville, the department evaluated each ESN on eight criteria that determined the overall risk level. By understanding these characteristics, the department will be able to anticipate service needs, identify areas where service gaps or issues affecting services exist, and adequately deploy resources to meet incident needs.

The Lowndes County Tax Assessor's Office provided single family and commercial occupancy data. CFR's engine companies performed a "windshield" assessment for multi-family complexes. The department's RMS, Fire Programs, was used to collect data regarding commercial occupancy information. Commercial occupancy risk levels were determined by using a risk model developed by Jacksonville Naval Air Station Fire Department (NASJAX). This model evaluated commercial occupancies on 8 risk criteria to determine an Occupancy Vulnerability Assessment (OVA) score. Risk levels were set based upon this score that included maximum (21 – 24), significant (15 – 20), moderate (10 – 14), and low (9 or less). The commercial OVA scoring schedule may be found in Appendix D. Residential and commercial mapping was provided by Atlas Geographic Data, Inc.

Before analyzing each ESN, two important components that influence community risk within the ESNs were examined. These components were the water distribution system and population density. The water distribution system was assessed for its ability to meet fire suppression needs. The population density map illustrated where individuals are located within the city. These concentrations are especially relevant in low income subsidized housing where at-risk target groups are found.

Water Distribution System

The domestic and fire suppression water needs are provided by Columbus Light & Water and East Lowndes Water Association. East Lowndes Water Association provides water for the majority of ESNs 98 and 117. Columbus Light & Water provides water services for the rest of the city. Each association utilizes wells to provide system water. Water is stored in ground and elevated tanks strategically placed throughout each system. Each distribution system is based upon a grid or connected system comprised of various sized water pipes to meet area needs. Although independent, both systems have been connected by valves that enable each to provide additional water to the other if needed. Each system's water pressure can be raised to support fire suppression operations. As a general rule, system up-grades are required when a system reaches 75 - 80% of system capacity. Public water systems are regulated by minimum standards set by the MS Department of Health. Table D11 provides basic systems capabilities of both associations:

Table D11: Water System Capacities

Association	Tanks (cap.)	Wells (cap.)	Hydrants	% Design Capacity
Col. Light/Water	4 (6.8 m/g*)	8 (11,200 gpm)	1166 (26 private)	42%
East Lowndes	1 (400,000 gall.)	2 (1,800 gpm)	114	7%

*m/g = million gallons

The Fire Prevention Division evaluates fire suppression water flow requirements as part of the plans review process for multi-family residential and commercial structures. Appendix B of the International Building Code identifies minimum water flow and flow duration requirements while Appendix C identifies the minimum number of hydrants to support this flow rate. Section B105.2 of the IBC allows for a 75% reduction of flow requirements for structures other than one or two family residences that have approved sprinkler systems installed. However, a minimum flow of 1,500 gallons per minute for the prescribed duration must still be met (IFC, 2006). For residential structures, a minimum of 1,000 gpm is required for homes less than 3,600 square feet. Homes over 3,600 sq. ft. shall meet the fire flow requirements of Table B105.1. Fire flow needs

in the SRA/ESN water assessment section were determined by using the Risk Management module of Fire Programs which calculated water flows based on NFPA water flow formulas.

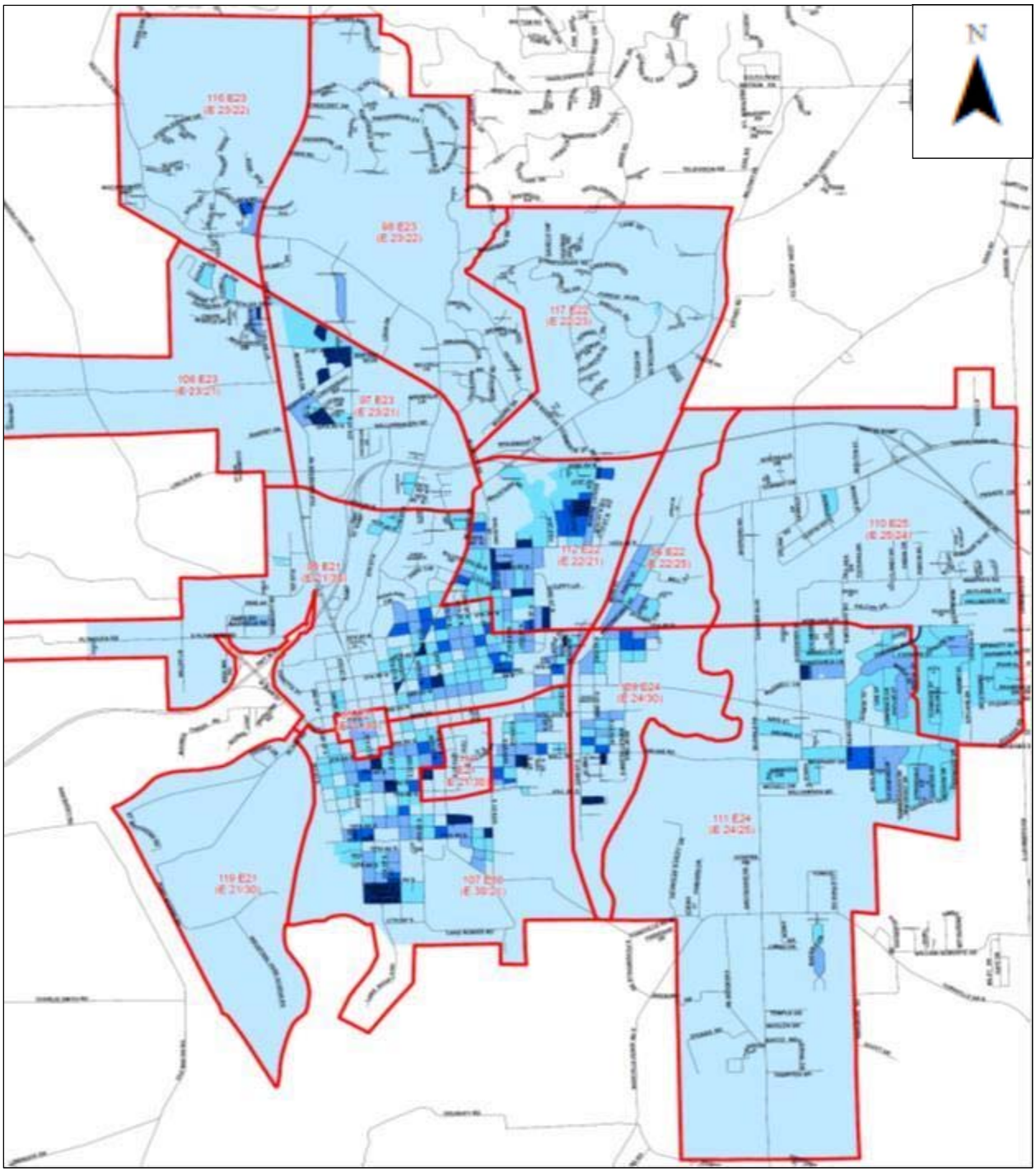
In rural/remote areas where the systems do not provide minimum flow requirements, a portable water shuttle operation would be required. A water shuttle operation may be supported through the use of the department's 2,500 gallon water tender, department engines, and water tenders from the county's five volunteer fire departments through requested mutual aid. Conservatively, the volunteer departments could provide a minimum water supply of 15,000 + gallons. However, an initial time lag would exist due to volunteer turnout and various travel times. Hydrant locations on the water maps are color coded to reflect NFPA 291 flow rate standards.

The majority of the water system is adequate to meet fire suppression needs. Both systems are well within their designed supply capacity and can meet future growth in both residential and commercial applications. Both system associations work with CFR to identify areas where deficiencies exist and where improvements can be made. This relationship is supported by recent improvements in both systems that were instrumental in the department being able to achieve a Class 4 Fire Suppression Rating in 2011. However, as seen in the following SRA/ESN assessments, there are a few areas where the system will have problems meeting fire flow demands. These fire flow deficiencies are due to either inadequate number of hydrants, and/or low water volumes and pressures (single line or poor grid systems). These areas are primarily found in the residential areas of ESNs 98, 108, 111, 116, 117, and 119. To meet suppression needs, these areas would require long supply hose lays potentially involving relay pumping operations or the establishment of a water shuttle operation involving department engines/tender or mutual aid support from Lowndes County Volunteer Fire Departments.

Population Density

Population density identifies not only where individuals live but also, when combined with institutional knowledge, serves as an indicator of populations in low income housing areas. In the following map, four of the higher density locations are low income housing complexes. The population map clearly identifies the "original" section of town (built around the "downtown" business district), East Columbus, and the lightly population areas of recent annexation.

Map D2: Columbus Population Density



ESN Risk Methodology

Columbus Fire and Rescue developed a management zone risk assessment model using the characteristics and influences that define the city and hazards encountered. This model featured 8 categories with specific scoring criterion that, when totaled, provided an overall risk assessment score. This score was then classified as low (8 – 12), moderate (13 – 16), high (17 – 21), or maximum (22 -25) to provide a risk level designation.

The following categories and scoring criterion follows:

1. **Incident History** is based upon the total number of incidents responded to on an annual basis.

   1 < 99 incidents per year
   2 100 to 249 incidents per year
   3 > 250 incidents per year

2. **ESN Population** is based upon total population within each ESN.

   1 < 1,499
   2 1,500 to 2,999
   3 > 3,000

3. **Multi-family Occupancies** identifies the total number of living units associated with multi-family residences.

   1 < 99
   2 100 to 249
   3 > 250

4. **Commercial Occupancy Vulnerability Assessment Score** uses the scores taken from the commercial occupancy CRA (Jacksonville NAS model). The scores were weighted to reflect risk based upon hazards present rather than by numbers (i.e. 5 maximum risk buildings present a greater hazard than 5 low risk buildings). The OVA score was determined by the following formula:

   ([# Maximum X 4] + [# Significant X 3] + [# Moderate X 2] + [# Low X 1]) = OVA

   1 < 99
   2 100 to 199
   3 200 to 299
   4 > 300

5. **Residential Property Values** are based upon the median assessed values provided by the Lowndes County Tax Assessor's Office.

    1 < $49,999
    2 $50,000 - $99,999
    3 > $100,000

6. **Commercial Property Values** are based upon the median assessed values provided by the Lowndes County Tax Assessor's Office.

    1 < $74,999
    2 $75,000 to $199,999
    3 > $200,000

7. **Water supply** evaluates the distribution system's ability to meet fire suppression needs.

    1 Adequate and reliable water supply
    2 Minor areas where water supplies do not meet water flow needs
    3 Areas that require Tanker 31 or mutual aid support

8. **Local characteristics** take into consideration unique characteristics of the ESN such as topography and access problems, critical infrastructures (food stores, hospitals, public safety infrastructure, detention centers, utilities, etc.), industrial occupancies, historical structures, and assisted living facilities.

    1 Low
    2 Moderate
    3 High

Table D12: ESN Risk Classifications

ESN	Risk Classification	ESN	Risk Classification
95	Moderate	110	High
96	Low	111	Maximum
97	High	112	Low
98	High	114	Moderate
99	High	116	Moderate
107	High	117	Low
108	Moderate	119	Low
109	Low	D3 AMA	Moderate

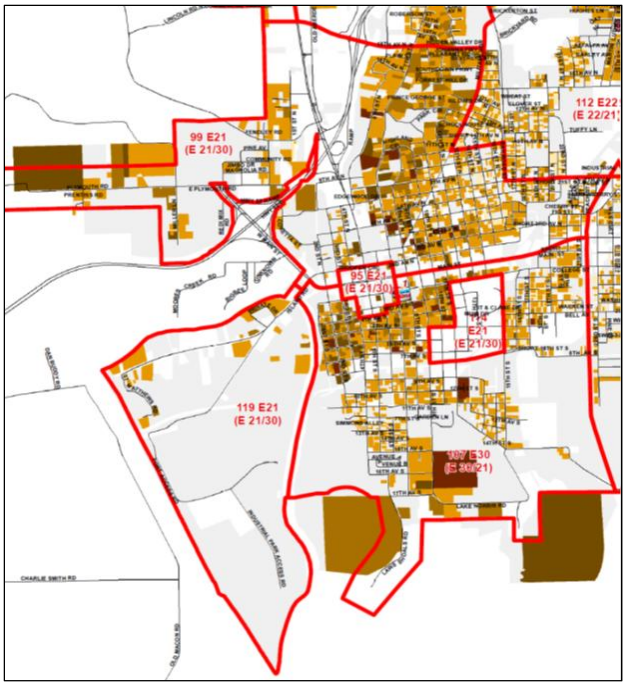
The following section is formatted by Station Response Areas with ESN summaries that support the risk level designations. Each ESN contains information and data that documents and verifies the risks encountered and the uniqueness of that specific area. To review the collected data, refer to Appendix E for SRA and ESN data worksheets.

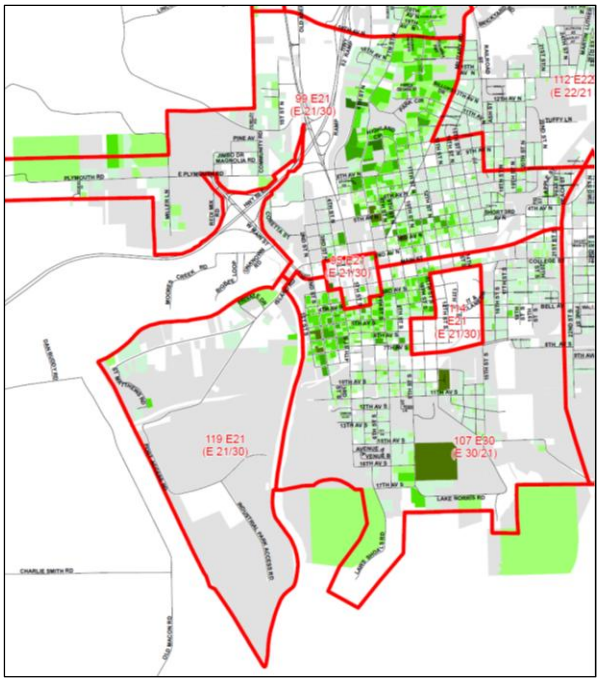
Station Response Area 1

ESN 99		
Criterion	ESN Values	Risk level Score
Incident history	397	3
Population	4,031	3
Multi-family Units	298	3
OVA Score	718	4
Residential Values	$35,560	1
Commercial Values	$65,045	1
Water system	2	2
Local Characteristics	High	3
Total		20

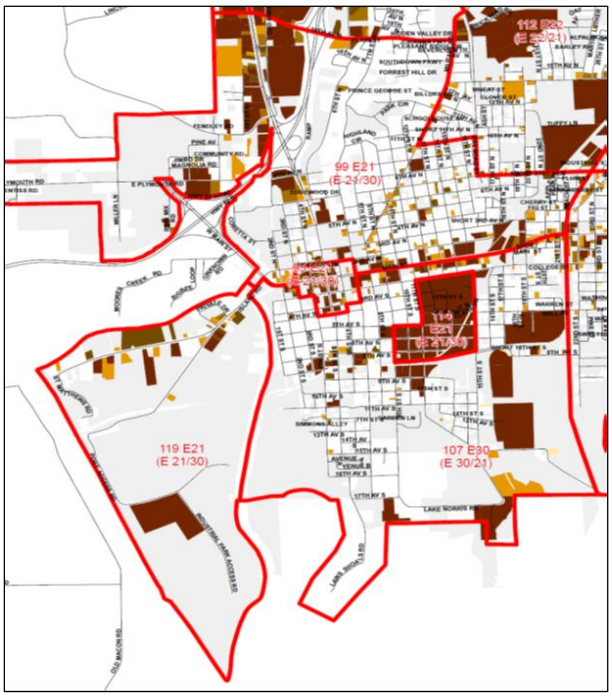
ESN 119		
Criterion	ESN Values	Risk level Score
Incident history	8	1
Population	45	1
Multi-family Units	0	1
OVA Score	53	1
Residential Values	$36,925	1
Commercial Values	$16,760	1
Water system	3	3
Local Characteristics	Moderate	3
Total		12

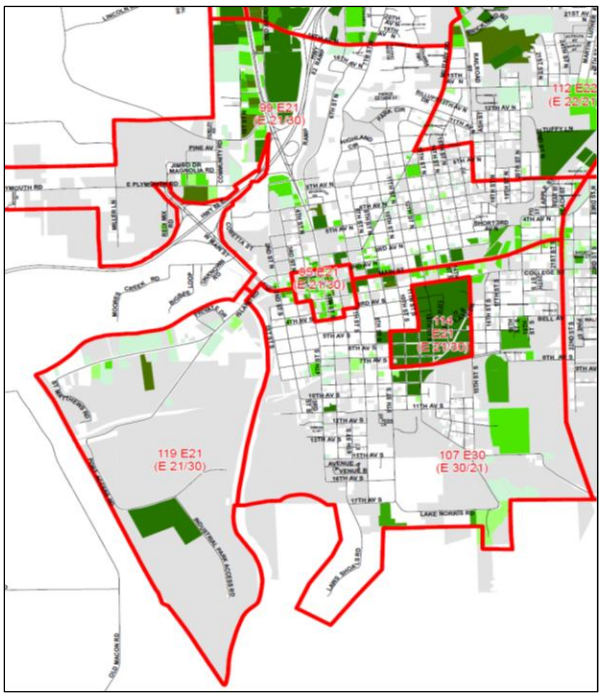
Map D3-A: Residential Square Footage and Property Values



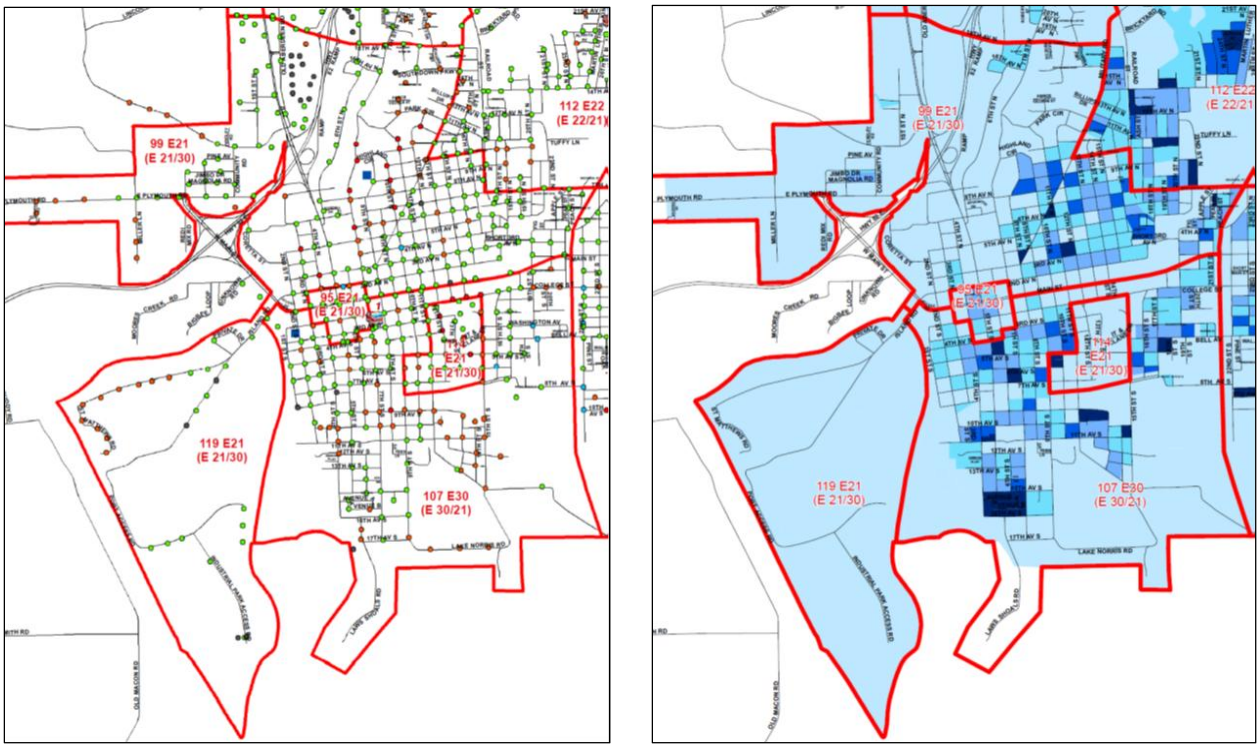


Map D3-B: Commercial Square Footage and Property Values





Map D3-C: Hydrant Locations and Population Density



ESN 99, known as Northside, comprises 2.32 square miles (9.9%) and has 41.35 road miles (17.4%). The ESN averages approxmiately 400 incidents per year and is ranked first in total fire events and number of structure fires. ESN 99 is second in population with a total of 4,031 which represents 17% of the city's total. The population of the ESN is spread throughout the district with high population densities being attributed to multi-family occupancies. There is 1 low income subsidized housing complex. ESN 99 is a high density neighborhood containing 1,235 residential structures. Assessed property values are low being indicative of older structures that represent the "original" part of the city that was constructed in close proximity to the "downtown" commercial district. There are 214 commercial occupancies of which most are classified as business, mercantile, and assemblies. The majority of commercial structures are along Main St., 2nd Ave. N., Military Rd., and 5th St. N. (which becomes Hwy 45 N.). There are 6 R-1 occupancies. Critical infrastructures include the Lowndes County Courthouse, Tax Assessor's Office, Columbus Municipal complex, Lowndes County Emergency Management Agency, and Lowndes County E-911 Communications Center. This ESN also contains the city's true highrise structure, Court Square Towers. There are a number of strip mall locations as well

as Leigh Mall. With the second highest number of maximum locations and a high number of commercial occupancies, ESN 99 has the highest OVA score that is comprised of maximum (5), Significant (67), and moderate (202). Assessed property values total $43.6 million. Travel times within the ESN may be affected by traffic congestion on 5th St. N / Hwy 45 N. Daily traffic totals average 26,000 to 28,000 vehicles per day on a road with a designed capacity of 30,000. This traffic congestion is especially high during daily commuter and lunch hours.

ESN 119, known as the "Island," comprises 1.29 square miles (5.6%) and has 4.26 road miles (1.8%). The ESN averages 10 incidents per year with the majority being EMS and false alarm related. The population on the Island is 45. Residential construction (28) is primarily limited to three locations; Island Cove Rd., several homes on a private drive on Port Access Rd. and homes on St. Matthews Rd. The homes on Port Access Rd. present a problem due to the long distance (approximately ½ mile) from the main road. The median residential square footage is 1,835 with a median assessed value of $36,925. ESN 119 is dedicated mainly to industrial development due to the Lowndes County Port on the Tenn-Tom Waterway, existing infrastructure, and available land acreage. The largest commercial structure is Baldor Electric with a total area of approximatley 305,000 square feet. One important characteristic of the Island is that there is only one access point.

The water system in ESN 99 is adequate to support fire flow requirements with the exception of a few isolated areas along Moore's Creek Rd, 6th St. N., Highland Circle, and Coretta St. A few areas in ESN 119 present problems, most notably Island Rd. and St. Matthews Rd. These areas are deficient due to either low water volume and/or long distances between hydrants that would require long supply hose lays, Tanker 31, and/or mutual aid support. The water distribution system on the Island is a non-looped single line system. The top 10 fire flow needs in SRA 1 are:

Occupancy	Req. GPM	Avail		Occupancy	Req. GPM	Avail
Franklin School	8,000	Yes		Cadence Bank	3,000	Yes
Col Public Library	5,000	Yes		Water's Truck	3,000	Yes
Ashley Furniture	4,500	No		Gilmer Inn	3,000	Yes
YMCA	4,000	Yes		Trotter Convention	2,500	Yes
Ruan/Col. Diesel	3,500	No		1st United Methodist	2,500	Yes

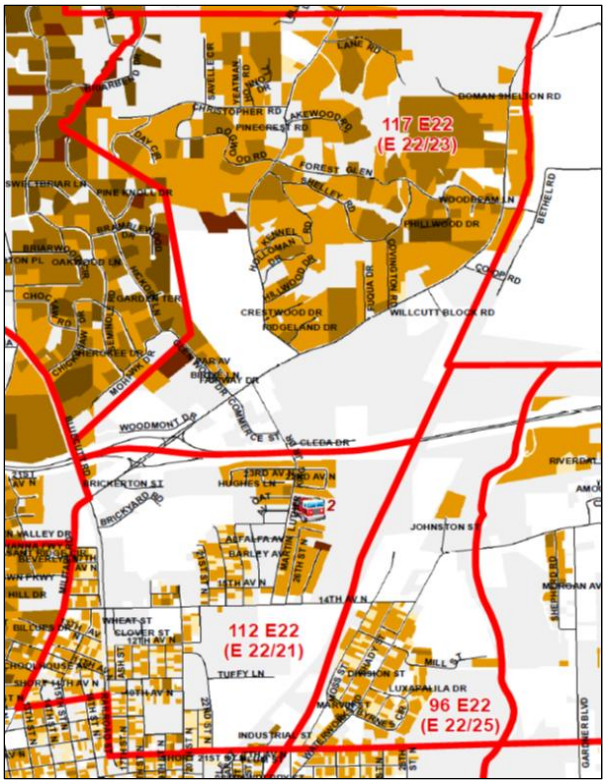
Station Response Area 2

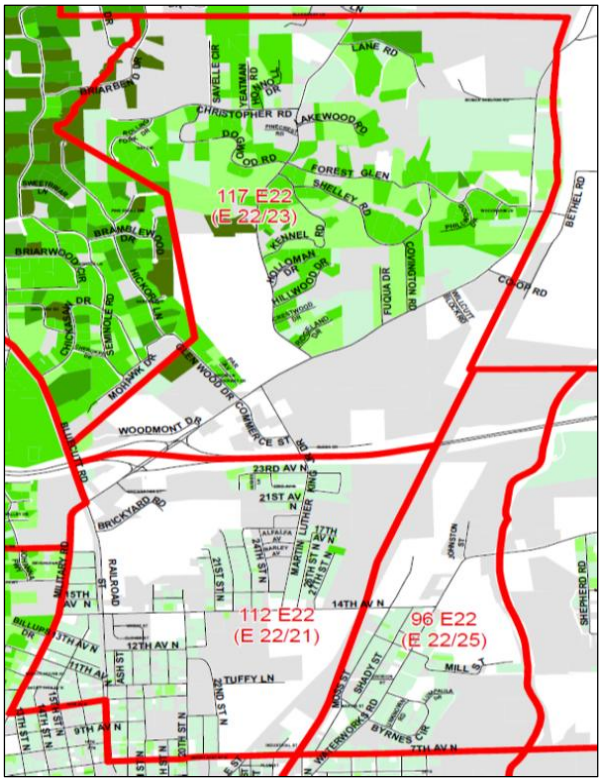
ESN 96		
Criterion	ESN Values	Risk level Score
Incident history	54	1
Population	597	1
Multi-family Units	11	1
OVA Score	62	1
Residential Values	$14,575	1
Commercial Values	$44,380	1
Water system	1	1
Local Characteristics	High	3
Total		10

ESN 112		
Criterion	ESN Values	Risk level Score
Incident history	257	3
Population	2,191	2
Multi-family Units	271	3
OVA Score	204	3
Residential Values	$21,900	1
Commercial Values	$32,985	1
Water system	1	1
Local Characteristics	Moderate	2
Total		16

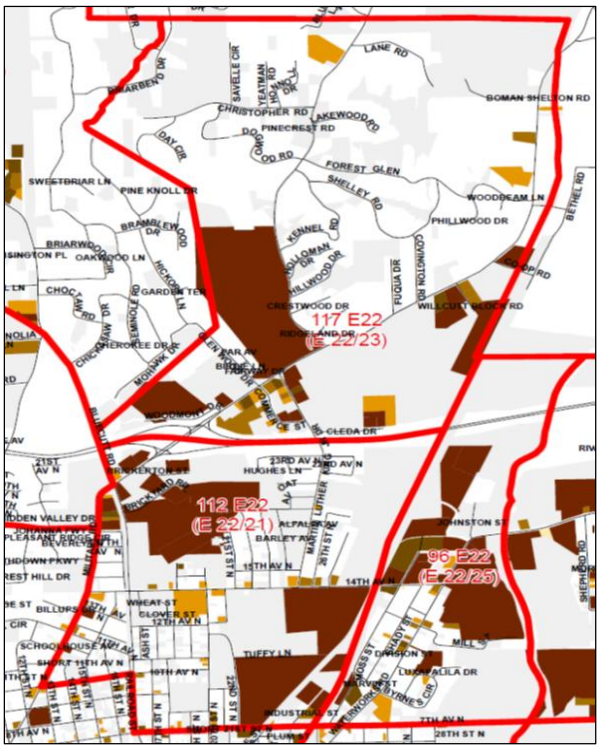
ESN 117		
Criterion	ESN Values	Risk level Score
Incident history	35	1
Population	648	1
Multi-family Units	0	1
OVA Score	95	1
Residential Values	$99,070	2
Commercial Values	$135,790	2
Water system	3	3
Local Characteristics	Low	1
Total		12

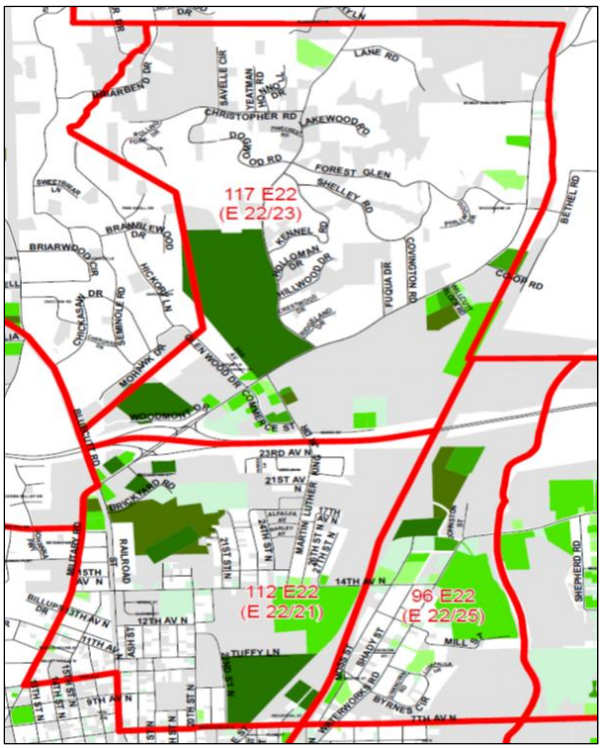
Map D4-A: Residential Square Footage and Property Values



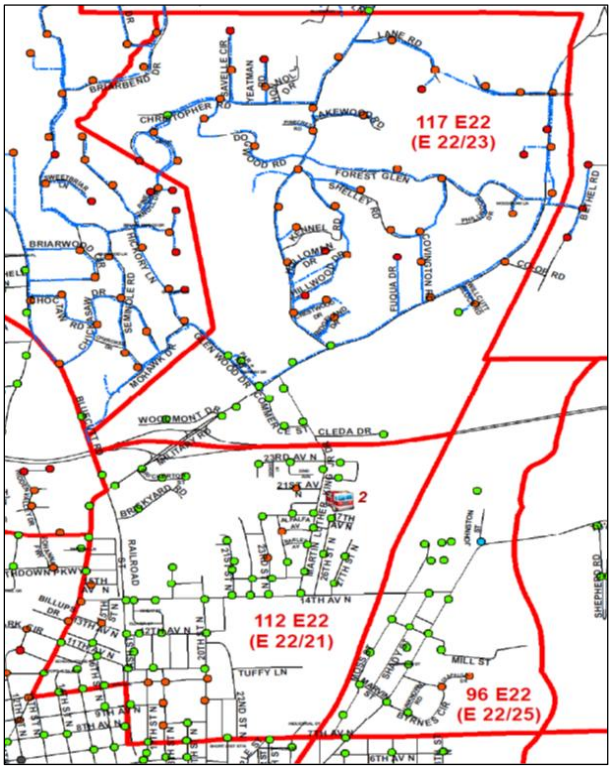


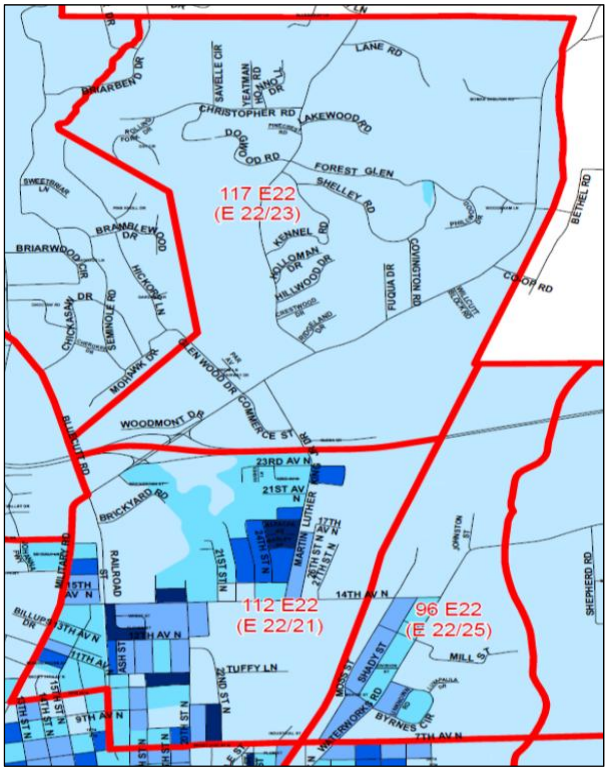
Map D4-B: Commercial Square Footage and Property Values





Map D4-C: Water Hydrant Locations and Population Density





ESN 96 comprises .56 square miles (2.4%) and has 4.99 road miles (2.1%). The ESN averages approximately 54 incidents per year with the majority being EMS related. However, recent incident trends indicate an increasing residential fire risk. Further monitoring of this trend is warranted. The population is 597 which represent 2.5% of city population. The ESN is a medium density neighborhood with 214 residential structures. The median assessed value is $14,575 reflecting the small median square footage of 1,170. There are only 36 commercial occupancies in the ESN of which the majority is businesses. There are 3 day care facilities present. The majority of these occupancies are rated as a moderate OVA score. However, Johnston Tombigbee Manufacturing Plant 1 and 2 encompasses approximately 380,000 square feet. Columbus Light and Water Treatment Plant and electrical warehouse are the only infrastructure located within the ESN. There are several potential access problems to this ESN. First, the bridge that connects Waterworks Rd. and Tuscaloosa Rd. represents one of four access points between Columbus and East Columbus. Second, access may be blocked by rail traffic that crosses 14th Ave. N. This situation would delay fire department response or require response from another station.

ESN 112 comprises .93 square miles (4%) and has 15.92 road miles (6.7%). The ESN averages 250 incidents per year with the majority being EMS related. However, fire risks are present. The population is 2,191 which represent 9% of city population. There are two major neighborhoods; the Queen City section (7th Ave. N.) and the Hughes neighborhood (MLK Dr.). There are two major low income subsidized housing complexes; the Dr. TV James Terrace on 14th Ave. N. and MLK Dr. The median assessed housing value is $21,900 with a median square foot of 1,171. There are 62 commercial occupancies mostly comprised of businesses. The majority of these occupancies are rated as a moderate OVA score. There is one R-1 rated occupancy. Major industrial occupancies in the ESN include Sanderson Plumbing (286,000 sq. ft.) and the Columbus Brick Complex (201,600 sq. ft.) that represents 50% of total ESN square footage. Other concentrated population risks include 6 day care facilities. The lone critical infrastructure in the ESN is CFR Station #2.

ESN 117 comprises 1.73 square miles (7.4%) and has 13.2 road miles (5.8%).The ESN averages 35 incidents per year with 60% being EMS related. There have only been 2 structure fires in the

analysis time period. The population is 648 which represent 2.7% of city population. The two main areas of population are found along Military Rd. and the Ridge Rd. area. This ESN is a low density housing area containing 282 residential structures. The median assessed value is $99,070 with a median square foot of 2,615. These values are reflective of home size as well as acreage. There are 38 commercial properties with 29 being business related. There is one R-1 rated occupancy. The majority of occupancies have a moderate OVA score with 8 having a significant OVA classification. The majority of commercial properties are located on Military Rd. Lowes (132,500 sq. ft.) accounts for approximately 25% of the ESN's total square footage. There are several potential access problems. The daily traffic total averages 12,000 vehicles per day on a road rated for 11,000. Traffic congestion is especially high during commuter hours. The second problem is long, narrow, dead-end roads running off Ridge Rd., several of which have no turn-around areas. This area is also known for long driveways that further limit apparatus access.

The water systems in ESN 96 and ESN 112 are adequate to support fire flow requirements. The system in ESN 117 is adequate to the Military / Ridge Rd. intersection. Past this point, flow rates and hydrant spacing decrease in residential areas and do not support minimum fire flow requirements. These areas require long supply hose lays, Tanker 31 response, and/ or mutual aid support. The top 10 fire flow needs in SRA 2 are:

Occupancy	Req. GPM	Avail		Occupancy	Req. GPM	Avail
Plumb Creek Env.	4,500	No		Experience Works	3,500	Yes
First Assembly Chil	4,000	No		Military Plaza	3,000	Yes
Old Hunt School	4,000	Yes		Columbus Machine	3,000	Yes
Brickerton Plaza	4,000	Yes		Riverchase Inn	2,500	Yes
Genesis Dream	3,500	Yes		Sunflower Food Store	2,500	Yes

Station Response Area 3

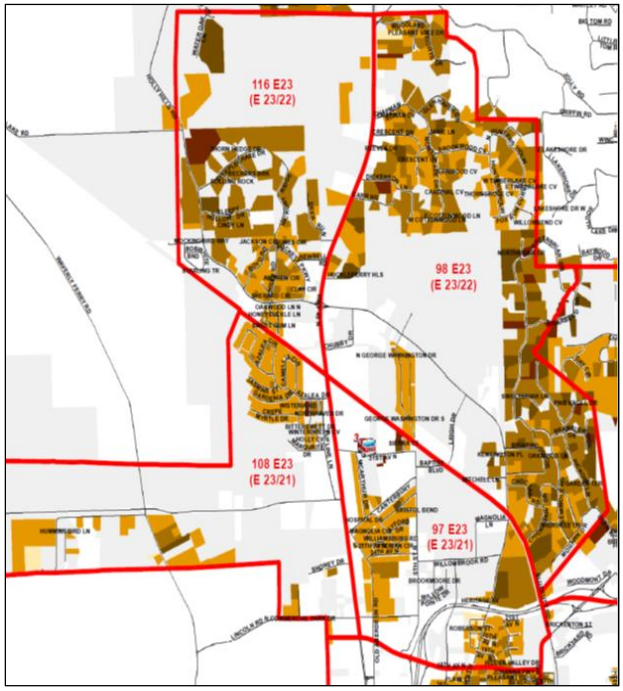
ESN 97		
Criterion	ESN Values	Risk level Score
Incident history	211	2
Population	1,566	2
Multi-family Units	612	3
OVA Score	350	4
Residential Values	$72,170	2
Commercial Values	$203,255	3
Water system	1	1
Local Characteristics	High	3
Total		20

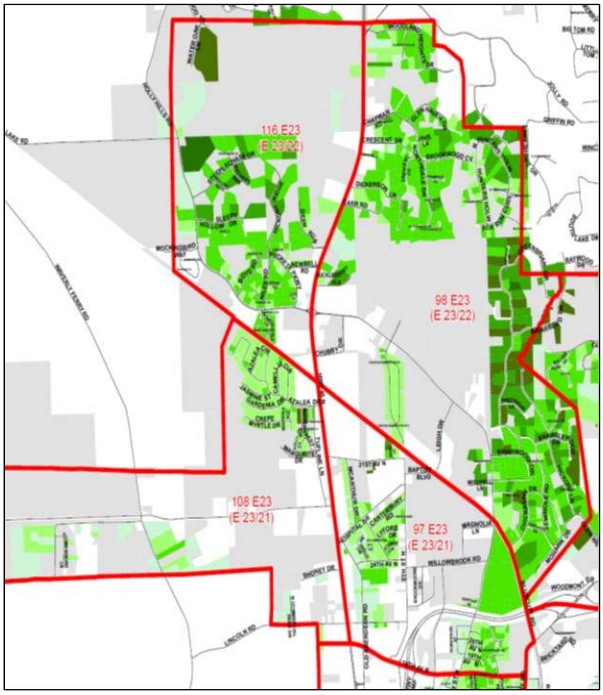
ESN 98		
Criterion	ESN Values	Risk level Score
Incident history	91	1
Population	1,356	1
Multi-family Units	192	2
OVA Score	162	2
Residential Values	$135,600	3
Commercial Values	$267,590	3
Water system	3	3
Local Characteristics	Moderate	2
Total		17

ESN 108		
Criterion	ESN Values	Risk level Score
Incident history	80	1
Population	611	1
Multi-family Units	62	1
OVA Score	245	3
Residential Values	$71,520	2
Commercial Values	$179,000	2
Water system	3	3
Local Characteristics	Moderate	2
Total		15

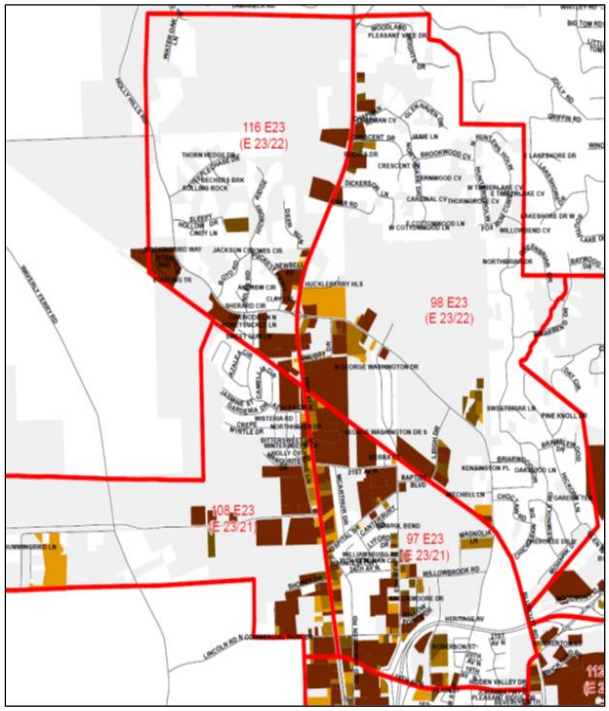
ESN 116		
Criterion	ESN Values	Risk level Score
Incident history	36	1
Population	714	1
Multi-family Units	379	3
OVA Score	73	1
Residential Values	$113,420	3
Commercial Values	$263,160	3
Water system	3	3
Local Characteristics	Low	1
Total		16

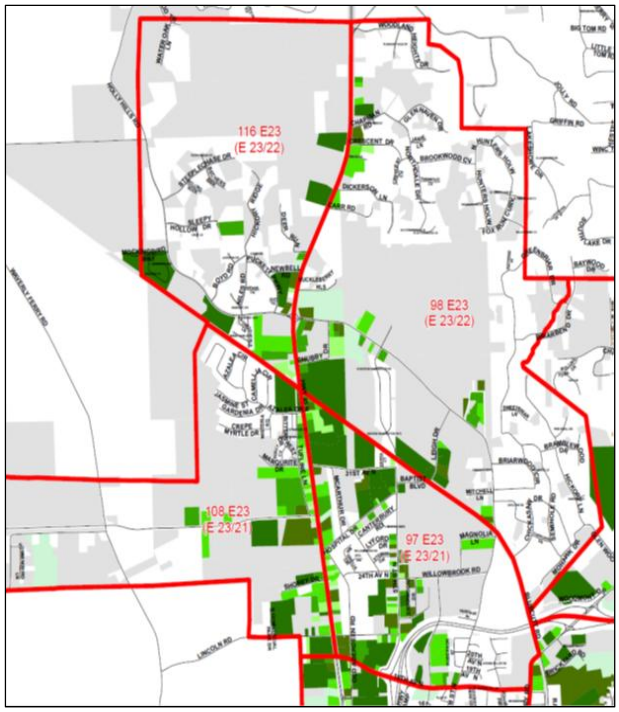
Map D5-A: SRA 3 Residential Housing Square Footage



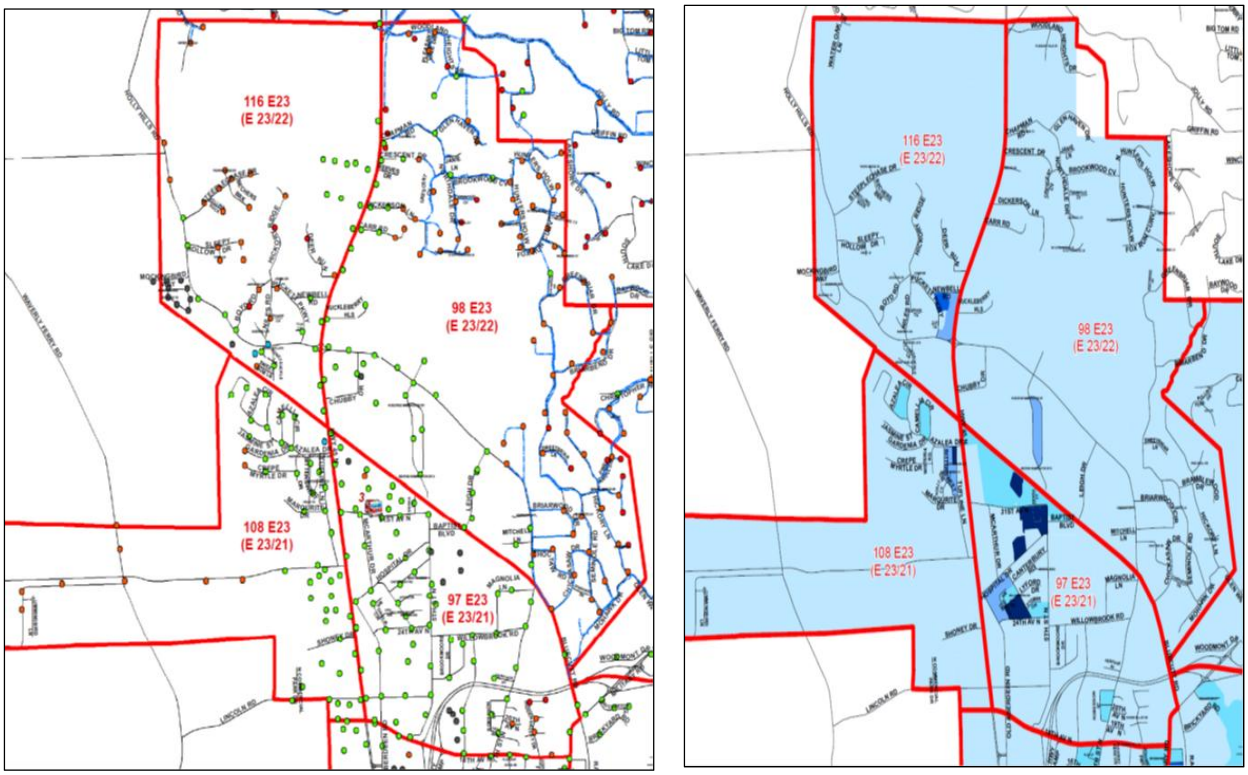


Map D5-B: SRA 3 Commercial Structure Square Footage





Map D5-C: Water Hydrant Locations and Population Density



ESN 97 comprises .97 square miles (4.2%) and has 13.49 road miles (5.7%). The ESN averages approximately 210 incidents per year with the majority being EMS related (72%). Fire events are slightly lower than the department average. Structure fires average 1 per year. The population is 1,566 which represents 6.6% of city population. The population is mainly found between 24th Ave. N. / Hospital Dr. and 18th Ave. N. There are 10 multi-family complexes. The ESN is a medium density neighborhood with 309 residential structures. The median assessed value is $72,170 with a median square footage of 2,139. There are 99 commercial structures in the ESN of which the majority are business and mercantile occupancies. The majority are located on Hwy 45 N. The majority of occupancies are rated as a moderate (117) OVA score. Significant occupancies include K-Mart complex (308,000 sq. ft.), Town Square complex (125,000 sq. ft.), and Vineyard Court Nursing Center (assisted living facility). There is one R-1 rated occupancy. Another is currently under construction. Critical infrastructures include Baptist Memorial Hospital, Heritage Academy, Joe Cook Elementary, and CFR Station # 3. Traffic congestion on Hwy 45 N. may cause delays in department response. The daily average is approximately 28,000

vehicles per day. The rated capacity is 30,000. Traffic congestion is heavy during commuter and lunch hours.

ESN 98 comprises 2.30 square miles (9.9%) and has 17.2 road miles (7.2%). The ESN averages approximately 90 incidents per year with the majority being EMS and non-fire related events (87%). There has only been 1 structure fire during the analysis timeframe. The population is 1,356 which represent 5.7% of city population. The population is mainly found in the Cady Hills and Fox Run subdivisions. The ESN is a light density neighborhood with 477 residential structures. The median assessed value is $135,600 with a median square footage of 3,098. These areas represent the more affluent areas of the city. Many of the homes are multi-story custom homes. There is 1 major multi-family complex. There are 99 commercial structures of which the majorities are business and mercantile. Commercial property is mainly located on Bluecutt Rd. and Hwy. 45 N. The majority of these occupancies are rated as a moderate (45) OVA score. There are 19 significant and 15 low OVAs as well. Traffic congestion on Hwy 45 N. may cause delays in department response. There are several potential access problems. First, the daily average on is approximately 26,000 vehicles per day. The rated capacity is 30,000. Traffic congestion is heavy during commuter hours. Second, residential areas present access problems in the form of steep, winding driveways that obstruct apparatus from setting up in normal distances.

ESN 108 comprises 1.82 square miles (7.8%) and has 10.37 road miles (4.4%). The ESN averages approximately 80 incidents per year with the majority being EMS related (68%). There has only been 1 structure fire during the analysis timeframe. The population is 611 which represent 2.5% of city population. The population is limited to the residential neighborhood on Azalea Dr. The ESN is a medium density neighborhood with 241 residential structures. The median assessed value is $71,520 with a median square footage of 2,201. There are 49 commercial structures in the ESN of which the majority is business, mercantile, and assembly occupancies. The majority of these occupancies are rated as a moderate (86) OVA score. Significant occupancies include Wal-Mart Super Center (204,000 sq. ft.), University Mall (187,000 sq. ft.), and Kroger Plaza Shopping Center (75,000 sq. ft.). There are multiple strip malls as well. There is one R-1 rated occupancy. Another is currently under construction. Critical infrastructures include the Columbus Lock and Dam. Traffic congestion on Hwy 45 N. may

cause delays in department response. The daily traffic average is approximately 26,000 vehicles per day. The rated capacity is 30,000. Traffic congestion is heavy during commuter and lunch hours.

ESN 116 comprises 1.38 square miles (5.9%) and has 7.61 road miles (3.2%). The ESN averages approximately 35 incidents per year with the majority being EMS and non-fire related (81%). There have been 3 structure fires during the analysis time period. The population is 714 which represent 3% of city population. The population is found in the Holly Hills Rd. area. There are two major multi-family complexes. The ESN is a light density neighborhood with 185 residential structures. The median assessed value is $113,420 with a median square footage of 2,861. There are 17 commercial structures in the ESN of which the majority is businesses and mercantiles. The majority of these occupancies are rated as a moderate (24) OVA score. Critical infrastructure is limited to Columbus Middle School. There are several potential access problems. First, traffic congestion on Hwy 45 N. may cause delays in department response. The daily traffic total averages approximately 28,000 vehicles per day on a road rated for 30,000. Traffic congestion is heavy during commuter hours. Second, residential areas present access problems in the form of steep, winding driveways that preclude apparatus from setting up in normal distances. This situation will require hand-lines being stretched from the apparatus.

The water system in ESN 97 and 108 is adequate to support fire flow requirements (with the exceptions of Wilkins-Wise Rd., Waverly Ferry, and Nash Rd. areas). The water system in ESN 98 and 116 are adequate along Hwy 45 N. and Bluecutt Rd. In the residential areas of ESN 98 and 116, water flow rate requirements and hydrant spacing do not support adequate fire flow requirements. These areas will require long supply hose lays, Tanker 31 response, and/or mutual aid support. The top 10 fire flow needs in SRA 3 are:

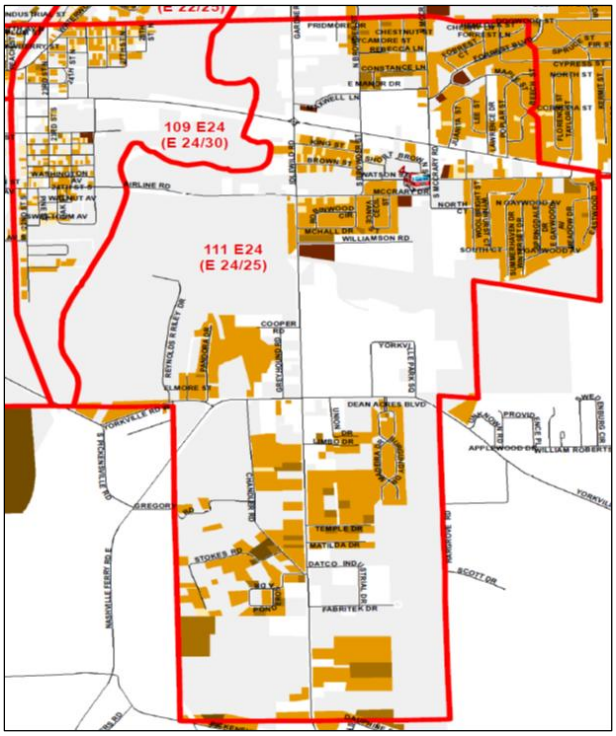
Occupancy	Req. GPM	Avail		Occupancy	Req. GPM	Avail
Carl Hogan Toyota	5,000	Yes		Col. OB/GYN	3,000	Yes
Vacant (1815 Mil.)	4,500	Yes		Col. MSD	3,000	Yes
Heritage School	4,000	Yes		Bluecut Office Plaza	3,000	No
Carl Hogan Toyota	4,000	Yes		First Presbyterian	3,000	No
University Business	3,000	Yes		Eagle Security	3,000	No

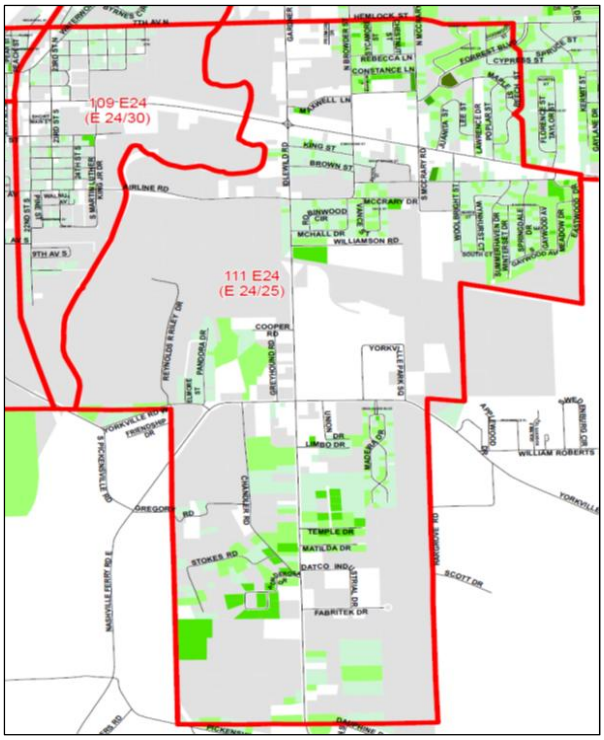
Station Response Area 4

ESN 109		
Criterion	ESN Values	Risk level Score
Incident history	158	2
Population	1,188	1
Multi-family Units	112	2
OVA Score	132	2
Residential Values	$16,250	1
Commercial Values	$36,400	1
Water system	1	1
Local Characteristics	Low	1
Total		11

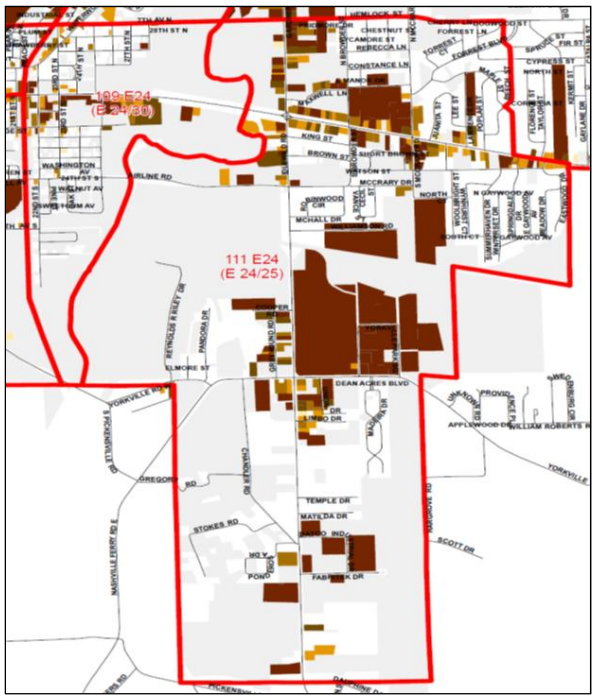
ESN 111		
Criterion	ESN Values	Risk level Score
Incident history	355	3
Population	3,569	3
Multi-family Units	315	3
OVA Score	518	4
Residential Values	$45,350	1
Commercial Values	$94,350	2
Water system	3	3
Local Characteristics	High	3
Total		22

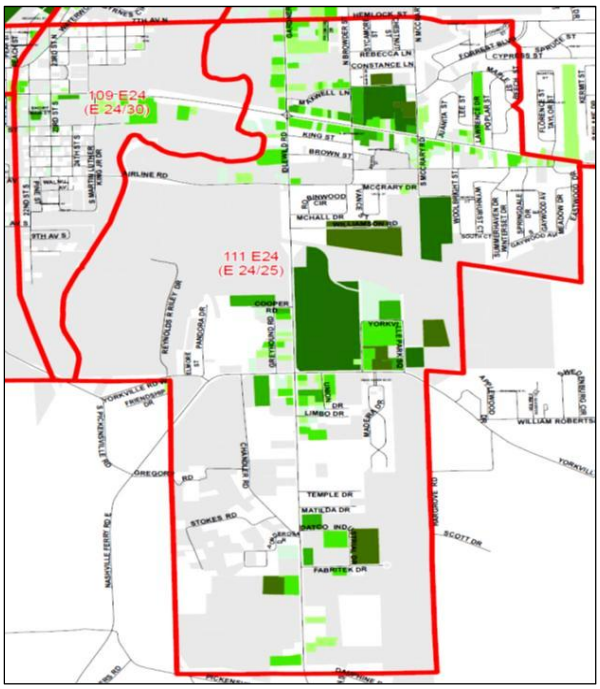
Map D6-A: Residential Square Footage and Property Values



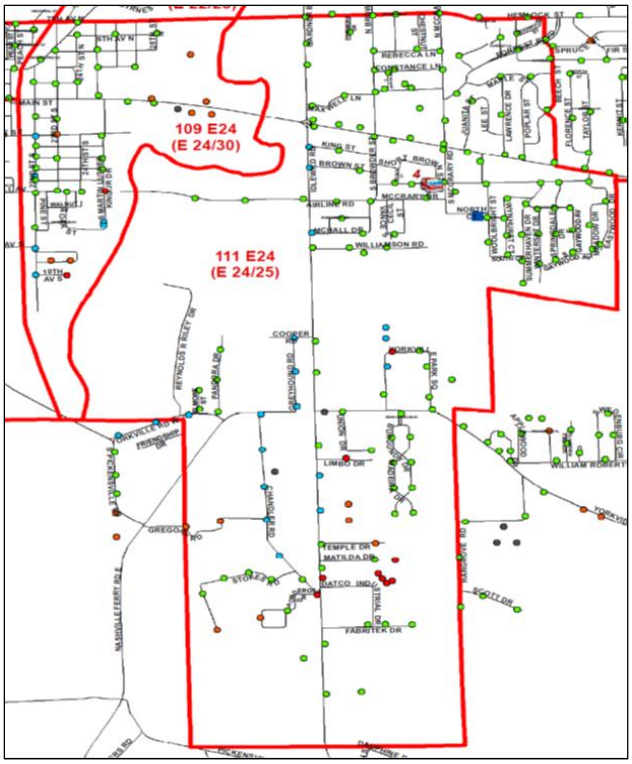


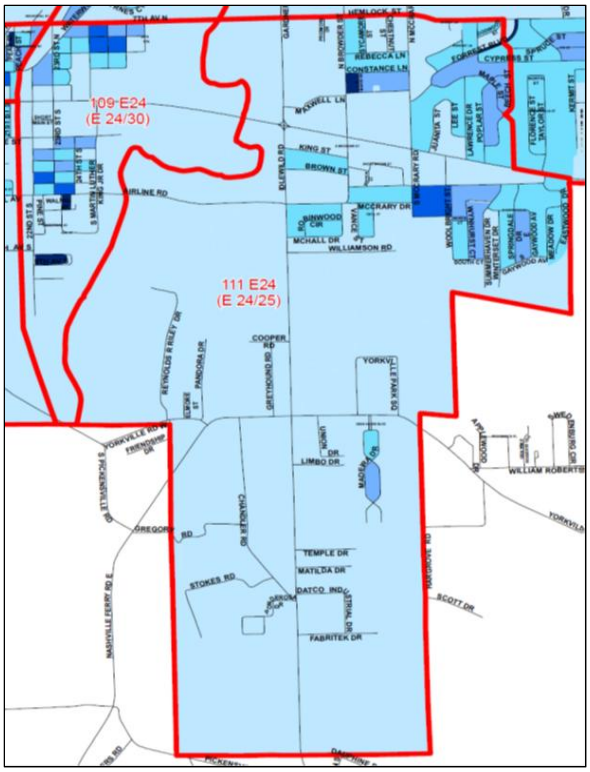
Map D6-B: Commercial Square Footage and Property Values





Map D6-C: Water Hydrant Locations and Population Density





ESN 109 comprises .82 square miles (3.5%) and has 10.33 road miles (4.4%). The ESN averages approximately 160 incidents per year with the majority being EMS related (77%). This ESN averages 4 structure fires per year. However, monitoring this ESN is warranted for future fire trend increases. The population is 1,188 which represent 5% of city population. There is 1 major low income subsidized multi-family complex. The ESN is a high density neighborhood with 339 residential structures. The median assessed value is $16,250 with a median square footage of 1,247. There are 59 commercial structures in the ESN of which the majorities are business and vacant occupancies. The majority of these occupancies are rated as a moderate (38) OVA score. Additionally, there are 13 significant and 17 low OVAs. Critical infrastructures are limited to Stokes-Beard Elementary, Lowndes County Adult Detention Center, and the City Garage. Of the 4 access points between Columbus and East Columbus, 2 are located between this ESN and ESN 111.

ESN 111, known collectively as East Columbus, comprises 4.11 square miles (17.7%) and has 29.94 road miles (12.6%). The ESN averages approximately 350 incidents per year with the majority being EMS related (74%). Structure fires represent a risk as well. This ESN is ranked second in number of fire events and third in number of structure fires. Aging residential structures and changing demographics have the potential to increase the fire risk in the next decade. This situation warrants continued monitoring for potential fire risk trends. The population is 3,569 which represent 15% of city population. The population is found on both sides of Alabama St., Airline Rd. and Hwy 69 S. There is 1 major assisted living complex (Trinity Personal Care) and 1 elderly living complex. The ESN is a medium density neighborhood with 1,292 residential structures. The median assessed value is $45,350 with a median square footage of 1,529. There are 195 commercial structures of which the majorities are business and mercantile. Industrial occupancies (17) represent a significant presence as well. The majority of these occupancies are rated as a moderate (181) OVA score. Other OVA scores include significant (35) and low (51). Commercial occupancies account for 3.7 million square feet. Critical infrastructures include Columbus Light and Water's water and waste treatment facilities, Fairview Elementary, Lowndes County Municipal Airport, and CFR Station #4. Traffic congestion on Idlewild / Hwy 69 S. may cause delays in department response. The daily traffic average is approximately 14,000 vehicles per day. The rated capacity is 15,000. Traffic congestion is heavy during commuter hours.

The water system in ESN 109 is adequate to support fire flow requirements. There are several problems in ESN 111 that include Hwy 69 S., Gregory Rd., and Chandler Rd. Long distances between hydrant locations and/or inadequate water volume will require long supply hose lays, Tanker 31, and/or mutual aid support in the form of a water shuttle operations. The top 10 fire flow needs in SRA 4 are:

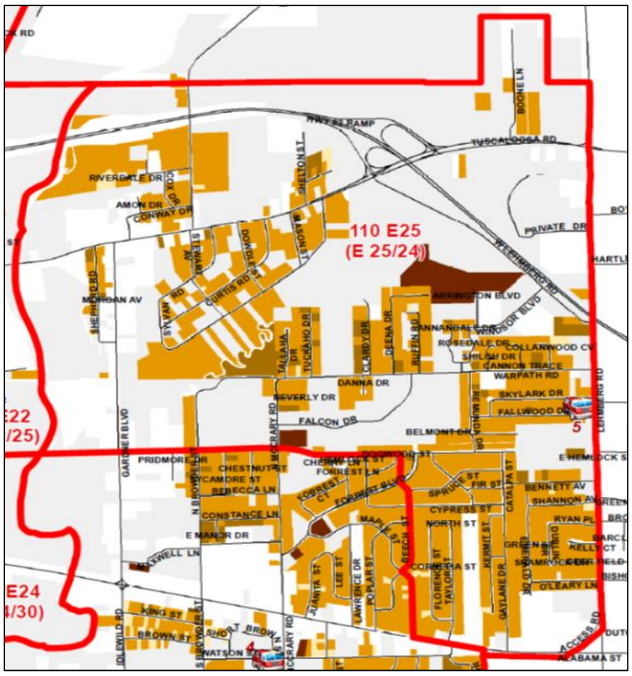
Occupancy	Req. GPM	Avail		Occupancy	Req. GPM	Avail
Fairview Baptist	5,000	Yes		Fred's	3,000	Yes
Magnolia Antiques	4,500	Yes		Salvation Army	3,000	Yes
Logista	4,000	Yes		American Glass	3,000	Yes
Cash Carry Plaza	3,000	Yes		Palmer Home Thrift	3,000	No
McConnell Brothers	3,000	No		Electric Motors	3,000	Yes

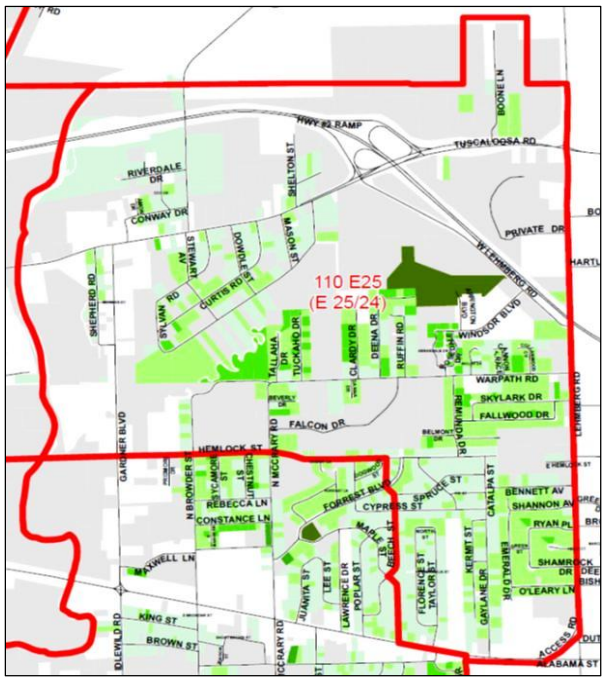
Station Response Area 5

ESN 110		
Criterion	ESN Values	Risk level Score
Incident history	390	3
Population	2,715	2
Multi-family Units	44	1
OVA Score	324	4
Residential Values	$54,290	2
Commercial Values	$68,185	1
Water system	1	1
Local Characteristics	High	3
Total		17

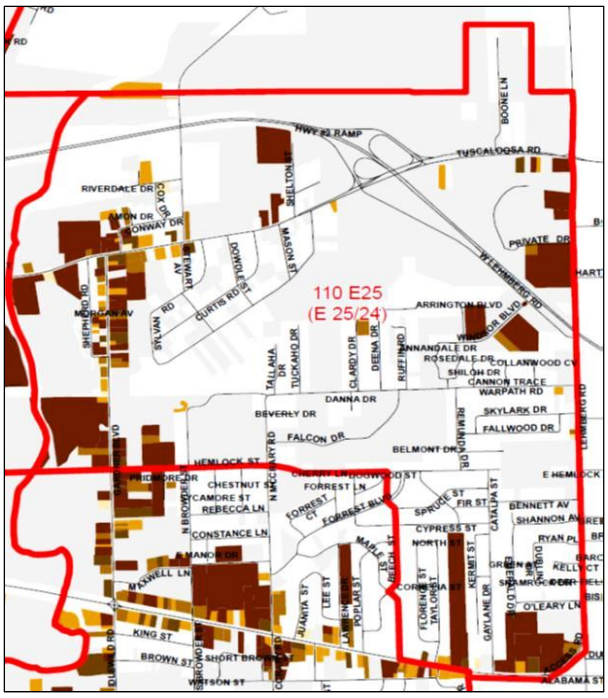
District 3 Automatic Mutual Aid District		
Criterion	District Values	Risk level Score
Incident history	5	1
Population	<999	1
Multi-family Units	444	3
OVA Score	59	1
Residential Values		1
Commercial Values		2
Water system	2	2
Local Characteristics	2	2
Total		13

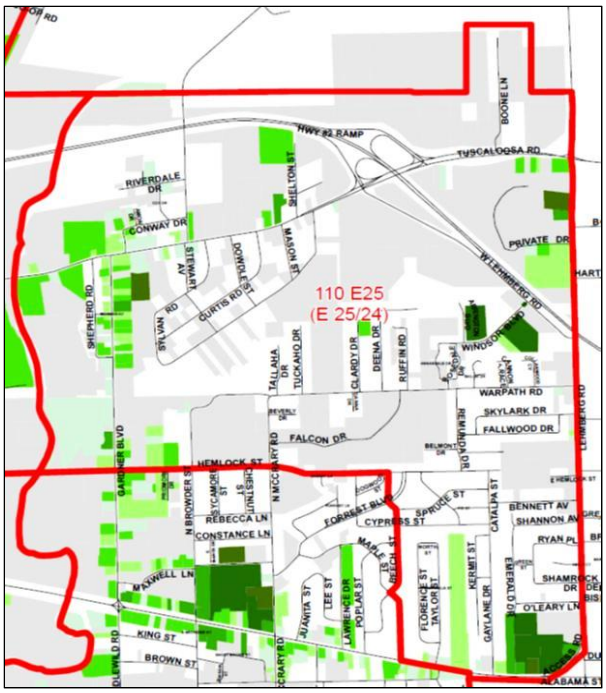
Map D7-A: Residential Square Footage and Property Values



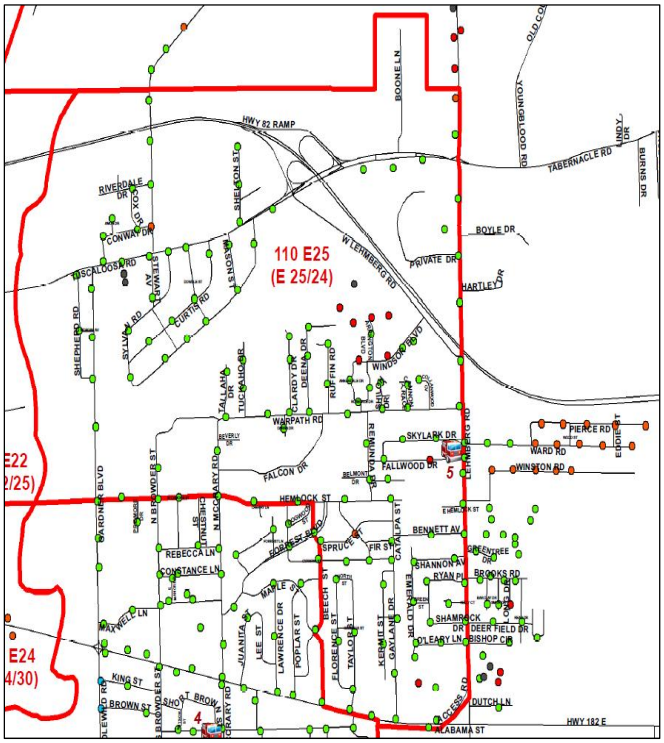


Map D7-B: Commercial Square Footage and Property Values





Map D7-C: Water Hydrant Locations and Population Density



ESN 110, known collectively as East Columbus, comprises 2.78 square miles (12%) and has 31.21 road miles (13.3%). The ESN averages approximately 400 incidents per year with the majority being EMS related (78%). Of interest is the fact that 46% of EMS responses are to 2 locations; Windsor Place and Aurora Nursing Care. The monitoring of fire risk is warranted due to aging residential structures and changing demographics. The population is 2,715 which represent 11.5% of city population. The population is spread throughout the ESN. There are 2 major assisted living complexes (Windsor Place and Aurora Nursing Care). The ESN is a medium density neighborhood with 1,081 residential structures. The median assessed value is $54,290 with a median square footage of 1,815. There are 118 commercial structures of which the majorities are business, mercantile, and assemblies. The majority of these occupancies are rated as a moderate (117) OVA score. Other OVA scores include significant (20) and low (30). Major occupancies include Lehmberg Crossing and 7 strip malls. Critical infrastructures include Columbus High School, Sale Elementary, and CFR Station #5.

Columbus Fire and Rescue provides automatic mutual aid to fire related incidents to areas east of Lehmberg Rd. Emergency services to this area is provided by Lowndes County District 3 VFD. CFR responds to approximately 5 incidents per year. There are 225 residential structures equally split between <1,500 sq. ft. and 1,500 to 2,500 sq. ft. There are 8 major multi-family complexes within this ESN representing a total of 73 buildings and 444 units. At-risk groups previously discussed are found in several of these complexes. There are 27 commercial structures with the majority being businesses. Industrial occupancies (2) represent a significant presence as well. The majority of these occupancies are rated as a moderate (15) OVA score. Other OVA scores include significant (8) and low (5). Major occupancies include Maxim Medical.

The water system in ESN 110 is adequate to support fire flow requirements. There are several areas where distances between hydrants would require long supply hose lays (Maple St. Popular St., Beech St.) however, pressures are sufficient. The water system in the D3 AMA is adequate with several exceptions; however, any deficiencies are overcome by responding District 3 VFD engines and tenders. The top 10 fire flow needs in SRA 5 are:

Occupancy	Req. GPM	Avail		Occupancy	Req. GPM	Avail
Columbus High Sch	7,500	No		USA Electrical	2,500	Yes
Hollis Roofing	4,000	Yes		Graham Business	2,250	Yes
McKellar Vo-Tech	3,500	No		Taggert Brother	2,250	Yes
Sale Elementary	3,500	Yes		Vacant	2,000	Yes
Walco Supply	2,500	Yes		First Pentecostal Chur	2,000	Yes

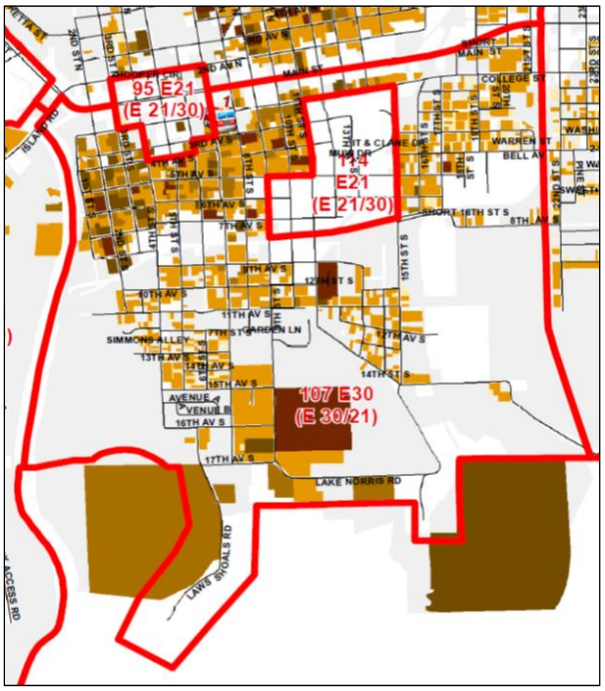
Station Response Area 6

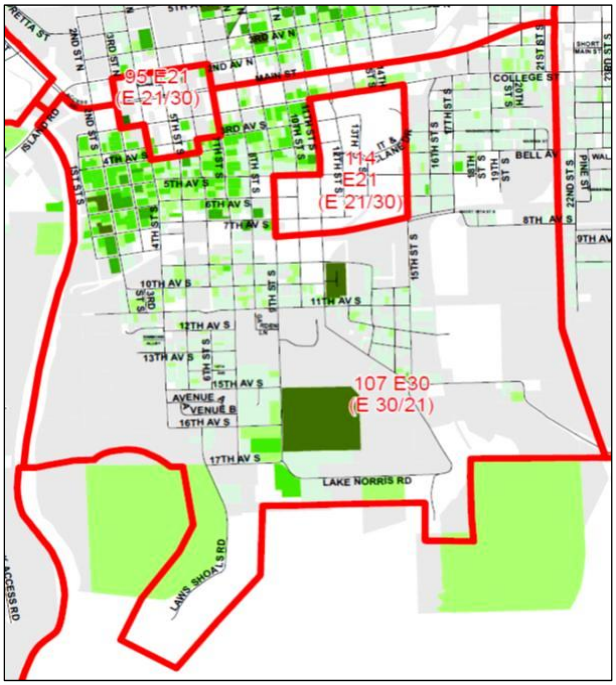
ESN 95		
Criterion	ESN Values	Risk level Score
Incident history	39	1
Population	168	1
Multi-family Units	153	2
OVA Score	296	3
Residential Values	$119,980	3
Commercial Values	$105,480	2
Water system	1	1
Local Characteristics	High	3
Total		16

ESN 107		
Criterion	ESN Values	Risk level Score
Incident history	319	3
Population	3,710	3
Multi-family Units	478	3
OVA Score	280	3
Residential Values	$35,810	1
Commercial Values	$43,205	1
Water system	1	1
Local Characteristics	High	3
Total		18

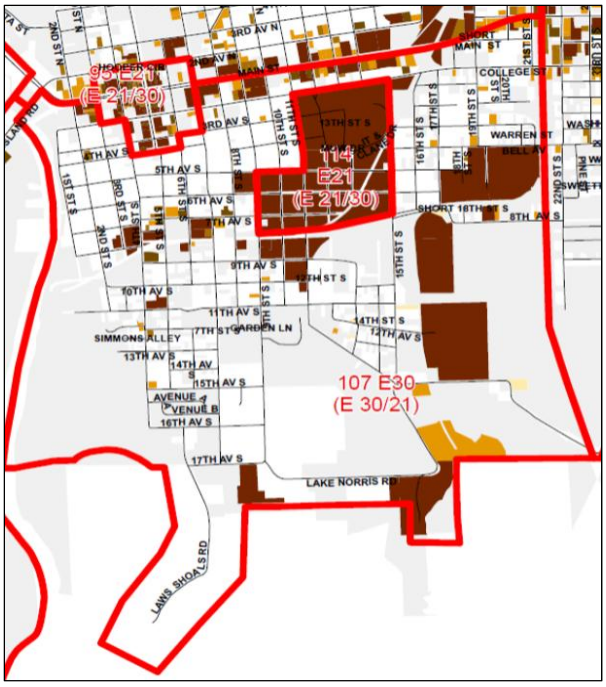
ESN 114		
Criterion	ESN Values	Risk level Score
Incident history	17	1
Population	531	1
Multi-family Units	764	3
OVA Score	139	2
Residential Values	n/a	1
Commercial Values	$94,350	2
Water system	1	1
Local Characteristics	High	3
Total		14

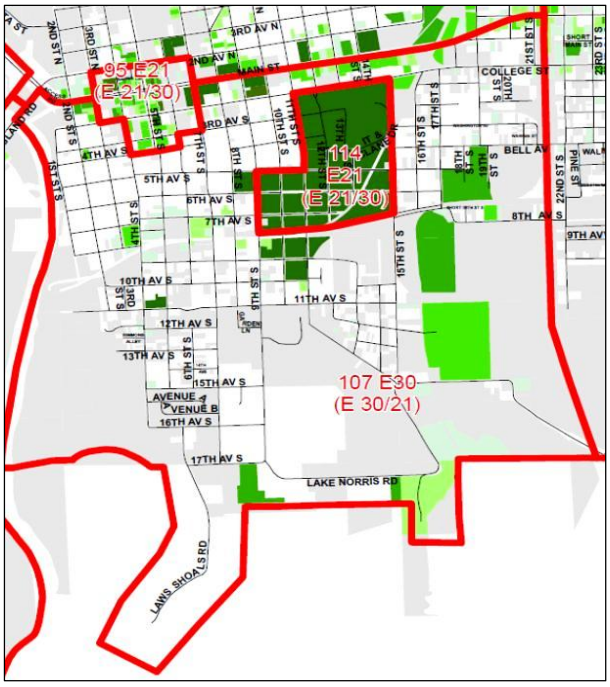
Map D8-A: Residential Square Footage and Property Values



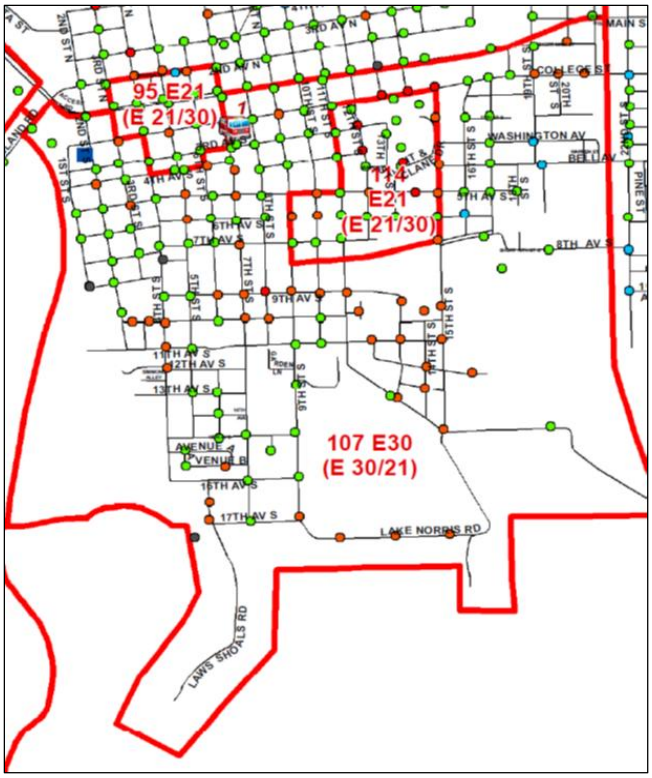


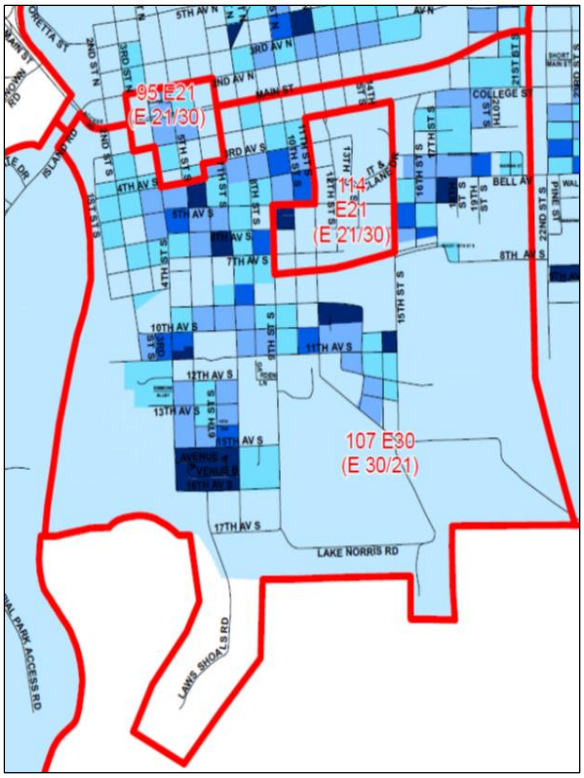
Map D8-B: Commercial Square Footage and Property Values





Map D8-C: Water Hydrant Locations and Population Density





ESN 95 comprises .07 square miles (.3%) and has 2.87 road miles (1%). The ESN averages approximately 40 incidents per year with the majority being EMS and non-fire related events (90%). There has only been 1 structure fire related event during the analysis time period. The population is 168 which represent .7% of city population. The main hazard of this ESN is commercial related. This ESN is referred to as the "Fire District." The fire district represents the old "downtown" commercial district. The majority of the construction is comprised of two story structures connected with little to no fire stops/breaks between. These buildings run the entire length of the block. Fire events within the district represent a major risk due to the age, size, life safety, and economic impact to the city. There are 101 commercial structures in the ESN of which the majorities are business and mercantile. Occupancy OVA classifications are maximum (4), significant (46), moderate (58), and low (26). Major occupancies within this ESN include the Trotter Convention Center, WCBI Communications, and the Café on Main building. This FMZ is experiencing a revitalization based upon a commercial/residential mixed occupancy use concept. These mixed occupancies are restricted to Assembly 2, Business, Mercantile, and Residential 2 occupancies. As a general rule, residential units are restricted from the 1st floors of these occupancies. Additionally, 145 buildings, recognized for historical and architectural importance, are found within the historical districts of the city. These districts include the National Register: Columbus Central Commercial Historic District and the local historic district.

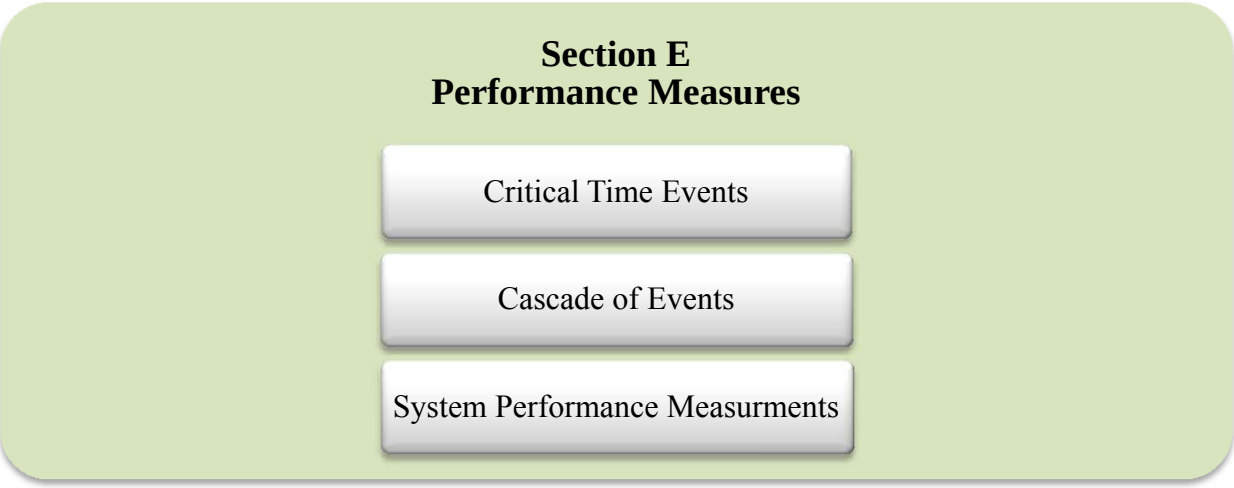
ESN 107, known as Southside, comprises 2.04 square miles (8.8%) and has 27.84 road miles (11.8%). The ESN averages approximately 325 incidents per year with the majority being EMS related (80%). This ESN is ranked third in number of fire events and second in the number of structure fires. Structure fires have decreased in the past 2 years; however, older structures and demographics indicate a need to monitor fire event trends. The population is 3,710 which represent 16.1% of city population. The ESN is a high density neighborhood between Main St. and 7th Ave. S. and a medium density from 7th Ave. S to city limits. The median assessed value is $35,810 with a median square footage of 1,453. However, as the maps point out, the assessed values are significantly different between the 2 density zones. There are several major multi-family occupancies within the ESN and 1 major low income subsidized housing complex. There are 108 commercial structures of which the majorities are business and assemblies. Commercial OVA scores include maximum (1), significant (42), and moderate (64). Critical infrastructures

include AT&T telephone exchange, Lowndes County Juvenile Detention Center, and CFR Station #1

ESN 114, known as "The W", is home to Mississippi University for Women. The W comprises .14 square miles (.6%) and has 3.67 road miles (1.5%). The ESN averages approximately 20 incidents per year with the majority being EMS and non-fire related events (70%). There were 4 reported fire events and no structure fires during the analysis time period. The population is 531 which represent 2.2% of city population. The major hazard of the W is the historical significance of the buildings and the R-2 dormitories. There are 10 dormitories with a capacity of 775 rooms. The nighttime population of the W is approximately 600 students. The daytime population is approximately 3,000 that include both students and staff. OVA scores indicate that there are 13 maximum, 23 significant, and 8 moderate occupancies on campus. Property values on the campus total $372 million. There are access problems associated with the W, specifically the narrow streets that limit Ladder 29 response and set-up. This apparatus is essential to fire event mitigation. Also, access to the campus from several secondary access points is restricted by gates during night-time hours.

The water system in ESN 95, 107, and 114 are adequate to support fire flow requirements with several exceptions. Areas of concern involve the blocks between 10th / 14th Ave. S. and 13th St. / 15 St. S., Lake Norris Rd., and South Pickensville Rd. These areas may require long supply hose lays, Tanker 31 response, and/or mutual aid support. The top 10 fire flow needs in SRA 6 are:

Occupancy	Req. GPM	Avail		Occupancy	Req. GPM	Avail
Princess Theater	4,500	Yes		Education / Human Sc..	2,250	Yes
St. Pauls Church	4,500	Yes		Martin Hall	2,500	Yes
Cable One	3,500	Yes		Fant Library	2,500	Yes
Bella	3,500	Yes		Hogarth Dining	3,500	Yes
Sylvan Learning	3,000	Yes		Hooper Science	2,000	Yes



E. Performance Measurement

The successful outcome of any incident is contingent upon a number of variables; however, the importance of adequate resources arriving within a prescribed time period remains the critical deciding factor. Yet, one cannot simply press a button on a stopwatch and claim performance is being met. To be truly successful, agencies must understand the numerous factors that influence time and the dynamic relationship that is established between each. This understanding begins with the recognition that time is crucial and within each incident is a uniform sequence of events that occur. These elements generate data upon which four factors that affect performance and service delivery may be evaluated.

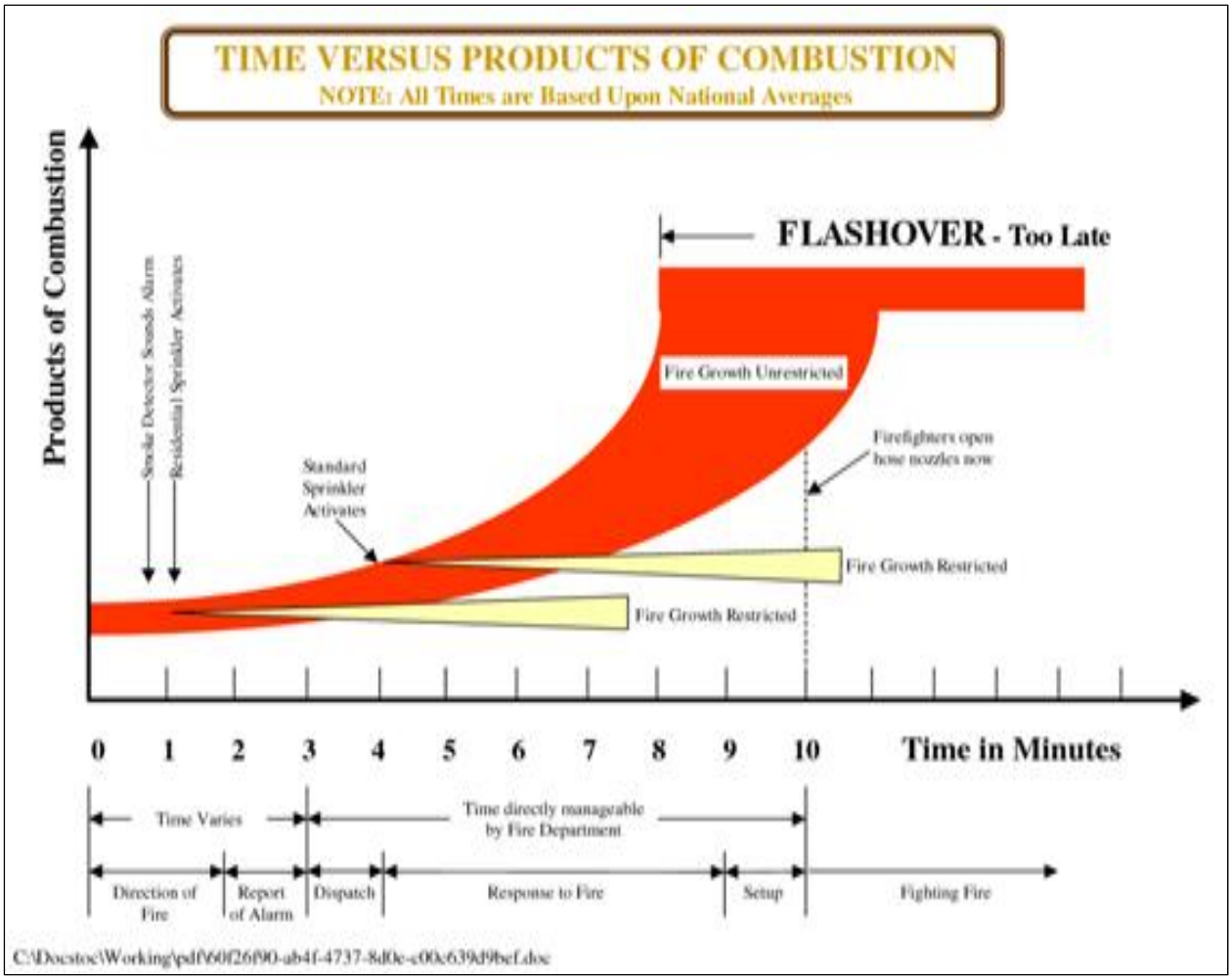
Time Critical Events

Time is a decisive factor in the outcome of an emergency. Department resources must arrive in a timely manner to begin mitigation efforts or the event will continue to escalate to a point where the outcome is set, often with dire consequences. To illustrate the importance of time on an emergency event, two time critical events are discussed.

The first event is flashover. Live burn experiments and fire growth models have shown that fires increase exponentially with time. During the free burning stage, fire will continue to grow until it reaches a point known as flashover. Flashover occurs when the contents within the room reach

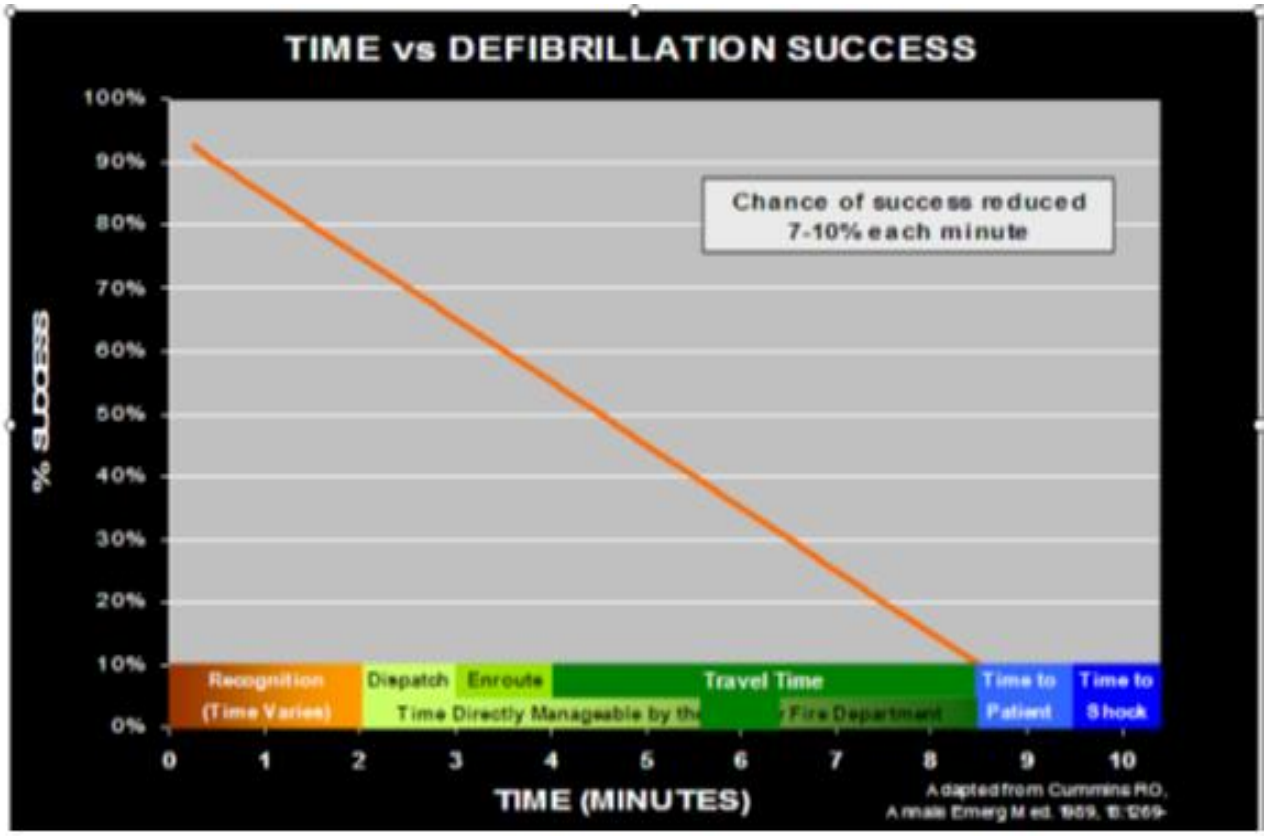
their ignition temperatures and fire engulfs the entire room. Research has revealed that flashover typically occurs between 4 to 10 minutes. This quick time is reflective of high fire loads and the synthetic materials commonly used to manufacture furnishings. During flashover, tenable situations are unlikely, even for firefighters in protective gear. Moreover, the effect of fire on light-weight truss construction increases the risk of structural collapse due to degradation of the building's structural components. As a result of these potential hazards, the goal for any department is to initiate fire suppression operations before this point is reached. Figure E1 illustrates the fire growth model up to flashover conditions.

Figure E1: Fire Growth / Flashover Time Model



Time is also critical when reviewing medical emergency incidents. Numerous articles in professional journals indicate that a correlation exists between improved patient outcomes and early intervention. Sudden cardiac arrest events provide a perfect example. The American Heart Association has determined that a lack of adequate perfusion (oxygenated blood flow) will result in brain damage in as little as 4 minutes. Irreversible damage or "brain death" will occur after 10 minutes. Research has indicated that the chances of surviving a sudden cardiac arrest decrease 10% for every minute definitive care, namely cardio-pulmonary resuscitation (CPR) and defibrillation is delayed.

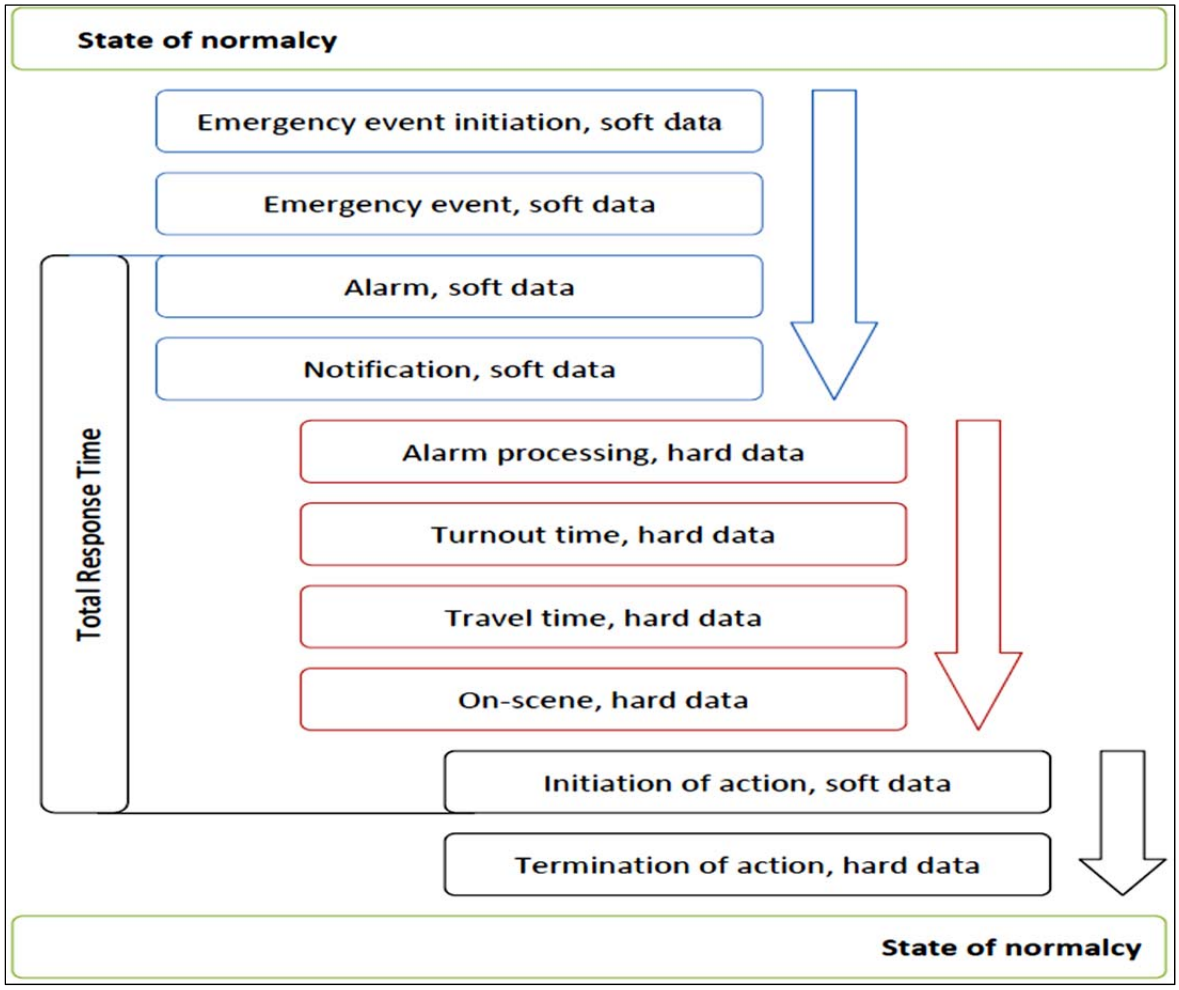
Figure E2: Sudden Cardiac Arrest Survivability Time Model



Cascade of Events

For every emergency incident there is a specific sequence or progression of events from start to finish that is referred to as the "cascade of events." Figure E3 illustrates the cascade of events timeline.

Figure E3: Cascade of Events



The cascade of events is important to understand because specific points in the sequence of events yield data that is used to measure service performance. There are two types of data produced: soft data and hard data. Soft data is more difficult to measure due to the generalized nature of the event. Hard data offers precise performance response measurements through documentation of incident times. The following definitions are presented to provide the reader with an understanding of each sequence step in the cascade of events (CFAI, 2009):

- State of normalcy: routine events or conditions without the need for help.
- Emergency event initiation: factors occur that may result in an activation of the emergency response system. An example would be a patient experiencing chest pains.
- Emergency event: also known as the "point of awareness," a recognition by an individual that assistance is needed. For buildings, the emergency event is the activation of mechanical or electronic devices such as smoke or heat detectors. This sequence event is considered soft data.
- Alarm: the activation of the emergency response system. Examples include E-911 calls or transmittal of an alarm to a Public Safety Answering Point (PSAP). This sequence event is considered soft qualitative data.
- Notification: the point of when the alarm is received and acknowledged at the PSAP. This event is hard quantifiable data.
- Alarm processing: the time interval between when the call is acknowledged at the PSAP and emergency responders are dispatched. This event is hard quantifiable data.
- Turnout time: the time interval between dispatch of the incident and when emergency responders go en-route (start travel). This event is considered hard quantifiable data.
- Travel time: the time interval when emergency responders go en-route (start travel) and ends with the arrival on scene. This sequence event is considered hard quantifiable data.
- On-scene time: point when emergency responders report their arrival at the scene. This event is considered hard quantifiable data.
- Initiation of action: the time when units arrive on scene and begin mitigating actions. This sequence event is considered soft data.
- Termination of action: the point when incident actions have been completed and the unit is available for other incidents.

For the purpose of accreditation, total response times are used as performance measures. Total response time is the time interval between acknowledgement of the emergency at the PSAP and the time resources arrive on scene and begin mitigating actions. In the past, performance response times were measured using averages, means, and mediums. Today, fractals are used as the reporting medium to provide a more precise understanding of performance. CFAI has established the 90th percentile fractal as the reporting benchmark to be used by departments. The

90th percentile mark indicates that 90% of response times were achieved at that specific reporting time.

System Performance Measurements

System performance is influenced or measured by four dynamics; distribution, concentration, reliability, and comparison. Each dynamic weighs a specific aspect of system performance. The data used for each dynamic was based upon the past three years of department responses. At this point, the data is used only for comparatives purposes. Establishing and adopting performance objectives will be discussed in the next section.

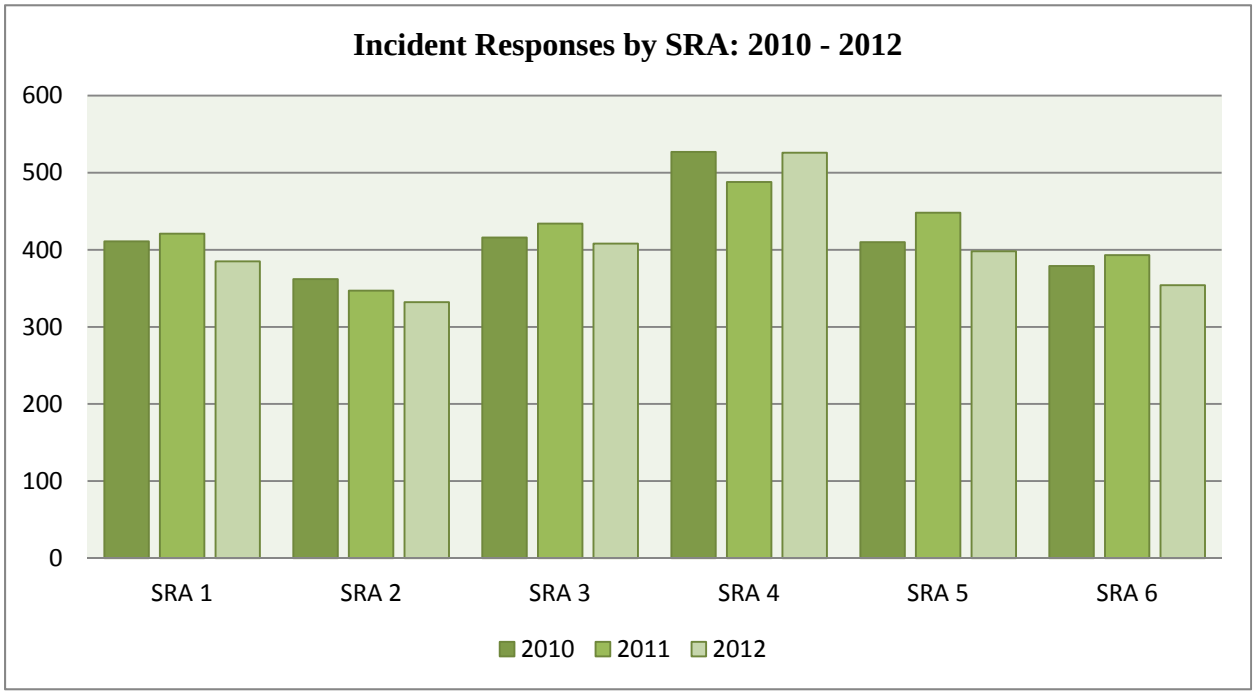
Distribution

Distribution is defined as the "geographic location of all first-due resources for initial intervention." Distribution measures the first-due unit's ability to arrive within the response time objective. Optimally, each distribution point should be equal or close in the city's geographical features that include size, road miles, and population. Out-of-balance distribution factors may place stressors on department resources and negatively impact system performance. Table E1 reflects four geographical comparison features for distribution. Graph E1 provides an overview of incident volume by SRA. Maps E1 and E2 provides an illustration of incident frequency. Map E2 is especially effective at providing a comparative 3D view by the analytical D3 districts. Map E3 provides distribution compliance for travel times while Map E4 documents total response time compliance. The impact of alarm processing and turnout times on performance is readily evident on this map.

Table E1: SRA Distribution Factors

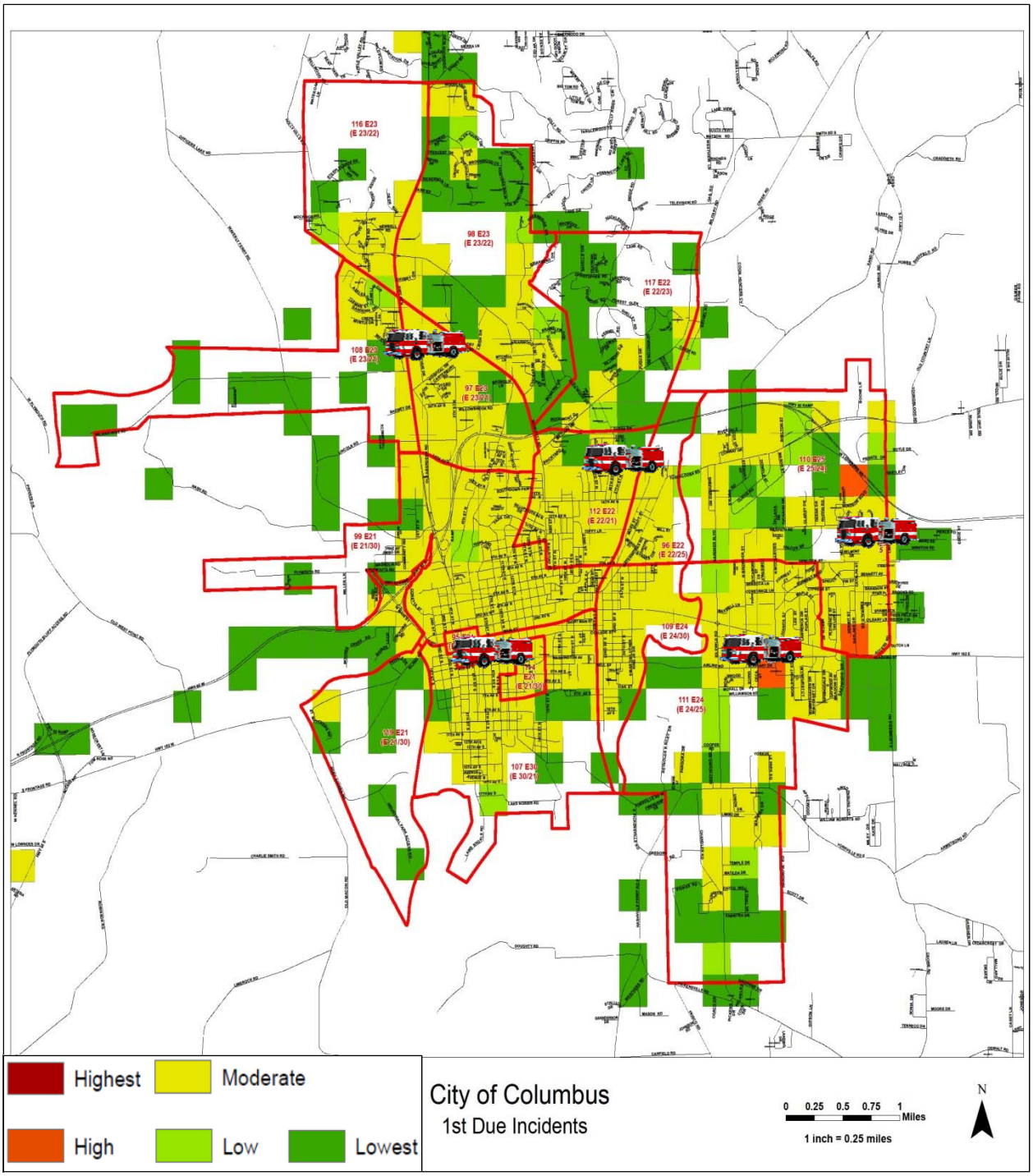
SRA	Square Miles		Road Miles		Population		Residential	
	Raw Data	%	Raw Data	%	Raw Data	%	Raw Data	%
SRA 1	3.61	15.5	46.6	19.7	4132	17.5	1,263	16.6
SRA 2	3.22	13.8	34.6	14.8	3436	14.5	1,259	16.6
SRA 3	6.47	27.8	48.7	20.7	4247	18	1,212	15.9
SRA 4	4.93	21.1	40.3	17.2	4757	20.1	1,631	21.5
SRA 5	2.78	12	31.2	13.3	2715	11.5	1,081	14.2
SRA 6	2.25	9.8	33.4	14.3	4353	18.4	1,152	15.2
Total	23.26	100	234.8	100	23640	100	7,598	100

Graph E1: Incident Responses by SRA: 2010 – 2012

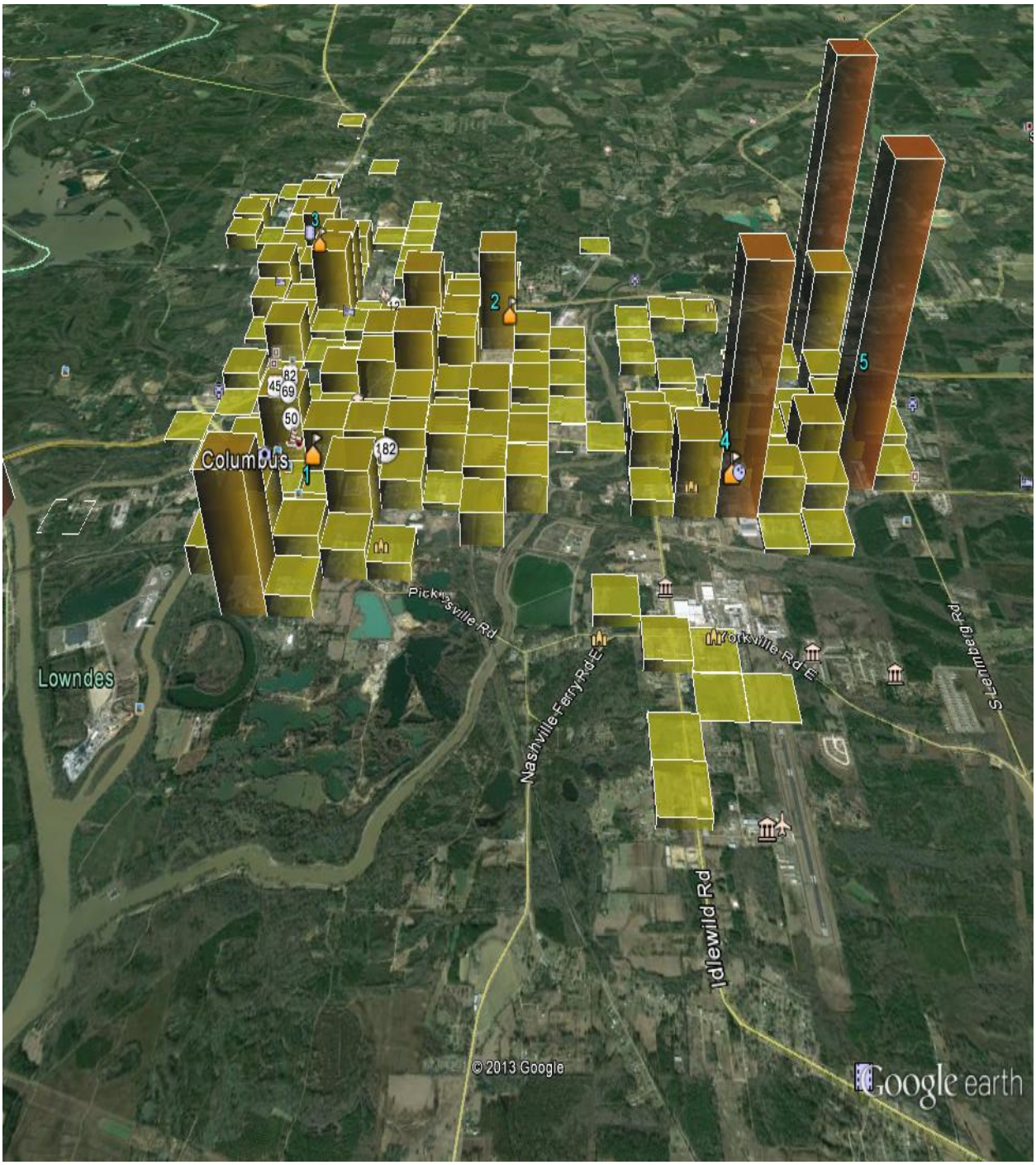


The distribution and concentration mapping was created using StatsFD, CFR's analysis software. This software establishes a grid system known as Dynamically Defined Districts (D3). D3 allows the department to identify response time performance within the ESN. Each D3 grid square is approximately 1,300 feet by 1,300 feet. However, this distance is adjustable and is set to meet jurisdictional needs. When evaluating D3 district performance, three factors must be considered. First, the total number of calls must be reviewed. The greater the number of incidents in the D3, the more valid the response times will be. Second, travel time (TT) compliance is measured by a single element and is a good indicator of distribution balance and that the correct units are deployed as 2nd due and ERF units. Finally, total response time (TRT) is the sum of three time measurements; call processing, turnout, and travel times. Missed compliance may be influenced by any one or a combination of the three time elements. Response time objectives were based upon CFAI recommendations for a suburban population density that is found on page 71 of the Fire & Emergency Service Self-Assessment Manual (8th Ed.).

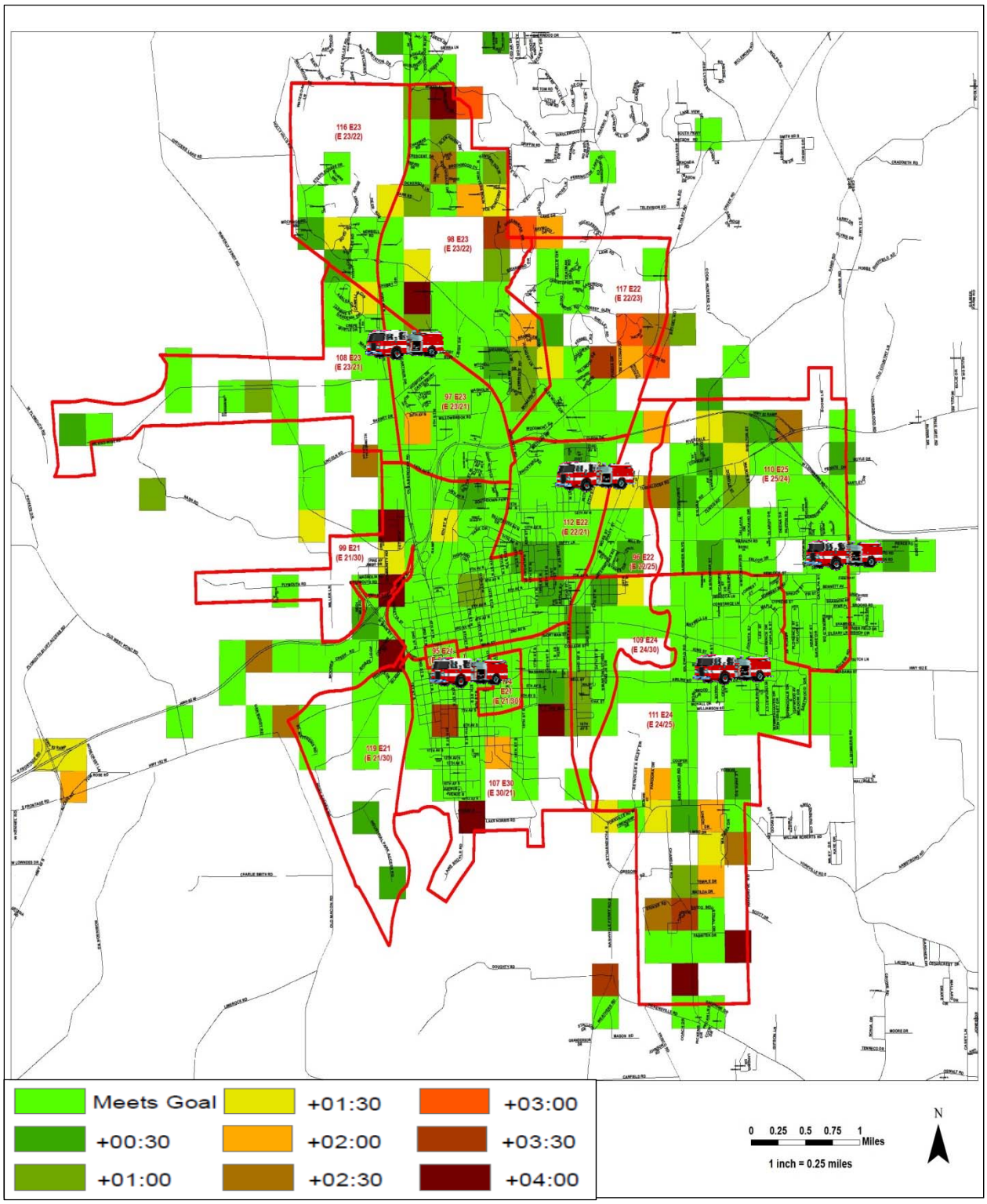
Map E1: Incident Frequency Locations



Map E2: Incident Frequency Location - 3D View

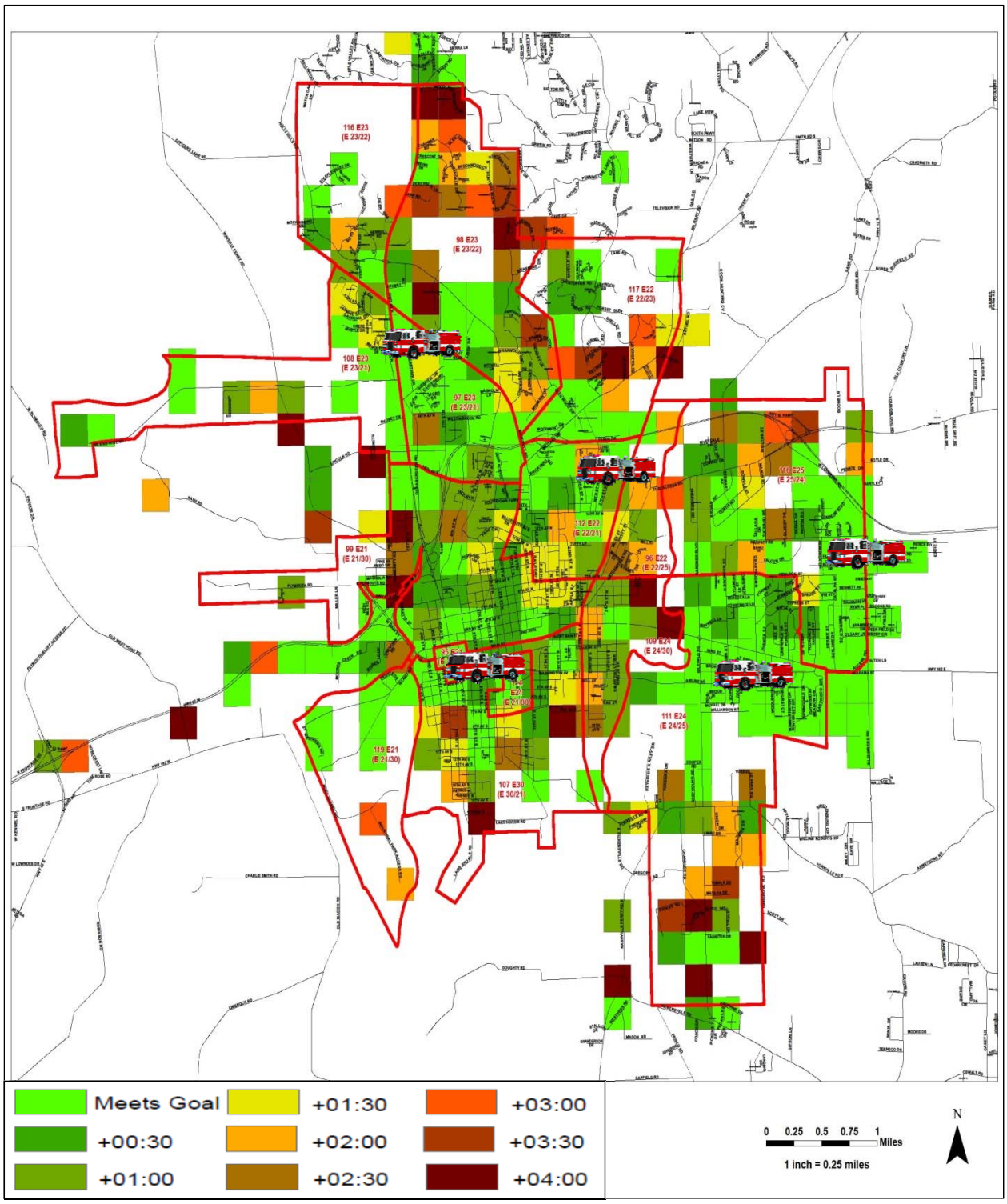


Map E3: Distribution Compliance - Travel Time



*****Performance is based upon a travel time objective of 5 minutes.

Map E4: Distribution Compliance - Total Response Time



*Performance is based upon a total response time objective of 7 minutes (7:20 for fire events)

Concentration

Concentration is defined as the spacing of resources arranged in a manner to ensure that an effective response force can be assembled and respond within the prescribed response time objective. ERF deployments are predicated upon the risk level of the incident and the critical tasks that must performed (see Critical Tasking Lists).

CFR classifies effective response forces into two categories; 2nd due units and ERF units. Second due units are dedicated apparatus that provide primary back-up of the initial apparatus based upon the ESN. The 2nd due unit's primary responsibilities is the establishment of a rapid intervention team and other critical tasks required in the initial phases of the incident. ERF units are comprised of the Battalion Chief and additional apparatus that are required to perform other critical tasks required by the incident risk level.

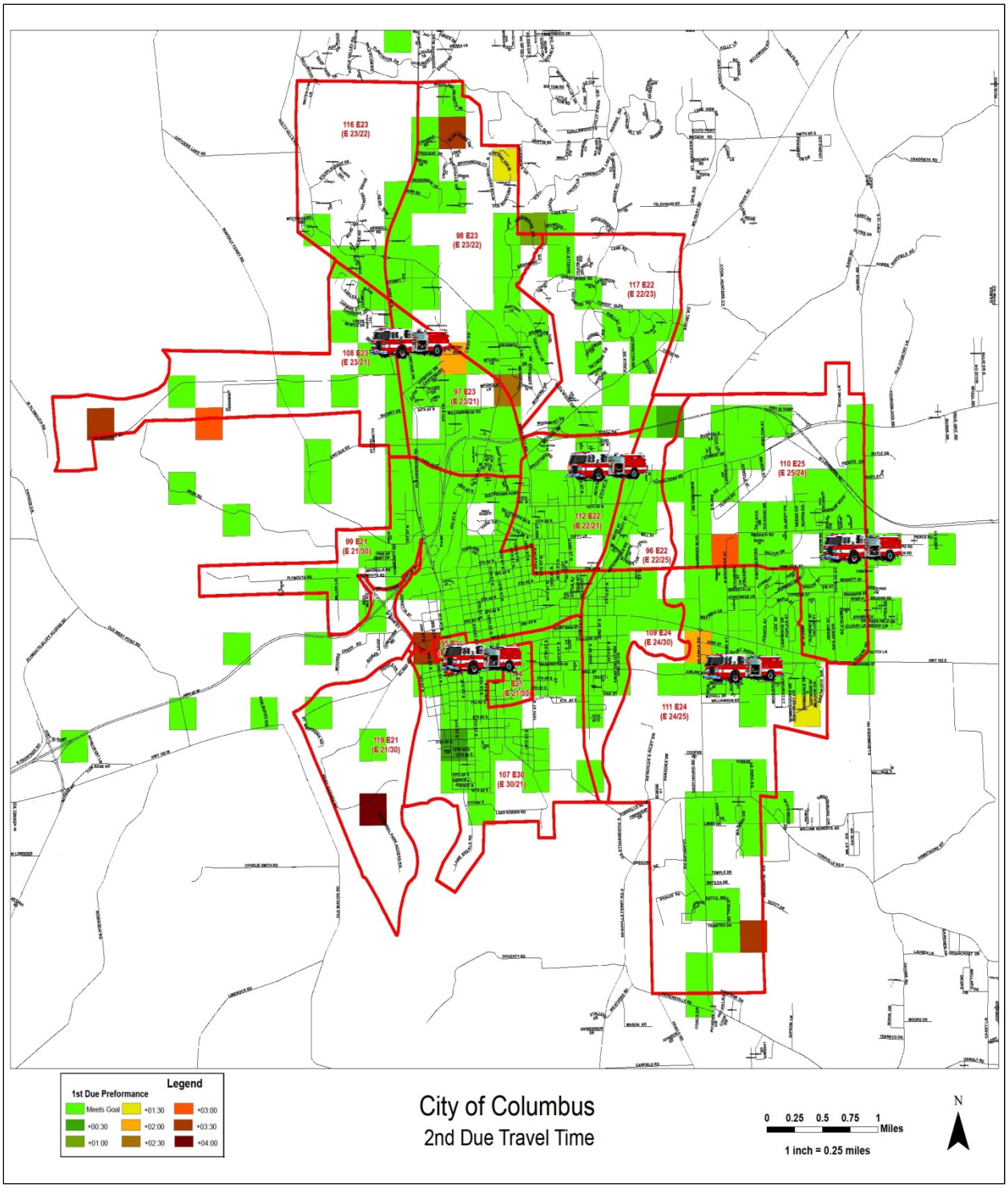
Table E2 reflects individual apparatus responses (green) and responses as an ERF unit (red). This table allows the department to determine if specific apparatus are being stressed (excessive responses) and to what extent. Of importance is the location of ERF responses which impacts ERF travel and total response times.

Table E2: Distribution and Concentration Responses by Station Response Areas

CFR Apparatus Response by Station Response Areas							
	Apparatus Responses by Station Response Areas					ERF Responses	% of Out of SRA Responses
	1 / 6	2	3	4	5		
E21	1,631	134	317	30	5	486	23%
E22	87	1,035	191	31	18	327	24.1%
E23	326	133	1,215	7	12	478	28.3%
E24	104	11	12	1,547	268	395	20.4%
E25	36	33	13	335	1,158	417	26.5%
E30	1,193	23	39	101	7	170	12.5%

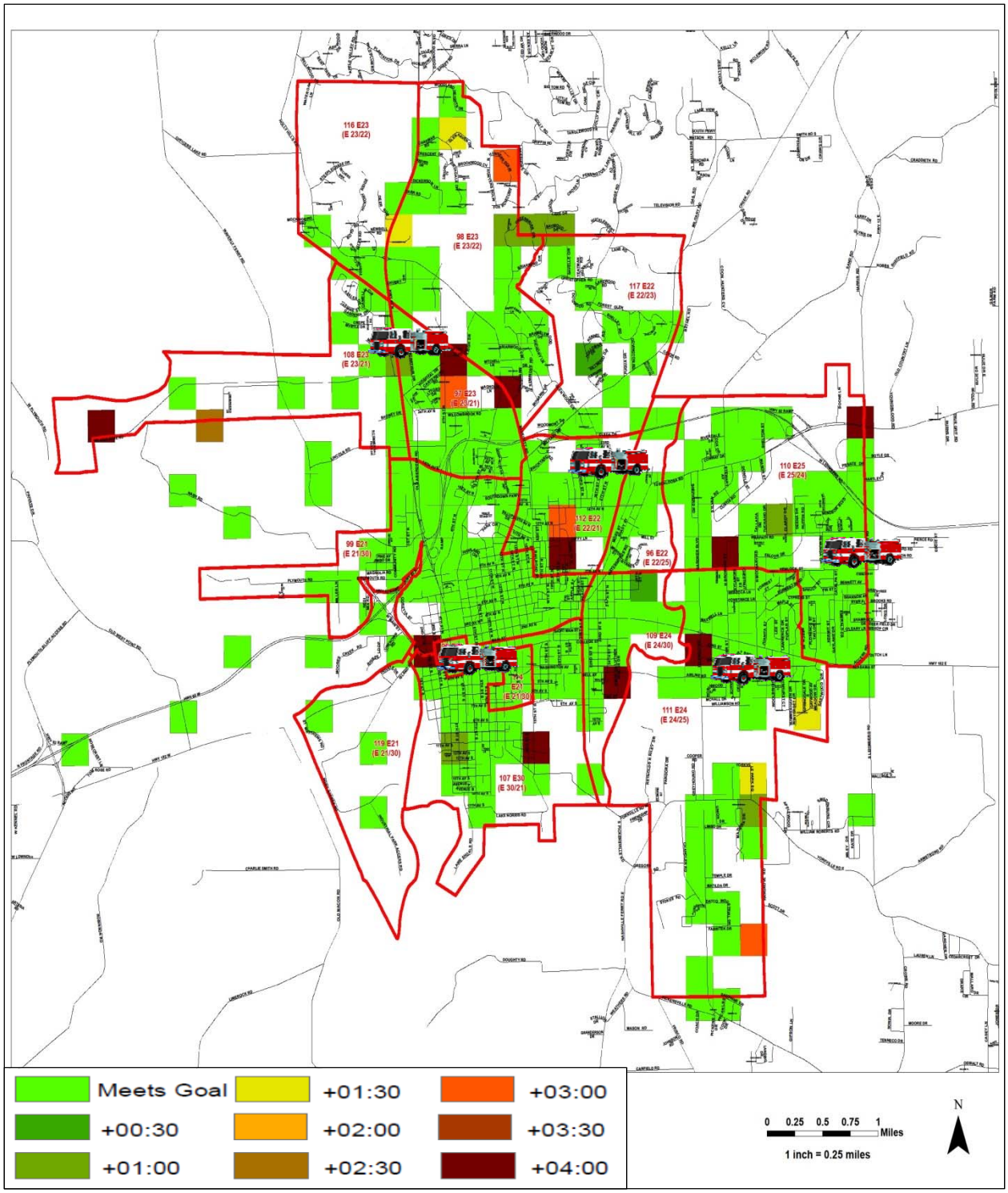
Maps E5 through E8 illustrate concentration compliance travel times and total travel times for 2nd due and EFR response units.

Map E5: Concentration Compliance - 2nd Due Travel Time



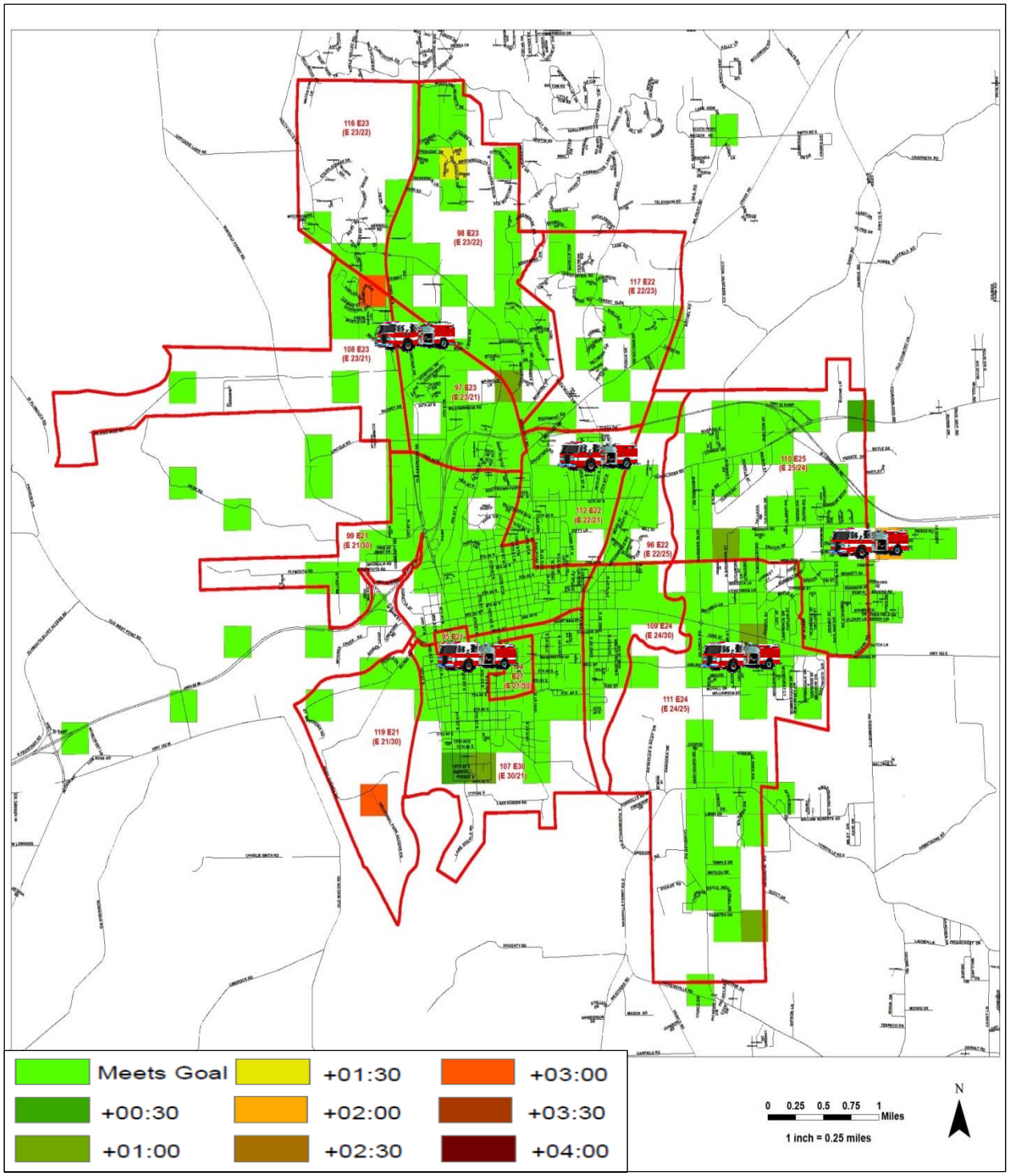
*Performance is based upon a travel time objective of 8 minutes.

Map E6: Concentration Compliance - 2nd Due Total Response Time



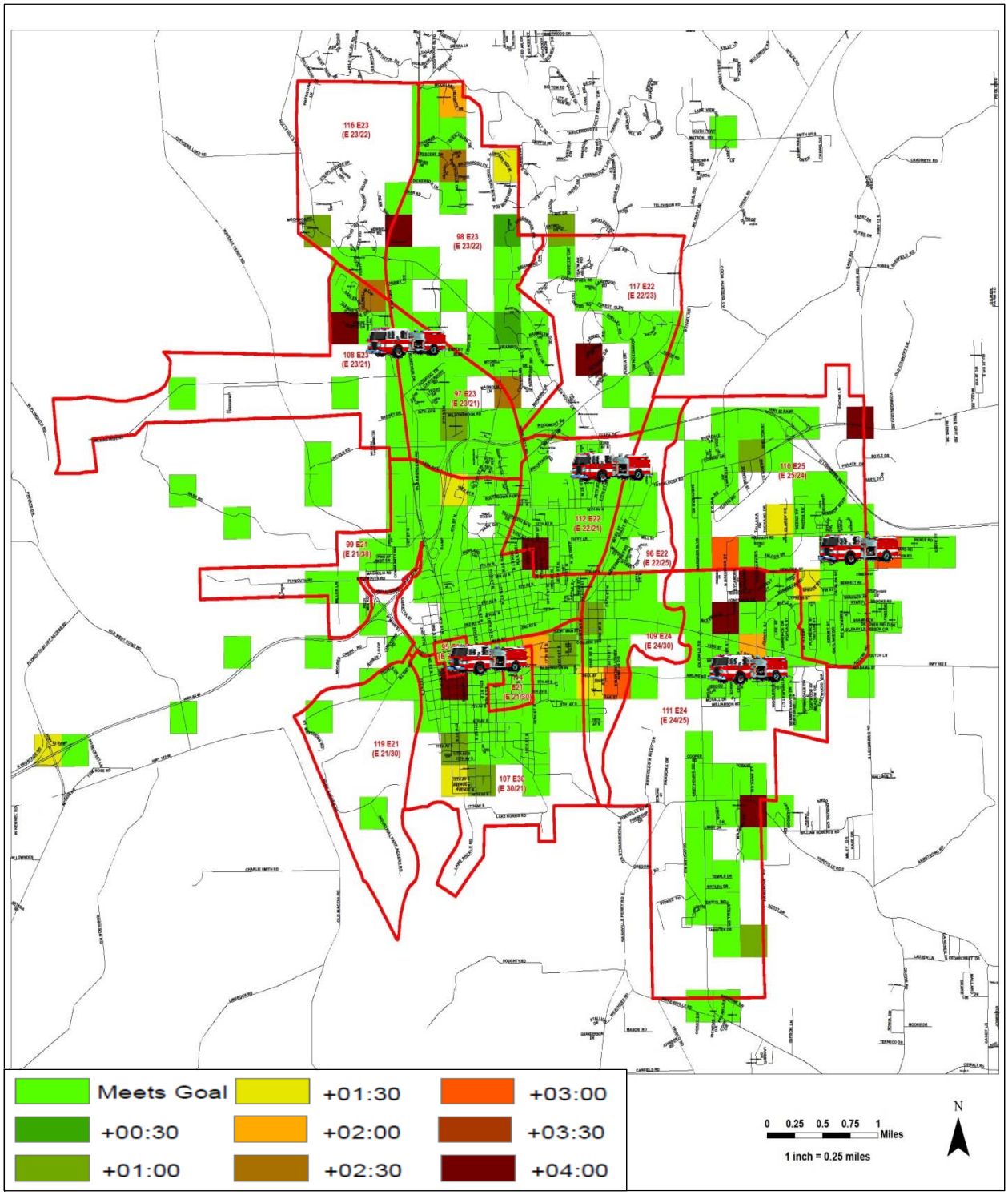
*Performance is based upon a total response time objective of 10 minutes (10:20 for fire events)

Map E7: Concentration Compliance: ERF Travel Time



*****Performance is based upon a travel time objective of 10 minutes.

Map E8: Concentration Compliance: ERF Total Response Time



*Performance is based upon a total response time objective of 12 minutes (12:20 for fire events)

Reliability

Reliability is a measurement of a unit's availability to respond to an incident, the ability to arrive first within its primary response area, and the ability to meet response time objectives. Reliability is influenced by a number of variables that include SRA size, station location in relation to its SRA, whether the apparatus was in-quarters or delayed due to performing details (i.e. training, inspections, public service, etc.). Table E3 reflects overall station reliability.

Table E3: Station Reliability

Station Reliability							
	Inc. per Day	Compliance	Reliability (arrives first in primary SRA district)				
			AM1 0000 – 0559	AM2 0600 - 1159	PM1 1200 - 1759	PM2 1800 - 2359	Avg.
Sta. 1	2.94	91%	88.8%	86%	87%	84.7%	86.5%
Sta. 2	1.05	92.9%	86.7%	81%	82.6%	75%	81%
Sta. 3	1.49	92.6%	66.7%	75%	75%	66.7%	72.3%
Sta. 4	1.61	83%	73.9%	83.8%	80.9%	68.6%	77.5%
Sta. 5	1.38	91.3%	75%	78.1%	87.5%	73%	79.2%

Reliability is also affected by simultaneous (concurrent) incidents. Simultaneous incidents are triggered when an incident occurs before a previous incident has cleared. Simultaneous calls impact performance when these incidents occur within the same SRA requiring an out-of-district response. The "All" column represents the number of times a simultaneous incidents occurred while the "SRA" column is the number of simultaneous incidents that occurred within the same SRA. For example, in 2012 there were 12 occurrences when the department had three calls in progress at the same time. Of this total, there was only 1 simultaneous incident in the same SRA.

Table E4: Simultaneous Incidents

CFR Simultaneous Incidents								
	1		2		3		4	
	All	SRA	All	SRA	All	SRA	All	SRA
2010	263	43	23	1	3	0	0	0
2011	321	57	35	6	7	1	2	0
2012	249	36	12	1	0	0	0	0

Comparability

The final component of system performance examined is comparability. Comparability provides a means to assess CFR's system performance with other departments of similar size as well as with national standards. The validity of comparison is dependent upon a "like for like" appraisal. Therefore, Table E5 provides response time performance criteria in addition to "dispatch to arrival." Currently, there are no departments in Mississippi that are nationally accredited. As a result, in-state response time documentation was limited to "dispatch to arrival" performance. It is anticipated that as more departments become aware of and seek national accreditation, in-state response time data will become available for comparability purposes using CFAI criteria.

Table E5: Department Comparability

Department Comparability					
	Comparison Agency Baselines				CFR Baseline
	Horn Lake MS	Tupelo MS	Southaven MS	Lenexa KS	
City Population	26,060	34,546	48,982	48,190	23,640
City Square Miles	16	51.1	33.8	34.3	23.2
# of Stations	3	7	4	5	5
# of Personnel	63	93	114	75	72
Alarm Processing	-	-	-	:50	2:06
Turnout	-	-	-	1:31	2:22
Travel	-	-	-	5:57	4:45
Call to Arrival	-	-	-	8:18	9:09
Dispatch to Arrival	4:46	4:19	5:14	7:28	7:07

National standard comparisons were taken from National Fire Protection Association 1710; Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Departments and CFAI's Fire & Emergency Service Self-Assessment Manual (8th Ed.). NFPA 1710 was used for alarm processing, turn-out time, and apparatus staffing benchmarks. The Self-Assessment Manual was utilized for distribution and concentration travel times due to additional time allowances based upon municipal population density classifications.

Table E6: National Standard Response Time Benchmarks

National Standard Response Time Comparison			
Performance Criteria		Performance Benchmarks	CFR Baseline Performance
Alarm (call) processing		1:00	2:06
Turn-out Time		1:00 EMS / 1:20 Fire	2:22
Travel – 1st arriving		5:00	4:29
Travel	2nd Due	8:00	5:17
	ERF	10:00	6:49
Fire Apparatus Staffing		4	3

CFR Baseline Performance

The following section provides a review of CFR's past system performance for all incidents. CFR classifies an effective response force into two ERF responses; 2nd due units and effective response forces. Second due units are apparatus that are dedicated to providing primary back-up of the initial apparatus. ERF units are comprised of the Battalion Chief and additional apparatus that are required by the incident risk level. This separation is necessary to track department performance at various event risk levels without response times being skewed by the longer response times of ERF units.

Response Time Definitions

In order to provide a better understanding of the terminology associated with system performance, the following terms are defined (CFAI, 2009):

- Baseline performance: The current measurement of performance in an organizational context.
- Benchmark: A standard from which something can be judged. Establishing the benchmark, or best practice, will help define superior performance of a service.
- Effective Response Force (ERF): The minimum amount of staffing and equipment that must reach a specific emergency zone location within a maximum prescribed total response time and is capable of initial fire suppression, EMS and/or mitigation.
- First due units: Primary units that have been assigned to a portion of a jurisdiction in which the units are designated for initial intervention/mitigation efforts.

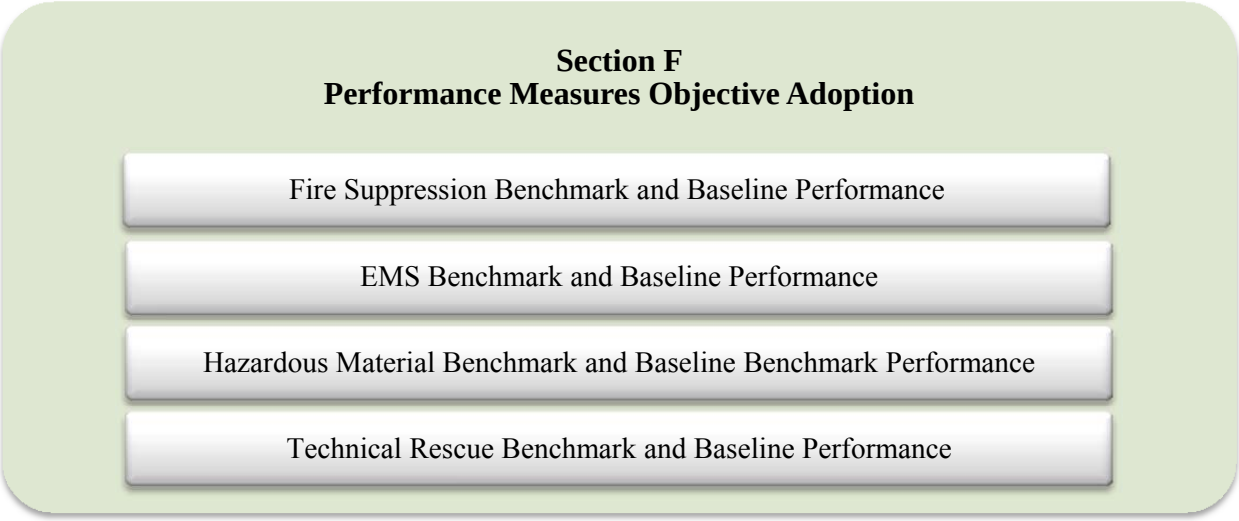
- Call processing (dispatch time): The portion of a fire department's response time that begins when the dispatcher receives an alarm and ends when the dispatcher assigns the proper companies to the emergency. The national standard for call processing is 60 seconds.
- Turnout time: The time that begins when the agency's facility (station) or response units notification system is activated by either an audible or visual annunciation and ends at the beginning point of travel time (units go en-route). For staffed fire departments, the benchmark is 80 seconds for fire and special operations incidents and 60 seconds for EMS emergencies.
- Travel time (TT): The time interval that begins when a unit is en-route and ends when the unit arrives at the scene.
- Total response time (TrT): The time interval from the receipt of the alarm at the primary PSAP (public safety answering point [E-911]) to when the first emergency unit arrive on-scene and begins intervention.

Based upon the system performance factors, Table E7 provides an overview of CFR's baseline service delivery performance for all types of emergency incidents. Section G will provide a summary of baseline performance by specific programs/services.

Table E7: CFR Baseline Response Time Performance

CFR: Baseline Performance			2010 / 2012	2012	2011	2010
Call Processing	Pick-up to Dispatch		2:06	1:47	2:07	2:21
Turnout Time	Turnout Time - 1st Unit		2:22	2:05	2:27	2:31
Travel Time	Travel Time Distribution (1st Unit)		4:45	4:33	4:58	4:44
	Travel Time - Concentration (ERF)	2nd	5:17	5:41	5:44	4:37
		ERF	6:49	7:03	7:18	5:51
Total Response Time	Total Response Time Distribution (1st Unit)		7:53	7:16	8:08	8:12
	Total Response Time Concentration (ERF)	2ND	8:40	8:51	8:55	8:19
		ERF	10:26	10:29	11:40	9:47

Performance Measures Objective Adoption



F. Adoption of System Performance Measures

The adoption of performance objectives will enable the department to measure its effectiveness at providing services to the community. This section establishes benchmark and baseline objectives and performance measures for each program offered by the department. The adoption of these benchmarks by the governing authority will establish public safety policy through service delivery expectations. Performance objectives are qualitative statements indicating a desired goal for department performance. Performance measures are quantitative statements indicating specific performance expectations. Benchmark objectives and measures represent industry best practices and were taken from nationally recognized standards for performance, specifically the National Fire Protection Association and the Commission on Fire Accreditation International. Baseline performance provides documentation of current department performance. As previously stated, response time performances were based upon fractals due to a more precise measurement of performance. CFAI has established the 90th percentile fractal as the reporting benchmark.

CFAI's Fire & Emergency Service Self-Assessment Manual (FESSAM) (8th ED) served as the principle guide on response time performance. CFAI recognizes municipal size as the defining criterion for establishing response time benchmarks thus eliminating a "one-size-fits-all"

approach to response standards. For accreditation purposes, Columbus is classified as a suburban area based on its population (23,640) and population density (1,072 individuals per square mile). CFAI response time benchmarks for 1st due, 2nd due, and ERF units may be found on page 71 of the FESSAM.

CFR's performance data was obtained from three sources; Fire Programs™, PTS Solutions™, and StatsFD™. Fire Programs and PTS provided the raw data. Basic data included:

- Basic incident identifiers (date, incident number, incident type, incident address and location (latitude and longitude), station and ESN identifiers)
- Basic incident times (call received, dispatch, arrival, and complete)
- Unit identifiers
- Unit specific times (call received, dispatch, en-route, arrival, and completed)
- CAD data for call processing

Incident information from Fire Programs and PTS was up-loaded into StatsFD for data analysis. The following analytical data from StatsFD was generated:

- Call processing
- Turnout times
- Travel times
- Total response time
- Dispatch to arrival
- Distribution and concentration performances
- Arrival sequences of apparatus
- D3 district performance spreadsheets and graphics
- Incident trend reports and graphs
- Worksheet analyzers (simultaneous incidents, SRA reliability)

Baseline performance was generated for each program instead of combined as reflected in Table E6. By reflecting program performance, slight response time variations will occur. However, response times should remain consistent. If not, a determination must be made to explain the variance (i.e. significant turnout time differences between fire and hazardous materials events).

Fire Suppression

Baseline Performance

CFR's baseline performance indicated actual response time performance for fire suppression incidents. CFR will use these times as a point of reference to establish benchmark response time objectives.

Table F1-A: Fire Suppression Baseline Performance

Fire Suppression: Baseline Performance		2010 / 2012	2012	2011	2010
Call Processing	Pick-up to Dispatch	2:17	1:57	2:22	2:24
Turnout Time	Turnout Time - 1st Unit	1:59	1:45	2:01	2:10
Travel Time	Travel Time – Distribution	4:12	3:50	4:43	4:00
	Travel Time - Concentration 2nd ERF	5:09 6:05	5:53 7:16	4:37 7:07	4:30 5:12
Total Response Time	Total Response Time Distribution	7:26	6:51	7:43	7:45
	Total Response Time Concentration 2nd ERF	8:26 9:31	8:52 10:08	7:55 9:44	8:21 9:09

*First Arriving Unit Total Response Time for **All Fire Risk Events**:* For 90 percent of all Fire risk events, the **total response time for 1st due units** staffed with a minimum of three firefighters, of which one being company officer certified, was **7 minutes and 26 seconds**. 1st due units were capable of; providing a minimum of 500 gallons of water, 1,250 gallons per minute of pump capacity, initiated command, and advanced an attack line flowing a minimum of 125 gallons per minute.

*2nd Due and ERF Unit Total Response time for **All Fire Risk Events**:* For 90 percent of all risk events, **the total response time for 2nd due units** staffed with a minimum of three firefighters was **8 minutes and 26 seconds**. The **total response time for ERF units** staffed with the appropriate number of personnel to meet critical tasking and the Battalion Chief was **9 minutes**

31 seconds. ERF units were capable of; establishing command, provided an adequate and continuous water supply, provided a dedicated RIC, and provided for other critical tasks.

Benchmark performance represents response time goals. In pursuit of providing superior services and continuous self-improvement, CFR strives to meet or exceed benchmark response time performance measures.

Table F1-B: Fire Suppression Benchmark Performance

Fire Suppression Benchmarks				
Benchmark Criterion	**Response Time Objective**			**Performance**
Alarm handling (Call Processing)	1:00			90%
Turnout time	1:20			90%
	1st Due	**2nd Due**	**ERF**	**Performance**
Travel Time	3:35	5:45	7:00	90%
Total Response Time	5:55	8:05	9:20	90%

Fire Suppression Performance Goal Statement: For all fire suppression incidents, the department shall meet or exceed total response time objectives with sufficient staffing and resources to stop the escalation of fire and contain it to the area of involvement upon arrival.

*First arriving units for **All Fire Risks:*** For 90% of call fire suppression incidents, the **total response time of the department's first arriving unit**, staffed with a minimum of four personnel shall be **5 minutes 55 seconds** in suburban population areas. The first arriving unit shall be capable of: providing 400 gallons of water and 1,250 gallons per minute (GPM) pumping capacity; initiating command; requesting additional resources; establishing and advancing an attack line flowing a minimum of 150 GPM.; establishing an uninterrupted water supply; containing the fire; rescuing at-risk patients; raising ladders, and performing ventilation and salvage operations. These operations shall be done in accordance with the department's administrative policy guides while at the same time providing for the safety of all personnel and the community.

*Effective Response Force (ERF) Total Response Time for **All Fire Risks**:* For 90% of all calls for fire suppression services, the **total response time for 2nd due** staffed with a minimum of four personnel shall be **8 minutes 05 seconds**. The **total response time for effective response force**

(ERF) staffed with the appropriate number of personnel to meet critical tasking shall be **9 minutes 20 seconds**. The ERF shall be capable of: establishing command; providing an uninterrupted water supply; advancing an attack line and a backup line for fire control; complying with the Occupational Safety and Health Administration (OSHA) requirements of two in-two out; completing forcible entry; searching and rescuing at-risk patients; ventilating the structure; controlling utilities; and performing ventilation, salvage and overhaul. The ERF shall also be capable of placing elevated streams into service from aerial ladders. These operations shall be done in accordance with the department's administrative policy guides while at the same time providing for the safety of all personnel and the community.

EMS

Baseline Performance

CFR's baseline performance indicated actual response time performance for EMS incidents. CFR will use these times as a point of reference to establish benchmark response time objectives.

Table F2-A: EMS Baseline Performance

EMS : Baseline Performance		2010 / 2012	2012	2011	2010
Call Processing	Pick-up to Dispatch	1:58	1:41	2:01	2:11
Turnout Time	Turnout Time - 1st Unit	2:24	2:04	2:29	2:33
Travel Time	Travel Time – Distribution	4:46	4:33	5:01	4:44
	Travel Time - Concentration 2nd ERF	5:47 6:56	6:17 7:01	5:33 5:59	4:31 4:19
Total Response Time	Total Response Time Distribution	7:53	7:13	8:05	8:15
	Total Response Time Concentration 2nd ERF	9:15 9:55	9:13 10:15	9:36 9:55	8:20 9:16

*First Arriving Unit Total Response Time for **All EMS Risk Events**:* For 90 percent of all EMS risk events, the **total response time for 1st due units** staffed with a minimum of three

firefighters, of which one being EMT certified, was **7 minutes 53 seconds**. 1st due units were capable of assessing scene safety, conducting an appropriate and thorough patient assessment, and provided Basic Life Support interventions consistent with the standard of care established by national, state, and local standards and protocols.

*Effective Response Force (ERF) Total Response Time for **All EMS Risks**:* For 90 percent of all EMS risk events, the **total response time for 2nd due units** staffed with a minimum of three firefighters, of which one being EMT certified, and the Battalion Chief was **9 minutes 15 seconds**. The **total response time for effective response force (ERF)** staffed with the appropriate number of personnel to meet critical tasking shall be **9 minutes and 55 seconds**. The ERF due units were capable of establishing incident command; establishing triage and patient care priorities, and provided for other critical tasks.

Benchmark performance represents response time objective goals. In pursuit of providing superior services, CFR strives to meet or exceed benchmark response time performance measures.

Table F2-B: EMS Benchmark Performance

EMS Benchmarks				
Benchmark Criterion	**Response Time Objective**			**Performance**
Alarm handling (Call Processing)	1:00			90%
Turnout time	1:00			90%
	1st Due	**2nd Due**	**ERF**	**Performance**
Travel Time	4:15	6:00	6:45	90%
Total Response Time	6:15	8:00	8:45	90%

EMS Performance Goal Statement: For all emergency medical incidents, the department shall meet or exceed total response time objectives with sufficient staffing and resources to provide medical services that will stabilize the situation and provide patient care and support to the patient.

*First Arriving Unit Total Response Time for **All EMS Risks**:* For 90% of all calls for EMS services, the **total response time** of the department's **first arriving unit**, staffed with a

minimum of four personnel shall be **6 minutes and 15 seconds.** The first arriving unit shall be capable of providing medical services that will stabilize the situation and provide patient care.

*Effective Response Force (ERF) Total Response Time for **All EMS Risks**:* For 90% of all calls for EMS services, the **total response time for 2nd due unit**s staffed with a minimum of four personnel shall be **8 minutes.** The **total response time for effective response force (ERF)** staffed with the appropriate number of personnel to meet critical tasking shall be **8 minutes and 45 seconds**. The ERF shall be capable of providing medical services that will stabilize the situation and provide care and support to the patient.

Hazardous Materials

Baseline Performance

CFR's baseline performance indicated actual response time performance for hazardous materials incidents. CFR will use these times as a point of reference to establish benchmark response time objectives.

Table F3-A: Hazardous Materials Baseline Performance

Hazardous Materials: Baseline Performance		2010 / 2012	2012	2011	2010
Call Processing	Pick-up to Dispatch	2:44	2:26	3:52	2:34
Turnout Time	Turnout Time - 1st Unit	2:40	2:11	3:17	3:02
Travel Time	Travel Time Distribution	4:29	4:05	4:47	4:00
	Travel Time Concentration 2nd ERF	 4:21 7:52	 4:16 5:57	 4:21 7:00	 4:29 7:52
Total Response Time	Total Response Time Distribution	8:48	6:58	9:00	8:48
	Total Response Time concentration 2nd ERF	 7:59 11:22	 7:24 9:40	 7:54 9:00	 9:01 11:50

First Arriving Unit Total Response Time for All Hazardous Materials Risk Events: For 90 percent of all hazardous materials risk events, the **total response time for 1st due units** staffed with a minimum of three firefighters, of which one being Hazardous Materials Technician I certified, was **8 minutes 48 seconds**. 1st due units were capable of assessing scene safety, notifying proper authorities, and establishing a seclusion perimeter.

Effective Response Force (ERF) Total Response Time for All Hazardous Materials Risk Events: For 90 percent of all hazardous materials risk events, the **total response time for 2nd due units** staffed with a minimum of three firefighters was **7 minutes 59 seconds**. **The total response time for ERF on-shift technicians** and the Battalion Chief was **11 minutes 22 seconds**.

Benchmark performance represents response time objective goals. In pursuit of providing superior services and continuous self-improvement, CFR strives to meet or exceed benchmark response time performance measures.

Table F3-B: Hazardous Materials Benchmark Performance

Hazardous Materials Benchmarks				
Benchmark Criterion	**Response Time Objective**			**Performance**
Alarm handling (Call Processing)	1:00			90%
Turnout time	1:20			90%
	1st Due	**2nd Due**	**ERF**	**Performance**
Travel Time	3:50	4:00	5:45	90%
Total Response Time Off-duty technicians and mutual aid	6:10	6:20	8:05 60:00	90%

Hazardous Materials Performance Goal Statement: For all Hazardous Materials incidents, the department shall meet or exceed total response time objectives with sufficient resources to stop the escalation of the incident, stabilize the situation, contain the hazard where applicable, and establish an action plan for the successful conclusion of the incident.

*First –Arriving Unit Total Response Time for **All Hazardous Materials Risks**:* For 90% of all calls for hazardous materials incidents, the **total response time** of the department's **first arriving unit**, staffed with a minimum of four personnel shall be **6 minutes 10 seconds**. The first arriving unit shall be capable of providing Hazardous Material actions to stabilize the

situation, stop the escalation of the incident, contain the hazard where applicable, and establish an action plan for the successful conclusion of the incident.

Effective Response Force (ERF) Total Response Time for ***All Hazardous Materials Risks****:* For 90% of all calls for hazardous materials services, the **total response time of the 2nd due units** staffed with a minimum of four personnel shall be **6 minutes 20 seconds.** The **total response time for the effective response force (ERF)** shall be **8 minutes 05 seconds**. The ERF shall be capable of providing Hazardous Materials services to stabilize the situation, stop the escalation of the incident, contain the hazard where applicable, and establish an action plan for the successful conclusion of the incident. The **total response time of off-duty technicians and mutual aid support shall be 60 minutes**.

Technical Rescue

Baseline Performance

CFR's baseline performance indicated actual response time performance for technical rescue incidents. CFR will use these times as a point of reference to establish benchmark response time objectives.

Table F4-A: Technical Rescue Baseline Performance

Technical Rescue: Baseline Performance		2010 / 2012	2012	2011	2010
Call Processing	Pick-up to Dispatch	1:42	1:31	2:04	1:00
Turnout Time	Turnout Time - 1st Unit	2:03	1:17	2:00	1:00
Travel Time	Travel Time Distribution	4:44	4:44	4:00	2:00
	Travel Time Concentration	12:32	12:32	11:13	2:00
Total Response Time	Total Response Time Distribution	7:20	6:27	7:20	4:00
	Total Response Time Concentration	17:15	17:15	15:16	4:00

First Arriving Unit Total Response Time for All Technical Rescue Risk Events: For 90 percent of all technical rescue risk events, **the total response time for 1st due units** staffed with a minimum of three firefighters, of which one shall be Operations level certified, was **7 minutes and 20 seconds**. 1st due units were capable of assessing scene safety, conducting a proper assessment of the event, and notifying the Battalion Chief for appropriate resources.

Effective Response Force (ERF) Total Response Time for All Technical Rescue Risk Events: For 90 percent of all technical rescue risk events, **the total response time for ERF on-shift technicians** was **17 minutes and 15 seconds**. If additional resources are required due to the nature and complexity of the technical rescue event, the total response time for off-duty technicians shall be 1 hour after notification.

Benchmark performance represents response time objective goals. In pursuit of providing superior services and continuous self-improvement, CFR strives to meet or exceed benchmark response time performance measures.

Table F4-B: Technical Rescue Benchmark Performance

Technical Rescue Benchmarks				
Benchmark Criterion	**Response Time Objective**			**Performance**
Alarm handling (Call Processing)	1:00			90%
Turnout time	1:20			90%
	1st Due	**2nd Due**	**ERF**	**Performance**
Travel Time	4:30	8:00	10:00	90%
Total Response Time				
Low and Moderate Risk	6:15	10:20	12:20	90%
High Risk	6:15	10:20	12:20	
Off-duty technicians and mutual aid			60:00	

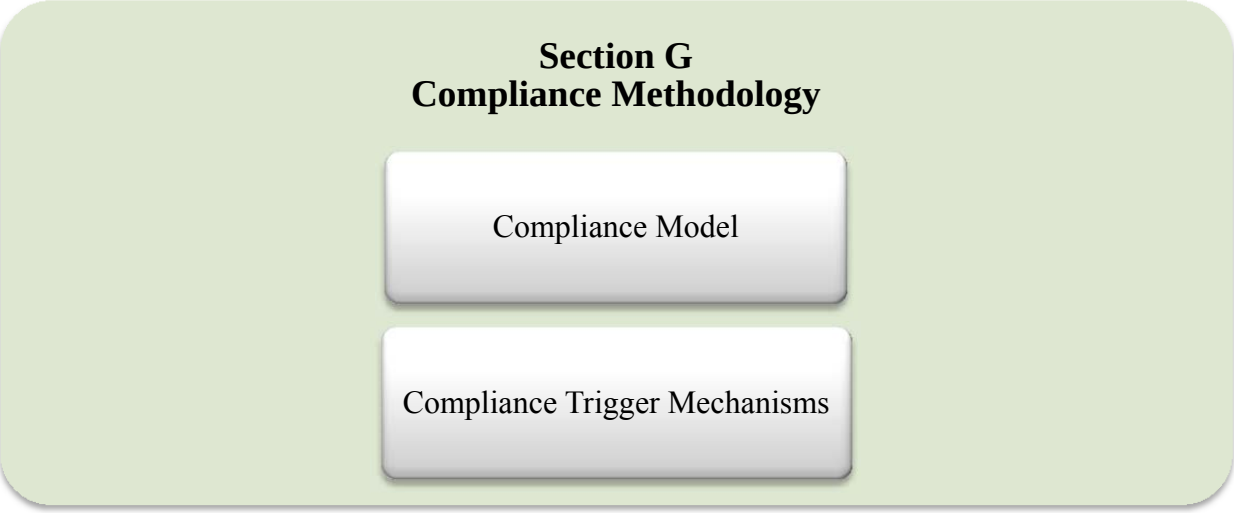
Technical Rescue Performance Goal Statement: For all technical rescue incidents, the department shall meet or exceed total response time objectives with sufficient staffing and resources to stabilize the situation and extricate the patient(s) from the emergency situation.

*First –Arriving Unit Total Response Time for **All Technical Rescue Risks**:* For 90% of all calls for technical rescue services, **the total response time** of the department's **first arriving unit**,

staffed with a minimum of four personnel shall be **6 minutes 15 seconds.** The first arriving unit shall be capable of providing rescue services to stabilize the incident, notifying the appropriate authorities, requesting additional ERF units if indicated, and extricate patients from the emergency situation if possible.

Effective Response Force (ERF) Total Response Time for ***All Technical Rescue Risks****:* For 90% of all calls for rescue services, **the total response time of the 2nd due units** staffed with a minimum of four personnel shall be **10 minutes 20 seconds**. **The total response time of the ERF units** staffed with the appropriate number of personnel to meet critical tasking shall be **12 minutes 20 seconds**. The ERF shall be capable of providing rescue services to stabilize the incident and extricate patients from the emergency situation. **The total response time for off-duty technician recall and mutual aid support shall be 60 minutes**.

Compliance Methodology



Compliance methodology establishes the processes to be followed to ensure the continued monitoring of service level objectives and performance measures. These processes provide a framework for service delivery improvement, appropriate direction during strategic planning, and validation of the Standards of Cover document.

G. Compliance Methodology

Compliance methodology follows the concept of "that which gets measured gets done." Continuous monitoring and maintenance reflects the resources and efforts that are put in place to ensure that any benefits gained by the SOC process are maintained or improved.

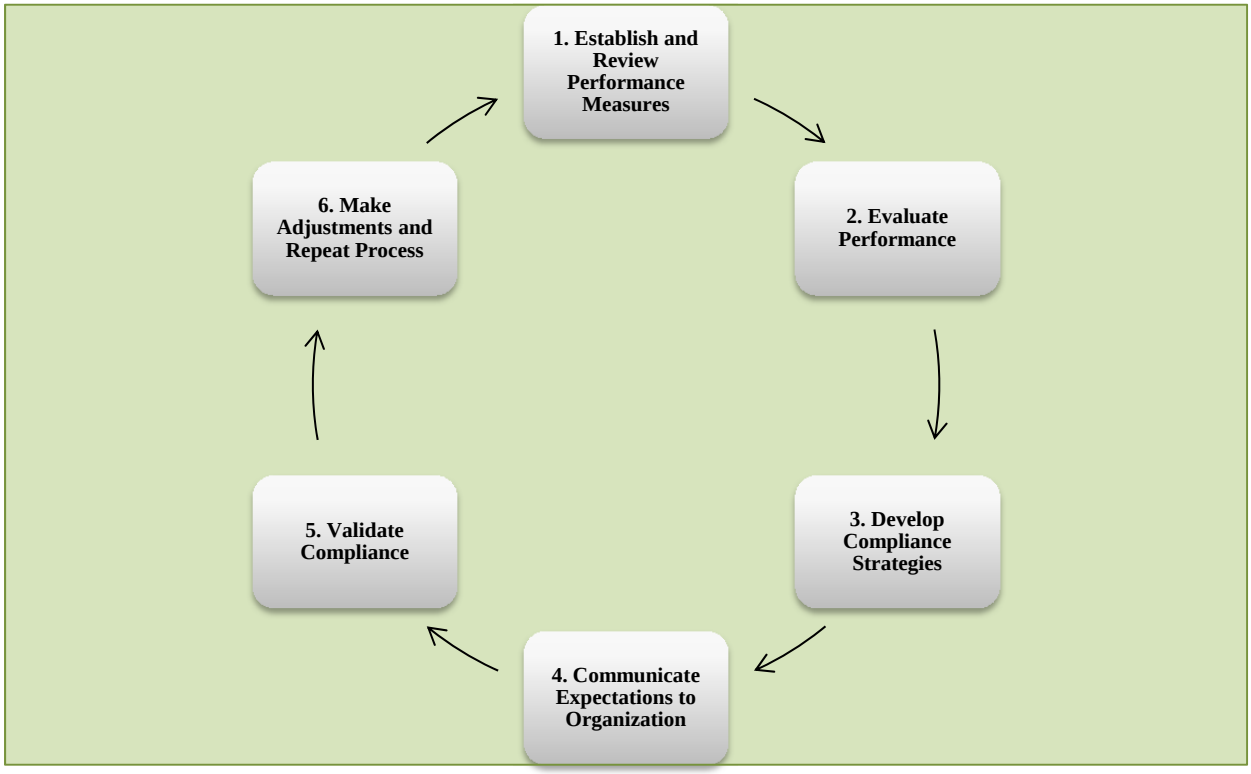
Compliance Model

The Fire Chief is overall responsible for service delivery compliance. The Assistant Chief is directly responsible for accreditation efforts and supervises the Accreditation Manager. The Accreditation Manager is responsible for maintaining the department's analysis database, maintaining files, and completing administrative reports associated with accreditation, annual compliance, and re-accreditation efforts.

Compliance is a continuous process of verification and validation. Compliance is sustained by using a systematic approach with established steps or phases. Each phase contains a critical element essential for ensuring the compliance cycle. CFR will use the model supported by CFAI

(Standards of Cover Manual, 5th ED, pg. 90). This six phase model provides a systematic approach that is necessary for meeting compliance efforts and satisfies department requirements for self-evaluation, monitoring, and adjustment in service delivery performance. The model is illustrated by Figure G1.

Figure G1: CFR Accreditation Compliance Model



The following steps and corresponding actions will be performed to ensure continued monitoring, evaluation, and compliance.

1. Establish and review performance measures
    - Document service delivery programs
    - Document program risk levels, critical tasking, and resource deployments
    - Document and adopt benchmark and baseline performance measurements for distribution and concentration levels for service delivery response.
    - Review service delivery programs with associated elements (risk levels, critical tasking, and system performance) on an annual basis.

- Review and update the SOC on an annual basis and conduct a comprehensive community risk assessment every five years.

2. Evaluate performance
   - Evaluate distribution baseline performance by service delivery programs
   - Evaluate concentration baseline performance by service delivery programs
   - Evaluate distribution and concentration by SRAs and ESNs

3. Develop compliance strategies
   - Identify strengths, weaknesses, opportunities, and threats
   - Maximize strengths and seek ways to capitalize on opportunities
   - Identify and develop solutions to identified weaknesses and threats

4. Communicate expectations to organization
   - Establish performance criterion
   - Communicate performance expectations with command staff and department personnel
   - Convey non-compliance actions to command staff and department personnel
   - Utilize StatsFD mobile reports to produce "real time" performance reports for command staff
   - Publish quarterly department response time performance "report cards"

5. Validate compliance
   - Maintain Fire Program incident reports and PTS CAD reconciliation on a weekly and monthly basis
   - Upload incident data into StatsFD on a monthly basis
   - Analyze and verify department and company level performance through evaluation of turnout, travel, and total response times
   - Analyze and verify distribution and concentration compliance through review of SRA and ESN evaluations
   - Establish meetings with command staff to review response performance analysis

6. Make adjustments and repeat process
    - Provide annual reports detailing department performance
    - Provide analysis of incident trends
    - Identify areas of non-compliance
    - Provide solutions to address non-compliance issues
    - Provide annual performance reports to governing authority for review and adoption

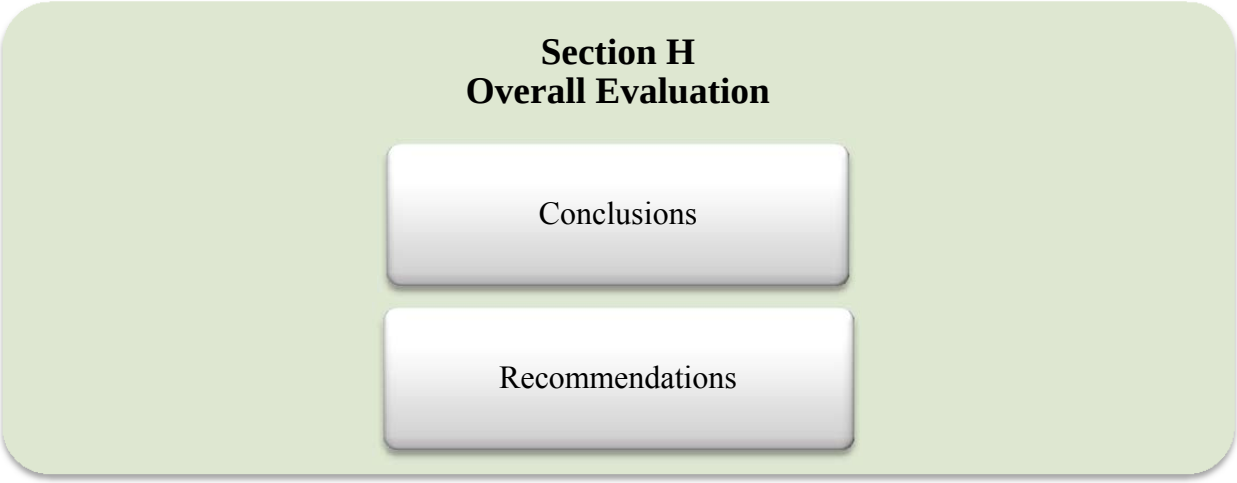
Compliance Trigger Mechanisms

To support the compliance model, CFR will utilize internal trigger mechanisms to track performance and anticipate or project non-compliance. First, StatsFD will generate email alerts for missed compliance that includes excessive turnout, travel, and total response times. StatsFD will also provide weekly performance reports documenting department, shift, and company level performance. StatsFD is in the process of a software upgrade and is being implemented during the writing of this report. Anticipated completion and full utilization of StatsFD is expected no later than September, 2013.

Second, the Accreditation Manager receives emails from the Lowndes County E-911 Communications Center for every incident. These reports are used to reconcile and verify RMS data input. Reconciliation eliminates data input errors and aids in identifying reasons for non-compliance such as out of district responses, dispatching errors, excessive call processing or dispatch times, and excessive department performance.

Finally, the Accreditation Manager provides quarterly department "report cards" detailing department, shift, and company level performance. These reports are used to identify non-compliance issues as well as provide an indication of department trends that affect compliance such as incident frequency, simultaneous incidents, and station/unit reliability. These system reports will focus not only on overall department performance but also examine ESN performance by examining specific D3 districts.

Overall Evaluation



H. Overall Evaluation

The purpose of the Overall Evaluation is to assess the delivery system through the risk analysis and performance measurements completed in the previous sections. The evaluation process provides a summation of the various key sections identifying what has worked well and where improvements may be made. These conclusions and recommendations provide city and department decision makers with empirical data based upon which public safety policy is established.

Conclusions

This section provides a summation of key sections of the Standards of Cover that consists of:

- Community risk factors
  a) Historical analysis
  b) Service delivery programs and program risk levels
  c) Critical tasking and resource deployments
  d) ESN risk analysis

- System performance
    a) Distribution
    b) Concentration
    c) Company reliability
    d) Baseline performance

Community Risk Factors

A community risk assessment was conducted using various resources and assets to develop a comprehensive understanding of the factors that represented a risk within the community. The community risk was separated into two main components; community service demands and community risk.

To understand community service demands, the department reviewed previous incident data to determine incident frequency, types of services being used, and where these services were being delivered. These factors were evaluated using multiple periods to identify response trends or stressors being placed on department resources. Prior to this analysis, a general understanding of incident responses were known such as call volume, incident type percentages, and fire property losses. However, no thought was given to location, times of occurrence, or other factors that impact service delivery performance. This assessment provided a comprehensive understanding of incident responses and their impact on performance. The historical perspective yielded predictable outcomes (i.e. medical responses represented the majority of department responses, incident volume decreased during early morning hours). However, the analysis also identified two peak time periods that indicate potential risk behaviors are occurring.

Service delivery programs (fire, EMS, hazardous materials, and technical rescue) were assigned a risk level based upon the Probability and Consequence Matrix. Each service program was placed into one of four risk quadrants. Probability of occurrence examined national, state, and local statistics that provided an overall potential for the event occurring while the consequences or impact examined the severity of the event based upon life safety risks, financial loss, or impact on the community (i.e. loss of a critical infrastructure). Risk level designations were directly linked to critical tasking and effective response force (ERF) deployments. Critical tasks identified the jobs that must be performed in order to mitigate the incident while ERF

deployments allocated adequate personnel and resources to accomplish the tasks. Prior to accreditation, specific risk levels had not been established and resource deployments were based on antiquated policies and procedures. This situation resulted in ERF deployments being reactive rather than proactive (i.e. additional units were dispatched when the event escalated beyond the control of on scene units). As a result of the SOC process, service delivery risk levels with critical tasking were incorporated into CFR's Policy and Procedures Manual. These policies and procedures dictate resource deployments and supports having the correct number and type of resources on scene to mitigate the incident in a timely manner.

Part of the risk assessment involved a thorough analysis of the hazards found in the community. The department reviewed key risk factors that included residential and commercial occupancies, population densities, natural disaster vulnerabilities, water system capabilities, and a hazardous materials Tier II site review. The risk assessment was extremely valuable for several reasons that included:

- Assigning risk levels to specific commercial occupancies
- Identifying at-risk population densities
- Understanding residential population and housing characteristics within each zone
- Identifying multi-family hazards within specific zones
- Matching water flow requirements with system capabilities
- Identifying Tier II sites within each management zone

Each ESN was assigned an overall risk rating using an internally developed risk model. This model identified which parts of the city have the most risks.

System Performance

System performance was conducted to determine how well the department is providing services from a time response perspective. As discussed, time is most often the deciding factor in incident outcomes. Response time performance evaluated individual time components of call processing, turnout, and travel time as well as total response time, which is a sum of the individual components. This assessment also evaluated distribution (first due units) and concentration (2nd due and ERF units) response time performance. These times were compiled to develop the department's baseline performance. Baseline performance was compared to nationally accepted

standards or industry best practices known as benchmark performance. Benchmark objectives provide performance goals for the department. System performance was also evaluated from a reliability standpoint. Reliability is a measure of a unit's availability for dispatch, ability to arrive first within its primary district, and meeting response time compliance (total response time).

During this assessment, the advantages of having analysis software were made readily apparent. The department's software took the raw RMS and CAD data and provided numerous analytical reports such as time compliance by D3 districts. D3 districts were critical in isolating specific problem areas within the ESN. As a result, several D3 districts were identified as being non-compliant, most notably in ESNs 98, 109, and 111. Two areas of concern where also noted when evaluating response time performance. Call processing and turnout times are approximately two times longer than recognized standards.

Recommendations

As a result of the Standards of Cover document and the department's effort to provide superior customer service, the following recommendations are made:

Recommendation 1: Incident Data / Record Management System Training Program

Errors in data entry (wrong unit response times, wrong incident codes, etc.) continue to occur at an unacceptable rate. Company officers and personnel responsible for entering incident information should be thoroughly familiar with the department's record management system for incident reporting. Internal training sessions should be developed and implemented to maintain uniformity.

Recommendation 2: Accreditation Manager / Public Education Collaboration

The Accreditation Manager and the Public Education Division should develop a formal process to address potential risk behavior issues discovered during incident analysis. Incident increases during two periods were identified during data analysis that may be the result of risk behavior.

Recommendation 3: Response Times - Call Processing

Baseline performance indicated that call processing times are twice that of the national standard. The Accreditation Manager and Lowndes County E-911 Communication Center Director should

thoroughly examine possible causes for delayed call processing times and implement corrective measures or procedures to ensure timely dispatching of emergency units.

Recommendation 4: Response Times - Turnout Time

Baseline performance indicated that turnout times are twice that of the national standard. The department's command staff and Accreditation Manager should thoroughly examine possible causes for delayed turnout times and implement corrective measures to ensure turnout times meet or exceed nationally recommended turnout time objectives.

Recommendation 5: Response Times – Distribution and Concentration Analysis

Response time analysis indicated non-compliance in several D3 districts. Continued monitoring and analysis of distribution and concentration response times by ESN and D3 districts is supported to determine adequate resource allocations and ensure that performance objectives and measures are being met or exceeded.

Recommendation 6: Water system improvements

The Fire Chief and Water Association Managers should continue to work together to identify areas where fire protection needs are deficient. Until addressed, the Fire Chief should ensure that department and mutual aid resources are being fully utilized to meet water flow requirements.

Recommendation 7: Accreditation and CFR

Columbus Fire and Rescue should continue to educate department personnel and city administration to the benefits of accreditation. The importance of accreditation should be recognized through internal and external actions that include:

- The formal adoption of the Standards of Cover by the governing body
- The continued integration of accreditation into department operations

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Appendix A

Lowndes County / City of Columbus Storm Events Table							
Location	**Date**	**Time**	**Event**	**Mag**	**Dth**	**Inj**	**PrD**
Drought							
LOWNDES (ZONE)	4/12/2007	0:00	Drought		0	0	0.00K
LOWNDES (ZONE)	4/25/2007	0:00	Drought		0	0	0.00K
LOWNDES (ZONE)	5/1/2007	0:00	Drought		0	0	0.00K
LOWNDES (ZONE)	6/1/2007	0:00	Drought		0	0	0.00K
LOWNDES (ZONE)	7/1/2007	0:00	Drought		0	0	100.00K
LOWNDES (ZONE)	8/6/2007	0:00	Drought		0	0	0.00K
LOWNDES (ZONE)	10/1/2010	0:00	Drought		0	0	0.00K
Thunderstorm Winds							
COUNTYWIDE	5/27/2000	19:30	Thunderstorm Wind		0	0	8.00K
COLUMBUS	6/25/2000	16:10	Thunderstorm Wind		0	0	4.00K
COUNTYWIDE	7/15/2000	20:36	Thunderstorm Wind		1	1	1.200M
COUNTYWIDE	7/20/2000	15:18	Thunderstorm Wind		0	0	100.00K
COLUMBUS	7/20/2000	16:05	Thunderstorm Wind		1	0	50.00K
COLUMBUS	7/31/2000	15:15	Thunderstorm Wind		0	0	4.00K
COLUMBUS	8/10/2000	19:45	Thunderstorm Wind		0	0	3.00K
COLUMBUS	7/4/2001	19:40	Thunderstorm Wind		0	0	2.00K
COLUMBUS	7/20/2001	18:00	Thunderstorm Wind		0	0	8.00K
COUNTYWIDE	10/24/2001	21:04	Thunderstorm Wind		0	0	1.00K
COUNTYWIDE	11/29/2001	14:15	Thunderstorm Wind		0	0	1.00K

COLUMBUS	4/8/2002	14:40	Thunderstorm Wind		0	0	3.00K
COLUMBUS	4/8/2002	15:05	Thunderstorm Wind		0	0	10.00K
COLUMBUS	7/19/2002	14:52	Thunderstorm Wind		0	0	1.00K
COLUMBUS	7/21/2002	15:30	Thunderstorm Wind		0	0	1.25K
COUNTYWIDE	8/20/2002	18:20	Thunderstorm Wind		0	0	1.50K
COUNTYWIDE	2/22/2003	0:00	Thunderstorm Wind	50 kts. EG	0	0	5.00K
COLUMBUS	3/13/2003	11:20	Thunderstorm Wind	50 kts. EG	0	0	5.00K
COUNTYWIDE	6/2/2003	19:30	Thunderstorm Wind	50 kts. ES	0	0	15.00K
COLUMBUS	6/11/2003	12:30	Thunderstorm Wind	55 kts. ES	0	0	30.00K
COLUMBUS	7/10/2003	16:15	Thunderstorm Wind	55 kts. ES	0	0	20.00K
COLUMBUS	7/22/2003	9:15	Thunderstorm Wind	50 kts. ES	0	0	5.00K
COLUMBUS	7/29/2003	12:36	Thunderstorm Wind	52 kts. ES	0	0	10.00K
COLUMBUS	8/27/2003	14:50	Thunderstorm Wind	50 kts. ES	0	0	1.00K
COUNTYWIDE	6/27/2004	16:35	Thunderstorm Wind	53 kts. EG	0	0	10.00K
COLUMBUS	12/7/2004	3:44	Thunderstorm Wind	55 kts. EG	0	0	10.00K
COLUMBUS	5/20/2005	16:20	Thunderstorm Wind	55 kts. EG	0	0	15.00K
COLUMBUS	8/21/2005	16:32	Thunderstorm Wind	60 kts. EG	0	0	80.00K
COLUMBUS	8/23/2005	17:18	Thunderstorm Wind	50 kts. EG	0	0	5.00K
COLUMBUS	11/15/2005	18:35	Thunderstorm Wind	55 kts. EG	0	0	10.00K
COLUMBUS	3/9/2006	15:27	Thunderstorm Wind	80 kts. EG	0	3	15.000M
COLUMBUS	3/13/2006	16:45	Thunderstorm Wind	55 kts. EG	0	0	20.00K
COLUMBUS	4/7/2006	23:15	Thunderstorm Wind	50 kts. EG	0	0	15.00K
COLUMBUS	7/18/2006	19:30	Thunderstorm Wind	50 kts. EG	0	0	10.00K
COLUMBUS	8/21/2006	12:30	Thunderstorm Wind	50 kts. EG	0	0	0.00K
COLUMBUS	1/5/2007	2:44	Thunderstorm Wind	61 kts. EG	0	0	0.00K
COLUMBUS	2/24/2007	22:30	Thunderstorm Wind	55 kts. EG	0	0	60.00K

COLUMBUS	4/14/2007	10:17	Thunderstorm Wind	50 kts. EG	0	0	2.00K
COLUMBUS	6/15/2007	13:00	Thunderstorm Wind	53 kts. EG	0	0	20.00K
COLUMBUS	6/27/2007	19:09	Thunderstorm Wind	50 kts. EG	0	0	0.00K
COLUMBUS	7/20/2007	13:49	Thunderstorm Wind	50 kts. EG	0	0	0.00K
COLUMBUS	10/18/2007	13:35	Thunderstorm Wind	50 kts. EG	0	0	0.00K
COLUMBUS	10/7/2008	2:04	Thunderstorm Wind	61 kts. EG	0	0	130.00K
High Winds							
LOWNDES (ZONE)	2/19/2002	20:30	High Wind	38 kts. E	0	0	0.00K
LOWNDES (ZONE)	4/12/2009	20:30	High Wind	50 kts. EG	0	0	50.00K
Tornados							
COLUMBUS	10/13/2001	14:59	Tornado	F1	0	0	80.00K
COLUMBUS	11/10/2002	19:08	Tornado	F3	0	55	60.000M
Hail							
COLUMBUS	2/18/2000	20:40	Hail	1.00 in.	0	0	0.00K
COLUMBUS	3/10/2000	16:05	Hail	1.75 in.	0	0	5.00K
COLUMBUS	4/4/2001	11:24	Hail	1.75 in.	0	0	25.00K
COLUMBUS	5/27/2001	14:55	Hail	0.75 in.	0	0	0.00K
COLUMBUS	7/31/2001	16:40	Hail	0.75 in.	0	0	0.00K
COUNTYWIDE	11/10/2002	19:20	Hail	1.25 in.	0	0	0.00K
COLUMBUS	3/18/2003	23:45	Hail	1.25 in.	0	0	5.00K
COLUMBUS	5/2/2003	13:41	Hail	0.75 in.	0	0	1.00K
COLUMBUS	5/5/2003	10:40	Hail	0.88 in.	0	0	1.00K
COLUMBUS	6/2/2003	16:35	Hail	0.75 in.	0	0	1.00K
COLUMBUS	3/13/2005	15:23	Hail	1.75 in.	0	0	0.00K
COLUMBUS	3/13/2005	17:25	Hail	0.88 in.	0	0	0.00K
COLUMBUS	3/13/2005	19:40	Hail	1.00 in.	0	0	0.00K

COLUMBUS	3/22/2005	19:50	Hail	0.75 in.	0	0	0.00K
COLUMBUS	8/12/2005	15:30	Hail	1.00 in.	0	0	0.00K
COLUMBUS	8/21/2005	16:35	Hail	0.88 in.	0	0	0.00K
COLUMBUS	2/3/2006	17:30	Hail	0.75 in.	0	0	0.00K
COLUMBUS	5/9/2006	15:20	Hail	0.75 in.	0	0	0.00K
COLUMBUS	7/15/2006	14:15	Hail	1.50 in.	0	0	0.00K
COLUMBUS	3/12/2010	2:13	Hail	1.75 in.	0	0	5.00K
Hurricanes							
LOWNDES (ZONE)	9/16/2004	0:00	Hurricane (Typhoon)		0	0	93.75K
LOWNDES (ZONE)	7/10/2005	15:00	Hurricane (Typhoon)		0	0	150.00K
LOWNDES (ZONE)	8/29/2005	8:00	Hurricane (Typhoon)		0	0	100.000M
Flash Flood							
COLUMBUS	6/27/2001	7:00	Flash Flood		0	0	0.00K
COUNTYWIDE	1/24/2002	14:30	Flash Flood		0	0	5.00K
COLUMBUS	2/21/2003	23:00	Flash Flood		0	0	1.00K
COLUMBUS	8/4/2003	19:00	Flash Flood		0	0	80.00K
COLUMBUS	6/7/2004	7:00	Flash Flood		0	0	20.00K
COLUMBUS	12/9/2004	3:45	Flash Flood		0	0	25.00K
COLUMBUS	5/9/2006	16:45	Flash Flood		0	0	3.000M
COUNTYWIDE	1/6/2009	12:15	Flash Flood		0	0	150.00K
COLUMBUS	9/16/2009	5:00	Flash Flood		0	0	5.00K
COLUMBUS	12/8/2009	21:40	Flash Flood		0	0	50.00K
Floods							
LOWNDES (ZONE)	2/6/2004	5:30	Flood		0	0	300.00K

Cold Wind Chill							
LOWNDES (ZONE)	1/1/2010	0:00	Cold/Wind Chill		0	0	300.00K
LOWNDES (ZONE)	1/14/2011	0:00	Cold/Wind Chill		1	0	0.00K
Winter Weather							
LOWNDES (ZONE)	12/20/2000	20:00	Winter Storm		0	0	1.00K
LOWNDES (ZONE)	1/7/2010	6:30	Winter Storm		0	0	15.00K
Ice Storm							
LOWNDES (ZONE)	12/21/2000	2:30	Ice Storm		0	0	2.00K
LOWNDES (ZONE)	2/3/2011	20:30	Ice Storm		0	0	400.00K
Heavy Snow							
LOWNDES (ZONE)	1/27/2000	18:00	Heavy Snow		0	0	50.00K
LOWNDES (ZONE)	3/1/2009	0:10	Heavy Snow		0	0	0.00K
LOWNDES (ZONE)	1/9/2011	14:15	Heavy Snow		0	0	30.00K
LOWNDES (ZONE)	2/9/2011	13:30	Heavy Snow		0	0	400.00K
LOWNDES (ZONE)	1/16/2013	23:45	Heavy Snow		0	0	50.00K

http://www.ncdc.noaa.gov/stormevents/

Appendix B

Business CRA Occupancy Vulnerability Assessment Form

Business name: _____ **Business address: _____**

Property Use: _____ **Date: _____**

Sprinkled: Y N **Standpipe: Y N** **Captain #: _____**

Risk Assessment Values

1.	**Life Hazard**	
	High life hazard (100 or more occupants)	3
	Medium life hazard (25 – 99 occupants)	2
	Low life hazard (< 25 occupants)	1
2.	**Community impact**	
	Severe (irreplaceable, historical, critical infrastructure)	3
	Medium life hazard (high casualty, job loss, food store)	2
	Minor (minor casualty, family loss)	1
3.	**Hazard Index**	
	Complex, Industrial, Special	3
	Simple, moderate, business	2
	Limited, common, residential	1
4.	**Water supply (within 800')**	
	0 or 1 hydrant (with less than 1000 gpm)	3
	1 > 1000 or over and 1 < 1000 gpm	2
	2 > 1000 gpm or over	1
5.	**Building usage**	
	Industrial, high life hazard, hazardous processes, large business	3
	Medium business	2
	Small business/office	1
6.	**Building construction (ISO)**	
	Combustible (Class 1, Class 2)	3
	Limited combustibility (Class 3, Class 4)	2
	Non-combustible (Class 5, Class 6)	1
7.	**Number of stories**	
	3 or more stories or > 40 ft.	3
	2 Stories	2
	Single story	1
8.	**Square footage**	
	15,000 sq. ft or > than	3
	7,501 to 14, 999 sq. ft.	2
	< 7,500 sq. ft	1

Building Sq. ft. (L X W X # of stories): _____ CRA Score: _____

Required Fire Flow: _____

Occupancy Fire Flow Requirements

1. **Subject Structure**

   a. **ISO Construction Type**

   Class 1 (Wood-frame)
   Class 2 (Joisted masonry)
   Class 3 (Non-combustible)
   Class 4 (Masonry non-combustible)
   Class 5 (Modified fire-resistive)
   Class 6 (Fire Resistive)

   b. **ISO Occupancy Type**

   C-1 (Non-combustible)
   C-2 (Limited-combustible)
   C-3 (Combustible)
   C-4 (Free burning)
   C-5 (Rapid burning)

2. **Exposures Present (< 50 ft): Y N**

   a. **Exposure Information**

   Frame, metal, or masonry with openings
   Blank masonry walls
   Exposed wall length: _____

   b. **Subject Wall Construction**

   Distance to exposure wall: _____
   Exposure wall height: _____

   c. **Exposure Wall Construction Type**

   Class 1 (Wood frame)
   Class 2 (Joisted masonry)
   Class 4 (Masonry non-combustible)
   Class 5 (Modified fire-resistive)
   Class 6 (Fire Resistive)
   If multiple exposures exist, list the exposure that poses the greatest risk.

   d. **Exposure Wall Openings**

   Unprotected openings
   Semi-protected openings
   Class 3 (Non-combustible) Blank Wall

3. **Special Hazards**

4. **Fuel Tank present: Y N**

   If present: Number or tanks: _____

   Width: _____ Length:_____ Depth: _____ Capacity: _____
   Width: _____ Length:_____ Depth: _____ Capacity: _____

Classification of Basic Construction Types

ISO classifies construction types into six different categories:
Construction Class 6 (fire-resistive construction)
Construction Class 5 (modified fire-resistive construction)
Construction Class 4 (masonry noncombustible construction)
Construction Class 3 (noncombustible construction)
Construction Class 2 (joisted masonry construction)
Construction Class 1 (wood frame construction)

Note: In applying the rules below, ISO disregards below-grade basement walls and the construction of the lowest floor (usually concrete).

Fire-resistive (Construction Class 6): Buildings constructed of any combination of the following materials:

Exterior walls or exterior structural frame:

- Solid masonry, including reinforced concrete, not less than 4 inches in thickness
- Hollow masonry not less than 12 inches in thickness
- Hollow masonry less than 12 inches, but not less than 8 inches in thickness, with a listed fire-resistance rating of not less than two hours
- Assemblies with a fire-resistance rating of not less than two hours

Note: Panel or curtain sections of masonry may be of any thickness.

Floors and roof:

- Monolithic floors and roof of reinforced concrete with slabs not less than 4 inches in thickness Construction known as "joist systems" (or pan-type construction) with slabs supported by concrete joists spaced not more than 36 inches on centers with a slab thickness not less than 2 inches
- Floor and roof assemblies with a fire-resistance rating of not less than two hours

Structural metal supports:
Horizontal and vertical load bearing protected metal supports (including prestressed concrete units) with a fire-resistance rating of not less than two hours

Note: Wherever in the SCOPES reference is made to "pre-stressed," this term shall also include "post-tensioned."

Modified f ire-resist ive (Construction Class 5): Buildings with exterior walls, floors, and roof constructed of masonry materials described in a., above, deficient in thickness, but not less than 4 inches; or fire-resistive materials described in a., above, with a fire-resistance rating of less than two hours, but not less than one hour.

Masonry noncombustible (Construction Class 4): Buildings with exterior walls of fireresistive construction (not less than one hour), or of masonry, not less than 4 inches in thickness and with noncombustible or slow burning floors and roof (including noncombustible or slow burning roof decks on noncombustible or slow burning supports, regardless of the type of insulation on the roof surface).

Noncombustible (Construct ion Class 3): Buildings with exterior walls, floors, and roof of noncombustible or slow burning materials supported by noncombustible or slow burning supports (including noncombustible or slow burning roof decks on noncombustible or slow burning supports, regardless of the type of insulation on the roof surface).

Joisted masonry (Construction Class 2): Buildings with exterior walls of fire-resistive construction (not less than one hour), or of masonry, and with combustible floors and roof.

Frame (Construction Class 1) : Buildings with exterior walls, floors, and roof of combustible construction, or buildings with exterior walls of noncombustible or slow burning construction, with combustible floors and roof.

Occupancy Type Examples

Noncombustible (C-1) - Merchandise or materials, including furniture, stock, or equipment, which in permissible quantities do not in themselves constitute an active fuel for the spread of fire. C-1 occupancy type examples:

Asbestos storage Metal products storage Clay storage Stone storage
Marble storage

Limited-combust ible (C-2) - Merchandise or materials, including furniture, stock, or equipment, of low combustibility, with limited concentrations of combustible materials. C-2 occupancy type examples:

Airport	bus	railroad terminal
Jail	Apartment	Library
Artist's studio	Medical laboratory	Auto repair shop
Motel	Auto showroom	Museum
Aviary	Nursing home	Barber shop
Office	Church	Pet grooming shop
Cold storage warehouse	Photographer's studio	Day care center
Radio station	Educational institution	Recreation center
Gasoline service station	Rooming house	Greenhouse
Undertaking establishment	Health club	

Combustible (C-3) - Merchandise or materials, including furniture, stock, or equipment, of moderate combustibility. C-3 occupancy type examples:

Auto parts store	Municipal storage building	Auto repair
training school	Nursery	sales outlet store
Bakery	Pavilion or dance hall	Boat sales (where storage□15%)
Pet shop	Book store	Photographic supplies
Bowling establishment	Printer	Casino
Restaurant	Commercial laundry	Sandwich shop
Contractor equipment storage	Shoe repair	Department store
Sporting goods	Dry cleaner	Supermarket
Gift shop	Theater	Hardware store
Vacant building	Leather processing	Wearing apparel factory (except furs)

Free-burning (C-4) - Merchandise or materials, including furniture, stock, or equipment, which burn freely, constituting an active fuel. C-4 occupancy type examples:

Aircraft hangers	Packaging and crating	Cabinet making
Paper products manufacturing	Combustible metals	Petroleum bulk distribution center
Dry cleaner (flammable fluids)	Stables	Feed store (with > 1/3 ton of hay)
Tire manufacturing	Fur apparel manufacturing	Tire recapping or retreading
Furniture manufacturing	Wax products (candles, etc.)	Kennels
Woodworking shop	Lumber	

Rapid burning or f lash burning (C-5) - Merchandise or materials, including furniture, stock, or equipment, which either

(1) burn with a great intensity
(2) spontaneously ignite and are difficult to extinguish
(3) give off flammable or explosive vapors at ordinary temperatures
(4) as a result of an industrial processing, produce large quantities of dust or other finely divided debris subject to flash fire or explosion

C-5 occupancy type examples:

Ammunition	Matches	Feed mill (with > 7 tons of hay & straw)
Mattress factory	Fireworks	Nitrocellulose-based plastics
Flammable compressed gases	Waste paper storage	Flammable liquids
Rag storage	Flour mill	Upholstering shop
Highly flammable solids	Painting with flammables or combustibles	

*****Classification of Basic Construction Types and Occupancy Example Types were provided by ISO.

Appendix C

Hazardous Material Tier II Locations

City of Columbus Hazardous Materials Tier II Locations				
Address	**ESN**		**Address**	**ESN**
1503 Johnston St.	96		1601 Johnston St.	96
2520 5th St. N	97		2120 Hwy 45 N.	97
712 Hwy 45 N.	99		1214 Hwy. 45 N.	99
822 Main St.	107		1002 Main St.	107
462 Lake Norris Rd.	107		201 19th St. N	107
620 17th Ave. S	107		2021 Hwy 45 N.	108
2203 Hwy 45 N.	108		2413 Hwy. 45 N	108
295 Marina Dr.	108		2219 Tufline Rd.	108
2202 Main St.	109		111 Lehmberg Rd.	110
1245 Lehmberg Rd.	110		227 Shelton St.	110
1604 Gardner Blvd.	110		1121 Gardner Blvd.	111
97 Alabama St.	111		103 Alabama St.	111
730 Alabama St.	111		322 Idlewild Rd.	111
1313 Hwy 69 S.	111		1444 Hwy 69 S.	111
617 Yorkville Park Sq.	111		168 Yorkville Rd. West	111
187 Datco Rd.	111		114 Brickyard Rd	112
114 Brickyard Rd	112		2501 14th Ave. N.	112
3115 Hwy. 45 N.	116		2301 Woodmont Dr.	117
69 Co-Op Rd	117		70 Industrial Park Access Rd	119
1825 Port Access Rd.	119			

Appendix D

Disaster Vulnerability Criteria Grading Schedule

Element	Risk Characteristic	Score
Area Impacted	No developed area impacted	0
	Less than 25% of developed area impacted	1
	Less than 50% of developed area impacted	2
	Less than 75% of developed area impacted	3
	Over 75% of developed area impacted	4
Health and Safety Consequences	No Health and safety impact	0
	Few injuries or illnesses	1
	Few fatalities but many injuries or illnesses	2
	Numerous fatalities	3
Property Damage	No property damage	0
	Few properties destroyed or damaged	1
	Few destroyed but many damaged	2
	Few damaged but many destroyed	3
Environmental Damage	Little or no environmental damage	0
	Resources damaged with short term recovery	1
	Resources damaged with long term recovery	2
	Resources damaged beyond recovery	3
Economic Disruption	No economic impact	0
	Low direct and/or indirect costs	1
	High direct and low indirect costs	2
	Low direct and high indirect costs	
	High direct and high indirect costs	3
Total Risk Rating		
	Future Occurrence	
Probability of Future Occurrence	Unknown but rare occurrence	1
	Unknown but anticipate an occurrence	2
	100 year or less occurrence	3
	25 year or less occurrence	4
	Once a year or more occurrence	5

Total Risk Rating = Sum of Total Risk Elements X Probability of Future Occurrence Score

Appendix E

SRA / ESN Data Worksheets

Station Response Area 1

Emergency Service Numbers (ESNs): 99 119		**Primary Engine:** E21
Population: 4132 (17.5%)	**Road Miles:** 46.57 (19.7%)	**Square Miles:** 3.61 (15.5%)

Structure Profile

Single Family Residential		Multi-Family Residential		Commercial	
Total Number	1,263	# Complexes	23	Total Number	241
Total Sq. Ft.	2,510,087	# Bldgs. / Units	45 / 298	Total Sq. Ft.	2,337,259
Total Value	67,123,410	Total Sq. ft.	261,973	Total Value	58,237,850

Commercial Occupancy Type / Risk Total Profile

A: 58	B: 133	E: 1	F: 5	H: 2	I: 4
M: 80	R: 10	S: 1	U: 0	Vacant: 95	

Commercial Risk Hazard Profile

CRA Risk Score	Maximum: 5	Significant: 74	Moderate: 213	Low: 103

Occupancy name	Life Hazard	Comm. Impact	Hazard Impact	Water Impact	Build. Usage	Const. Type	# of Stories	Sq. Ft.	Total Risk Score
First Baptist Church	3	3	3	1	3	3	3	3	22
Lowndes County Courthouse/EMA	3	3	3	1	3	3	3	3	22
Franklin Elementary	3	3	3	1	3	3	2	3	21
Main St. Presbyterian	3	2	3	1	3	3	3	3	21
Court Square Towers	3	2	3	1	3	2	3	3	20

Incident History

	All Incidents	Fires (Bldg.)	EMS	Haz-Mat	Tech Res.	Other
2010	411	42 (7)	301	10	1	57
2011	421	50 (9)	284	16	0	71
2012	385	34 (10)	294	7	1	49
Total	1217	126 (26)	879	33	2	177

ESN 99 Profile

1st Due: E21 **2nd Due:** E 30	**Population:** 4,031 (17%)	**Road Miles:** 41.35 (17.4%)	**Square Miles:** 2.32 (9.9%)

Structure Profile

Single Family Residential		Multi-Family Residential		Commercial	
Number	1,235	# Complexes	23	Number	214
Total Sq. Ft.	2,455,348	# Bldgs. / Units	45 / 298	Sq. Ft.	1,820,161
Avg. Sq. Ft.	1,988	Total Sq. ft.	261,973	Avg. Sq. Ft.	8,505
Median Sq. Ft.	1,574	Single Family Sq. Ft.		Median Sq. Ft.	3,370
Total Value	65,615,300	< 1,499	577	Total Value	43,589,120
Avg. Value	53,130	1,500 – 2,999	504	Avg. Value	203,687
Median Value	35,560	< 3,000	154	Median Value	65,045

Commercial Occupancy Type Profile

A: 57	B: 126	E: 1	F: 2	H: 0	I: 4
M: 80	R: 8	S: 0	U: 0	Vacant: 82	

Commercial Risk Hazard Profile

CRA Risk Score	Maximum: 5	Significant: 67	Moderate: 202	Low: 93

Occupancy name	Life Hazard	Comm. Impact	Hazard Impact	Water Impact	Build. Usage	Const. Type	# of Stories	Sq. Ft.	Total Risk Score
First Baptist Church	3	3	3	1	3	3	3	3	22
Lowndes County Courthouse/EMA	3	3	3	1	3	3	3	3	22
Franklin Elementary	3	3	3	1	3	3	2	3	21
Main St. Presbyterian	3	2	3	1	3	3	3	3	21
Court Square Towers	3	2	3	1	3	2	3	3	20

Incident History

	All Incidents	Fire (Bldgs.)	EMS	Haz-Mat	Tech. Rescue	Other
2010	405	42 (7)	297	10	1	55
2011	411	49 (9)	280	13	0	69
2012	375	33 (10)	287	7	0	48
Total	1191	124 (26)	864	30	1	172

ESN 119 Profile

1st Due: E21 **2nd Due:** E 30/L29	**Population:** 45 (.5%)	**Road Miles:** 4.26 (1.8%)	**Square Miles:** 1.29 (5.6%)

Structure Profile

Single Family Residential		Multi-Family Residential		Commercial	
Number	28	# Complexes	0	Number	27
Total Sq. Ft.	54,739	# Bldgs. / Units	0	Total Sq. Ft.	517,098
Avg. Sq. Ft.	1,955	Total Sq. ft.	0	Avg. Sq. Ft.	19,152
Median Sq. Ft.	1,835	Single Family Sq. Ft.		Median Sq. Ft.	4,376
Total Value	1,508,110	< 1,499	11	Total Value	14,648,730
Avg. Value	53,861	1,500 – 2,999	13	Avg. Value	542,545
Median Value	36,925	< 3,000	4	Median Value	16,760

Commercial Occupancy Type Profile

A: 1	B: 7	E: 0	F: 3	H: 2	I: 0
M: 2	R: 2	S: 1	U: 0	Vacant: 13	

Commercial Risk Hazard Profile

CRA Risk Score	Maximum: 0	Significant: 7	Moderate: 11	Low: 10

Occupancy name	Life Hazard	Comm. Impact	Hazard Impact	Water Impact	Build. Usage	Const. Type	# of Stories	Sq. Ft.	Total Risk Score
Baldor Electric	3	3	3	1	3	2	2	3	20
Metals USA	2	2	3	3	3	2	1	3	19
Columbus Scrap Metal	2	2	3	3	3	2	1	3	19
Southern Ionics	1	2	3	1	3	3	1	1	15
Sander's Oil Company Bulk Facility	1	2	3	1	3	2	1	2	15

Incident History

	All Incidents	Fire (Bldgs.)	EMS	Haz-Mat	Tech. Rescue	Other
2010	6	0 (0)	4	0	0	2
2011	10	1 (0)	4	3	0	2
2012	10	1 (0)	7	0	1	1
Total	26	2 (0)	15	3	0	5

Station Response Area 2

Emergency Service Numbers (ESNs): 96 112 117		**Primary Engine:** E22
Population: 3436 (14.5%)	**Road Miles:** 34.63 (14.8%)	**Square Miles:** 3.22 (13.8%)

Structure Profile

Single Family Residential		Multi-Family Residential		Commercial	
Total Number	1,259	# Complexes	15	Total Number	136
Total Sq. Ft.	1,989,802	# Bldgs. / Units	112 / 282	Total Sq. Ft.	2,121,516
Total Value	55,045,250	Total Sq. ft.	277,959	Total Value	31,736,020

Commercial Occupancy Type Profile

A: 25	B: 74	E: 1	F: 9	H:1	I: 2
M: 26	R: 2	S: 4	U: 0	Vacant: 25	

Commercial Risk Hazard Profile

CRA Risk Score	Maximum: 0	Significant: 32	Moderate: 114	Low: 37

Occupancy name	Life Hazard	Comm. Impact	Hazard Impact	Water Impact	Build. Usage	Const. Type	# of Stories	Sq. Ft.	Total Risk Score
Sanderson Plumbing Manufacturing	3	2	3	1	3	2	2	3	19
Wingate Inn	3	2	2	1	2	3	3	3	19
Johnston Tombigbee Manufacturing	3	2	3	1	3	2	1	3	18
Lowe's	3	2	3	1	3	2	1	3	18
First Assembly of God / day care	3	2	3	1	3	2	1	3	18

Incident History

	All Incidents	Fires (Bldgs.)	EMS	Haz-Mat	Tech Res.	Other
2010	362	39 (4)	264	7	0	52
2011	339	26 (4)	248	1	0	64
2012	343	41 (9)	233	10	1	58
Total	1044	106 (17)	745	18	1	174

ESN 96 Profile

1st Due: E22 **2nd Due:** E25	**Population:** 597 (2.5%)	**Road Miles:** 4.99 (2.1%)	**Square Miles:** .56 (2.4%)

Structure Profile

Single Family Residential		Multi-Family Residential		Commercial	
Number	214	# Complexes	2	Number	36
Total Sq. Ft.	274,851	# Bldgs. / Units	2 / 11	Total Sq. Ft.	663,232
Avg. Sq. Ft.	1,284	Total Sq. ft.	8544	Avg. Sq. Ft.	18,423
Median Sq. Ft.	1,170	Single Family Sq. Ft.		Median Sq. Ft.	5,002
Total Value	3,639,260	< 1,499	169	Total Value	4,266,740
Avg. Value	17,005	1,500 – 2,999	43	Avg. Value	118,520
Median Value	14,575	< 3,000	2	Median Value	44,380

Commercial Occupancy Type Profile

A: 1	B: 11	E: 0	F: 3	H: 1	I: 0
M: 1	R: 0	S: 3	U: 0	Vacant: 6	

Commercial Risk Hazard Profile

CRA Risk Score	Maximum: 0	Significant: 6	Moderate: 19	Low: 6

Occupancy name	Life Hazard	Comm. Impact	Hazard Impact	Water Impact	Build. Usage	Const. Type	# of Stories	Sq. Ft.	Total Risk Score
Johnston Tombigbee Manufacturing	3	2	3	1	3	2	1	3	18
Maranatha Faith Center	3	2	2	1	3	2	2	2	17
Col. Light & Water Treatment Facility	1	3	3	1	2	2	1	3	16
Young's Christian Academy	3	2	2	1	2	2	1	2	14
Jingle Bell Pre-school	3	1	2	1	2	3	1	1	14

Incident History

	All Incidents	Fire (Bldgs.)	EMS	Haz-Mat	Tech. Rescue	Other
2010	53	7 (0)	40	1	0	5
2011	45	5 (3)	33	0	0	7
2012	65	9 (3)	42	2	0	12
Total	163	21 (6)	115	3	0	24

ESN 112 Profile

1st Due: E22 2nd Due: E21	Population: 2,191 (9%)	Road Miles: 15.92 (6.7%)	Square Miles: .93 (4%)

Structure Profile

Single Family Residential		Multi-Family Residential		Commercial	
Number	763	# Complexes	13	Number	62
Total Sq. Ft.	977,324	# Bldgs./Units	110 / 271	Total Sq. Ft.	999,859
Avg. Sq. Ft.	1,281	Total Sq. ft.	269,415	Avg. Sq. Ft.	16,127
Median Sq. Ft.	1,171	Single Family Sq. Ft.		Median Sq. Ft.	2,506
Total Value	18,688,490	< 1,499	602	Total Value	14,245,260
Avg. Value	24,493	1,500 – 2,999	147	Avg. Value	229,762
Median Value	21,900	< 3,000	14	Median Value	32,985

Commercial Occupancy Type Total Profile

A: 18	B: 34	E: 1	F: 4	H: 0	I: 1
M: 20	R: 2	S: 1	U: 0	Vacant: 13	

Commercial Risk Hazards

CRA Risk Score	Maximum: 0	Significant: 18	Moderate: 63	Low: 24

Occupancy name	Life Hazard	Comm. Impact	Hazard Impact	Water Impact	Build. Usage	Const. Type	# of Stories	Sq. Ft.	Total Risk Score
Sanderson Plumbing Manufacturing	3	2	3	1	3	2	2	3	19
Wingate Inn	3	2	2	1	2	3	3	3	19
Riverchase Inn	3	2	2	1	3	2	2	3	18
Sunflower Food Store	3	2	2	1	2	3	1	3	17
Columbus Brick Company	2	2	3	1	3	2	1	3	17

Incident History

	All Incidents	Fire (Bldgs.)	EMS	Haz-Mat	Tech. Rescue	Other
2010	274	26 (4)	201	9	0	38
2011	253	14 (0)	183	6	0	50
2012	244	28 (6)	172	8	0	36
Total	771	68 (10)	556	23	0	124

ESN 117 Profile

1st Due: E22 **2nd Due:** E23	**Population:** 648 (2.7%)	**Road Miles:** 13.72 (5.8%)	**Square Miles:** 1.73 (7.4%)

Structure Profile

Single Family Residential		Multi-Family Residential		Commercial	
Number	282	# Complexes	0	Number	38
Total Sq. Ft.	737,627	# Bldgs. / Units	0	Total Sq. Ft.	458,425
Avg. Sq. Ft.	2,615	Total Sq. ft.	0	Avg. Sq. Ft.	12,064
Median Sq. Ft.	2,467	Single Family Sq. Ft.		Median Sq. Ft.	5,010
Total Value	32,717,500	< 1,499	27	Total Value	13,224,020
Avg. Value	116,020	1,500 – 2,999	187	Avg. Value	348,001
Median Value	99,070	< 3,000	68	Median Value	135,790

Commercial Occupancy Type Total Profile

A: 6	B: 29	E: 0	F: 2	H: 0	I: 1
M: 5	R: 2	S: 0	U: 0	Vacant: 6	

Commercial Risk Hazards

CRA Risk Score	Maximum: 0	Significant: 8	Moderate: 32	Low: 7

Occupancy name	Life Hazard	Comm. Impact	Hazard Impact	Water Impact	Build. Usage	Const. Type	# of Stories	Sq. Ft.	Total Risk Score
Lowe's	3	2	3	1	3	2	1	3	18
First Assembly of God	3	2	3	1	3	2	1	3	18
Lowndes County Co-Op/Farm Supply	1	2	3	3	2	3	1	3	18
Columbus Paper and Chemical	1	2	3	2	2	3	1	3	17
EMCC Culinary/Golf Management	2	1	2	3	2	3	2	2	17

Incident History

	All Incidents	Fire (Bldgs.)	EMS	Haz-Mat	Tech. Rescue	Other
2010	35	7 (1)	20	0	0	8
2011	49	8 (1)	35	0	0	6
2012	23	4 (0)	9	0	1	9
Total	107	19	64	0	1	23

Station Response Area 3

Emergency Service Numbers (ESNs): 97 98 108 116		**Primary Engine:** 23
Population: 4247 (18%)	**Road Miles:** 48.67 (20.7%)	**Square Miles:** 6.47 (27.8%)

Structure Profile

Single Family Residential		Multi-Family Residential		Commercial	
Total Number	1,212	# Complexes	19	Total Number	223
Total Sq. Ft.	3,276,622	# Bldgs./Units	176 / 1245	Total Sq. Ft.	3,312,398
Total Value	149,266,360	Total Sq. ft.	1,272,214	Total Value	116,235,000

Commercial Occupancy Type Profile

A: 47	B: 219	E: 4	F: 6	H: 0	I: 2
M: 72	R: 2	S: 2	U: 0	Vacant: 72	

Commercial Risk Hazard Profile

CRA Risk Score	Maximum: 2	Significant: 70	Moderate: 272	Low: 67

Occupancy name	Life Hazard	Comm. Impact	Hazard Impact	Water Impact	Build. Usage	Const. Type	# of Stories	Sq. Ft.	Total Risk Score
Baptist Memorial Hospital	3	3	3	1	3	2	3	3	21
Best Western	3	1	3	3	3	3	2	3	21
Evangel Church	3	1	2	3	3	3	2	3	20
Fairfield Inn	3	1	3	1	3	3	3	3	20
Wal-Mart	3	3	3	1	3	2	1	3	19

Incident History

	All Incidents	Fires (Bldgs.)	EMS	Haz-Mat	Tech Res.	Other
2010	394	31 (0)	278	9	0	76
2011	421	39 (5)	289	5	3	85
2012	403	36 (3)	249	5	1	112
Total	1218	106 (8)	816	19	4	273

ESN 97 Profile

1st Due: E23 2nd Due: E21	Population: 1,566 (6.6%)	Road Miles: 13.49 (5.7%)	Square Miles: .97 (4.2%)

Structure Profile

Single Family Residential		Multi-Family Residential		Commercial	
Number	309	# Complexes	10	Number	99
Total Sq. Ft.	661,092	# Bldgs./Units	81 / 612	Total Sq. Ft.	1,169,004
Avg. Sq. Ft.	2,139	Total Sq. ft.	619,864	Avg. Sq. Ft.	11,808
Median Sq. Ft.	2,001	Single Family Sq. Ft.		Median Sq. Ft.	5,167
Total Value	23,070,850	< 1,499	65	Total Value	45,315,260
Avg. Value	74,663	1,500 – 2,999	219	Avg. Value	457,730
Median Value	72,170	< 3,000	25	Median Value	203,255

Commercial Occupancy Type Total Profile

A: 21	B: 91	E: 3	F: 0	H: 0	I: 1
M: 34	R: 1	S: 0	U: 0	Vacant: 26	

Commercial Risk Hazards

CRA Risk Score	Maximum: 1	Significant: 29	Moderate: 117	Low: 25

Occupancy name	Life Hazard	Comm. Impact	Hazard Impact	Water Impact	Build. Usage	Const. Type	# of Stories	Sq. Ft.	Total Risk Score
Baptist Memorial Hospital	3	3	3	1	3	2	3	3	21
Fairfield Inn	3	1	3	1	3	3	3	3	20
Cook Elementary School	3	3	3	1	3	2	1	3	19
Heritage Academy School	3	2	3	1	3	3	1	3	19
Church of Christ / day care	3	2	3	1	3	3	1	3	19

Incident Trends

	All Incidents	Fire (Bldgs.)	EMS	Haz-Mat	Tech. Rescue	Other
2010	236	13 (0)	178	2	0	43
2011	206	13 (1)	141	2	0	50
2012	192	11 (2)	140	3	1	37
Total	634	37 (3)	459	7	1	130

ESN 98 Profile

1st Due: E23 2nd Due: E22	Population: 1,356 (5.7%)	Road Miles: 17.2 (7.2%)	Square Miles: 2.30 (9.9%)

Structure Profile

Single Family Residential		Multi-Family Residential		Commercial	
Number	477	# Complexes	2	Number	58
Total Sq. Ft.	1,555,611	# Bldgs./Units	22 / 192	Total Sq. Ft.	847,153
Avg. Sq. Ft.	3,261	Total Sq. ft.	300,000	Avg. Sq. Ft.	14,606
Median Sq. Ft.	3,098	Single Family Sq. Ft.		Median Sq. Ft.	6,142
Total Value	82,820,750	< 1,499	6	Total Value	29,456,370
Avg. Value	173,628	1,500 – 2,999	219	Avg. Value	507,868
Median Value	135,600	< 3,000	252	Median Value	267,590

Commercial Occupancy Type Total Profile

A: 10	B: 54	E: 1	F: 1	H: 0	I: 1
M: 5	R: 0	S: 0	U: 0	Vacant: 19	

Commercial Risk Hazards

CRA Risk Score	Maximum: 0	Significant: 19	Moderate: 45	Low: 15

Occupancy name	Life Hazard	Comm. Impact	Hazard Impact	Water Impact	Build. Usage	Const. Type	# of Stories	Sq. Ft.	Total Risk Score
First Presbyterian Church	3	2	2	1	3	3	2	3	19
TrustMark Bank	3	2	2	1	2	2	3	3	18
First Baptist Church	3	2	2	1	3	3	1	3	18
Columbus Orthopedic	2	2	2	1	2	3	2	3	17
Life Church	3	1	2	2	3	3	1	2	17

Incident Trends

	All Incidents	Fire (Bldgs.)	EMS	Haz-Mat	Tech. Rescue	Other
2010	86	9 (0)	49	0	0	28
2011	102	11 (1)	64	3	0	24
2012	87	6 (0)	46	0	0	35
Total	275	26 (1)	159	3	0	87

ESN 108 Profile

1st Due: E23 **2nd Due:** E21	**Population:** 611 (2.5%)	**Road Miles:** 10.37 (4.4%)	**Square Miles:** 1.82 (7.8%)

Structure Profile

Single Family Residential		Multi-Family Residential		Commercial	
Number	241	# Complexes	3	Number	49
Total Sq. Ft.	530,580	# Bldgs./Units	16 / 62	Total Sq. Ft.	889,834
Avg. Sq. Ft.	2,201	Total Sq. ft.	55,800	Avg. Sq. Ft.	18,160
Median Sq. Ft.	2,019	Single Family Sq. Ft.		Median Sq. Ft.	4,908
Total Value	18,148,360	< 1,499	10	Total Value	23,709,950
Avg. Value	75,304	1,500 – 2,999	213	Avg. Value	483,877
Median Value	71,520	< 3,000	18	Median Value	179,040

Commercial Occupancy Type Total Profile

A: 15	B: 55	E: 0	F: 5	H: 0	I: 0
M: 29	R: 1	S: 2	U: 0	Vacant: 17	

Commercial Risk Hazards

CRA Risk Score	Maximum: 1	Significant: 16	Moderate: 86	Low: 21

Occupancy name	Life Hazard	Comm. Impact	Hazard Impact	Water Impact	Build. Usage	Const. Type	# of Stories	Sq. Ft.	Total Risk Score
Best Western	3	1	3	3	3	3	2	3	21
Wal-Mart	3	3	3	1	3	2	1	3	19
Belks	3	2	2	1	3	2	1	3	17
Kroger Food Store	3	2	2	1	3	2	1	3	17
Reeds	3	2	2	1	3	2	1	3	17

Incident History

	Tot. Incidents	Fire (Bldgs.)	EMS	Haz-Mat	Tech. Rescue	Other
2010	74	9 (0)	53	2	0	10
2011	87	10 (1)	61	1	2	13
2012	81	11 (0)	51	2	0	17
Total	242	30 (1)	165	5	2	40

ESN 116 Profile

1st Due: E23 2nd Due: E22	Population: 714 (3%)	Road Miles: 7.61 (3.2%)	Square Miles: 1.38 (5.9%)

Structure Profile

Single Family Residential		Multi-Family Residential		Commercial	
Number	185	# Complexes	4	Number	17
Total Sq. Ft.	529,339	# Bldgs./Units	57 / 379	Total Sq. Ft.	406,407
Avg. Sq. Ft.	2,861	Total Sq. ft.	296,550	Avg. Sq. Ft.	23,906
Median Sq. Ft.	2,719	Single Family Sq. Ft.		Median Sq. Ft.	11,731
Total Value	25,226,400	< 1,499	3	Total Value	17,753,420
Avg. Value	136,359	1,500 – 2,999	115	Avg. Value	1,044,319
Median Value	113,420	< 3,000	67	Median Value	263,160

Commercial Occupancy Type Total Profile

A: 1	B: 7	E: 0	F: 0	H: 0	I: 0
M: 4	R: 2	S: 1	U: 0	Vacant: 10	

Commercial Risk Hazards

CRA Risk Score	Maximum: 1	Significant: 5	Moderate: 24	Low: 6

Occupancy name	Life Hazard	Comm. Impact	Hazard Impact	Water Impact	Build. Usage	Const. Type	# of Stories	Sq. Ft.	Total Risk Score
Evangel Church	3	2	2	3	3	3	2	3	21
Columbus Middle School	3	3	3	1	3	1	1	3	18
Columbus Marble Works	2	2	3	1	3	2	1	3	17
Carl Hogan Toyota	2	2	2	1	2	3	1	3	16
Dowdle Gas	1	2	3	1	2	3	1	3	16

Incident History

	Tot. Incidents	Fire (Bldgs.)	EMS	Haz-Mat	Tech. Rescue	Other
2010	20	2 (0)	14	1	0	3
2011	39	6 (2)	24	0	1	8
2012	48	8 (1)	16	1	0	23
Total	107	16 (3)	54	2	1	34

Station Response Area 4

Emergency Service Numbers (ESNs): 109 111		**Primary Engine:** E24
Population: 4757 (20.1%)	**Road Miles:** 40.27 (17.2%)	**Square Miles:** 4.93 (21.2%)

Structure Profile

Single Family Residential		Multi-Family Residential		Commercial	
Total Number	1,631	# Complexes	21	Total Number	254
Total Sq. Ft.	2,668,043	# Bldgs./Units	82 / 427	Total Sq. Ft.	4,033,962
Total Value	73,769,590	Total Sq. ft.	373,560	Total Value	36,820,440

Commercial Occupancy Type Profile

A: 40	B: 125	E: 3	F: 18	H: 2	I: 7
M: 50	R: 2	S: 5	U: 1	Vacant: 79	

Commercial Risk Hazards

CRA Risk Score	Maximum: 0	Significant: 48	Moderate: 219	Low: 68

Occupancy name	Life Hazard	Comm. Impact	Hazard Impact	Water Impact	Build. Usage	Const. Type	# of Stories	Sq. Ft.	Total Risk Score
Fairview Baptist Church	3	3	3	1	3	3	2	3	21
Lowndes County Adult Detention Center	3	3	3	1	3	2	1	3	19
Trinity Personal Care	3	3	3	1	3	2	1	3	19
Coleman Head Start	3	2	3	2	2	3	1	3	19
All Nation's Ministries	3	2	3	2	3	2	2	2	19

Incident History

	All Incidents	Fires (Bldgs.)	EMS	Haz-Mat	Tech Res.	Other
2010	536	34 (6)	422	9	0	71
2011	501	54 (9)	365	6	1	75
2012	520	37 (10)	388	11	0	84
Total	1557	125 (25)	1175	26	1	230

ESN 109 Profile

1st Due: E24 **2nd Due:** E30	**Population:** 1,188 (5%)	**Road Miles:** 10.33 (4.4%)	**Square Miles:** .82 (3.5%)

Structure Profile

Single Family Residential		Multi-Family Residential		Commercial	
Number	339	# Complexes	6	Number	59
Total Sq. Ft.	422,937	# Bldgs./Units	39 / 112	Total Sq. Ft.	331,279
Avg. Sq. Ft.	1,247	Total Sq. ft.	157,220	Avg. Sq. Ft.	5,615
Median Sq. Ft.	1,139	Single Family Sq. Ft.		Median Sq. Ft.	331,279
Total Value	6,572,960	< 1,499	284	Total Value	3,539,130
Avg. Value	19,389	1,500 – 2,999	50	Avg. Value	59,985
Median Value	16,250	< 3,000	5	Median Value	36,400

Commercial Occupancy Type Total Profile

A: 5	B: 21	E: 1	F: 1	H: 0	I: 2
M: 7	R: 2	S: 1	U: 0	Vacant: 23	

Commercial Risk Hazards

CRA Risk Score	Maximum: 0	Significant: 13	Moderate: 38	Low: 17

Occupancy name	Life Hazard	Comm. Impact	Hazard Impact	Water Impact	Build. Usage	Const. Type	# of Stories	Sq. Ft.	Total Risk Score
Lowndes County Adult Detention Center	3	3	3	1	3	2	1	3	19
Coleman Head Start	3	2	3	2	2	3	1	3	19
Budget Inn	3	1	2	1	3	2	2	3	17
Canaan Baptist Church	3	2	2	2	2	3	1	1	16
Salvation Army Office	2	2	2	1	3	2	1	3	16

Incident History

	All Incidents	Fire (Bldgs.)	EMS	Haz-Mat	Tech. Rescue	Other
2010	179	14 (5)	141	2	0	22
2011	145	15 (3)	106	4	0	20
2012	151	9 (4)	118	4	0	20
Total	475	38 (12)	365	10	0	62

ESN 111 Profile

1st Due: E24 **2nd Due:** E25	**Population:** 3,569 (15%)	**Road Miles:** 29.94 (12.6%)	**Square Miles:** 4.11 (17.7%)

Structure Profile

Single Family Residential		Multi-Family Residential		Commercial	
Number	1,292	# Complexes	15	Number	195
Total Sq. Ft.	2,245,106	# Bldgs./Units	43 / 315	Total Sq. Ft.	3,702,683
Avg. Sq. Ft.	1,737	Total Sq. ft.	216,340	Avg. Sq. Ft.	18,988
Median Sq. Ft.	1,529	Single Family Sq. Ft.		Median Sq. Ft.	5,051
Total Value	67,196,630	< 1,499	620	Total Value	33,281,310
Avg. Value	52,010	1,500 – 2,999	615	Avg. Value	170,673
Median Value	45,350	< 3,000	57	Median Value	94,350

Commercial Occupancy Type Total Profile

A: 35	B: 104	E: 2	F: 17	H: 2	I: 5
M: 43	R: 0	S: 4	U: 1	Vacant: 56	

Commercial Risk Hazards

CRA Risk Score	Maximum: 0	Significant: 35	Moderate: 181	Low: 51

Occupancy name	Life Hazard	Comm. Impact	Hazard Impact	Water Impact	Build. Usage	Const. Type	# of Stories	Sq. Ft.	Total Risk Score
Fairview Baptist Church	3	3	3	1	3	3	2	3	21
All Nation's Ministries	3	2	3	2	3	2	2	2	19
Trinity Personal Care	3	3	3	1	3	2	1	3	19
Metso Paper USA	2	2	3	1	3	2	2	3	18
Janeville Acoustics	3	2	3	1	3	2	1	3	18

Incident History

	All Incidents	Fire (Bldgs.)	EMS	Haz-Mat	Tech. Rescue	Other
2010	348	26 (4)	266	7	0	49
2011	343	39 (5)	248	2	1	53
2012	375	31 (4)	276	7	0	61
Total	1066	96 (18)	790	16	1	163

Station Response Area 5

Emergency Service Numbers (ESNs): 110 D3 AMA		**Primary Engine: 25**
Population: 2715 (11.5%)	**Road Miles:** 31.21 (13.3%)	**Square Miles:** 2.78 (12%)

Structure Profile

Single Family Residential		Multi-Family Residential		Commercial	
Total Number	1,081	# Complexes	4	Total Number	118
Total Sq. Ft.	1,961,870	# Bldgs./Units	15 / 44	Total Sq. Ft.	936,386
Total Value	64,332,970	Total Sq. ft.	62,280	Total Value	19,676,830

Commercial Occupancy Type Profile

A: 24	B: 62	E: 3	F: 7	H: 0	I: 4
M: 28	R: 0	S: 0	U: 0	Vacant: 36	

Commercial Risk Hazard Profile

CRA Risk Score	Maximum: 0	Significant: 20	Moderate: 115	Low: 30

Occupancy name	Life Hazard	Comm. Impact	Hazard Impact	Water Impact	Build. Usage	Const. Type	# of Stories	Sq. Ft.	Total Risk Score
Columbus High School	3	3	3	1	3	2	1	3	19
Windsor Place	3	2	2	1	3	3	2	3	19
Aurora Assisted Living Facility	3	2	3	1	3	3	1	3	19
Sale Elementary	3	3	2	1	3	2	1	3	18
Southern Family Market	3	2	2	1	3	3	1	3	18

Incident History

	All Incidents	Fires (Bldgs.)	EMS	Haz-Mat	Tech Res.	Other
2010	399	18 (1)	302	11	0	68
2011	397	25 (5)	311	2	2	57
2012	374	17 (2)	296	8	0	53
Total	1170	60 (8)	909	21	2	178

ESN 110 Profile

1st Due: E25 **2nd Due:** E24	**Population:** 2,715 (11.5%)	**Road Miles:** 31.21 (13.3%)	**Square Miles:** 2.78 (12%)

Structure Profile

Single Family Residential		Multi-Family Residential		Commercial	
Number	1,081	# Complexes	4	Number	118
Total Sq. Ft.	1,961,870	# Bldgs./Units	15 / 44	Total Sq. Ft.	936,386
Avg. Sq. Ft.	1,815	Total Sq. ft.	62,280	Avg. Sq. Ft.	7,935
Median Sq. Ft.	1,732	Single Family Sq. Ft.		Median Sq. Ft.	5,075
Total Value	64,332,970	< 1,499	305	Total Value	19,676,830
Avg. Value	59,512	1,500 – 2,999	741	Avg. Value	166,753
Median Value	54,290	< 3,000	35	Median Value	68,185

Commercial Occupancy Type Profile

A: 24	B: 62	E: 3	F: 7	H: 0	I: 4
M: 28	R: 0	S: 0	U: 0	Vacant: 36	

Commercial Risk Hazard Profile

CRA Risk Score	Maximum: 0	Significant:20	Moderate: 117	Low: 30

Occupancy name	Life Hazard	Comm. Impact	Hazard Impact	Water Impact	Build. Usage	Const. Type	# of Stories	Sq. Ft.	Total Risk Score
Columbus High School	3	3	3	1	3	2	1	3	19
Windsor Place	3	2	2	1	3	3	2	3	19
Aurora Assisted Living Facility	3	2	3	1	3	3	1	3	19
Sale Elementary	3	3	2	1	3	2	1	3	18
Southern Family Market	3	2	2	1	3	3	1	3	18

Incident History

	All Incidents	Fire (Bldgs.)	EMS	Haz-Mat	Tech. Rescue	Other
2010	399	18 (1)	302	11	0	68
2011	397	25 (5)	311	2	2	57
2012	374	17 (2)	296	8	0	53
Total	1170	60	909	21	2	178

ESN District 3 VFD Automatic Mutual Aid

1st Due: E25 **2nd Due:** E24	District 3 Volunteer Fire Department

Structure Profile

Single Family Residential		Multi-Family Residential	
Number	255	# Complexes	8
		# Bldgs. / Units	73 / 444
Single Family Sq. Ft.		Total Sq. ft.	496,178
< 1,499	129	Commercial	
1,500 – 2,999	126	Number	27
< 3,000	0	Total Sq. ft.	229,990

Commercial Occupancy Type Profile

A: 3	B: 12	E: 0	F: 2	H: 2	I: 2
M: 0	R: 0	S: 1	U: 1	Vacant: 4	

Commercial Risk Hazard Profile

CRA Risk Score	Maximum: 0	Significant: 8	Moderate: 15	Low: 5

Occupancy name	Life Hazard	Comm. Impact	Hazard Impact	Water Impact	Build. Usage	Const. Type	# of Stories	Sq. Ft.	Total Risk Score
Eco Lab - Plant	2	2	3	1	3	2	1	3	17
Eco Lab - Plant	2	2	3	1	4	2	1	3	17
Eco Lab - Office	2	2	2	1	3	2	2	3	17
Lowndes Medical Clinic	2	2	2	3	2	3	1	2	17
Canaan Baptist Church	3	2	2	1	2	3	1	2	16

Incident History

	2010	2011	2012
Fire Incidents	6	8	4

Station Response Area 6

Emergency Service Numbers (ESNs): 95 107 114		**Primary Engine: 30**
Population: 4353 (18.4%)	**Road Miles:** 33.43 (14.3%)	**Square Miles:** 2.25 (9.7%)

Structure Profile

Single Family Residential		Total R1-2 Occupancies		Commercial	
Total Number	1,152	# Complexes	41	Total Number	209
Total Sq. Ft.	2,222,725	# Bldgs./Units	79 / 1337	Total Sq. Ft.	3,265,127
Total Value	5,743	Total Sq. ft.	1,305,114	Total Value	401,779,268

Commercial Occupancy Type Profile

A: 51	B: 127	E: 0	F: 6	H: 1	I: 3
M: 48	R: 11	S: 4	U: 0	Vacant: 72	

Commercial Risk Hazard Profile

CRA Risk Score	Maximum: 18	Significant: 111	Moderate: 130	Low: 50

Occupancy name	Life Hazard	Comm. Impact	Hazard Impact	Water Impact	Build. Usage	Const. Type	# of Stories	Sq. Ft.	Total Risk Score
Calloway/Columbus/Hastings/Lott	3	3	3	1	3	3	3	3	22
Reneau Hall	3	3	3	1	3	3	3	3	22
Whitfield Auditorium	3	3	3	1	3	3	2	3	21
Trotter Convention Center	3	3	3	1	3	3	2	3	21
St. Paul's Church	3	3	3	1	3	3	2	3	21

Incident History

	All Incidents	Fires (Bldgs.)	EMS	Haz-Mat	Tech Res.	Other
2010	379	45 (14)	285	8	0	41
2011	393	25 (6)	298	11	0	59
2012	354	28 (4)	268	5	1	52
Total	1126	98 (24)	851	24	1	152

ESN 95 Profile

1st Due: E21 **2nd Due:** L29, E23, E22	**Population:** 168 (.7%)	**Road Miles:** 2.87 (1.0%)	**Square Miles:** .07 (.3%)

Structure Profile

Single Family Residential		Mixed Occupancy		Commercial	
Number	15	# Complexes	N/A	Number	101
Total Sq. Ft.	57,583	Total # Bldgs.	51 / 153	Total Sq. Ft.	717,516
Avg. Sq. Ft.	3,839	Total Sq. ft.	227,231	Avg. Sq. Ft.	7,104
Median Sq. Ft.	3,500	Single Family Sq. Ft.		Median Sq. Ft.	5,076
Total Value	3,161,460	< 1,499	2	Value	15,029,660
Avg. Value	210,764	1,500 – 2,999	3	Avg. Value	148,808
Median Value	119,980	< 3,000	10	Median Value	105,480

Commercial Occupancy Type Profile

A: 17	B: 54	E: 0	F: 1	H: 0	I: 1
M: 29	R: 1	S: 0	U: 0	Vacant: 35	

Commercial Risk Hazard Profile

CRA Risk Score	Maximum: 4	Significant: 46	Moderate: 58	Low: 26

Occupancy name	Life Hazard	Comm. Impact	Hazard Impact	Water Impact	Build. Usage	Const. Type	# of Stories	Sq. Ft.	Total Risk Score
Trotter Convention Center	3	3	3	1	3	3	2	3	21
J and E	3	3	3	1	3	3	2	3	21
J. Broussards	3	3	3	1	3	3	3	2	21
First United Methodist Church	3	3	3	1	3	2	2	3	20
WCBI Communications	2	3	2	1	3	3	3	3	20

Incident History

	All Incidents	Fire (Bldgs.)	EMS	Haz-Mat	Tech. Rescue	Other
2010	36	4 (0)	20	1	0	11
2011	39	2 (0)	15	2	0	20
2012	42	3 (1)	17	0	0	22
Total	117	9 (1)	52	3	0	53

ESN 107 Profile

1st Due: E30 **2nd Due:** E21	**Population:** 3,710 (16.1%)	**Road Miles:** 27.84 (11.8%)	**Square Miles:** 2.04 (8.8%)

Structure Profile

Single Family Residential		Multi-Family Residential		Commercial	
Number	1,137	# Complexes	31	Number	108
Total Sq. Ft.	2,165,142	# Bldgs./Units	104 / 478	Total Sq. Ft.	1,179,977
Avg. Sq. Ft.	1,904	Total Sq. ft.	528,868	Avg. Sq. Ft.	10,926
Median Sq. Ft.	1,453	Single Family Sq. Ft.		Median Sq. Ft.	3,760
Total Value	59,998,470	< 1,499	599	Total Value	14,086,460
Avg. Value	52,769	1,500 – 2,999	395	Avg. Value	130,430
Median Value	35,810	< 3,000	143	Median Value	43,205

Commercial Occupancy Type Profile

A: 26	B: 45	E: 0	F: 5	H: 1	I: 2
M: 19	R: 0	S: 2	U: 0	Vacant: 33	

Commercial Risk Hazard Profile

CRA Risk Score	Maximum: 1	Significant: 42	Moderate: 64	Low: 22

Occupancy name	Life Hazard	Comm. Impact	Hazard Impact	Water Impact	Build. Usage	Const. Type	# of Stories	Sq. Ft.	Total Risk Score
St. Paul's Church	3	3	3	1	3	3	2	3	21
AT&T	2	3	3	1	3	2	3	3	20
Central UM Church	3	3	2	1	2	3	2	3	19
Zion Gate Church	3	2	2	1	3	3	2	3	19
Regions Bank	2	3	3	1	3	1	3	3	19

Incident History

	All Incidents	Fire (Bldgs.)	EMS	Haz-Mat	Tech. Rescue	Other
2010	322	39 (14)	251	7	0	25
2011	340	22 (6)	277	8	0	33
2012	296	24 (3)	239	5	1	27
Total	958	85 (23)	767	20	1	85

ESN 114 Profile (MS University for Women)

1st Due: E21 **2nd Due:** L29, E23	**Population:** 531 (2.2%)	**Road Miles:** 3.67 (1.5%)	**Square Miles:** .14 (.6%)

Structure Profile

Multi-Family (Faculty Apts)		**MUW Dorms**		**Commercial**	
Number	2 / 6 / 48	# Complexes	8	Number	54
Total Sq. Ft.	66,600	# Bldgs./Units	658	Total Sq. Ft.	1,367,634
Avg. Sq. Ft.	9,350	Total Sq. ft.	430,800	Avg. Sq. Ft.	N/A
Median Sq. Ft.	12,600	**MUW R - Other**		Median Sq. Ft.	N/A
Total Value	N/A	# Complexes	N/A	Total Value	372,663,148
Avg. Value	N/A	# Bldgs./Units	3 / 58	Avg. Value	N/A
Median Value	N/A	Total Sq. ft.	34,740	Median Value	N/A

Commercial Occupancy Type Profile

A: 8	B: 28	E: 0	F: 0	H: 0	I: 0
M: 0	R: 10	S: 2	U: 0	Vacant: 4	

Commercial Risk Hazard Profile

CRA Risk Score	Maximum: 13	Significant: 23	Moderate: 8	Low: 2

Occupancy name	Life Hazard	Comm. Impact	Hazard Impact	Water Impact	Build. Usage	Const. Type	# of Stories	Sq. Ft.	Total Risk Score
Calloway/Columbus/Hastings/Lott	3	3	3	1	3	3	3	3	22
Reneau Hall	3	3	3	1	3	3	3	3	22
Whitfield Auditorium	3	3	3	1	3	3	2	3	21
Peyton Hall	2	3	3	1	3	3	3	3	21
Parkinson Hall	3	3	3	1	3	3	3	2	21

Incident History

	Total Incidents	Fire (Bldgs.)	EMS	Haz-Mat	Tech. Rescue	Other
2010	21	2 (0)	14	0	0	5
2011	14	1 (0)	6	1	0	6
2012	16	1 (0)	12	0	0	3
Total	51	4 (0)	32	1	0	14