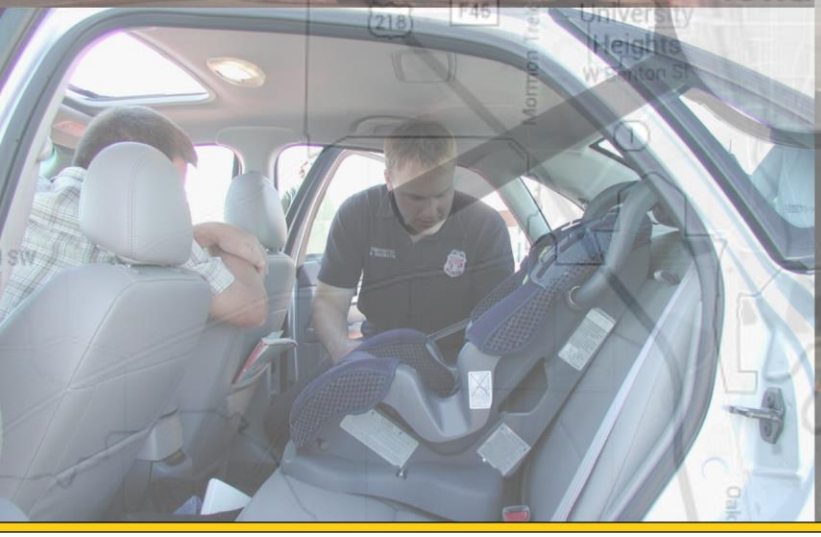
IOWA CITY Fire Department

Community Risk Assessment & Standards of Cover



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Iowa City Fire Department

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February 2018

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Executive Summary

The Iowa City Fire Department (ICFD) was one of the first fire departments established in Iowa. The beginnings of the department date back to 1842, three years after the founding of Iowa City and four years before Iowa became a state. Today the ICFD is a full service municipal fire department providing fire suppression, emergency medical services (EMS), technical rescue, and hazardous materials (hazmat) response. The staff is equally committed to providing quality non-emergency service in fire prevention, code enforcement, life safety education, and emergency preparedness. The department is entrusted to providing a high level of professionalism and efficiency on behalf of the community it serves.

The department has been involved with the Commission on Fire Accreditation International (CFAI) for over ten years as a means to improve service delivery through organizational improvement. The ICFD was awarded accredited agency status in 2008 and again in 2013. Today, the department continues to utilize the accreditation model to improve our ability to assess and measure the efficiency and effectiveness of our programs. The department is committed to improving the quality of life for the citizens of this community. In 2018, the department will again present itself for review by the CFAI.

The Iowa City Fire Department conducted a Community Risk Assessment/Standard of Cover (CRSOC) project to achieve maximum effectiveness in mitigating all types of risk. Simply stated, the Standard of Cover (SOC) illustrates all hazards deployment strategies and links projected demand for resources to classifications and categories of risk.

The development of the department's systematic deployment strategy is a combination of subjective analysis and applied objective data. This document is a comprehensive assessment of community risk. It provides an understanding of community risk as it relates to the deployment of emergency service personnel and equipment. To quantify the analysis, the department established a risk assessment methodology which is a common set of rules related to the assessment of hazards and risks. Risk levels are classified using a three axis risk assessment methodology. The process includes an assessment of threat probability, the consequence to the community, and the impact to the department. Threats can be predicted utilizing quantifiable data. Consequence is a measure of the disparate outcome (emotional, economic, or historical). Impact is the measured "drain effect" regarding adverse service area resource availability caused by emergency incident mitigation demand. Impact reflects the agency's remaining capacity to deploy and cover.

The document begins with a description of the community, a summary of the services provided, and a review of community expectations. The comprehensive examination of risk that follows is geographically described and analyzed by Risk Management Zones (RMZ) and fire station response districts.

Risk classifications for fire, EMS, haz-mat, and technical rescue are assessed and quantified into low, moderate, high, and special risk categories. A critical tasking analysis was completed which identified the number of staff necessary to safely mitigate each category of risk within a prescribed timeframe.

Historical response time data was used to measure current system performance. Performance objectives were identified, which specified response time measures for alarm handling, turnout, and travel times. Baseline and benchmark performance measures for the distribution of fixed facilities (first arriving unit) and the assembly of an effective response force (ERF) per critical task requirements were established by service classification and category of risk.

Finally, overall conclusions were presented and the following recommendations were made for consideration by the fire chief and other policy makers.

1. Response Time – Fixed Facilities: Service demand and community expectations in response time performance will eventually require two additional fixed facilities and the relocation of fire station #3.

2. Response Time Components – Alarm handling, turnout, and travel time: Time saving improvements in call taking procedures to include a modernized CAD and JECC agency accreditation should be pursued. Fire station design and crew proficiency should be relied upon to improve turnout time while improvements to travel time performance will require technology based solutions.

3. Reassessment of High and Special Risk Occupancies: The three axis risk assessment methodology adds "impact" to probability and consequence in the calculation of risk. As a result, the number of occupancies identified as high and special risk for fire events has increased. A reassessment of high and special risk categories within the classifications of EMS, hazmat, and rescue should also be performed.

4. Assembling an Effective Response Force (ERF) for High and Special Risk Events: Given current minimum staffing levels, an additional engine company must be added to first alarm building fire dispatch protocols to minimally satisfy critical task requirements at high and special risk occupancies. Alternatively, four-person minimum staffing could satisfy critical task requirements without adding an additional unit. Dispatch protocols will need to be adjusted in the short term to fulfill critical task requirements. Discussions on how to achieve additional staffing should be pursued.

A. Description of Community Served

Introduction

As home to a large public university with exceptional programs in the arts and sciences, Iowa City features a vibrant intellectual and cultural scene. Lectures by guest scholars of international importance, a wide selection of weekly in-house colloquiums, nightly live music in local clubs, concerts by internationally recognized orchestras, readings by local authors in independent book stores, and displays by local artists at galleries all underscore that Iowa City has something for everyone.

Image 1 The University of Iowa Old Capitol designated a national historic landmark

Image 2 The University of Iowa Pentacrest

Image 3 The T. Anne Cleary walkway

Image 4 The University of Iowa Hospitals and Clinics
a 732-bed public teaching hospital and level 1 trauma center is Iowa's only tertiary-level care center. UIHC employs over 7,100 people.

Image 5 Ped Mall, Downtown Iowa City

Image 6 Ped Mall, Downtown Iowa City

Image 7 Summer of the Arts Jazz Fest, Downtown Iowa City

Image 8 Park@201, one of several new high rise buildings in downtown Iowa City

Image 9 Winter Weatherdance, Ped Mall, Iowa City

The University of Iowa is a major national research university located on a 1,900-acre campus. The University of Iowa is composed of 11 colleges, the largest of which is the College of Liberal Arts and Sciences, enrolling most of Iowa's undergraduates. The Henry B. Tippie College of Business, the Roy J. Carver College of Medicine, and the Colleges of Education, Engineering, Law, Nursing, Pharmacy enroll undergraduates. All provide graduate degree programs along with the Colleges of Dentistry and Public Health. The university occupies more than 120 major buildings.

Image 10 Panoramic view of downtown Iowa City during Summer of the Arts

Image 11 Statue of Irving Weber in downtown Iowa City.
Irving Weber was a University of Iowa swimmer, the first to make the All-American Swimming Team. Beginning in the 1970s, his weekly Saturday newspaper articles were what led to his greatest renown in the community. His articles regularly informed readers about Iowa City's history.

Image 12 Iowa Advanced Technology Laboratories

Image 13 Hancher Auditorium, University of Iowa emerges from historic 2008 flood to open in the fall of 2016

Image 14 Voxman Music Building
at 93 E Burlington St, Iowa City, opened to students in the fall of 2016

Image 15 Petersen Residence Hall
opened in the fall of 2015

Image 16 University of Iowa School of Art and Art History
141 N Riverside Drive, Iowa City *Ars Longa. Vita Brevis Est (Art is forever. Life is short)*

Image 17 Madison Street Residence Hall
will house more than 1,000 students. Opening in the fall of 2017.

Combine all this with easy access to the outdoor attractions in and around the area and it is not surprising that Iowa City is consistently ranked among the best places to live and work:

- Iowa City one of the Midwest's Best Budget Destinations on BudgetTravel.com
- Iowa City the #9 place to live in Iowa according to Niche
- Iowa City named #2 for the "Top 100 Best Places to Live 2017" by Livability outpacing more than 2,100 cities
- Iowa City ranked #4 by NBC's Today Show for Best Place to Retire in the U.S.
- Iowa City #2 of Best 25 Cities for Entrepreneurs by Entrepreneur
- University of Iowa was tied for 82nd among national university rankings, tied for 33rd among public universities, and tied for 130th among global universities by *U.S. News & World Report*
- 16 University of Iowa graduate programs ranked among the top 25 in the nation in *U.S. News & World Report*; in graduate school rankings, Iowa's Carver College of Medicine tied for 25th in the country for primary care and tied for 33rd in the country for research, its College of Public Health tied for 17th, its College of Pharmacy tied for 17th, its College of Law tied for 20th, and its Nursing School tied for 23rd
- Iowa City ranked #4 of 21 "Coolest cities in America" by Expedia Viewfinder
- Iowa City ranked #1 for Best Small Metro to live after College Graduation by America Institute for Economic Research
- Iowa City ranked #4 for Mid-Size City for Most Volunteers by Corporation for National and Community Service
- Iowa City ranked #5 for Best College Towns in America by Business Insider
- The United Nations Educational, Scientific, and Cultural Organization (UNESCO) designated Iowa City, the world's third City of Literature on Nov. 20, 2008. Iowa City joined Edinburgh, Scotland, and Melbourne, Australia, as UNESCO Cities of Literature. Subsequent designations have been conferred upon Dublin, Ireland; Reykjavik, Iceland; Norwich, England; Krakow, Poland; Heidelberg, Germany; Dunedin, New Zealand; Granada, Spain; and Prague, Czech Republic.

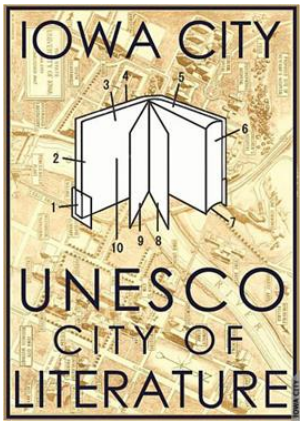


Image 18 Iowa City Old Capitol building

Iowa City was the second capital of the Iowa Territory and the first capital city of the State of Iowa. The Old Capitol building is a National Historic Landmark in the center of the University of Iowa campus. Iowa City is the only City of Literature in North or South America, Africa and Asia, as awarded by UNESCO in 2008.

Image 19 Iowa City Public Library
established in 1896. Currently located in a new facility at the intersection of College and Linn Street on the downtown Ped Mall.

The Iowa City Fire Department (ICFD) was one of the first fire departments established in Iowa. The roots of the department go back to 1842, three years after the founding of Iowa City and four years before Iowa's statehood. The original firefighting equipment, consisting mostly of buckets, was stored in the basement of the Old Capitol building. Today, the ICFD provides emergency and non-emergency services including fire suppression, emergency medical care via basic and advanced life support services (EMS), technical rescue, and hazardous materials response. The entire staff is dedicated to providing the highest quality of service to the community by way of community risk reduction services to include: fire prevention and fire code enforcement, fire and life safety education, and emergency and disaster preparedness. The ICFD is striving to achieve a level of professionalism and efficiency that meets or exceeds the community's expectations. The department has been involved with the Commission on Fire Accreditation International (CFAI) for over ten years as a means to improve service delivery through organizational improvement. The ICFD was awarded accredited agency status in 2008 and again in 2013. Today, the department continues to utilize the accreditation model to improve our ability to assess and measure the efficiency and effectiveness of our programs. The department is committed to improving the quality of life for the citizens of this community. In 2018, the department will again present itself for review by the CFAI.

Community Legal Basis

Iowa City was created by an act of the Legislative Assembly of the Iowa Territory on January 21, 1839, fulfilling the desire of Governor Lucas to move the capital out of Burlington and closer to the center of the territory. This act began, "An Act to locate the Seat of Government of the Territory of Iowa . . . so soon as the place shall be selected, and the consent of the United States obtained, the commissioners shall proceed to lay out a town to be called "Iowa City.""

Commissioners Chauncey Swan and John Ronalds met on May 1 in the small settlement of Napoleon, south of present day Iowa City, to select a site for the new capital city. The following day the commissioners selected a site on bluffs above the Iowa River north of Napoleon, placed a stake in the center of the proposed site and began planning the new capital city. Commissioner Swan, in a report to the legislature in Burlington, described the site: "Iowa City is located on a section of land laying in the form of an amphitheater." By June of that year, the town had been platted and surveyed from Brown Street in the north to Burlington Street in the south, and from the Iowa River eastward to Governor Street.

While Iowa City was selected as the territorial capital in 1839, it did not become the capital city until 1841; after construction on the capital building had begun. The capital building was completed in 1842, and the last four territorial legislatures and the first six Iowa General Assemblies met there until 1857, when the state capital was moved to Des Moines.

Image 20 Iowa Territory Centennial Three Cent Stamp picturing the old state capitol building in Iowa City.

History of the Community

The first settlements in Iowa clustered along the Mississippi River. Dubuque, Davenport, Bloomington (now Muscatine), Burlington, and Fort Madison sprang up from mining camp, private land reserve, boat landing, trading-post, or military garrison into bustling frontier towns. But it was not long before the fertile prairie to the west began to lure the pioneers away from the hills along the river. In August, 1836, the population of the two counties in the Iowa country was 10,531. Twenty-one months later the census showed an increase of 117%. Of the 22,859 persons then in Iowa, 7,755 (or over 33.9%) were living in Missouri River basin counties; and after two more years, out of a total population of 43,112, over 44.1% or 19,041 people were inhabitants of inland counties.

This rapid shifting of the center of population westward brought with it the need for roads, mail routes, and other conveniences. By no means the least persistent of the demands of the people was for the location of the capital of the Territory to be near the center of population. Travel in those days was not the negligible consideration it now is. Indeed, the problem of accessibility led to the opinion that the seat of government should occupy a central position geographically as well as with respect to the mass of population.

The First Legislative Assembly of the Territory of Iowa, having in mind the future development of the Territory, made provision for the establishment of the permanent seat of government at some point within Johnson County; and Governor Robert Lucas approved the act on January 21, 1839. For three years, or until the public buildings at Iowa City — for such was to be the name of the capital of Iowa — were declared ready for occupancy, the Legislative Assembly was to continue to hold its meetings at Burlington. A supplementary act authorized the Governor to "apply to Congress for a donation of, or a pre-emption to, four sections of land on which to locate the seat of government;" while a joint resolution instructed William W. Chapman, Territorial Delegate to Congress, to ask for a donation of "at least four sections of land, on which to locate the seat of government of the Territory of Iowa."

Chauncey Swan, John Ronalds, and Robert Ralston, who had been appointed commissioners for that purpose, chose the permanent site for the capital on May 4, 1839, indicating the place by a slab driven

into the ground about where the Old Stone Capitol at Iowa City now stands. In October of the same year official notice of the selection was returned to the Register of the Land Office at Dubuque.

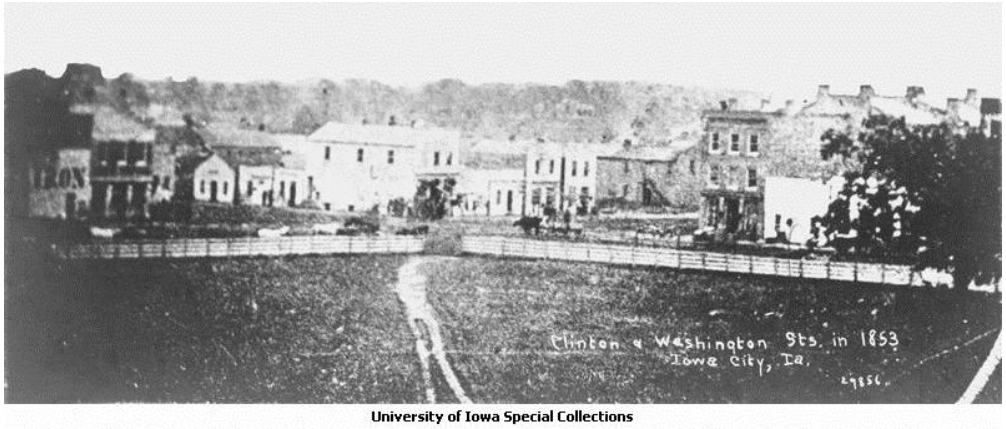
After two years, it was seen that the capitol building at Iowa City would not be ready for occupancy at the end of the three years allotted for the work of construction. In view of this fact, the following Legislative Assembly would meet on the first Monday in December, 1841, at Iowa City, if "other sufficient buildings shall be furnished for the accommodation of the Legislative Assembly, rent free." Such accommodations were provided and in conformity with a proclamation of Governor Robert Lucas, the fourth regular session of the Legislative Assembly convened on December 6, 1841, in the new capital city. On that day Iowa City became the capital of Iowa in fact as well as in name.

For sixteen years, the seat of government remained at Iowa City. That thriving town beheld fourteen sessions of the legislature and three constitutional conventions convene, accomplish their work, and adjourn. It witnessed also, during those sixteen years, a constant stream of settlers who came to push the frontier farther and farther toward the west. At each of the constitutional conventions and at all but two sessions of the Legislative Assembly or General Assembly the question of re-locating the capital arose in one form or another.

Image 21 Historic State Capitol

When Iowa moved its seat of government to Des Moines, the Old Capitol was given to the University of Iowa. The building was used for classrooms and offices and soon became a symbol for the University.

The delegates to the first constitutional convention in Iowa were called to order on October 7, 1844. When the report of the committee on schedule — that is, the article of the constitution providing for the transition from Territorial to State government — came before the assembly on the twenty-sixth day of the same month, Mr. George Hobson of Henry County proposed as an amendment to the section fixing the time for the first meeting of the General Assembly that Iowa City "shall be the seat of government of the State of Iowa until the year eighteen hundred and sixty-five, and until removed by law." The proposition was agreed to by a vote of forty-one to twenty-seven.



University of Iowa Special Collections

Image 22 Clinton & Washington Streets (1853)

The Constitution of 1846 under which Iowa became a state, contained a provision that Iowa City "shall be the Seat of Government of the State of Iowa, until removed by law." The failure to incorporate a clause locating the capital at that place for any definite period, as the Constitution of 1844 had done, was probably a concession to the southern and western portions of the territory, where a strong sentiment was developing in favor of removing the capital farther west at no remote time. In fact, it was immediately pointed out by those opposed to the Constitution that this was a subtle method of accomplishing the immediate relocation of the capital; for in the General Assembly, under the new constitution, there would be a majority of eighteen members from the south and southwest who would be inclined to vote for the establishment of the capital at the Raccoon Forks of the Des Moines River, the location of Fort Des Moines.

In 1857, the state capital was moved to Des Moines. Iowa City was compensated for the loss of the state capital with the establishment of the University of Iowa, now one of the country's top 30 public universities with more than 30,000 students enrolled in more than 100 areas of studies.

Image 23 Herky the Hawk, athletics mascot of the University of Iowa.
There are currently two different styles of Herky costumes. The version used at football games features Herky wearing a football helmet.

Image 24 Department of Dance, College of Liberal Arts, the University of Iowa

Image 25 Iowa Gymnastics Training Facility

Image 26 Independence Day fireworks display from Hubbard Park, University of Iowa

Image 27 Medical Education Research Facility, University of Iowa

Image 28 College of Public Health, University of Iowa

Image 29 Kirk Ferentz, Iowa football Head Coach since the 1999 season

Community Financial Basis

The fire department is, for the most part, funded by the city's general fund. The general fund is supported by eight funding source areas. Property tax is the largest portion of the source areas, followed by other taxes and charges for services. Property tax revenue of $51,492,986 is the primary funding source for General Fund operations, providing an estimated 34% of total revenue in FY2015. The ICFD's annual operating and capital budget appropriated for the year ending June 30, 2015 was $8,410,949. For FY2017, the fire department is appropriated $8,519,281.

Table 1 General Fund Revenue (2017-2020)

Revenues & Transfers In	2017 Actual	2018 Revised	2019 Budget	2020 Projected
Property Taxes	$31,754,702	$32,862,685	**$34,764,019**	$35,459,299
Delinquent Property Taxes	-		**-**	-
Other City Taxes	2,534,880	2,469,854	**2,630,582**	2,639,371
Licenses And Permits	3,521,079	2,551,850	**2,543,150**	2,543,150
Use Of Money And Property	812,954	686,337	**774,516**	774,516
Intergovernmental	3,580,793	3,502,070	**3,736,816**	3,736,816
Charges For Fees And Services	1,697,137	1,374,189	**1,340,308**	1,340,308
Miscellaneous	5,484,920	5,935,042	**5,982,233**	6,046,368
Other Financial Sources	1,764,562	3,158,753	**1,377,298**	1,377,298
Sub-total Revenues:	51,151,026	52,540,780	**53,148,922**	53,917,126
Transfers In	10,655,199	10,153,215	**11,772,657**	12,046,881
Total Revenues & Transfers In	$61,806,225	$62,693,995	**$64,921,579**	$65,964,007

The City of Iowa City Finance Department provides a fiscal year budget manual to each department and division to assist in the development of the annual budget. Each year, the departments develop a multi-year capital outlay budget, which is reviewed and updated annually. The preparation of the City's annual budget includes the one-year annual budget, required by Iowa Code, and a second-year text projection as a planning tool. The text notes permit a more comprehensive review of the City's financial condition, allowing analysis of current and future needs. A budget calendar is included in the budget manual to provide further guidance in the budget process. During preparation of the plan, careful review is made of property tax levy rates, utility and user fee requirements, ending cash balances by fund, debt service obligations, bond financing needs, capital outlay for equipment

purchases, and major capital improvement projects. Departments are required to update their line item budgets for each activity within the computerized public sector MUNIS financial software system.

The City Council sets the budget priorities and adopts the financial plan. All budgetary decisions are approved by the City Council.

Table 2 Capital Improvement Plan (2017-2021)

Fire Department Projects	Priority	2017	2018	2019	2020	2021
Fire Apparatus Replacement Program	1			60,000	1,790,000	1.300,000
Fire Training Center Relocation	2	700,000				

Capital Improvement Plan, 2017 – 2021

The CIP plan fully funds the fire apparatus replacement schedule. The planned replacements will allow the department to maintain apparatus per the approved vehicle replacement plan.

In late 2014, the fire and police departments jointly leased a storage facility just outside of the city to provide temporary storage for a reserve apparatus, training props and miscellaneous equipment that was previously housed in the fire department training center.

The previously unfunded proposal to construct a fire training building, burn room, stair tower, rappelling and search areas has been significantly revised and downsized to vastly reduce the project cost and land space. The plan is to allocate $700,000 to replace the fire training facility that was lost to the revitalization of the north wastewater site in 2014. An accessible training area to keep fire department personnel well trained and in the city so as to be readily available for calls for service remains the goal. The absence of a training center will increase risk over time due to skills degradation.

Table 3 Capital Improvement Program, Unfunded Fire Department Projects

Project Name	Description	Unfunded Amount
Fire Station #1 Relocation	Relocate & expand central fire station	11,593,000
Fire Station #5	Construction of Station #5 in the South Planning District	2,898,000
Fire Station #6	Construction of Station #6 in the Southwest Planning District	2,898,000
Traffic Signal Pre-emption System	City-wide GIS based signal pre-emption for emergency vehicles	1,221,000
Emerald Street Diamond Grinding	Diamond grinding to remove slab warping that interferes with the movement of fire apparatus from Station #2	212,000

Three of the unfunded projects are for fixed fire department facilities. Fire Stations #5 and #6 are planned to provide acceptable travel times, and Fire Station #1 relocation is to replace the small and

outdated central station. The traffic pre-emption system and the Emerald Street diamond grinding are projects that if funded, would improve fire department response times.

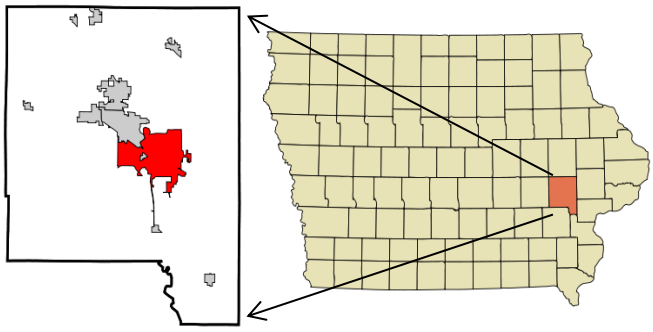
For every year between 2013-2017, the City's Finance Department has been awarded the national Distinguished Budget Presentation Award by the Government Finance Officers Association (GFOA). In 2017, the City of Iowa City received, for the 32nd consecutive year, the Certificate of Achievement for Excellence in Financial Reporting for its Comprehensive Annual Financial Report (CAFR). In April 2017, the city received word that for the 42nd consecutive year, Moody's Investors Service had awarded the City of Iowa City an AAA bond rating, the highest credit rating possible. The top tier AAA rating ranks Iowa City among the most financially stable cities in the state of Iowa and the nation.

Area Description

Community Boundaries

Iowa City is located on both sides of the Iowa River in a rich agricultural area in southeast Iowa, in the heart of the Midwest, just south of the Coralville reservoir. This location, 25 miles south of Cedar Rapids and approximately 55 miles west of Davenport and the Mississippi River, is within easy reach of many of the major Midwest metropolitan centers, lying 300 miles north of St. Louis, a little over 200 miles west of Chicago, and 250 miles east of Omaha. The city covers 25.28 square miles in the central portion of Johnson County.

Map 1 Iowa City within Johnson County within the State of Iowa



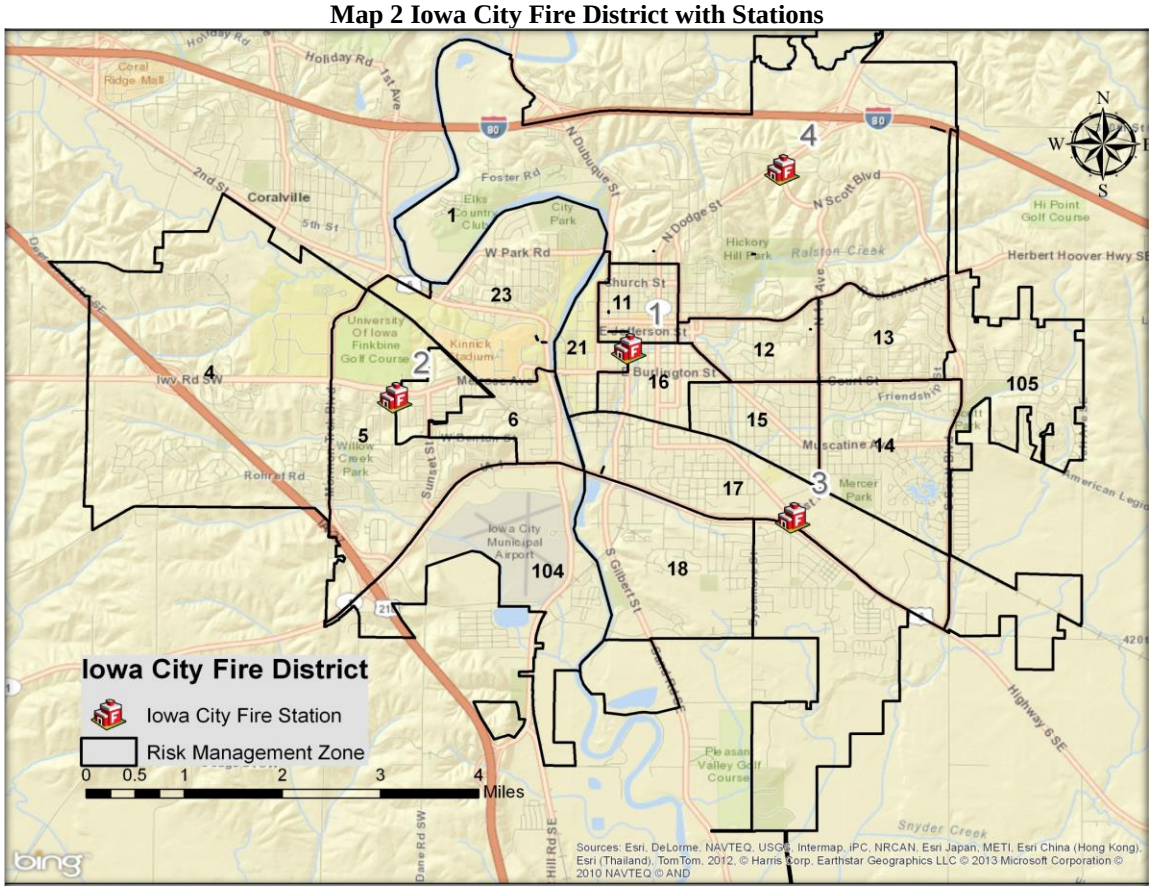
Community Planning Areas/Zones

The concept of the census tract was first developed in the United States. In 1906, Dr. Walter Laidlaw originated the concept of permanent, small geographic areas as a framework for studying change from one decennial census to another in neighborhoods within New York City. After 1930, the Census Bureau saw the need to standardize the delineation, review, and updating of census tracts and published the first set of census tract criteria in 1934. The goal of the criteria has remained unchanged; that is, to assure comparability and data reliability through the standardization of the population thresholds for census tracts, as well as requiring that their boundaries follow specific types of geographic features that do not change frequently. In the U.S., census tracts are designed to be relatively homogeneous geographic units with respect to population characteristics, economic status, and living conditions. General demographic information, an overview of economic conditions, and employment workforce data is available by census tract and all fixed facilities can be identified

by census tract. Iowa City includes all or portions of 17 different census tracts. The ICFD refers to the 17 tracts as Risk Management Zones (RMZs). They are listed by their census tract number and they provide defined geographic regions for tracking incident data and describing the built environment. All planning documents that predate 2017 reflect 16 RMZ's; in 2017 the ICFD began providing service to the community of University Heights, which in January 2018 was designated RMZ 5UH.

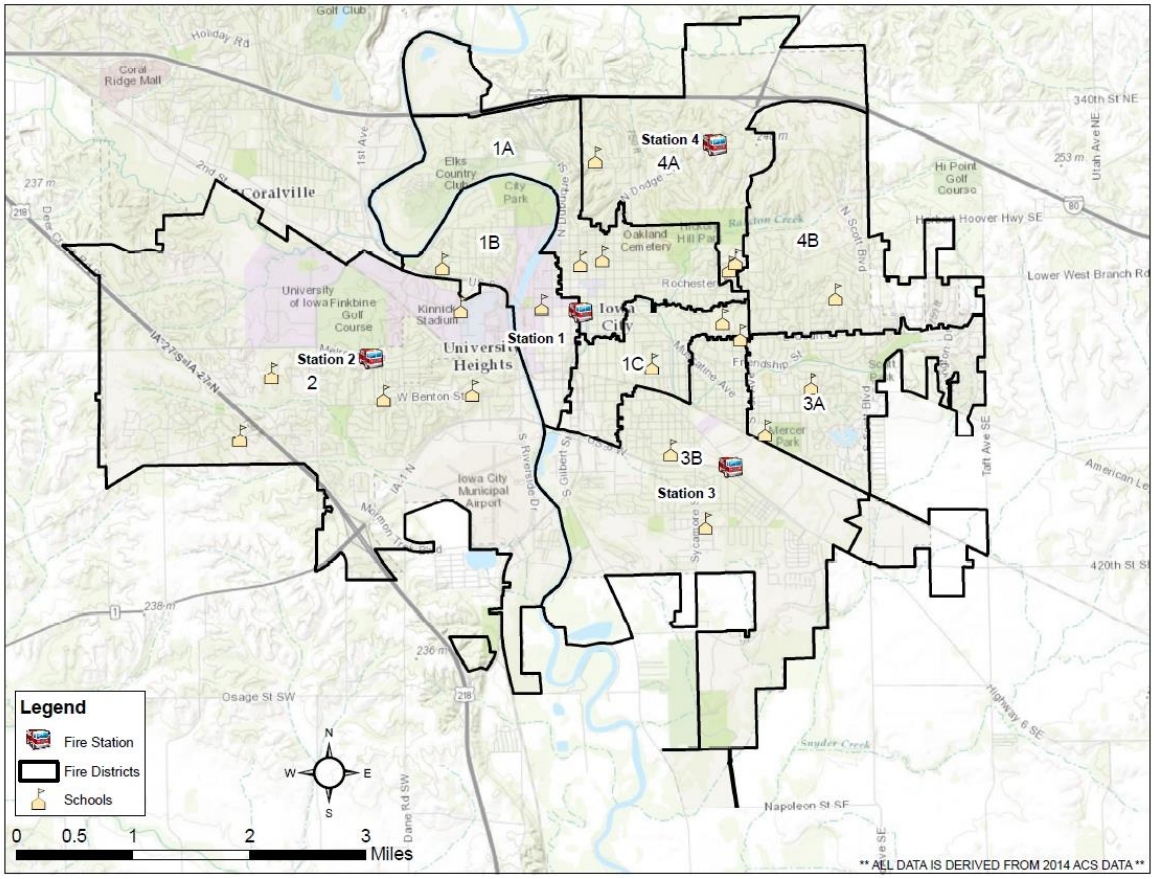
The ICFD conducts a thorough analysis of the community risks within each of the 17 RMZs. The assessment involves an all-hazard risk assessment in each RMZ (pursuant to Criterion 2B of the CFAI FESSAM 9th Edition).

Map 2 Iowa City Fire District with Stations



Incident location is an important factor when conducting a community risk assessment. The department uses two components to analyze incident locations. The components are Risk Management Zones (RMZs) and fire station response areas (districts). Iowa City has four fire stations and four fire districts. A district is defined as that fire station's first-due response area.

Map 3 Iowa City Fire District with Stations and Schools



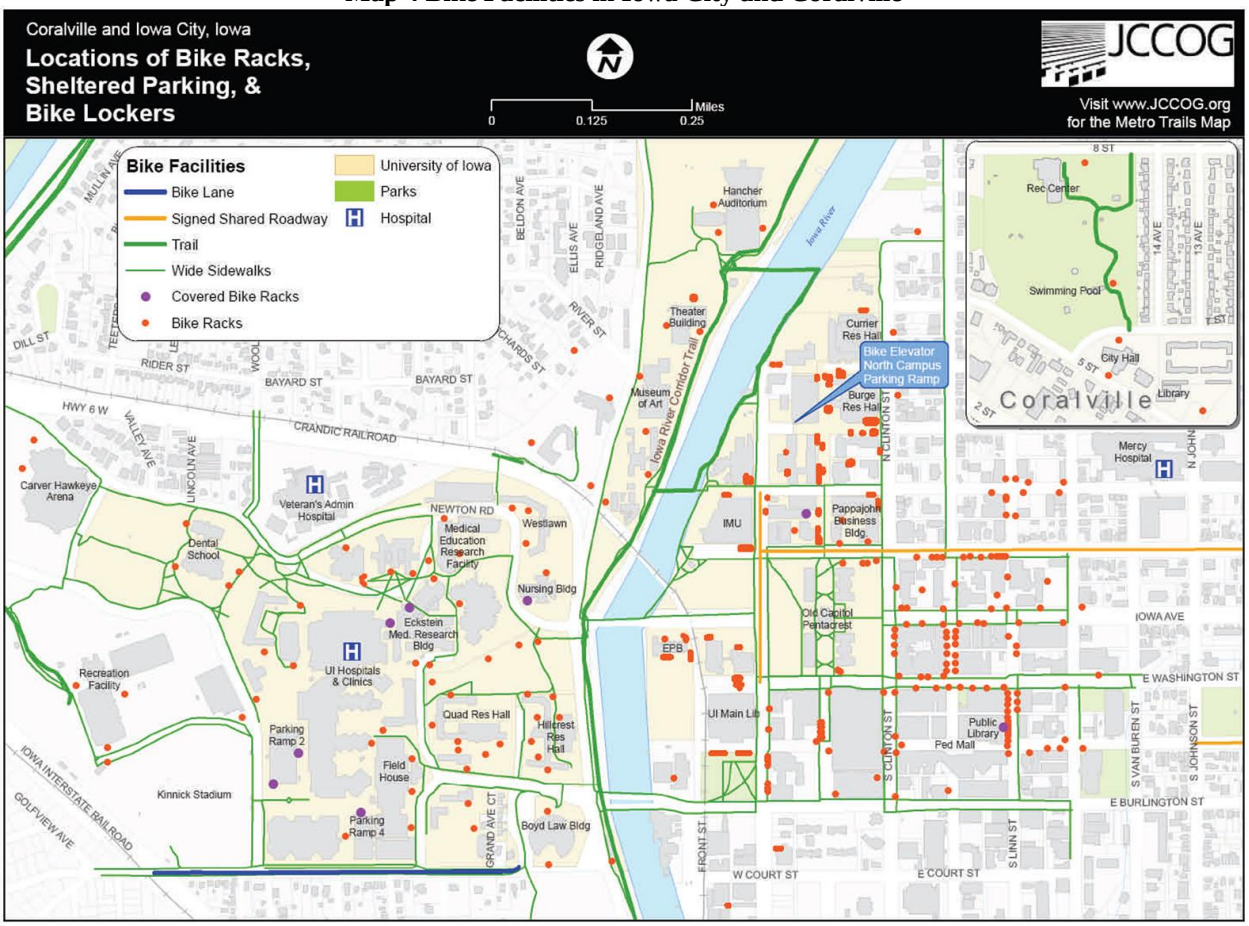
As part of the risk assessment process, the ICFD conducts a thorough evaluation of the risks (both fire and non-fire) within each RMZ. The assessment process identifies the maximum or worst, typical or routine, and the remote or isolated risk(s) within each RMZ.

Maximum risks are hazards that require the most amounts of emergency resources, or that would result in the greatest negative effect on the community. Examples include, but are not limited to, the loss of life or property; damage to critical infrastructure, economic, historical or environmental impact, etc. Typical or routine risks are those risks most common to an RMZ.

Community Transportation Systems

There are several modes of transportation within the city, including roadways, a municipal airport, bus service, trails, a bicycle friendly community, and a freight-only rail line. The Johnson County Council of Governments reports that, per the (2010) U.S. Census, Iowa City has far more pedestrian and bicycle commuters than the rest of the state, with 15.5 percent per capita pedestrians and 2.5 percent per capita bicyclists. The Eastern Iowa Airport, 20 miles to the northwest, is a commercial airport that provides service to the Iowa City / Cedar Rapids area.

Map 4 Bike Facilities in Iowa City and Coralville



Iowa City Municipal Airport Operations and Facilities

Iowa City's general aviation airport is located on the south side of the city, two miles southwest of the central business district. The Iowa City Municipal Airport is the second busiest general aviation airport in the state. It has been operating since 1918 and is the oldest general aviation airport this side of the Mississippi River. Eighty-four aircraft are based at the airport where approximately 36,000 flight operations are conducted annually.

The Iowa City Municipal Airport does not have a significant impact on the arterial street system. South Riverside Drive, a four-lane arterial street provides vehicular access to the airport. Existing Iowa City Municipal Airport facilities include two runways, the terminal building, a maintenance facility, hangars, and the fueling facilities. The airport terminal includes a pilots' lounge, weather briefing room, lobby, classroom, and administrative offices. Fueling facilities are provided for the fixed base operator.

The fixed base operator offers fuel sales, charter service, maintenance, flight lessons, and other airport support services. Existing runway dimensions are 3,900 x 75 feet (Runway 12-30), and 5,004

x 100 feet (Runway 7-25), and can accommodate larger aircraft than many other general aviation airports.

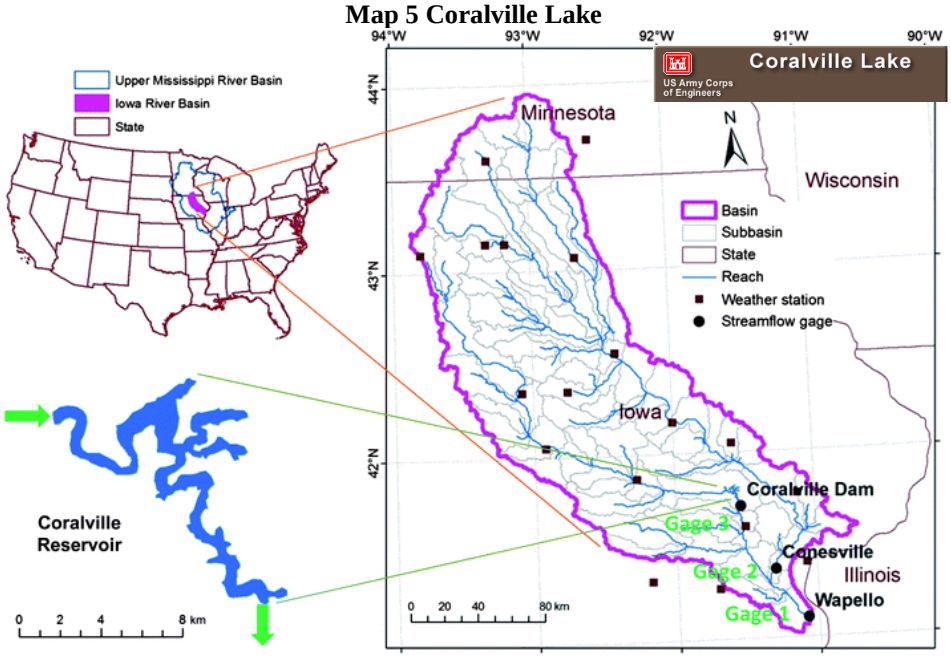
The airport is utilized by single engine, twin engine, turboprop, and business jet aircraft, along with helicopters. The airport also offers aircraft parking. Regional access to the airport is provided by U.S. Highway 218/27, I-80, I-380, U.S. Highway 6, and Iowa Highway 1. The airport supports 115 jobs in the Iowa City Area and contributes $11.2 million in economic output. A study on the economic impact of aviation in Iowa was commissioned by the Iowa Department of Transportation and estimates that 36,450 operations occur per year, and 70 aircraft visit the airport each week on average.

The Airport Commission voted in 2009 to change the traffic patterns on Runway 7 and 12 to right-hand traffic. The change provides increased safety for separation between aircraft and helicopter traffic landing at the UI Hospitals & Clinics. In addition, aircraft landing traffic patterns are shifted away from the residential areas to the north and northwest of the airport.

Waterways

The Iowa River runs through the City of Iowa City. Approximately 300 miles long, the Iowa River is open to traffic to Iowa City, about 65 miles from its mouth. The river is dammed to create the Coralville reservoir just north of Iowa City to provide flood control and recreation.

Map 5 Coralville Lake



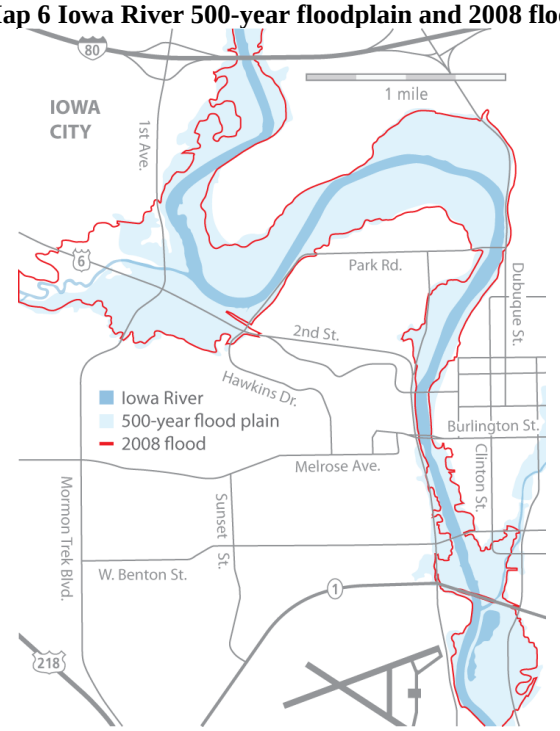
On June 15, 2008, the Iowa River in Iowa City crested at 31.53 feet. Major flood stage is 25 feet. Frequent and heavy rainfall events in late May and early June caused record flooding. Coralville Lake, the man-made reservoir built to control flooding, topped at a record 717.02 feet above sea level, five feet above the dam's emergency spillway.

The flood of 2008 was severe in many eastern Iowa communities. Nearly 800 homes and 260 businesses were damaged in Iowa City, Coralville, and rural Johnson County. Critical infrastructures such as drinking water and wastewater facilities were threatened. Many major roads and highways throughout Iowa were closed during the flooding.

Image 30 Flood waters over the emergency spillway at the Coralville Dam (2008)

Image 31 Coralville Lake: record high crest at 717.02 feet above sea level

Map 6 Iowa River 500-year floodplain and 2008 flood



Map 7 Iowa City 100 and 500 year floodplains

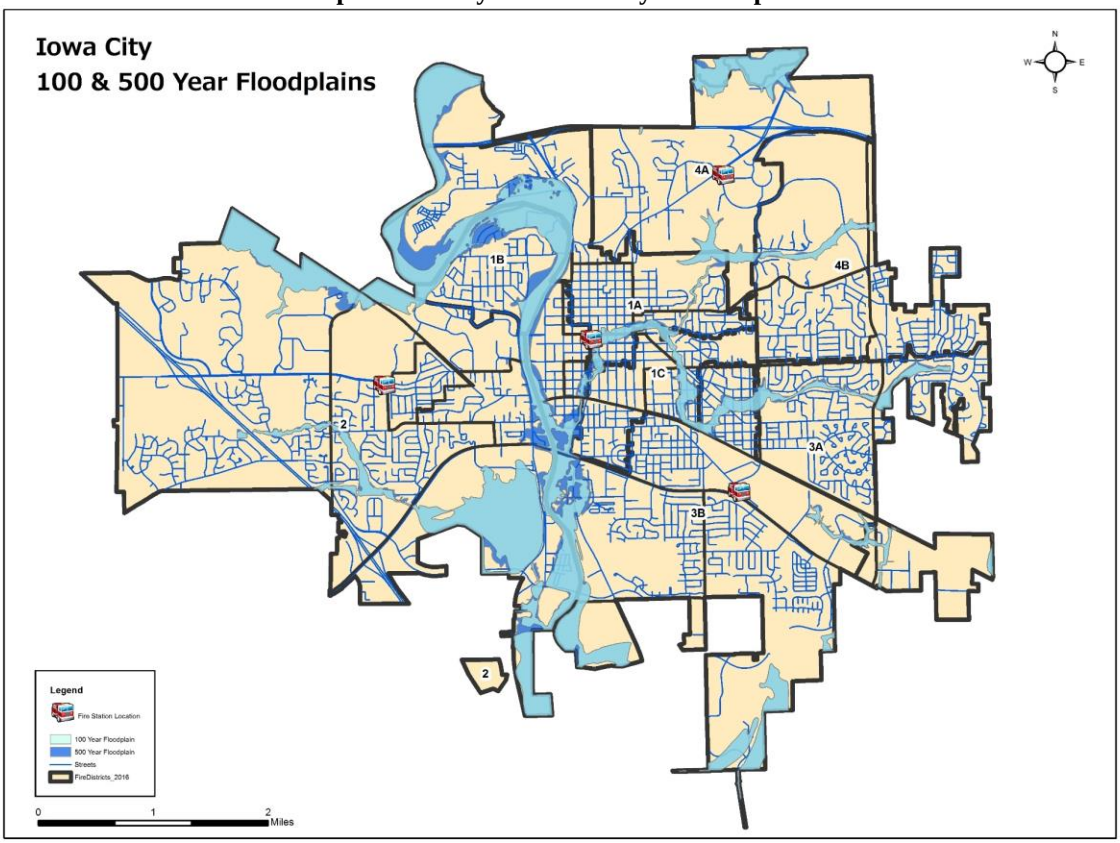


Image 32 2008 Flood, ICFD Training Center (tan building on the right)

Image 33 2008 Flood, The University of Iowa Memorial Union

Image 34 2008 Flood, University of Iowa Advanced Technology Research Facility

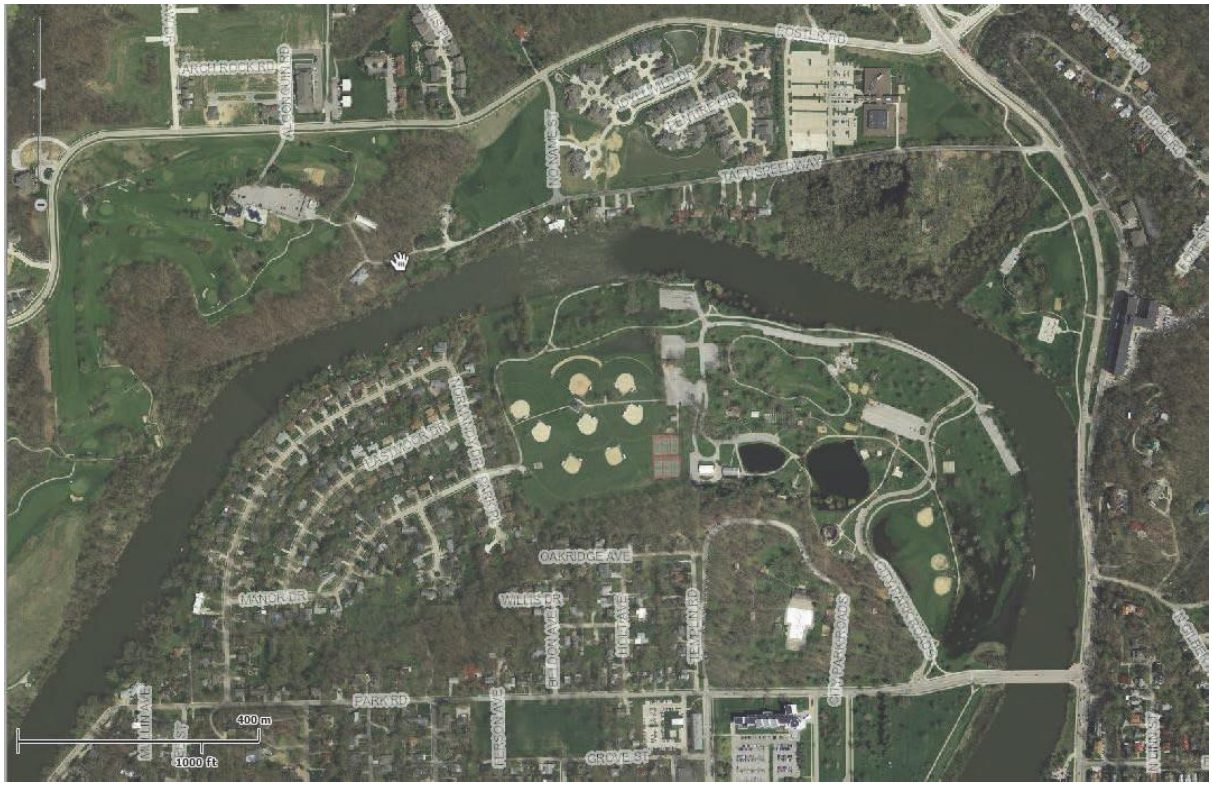


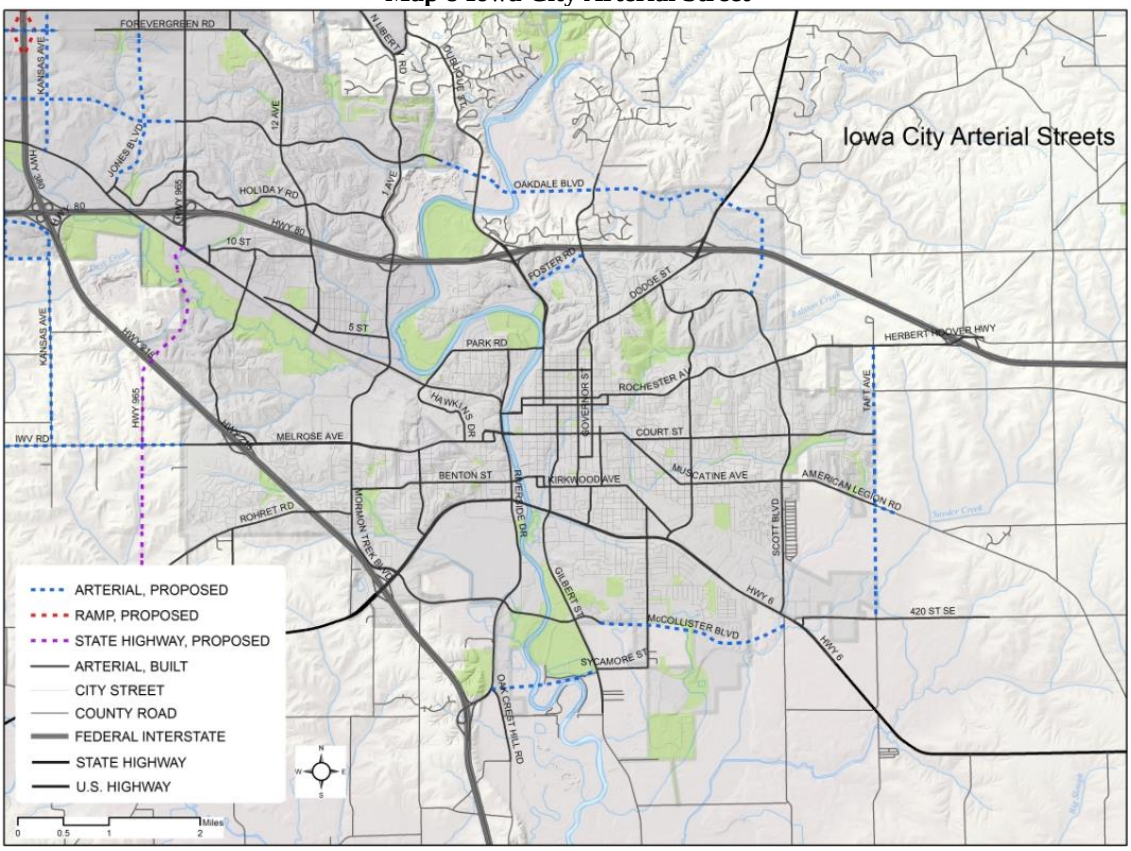
Image 35 Pre-Flood: Normandy Drive, Idyllwild, N Dubuque Street & Lower City Park

Image 36 2008 Flood: Normandy Drive, Idyllwild, N Dubuque Street & Lower City Park

Highways

Four highways run through Iowa City: U.S. 218/27, Iowa 1, and U.S. 6. Interstate 80 runs east-west along the northern edge of Iowa City. U.S. Highway 218/27 (The Avenue of the Saints) runs north south along the western edge of the city.

Map 8 Iowa City Arterial Street



Thousands of trips per day are made on the streets, roads, highways, and interstates that go through Iowa City. If the designated capacity of the roadway is exceeded, the potential for a major incident increases. Weather conditions play a major factor in the ability of traffic to flow safely in and through the city, as does the time of day and the day of the week. Although certain intersections may pose a higher risk than others due to a tight turning radius or low sight distance, traffic volume also plays a role, as streets with more traffic are more likely to experience a higher incident of accidents.

Rail

Iowa City is served by the freight-only Iowa Interstate Railroad (IAIS) and the Cedar Rapids and Iowa City Railway (CRANDIC). The main products handled by the IAIS, a class II railroad, include farm products, food products, transportation equipment, waste and scrap products, and metals. The CRANDIC is a class III railroad. The main products handled by the CRANDIC include food products, coal, grain, paper, and hazardous materials.

First Avenue Grade Separation Project

Approximately 13,000 vehicles use First Avenue daily, with future volumes projected to increase moderately. Each day, between two and four trains block First Avenue, causing conflicts, major traffic delays, and delays in our ability to provide emergency services. Traffic studies have shown that on average, whenever the crossing is blocked, 288 vehicles idle in traffic for 10 to 20 minutes, while another 392 vehicles seek other routes, including the nearest grade-separated crossing on Summit Street, a four-mile detour.

Construction on a grade separation project began in April of 2015. The plan involves lowering First Avenue while raising the railroad at the current at-grade crossing of the Iowa Interstate Railroad. The City of Iowa City has designated funds, along with support from federal funding, to design and construct the separation between the railroad and vehicle and pedestrian traffic. Included in this project will be a new railroad bridge, street paving, water main improvements, and other related work. The project will decrease risk to this portion of Iowa City and improve fire department response reliability by eliminating the blockage of traffic along First Avenue caused by passing trains.

Image 37 First Avenue Grade Separation

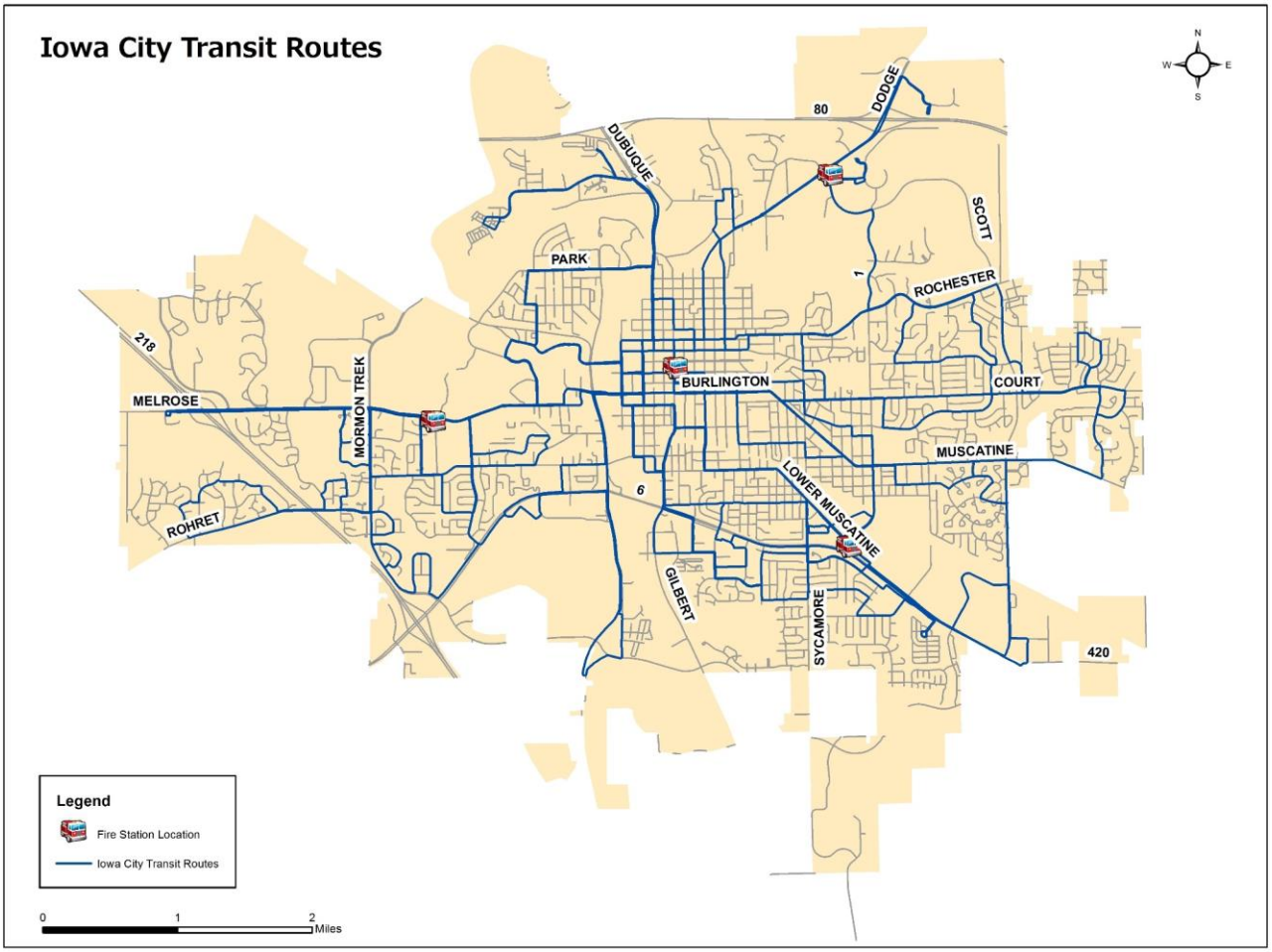
The city and the surrounding areas stand to benefit from other proposed rail improvements. The Iowa Department of Transportation is working to initiate a new commuter-oriented passenger rail service in the Iowa City and Cedar Rapids Corridor on the CRANDIC lines. The corridor is well-located to serve commuters traveling from Cedar Rapids, North Liberty, and Coralville to Iowa City's downtown and the University of Iowa.

In 2010, the State of Iowa received $230 million in transportation appropriation funds to create a new intercity passenger-rail service between Chicago and Iowa City via the Quad Cities, by upgrading 131 miles of track to meet FRA Class IV requirements, which will enable 79 mph passenger-rail operations. The project is moving forward in the state of Illinois but political support in Iowa has waned.

Transit Service

Iowa City Transit, Coralville Transit, and the University of Iowa Campus provide public transportation. Iowa City has a higher than average number of buses and public transportation options compared to most other cities in Iowa. The 2010 Census showed that among similarly sized communities, the Iowa City Urbanized Area ranked tenth in the country for percentage of persons using public transit to get to work at 5.3 percent. The next highest percentage for a metropolitan area in Iowa was 1.6 percent. The Iowa City Urbanized Area also ranked third highest in the country for persons walking to work at 10 percent.

Map 9 Iowa City Transit Routes



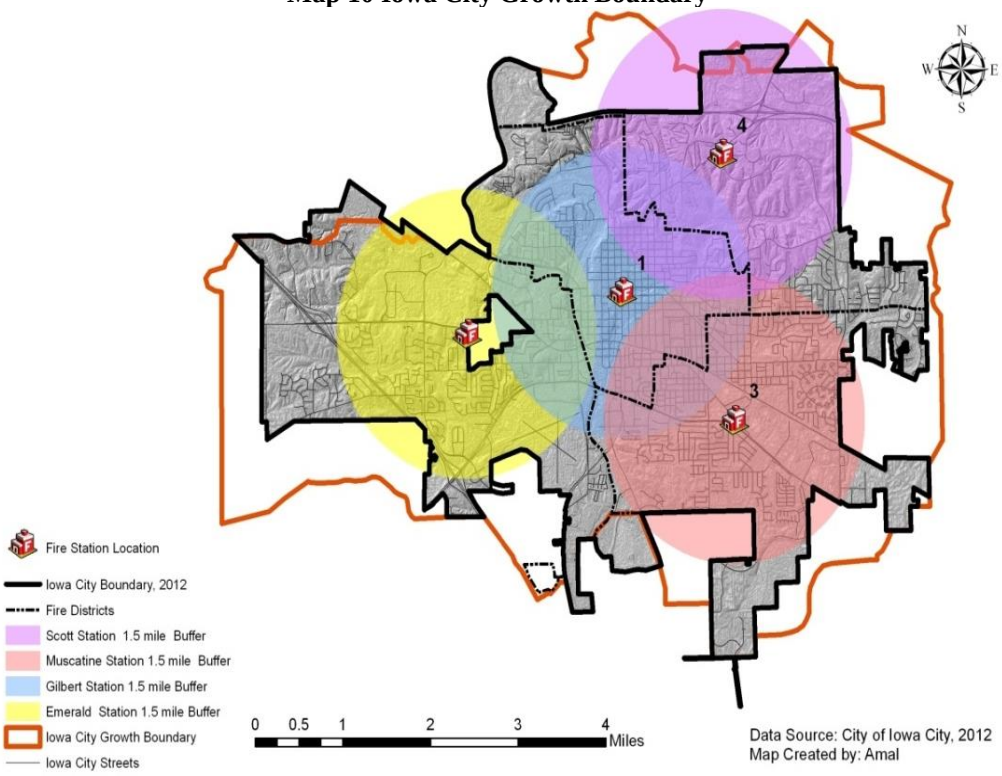
Iowa City Transit is the primary provider of public transit in the north district. Two bus routes offer residents of the north district connections to downtown Iowa City, the University of Iowa, and to other destinations in the Iowa City area. The Manville Heights route provides transportation to the western portion of the district, while the North Dodge route provides service in the eastern half of the district. The University of Iowa's CAMBUS provides fixed route service to campus facilities and the University of Iowa Bionic Bus and the Johnson County SEATS provide para-transit for persons with disabilities.

Community Critical Infrastructure
(e.g. water supply distribution, storm drainage, etc.)

Iowa City's growth policy is an integral part of the Comprehensive Plan in three ways: 1) It defines a long-range planning boundary for Iowa City; 2) It establishes when annexations should occur; and 3) It establishes where the investment of public funds for infrastructure and improvements should occur (namely roads, water, and sewer).

The Growth Boundary defines the city's potential corporate limits – land that, for the purposes of long-range planning, is projected to serve the city's growth need for 30-40 years. Sanitary sewer and streets are the most expensive items of public infrastructure that must be provided to all new development within the City.

Map 10 Iowa City Growth Boundary

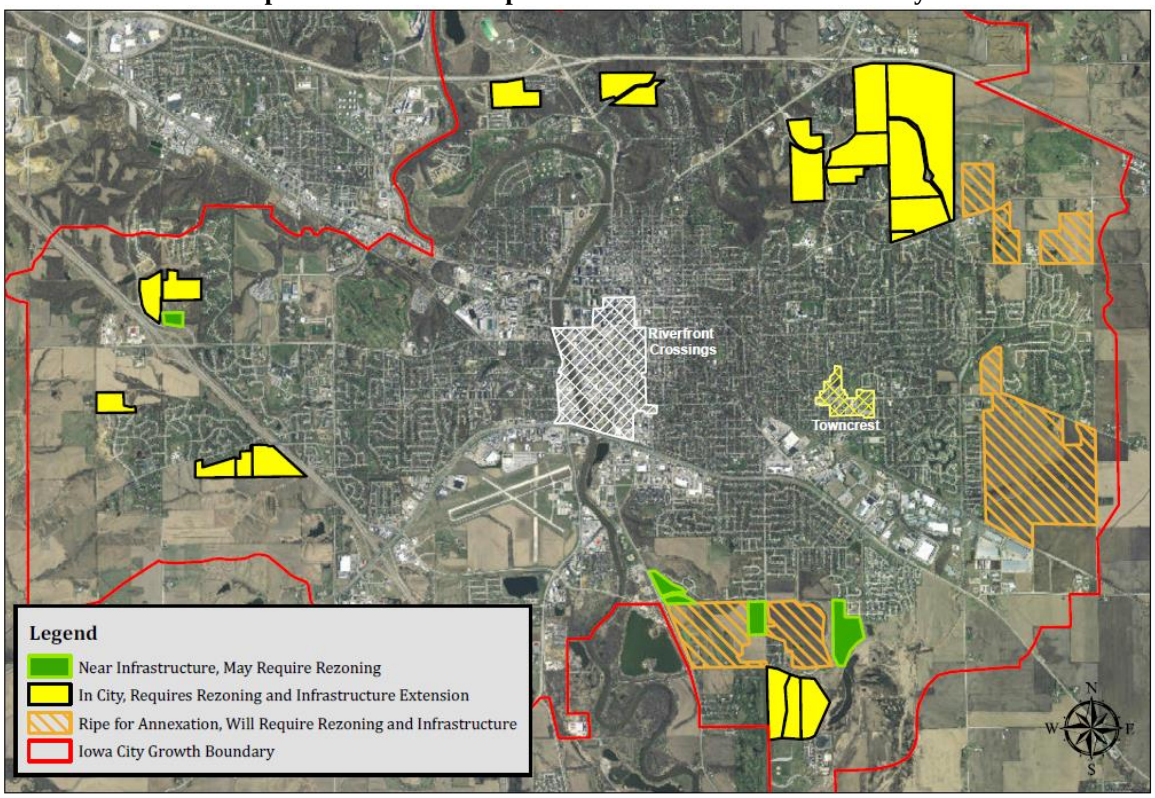


Land included in the growth area must have the potential to be connected to the sewer system, which is based on watershed boundaries. Guiding new developments to watersheds that can be served by gravity flow to the City's sewage treatment plant enables the most cost effective provision of this essential City service. The growth boundary is used when making decisions regarding the extension of infrastructure, the approval of subdivisions, the approval of agreements with other governmental jurisdictions regarding growth, and in response to annexation requests. In addition, the City coordinates with private utilities to ensure that areas proposed for development can be fully served.

A Public Works Land Inventory indicates that Iowa City had more than 1,496 acres of vacant residential land within city limits, mostly in the South and Northeast District. The designated growth area contains an additional 3,095 acres of vacant residential land. If future residential development

occurs at densities similar to recent development patterns, Iowa City could reach build out capacity in 2034. However, if residential development were to maximize current zoning capacity, Iowa City would not reach build out capacity until 2055. Infill development at higher densities would absorb some housing demand, thus conserving farmland and maximizing the use of infrastructure.

Map 11 Potential Development Areas: Perimeter of Iowa City



When the City prioritizes public investment in infrastructure and public amenities, improvements that serve properties within the corporate limits of Iowa City that further the City's policy of compact and contiguous growth, including urban infill development, should be given priority. This policy will guide decision-making for the City's Capital Improvement Program (CIP). The CIP is one of the most effective tools the City has to affect the timing and direction of growth. Historically, the City invested in infrastructure to accommodate moderate growth rather than building infrastructure prior to development. In the future, City Council will use the CIP to effectively guide the location and timing of growth in the community through an annual review and prioritization of the CIP prior to the budget process.

Area Development

Growth Boundaries

While continued development of new neighborhoods and employment areas are anticipated in the City's growth area, a significant policy focus for the City is to accommodate growth to the extent possible by facilitating higher density urban infill development, such as in the Riverfront Crossings

District, and through stabilization and revitalization efforts in existing neighborhoods and commercial areas.

Map 12 Riverfront Crossing District

In 2014, the City of Iowa City completed its $50 million Wastewater Treatment Plant expansion project; the largest public works project ever undertaken by the City. The work involved permanently shutting down operations at the 80-year-old North Plant, located on South Clinton Street, and expanding the newer South Wastewater Treatment Plant on Napoleon Street. The plant is state-of-the-art, utilizing innovative modern designs, and natural bioprocesses that are inspired by nature to treat the wastewater and return it to the Iowa River. Unlike the hazardous chemicals that were used in the past, these eco-friendly processes ultimately protect our community and our environment, including the restored wetlands and prairie that surround the facility, where grasses, wildflowers, birds, and wildlife abound. The $26.5 million expansion at Iowa City's south wastewater treatment plant doubled its capacity from 5 million gallons per day (MGD) to 10 MGD. The expansion provided Iowa City with the opportunity to configure the system to serve long-term city growth and allow the phase out of the older, downtown north wastewater treatment plant.

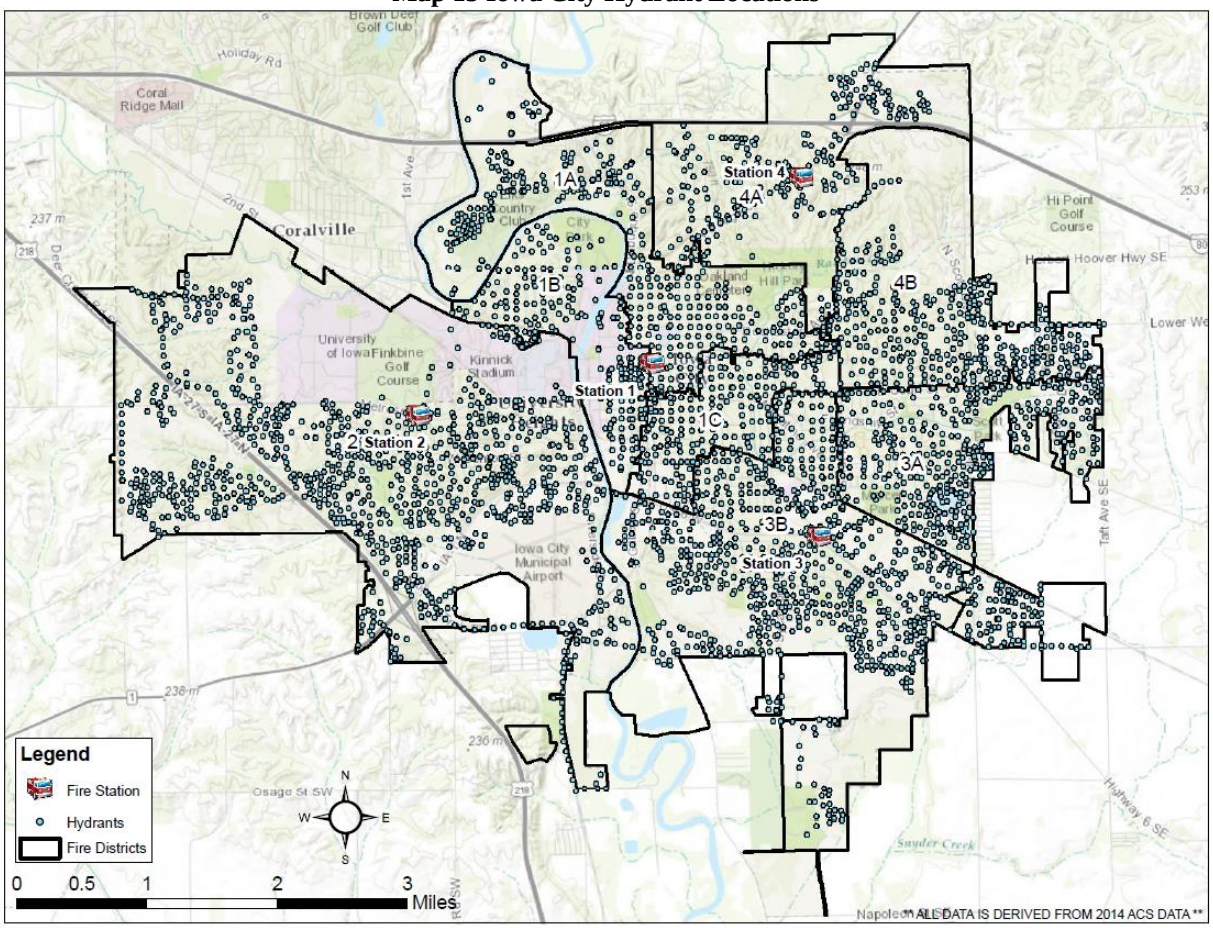
Image 38 Iowa City's Wastewater Treatment Plant

Iowa City's water treatment plant went online in 2003. The plant was designed to treat five different sources of water including surface water. The primary source of water utilized by the city is water from alluvial wells. Deep wells include two Jordan wells (approximately 1,600 feet deep) and four Silurian wells (approximately 400 feet deep). There are four alluvial wells, shallow wells approximately 40 feet deep that use the sands and gravel adjacent to the river to naturally filter impurities from the raw source before reaching the purification facility. Surface water sources include the Iowa River and a manmade lake located on the facility site. Because of the many water sources on two water well sites, Iowa City has the ability to provide an excellent blend of high quality water as well as an abundant capacity. After blending the water, it is purified through an aerator; softened to improve clarity and reduce water hardness; re-carbonated to stabilize the water for customer use; filtered to remove particle traces and improve taste; and then disinfected and fluoridated. The water is then ready for consumption.

Image 39 Iowa City Water Treatment Plant

The City of Iowa City, Comprehensive Annual Financial Report lists the following critical infrastructure assets:
Miles of water main: 271
Number of city owned fire hydrants: 3,385

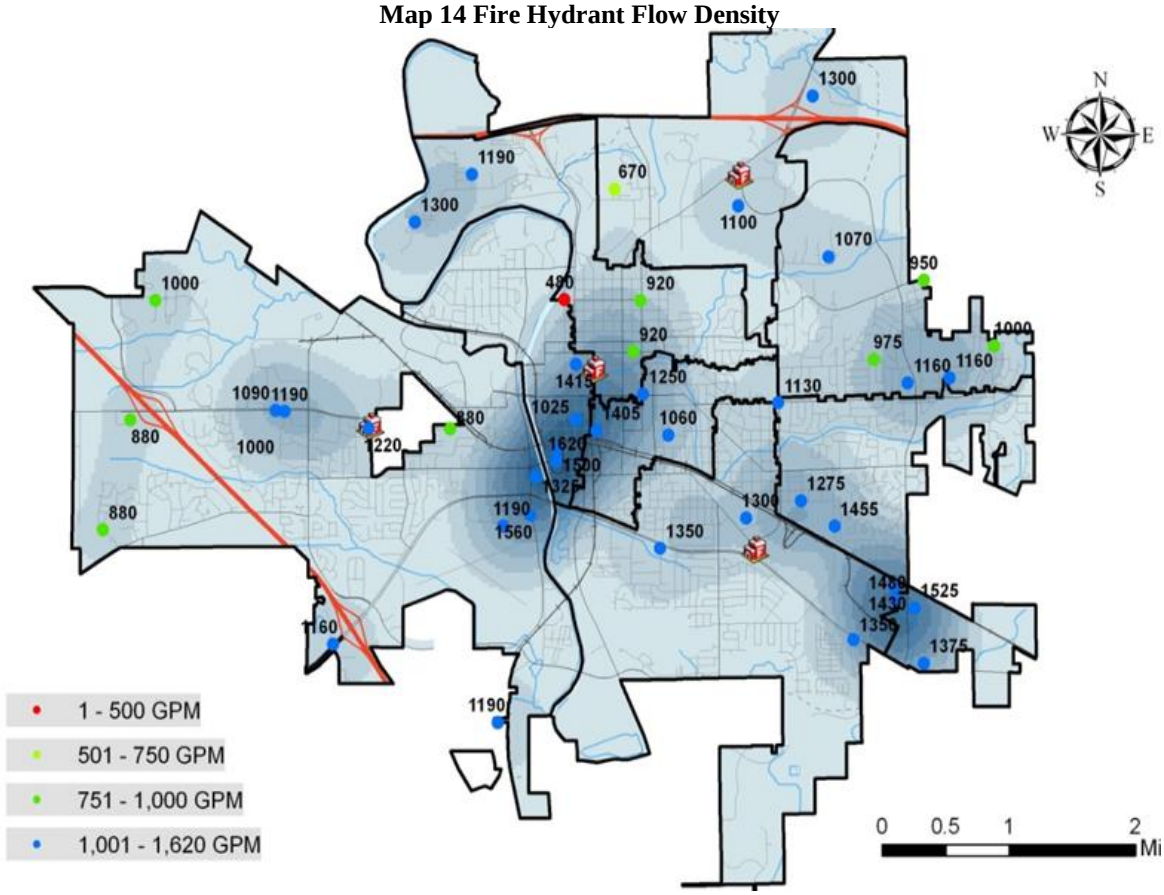
Map 13 Iowa City Hydrant Locations



Daily average consumption of water in gallons: 5,640,000
Maximum daily capacity of water treatment plant in gallons: 16,700,000
Maximum storage capacity in gallons: 9,000,000
Sanitation Landfill: 411 acres
Landfill tonnage: 115,624
Miles of sanitary sewer: 298
Miles of storm sewer: 131
Daily average wastewater treatment in gallons: 10,020,000
Maximum daily wastewater treatment capacity of plant in gallons: 41,100,000
Streets (in miles): 279
Street lights: 3,412

The map below shows fire flow density based on flow tests for a sample of 100 fire hydrants. The concentrations of higher flow hydrants are well suited for parts of the city that are the most populated and have higher property values.

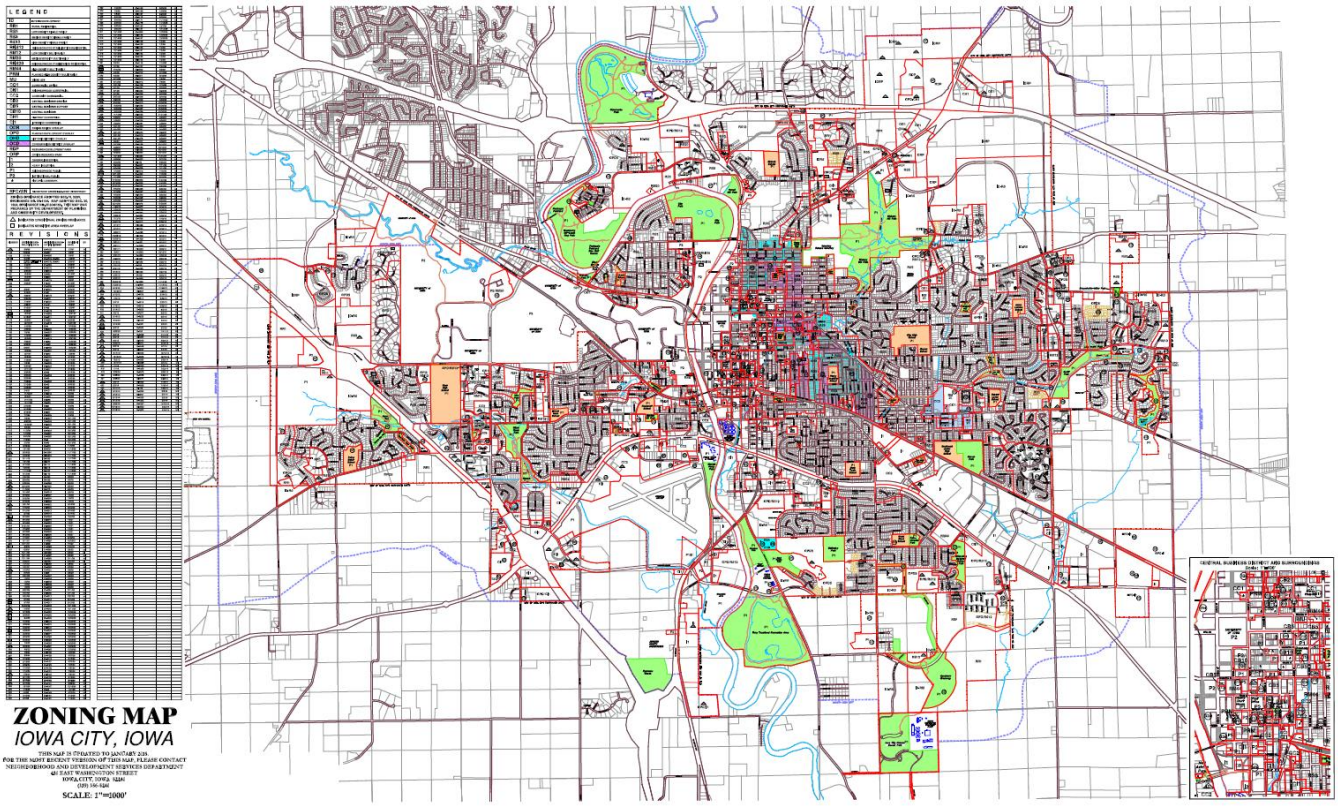
Map 14 Fire Hydrant Flow Density



Community Land Use and Zoning

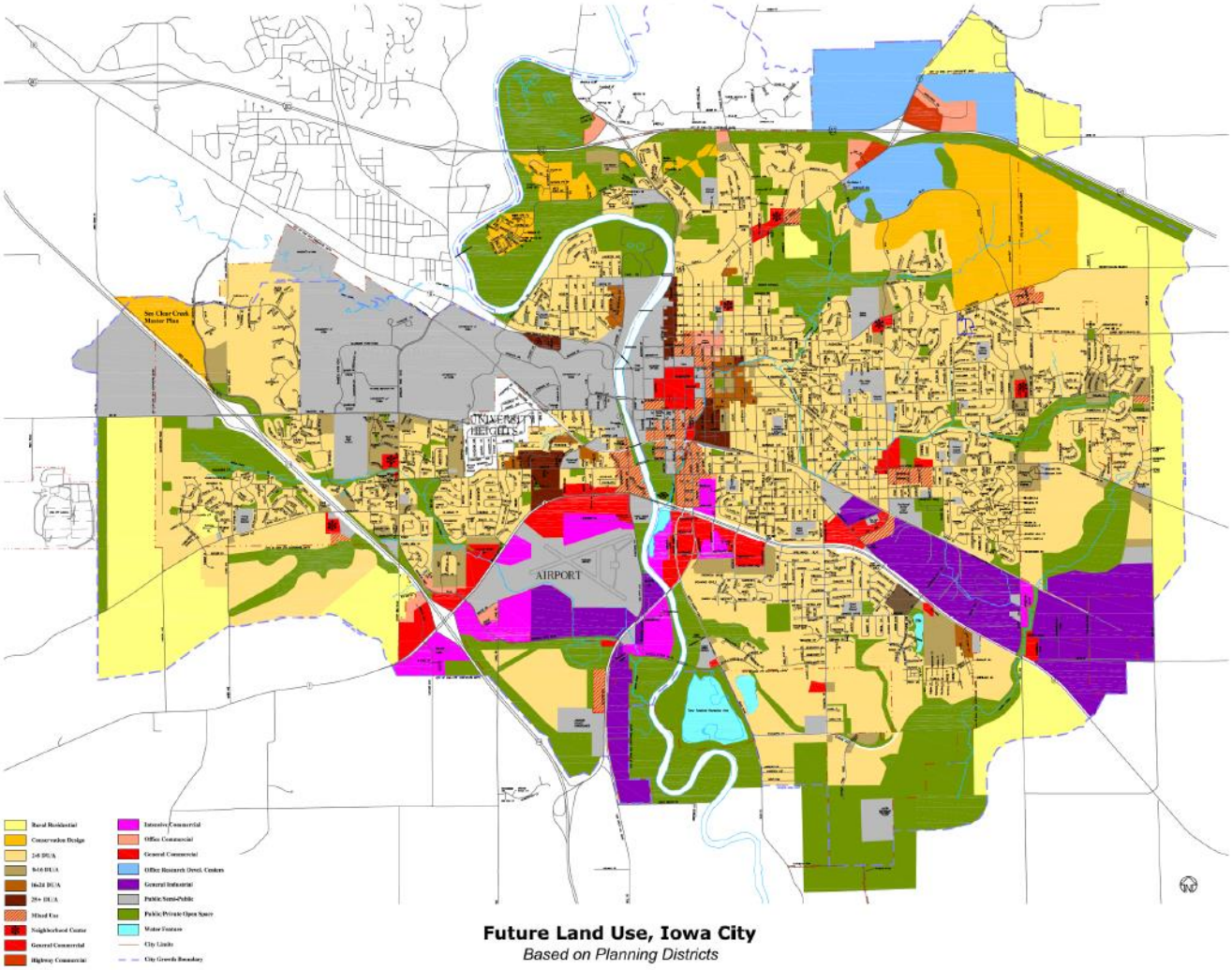
The character and future of Iowa City is set by the imagination, vision and commitment of the people who live and work here. The Urban Planning Office engages the general public in comprehensive and district planning. The Urban Planning Office reviews and makes recommendations for the Iowa City Planning and Zoning Commission on applications for rezoning, street vacations, annexations, subdivisions, and changes in the Iowa City Zoning Code.

Map 15 Iowa City Zoning Map



The Comprehensive Plan is often referred to as a roadmap for directing growth and change over time. It describes a broad vision for the kind of community Iowa City should be and the steps necessary to get there. The Comprehensive Plan guides decisions on planning and development issues as they arise and evolve as amendments are made.

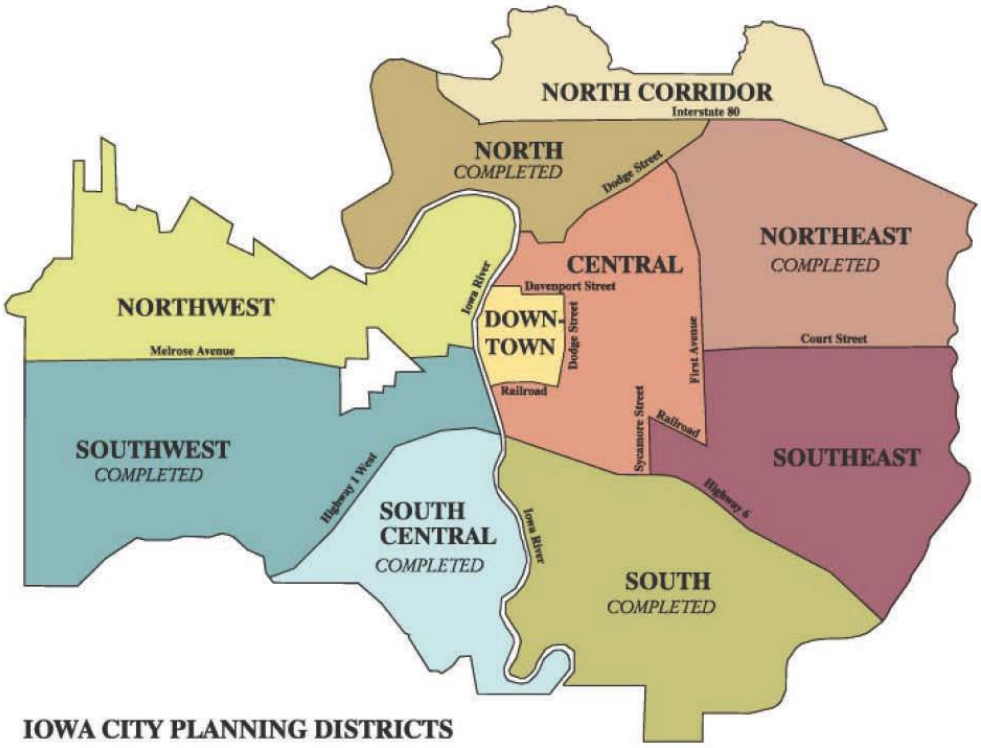
Map 16 Future Land Use



Future Land Use, Iowa City
Based on Planning Districts

The City of Iowa City adopted an updated Comprehensive Plan in May of 2013. The new plan, Iowa City 2030, sets a foundation for moving our community forward on a path to sustainability. The plan sets forth a general vision and a broad set of goals to guide future development within the city. It includes a Future Land Use Map with general designations of appropriate land uses and density of development in relation to available infrastructure. A sustainability assessment completed in the summer of 2013 provides baseline data that may be used to set measurable targets and goals in areas such as energy and water conservation, resource management and community wellness.

Map 17 Iowa City Planning Districts



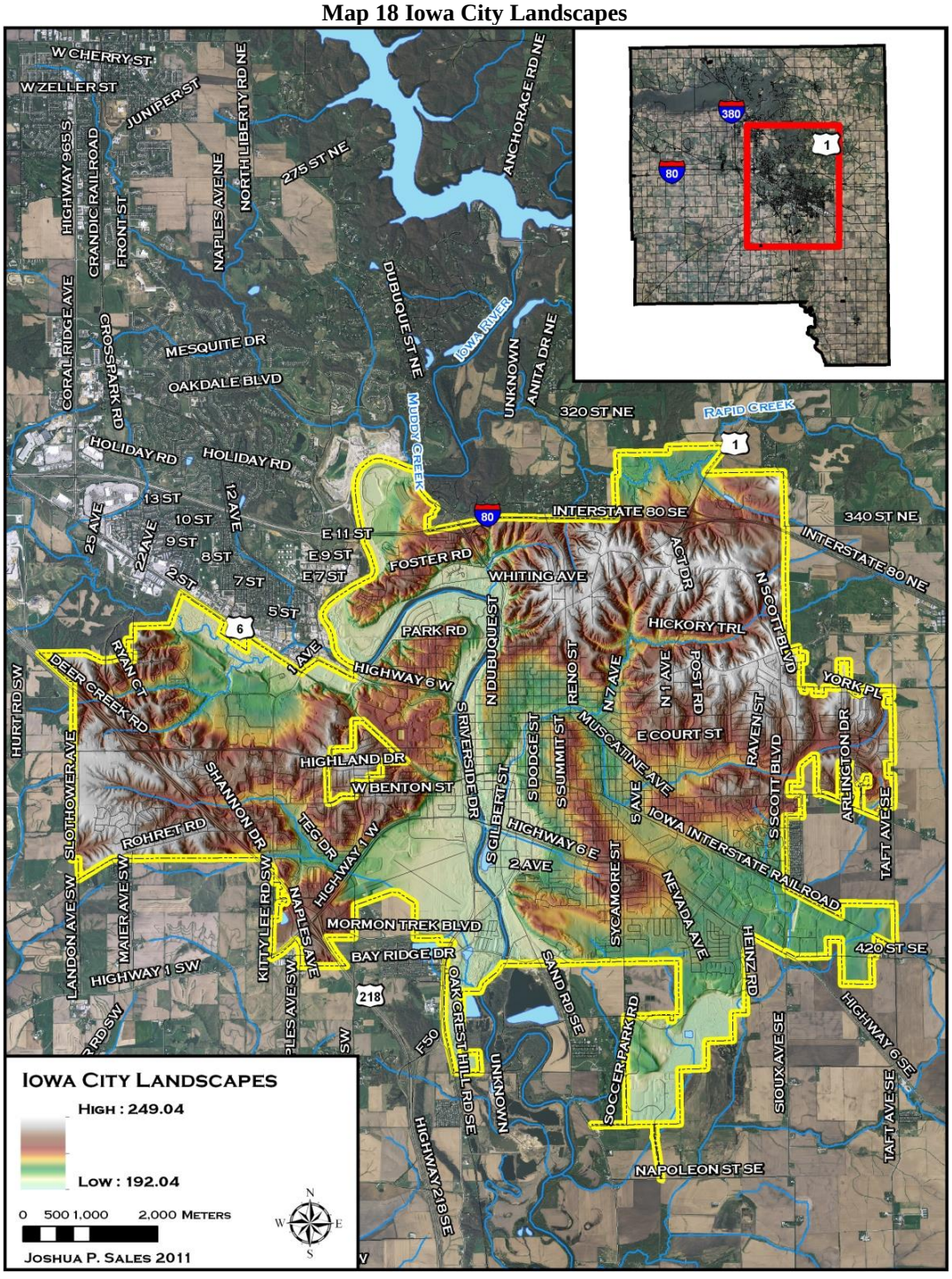
The district planning process involves extensive citizen participation focusing on ten district areas of the community. Detailed plans have been developed for eight of the ten planning districts. These plans address the unique issues and opportunities in each district. Once adopted by the City Council, the district plans become part of the Iowa City Comprehensive Plan. The most recently adopted plan is the Downtown and Riverfront Crossings Master Plan.

Community Topography

The Iowa glacial plain was formed by five different glaciers. The last glacier, which covered about one-fifth of the state's area, retreated from the north-central region some 10,000 years ago, leaving the topsoil as its legacy. Glacial drift formed the small lakes in the north. The oldest rock outcropping, located in the state's northwest corner, is about 1 billion years old.

The topography of Iowa consists of a gently rolling plain that slopes from the highest point of 1,670 ft. (509 m) in the northwest to the lowest point of 480 ft. (146 m) in the southeast at the mouth of the Des Moines River. About two-thirds of the state lies between 800 ft. (244 m) and 1,400 ft. (427 m) above sea level; the mean elevation of land is 1,100 ft. (336 m). Iowa City has a wide range of elevations, generally sloping from the hills on the northeast and west sides of town down toward the Iowa River and areas toward the south of town. The average elevation for the city is 668 feet (203.6 m) above sea level from a low of 630 feet (192.04m) to a high of 817 feet (249.04 m).

Map 18 Iowa City Landscapes



Supremely well suited for agriculture, Iowa has the richest and deepest topsoil in the US and an excellent watershed. Approximately two-thirds of the state's area is drained by the Mississippi River, which forms the entire eastern boundary, and its tributaries. The western part of the state is drained by the Missouri River and its tributaries. Iowa has 13 natural lakes.

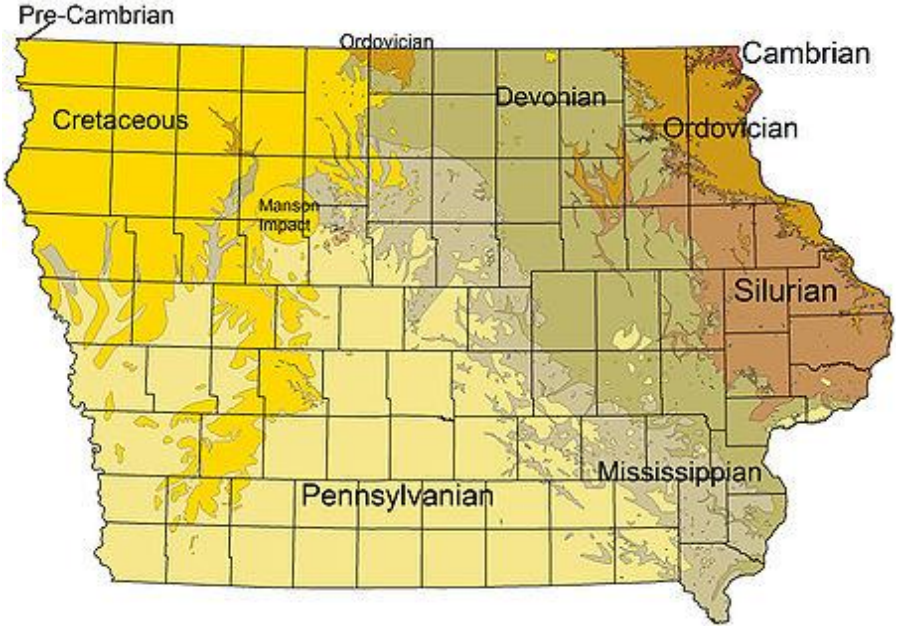
Community Geography

Iowa City is within the regional geographic units, which define its vegetation, topography, and geology. The EPA's Level IV Eco-regions (2002) identifies the Southern Iowa Rolling Loess Prairies, a region known for its undulating and rolling landscapes, and the Interior River Lowlands as the sub-regions of local prominence.

Community Geology

Iowa's bedrock geology generally increases in age from west to east. In northwest Iowa, Cretaceous bedrock can be 74 million years old, in eastern Iowa Cambrian bedrock dates to 500 million years ago. Buried deeply within Iowa's bedrock, the Midcontinent Rift System can be seen clearly in magnetic anomaly maps of Iowa. This billion-year-old tectonic plate scar extends from Kansas through Lake Superior. This rift is not seismically active. No major active fault lines exist in Iowa, and Iowa is one of the most seismically stable states in the US. Apart from a 1968 Illinois earthquake, which caused the water tower at Lineville, Iowa to leak, no injuries or significant damage has ever been caused by earthquakes in Iowa. Lake earthquakes associated with the New Madrid Fault of far southern Illinois and Missouri can occasionally be felt in eastern Iowa.

Map 19 Bedrock Geologic Map of Iowa



Iowa is generally not flat; most of the state consists of rolling hills. Iowa can be divided into eight landforms based on glaciation, soils, topography and river drainage. Iowa City lies within the Southern Iowa drift plain. The SIDP is probably the most familiar landscape to travelers, since most of Interstate 80 in Iowa runs through the SIDP. The classic Iowa landscape, consisting of rolling hills of Wisconsin-age loess on Illinoisan (or earlier) till. The SIDP is some of the most productive agricultural land in the world.

Community Physiography

Floods in 1993 washed away all the soil and unconsolidated bedrock along the spillway of the Coralville Lake Dam, just two miles north of Iowa City, exposing a rich collection of Devonian-age fossils. This area has been transformed into a visitors' center, where hikers can tour the bedrock. The June 2008 floods expanded the fossil bed floor, and removed some of the weathered overburden.

Historically, Iowa was a significant coal producer. Iowa coal tends to be too high in sulfur for modern applications, and the last commercial mine closed in 1994. Iowa has very limited natural gas and oil production.

Like most Upper Midwest and Plains states, radon is a common problem in Iowa, especially in areas with clay-rich soils.

The elements of terrain and vegetation interplay across the city. Terrain that is present includes:

- Level and gently undulating uplands
- Nearly level stream courses, floodplains, bottomlands
- Open slopes and ravines
- Rolling uplands

Vegetation/Habitat features that are present in Iowa City include:

- Forests
- Woodlands
- Prairie
- Wetlands

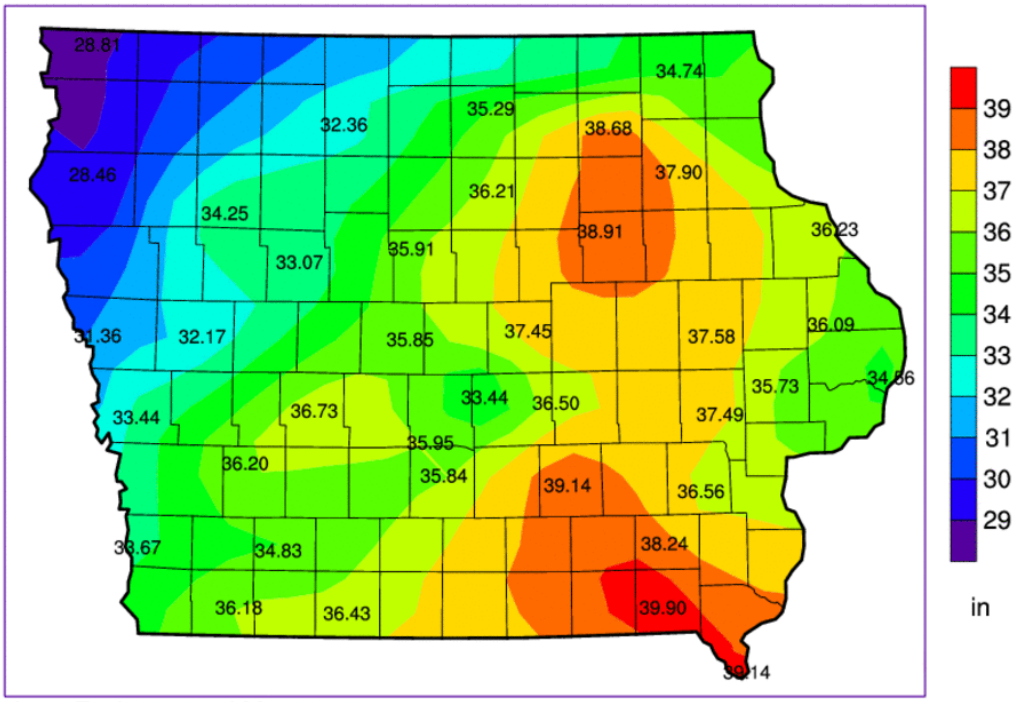
Landscape elements and features combine to create a mosaic of different habitats in different terrain settings throughout the city. As a river city, its geographical location grants close proximity to the Iowa River. Locally prominent limestone, shale, and dolomite outcrops line the remnant bluffs and terraces above the river's edge, which sometimes hint at the former course before the Iowa River channelized to control flooding.

Local habitats are representative of statewide ecosystems commonly found within the general categories of Forest, Open Woodland, Savanna, Wetland, and Prairie terrestrial habitats dissected by aquatic habitats found with the Iowa River and its tributaries. Aquatic habitats within Iowa City include the Iowa River, Rapid Creek, Ralston Creek, Clear Creek, and Snyder Creek.

Community Climate

Like most cities in the upper Midwest and due to its location in the central portion of North America, the climate is continental in character. Iowa City experiences four seasons annually – spring, summer, fall, and winter. Because it is far from the influence of a large body of water, a wide variation in both temperature and precipitation during four seasons is common.

Map 20 Yearly Average Precipitation (1981-2010)



Spring ushers in the beginning of the severe weather season. Iowa averages about 50 days of thunderstorm activity per year. Iowa City's climate is warm and humid during the summer with daytime temperatures often near 90 degrees Fahrenheit and very cold during the winter when temperatures drop well below freezing. The warmest month of the year is July, with an average maximum temperature of 87.5 degrees Fahrenheit, while the coldest month of the year is January, with an average minimum temperature of 13.4 degrees Fahrenheit. The highest recorded temperature was 104 degrees Fahrenheit in 1988, while the lowest recorded temperature was -26 degrees Fahrenheit in 1996.

Temperature variations between night and day tend to be moderate during summer with a difference that can reach 21 degrees Fahrenheit, and limited during winter with an average difference of 17 Degrees Fahrenheit. The annual average precipitation in Iowa City is 37.27 inches. Rainfall is evenly distributed throughout the year.

The pattern of precipitation across Iowa is seasonal, with more rain falling in the summer months. Summer precipitation results primarily from thunderstorm activity, although longer, less intense rains are common in the area. Other forms of precipitation recorded in the area include snow, hail, ice pellets, and sleet. The month of June is typically the wettest month. The annual snowfall average based on weather data collected from 1981 to 2017, from the NOAA National Climate Data Center is 27.2 inches.

The following data tables contain Iowa City's weather information, which was provided by the weather base in March 2016.

Table 4 Monthly Weather Averages, Summary

Average Temperature — Years on Record: 30

	ANNUAL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
F	50	22.1	26.3	38.6	51	61.4	71.5	74.8	72.7	64.2	52	39	25.2

Average High Temperature — Years on Record: 30

	ANNUAL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
F	59.6	30	34.3	48.2	61.7	71.9	81.6	84.6	82.6	75.9	62.9	47.7	33

Average Low Temperature — Years on Record: 30

	ANNUAL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
F	40.4	14.3	18.3	29.1	40.2	50.9	61.3	65	62.8	52.5	41.1	30.2	17.5

Average Precipitation — Years on Record: 30

	ANNUAL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
in.	36.3	0.9	1.2	2.2	3.5	4.2	4.6	5	4.5	3.4	2.9	2.4	1.5

Highest Recorded Temperature — Years on Record: 26

	ANNUAL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
F	109	61	66	84	92	105	105	109	108	99	94	81	67

Lowest Recorded Temperature — Years on Record: 25

	ANNUAL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
F	-23	-23	-23	-16	13	27	37	45	39	24	11	-4	-19

F = Degrees Fahrenheit; in. = Inches of Precipitation

Although weather impedance to emergency response is rare, the consideration of such a factor is still important. Heavy snow and ice can seriously impede response times as it did in 2007 when large amounts of rain and slush suddenly froze leaving thick icy ruts forcing emergency response vehicles to reduce their speed. Heavy equipment was eventually used to scrape the pavements clean but for several weeks the impact was measurable and led to numerous broken axles and springs on emergency response vehicles.

Table 5 Average Snowfall, Rainy Days, Relative Humidity

Average Snowfall — Years on Record: 63

	ANNUAL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
in.	28.4	7.7	6.7	5	1	---	---	---	---	---	0.2	1.8	6

Average Number of Rainy Days — Years on Record: 99

	ANNUAL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Days	64.8	3.7	3.6	5.3	6.1	6.9	7.5	6.9	6.6	6	4.5	3.8	3.9

Average Relative Humidity — Years on Record: 6

	ANNUAL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
%	74	79	78	75	67	70	75	76	77	75	69	72	78

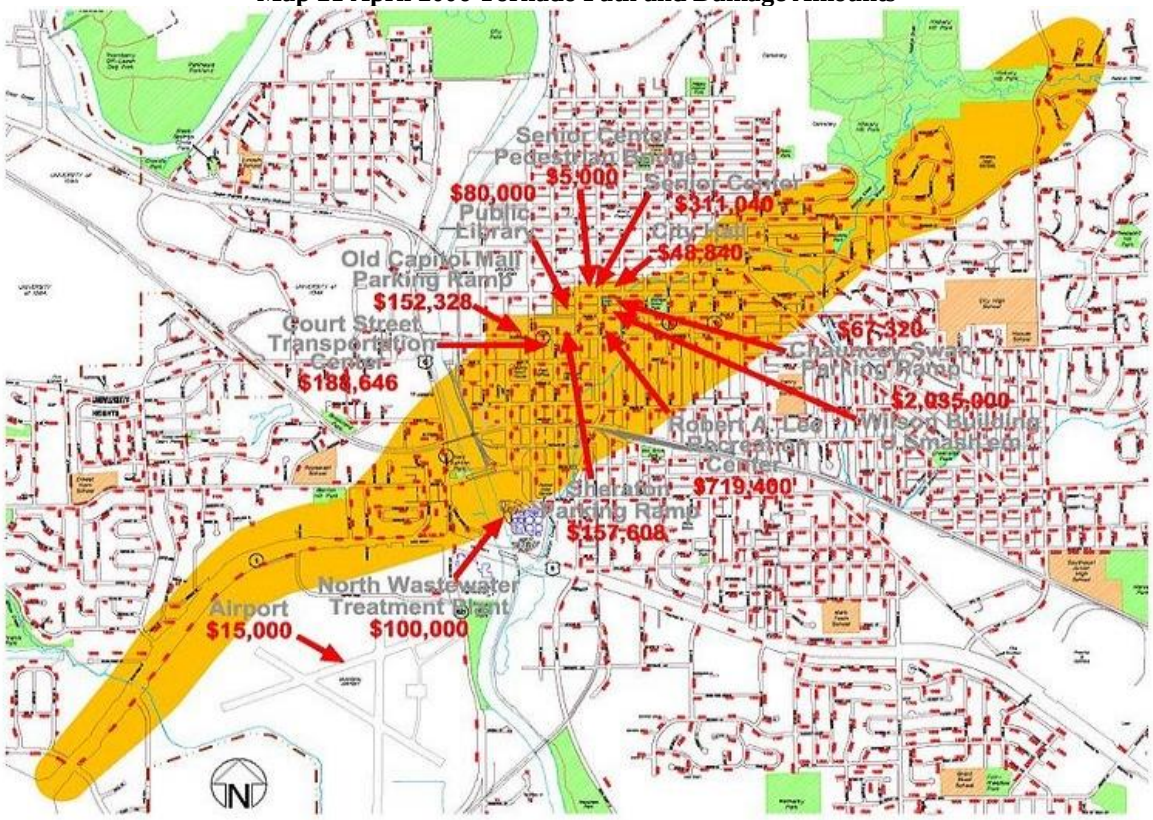
Image 40 Iowa City Streets Department at work

There are no large bodies of water between the Rockies and Iowa, so meteorologists say Iowa is in the "rain-shadow" of the mountains. This means most of the time the west winds that cross Iowa are dry and hot. Cool, dry air from the north provides relief from summer heat or it can make it even colder in the winter. Southerly winds coming up from the Gulf of Mexico provide most of Iowa's precipitation.

Any of these systems can be in place for a long period of time. They produce stable, sometimes pleasant, sometimes unpleasant weather conditions. Long periods of hot, dry winds from the west can cause drought conditions. A continuous stream of moisture-rich air from the south can cause flooding. When any two of the systems collide, there is a good chance there will be an outbreak of severe weather.

On the evening of April 13, 2006, a severe storm consisting of large hail and tornadoes struck Iowa City, causing severe property damage and displacing many from their homes, including University of Iowa students. The storm left a path of destruction three and a half miles long and a third of a mile wide. The National Weather Service reported five to six tornadoes in Johnson County, two of which touched down in Iowa City, and one of which was classified as an EF-2 tornado, with winds over 150 miles per hour. It was the first tornado recorded to directly hit Iowa City. No serious injuries were reported.

Map 21 April 2006 Tornado Path and Damage Amounts



Iowa City is located in tornado alley and within Wind Zone 4, the highest wind zone in the country. Per NOAA records, Iowa City is in an area experiencing 20-30 significant tornadoes per 100-year period, providing an average of one event every four years. For that reason, the entire jurisdiction is at risk of experiencing a tornado or a windstorm. The April 2006 tornado with EF-2 magnitude winds caused $12 million in damage.

Image 41 Iowa Avenue following April 2006 tornado

Image 42 Alpha Chi Omega Sorority, 828 E Washington Street, Iowa City

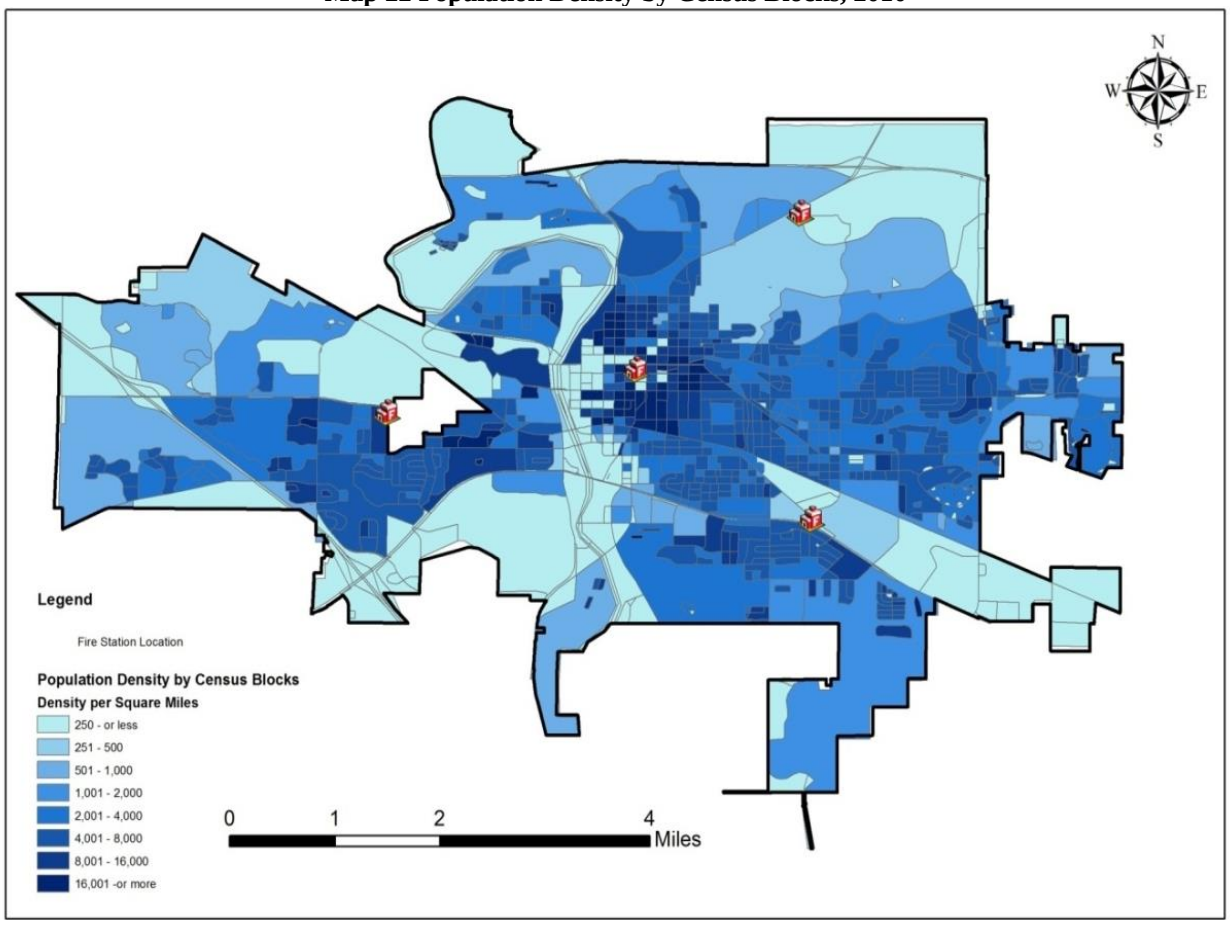
Image 43 St. Patrick's Catholic Church, Iowa City

Demographic Features

Community Population/Population Densities

While many communities in Iowa and the rural Midwest are losing population, Iowa City continues to grow. Between 1960 and 1970, the population grew by 40%. Another period of considerable population growth occurred between 1990 and 2000 when population increased by 18%. Such growth is not a new trend: Iowa City's population has increased during every decade for the past century. Per the 2010 Census, Iowa City had a population of 67,862, a 9.1% increase over the 2000 Census. The US Census Bureau in 2016 estimates Iowa City's population to be 74,398. The US Census Bureau indicates that Iowa City's population grew by 9.1% from 2010 to present and that Johnson County was the second fastest growing county in the state. A linear projection model estimates that by 2030 the population of Iowa City will be approximately 84,000. Adding to the permanent population are more than a million visitors each year who come to enjoy cultural events and art exhibits, to attend Big Ten athletic events, and to participate in the many conferences and educational programs scheduled at the university year-round.

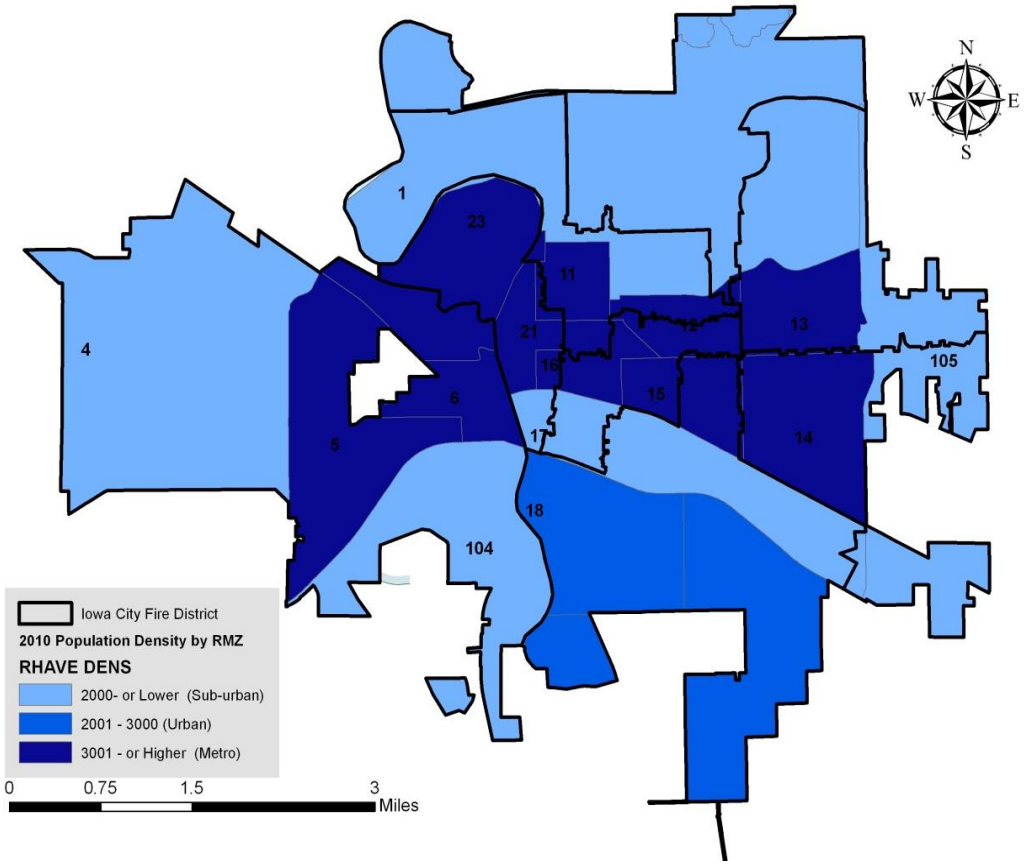
Map 22 Population Density by Census Blocks, 2010



Risk Management Zone (RMZ) population densities per the 2010 Census:

RMZ	Population Density
1	1,071
4	1,349
5	4,355
6	6,249
11	10,808
12	4,080
13	4,232
14	4,087
15	4,477
16	17,587
17	1,835
18	2,600
21	10,890
23	3,262
104	14
105	1,837

Map 23 2010 Population Density by RMZ



Community Demographic Features

Higher education (the University of Iowa and Kirkwood Community College), exert a major influence on the demography of Iowa City. The student population of over 31,000 (22,354 undergraduates, 5,616 graduate and professional, 1,417 post-doctoral) makes Iowa City's median age (25.4 years) young, especially for Iowa. Iowa City is also one of the most educated communities in the country: 95.7% of residents age 25 years and older have a high school diploma; 59.9% of residents 25 years and older have a bachelor's degree or higher.

College age residents and young adults comprise nearly half of Iowa City's population, with those between the ages of 18 and 24 accounting for 32.5% of the total population. From 2000 to 2012 this segment of the population grew by 10% (from 20,438 persons to 22,708 persons). Meanwhile, the number of young adult residents aged 25-34 increased by 9.4% (from 10,218 to 11,183 persons), accounting for 12% of Iowa City's total population.

Senior citizens and those approaching retirement age are by far the fastest growing age groups due to the aging Baby Boom generation and Iowa City's allure as a regional retirement destination. Census data from 2000 to 2010 reflects an 81% increase in the number of residents age 55 to 64, and a 26.5% increase in residents age 65 and over.

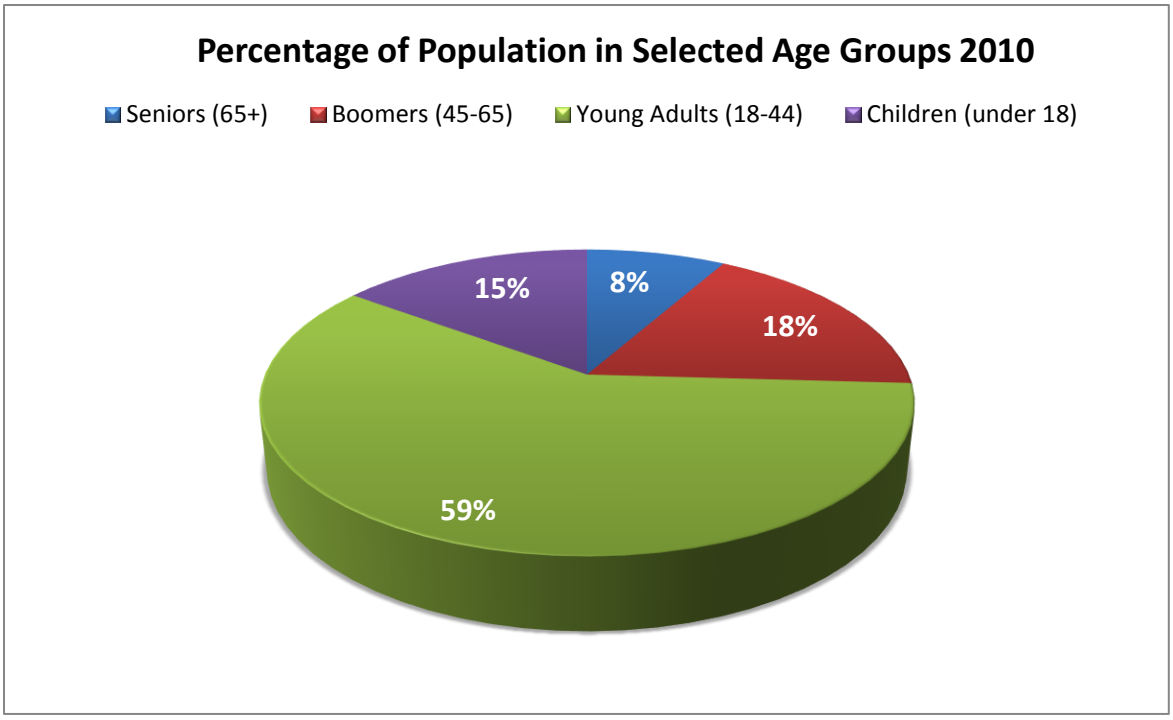
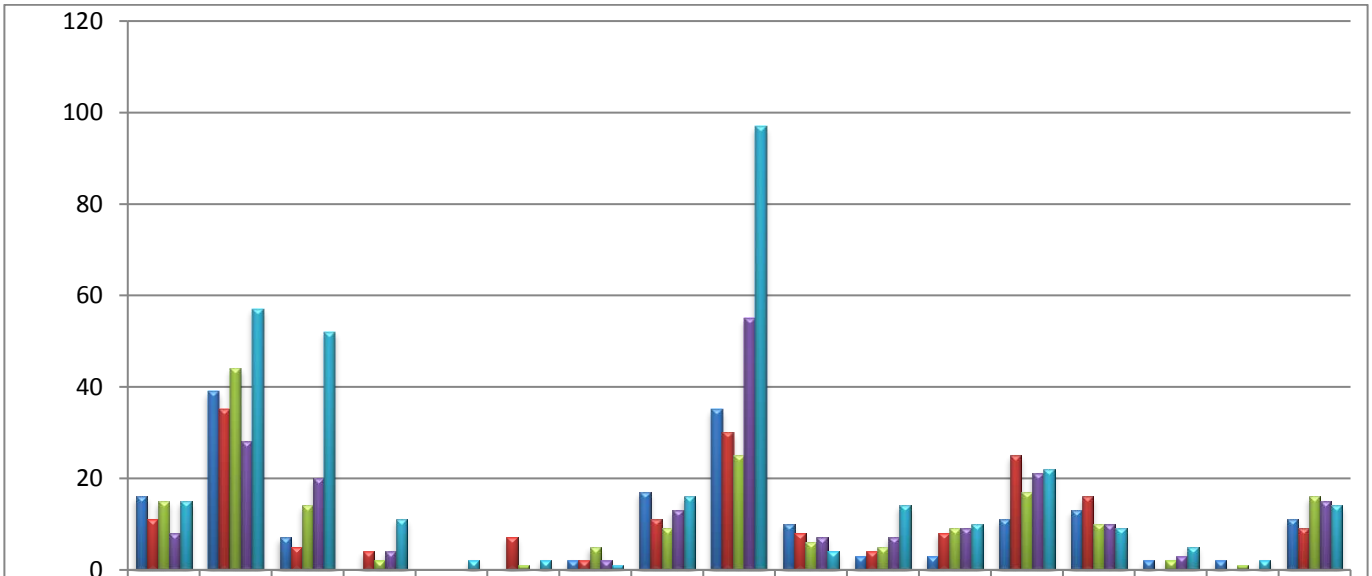


Figure 1 Percentage of Population in Selected Age Groups (2010)

An increase in the incidents of cooking fires in RMZ 4, 18, and 105 is believed to be linked to a demographic high in older adults and college age young adults.



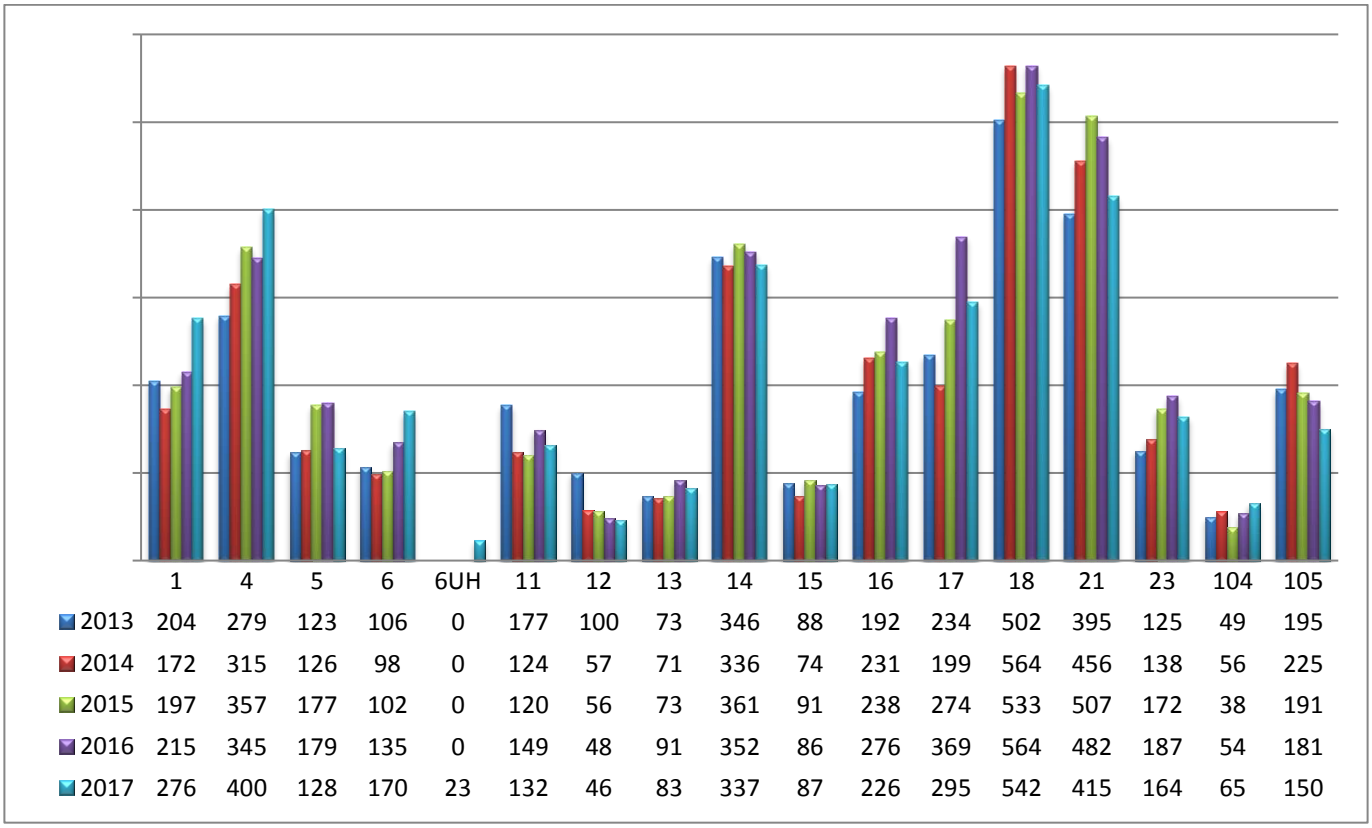
	1	4	5	6	5UH	11	12	13	14	15	16	17	18	21	23	104	105
2013	16	39	7	0	0	0	2	17	35	10	3	3	11	13	2	2	11
2014	11	35	5	4	0	7	2	11	30	8	4	8	25	16	0	0	9
2015	15	44	14	2	0	1	5	9	25	6	5	9	17	10	2	1	16
2016	8	28	20	4	0	0	2	13	55	7	7	9	21	10	3	0	15
2017	15	57	52	11	2	2	1	16	97	4	14	10	22	9	5	2	14

Figure 2 Assist Invalid by RMZ (2013-2017)

Likewise, a 100% increase from 2013 to 2017 in calls categorized as "assist invalid" are likely due to a similar shift in demographics.

Per the 2010 Census, Iowa City experienced a decline in residents between the ages of 35 and 54 years of age – an age cohort that one might think of as the "family" years. The number of residents age 35 to 44 shows a decline of 13.5%, while the number of residents age 45 to 54 dropped by 6.9%. The only other group to experience a decline was the number of children 10-14 years of age, which dropped by 8%.

The effect of community demographics on service demands is perhaps best demonstrated in a chart that tracts emergency medical (EMS) calls for service within each risk management zone (RMZ). EMS calls represented 47.8% of all incidents in 2017.



	1	4	5	6	6UH	11	12	13	14	15	16	17	18	21	23	104	105
2013	204	279	123	106	0	177	100	73	346	88	192	234	502	395	125	49	195
2014	172	315	126	98	0	124	57	71	336	74	231	199	564	456	138	56	225
2015	197	357	177	102	0	120	56	73	361	91	238	274	533	507	172	38	191
2016	215	345	179	135	0	149	48	91	352	86	276	369	564	482	187	54	181
2017	276	400	128	170	23	132	46	83	337	87	226	295	542	415	164	65	150

Figure 3 EMS by Risk Management Zone (2013-2017)

RMZ 4 includes a higher percentage of minority and low to moderate income populations while RMZ 4, 14, 18, and 105 include higher percentages of senior citizens and older adults. RMZ 21 is a tract that is densely populated with college age young adults.

The 2010 Census shows that a full third of Iowa City households (9,488) consisted of single persons. Another 23% of households (6,426) are classified as non-family – that is people living together who are unrelated by birth or marriage. In Iowa City, the average household size is 2.22 persons, just below the state (2.41) and national (2.58) averages. More than half of all households in Iowa City are renters.

The growth in the number of young adults and seniors, along with the changing size and configuration of households, has important implications for future development. Iowa City is experiencing increasing demand for higher-density housing located in walkable neighborhoods, especially those close to downtown and campus, and for more housing options to accommodate seniors and empty-nesters. Meanwhile, stable neighborhoods with affordable housing and quality schools are essential to ensuring that Iowa City remains an attractive place for families with children.

As of the 2010 Census, there were 67,862 people, 27,657 households, and 11,743 families residing in the city. The population density was 2,713.4 inhabitants per square mile. There were 29,270 housing units at an average density of 1,170.3 per square mile. The racial makeup of the city was 82.5% White, 5.8% African American, 0.2% Native American, 6.9% Asian, 2.1% from other races, and 2.5% from

two or more races. Hispanic or Latino of any race was 5.3% of the population. The chart below shows the racial mix of the city.

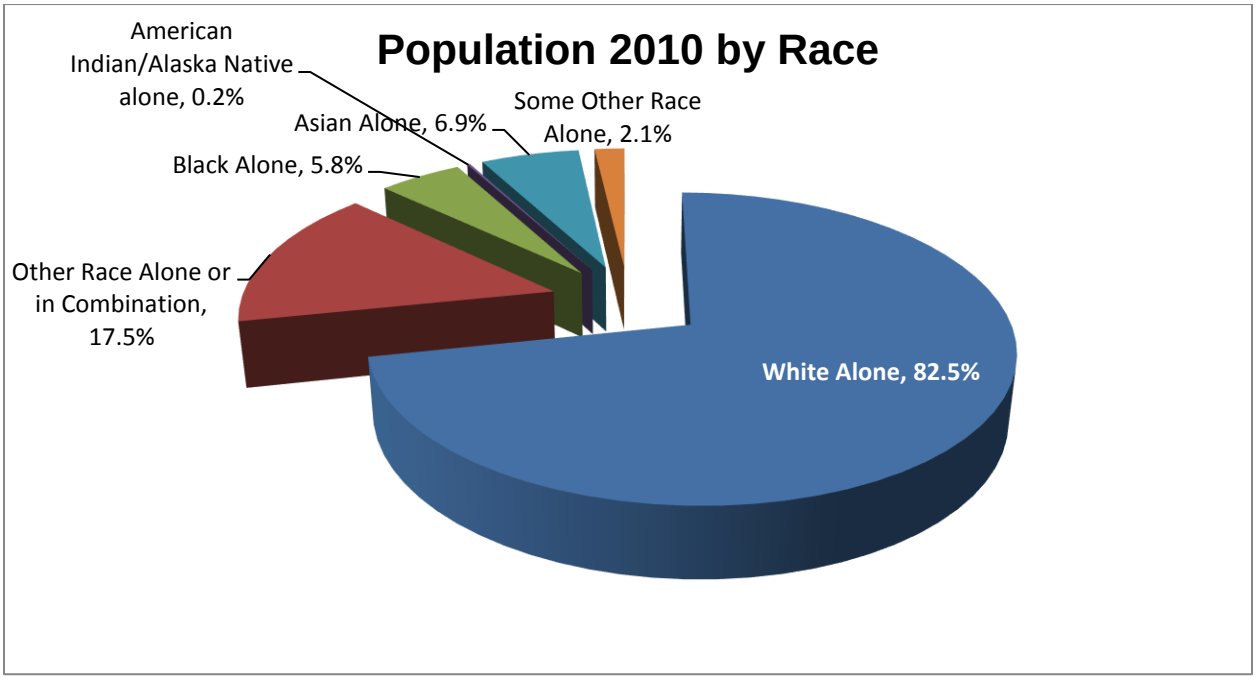


Figure 4 Population by Race (2010 Census)

Foreign-born persons made up 11.8% of the population and 15.7% of the population spoke a language other than English at home. The gender makeup of the city was 49% male and 50.3% female.

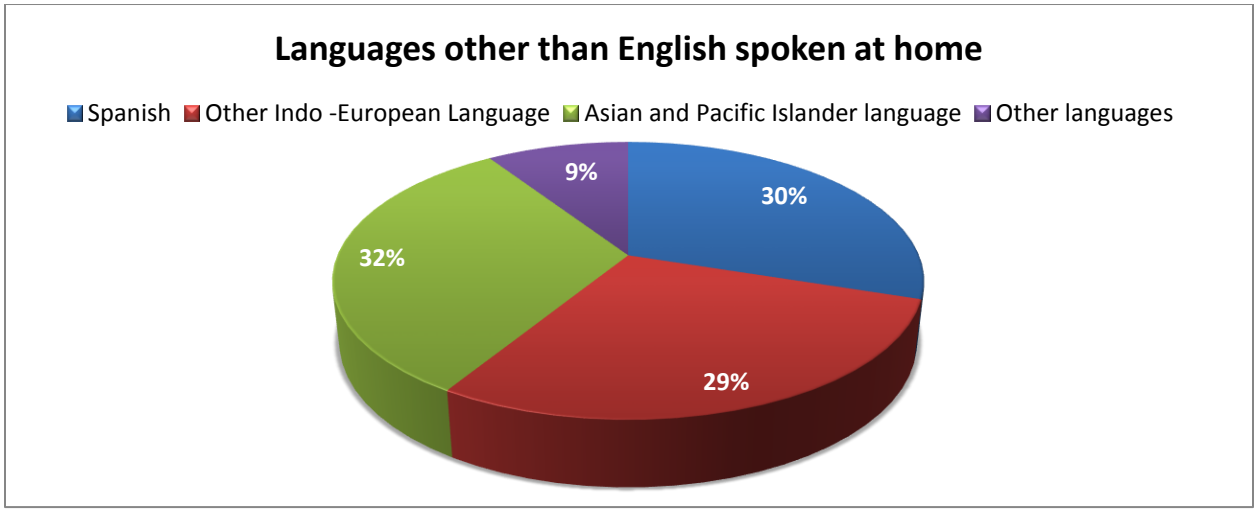


Figure 5 Languages other than English spoken at home

There were 27,657 households of which 19.8% had children under the age of 18 living with them, 32.5% were married couples living together, 7.2% had a female householder with no husband present, 2.8% had a male householder with no wife present, and 57.5% were non-families. 34.3% of all households were made up of individuals and 7% had someone living alone who was 65 years of age or older. The average household size was 2.22 and the average family size was 2.88. Median

household income, 2009-2013, was $41,410. The level of persons below poverty level for the same period was 28.2%. The median value of owner-occupied housing units was $180,900. The percentage of housing units in multi-unit structures was 45.6%. Mean travel time to work was 16.3 minutes.

At-risk populations include 10,939 children (those under 18 years), 6,020 seniors (65 years or older), and about 353 individuals with physical and/or mental disabilities. It is assumed that these groups are more likely to require assistance during times of disaster and therefore are considered more "at-risk" than the remaining population.

B. History of the Agency

Legal Establishment of the Fire Department

The code of Iowa grants the City of Iowa City the authority to establish, house, equip, staff, uniform, and maintain a fire department. The Iowa City Fire Department was established by city ordinance on February 1, 1874. According to the proceedings of the Fourth Legislative Assembly of the Territory of Iowa, Council File 109, a bill authorizing the Iowa City Fire Engine Company was approved in February 1842, largely for the protection of what was then the new state capitol building, known now as "Old Capitol." The company was finally formed on January 31, 1844. The Iowa City Fire Engine Company apparently went out of existence sometime in the late 1840s or early 1850s. Then in 1861, in response to a fire that burned most of the buildings on Dubuque Street between Iowa Avenue and Washington Street, the City Council passed an ordinance to "establish companies in Iowa City."

Major Historical Milestones of the Department

Fire protection was an essential component of public safety when Iowa was on the frontier, just as it is now. Then, the position of firefighter was filled by a dedicated volunteer who was willing to sacrifice his time, energy, health and even his life to help protect the community. At some point in each town and city, these volunteer firefighters stopped simply congregating at the scene of a fire and formed themselves into fire companies and fire departments. Through an 87-year "volunteer era" of the fire department in Iowa City, there were 12 separate fire companies. Together, these fire companies had well over 400 volunteers. Some of the companies lasted only a few years while others remained active for decades. There were as many as six different fire companies in Iowa City at one time. Eventually, they were grouped under the umbrella name of the Iowa City Fire Department, while maintaining their individual identities and functions. These volunteer fire companies performed a much-needed public service, which Iowa City could not have otherwise afforded at the time.

As a result of a citizens' petition, the City Council ordered the marshal to "procure, upon the best possible terms, three-story, two-story, and two 14-foot ladders, six poles with the necessary hooks, chains, and ropes, together with a carriage suitable for the conveyance of the same, and to provide a suitable central place for the keeping of the same." Thus, Iowa City Fire Company #1 was formed on October 26, 1855, and was equipped with the items that the marshal bought in 1854. They may have

had a hand engine, because on August 11, 1856, the Council recommended the expenditure of $300 for the purchase of a fire engine.

In 1861, the City Council passed an ordinance to establish fire companies in Iowa City. The council also authorized the purchase of equipment for firefighters. The equipment was pulled to the fire by horses hired for each alarm from the nearby livery. Once on the scene of a fire, the pump was powered by hand by firefighters to add pressure to water from the mains.

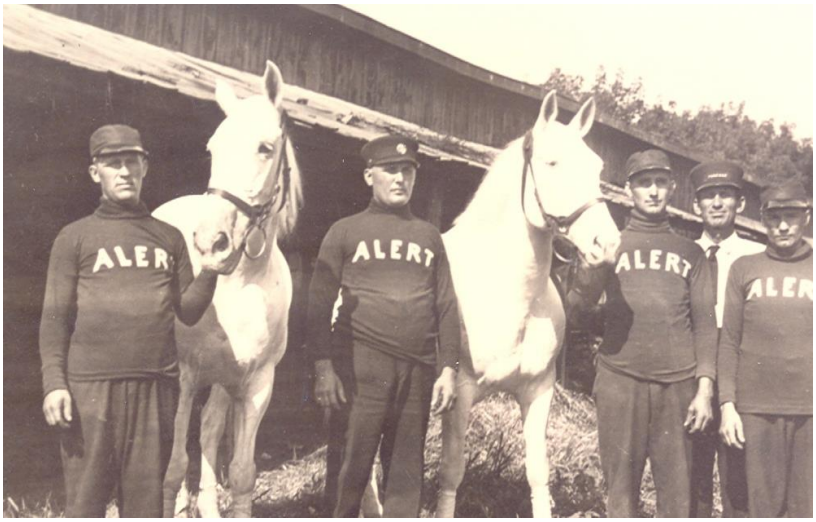


Image 44 Five firefighters taking possession of Snowball and Highball (1912)
Fire Chief Jim Clark is second from the left.

In 1872, in response to a fire that destroyed the famous Clinton House Hotel, the city council agreed to purchase $500 worth of fire-fighting equipment, including hook and ladder equipment and buckets. This led to the founding of the entity named the Iowa City Fire Department (ICFD). The new equipment brought about the formation of a second fire company. With the formation of two independent fire companies, the ICFD was established by ordinance on February 1, 1874.

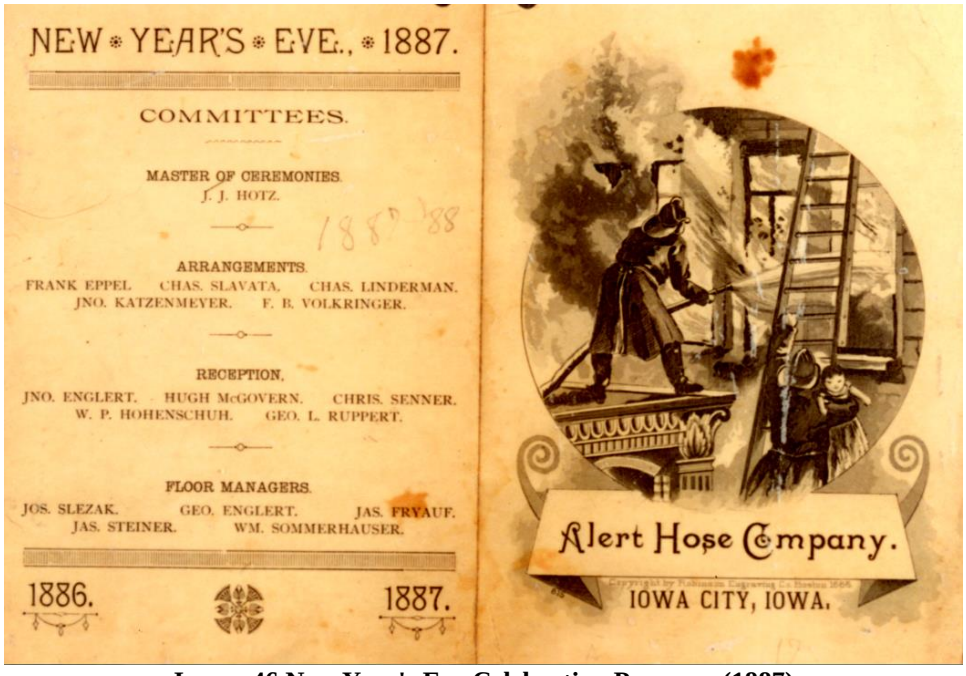
The ordinance provided for companies of fire wardens, horsemen, engine men, and ladder men. These companies were autonomous and task specific, but unlike rival companies in other cities, they were considered part of one fire department. They operated under the supervision of a fire chief and two assistant chiefs. All fire apparatus was placed under the care of the fire chief who was required to make a quarterly report to the City Council on the condition of the fire department. Despite these improvements, large fires were still fought by calling on unorganized spectators to assist the firefighters. Throughout the 1870s newspapers called for the city to double the number of firefighters, arguing that the only proper way to fight fires was with many "disciplined men" supervised by a "competent head." In 1881, Iowa City built a new city hall at the corner of Linn and Washington Streets. ICFD headquarters were moved to the new building.

In 1883, a second fire station, the Alert Hose House, was built at 206 North Linn Street. The station was equipped with a four-wheel hose cart to protect the north end of the city. This was the first

substation of the ICFD, and signaled a change in fire protection from the downtown business section toward residential neighborhoods.

Image 45 Alert Hose House, built in 1883, was Iowa City's first substation.

In 1890, the Iowa State Legislature passed a law allowing second-class cities (those with a population between 2,000 and 15,000) to levy a tax, "For the purpose of maintaining a fire department." As a result, the city was able to purchase more equipment. An even greater impact on the department was the provision within the law that allowed cities to pay firefighters for their time spent at fires.


NEW * YEAR'S * EVE., * 1887.

COMMITTEES.

MASTER OF CEREMONIES.
J. J. HOTZ.

ARRANGEMENTS.
FRANK EPPEL. CHAS. SLAVATA. CHAS. LINDERMAN.
JNO. KATZENMEYER. F. B. VOLKRINGER.

RECEPTION.
JNO. ENGLERT. HUGH McGOVERN. CHRIS. SENNER.
W. P. HOHENSCHUH. GEO. L. RUPPERT.

FLOOR MANAGERS.
JOS. SLEZAK. GEO. ENGLERT. JAS. FRYAUF.
JAS. STEINER. WM. SOMMERHAUSER.

1886. 1887.

Alert Hose Company.
IOWA CITY, IOWA.

Image 46 New Year's Eve Celebration Program (1887)

The fire department improved its alarm system at about this time. By 1897, there were eight municipal alarm boxes set up on corners throughout the city. They were connected to a striker at the chief's residence, the water works and at Foster and Thompsons's Livery Barn. There were indicators at City Hall and at the Alert Hose Company to tell the firefighters the vicinity of the alarm.

On Saturday, June 19, 1897, the ICFD lost its first firefighter at an emergency incident. The Mechanics Academy, which served as the University of Iowa's Library, was struck by lightning at about four o'clock in the morning. Lycurgus (Kirk) Leek of the Protection Engine and Hose Company No. 1 was fighting the fire on the third floor when the roof collapsed. He was knocked unconscious and perished in the fire. Mr. Leek is buried at Oakland Cemetery. His headstone reads, "Lycurgus Leek who sacrificed his life June 19, 1897, while fulfilling the duty of a volunteer fireman, aged 40 years, 4 months, 4 days."

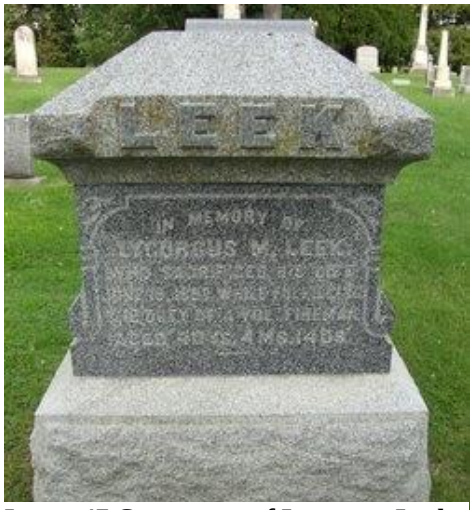


Image 47 Gravestone of Lycurgus Leek, Iowa City's first line of duty death

Lycurgus Leek's death almost led to the disbanding of the ICFD. Some citizens had charged that his death was due to the department's incapacitation caused by too much alcohol consumed by its members at the fire fighters' tournament held in Iowa City earlier that week. To their credit, the local newspapers whole-heartedly supported the firefighters. They called on residents to remember the good service provided by the fire department over the years.

A large fire at the Metropolitan Block at the corner of Dubuque and Washington Streets (the current location of the Jefferson Hotel) in 1912 led to three major improvements. The first was the purchase of Snow Ball and High Ball, Iowa City's famous matched white fire horses. Snow Ball and High Ball were quartered at the Alert Hose Company on North Linn to pull the hose cart.

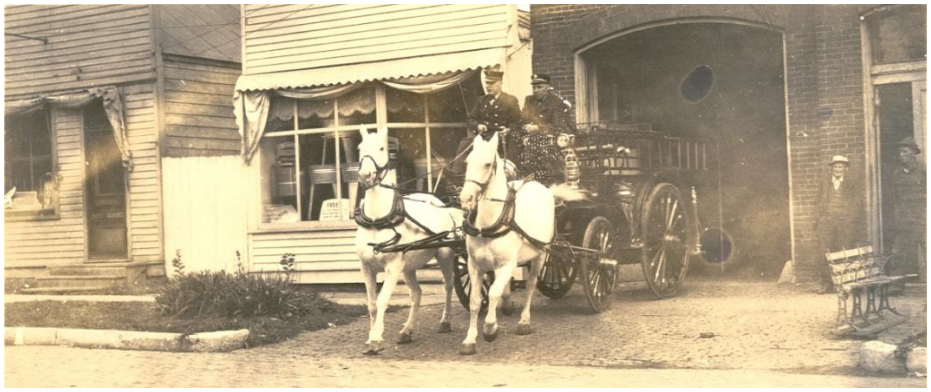


Image 48 Highball and Snowball responding to a call (1912)

The second was the purchase of the city's first motorized 1912 Seagrave fire apparatus. The truck was purchased on January 13 and was housed at the City Hall building.

Image 49 Iowa City's first motorized 1912 Seagrave fire apparatus (February 1913)

Image 50 Iowa City's first motorized fire apparatus, delivered in January of 1912

The third was the institution of a paid department. On October 1, 1912, James Clark, Herman Amish and George Kasper were hired as Iowa City's first full time paid firefighters. James Clark was named chief. He and Herman Amish were stationed at headquarters. George Kasper was stationed at the Alert Hose Company on North Linn. The volunteer fire companies continued to be an integral part of the ICFD. They responded alongside the paid firefighters until 1929 when the department became fully paid.

Images 51 Iowa City Fire Department (October 1925)

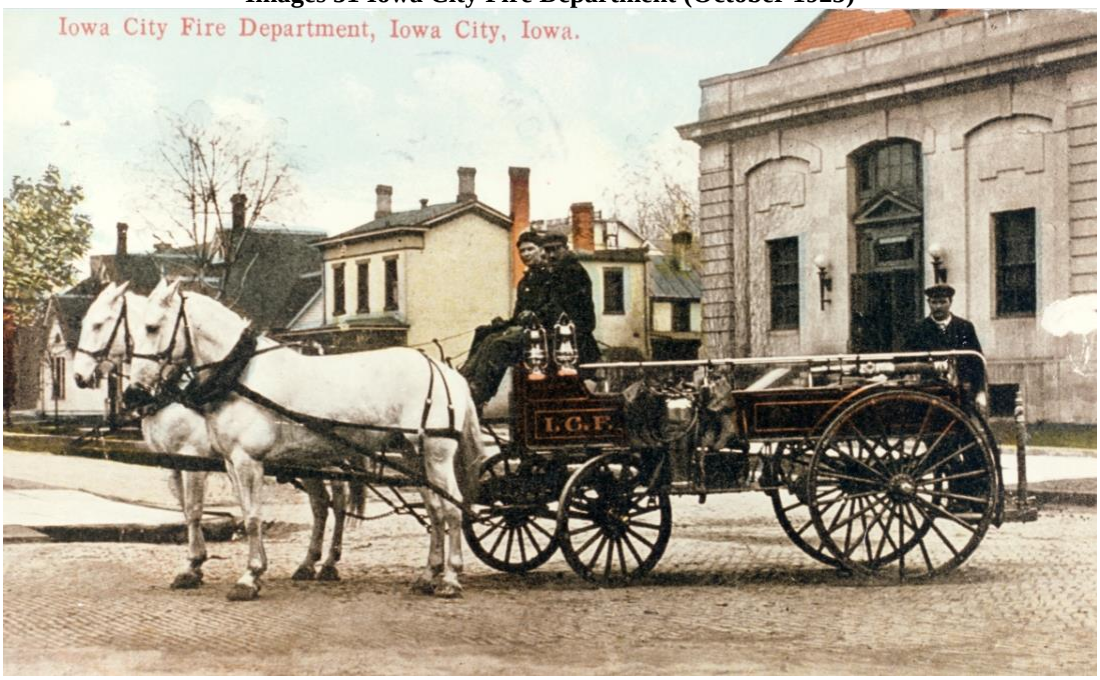


Image 52 ICFD Membership Photograph (1929)

A second piece of motorized apparatus was purchased on October 8, 1922. The 1922 American LaFrance pumper was housed in the City Hall building. With the purchase of the second motorized apparatus, the age of the horse drawn hose cart was coming to a close. In 1925, Highball and Snowball were put out to pasture at a farm near Solon.

On July 14, 1929, the Alert Hose House on North Linn Street finally closed and a two-platoon system was created. The six paid firefighters worked every other day. The inclusion of the fire chief brought the total strength of the department to seven. The department continued to grow throughout the 1930s, despite the hardships of the depression. By 1938 there were eleven members where there had been seven in 1932. Local 610 of the International Association of Firefighters (IAFF) was chartered in Iowa City on February 7, 1939. Local 610 has maintained continuous affiliation with the IAFF since that initial charter.

The Second World War had a much greater impact on the ICFD than The Great Depression. Personnel remained at the same level and there were no new vehicles purchased. However, like the rest of the country, the post war era was a time of great expansion. The chief's vehicle was finally replaced on March 18, 1947, and on September 5, the 1922 pumper was replaced by a 1000 gallon per minute 1947 American LaFrance engine.

The department took delivery of its first aerial apparatus on July 6, 1948. The 85-foot American LaFrance was too long to fit into the old City Hall, so a new station, Station #2, was opened on January 13, 1949 to accommodate its length. Station #2, located at 315 South Gilbert Street also housed the 1934 Seagrave pumper and the department's panel truck. It was staffed with four firefighters. During these years, the department also grew in numbers of personnel. By 1950 the department had grown to 21 members. The increase was due partly to the increased need for people to fill two stations and partly because of the institution of the "Kelly Day."

Image 53 Iowa City's First Aerial Apparatus

From 1929 until 1947, firefighters had worked 24-hour shifts, every other day. Starting on April 1, 1947, on your "Kelley Day", which was one of every 16 days worked, you did not report for duty. This extra day off was increased over the years to one in twelve in 1952, one in ten in 1957, and one in eight in 1964. The Kelley Day was finally eliminated on January 1, 1966 when the department went to a three shift, 56-hour per week "California Swing" staffing solution.

In 1957, a new Pirsch engine was delivered. In 1960, the current Fire Station #1 on South Gilbert Street was built and on January 1, 1961, the fire department moved into its new quarters.

Image 54 ICFD Fire Station #1 on South Gilbert Street

Iowa City grew in population through the 1950s and 1960s and the fire department grew with it. A second station was opened at 301 Emerald Street on August 23, 1968. The cost of Fire Station #2 was $61,700. Additional personnel were hired to staff the new station, bringing the total strength to 35.

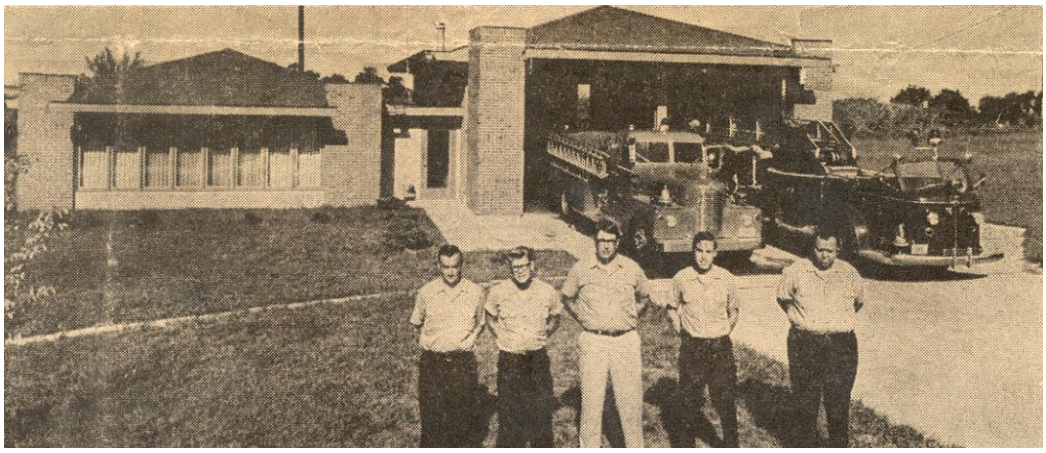


Image 55 ICFD Fire Station #2 (opened on August 23, 1968)

Fire Station #2 was demolished in 2007 and a new station with 10,300 square feet and three bays designed to Leadership in Energy and Environmental Design (LEED) criteria was built at that location for a total cost of $2.07 million.

April 7, 1969, was probably the most tragic day in the history of the ICFD. Seven firefighters were badly injured in an explosion at Mercy Hospital. Several were hospitalized as a result. Fire Chief Dean Bebee had to return temporarily to shift work to help bring the department up to needed staffing levels. Lieutenant Robert Hein received the worst injuries of any of the firefighters. Lieutenant Hein was in a coma for several months. He was never able to return to work and he died on October 15, 1971 as a result of his injuries. Robert Hein is buried at St. Joseph Cemetery. Robert and Letha Hein had 16 children.

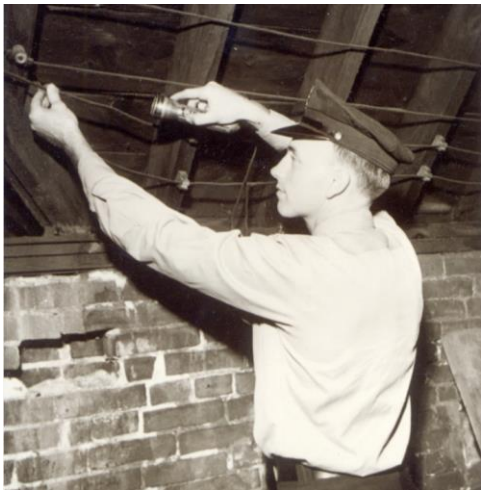


Image 56 Lt. Robert Hein

The department purchased a new ladder truck in 1970. The American LaFrance truck had a 100-foot aerial ladder and a 1500-gallon per minute pump. The truck was put in service at Station #1. The old aerial was moved to Station #2 where it was kept in reserve. On February 12, 1972, the southeast fire station, Station #3, was opened. Nine additional firefighters were hired to staff this station. Station #3 remains in service today.

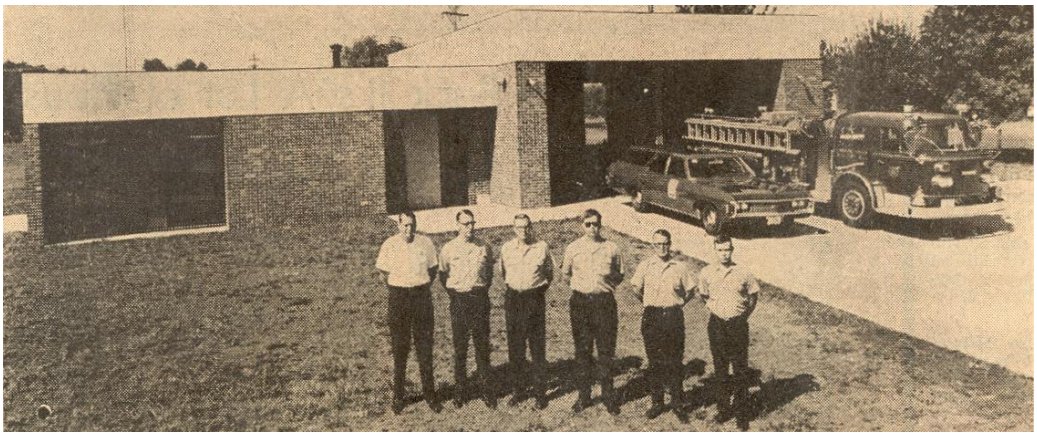


Image 57 Fire Station #3 (opened February 12, 1972)

On August 18, 1977, the department hired Linda Eaton, its first female firefighter. The department gained brief notoriety when Linda had her first child and sought rights to nurse the baby on duty. To her, it wasn't about the Equal Rights Amendment (ERA) or feminism at all – it was about her son's health. But in 1979, a breastfeeding firefighter brought the nation to the door of the ICFD: to see just how far and how fast the world was changing. During her brief career, sex discrimination complaints and lawsuits were central to the dramatic transformation of workplace policies that began across the U.S. during the 1970s. Her struggles against sex discrimination are documented in a PhD thesis by Sharon Marie Lake entitled, "The Accidental Feminist: Iowa's Breastfeeding Firefighter and the National Struggle for Workplace Equity." Eaton's last day as an Iowa City firefighter was May 27, 1980. Two weeks prior to her resignation the city council voted to appeal the Iowa Civil Rights Commission's ruling that ordered the city to permit Linda Eaton to nurse her baby twice a day at the fire station until she weaned him. The city's decision was disheartening to Eaton and in her letter of resignation she stated, "I guess quitting is my last gesture of good faith to my fellow comrades that they may know I never meant them or the profession harm or dishonor."

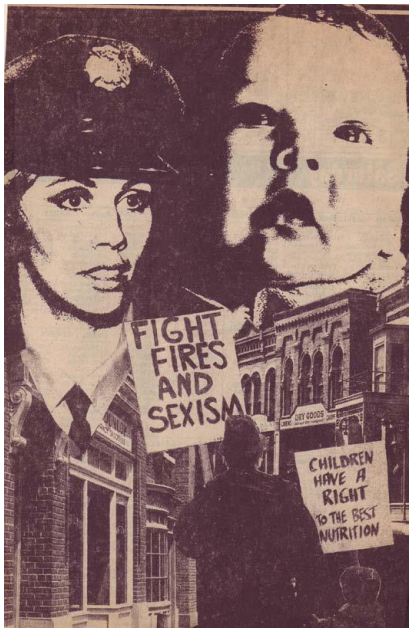


Image 58 Des Moines Register (January 27, 1979) This drawing accompanied an editorial in support of Linda Eaton.

The 1980s brought many more changes to longstanding traditions in the fire service. The delivery of emergency medical services and hazardous materials response was formalized. Public education

activities were given new emphasis, new Occupational Safety and Health Administration (OSHA) standards were born, the Incident Command System was developed, and an 800 MHz trunked radio system allowed police and firefighters to talk to one another.

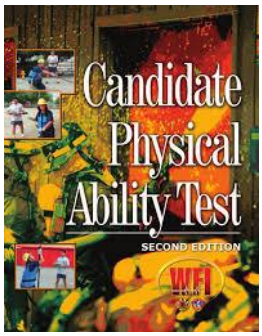
The ICFD was unanimously awarded Accredited Agency status by the Commission on Fire Accreditation International (CFAI) at the Center for Public Safety Excellence (CPSE) commission hearings in Denver, Colorado, on August 14, 2008. Agency accreditation is a voluntary process. The ICFD joined 128 agencies worldwide to obtain CFAI Accredited Agency status. Some of the many benefits to accreditation are:

- Assessments that are based on organizational performance
- A focus on outcomes rather than outputs
- A self-assessment process that empowers the agency to identify strengths and weaknesses
- The use of empirical-based data
- Allows for the establishment of a plan for improvement
- Encourages continuous quality improvement
- Encourages the development of organizational procedural documents
- Third party review of the organization to ensure safe operations, effectiveness, and efficiency.

The ICFD was re-accredited in Chicago, Illinois, on August 14, 2013.

The department was severely tested during the flood of 2008 with the ICFD training center falling victim. At the crest of the flood, water was roughly 42 inches deep throughout and around the building. Approximately 800 hours of labor was spent restoring the training center to use only to eventually lose the site permanently in 2014, when the adopted city strategy of providing room for the river to flood returned the site of the training center to a wetlands park. The flood of 2008 threatened to close all bridges linking the east and west sides of the city. ICFD personnel staffed two additional companies on the west side of the river to ensure a safe and effective response to fire emergencies there and elsewhere in the city.

Image 59 Flood of 2008 with ICFD training center pictured (tan building on right)



The ICFD instituted a pass/fail fitness exam for new hires, known as Candidate Physical Ability Test (CPAT) in 2010. The top scores from the written exam are afforded the opportunity to proceed to the CPAT. The fitness exam has been used twice since to formulate new hire certified lists.

The CPAT has been reviewed and utilized by fire departments throughout the U.S. and Canada

Also in 2010, two public safety answering points (PSAP), formerly operated by the city and the county, were consolidated into one Joint Emergency Communications Center (JECC). A state-of-the-art P25 compliant digital 800 MHz radio system provides interoperable communications for all fire, law enforcement, and emergency medical service providers in Johnson County.

Image 60 Joint Emergency Communications Center (opened 2010)

Two new 2011 Pierce Impel pumpers were placed into service in 2011. Each one is equipped with a 1500 gallon per minute pump. One of the pumpers was assigned to Station #3 and the other was assigned to Station #4. A 2011 Pierce Velocity Quint was placed into service this same year at Station #2. Iowa City's first quint is equipped with a 75-foot aerial ladder, giving it extra capabilities. The cost of the three apparatus was $1.9 million.

Image 61 Three New Fire Apparatus (purchased in 2011)

The department took delivery of a new Rescue One 1660 Connector boat in 2011. The boat is equipped with a light bar, emergency lighting, a vinyl top, and a cover. The boat is a larger version of the Jon boat it replaced.

Image 62 Rescue One Connector Boat (purchased in 2011)

On August 1, 2011, the ICFD went live with Mobile Data Computer applications in all apparatus. Eleven apparatus were outfitted with Hub-Data911 mobile computer systems equipped with mobile software solutions for vehicular environments. Tac10 fire mobile software provides unit connectivity to the Joint Emergency Communications Center that allows each unit to manually stamp status changes and receive dispatch information electronically. Internet access via cellular services provides access to occupancy information, incident data, fire pre-plan information, and fire inspection data. Incident mapping and AVL/GPS functions are also provided via the MDCs.

Fire Station #4 is located at the intersection of North Dodge Street and Scott Boulevard. The 13,300 square-foot station opened on Monday, October 3, 2011, at 0700 hours and responded to its first call for service at 0705. Station #4 is providing faster service to the growing northeast side of Iowa City. The additional satellite station came with nine new firefighters and is equipped with an engine, a rescue truck, and a reserve engine. The building features drive-thru apparatus bays, a first for Iowa City. The building also includes a geothermal HVAC system, generous use of ambient day lighting, water-efficient fixtures, and other features designed to achieve gold certification in the Leadership in Energy and Environmental Design (LEED), a green building certification system. Total project cost was approximately $3.2 million. The project was made possible thanks to a Culver/Judge I-Jobs project grant totaling $2.2 million.

Image 63 Iowa City Fire Station #4 (opened October 3, 2011)

Blue Card Command System is a training program designed to help fire officers and future officers sharpen their tactical decision-making skills, time and resource management, and communications skills with computer-aided fire ground simulations. In 2011, the ICFD was awarded an $18,000 Assistance to Firefighters Grant (AFG) to be used toward the Blue Card Command Training Program. The City of Iowa City contributed $4,337 toward the project. The ICFD was able to certify one member as a Blue Card trainer and an additional 23 members completed the online and simulation classes to become certified users. The department has since certified one more trainer and institutionalized the Blue Card Command System training department-wide. Blue Card Command is a training and certification system that trains company and command officers on how to standardize local incident operations across their organization.

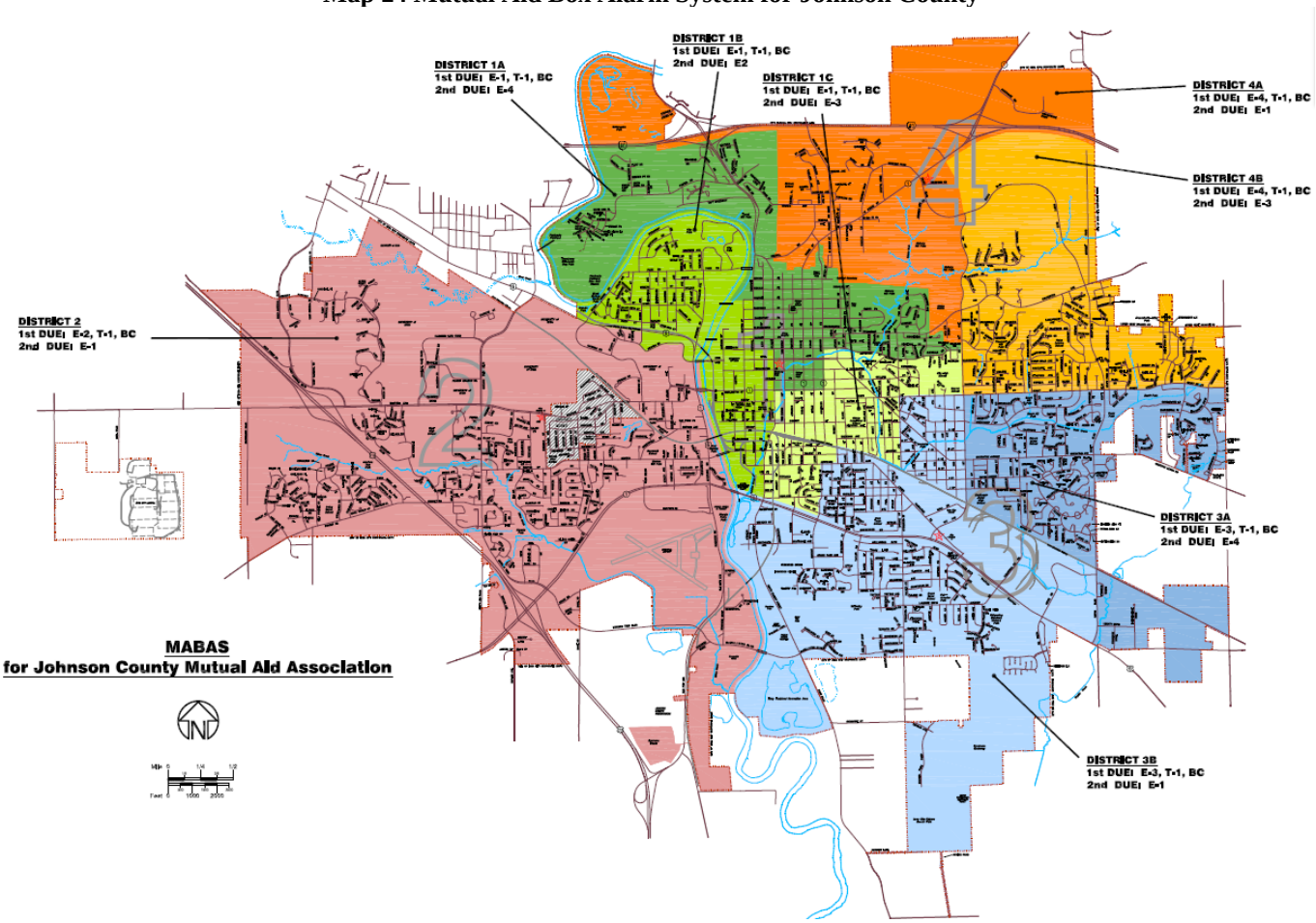
Insurance Services Office, Inc. (ISO) Public Protection Classification (PPC) plays an important role in the underwriting process at insurance companies. PPC is important to communities and fire departments with the issuance of a respected benchmark that is used by many departments as a valuable tool when planning, budgeting, and justifying fire protection improvements. ISO is the leading supplier of data and analytics for the property/casualty insurance industry. Most insurers use PPC classifications for underwriting and calculating premiums for residential, commercial, and industrial properties. A community's investment in fire mitigation is a proven and reliable predictor of future fire losses. The ICFD's PPC improved from Class 3 to Class 2, on a scale from 1 to 10, effective

November 1, 2012. A 2017 reevaluation by ISO affirmed the Class 2 rating. ISO was formed in 1971 as an advisory and rating organization for the property/casualty insurance industry to provide statistical and actuarial services.

Current Legal Boundary of Service Area

The ICFD legal boundary of service area is equal to the community boundaries. Iowa City is located on both sides of the Iowa River in a rich agricultural area in southeast Iowa, in the heart of the Midwest, just south of the Coralville reservoir. This location, 25 miles south of Cedar Rapids and approximately 55 miles west of Davenport and the Mississippi River, is within easy reach of many of the major Midwest metropolitan centers, lying 300 miles north of St. Louis, a little over 200 miles west of Chicago, and 250 miles east of Omaha. The city covers 25.28 square miles in the central portion of Johnson County.

Map 24 Mutual Aid Box Alarm System for Johnson County



Current Organization, Divisions, Programs and Services

The ICFD provides an integrated all risk response to the community. The department has four functional areas of responsibility:

1. **Administration and Support** – The fire chief is the highest-ranking administrative officer in the ICFD. As such, the fire chief is the administrator of all activities the department carries out. In the addition, the fire chief conducts all responsibilities set out by Federal or State laws, city ordinance, and the requirements of the city manager, mayor, and the Iowa City City Council. The deputy fire chief is the second in command officer in the ICFD and is responsible for supervising all department operations. The deputy fire chief is responsible for Homeland Security initiatives, buildings and grounds, fire service accreditation, special projects, and other duties as assigned. Fire Administration and Support provides essential support, such as: emergency management, public information, planning, budgeting, performance measures, logistics and support services, and human resource management. Battalion chiefs are assigned Administration and Support collateral duties to include calendar administration, the Health & Safety Committee, station wear, physicals and immunizations, and other duties as assigned.
2. **Community Risk Reduction / Fire Prevention** – The battalion chief assigned as the fire marshal is in charge of the fire prevention bureau and as such reports to the fire chief. The fire marshal is directly responsible for organizing all community risk reduction activities, including fire/arson investigation, code enforcement inspections, public education, and the maintenance and purchase of hardware and software for computers.
3. **Emergency Operations** – The emergency operations division works a three-shift system. Each duty shift is comprised of 24 hours and consists of one battalion chief, one captain, four lieutenants, and 14 firefighters. The division is directly responsible for fire suppression, emergency medical response, hazardous materials response, special operations rescue operations, and other duties assigned to them. The deputy fire chief oversees emergency operations, while battalion chiefs perform collateral administrative duties within the division.
4. **Training and Equipment** – The training battalion chief and the training officer plan, develop, and coordinate in-house training activities with the assistance of a training committee. The division is directly responsible for training in the areas of emergency medical services, rescue, fire suppression, and hazardous materials. The purchasing of apparatus is managed by the deputy fire chief, while procurement equipment, and personal protective equipment is managed by the battalion chief assigned to training and equipment. The repair and maintenance of apparatus, tools, and equipment is also assigned to the training and equipment battalion chief.

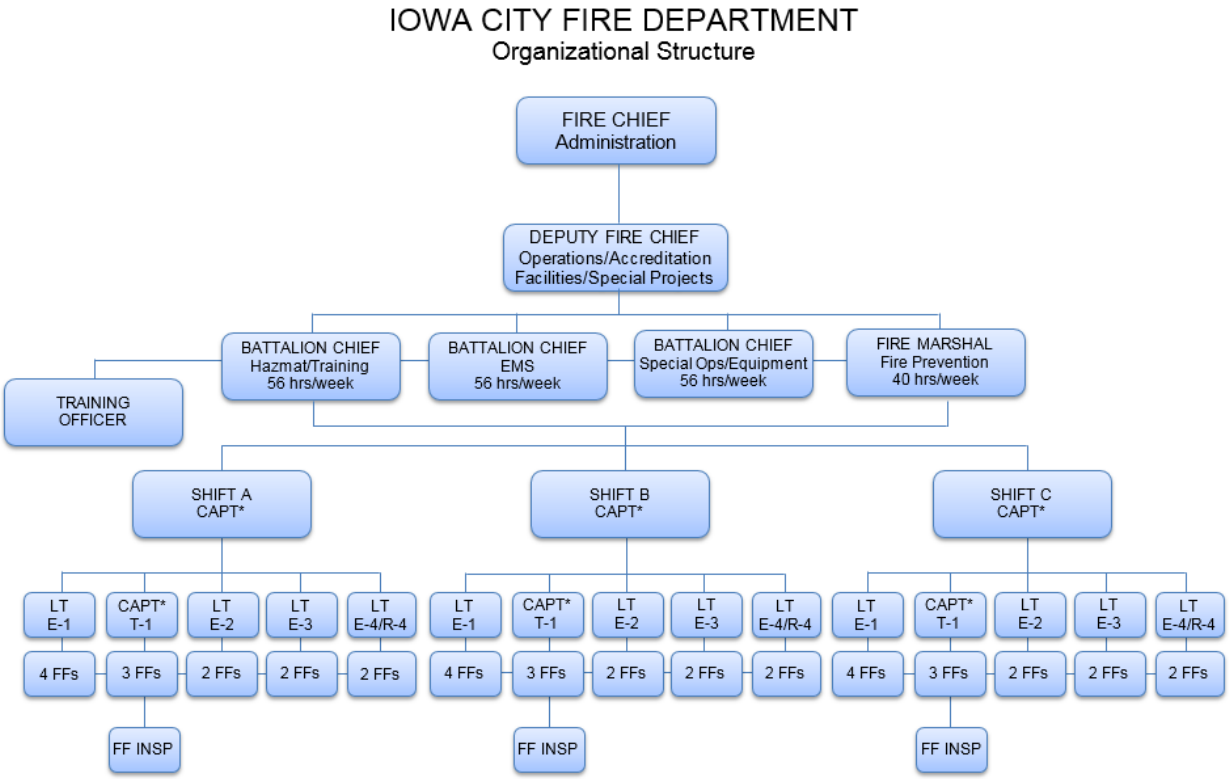


Figure 6 ICFD Organizational Chart

Fire Stations, Training Facilities, Apparatus, Equipment and Staffing

The department currently operates from four fire stations and maintains a staff of 64 uniformed personnel. The department's minimum daily staffing is 16 firefighters and officers with a maximum of 20. Firefighters respond on three engine companies, one quint company, one truck company, and one battalion chief's vehicle. Minimum staffing on each apparatus is three personnel. Station 1 is staffed with a minimum of seven personnel, of which two are officers. Stations 2, 3, and 4 are staffed with a minimum of three personnel at each station, of which one is an officer or acting officer.

Fire Station #1 is at 410 E. Washington Street. One engine company, one truck company, one heavy rescue (cross-staffed by the truck company) and one battalion chief respond from this location. Station #1 houses the administration, emergency operations, and training divisions – fire chief, deputy fire chief, battalion chief, fire marshal, and training officer. Station #1 has a conference room, and a self-contained breathing apparatus (SCBA) repair room and compressor. Living quarters are located on the second floor with a designated exercise area and separate bathroom/shower facilities for male and female personnel.

Image 64 ICFD Station #1

Station #1 was remodeled in 1990, which improved the amount of space for administrative use and classroom space for training. The second-floor kitchen was remodeled in 2012. Nine company officers share four workstations for the completion of reports. The engine room consists of three bays to house six pieces of emergency equipment.

Fire Station #2 is located at 301 Emerald Street. The designated hazmat station, one quint and one hazardous materials response apparatus respond from Station #2. It has taken on the function of storing supplies and equipment for the county hazmat team. Station #2 has added off-street parking. Living quarters include a large kitchen, living room, exercise room, locker room, six private sleeping rooms, storage cubicles, and separate male/female bathroom/shower facilities. There is a small conference room/library, as well as multiple work stations for the firefighters to utilize.

Image 65 ICFD Station #2

One engine company responds from Station #3, located at 2001 Lower Muscatine Road. This station served as the public education station until 2017. Due to limited storage / functional space and high call volume, public education was transferred to the more spacious and modern Station #4 in fall of 2017. Living quarters include four bedrooms, an exercise room, male and female bathroom/shower facilities, a small kitchen, and a large storage room.

Image 66 ICFD Station #3

Fire Station #4 is at 2008 N. Dubuque Road. One engine responds from this location. Station #4 is the public education station, and has meeting space, equipment and supply storage provided for this specialty areas. Station #4 also houses an ALS ambulance and crew of two paramedics. The ambulance is owned and operated by Johnson County Ambulance Service. Living quarters include six bedrooms, an exercise room, male and female bathroom/shower facilities, and an office for the lieutenants, a conference room, a large kitchen, living room, and a basement classroom.

Images 67 ICFD Station #4

The ICFD's training center was demolished and the property was returned to park land in 2015, due to the possibility of flooding. The department is currently seeking budget authority to secure a new site that can be developed into a fire department training center. In the meantime, the Coralville training center is available for the department to use on occasion. The department has requested and been granted overtime monies to sometimes send personnel to that site for hands-on training. The

Coralville training center is too far away to train there and provide timely emergency response service to Iowa City.

The ICFD operates a combination of three engines with 1500 gallon per minute pumps, each carrying 750 gallons of water and 30 gallons of structural firefighting foam, one ladder truck with a 2000 gallon per minute pump and 200 gallons of water, and one quint equipped with a 1500 gallon per minute pump, 500 gallons of water, a full complement of hose, ground ladders, and light rescue equipment. A heavy rescue, hazmat unit and water craft are cross staffed by on-duty personnel. One incident command vehicle operates out of Station #1. A tow vehicle and a tech rescue trailer operate out of Station #4. An all-purpose ATV's, three water craft, and five staff vehicles are assigned to Station #1. The department maintains four reserve engines.

Image 68 Engine 1

Image 69 Truck 1

Image 70 Quint 2

Image 71 Engine 3

Image 72 Engine 4

Image 73 Rescue 1

Image 74 Command

Station #1 is staffed with a minimum of seven personnel, of which two are officers. A captain or a lieutenant will be the officer assigned to Truck 1. Stations #2, #3, and #4 will be staffed with a minimum of three personnel at each location, of which one will be an officer or acting officer. Minimum staffing is 16 and maximum staffing is 20. Note that T-1 personnel also operate R-1.

Table 6 Emergency Response Staffing

STATION 1					STATION 2	STATION 3	STATION 4
ON-DUTY	**BC**	**E-1**	**T-1**	**R-4**	**Q-2**	**E-3**	**E-4**
20	1	4	4	0	4	4	3*
19	1	4	4	0	4	3	3*
18	1	4	4	0	3	3	3*
17	1	3	4	0	3	3	3*
16	1	3	3	0	3	3	3*

***T-1 personnel also operate R-1**

C. Current Levels of Service with Delivery Programs

Fire Suppression

Fire suppression services provided by the Iowa City Fire Department (ICFD) include responses to building fires involving single-family dwellings, multi-family buildings, commercial and residential high-rise buildings, and commercial and industrial buildings. Other fire suppression services provided include responses to fires involving mobile property, to include passenger and road freight transport vehicles, rail, water and recreational vehicles, as well as fires involving heavy equipment and small private aircraft. Fire suppression services for natural vegetation, landfill, and dumpster (rubbish) fires are also provided.

Image 75 Structure Fire: Iowa Avenue (September 24, 2011)

The department currently operates from four fire stations and maintains a staff of 64 uniformed suppression personnel. The department's minimum daily firefighter staffing is 16 firefighters and officers (maximum of 20) responding on three engines companies, one quint company, one truck

company, and one battalion chief command vehicle. Minimum staffing on each apparatus is three personnel.

The ICFD responds to all emergency incidents with predetermined apparatus assignments. The assignments are based on potential incident severity, past experience, and the associated risk-to-benefit analysis as determined by the department. ICFD Operational Guideline No. 125.04, Dispatch Protocols, defines and assigns apparatus accordingly. Building fires of moderate risk are assigned three engine/quint companies, one truck company, the battalion chief, one Johnson County Ambulance Service (JCAS) Adam unit, and administrative chief officers as necessary to fill effective response force requirements. High and special risk building fires receive an additional engine with the first alarm. High and special risk building fires include (upon request) activation of the Mutual Aid Box Alarm System (MABAS) to provide additional predetermined units for call-up and/or change of quarters. A change of quarters is available to maintain response-ready units in ICFD stations. Second or greater alarm resources are also predetermined within the MABAS document. Low risk fires such as trash or vehicle fires are handled by one engine/quint company.

The City of Iowa City has a 28E agreement with surrounding communities to provide fire protection and other emergency services. The MABAS, adopted in November of 2001, is a preplanned mutual aid system used to deal with emergencies exceeding department resources. MABAS contains predetermined response of personnel and equipment to five alarm levels. In 2017, the ICFD received mutual aid on 6 incidents and provided mutual aid on 15 occurrences. Auto Aid agreements with agencies to our east and west were enacted to provide the quickest possible service to incidents on Interstate 80. In 2017, auto aid was provided 10 times and received 10 times.

Figure 7 Auto Aid/Mutual Aid Given and Received (2017)

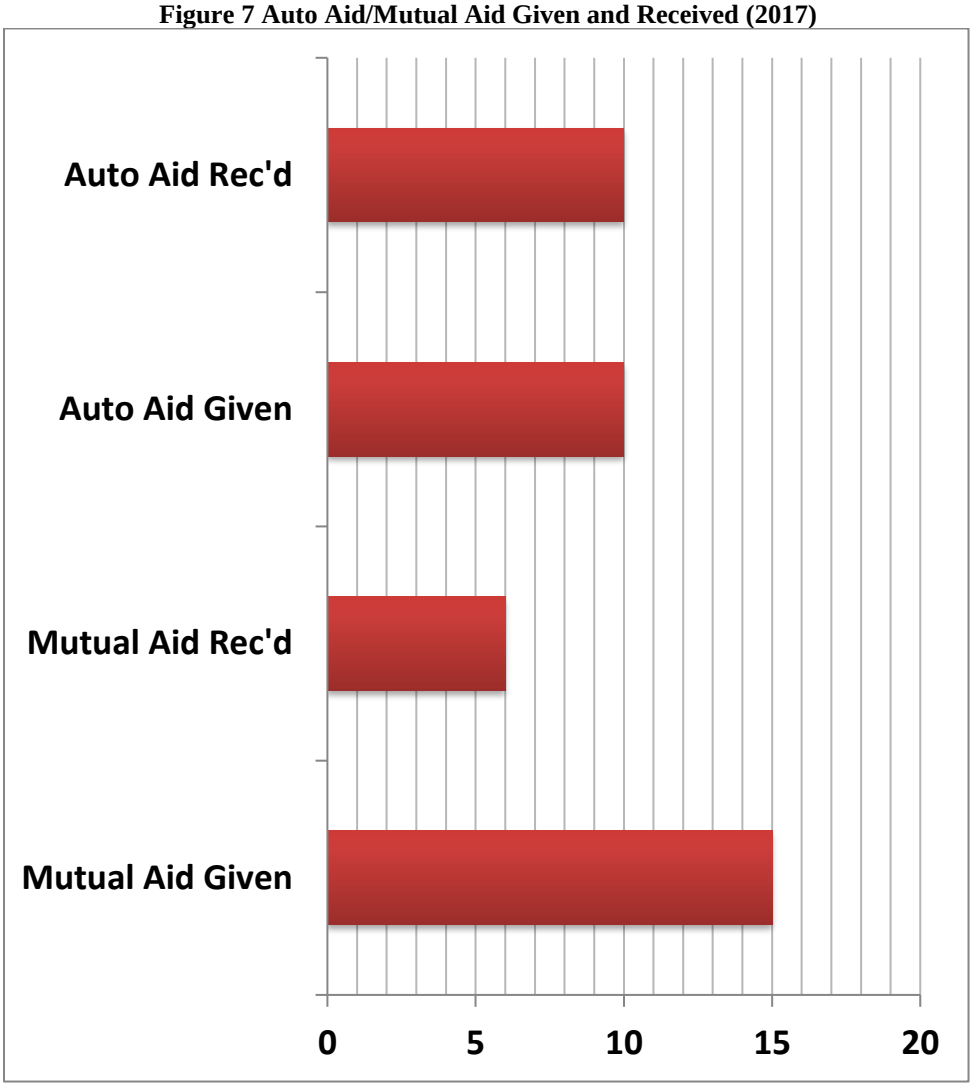


Image 76 Water Rescue Operations on the Iowa River

All fire apparatus are equipped to meet typical fire suppression activities encountered by the ICFD. The type and amount of equipment carried on apparatus is based on past experience. Other determining factors include National Fire Protection Association (NFPA) standards relating to apparatus and equipment, as well as Insurance Services Organization (ISO) guidelines. Equipment on all apparatus is standardized and/or similar, including that on reserve apparatus.

Rescue

Technical rescue includes incidents where a successful operation requires the rescuer(s) to employ special knowledge, skills, tools, and techniques. In comparison to firefighting, which generally requires large numbers of personnel, technical rescue requires fewer personnel, but a sizeable amount of specialized equipment and skills training.

Image 77 ICFD Technical Rope Rescue Training Evolution using ropes, pulleys, harnesses, belay devices, and various hauling implements.

Image 78 ICFD Confined Space Training Evolution
involving a subset of technical rescue operations comprised of the rescue and recovery of victims trapped in a confined space.

The entire range of technical rescue includes auto and machinery extrications, confined space rescue, trench and building collapse, high-angle rope rescue, and water and ice rescue. Rescue operations include many non-emergency services, such as carbon monoxide investigations, smoke and odor investigations, and miscellaneous requests for public assistance.

Image 79 ICFD Connector Boat Pairing
with a second Connector boat for a river rescue/recovery operation

The ICFD has three rescue technician level trained responders available on-duty at all times to respond to technical search and rescue incidents as specified in *NFPA 1670: Standard on Operations*

and Training for Technical Search and Rescue Incidents. The responders have the ability to identify hazards, use equipment, and apply advanced techniques specified in NFPA 1670 that are necessary to coordinate, perform, and supervise technical search and rescue incidents. All ICFD members are trained to the Operations Level of NFPA 1670 to support and participate in technical search and rescue incidents. As with fire incidents, the ICFD respond with specific apparatus assignments based on incident severity, past experience, and the associated risk-to-benefit analysis as determined by the ICFD. As with all other risks, a low risk event will receive a response that includes three personnel. Moderate risk events are provided a minimum of 10 personnel; high risk events a minimum of 16 personnel; and special risk events a minimum of 16 personnel with a Special Operations Rescue Team call-back and the resources available through the Johnson County Mutual Aid Box Alarm System (MABAS). Mutual aid partners have been trained to the Operations Level of NFPA 1670 by ICFD Special Operations Rescue Team (SORT) personnel to support and participate in special risk incidents.

Image 80 ICFD Trench Rescue Training Evolution

Medical

The ICFD provides a first responder medical care at the Basic Life Support (BLS) level. All firefighters are trained and certified as Emergency Medical Technicians (EMT); 16 are certified paramedics. The ICFD is a non-transport agency. Transport service is provided by the Johnson County Ambulance Service (JCAS).

Iowa Code Section 147A.4, subsection 2, establishes requirements for the certification of emergency medical care providers. The Iowa Department of Public Health establishes the rules and requirements concerning prerequisites, training, and experience for determining when individuals have met these requirements. Additionally, a program that desires to provide emergency medical care in the out-of-hospital setting must apply to the department for authorization to establish a program for delivery of the care at the scene of an emergency, during transportation to a hospital, in the hospital emergency department, and until care is directly assumed by a physician or by authorized hospital personnel.

EMS certification is for a period of two years. EMTs must obtain 24-hours of Continuing Education Hours (CEH) to renew certification. At least one-half of the total CEH must be designated as formal hours. Providers must also have a current course completion card for cardiopulmonary resuscitation (CPR) that includes CPR, automated external defibrillation (AED) and obstructed airway procedure for all age groups.

The primary focus of the EMT is to provide basic emergency medical care and transportation for critical and emergent patients who access the emergency medical system. The EMT possesses the basic knowledge and skills necessary to provide patient care and transportation. EMTs function as part of a comprehensive EMS response, under medical oversight. EMTs perform interventions with the basic equipment typically found on an ambulance. The EMT is a link from the scene to the emergency health care system.

Paramedics are individuals who have successfully completed a program of training that used, as a minimum, the 2005 National Education Standards for the Paramedic or completed the EMT-P to Paramedic transition requirements and successfully completed the testing requirements. The Paramedic is an allied health professional whose primary focus is to provide advanced emergency medical care for critical and emergent patients who access the emergency medical system. This individual possesses the complex knowledge and skills necessary to provide patient care and transportation. Paramedics function as part of a comprehensive EMS response, under medical oversight. Paramedics perform interventions with the basic and advanced equipment typically found on an ambulance. The Paramedic is a link from the scene into the health care system.

The Iowa Bureau of Emergency and Trauma Services Emergency Medical Care Provider Scope of Practice document, dated February 2017, lists the following sets of skills for EMTs and Paramedics.

Table 7 Airway and Breathing Skills

Airway and Breathing		
Skill	**EMT**	**Paramedic**
Airway - Manual	X	X
Airway - Oral	X	X
Airway - Multi-Lumen		X
Airway - Esophageal/Traacheal		X
BiPAP/CPAP		X
Bridge Airway Devices		X
Capnography/ETCO2		X
Chest Tube-Monitoring		X
Crichothyrotomy - Percutaneous		X
Endotracheal Intubation - Nanal/Oral		X
Gastric Decompression - NG or OG tube		X
Needle Chest Decompression		X
Obstruction - Direct Laryngoscopy		X
Obstruction - Manual	X	X
Oxygen Delivery (including humidified)	X	X
PEEP Therapeutic		X
Suctioning - Upper Airway	X	X
Ventilations - Bag Valve	X	X
Ventilations - via Mouth	X	X
Ventilations - Manually Triggered	X	X
Ventilator - Automatic Transport	X	X
Suctioning - Tracheobronchial		X

Table 8 Assessment Skills

Assessment		
Skill	**EMT**	**Paramedic**
Blood Chemistry Analysis		X
Blood Glucose Monitor		X
Blood Pressure	X	X
Blood Oximetry	X	X
Blood Sampling - Capillary Tube		X
Blood Sampling - Venous		X
Central Line Monitoring		X
EKG - Multi lead (Interpretive)		X
Pulse Oximetry		X

Table 9 Emergency Trauma Skills

Emergency Trauma Care		
Skill	**EMT**	**Paramedic**
Cervical Stabilization - Manual	X	X
Extremity Stabilization - Manual	X	X
Extremity Splinting	X	X
Eye Irrigation	X	X
Hemorrhage Control	X	X
PASG	X	X
Spinal Immobilization	X	X

Table 10 Pharmacological Intervention Skills

Pharmacological Intervention		
Skill	**EMT**	**Paramedic**
Autoinjector - Self/Peer Rescue	X	X
Autoinjector - Epinephrine		X
OTC Medications	X	X
Patient Assisted Meds	X	X
Aerosolized/Nebulized		X
Buccal		X
Endotracheal tube		X
Inhaled - Self administered		X
Intramuscular		X
Intranasal		X
Intravenous push		X
Intravenous piggyback		X
Nasogastric		X
Oral		X
Rectal		X
Subcutaneous		X
Sublingual		X
Blood Administration		X
Central Line Access		X
IO Insertion		X
IV Fluid Infusion		X
Peripheral IV Insertion		X
Thrombolytic Administration		X

Table 11 Medical/Cardiac Care Skills

Medical/Cardiac Care		
Skill	**EMT**	**Paramedic**
Assisted Delivery	X	X
Cardioversion		X
Carotid Massage		X
CPR - Manual/Mechanical	X	X
Defibrillation - Manual		X
Defibrillation - Automated	X	X
Transcutaneous Pacing		X

All fire apparatus carry Automatic External Defibrillation (AED) units for restoring heart rhythms and personnel are recertified in the use of AEDs quarterly. Shift EMS coordinators facilitate monthly continuing education training that incorporates both hands-on and online training.

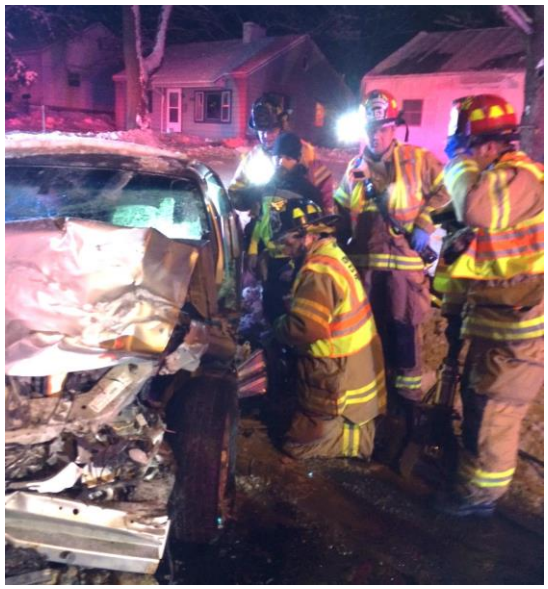


Image 81 ICFD Performing Vehicle Extrication,
the process of removing a vehicle from around a person who has been involved in a motor vehicle accident.

The ICFD responds to calls for emergency medical services with specific apparatus assignments. Apparatus assignments are based on potential incident severity, past experience, and the associated risk-to-benefit analysis as determined by the ICFD. Both low and moderate risk events are minimally provided one unit with a minimum of three personnel with BLS capabilities. High risk events are minimally dispatched to provide 10 personnel with BLS capabilities and special risk events will minimally be dispatched to provide 16 personnel. The Johnson County Mutual Aid Box Alarm System (MABAS) will be utilized to augment resource needs as determined by the incident commander. All Johnson County Mutual Aid Partners are trained EMS first responders and can assist in that capacity.

Hazardous Materials

The ICFD's hazardous materials response service was established in 1988. At least three hazmat technician level trained responders are available and on-duty at all times. The ICFD is prepared to respond to and mitigate the release of hazardous materials. All personnel are trained to the hazardous materials technician level and front line engine companies are equipped with basic tools to perform defensive operations in the event of a minor release. Minor release might include fuel spills at a local filling station, a fluid cleanup resulting from a motor vehicle accident or a carbon monoxide release within a structure. All apparatus carry the Emergency Response Guidebook (ERG), the NIOSH Pocket Guide, shovels, and binoculars. Additionally, all engine companies carry oil dry. All carbon monoxide events will get a response from the local utility company, Mid-American Energy.

Image 82 ICFD Hazardous Materials Response Technicians donning personal protective equipment.

Members of the ICFD take part in hazardous materials training on the company and department level. Company training topics concentrate on basic hazmat response competencies. Quarterly department training is multi-company to include specialty classes and scenarios. Probationary firefighters must demonstrate proficiency with hazmat competencies within their first year of employment to realize technician level certification. The competencies are based on the *NFPA 472: Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents*.

Response and mitigation of larger, more complex incidents is accomplished in partnership with the Johnson County Hazardous Materials Response Team (JCHMRT). The JCHMRT is a combination team comprised of Iowa City firefighters, the Johnson County Sheriff's Office, volunteer firefighters from departments within Johnson County, technical specialists, and civilians. The team is under the autonomy of the Johnson County Sheriff and is directed by a six-person executive board. The board is made up of team members. Two are appointed, one by the Iowa City Fire Chief and one the by Johnson County Sheriff. The battalion chief assigned to emergency operations is the fire chief's appointed board member. The county EMA director is the sheriff's appointment. The remaining board positions are voted on by the team.

Image 83 Confined space training exercise.

The JCHMRT utilizes a hazmat response unit that is housed at ICFD Fire Station #2. The apparatus is a walk-in rescue body design that is fully stocked with hazmat response supplies. Upon receipt of a call for service, the hazmat unit will be brought to the scene by those assigned to Fire Station #2, if available, or by off-duty ICFD personnel or by JCHMRT volunteer members.

Station #2 is the department's hazardous materials response specialty station. All personnel assigned to this station are members of the JCHMRT. Station #2 personnel are the department's specialists and are responsible for delivering hazmat training to all personnel. Personnel assigned to Station #2 are sent to outside hazardous materials training classes. The training ensures Station #2 personnel are afforded contemporary, standards-based training.

Image 84 Hazardous materials functional exercise at the University of Iowa

The ICFD responds to hazardous materials incidents with specific apparatus assignments. Assignments are based on potential incident severity, past experience, and the associated risk-to-benefit analysis as determined by the ICFD. All low risk hazmat incidents will be dispatched as a single engine/quint company assignment with a minimum of three personnel. Moderate risk events will be provided a minimum of 13 personnel. A scene size-up to determine potential release and/or degree of toxicity, flammability, or radiation will dictate a callout for the JCHMRT. High-risk events dictate a full team call-out of the JCHMRT. A callout is done via the Johnson County Emergency Communications Center (JECC). All level A or B entry requirements will necessitate the assistance of the JCHMRT. High-risk events will be provided a minimum of 16 personnel. Special risk events will be provided a high-risk assignment of 16 personnel minimally and may require other specialists such as the Iowa WMD Taskforce and/or the 71st Civil Support Team to safely mitigate the incident. The Johnson County Mutual Aid Box Alarm System (MABAS) can be utilized to provide additional resources for hazardous materials response. All Johnson County Mutual Aid Partners are trained to the hazardous materials operations level.

Specialized Services

Project Safe Place is a national youth outreach program that educates thousands of young people every year about the dangers of running away or trying to resolve difficult, threatening situations on their own. All ICFD fire stations are designated as Safe Place sites.

Safe Place is administered based on department policy in the following manner: A youth in crisis walks into a local fire station and tells the first available ICFD employee that they need Safe Place help. The employee identifies a comfortable place for the youth to wait while they call the Safe Place contact phone number. The Safe Place contact calls the ICFD back to identify the volunteer or staff member that will come to meet the youth. Generally, within 20-30 minutes, the Safe Place volunteer or staff person arrives to talk with the youth and transport the youth to the agency for counseling, support, a place to stay, or other resources as needed.

Community Risk Reduction Services

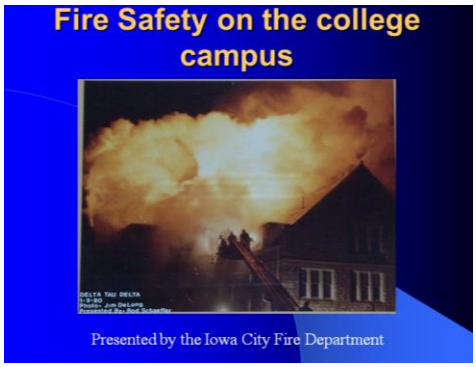
Safety Village is an open-air classroom constructed on school property. A two-week summer camp is held each year to teach injury prevention to 5, 6, and 7-year-old children.

The ICFD provides community risk reduction services under the direction of the Iowa City Fire Marshal. It is within the mission of the ICFD to ensure a high quality of life for residents and guests of the city through the protection of life, property, and the environment. The department works toward this purpose through public education programs and events and through the application and enforcement of fire and life safety codes and ordinances.

Image 85 Iowa City Firefighters routinely provide station tours and public relations activities

Fire Station #4 is the designated public education specialty station. The nine people assigned to this specialty station have primary responsibility for public education and life-safety education outreach

services. The department engages every member of the ICFD in education outreach programs in one form or another. The ICFD has established partnerships with several local and state agencies that work together to reduce risk to the citizens of Iowa City. Those agencies include but are not limited to: the State Fire Marshal, the University of Iowa, Kirkwood Community College, the University of Iowa Hospitals and Clinics, Mercy Hospital, the UI Burn Treatment Center, the Johnson County Emergency Management Agency, the City of Iowa City Neighborhood and Development Services Department, and the Iowa City Community School District.



Iowa City firefighters provide fire safety education to college students at the University of Iowa.

The ICFD and Mercy Hospital Iowa City have served as co-lead agents for SAFE KIDS Johnson County, a childhood injury prevention coalition aimed at preventing unintentional injuries to children for over 20 years. Safe Kids is a global organization dedicated to protecting kids from unintentional injuries, the number one cause of death for children in the United States.

Safe Kids Johnson County

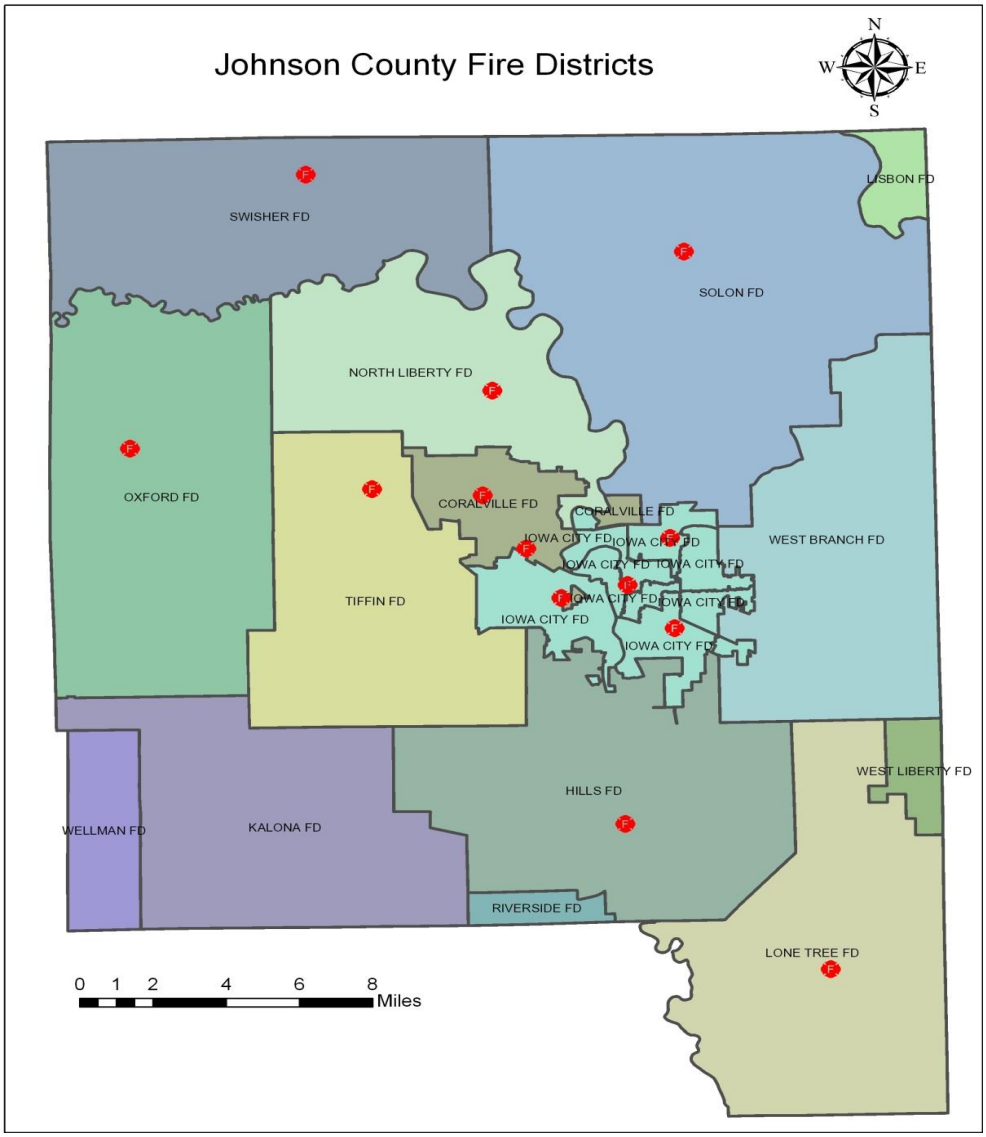
Fire and life safety code adoption and enforcement is under the direct supervision of the fire marshal. The fire marshal is assisted by all members of the department with code enforcement responsibilities. Regularly scheduled inspections of all commercial and university properties and new construction plan reviews are important pieces of the program. A group of three bureau inspectors, one from each shift that are assigned to the truck company receive extra training in code enforcement and origin and cause determination. The “bureau inspectors” perform specialized inspections and conduct origin and cause investigations that exceed company officer capabilities.

D. Current Deployment and Coverage Areas

Points of Service Delivery

All fire departments in Johnson County are dispatched centrally by the Johnson County Joint Emergency Communications Center (JECC).

Map 25 Johnson County Fire Districts and Station Locations



Iowa City fire stations are located at:

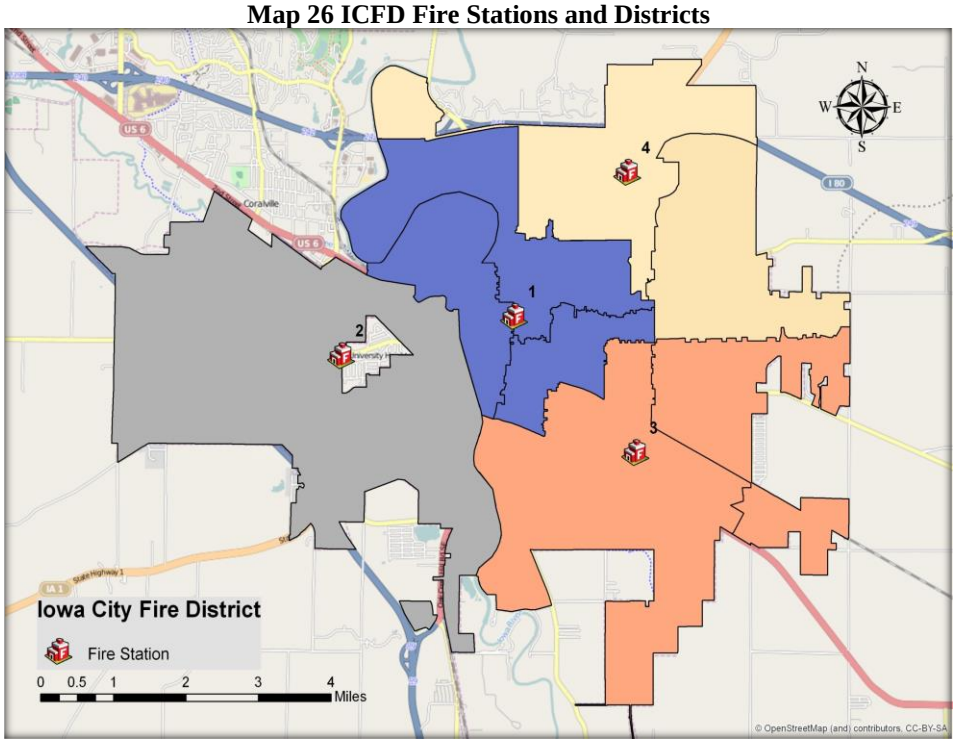
Fire Station 1: 410 E. Washington Street

Fire Station 2: 301 Emerald Street

Fire Station 3: 2001 Lower Muscatine Road

Fire Station 4: 2008 N. Dubuque Road

Map 26 ICFD Fire Stations and Districts



The Iowa City Fire Department (ICFD) provides service to all areas within the geographical boundaries of Iowa City.

Minimum Deployment Resources

Station #1 will be staffed with a minimum of seven personnel, of which two will be officers. A captain or lieutenant shall be the officer assigned to Truck 1. Stations 2, 3, and 4 will be staffed with a minimum of three personnel at each location, of which one will be an officer or acting officer. The recommended distribution of staff personnel is as follows:

Table 12 Station and Apparatus Staffing

	STATION 1				STATION 2	STATION 3	STATION 4
ON-DUTY	**BC**	**E-1**	**T-1**	**R-1**	**Q-2**	**E-3**	**E-4**
20	1	4	4	0	4	4	3*
19	1	4	4	0	4	3	3*
18	1	4	4	0	3	3	3*
17	1	3	4	0	3	3	3*
16	1	3	3	0	3	3	3*

***T-1 personnel also operate R-1**

The ICFD operates a minimum of three engines with 1500 gallon per minute pumps, each carrying 750 gallons of water and 30 gallons of structural firefighting foam, one ladder truck with a 2000 gallon per minute pump and 200 gallons of water, and one quint equipped with a 1500 gallon per minute pump, 500 gallons of water, a full complement of hose, ground ladders, and light rescue equipment. A heavy rescue, hazmat unit and water craft are cross staffed by on-duty personnel.

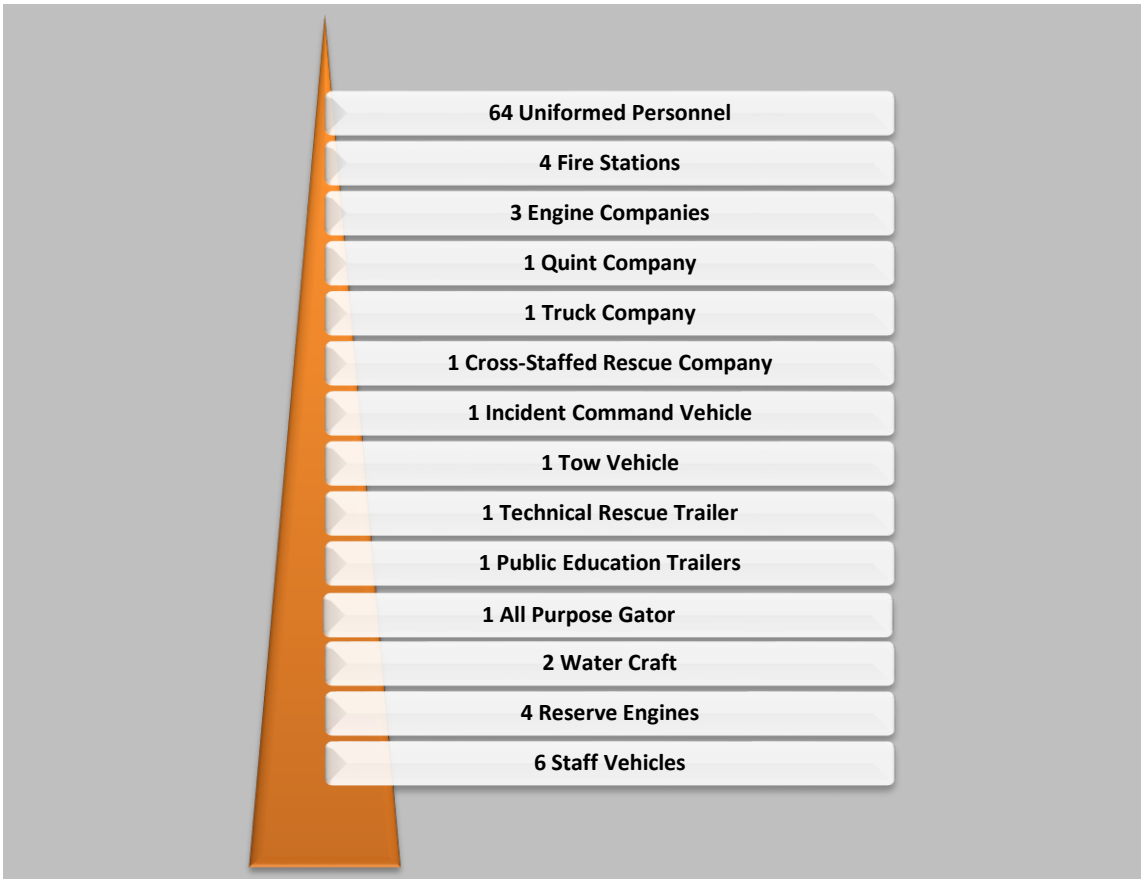


Figure 8 Personnel and Resources

All public safety agencies in Johnson County are dispatched centrally by the Johnson County Joint Emergency Communications Center. The communications center is appropriately staffed with call takers and dispatchers for law enforcement and fire/emergency medical call types.

Image 86 Johnson County Joint Emergency Communications and Emergency Operations Center

Sixty-four uniformed personnel are assigned to four major divisions within the ICFD: Administration and Support, Fire Prevention / Community Risk Reduction, Training and Equipment, and Emergency Operations. The ICFD provides an integrated all risk response to the community. The city covers

25.28 square miles in the central portion of Johnson County. The US Census Bureau estimates the 2017 population of Iowa City to be 74,398, creating an overall population density of 2,9.43 people per square mile. The city includes 304 road miles of streets. Response areas for the four fire districts within Iowa City are shown in the following map.

Map 27 MABAS Response Areas

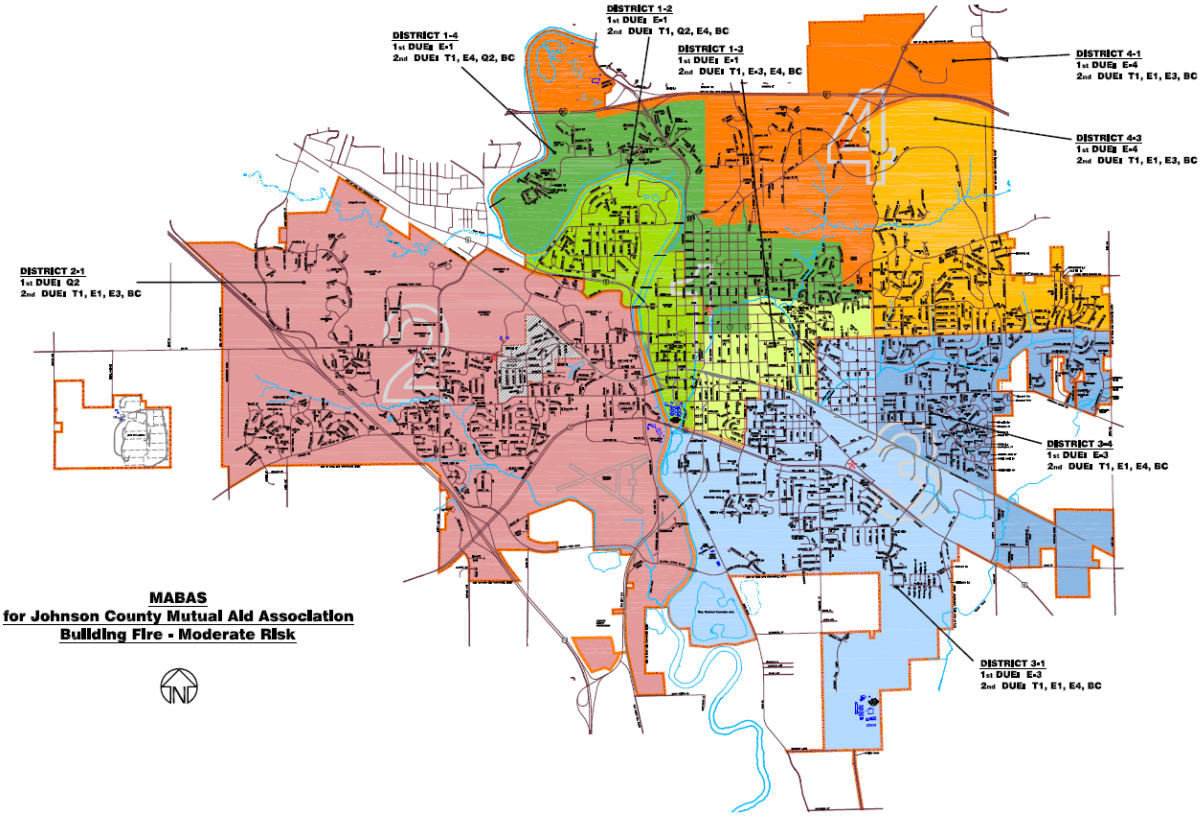


Table 13 Approximate Road Miles in Each Fire District

District	Sub-District	Miles	Total
	1-4	35.36	
	1-2	21.85	
	1-3	18.73	
1			**75.94**
2	2-1		**87.35**
	3-4	32.6	
	3-1	58.24	
3			**90.84**
	4-1	22.57	
	4-3	28.09	
4			**50.66**

E. Summary of Community Response History

The 2008 ICFD Commission on Fire Accreditation International Final Report dated March 6, 2008, included the following strategic recommendation: "The department should develop methods and

procedures to better utilize the data in the information systems to align department activities and increase knowledge and efficiency." The recommendation has been addressed over the years by including a calendar year data review as part of an annual Spring Planning Meeting. The day-long analysis of data and the adjustment of goals and objectives that's followed has contributed to a culture of continuous improvement.

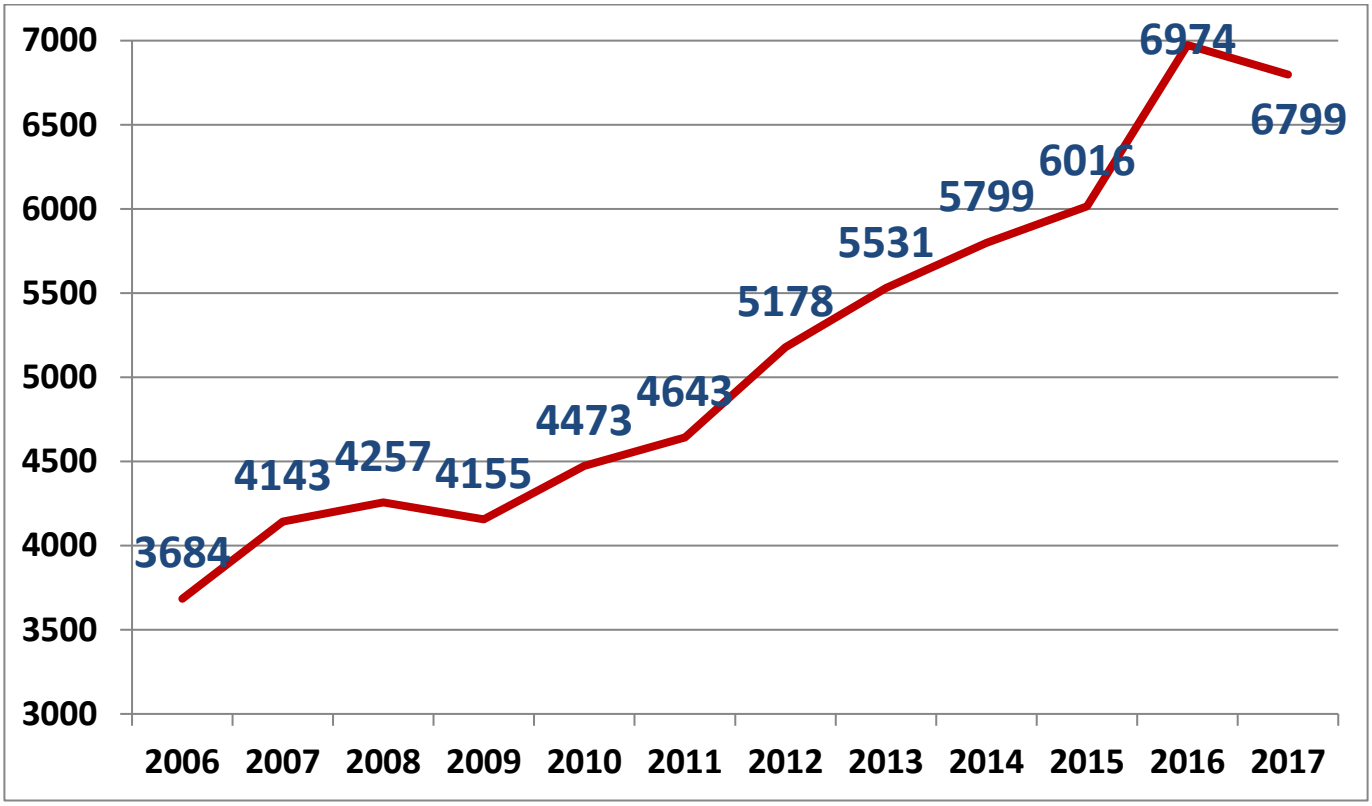


Figure 9 Total Number of Incidents (2006-2017)

The department has experienced an 85% increase in the total number of calls for service in the period from 2006 to 2017.

F. Community Priorities, Expectations, and Performance Goals

Mission Statement

"The mission of the Iowa City Fire Department is to protect our community by providing progressive, high quality emergency and preventive services."

Community Service Priorities

The rankings of the programs and services as provided by community members at the community forum that was conducted on November 12, 2015, are as follows:

Table 14 Program Ranking

PROGRAMS	RANKING	SCORE
Fire Suppression	1	363
Emergency Medical Services	2	311
Technical Rescue	3	268
Hazardous Materials Mitigation	4	169
Community Risk Reduction	5	166
Domestic Preparedness Planning and Response	6	159
Fire Investigation	7	124
Public Education	8	92

Community Service Expectations

On November 12, 2015, a community forum was conducted by the Center for Public Safety Excellence at the Iowa City Public Library to gathering feedback from the community.

The purpose of gathering feedback from the community runs parallel to a business collecting feedback from its customers. The governmental entity, like the business, cannot truly operate efficiently and effectively without understanding the true nature of expectations, concerns, and strengths of its customer base. In government, that customer base is the constituency served. Iowa City Fire Department (ICFD) solicited the feedback and input from a diverse demographic representation of its population. This report delivers the methodology employed and the findings from the responses provided by the community participants.

When analyzing the received feedback, priority and thematic approaches are used to get to the heart of what is the most important to the community respondents. While all responses in the raw-data form are important, the analysis brings to the forefront an understanding and focus for the agency. It is important to note that all feedback from the community is important as it applies to various areas of the department. The department is best served by conducting greater internal analyses of the provided feedback to formulate future objectives and strategies for continuous improvement.

Methodology and Findings

Program and Service Prioritization

Participants were provided with an instrument to determine the prioritization of the core programs and services provided by the ICFD. In the instrument, participants are asked to do a "direct comparison" between two different services as to which, in the participant's mind, takes priority in each specific comparison. Each service is directly compared to another service and this continues until all services are compared to all other services. Responses were then tabulated together to formulate the combined stakeholder result as listed in the table. This quantitative and cumulative approach provides the department with a numerical prioritization ranking. It is understood that this snapshot of information contains some bias as to the specific respondents.

Additionally, the data can be impacted by cognitive dissonance. Because of cognitive dissonance, the responses may be shifted in priority due to shifting personal biases or impacts from external sources. For instance, there may be a shift toward more prioritization for Domestic Preparedness in a region recently impacted by a natural disaster. It is hard to determine if cognitive dissonance impacts the prioritization in a non-normal way without further researching the external impacts and exposures provided to the respondents. Therefore, the department must consider the role of cognitive dissonance and its potential impact on the prioritization when analyzing the overall feedback provided.

Community Expectations

Analysis of the community expectations is based on the prioritization of the data. Respondents were asked to place their expectations in a priority manner with the number-one expectation receiving the highest weight and the number-five expectation receiving the lowest weight. With this weighting in mind, the prioritization works to bring the highest priority expectation to the top of the list. As stated previously, all responses are important. However, focusing on those responses that create the highest priority assists the agency and governing body in its decision-making process. While there were 58 total thematic responses, the top 15 are presented since they carried the heaviest weight overall. However, the inclusion of all the expectations in the department's decision-making process remains important.

Analysis of the respondent data provides that the top 15 prioritized expectations give the majority basis for the community responses. They are:

1. A timely response to all emergencies with highly trained personnel, to include adequate apparatus and equipment. The ICFD should respond as quickly as possible to the scene of a fire.
2. Well-trained personnel. With such a large menu of services, a great deal of time, money, and effort need to go into the training of members to be able to safely respond and handle any and all situations.

3. Well-equipped personnel. The firefighters need to have access to the most modern, safe equipment, apparatus, gear, and other support items to handle any and all types of responses.
4. Educate building owner and public about fire safety. Education to the public.
5. I expect professional behaviors on scene and off scene; especially after an incident. Professionalism.
6. Enough people available to safely and quickly respond to emergencies. The staffing levels are important so that multiple alarms can be handled. Provide more staff and equipment for growing community.
7. The department needs to communicate with the community on a regular basis. Community transparency and accessibility. Open communication paths.
8. Effective oversight of fire code compliance, occupancy compliance. Insure compliance with fire code in public buildings as well as emergency equipment in residential structures.
9. Planning and resources for large-scale emergencies.
10. In the public eye - I expect friendly, informative firefighters who will answer questions, thrill a small child with their kindness, and offer common courtesy. Approachable, friendly, courteous, and knowledgeable staff/personnel.
11. The ICFD should be run as efficiently as possible without compromising the level of service they provide. Cost effectiveness and being a good steward of taxpayer dollars.
12. Work closely with business owners, including landlords, to evaluate and counsel on life safety issues for physical structures and grounds planning.
13. Work with other emergency responders. Calls for service / training. ICFD should work well with the other emergency responders in Iowa City, surrounding communities and Johnson County.
14. Work seamlessly with community partners to accomplish goals and objectives.
15. A department that is engaged with the community.

Areas of Concern Identified by the Community Stakeholders

(No particular order or priority given to the concerns that were identified by community stakeholders)

- I'm concerned about the number of firefighters now in relationship to how large the city has grown. I don't think the number is up-to-date with Iowa City's size.
- Equipment – Does the department have everything it needs to respond to all types of emergencies?
- I know that training is essential. I'm quite concerned there is no replacement plan for a new training center since we lost the other one. This is something that must be addressed soon.
- How will the loss of the current training facility be handled? New facility? Work with Coralville? Question of proximity to Iowa City.

- Are there ways to better coordinate among jurisdictions and agencies? Example: Place ambulances at ICFD stations. Cross-training?
- Funding issues. Can we afford to keep up with state-of-the-art?
- Inadequate training facility. The loss of an amazing training ground to flooding and FEMA buy-out put the firefighters and the community at risk.
- The number of multiple alarms and the increasing size of the city (annexing and new developments) jeopardize the department, the members, and subject the community to more losses.
- The lack of diversity of personnel. Minorities need to be represented. The department does a good job with female personnel.
- What is the long-term role of the department in EMS?

Positive Comments and Strengths Provided by the Community Stakeholders

(No particular order or priority given to the comments and strengths that were identified by community stakeholders)

- I love the fact that the fire department is accredited. I know how much time and work this takes. Thank you for doing this. It gives me even more confidence in the ICFD.
- I have always felt the firefighters have been professional and prepared both on-scene and off-scene.
- Having quality staff and officers makes a world of difference in morale and satisfaction among the firefighters. The staff is excellent.
- Thank you for spending the dollars to send firefighters off to specialized training across the country. The National Fire Academy training has helped countless Iowa City firefighters become even better firefighters!
- The willingness to seek community input speaks highly of the department and the city.
- I think the fire department does an amazing job. They respond quickly when called and are competent in every way.
- They are visible in the community as resources and not just during emergencies.
- Personally, I have not needed the services of the department. Professionally, they have been called to our place of business where they were thorough and attentive to our needs.
- All Iowa City firefighters I have dealt with have been very impressive while performing their duties. Great community image!
- Great job of getting feedback from the community and always seem to be working to improve.

Performance Goals

NOTE: The following benchmark goals and objectives were developed to comply with the 2013 Community Risk and Emergency Service Analysis / Standard of Cover. The work undertaken now (2018) to reevaluate community risks and write a new Standard of Cover has changed some or all of

the community service level benchmark goals and objectives. In summary, these performance objectives are historical.

Community Service Level Benchmark Objectives

Fire

Objective: For all fire incidents, the Iowa City Fire Department shall arrive in a timely manner with sufficient resources to stop the escalation of the fire and keep the fire to the area of involvement upon arrival. Initial response resources shall be capable of containing the fire, rescuing at-risk victims, and performing salvage operations, while providing for the safety of the responders and general public.

- Distribution Performance Measure for Fire – All: The first engine (or truck or quint with engine capabilities) staffed with a minimum of three personnel shall arrive within 6 minutes 20 seconds total response time in metropolitan and urban population areas for 90% of all requests for emergency service.
- Concentration Performance Measure for Fire – Low and Moderate (Unconfirmed): The second through fifth due units staffed with a minimum of 12 personnel and the battalion chief shall arrive within 10 minutes 20 seconds total response time in metropolitan and urban population areas to have a minimum of 16 personnel on scene for 90 percent of all requests for emergency services.
- Concentration Performance Measure for Fire – Low and Moderate (Confirmed): The second through fifth due units staffed with a minimum of 12 personnel and the battalion chief shall arrive within 10 minutes 20 seconds total response time in metropolitan and urban population areas to have a minimum of 16 personnel on scene for 90 percent of all requests for emergency services.
- Concentration Performance Measure for Fire – High: The second through fifth due units staffed with a minimum of 12 personnel and the battalion chief shall arrive within 10 minutes 20 seconds total response time in metropolitan and urban population areas to have a minimum of 16 personnel on scene for 90 percent of all requests for emergency services.
- Concentration Performance Measure for Fire – Special: To the resources identified in high risk response add the preplanned mutual aid resources available through the Johnson County Mutual Aid Box Alarm System (MABAS). Iowa City's four fire districts are divided into 12 boxes. Each box can escalate, depending upon the needs of the incident commander's incident action plan to a 5th alarm, with each alarm bringing additional apparatus and personnel. Mutual aid resources will be necessary to assemble an effective response force capable of addressing the critical tasks necessary to control a special risk event.

EMS

Objective: For all emergency medical incidents, the Iowa City Fire Department shall arrive in a timely manner with sufficiently trained and equipped personnel to provide medical services that will stabilize the situation, provide care and support to the victim and reduce, reverse, or eliminate the

conditions that have caused the emergency while providing for the safety of the responders. Timely transportation of victim to appropriate medical facilities shall be accomplished in an effective and efficient manner when warranted.

- Distribution Performance Measure for EMS – All: The first unit (with BLS capabilities) staffed with a minimum of three personnel shall arrive within six minutes total response time in metropolitan and urban population areas for 90% of all requests for emergency service.
- Concentration Performance Measure for EMS – Low and Moderate: Same as Distribution Performance Measure.
- Concentration Performance Measure for EMS – High: The second and third unit with BLS capabilities staffed with a minimum of six personnel and the battalion chief shall arrive within 10 minutes total response time in metropolitan and urban population areas, to have a minimum of 10 personnel on scene for 90 percent of all requests for emergency service.
- Concentration Performance Measure for EMS – Special: The second through fifth due units staffed with a minimum of 12 personnel and the battalion chief shall arrive within 10 minutes total response time in metropolitan and urban population areas, to have a minimum of 16 personnel on scene for 90 percent of all requests for emergency services. Mutual aid resources may be necessary to assemble an effective response force capable of addressing the critical tasks necessary to control a special risk event. Preplanned mutual aid resources are available through the Johnson County Mutual Aid Box Alarm System (MABAS).

Rescue

Objective: For all incidents where rescue of victims is required, the Iowa City Fire Department shall arrive in a timely manner with sufficient resources to stabilize the situation and extricate the victim(s) from the emergency situation or location without causing further harm to the victim, responders, public or the environment.

- Distribution Performance Measure for Rescue – All: The first unit (engine, truck, quint, or rescue) staffed with a minimum of three personnel shall arrive within six minutes twenty seconds total response time in metropolitan and urban population areas, for 90% of all requests for emergency service.
- Concentration Performance Measure for Rescue – Low: Same as distribution performance measure.
- Concentration Performance Measure for Rescue – Moderate: The second and third due engine, truck, rescue or quint staffed with a minimum of six personnel and the battalion chief shall arrive within 10 minutes 20 seconds total response time in metropolitan and urban population areas, to have a minimum of 10 personnel on scene for 90 percent of all requests for emergency services.
- Concentration Performance Measure for Rescue – High: The second through fifth due units staffed with a minimum of 12 personnel and the battalion chief shall arrive within 10 minutes 20 seconds total response time in metropolitan and urban population areas, to have a minimum of 16 personnel on scene for 90 percent of all requests for emergency services.
- Concentration Performance Measure for Rescue – Special: To the resources identified in high risk response add the preplanned mutual aid resources available through the Johnson County Mutual Aid Box Alarm System (MABAS). A call-back of off-duty Special Operations Rescue Technicians (SORT) will bring added staffing. One or both groups may be necessary to provide an effective response force capable of addressing the critical tasks necessary to control a special risk event.

Hazardous Materials

Objective: For all incidents where hazards involving hazardous materials are involved, the Iowa City Fire Department shall arrive in a timely manner with sufficient resources 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 without causing further harm while providing for the safety and security of the responders, public, and the environment.

- Distribution Performance Measure for Hazardous Materials – All: The first unit (engine, truck, quint, or rescue) staffed with a minimum of three personnel shall arrive within six minutes 20 seconds total response time in metropolitan and urban population areas, for 90% of all requests for emergency service.
- Concentration Performance Measure for Hazardous Materials – Low: Same as distribution performance measure.
- Concentration Performance Measure for Hazardous Materials – Moderate: The second, third, and fourth units staffed with a minimum of nine personnel and the battalion chief shall arrive within 10 minutes 20 seconds total response time in metropolitan and urban population areas, to have a minimum of 13 personnel on scene for 90 percent of all requests for emergency service.
- Concentration Performance Measure for Hazardous Materials – High: The second, third, fourth and fifth unit staffed with a minimum of twelve personnel and the battalion chief shall arrive within 10 minutes 20 seconds total response time in metropolitan and urban population areas, to have a minimum of 16 personnel on scene for 90 percent of all requests for emergency service.
- Concentration Performance Measure for Hazardous Materials – Special: To the resources identified in high risk response add a full team call-out of the Johnson County Hazardous Materials Response Team (JCHMRT). The preplanned mutual aid resources available through the Johnson County Mutual Aid Box Alarm System (MABAS) may also be added. The JCHMRT will be necessary to assemble an effective response force capable of addressing the critical tasks necessary to control a special risk event.

G. Community Risk Assessment and Risk Levels

Risk Assessment Methodology

Methodology (Probability/Consequence/Impact of Event Risk)

In community risk assessment, the goal is to quantify risks so that response assignments can be appropriately configured based upon a measured level of threat. For emergency response, it is important to ensure that allocated resources match the degree of risk that is present. The Iowa City Fire Department (ICFD) has chosen a particular methodology to develop a systematic approach to the management of resource deployment. In all cases, the simpler the output, the easier it will be to use. The department has chosen a three-axis methodology that includes the elements of probability, consequence, and impact. Once each element is assigned a score, Heron's formula is utilized to calculate an overall risk level.

There is always a probability that an event will occur. The frequency of those occurrences can be measured. Probability speaks to the predictability of an event occurring, and through the quantification of historical data, provides a method of projecting the frequency of future events. Likewise, there are always consequences to an event, which range from low to high. A fire in a nursing home may be an infrequent event, but it carries an extremely high consequence to life and property. Individuals not capable of self-preservation i.e. patients, injured healthcare workers, employees or visitors, must be rescued from the immediate area of fire origin. A fire in a healthcare facility that results in a loss of life to those that are least able to care for themselves would affect the community psyche for many, many years. Impact measures the effect of an event on the fire department. Impact is the measured "drain effect" regarding adverse service area resource availability and coverage caused by emergency incident mitigation demand. Here again, the range is from low to high.

Certain tools are utilized to measure probability, consequence, and impact. It is possible to project call trends using historical data. Future demand for services is impacted by growth and development. An increase in population density will, for example, affect the frequency of certain services as will the construction of senior housing. The distribution of calls by type, time, location, and resource can be used to determine trends, which can be projected into the future. Using historical data, it is possible to create service demand data for various planning areas and then project for future demands. The third axis aims to quantify fire department impact. Two considerations with respect to impact include: the amount of resources that are required to mitigate the event; and the remaining capacity that then exists to protect the area and be available for subsequent deployment.

To properly identify the elements affecting risk, a common set of rules are required. Specific incidents are assigned numbers for each element to include probability, consequence, and impact. The assigned numerical values can range from two to ten and can only be even numbers. The first value will represent the threat, the second the consequence, and the third will be assigned according to department impact.

Measurements are provided according to group types. The classification groups are: fire, emergency medical services (EMS), hazardous materials (hazmat), and technical rescue. Measurements are provided for all classifications of events. Likewise, categories are defined that include: low risk, moderate risk, high/special or maximum risk. Within each of the 16 planning areas, all five of the risk classifications are assessed using the probability, consequence, and impact methodology. By using this form of methodology, risks were identified in each planning area based on past incident data (probability), the potential loss of life and/or property (consequence), and the measured commitment of fire department resources to the event (impact).

Rules related to the score assigned to the threat category are primarily considerate of their historical frequency as well as their potential to occur. A score of 2 would reflect an incident that rarely occurs or has a very low potential, like once each year. Conversely, an incident that occurs daily or has great potential to exist would be assigned a score of 10.

Table 15 Ranking Probability

Score	Threat Definition
2	Occurs rarely or has very low potential – annual basis
4	Occurs somewhat rarely or has low potential – every six months
6	Occurs often or has potential to occur – monthly
8	Occurs frequently or has frequent potential – weekly
10	Occurs very often or has great potential – daily

Assigning a score to the consequence of an incident has multidimensional considerations. Included within this category are consequences related to the financial, life loss, and emotional impacts that an incident could contain. Rules related to scoring this portion of the formula can best be visualized by a table as shown below.

Table 16 Ranking Consequence

Score	Financial	Life Loss	Emotional
2	No financial loss	No loss of life	No emotional impact
4	Minor financial loss	Potential loss of single life	Very low emotional impact
6	Moderate financial loss	Loss of a single life	Moderate emotional impact
8	Significant financial loss	Loss of a single life with potential loss of multiple lives	Significant emotional impact
10	Very high financial loss	High probability of multiple life loss	Very high emotional impact

The third risk evaluation element embodies the impact that a particular response has on the agency. This is important because the more resources that an incident requires directly effects the agency's capabilities related to the current event as well as the department's ability to respond to subsequent calls for service. Rules assigned to this category directly correlate to the resources assigned to the incident. A single company incident will receive a score of two. This score will increase by two points each time an additional unit is assigned to the response. A structure assignment of two engines, a ladder, and a command vehicle will receive a score of eight.

Table 17 Ranking Impact

Score	Impact Definition
2	Single Company Response
4	Two Company Response
6	Three Company Response
8	Four company Response
10	Five (or greater) Company Response

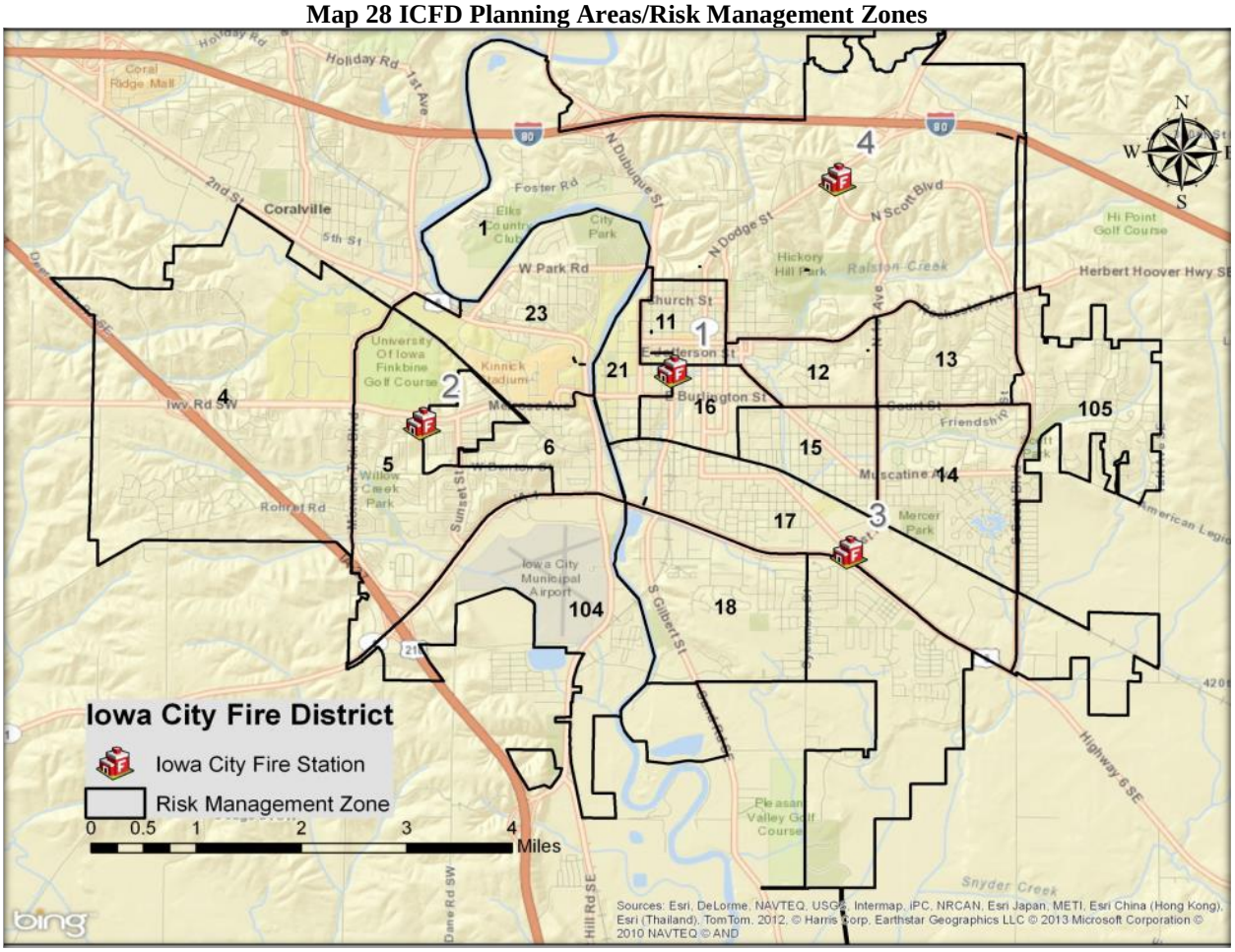
Planning Areas/Zones

The first recorded instances of the delineation of small geographic entities based on population, topography, and housing characteristics were the sanitary districts. The sanitation districts of the early 20th century were used to analyze and compare the effect of population, topography, and housing on the mortality rate of the inhabitants. The idea eventually led to the delineation of tracts for the tabulation of census data. The goal of the criteria has remained unchanged over time; that is, to assure comparability and data reliability through the standardization of the population thresholds for census tracts, as well as requiring that their boundaries follow specific types of geographic features that do not change frequently.

For these reasons, the ICFD chose the use of census tracts as planning areas in preparing its first Standard of Response Coverage document in 2007. The City of Iowa City includes 16 census tracts. Incident response data is automatically populated by computer-aided dispatch (CAD) with the assigned census tract number. The boundaries are well-defined and descriptive population demographics and other descriptive data are readily available to assist with meaningful analysis. Having used census tracts as planning areas for nearly ten years, the department finds the census tract boundary continuity and the resulting census tract data comparability over time to be desirable.

Today, planning areas for the ICFD include the following:

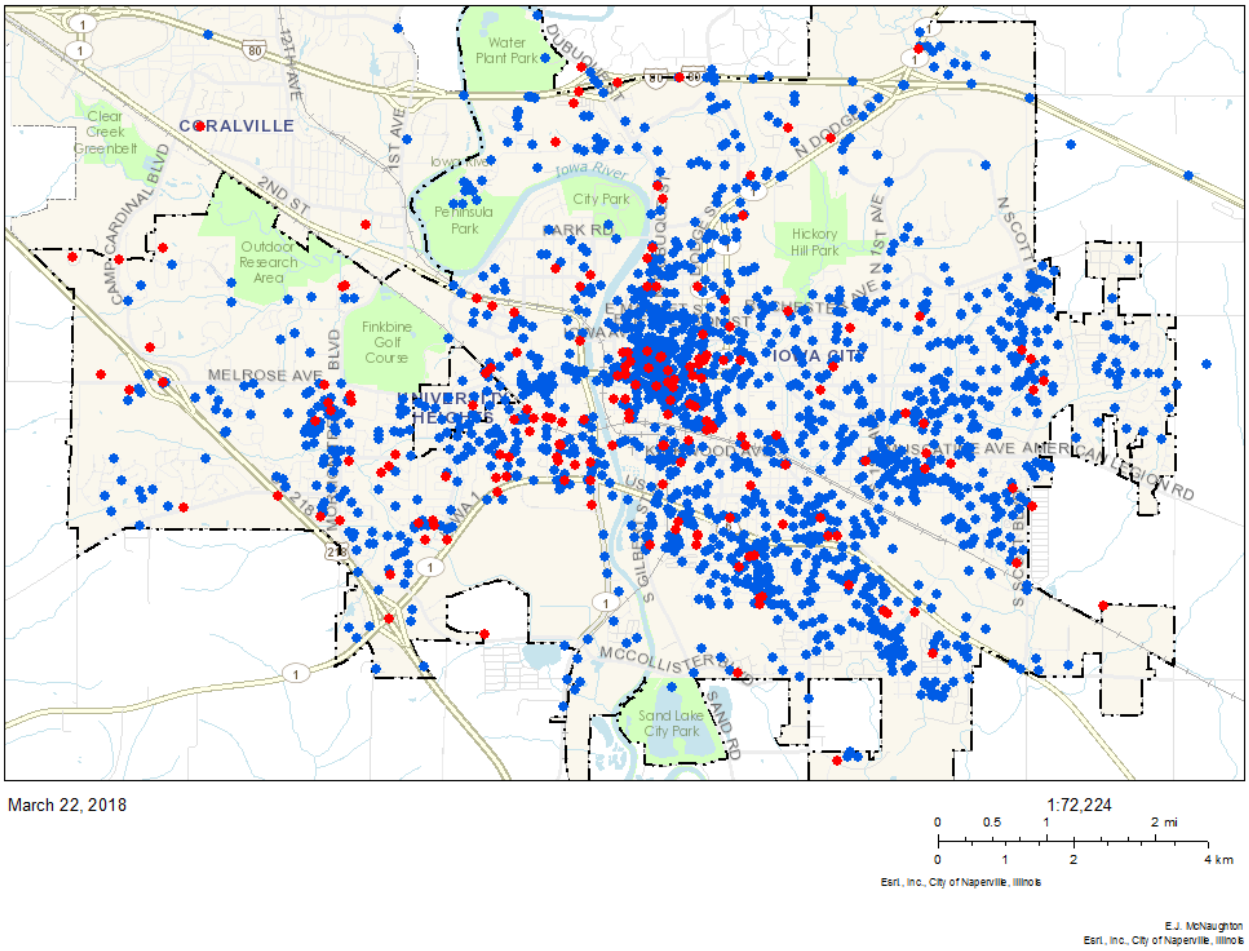
Map 28 ICFD Planning Areas/Risk Management Zones



Sixteen Census Tracts or Risk Management Zones (RMZ)

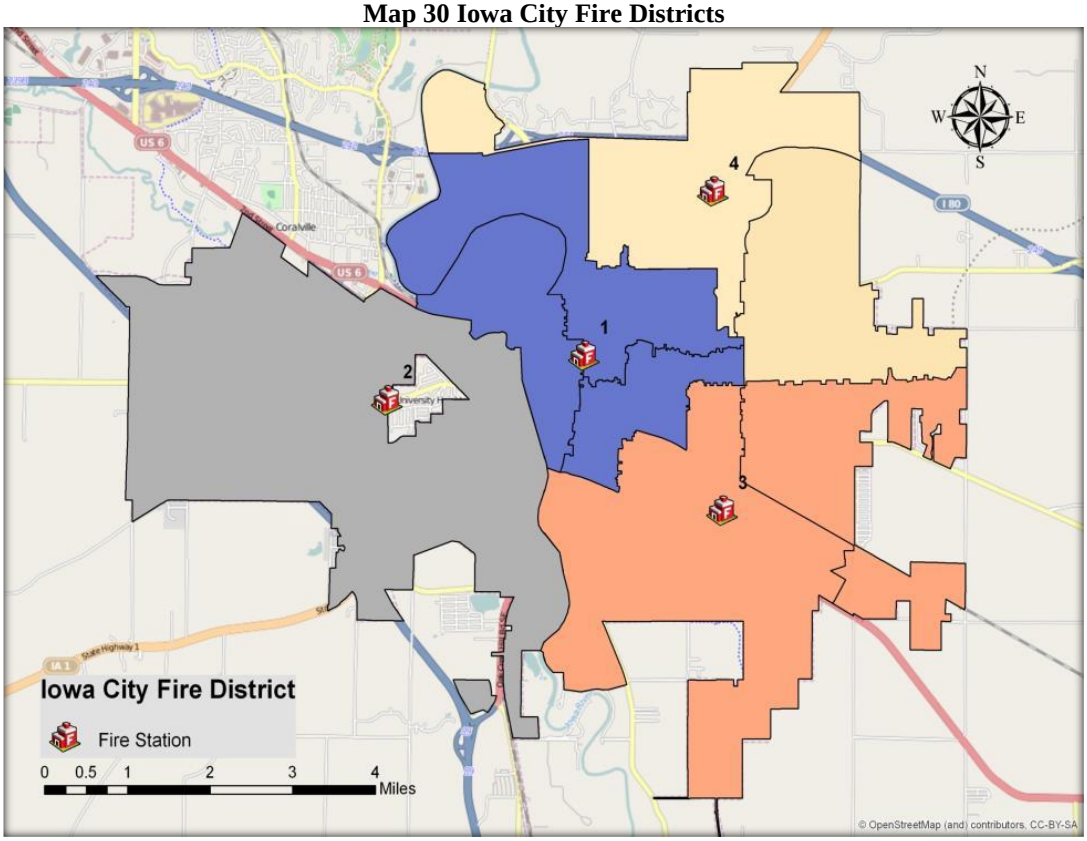
The risk management zones (RMZs) are census tracts that provide descriptive information via the census bureau for analysis and planning. Incident tract numbers are captured in the Records Management System (RMS) and provide for easy analysis.

Map 29 2013-2017 Emergent Call Density



Geocoding of incident data remains a priority goal for the ICFD. The CAD is currently capturing approximately 98% of our incidents for GIS mapping, an increase of more than 50 percent over recent years. The department has manually populated the balance of 2013 through 2017 incident data. A University of Iowa Mechanical Engineering student intern has been utilized to provide incident heat maps for this publication and for future analysis.

Map 30 Iowa City Fire Districts



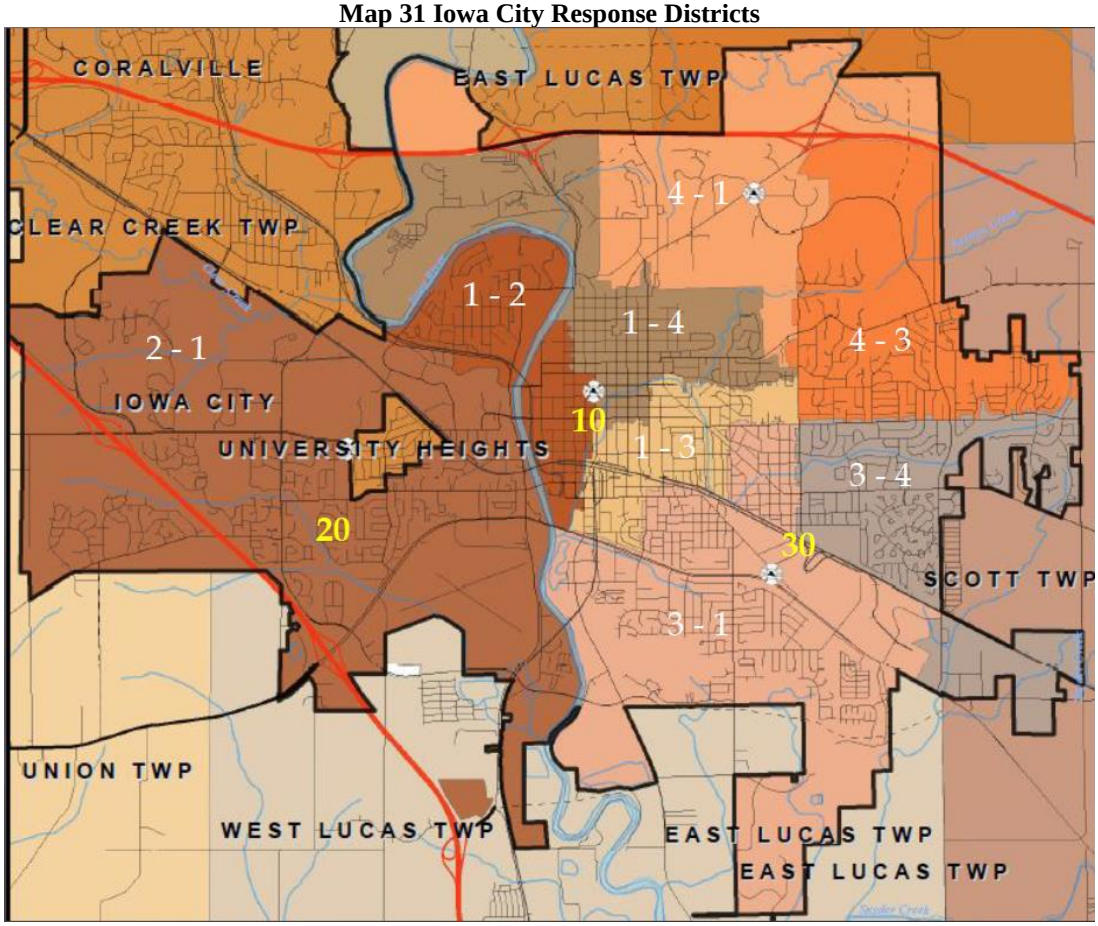
Four Fire Districts

The four fire districts align with the four fixed facility fire stations. The district boundaries are closely associated with transportation routes and travel distance to the nearest fire station. District boundaries are defined by parcels of land that are programmed into the CAD for automatic population of unit assignments.

Table 18 Approximate Road Miles in Each Fire District

District	Response District	Miles	Total
	1-4	35.36	
	1-2	21.85	
	1-3	18.73	
1			**75.94**
2	2-1		**87.35**
	3-4	32.6	
	3-1	58.24	
3			**90.84**
	4-1	22.57	
	4-3	28.09	
4			**50.66**
TOTAL			**304.79**

Map 31 Iowa City Response Districts



Eleven Response Districts

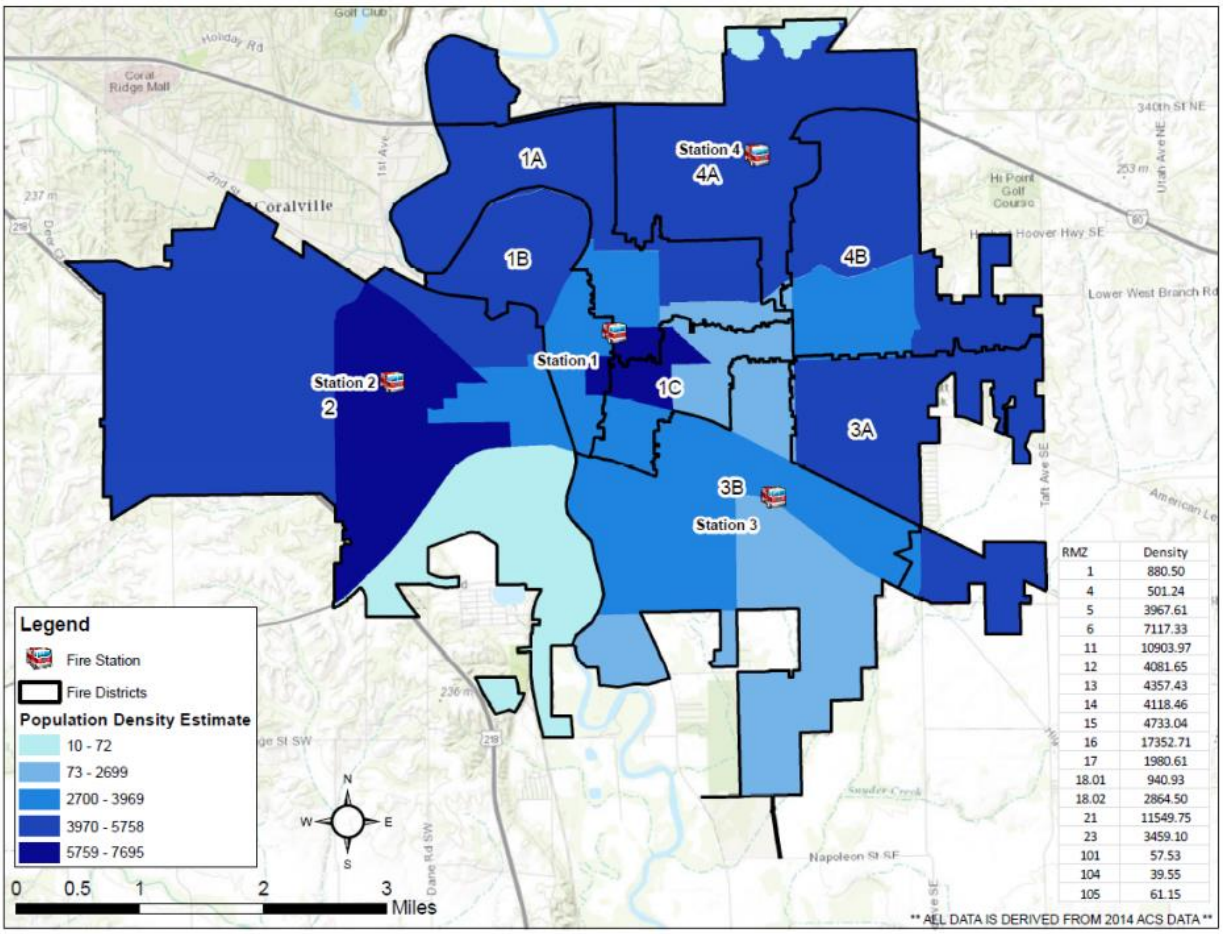
The eleven response districts are configured to provide a fast and efficient response to events requiring more than one unit. Eight of the response districts are designated 1-2, 1-3, 1-4, 2-1, 3-1, 3-4, 4-1, and 4-3. The first number corresponds to the district and the second number indicates which neighboring district provides the second-due unit. Response districts 10, 20, and 30 are linked to high and special risk occupancies within districts, 1, 2, and 3. Building fires in these districts receive an additional engine on the first alarm assignment. District 4 has no high or special risk occupancies, therefore there is no response district 40. The CAD is pre-programmed to assign units according to the incident location, the classification of risk (fire, EMS, hazmat, and tech rescue), and the category of risk (low, moderate, high, or special).

At its annual Spring Planning Meeting on April 14, 2016, the ICFD elected to rely more heavily on the 11 response districts for planning purposes, particularly as it relates to emergency response and mitigation. Performance data that is tied to the response districts will have greater use and application because it is more familiar. Department employees are intimately familiar with response districts but only vaguely familiar with census tracts.

Incident response data for this study will be displayed according to the four response districts. Most of the descriptive data is collected and conveyed by census tracts. Rather than apportion the department's calculations of descriptive data to the response districts, which sacrifices accuracy, the agency has chosen to display descriptive information within this document according to the census tracts that overlay the four fire districts and eight response sub-districts.

The map below conveys the above in that the 16 census tracts (RMZs) are color coded to reflect population density while the heavy black lines separate the eight response sub-districts.

Map 32 Population Density Estimates by RMZ



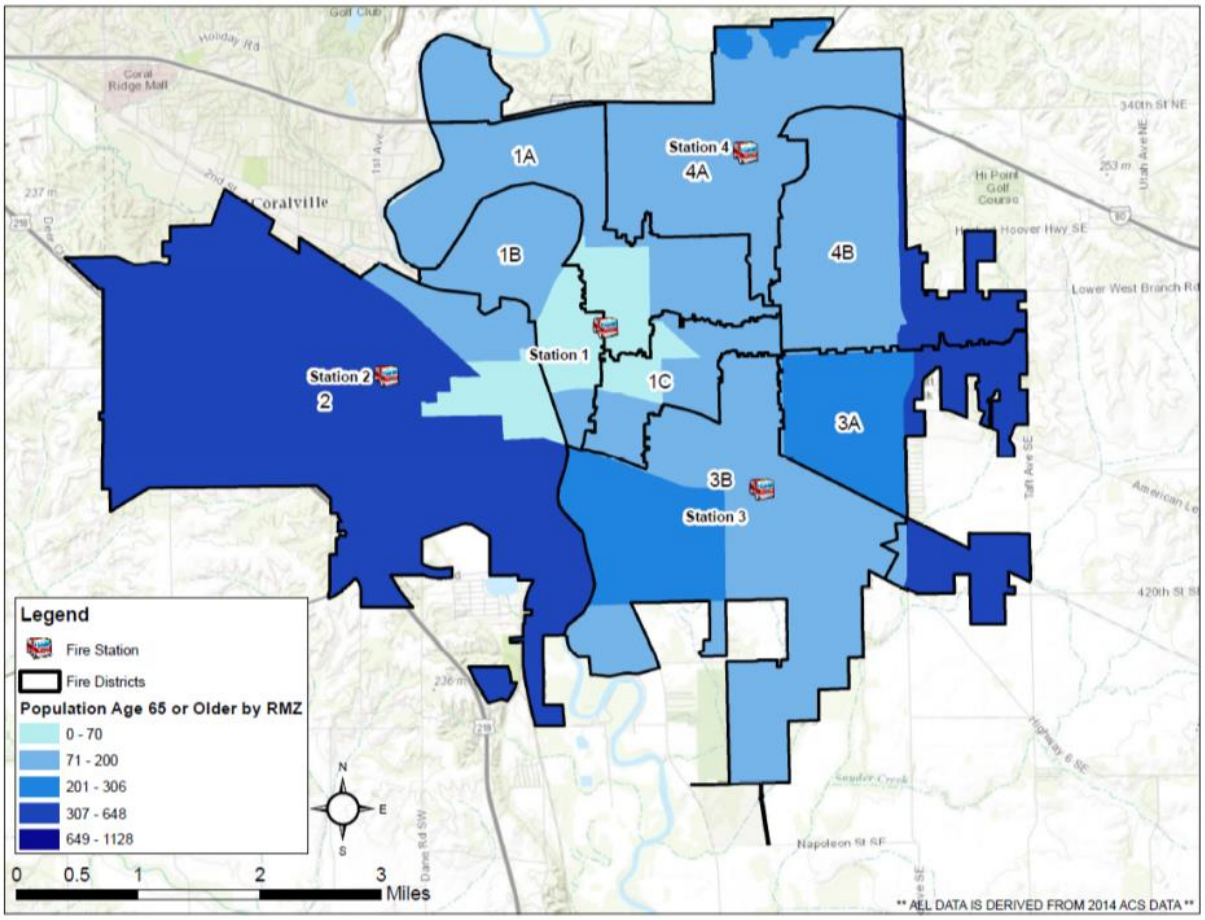
RMZ	Density
1	880.50
4	501.24
5	3967.61
6	7117.33
11	10903.97
12	4081.65
13	4357.43
14	4118.46
15	4733.04
16	17352.71
17	1980.61
18.01	940.93
18.02	2864.50
21	11549.75
23	3459.10
101	57.53
104	39.55
105	61.15

Iowa City's current population is estimated to be 74,398. Its 2010 population of 67,894, is said to have increased by 8.13%. Iowa City's median age is 25.9 years and the overall population density is calculated to be 2,713.

At Risk Groups

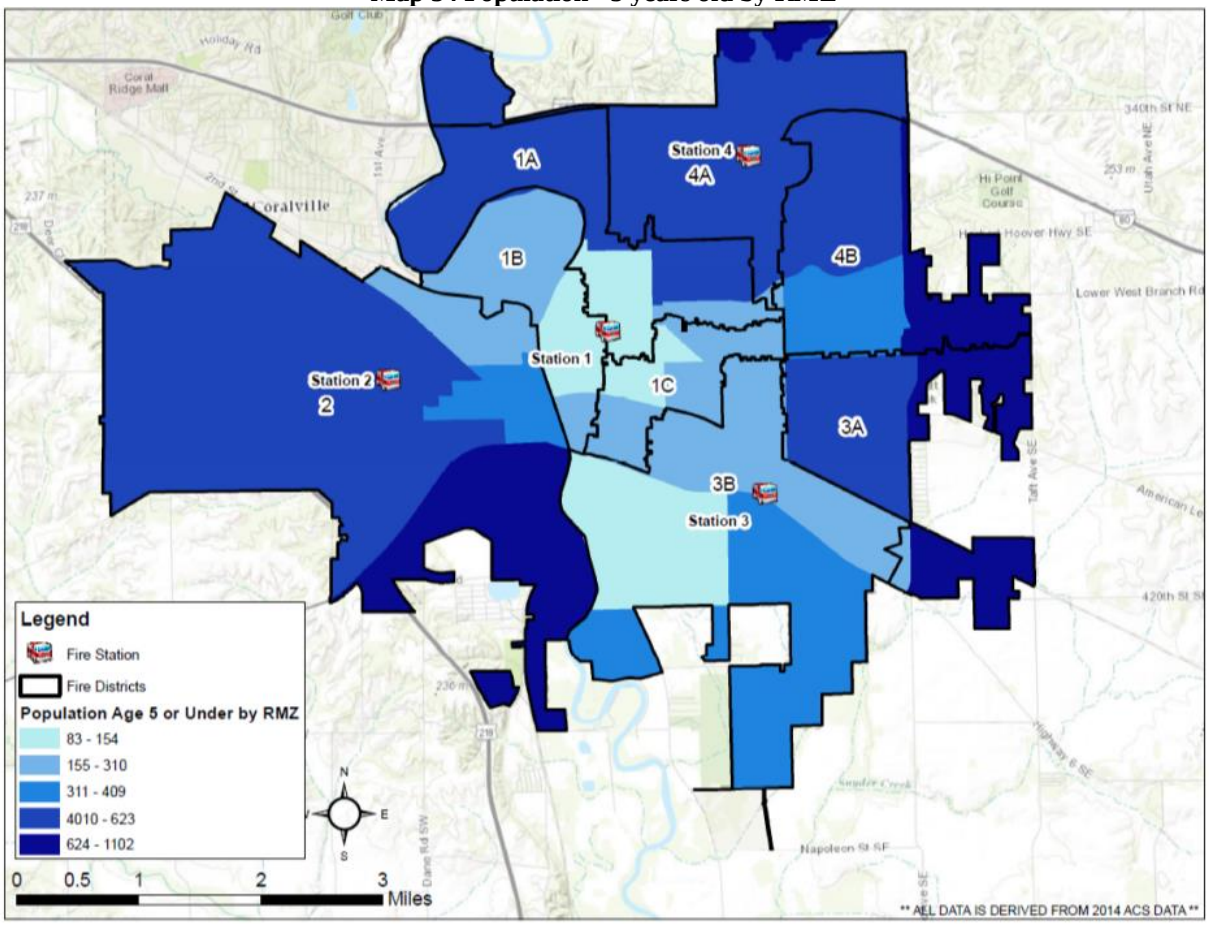
Generally, at risk populations include 17,464 children (those under 18 years), 405 of which have a non-institutionalized disability, 6,065 seniors (65 years or older), with 1,924 having a non-institutionalized disability. It is assumed that these groups are more likely to require assistance during times of disaster and therefore are considered to be more "at-risk" than the remaining population.

Map 33 Population >65 years old by RMZ



Total population of children less than five years of age is estimated to be 7,613, with RMZ distributions as shown in the map below.

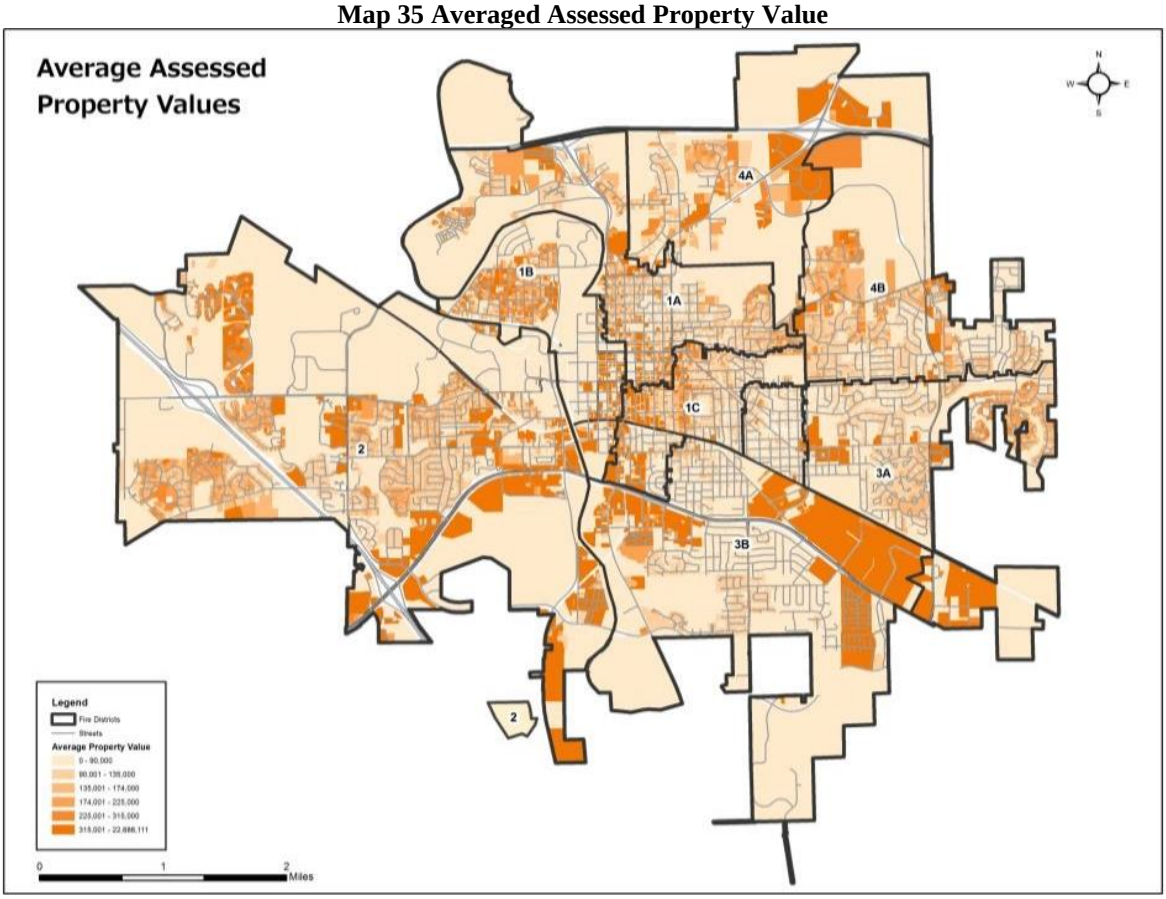
Map 34 Population <5 years old by RMZ



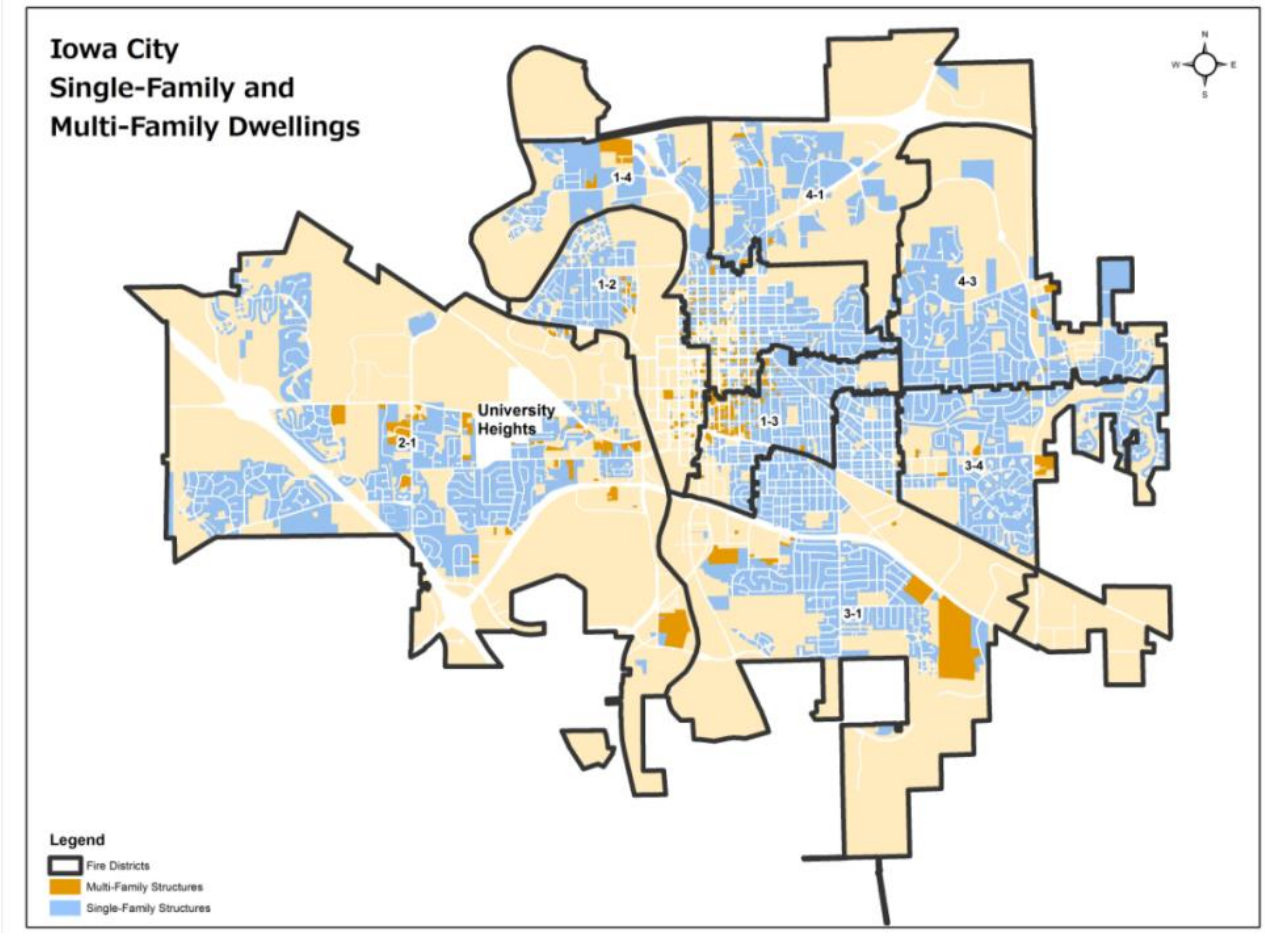
Housing Characteristics

The total number of housing units in Iowa City is 31,226. Of the 29,571 occupied housing units, 13,883 are owner-occupied and 15,688 are renter-occupied. The average household size of owner-occupied units is 2.32. The average household size of renter-occupied units is 2.10. The median (dollars) value of owner-occupied units is $191,000.

Map 35 Averaged Assessed Property Value



Map 36 Iowa City Single Family and Multi Family Dwellings

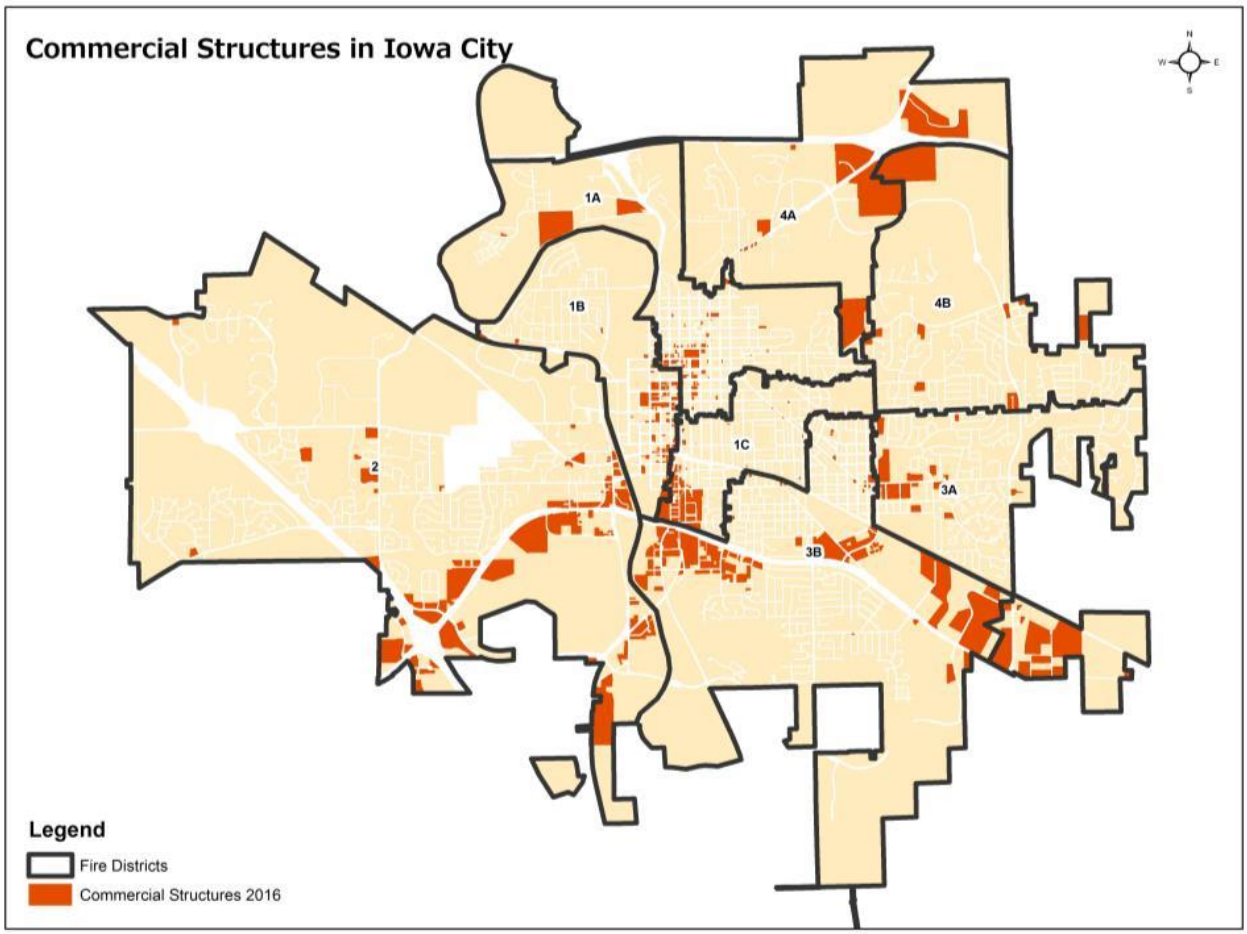


The U.S. Census Bureau describes the Iowa City workforce as follows:

Private wage and salary workers: 63.5%
Government workers: 32.6%
Self-employed in own business: 3.7%

Iowa City occupations in the 2014 database are stated accordingly:
Management, business, science, and arts occupations: 46.1%
Service occupations: 20.8%
Sales and office occupations: 20.3%
Natural resources, construction, and maintenance occupations: 9.5%
Iowa City's current unemployment is said to be 3%

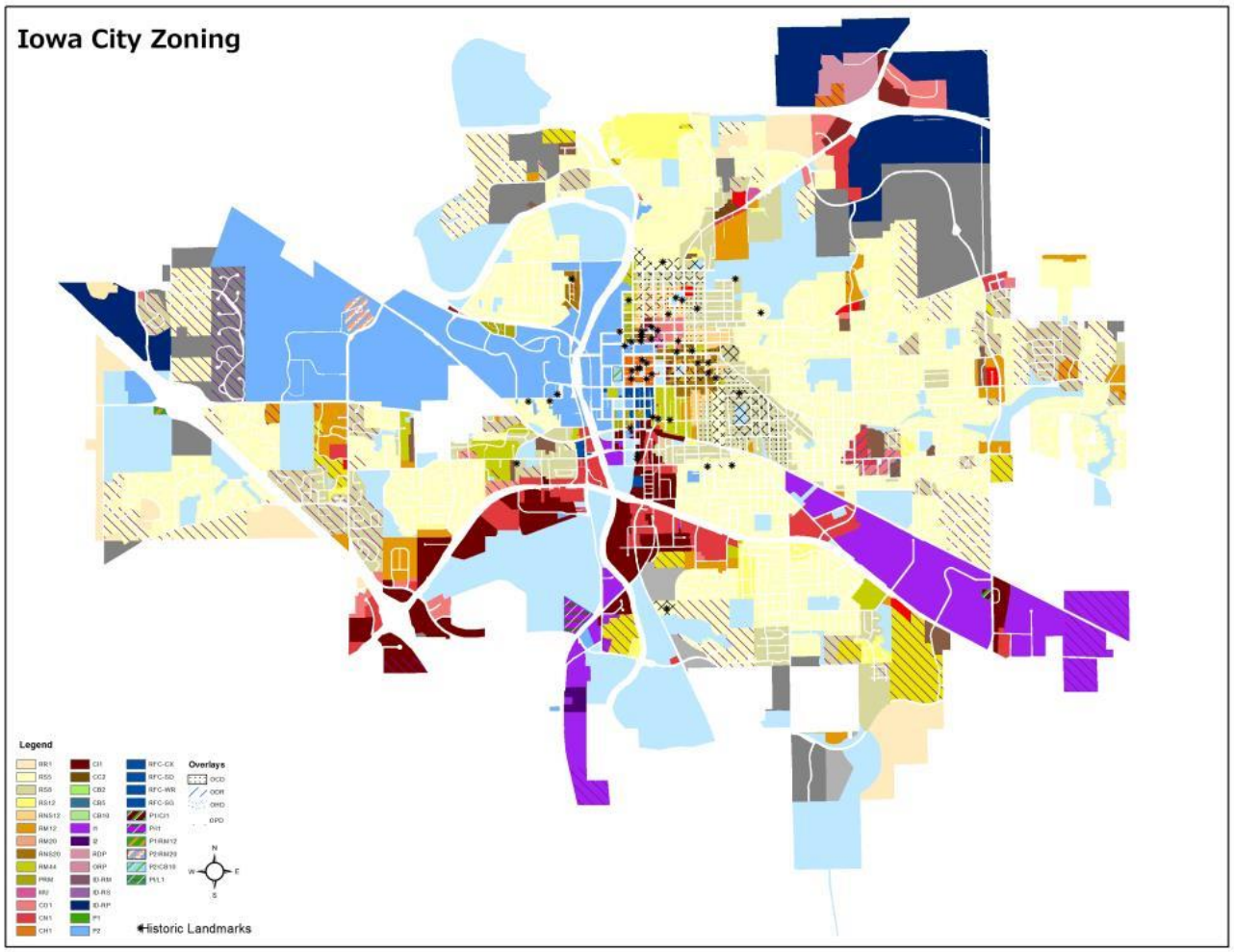
Map 37 Commercial Structures in Iowa City



Urban Planning

The Urban Planning Office of the Neighborhood and Development Services Department advises the Planning and Zoning Commission, Board of Adjustment, Historic Preservation Commission, the Iowa City Council, and the general public on planning and land development issues. Through its work with developers, residents and other city departments, the Urban Planning Office encourages orderly growth, redevelopment where appropriate, and preservation of historic properties and environmental resources.

Map 38 Iowa City Zoning



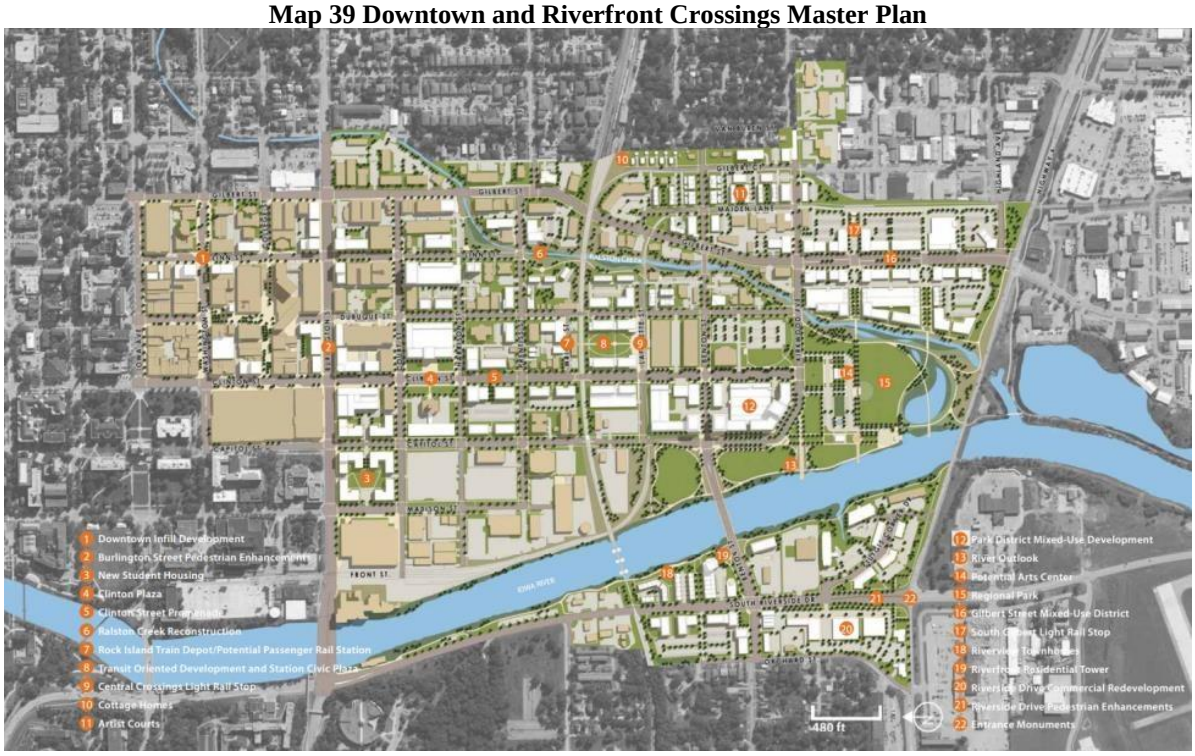
The Comprehensive Plan is often referred to as a roadmap for directing growth and change over time. It describes a broad vision for the kind of community Iowa City should be and the steps necessary to get there. The Comprehensive Plan guides decisions on planning and development issues as they arise and evolve as amendments are made.

The City of Iowa City adopted an updated Comprehensive Plan in May 2013. The new plan, Iowa City 2030, sets a foundation for moving our community forward on a path to sustainability. A sustainability assessment completed in the summer of 2013 provides baseline data that may be used

to set measurable targets and goals in areas such as energy and water conservation, resource management and community wellness.

The district planning process involves extensive citizen participation focusing on ten distinct areas of the community. Detailed plans have been developed for eight of the ten planning districts. These plans address the unique issues and opportunities in each district. Once adopted by the City Council, the district plans become part of Iowa City's Comprehensive Plan. The most recently adopted plan is the Downtown and Riverfront Crossings Master Plan, shown below.

Map 39 Downtown and Riverfront Crossings Master Plan



The Riverfront Crossings District is 76 acres in size, and designed to accommodate up to 900 residential units and up to 220,000 sq. ft. of ground floor retail/office space. The plan envisions a neighborhood just south of downtown featuring a waterfront park with walking and biking trails, access to the Iowa River for boating and fishing, a variety of housing options near shopping, restaurants, jobs, a state-of-the-art recital hall and recreational facilities, just a short walk to downtown Iowa City and the University of Iowa campus.

Low to Moderate Income

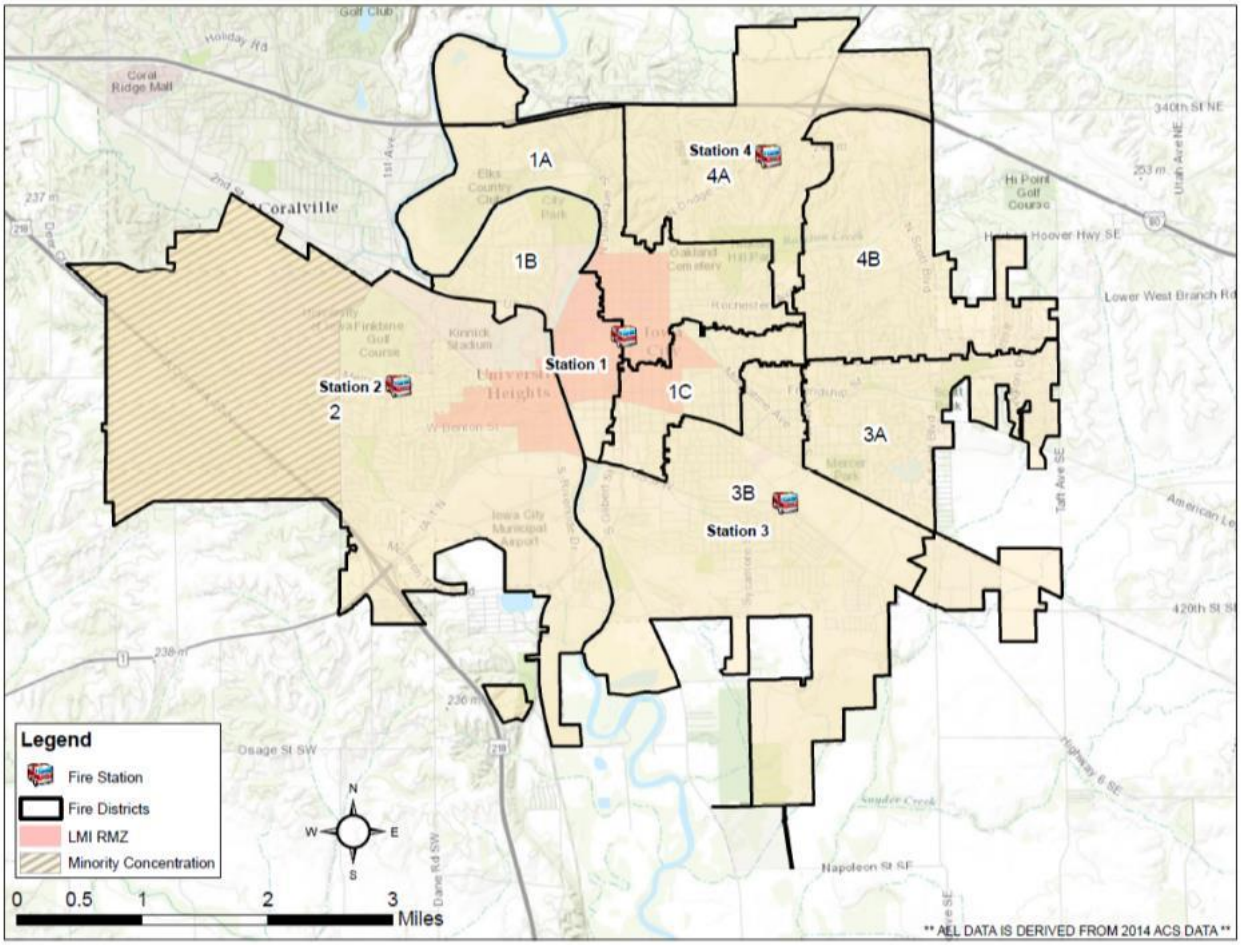
Low to moderate-income (LMI) populations are considered 80% of the median income for the area. Using a median income per household for the city of $53,482, the LMI for a household was calculated to be $42,786. An LMI RMZ is designated when 51% or more of the population falls below the LMI.

LMI RMZs

RMZ 6	63.72 %
RMZ 11	71.60 %

RMZ 16	84.17 %
RMZ 21	91.8 %

Map 40 Low to Moderate Income Populations



Minority Concentrations

Minority concentrations were calculated using the 2014 American Community Survey (ACS) data. A risk management zone (RMZ) that qualifies as having a minority concentration is defined as containing at least 10% or more minority populations. Iowa City's population that define themselves by one race totals 97.4% of the population. Of those, 81% are white, 8% are Asian, 5.8% are black, 0.3% are American Indian and Alaska Native, 0.3% are Native Hawaiian, and 2% are some other race.

Minority RMZ

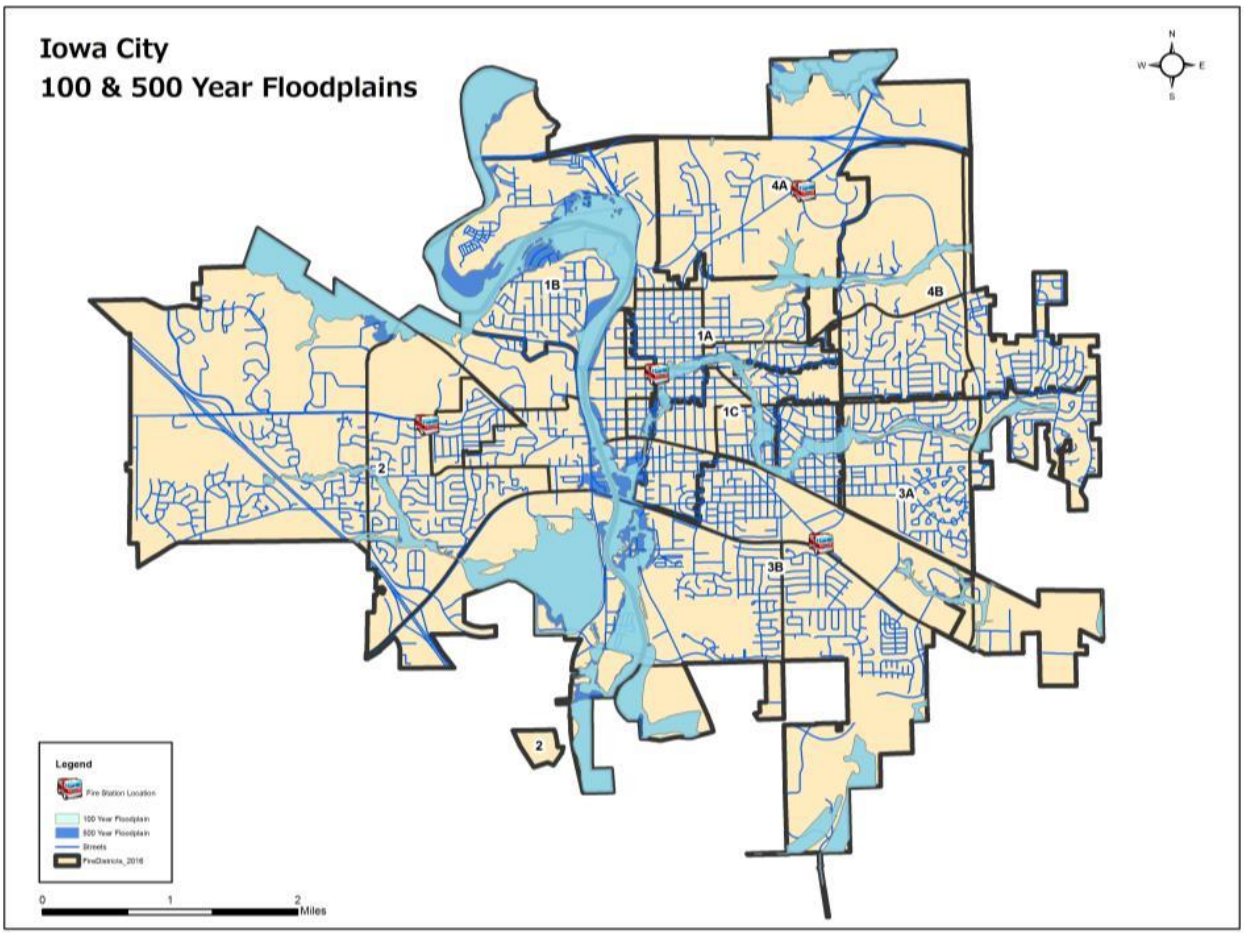
RMZ 4	22.08 % Asian residents in RMZ 4
	8.0 % Asian residents in the city

Impact of Increased Urban Development

The frequency and severity of flooding has increased in recent years, partly as a result of increasing urban development. As more land becomes covered with impermeable surfaces such as buildings,

parking lots, and roads, water cannot drain into the soil and surface runoff increases, thereby causing acute local flooding.

Map 41 Iowa City 100 and 500 Year Floodplains



Flood Hazard Areas

There are areas of residentially used floodplain on the east side of the Iowa River that extend beyond the Iowa River. Ralston Creek, a central feature of the residential neighborhood located between Court Street and Muscatine Avenue, runs through a large portion of town, and impacts a number of neighborhoods, most of which were built in the second quarter of the 20th Century.

The southeast district is bounded by Court Street on the north, Highway 6 on the south, and extends from 1st Avenue and the Sycamore Mall area on the west to the city's growth area boundary located just east of Taft Avenue. It contains residential neighborhoods with a mix of housing types, including single-family homes, townhomes, condominiums, apartments, and elderly housing.

The southeast side of the city has seen new development over the past 20 years and a substantial amount of this development has been multi-family. There are industrial properties in this area as well. The majority of homes on the west side of the river are post WWII. While Ralston Creek is viewed as an asset and an amenity for the Court Hill Neighborhood, it is also prone to flash flooding,

particularly during heavy local rain events. Residents and business owners with property along the creek should be aware of dangers posed by flooding, not only to property, but also to public safety.

Iowa City's floodplain management ordinance, intended to discourage and restrict new development in flood hazard areas, has been in place since 1977. However, in response to the devastating floods of 1993 and 2008, the city re-examined these regulations and expanded the definition of "flood hazard" to include the "100-year" and "500-year" floodplains. Almost all property along Ralston Creek in Court Hill Neighborhood is developed.

Image 87 Ralston Creek during a rainstorm (April 2013)

The city applied and received Community Development Block Grant (CDBG) disaster recovery funds through the Iowa Department of Economic Development (IDED) in 2009 and 2010 to replace some housing demolished and converted to permanent green space.

Image 88 Normandy Drive Waterfront

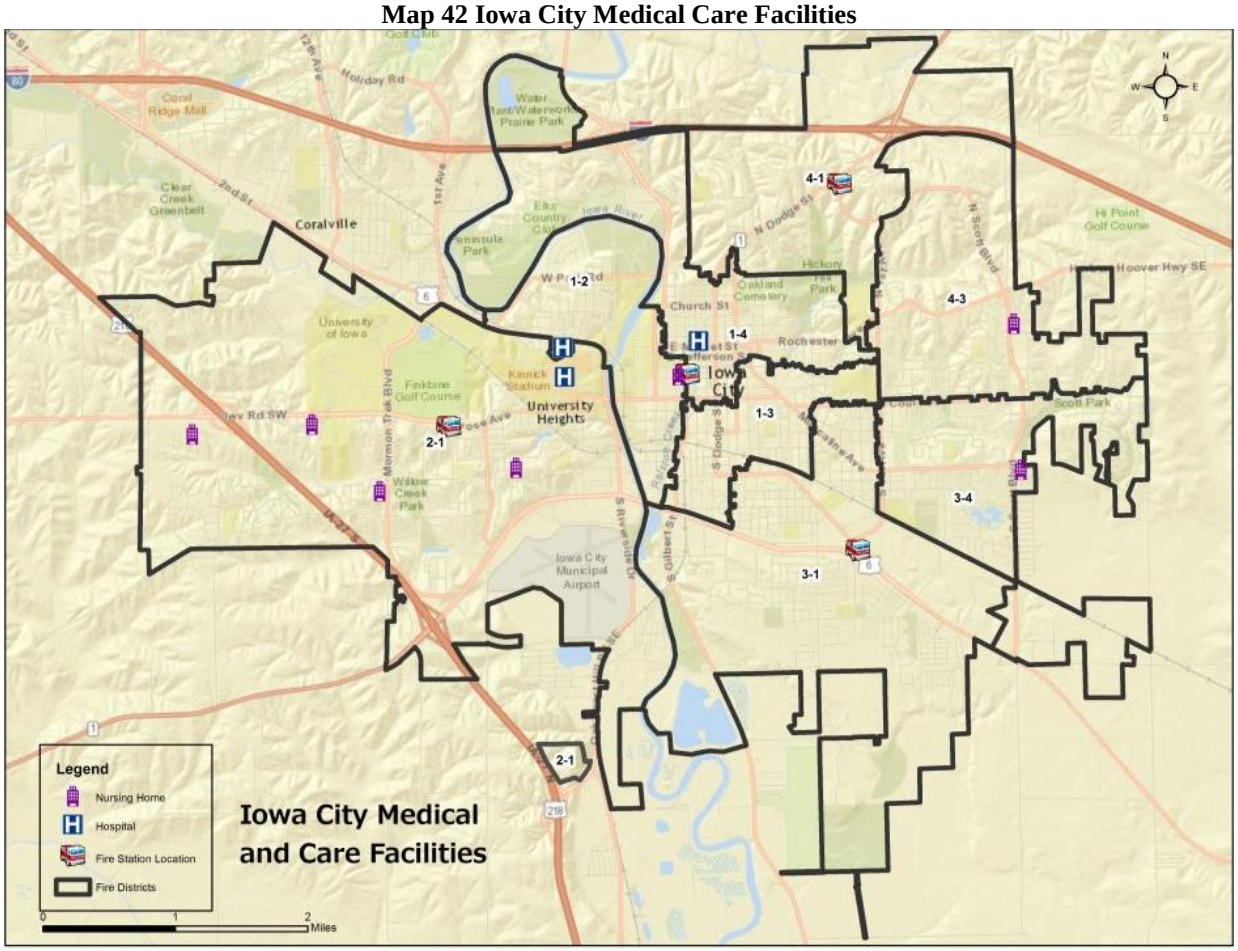
Image 89 Iowa City Flood of 2008

The Ralston Creek watershed is located on the east side of Iowa City. Its southern and lower branches are urbanized. The north branch sub-basin is largely agricultural, but has undergone new development as Iowa City has continued to expand. Hickory Hill Park is located at the downstream end of the north branch sub-basin and a bridge on Rochester Avenue that crosses the creek constrains flood flows. The regional storm water detention basin for the north branch of Ralston Creek is in Hickory Hill Park. The south branch of Ralston Creek flows into the regional storm water detention basin located east of Scott Boulevard in Scott Park. These regional basins are able to serve most of the northeast district. Developers in this district are not required to provide on-site storm water detention facilities, as long as sufficient capacity remains within the two regional storm water basins. Although a 100-year storm water route needs to be provided through each property, not having to provide storm water detention facilities on individual properties allows for more compact development to occur within the district.

Medical Care Facilities

Iowa City is home to several important medical care facilities, including University of Iowa Hospitals and Clinics, Mercy Hospital, and the Veterans Administration Medical Center. These facilities along with skilled nursing, assisted living, urgent care centers and other out-patient care facilities present a unique life safety risk in that they house people who are of limited mobility or non-ambulatory. Evacuation of patients requires additional emergency response resources and well trained facility staff. The following map shows the locations of these important community resources and care facilities.

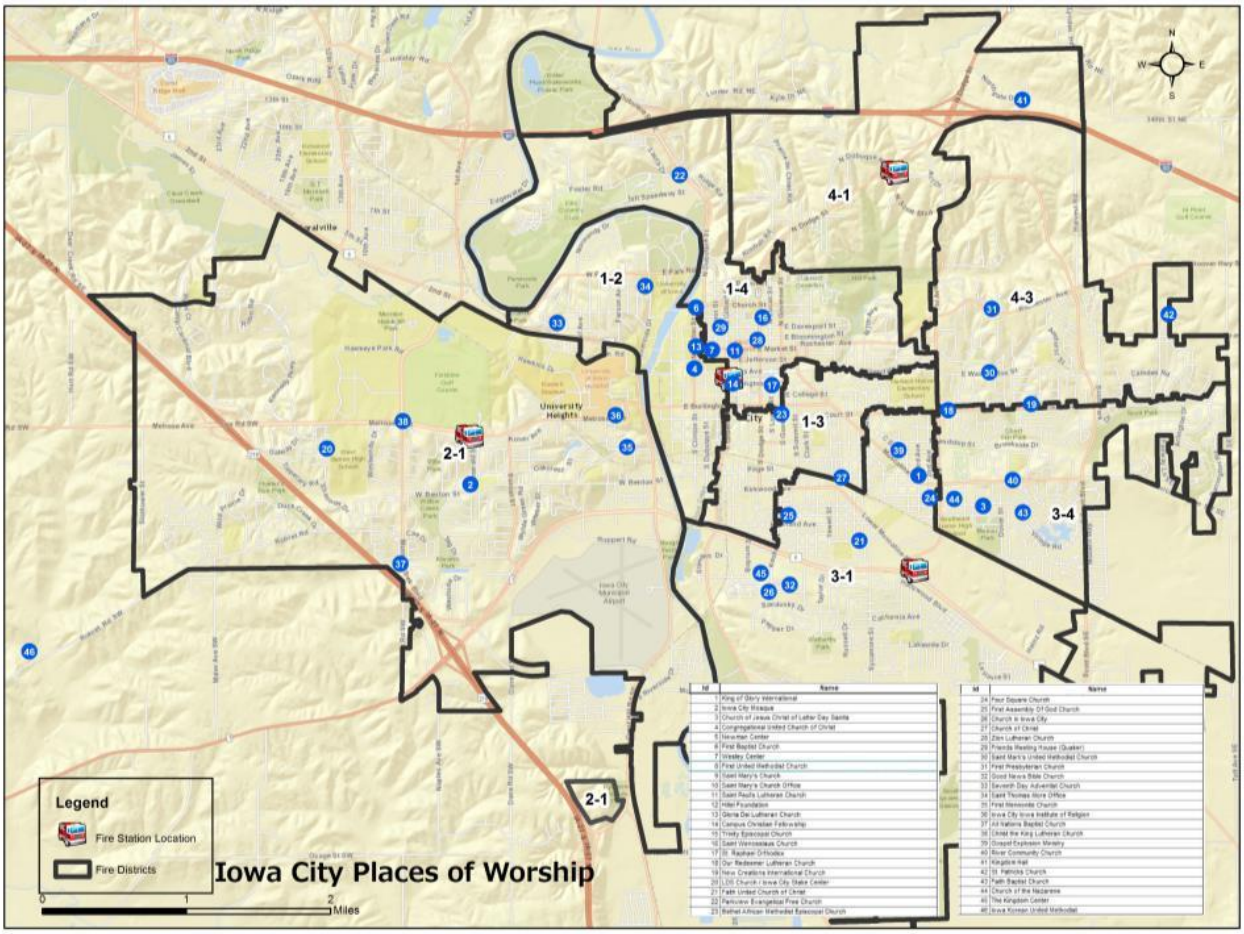
Map 42 Iowa City Medical Care Facilities



Places of Worship

Unfortunately, even places of worship have been the scene of crisis situations. Churches, mosques and other places of worship have a unique challenge when it comes to security and safety. Places of worship want to be open and welcoming to the community while also protecting the people and property inside.

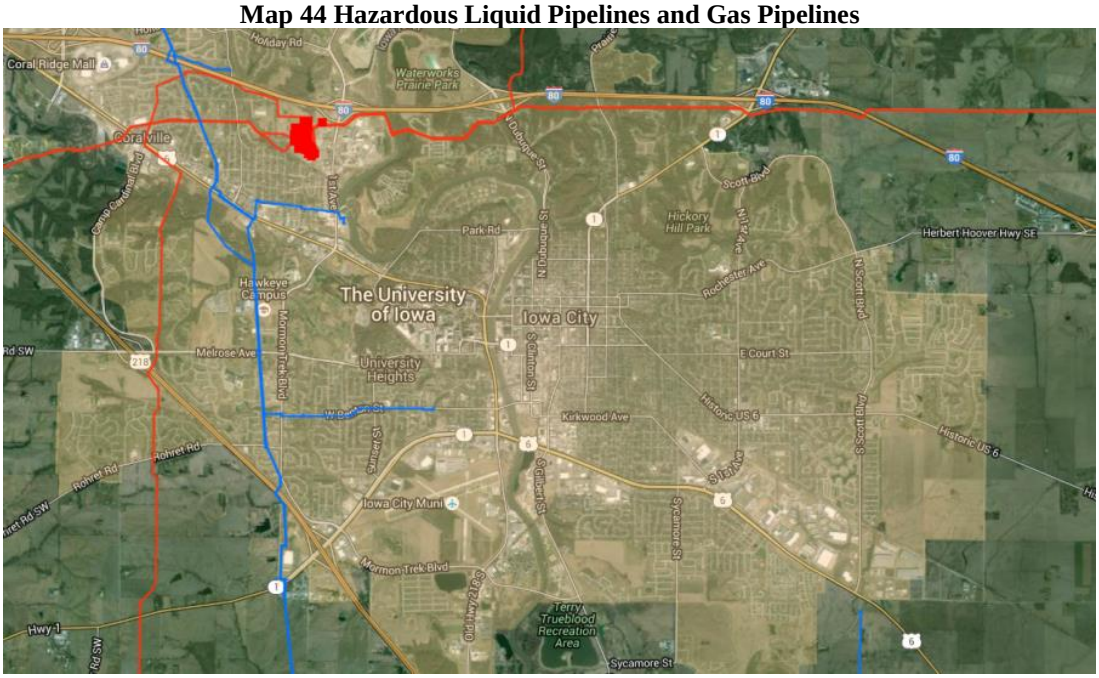
Map 43 Iowa City Places of Worship



Gas Transmission and Hazardous Liquid Pipelines

The following map is provided by the National Pipeline Mapping System. Hazardous liquid pipelines that traverse the Iowa City metropolitan area are shown in RED and gas pipelines are shown in BLUE. The Magellan Pipeline Company above ground liquid tank field in Coralville is also shown in RED.

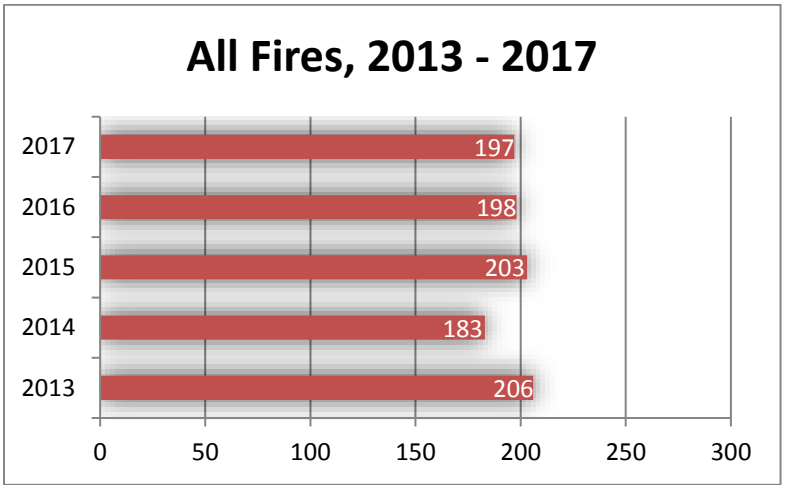
Map 44 Hazardous Liquid Pipelines and Gas Pipelines



Risk Assessment

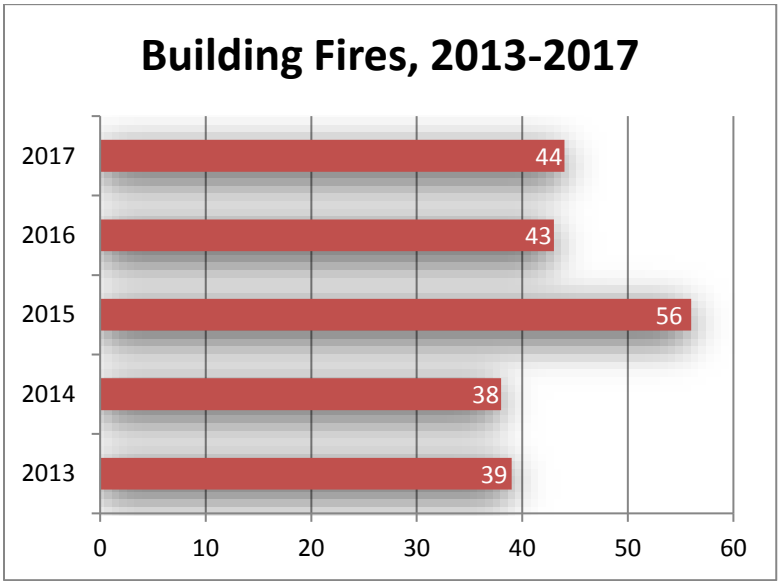
Fire Suppression Services

The chart below demonstrates a moderate increase in fire responses since 2011. Fire responses, which characterized less than 4 percent of the department's total call volume in 2015, represent a smaller percentage of the total calls for service when compared to non-fire responses. Nonetheless, fire responses pose an elevated risk to safety because of the hazardous nature of fire.



Building Fires

Building fires present a greater threat to life and property and the potential for much larger economic losses. Iowa City has modern fire codes and fire suppression requirements in new construction and building renovations, coupled with improved firefighting equipment, and training and techniques, to lessen the chance and impact of major urban fires. Most building fires occur in residential structures, but the occurrence of fire in a commercial or industrial facility could affect more people and pose a greater threat to those near a fire or fighting the fire.



In 2005, the ICFD chose the Risk, Hazard, and Value Evaluation (RHAVE) methods to identify, categorize, and analyze fire risk for all 21,139 buildings within Iowa City. The ICFD chose the RHAVE process to identify the city's hazardous areas, as well as analyze risks, potential risks, and identify the city's needs in terms of response time and service required.

Building Occupancy Risk Assessment

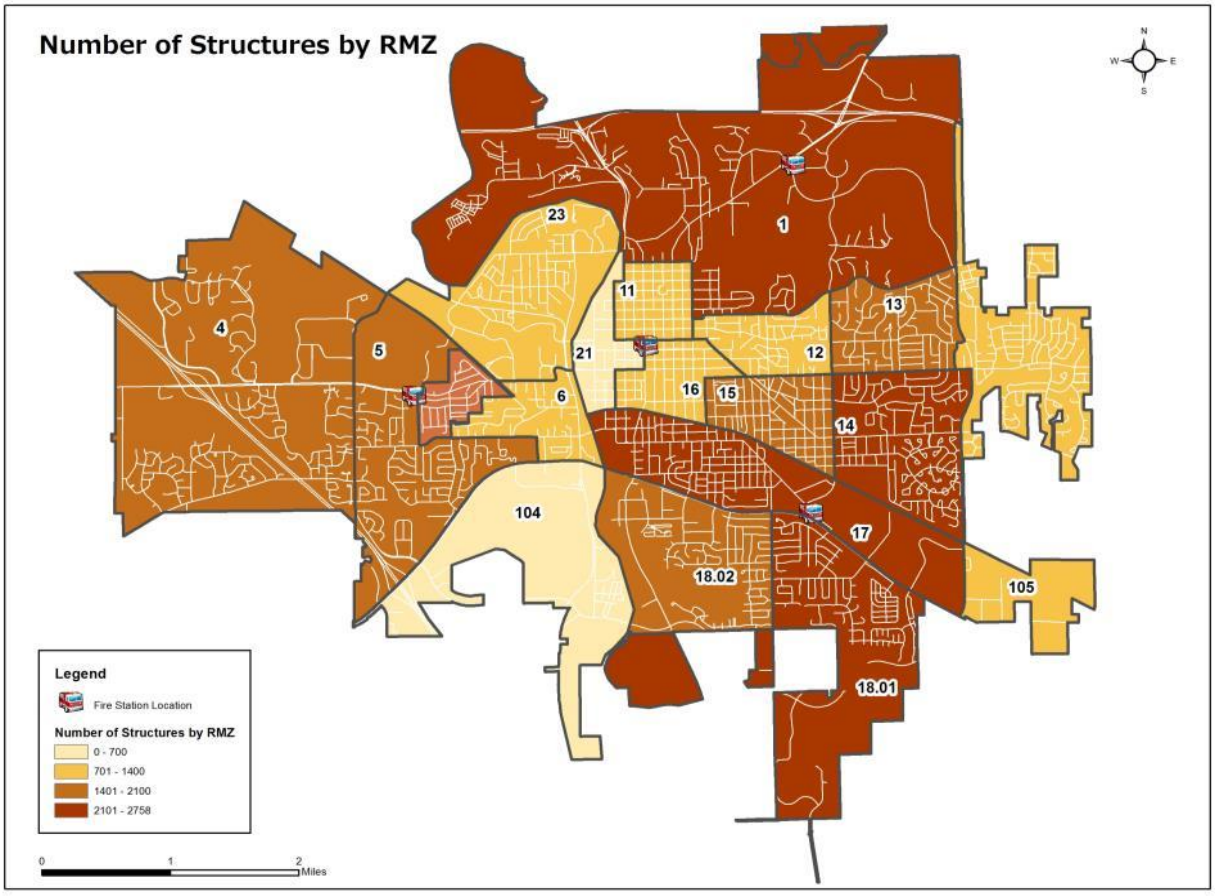
In most communities, the majority of losses occur in the smallest percentage of emergencies that reach the significant destruction or loss ranges. The objective of risk assessment technique is to reduce serious loss in a very unusual event in the community. This involves trying to keep routine emergencies from becoming serious loss situations.

In 2005, the ICFD initiated the RHAVE program to identify potential hazards and level of risk within Iowa City. The RHAVE process is administered by the Fire Prevention Bureau. In 2012, a database platform was formulated to provide greater flexibility in sorting data and creating reports. The software analyzes the data to calculate an Occupancy Vulnerability Assessment Profile (OVAP) score. Six factors are considered in the formula. The building score includes type of construction, exposure hazards, and access to the building, how tall the building is, and square footage. The life-safety factor includes things such as occupant load, occupant mobility, fire alarm equipment, and the existing system. The risk score includes the probability and consequence of a serious fire incident based on regulatory oversight, human activity, and experience. The consequence score quantifies the department's capacity to control, the hazards within a building, and combustible fire load that is present. The water demand score determines the required fire flow for the building and the fire flow that is available at the closest fire hydrant. The final factor included in the OVAP formula involves the potential impact a large fire or loss would have on the community. The program groups the occupancy according to the OVAP score. A building is considered a high risk if the score is greater than 50, a significant risk if the score is from 40-49, a moderate risk if the score is from 16-39, and a low risk if the score is 15 or less.

While risk factors all have some common thread, the rationale of placing occupancy within any risk assessment category is to assume the worst. For example, fire flow as a risk assessment criteria or requirement is based on defining the problem that will occur if the occupancy is totally involved, and therefore creates the maximum demand upon fire suppression services.

RHAVE is made up of seven sections: Building Score, Life-Safety Score, Risk Score, Consequence Score, Water Demand Score, Value Score, and the final OVAP score. Each section has different categories that are scored from zero to five. The ICFD's goal is to objectively evaluate all the city's occupancies so there is a full and complete understanding of the demands placed upon its fire department.

Map 45 Number of Structures by RMZ

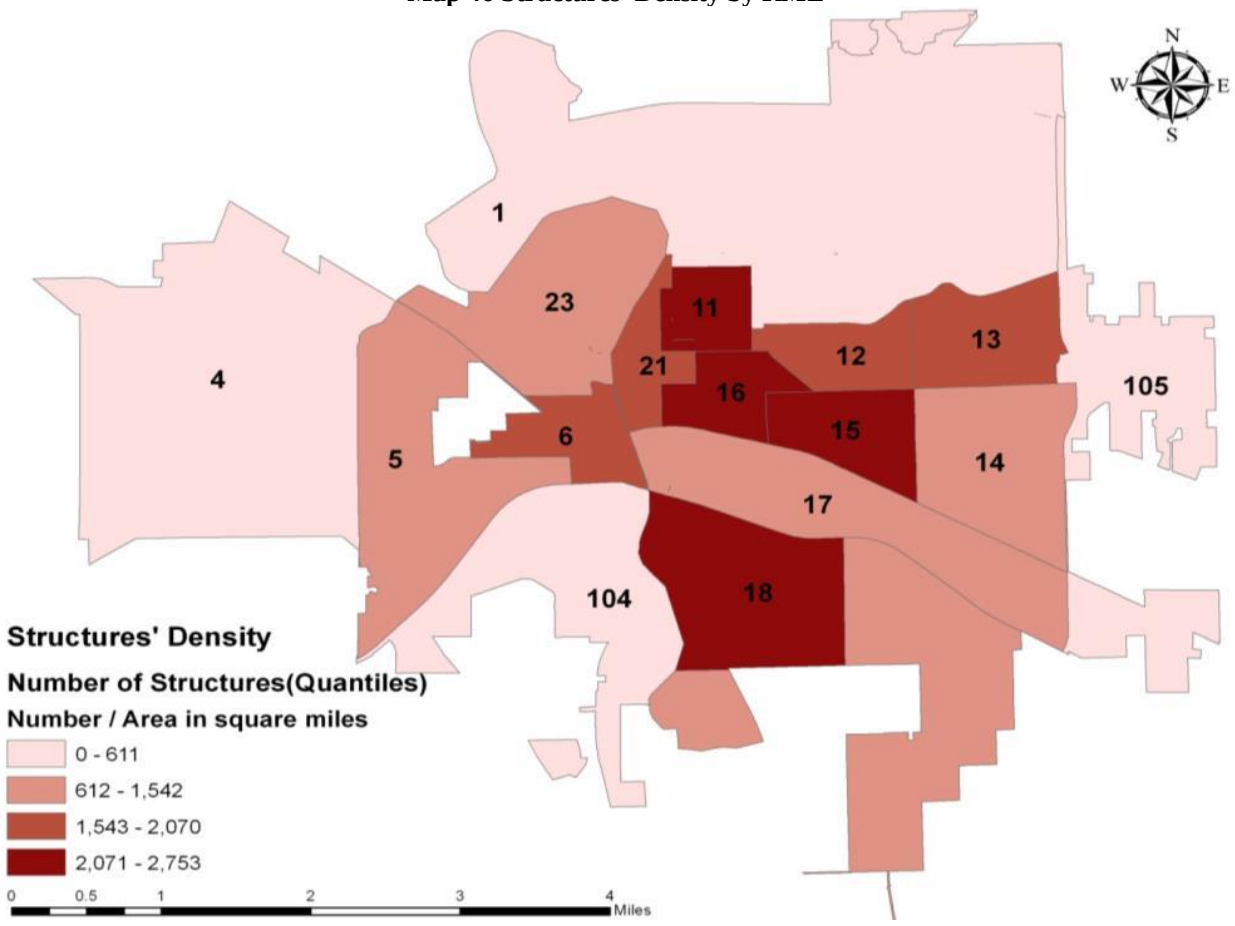


Building Score

Building Score is composed of six different categories: exposure separation, type of construction, stories, access, and square footage. Exposure separation is defined by how far the building being evaluated is from the next closest building. The closer the two buildings are to each other, the higher the ranking.

Construction type is determined by the materials of which a building is constructed. The more hazardous the construction materials used, the higher the score a building receives. Buildings are also evaluated by how tall, or by the number of stories constructed. If a building is one to two stories tall, it receives one point. If a building is seven to nine stories tall, it receives four points toward the total OVAP score. Access sides to the building being evaluated include all doors except garage doors and do not include windows. The lower the number of sides of access, the higher amount of points an occupancy receives.

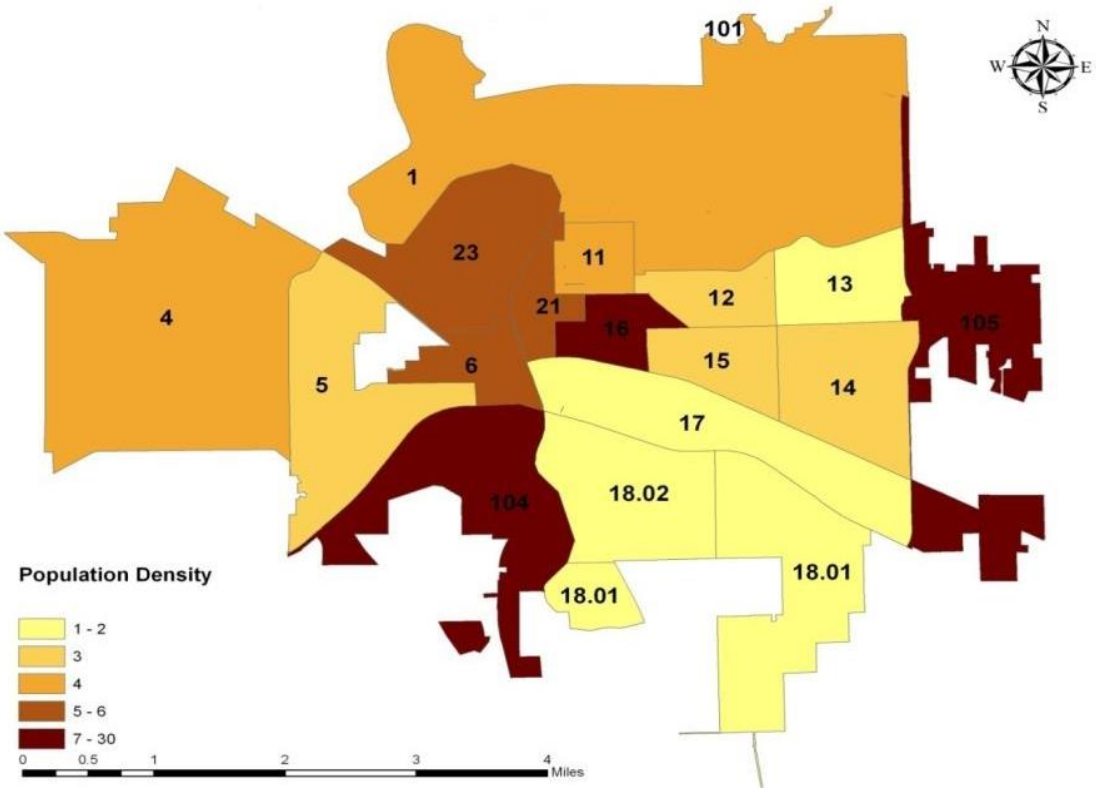
Map 46 Structures' Density by RMZ



Life-Safety Score

Life-Safety Score is composed of four different categories: occupant load, occupant mobility, warning alarm, and egress system. Occupant load is determined by how many people a building can hold. If there is an occupant load ranging from zero to ten, one point is awarded. If there is an occupant load greater than 300, five points is awarded. Occupant mobility is based on how high a building is and the state of the occupants inside. The occupants inside a building could be awake ambulatory, asleep ambulatory, or non-ambulatory/restrained. Warning alarm is determined by the type of alarm present in a building. No alarm system present would receive five points, while an automatic-central station alarm would only receive one point. The last category, egress system, has two options: conforming and non-conforming. Most occupancies in Iowa City have a conforming egress system.

Map 47 Population Density per Structure



Risk Score

Risk Score has three different categories: regulatory oversight, human activity, and experience. Regulatory oversight determines if a building is highly regulated with mandatory compliance (industrial, one point), highly regulated with inspections scheduled (commercial, two points), regulated with inspections scheduled randomly (residential, three points), etc. Human activity is based on who has access to the building in question and how accessible the building is for bystanders. All buildings have the same experience score, which is an annual event (four points).

Consequence Score

Consequence Score has three different categories: capacity to control, hazard index, and fire load. Capacity to control determines if a building is on fire and how much damage that building will do to the surrounding area and buildings. If the fire can be controlled within the building of origin, one point is awarded. However, if the fire building is hazardous to firefighting activities, five points are awarded. Hazard index gives more points to buildings with greater hazards. Fire load is broken down as light (one point), ordinary hazard group I (two points), ordinary hazard group II (three points), extra hazard group I (four points), and extra hazard group II (five points).

Water Demand Score

Water Demand Score is composed of two categories: required fire flow and fire flow available. The required fire flow is determined from a fire flow spreadsheet. The fire flow spreadsheet considers seven different factors: construction coefficient, building area, occupancy factor, exposure factor, if the building has a wood roof, and whether or not the building has sprinklers. Once a fire flow is determined from the fire flow spreadsheet, points are awarded to the score. The lower the required fire flow, the lower the points that are achieved. Fire flow available is determines whether the required fire flow that was calculated is present at the closest fire hydrant.

Value Score

Value Score has one category: property value. The point system for property value starts at 1.0 and increases in increments of 0.1 to reflect an increase in property value. If a building is a personal/family loss, one point is awarded. If a building is an irreplaceable loss to the community, it is awarded 1.4 points. Property loss due to fires totaled $3.3 million and $1.6 million in 2014 and 2015 respectively.

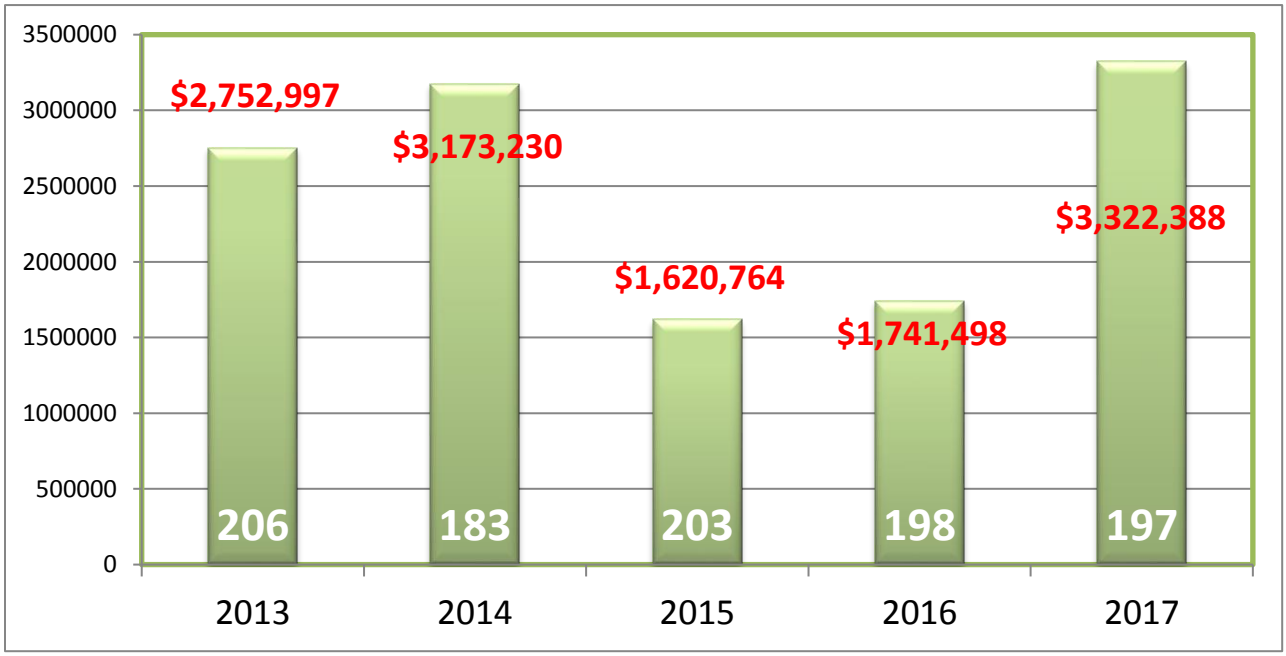
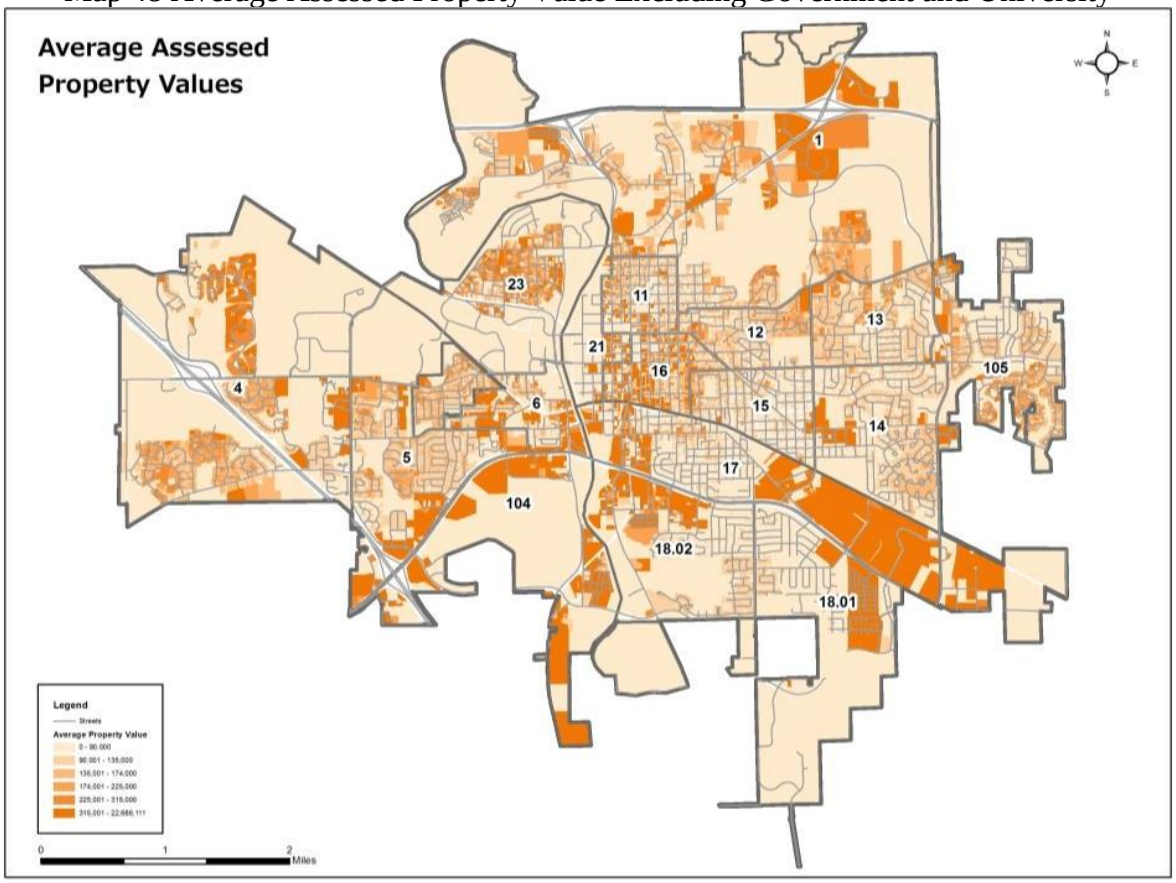


Figure 10 Property Loss Due to Fire (2013-2017)

Map 48 Average Assessed Property Value Excluding Government and University



Once all the hazard information is entered, an Occupancy Vulnerability Assessment Profile (OVAP) score is calculated. Final OVAP scores are categorized as follows:

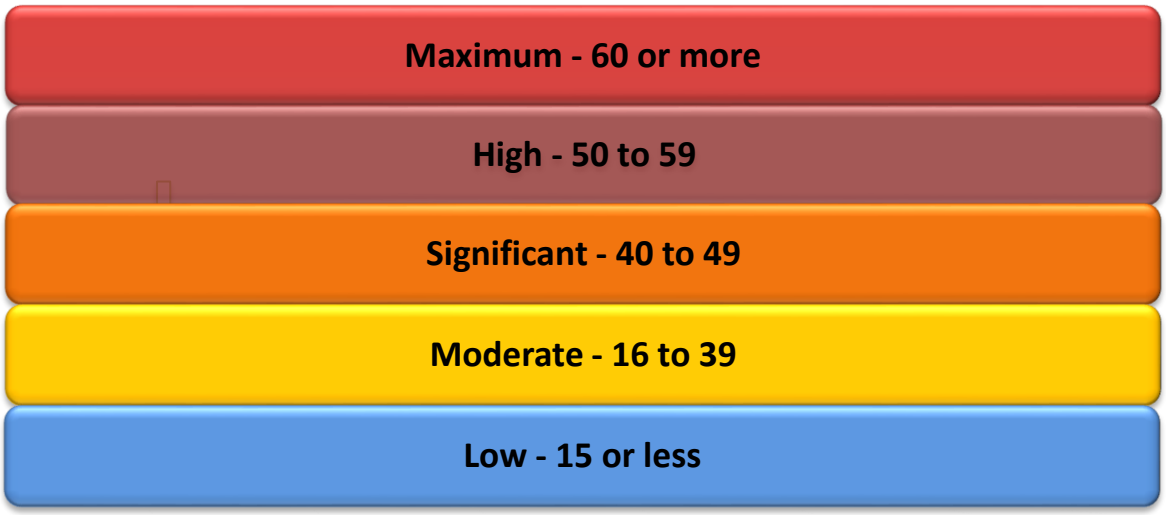


Figure 11 OVAP Categories

The final OVAP score is an accumulation of all the previous scores from each category, which determines an overall score for each building. A building is considered "maximum risk" if the score achieved is greater than 60 and a "high risk" if a building achieved a score from 50-59. A building is considered "significant risk" if the score achieved is from 40-49. A building is classified as "moderate risk" if the score achieved is from 16-39 and "low risk" if the score achieved is 15 or less. The largest OVAP score achieved was 71 for the Iowa Memorial Union. Using the RHAVE process, Fire Administration identified 3 "maximum risk" buildings, 44 "high risk" buildings, 215 "significant risk" buildings, 20,840 "moderate risk" buildings, and 30 "low risk" buildings. As a result of this analysis, the city is said to be comprised mainly of structures having a "moderate" risk profile as defined above. OVAP hazard statistics show that nearly 99 percent of the 21,139 occupancies reviewed were assigned a moderate risk level. The graph and associated table below summarizes the overall results of the fire risk analysis.

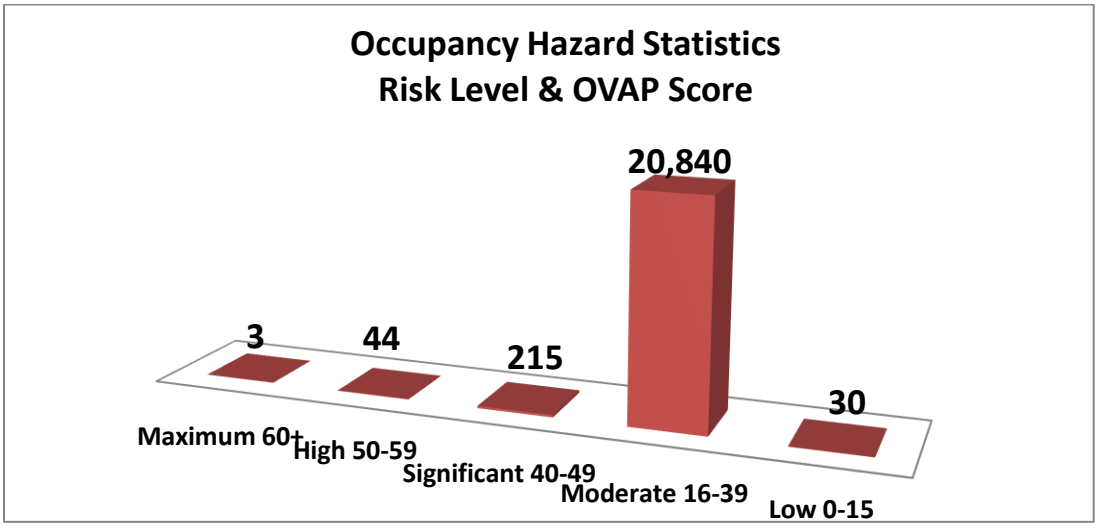


Figure 12 Occupancy Hazard Statistics

Table 19 Total Occupancy Hazard Statistics

Risk Level	OVAP Score	# of Structures	Value	%
Maximum	60+	3	191	0.0
High	50-59	44	2,372	0.2
Significant	40-49	215	9,248	1.0
Moderate	16-39	20840	482,321	98.6
Low	0-15	30	329	0.1
Average Score	23.4	21,132	494,461	100

Table 20 Total Structures by Type of Use and Risk Class

CLASS	Commercial	Government	Multi-family Residential	Single-family Residentrial	University
Maximum Risk (60+ OVAP)	0%	0%	0%	0%	100%
High Risk (50-59 OVAP)	14%	2%	2%	0%	82%
Significant Risk (40-49 OVAP)	54%	5%	15%	0%	26%
Moderate Risk (16-39 OVAP)	10%	0%	27%	62%	1%
Low Risk (15 or Less OVAP)	10%	87%	0%	3%	0%

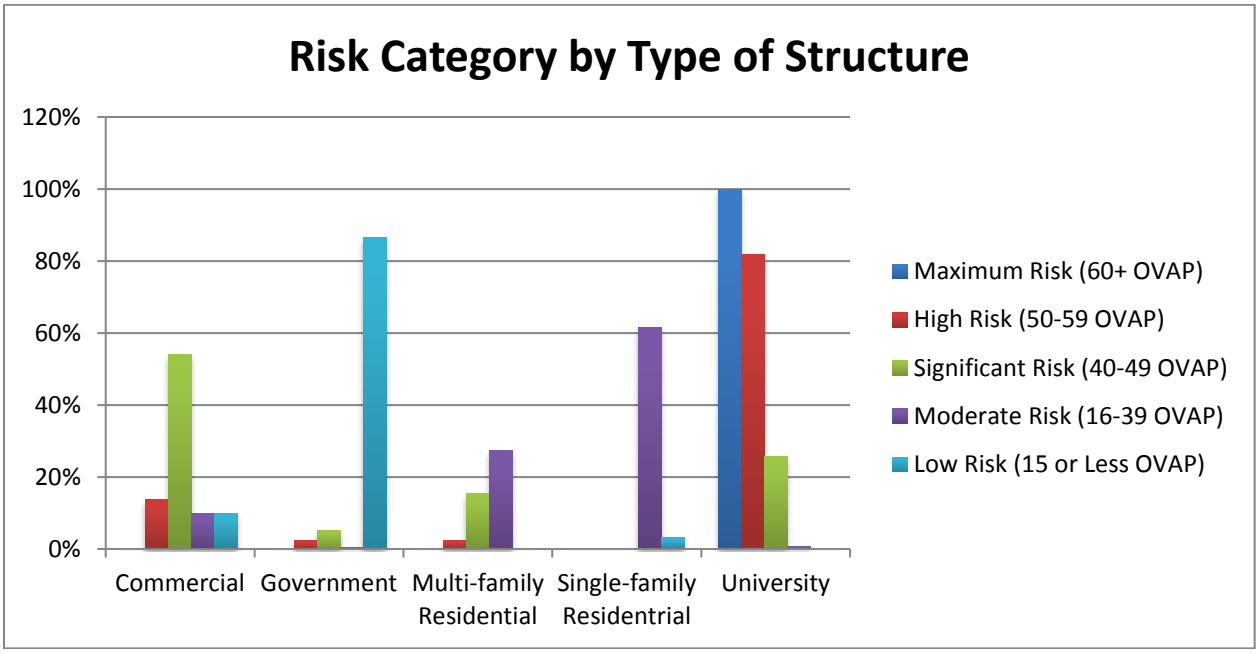
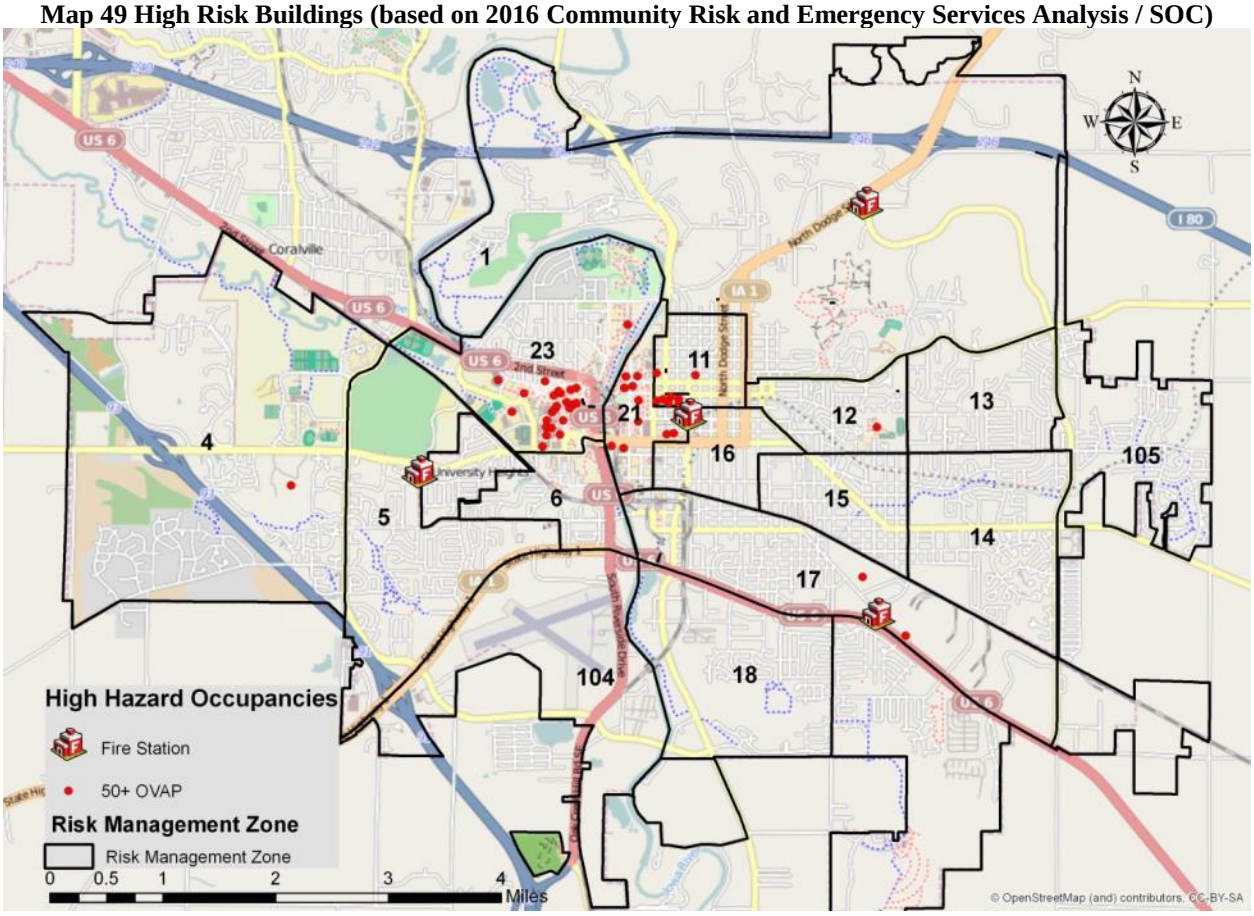


Figure 13 Risk Category by Type of Structure

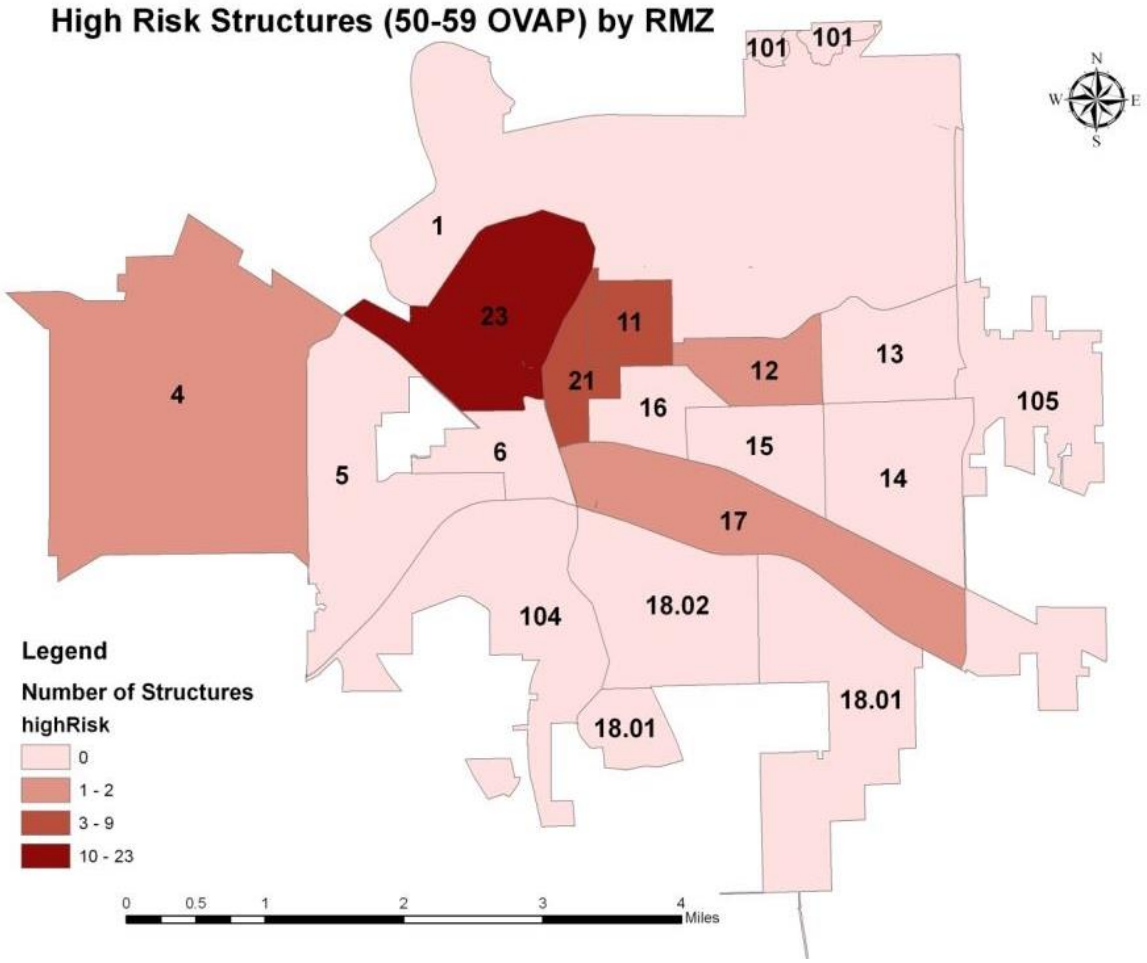
Map 49 High Risk Buildings (based on 2016 Community Risk and Emergency Services Analysis / SOC)



Attributes of a Building in Maximum Risk Category

The "Maximum Risk" category required an OVAP score equal to or greater than 60. There are only three occupancies placed in maximum risk, making it the smallest category of the five. The "High Risk" category has an OVAP score of 50-59. There are 44 occupancies in this category; however, 82% of the occupancies are university buildings and 14 percent are commercial buildings. Generally, buildings in those two categories have occupancy loads of 300+ people, require water flows more than 6000 GPM, and are valuable pieces of property. A majority of these buildings don't have the needed water flow available from the closest fire hydrant. All the Maximum Risk structures as identified by RHAVE analysis are university buildings.

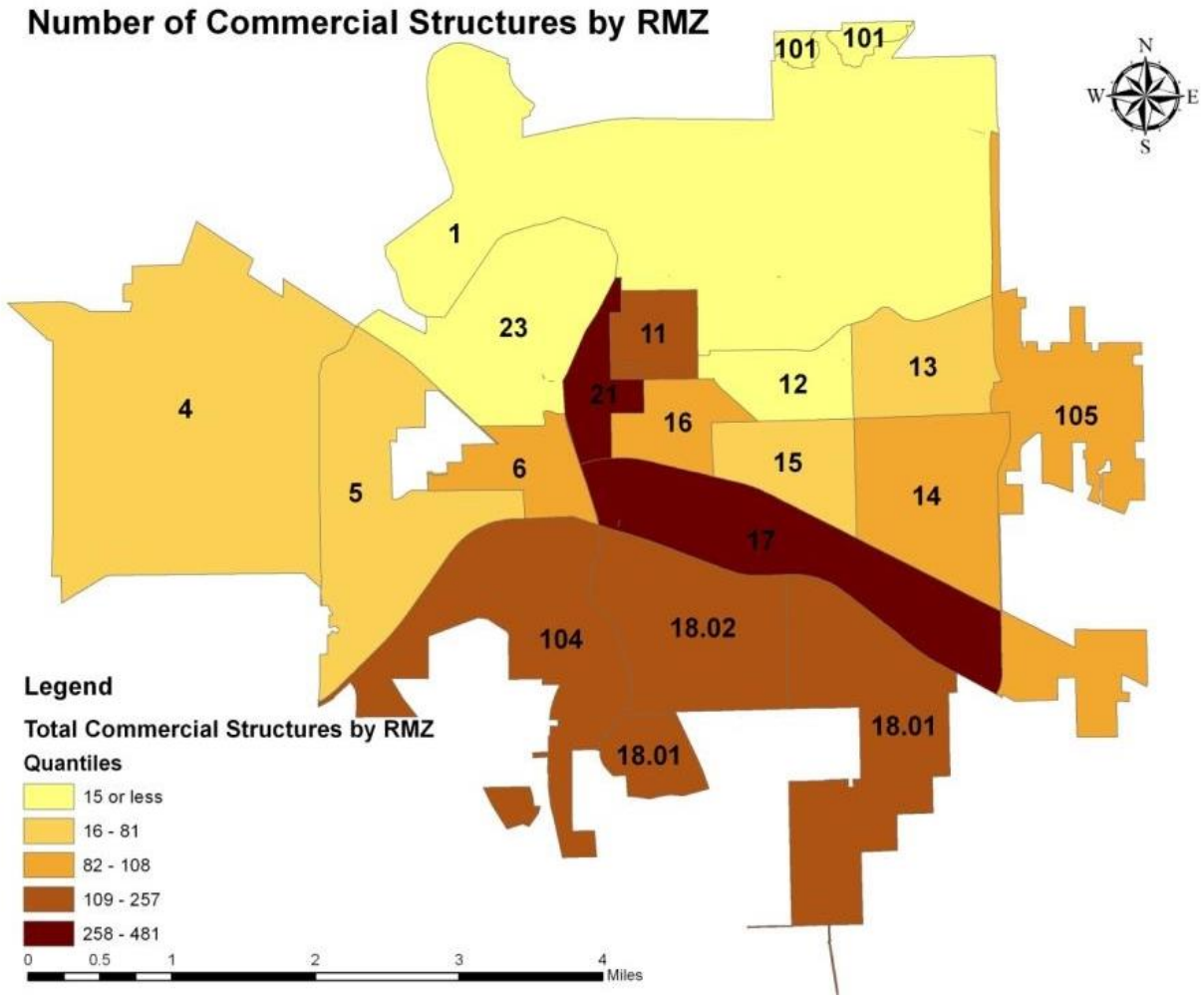
Map 50 High Risk Buildings by RMZ



Attributes of a Building in Significant Risk Category

The "Significant Risk" category has an OVAP score ranging from 40-49. These occupancies are large with some having square footage of around 40,000. The height of the buildings varies from one story to six stories tall. In this category, the type of fire alarm system a building has is starting to become a factor. A lot of these buildings have no alarm system or some type of manual alarm system. The hazards in this category range from common hazards to multiple and complex hazards. Property value of these buildings is becoming a factor as well. This includes moderate economic impact/severe causality exposure, severe economic impact/tax base or job loss, and irreplaceable loss to community if these buildings are damaged or destroyed. The majority of buildings - 54 percent - in this class are commercial buildings with university buildings comprising 26 percent of this class.

Map 51 Significant Risk Structures by RMZ



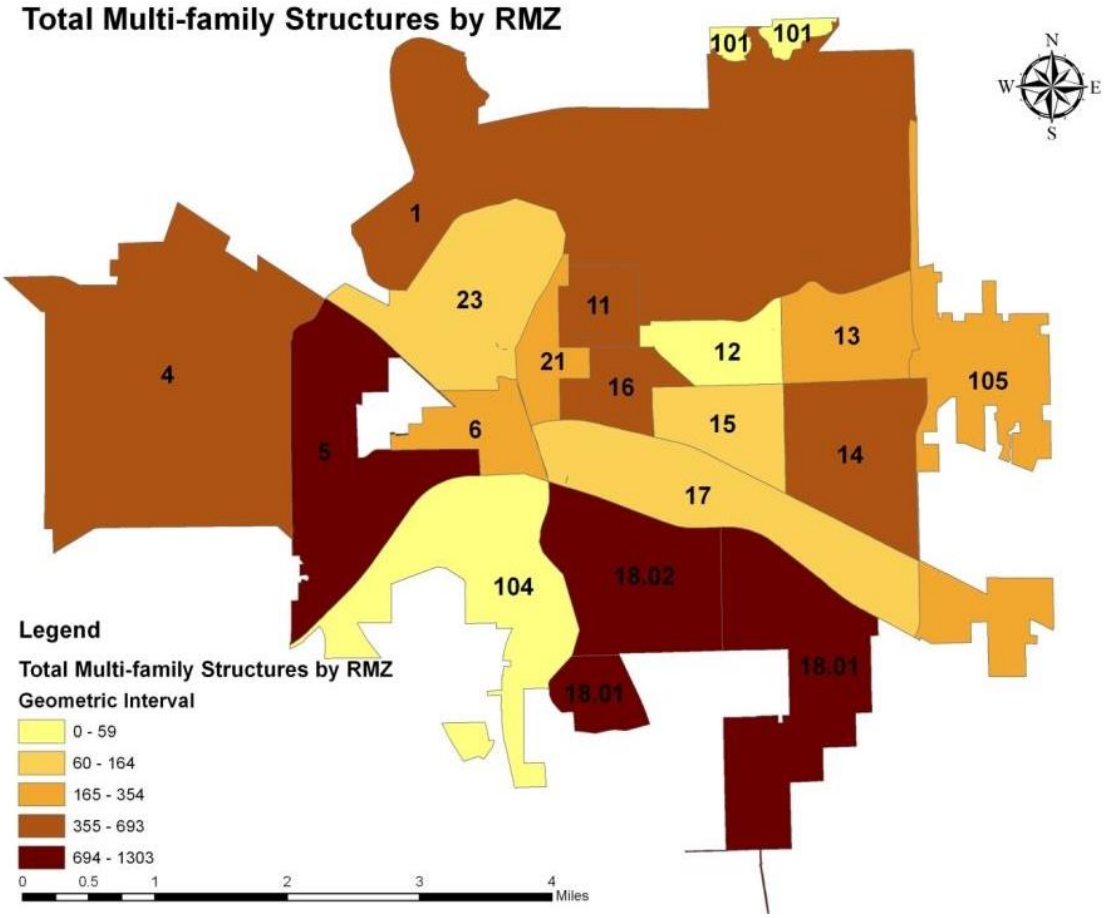
Attributes of a Building in Moderate Risk Category

The "Moderate Risk" category has an OVAP score ranging from 16-39. This category is the most diverse when it comes to occupancy type. Occupancies with "moderate risk" have various characteristics.

Because this category is so diverse, it is hard to pinpoint any distinguishable characteristic that separates occupancies in this category from occupancies in the other four categories. Most of these buildings are large, have small exposure separations, a large occupant load, common hazards, mixed hazards, and industrial hazards.

Almost all the residential occupancies in Iowa City fall into the 15-39 OVAP score category. Single-family residential being the predominant category comprises 62 percent of this class. Multi-family residential comprises 27 percent. These residential occupancies include apartments, zero-lot-lines, multi-family dwellings, single-family dwellings, and condominiums. Most residential occupancies range from 21-26 with very minute differences present to cause that range. Occupancies in this category have common and mixed hazards, an occupancy load no greater than 50 people, have access on most sides of the building, and square footage under 15,000 feet.

Map 52 Total Multi-Family Structures by RMZ



Attributes of a Building in a Low Risk Category

The "Low Risk" category required an OVAP score equal to or less than 15. There are 30 occupancies in this category. All buildings in this category have access points on all sides, are less than 7,500 square feet, are no taller than two stories, and have the lowest fire load, hazard index, and water demand available.

Table 21 Average OVAP Score by RMZ

RMZ	Average OVAP	Number of Structures	Total Value
1	22.42	1,470	41,996
4	22.55	1,822	41,090
5	23.32	2,314	53,978
6	24.61	761	18,725
11	23.78	1,002	23,834
12	21.77	784	17,072
13	22.21	1,470	32,655
14	22.44	1,731	38,835
15	21.75	1,217	26,471
16	24.19	871	21,070
17	24.87	1,612	40,083
18	23.1	2,896	66,876
21	31.46	677	21,293
23	23.94	861	20,608
104	29.75	224	6,663
105	22.82	1,017	23,213

Map 53 Average OVAP Score by RMZ

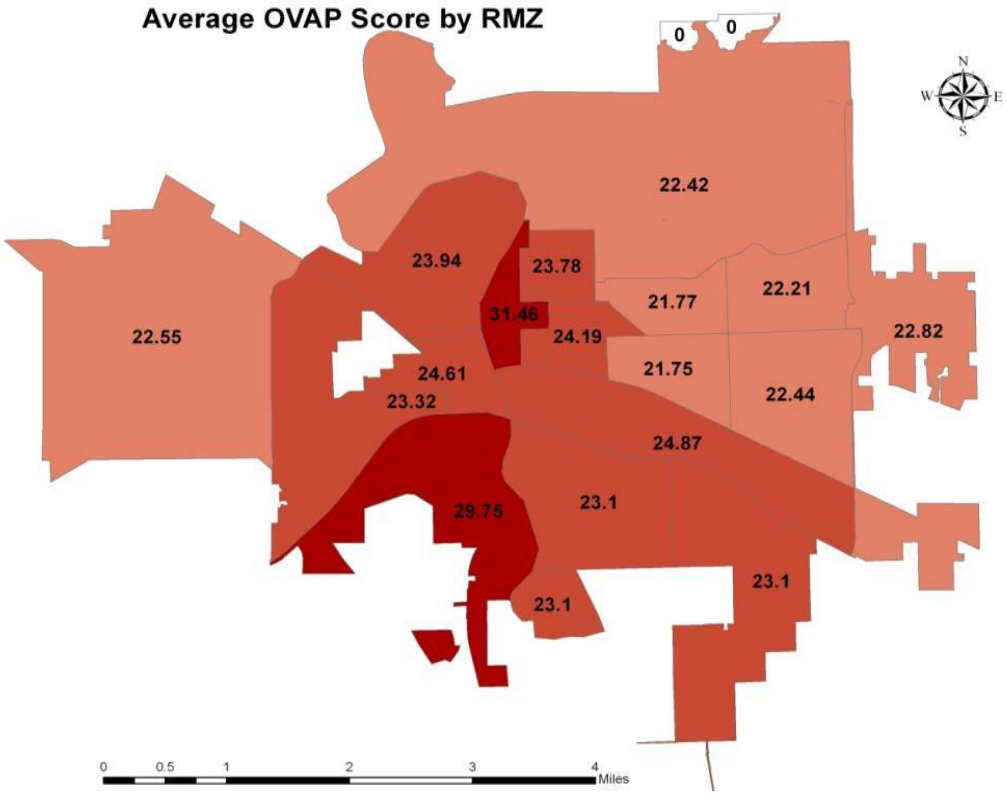


Table 22 RMZ Classifications as Identified by RHAVE

Occupancy Hazard Statistics RMZ 21				
Risk Level	OVAP Score	# of Structures	Value	%
Maximum	60+	2	128	0.3
High	50-59	9	481	1.3
Significant	40-49	79	3,388	11.7
Moderate	16-39	586	17,281	86.6
Low	0-15	1	15	0.1
Average Score	31.46	677	21,293	100

Occupancy Hazard Statistics RMZ 23				
Risk Level	OVAP Score	# of Structures	Value	%
Maximum	60+	1	63	0.1
High	50-59	23	1,260	2.7
Significant	40-49	20	894	2.3
Moderate	16-39	817	18,391	94.9
Low	0-15	0	-	0.0
Average Score	23.94	861	20,608	100

Occupancy Hazard Statistics RMZ 104				
Risk Level	OVAP Score	# of Structures	Value	%
Maximum	60+	0		0.0
High	50-59	0	-	0.0
Significant	40-49	25	1,049	11.2
Moderate	16-39	198	5,599	88.4
Low	0-15	1	15	0.4
Average Score	29.75	224	6,663	100

Occupancy Hazard Statistics RMZ 105				
Risk Level	OVAP Score	# of Structures	Value	%
Maximum	60+	0		0.0
High	50-59	0	-	0.0
Significant	40-49	4	168	0.4
Moderate	16-39	1012	23,033	99.5
Low	0-15	1	12	0.1
Average Score	22.82	1,017	23,213	100

Occupancy Hazard Statistics RMZ 12				
Risk Level	OVAP Score	# of Structures	Value	%
Maximum	60+	0	-	0
High	50-59	1	50	0.1
Significant	40-49	1	44	0.1
Moderate	16-39	782	16,977	99.7
Low	0-15	0	-	0
Average Score	21.77	784	17,072	100

Occupancy Hazard Statistics RMZ 13				
Risk Level	OVAP Score	# of Structures	Value	%
Maximum	60+	0	-	0.0
High	50-59	0	-	0.0
Significant	40-49	1	43	0.1
Moderate	16-39	1469	32,612	99.9
Low	0-15	0	-	0.0
Average Score	22.21	1470	32,655	100

Occupancy Hazard Statistics RMZ 14				
Risk Level	OVAP Score	# of Structures	Value	%
Maximum	60+	0	-	0.0
High	50-59	0	-	0.0
Significant	40-49	3	134	0.2
Moderate	16-39	1722	38,642	99.5
Low	0-15	6	60	0.3
Average Score	22.44	1731	38,835	100

Occupancy Hazard Statistics RMZ 15				
Risk Level	OVAP Score	# of Structures	Value	%
Maximum	60+	0	-	0.0
High	50-59	0	-	0.0
Significant	40-49	0	-	0.0
Moderate	16-39	1215	26,451	99.8
Low	0-15	2	20	0.2
Average Score	21.75	1217	26,471	100

Occupancy Hazard Statistics RMZ 16				
Risk Level	OVAP Score	# of Structures	Value	%
Maximum	60+	0	-	0.0
High	50-59	0	-	0.0
Significant	40-49	11	473	1.3
Moderate	16-39	860	20,597	98.7
Low	0-15	0	-	0.0
Average Score	24.19	871	21,070	100

Occupancy Hazard Statistics RMZ 17				
Risk Level	OVAP Score	# of Structures	Value	%
Maximum	60+	0	-	0.0
High	50-59	2	102	0.1
Significant	40-49	21	924	1.3
Moderate	16-39	1589	39,058	98.6
Low	0-15	0	-	0.0
Average Score	24.87	1612	40,083	100

Occupancy Hazard Statistics RMZ 1				
Risk Level	OVAP Score	# of Structures	Value	%
Maximum	60+	0	-	0.0
High	50-59	0	-	0.0
Significant	40-49	9	382	0.5
Moderate	16-39	1850	41,459	98.8
Low	0-15	14	155	0.7
Average Score	22.42	1873	41,996	100

Occupancy Hazard Statistics RMZ 4				
Risk Level	OVAP Score	# of Structures	Value	%
Maximum	60+	0	-	0.0
High	50-59	1	50	0.1
Significant	40-49	4	175	0.2
Moderate	16-39	1817	40,864	99.7
Low	0-15	0	-	0.0
Average Score	22.55	1822	41,090	100

Occupancy Hazard Statistics RMZ 5				
Risk Level	OVAP Score	# of Structures	Value	%
Maximum	60+	0	-	0.0
High	50-59	0	-	0.0
Significant	40-49	4	168	0.2
Moderate	16-39	2309	53,800	99.8
Low	0-15	1	10	0.0
Average Score	23.32	2314	53,978	100

Occupancy Hazard Statistics RMZ 6				
Risk Level	OVAP Score	# of Structures	Value	%
Maximum	60+	0	-	0.0
High	50-59	0	-	0.0
Significant	40-49	14	617	1.8
Moderate	16-39	745	18,089	97.9
Low	0-15	2	20	0.3
Average Score	24.61	761	18,725	100

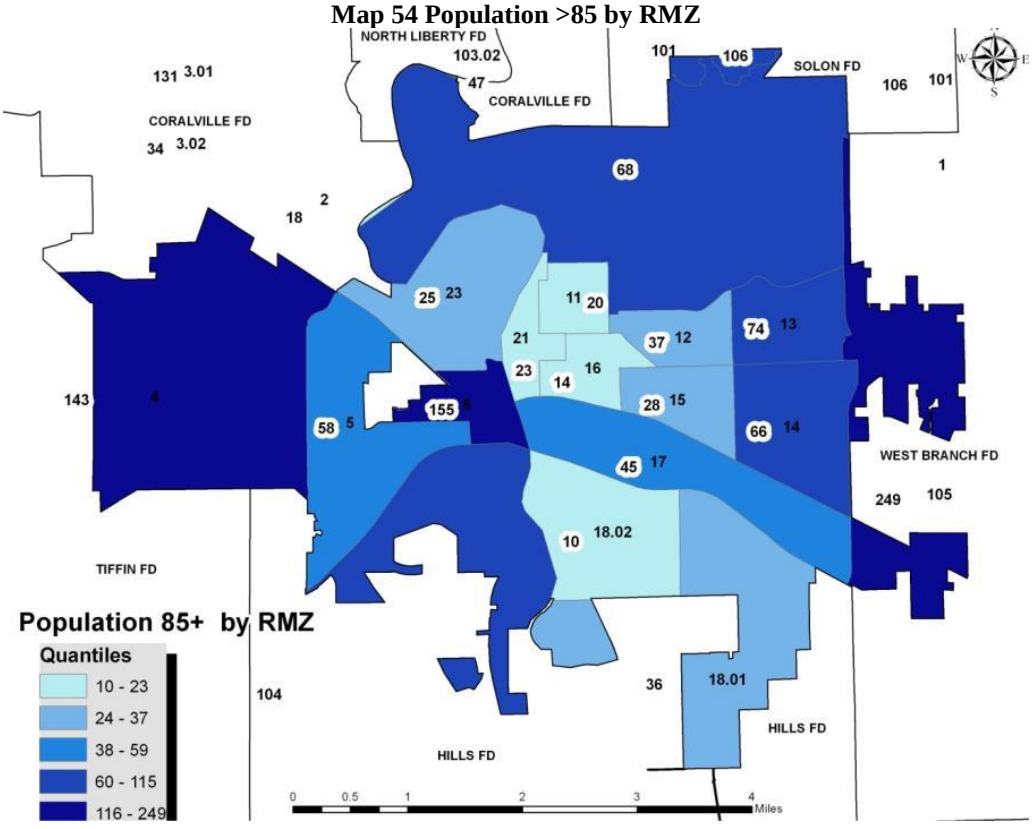
Occupancy Hazard Statistics RMZ11				
Risk Level	OVAP Score	# of Structures	Value	%
Maximum	60+	0	-	0
High	50-59	8	429	0.8
Significant	40-49	6	257	0.6
Moderate	16-39	988	23,149	98.6
Low	0-15	0	-	0
Average Score	23.78	1002	23,834	100

	Occupancy Hazard Statistics RMZ 18			
Risk Level	OVAP Score	# of Structures	Value	%
Maximum	60+	0	-	0.0
High	50-59	0	-	0.0
Significant	40-49	13	533	0.4
Moderate	16-39	2881	66,321	99.5
Low	0-15	2	23	0.1
Average Score	23.1	2896	66,876	100

Fire Risk Factors

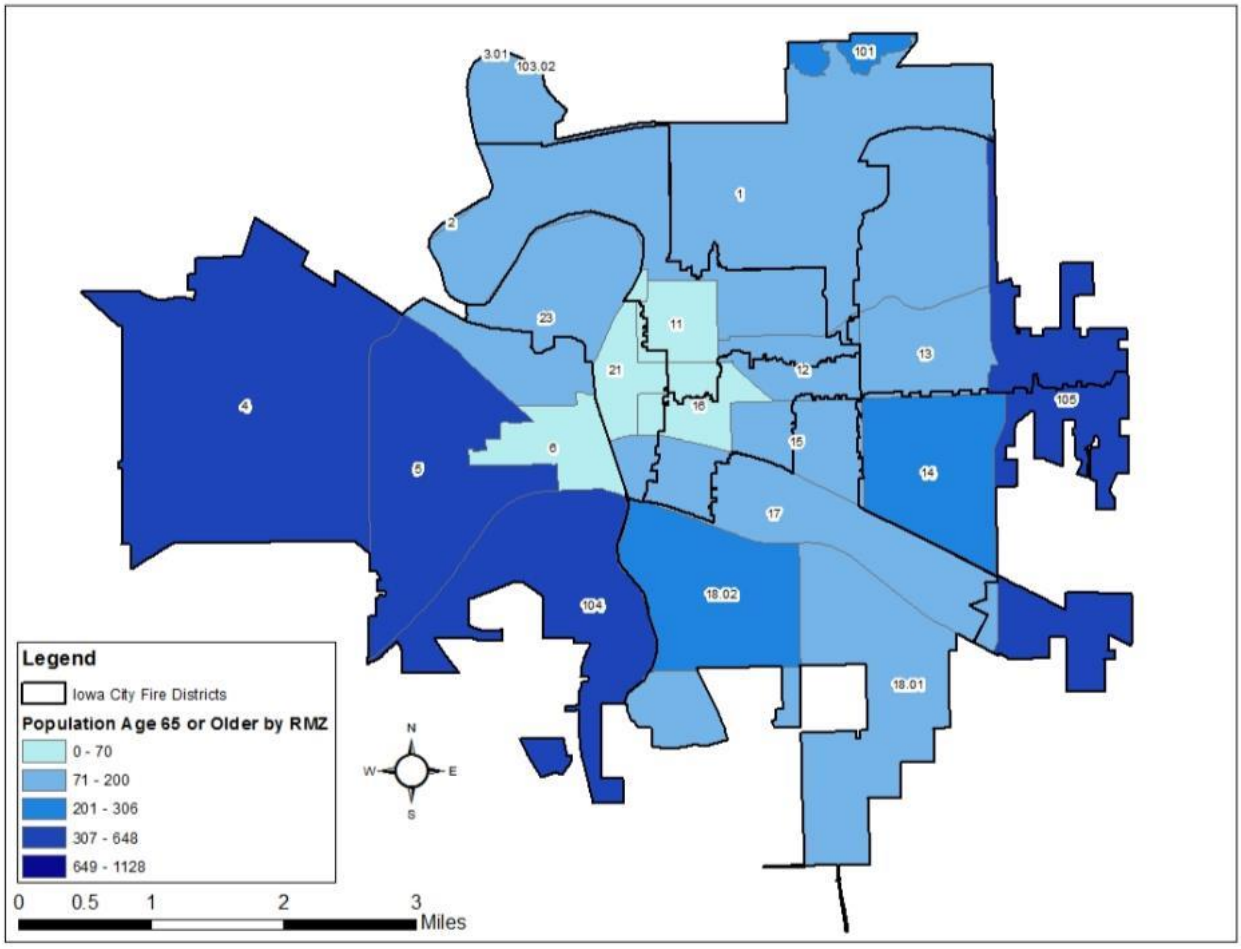
According to the U.S. Fire Administration (USFA), older adults are more vulnerable in a fire than the general population due to a combination of factors including mental and physical frailties, greater use of medications, and elevated likelihood of living in poverty-like or fixed income situations. As shown in the map below, RMZ 105, RMZ 4, and RMZ 6 have populations with the highest number of individuals aged 85 years and older. Employing probability, consequence and impact methodology, it is significant that the U.S. Census Bureau estimates that older adults comprise 12 percent of the population and growing. It is estimated that the older population will continue to rise sharply between 2016 and 2030, the years when the baby boom generation will be in retirement. By 2030, the Department of Health and Human Services Administration on Aging estimates adults aged 65 and over will comprise 20 percent of the U.S. population.

Map 54 Population >85 by RMZ



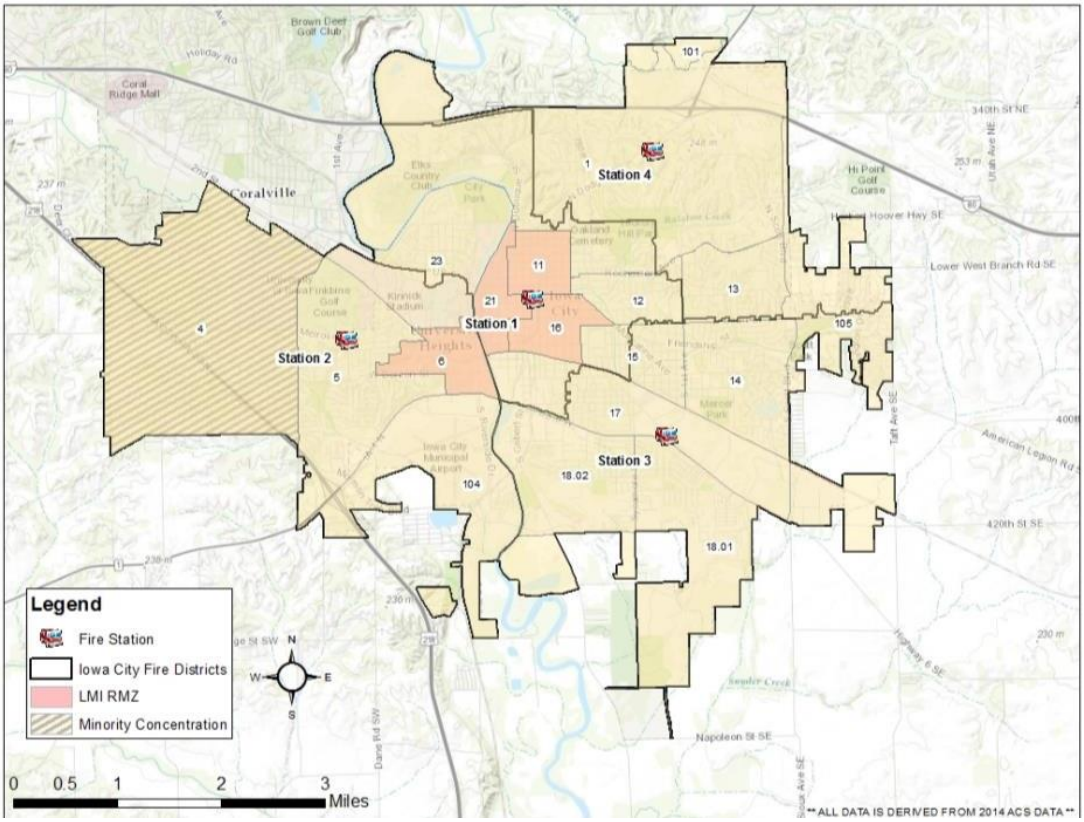
In terms of consequence, the elderly continue to experience a disproportionate share of fire deaths. According to the USFA, older adults represented 12% of the U.S. population, but suffered more than 30 percent of all fire deaths. The relative risk of individuals aged 65 and over dying in a fire is 2.6 times greater than that of the general population. The risk worsens as age increases: the risk is 1.7 for adults aged 65 to 74, but soars to 4.7 for those over age 84. With this in mind, it is notable that Iowa City has several multi-family residential structures referred to as retirement communities, which are home primarily to older adults.

Map 55 Population >65 by RMZ



Likewise, according to the USFA, people in poverty-like or fixed income situations are more vulnerable to fire risk. Using probability and consequence methodology, this fire risk level conclusion can be drawn from numerous studies and data compiled by the USFA. The probability aspect, and therefore the predictability of this impact on the community, can be measured by quantifying the portion of the community living in poverty-like or fixed income situations. The map below shows the distribution of low-to-moderate-income and minority populations by RMZ.

Map 56 Low to Moderate Income and Minority Concentrations by RMZ



The City of Iowa City Housing Authority (ICHA) offers programs that provide housing at a reduced rate for those meeting the annual gross income eligibility requirements, with priority given to families who qualify for local working preference, are elderly, or have a household member that is disabled.

Special Housing

The U.S. Census defines disabled persons as those with impaired mobility, including the blind. The number of disabled persons in a district has important planning and social implications, which affect the demand for specialized access and EMS demands.

According to census data the most stable group is the age set of 65 years and older with an increase of four-tenths of one percent as a percentage of total population. These people are often life-long residents of Iowa City. The U.S. Census states that 14.5% of Iowa City households include individuals 65 years of age and older. As shown by the maps, senior population is not evenly distributed across the city. The largest number (249) of Iowa City's 85+ seniors, as well as 1,084 of the total 65+ population lives in RMZ 105.

This increasing demographic is realized daily by EMS providers, but its effect on fire operations must not be overlooked. As this population shift continues so will the demand for housing that meets the lifestyle demands of active senior citizens and those in need of much more advanced care. According to the National Fire Protection Association, once a person reaches 65, the risk of being killed or

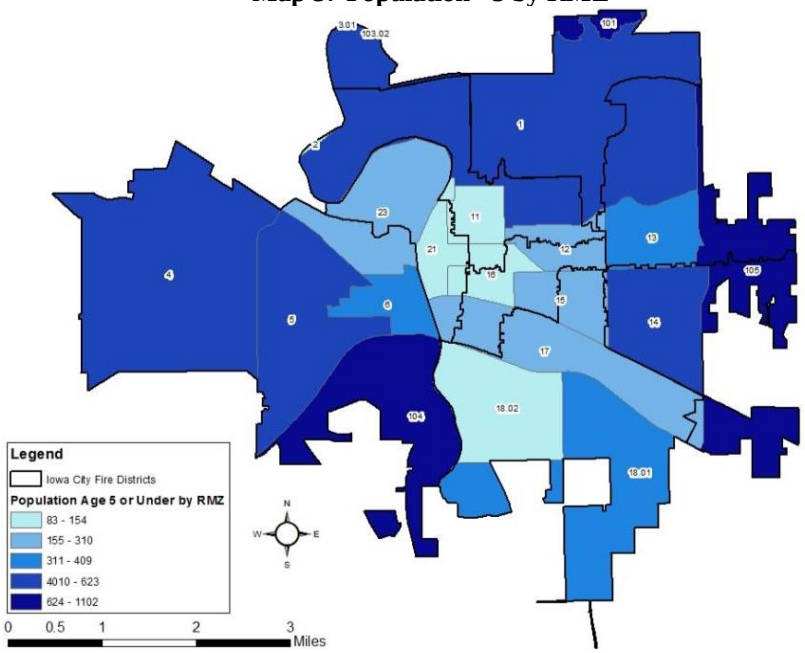
injured by fire doubles compared to the general population. Many communities are seeing a building boom of senior care housing that is much different than that of a generation ago, which resembled a sterile hospital environment. Many of these new facilities have senior citizens with very different needs all living at a facility that might possess a single street address. It is only through thorough pre-planning that fire departments will be able to identify these occupancies and establish appropriate rescue and fire suppression strategies.

One of the objectives of the ICFD training program is to have firefighters demonstrate a basic understanding of different types of senior communities and facilities. Firefighters will also gain an understanding of facility operations and built-in fire protection systems at these facilities and to educate staff, as well as the senior occupants on fire and life safety principles.

Children and Fire

According to the U.S. Fire Administration, 52% of child fire deaths affect those under the age of 5. Iowa City's population age 5 or under is 7,613. Escaping from fire can be difficult for very young children because they lack the motor skills and mental capabilities needed to quickly escape a burning building. The number of fire injuries are also highest in the under age 5 bracket. Boys are at a higher risk of death from fire than girls; African-American children are at an increased risk of death from fire. ICFD prevention campaigns urge parents and caregivers to install and maintain working smoke alarms, to safely store matches and lighters out of the reach of children, and to practice a fire escape plan with small children. The US Census Bureau indicates 6% of housing units in Iowa City have children less than 6 years of age.

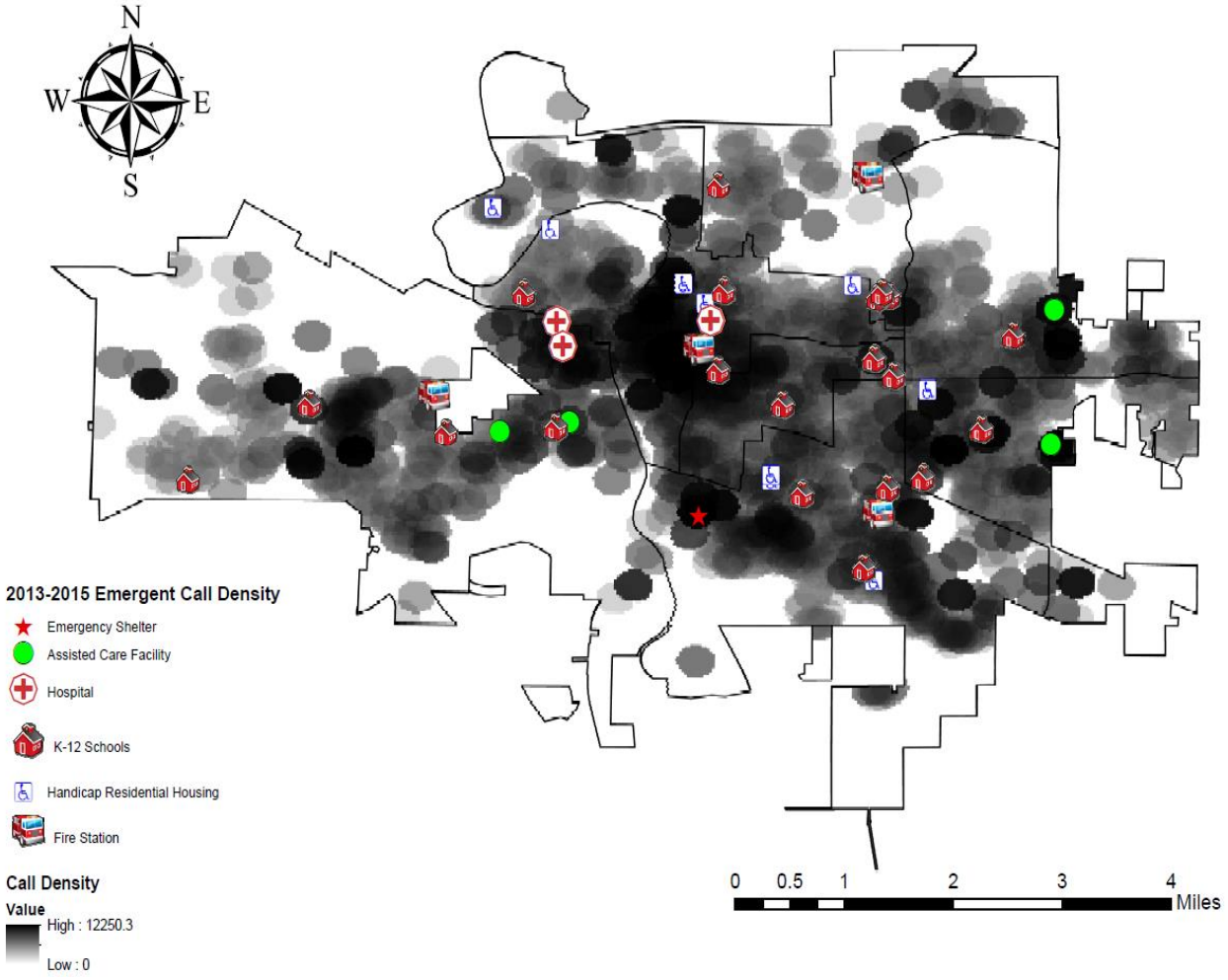
Map 57 Population <5 by RMZ



Accessible Units

The Iowa City Housing Authority (ICHA) has 37 accessible units in its inventory. All 37 units are currently occupied. Households receiving HCVP rental assistance needing accessible units have also utilized the private market.

Map 58 Density of Incidents in Relation to Special Housing



Historical Buildings

Structure fires also pose a risk to the community's history. When fire strikes a historic structure, the consequences may not only be devastating to the building itself, but also to the community as a whole. This is especially true if fire destroys any one-of-a-kind artifacts found within.

Fire, caused by workers using hand torches to remove asbestos from the building during an exterior repair project, destroyed most

of the gold dome of Iowa's Old Capitol on Tuesday, November 20, 2001. The building was built in 1840. It served as the last capitol of the Iowa territory - from 1842 to 1846. The fire caused an estimated $5.9 million in damage. Restoration of the building took four and a half years and approximately $9 million to complete. Iowa City is home to 68 properties on the National Register of Historic Places.

Special Type Incident: Iowa City Landfill Fire

On May 26, 2012, the ICFD responded to a fire call at the Iowa City Landfill, located at 3900 Hebl Avenue, one mile west of Highway 218 in Iowa City. The fire started at the working face of the landfill where garbage was dumped earlier in the day. The fire quickly spread to the exposed landfill liner system, which includes a drainage layer of approximately 1.3 million shredded tires. Once the fire was in the drainage system, strong south winds spread it quickly along the west edge of the landfill cell. Landfill staff used bulldozers to cut a gap in the shredded tire layer to contain the fire, but the fire spread across the gap before it could be completed. Staff regrouped and cut two additional fire breaks to halt the rapidly moving fire.

Protecting the health and safety of the public and workers on-site remained the number one priority for the City and all cooperating agencies as the tire shreds continued to burn. Also of primary concern was keeping the fire from spreading to adjacent landfill cells and to a portion of the new cell which was successfully isolated in the days following the fire's ignition. On June 1, 2012, Iowa City Mayor Matt Hayek signed a local disaster declaration. The declaration facilitated access to state and federal resources, including advanced air quality monitoring and thermal imaging technology to assist with mitigating the incident. The Johnson County Health Department partnered with the State Hygienic Laboratory, Iowa Department of Natural Resources and subject matter experts with the University of Iowa to monitor air quality throughout the region. Officials with the United States Environmental Protection Agency actively partnered with local and state officials on issues related to air quality. On Tuesday, June 12, 2012, environmental restoration contactors completed a stir, burn, and cover strategy to finally contain the fire and stop the burning. Heavy equipment was in operation for a period of nine days. The City estimated the loss to be $4 million.

Fire Risk Level Conclusions

A careful assessment and analysis of fire risk within the community has revealed a number of valuable fire risk conclusions. The use of existing RHAVE data and OVAP scores allows the agency to analyze the vulnerability and risks of specific structures. This evaluative process will be made more complete by integrating the three-axis risk methodology which considers the probability, consequence, and impact of incident types throughout the community. The three-axis approach promotes a comprehensive analysis which then allows for appropriate scoring and categorizing of

each type of incident as low, moderate, high or special. Clearly, the community faces a very real fire potential and risk scenario, as demonstrated by the previous discussion of fire risk as it relates to probability and consequence.

Historical fire suppression response frequency and loss data speaks to the potential (probability) of future fire occurrences within the community. Differing population densities within planning areas (RMZs) also have a direct correlation to fire potential. Another reliable predictor of future fire potential is the prevalence of at-risk populations within the community (i.e. children, older adults, people living in poverty-like or fixed income situations). It is fair to say the city contains risk characteristics allowing for the prediction of future fire occurrences within the community.

Single family residential structure fire events are classified as moderate fire risk while multi-family residential and commercial structure fire events are classified as high fire risk because of their significant potential life and/or property loss scenarios. The OVAP-style hazard approach used within the fire risk analysis clearly demonstrates that factors such as occupant load and mobility, size, property value, and capacity for fire control, have an unmistakable relationship to potential fire loss. Iowa City's youthful median age and the risk taking behavior frequently associated with young people living away from home for the first time exaccerbate risk and probability. Moderate risk fires minimally require three engine companies (or two engines and one quint depending on incident location) a ladder company, and a battalion chief for a total of 13 shift personnel. In order to diminish complexity for the PSAP calltaker, subsequently reducing call-processing time, the department has aligned moderate risk dispatch protocol with that for high risk fires.

High risk events and special risk events affect the community in terms of loss of life and/or significant property, but also may have an important economic or historic impact to the community. They will also certainly impact the department because of the large allocation of resources to such events. In fact, very large fire occurrences are certain to bring the department to the point of resource exhaustion. Therefore, the conclusion drawn is that increased fire risk warrants an increased concentration of fire suppression resources. High risk fires are allocated an initial response of three engine companies, one quint, a ladder company and a battalion chief to provide a response force of at least 16 personnel. A callback of off duty personnel will follow and the Johnson County Mutual Aid Box Alarm System (MABAS) may be utilized to bring additional resources as required.

Certain fire occurrences are extraordinary in nature, and due to their low frequency of occurrence and potentially high consequence to the community, are classified as a special fire risk. Examples of special high risk fires include: fires in high-rise buildings, hospitals, university research facilities, large assembly occupancies, and heavy manufacturing. Special risk fires will exhaust the ability of on duty crews to mitigate the incident. The Johnson County Mutual Aid Box Alarm System (MABAS) will be utilitzed to assemble additional resources to mitigate the incident. Experiential data suggests a MABAS third alarm will provide 50 personnel within 45 - 60 minutes of the alarm. The MABAS agreement provides two more alarm levels, for a total of five alarms. Each alarm can be ordered with or without a change of quarters. The change of quarters request provides one engine and four

personnel to each of Iowa City's four fire stations. A second alarm will produce, on average, 16 off-duty ICFD personnel and two administrative chiefs to the incident; a third alarm will add four apparatus, 16 personnel, and one chief; a fourth alarm will add four apparatus, 16 personnel, and one chief; and a fifth alarm will add four apparatus and 16 personnel, and one chief.

Other types of fire occurrences have been identified that are probable within the community; however, they carry much less risk-and are of a lesser consequence to the community. These events, such as appliance fires, flue fires, outbuilding fires, transport vehicle fires, and single family dwellings are classified as either low or moderate fire risk. Fewer resources are allocated to this type of fire risk level, and the impact to the department is less as well. Fires involving passenger vehicles, rubbish or vegetation are included in this category.

The risk level classifications found on the following pages are designed to match risk with the appropriate response force necessary to perform the critical tasks dictated by the specific incident type. In other words, an effective response force must be assembled to perform the needed actions (critical tasks) to control the incident and prevent its further escalation.

Grass Fire	
Heron's Formula	
RISK	SCORE
Probability of occurrence	4
Consequence to community	2
Impact on Fire Department	2
SCORE	8.485

Dumpster Fire	
Heron's Formula	
RISK	SCORE
Probability of occurrence	6
Consequence to community	2
Impact on Fire Department	2
SCORE	12.33

Open Burning Investigation	
Heron's Formula	
RISK	SCORE
Probability of occurrence	6
Consequence to community	2
Impact on Fire Department	2
SCORE	12.33

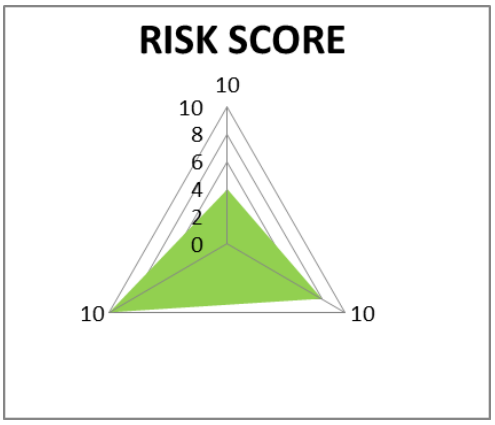
Vehicle Fire	
Heron's Formula	
RISK	SCORE
Probability of occurrence	8
Consequence to community	2
Impact on Fire Department	2
SCORE	16.25

Large Vehicle Fire	
Heron's Formula	
RISK	SCORE
Probability of occurrence	4
Consequence to community	4
Impact on Fire Department	6
SCORE	26.53

Fire Alarm	
Heron's Formula	
RISK	SCORE
Probability of occurrence	10
Consequence to community	2
Impact on Fire Department	2
SCORE	20.2

Residential Structure Fire	
Heron's Formula	
RISK	SCORE
Probability of occurrence	6
Consequence to community	4
Impact on Fire Department	8
SCORE	44.18

Multi-Family Dwelling Fire	
Heron's Formula	
RISK	SCORE
Probability of occurrence	4
Consequence to community	8
Impact on Fire Department	10
SCORE	67.17



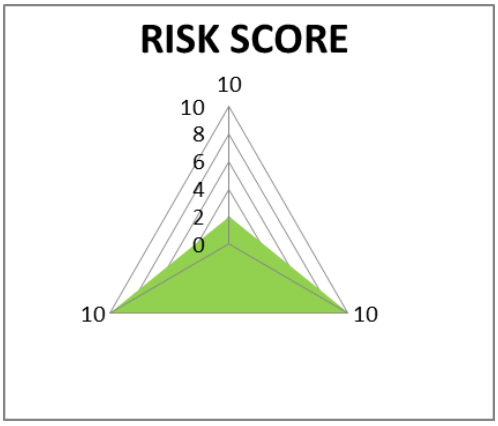
Small Commercial Structure Fire	
Heron's Formula	
RISK	SCORE
Probability of occurrence	4
Consequence to community	6
Impact on Fire Department	10
SCORE	53.74

Large Commercial Structure Fire	
Heron's Formula	
RISK	
Probability of occurrence	4
Consequence to community	8
Impact on Fire Department	10
SCORE	67.17

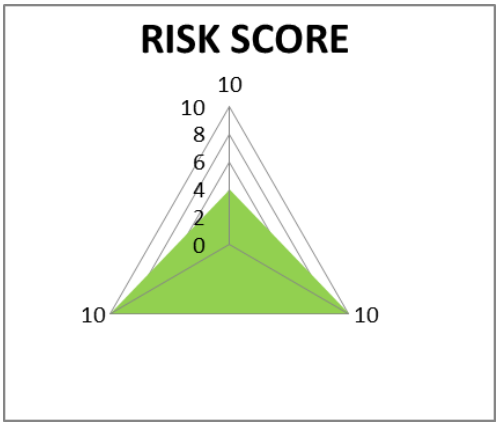
High Rise Structure Fire	
Heron's Formula	
RISK	SCORE
Probability of occurrence	4
Consequence to community	10
Impact on Fire Department	10
SCORE	81.24

Light Manufacturing	
Heron's Formula	
RISK	SCORE
Probability of occurrence	2
Consequence to community	8
Impact on Fire Department	10
SCORE	59.4

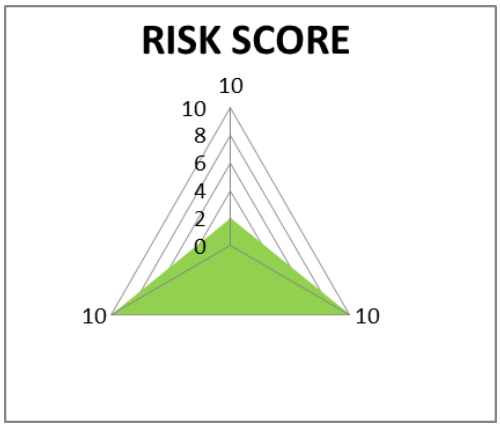
Heavy Manufacturing	
Heron's Formula	
RISK	SCORE
Probability of occurrence	2
Consequence to community	10
Impact on Fire Department	10
SCORE	73.48



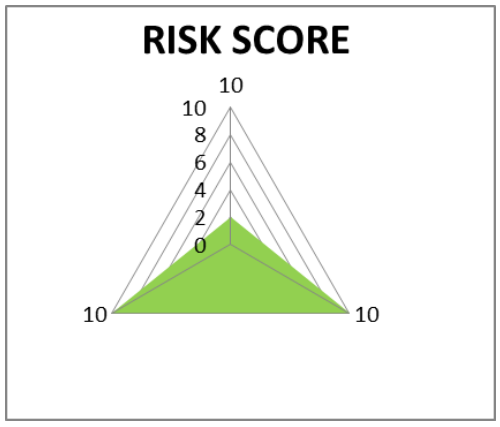
Hospital	
Heron's Formula	
RISK	SCORE
Probability of occurrence	4
Consequence to community	10
Impact on Fire Department	10
SCORE	81.24



Research Facility	
Heron's Formula	
RISK	SCORE
Probability of occurrence	2
Consequence to community	10
Impact on Fire Department	10
SCORE	73.48



Nursing Home Fire	
Heron's Formula	
RISK	SCORE
Probability of occurrence	2
Consequence to community	10
Impact on Fire Department	10
SCORE	73.48



Scoring Results:
Low Risk = 0-25
Moderate Risk = 26-50
High Risk = 51-70
Special Risk = 71-100

Fire Critical Task Analysis

According to the Commission on Fire Accreditation International, to create standard levels for response in the mitigation actions, an assessment must be conducted locally to determine the capabilities of the arriving companies and individual responders to achieve those critical tasks. When identifying critical tasks, responder safety must be a priority.

An effective response force (ERF) is the number of staff necessary to complete all the identified tasks within a prescribed timeframe. Deployment standards specific to NFPA 1710 were considered when determining critical tasking. The following tables show critical tasks and associated risk with the ERF for the incident.

Table 23 Fire Critical Tasks

Fire Risk: Low	
Critical Task	Number of Staff
Command/Safety	1
Fire Attack	1
Pump Operations	1
TOTAL	3

Fire Risk: Moderate	
Critical Task	**Number of Staff**
Command	**1**
Safety	**1**
Fire Attack	**2**
RIC	**2**
Pump Operations/Water Supply	**1**
Ventilation/Ground Ladders	**2**
Search and Rescue	**2**
Back Up Line	**2**
TOTAL	**13**
Admin Chief (ICS)	**1**

Fire Risk: High	
Critical Task	Number of Staff
Command	1
Safety	1
Attack Line	2
2nd Attack Line	2
Pump Operations/Water Supply	1
Back-Up Line	2
RIC	2
Search and Rescue	2
Ventilation/Utilities	2
Utilities/Exposure Protection	1
TOTAL	16
Admin Chiefs (ICS)	2

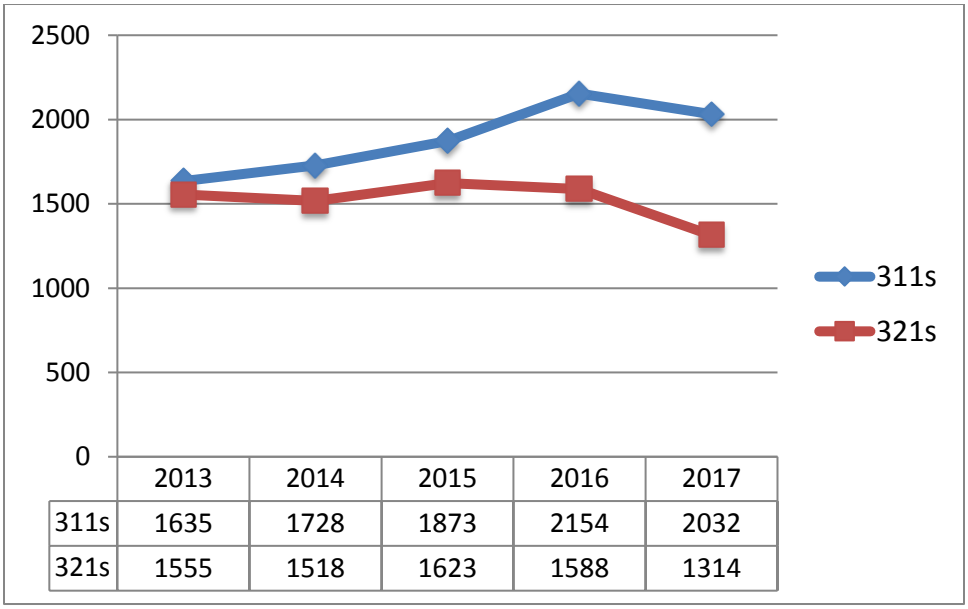
Fire Risk: Special	
Critical Task	Number of Staff
Command	1
Command Aid	1
Safety	1
Division Supervisors	2
Staging	1
Attack Line	2
2nd Attack Line	2
Pump Operations/Water Supply	2
Back-Up Line	2
Rapid Intervention	2
Search and Rescue	2
Ventilation/Ground Ladders	2
Utilities/Exposure Protection	4
Aerial Operations/Other	4
On Deck	2
Level 1 Staging	6
Level 2 Staging	14
TOTAL	50*
Admin Chief (ICS)	2

*Equates to MABAS Alarm Level 3

Emergency Medical Services

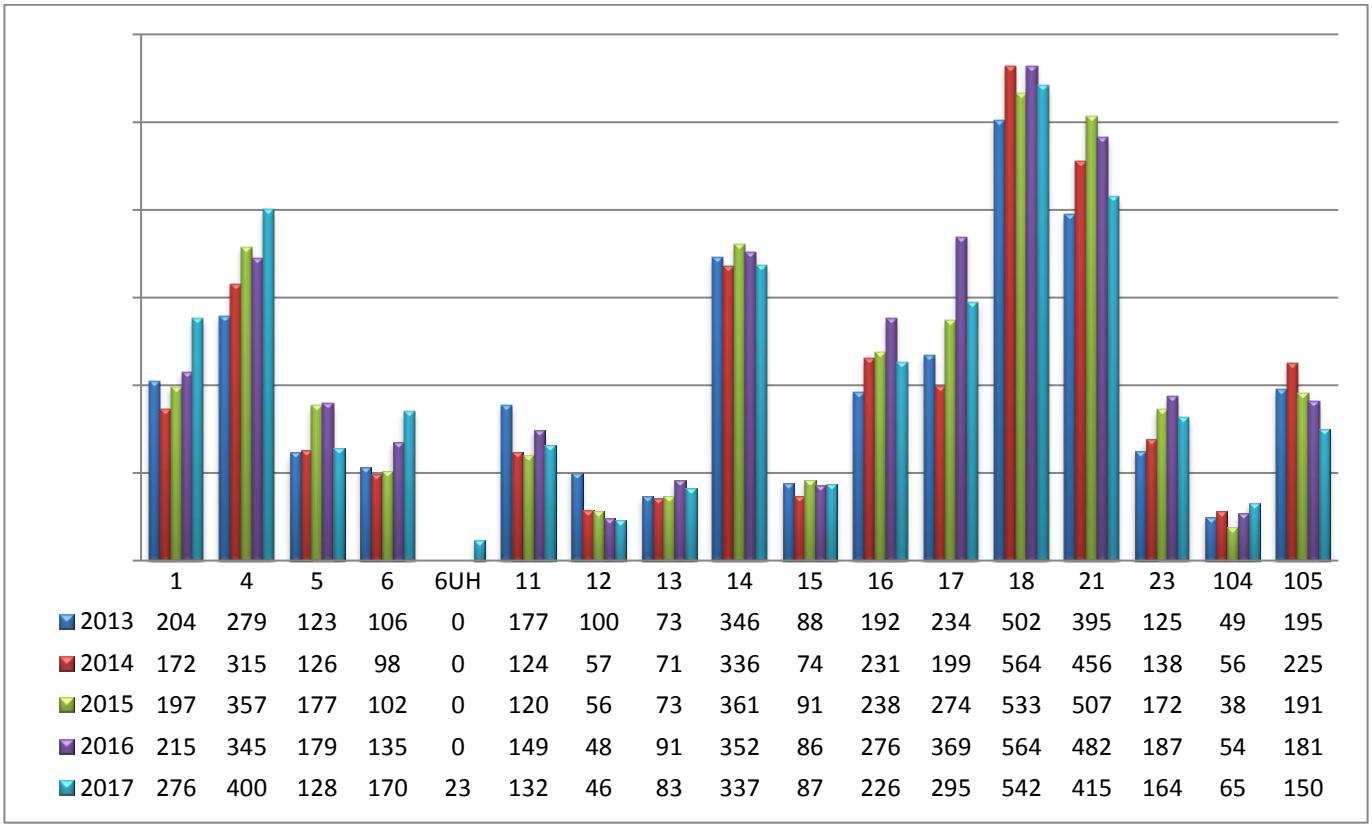
The most common type of call for service in Iowa City - like most fire departments across the United States - is EMS response. EMS incidents are a significant risk to the community. After several years of notable increases in this category, EMS service demands decreased in 2017. This may be in-part due to the institution of Emergency Medical Dispatch protocol. In 2017, the ICFD responded to 3,346 EMS incidents.

The following chart breaks down the department's EMS responses over the past five years. A 311 is a medical assist incident and a 321 is an EMS incident involving direct patient care, excluding motor vehicle accidents with injuries.



	2013	2014	2015	2016	2017
311s	1635	1728	1873	2154	2032
321s	1555	1518	1623	1588	1314

Figure 14 EMS Responses (2013-2017)

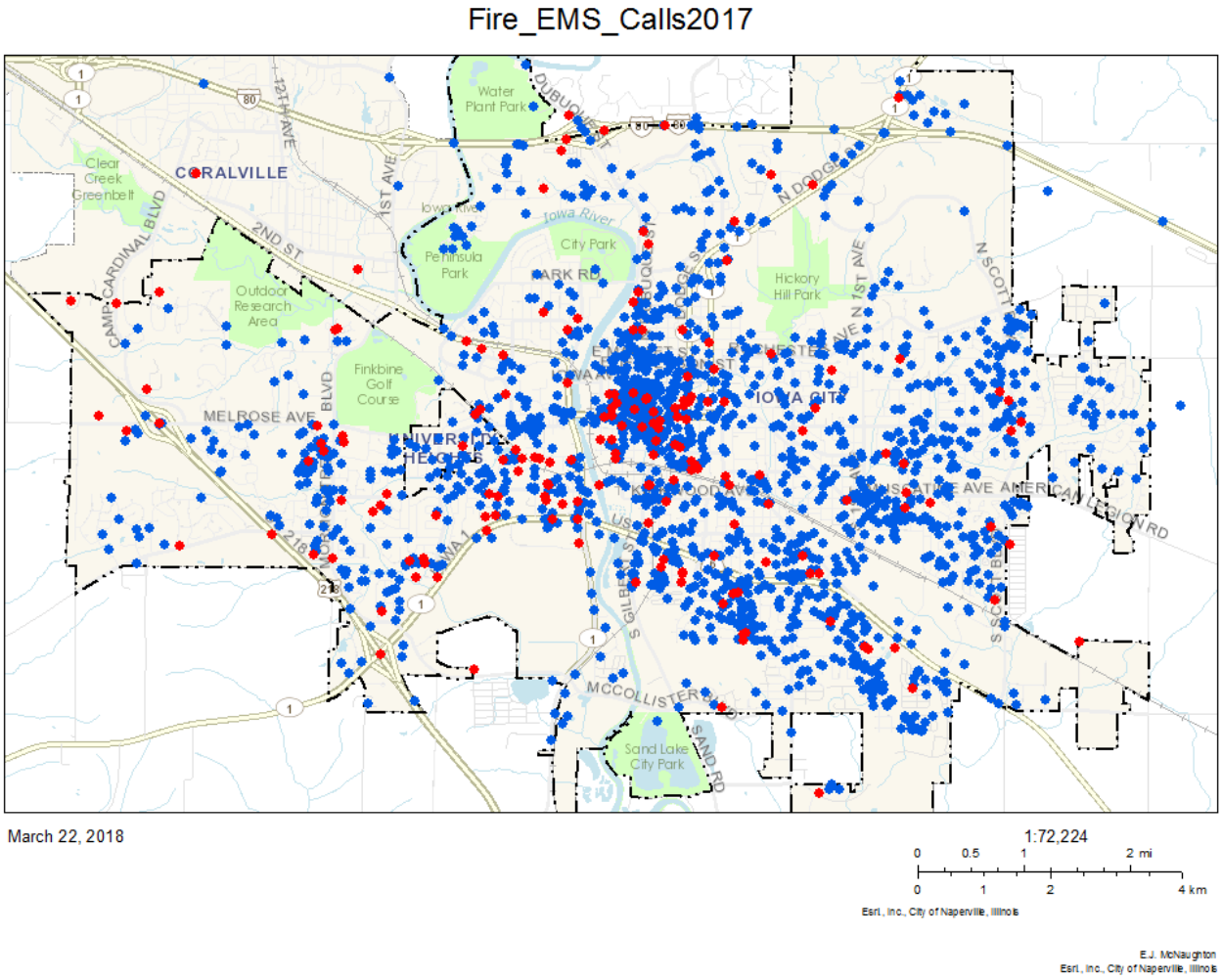


	1	4	5	6	6UH	11	12	13	14	15	16	17	18	21	23	104	105
2013	204	279	123	106	0	177	100	73	346	88	192	234	502	395	125	49	195
2014	172	315	126	98	0	124	57	71	336	74	231	199	564	456	138	56	225
2015	197	357	177	102	0	120	56	73	361	91	238	274	533	507	172	38	191
2016	215	345	179	135	0	149	48	91	352	86	276	369	564	482	187	54	181
2017	276	400	128	170	23	132	46	83	337	87	226	295	542	415	164	65	150

Figure 15 EMS Incidents by RMZ

Consistent with the probability and consequence methodology discussed earlier, the hot-spot map below identifies the areas within the community with the greatest EMS density. The frequency of EMS responses is greatest in the areas of the community with higher population densities and with special housing units discussed earler.

Map 59 Fire and EMS Incidents

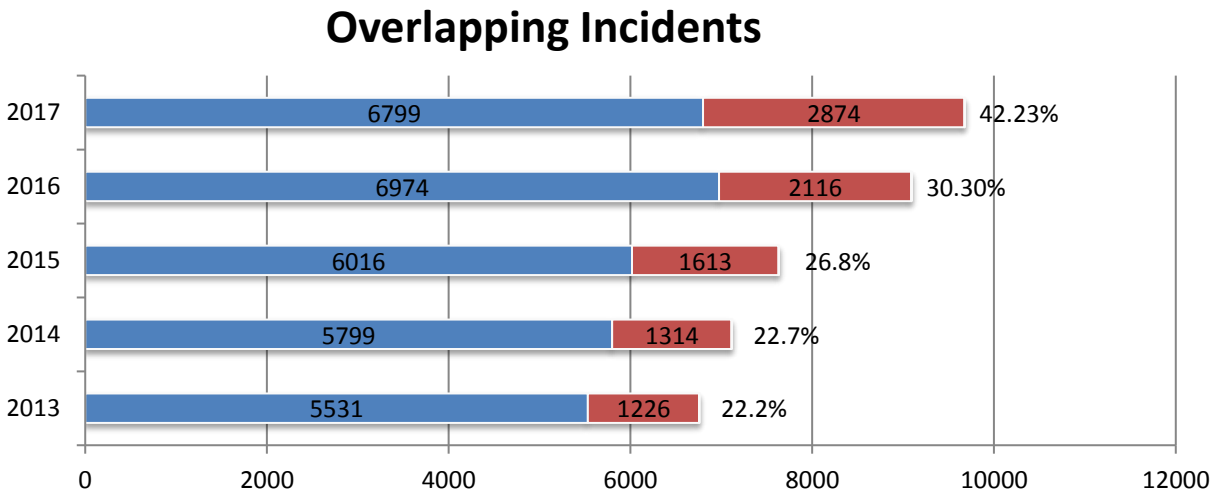


EMS Risk Factors

Similar to fire risk, areas of the community characterized by populations living in poverty-like conditions account for a greater service demand for EMS, as compared to other areas of the community. This problem has been exacerbated by the increasing income gap between the well-off and the poor in the U.S., and cutbacks in income support programs for low-income households. According to the 2010 Census, 4.7 percent of Iowa City's population is living below the poverty level.

The city's population is growing older. According to the current census estimate, 8.6 percent of the total population are 65 years of age or older. The Census Bureau estimates that the number of older adults within the community will rise dramatically between now and the year 2030. For our purposes the population of older adults is considered at-risk due to the population's often non-ambulatory nature, chronic medical conditions, increased use of medications, and elevated likelihood of living in poverty-like or fixed income situations.

Dense populations of older adults can impact risk and the subsequent demand for EMS services within the community. Subsequent high demand for EMS services has an obvious high consequence to the community, due to the elevated levels of resources that must be allocated to meet this demand. Unmistakably, these resources, once deployed, are unavailable to meet any other service needs of the community as seen in the number of overlapping incidents that can adversely affect response time. When a response unit is unavailable, the response time to an emergency in their first due area will be longer because a more distant unit will have to respond.



	2013	2014	2015	2016	2017
Incidents	5531	5799	6016	6974	6799
Overlapping	1226	1314	1613	2116	2874
Percent	22.2%	22.7%	26.8%	30.30%	42.23%

Figure 16 Overlapping Incidents (2013-2017)

As mentioned earlier, Iowa City is home to several concentrated populations of older adults living in multi-family dwellings and "retirement communities." Further, the city has a number of other

facilities which fall under the "assisted living" designation as well as the "24–hour-care skilled nursing facility" designation.

EMS Risk Level Conclusions

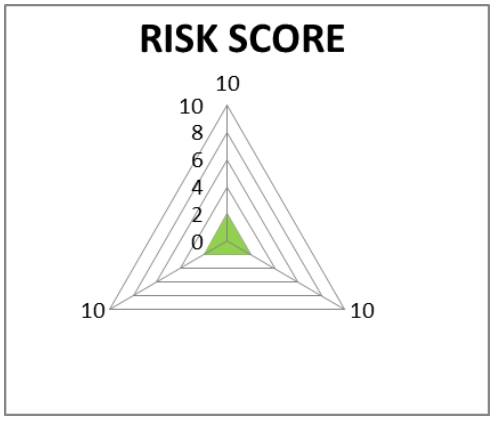
Medical Emergency (BLS)	
Heron's Formula	
RISK	SCORE
Probability of occurrence	10
Consequence to community	2
Impact on Fire Department	2
SCORE	20.19901

Medical Emergency (ALS)	
Heron's Formula	
RISK	SCORE
Probability of occurrence	10
Consequence to community	4
Impact on Fire Department	2
SCORE	32.12476

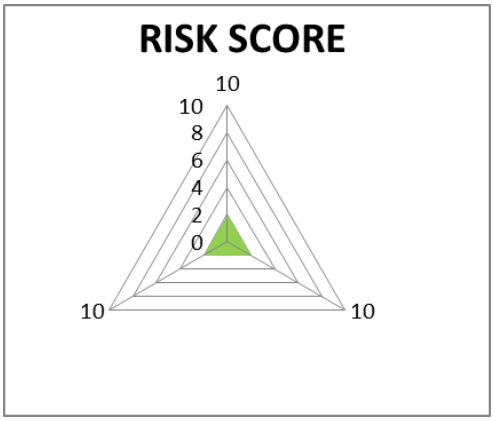
Traumatic Injury (BLS)	
Heron's Formula	
RISK	SCORE
Probability of occurrence	8
Consequence to community	2
Impact on Fire Department	2
SCORE	16.24808

Traumatic Injury (ALS)	
Heron's Formula	
RISK	SCORE
Probability of occurrence	8
Consequence to community	4
Impact on Fire Department	6
SCORE	44.18144

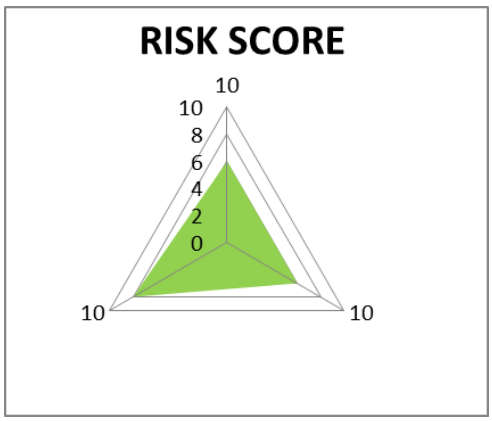
Lift Assist	
Heron's Formula	
RISK	SCORE
Probability of occurrence	2
Consequence to community	2
Impact on Fire Department	2
SCORE	4.898979



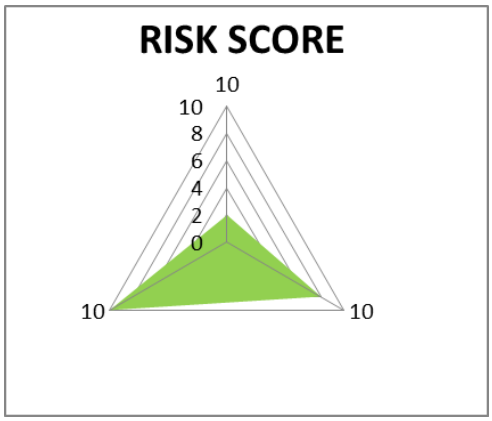
DOA	
Heron's Formula	
RISK	SCORE
Probability of occurrence	2
Consequence to community	2
Impact on Fire Department	2
SCORE	4.898979



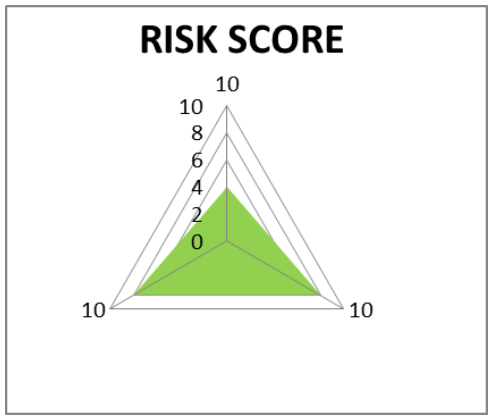
MCI <10 Patients	
Heron's Formula	
RISK	SCORE
Probability of occurrence	6
Consequence to community	6
Impact on Fire Department	8
SCORE	54.33231



MCI >10 Patients	
Heron's Formula	
RISK	SCORE
Probability of occurrence	2
Consequence to community	10
Impact on Fire Department	10
SCORE	73.48469



CO Exposure	
Heron's Formula	
RISK	SCORE
Probability of occurrence	4
Consequence to community	8
Impact on Fire Department	8
SCORE	55.42563



Scoring Results:
Low Risk = 0-25
Moderate Risk = 26-50
High Risk = 51-70
Special Risk = 71-100

EMS Risk Level Classifications

The following risk level conclusions are established:

Low Lift and invalid assists are considered low risk. Also identified as a low risk are incidents involving people who may have obvious morbidity. Incidents involving any Basic Life Support (BLS) treatment are considered low risk.

Moderate Emergent EMS incidents, either illness (medical) or injury (trauma) are considered moderate risk. These incidents include CPR in progress and all Advanced Life Support (ALS) single patient incidents.

High Multiple patient ALS incidents, MCI events involving 10 or fewer patients and multiple patient carbon monoxide incidents are considered high risk. (Vehicle entrapment is categorized within risk classifications for rescue.)

Special Multiple patient/MCI events involving more than 10 patients are considered special risk.

EMS Critical Task Analysis

According to the Commission on Fire Accreditation International, to create standard levels for response in the mitigation actions, an assessment must be conducted locally to determine the capabilities of the arriving companies and individual responders to achieve those critical tasks. Service delivery deployment related to NFPA 1710 was considered when determining critical tasking related to EMS. When identifying critical tasks, responder safety must be a priority.

An ERF is the number of staff/tasks necessary to complete all the identified tasks within a prescribed timeframe. The following tables show critical tasks and associated risk with the ERF for the incident.

All incidents which fall within the EMS risk category low or moderate will be dispatched as a single company response. If pre-arrival or on-scene information warrants, the first arriving officer may special call additional resources. Risk category High will receive a minimum of 10 personnel; Risk category Special will receive a minimum of 16 personnel with additional resources made available through the Johnson County Mutual Aid Box Alarm System.

Table 24 EMS Critical Tasks

EMS Risk: Low	
Critical Task	Number of Staff
Command/Safety/Documentation	1
Patient Care	2
TOTAL	3

EMS Risk: Moderate	
Critical Task	Number of Staff
Command/Safety/Documentation	1
Patient Care	2
TOTAL	3

EMS Risk: High	
Critical Task	Number of Staff
Command	1
Safety	1
Patient Care	6
Hazard Control	1
Triage	1
TOTAL	10

EMS Risk: Special	
Critical Task	Number of Staff
Command	1
Safety	1
Patient Care	12
Hazard Control	1
Triage	1
TOTAL	16*

***In the event of an extraordinary special risk EMS incident the Johnson County Mutual Aid Box Alarm System (MABAS) will be utilized to assemble additional personnel and apparatus as stated in the fire critical task analysis. Mutual aid companies are certified first responders and are qualified to assist and support the ICFD in accomplishing its mission.**

Hazardous Materials Services

Hazardous materials and hazardous wastes are a concern for the city because a sudden accidental or intentional release of such materials can be dangerous to human health and safety, damage property, and affect the quality of the environment. The most likely occurrences of such releases are in the following areas: transportation routes, business and industry, university labroatories, agriculture, and illegal dumping.

All personnel are trained to the hazmat technicial level, as outlined in NFPA 472. Agency apparatus are equiped with operations level equipment. Any incident that is beyond that of defensive operations, requires the callout of the Johnson County Hazardous Materials Response Team (JCHMRT). This team is comprised of agency personnel assigned to Station #2 as well as individuals sponsored by area volunteer fire departments, various departments within Johnson County government, and area businesses with an interest in hazardous materials response. Total team membership is 30 personnel. The team response apparatus, HazMat 1, is owned by the county but is stationed at Iowa City Fire Station #2. HazMat 1 carries equipment required for a technician level response.

HazMat Risk Level Conclusions

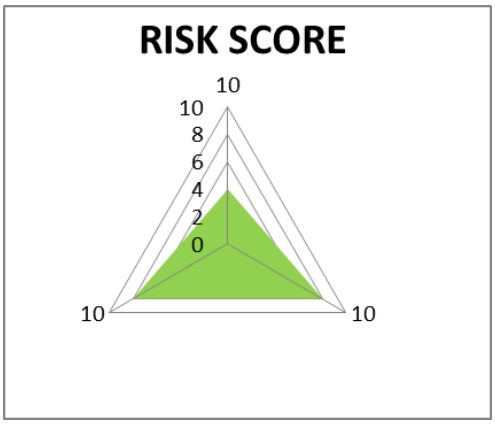
Fluid Cleanup	
Heron's Formula	
RISK	SCORE
Probability of occurrence	8
Consequence to community	2
Impact on Fire Department	2
SCORE	16.24808

CO Incident - No Injuries	
Heron's Formula	
RISK	SCORE
Probability of occurrence	6
Consequence to community	2
Impact on Fire Department	2
SCORE	12.32883

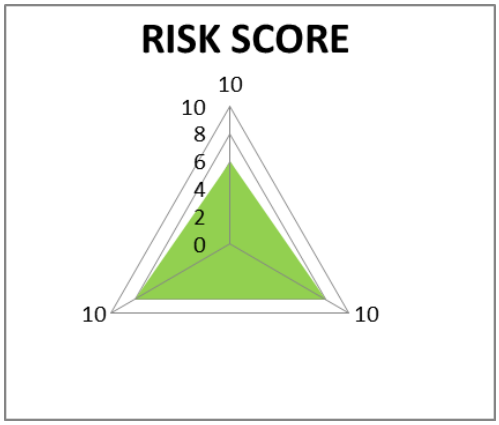
Natural Gas Leak - Exterior	
Heron's Formula	
RISK	SCORE
Probability of occurrence	6
Consequence to community	2
Impact on Fire Department	4
SCORE	19.79899

Natural Gas Leak - Interior	
Heron's Formula	
RISK	SCORE
Probability of occurrence	6
Consequence to community	4
Impact on Fire Department	8
SCORE	44.18144

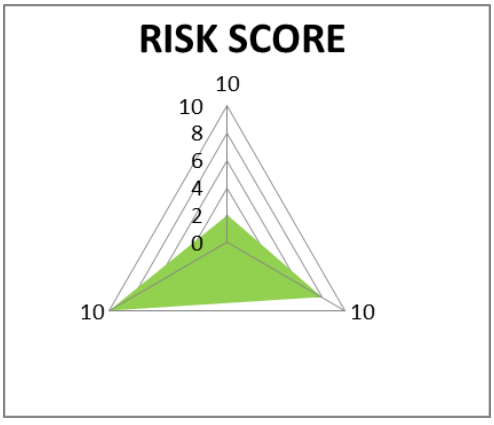
Lab Release	
Heron's Formula	
RISK	SCORE
Probability of occurrence	4
Consequence to community	8
Impact on Fire Department	8
SCORE	55.4256



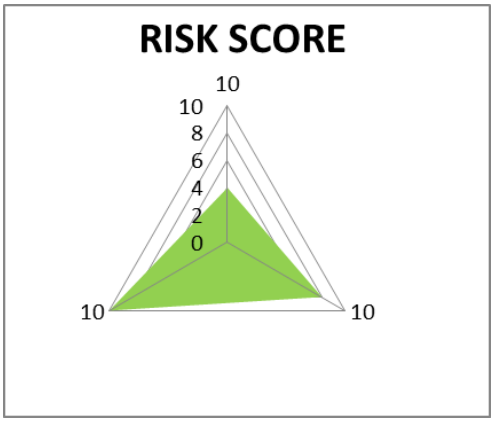
Transportation Release	
Heron's Formula	
RISK	SCORE
Probability of occurrence	6
Consequence to community	8
Impact on Fire Department	8
SCORE	65.96969



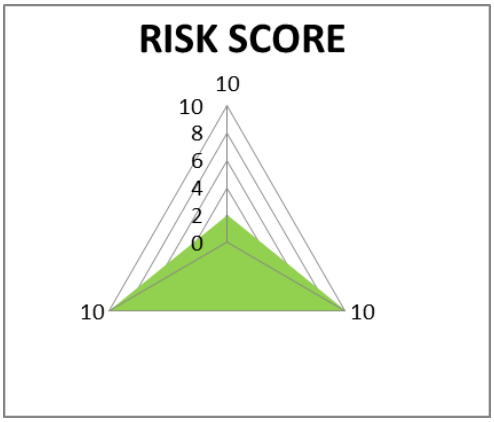
Rail Accident	
Heron's Formula	
RISK	SCORE
Probability of occurrence	2
Consequence to community	8
Impact on Fire Department	10
SCORE	59.39697



Facility Leak	
Heron's Formula	
RISK	SCORE
Probability of occurrence	4
Consequence to community	8
Impact on Fire Department	10
SCORE	67.17142



WMD Event	
Heron's Formula	
RISK	SCORE
Probability of occurrence	2
Consequence to community	10
Impact on Fire Department	10
SCORE	73.48469



Scoring Results:
Low Risk = 0-25
Moderate Risk = 26-50
High Risk = 51-70
Special Risk = 71-100

HazMat Risk Level Classifications

The following risk level conclusions are established:

Low Incidents include investigations with carbon monoxide, natural gas or other commonly encountered hazardous materials such as gasoline and anti-freeze. An ERF of 3 personnel is necessary to complete the critical task assignments of low risk HazMat incidents.

Moderate Incidents include HazMat spills and gas leaks to include methane and propane. Incidents will include investigations inside a structure for hazardous materials. An ERF of 13 personnel is necessary to complete the critical task assignments of moderate risk HazMat incidents.

High Incidents include cases where a full team roll-out of the Johnson County Hazardous Materials Response Team is required. Incidents include a large quantity transportation accident release, an unknown chemical release from a lab, or a chemical release at a manufacturing facility. An ERF of 16 personnel is necessary to initiate the critical task assignments of high risk HazMat incidents. Specific and detailed task assignments would be determined by the incident commander or team leader.

Special Incidents include events requiring full team activation plus additional HazMat specialists to initiate the critical task assignments associated with a special risk HazMat incident. Special risk incidents include any large-scale HazMat event, natural or manmade such as a significant train derailment, a dirty bomb or a WMD event. An ERF of 22 personnel is necessary to initiate the critical task assignments. A team roll-out of the Johnson County Hazardous Materials Team will be required and requested via the Joint Emergency Communications Center (JECC). Additional state resources such as the Iowa WMD team and 71st Civil Support Team may be special called through Johnson County Emergency Management. NOTE: ICFD HazMat technicians train and work frequently with military civil support personnel.

HazMat Critical Task Analysis

According to the CFAI, to create standard levels for response mitigation, an assessment must be conducted locally to determine the capabilities of arriving companies and individual responders to achieve critical tasks. When identifying critical tasks, responder safety must be a priority.

An ERF is the number of staff/tasks necessary to complete all identified tasks within a prescribed timeframe. The following tables show critical tasks and associated risk with the ERF for the incident.

Table 25 HazMat Critical Tasks

HazMat Risk: Low	
Critical Task	Number of Staff
Command/Safety/Documentation	1
Investigation/Monitoring	2
TOTAL	3

HazMat Risk: Moderate	
Critical Task	Number of Staff
Command	1
Safety	1
Documentation	1
Entry Team	2
Backup	2
Hazard Control	2
Pump Operator	1
Support/Decon	3
TOTAL	13

HazMat Risk: High	
Critical Task	Number of Staff
Command	1
Safety	1
Documentation/Research	2
HazMat Group Supervisor	1
Entry	2
Entry 2	2
Backup	2
Decon	2
HazMat Support	3
TOTAL	16
Admin Chief (ICS)	1

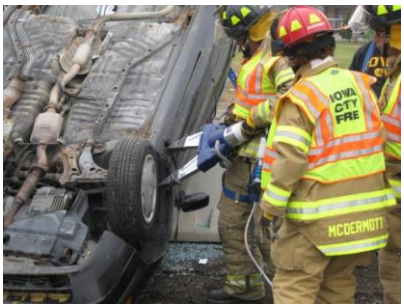
HazMat Risk: Special	
Critical Task	Number of Staff
Command	1
Safety	1
HazMat Group Supervisor	1
Documentation	1
Staging Manager	1
Entry	2
Entry 2	2
Backup	2
Decon	2
Research	2
General HazMat Support	3
Technical HazMat Support	4
TOTAL	22*
Admin Chiefs (ICS)	2

*** Six (6) additional on-duty ICFD technician level personnel may be assigned to the incident. In the event of a particularly difficult or complicated HazMat incident, the Johnson County Mutual Aid Box Alarm System (MABAS) will be utilized to attain the same quantity of personnel and apparatus as stated previously in the fire critical task analysis. Mutual aid companies are certified as operations level providers in hazardous materials response and are qualified to assist and support the ICFD in the performance of its duties.**

Rescue Services

Although the frequency of technical rescue incidents in Iowa City does not compare to that of fire and EMS, it was still necessary to identify rescue service risks, due to the high consequential nature they present. These risks were divided into the following technical rescue disciplines: vehicle extrication, confined space rescue, trench rescue, structural collapse rescue, rope rescue, and water/ice rescue.

Vehicle Extrication: Given the amount of highway and roadway lane miles traversing Iowa City, coupled with the prevalence of traffic collisions, there is a potential vehicle extrication risk to the community. Vehicle extrication is defined as the process of removing a vehicle from around a person that has been involved in a motor vehicle accident, when conventional means of exit are impossible or unadvisable. Vehicle extrication risks were identified based on the most recent published crash data from federal and state agencies, and by using trend analysis of the department's response to traffic collisions with vehicle extrications from 2008-2010 as a method for predicting future occurrences. Locally, 4 incidents involving the extrication of a victim from a vehicle were performed in 2017.



Confined Space: There are many workplaces in the city that contain spaces considered as "confined," simply because their dimensions and configurations hinder the activities of employees who must enter, work in, and exit them. Examples

of confined spaces include, but are not limited to, the following: underground vaults, tanks, hoppers, storage bins, manholes, pits, silos, sewage digesters, process vessels, tunnels, and pipelines. Generally, workers enter into these spaces for the purpose of inspection, testing of equipment, maintenance, and cleaning.

Although an exact number of confined spaces and permit-required confined spaces are not kept on record with the state of Iowa or the City of Iowa City, confined space risks were identified based on national and state-level occupational fatality statistics and site hazard planning conducted during pre-planning, business inspections, and training.

The Occupational Safety and Health Administration (OSHA) defines a confined space as any space that has limited or restricted means for entry or exit, and is not specifically designed for continuous employee occupancy. Spaces that meet OSHA's definition of a "confined space" and contain health and safety hazards are called "permit-required" confined spaces. These spaces have one or more of the following characteristics: contains (or has the potential to contain) a hazardous atmosphere; contains a material that has the potential to engulf an entrant; has walls that converge inward or floors that slope downward and taper into a smaller area which could trap or asphyxiate an entrant; or contains any other recognized safety or health hazard, such as unguarded machinery, exposed live wires, or heat stress.

According to the Bureau of Labor and Statistics, a majority of confined space rescues occur as a result of exposure to toxic environments and asphyxiation. Annually, the Bureau of Labor and Statistics reports approximately 350 fatalities (390 in 2017) from exposure to harmful substances and environments. Although the frequency of responding to confined space rescues is inherently low, as evident from the data listed above, it must be considered because the hazards certainly exist within the community. Therefore, it is reasonable to presume that because the hazards exists in many different forms throughout the community, the risk potential is real and therefore the probability to respond to future occurrences cannot be overlooked. No instances of confined space rescue occurred in 2017.

Trench Rescue: Trench rescue is defined as the process of rescuing a victim that has become entrapped in a trench as the result of a cave-in or collapse at a construction site. OSHA defines a trench as a narrow underground excavation that is deeper than it is wide, but less than 15 feet wide. Trench excavation sites pose a significant level of risk to the community because of their prevalence throughout the city. Routinely, private contractors and public works employees are working in and around trenches while performing maintenance and repair to utilities and/or installing new utilities.

Trenching and excavation work presents serious risks to all workers involved, but the greatest risk is that of a trench cave-in. According to the National Institute of Occupational Safety and Health (NIOSH), when cave-in accidents occur, they are much more likely to result in worker fatalities than other excavation-related accidents.

Similar to confined spaces, occupational accidents producing injuries and fatalities happen regularly at construction sites, including trench cave-ins and falls. According to OSHA, construction site accidents are very prevalent across the nation and report high consequences to human life, listing 991 fatalities in 2016. The number of fatal work injuries in construction in 2016 was the highest reported total since 2008. According to a 2015 Bureau of Labor and Statistics report, the fatality rate for excavation work is 112% higher than the rate for general construction. Although the frequency of responding to trench rescue incidents is inherently low - as it is with other technical rescues - it must be considered because the hazard exists, as well as the potential for fatal consequences. Based on the aforementioned statistical data, it is reasonable to presume there is trench rescue risk associated with excavation work being performed locally in the construction industry, and therefore the potential exists to respond to trench rescue incidents in the future. No cases of trench/below grade rescue were performed locally in 2017.

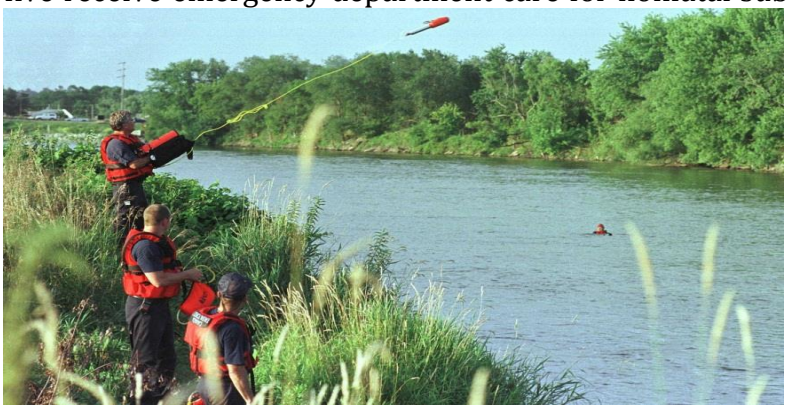
Structural Collapse: Structural collapse rescue is defined as the process of locating and removing trapped and often injured victims from partially or totally collapsed structures. The collapse of a structure is usually the result of a natural or man-made disaster. Natural disasters resulting in structural collapse are most often caused by natural events such as earthquakes, tornadoes, and hurricanes. Man-made disasters resulting in structural collapse are usually the result of human intent, error, negligence, or an engineering failure of a man-made system. Although modern building codes have greatly reduced the risk of being hurt or killed in a man-made structural collapse disaster, they cannot totally eliminate the risk altogether because of the unpredictable nature of disasters. However, while the probability of a building collapse as the result of a disaster is low, the consequences can be tragic and necessitate the identification of the risk in the City.

Due to the fact that natural disaster data is more prevalent than man-made disaster data, structural collapse risks were identified based on statistical weather data. Iowa ranks eighth in the United States for tornado frequency, averaging 49.2 tornadoes per year, 1991-2017. Based on those statistics, it is reasonable to presume that there is a potential for a natural disaster to occur in the future within the City of Iowa City; therefore, the same potential exists for structural collapse.

Iowa Avenue following EF2 tornado (April 15, 2006)

Rope Rescue: Rope rescue is defined as any rescue attempt that requires the use of rope and related equipment to safely gain access to, and remove patients from, hazardous geographic areas with limited access such as steep embankments, high rise buildings, or any type of above or below grade structure (i.e. embankments, cell towers, bridges, spillways, silos, water towers, high rise structures). Given the fact that most of these hazardous areas have already been identified earlier in the document, the potential for rope rescue risk must be considered. However, despite the amount of hazards within the city, rope rescue emergencies happen very infrequently. In fact, the ICFD has only responded to one incident in the last four years. Also, statistical data for rope rescue incidents is not compiled by any local, state, or federal agency, thus making it nearly impossible to quantify rope rescue risk. Therefore, although rope rescue incident data is lacking to show possible trends, the ICFD has identified rope rescue risks based on site hazard planning conducted during pre-planning, business inspections, and training as a method for predicting future occurrences.

Water/Ice Rescue: Water related activities, bodies of water (lakes, ponds, creeks, etc.) and containers of water (pools, etc.) pose risk to the community. According to the Center for Disease Control (CDC), about ten people die every day from unintentional drowning. Of these, about one in five people who die from drowning are children 14 and younger. For every child who dies from drowning, another five receive emergency department care for nonfatal submersion injuries. Drowning is responsible for more deaths among chldren 1-4, than any other cause except congenital anomalies (birth defects). Among those 1-14, fatal drowning remains the second leading cause of unintentional injury-related death behind motor vehicle crashes.



Iowa City owns three commercial swimming pools. The CDC data also shows that males, children, and minorities are most at risk. According to the CDC, nearly 80 percent of people who die from drowning are male.

The ICFD did not respond to any water or ice rescues in 2017. Although the historical occurrence may be considered low locally, the potential life-threatening consequence, especially to males, children and minorities, is unacceptable in any community.

Rescue Risk Level Conclusions

A careful assessment and analysis of rescue risk within the community has revealed numerous valuable rescue risk level conclusions. Clearly, the community faces a very real rescue potential and risk scenario, as demonstrated by the previous discussion of rescue risk as it relates to probability and consequence.

Rescue risk potentials were classified by type, to include the technical rescue disciplines of vehicle extrication, confined space rescue, trench rescue, structural collapse rescue, rope rescue, and water/ice rescue. Historical rescue response frequency data speaks to the potential (probability) of future rescue occurrences within the community. Each rescue type's potential is substantiated by the widespread presence of structures and areas within the community that carry with them specific hazards. Certainly, the city's large number of roadway lane miles create a vehicle extrication potential. Similarly, for example, the prevalence of industrial occupancies and bodies of water in the community illustrate confined space rescue and water/ice rescue potentials, respectively.

Traffic injury accidents with extrication, industrial accidents, vehicles colliding with buildings, and water/ice rescues are classified as a high rescue risk because of their inherent probability of occurrence, as well as for their significant potential loss scenarios. In addition, the level of difficulty of these rescues is of an elevated nature, making potential negative consequences more likely.

Many rescue occurrences are exceptional in nature, and due to their low frequency of occurrence and potentially high consequence to the community, are classified as a special rescue risk. Examples include: structural collapse, rope, trench, confined space, and high angle rescues. Understandably, also included in this risk category is a natural disaster mass casualty incident (MCI), such as a tornado strike, a man-made disaster, or a downed aircraft. Of course, the level of difficulty in mitigating such an event is extraordinary, making potential negative consequences much more likely.

High risk rescue and special risk rescue occurrences affect the community in terms of significant injury or loss of life, but also may have an important economic impact to the community. They will also certainly impact the department because of the large allocation of resources to such events. In fact, large MCI occurrences are almost certain to bring the ICFD to the point of resource exhaustion. Therefore, the conclusion can be drawn that increased rescue risk means an increased concentration of (need for) rescue resources. Dispatch protocols are constructed to provide a minimum of 10 personnel to a moderate risk incident, 16 to a high risk incident, and 16 plus SORT and MABAS resources to a special risk rescue incident.

Special rescue risk incidents have the potential to bring with them very complex problems which would likely require the technical skill set of the departments special operations response team (SORT). The SORT is activated anytime the department arrives at a confirmed trench or structural collapse rescue incident. The activation will trigger a response from off duty personnel as SORT membership is spread across all three shifts. Should the incident exceed the capability of the SORT, a request for the state's urban search and rescue team could be made. This team is located in both Cedar Rapids and Sioux City and would be requested through the county emergency management coordinator.

All risk level classifications found on the following page are designed to match the risk with the appropriate response force necessary to perform the mitigation actions called for by the specific incident type. In other words, an Effective Response Force (ERF) must be assembled (concentration of resources) within the proper timeframe to perform the needed actions (critical tasks) to control the incident and prevent its further escalation.

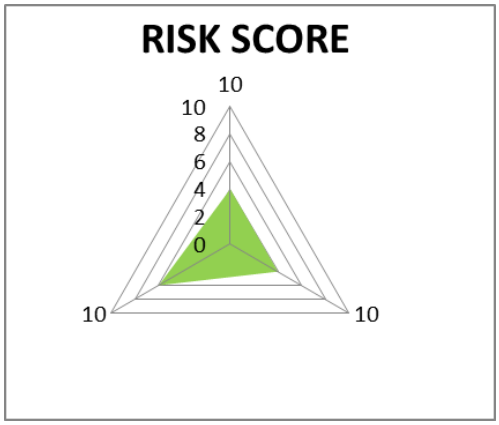
Confined Space Standby	
Heron's Formula	
RISK	SCORE
Probability of occurrence	8
Consequence to community	2
Impact on Fire Department	2
SCORE	16.25

Motor Vehicle Accident	
Heron's Formula	
RISK	SCORE
Probability of occurrence	8
Consequence to community	4
Impact on Fire Department	2
SCORE	25.92

Elevator Rescue	
Heron's Formula	
RISK	SCORE
Probability of occurrence	8
Consequence to community	2
Impact on Fire Department	2
SCORE	16.25

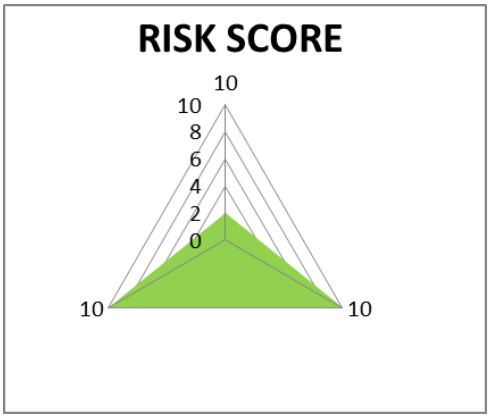
Confined Space Rescue	
Heron's Formula	
RISK	SCORE
Probability of occurrence	2
Consequence to community	8
Impact on Fire Department	10
SCORE	59.4

Low Angle Rescue	
Heron's Formula	
RISK	SCORE
Probability of occurrence	4
Consequence to community	4
Impact on Fire Department	6
SCORE	26.53

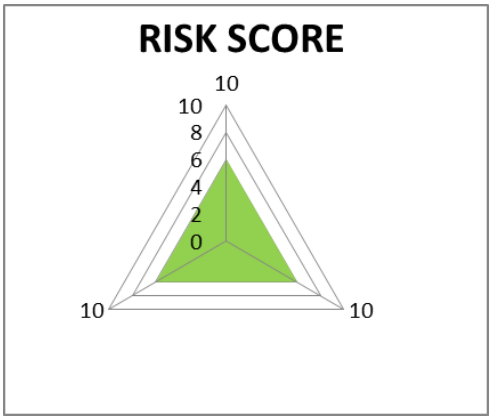


High Angle Rescue	
Heron's Formula	
RISK	SCORE
Probability of occurrence	4
Consequence to community	6
Impact on Fire Department	10
SCORE	53.74

Trench Rescue	
Heron's Formula	
RISK	SCORE
Probability of occurrence	2
Consequence to community	10
Impact on Fire Department	10
SCORE	73.48

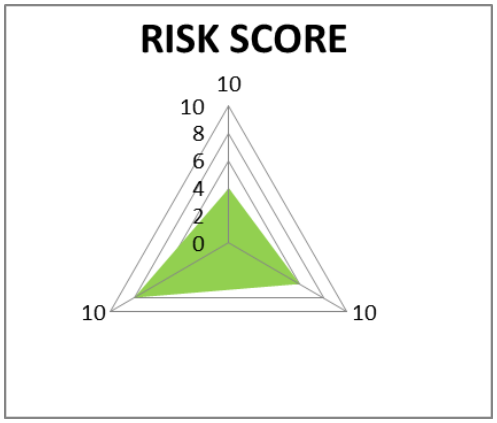


Vehicle Extrication Rescue	
Heron's Formula	
RISK	SCORE
Probability of occurrence	6
Consequence to community	6
Impact on Fire Department	6
SCORE	44.09

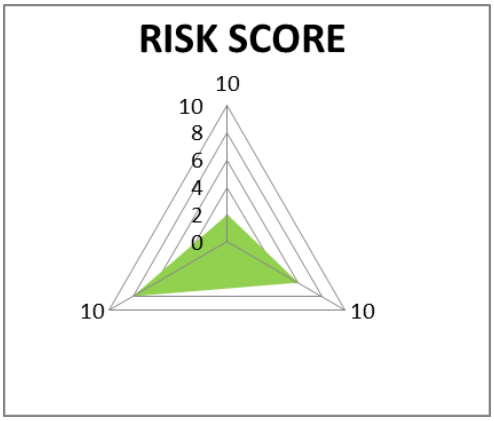


Emergency Building Collapse	
Heron's Formula	
RISK	SCORE
Probability of occurrence	2
Consequence to community	10
Impact on Fire Department	10
SCORE	73.48

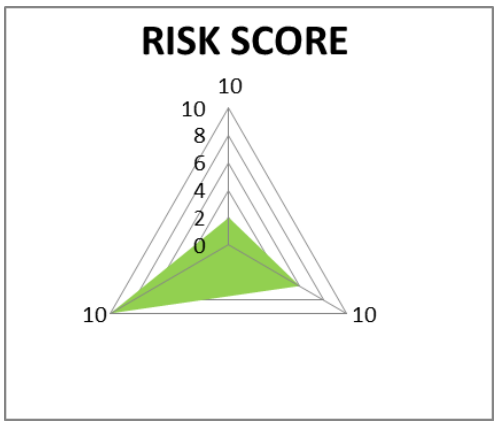
Water Rescue	
Heron's Formula	
RISK	SCORE
Probability of occurrence	4
Consequence to community	6
Impact on Fire Department	8
SCORE	44.18



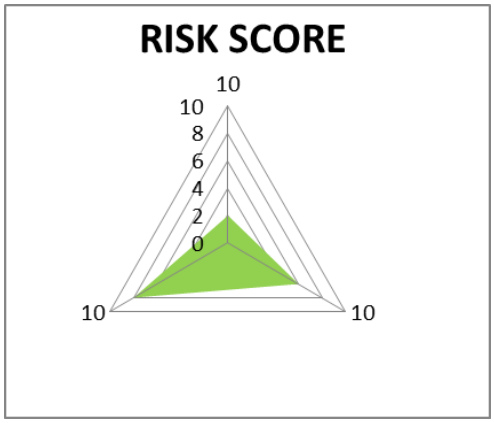
Ice Rescue	
Heron's Formula	
RISK	SCORE
Probability of occurrence	2
Consequence to community	6
Impact on Fire Department	8
SCORE	36.77



Tower Rescue	
Heron's Formula	
RISK	SCORE
Probability of occurrence	2
Consequence to community	6
Impact on Fire Department	10
SCORE	45.52



Wide Area Search	
Heron's Formula	
RISK	SCORE
Probability of occurrence	2
Consequence to community	6
Impact on Fire Department	8
SCORE	36.77



Wilderness Search	
Heron's Formula	
RISK	SCORE
Probability of occurrence	2
Consequence to community	4
Impact on Fire Department	8
SCORE	25.92

Scoring Results:
Low Risk = 0-25
Moderate Risk = 26-50
High Risk = 51-70
Special Risk = 71-100

Rescue Risk Level Classifications

The following risk level conclusions are established:

Low Removal from stuck elevators and confined space standby notifications are considered low risk.

Moderate Rescues involving a motor vehicle accident with a trapped occupant as well as low angle situations are considered moderate risk. Included too are any rescues located on or near the city trail system, low angle rescues, and ice rescue, or water rescue.

High Rescue involving confined spaces or high angle situations are considered high risk.

Special Rescue involving structural collapse or trench collapse is considered special risk. Natural and man-made disasters are considered Special Risk. Special risk incidents will cause the Special Operations Rescue Team (SORT) to be activated.

Rescue Critical Task Analysis

According to the CFAI, to create standard levels for response mitigation, an assessment must be conducted locally to determine the capabilities of arriving companies and individual responders to achieve critical tasks. NFPA 1670 was considered when assessing the operational criteria related to rescue task analysis. When identifying critical tasks, responder safety must be a priority.

An ERF is the number of staff/tasks necessary to complete all the identified tasks within a prescribed timeframe. The following tables show critical tasks and associated risk with the ERF for the incident.

Table 26 Rescue Critical Tasks

Rescue Risk: Low	
Critical Task	Number of Staff
Command/Safety	1
Rescue Operations	2
TOTAL	3

Rescue Risk: Moderate	
Critical Task	Number of Staff
Command	1
Safety	1
Rescue Operations	3
Support Operations	3
Stabilization	1
Patient Care	1
TOTAL	10

Rescue Risk: High	
Critical Task	Number of Staff
Command	1
Safety	1
Attack Line	1
Pump Operations/Water Supply	1
Rescue Group Supervisor	1
Rescue Operations	2
Support Operations	6
Patient Management	1
Hazard Control	2
TOTAL	16
Admin Chief (ICS)	1

Rescue Risk: Special	
Critical Task	Number of Staff
Command	1
Safety	1
Attack Line	1
Pump Operations/Water Supply	1
Rescue Group Supervisor	1
Rescue Operations	2
Support Operations	6
Patient Management	1
Hazard Control	2
TOTAL	16* + SORT + MABAS + USAR
Admin Chiefs (ICS)	2

*** The total ERF will be higher depending on the number of off-duty SORT members that respond to the callback. Additional support personnel will be requested via the Johnson County Mutual Aid Box Alarm System (MABAS). Mutual Aid personnel have been trained by the ICFD to support and provide assistance to the SORT.**

H. Historical Perspective and Summary of System Performance

Distribution Factors

The following distribution study results demonstrate the department's initial incident intervention capabilities to provide quick deployment to minimize and terminate average, or routine emergencies.

Area per first-due company

APPROXIMATE AREA IN EACH FIRE DISTRICT	
District	Square Miles
1	4.6
2	8.7
3	7.2
4	5.6

The table expresses the size or area of each fire district in square miles. Fire district #2 is the largest of the four districts and district #1 is the smallest.

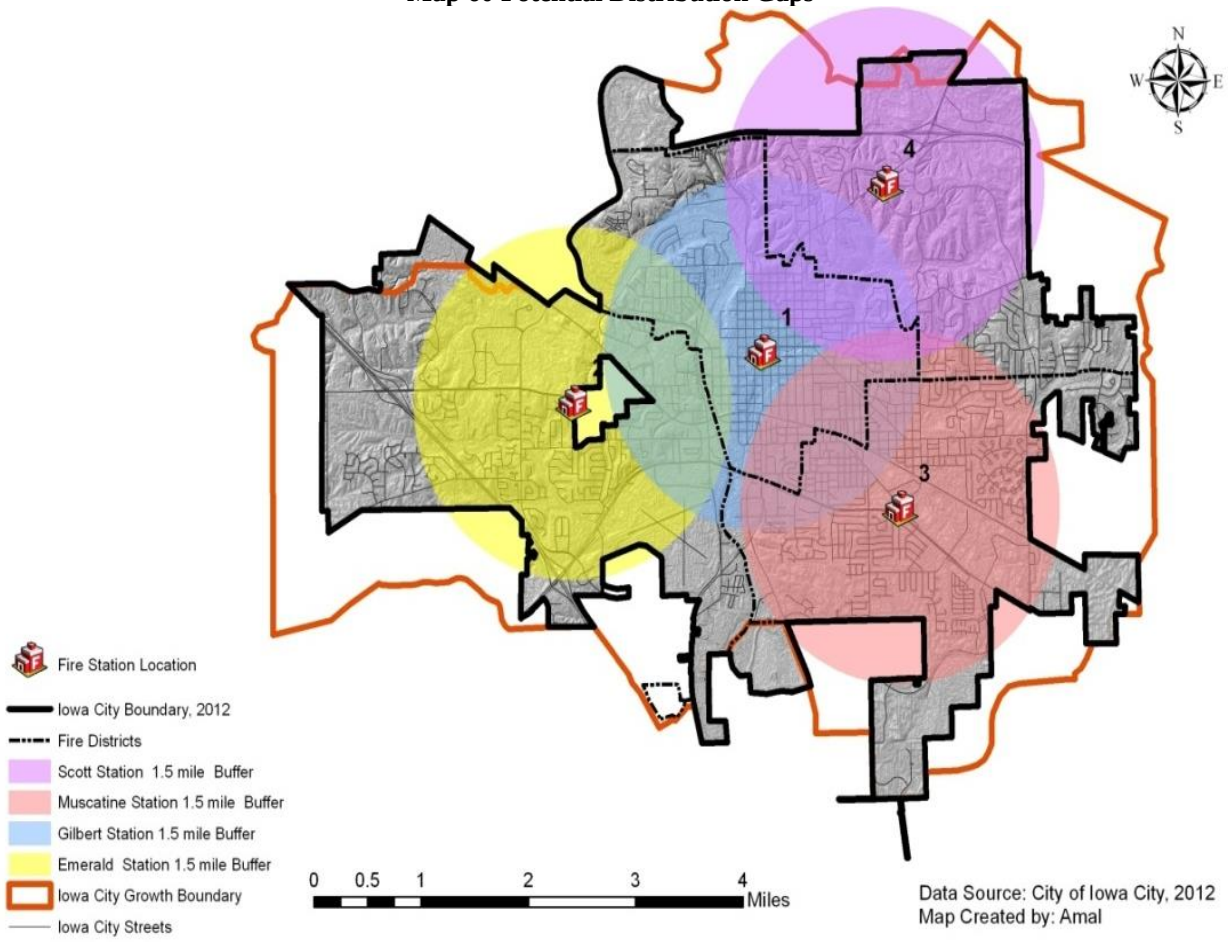
Number of road miles per first-due company

APPROXIMATE ROAD MILES IN EACH FIRE DISTRICT				
District		Miles		% of Total
1		75.94		25%
2		87.35		29%
3		90.84		30%
4		50.66		17%

This table provides an approximate number of road miles currently built within each fire district along with a percentage of the total road miles. Fire district #4 has the least number of road miles to date. Fire districts #2 and #3 contain a strikingly similar number of road miles.

Catchment Areas

Map 60 Potential Distribution Gaps



In addition to the city's growth boundary, which is the geographical area currently serviceable by the sanitary sewer system, the map above displays a 1 ½ mile radius around each of the four fire stations. The areas that are outside of a colored circle represent potential gaps in the distribution of first-due resources due to excessive travel time.

Population served by first-due company

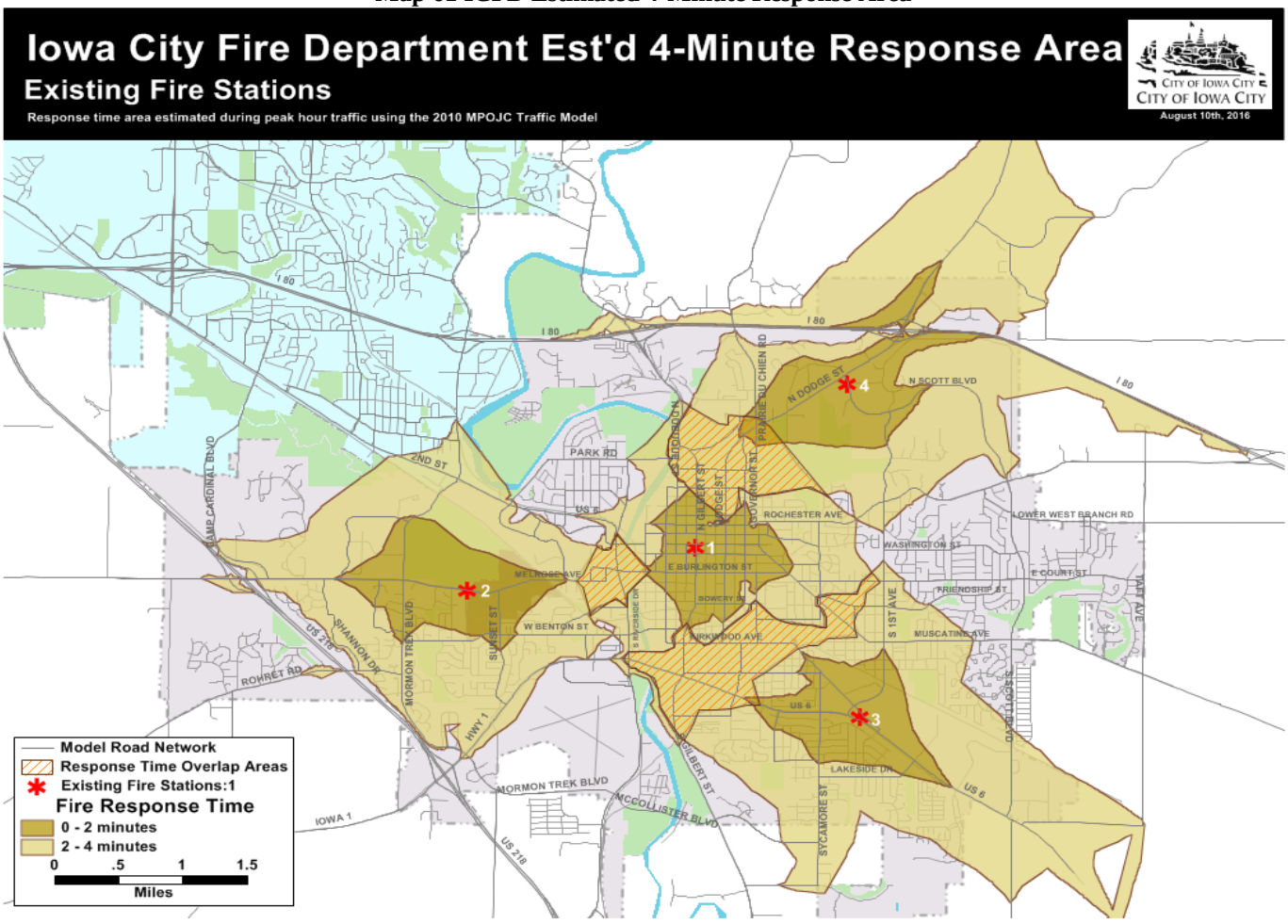
Table 27 Population Served by First Due Company

District	Approximate Population
1	28,780
2	17,185
3	17,489
4	9,749

The number of people living in a fire district will influence call volume.

Projected Coverage Area as Defined by Travel Time

Map 61 ICFD Estimated 4-Minute Response Area



Computer modeling of estimated travel times during peak hour traffic are shown above. The model uses the 2010 Metropolitan Planning Organization of Johnson County (MPOJC) Traffic Model. Experiential data has closely mirrored the computer modeling estimates depicted here.

Areas Outside of Draft Performance Objectives

The two charts that follow provide first-due benchmark response performance figures for each of the 16 Risk Management Zones (RMZ). The first chart displays fire and special operations type incidents and the second chart EMS incidents. Fire and special operations incidents are afforded 80 seconds to turnout whereas EMS incidents are held to 60 seconds turnout. The left side of the table combines incident data from 2013-2017, while the right side of the chart looks at calendar year 2017 data, the most recent year for which data was available. The columns marked "Service Reliability" display the percentage of incidents that met the service delivery objective as defined by *NFPA 1710: Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*.

Table 28 Fire and Special Operations NFIRS Incident Types: All 100s, 322, 323, 324, 372, 411-431

RMZ	Service Delivery Objective, 2013-2017		Total Emergency Responses	Fire & Special Ops Service Reliability	RMZ	Service Delivery Objective, 2017		Total Emergency Responses	Fire & Special Ops Service Reliability
	Met	Not Met				Met	Not Met		
1	123	78	201	61.0%	1	33	23	56	58.9%
4	94	39	133	70.6%	4	21	16	37	56.7%
5	67	35	102	65.6%	5	15	7	22	68.1%
5UH	3	0	3	100.0%	5UH	3	0	3	100.0%
6	59	17	76	77.6%	6	20	7	27	74.0%
11	120	2	122	98.3%	11	22	0	22	100.0%
12	25	3	28	89.2%	12	3	0	3	66.6%
13	7	10	17	41.0%	13	3	2	5	60.0%
14	57	19	76	75.0%	14	9	5	14	64.2%
15	30	4	34	88.2%	15	6	1	7	85.7%
16	154	7	161	95.6%	16	29	4	33	87.8%
17	169	10	179	94.4%	17	38	2	40	95.0%
18	147	32	179	82.1%	18	30	8	38	78.9%
21	110	4	114	96.4%	21	22	3	25	88.0%
23	66	27	93	70.9%	23	16	5	21	76.1%
104	18	29	47	38.2%	104	4	9	13	30.7%
105	9	26	35	25.7%	105	0	3	3	0.0%
Total	1258	342	1600	78.6%	Total	274	95	369	74.2%

NFPA 1710, Organization and Deployment of Fire Suppression Operations, Emergency Medical Operat and Special Operations to the Public by Career Fire Departments Chapter 4, Organization	Event	Alarm Processing	Turnout	Travel	Service Delivery Objective
	Fire / Special Ops	:90	:80	4:00	6:50
					90% of the time
	EMS	:90	:60	4:00	6:30

Table 29 EMS NFIRS Incident Types: 311, 320, 321

RMZ	Service Delivery Objective, 2013-2017		Total Emergency Responses	EMS Service Reliability	RMZ	Service Delivery Objective, 2017		Total Emergency Responses	EMS Service Reliability
	Met	Not Met				Met	Not Met		
1	627	319	946	66.2%	1	162	60	222	72.9%
4	1012	473	1485	68.1%	4	236	92	328	71.9%
5	425	206	631	67.3%	5	76	27	103	73.7%
5UH	16	3	19	84.2%	5UH	16	3	19	84.2%
6	409	134	543	75.3%	6	107	32	139	76.9%
11	600	22	622	96.4%	11	103	3	106	97.1%
12	222	57	279	79.5%	12	28	9	37	75.6%
13	91	248	339	26.8%	13	19	52	71	26.7%
14	995	536	1531	64.9%	14	187	85	272	68.7%
15	296	66	362	81.7%	15	54	14	68	79.4%
16	1000	29	1029	97.1%	16	179	6	185	96.7%
17	1086	132	1218	89.1%	17	216	25	241	89.6%
18	1940	400	2340	82.9%	18	356	65	421	84.5%
21	2054	199	2104	97.6%	21	366	7	373	98.1%
23	459	274	733	62.6%	23	93	57	150	62.0%
104	78	137	215	36.2%	104	13	33	46	28.2%
105	231	617	848	27.2%	105	39	85	124	31.4%
Total	11541	3852	15244	75.7%	Total	2250	655	2905	77.4%

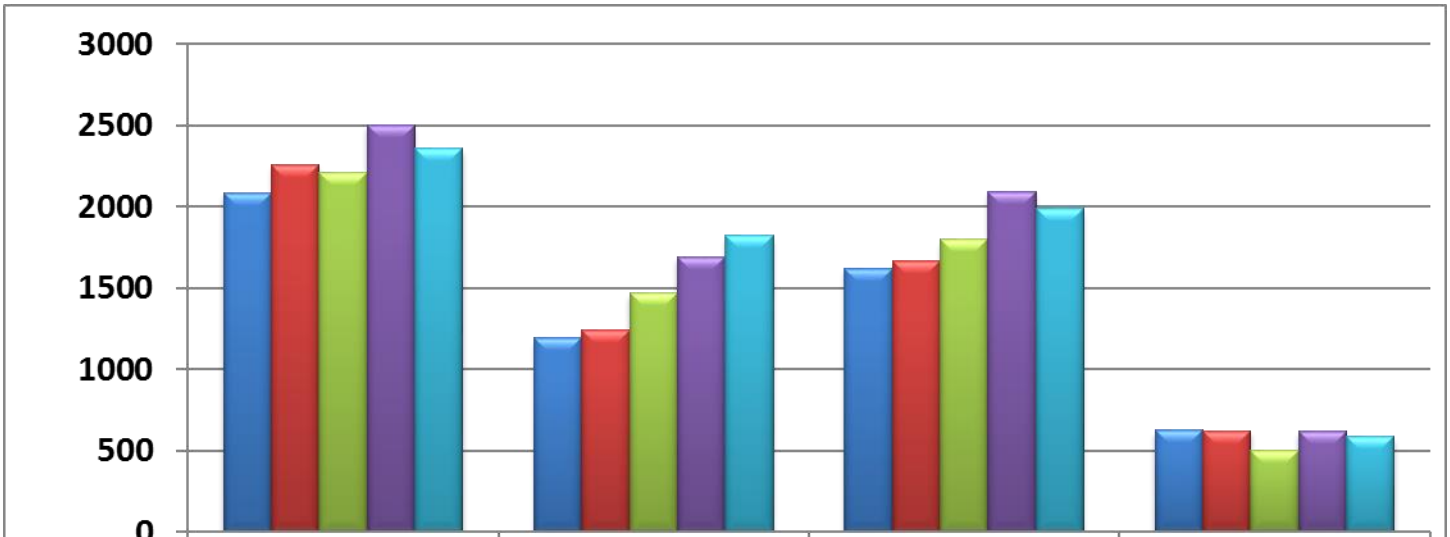
NFPA 1710, Organization and Deployment of Fire Suppression Operations, Emergency Medical Operat and Special Operations to the Public by Career Fire Departments Chapter 4, Organization	Event	Alarm Processing	Turnout	Travel	Service Delivery Objective
	Fire / Special Ops	:90	:80	4:00	6:50
					90% of the time
	EMS	:90	:60	4:00	6:30

A low percentage within the service reliability column indicates improvements are necessary to meet response time goals as defined by NFPA 1710. The goal is to achieve the first unit arrival response time objective 90% of the time. To be clear, the charts above do include the three elements of response time: alarm processing, turnout time, and travel time.

Concentration Factors

A study of concentration factors is conducted to include an analysis of the arrangement of fixed facilities so the "initial support force" and the "effective response force" can be assembled at the site of an incident within the adopted public policy timeframes. Is the spacing of multiple resources arranged close enough together so that an initial response force can be assembled on-scene within adopted public policy timeframes? The "effective response force" is that which will most likely stop the escalation of the emergency for each risk type. Concentration measures include all the following:

Number of Calls Per First-Due Company



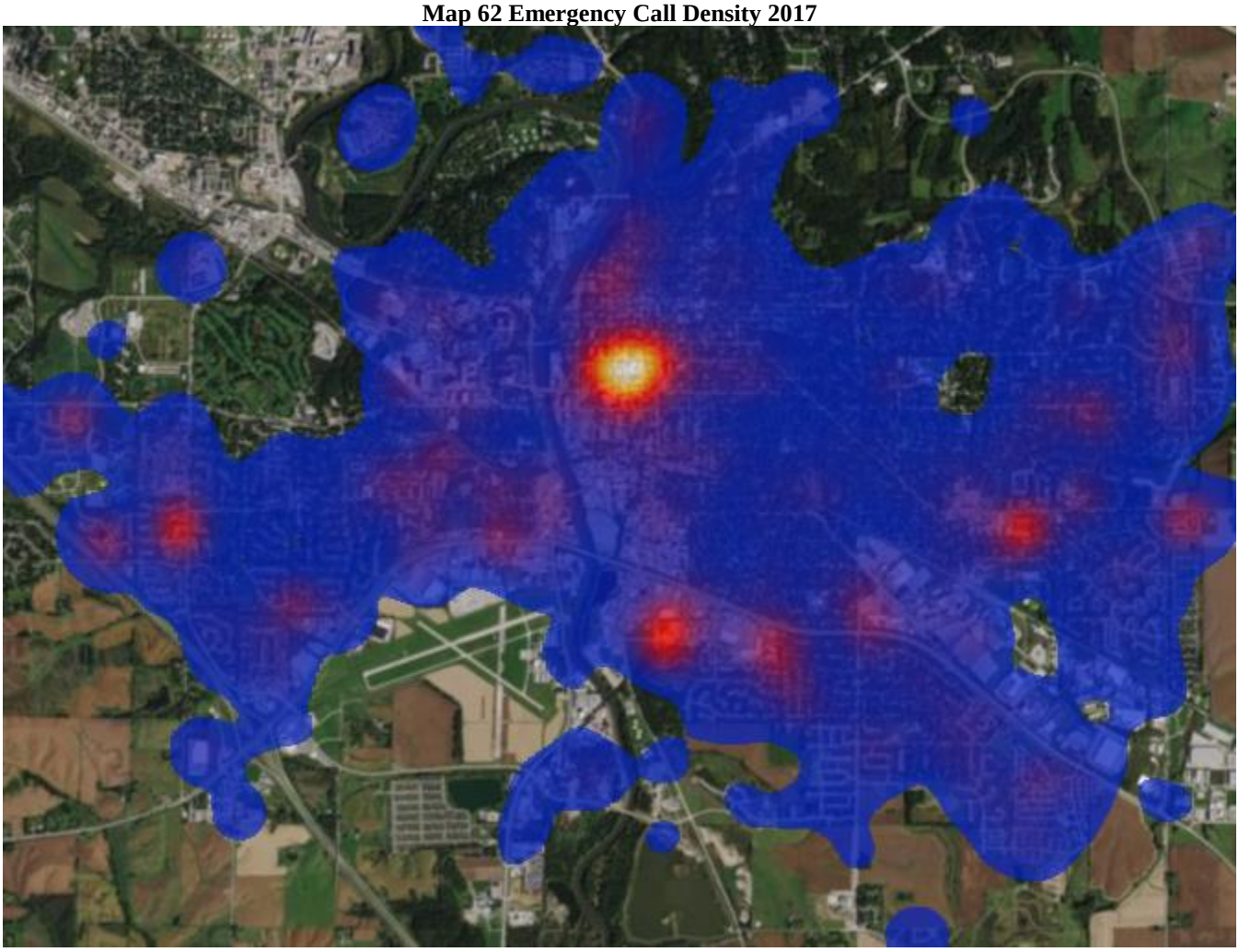
	Station 1	Station 2	Station 3	Station 4
2013	2089	1192	1622	627
2014	2262	1246	1667	624
2015	2214	1469	1799	500
2016	2506	1694	2097	618
2017	2360	1824	1988	589

Figure 17 Total Incident Calls by District (2013-2017)

Growth and development in fire district #4, which opened in October of 2011, is just beginning. Significant land is available for development when the owner(s) are ready to do so. Call volume in fire district #1 remains fairly constant while districts #2 and #3 (single engine companies) continue to see incremental growth.

Call Density by Response Grid

Map 62 Emergency Call Density 2017



The map above displays the density of emergency calls for service for 2017. In calendar year 2017, 35% of all calls for service were in District 1, 27% were in District 2, 29% in District 3, and 9% in District 4. It is interesting to see how closely the percentage of emergency calls for service mirrors the percent of total population within the fire district. The table below addresses 2017 calls for service and compares the percentage of incidents with the percentage of the population.

Table 30 Calls for Service (2017)

District	% of Incidents	% of Population
1	35	39
2	27	23
3	29	24
4	9	13

Areas Served by Specialty Units

Iowa City operates one ladder truck (Truck 1) and one heavy rescue (Rescue 1). Truck 1 and Rescue 1 both respond out of Station #1. Both provide service to all parts of the city. The following tables detail the number of responses by Truck 1 and Rescue 1 in calendar year 2017 to each of the sub-districts and to our mutual aid partners of Coralville, West Branch, and Solon.

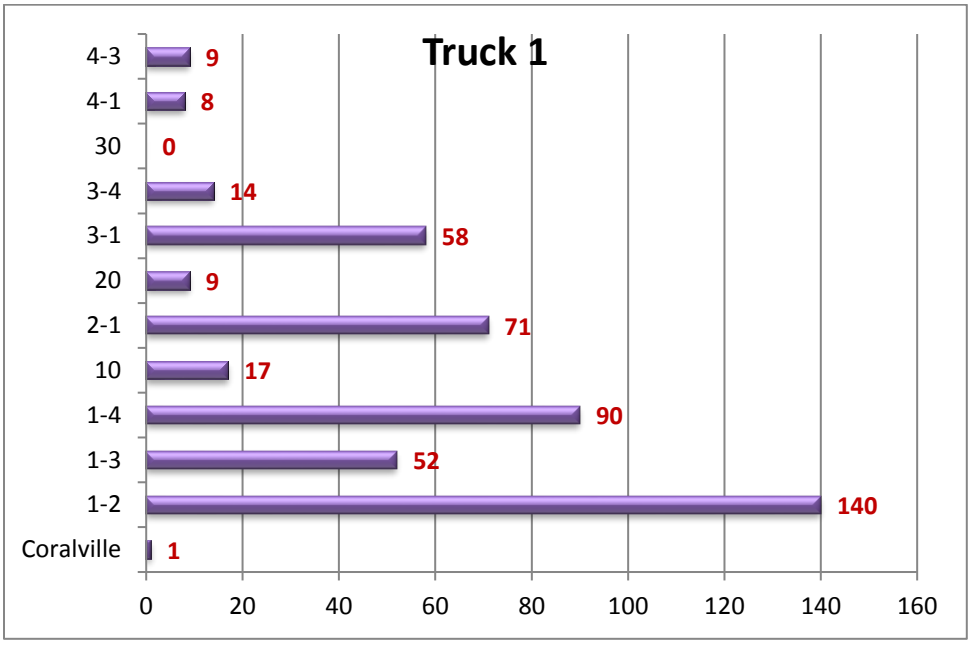


Figure 18 Truck 1 Responses by Sub-District (2017)

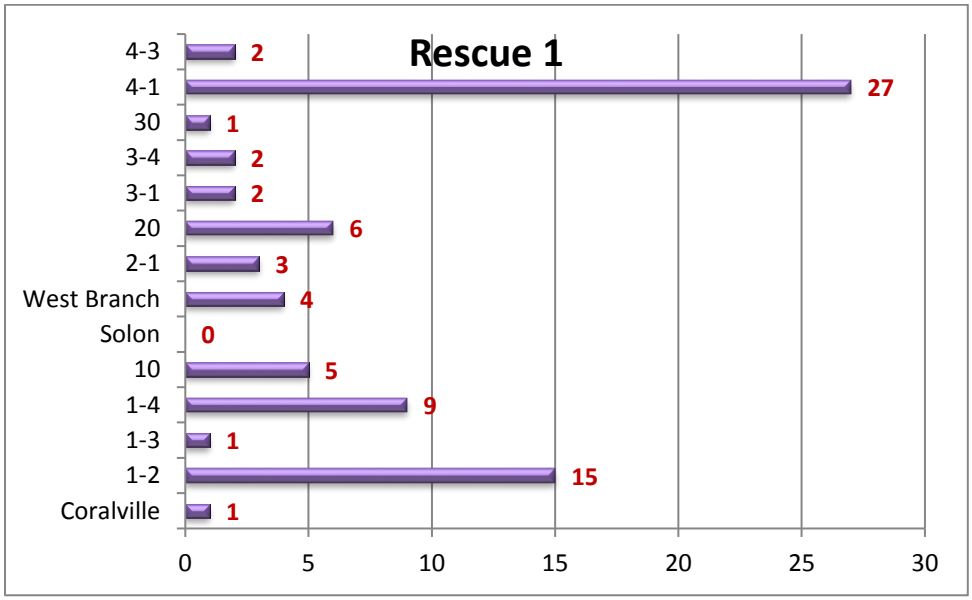


Figure 19 Rescue 1 Responses by Sub-District (2017)

ERF (Effective Response Force)

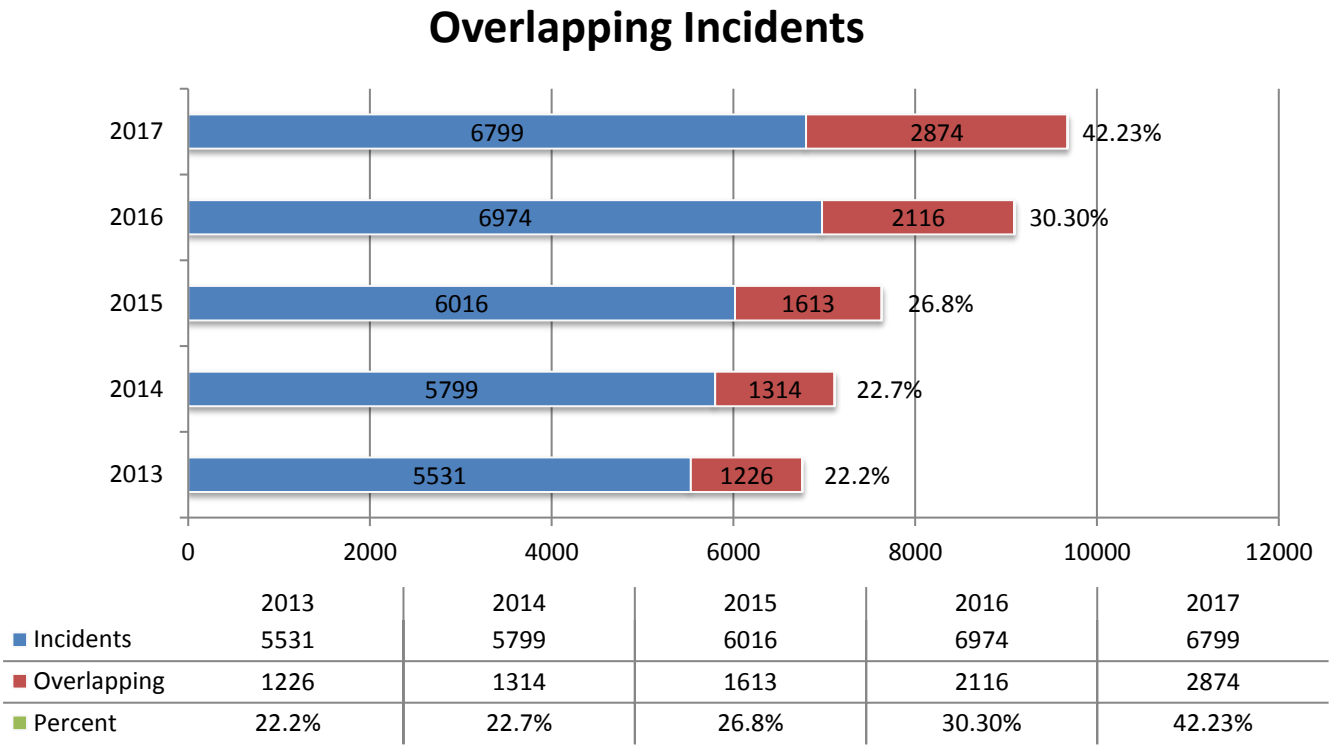
Total response times for 90% of all code 3 moderate risk fires and special operations events are shown below. The column on the right lists total response times for 90% of all code 3 low and moderate risk EMS events by year.

Table 31 Total Response Times for 90% of all Code 3 Moderate Risk Fires and Special Operations Events (2013-2017)

Moderate Risk	FIRE & SPECIAL OPS		EMS
Year	1st Unit	ERF	1st Unit
2013	7:33	14:01	8:46
2014	7:39	16:32	8:52
2015	8:30	12:34	8:46
2016	7:38	11:23	8:31
2017	6:30	13:41	8:42

The chart above is system-wide. Detailed analysis of response time performance within each response district and for all risk levels are shown below. The ICFD has imposed numerous programs and campaigns to reduce total response times. The quality of the community's distribution network will be viewed within a historical context using data from the previous five years. The distribution network includes department apparatus responding from their respective fire stations within the city.

Reliability Factors



	2013	2014	2015	2016	2017
Incidents	5531	5799	6016	6974	6799
Overlapping	1226	1314	1613	2116	2874
Percent	22.2%	22.7%	26.8%	30.30%	42.23%

Figure 20 Overlapping Incidents (2013-2017)

Distribution reliability is only as good as the availability of the response resources within it. If units are unavailable to respond to incidents because of a high emergency workload, then reliability may be in question. The table above conveys an increase in call volume over time as well as an increase in the number and percentage of incidents that overlap. Overlapping incidents are emergency events that commence before a previous emergency incident is concluded.

Table 32 First In other than First Due, by District (2013-2017)

District	First-In	2013	2014	2015	2016	2017	Total	
1	2	10	19	8	15	29		
1	3	7	9	2	18	24		
1	4	13	17	4	12	16		
	Total	**30**	**45**	**14**	**45**	**69**	**203**	
2	1	52	36	71	68	93		
2	3	4	5	2	3	9		
2	4	2	1	0	1	1		
	Total	**58**	**42**	**73**	**72**	**103**	**348**	
3	1	55	45	86	69	71		
3	2	3	0	6	10	4		
3	4	45	30	27	37	19		
	Total	**103**	**75**	**119**	**116**	**94**	**507**	
4	1	16	9	13	21	16		
4	2	0	1	0	1	3		
4	3	12	8	10	23	12		
	Total	**28**	**18**	**23**	**45**	**31**	**145**	
Total by Year		**219**	**180**	**229**	**278**	**318**		
Percent of All Calls		**4.0%**	**3.1%**	**3.8%**	**4.0%**	**4.7%**		
Responded code 2 or code 3 from the out-of-district station								
Incident type 381 (Rescue standby) excluded								

When all first arriving units are in their respective station locations, the department considers the distribution of resources to be statistically reliable. The ICFD has a total of five fire companies in four fixed facilities. If the first-due company is not available and a fire unit from another station responds, total response time generally suffers due to increased travel time. The department monitors daily activity and makes every effort to ensure that at least one company is available in each district. Table 32 displays those occasions by year and by fire district that required a response from a more distant fire station.

Table 33 First Due Response Reliability, by Station (2017)

Response Reliability – 2017				1st Due Unit
1st Unit	Station 1	Station 2	Station 3	Station 4
Station 1	2142 (96.8%)	93	71	16
Station 2	29	1766 (94.4%)	4	3
Station 3	24	9	1887 (95.2%)	12
Station 4	16	1	19	532 (94.4%)
Total	2211	1869	1981	563

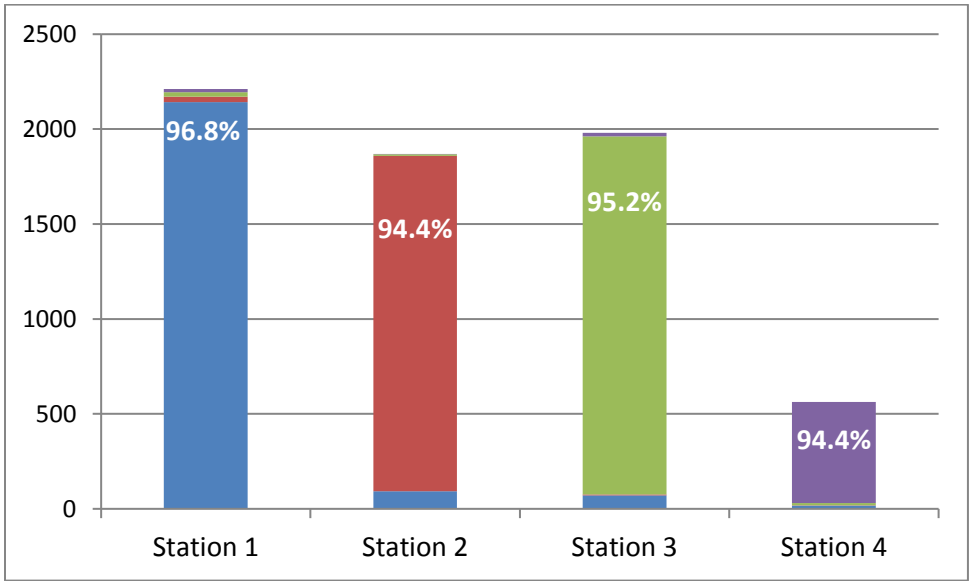


Figure 21 First Due Response Reliability, by Station, and Total Calls (2017)

Table 33 and Figure 26 convey the number of calls by station and the percentage of incidents that were handled by the company assigned to the station. Note that Station #1 is staffed with two companies (Engine 1 and Truck 1).

Baseline Performance Tables

Response time performance is the definitive measurement of service reliability. Even though resources may be located appropriately in a distribution network and available to respond to calls for service, the potential to be unreliable still exists if the resources are unable to arrive at emergency incidents within predetermined response time parameters (i.e. benchmark or baseline 90th percentile measures).

The term "benchmark" refers to a standard by which something can be measured. The term "baseline" refers to the assessment and measurement of current service delivery practices relative to benchmark. To correctly identify potential gaps in overall service reliability, the ICFD has chosen to evaluate its performance reliability in relation to benchmark or target measurements.

Table 34 Baseline: Low Risk Fire Suppression

Low Risk - Fire - 90th Percentile Times - Baseline Performance System Wide		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	2:04	2:43	1:43	1:46	2:20	2:04	1:04
Turnout Time	Turnout Time 1st Unit	1:45	1:58	1:34	1:42	1:38	1:42	1:20
Travel Time	Travel Time 1st Unit **Distribution**	5:16	5:29	5:02	4:57	5:32	5:23	4:00
	Travel Time ERF **Concentration**							
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	8:06	8:34	7:30	7:43	8:16	8:08	6:24
		568	103	118	109	117	121	
	Total Response Time ERF **Concentration**							

Table 35a Baseline: Moderate Risk Fire Suppression

Moderate Risk - Fire - 90th Percentile Times - Baseline Performance System Wide			2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	Urban	1:41	1:07	1:56	1:47	1:30	1:23	1:04
Turnout Time	Turnout Time 1st Unit	Urban	1:40	1:58	1:29	1:34	2:05	1:42	1:20
Travel Time	Travel Time 1st Unit **Distribution**	Urban	5:15	4:07	5:15	5:41	5:14	5:07	4:00
	Travel Time ERF **Concentration**	Urban	9:39	9:39	8:46	9:09	14:25	9:35	8:00
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	7:44	6:30	7:38	8:30	7:39	7:33	6:24
			105	24	20	26	15	20	
	Total Response Time ERF **Concentration**	Urban	13:41	12:37	11:23	12:34	16:32	14:01	10:24
			71	17	16	19	9	10	

Table 35 Baseline: High Risk Fire Suppression

High Risk - Fire - 90th Percentile Times - Baseline Performance System Wide			2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	Urban	1:40	1:47	1:53	1:24	1:30	1:38	1:04
Turnout Time	Turnout Time 1st Unit	Urban	1:40	1:38	1:43	1:30	1:44	1:29	1:20
Travel Time	Travel Time 1st Unit **Distribution**	Urban	4:15	3:19	3:50	5:06	3:32	5:17	4:00
	Travel Time ERF **Concentration**	Urban	12:14	8:38	13:40	10:52	28:50	13:42	8:00
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	6:34	5:33	6:38	7:14	6:01	7:18	6:24
			92	20	14	19	25	14	
	Total Response Time ERF **Concentration**	Urban	25:40	12:11	22:37	35:36	33:02	25:52	10:24
			32	9	6	7	6	4	

Table 36 Baseline: Special Risk Fire Suppression

Special Risk - Fire - 90th Percentile Times - Baseline Performance District 1		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	1:30	NA	0:47	0:46	1:17	1:12	1:04
Turnout Time	Turnout Time 1st Unit	2:00	NA	1:27	0:00	1:14	2:00	1:20
Travel Time	Travel Time 1st Unit **Distribution**	4:08	NA	3:00	2:45	2:23	4:08	4:00
	Travel Time ERF **Concentration**	NA	NA	NA	NA	NA	NA	8:00
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	6:26	NA	5:14	3:31	4:54	6:26	6:24
		6	0	1	1	1	3	
	Total Response Time ERF **Concentration**	NA	NA	NA	NA	NA	NA	10:24
		0	0	0	0	0	0	

Table 37 Baseline: Low/Moderate Risk EMS

Low/Moderate Risk - EMS - 90th Percentile Times - Baseline Performance System Wide		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	1:43	1:48	1:40	1:38	1:35	1:58	1:30
Turnout Time	Turnout Time 1st Unit	1:34	1:34	1:33	1:29	1:31	1:41	1:00
Travel Time	Travel Time 1st Unit **Distribution**	5:18	5:20	5:14	5:16	5:18	5:21	4:00
	Travel Time ERF **Concentration**							
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	7:39	7:38	7:28	7:33	7:37	7:55	6:30
		16,098	3,109	3,402	3,287	3,164	3,136	
	Total Response Time ERF **Concentration**							

Low/Moderate risk EMS incidents: either illness (medical) or injury (trauma) are considered low or moderate risk. The ERF is the number of staff/tasks necessary to complete all the identified tasks within a prescribed timeframe. For Low/Moderate risk EMS incidents, the ERF is fulfilled with the arrival of the 1st unit.

Table 38 Baseline: Low Risk HazMat

Low Risk - Hazmat - 90th Percentile Times - Baseline Performance System Wide			2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	Urban	2:16	2:25	2:17	0:56	2:14	1:30	1:30
Turnout Time	Turnout Time 1st Unit	Urban	1:36	1:55	1:32	1:27	1:35	1:24	1:00
Travel Time	Travel Time 1st Unit **Distribution**	Urban	5:05	4:25	4:47	5:00	6:01	3:55	4:00
	Travel Time ERF **Concentration**	Urban							
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	7:38	6:58	8:09	6:49	8:26	5:59	6:30
			38	11	12	3	7	5	
	Total Response Time ERF **Concentration**	Urban							

Table 39 Baseline: Moderate Risk HazMat

Moderate Risk - Hazmat - 90th Percentile Times - Baseline Performance System Wide			2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	Urban	2:30	2:34	2:34	2:05	2:00	2:39	1:30
Turnout Time	Turnout Time 1st Unit	Urban	1:54	2:01	1:32	1:50	1:50	1:52	1:20
Travel Time	Travel Time 1st Unit **Distribution**	Urban	5:18	5:12	5:28	4:44	6:04	5:09	4:00
	Travel Time ERF **Concentration**	Urban	9:00	9:08	8:39	7:49	19:00	7:53	
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	8:18	8:16	7:55	7:09	8:20	8:28	6:50
			138	38	31	19	22	28	
	Total Response Time ERF **Concentration**	Urban	12:52	13:05	11:41	13:18	13:08	12:54	10:50
			58	20	15	6	11	6	

Table 40 Baseline: High Risk HazMat

High Risk - Hazmat - 90th Percentile Times - Baseline Performance System Wide		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	3:19	1:02	3:19	NA	2:22	1:28	1:30
Turnout Time	Turnout Time 1st Unit	1:48	0:59	1:19	NA	1:31	1:48	1:20
Travel Time	Travel Time 1st Unit **Distribution**	2:56	0:56	2:55	NA	2:33	2:56	4:00
	Travel Time ERF **Concentration**	NA	NA	NA	NA	NA	NA	
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	7:15	2:57	7:15	NA	6:26	6:12	6:50
		8	1	3	0	3	1	
	Total Response Time ERF **Concentration**	NA	NA	NA	NA	NA	NA	10:50
		0	0	0	0	0	0	

Table 41 Baseline: Low Risk Technical Rescue

Low Risk - Rescue - 90th Percentile Times - Baseline Performance System Wide			2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	Urban	1:53	NA	NA	1:53	NA	NA	1:30
Turnout Time	Turnout Time 1st Unit	Urban	2:09	NA	NA	2:09	NA	NA	1:00
Travel Time	Travel Time 1st Unit **Distribution**	Urban	4:36	NA	NA	4:36	NA	NA	4:00
	Travel Time ERF **Concentration**	Urban							
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	6:18	NA	NA	6:18	NA	NA	6:30
			3	0	0	3	0	0	
	Total Response Time ERF **Concentration**	Urban							

Table 42 Baseline: Moderate Risk Technical Rescue

Moderate Risk - Technical Rescue - 90th Percentile Times - Baseline Performance System Wide			2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	Urban	1:19	1:02	1:33	1:11	:13	1:34	1:30
Turnout Time	Turnout Time 1st Unit	Urban	1:40	1:40	1:56	1:15	:51	1:46	1:20
Travel Time	Travel Time 1st Unit **Distribution**	Urban	6:32	7:44	5:16	7:40	1:41	4:34	4:00
	Travel Time ERF **Concentration**	Urban	9:49	9:42	7:42	6:13	NA	10:48	
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	8:57	9:09	8:42	9:53	2:45	7:54	6:50
			25	6	8	5	1	5	
	Total Response Time ERF **Concentration**	Urban	12:51	12:08	29:00	29:00	NA	08:00	
			10	3	4	1	0	2	

Table 43 Baseline: High Risk Technical Rescue

High Risk - Technical Rescue - 90th Percentile Times - Baseline Performance System Wide			2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	Urban	1:42	NA	1:42	1:40	1:00	1:21	1:30
Turnout Time	Turnout Time 1st Unit	Urban	1:13	NA	1:06	0:55	1:13	1:03	1:20
Travel Time	Travel Time 1st Unit **Distribution**	Urban	3:38	NA	2:41	3:38	3:04	2:19	4:00
	Travel Time ERF **Concentration**	Urban	8:04	NA	NA	NA	04:00	NA	
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	6:13	NA	5:29	9:53	2:45	7:54	6:50
			4	0	1	1	1	1	
	Total Response Time ERF **Concentration**	Urban	15:58	NA	NA	NA	15:58	NA	
			1	0	0	0	1	0	

Table 44 Baseline: Special Risk Technical Rescue

Special Risk - Technical Rescue - 90th Percentile Times - Baseline Performance System Wide			2013-2017	2016	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	Urban	0:57	NA	NA	NA	NA	0:57	1:30
Turnout Time	Turnout Time 1st Unit	Urban	0:41	NA	NA	NA	NA	0:41	1:20
Travel Time	Travel Time 1st Unit **Distribution**	Urban	3:40	NA	NA	NA	NA	3:40	4:00
	Travel Time ERF **Concentration**	Urban	NA	NA	NA	NA	NA	NA	
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	5:18	NA	NA	NA	NA	5:18	6:50
			1	0	0	0	0	1	
	Total Response Time ERF **Concentration**	Urban	NA	NA	NA	NA	NA	NA	
			0	0	0	0	0	0	

I. Evaluation of Service Delivery

The Iowa City Fire Department (ICFD) uses an adopted methodology to establish service level objectives, including specific time objectives for each major service component (i.e., fire suppression, emergency medical services (EMS), special operations, hazardous material incidents, and technical rescue incidents) and objectives for the percentage of responses that meet the time objectives. The service delivery objectives are part of the National Fire Protection Association's 1710: *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments.*

Performance objectives are expressed in benchmark and baseline statements. Benchmark statements are defined as a standard from which something can be judged. They can also refer to future performance goals. Searching for the industry best practices will help define superior or benchmark performance for which an organization can strive to meet. Baseline is defined as a database from which something can be judged. It refers to current and historical performance of the agency. Baselines state what the agency is doing, today. Benchmarks are statistics and data from other organizations that we use to compare the ICFD's baseline data. The ICFD will keep pace with evolving industry research and the publication of updated standards to consider the impacts of changing expectations on existing benchmark targets regarding current baseline performance and local needs and circumstances.

Performance Objectives – Benchmarks

Fire Suppression Services Program

First Arriving Unit Total Response Time for all risks: For 90 percent of all calls for fire suppression services, the Total Response Time (TRT) of the ICFD's first arriving unit, staffed with a minimum of three personnel shall be: 6 minutes, 24 seconds. The TRT includes an alarm handling time of 64 seconds, a turnout time of 80 seconds, a travel time of 240 seconds, for a total of 384 seconds (6 minutes, 24 seconds). The first arriving unit with a minimum of three personnel shall be capable of: providing 500 gallons of water and 1,500 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, and performing salvage operations. These operations shall be done in accordance with the ICFD's administrative policies and guidelines which includes the two in-two out rules of engagement, while at the same time providing for the safety of all personnel and the community.

Effective Response Force (ERF) Total Response Time for the following fire risks:

For 90 percent of all calls for moderate risk fire suppression services, the TRT for the arrival of the ERF staff with 13 personnel to meet critical task requirements shall be 10 minutes, 24 seconds.

For 90 percent of all calls for high risk fire suppression services, the TRT for the arrival of the ERF staff with 16 personnel to meet critical task requirements shall be 12 minutes, 34 seconds for high risk events.

For 90 percent of all calls for special risk fire suppression services, the TRT for the arrival of the ERF with 16 personnel plus the call-back of off duty personnel and mutual aid assistance shall be 12 minutes, 34 seconds for special risk events.

The ERF shall be capable of the safety and control tasks identified in the tables below, while complying with the Occupational Safety and Health Administration (OSHA) requirements of two in-two out. These operations shall be done in accordance with the ICFD's administrative policies and guidelines, while at the same time providing for the safety of all personnel and the community.

Table 36 Critical Tasks: Fire Risks - Low, Moderate, High, Special

Fire Risk: Low	
Critical Task	**Number of Personnel**
Command/Safety	1
Fire Attack	1
Pump Operations	1
TOTAL	3
Fire Risk: Moderate	
Critical Task	**Number of Personnel**
Command	1
Safety	1
Fire Attack	2
RIC	2
Pump Operations/Water Supply	1
Ventilation/Ground Ladders	2
Search and Rescue	2
Back-up Line	2
TOTAL	13
Admin Chief (ICS)	1
Fire Risk: High	
Critical Task	**Number of Personnel**
Command	1
Safety	1
Attack Line	2
2nd Attack Line	2
Pump Operation/Water Supply	1
Back-up Line	2
RIC	2
Search and Rescue	2
Ventilation/Utilities	2
Utilities/Exposure Protection	1
TOTAL	16
Admin Chiefs (ICS)	2
Fire Risk: Special	
Critical Task	**Number of Personnel**
Command	1
Command Aid	1
Safety	1
Division Supervisors	2
Staging	1
Attack Line	2
2nd Attack Line	2
Pump Operations/Water Supply	2

Back-up Line	2
Rapid Intervention	2
Search and Rescue	2
Ventilation/Ground Ladders	2
Utilities/Exposure Protection	4
Aerial Operations/Other	4
On Deck	2
Level 1 Staging	6
Level 2 Staging	14
TOTAL	50*
Admin Chief (ICS)	2
*Equates to a Mutual Aid Box Alarm System (MABAS) Level 3	

Emergency Medical Services Program

First Arriving Unit Total Response Time for low and moderate risk EMS events: For 90 percent of all call for EMS services, the TRT of the ICFD's first arriving unit (with BLS capabilities), staffed with a minimum of three personnel shall be 6 minutes, 30 seconds. The TRT includes 90 seconds alarm handling, 60 seconds turnout, 240 seconds travel, for a total of 390 seconds, or 6 minutes, 30 seconds. The first arriving unit shall be capable of providing medical services that will stabilize the situation and provide care and support to the patient.

Table 37 Critical Tasks: EMS Risk - Low and Moderate

EMS Risk: Low and Moderate	
Critical Task	**Number of Personnel**
Command/Safety/Documentation	1
Patient Care	2
TOTAL	3

Hazardous Materials Services Program

First Arriving Unit Total Response Time for all HazMat Risks: For 90 percent of all calls for hazmat services, the TRT of the ICFD's first arriving unit, staffed with a minimum of three personnel shall be 6 minutes, 50 seconds. The TRT includes 90 seconds alarm handling, 80 seconds turnout, and 240 seconds travel, for a total of 410 seconds, or 6 minutes, 50 seconds. The first arriving unit shall be capable of providing hazmat services to stabilize the situation, stop escalation of the incident, contain the hazard where applicable, and establish an action plan for successful conclusion of the incident.

Effective Response Force (ERF) Total Response Time for the following HazMat Risks:

For 90 percent of all calls for moderate risk hazmat services, the TRT for the arrival of the ERF staff with 13 personnel to meet critical task requirements shall be: 10 minutes, 50 seconds.

For 90 percent of all calls for high risk hazmat services, the TRT for the arrival of the ERF staff with 16 personnel to meet critical task requirements shall be 10 minutes, 50 seconds.

The ERF shall be capable of providing hazmat services to stabilize the situation, stop escalation of the incident, contain the hazard where applicable, and establish an action plan for successful conclusion of the incident.

Table 38 Critical Tasks: HazMat Risk - Low, Moderate, High

HazMat Risk: Low	
Critical Task	**Number of Personnel**
Command/Safety/Documentation	1
Investigation/Monitoring	2
TOTAL	3
HazMat Risk: Moderate	
Critical Task	**Number of Personnel**
Command	1
Safety	1
Documentation	1
Entry Team	2
Backup	2
Hazard Control	2
Pump Operator	1
Support/Decon	3
TOTAL	13
HazMat Risk: High	
Critical Task	**Number of Personnel**
Command	1
Safety	1
Documentation/Research	2
HazMat Supervisor	1
Entry	2
Entry 2	2
Backup	2
Decon	2
HazMat Support	3
TOTAL	16
Admin Chief (ICS)	1

Rescue Services Program

First Arriving Unit Total Response Time for all Rescue Risks: For 90 percent of all calls for rescue services, the TRT of the ICFD's first arriving unit, staffed with a minimum of three personnel shall be 6 minutes, 50 seconds. The TRT includes 90 seconds alarm handling, 80 seconds turnout, 240 seconds travel, for a total of 410 seconds, or 6 minutes, 50 seconds. The first arriving unit shall be capable of providing rescue services to stabilize the incident and extricate patients from the emergency situation.

Effective Response Force (ERF) Total Response Time for the following Rescue Risks:

For 90 percent of all calls for moderate risk rescue services, the TRT for the arrival of the ERF staff with 13 personnel to meet critical task requirements shall be: 10 minutes, 50 seconds.

For 90 percent of all calls for high risk rescue services, the TRT for the arrival of the ERF staff with 16 personnel to meet critical task requirements shall be 10 minutes, 50 seconds for high risk events.

The ERF shall be capable of providing rescue services to stabilize the incident and extricate patients from the emergency situation.

Table 39 Critical Tasks: Rescue Risk - Low, Moderate, High

Rescue Risk: Low	
Critical Task	**Number of Personnel**
Command/Safety	1
Rescue Operations	2
TOTAL	3
Rescue Risk: Moderate	
Critical Task	**Number of Personnel**
Command	1
Safety	1
Rescue Operations	3
Support Operations	3
Stabilization	1
Patient Care	1
TOTAL	10
Rescue Risk: High	
Critical Task	**Number of Personnel**
Command	1
Safety	1
Attack Line	1
Pump Operations/Water Supply	1
Rescue Group Supervisor	1
Rescue Operations	2
Support Operations	6
Patient Management	1
Hazard Control	2
TOTAL	16
Admin Chief (ICS)	1

Performance Objectives – Baselines

Fire Suppression Services Program

First Arriving Unit Total Response Time for all Fire Risks: For 90% of all requests for fire suppression services, the total response time of the first arriving unit, staffed with a minimum of three personnel shall be 7 minutes, 57 seconds. The first arriving unit shall be capable of: providing 500 gallons of water and 1,500 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, and performing salvage operations. These operations shall be done in accordance with the ICFD's administrative policies and guidelines, which include the two in-two out rules of engagement, while at the same time providing for the safety of all personnel and the community.

Effective Response Force (ERF) Total Response Time for the following Fire Risk Services:

For 90 percent of all calls for moderate risk fire suppression services, the TRT for the arrival of the ERF staff with 13 personnel to meet critical task requirements shall be 13 minutes, 41 seconds for moderate risk events.

For 90 percent of all calls for high risk fire suppression services, the TRT for the arrival of the ERF staff with 16 personnel to meet critical task requirements shall be 25 minutes, 40 seconds for high risk events.

For the time period 2013-2017, the ICFD did not experience any special risk fires that required the arrival of the ERF.

The ERF shall be capable of the safety and control tasks identified in the tables below, while complying with the Occupational Safety and Health Administration (OSHA) requirements of two-in two-out. These operations shall be done in accordance with the ICFD's administrative policies and guidelines, while at the same time providing for the safety of all personnel and the community.

Emergency Medical Services Program

Total Response Time for all calls for EMS Services: For 90% of all calls for EMS services, the TRT (with BLS capabilities), staffed with a minimum of three personnel shall be 7 minutes, 53 seconds. The unit shall be capable of providing medical services that will stabilize the situation and provide care and support to the patient.

Hazardous Materials Services Program

Fire Arriving Unit Total Response Time for all HazMat Risks: For 90% of all calls for hazmat services, the TRT of the ICFD's first arriving unit, staffed with a minimum of three personnel shall be 10 minutes, 25 seconds. The first arriving unit shall be capable of providing hazmat services to stabilize the situation, stop escalation of the incident, contain the hazard where applicable, and establish an action plan for successful conclusion of the incident.

Effective Response Force (ERF) Total Response Time for the following HazMat Risks: For 90 percent of all calls for moderate risk hazmat services, the TRT for the arrival of the ERF staff with 13 personnel to meet critical task requirements shall be 12 minutes, 52 seconds. The ERF shall be capable of

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

Rescue Services Program

First Arriving Unit Total Response Time for all Rescue Risks: For 90% of all calls for rescue services, the TRT of the ICFD's first arriving unit, staffed with a minimum of three personnel shall be 8 minutes, 54 seconds. The first arriving unit shall be capable of providing rescue services to stabilize the incident and extricate patient(s) from the emergency situation.

Effective Response Force (ERF) Total Response Time for the following Rescue Risks:

For 90 percent of all calls for moderate risk rescue services, the TRT for the arrival of the ERF staff with 13 personnel to meet critical task requirements shall be 12 minutes, 51 seconds.

For 90 percent of all calls for high risk rescue services, the TRT for the arrival of the ERF staff with 16 personnel to meet critical task requirements shall be 15 minutes, 58 seconds for high risk events.

The ERF shall be capable of providing rescue services to stabilize the incident and extricate patients from the emergency situation.

Performance Gaps – Baseline to Benchmark Time Gap

To better understand the tables that follow, explanations and definition of terms are provided:

BENCHMARK – A benchmark is defined as a standard from which something can be judged. It refers to future performance goals. Searching for the benchmark or best practice will help the agency define superior performance of the service.

BASELINE – A baseline is defined as a database from which something can be judged. It refers to current and historical performance. It is the measurement of the actual performance to achieve the organization's goals and objectives.

Note: The baseline data presented here represents a compilation of city-wide response data from 2013-2017. The statistical significance of the comparisons will vary with risk classification and category due to the size of the data set. Namely, the fire suppression table includes 568 low risk fires, 105 moderate risk fires, 92 high risk fires, and only 6 special risk fires; By comparison, the low/moderate risk EMS table includes 16,098 incidents; hazmat has 38 low risk incidents and 138 moderate risk incidents, as well as 8 high risk incidents; technical rescue has 3 low risk incidents, 25 moderate risk incidents, 4 high risk incidents, and 1 special risk rescue response.

Table 40 Baseline-Benchmark Performance Comparison: Fire Suppression - Low, Moderate, High, Special

FIRE SUPPRESSION							
Risk		Alarm Handling	Turnout	1st Arriving Travel	ERF Travel	1st Arriving TRT	ERF TRT
Low	*BENCHMARK*	1:04	1:20	4:00		6:24	
	BASELINE	2:04	1:45	5:16		8:06	
Moderate	*BENCHMARK*	1:04	1:20	4:00	8:00	6:24	10:24
	BASELINE	1:41	1:40	5:15	9:39	7:44	13:41
High	*BENCHMARK*	1:04	1:20	4:00	10:10	6:24	12:34
	BASELINE	1:40	1:40	4:15	12:14	6:34	25:40
Special	*BENCHMARK*	1:04	1:20	4:00	10:10	6:24	12:34
	BASELINE	1:19	1:45	3:34		6:07	

Table 41 Baseline-Benchmark Performance Comparison: EMS - Low/Moderate

EMS							
Risk		Alarm Handling	Turnout	1st Arriving Travel	ERF Travel	1st Arriving TRT	ERF TRT
Low/	*BENCHMARK*	1:30	1:00	4:00		6:30	
Moderate	*BASELINE*	1:43	1:34	5:18		7:39	

Table 42 Baseline-Benchmark Performance Comparison: HazMat - Low, Moderate

HAZMAT							
Risk		Alarm Handling	Turnout	1st Arriving Travel	ERF Travel	1st Arriving TRT	ERF TRT
Low	*BENCHMARK*	1:30	1:20	4:00		6:50	
	BASELINE	2:16	1:36	5:05		7:38	
Moderate	*BENCHMARK*	1:30	1:20	4:00	8:00	6:50	10:50
	BASELINE	2:30	1:54	5:18	9:00	8:18	12:52
High	*BENCHMARK*	1:30	1:20	4:00	8:00	6:50	10:50
	BASELINE	3:19	1:48	2:56		7:15	

Table 43 Baseline-Benchmark Performance Comparison: Technical Rescue - Low, Moderate, High, Special

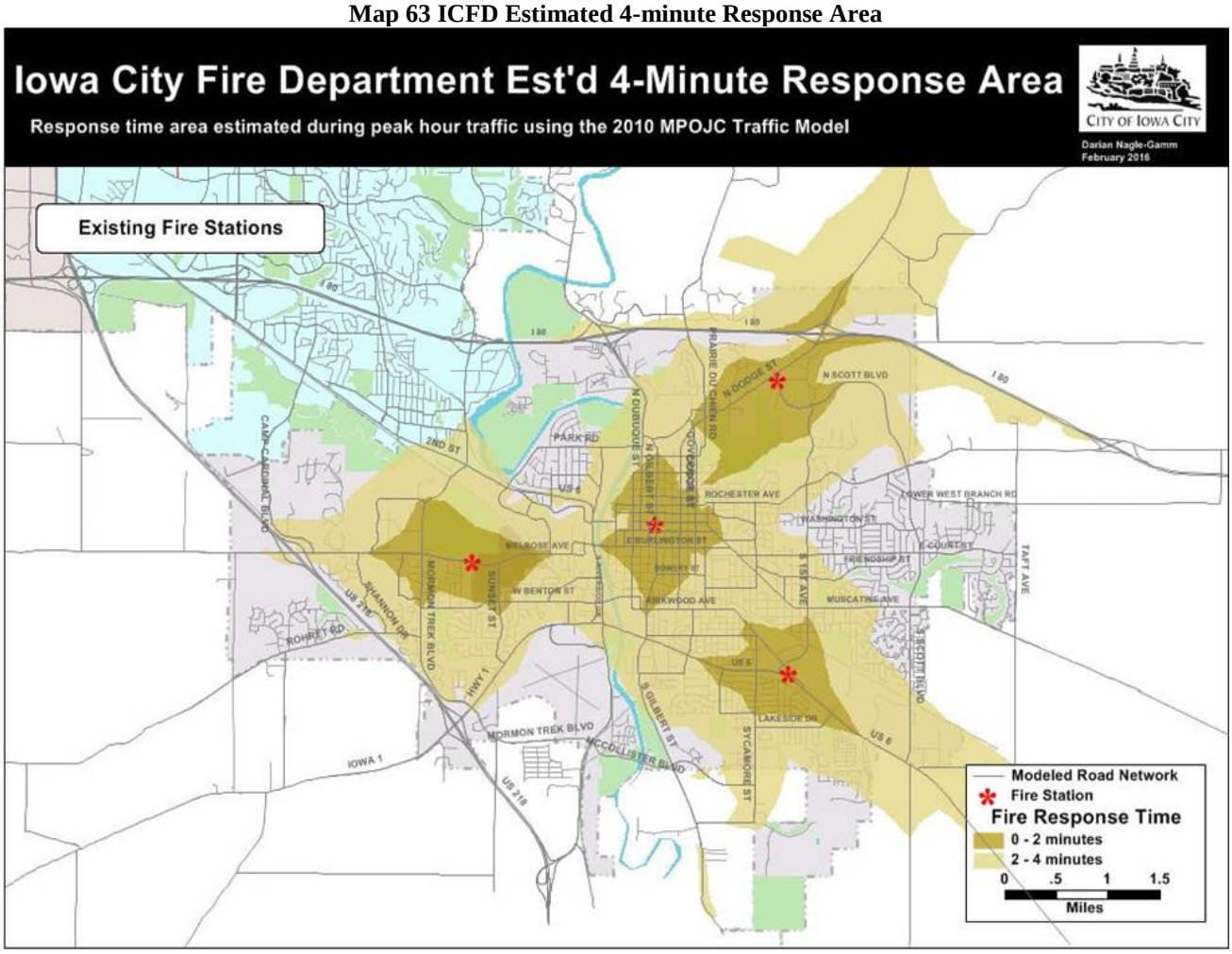
TECHNICAL RESCUE							
Risk		**Alarm Handling**	**Turnout**	**1st Arriving Travel**	**ERF Travel**	**1st Arriving TRT**	**ERF TRT**
Low	***BENCHMARK***	1:30	1:20	4:00		6:50	
	BASELINE	1:53	2:09	4:36		6:18	
Moderate	***BENCHMARK***	1:30	1:20	4:00	8:00	6:50	10:50
	BASELINE	1:19	1:40	6:32	9:49	8:57	12:51
High	***BENCHMARK***	1:30	1:20	4:00	8:00	6:50	10:50
	BASELINE	1:42	1:13	3:38	8:04	6:13	15:58
Special	***BENCHMARK***	1:30	1:20	4:00		6:50	
	BASELINE	0:57	0:41	3:40		5:18	

Areas of Program Delivery and Coverage Improvement

Response Time Performance

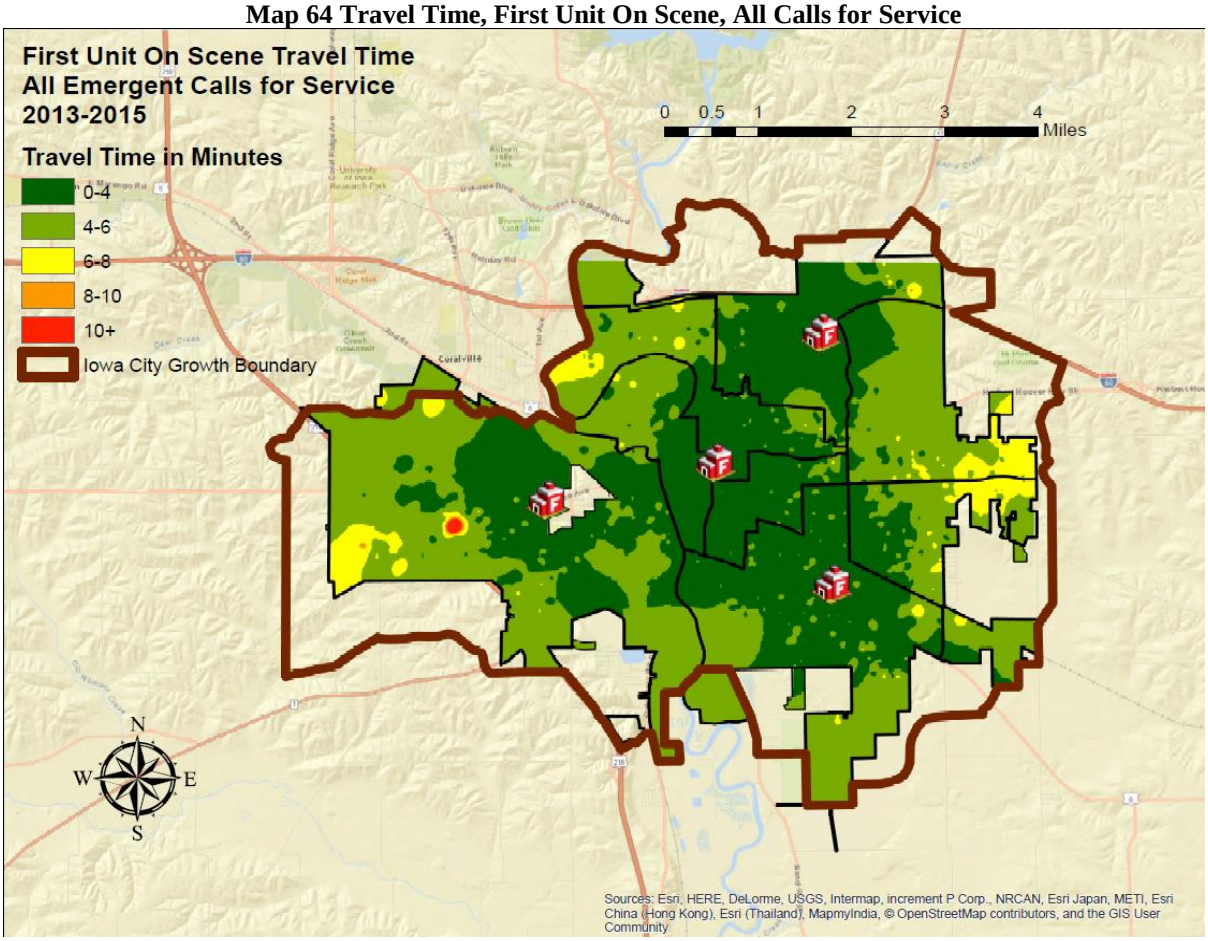
Computer modeling of estimated response times from the four fixed base fire stations suggest that coverage deficits may exist in areas not serviced by a travel time of four minutes or less (depicted on the map below).

Map 63 ICFD Estimated 4-minute Response Area



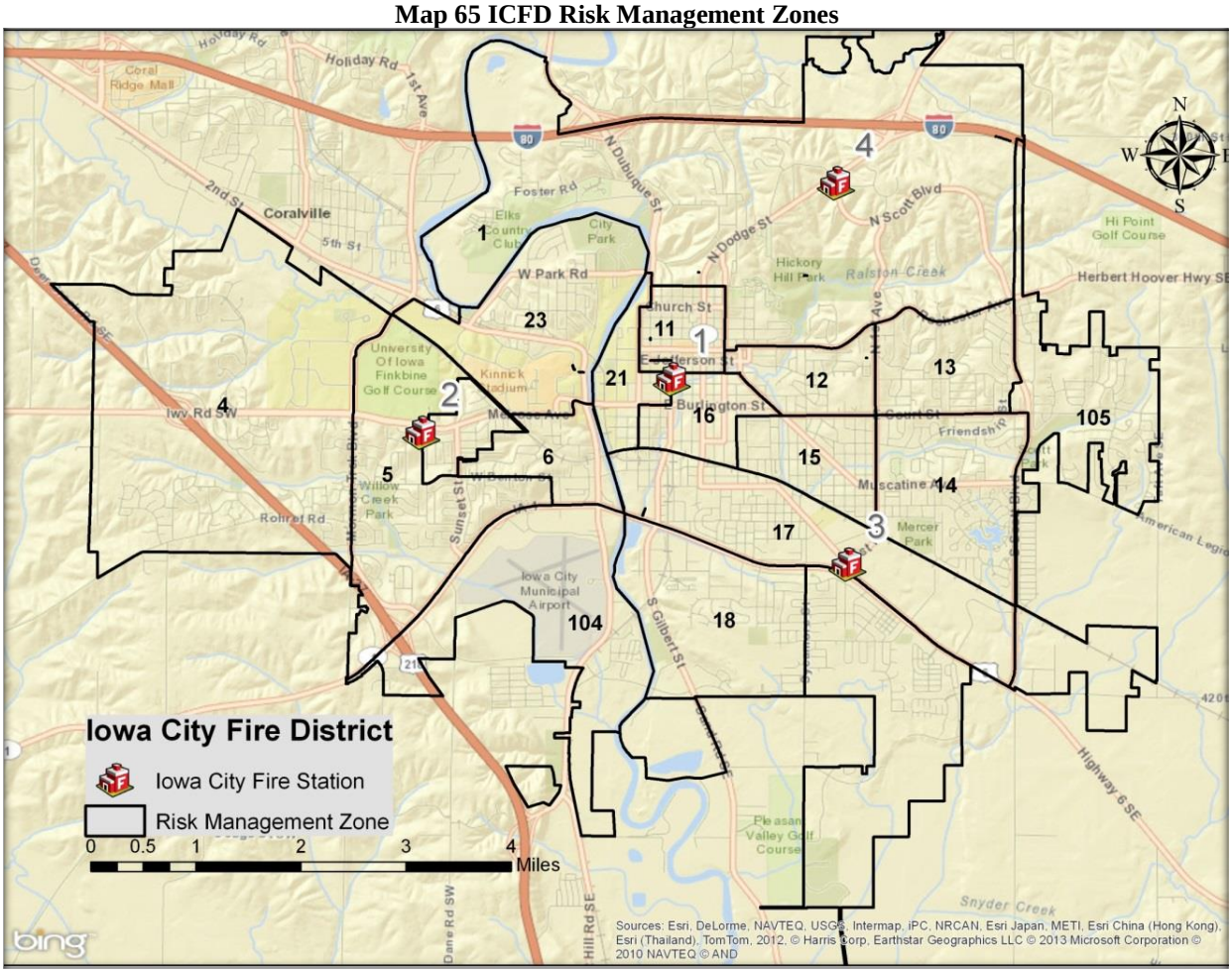
The analysis of response time data closely mirrors the computer projection. The delivery of emergency services to the following Risk Management Zones (RMZ) requires improvement: 1, 4, 5, 13, 14, 23, 104, and 105. The travel time map shown below includes experiential data from 2013-2015 and growth area boundaries.

Map 64 Travel Time, First Unit On Scene, All Calls for Service

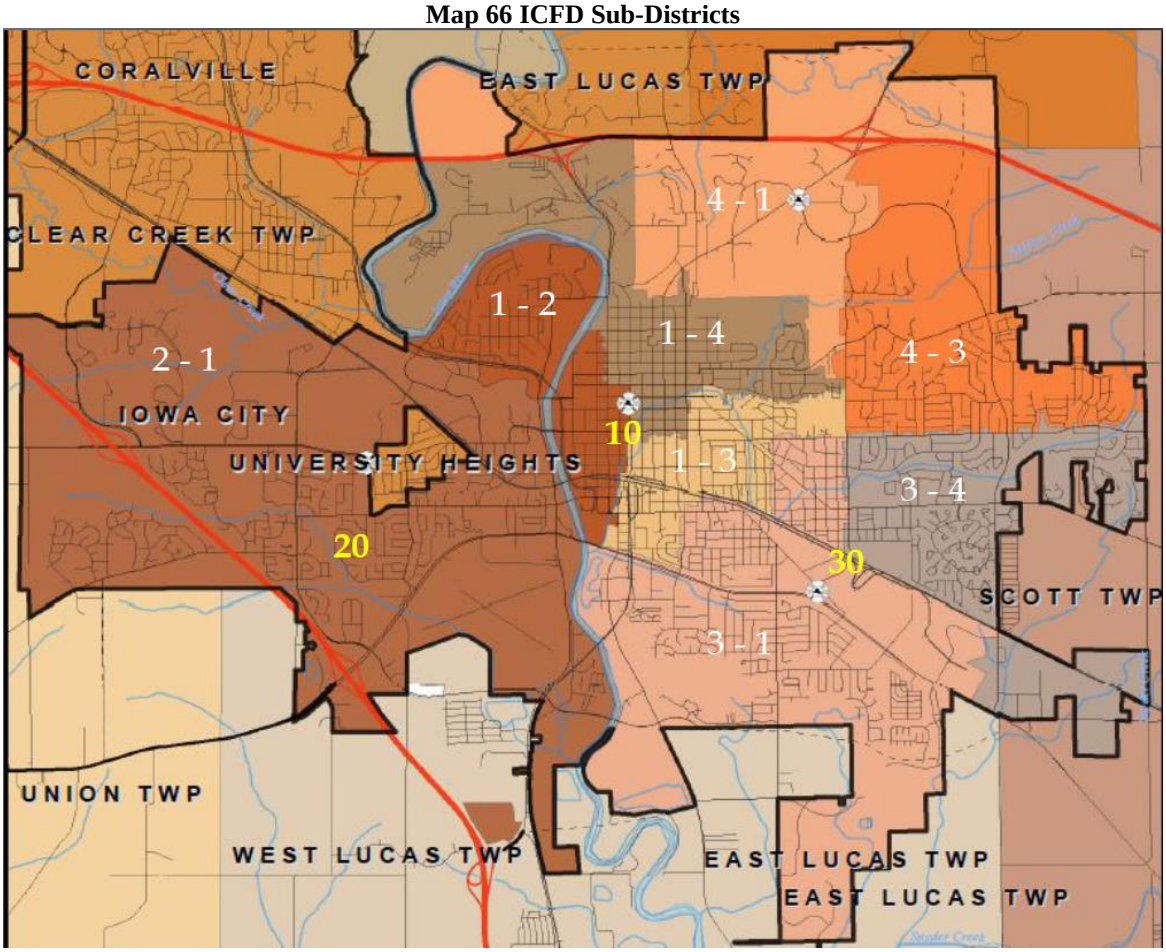


RMZ 1 includes a residential neighborhood known as the Peninsula. The Peninsula is in the far NW corner of district 1-2 and thus requires longer travel times to arrive. If a 55-acre mixed use development in the Forest View neighborhood of RMZ 1 moves forward the area will certainly require improvements to the delivery of emergency services. RMZ 4 is at the western edge of district 2-1. It includes an expanding residential development that is currently accessed via Rohret Road. Travel distance and travel times to the SW corner of RMZ 4 are excessive. Due to its size and location, district 2-1 requires longer travel times to put the first unit on scene as well as time to fill an effective response force assignment. The southern tip of RMZ 5 has a residential loop (West Side Drive) that is difficult to reach in the desired timeframe. RMZ 13 and 14 are in eastern Iowa City, separated by Court Street, and just west of Scott Boulevard. RMZ 13 is in district 4-3 (first-due service from Station #4) and RMZ 14 is in district 3-4 (first-due service from Station #3). All of RMZ 13 and the northern reaches of RMZ 14 require service delivery improvements. RMZ 23 includes the Manville Heights neighborhood in district 1-2. Response time goals are difficult to meet in the western portions of Manville Heights. RMZ 104 includes the airport and other commercial interests at the southern end of district 2-1. It too is difficult to reach within the prescribed response time goals. Lastly, RMZ 105 is east of Scott Boulevard and is serviced by both district 4-3 (north of Court St), and 3-4 (south of Court St). Both require travel times that exceed the community's response time goals.

Map 65 ICFD Risk Management Zones



Map 66 ICFD Sub-Districts



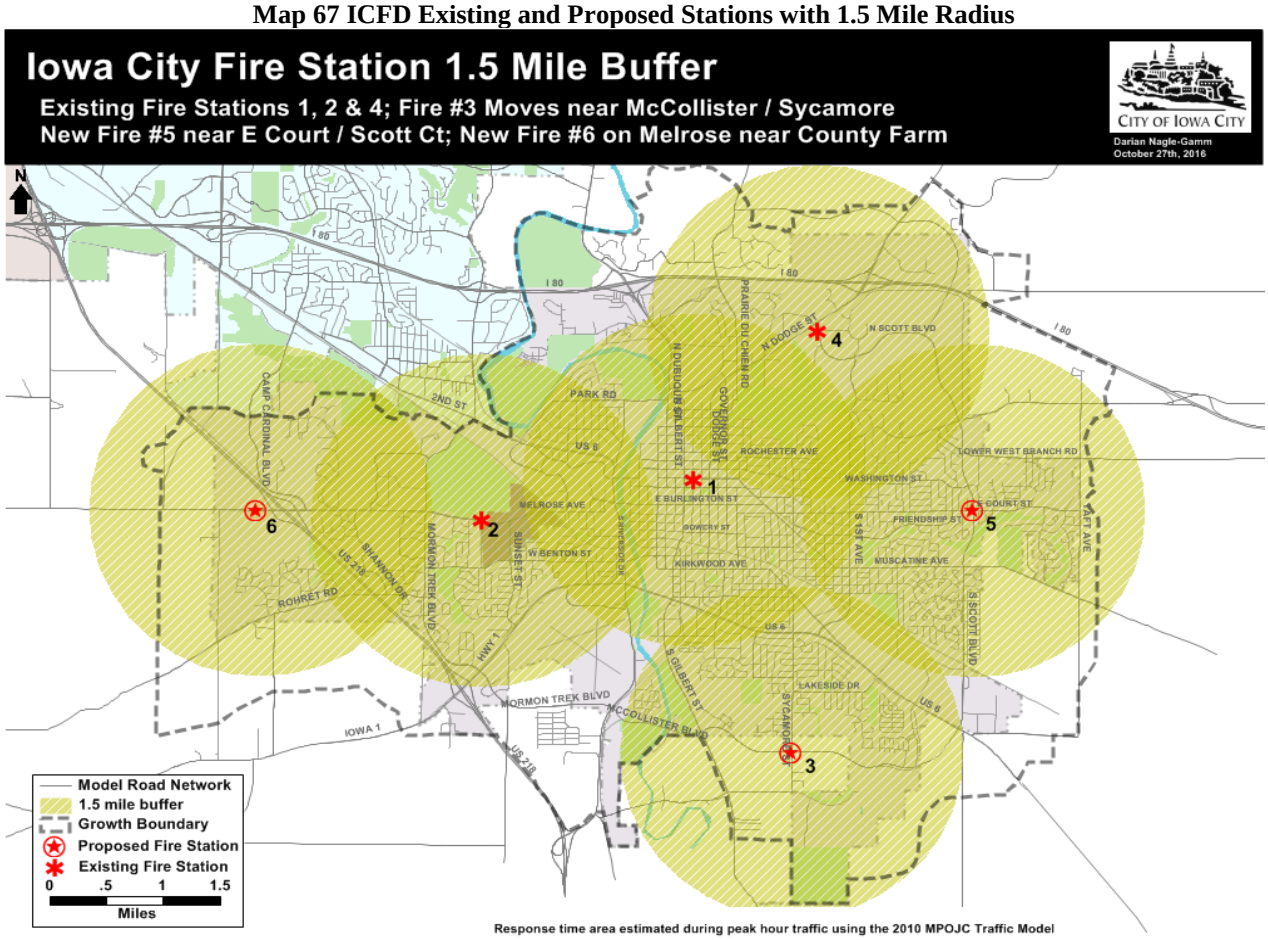
Evaluating High and Special Risk Occupancies

The re-evaluation of community hazards and risks performed in this study has led the agency to enhance its method of evaluating risk by adding an "impact" component to the quantitative analysis. Impact is the "drain effect" regarding adverse service resource availability and coverage caused by the demands of incident mitigation. The quantifiable considerations that pertain to impact or the drain effect include: the required commitment of agency resources for the emergency event mitigation (based upon critical tasks), and the residual coverage effect or challenge (reserve capacity left for area protection, deployment and/or coverage). Acknowledging the drain effect in risk assessment methodology will increase the number of occupancies the ICFD classifies as "high" or "special risk." For example, fires involving multi-family dwellings, commercial structures, and light manufacturing will be considered high risk occupancies. High-rise buildings, hospitals, university research facilities, large assembly occupancies, nursing homes, and heavy manufacturing will be considered special risk occupancies.

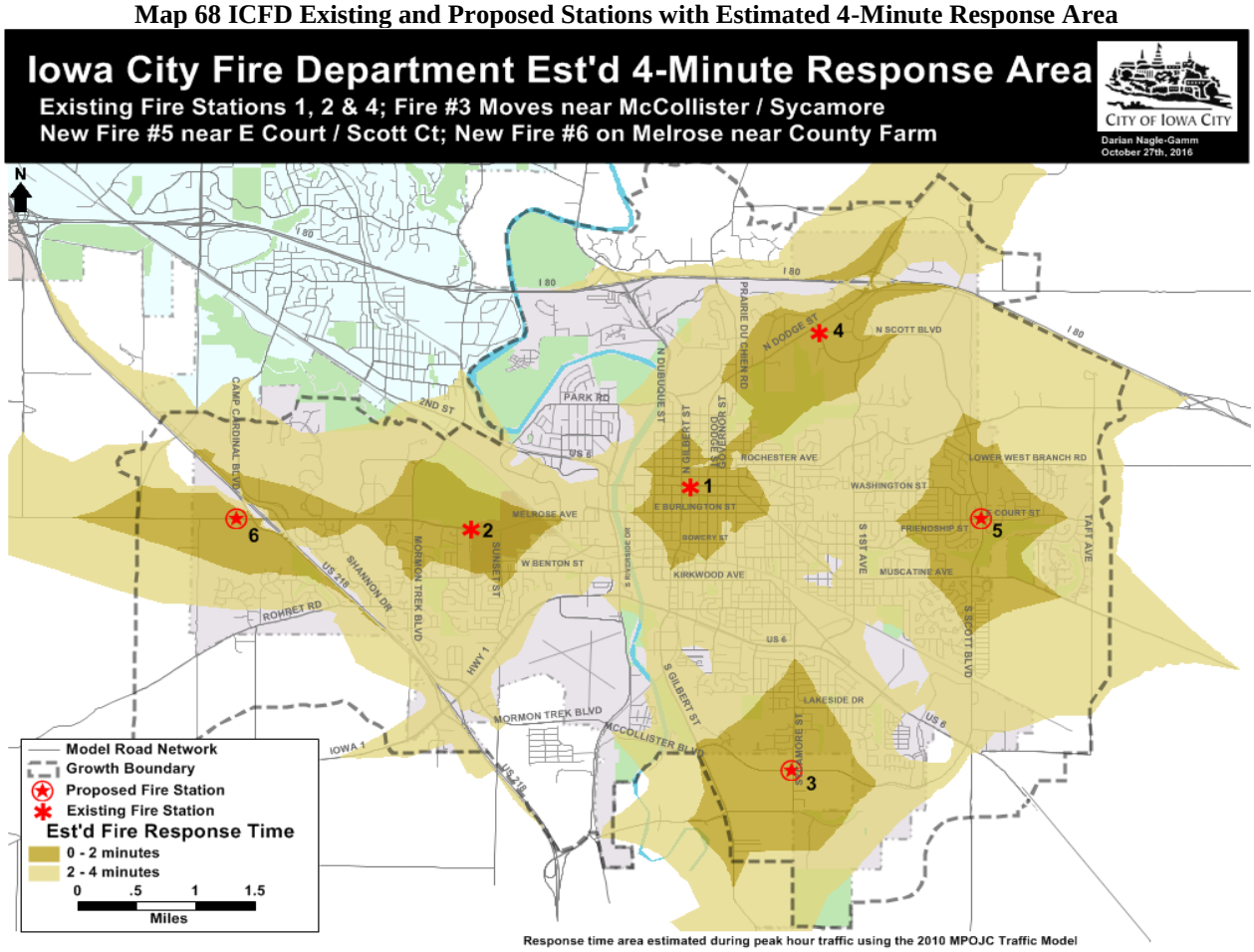
Recommendations for Improved Effectiveness in Deployment and Coverage

Response Time – Fixed Facilities

Map 67 ICFD Existing and Proposed Stations with 1.5 Mile Radius



Map 68 ICFD Existing and Proposed Stations with Estimated 4-Minute Response Area



Improvements in response time performance will eventually require the addition of two fixed facilities and the relocation of Station #3. The completion of arterial connector streets (McCollister Blvd) will improve the department's ability to assemble an effective response force in areas served by those connectors. Station #3 should be moved to a location south of its existing location to better serve the growth area that is occurring in and around Alexander Elementary. Station #3 is ICFD's second busiest engine company therefore any change in its location will influence service delivery elsewhere. An additional fixed facility is required at or near the intersection of E Court St and Scott Ct to better serve RMZ 13, 14, and 105. With a preference for in-fill development, expansion west of US 27 (Avenue of the Saints) is currently discouraged. When growth and expansion does move west of US 27 and near Hwy 1, an additional west side fire station will be required to appropriately serve RMZ 4. The additional west side facility should be positioned to improve service delivery to the Camp Cardinal area as well as the SW corner of RMZ 4. An additional fire station on the city's west side will improve first-due and concentration response force baselines in all of district 2-1.

Response Time – Alarm Handling, Turnout, and Travel Time

Modern fire station alerting systems contain features such as Computer Aided Dispatch (CAD) integration, automatic text-to-speech conversion of incident notices, simultaneous broadcast to multiple stations, and utilization of multi-media communications to notify responders. Time has always been of the utmost importance when responding to emergencies. Responding quickly can make all the difference in saving lives, reducing injuries and minimizing property damage. When lives and property are at risk, every second of the emergency response cycle counts. Time saving improvements in call taking procedures to include a modernized CAD system and agency accreditation for the Johnson County Joint Emergency Communications Center should be pursued. The second part of response time is turnout time. Elements that affect turnout time include: voice only notification versus dispatch to Mobile Data Computer (MDC), fire response versus EMS response, daytime versus nighttime response, firefighter crew proficiency in turning out, and the effects of station design and layout. Each of these elements should be studied carefully and improved upon where opportunities exist. Improvements to travel time will require technology-based solutions. Apparatus are already equipped with in-cab computers that include automatic vehicle location (AVL) devices to track fire apparatus in real time using GPS. This technology can provide valuable information and allow dispatchers to notify units that are closest to a received call for service, thus reducing travel time. Traffic control preemption devices also utilize GPS technology to allow emergency responders to reach their destinations as quickly and as safely as possible by controlling traffic lights. Traffic preemption is said to improve travel times by up to 25 percent while reducing intersection crash rates by up to 70 percent. The application and use of technology to reduce travel time and make emergency response safer for the public and the responders should be pursued.

Reassigning High and Special Risk Occupancies

By incorporating the three-axis risk assessment methodology that adds “impact” to probability and consequence in the calculation of risk, building fires involving multi-family dwellings, commercial businesses, and light manufacturing need to be categorized high risk occupancies. Similarly, building fires involving high-rise buildings, hospitals, university research facilities, large assembly occupancies, nursing homes, and heavy manufacturing need to be categorized special risk occupancies. A reassessment of high and special risk categories within the classifications of EMS, hazmat, and rescue should also be performed.

Assembling an Effective Response Force for High and Special Risk Events

To save lives and minimize property damage, fire suppression crews must arrive within an appropriate timeframe and possess adequate resources to accomplish critical tasks. Given the current minimum staffing of three persons on every apparatus, an additional engine company has been added to first alarm dispatch protocols (4/1/1/) to minimally satisfy critical task requirements at high and special risk occupancies. Four-person minimum staffing on every apparatus could satisfy critical task requirements without adding an additional unit and the requisite travel time of adding a fourth engine to the response could be eliminated. Dispatch protocols will need to be adjusted in the short term to fulfill critical task requirements to high and special risk building fire occupancies by adding an additional engine. Discussions on how to achieve additional staffing should continue.

J. Performance Maintenance and Improvement Plans

Compliance Team / Responsibility

To ensure the Iowa City Fire Department (ICFD) is meeting current service level objectives, continuous monitoring of service level baselines must be conducted on a regular basis. The Compliance Team, made up of the accreditation manager, command staff, and company officers, will review service level baselines on a quarterly basis. Included in the review shall be a summary of the results of the service level objectives, a comparison of current results to previous results and calculations of the difference in results between time periods. Summary data and analysis will be communicated to line personnel.

Fire department response personnel and JECC dispatchers will be expected to close performance gaps by focusing on internal process improvements and by training. Both groups will be held accountable for their performance and effectiveness. The department will consider technological enhancements to further improve outcomes. Finally, the department will explore solutions other departments have implemented to close the gaps to gain from their lessons learned and avoid repeating mistakes.

Performance Evaluation and Compliance Strategy

In addition to the review of service level objectives, the command staff will review the response demands within each zone and the identified risks within. The accreditation manager will determine if there have been any changes within a planning zone, changes to service demands or changes in standards or operations that impact the service level objectives or the Standard of Cover document. These reviews will be conducted on an annual basis.

Compliance Verification Reporting

To aid in the collection and presentation of this information, the Compliance Team will work as a group to assemble all required information and assist the accreditation manager in the interpretation of data and considerations for improvement towards achieving targets (benchmarks). The final report will be presented annually at the Summer Planning Meeting by the accreditation manager. Steps forward to assure continuous improvement will be published in the fiscal year Annual Goals and Objectives, which are submitted to the city manager and the elected officials for review and comment.

Constant Improvement Strategy

The nonstop improvement process must be perpetual, comprehensive, and resilient in order to help ensure not only compliance, but that quality service is provided to the community. The ICFD is dedicated to ensuring continuous improvement compliance as part of its commitment to the community. The fire chief will direct the command and continuous improvement teams, while the deputy fire chief, serving as the department's accreditation manager, guides the continuous improvement effort.

K. Appendices, Exhibits, and Attachments

Apparatus Replacement Schedule

Apparatus/Vehicle Replacement

Heavy Apparatus

Replace	Vehicle	Equip. No.	Model Yr.	Vehicle Type	Location	Repl.Cost	Life
FY 19	E-33	351	2003	Pierce Engine	Station 3	$695,000	16 yrs.
FY 20	Q-2	358	2011	Pierce Quint	Station 2	$1.3M	9 yrs.
FY 22	T-1	T-1	2006	Pierce Aerial	Station 1	$1.9M	*16 yrs.
FY 25	E-22	354	2009	Pierce Engine	Station 2	$1.1M	16 yrs.
FY 25	E-11	352	2009	Pierce Engine	Station 1	$1.1M	16 yrs.
FY 25	E-44	353	2009	Pierce Engine	Station 4	$1.2M	16 yrs.
FY 26	R-4	391	2010	Pierce HD Rescue	Station 4	$1.6M	*16 yrs.
FY 27	E-3	356	2011	Pierce Engine	Station 3	$1.4M	16 yrs.
FY 27	E-4	357	2011	Pierce Engine	Station 4	$1.4M	16 yrs.
FY 29	E-1	381	2013	Pierce Engine	Station 1	$1.5M	16 yrs.

Costs estimated at 5% per year, 16 year rotation: 9 years Front Line, 7 years Reserve

Light Vehicles

Replace	Vehicle	Equip. No.	Model Yr.	Vehicle Type	Location	Repl.Cost	Life
FY 18	Inspector	350	2011	Dodge Dakota	Station 1	$38,000	7 yrs.
FY 19	FM	373	2012	Chevy Impala	Station 1	$37,000	7 yrs.
FY 19	Support 1	360	2012	Ford F550	Station 4	$88,500	7 yrs.
FY 20	TO Pickup	370	2013	Ford F150	Station 4	$40,000	7 yrs.
FY 22	Chief	369	2015	Ford Explorer	Station 1	$38,000	7 yrs.
FY 22	D.C.	359	2015	Ford Explorer	Station 1	$38,000	7 yrs.

Costs estimated at 5% per year for 7 years

T1 and R4 are both 16 year front line apparatus

Specialty Vehicles

Replace	Vehicle	Equip. No.	Model Yr.	Vehicle Type	Location	Repl.Cost	Life
FY 18	Safety Trl	333	2003	Trailer	Trng. Ctr.	$60,000	15 yrs.
FY 20	Gator	334	2005	John Deere ATV	Station 1	$32,000	20 yrs.
FY 26	Boat 1		2011	Rescue One 1660	Station 1		15 yrs.
FY 31	Trench		2016	Trailer	Station 4		15 yrs.

Evaluated on a case-by-case basis, funded in the CIP or 3-year financial plan as capital outlay.

Travel Vehicle & Command Vehicle to be replaced FY 16/17. Gator 1 to be replaced if funding permits.

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Apparatus Maintenance and Repair

Apparatus Operating Costs

	M&R			Fuel Cost					Total
							CPM	Miles	Miles
	Last 12 Mos.	FY2015	FY2014	Last 12 Mos.	FY2015	FY2014	Last 12 M	Last 12 M	4/03/2017
E1	$7,686.00	$16,176.00	$8,914.00	$3,274.00	$6,407.00	$7,369.00	$1.91	5,727	26,404
E3	$8,384.00	$18,314.00	$12,079.00	$3,050.00	$7,059.00	$8,878.00	$1.84	6,211	42,995
E4	$2,780.00	$6,922.00	$2,107.00	$1,941.00	$3,796.00	$5,455.00	$1.04	4,559	31,571
Q2	$19,769.00	$15,922.00	$21,792.00	$4,645.00	$7,327.00	$9,141.00	$3.39	7,208	40,282
T1	$9,973.00	$18,135.00	$20,941.00	$3,378.00	$5,264.00	$6,537.00	$2.97	4,495	44,489
R4	$184.00	$3,963.00	$268.00	$299.00	$625.00	$906.00	$0.65	740	9,968
BC	$286.00	$4,678.00	$1,225.00	$379.00	$1,664.00	$2,255.00	$0.40	1,643	1,643
E11	$4,079.00	$10,068.00	$2,457.00	$1,341.00	$802.00	$746.00	$2.17	2,500	28,434
E22	$2,587.00	$3,068.00	$438.00	$1,581.00	$2,256.00	$705.00	$1.27	3,293	29,471
E33	$3,394.00	$1,295.00	$5,115.00	$184.00	$458.00	$769.00	$7.93	451	53,035
E44	$1,292.00	$2,627.00	$5,661.00	$794.00	$430.00	$389.00	$0.91	2,285	29,140
E55		$658.00	$2,430.00		$61.00	$260.00			
Total	$60,414.00	$101,826.00	$83,427.00	$20,866	$36,149.00	$43,410.00		39,412	111

Apparatus Replacement Analysis Worksheet

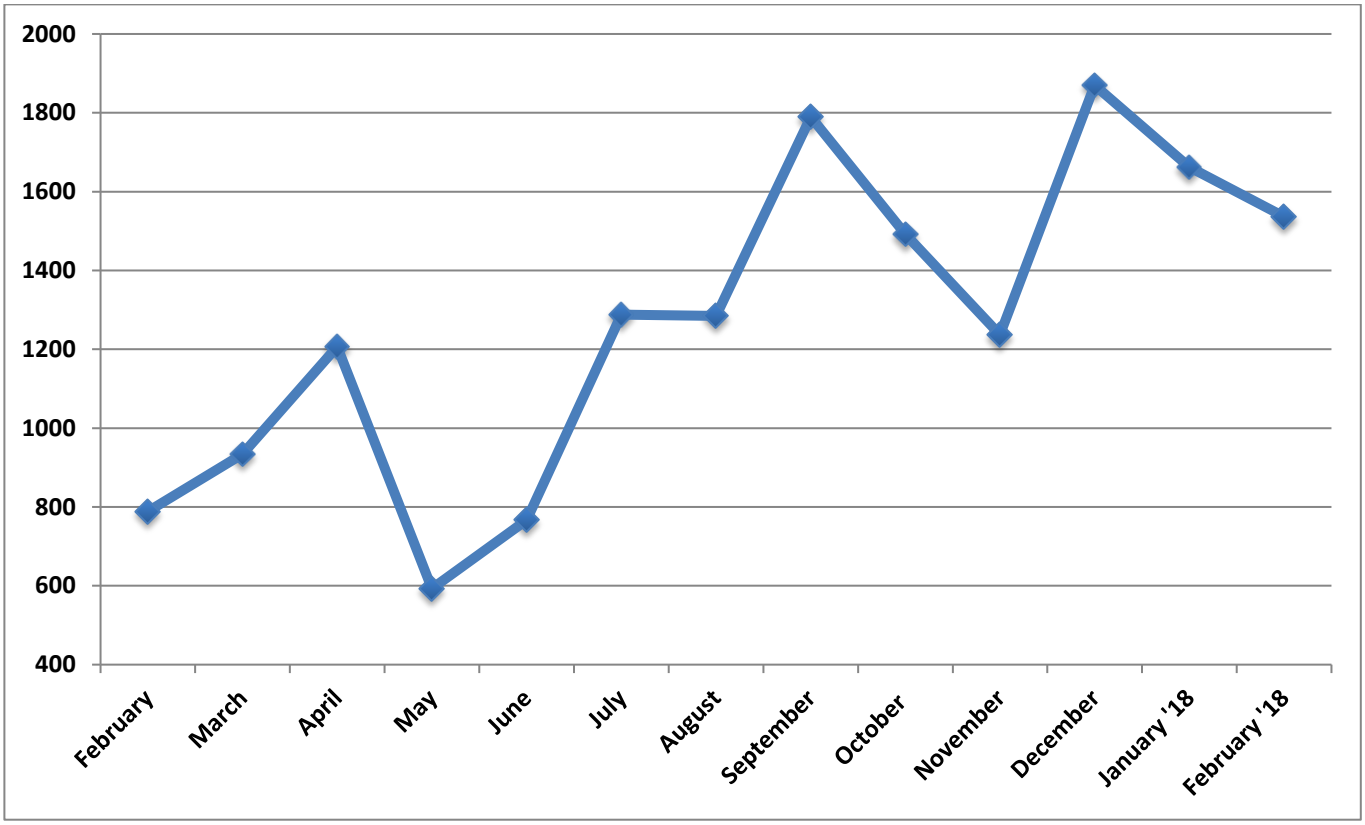
			9/14/2017					
HEAVY APPARATUS: 15 Years / 70,000 Miles			MILEAGE	METER	MAINT.	AGE	CONDITION +/- 2.0 pts max	TOTAL
T-1	2006	Pierce Dash Aerial T-1	46,672	3.3	1.7	3.8	0.00	8.8

HEAVY APPARATUS: 16 Years / 70,000 Miles			MILEAGE	METER	MAINT.	AGE	CONDITION +/- 2.0 pts max	TOTAL
351	2003	Pierce Enforcer 1500 E-33	53,320	3.8	2.0	4.5	0.00	10.3
352	2009	Pierce Impel PUC E-11	28,912	2.1	0.9	2.7	0.00	5.7
353	2009	Pierce Impel PUC E-44	30,001	2.1	0.8	2.5	0.00	5.4
354	2009	Pierce Impel PUC E-22	33,397	2.4	0.6	2.7	0.00	5.7
355							0.00	
356	2011	Pierce Impel PUC E-3	46,784	3.3	1.4	1.9	0.00	6.6
357	2011	Pierce Impel PUC E-4	34,341	2.5	0.3	1.9	0.00	4.7
358	2011	Pierce Velocity Aerial Q-2	41,113	2.9	1.1	1.9	0.00	5.9
381	2013	Pierce Impel PUC E-1	29,729	2.1	0.7	1.4	0.00	4.2
391	2010	Pierce Impel HD Rescue R-4	10,233	0.7	0.3	2.2	0.00	3.2

LIGHT APPARATUS: 7 Years / 50,000 Miles			MILEAGE	METER	MAINT.	AGE	CONDITION +/- 2.0 pts max	TOTAL
337	2017	Chevrolet 1500 4x4 Crew	848	0.1	0.0	0.3	0.00	0.4
350	2011	Dodge Dakota 4x4 Ext Cab	18,732	1.9	3.3	4.7	0.00	9.9
359	2015	Ford Explorer AWD	11,114	0.9	0.5	2.0	0.00	3.4
360	2012	Ford F550 XLT 4x4 Flatbed	5,687	0.6	0.8	3.5	0.00	4.9
368	2016	Chevrolet 2500 4x4 Crew	4,829	0.4	0.1	0.6	0.00	1.1
369	2015	Ford Explorer AWD	18,874	1.6	0.6	2.0	0.00	4.2
370	2013	Ford F150 4X4 Crew	25,299	1.8	0.5	2.8	0.00	5.1
373	2012	Chevrolet Impala LS	23,510	2.4	1.6	4.0	0.00	8.0

#337 replaced
5/2/17
#368 replaced
12/21/16

Monthly Training Hours, 2/17 – 2/18



Baseline Performance Tables by Fire District

Low Risk - Fire - 90th Percentile Times - Baseline Performance District 1		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	2:18	2:46	1:34	1:43	2:26	2:26	1:04
Turnout Time	Turnout Time 1st Unit	1:42	1:47	1:33	1:40	1:50	1:41	1:20
Travel Time	Travel Time 1st Unit **Distribution**	4:30	4:46	3:34	3:15	4:17	4:43	4:00
	Travel Time ERF **Concentration**							
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	7:18	7:30	5:39	6:32	7:32	7:36	6:24
		225	39	38	43	48	57	
	Total Response Time ERF **Concentration**							

Moderate Risk - Fire - 90th Percentile Times - Baseline Performance District 1		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	1:28	1:03	2:16	1:24	1:20	1:46	1:04
Turnout Time	Turnout Time 1st Unit	1:57	2:51	1:33	1:25	2:13	2:23	1:20
Travel Time	Travel Time 1st Unit **Distribution**	4:30	3:56	3:46	4:48	2:55	6:38	4:00
	Travel Time ERF **Concentration**	7:50	7:44	5:43	7:42	4:25	9:47	8:00
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	7:03	6:14	6:49	7:50	6:26	8:49	6:24
		34	6	4	10	5	9	
	Total Response Time ERF **Concentration**	11:25	10:37	9:37	12:08	7:22	15:53	10:24
		20	5	1	8	1	5	

High Risk - Fire - 90th Percentile Times - Baseline Performance District 1		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	1:38	1:53	1:57	1:28	1:32	1:41	1:04
Turnout Time	Turnout Time 1st Unit	1:45	1:45	1:48	1:33	1:42	2:34	1:20
Travel Time	Travel Time 1st Unit **Distribution**	3:06	2:58	3:39	4:20	2:53	1:47	4:00
	Travel Time ERF **Concentration**	9:01	2:25	5:21	5:52	28:51	8:40	8:00
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	5:18	5:19	6:34	6:33	5:11	4:44	6:24
		44	9	4	6	20	5	
	Total Response Time ERF **Concentration**	26:35	5:47	11:56	15:45	33:02	23:49	10:24
		18	5	1	4	5	3	

Special Risk - Fire - 90th Percentile Times - Baseline Performance District 1		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	1:30	NA	0:47	0:46	1:17	1:12	1:04
Turnout Time	Turnout Time 1st Unit	2:00	NA	1:27	0:00	1:14	2:00	1:20
Travel Time	Travel Time 1st Unit **Distribution**	4:08	NA	3:00	2:45	2:23	4:08	4:00
	Travel Time ERF **Concentration**	NA	NA	NA	NA	NA	NA	8:00
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	6:26	NA	5:14	3:31	4:54	6:26	6:24
		6	0	1	1	1	3	
	Total Response Time ERF **Concentration**	NA	NA	NA	NA	NA	NA	10:24
		0	0	0	0	0	0	

Low Risk - Fire - 90th Percentile Times - Baseline Performance District 2		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	1:54	2:21	1:48	1:42	2:35	1:48	1:04
Turnout Time	Turnout Time 1st Unit	1:54	2:00	1:50	1:47	1:36	2:07	1:20
Travel Time	Travel Time 1st Unit **Distribution**	5:51	6:55	5:21	6:04	5:45	5:28	4:00
	Travel Time ERF **Concentration**							
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	8:44	10:00	8:02	8:29	8:15	8:41	6:24
		168	34	38	29	24	43	
	Total Response Time ERF **Concentration**							

Moderate Risk - Fire - 90th Percentile Times - Baseline Performance District 2		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	1:38	1:08	1:54	1:49	1:27	1:12	1:04
Turnout Time	Turnout Time 1st Unit	1:39	1:34	1:24	1:40	2:04	1:22	1:20
Travel Time	Travel Time 1st Unit **Distribution**	6:09	4:42	4:46	6:34	5:23	4:01	4:00
	Travel Time ERF **Concentration**	12:42	11:58	11:25	12:45	14:25	4:17	8:00
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	8:38	7:07	8:47	9:12	7:44	6:04	6:24
		28	10	5	6	4	3	
	Total Response Time ERF **Concentration**	04:00	20:57	13:55	24:00	16:32	6:35	10:24
		13	4	3	2	3	1	

High Risk - Fire - 90th Percentile Times - Baseline Performance District 2		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	1:28	:44	1:33	1:30	1:27	1:21	1:04
Turnout Time	Turnout Time 1st Unit	1:37	1:07	1:47	1:29	1:46	1:14	1:20
Travel Time	Travel Time 1st Unit **Distribution**	6:14	3:41	3:35	9:31	4:15	5:54	4:00
	Travel Time ERF **Concentration**	13:42	6:24	13:40	5:25	NA	13:42	8:00
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	7:44	5:32	6:40	11:35	6:45	7:11	6:24
		19	1	3	8	2	5	
	Total Response Time ERF **Concentration**	25:52	10:54	16:26	21:08	NA	25:52	10:24
		5	1	1	2	0	1	

Special Risk - Fire - 90th Percentile Times - Baseline Performance District 2		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	1:13	NA	1:13	NA	NA	0:39	1:04
Turnout Time	Turnout Time 1st Unit	1:31	NA	1:31	NA	NA	1:14	1:20
Travel Time	Travel Time 1st Unit **Distribution**	3:34	NA	2:29	NA	NA	3:34	4:00
	Travel Time ERF **Concentration**	NA	NA	NA	NA	NA	NA	8:00
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	5:27	NA	5:13	NA	NA	5:27	6:24
		2	0:00	1	0	0	1	
	Total Response Time ERF **Concentration**	NA	NA	NA	NA	NA	NA	10:24
		0	0	0	0	0	0	

Low Risk - Fire - 90th Percentile Times - Baseline Performance District 3		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	2:03	2:51	1:37	2:01	2:18	1:50	1:04
Turnout Time	Turnout Time 1st Unit	1:36	1:49	1:35	1:30	1:30	1:36	1:20
Travel Time	Travel Time 1st Unit **Distribution**	5:04	5:35	4:53	4:43	5:02	5:01	4:00
	Travel Time ERF **Concentration**							
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	7:43	9:11	6:52	7:02	7:42	7:44	6:24
		147	23	38	34	34	18	
	Total Response Time ERF **Concentration**							

Moderate Risk - Fire - 90th Percentile Times - Baseline Performance District 3		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	2:13	3:10	2:42	1:45	2:11	2:14	1:04
Turnout Time	Turnout Time 1st Unit	1:34	2:28	1:28	1:10	2:06	1:40	1:20
Travel Time	Travel Time 1st Unit **Distribution**	5:04	4:13	5:54	4:10	4:41	5:19	4:00
	Travel Time ERF **Concentration**	9:06	9:40	9:06	8:19	9:04	9:34	8:00
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	7:39	6:32	7:41	7:03	8:07	8:19	6:24
		36	7	9	10	4	6	
	Total Response Time ERF **Concentration**	12:36	12:38	11:43	11:58	12:38	13:49	10:24
		32	7	9	9	4	3	

High Risk - Fire - 90th Percentile Times - Baseline Performance District 3		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	1:48	1:48	2:14	1:02	1:30	4:09	1:04
Turnout Time	Turnout Time 1st Unit	1:31	1:37	1:22	1:46	1:20	1:31	1:20
Travel Time	Travel Time 1st Unit **Distribution**	4:14	3:17	4:13	3:53	3:43	5:21	4:00
	Travel Time ERF **Concentration**	12:23	8:38	12:23	10:52	8:48	NA	8:00
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	6:49	6:30	6:57	5:46	5:38	8:17	6:24
		24	6	7	4	3	4	
	Total Response Time ERF **Concentration**	35:36	12:11	22:37	35:36	13:52	NA	10:24
		9	3	4	1	1	0	

Special Risk - Fire - 90th Percentile Times - Baseline Performance District 3		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	2:16	NA	2:16	0:57	NA	NA	1:04
Turnout Time	Turnout Time 1st Unit	1:20	NA	1:20	1:08	NA	NA	1:20
Travel Time	Travel Time 1st Unit **Distribution**	2:10	NA	2:05	2:10	NA	NA	4:00
	Travel Time ERF **Concentration**	NA	NA	NA	NA	NA	NA	8:00
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	5:29	NA	5:29	4:15	NA	NA	6:24
		3	0	2	1	0	0	
	Total Response Time ERF **Concentration**	NA	NA	NA	NA	NA	NA	10:24
		0	0	0	0	0	0	

Low Risk - Fire - 90th Percentile Times - Baseline Performance District 4		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	1:30	1:20	1:22	1:24	1:45	0:56	1:04
Turnout Time	Turnout Time 1st Unit	1:42	2:09	1:27	1:33	1:31	1:29	1:20
Travel Time	Travel Time 1st Unit **Distribution**	6:51	4:52	5:24	5:18	8:00	2:59	4:00
	Travel Time ERF **Concentration**							
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	9:54	7:46	7:49	7:47	11:35	5:24	6:24
		26	7	4	3	11	1	
	Total Response Time ERF **Concentration**							

Moderate Risk - Fire - 90th Percentile Times - Baseline Performance District 4		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	1:27	1:04	1:27	NA	0:54	1:04	1:04
Turnout Time	Turnout Time 1st Unit	1:57	1:57	1:32	NA	1:07	1:37	1:20
Travel Time	Travel Time 1st Unit **Distribution**	5:09	2:58	4:26	NA	5:09	4:45	4:00
	Travel Time ERF **Concentration**	6:48	6:48	5:27	NA	6:32	6:15	8:00
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	7:26	5:59	7:22	NA	7:06	7:26	6:24
		7	1	2	0	2	2	
	Total Response Time ERF **Concentration**	9:56	9:56	8:37	NA	8:59	8:04	10:24
		5	1	2	0	1	1	

High Risk - Fire - 90th Percentile Times - Baseline Performance District 4			2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	Urban	1:00	1:00	NA	0:49	NA	NA	1:04
Turnout Time	Turnout Time 1st Unit	Urban	1:07	1:07	NA	1:05	NA	NA	1:20
Travel Time	Travel Time 1st Unit **Distribution**	Urban	3:40	0:42	NA	3:40	NA	NA	4:00
	Travel Time ERF **Concentration**	Urban	7:22	7:22	NA	NA	NA	NA	8:00
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	5:34	2:49	NA	5:34	NA	NA	6:24
			2	1	0	1	0	0:00	
	Total Response Time ERF **Concentration**	Urban	14:53	14:53	NA	NA	NA	NA	10:24
			1	1	0	0	0	0	

Low/Moderate Risk - EMS - 90th Percentile Times - Baseline Performance District 1		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	1:43	1:46	1:42	1:38	1:35	1:58	1:30
Turnout Time	Turnout Time 1st Unit	1:36	1:37	1:36	1:37	1:31	1:39	1:00
Travel Time	Travel Time 1st Unit **Distribution**	4:10	4:14	3:56	4:05	4:27	4:06	4:00
	Travel Time ERF **Concentration**							
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	6:32	6:33	6:13	6:28	6:41	6:44	6:30
		5,295	943	1,169	1107	1,055	1,021	
	Total Response Time ERF **Concentration**							

Low/Moderate Risk - EMS - 90th Percentile Times - Baseline Performance District 2		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	1:48	1:55	1:44	1:41	1:40	1:58	1:30
Turnout Time	Turnout Time 1st Unit	1:34	1:26	1:35	1:26	1:30	1:47	1:00
Travel Time	Travel Time 1st Unit Distribution	5:28	5:28	5:19	5:34	5:26	5:34	4:00
	Travel Time ERF Concentration							
Total Response Time	Total Response Time 1st Unit on Scene Distribution	7:52	7:48	7:41	7:46	7:55	8:12	6:30
		3,652	789	784	764	668	647	
	Total Response Time ERF Concentration							

Low/Moderate Risk - EMS - 90th Percentile Times - Baseline Performance District 3		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	1:39	1:41	1:35	1:34	1:32	1:54	1:30
Turnout Time	Turnout Time 1st Unit	1:29	1:29	1:23	1:21	1:30	1:38	1:00
Travel Time	Travel Time 1st Unit Distribution	5:16	5:19	5:18	5:03	5:11	5:33	4:00
	Travel Time ERF Concentration							
Total Response Time	Total Response Time 1st Unit on Scene Distribution	7:36	7:33	7:27	7:23	7:23	7:59	6:30
		5,578	1,030	1,129	1127	1,134	1,158	
	Total Response Time ERF Concentration							

Low/Moderate Risk - EMS - 90th Percentile Times - Baseline Performance District 4		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	1:44	1:36	1:48	1:39	1:41	2:01	1:30
Turnout Time	Turnout Time 1st Unit	1:39	1:43	1:32	1:35	1:41	1:42	1:00
Travel Time	Travel Time 1st Unit Distribution	6:08	6:02	5:55	6:07	6:24	6:11	4:00
	Travel Time ERF Concentration							
Total Response Time	Total Response Time 1st Unit on Scene Distribution	8:42	8:22	8:31	8:46	8:52	8:46	6:30
		1,512	290	320	285	307	310	
	Total Response Time ERF Concentration							

Low Risk - Hazmat- 90th Percentile Times - Baseline Performance District 1		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	1:55	2:42	1:55	NA	0:49	NA	1:30
Turnout Time	Turnout Time 1st Unit	1:38	2:32	1:14	NA	1:35	NA	1:00
Travel Time	Travel Time 1st Unit **Distribution**	4:25	4:25	5:31	NA	3:43	NA	4:00
	Travel Time ERF **Concentration**							
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	6:34	6:34	8:30	NA	5:37	NA	6:30
		11	5	4	NA	2	NA	
	Total Response Time ERF **Concentration**							

Moderate Risk - Hazmat- 90th Percentile Times - Baseline Performance District 1		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	3:08	3:07	3:15	2:07	1:51	3:17	1:30
Turnout Time	Turnout Time 1st Unit	1:55	2:02	1:29	1:55	1:53	1:35	1:20
Travel Time	Travel Time 1st Unit **Distribution**	4:12	3:29	2:18	3:00	6:48	4:28	4:00
	Travel Time ERF **Concentration**	7:11	6:21	8:09	5:21	7:14	7:53	
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	8:08	7:44	5:50	6:16	9:14	7:48	6:50
		64	16	11	10	13	14	
	Total Response Time ERF **Concentration**	16:00	11:14	11:50	13:18	11:09	12:54	10:50
		27	10	5	3	6	3	

High Risk - Hazmat- 90th Percentile Times - Baseline Performance District 1		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	3:19	NA	3:19	NA	1:34	1:28	1:30
Turnout Time	Turnout Time 1st Unit	1:48	NA	1:14	NA	1:05	1:48	1:20
Travel Time	Travel Time 1st Unit **Distribution**	2:56	NA	2:43	NA	0:22	2:56	4:00
	Travel Time ERF **Concentration**	NA	NA	NA	NA	NA	NA	
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	7:15	NA	7:15	NA	3:01	6:12	6:50
		4	0	2	0	1	1	
	Total Response Time ERF **Concentration**	NA	NA	NA	NA	NA	NA	10:50
		0	0	0	0	0	0	

Low Risk - Hazmat- 90th Percentile Times - Baseline Performance District 2		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	2:19	1:40	2:19	0:21	NA	0:52	1:30
Turnout Time	Turnout Time 1st Unit	1:55	1:55	1:51	1:27	NA	1:12	1:00
Travel Time	Travel Time 1st Unit **Distribution**	4:46	4:06	4:04	4:46	NA	3:55	4:00
	Travel Time ERF **Concentration**							
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	8:14	6:20	8:14	6:34	NA	5:59	6:30
		9	2	5	1	0	1	
	Total Response Time ERF **Concentration**							

Moderate Risk - Hazmat- 90th Percentile Times - Baseline Performance District 2		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	2:02	2:29	2:04	1:37	2:01	1:53	1:30
Turnout Time	Turnout Time 1st Unit	1:54	1:50	1:52	1:33	1:26	2:02	1:20
Travel Time	Travel Time 1st Unit **Distribution**	5:57	5:25	6:36	4:52	6:05	5:17	4:00
	Travel Time ERF **Concentration**	10:01	12:42	8:59	7:00	9:49	6:53	
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	8:47	8:50	9:40	7:39	8:21	8:58	6:50
		27	10	5	3	4	5	
	Total Response Time ERF **Concentration**	13:03	15:13	11:52	9:20	13:08	9:47	10:50
			7	2	1	2	2	

High Risk - Hazmat - 90th Percentile Times - Baseline Performance District 2		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	0:40	NA	0:40	NA	NA	NA	1:30
Turnout Time	Turnout Time 1st Unit	1:19	NA	1:19	NA	NA	NA	1:20
Travel Time	Travel Time 1st Unit **Distribution**	2:55	NA	2:55	NA	NA	NA	4:00
	Travel Time ERF **Concentration**	NA	NA	NA	NA	NA	NA	
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	4:54	NA	4:54	NA	NA	NA	6:50
		1	0	1	0	0	0	
	Total Response Time ERF **Concentration**	NA	NA	NA	NA	NA	NA	10:50
		0	0	0	0	0	0	

Low Risk - Hazmat- 90th Percentile Times - Baseline Performance District 3		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	2:22	2:25	2:22	NA	0:58	1:30	1:30
Turnout Time	Turnout Time 1st Unit	1:20	1:17	0:55	NA	1:07	1:24	1:00
Travel Time	Travel Time 1st Unit **Distribution**	4:52	3:19	4:52	NA	5:16	3:41	4:00
	Travel Time ERF **Concentration**							
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	6:58	6:58	7:19	NA	6:56	5:55	6:30
		11	2	2	0	3	4	
	Total Response Time ERF **Concentration**							

Moderate Risk - Hazmat- 90th Percentile Times - Baseline Performance District 3		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	2:07	2:15	2:19	1:37	2:04	2:50	1:30
Turnout Time	Turnout Time 1st Unit	1:38	3:20	1:27	1:56	1:19	1:50	1:20
Travel Time	Travel Time 1st Unit **Distribution**	5:12	5:19	5:30	5:09	5:07	5:06	4:00
	Travel Time ERF **Concentration**	9:15	9:01	9:26	7:49	9:19	6:44	
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	8:02	8:03	8:01	7:02	8:07	8:46	6:50
		38	8	11	6	4	9	
	Total Response Time ERF **Concentration**	12:10	12:21	11:28	11:00	13:10	10:09	10:50
		13	2	6	2	2	1	

High Risk - Hazmat - 90th Percentile Times - Baseline Performance District 3		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	2:02	1:02	NA	NA	2:02	NA	1:30
Turnout Time	Turnout Time 1st Unit	1:30	0:59	NA	NA	1:30	NA	1:20
Travel Time	Travel Time 1st Unit **Distribution**	2:19	0:56	NA	NA	2:19	NA	4:00
	Travel Time ERF **Concentration**	NA	NA	NA	NA	NA	NA	
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	5:51	2:57	NA	NA	5:51	NA	6:50
		2	1	0	0	1	0	
	Total Response Time ERF **Concentration**	NA	NA	NA	NA	NA	NA	10:50
		0	0	0	0	0	0	

Low Risk - Hazmat- 90th Percentile Times - Baseline Performance District 4		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	2:14	1:13	1:28	0:56	2:14	NA	1:30
Turnout Time	Turnout Time 1st Unit	1:32	1:10	1:32	0:53	0:52	NA	1:00
Travel Time	Travel Time 1st Unit **Distribution**	6:37	6:37	3:00	5:00	6:01	NA	4:00
	Travel Time ERF **Concentration**							
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	9:00	9:00	6:00	6:49	8:26	NA	6:30
		6	2	1	1	2	0	
	Total Response Time ERF **Concentration**							

Moderate Risk - Hazmat- 90th Percentile Times - Baseline Performance District 4		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	2:34	1:05	2:34	NA	1:33	NA	1:30
Turnout Time	Turnout Time 1st Unit	1:46	1:32	1:46	NA	1:36	NA	1:20
Travel Time	Travel Time 1st Unit **Distribution**	4:13	1:59	2:51	NA	4:13	NA	4:00
	Travel Time ERF **Concentration**	5:37	5:40	5:21	NA	5:37	NA	
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	7:22	4:36	5:42	NA	7:22	NA	6:50
		7	2	1	0	1	0	
	Total Response Time ERF **Concentration**	8:56	8:14	7:59	NA	8:56	NA	10:50
		4	1	2	0	1	0	

High Risk - Hazmat - 90th Percentile Times - Baseline Performance District 4		2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	2:22	NA	NA	NA	2:22	NA	1:30
Turnout Time	Turnout Time 1st Unit	1:31	NA	NA	NA	1:31	NA	1:20
Travel Time	Travel Time 1st Unit **Distribution**	2:33	NA	NA	NA	2:33	NA	4:00
	Travel Time ERF **Concentration**	NA	NA	NA	NA	NA	NA	
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	6:26	NA	NA	NA	6:26	NA	6:50
		1	0	0	0	1	0	
	Total Response Time ERF **Concentration**	NA	NA	NA	NA	NA	NA	10:50
		0	0	0	0	0	0	

Low Risk - Rescue - 90th Percentile Times - Baseline Performance District 1			2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	Urban	1:53	NA	NA	1:53	NA	NA	1:30
Turnout Time	Turnout Time 1st Unit	Urban	2:09	NA	NA	2:09	NA	NA	1:00
Travel Time	Travel Time 1st Unit **Distribution**	Urban	1:20	NA	NA	1:20	NA	NA	4:00
	Travel Time ERF **Concentration**	Urban							
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	5:22	NA	NA	5:22	NA	NA	6:30
			1	0	0	1	0	0	
	Total Response Time ERF **Concentration**	Urban							

Moderate Risk - Technical Rescue - 90th Percentile Times - Baseline Performance District 1			2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	Urban	1:02	1:02	:56	1:00	NA	1:00	1:30
Turnout Time	Turnout Time 1st Unit	Urban	1:39	1:19	1:39	:25	NA	1:15	1:20
Travel Time	Travel Time 1st Unit **Distribution**	Urban	7:44	7:44	3:37	0:00	NA	1:36	4:00
	Travel Time ERF **Concentration**	Urban	7:42	6:13	7:42	NA	NA	NA	
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	9:09	9:09	6:12	1:25	NA	3:51	6:50
			8	3	3	1	0	1	
	Total Response Time ERF **Concentration**	Urban	17:00	9:05	12:17	NA	NA	NA	
			4	2	2	0	0	0	

High Risk - Technical Rescue - 90th Percentile Times - Baseline Performance District 1			2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	Urban	NA	NA	NA	NA	NA	NA	1:30
Turnout Time	Turnout Time 1st Unit	Urban	NA	NA	NA	NA	NA	NA	1:20
Travel Time	Travel Time 1st Unit **Distribution**	Urban	NA	NA	NA	NA	NA	NA	4:00
	Travel Time ERF **Concentration**	Urban	NA	NA	NA	NA	NA	NA	
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	NA	NA	NA	NA	NA	NA	6:50
			0	0:00	0	0	0	0	
	Total Response Time ERF **Concentration**	Urban	NA	NA	NA	NA	NA	NA	
			0	0	0	0	0	0	

Special Risk - Technical Rescue - 90th Percentile Times - Baseline Performance District 1			2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	Urban	NA	NA	NA	NA	NA	NA	1:30
Turnout Time	Turnout Time 1st Unit	Urban	NA	NA	NA	NA	NA	NA	1:20
Travel Time	Travel Time 1st Unit **Distribution**	Urban	NA	NA	NA	NA	NA	NA	4:00
	Travel Time ERF **Concentration**	Urban	NA	NA	NA	NA	NA	NA	
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	NA	NA	NA	NA	NA	NA	6:50
			0	0	0	0	0	0	
	Total Response Time ERF **Concentration**	Urban	NA	NA	NA	NA	NA	NA	
			0	0	0	0	0	0	

Low Risk - Rescue - 90th Percentile Times - Baseline Performance District 2			2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	Urban	1:04	NA	NA	1:04	NA	NA	1:30
Turnout Time	Turnout Time 1st Unit	Urban	1:21	NA	NA	1:21	NA	NA	1:00
Travel Time	Travel Time 1st Unit **Distribution**	Urban	4:36	NA	NA	4:36	NA	NA	4:00
	Travel Time ERF **Concentration**	Urban							
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	6:18	NA	NA	6:18	NA	NA	6:30
			2	0	0	2	0	0	
	Total Response Time ERF **Concentration**	Urban							

Moderate Risk - Technical Rescue - 90th Percentile Times - Baseline Performance District 2			2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	Urban	1:11	NA	1:04	1:11	NA	:56	1:30
Turnout Time	Turnout Time 1st Unit	Urban	1:24	NA	1:24	1:15	NA	:57	1:20
Travel Time	Travel Time 1st Unit **Distribution**	Urban	7:40	NA	5:16	7:40	NA	2:33	4:00
	Travel Time ERF **Concentration**	Urban	10:48	NA	6:01	6:13	NA	10:48	
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	9:53	NA	7:44	9:53	NA	4:26	6:50
			6	0	3	2	0	1	
	Total Response Time ERF **Concentration**	Urban	16:08	NA	9:27	12:29	NA	16:08	
			4	0	2	1	0	1	

High Risk - Technical Rescue - 90th Percentile Times - Baseline Performance District 2			2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	Urban	1:21	NA	NA	NA	1:00	1:21	1:30
Turnout Time	Turnout Time 1st Unit	Urban	1:13	NA	NA	NA	1:13	1:03	1:20
Travel Time	Travel Time 1st Unit **Distribution**	Urban	3:04	NA	NA	NA	3:04	2:19	4:00
	Travel Time ERF **Concentration**	Urban	8:04	NA	NA	NA	8:04	NA	
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	5:17	NA	NA	NA	5:17	4:26	6:50
			2	0	0	0	1	1	
	Total Response Time ERF **Concentration**	Urban	15:58	NA	NA	NA	15:58	NA	
			1	0	0	0	1	0	

Special Risk - Technical Rescue - 90th Percentile Times - Baseline Performance District 2			2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	Urban	NA	NA	NA	NA	NA	NA	1:30
Turnout Time	Turnout Time 1st Unit	Urban	NA	NA	NA	NA	NA	NA	1:20
Travel Time	Travel Time 1st Unit **Distribution**	Urban	NA	NA	NA	NA	NA	NA	4:00
	Travel Time ERF **Concentration**	Urban	NA	NA	NA	NA	NA	NA	
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	NA	NA	NA	NA	NA	NA	6:50
			0	0	0	0	0	0	
	Total Response Time ERF **Concentration**	Urban	NA	NA	NA	NA	NA	NA	
			0	0	0	0	0	0	

Low Risk - Rescue - 90th Percentile Times - Baseline Performance District 3			2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	Urban	NA	NA	NA	NA	NA	NA	1:30
Turnout Time	Turnout Time 1st Unit	Urban	NA	NA	NA	NA	NA	NA	1:00
Travel Time	Travel Time 1st Unit **Distribution**	Urban	NA	NA	NA	NA	NA	NA	4:00
	Travel Time ERF **Concentration**	Urban							
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	NA	NA	NA	NA	NA	NA	6:30
			0	0	0	0	0	0	
	Total Response Time ERF **Concentration**	Urban							

Moderate Risk - Technical Rescue - 90th Percentile Times - Baseline Performance District 3			2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	Urban	1:34	1:00	1:33	:54	NA	1:34	1:30
Turnout Time	Turnout Time 1st Unit	Urban	1:56	1:12	1:56	1:01	NA	1:46	1;20
Travel Time	Travel Time 1st Unit **Distribution**	Urban	5:55	3:38	5:13	5:55	NA	4:34	4:00
	Travel Time ERF **Concentration**	Urban	6:00	NA	NA	NA	NA	6:00	
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	8:42	5:50	8:42	7:50	NA	7:54	6:50
			7	2	2	1	0	2	
	Total Response Time ERF **Concentration**	Urban	9:29	NA	NA	NA	NA	9:29	
			1	0	0	0	0	1	

High Risk - Technical Rescue - 90th Percentile Times - Baseline Performance District 3			2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	Urban	1:42	NA	1:42	1:40	NA	NA	1:30
Turnout Time	Turnout Time 1st Unit	Urban	1:06	NA	1:06	0:55	NA	NA	1;20
Travel Time	Travel Time 1st Unit **Distribution**	Urban	3:38	NA	2:41	3:38	NA	NA	4:00
	Travel Time ERF **Concentration**	Urban	NA	NA	NA	NA	NA	NA	
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	6:13	NA	5:29	6:13	NA	NA	6:50
			2	0	2	1	0	0	
	Total Response Time ERF **Concentration**	Urban	NA	NA	NA	NA	NA	NA	
			0	0	0	0	0	0	

Special Risk - Technical Rescue - 90th Percentile Times - Baseline Performance District 3			2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	Urban	NA	NA	NA	NA	NA	NA	1:30
Turnout Time	Turnout Time 1st Unit	Urban	NA	NA	NA	NA	NA	NA	1;20
Travel Time	Travel Time 1st Unit **Distribution**	Urban	NA	NA	NA	NA	NA	NA	4:00
	Travel Time ERF **Concentration**	Urban	NA	NA	NA	NA	NA	NA	
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	NA	NA	NA	NA	NA	NA	6:50
			0	0	0	0	0	0	
	Total Response Time ERF	Urban	NA	NA	NA	NA	NA	NA	
			0	0	0	0	0	0	

	Concentration								

Low Risk - Rescue - 90th Percentile Times - Baseline Performance District 4			**2013-2017**	**2017**	**2016**	**2015**	**2014**	**2013**	**Target**
Alarm Handling	Pick-up to Dispatch	Urban	NA	NA	NA	NA	NA	NA	1:30
Turnout Time	Turnout Time 1st Unit	Urban	NA	NA	NA	NA	NA	NA	1:00
Travel Time	Travel Time 1st Unit **Distribution**	Urban	NA	NA	NA	NA	NA	NA	4:00
	Travel Time ERF **Concentration**	Urban							
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	NA	NA	NA	NA	NA	NA	6:30
			0	0	0	0	0	0	
	Total Response Time ERF **Concentration**	Urban							

High Risk - Technical Rescue - 90th Percentile Times - Baseline Performance District 4			2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	Urban	NA	NA	NA	NA	NA	NA	1:30
Turnout Time	Turnout Time 1st Unit	Urban	NA	NA	NA	NA	NA	NA	1:20
Travel Time	Travel Time 1st Unit **Distribution**	Urban	NA	NA	NA	NA	NA	NA	4:00
	Travel Time ERF **Concentration**	Urban	NA	NA	NA	NA	NA	NA	
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	NA	NA	NA	NA	NA	NA	6:50
			0	0	0	0	0	0	

Moderate Risk - Technical Rescue - 90th Percentile Times - Baseline Performance District 4			2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	Urban	1:25	:41	NA	1:25	:13	1:05	1:30
Turnout Time	Turnout Time 1st Unit	Urban	1:40	1:40	NA	:46	:51	:57	1:20
Travel Time	Travel Time 1st Unit **Distribution**	Urban	6:56	4:13	NA	6:56	1:41	2:40	4:00
	Travel Time ERF **Concentration**	Urban	9:42	9:42	NA	NA	NA	NA	
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	9:07	6:34	NA	9:07	2:45	4:42	6:50
			4	1	0	1	1	1	
	Total Response Time ERF **Concentration**	Urban	12:08	12:08	NA	NA	NA	NA	
			1	1	0	0	0	0	

Special Risk - Technical Rescue - 90th Percentile Times - Baseline Performance District 4			2013-2017	2017	2016	2015	2014	2013	Target
Alarm Handling	Pick-up to Dispatch	Urban	0:57	NA	NA	NA	NA	0:57	1:30
Turnout Time	Turnout Time 1st Unit	Urban	0:41	NA	NA	NA	NA	0:41	1:20
Travel Time	Travel Time 1st Unit **Distribution**	Urban	3:40	NA	NA	NA	NA	3:40	4:00
	Travel Time ERF **Concentration**	Urban	NA	NA	NA	NA	NA	NA	
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	5:18	NA	NA	NA	NA	5:18	6:50
			1	0	0	0	0	1	
	Total Response Time ERF **Concentration**	Urban	NA	NA	NA	NA	NA	NA	
			0	0	0	0	0	0	