Billings Fire Department

Montana

Long-Range Master Plan

February 2018

Emergency Services Consulting International

Providing Expertise and Guidance that Enhances Community Safety

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Acknowledgments

Emergency Services Consulting International (ESCI) would like to acknowledge that without the assistance and support of the administrative staff and personnel of the Billings Fire Department, this project could not have been successfully completed.

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Executive Summary

Emergency Services Consulting International (ESCI) was engaged by the City of Stillwater Fire Department (SFD) to complete a Staffing Needs Assessment. This report will assist the city in future planning and provision of comprehensive emergency services to the citizens of the service area. This report evaluates current conditions found to exist in the agency, projects future community growth and service demand, and provides recommendations to sustain or enhance current services over the next 10 to 15 years.

ESCI thanks the Billings City Council, the fire chief, and the staff of the BFD for their outstanding cooperation in the preparation of this report. All involved were candid in their comments and provided a tremendous amount of essential information.

The Master Plan begins with an Evaluation of Current Conditions, which provides a snapshot in time of the organization as it is today and establishes an informational baseline from which the balance of the Master Plan is developed.

Evaluation of Current Conditions

An analysis of current conditions is documented in eight survey sections, reviewing the BFD organizational composition, financial condition, management components, staffing and personnel management, planning, training and fire prevention programs, service delivery, and capital assets and infrastructure. Each component of the evaluation includes an introductory explanation of the subject area and a discussion of desirable outcomes and identified best practices.

The evaluation of current conditions provides the fire department with a detailed assessment of existing fire and EMS operations and also provides the ESCI project team with a snapshot in time, the basis from which the balance of the Master Plan is developed.

Criterion used to evaluate the fire department has been developed over many years. These gauges include relevant guidelines from national accreditation criteria, the National Fire Protection Association (NFPA) standards, federal and state mandates for fire and EMS systems, recommendations by various organizations such as the Center for Public Safety Excellence (CPSE), and generally accepted best practices within the fire and EMS industry.

The Billings Fire Department is a full-service agency, providing an array of services including fire prevention and suppression, technical rescue, hazardous materials, emergency medical response, and many other services. The department operates from seven strategically placed fire stations using a sizeable fleet of fire and specialized response vehicles. The stations are staffed with career personnel, with a total complement of 110 operational personnel.

In completing the evaluation phase, the team members found an exceptionally well-managed fire department that has done an excellent job of keeping pace with its challenges and increasing demands, while also effectively addressing the management, administrative, and operational needs of a modern-day fire department. The elected officials and staff of the City of Billings have good reason to be proud of the quality of their organization.

Service Delivery Analysis

The report also includes an extensive analysis of the department's current ability to provide services to its constituents. The analysis includes the following:

- Community Risk Assessment
- Population Growth Projections
- Historic System Response Workload
- Response Unit Workload Analysis
- Population and Incident Workload Forecast
- Critical Tasking and Alarm Assignments
- Review of Historical System Performance

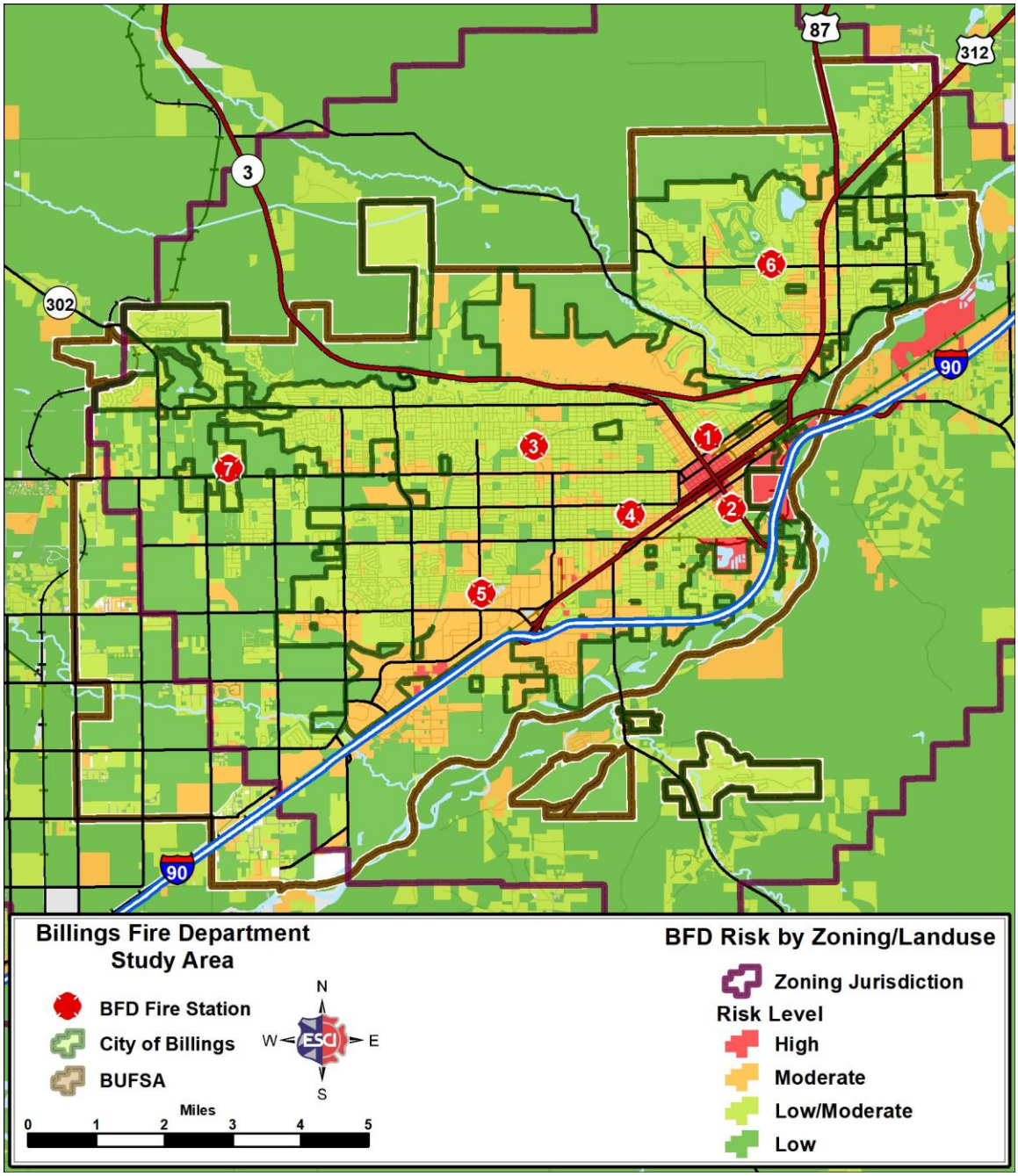
Land Use and Community Risk

ESCI uses City of Billings and Yellowstone County parcel data and current zoning classifications in the BFD service area to examine current land use. A risk level is assigned based on the following definitions:

- Low risk – Areas zoned and used for agricultural purposes, open space, low-density rural residential, and other low intensity uses.
- Moderate risk – Areas zoned for medium density single family properties, small commercial and office uses, low-intensity retail sales, and equivalently sized business activities.
- High risk – Higher-intensity business districts, mixed use areas, high-density residential, industrial, warehousing, and large mercantile centers.

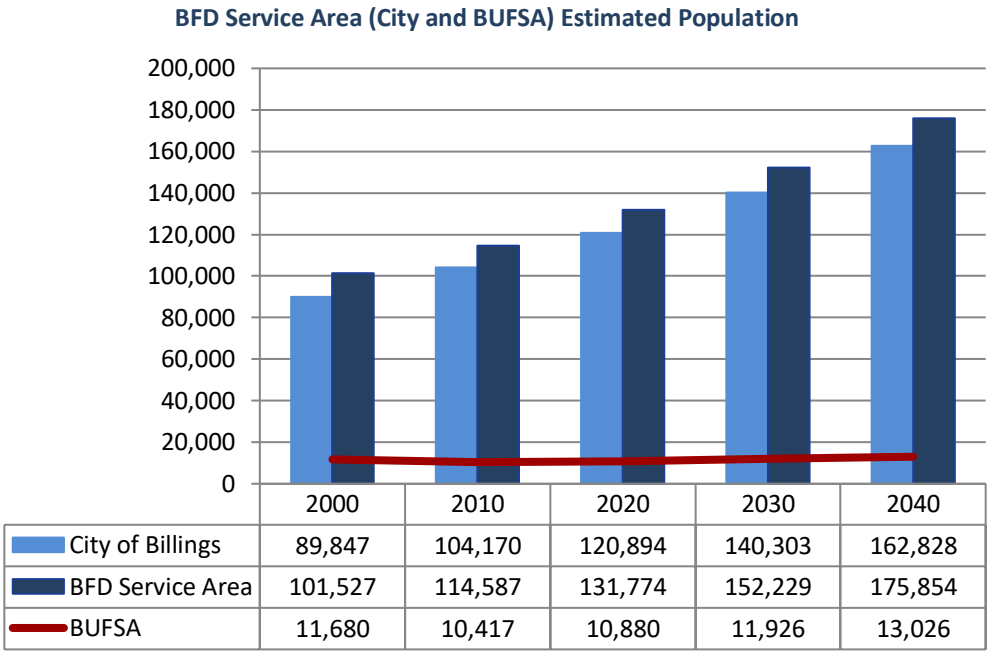
The following figure displays relative community risk within the BFD service area using the criteria listed above.

BFD Community Risk by Zoning and Land Use



Population History and Growth

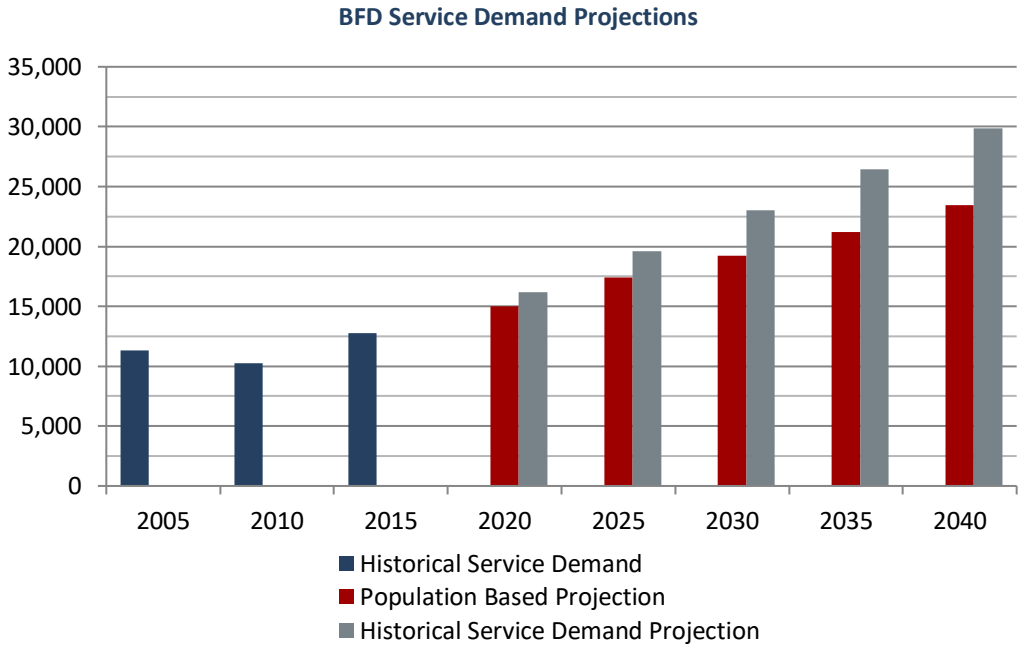
Population growth is also projected in the following graph.



	2000	2010	2020	2030	2040
City of Billings	89,847	104,170	120,894	140,303	162,828
BFD Service Area	101,527	114,587	131,774	152,229	175,854
BUFSA	11,680	10,417	10,880	11,926	13,026

Future System Demand

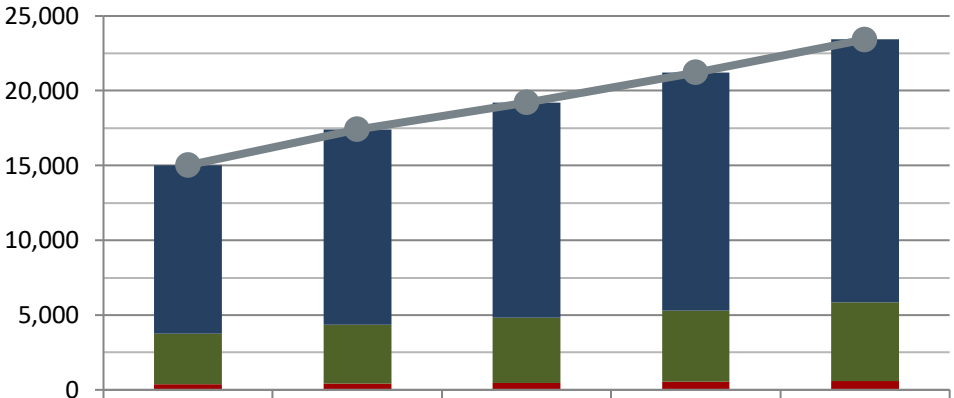
Projections of future service demand in the BFD service area are provided as well.



The projection labeled “Historical Service Demand” is based on historical service demand from 2005 through 2016.

With this information, ESCI projected future population and fire and EMS workload.

BFD Projected Service Demand by Incident Category, 2020–2040



	2020	2025	2030	2035	2040
EMS	11,265	13,059	14,418	15,919	17,576
Other	3,379	3,918	4,325	4,776	5,273
Fire	375	435	481	531	586
Total	15,020	17,412	19,224	21,225	23,434

Current Conditions

The report continues to evaluate the department's programs, practices, management procedures, and emergency response performance. Findings and observations are mirrored against national standards, best practices, and the experience of ESCI consultants.

Future Delivery System Models

Armed with the preceding analysis, ESCI identifies future needs and workload and offers guidance regarding how the department can best move forward. Initial strategies are listed as short and mid-term initiatives, followed by additional long-term recommendations.

Short and mid-term strategies recommend that the department:

- Address the departmental span of control;
- Address shortages in support staff;
- Possibly modify the work week scheduling;
- Implement Alternate Response Unit approaches;
- Increase Fire Prevention Division staffing;
- Implement Community Risk Reduction approaches; and
- Initiate Medical Priority Dispatch procedures.

Following the short and mid-term recommendations, ESCI identifies strategies that should be considered long-term initiatives. Each is discussed in detail, and implementation guidance is provided. The following elements are discussed as long-term future considerations. The report cites multiple future system model modifications, included both short-term and long-term initiatives that are identified in the interest of improving and maintaining future system integrity. Each initiative is discussed in detail and guidance is provided.

Future fire station deployment strategies are detailed including:

- Station Deployment Strategy 1—Current Station Locations Plus One Additional Station
- Station Deployment Strategy 2—Current Station Locations Plus Two Additional Stations
- Station Deployment Strategy 3—Optimized Nine Stations

The Long-Range Master Plan begins with an Evaluation of Current Conditions on the following page.

Evaluation of Current Conditions

Emergency Services Consulting International (ESCI) was engaged by the City of Billings, Montana to provide a long-range plan for the delivery of fire and emergency services within the Billings Fire Department (BFD) that will assist the department in future efforts and long-range planning. This report serves as the culmination of the project and is configured as an Organizational Long-Range Master Plan that evaluates current conditions; projects future growth, development, and service demands; and provides recommendations to enhance current services or provide an equal level of service over the next 10 to 20 years.

Using organizational, operational, staffing, and geographic information system (GIS) models; this phase of the study provides recommendations for improvement in current services delivered to the community. The evaluation and analysis of data and other information is based on Montana state laws and regulations, National Fire Protection Association (NFPA) standards, Commission on Fire Accreditation International (CFAI) self-assessment criteria, health and safety requirements, federal and state mandates relative to emergency services, and generally accepted best practices within the emergency services community.[1]

Each section in the following report provides the reader with general information about that element, as well as observations and analyses of any significant issues or conditions that are pertinent. Observations are supported by data provided by the BFD and collected as part of the review and interview process. Finally, specific recommendations are included to address identified issues or to take advantage of opportunities that may exist.

ORGANIZATIONAL OVERVIEW

The Organizational Overview component provides a summary of the agency's composition, discussing its configuration and the services it provides. Data provided by BFD administrative and management staff, as well as both internal and external stakeholders, was combined with information collected during ESCI's fieldwork to develop the following overview.

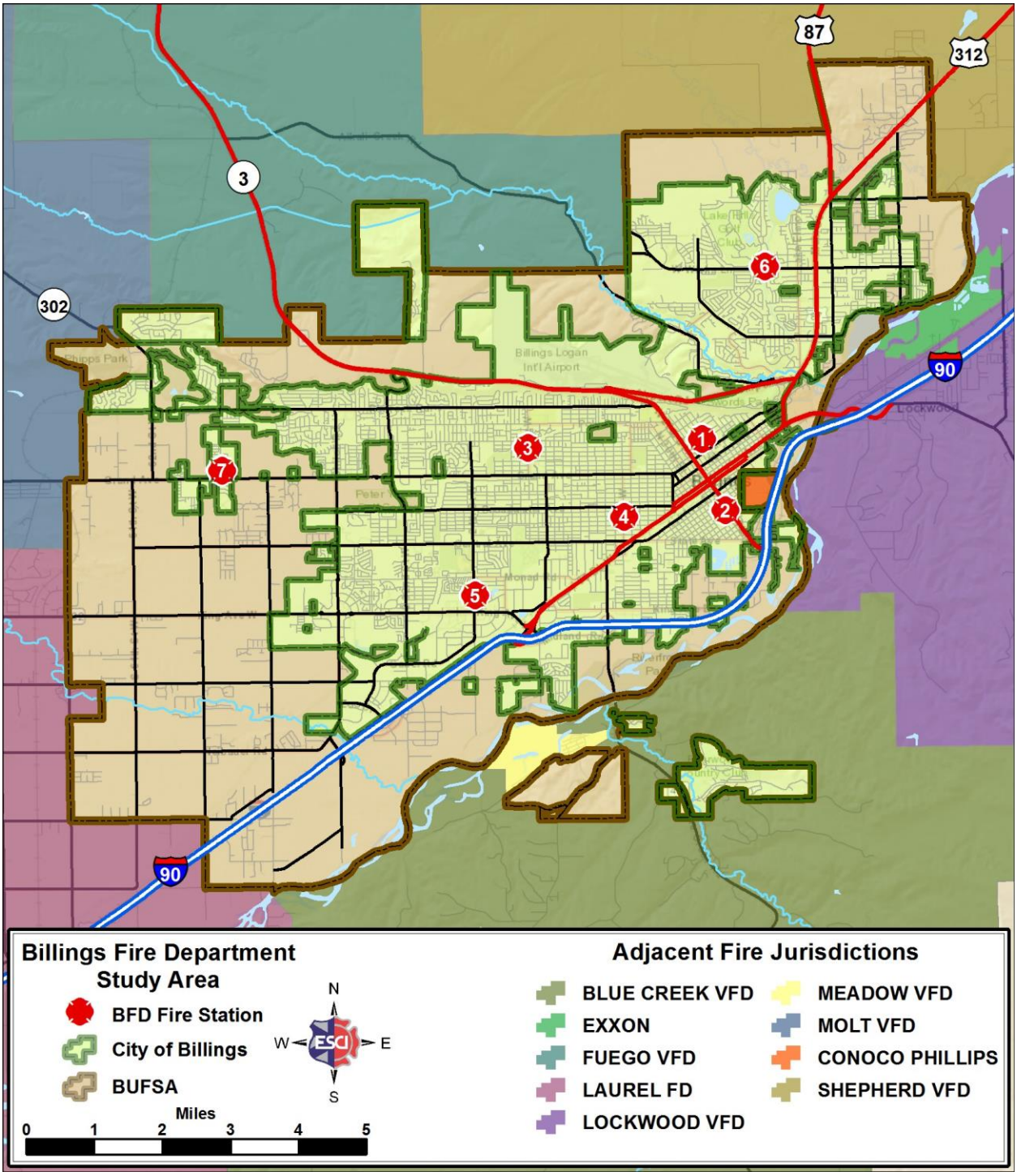
The purpose of this section is two-fold. First, it verifies the accuracy of baseline information along with ESCI's understanding of the agency's composition. This provides the foundation from which the Long-Range Master Plan is developed.

Secondly, the overview serves as a reference for the reader who may not be fully familiar with the details of the agency's operations. Where appropriate, ESCI includes recommended modifications to current observations based on industry standards and best practices.

The following map reflects the Billings Fire Department service area.

[1] The CFAI organization is now a subsection of the Center for Public Safety Excellence (CPSE) but maintains its prime function of accrediting fire agencies.

Figure 1: Service Area Map



The department's service area encompasses approximately 91.48 square miles. This includes 43.75 square miles in the City of Billings as well as an additional 47.73 square miles that fall outside of the city and within the Billings Urban Fire Service Area—an independent fire protection district. In total, the service area population consists of an estimated 124,000 residents with a variable daily influx of inbound commuters.

Governance

The very basis of any service provided by governmental or quasi-governmental agencies lies within the policies that give that agency the responsibility and authority upon which to act. In most governmental agencies, including BFD, those policies lie within the charters, ordinances, and other governing documents adopted by the agency. The following figure provides a general overview of the City's governance and lines of authority elements.

Figure 2: Governance and Lines of Authority

Survey Components	Billings Fire Department Observations
Agency	
Agency name	Billings Fire Department
Preferred acronym	BFD
Governance and Lines of Authority	
Governing body	Mayor/council form of government. 5 wards with 2 council members plus the Mayor
Head of governing body	
Key employee of governing body	City Administrator
Meetings	Second and fourth Monday
Elected official authority defined	In City charter
Fire Chief position	
Hired by contract	No
Term of contract	N/A
Periodic performance evaluation	Annual
Fire Chief/authority defined	Yes, Montana Code Annotated
Policy and administrative roles defined	City charter
Attributes of Successful Organizations	
Policy, rules, guiding documents	Policy and Procedures manual and Standard Operating Protocols
Process for revision provided	
Legal counsel maintained	Yes
Consultation available	City attorney
Labor counsel	City attorney, or outsourced
Financial controls	Yes
Financial control system	Key card purchase order processes in place, via finance department
Financial review	Annual audit completed
Auditor	Audit completed via City finance department
Frequency of review	Annually
Governing body minutes maintained	Yes
Availability of minutes	Available on the City website (ci.billings.mt.us)

Discussion

The Billings Fire Department is organized as a municipal subdivision of the City of Billings, Montana. As such, the Fire Chief is directly responsible to the City Council, by way of the City Administrator, to whom the Chief reports directly.

The City is structured under what is characterized as a Mayor-Council form of government. The governance model is typical of similar sized municipalities in Montana. In Billings, a total of ten City Council members are seated, separated geographically into five "wards." Each ward is assigned two council members. The Mayor, who is the eleventh member of the council, serves the City as a whole and is not assigned to a ward.

The City Council appoints a City Administrator to oversee the day to day operations of the City. The position was created by the City's charter, when it was adopted by voters in 1976. The City Administrator executes the policies established by the City Council and administers the affairs of the City.

The Fire Chief reports directly to the City Administrator. The Chief is responsible for the day to day operations and assuring that future planning needs are met, a key element of this study process. In doing so, the Chief supervises an administrative and support staff of four, a training and fire prevention staff of 7 and an operational component of 110 emergency responders. Further, the fire department is responsible for providing 911 dispatch services, adding a communications center manager, three supervisors, thirty-one (31.5) dispatchers and a .6 FTE Public Safety Technician to the department's staffing total.

The City is appropriately configured, much like other Montana cities, with a City charter, organizational structure, legal counsel, and financial controls.

Organizational Design

The structural design of an emergency services agency is vitally important to its ability to deliver service in an efficient and timely manner while providing the necessary level of safety and security to the members of the organization. During an emergency, an individual's ability to supervise multiple personnel is diminished thus industry standards recommend a span of control of four-to-six personnel under stressed situations. This is a recommendation carried forward from military history and has shown to be effective in emergency service situations.

In addition, employees tend to be more efficient when they know to whom they report and have a single point of contact for supervision and direction. A recent research project conducted by the Columbia University, Northwestern University, and University of Queensland, Australia, found that,

> [W]hen there are tasks that require teamwork, people get more done when there are leaders and followers. Without a clear chain of command, members often become sidetracked with grabbing power and lose track of the task at hand.[2]

[2] "Why Hierarchies are Good for Productivity," *Inc*. September 2012, p 26.

The following figure summarizes the organizational design components of the BFD:

Figure 3: Organizational Design

Survey Components	Billings Fire Department Observations	Comments and Recommendations
Organizational Structure		
Structure type	Traditional top-down hierarchy, organized as a municipal subdivision of the City of Billings, with an additional contract service area	The Billings Urban Fire Service Area (BUFSA) is outside of the city limits of Billings, served by BFD via contract.
Descriptions of all jobs maintained	Yes, City Human Resources Division	
Job descriptions updated	As needed—no regular schedule	Review and update job descriptions on an annual basis.
Employment agreements	Collective Bargaining Agreement with IAFF. All personnel represented below Assistant Chief level. Dispatch personnel are represented by Teamsters below the supervisor level. Office personnel are non-represented.	
Chain of Command		
Defined Chain of command	Yes, via organizational chart and internal policy	
Hiring/Firing authority	Progressive discipline process defined by HR policy and Collective Bargaining Agreement. Chief has authority over hiring, recommends to City Administrator regarding termination.	
Formation and History		
Organization formed	1883	
History maintained	No	
Individual or group responsible	N/A	

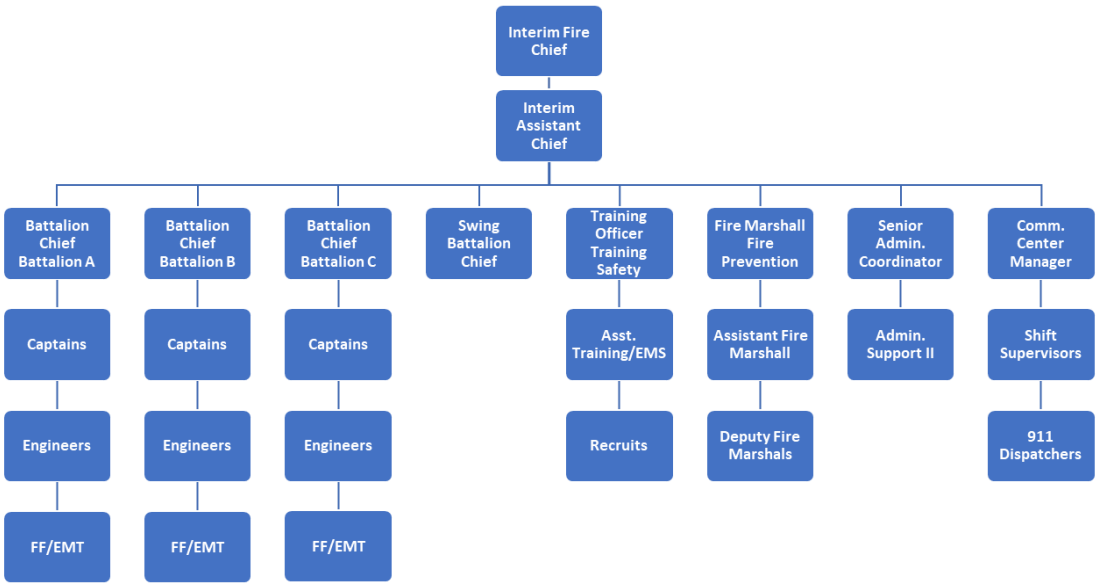
Organizational Structure

To operate effectively the structure of a fire department needs to be clearly defined in the form of an organizational chart. The chart institutionalizes the agency's hierarchy, identifies roles and, most importantly, reporting authority, and helps to assure that communication flows appropriately, as well as limiting opportunities to circumvent the reporting structure.

BFD has developed an organizational chart that achieves this purpose, demonstrating how the agency generally operates under a traditional top-down manner. However, it is noted that, due to the recent retirement of the Fire Chief, the current Chief and Assistant Chief positions are occupied by interim placements. In addition, some battalion level positions are staffed in an acting capacity.

The department's current organizational chart is shown in the following figure:

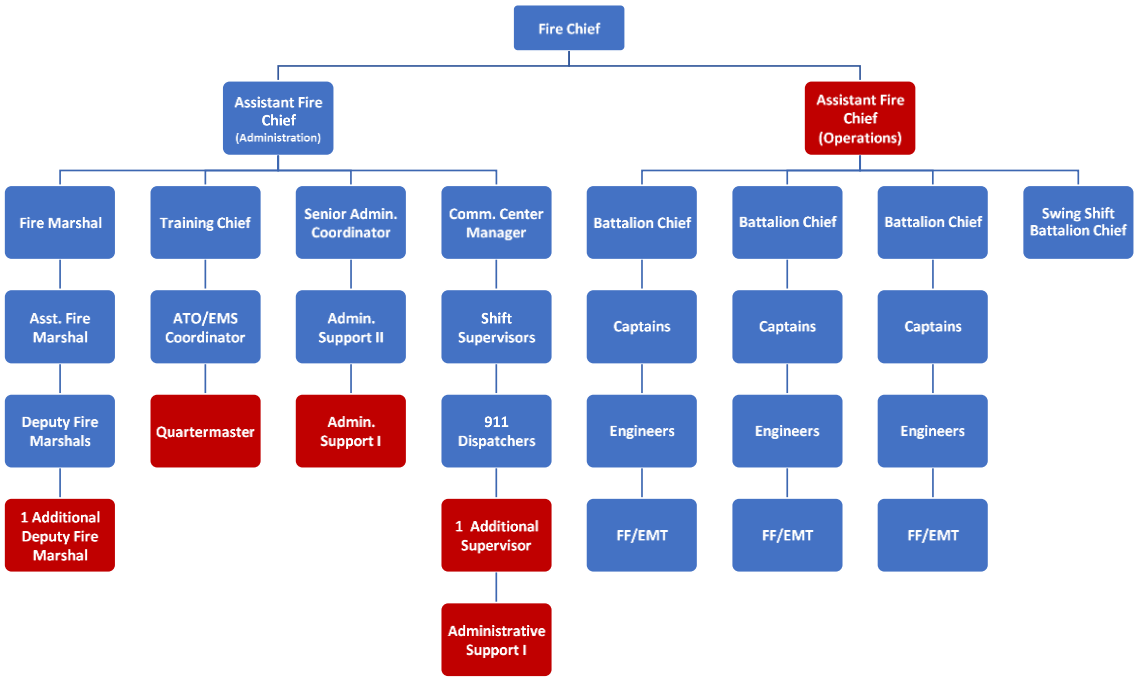
Figure 4: Interim Organizational Chart



As stated, the department is operating under leadership that is appointed to interim roles at this time, due to the retirement of the previous Fire Chief. The interim organizational chart, above, depicts the Assistant Chief's current span of control as eight-to-one, a level that ESCI considers to be higher than is conducive to effective organizational management. The matter is discussed further in the Staffing Analysis section.

As a part of the transition from an interim to a permanent Fire Chief, the department provided ESCI with an updated organizational chart that is intended to be implemented upon appointment of a new Chief in early 2018, and dependent upon any changes that the new Chief may elect to implement. The anticipated organizational chart is in the following figure.

Figure 5: Proposed 2018 Organizational Chart



Note: Positions in red shaded boxes are not currently funded

The current interim chart and the proposed organizational structure are similar, except for the addition in the future chart of an Assistant Chief of operations position. This position is not currently staffed. In addition, the other positions listed in red boxes in the chart above have been requested but are not yet funded. ESCI finds that the proposed span of control is considerably more appropriate than that of the current interim configuration.

Structure and Decision Making

From an organizational structure and decision-making standpoint, the organization is configured appropriately, and the hierarchy is designed to allow for an acceptable span of control, once the planned future organizational chart is in place. However, it is noted that an organizational chart by itself is of no significance if policy and procedure within the organization does not assure that members follow the defined chain of command. Too often, individuals are allowed to circumvent the organizational structure to meet personal agendas. For this reason, it is essential that the organization implement and enforce practices that assure that the chain of command is properly adhered to.

Key Recommendations

- Review and implement procedures that assure the organization's chain of command will be adhered to.
- Establish a schedule for regular review and update of all job descriptions.

Service Area and Infrastructure

The size and composition of a fire department's service area affects the type and number of personnel, fire stations, and vehicles that are needed to provide services efficiently. Sometimes complex decisions need to be employed regarding deployment strategies to properly position resources based on land area, geography, risk, and similar factors.

Following is a summary of the Billings Fire Department service area and infrastructure resources.

Figure 6: Service Area and Infrastructure

Survey Components	Billings Fire Department Observations	Comments and Recommendations
General Description of Agency		
Agency type	Municipal Subdivision, also serving Billings Urban Fire Service Area (BUFSA)	BUFSA is a fire district, served by BFD via contract
Area, square miles	91.48	
Headquarters	Located at Station 1	
Fire stations	7	
Other facilities	2 – training facility, former maintenance shop at Station 5 that houses hazmat response equipment	
Population served	114,000 (city) / 10,000 (BUFSA)	124,000 total population served
Service Delivery Infrastructure		
Emergency vehicles	28	
Engines (pumpers)	6	
Engine, reserve	3	
Ladder truck	2, one of which is a quint	
Ambulance	0	
Ladder truck, reserve	1	
Quick response unit	2	
Water tender	2	
Brush	3	
Rescue	1	
ISO Rating	3	
Total fire department personnel, uniformed and civilian	157.1 FTE	Inclusive of operational, administrative, and dispatch personnel
Administrative and support personnel, full-time	Fire department administration – 4 911 center administration – 4 Prevention – 5 Training – 2	
Administrative and support personnel, volunteer	0	
Operational personnel, full-time	110 (Fire) + 31.5 (911) + .6 FTE (Public Safety Technician-shared with Police Dept. & 911 Center)	

Discussion

The BFD service area is large, consisting of nearly 100 square miles of a demographically diverse region. The department serves an area ranging from urban, relatively high-density zones, residential and light commercial areas, to suburban and rural areas that fall in the BUFSA portion of the service area. All of these different risk types influence the standards of deployment resources implemented by the department and programs provided to its citizens.

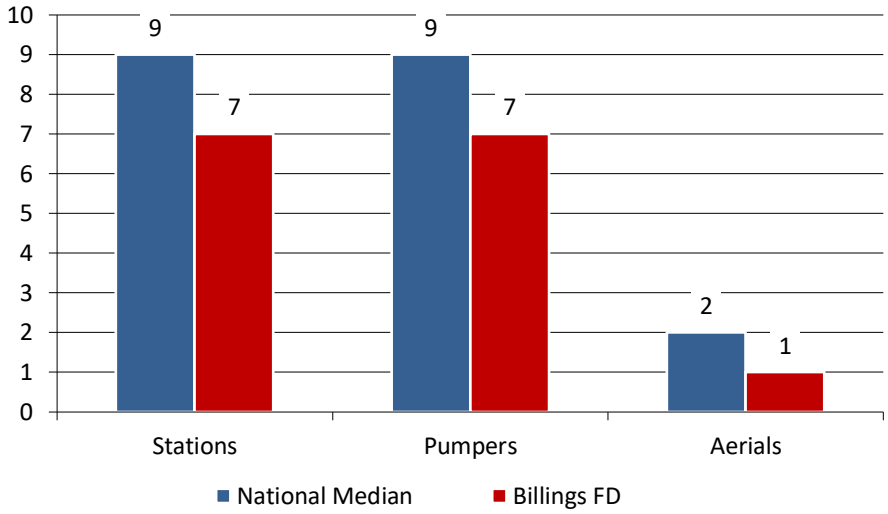
The fire department is responsible for fire and EMS service delivery for the entirety of the City of Billings, consisting of 43.75 square miles with a population of 114,000 citizens. In addition, the department provides emergency response to the Billings Urban Fire Service Area (BUFSA). BUFSA is a separate entity, organized as a fire protection district under Montana State Law. The district consists of 47.73 square miles that are adjacent to the boundaries of the City of Billings and has its own taxing authority. Until recently, the BUFSA was administered by the Board of County Commissioners, however it is now under the direction of a stand-alone Board of Trustees.

BFD has deployed personnel and apparatus in strategically located fire stations, balancing the needs of providing effective coverage to what is a widely dispersed geographic area. The department has done so based on a combination of available resources, financial capacity, and the department's deployment strategies, which are discussed in further detail later in this report.

BFD's continuing challenge will be making the most prudent staffing and facility placement decisions in consideration of community growth, balancing multiple considerations including risk exposure, response times, access challenges, deployment, community expectations, and fire department capacity.

In the following figure, a comparison of fire stations, front line pumpers (engines), and aerial trucks is provided, mirrored against National Median data.

Figure 7: Capital Asset Comparison



Relative to national comparators, BFD has a lesser number of fire stations, pumpers and aerials than similar sized organizations, based on population.[3] It is noted that one of the pumpers included in the chart above is a "quint" apparatus, meaning that it also carries an aerial ladder.

Budgets and Finance

No emergency services agency, whether municipal or district, can survive without adequate funding. This funding, which may come from a variety of sources such as ad valorem taxes, fundraisers, donations, etc., form the basis from which the agency is able to purchase the necessary equipment to fulfill its mission. Without adequate funding that is also sustainable, an organization is destined for failure. In the current economy, most communities are searching for ways in which to reduce expenditures while maintaining levels of service. Simultaneously, emergency services organization are finding it increasingly difficult to deliver the services that the community desires and are often asking for more funding to adequately supply the expected levels of services.

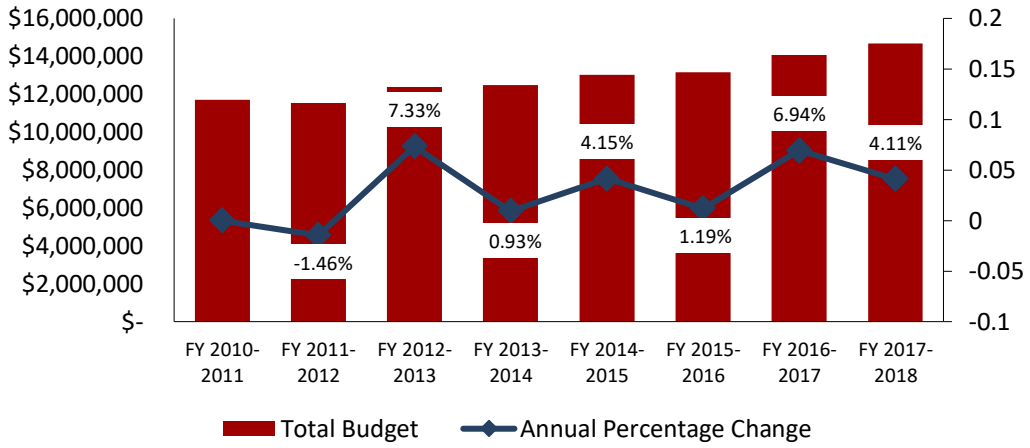
The following is a discussion of BFD's operating budget. The representations illustrate total departmental budget including personnel, supplies/materials, and capital expenditures, information that will be used in future analyses in this report.

[3] Benchmark data from National Fire Protection Association (NFPA) is based on population and does not consider geographical size or population density of the particular area. The data from which these comparable figures are extracted does not delineate between volunteer or career departments nor does it segregate out those departments heavily involved in the provision of emergency medical services, particularly transport service, which can increase departmental costs dramatically.

Operating Budget

The Billings Fire Department is financially supported as a component of the City of Billings annual budget, along with partial financial support provided via the Billings Urban Service Area. The department's total operating budget from fiscal years 2010–2011 to 2017–2018 is reflected in the following figure.

Figure 8: Historical Budget Growth



The budget has ranged from $11,706,350 in 2010, to a high of $14,661,773 in the 2017–2018 fiscal year. The increase over the five-year time span totals $2,955,383, or 11.6 percent. The department's overall budget has seen a 4.96 percent average annual growth since 2010, but this growth is not reflected in all divisions of the organization.

BFD's budget is separated into a traditional format, with its major areas identified as: Fire Administration, Fire Suppression, Fire Prevention, and Fire Training. The allocations by budget category are listed in the following figure.

Figure 9: Budget Category Comparison

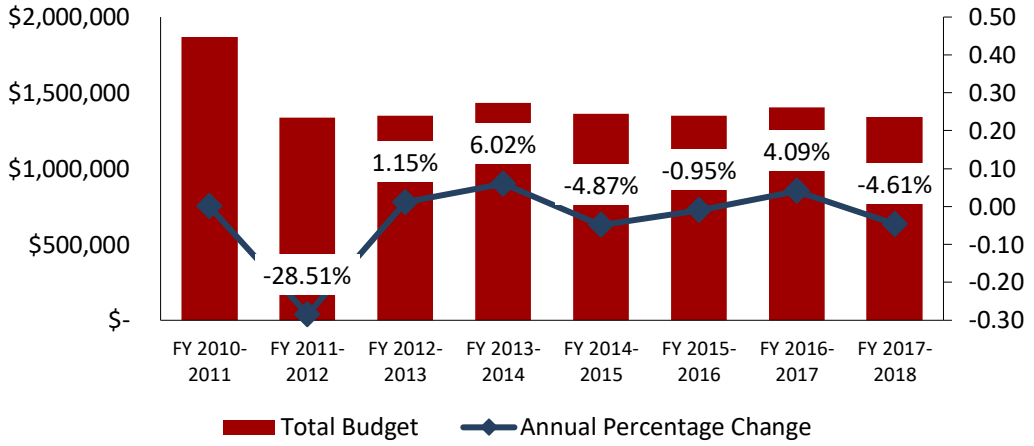
Budget Category	2017 Adopted Budget
Fire Administration	$1,339,598
Fire Suppression	$12,278,658
Fire Prevention	$685,179
Fire Training	$358,338

As demonstrated above, the majority of the budget is carried by the Fire Suppression portion, which is by far the largest area and is 83.7 percent of the total budget. The category has increased an average of 4.33 percent since 2010 to accommodate growth in the compensation and benefits categories for FTEs that were added.

The Fire Training budget saw an average increase at 4.43 percent, but this was limited to the salary component for an additional training FTE and there was little change in the costs attributed to training supplies and classes, despite the growth in the number of FTEs. The Fire Prevention portion of the budget, while larger than 2010, was the most modest of the areas of the budget that saw growth, with an average 3.17 percent growth during the same period.

The Fire Administration area of the budget has seen a significant decrease since 2010, losing 28.3 percent of its funding through 2017, skewing much of the financial data for this period by setting an artificially low starting point for comparison purposes. This is particularly concerning given the growth of the department and the rising number of incidents that the department is responding to. The trend is detailed in the following figure.

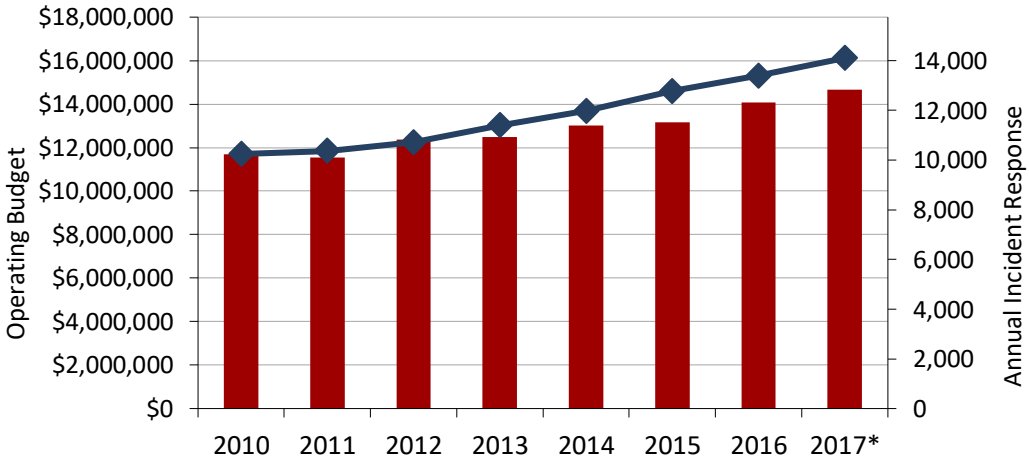
Figure 10: Fire Administration Budget History



The decline in 2011–2013 was largely a result of the completion of Station 7, two years earlier than anticipated.

In the following figure, the department's annual budget is compared to the annual incident volume. As the department annual incident volume increased by 30.8 percent, the annual budget was outpaced and grew by 25.3 percent in comparison.

Figure 11: Annual Budget to Annual Incident Volume Comparison



*2017 Annual Incident Volume totaled 14,446.

Emergency Response Type and Frequency

BFD responded to 13,296 requests for assistance from the citizens of the city in the July 2016–July 2017 fiscal year. As is typically found, a substantial portion of the incidents are of an emergency medical nature. The department's emergency calls for 2016–2017 are listed in the following figure.

Figure 12: Emergency Response Type and Frequency

Survey Components	Billings Fire Department Observations	Percentage of Total
Incidents		
Fire	327	2.4%
Value of property exposed to fire, 2016	$24,419,052	N/A
Value of property lost to fire, 2012	$9,946,251	N/A
Rupture or explosion	5	
EMS/rescue	6,482	47.3%
Number of EMS transports	N/A	N/A
Hazardous condition	281	2.1%
Service call	1,115	8.1%
Good intent call	4,823	35.2%
False call	662	4.8%
Severe weather	1	0.01%
Other	2	0.01%
Total	13,698	100.00%

Discussion

BFD responded to a total of 13,698 requests for service in the 2016–2017 fiscal year. Of those, 6,482 were responses to medical emergencies, accounting for 47.3 percent of total responses, which is a lower ration than typically seen in similar agencies. However, it is noted that the department's reporting practices are configured so that they enter calls to which they respond but are cancelled prior to arrival in the "good intent call" category. The practice is appropriate, but many agencies do not do so. Specifically, if all cancelled calls—a large portion of emergency medical incidents—were reported in the EMS/rescue category, the percentage of medical responses relative to total incidents would be similar to other like-sized agencies.

Following is a breakdown of the department's "good intent," "cancelled" calls and "EMS cancelled" calls:

Figure 13: "Good Intent Call" Breakdown

Call Type	Count	% of Total Incidents
Good Intent Calls	4,823	35.2%
Cancelled Calls	4,256	31.1%
EMS Cancelled Calls	3,113	22.7%

The data reveals that the department has a higher number of cancelled EMS calls than is typically seen. The reason is unclear but is likely related to the fact that the department does not determine whether it will respond to medical emergencies based on a prioritization protocol but, instead, responds to all Emergency Medical Services (EMS) calls that are reported to the 911 Center. A system, titled Medical Priority Dispatch System (MPDS), is available via the 911 Center but not implemented by BFD. Future consideration to MPDS implementation is addressed later in this report.

MANAGEMENT COMPONENTS

Effective fire department management is a common challenge for fire service leaders. Today's fire department must address management complexities that include an effective organizational structure, adequacy of response, maintenance of competencies, a qualified work force, and financial sustainability for the future.

To be effective, the management of a fire department needs to be based on several components. A key element of forward thinking management is accomplished by the Billings Fire Department completing this Long-Range Master Plan process. This report will need to be built upon to ensure that essential foundational elements such as policy and operational documents, development of internal and external communication practices, recordkeeping, and sustainable financial practices are implemented and maintained.

In the following report section, ESCI examines the BFD's current efforts to manage the organization and identifies measures and best practices we are recommending for the future.

Foundational Management Elements

The development of baseline management components in an organization enables it to move forward in an organized and effective manner. In the absence of foundational management elements, the organization will tend to operate in a random and generally ineffective manner. The following figure reviews BFD's baseline management components.

Figure 14: Foundational Elements

Survey Components	Billings Fire Department Observations	Comments and Recommendations
Mission, Vision, Strategic Planning, Goals and Objectives		
Mission statement adopted	Yes	
Displayed	Yes (Letterhead only)	Institutionalize the department's mission statement.
Periodic review	No	
Vision established and communicated	Yes	
Values of staff established	Yes	
Strategic or master plan (fire department)	Master Plan currently ongoing. No strategic plan.	Upon completion of this master planning process, complete a strategic plan to implement the study findings.
Adopted by elected officials	N/A	
Published and available	N/A	
Periodic review	N/A	
Agency goals and objectives established	Not defined	
Date developed	N/A	
Periodic review	N/A	
Tied to division/personnel performance statements/plans	N/A	

Survey Components	Billings Fire Department Observations	Comments and Recommendations
Objectives linked to programs	N/A	
Performance objectives established	N/A	
Code of ethics established	Yes, at the City level only	

Discussion

A fire department strategic plan establishes a road map for the organization by first developing statements of the agency's Mission, Vision, and Core Values. From there, the plan identifies primary goals for a three to five-year period and the objectives with which to achieve them. Finally, responsibility for completing the objectives is assigned and performance criteria are established by which to measure progress.

BFD has completed one element of a strategic plan by establishing a Mission Statement, however it has not been reviewed on a regular basis and is not institutionalized by being posted in the fire stations, on the agency website and other places such as member's business cards. A full strategic plan has not been completed.

BFD is advised to embark on a path toward developing a comprehensive five-year strategic plan, including mission, vision, and values, and performance objectives. The BFD strategic planning process will identify specific goals and objectives whereby it intends to meet its vision. These goals and objectives will provide guidance in decision-making and focus the department's efforts on the most critical issues that will impact its success in the future. In addition, the plan will provide the members with direction for the future and how each fits in.

When an organization is undertaking a master planning process like this one, the result will be an extensive "things to-do list." One of the best ways to prioritize and plan for the implementation of recommendations contained in this report, is by use of the strategic planning process. It is recommended that this study be followed directly by the completion of a strategic plan. ESCI can assist in the process.

Finally, the City of Billings has adopted a code of ethics. However, the fire department has not done so internally. It is recommended that a BFD code of ethics be established that compliments that of the City.

Key Recommendations

- Institutionalize the department's mission statement.
- Undertake a strategic planning process upon completion of this study.
- Initiate an annual review of mission, values, and vision statements.
- Develop a stated code of ethics.

Management Documents and Processes

Similarly, an organization should establish appropriate documentation, policies, procedures, and identification of internal and external issues that affect the agency. Processes must also be established to address the flow of information and communication within the fire department as well as with its constituents.

The next figure reviews BFD's management documents and processes.

Figure 15: Foundational Documents and Processes

Survey Components	Billings Fire Department Observations	Comments and Recommendations
Availability of SOPs, Rules and Regulations, Policies		
Copies of rules provided	Fire department Policy Manual	
Last date reviewed	Ongoing, reviewed on a as needed basis. Updated 2 to 3 times per year generally.	
Copies of SOGs or guidelines available	Fire Department Protocol Manual	Standard Operating Guidelines (SOGs) are called protocols by BFD.
Regular update	Most recent revision was in 2012	Review and update operating protocols on a regular basis.
Process for development of new SOGS (protocols)	None	Establish a structured process for developing new operating protocols.
SOGS (protocols) used in training evolutions	Limited	Closely incorporate operating protocols into ongoing training of personnel.
Policy manual available	Yes	
Reviewed for consistency	No	Review and update the policy manual on a regularly scheduled basis.
Reviewed for legal mandates	No	Subject policy manual content to legal review, where applicable.
Training on policies provided	Pending	Incorporate operating protocols into ongoing training of personnel.
Identification of Critical Issues		
Critical issues are identified	Yes	
First critical issue	Staffing. Limited at the command and suppression levels as well as administrative support. Prevention and training and dispatch are reportedly understaffed.	Conduct a workload analysis for command and administrative support staffing and address staffing needs as detailed in this report as funding allows.
Second critical issue	Sustainability of operational funding, particularly overtime funding to accommodate training and other needs.	Regularly review operational funding and overtime expense.
Third critical issue	Current and future station locations.	Evaluate station locations to maximize deployment as detailed in this report.

Survey Components	Billings Fire Department Observations	Comments and Recommendations
Internal evaluation of critical issues	Yes	Periodically conduct an internal analysis of critical issues facing the organization with internal stakeholder input.
Challenges of the Future		
Challenges are identified	Yes	
First challenge	Growth and in-fill of vacant land.	The current growth is said to be about 2 percent annually. Service demand is increasing in a similar manner.
Second challenge	Geography of the service areas, travel routes, impediments.	Some station locations represent extended travel times.
Third challenge	Sustainability of services and programs. Financing of training, prevention, Public Education Programs.	
Internal and External Communications		
Internal Communications		
Regularly scheduled staff meetings (fire department)	Monthly staff meeting with Battalion and Division Chiefs were recently re-established.	
Written staff meeting minutes	Yes	
Memos	Yes	
Member newsletter	None	Consider producing periodic internal newsletters to keep all personnel informed of ongoing events.
Member forums	None	Periodically meet with personnel or conduct informational forums.
Open door policy	Yes	
Bulletin board	In all stations	
Vertical communication path clearly identified	Yes, via chain of command and organizational chart.	
E-mail	Yes	
Employee mail boxes	Each employee has an email account.	
Voice mail	Select personnel have voicemail.	
Issues taskforce	Pending	Continue/complete the process of developing a group that identifies departmental issues and solutions.
External Communications		
Community newsletter	Yes, produced by the City.	Consider a community newsletter specific to the fire department.
Website	Yes, maintained by the City.	

Survey Components	Billings Fire Department Observations	Comments and Recommendations
Advisory committee(s)	Internal: EMS, Apparatus, and Equipment, and Wildland Committee were all dormant and are being restored. External: Communications center advisory board; Advanced medical services (EMS providers); City College Paramedic Advisory Committee	
Complaint process	Yes	
social media (Facebook/twitter)	Not at this time	
Community survey	Yes, conducted by the City.	
Local community planning organizations	Yes	
Focus groups	Yes	

Discussion

BFD has established policy, procedure, and baseline management practices that are appropriate and consistent with fire department best practices.

Policy and Procedure

BFD operations are conducted under policy guidance from the City, as far as employment, human resources, and related considerations. In addition, the fire department operates under policy and procedure that is specific to its internal operations.

Fire departments typically manage and direct operational practices by way of Standard Operating Procedures (SOPs), or Standard Operating Guidelines (SOGs). Billings Fire Department has a similar practice, referencing their operating procedures as "protocols." An agency protocol manual is maintained as the basis for operational aspects of the organization. However, at the time of ESCI's field visits, the protocol manual had not been updated since 2012. It was indicated during stakeholder interviews that administration staffing limitations have prohibited the department from addressing the need.

Protocols establish the basis for all the department operations, in the station and on the emergency scene. For this reason, it is essential that the protocols be current. BFD is advised to review and update its protocols and to establish an ongoing practice of maintaining current procedures.

Critical Issues and Organizational Challenges

The Fire Chief has identified critical issues facing the organization as follows:

Figure 16: Fire Chief-Identified Critical Issues

Identified Critical Issues	
First Critical Issue	Staffing. Limited at the command and suppression levels as well as administrative support. Prevention and training, and dispatch are reportedly understaffed.
Second Critical Issue	Sustainability of operational funding, particularly overtime funding to accommodate training and other needs.
Third Critical Issue	Current and future station locations.

Discussion

Department staffing is a concern at both administrative and operational levels. In the Staffing section of this report, ESCI provides a detailed assessment of the department's personnel resources and deployment. It is also recommended that the City review and analyze current command and administrative support staffing, and address staffing needs as detailed in this report, and as financial capacity allows.

Funding is a second critical issue, which is a common concern found in most fire departments. Sustainability of operational funding was specifically noted as an area of concern, which is supported by other findings in this report. The challenge will be ongoing, and ESCI recommends that BFD closely monitor operational funding and overtime expense and seek financial support where possible.

The third critical issue identified was purely operational in nature, that of current and future fire station locations. In the Service Delivery and Performance section of this report, a very detailed analysis of current and future fire station locations. Response delivery concerns with existing station locations are identified and future facility needs are specified.

Figure 17: Identified Future Challenges

Identified Future Challenges	
First Challenge	Community growth and in-fill of vacant land
Second Challenge	Geography of the service areas, travel routes, impediments
Third Challenge	Sustainability of services and programs. Financing of training, prevention, Public Education Programs.

Challenges related to community growth and infill, and related fire department service demand (workload) are not only identified as a primary concern but are also the foundation of the reason for this report.

Key Recommendations

- Review and update operating protocols and establish an ongoing practice of maintaining procedures in a current state.
- Review and analyze current command and administrative support staffing and address staffing needs as detailed in this report, as funding allows.
- Closely monitor operational funding and overtime expense and seek financial support where possible.

Record Keeping and Documentation

In any organization, documentation of activities is of paramount concern. The following figure reviews the practices that are in place in the BFD.

Figure 18: Record Keeping and Documentation

Survey Components	Billings Fire Department Observations
Document Control	
Process for public access established	Process to request public documents is in place
Hard copy files protected	Yes
Computer files backed up	Yes, maintained by the City IT Division
Security	
Building security	Secured when un-occupied
Office security	Secured when un-occupied
Computer security	Yes
Vehicle security	City owned, yes, personal, no
Capital inventory maintained	Yes
Asset security system used	No
Inventory interval	Yes, but limited
Monetary controls used	Yes
Cash access controls	Yes
Credit card controls	Yes, via City Policy
Purchasing controls	Yes, via City Policy
Reporting and Records	
Records kept by computer	Yes
Type of platform	PC based
Operating system	Windows
Periodic report to elected officials	Yes
Financial report	Yes, via City Finance Division
Management report	Annual report only
Operational report	Annual report only
Distributed to others	Yes
Annual report produced	Yes
Distributed to others	Yes
Analysis of data provided	Not formally
Required records maintained	Yes
Incident reports	Yes
Patient care reports	Yes
Exposure records	Yes
SCBA testing	Yes
Hose	Yes

Survey Components	Billings Fire Department Observations
Ladder	Yes
Pump	Yes
Breathing air	Yes
Information Technology	
Computer platform	Windows
Maintenance/IT support provided by	City IT Division

Discussion

BFD has met the considerations for physical and data security, including appropriate computer backup practices. Reporting files are secured and meet accepted standards and best practices.

BFD completes all required testing of critical equipment. ESCI recommends that the department verify these records are preserved for review as required.

PLANNING FOR FIRE PROTECTION AND EMERGENCY MEDICAL SERVICES

Emergency services exist in a rapidly changing environment. Along with improved tools and technologies used to provide service there is the increased regulation of activities, new risks to protect, and other challenges that can quickly catch the unwary off guard. Only through continuous internal and external environmental awareness and periodic course corrections can an organization stay on the leading edge.

To do a better job with available resources, the organization must focus on improving services while identifying programs or activities that may no longer serve its changing needs. Through planning, a fire department can establish a vision for the future, create a framework within which decisions are made, and chart its course to the future. The quality and accuracy of the planning function determines the success of the organization.

To be truly effective, an emergency services agency must consider planning on five distinct levels:

1. Tactical planning
2. Operational planning
3. Master planning
4. Strategic planning
5. Emergency management planning

Tactical planning is the development of *strategies for potential emergency incidents*. Operational planning is the *organization of day-to-day activities*—as primarily outlined by a department's standard operating guidelines and procedures—and the integration of the agency into other local, regional, or national response networks. Master planning is *preparation for the long-term effectiveness* of the agency as the operating environment changes over time. Finally, strategic planning is a process of *identifying* an organization's mission, vision, and values *and prioritizing goals and objectives* for things that need to be accomplished in the near future.

BFD performs some fundamental, short-term planning in the form of the annual budget development process, which is used to define the activities and priorities identified for the upcoming year. However, establishing a long-term planning perspective for the fire department is important as well. Without a plan, it is impossible for an organization to know when it is reaching milestones or providing exceptional services to its constituency.

The following figure details the current planning efforts in place in the Billings Fire Department.

Figure 19: Planning for Fire and Emergency Medical Services

Survey Components	Billings Fire Department Observations	Comments and Recommendations
Organizing for the Planning Process		
Adopted planning process	Not formally	Establish a structured internal planning process.
Long-range planning		
Master planning	This process	
Strategic planning	None	Complete a strategic planning process to implement the recommendations of this master plan.
Capital improvement planning	Equipment replacement Plan (ERP) Technology Replacement Plan (TRP) City Capital Improvement Plan (CIP)	
Financial planning	Yes, under revision	
Operational planning		
Response planning	Run card and dispatch protocols in place and recently revised	
Regional incident command	Yes	
Mutual aid planning	Yes, county wide mutual aid agreement	
Disaster planning	Yes, via LEPC[4] and county	
Tactical planning		
Pre-fire planning	Completed by the Fire Prevention Bureau	Assure that all target hazards receive pre-fire planning at a minimum. Make pre-plans readily available to response crews.
Specific hazard plans	Yes	
Hazardous materials planning	Yes, via LEPC	
Current Planning Process		
Planning group established	Not defined	Establish an internal planning group that meets regularly.
Current and future environmental analysis	Informally only	Task the planning group to conduct an "environmental scan" to identify planning needs.
Strategies formulated (goals)	In progress	Use planning group findings to develop planning goals.
Benchmarks (performance objectives)	In progress	Define planning goals with measurable performance objectives.

[4] LEPC: Local Emergency Management Committee

Survey Components	Billings Fire Department Observations	Comments and Recommendations
Interest Group Assistance In Planning Process		
Customer survey	Not routinely	Periodically conduct citizen surveys to help identify planning needs.
Citizen involvement	Some citizens are engaged in department business. Community members are welcomed at meetings.	
Business community involvement	Business owners are involved with the fire department to varying degrees.	
Elected official involvement	Elected officials are engaged largely via the budget process.	
Staff participation	Staff participation has varied in the past and is progressing.	
Emergency Preparedness Planning		
Preparedness and response (EOP,[5] EAP,[6] RMP,[7] radiological preparedness)	County DES[8] coordinator = incudes the City. LEPC in place I addition to DES.	
Plans/documents	County EOP, EOPs for each refinery, Airport EOP at the county level.	
Date developed		
Adopted by elected officials	Yes	
Published and available	Yes	
Periodic review	Yes	
Emergency Management Resources		
Internal personnel resources	No dedicated resources	
External personnel resources	LEPC Member agencies	

Discussion

The department has addressed a number of planning needs, that of noted importance is this master planning process. Additional planning has been undertaken at the City level, including essential elements such as capital and technology replacement planning. The following discussion focuses on the identified planning strategies.

5 EOP: Emergency Operations Plan
6 EAP: Emergency Action Plan
7 RMP: Risk Management Plan
8 DES: Department of Emergency Services

Planning Processes

Planning efforts have been positive, however what has been accomplished has not occurred within the context of a structured and organized planning process internal to the fire department. ESCI has found that effective planning occurs when an organization makes it a point to plan, assigns responsibility to a planning group to identify planning needs, and establishes goals and performance measures by which to achieve the specified goals.

It is recommended that BFD establish an internal planning group, with direction to identify planning needs and put steps in place to achieve them.

Tactical Planning

It is critically important that firefighters and command staff have comprehensive, accurate information readily at hand to identify hazards, direct tactical operations, use built-in fire suppression systems, and fire resistive features. This is accomplished by building familiarization tours, developing pre-incident plans, and conducting tactical exercises, e.g. on-site or tabletop simulations. Pre-incident plans are easy to use, quick reference tools for company officers and command staff.

The BFD Fire Prevention Bureau currently completes pre-incident plans; however, they are not routinely included in the agency's ongoing training efforts. The department is encouraged to develop and maintain effective pre-incident plans and to incorporate the plans routinely into the training program. Further, it is recommended that efforts be made to assure that all target hazards are subject to a pre-fire plan and that completed plans be readily available to response crews via mobile data terminals or similar technology.

Operational Planning

Operational planning includes the establishment of minimum staffing policies, standardized response plans or protocols, regional incident command planning, mutual aid and automatic aid planning (locally and regionally), resource identification and planning, and disaster planning.

Maintaining a comprehensive and current emergency plan and resource list is the best opportunity for BFD to ensure adequate resources are readily available to control major events. Resource lists should be available to incident commanders and general staff in the field, and in an emergency operations center.

BFD has entered into a mutual aid agreement with the other Yellowstone County agencies. The existing agreement does not include an automatic aid component. Automatic Aid is the same as Mutual Aid but is pre-programmed into dispatch protocols to send pre-determined units on the initial call dispatch, based on the type of incident. This eliminates the need for the responding fire officer to specifically request assistance from other agencies while responding to or managing a large incident. It is recommended that BFD develop Automatic Aid procedures with its dispatch center and Mutual Aid partners.

Master Planning

The Billings Fire Department has wisely recognized the need for a stronger planning effort by undertaking this master planning process. This plan gives the department a clear idea of where it is today, where it will be in the future, and what it will need to do to get there. This Master Plan is designed to provide a view of the organization in a 15-year time frame.

Strategic Planning

BFD has not completed a strategic plan in the past. A strategic plan involves a three to five-year planning window and establishes prioritized goals and objectives for the organization. The planning approach is particularly important when a Master Plan has been completed. The reason is that the Master Plan identifies multiple recommendations and future strategies, which are then evaluated and prioritized via the Strategic Plan. Completion of a Strategic Plan within six months of this Master Plan is highly recommended. ESCI can assist with the process.

Capital Improvement Planning

In ESCI's experience with many cities and fire departments nationwide, capital replacement planning is routinely found to be inadequate. Often, no planning is in place and agencies simply wait until an expensive capital asset is no longer useable to determine how to fund its replacement. In other instances, a replacement schedule is in place, but accompanying funding for the scheduled expense is not.

The City of Billings, and the BFD, are an exception to much of ESCI's experience. The City has three initiatives in place for future planning. First, the City maintains a Capital Improvement Plan (CIP) that anticipates and funds large capital projects. In addition, an Equipment Replacement Plan has been established for the purpose of financing replacement of City equipment, inclusive of but not limited to fire apparatus. Finally, a Technology Replacement Plan (TRP) is in place to address IT and related needs. Billings is commended for its insight into this important planning need.

Emergency Management Planning

Emergency management, once a low priority in the mind of the public, has risen to the conscious level of everyday life. Nonexistent before 2001, the DHS (Department of Homeland Security), terrorist threat warnings, the Transportation Safety Administration (TSA) screenings on public transportation, and security checks at sporting events and concerts are now common parts of urban life.

Well-prepared community governments prepare themselves, other institutions, businesses, and the public to survive disaster by mitigating hazards to eliminate or reduce risk. By developing and maintaining emergency action plans, and by exercising and updating the plans regularly, municipal governments help limit (or manage) the consequences of a disaster. The common term for governmental disaster preparedness is emergency management.

The Billings Fire Department has not developed its own plans for responding to disasters and has chosen to rely on the county-wide emergency management functions of the Yellowstone County. The department has had some input on these plans, but exercises have been infrequent. It is paramount that department staff be involved in the planning process and well informed of the plan contents. ESCI recommends that the department take an active role in the development of emergency management planning with the City and County.

Key Recommendations

- Establish an internal planning group that meets regularly. Task the group to conduct an "environmental scan" to identify planning needs and establish means by which to address them.
- Complete a Strategic Plan to address implementation of this Master Plan within six months.
- Increase involvement in the emergency management planning process locally and at the county level.

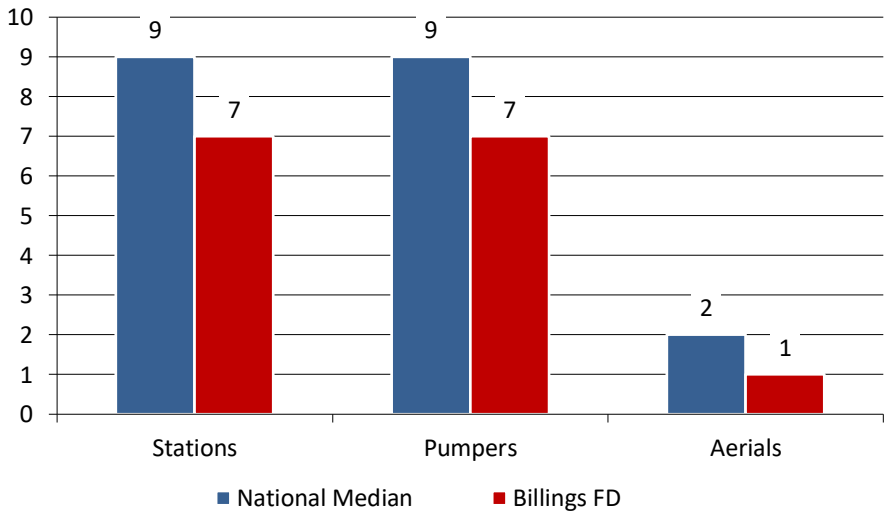
CAPITAL ASSETS AND ASSESSMENT OF CURRENT INFRASTRUCTURE

Regardless of an emergency service agency's financing, if appropriate capital equipment is not available for the use by responders, it is impossible for a fire department to deliver services effectively. Two primary capital assets that are essential to the provision of emergency response are facilities and apparatus (response vehicles).

BFD maintains an inventory of seven fire stations, seven front line fire engines, one of which is a "Quint" aerial apparatus, and one aerial ladder truck that are needed to carry out its emergency mission. In addition, a complement of people, equipment, and facilities support the department's operations. Because firefighting is an extremely physical pursuit, the adequacy of personnel resources is a primary concern; but no matter how competent or numerous the firefighters are, the department will fail to execute its mission if it lacks sufficient facilities and fire apparatus distributed in an efficient manner.

The BFD maintains millions of dollars-worth of capital assets. These assets are necessary to provide service and must be maintained and replaced as needed. A comparison of major capital assets, including fire engines, aerial ladder trucks, and fire stations is provided in the following figure.

Figure 20: Capital Asset Comparison



As stated previously, BFD has fewer capital resources in terms of fire stations, pumpers and aerial when compared to similar sized organizations, based on population and data from the National Fire Protection Association.[9] While numerous other factors need to be considered, the numbers of capital resources will directly impact the agency's response performance and, if undersized, may adversely affect the ability to achieve response goals. The question is addressed in greater detail in the Service Delivery and Performance section of this report.

Apparatus Replacement Planning

Fire apparatus are typically unique pieces of equipment, often very customized to operate efficiently in a narrowly defined mission. A pumper may be designed such that the compartments fit specific equipment and tools, with virtually every space on the truck designated in advance for functionality. This same vehicle, with its specialized design, cannot be expected to function in a completely different capacity, such as a hazardous materials unit or a rescue squad. For this reason, fire apparatus is very expensive and offers little flexibility in use and reassignment. As a result, communities across the country have sought to achieve the longest life span possible for these vehicles.

Unfortunately, no mechanical piece of equipment can be expected to last forever. As a vehicle ages, repairs tend to become more frequent, parts more difficult to obtain, and downtime for repair increases. Given the emergency mission that is so critical to the community, this factor of downtime is one of the most frequently identified reasons for apparatus replacement.

Because of the large expense of fire apparatus, most communities find the need to plan ahead for the cost of replacement. To properly do so, agencies often turn to the long-accepted practice of establishing a life cycle for the apparatus that results in a replacement date being anticipated well in advance. Forward thinking organizations then set aside incremental funds during the life of the vehicle so replacement dollars are ready when needed.

As stated earlier, the City of Billings and BFD, maintain a Capital Replacement Plan as well as an Equipment Replacement Plan that places fire apparatus on a specified replacement cycle from date of primary service. ESCI commends this effort and encourages the City to routinely review and update the replacement schedule and forecast replacement costs, as both are subject to change over time.

[9] Benchmark data available through National Fire Protection Association (NFPA) is based primarily on population and does not consider geographical size or population density of the particular area. Regarding costs per capita, the data from which these comparable figures are extracted does not delineate between volunteer or career departments nor does it segregate out those departments heavily involved in the provision of emergency medical services, particularly transport service, which can increase departmental costs dramatically.

Facilities

Appropriately designed and maintained facilities are critical to a fire department's ability to provide services in a timely manner and with appropriate deployment of assets. ESCI observed and reviewed the fire stations operated by Billings Fire Department.

The findings are summarized in the following pages and any areas of concern observed are identified.

Figure 21: Billings Fire Department Station 1

Billings Fire Station 1 serves to provide response to the downtown core and also houses the department's administrative, fire prevention and training division offices as well as the city's dispatch center. The facility is comprised of five, double depth, apparatus bays.

This facility does not meet current capacity needs and is aging.

SURVEY COMPONENT	OBSERVATIONS
STRUCTURE	
Physical address	2305 8TH Avenue North
Construction type	Wood frame and masonry exterior
Date of construction	1973
Seismic protection/energy audits	2013
Auxiliary power	Diesel generator
Condition	Fair
Special considerations (ADA, mixed gender appropriate, storage, etc.)	Marginally ADA compliant. Not configured for dual gender use. Storage and apparatus space is fully maximized.
Square footage	14,740
FACILITIES AVAILABLE	
Exercise/workout	A workout area is in a former racquet ball court
Kitchen/dormitory	A good-sized kitchen/dining area is present. A dormitory room has space for 7, with separate quarters for the Captain as well as the BC.
Lockers/showers	Yes, but inadequate numbers of lockers
Training/meetings	Large training room downstairs seats 40 students and a smaller conference room is also present.
Washer/dryer	Yes
SAFETY AND SECURITY	
Sprinkler system	Basement area only. The balance is not protected.
Smoke detection	Yes
Security	Controlled access and cameras
Apparatus exhaust system	On all front-line diesel apparatus
Units/staffing levels assigned	Six, with three cross-staffed units.

Figure 22: Billings Fire Department Station 2

Station 2 is a two-bay facility. One bay is of drive-through configuration but is not utilized accordingly so units back-in to the station. The facility has exceeded its capacity and is in need of updating/renovating.

A four-story training tower located on the property was updated two years ago, in good condition.

SURVEY COMPONENT	OBSERVATIONS
STRUCTURE	
Physical address	501 South 28th Street
Construction type	Wood frame/masonry exterior
Date of construction	1965
Seismic protection/energy audits	Original electrical service and boiler system, dated and possibly inefficient. Weakly insulated building.
Auxiliary power	Diesel generator
Condition	Poor—Clean but worn and in need of remodel or replacement. Drives and pad in poor condition and in need of repair.
Special considerations (ADA, mixed gender appropriate, storage, etc.)	Not dual gender appropriate and not ADA compliant. Storage use fully maximized.
Square footage	4,672
FACILITIES AVAILABLE	
Exercise/workout	Workout room inside dormitory room, which is combined with locker areas into one crowded space.
Kitchen/dormitory	Kitchen/dining table/lounge all one room
Lockers/showers	Lockers in dormitory area, as listed above, single bay restroom.
Training/meetings	No facilities
Washer/dryer	Present
SAFETY AND SECURITY	
Sprinkler system	The station is not protected ay an automatic fire sprinkler system.
Smoke detection	Detectors present
Security	None
Apparatus exhaust system	Yes
Units/staffing levels assigned	Three cross-staffing two units.

Figure 23: Billings Fire Department Station 3

Station 3 is a two-bay facility with a basement area. One bay is drive through and the other requires backing in. Turnouts are stored in a room separated from the engine bays.

Station 3 meets current needs; however, the station is over 50 years old and is at its maximum capacity for staffing and apparatus.

SURVEY COMPONENT	OBSERVATIONS
STRUCTURE	
Physical address	1928 17TH Street West
Construction type	Wood Frame/Masonry Exterior
Date of construction	1965
Seismic protection/energy audits	Yes
Auxiliary power	None
Condition	Fair—Station appears well kept, but shows its age.
Special considerations (ADA, mixed gender appropriate, storage, etc.)	Remodeled in 2014 to address maintenance and mixed gender issues. Some storage available.
Square footage	4,000 square feet
FACILITIES AVAILABLE	
Exercise/workout	Workout area in basement (poor access to apparatus bays).
Kitchen/dormitory	Small kitchen/dayroom. Separate sleeping areas with lockers.
Lockers/showers	Separate restrooms with shower
Training/meetings	None
Washer/dryer	Washer/dryer available for on duty crews
SAFETY AND SECURITY	
Sprinkler system	No automatic fire sprinkler system
Smoke detection	Residential smoke detectors in sleeping areas and kitchen
Security	Keypads on exterior doors
Apparatus exhaust system	Yes
Units/staffing levels assigned	One first out engine staffed with three personnel

Figure 24: Billings Fire Department Station 4

Station 4 has three drive-through, bays. The station houses a crew of three, and includes a breathing air compressor and a space designated for SCBA equipment repair and testing.

The station well kept, but in need of repairs. It meets the current needs of the department and with proper maintenance and improvements could meet the future needs of the BFD.

SURVEY COMPONENT	OBSERVATIONS
STRUCTURE	
Physical address	475 6TH Street West
Construction type	Wood Frame/masonry exterior
Date of construction	2001
Seismic protection/energy audits	Yes
Auxiliary power	Diesel generator
Condition	Fair to good—Numerous deferred maintenance issues identified during site visit.
Special considerations (ADA, mixed gender appropriate, storage, etc.)	A community room for public use (ADA compliant). Crew quarters may not be mixed gender appropriate.
Square footage	9,998 square feet
FACILITIES AVAILABLE	
Exercise/workout	Workout area in the basement has HVAC drainage problems and has poor access to apparatus bays.
Kitchen/dormitory	Kitchen/dayroom are adequate. Single sleeping area with four beds, separate sleeping area in the Captain's office.
Lockers/showers	Separate restrooms with showers
Training/meetings	Community room available for training and meetings
Washer/dryer	Commercial extractor for PPE decontamination. Washer/dryer for on duty crew use.
SAFETY AND SECURITY	
Sprinkler system	No automatic fire sprinkler system
Smoke detection	Residential smoke alarms in sleeping area and kitchen
Security	Keypad locks on exterior doors. Crew quarters are accessible from Community room and should be secured.
Apparatus exhaust system	Yes
Units/staffing levels assigned	Three apparatus; three personnel on first out engine (quint), others cross-staffed.

Figure 25: Billings Fire Department Station 5

Station 5 has two bays with one bay configured for drive-through use. The facility is nearly 45 years old and shows signs of aging.

A second approximately 4,500 square foot building, a former maintenance facility, houses a HazMat unit and the State Regional Hazmat response apparatus.

The capacity for apparatus and personnel at this station is maximized.

SURVEY COMPONENT	OBSERVATIONS
STRUCTURE	
Physical address	605 South 24TH Street West
Construction type	Wood Frame/masonry exterior
Date of construction	1973
Seismic protection/energy audits	Yes
Auxiliary power	Diesel Generator
Condition	Fair—Clean but showing age.
Special considerations (ADA, mixed gender appropriate, storage, etc.)	Marginally ADA compliant, not mix gender appropriate.
Square footage	5,740
FACILITIES AVAILABLE	
Exercise/workout	Equipped workout area is available
Kitchen/dormitory	Small kitchen/dayroom area, three beds in a single sleeping area, separate sleeping area in Captain's office.
Lockers/showers	Personal lockers in sleeping area, single restroom with two stalls, separate shower.
Training/meetings	None
Washer/dryer	Washer/dryer is available for on duty crews
SAFETY AND SECURITY	
Sprinkler system	No automatic fire sprinkler system
Smoke detection	Residential smoke alarms in sleeping area and kitchen
Security	Keypad locks on exterior doors
Apparatus exhaust system	Yes
Units/staffing levels assigned	Six apparatus; three personnel on first out engine, other apparatuses are cross-staffed.

Figure 26: Billings Fire Department Station 6

Station 6 covers an area of Billings referred to as "The Heights," which has 30,000 people living in its response area. Constructed in 1987, that station is aging but has been well maintained and is in generally good condition.

While there is room in the bays for additional response units, remodeling would be necessary to add staff.

SURVEY COMPONENT	OBSERVATIONS
STRUCTURE	
Physical address	1601 Saint Andrews
Construction type	Wood Frame
Date of construction	1987
Seismic protection/energy audits	Yes
Auxiliary power	No system in place
Condition	Fair to good condition, well maintained.
Special considerations (ADA, mixed gender appropriate, storage, etc.)	ADA access is present, limited dual-gender capabilities.
Square footage	5,560
FACILITIES AVAILABLE	
Exercise/workout	Limited workout equipment is available in the basement
Kitchen/dormitory	Kitchen/dining table/lounge are all in one room. Sleeping limited to three staff members. Basement would need egress window to add bedroom space.
Lockers/showers	Two showers/bathrooms
Training/meetings	No training or meeting facilities are present
Washer/dryer	Yes
SAFETY AND SECURITY	
Sprinkler system	No automatic fire sprinkler system
Smoke detection	Smoke alarms present
Security	Combination door locks
Apparatus exhaust system	Yes
Units/staffing levels assigned	Three personnel cross-staffing two units.

Figure 27: Billings Fire Department Station 7

Station 7 is the newest BFD station. The facility has three double-depth drive-through bays. The station is attractive and appears well maintained.

Station 7 is well located to serve the western most portions of the BFD service area (City and BUFSA). The station meets the current needs of BFD and there is capacity for additional apparatus and staffing to meet future needs as growth occurs in the area.

SURVEY COMPONENT	OBSERVATIONS
STRUCTURE	
Physical address	1501 54th Street West
Construction type	Wood frame/masonry exterior
Date of construction	2007
Seismic protection/energy audits	N/A
Auxiliary power	Diesel generator
Condition	Good—Station is clean and well maintained, crews report that the property has some flooding in bays during heavy rains, due to poor drainage.
Special considerations (ADA, mixed gender appropriate, storage, etc.)	Public area is ADA compliant, quarters are mixed gender appropriate, storage space is adequate.
Square footage	8,000 square feet
FACILITIES AVAILABLE	
Exercise/workout	Workout area is available
Kitchen/dormitory	Kitchen/dayroom area is adequate. Four sleeping areas plus a sleeping area in the Captain's office.
Lockers/showers	Separate restrooms and showers, locker space in sleeping areas.
Training/meetings	None
Washer/dryer	Washer/dryer available for on duty crews
SAFETY AND SECURITY	
Sprinkler system	None
Smoke detection	Residential smoke alarms in sleeping area and kitchen
Security	Keypad locks on exterior doors
Apparatus exhaust system	Yes
Units/staffing levels assigned	Three apparatus; three personnel on first out engine, other apparatuses are cross-staffed.

Figure 28: Billings Fire Department Training Facility

The training facility is located on 5 acres adjacent to the Billings Logan International Airport. The facility was recently completed and includes a live fire area, SCBA maze, roof panels for ventilation, and metal floor decks.

The outside area includes room for various props, fire extinguisher training, and vehicle extrication. Additionally, there is a driving area for emergency vehicle operator training. A storage building is available for training materials and props. The training facility was built at minimal cost, using the skills and efforts of BFD personnel whenever possible.

The training facility should meet the current and future needs of the department.

SURVEY COMPONENT	OBSERVATIONS
STRUCTURE	
Physical address	Adjacent to Billings Airport
Construction type	Metal storage containers
Date of construction	2017
Seismic protection/energy audits	Not applicable
Auxiliary power	None
Condition	New
Special considerations (ADA, mixed gender appropriate, storage, etc.)	Not applicable
Square footage	Approximately 4,000 square feet
FACILITIES AVAILABLE	
Exercise/workout	Not applicable
Kitchen/dormitory	Not applicable
Lockers/showers	Not applicable
Training/meetings	Not applicable
Washer/dryer	Not applicable
SAFETY AND SECURITY	
Sprinkler system	Plumbed for stand pipe and sprinklers supported by pumper
Smoke detection	None
Security	Located behind locked gate on airport property
Apparatus exhaust system	None
Units/staffing levels assigned	None

Facility Discussion

ESCI observed the BFD stations to be well cared for by the response crews, clean, and organized, generally. However, the buildings were found to be in varying conditions. Some, including Stations 2, 3, and 4, need increased maintenance or replacement, and others do not have sufficient space and accommodations to meet current use needs. Deferred maintenance issues were identified by crews as an ongoing problem.

Dual gender and American's with Disability Act compliance, while reported as addressed, was viewed as marginally the case in some stations.

Apparatus

BFD maintains a sizeable fleet of response vehicles that appear to be well maintained. The overall condition of the fleet was found to be good, however some front-line units are aging. Engine 2, specifically, is reaching the end of its service life. An inventory of fire apparatus, configuration, and condition is provided in the following figure.

Figure 29: BFD Apparatus Inventory

Station 1							
Apparatus Designation	Type	Year	Make/Model	Condition	Seating Capacity	Pump Capacity	Tank Capacity
Engine 1	Engine	2009	Sutphen	Good	3	1,500	750
Truck 1	100 ft. Ladder	2015	Pierce	Good	3	1,500	300
Engine 11	4X4 Engine	2003	HME	Poor	Reserve	1,500	750
Tender 1	Tender	1997	Freightliner	Good	1	400	2,450
Brush 1	Brush	2008	Ford F550	Good	1	130	450

Station 2							
Apparatus Designation	Type	Year	Make/Model	Condition	Seating Capacity	Pump Capacity	Tank Capacity
Engine 2	Engine	2001	Sutphen	Poor	3	1,500	750
Rescue 2	Multi Discipline	2009	GMC 4500	Good	3	N/A	N/A

Station 3							
Apparatus Designation	Type	Year	Make/Model	Condition	Seating Capacity	Pump Capacity	Tank Capacity
Engine 3	Engine	2009	Sutphen	Good	3	1,500	750
Engine 77	Engine 4X4	2003	HME	Poor	Reserve	1,500	750

Station 4							
Apparatus Designation	Type	Year	Make/Model	Condition	Seating Capacity	Pump Capacity	Tank Capacity
Engine 4	70 foot tower	2005	Sutphen	Good	3	1,500	750
MAC 4	Mobile Air Van	2012	Freightliner	Good	1	N/A	N/A
Squad 4	QRV	2010	Ford F550	Good	1	300	500

Station 5							
Apparatus Designation	Type	Year	Make/Model	Condition	Seating Capacity	Pump Capacity	Tank Capacity
Engine 5	Engine	2008	Sutphen	Good	3	1,500	750
Tender 5	Tender	2004	Freightliner	Good	1	400	2600
Engine 55	Engine	2001	Sutphen	Poor	Reserve	1,500	750
Brush 5	Brush	2004	Ford F550	Good	1	130	450
Hammer 5	Hazmat	2004	Freightliner	Good	1	N/A	N/A

Station 6							
Apparatus Designation	Type	Year	Make/Model	Condition	Seating Capacity	Pump Capacity	Tank Capacity
Engine 6	Engine	2007	Sutphen	Good	3	1,500	750

Station 7							
Apparatus Designation	Type	Year	Make/Model	Condition	Seating Capacity	Pump Capacity	Tank Capacity
Engine 7	Engine	2008	Sutphen	Good	3	1,500	750
Truck 77	105’ ladder	1997	Sutphen	Good	Reserve	1,500	250
Brush 7	Brush	2002	Ford F550	Good	1	130	450

Discussion

ESCI observed the BFD’s vehicles to be well maintained and in good condition generally. It is noted that five of the seven department fire engines and a ladder truck were purchased in the 2007–2009 time frame. That means that those vehicles will also be due for replacement at approximately the same time. The large expenditure will need to be planned for. BFD is fortunate to have established a capital replacement plan, as discussed elsewhere in this report. The presence of an adequate replacement plan is critical, especially given the replacement timing involved.

STAFFING

Personnel make up the largest expense of any fire agency, and Billings Fire Department is no exception.

The effective management of human resources requires a balance between the maximum utilization of the overall workforce and the experience of a high level of job satisfaction by individual workers. To achieve this goal consistently, management must combine reliability with a safe working environment, fair treatment, the opportunity to provide input, and recognition of the individual's commitment and sacrifice. Job satisfaction depends upon this combination of factors.

As an urban area within a sparsely populated rural environment, Billings is somewhat isolated from other, more densely populated communities. To the degree that this contributes to the sense of community, this factor is a positive one for BFD. Many fire department personnel have lived in the area for a long time. They know the area's history and are well connected to the citizens who make up the community.

Administrative and Support Staffing

One of the primary responsibilities of a fire department's administration is to ensure that the operational segment of the organization has the ability and means to respond to and mitigate emergencies in a safe and efficient manner. An effective administration and support services system is critical to the success of a fire agency.

The management team is led by the Fire Chief, who serves as a department head reporting to the City Manager. His responsibilities include providing organizational leadership consistent with the guidance provided by the City Manager and City Council; keeping the City Manager and City Council informed about issues important to the overall management of the City and to its policy-makers; implementing City policy as set by the council and directed by the City Manager; administering the fire department budget as approved by the council; partnering as directed in the hiring, firing, and administering discipline to the workforce; representing the fire department to the public; and performing other tasks consistent with a department head's duties.

BFD employs one Assistant Chief and a Fire Marshal. The rest of the department's administrative and support staff is made up of both uniformed and civilian personnel coordinating or performing training, EMS, and Fire Prevention. The fire department is also responsible for managing Billings' 911 Dispatch Center. That means that in addition to managing the fire department, the Fire Chief also directs a communications center manager, three supervisors, and thirty-one (31.5) dispatchers. It is unusual for a Fire Chief to be responsible for a dispatch center of this size, and the 911 center does not fall under the scope of work for staffing section of this master plan. However, it should be taken into consideration as a part of the organization in need of supervision by the administrative staff.

Total administration and support staff (excluding the dispatch function) is reported as 4, two of whom are non-sworn civilian administrative support staff. These comprise just 7 percent of the total fire department. Fire districts, which do not enjoy the support services that city fire departments receive from city infrastructure, often show administration and support ratios in the range of just under 20 percent. City fire departments usually show ratios of somewhat less, and BFD is on the low end of what ESCI sees as the range of similar city fire departments. Again, this is without taking into consideration the added administrative responsibility for 911 dispatch.

Like any other organization, administration and support need appropriate resources to function properly. By analyzing the administrative and support positions within an organization we can create a common understanding of the relative resources committed to this function compared to industry best practices and similar organizations. The appropriate balance of administration and support compared to operational resources and service levels is critical to the success of the department in accomplishing its mission and responsibilities. A current organizational structure chart for BFD shows a deficit in managerial staffing.

Figure 30: Administrative and Support Staffing

Survey Components	Billings Fire Department Observations	Comments and Recommendations
Administration and Other Support Staff: DAYS		
Fire Chief	1	
Operations Chief	1 (Assistant Chief)	
Training	2	Training Officer Asst. Training Officer
EMS Coordinator	0	Shared duty with the Assistant Training Officer
Fire Prevention	5	Fire Marshal Asst. Fire Marshal 3 Deputy Fire Marshals
Administrative Assistant	1	Admin Coordinator
Secretary	1	Admin Support II
Total administrative, Training and Prevention staff	11	
Percent administrative & support to total department personnel	7%	

Discussion

Given the growing portfolio of responsibilities that the modern fire service has embraced, few fire departments see themselves as being adequately resourced. Therefore, priorities need to be determined and limits need to be set. Areas like capital infrastructure and service delivery are addressed in other parts of this report. In this section of the plan, ESCI is addressing only staffing. BFD's total staffing may be within the norms for the region, but for the fire service in general it is lean and therefore administration of the agency is a challenge.

BFD has the same service expectations as do other fire departments that enjoy larger staffing and budgets. In addition to its traditional role, the fire department supports a Hazardous Materials Team and a Technical Rescue Team (trained in swift water, high angle, confined space, and building collapse rescue). It also has a specially trained team to maintain its self-contained breathing apparatus (SCBA).

To meet these challenges, it is necessary for a department the size of BFD to be well organized and efficiently run. It is critical that all personnel feel motivated and empowered to perform duties that departments with larger staffing and greater funding can assign to administrators. BFD's current organizational chart (available elsewhere in this report) reflects a greater than optimal span of control at the top of the chain of command. This can have the effect of limiting effective control—because the manager cannot exert adequate supervision—or creating inefficiency should the manager become a choke point for decision-making.

Chief officers create systems that cause all work to flow through themselves out of good intention or in response to a lack of sufficient management staffing, but the effect is to overburden the manager at the center of the system in the name of accountability and to reduce the efficiency of the rest of the team. Another result of inadequate management staffing is the lack of capacity for strategic planning and to maintain optimal communications within the fire department and between the fire department and other partner departments within the City.

ESCI team members studying the various functions within the department will provide specific feedback regarding staffing needs within each division, but of concern to this section of the study is the span of control of the Assistant Chief. The term "span of control" refers to the number of subordinates the manager supervises. Optimal span of control is usually about five. BFD's Assistant Chief appears to have eight. Likewise, each of the Battalion Chiefs have eight company officer as direct reports. BFD has a lean administrative team that could be enhanced in depth with the addition of another Chief Officer and a reorganization of responsibilities. Another option might be the sharing of some reports with the Fire Chief position. Given the small number of administrative Chief Officers within the Billings Fire Department, the addition of at least one other Chief Officer would be the preferred option.

The issue of proper administrative staffing arises in more than one context. Is the fire department placing too much emphasis on administration and not enough on operations? Or, is the department providing appropriate support staffing to its divisions in accordance with priorities developed by the Fire Chief, the City Manager, and the City Council? As stated, BFD's balance between operational and support staff is generally low for the range that ESCI and others commonly find in municipal fire departments. Municipal fire departments tend to have a smaller ratio of support to operations than fire districts because HR, Finance, IT, and facilities maintenance functions are supplied to the fire department by other departments in the City. While not raised as an issue in Billings, ESCI does not find that BFD has overstaffed its administrative functions to the detriment of its operational (emergency response) mission. In fact, under-resourcing its administrative function can potentially have a negative impact on operations if training, planning, and prevention priorities are not adequately supported. It is these "supporting" functions that prepare operational staff for future challenges and opportunities.

For a department of its size, BFD's administrative support team—with an FTE count of two—is small. The use of networked computer systems has reduced private and public-sector organizations' need for administrative assistance, but when administrative staff are reduced too far, supervisors and managers are forced to provide administrative assistance for themselves. Often, they are not as efficient in performing these tasks, and the time spent on them takes away from the time that should be spent in planning and other supervisory responsibilities.

Another consideration at BFD should be the cross-training of administrative and support personnel. In lean-staffed organizations, cross-training of support personnel is an important way to reduce the dysfunction that may occur when a key employee leaves the workplace—whether temporarily due to vacation or a medical issue or permanently due to retirement or a move to another job. When one or more employees work in a parallel environment, cross-training can be arranged between peers through supervisory support. When workers do not have parallel assignments, it falls to supervisors to initiate vertical cross-training. That means that supervisors need to learn the rudiments of subordinates' duties, and subordinates need to learn some part of their supervisors' duties. Doing so increases the likelihood that a supervisor can help train a subsequent hire if or when a subordinate vacates a position while creating a succession plan in the event that the supervisor is the one who vacates a position. A subordinate may want to move into the supervisory role, or that same subordinate might stay in his or her position and assist in the training of a new supervisor. In fire departments one-tenth the size of Billings, a typical administrative support FTE count is two. At BFD, none of the traditional support functions (Training, EMS, Fire Prevention) are adequately supported. The result is that managers are doing their own support work and lack adequate time to perform some of their higher managerial functions.

Key Recommendations

- Reorganize the administrative team using span of control principles and existing personnel in the most effective way possible.
- Consider staffing at least a second (and, in time, a third) Assistant Chief position and separating areas of responsibility rationally.
- Add at least one FTE, at the rank of Chief or Company Officer, to training staff.
- Add at least one full-time Administrative Assistant.
- If needed, consider recruiting civilian volunteers to assist with administrative support functions or establish a paid, temporary help pool.
- Encourage cross-training between supervisors and subordinates.

Emergency Service Staffing

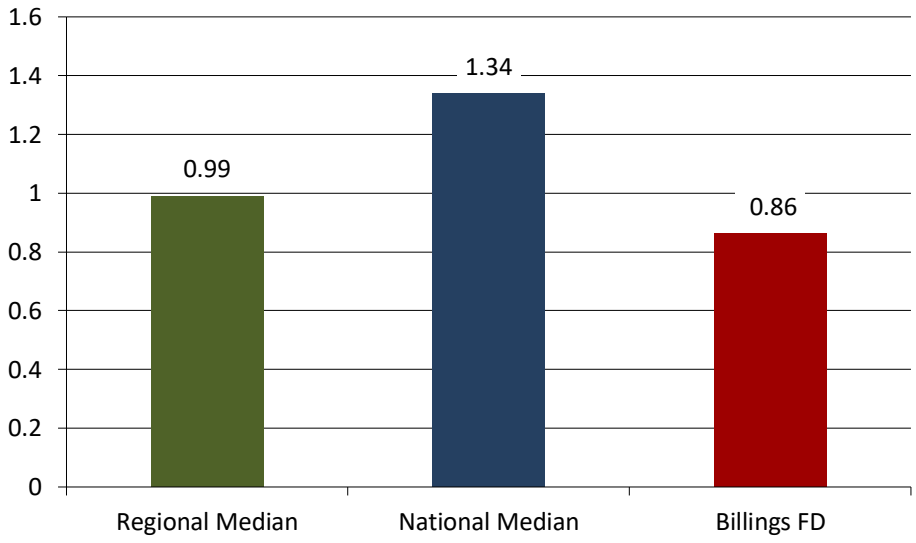
It takes an adequate and properly trained staff of emergency responders to put the appropriate emergency apparatus and equipment to its best use in mitigating incidents. Insufficient staffing at an operational scene decreases the effectiveness of the response and increases the risk of injury to all individuals involved. Fire personnel of Billings Fire Department perform fire and emergency medical first response from seven stations that are always staffed with seven pumpers (engines), one ladder truck, and a shift Battalion Chief. In its region, BFD is the only significant, professional fire response agency.

Emergency medical responses run from the minor—a person in physical but not life-threatening distress, to major—multiple critical patients at a major vehicle accident, for example. Fire departments are expected to develop protocols for the handling of various kinds of emergencies.

For fires, it is also a best practice to develop plans for responding to and performing the many tasks that must be performed at the scene. These tasks can be broken down into two key components—life safety and fire flow. Life safety tasks are based on the number of building occupants, and their location, status, and ability to take self-preservation action. Life safety related tasks involve search, rescue and evacuation of victims. The fire flow component involves delivering sufficient water to extinguish the fire and create an environment within the building that allows entry by firefighters.

In the next figure, ESCI uses data provided from the National Fire Protection Association (NFPA) to compare BFD emergency response staffing to similar sized organizations, regionally, on a per 1,000 population bases.

Figure 31: Emergency Response Staffing per 1,000 Population



This figure demonstrates that, compared to similar sized agencies in the western region, BFD's emergency response staffing falls somewhat below the regional median, and well below the national median.

It is noted that the benchmark data in the preceding figure is obtained from the National Fire Protection Association (NFPA) and is based primarily on population. The data does not consider geographic size or population density of the area. Further, the data from which these comparable figures is extracted does not delineate between volunteer or career departments nor does it segregate those departments heavily involved in the provision of emergency medical services, particularly transport service, which can increase departmental staffing levels and costs. A non-transport agency, like BFD, would be expected to have a somewhat lesser number of line personnel than one that provides ambulance transportation. When that factor is considered, BFD personnel numbers remain lower by comparison.

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

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

The first 15 minutes is the most crucial period in the suppression of a fire. How effectively and efficiently firefighters perform during this period has a significant impact on the overall outcome of the event. This general concept is applicable to fire, rescue, and medical situations. Critical tasks must be conducted in a timely manner to control a fire or to treat a patient. BFD is responsible for assuring that responding companies can perform all described tasks in a prompt, efficient, and safe manner.

NFPA 1700 recommends that fire departments develop a "Standards of Cover" document. This document describes the department's approach to specific emergency situations, dependent upon the resources available to that department. It serves as a communication tool to the community and as a guideline for incident commanders as they direct the department's response to an unfolding emergency incident. The issue of a Standards of Cover document is addressed elsewhere in this report.

In addition to the work responsibilities associated with emergency responders, BFD firefighters also engage in company level fire inspections, public education activities, and emergency management.

Each of Billings Fire Department's shifts is commanded by a Battalion Chief. At minimum staffing, BFD has a total of seven company officers, seven engineers, or drivers, seven firefighter-EMTs or firefighter-paramedics, and one Battalion Chief on duty. Depending upon the number of members on leave any particular day, there may be a slight increase in staffing. If the number of firefighters on leave causes staffing to fall below that minimum, the department currently hires back to maintain the standard. BFD currently tries to maintain eight three-person crews, each consisting of a company officer, a driver, and a firefighter.

These crews staff seven fire engines and one ladder truck. However, personnel vacancies often result in a closed ladder truck. At those times, the ladder is "cross-staffed," that is, an engine crew is moved over to staff the ladder truck when needed. This cross staffing of companies is also used to put other apparatus in service for particular calls. For example, an engine or a truck crew might staff a lighter brush rig or a water tender when responding to a wildland interface fire or to an area that does not have a water supply (through hydrants).

As noted earlier, BFD's Battalion Chiefs currently have a span of control each shift of eight company officers—seven on the engines and one on the ladder truck (when sufficient personnel allow). The chain of command that runs from company officer to Battalion Chief begins to strain as a department grows

beyond five or six stations. A common response to this challenge is the creation of a “station” or “senior” Captain position responsible for overall supervision of the entire station. While the Battalion Chief must still supervise all fire companies on his or her given shift, the overall supervision can be reduced to two or three senior Captains who, in turn, provide the supervision for the other company officers assigned to their stations. An alternative would be to separate the department into two battalions, assigning two Battalion Chiefs to each shift.

As noted above, the department fields hazardous materials, technical rescue, and SCBA maintenance teams. Being a member of any of the teams entails training requirements over and above those required of other members of the department.

Figure 32: Emergency Response Staffing

Survey Components	Billings Fire Department Observations	Comments and Recommendations
Emergency Service Staff		
Battalion Chief	4	
Captain	30	May be two Captains at Station 1 if the truck is in service. Two additional Captains per shift will be off on Kelley Days.
Lieutenant	0	
Engineer	30	All personnel are EMTs or Paramedics
Firefighter/EMT	43	
Use of Career and Volunteer Personnel		
Career scheduling methodology		
Length of normal duty period	24 / 48 Kelly Shift	
FLSA period	27 days	
Residency requirements	None	
Operational services provided		
Fire suppression	Yes	
EMS/rescue, first response	Yes	
EMS, advanced life support	Yes, but limited	
Specialized rescue	Yes	
Fire prevention inspections	Yes	
Emergency management	Yes	
Public education	Limited	
Hazardous materials response (level)	Yes	All: Awareness 36 – Technician level 9 – HazMat/ALS
Volunteer services	No	
Chaplain	No	
Civilian administrative volunteer	No	

Discussion

During stakeholder interviews, it became clear that members of the Billings Fire Department, regardless of position within its hierarchy, were proud of and committed to the emergency response mission of the department. One frustration common to many within the organization arose from a sense that the department has failed to maintain adequate staffing to address the needs of a growing community. Whether this is the result of fiscal issues outside of the City's control, a lack of commitment by the City to the mission of the fire department, or any other cause, managers and line employees were interested in seeing additional resources provided in support of BFD. ESCI team members were provided with at least two documents—related to fire prevention and to overall response staffing—intended to document the need for additional personnel.

FLSA and Work Schedules

Until late 1986, fire departments, like all public agencies, were not subject to the federal regulations pertaining to working conditions and hours of work. Any regulations they worked under were promulgated by each individual state or local jurisdiction. Some states had complex regulations governing public safety unions. Other states actually forbade firefighters (and others) from belonging to unions or engaging in workplace bargaining. When the United States Supreme Court decided that public employees should fall under the Fair Labor Standards Act (or FLSA), work rules for all public employees changed.

Of greatest significance for fire departments at first was the establishment of the requirement that firefighters be paid time and one-half overtime after exceeding a maximum work week. Presumably since many of the country's paid firefighters worked 24-hour shifts, during which they could often rest or sleep for some part of the time, the maximum number of work hours in a week was not set at 40-hours, as is the case for most workers. It was set at 53 hours per week. Additionally, the government has even allowed for the work week to be averaged over a period of several months. Most employers are required to establish a regular, 7-day work week for tracking and paying overtime. Fire departments were required to establish an "FLSA work cycle" of from 7 to 28 days which can be applied to the entire work force as a group or to each employee individually. For simplicity sake, a set, organization-wide FLSA cycle is easier to administer.[10]

At the time of the 1986 ruling, many fire departments around the United States were working some form of the 24–48, three platoon system. The simplest form is one shift "on," two shifts "off," repeated. Other iterations of the 24–48 can look like this: 24 "on," 24 "off," 24 "on," 24 "off," 24 "on," 96 "off," repeat. Again, there are other variations, but as long as the ration of one 24-hour shift "on" to two 48-hour shifts "off" is maintained, the average work week that results is 56 hours per week. What that meant after 1986 was that any firefighter working that shift type was entitled to 3 hours of time and one-half overtime per week, as measured over an FLSA cycle of from 7 to 28 days.

At first, employers usually opted for the 28-day cycle. Under the FLSA, if a firefighter took time off during the cycle, the employer could deduct those hours from "hours worked" and save the half-time pay for those three hours per week. Over time, many employers have changed to the 27-day cycle because with a three-platoon system, all three shifts work the same number of hours in each cycle.[11]

Even before the 1986 FLSA ruling, some fire departments had adopted methods for reducing the average work week for its firefighters. Some departments, especially very busy city departments, used "10–14" scheduling, assigning firefighters to a combination of 10-hour days and 14-hour nights and working between 40 and 50 hours per week. These schedules are found mainly on the east coast. In departments using the 24-hour duty shift, "Kelly Days" became common. A Kelly Day is simply a regular day off (RDO) that falls on what would normally be an employee's work shift (under the 24-48 schedule). Another way to achieve the same end (a shorter work week) was to create a four-platoon system and then schedule

[10] There are circumstances under which an employer might choose the other option, but it is not relevant to Billings Fire Department or this study.

[11] In the 28-day cycle, one shift is working an extra day, earning extra overtime, each cycle—a problem for payroll departments.

firefighters to work back on their normal days off—in order to add back hours to an agreed upon average.[12] For the regular 24–48 schedule, one Kelly shift every 19 shifts reduces the average work week from 56 to 53 hours.

What is typical for firefighter work weeks changes regionally throughout the country. In Oregon, for example, fire departments in the Portland metropolitan area have bargained for sufficient Kelly days to average between 50 and 52 hours per week. This is a fairly recent development. Most of the rest of the professional firefighters in the state are still working the traditional 56-hour week. Firefighters in Washington have generally been working 50 hours per week or slightly less for over two decades, but there are still small departments that are working 56 hours per week. In Montana, a survey of the five main city departments show a range of from 42 hours to 48 hours per week. Billings Fire Department's work week would be quite low by Oregon standards, but, while on the low end, falls within the range for its closest comparative fire departments. BFD's 27-day FLSA cycle is typical for fire departments using 24–48-hour work shifts.

As stated above, it is believed that the rationale for the 53-hour overtime threshold for firefighters was the result of the assumption that most firefighters spent a portion of each 24-hour shift in an on-call status. This is not the expectation of most employees in other 40-hour per week jobs. The labor agreement between the City and the firefighters' union actually codifies the standby assumptions when, on pages 9 and 10 it limits work and training hours to no more than 12 hours per shift. During the other 12 hours of the shift, employees are required only to respond to alarms. The expectation to respond only to alarms is extended to Sundays and holidays as well. Under the terms of the FLSA, any hours worked between the current standard 43.6 hours per week and the FLSA maximum of 53 hours per week, could be paid at straight time (rather than time and one-half). However, the labor agreement currently in force would not allow that, and any change would require mutual agreement between the parties. Doing so would be less expensive than the cost of hiring additional staff but would require a significant change in the way that work is currently organized at BFD.

Currently, the Billings Fire Department is in compliance with the FLSA, using a regular work schedule for its fire operations personnel that requires fewer hours worked before overtime is paid.

Alternative Uses of the Current Work Force

As explained, Billings Fire Department has a certain amount of untapped work capacity within its current work force. Any contemplated changes would need to be negotiated with the firefighters' labor representatives, but after interviewing key stakeholders, the ESCI team believes that the firefighters would be willing to enter a conversation regarding the regular work week.

Here is an example of what might be achieved through a modification of the current work schedule: In every ten-shift cycle, BFD firefighters receive two shifts off as "Kelly Days." Paying the current work force to work one of those two Kelly shifts each month would result in the equivalent increase of 107 shifts per

[12] Seattle, Washington, Fire Department uses a variation of this.

month—or the same as eleven additional FTEs (full time equivalents). At current staffing, this number of FTEs would staff an additional apparatus, possibly reducing the need to cross-staff multiple apparatus as often.

Using current staff to cover more hours, especially at straight time, is more efficient than hiring eleven additional personnel. Additional personnel must be supported through training, equipping, and all the fringe benefits associated with full-time employment. Reducing the monthly Kelly Day count to one would still leave the firefighters working just under 50 hours per week on average, and within the range of other Montana municipal fire departments.

Based upon population growth and other factors that affect the growth in response demands for BFD, additional personnel or different deployment strategies may prove attractive. Peak activity staffing and advanced 911 triaging of certain medical calls are two deployment strategies that some fire departments have adopted to reduce strain on their existing infrastructure.

Peak Activity Units (PAUs) are a response to the general flow of demand on an emergency response system. Most fire and EMS systems experience an increase in calls for service from morning through approximately the end of the work day, then a tapering off into the night hours. Monday through Friday during the normal work day are also the hours when emergency response providers schedule on-going training and other company-level activities (company inspections, building and area familiarization, public education). Staffing additional apparatus during the area's busiest times makes sense and is common among law enforcement agencies and private ambulance companies. The fire service, because of its traditional reliance on the 24-hour shift, has found it challenging to adapt in this way.

PAUs have been staffed mainly in two ways. Alternative schedules may be adopted and a small number of the incumbent work force assigned to work schedules that cover the busier times. Alternatively, some departments hire back incumbent personnel to staff peak activity units. The option chosen by the agency depends upon the peak activity need.

Another approach to more efficient staffing arises from the realization that many EMS calls that arrive through the 911 system are non-acute and do not require the fire service's basic response unit—in BFD's case, a 3-firefighter/EMT staffed engine or ladder truck or an ALS medic unit. With the approval of the agency's physician advisor and the development of a careful screening process at the call-taking level, a number of low acuity EMS calls can be assigned to a single-personnel staffed car or light truck. The result of this strategy is to reduce out-of-service time of engine and truck companies, out-of-service time created when they respond to calls that are not really "emergencies"

The implementation of a Peak Activity Unit strategy holds benefits that may be advantageous to BFD. It has been successfully implemented in fire departments that were looking for a more efficient way to address staffing needs. However, it is important to clarify that the strategy would require the addition of response personnel to be effective. Existing staffing levels, as currently deployed, are not adequate to implement the approach.

EMS Staffing

As has become typical for fire agencies in the United States, the majority of BFD's emergency responses are classified as medical calls. The result has been that emergency medical training and certifications for firefighters has become a priority for almost all career, and most volunteer fire departments. In Billings Fire Department's case, all response personnel are trained to at least the EMT-Basic level. Some are trained to an intermediate level, and even though BFD does not operate as an advanced life support (ALS) provider, approximately 30 of its firefighters hold paramedic certifications.

Employing personnel who are certified as paramedics does not qualify an agency to say that it provides ALS services to its citizens. A report prepared by BFD managers for the City enumerated the additional steps required for Billings to raise its EMS service level, and they include licensing, protocol requirements, equipment and drug supplies, and training requirements. This information does not need to be recreated for the purposes of this report.

Currently, ALS service to the citizens served by the Billings Fire Department is provided by American Medical Response (AMR) which also provides medical transport services to the community. BFD responds to medical calls and often arrives on scene first—due to the strategic locations of its fire stations and the fact that there are more fire apparatus on duty than there are ambulances at any given time. BFD EMTs and paramedics initiate patient care and then, upon arrival by AMR, transfer care to ambulance staff.

One of the advantages of this method of handling emergency medical calls is that it relieves the fire department of the time out of service burden experienced by transporting agencies. BFD's units will be out of service and unavailable to respond to other calls during the time that they are responding to and then treating the patient (or patients) on a first call. Once they leave the scene, they are available to respond to a subsequent request for service. The transporting unit will continue to be out of service while it takes the patient to the hospital and transfers the care of that patient to hospital personnel. The medical reports required for all patients will be longer (and sometimes more complex) than the ones required of fire personnel. That is because the ambulance personnel will have to include all of the interventions (treatments) provided by fire personnel in addition to any care that they, the ambulance crew, provide.

For these reasons an EMS service delivery system that uses a combination of public sector fire responders and private sector ambulance responders is a very common throughout the country.

The value of adding an ALS capability to Billings Fire Department's response profile is in the added patient care that the department would be able to provide if it could offer immediate ALS-level care to more critical patients rather than having to wait for the ambulance to arrive. Also, ESCI's information is that minimum ALS staffing for the ambulances serving Billings is one paramedic. On many emergency medical calls requiring the care of paramedics, one paramedic is not enough. By adding at least one paramedic to the on-scene personnel, BFD would be increasing the likelihood of a positive outcome.

The types of calls that would be most affected would be cardiac (heart), respiratory (breathing difficulty), and severe trauma incidents. For these kinds of calls, the delay in initiating ALS care can have a significant impact on successful patient outcomes. This is the reason that many fire departments across the country have added ALS service to their portfolios. In some instances, fire agencies have staffed back-up ambulances to assist local private ambulance companies when all of their on-duty units are already on calls. This back-up service often reduces costs for the private provider—thereby reducing community ambulance transport rates, while improving service to citizens—by reducing the instances of delayed ambulance response caused during busy activity periods. Billings has experienced the lack of ambulance availability at times.

If BFD were to upgrade its EMS service level to include advanced life support on all fire apparatus, it would probably have to increase its number of paramedics slightly. An increase would not be necessary if the department were to decide that ALS response was not required on all apparatus or on a 24/7 basis. Under the current work schedule, it would take at least 20 percent of the paramedic-trained work force to cover the vacancies created by the scheduled absences of the rest of the paramedic work force. As pointed out, the current number of paramedics would be adequate if not all engines and the truck were designated to be staffed as ALS, or, if the department were to decide that it would be acceptable to downgrade a normally ALS apparatus to BLS when paramedic staffing was not available.

Key Recommendations

- Consider improving span of control for line Chief Officers by adopting a Station Captain position.
- Consider adding alternative staffing options like a longer standard work week, peak activity unit(s), and community medical response unit(s) based on availability of adequate staffing resources.
- Consider upgrading the department's EMS response from BLS to ALS, limiting ALS staffing or adding ALS staff to meet the department's ALS service commitment.

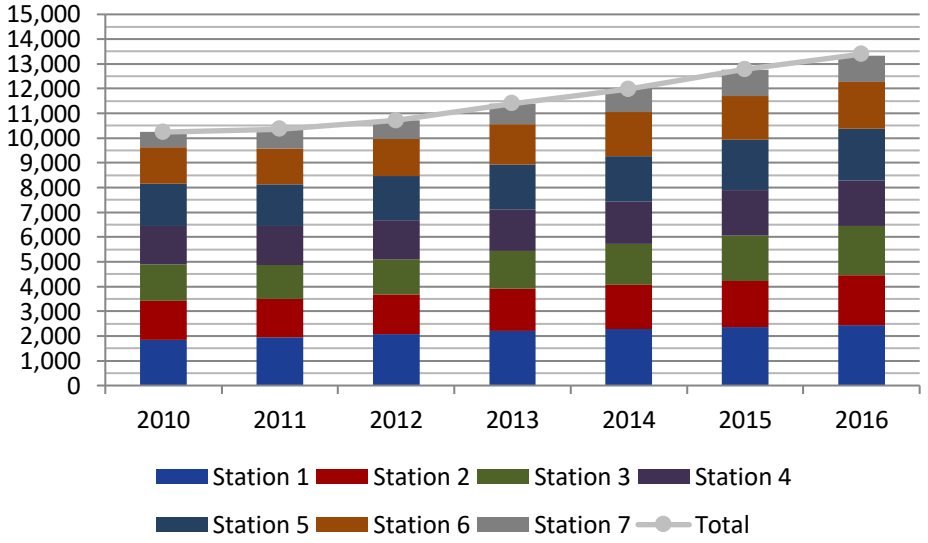
SERVICE DELIVERY AND PERFORMANCE

The delivery of fire suppression, rescue and emergency medical services is no more effective than the sum of its parts. It requires efficient notification of an emergency and rapid response from well-located facilities in appropriate apparatus with enough well-trained personnel following a well-practiced plan of action. This section of the report provides an analysis of the current service delivery components of the Billings Fire Department. National Fire Incident Records System (NFIRS) data, incident response data, and apparatus response data collected by the department is used in this section of the report.

Service Demand

In the demand analysis, ESCI reviews current and historical service demand by incident type and temporal variation for the BFD. GIS software is used to provide a geographic display of demand within the study area. The following figure displays historical service demand from 2010 through 2016.

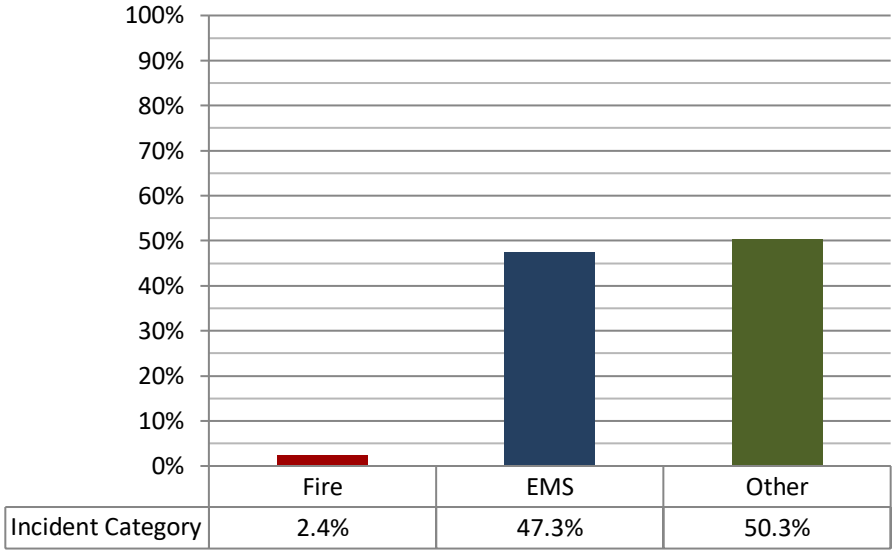
Figure 33: BFD Annual Service, 2010–2016



During the period displayed, BFD service demand increased by over 30 percent (30.8 percent). Examination of the data reveals that annual service demand has increased at all seven BFD stations. Station 7 experienced the greatest increase, approximately 73 percent; while Station 4 service demand increased the least, just over 19 percent (19.4 percent). Note this analysis is based on unique incidents and the station area in which the incident occurred. Further discussion of station workload occurs in the Response Reliability analysis.

The next figure summarizes July 2016 to July 2017 (Fiscal Year 2017) service demand into Fire, EMS, or Other categories.

Figure 34: BFD Service Demand by Incident Category, July 2016–July 2017

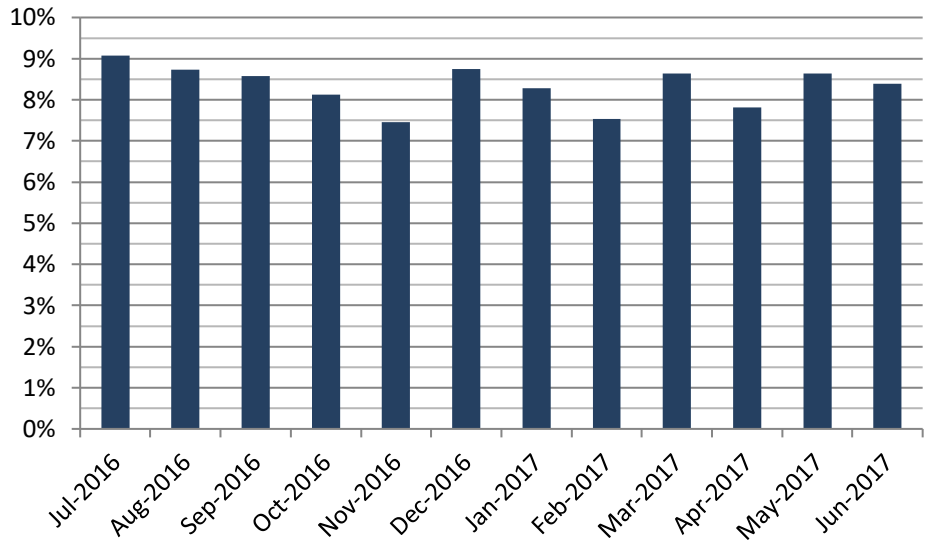


Using the National Fire Incident Reporting System (NFIRS) incident type definitions, ESCI categorizes incidents as "Fire" (structures, vehicle, brush, any 100-series incident in NFIRS), "EMS" (all calls for medical service including MVA's and rescues, any 300-series incident in NFIRS), and "Other" (false alarms, hazmat incidents, service calls, all other NFIRS incident series). As discussed previously, the percentage of EMS incidents reported is low compared to national and regional comparable fire jurisdictions. Examination of the data reveals that in the July 2016 to July 2017 data BFD units responded to over 3,100 cancelled EMS incidents. Including these incidents in the EMS category, results in the percentage of EMS incidents increasing to approximately 70 percent, which is comparable to other fire jurisdictions that provide EMS first responder service. Additionally, examination of historical incident data in BFD annual reports shows that from 2008 through 2013 EMS incidents represent approximately 66 to 70 percent of BFD service demand. This would lead ESCI to believe that the decrease in EMS incident is due to a change in reporting practices or a change in dispatch procedures; and not a decrease in the number of EMS incidents.

Temporal Variation

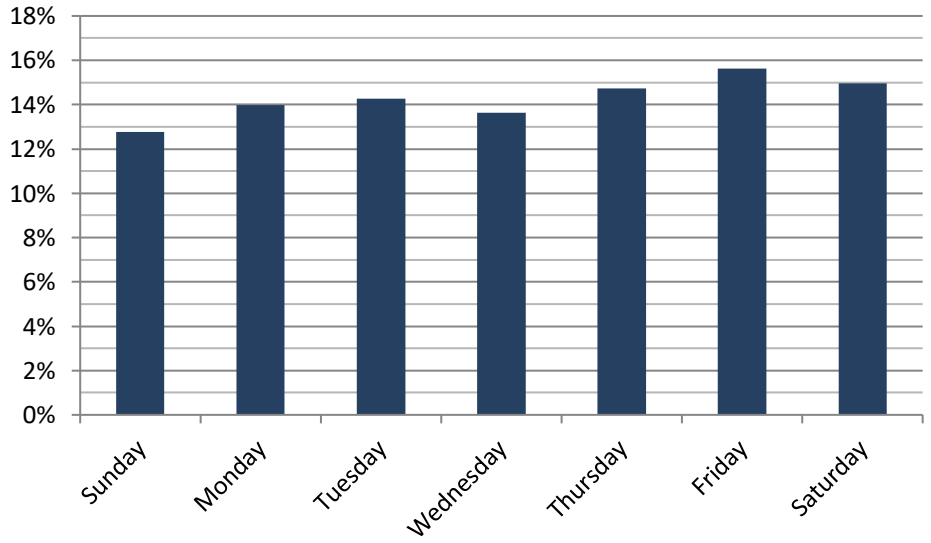
Service demand is not static, and BFD workload varies by temporal variation. The following figures illustrate how service demand varied by month, day of week, and hour of day during fiscal year 2017 (FY 2017) in order to identify any periods of time that pose significantly different risks and hazards. This analysis begins by evaluating service demand by month.

Figure 35: BFD Service Demand by Month of the Year, July 2016–July 2017



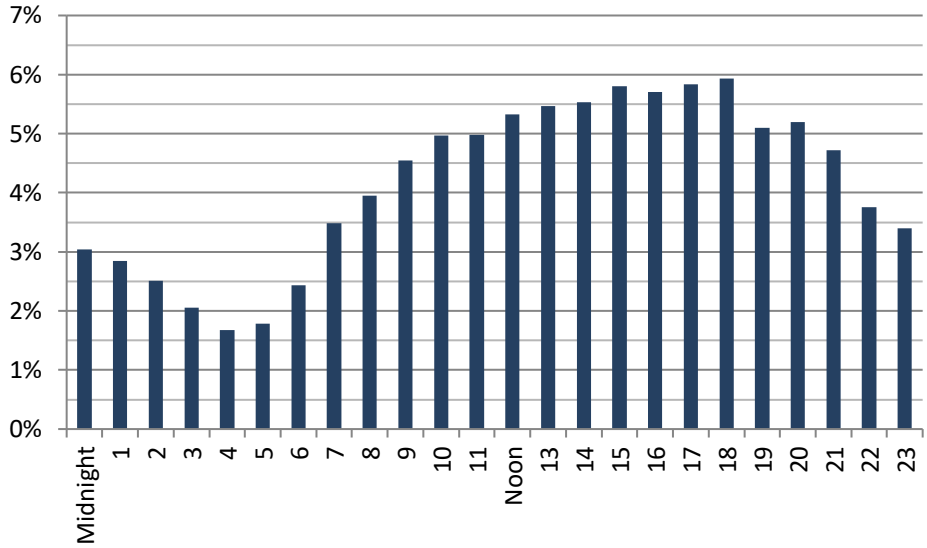
Overall service demand varies throughout the year, with the lowest demand in November 2016 and February 2017 (7.5 percent) and the highest percentage (9.1 percent) of incidents in July 2016. The range is approximately 1.5 percent.

Figure 36: BFD Service Demand by Day of the Week, July 2016–July 2017



As with monthly service demand, service demand by day of the week varies within a narrow range throughout the week. Friday displays the highest demand (15.6 percent), with the lowest service demand on Sunday (12.8 percent).

Figure 37: BFD Service Demand by Hour of the Day, July 2016–July 2017

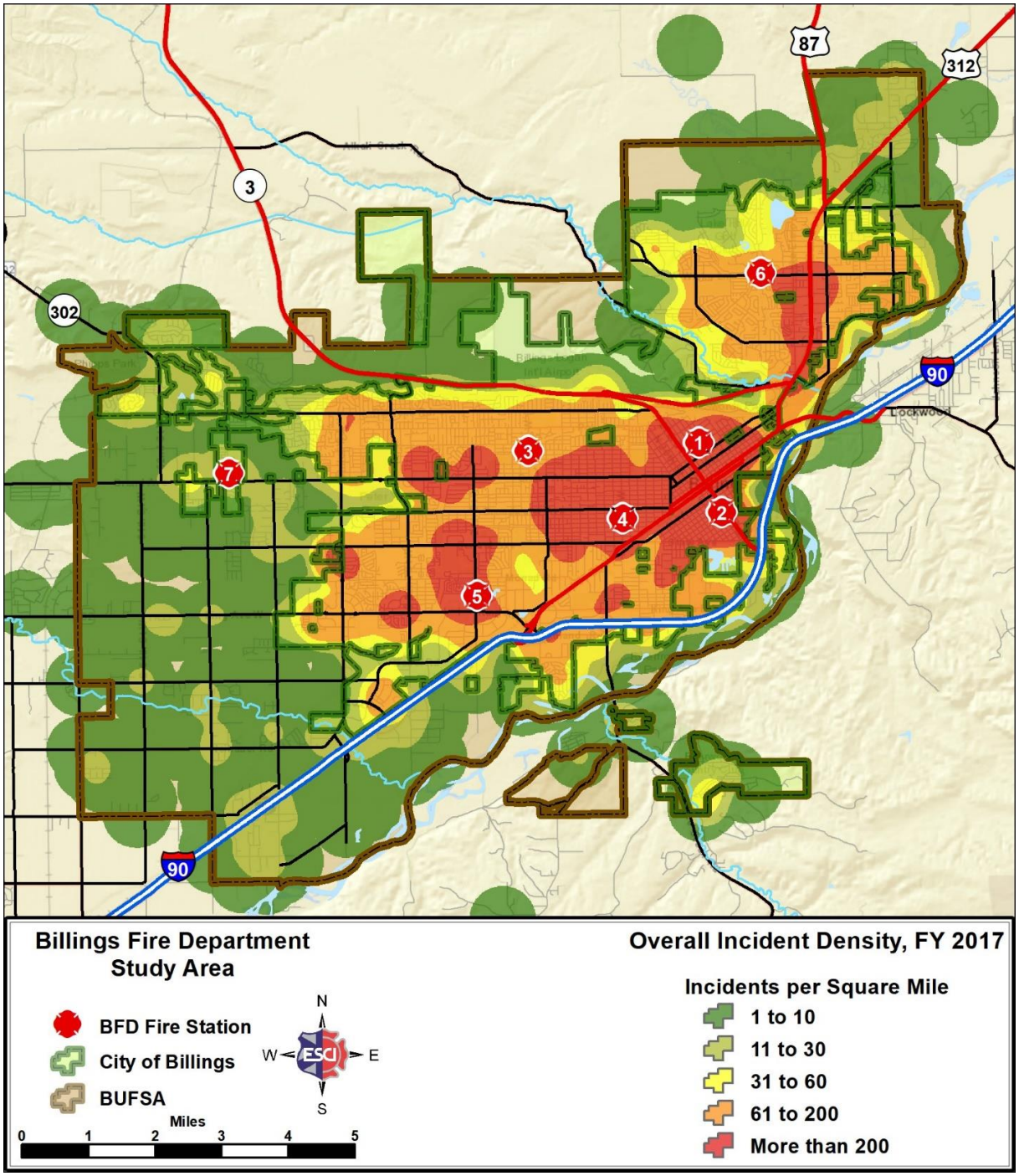


Service demand directly correlates with the activity of people, with workload increasing during daytime hours, and decreasing during nighttime hours as shown in the preceding figure. Over 64 percent of BFD service demand in fiscal year 2017 occurred between 9:00 AM and 9:00 PM. The increase in service demand during the day is significant and predictable. There is an opportunity to anticipate increased workload and improve response performance by deploying additional apparatus or personnel during the busiest times of the day.

Geographic Service Demand

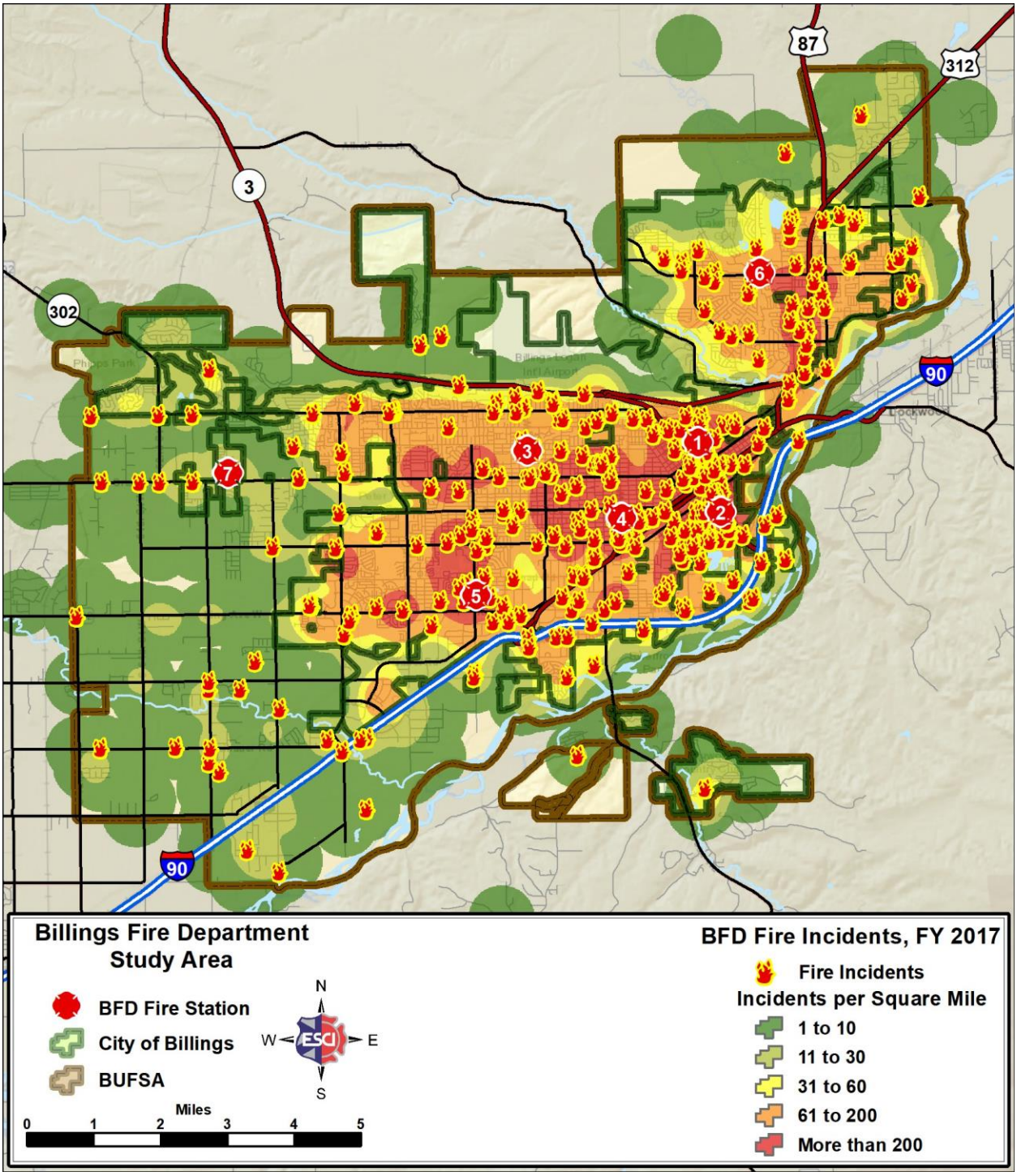
In addition to the temporal analysis of service demand, it is useful to examine the geographic distribution of service demand. In the following figure, ESCI uses dispatch center data to plot incident locations and calculate the mathematical density of FY 2017 service demand in the BFD service area.

Figure 38: BFD Overall Geographic Service Demand, July 2016–July 2017



The highest service demand in the BFD service area is concentrated in the area roughly bounded by Stations 1, 2, 3, and 4. There are also areas of higher incident density around Station 5 and in the Station 6 service area (The Heights). Station 7 experienced the greatest increase in service demand between 2010 and 2016. However, overall incident density is still relatively low compared to the core of Billings and the Heights neighborhood. Not surprisingly, incident density inside the City of Billings is greater than the density of incidents demonstrated in the Billings Urban Fire Service Area (BUFSA).

Figure 39: BFD Fire Incidents and Overall



Fire incidents are the least frequent incident type in the BFD data set. However, fire incidents are distributed throughout the study area in a pattern that is similar to the overall incident data.

As part of the 911 center's computer aid dispatch system (CAD) each BFD incident is assigned to a grid zone. The following figure displays the number of BFD incidents per zone from July 2016 to July 2017.

Figure 40: BFD Service Demand by Zone, July 2016–July 2017

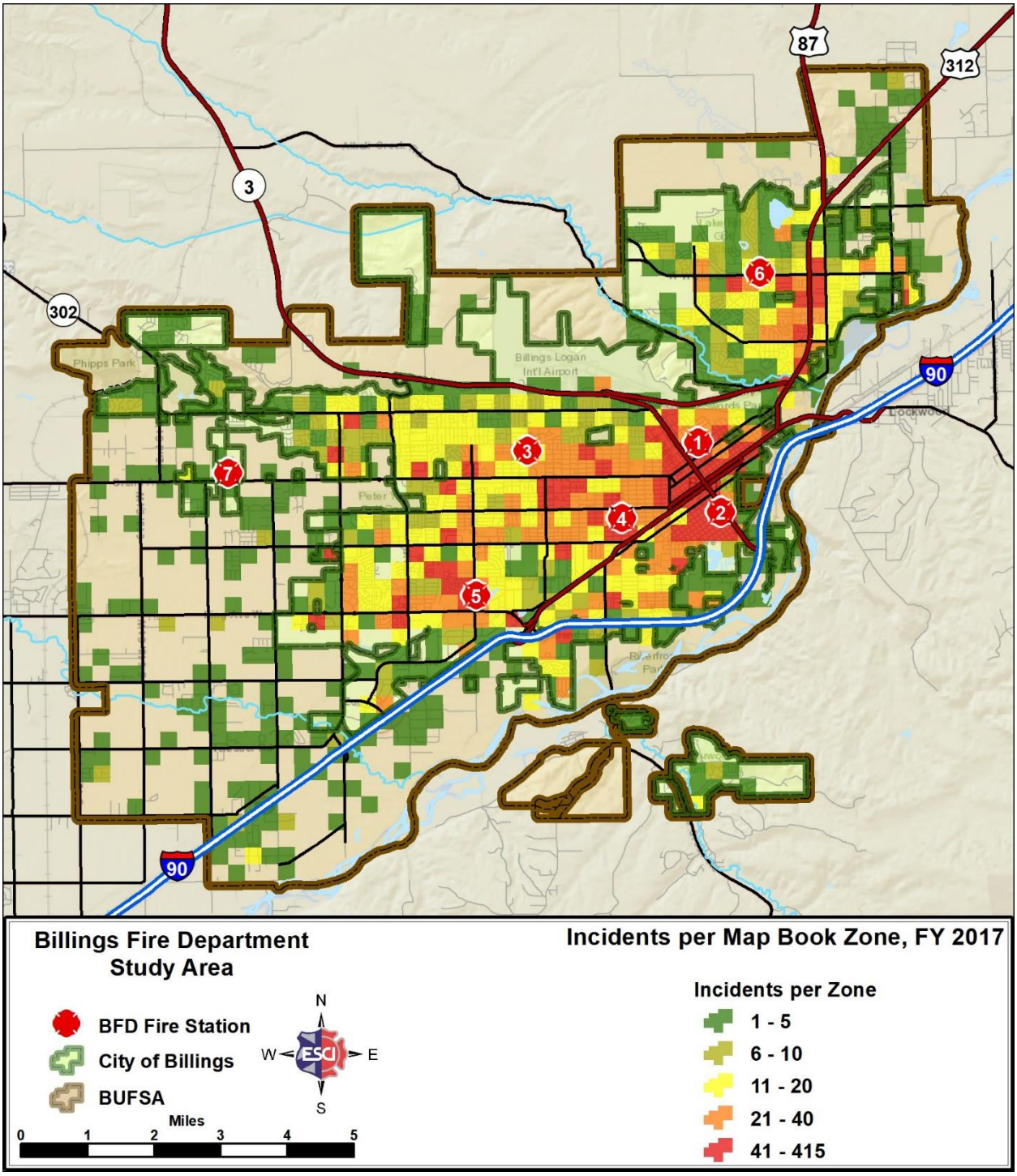


Figure 38 uses GIS raster analysis to calculate the mathematical density of incidents. This figure utilizes the count of incidents per map grid to display specific zones with high service demand. Both Figure 38 and Figure 40 display areas of greater service demand in the BFD service area.

Resource Distribution

The analysis of resource distribution presents an overview of the current deployment of fire department facilities, equipment, and personnel within the BFD service area.

Figure 41: BFD Study Area

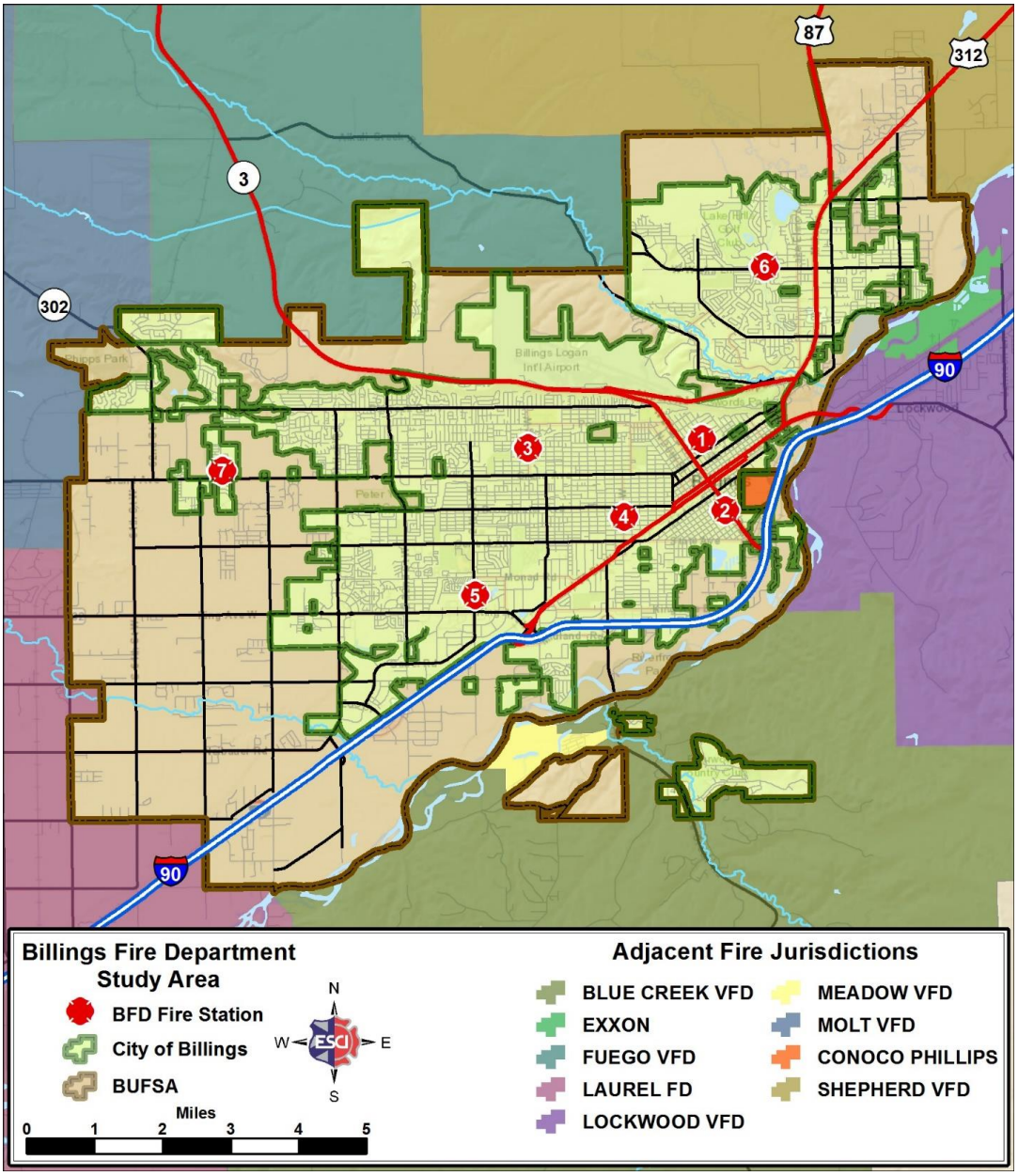
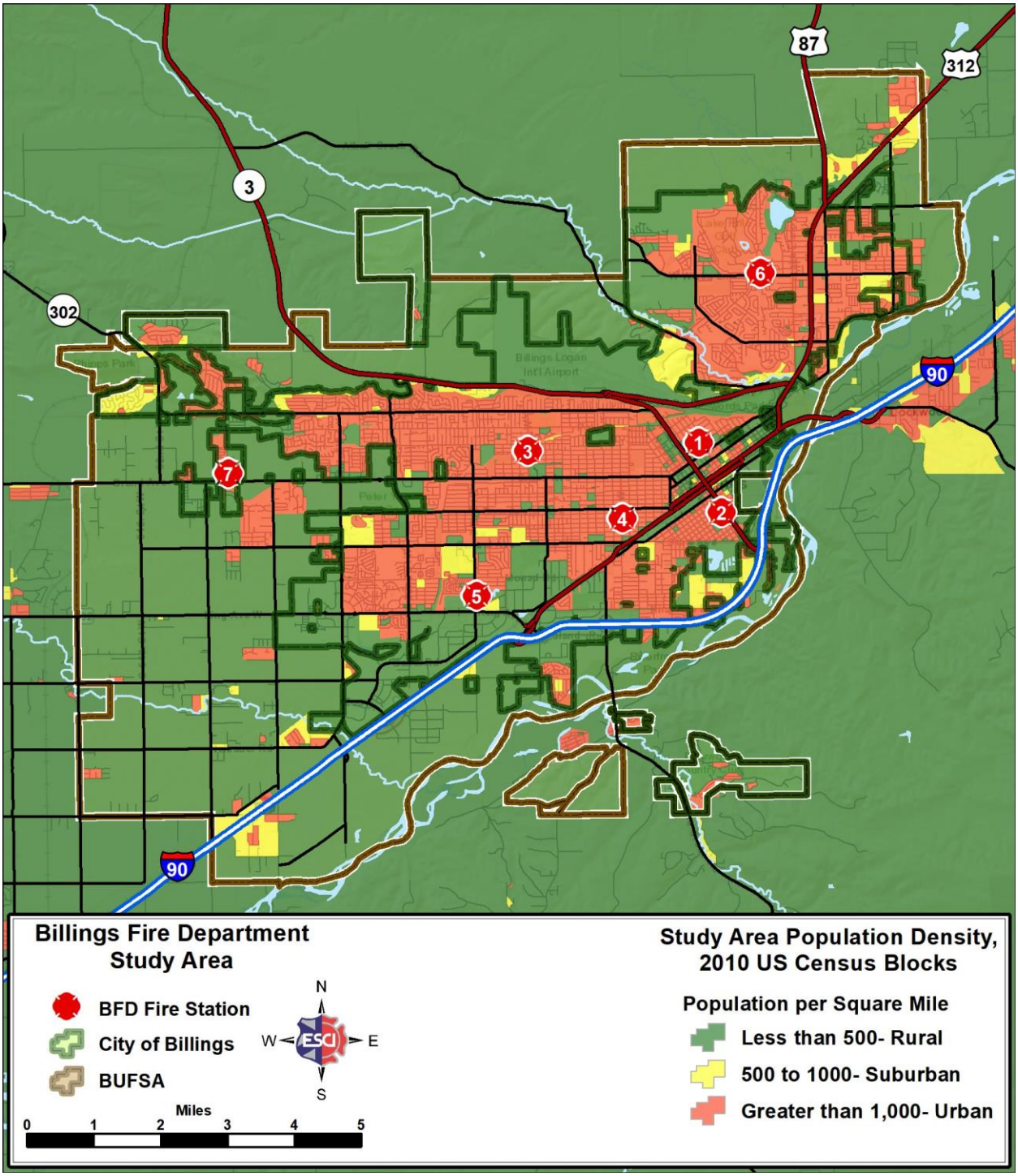


Figure 41 depicts the BFD study area. The City of Billings encompasses approximately 43.7 square miles. The Billings Urban Fire Service Area (BUFSA) is a fire protection district surrounding the city (approximately 47.7 square miles), which contracts with the City of Billings for fire department services. Overall, the Billings Fire Department serves an area of approximately 91.5 square miles. BFD currently provides fire protection, emergency medical first response and rescue services, and hazardous materials response; within the city and BUFSA from seven stations distributed throughout Billings.

The following figure uses 2010 US Census Block data to display population density in Billings and the surrounding area.

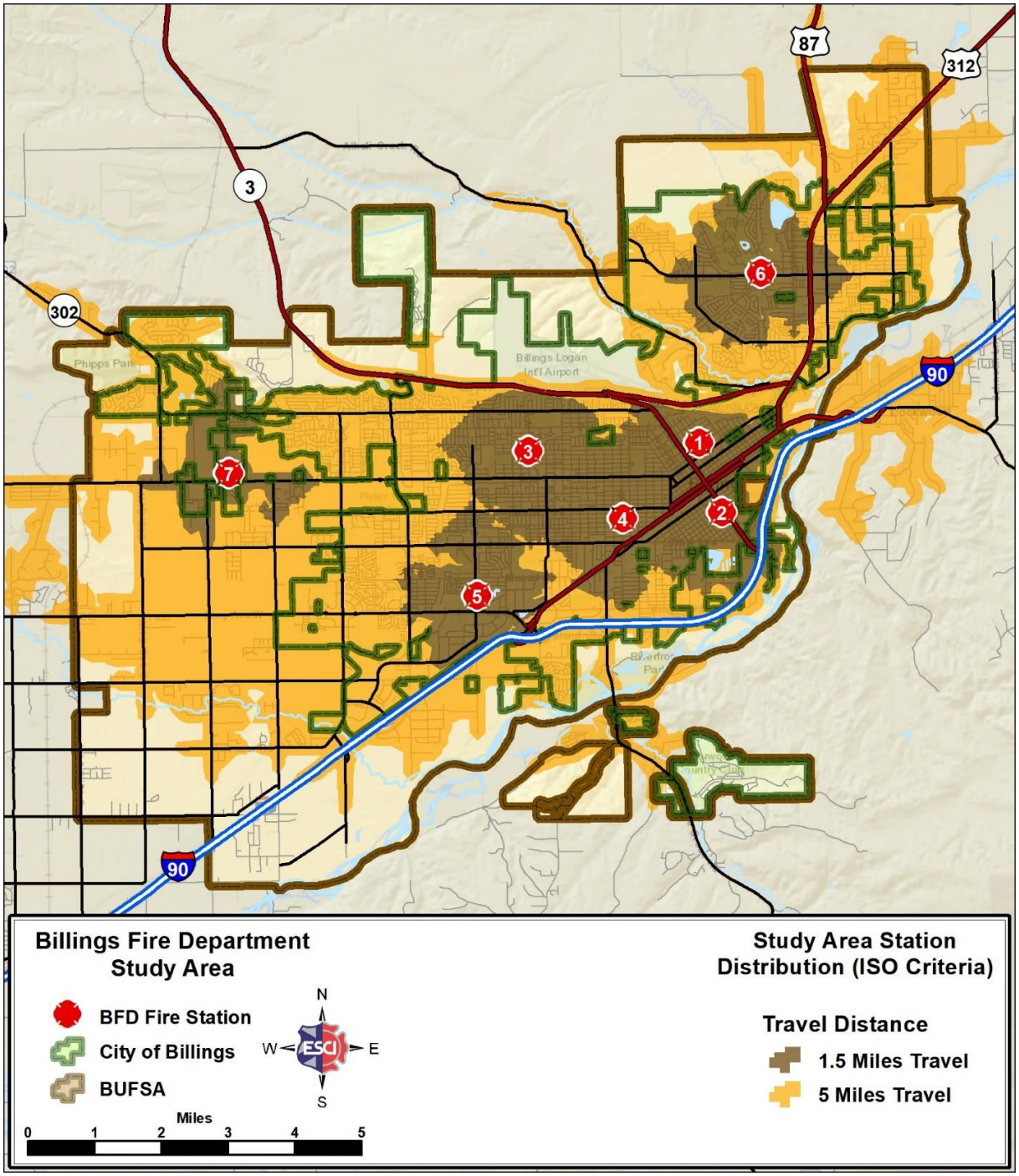
Figure 42: BFD Population Density, 2010 US Census Data



The current estimated population of Billings is approximately 114,000. This represents an increase of 8.6 percent since 2010. The overall population density of the city is approximately 2,609 persons per square mile. As evidenced in this figure, the City of Billings is largely urban in nature with smaller areas of suburban and rural population density. Note that areas inside Billings on either side of Interstate 90 and in the downtown business district display as rural based on population density. These areas are developed commercial or industrial areas without any full-time residential population. The BUFSA outside of Billings is generally rural with pockets of higher population density.

The Insurance Services Office (ISO) is a national insurance industry organization that evaluates fire protection for communities across the country. A jurisdiction's ISO rating is an important factor when considering fire station and apparatus distribution since it can affect the cost of fire insurance for residents and businesses. To receive maximum credit for station and apparatus distribution, ISO recommends that all hydranted, "built up" portions in a community be within 1.5 road miles of an engine company. Additionally, a structure should be within five miles of a fire station to receive a fire protection rating that may result in a reduction of insurance cost. The next two figures examine current station and apparatus distribution based on credentialing criteria for the Insurance Services Organization (ISO).

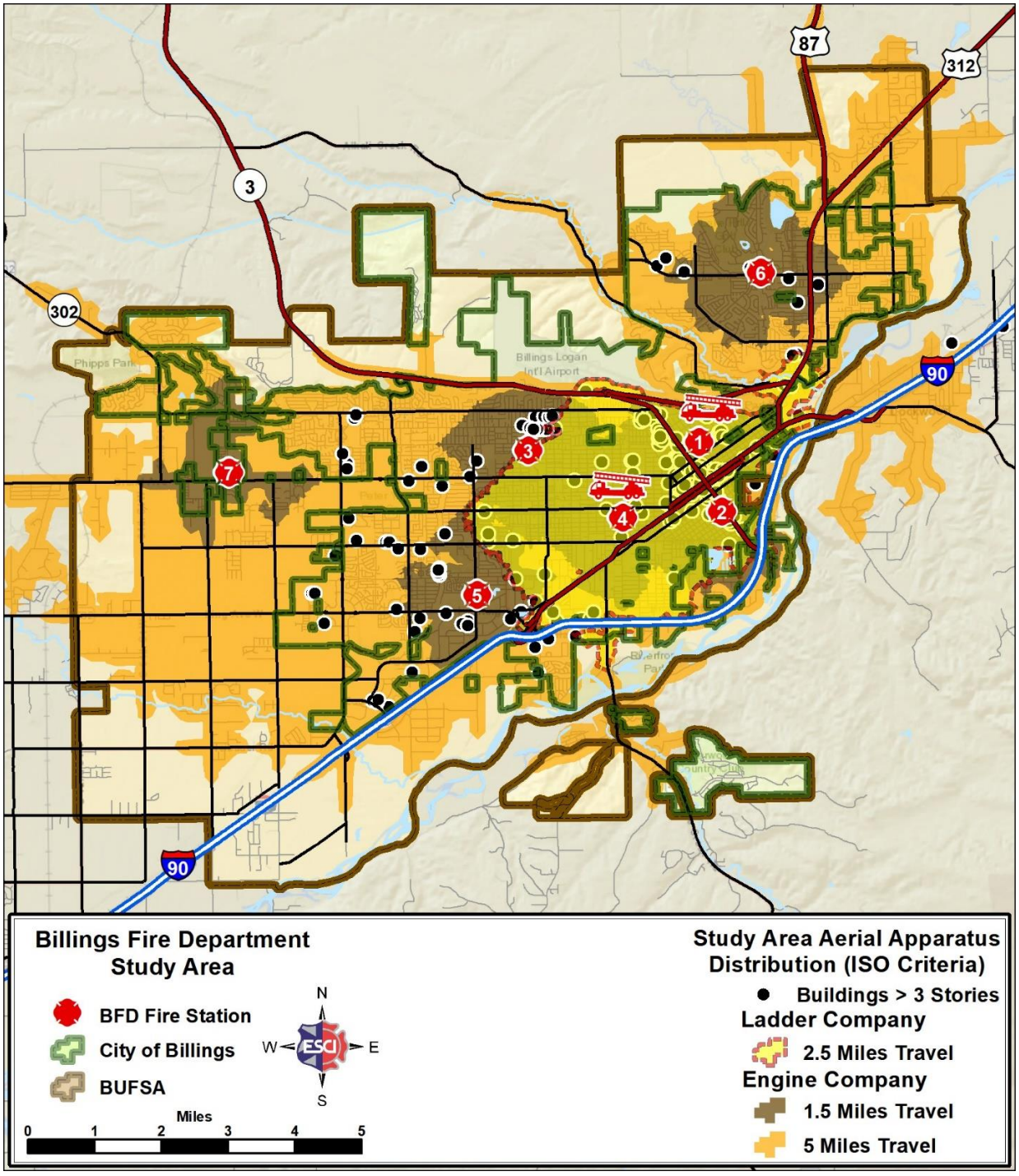
Figure 43: BFD Station Distribution (ISO Criteria)



Over 52 percent of the road network in Billings is within 1.5 miles of a BFD station. With the exceptions of the Rehberg Ranch subdivision northeast of the airport and the Briarwood Country Club subdivision south of the Yellowstone River; nearly all the currently developed portions of Billings are within five miles of a fire station. Portions of the BUFSA south of Interstate 90 and on the western boundary of the BUFSA are beyond five miles travel of a BFD station.

Similar to engine company criteria, ISO recommends that ladder companies (aerial apparatus) be placed at 2.5-mile intervals in areas with buildings over three stories in height.

Figure 44: BFD Aerial Apparatus Distribution (ISO Criteria)



BFD operates aerial apparatus at Station 1 and Station 4. The ISO criteria for aerial distribution are based on the presence of structures over three stories or requiring high fire flow. Seventy-one percent (71%) of buildings over three stories in Billings are within 2.5 miles travel of a BFD aerial apparatus.

Insurance Services Office Classification Review

The ISO recently assigned Billings a Public Protection Classification (PPC™) of Class 3/10 (Class 1 represents exemplary fire protection) in August 2017. This is an improvement over the previous PPC of Class 4. The PPC of Class 3 refers to properties within five miles of a fire station and within 1,000 feet of a creditable water supply (hydrant, suction point, dry hydrant). The Class 10 PPC applies to properties beyond five miles of a recognized fire station. As displayed in the previous figures, there are portions of the city and the BUFSA that are beyond five miles travel of a fire station. The following figure is extracted from the August 2017 Summary Report for the Billings Fire Service Protection Area (FPSA).

Figure 45: Summary PPC™ Table, August 2017 ISO Summary Report for the Billings FPSA

FSRS Item	Earned Credit	Credit Available
Emergency Communications		
414. Credit for Emergency Reporting	2.40	3
422. Credit for Telecommunicators	3.91	4
432. Credit for Dispatch Circuits	2.55	3
440. Credit for Emergency Communications	8.86	10
Fire Department		
513. Credit for Engine Companies	6.00	6
523. Credit for Reserve Pumpers	0.50	0.5
532. Credit for Pumper Capacity	3.00	3
549. Credit for Ladder Service	1.34	4
553. Credit for Reserve Ladder and Service Trucks	0.48	0.5
561. Credit for Deployment Analysis	4.02	10
571. Credit for Company Personnel	6.30	15
581. Credit for Training	8.22	9
730. Credit for Operational Considerations	2.00	2
590. Credit for Fire Department	31.86	50
Water Supply		
616. Credit for Supply System	26.15	30
621. Credit for Hydrants	3.00	3
631. Credit for Inspection and Flow Testing	1.06	7
640. Credit for Water Supply	30.21	40
Divergence	-2.36	--
1050. Community Risk Reduction	3.39	5.50
Total Credit	71.96	105.5

The ISO evaluates three primary areas to arrive at a community's public protection classification: emergency communication and dispatch system, the fire department, and the community's pressurized hydrant or tanker-based water supply.

The emergency communications function includes the capabilities of the call receipt and dispatch system along with the quality and redundancy of communications systems between dispatchers and response units. The ISO gave the Billings Emergency Communications Center 8.86 points out of a possible 10 points. Minor deficiencies were noted as displayed in the above figure.

The fire department is evaluated on its ability to provide needed apparatus within specified distances of developed property, the pump capacity and equipment carried on those apparatus, and the number of personnel staffing each. In addition, the fire department is evaluated on its training programs and facilities. BFD received 31.86 points out of a possible 50 points for this element. In Figure 45, deficiencies are noted in items 549-Ladder Service, 561-Deployment Analysis, and 571-Company Personnel. The training program received 8.22 points out of a possible nine points.

The water system is evaluated on the amount of storage, size of water mains, distribution and condition of fire hydrants, and the ability of the system to deliver needed quantities of water based on specific risks within the service area. The water system received 30.21 points out of a possible 40 points. Deficiencies were noted in the water supply system (when needed water flow from fire hydrants is compared to available water flow) and in the fire hydrant inspection program.

ESCI encourages BFD to work with ISO representatives to mitigate deficiencies which may result in further improvement in the department's ISO PPC; and a reduction in the cost of fire insurance for the department's constituents.

The ISO Public Protection Classification program only addresses fire suppression activities and is primarily concerned with the geographic coverage of property. For jurisdictions such as BFD that respond to all types of emergencies, the travel time required to respond from a fire station to any type of emergency call for service is of equal importance. The national consensus standard NFPA 1710 provides travel time goals for fire, EMS, and special operations emergency responses.[13] The following figures demonstrate travel time over the existing road network, using the parameters of the NFPA 1710 standard. Travel time is calculated using the posted speed limit and adjusted for negotiating turns and intersections. One-way street network directionality is also respected.

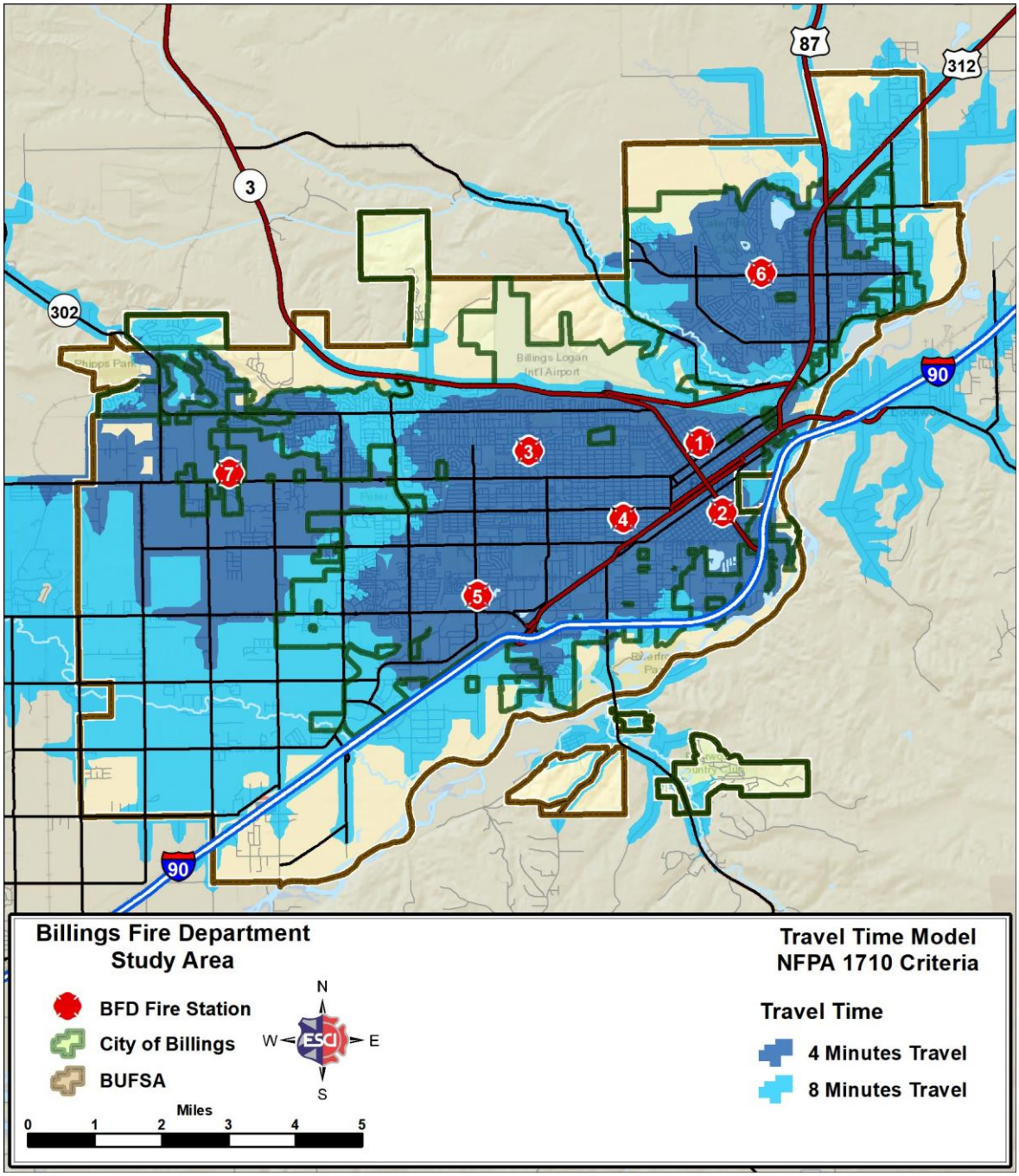
NFPA Standards Relative to Resource Distribution

The NFPA 1710 standard specifies that career staffed fire departments deploy resources such that 90 percent of emergency service demand can be reached in four minutes travel time or less. Additionally, the standard recommends that the full first alarm assignment should arrive in eight minutes travel or less at a fire suppression incident (measured at the 90th percentile).

The following figure demonstrates BFD travel time capabilities from the currently staffed fire stations, based on the NFPA 1710 criteria.

[13] *NFPA 1710, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments* (National Fire Protection Association 2016).

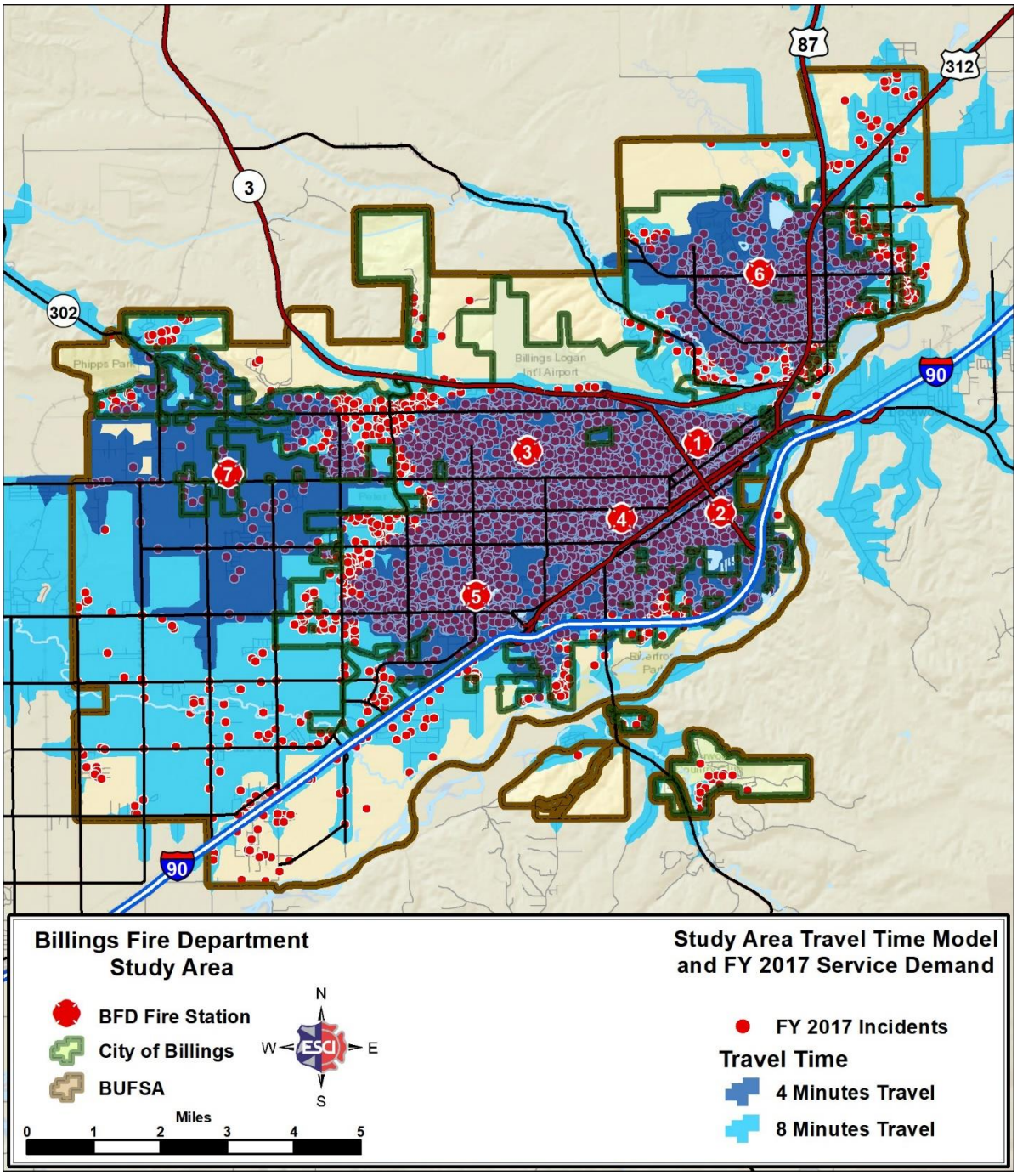
Figure 46: BFD Study Area Travel Time Model (NFPA 1710 Criteria)



The quality and connectivity of the street network, traffic, geography, and barriers can all affect potential travel time performance. The street network in Billings provides relatively good access through the service area. However, there are gaps in the travel time coverage displayed in this figure. As Billings has grown to the west, the city has grown beyond four minutes travel of Stations 4 and 5. Station 6, located in the Billings Heights neighborhood, is to some extent isolated from additional resources by the single access route into the area. Rimrock Road, which runs roughly east–west just south of Highway 3, limits access to Highway 3 and the airport area; from the BFD stations located on the valley floor in Billings.

The following figure displays FY 2017 service demand and travel time model.

Figure 47: BFD FY 2017 Service Demand and Travel Time Model (NFPA 1710 Criteria)



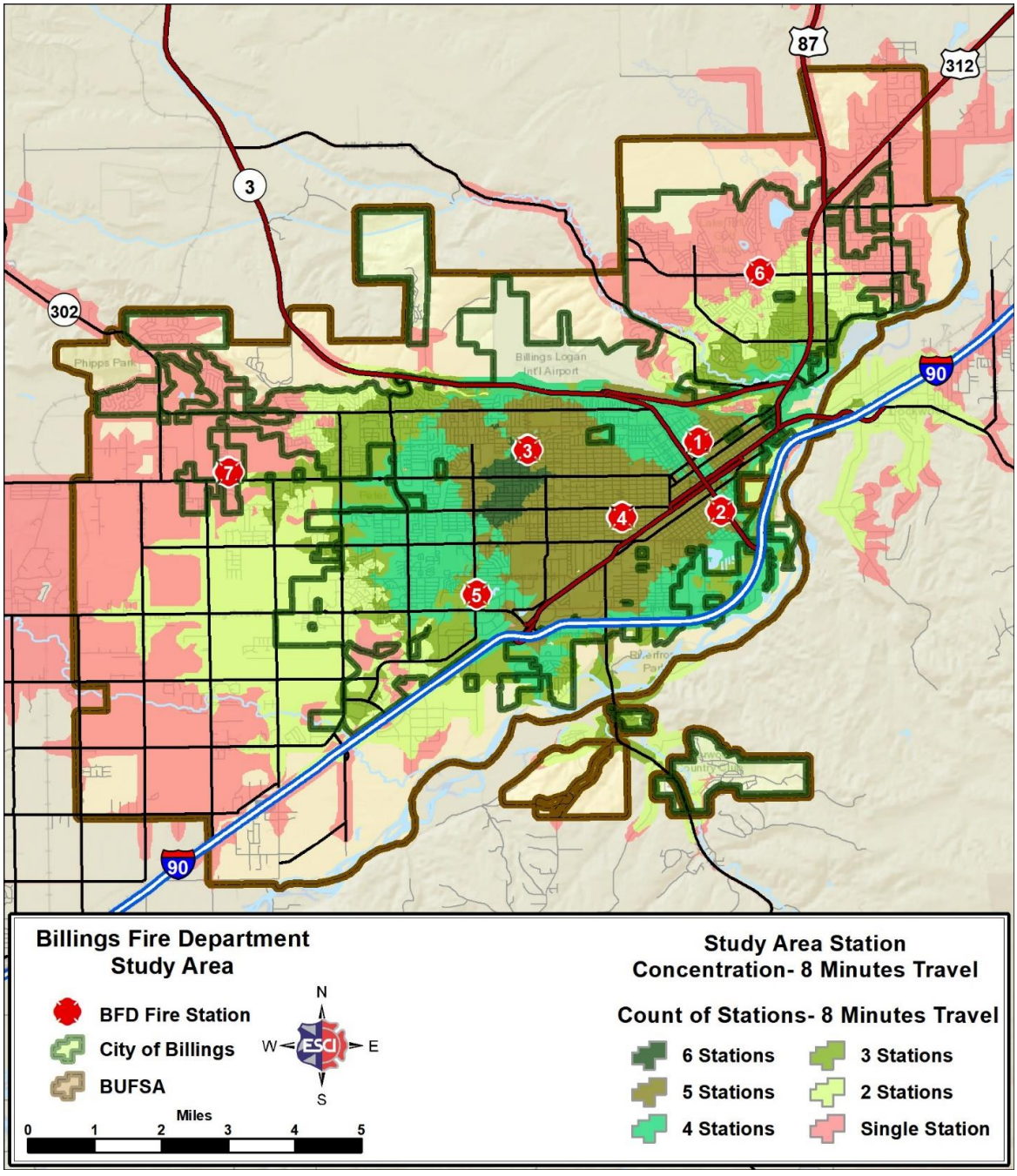
Approximately 86 percent of BFD emergency service demand is within four minutes travel of a BFD station. Note that the travel time model does not measure actual travel time performance. The model demonstrates potential travel time assuming all apparatus are in quarters and available. Actual BFD response performance is discussed in the Response Performance section of this report. Possible options for future station locations are discussed in the Future Options section of this report.

Resource Concentration

The concentration analysis examines the ability of the BFD to assemble multiple resources (both apparatus and people) such that sufficient resources to safely and effectively mitigate an emergency arrive in a timely manner. The eight-minute travel time criteria used for this analysis is based on the National Fire Protection Association (NFPA) *Standard 1710*. The 1710 standard specifies that the full first alarm assignment for a moderate risk structure fire (single story residential structure) should arrive within eight minutes travel.

The following figure demonstrates the concentration of staffed fire stations within eight minutes travel time or less.

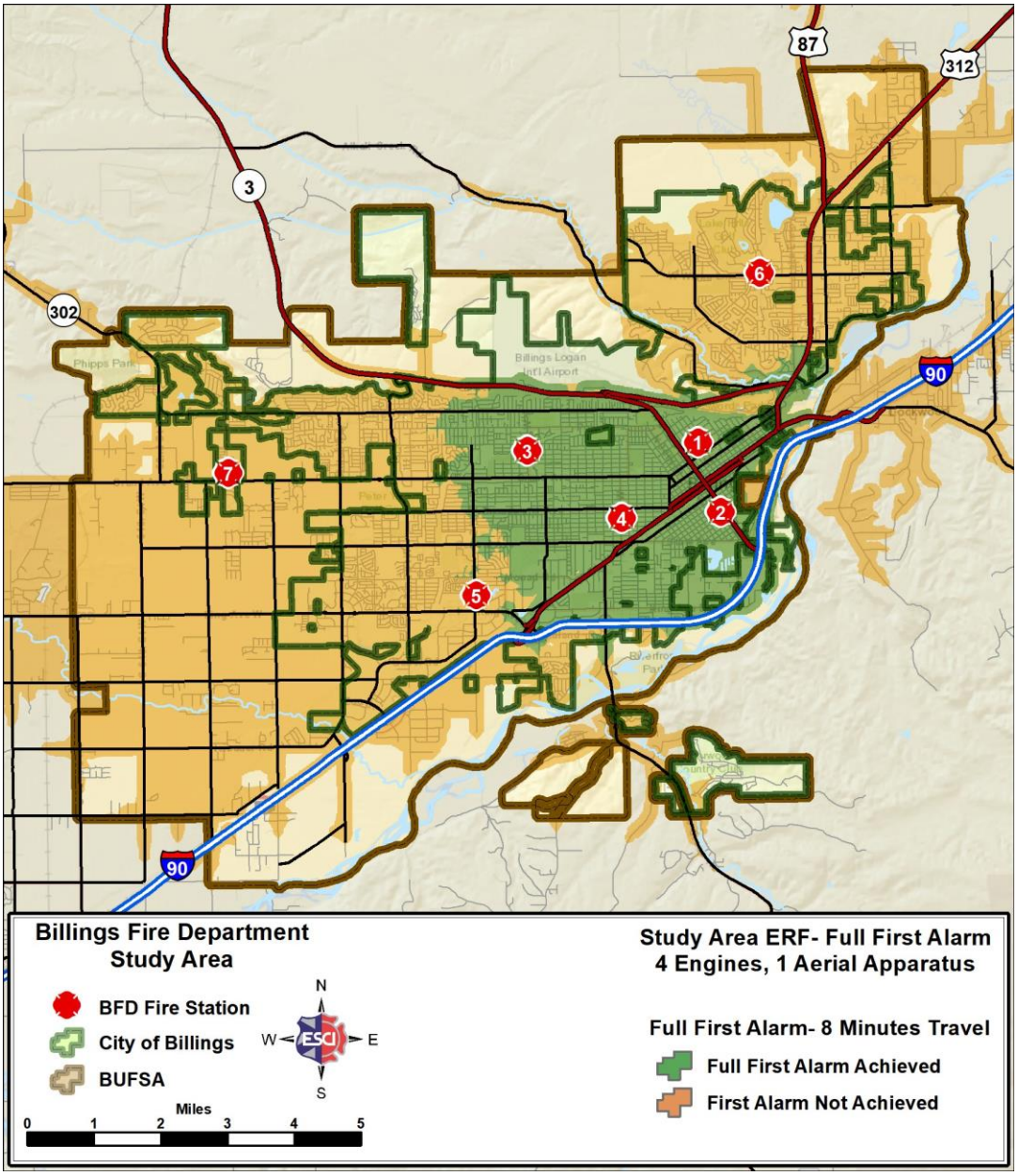
Figure 48: BFD Station Concentration, Eight Minutes Travel Time



The majority of Billings east of Station 5 is within eight minutes travel or less of four to six BFD stations. Two to three stations can reach the portions of the Station 6 service area south of the station in 8 minutes. There are no additional resources that can reach the newer residential development north of Station 7; or in the BUFSA in eight minutes or less.

BFD identifies four engines and one aerial apparatus as the full first alarm assignment for a structure fire. The following figure displays the portions of the BFD service area within a full first alarm assignment in eight minutes travel or less.

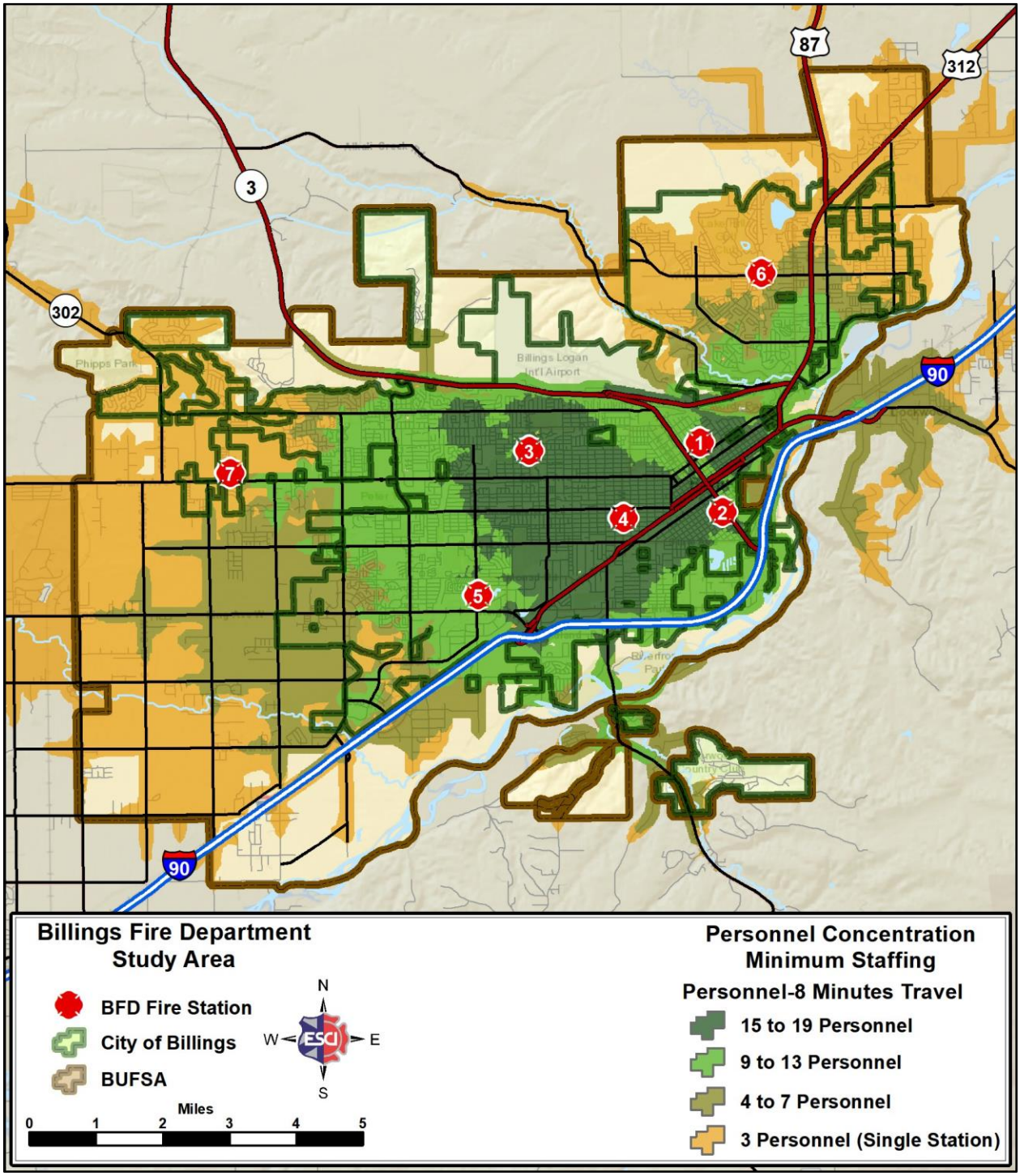
Figure 49: BFD Full First Alarm Assignment, Eight Minutes Travel



The portions of Billings, including the central business district downtown; and areas east of Station 5, are within eight minutes travel of a full first alarm assignment for a moderate risk structure fire. Fire service best practices documents recommend that 14 to 16 personnel are needed to safely and effectively mitigate a moderate risk residential structure fire.[14] The following figure demonstrates the concentration of personnel available at minimum staffing (22 personnel) in eight minutes travel in the BFD service area.

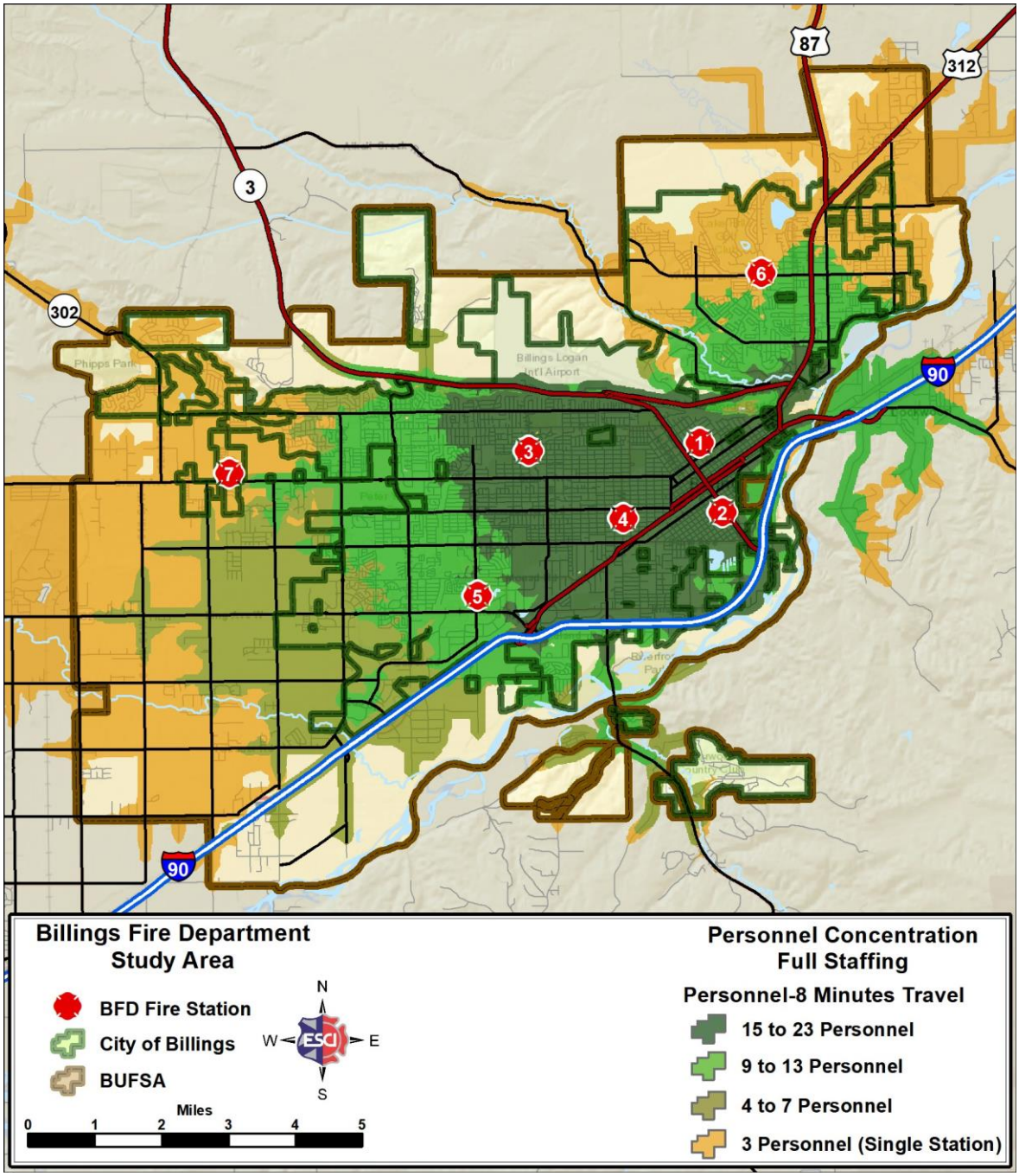
[14] See: *NFPA 1710, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments* (National Fire Protection Association 2016); and the Center for Public Safety Excellence (CPSE) Community Risk Assessment: Standards of Cover, 6th Edition, 2016.

Figure 50: BFD Personnel Concentration (ERF) – Minimum Staffing, Eight Minutes Travel



At minimum staffing levels, resources from five BFD stations are required to arrive in eight minutes travel time or less. This includes the downtown business district and the majority of the area bounded by Stations 1 through 5. As previously discussed, the area west and north of Station 7 and north of Station 6 are within eight minutes travel of a single station or three personnel. The following figure displays the personnel concentration at full staffing (26).

Figure 51: BFD Personnel Concentration (ERF) – Full Staffing, Eight Minutes Travel



At full staffing levels, the concentration of personnel increases from 15 to 19 personnel to 15 to 23 personnel. Additionally, the area where an ERF of 15 or more personnel is available in eight minutes travel extends to all the area around Station 1; the area south of Station 2; and into the southern portions of the Heights neighborhood, north of the intersection of Airport Road and Main Street (Highway 10E).

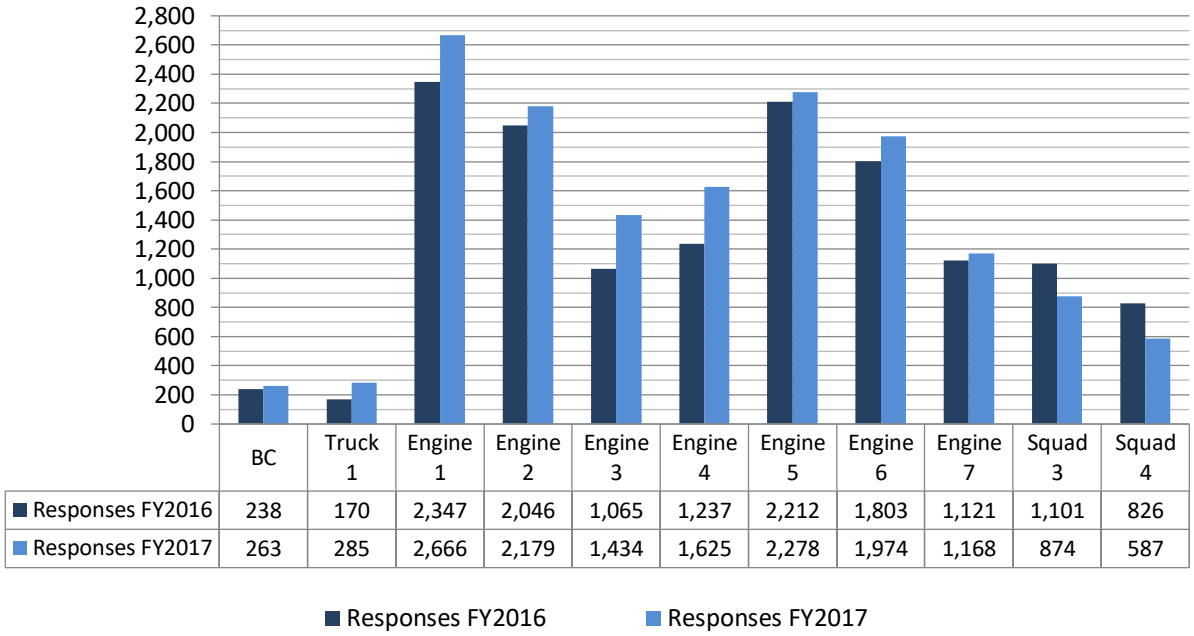
As with the travel time model, the concentration models measure potential travel time performance assuming that apparatus are in quarters and available to respond.

Response Reliability

The workload of emergency response units can be a factor in response time performance. The busier a given unit, the less available it is for the next emergency. If a response unit is unavailable, then a unit from a more distant station must respond, increasing overall response time. Although fire stations and response units may be distributed in a manner to provide quick response, that level of performance can only be obtained when the response unit is available in its primary service area.

The following figure displays the number of responses per apparatus from July 2015 to July 2017. Specialty apparatus such as brush engines, hazmat vehicle, tenders, etc., that are usually cross-staffed and dispatched on "as needed" basis; are not included in this analysis. Examination of the data reveals that these units responded to anywhere from 5 to 50 incidents annually in either FY 2016 or FY 2017.

Figure 52: BFD Apparatus Responses, July 2015–July 2017

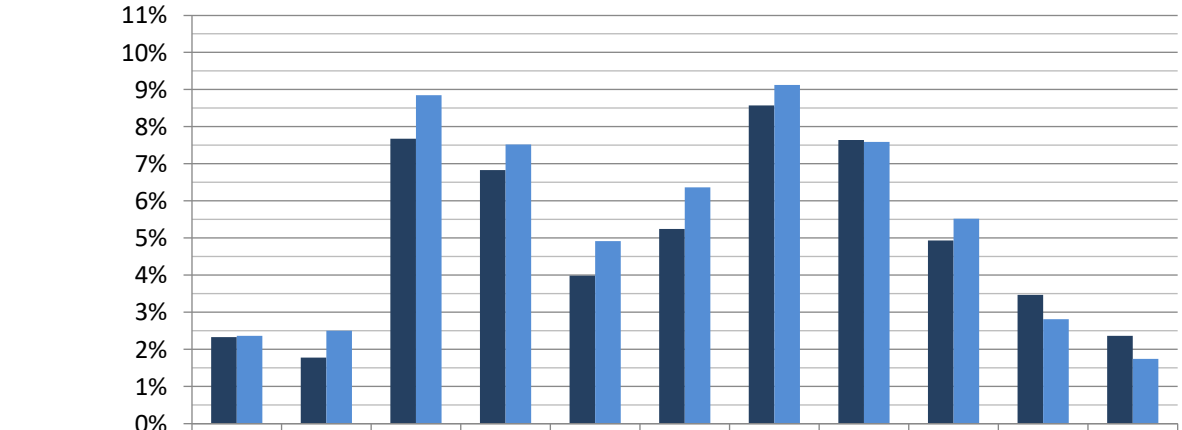


	BC	Truck 1	Engine 1	Engine 2	Engine 3	Engine 4	Engine 5	Engine 6	Engine 7	Squad 3	Squad 4
Responses FY2016	238	170	2,347	2,046	1,065	1,237	2,212	1,803	1,121	1,101	826
Responses FY2017	263	285	2,666	2,179	1,434	1,625	2,278	1,974	1,168	874	587

This analysis differs from the Service Demand analysis in that total workload for each apparatus is measured, which includes instances of multiple apparatus responding to the same incident. Three of the BFD frontline engines (Engine 1, Engine 2, and Engine 5) exceeded 2,000 responses in FY 2016 and FY 2017. The Battalion Chief and Truck 1 experienced the lowest number of responses in the data displayed.

Unit hour utilization (UHU) analyzes the amount of time that a unit is *not* available for response because it is already committed to another incident. The larger the number, the greater its utilization and the less available it is for assignment to subsequent calls for service. The following figure displays the total time BFD primary response apparatus were committed to an incident from July 2015 to July 2017, and expresses this as a percentage of the total time in the year (FY 2016 and FY 2017).

Figure 53: BFD Unit Hour Utilization (UHU), July 2015–July 2017

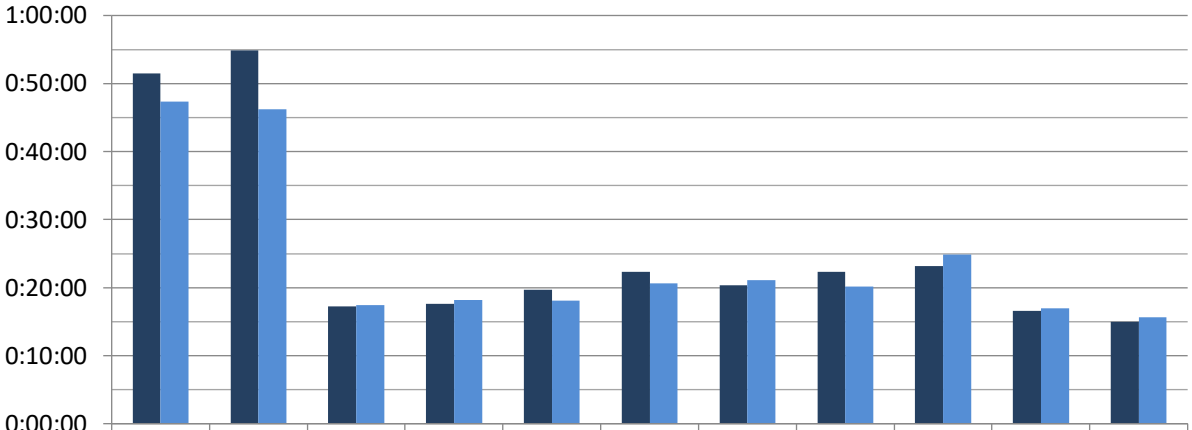


	BC	Truck 1	Engine 1	Engine 2	Engine 3	Engine 4	Engine 5	Engine 6	Engine 7	Squad 3	Squad 4
UHU- FY 2016	2.33%	1.77%	7.68%	6.84%	3.98%	5.25%	8.58%	7.65%	4.94%	3.48%	2.36%
UHU- FY 2017	2.37%	2.50%	8.86%	7.52%	4.92%	6.37%	9.13%	7.59%	5.53%	2.81%	1.74%

Unit hour utilization (UHU) is an important statistic to monitor, especially when a jurisdiction follows industry best practices and measures response performance using percentile-based performance standards. Where response performance is measured at the 90th percentile, unit hour utilization greater than 10 percent means that the response unit will be less likely to provide on-time response to its 90 percent target even if response is its only activity. Currently, no BFD apparatus exceeds the 10 percent threshold. However, several of the first out engine companies are approaching 10 percent UHU rates. Note that as unit hour utilization increases, not only are units less available for emergency responses; but also, less likely to complete other duties, such as inspections, training, public education, and routine station duties. BFD should monitor unit hour utilization to ensure that response performance and other duties are not negatively affected by increased unit hour utilization.

The next figure illustrates the average time a primary response apparatus was committed to an incident, from initial dispatch until the apparatus cleared the scene or was cancelled.

Figure 54: BFD Apparatus Average Time Committed, July 2015–July 2017



	BC	Truck 1	Engine 1	Engine 2	Engine 3	Engine 4	Engine 5	Engine 6	Engine 7	Squad 3	Squad 4
FY 2016	51:28	54:52	17:12	17:34	19:39	22:18	20:23	22:17	23:09	16:36	15:01
FY 2017	47:19	46:11	17:28	18:09	18:03	20:36	21:03	20:12	24:54	16:56	15:36

In general, the average time an engine company is committed to an incident is approximately 17 to 23 minutes. The average time committed is similar to comparable all hazard fire jurisdictions, that provide EMS first response service. The BC and Ladder 1 display the longest average time committed. These units are less likely to be cancelled and respond to a higher percentage of fire incidents which require a greater time commitment.

Simultaneous or concurrent incidents can affect a fire department's ability to muster sufficient resources to respond to additional emergencies. The following figure demonstrates the percentage of the time that BFD resources were committed to more than one incident at the same time in FY 2016 and FY 2017.

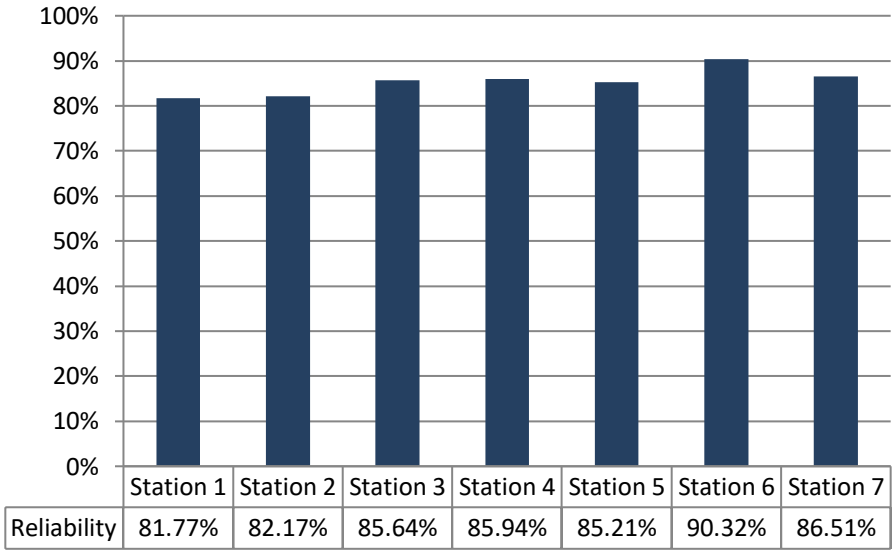
Figure 55: BFD Concurrent Incidents, July 2015–July 2017

FY 2016		FY 2017	
Concurrent Incidents	Percentage	Concurrent Incidents	Percentage
Single Incident	62.7%	Single Incident	59.9%
2	29.1%	2	29.5%
3	6.8%	3	8.6%
4	1.2%	4	1.7%
5 or More	0.4%	5 or More	0.3%

Over 37 percent of FY 2016 service demand occurred while another incident was in progress. In FY 2017, the percentage of concurrent incidents increased to over 40 percent. The number of concurrent incidents increased from 4,746 in FY 2016 to 5,410 in FY 2017, a 14 percent increase. Peak activity units (PAUs) are an effective method for mitigating the effect of concurrent incidents on station reliability and emergency response performance. Peak activity units are discussed in the Recommendations section of this report.

The ability of a fire station's first-due unit(s) to respond to an incident within its assigned response area is known as unit or station reliability. The following figure demonstrates the percentage of incidents that a first-due apparatus for each of the BFD station areas was the first apparatus on scene in their particular station area, during FY 2017.

Figure 56: BFD Station Reliability, July 2016–July 2017



	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	Station 7
Reliability	81.77%	82.17%	85.64%	85.94%	85.21%	90.32%	86.51%

Response performance can be negatively affected by apparatus from a more distant station responding into another station response zone, due to the commitment of assigned apparatus to different incident. To meet a 90th percentile response goal, the optimum station reliability rate should be 90 percent. As seen in the previous figure, station reliability within the BFD service area varies between approximately 82 percent in the Station 1 and Station 2 response zones to slightly over 90 percent in the Station 6 response zone. Actual response performance by station area is discussed in the Response Performance analysis that follows.

Response Performance

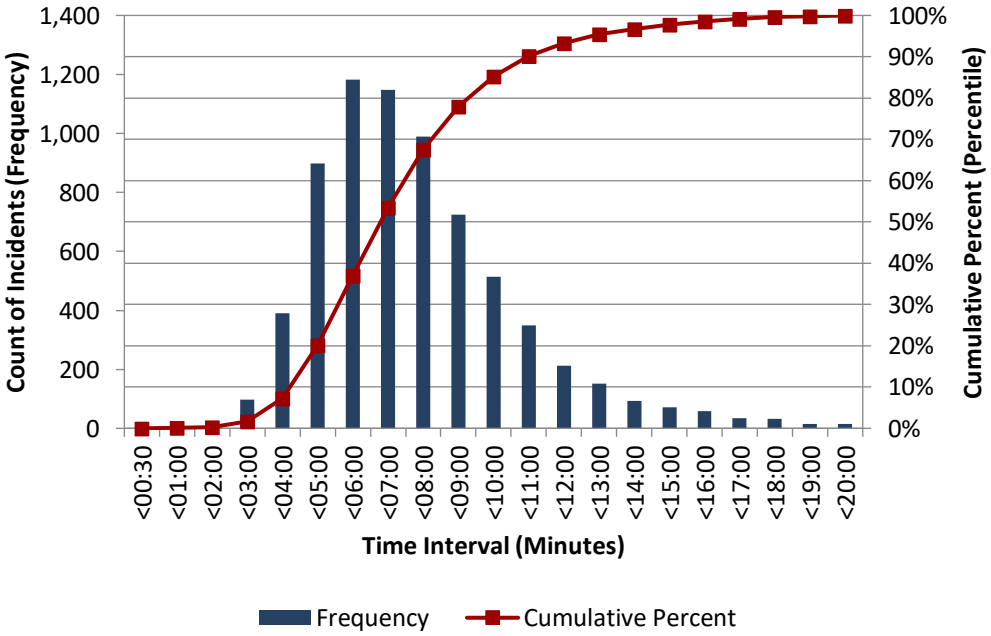
Perhaps the most publicly visible component of an emergency services delivery system is that of response performance. Most citizens and policymakers alike want to know how quickly they can expect to receive services. In the performance summary, ESCI examines emergency response performance for the BFD service area, using incident data from the Billings City/County 911 Center from July 2016 to July 2017 (FY 2017). Non-emergency incidents, mutual aid incidents outside the BFD service area, data outliers, and invalid data are removed from the data set whenever possible.

ESCI measures total response time performance from the time the alarm is received at the 911 Center to when the first apparatus arrived on the scene of the emergency. Both average and 90th percentile response performance is calculated for these emergency incidents. The use of percentile measurement of total response time performance follows the recommendations of the NFPA standards and the Center for Public Safety Excellence (CPSE/CFAI) Standards of Cover document.

Fire department leaders and policy makers often use "average" response performance measures since the term is commonly used and widely understood. The most important reason for not using average for performance standards is that it may not accurately reflect the performance for the entire data set, and can be easily skewed by data outliers. Percentile measurements are a better measure of performance since they show that the majority of the data set has achieved a particular level of performance.

The following figure displays overall emergency response time frequency throughout the BFD study area.

Figure 57: BFD Emergency Response Frequency, July 2016 to July 2017



The most frequently recorded response time for emergency incidents is between five and six minutes. The overall average is 7 minutes, 18 seconds, with the first unit on scene at 90 percent of emergency incidents in 10 minutes, 57 seconds or less. The previous figure measures total response time. Total response time is composed of the following components:

- Call Processing Time – The amount of time between when a dispatcher answers the 911 call and resources are dispatched.
- Turnout Time – The time interval between when units are notified of the incident and when the apparatus begins travelling to the incident.

- Travel Time – The amount of time the responding unit spends travelling to the incident.
- Total Response Time – Total Response Time equals the combination of "Processing Time," "Turnout Time," and "Travel Time."

Tracking the individual pieces of total response time assists with identifying deficiencies and areas for improvement. Industry best practice documents such as the Center for Public Safety Excellence (CPSE) *Community Risk Assessment: Standards of Cover* document and the national consensus standard NFPA 1710 recommend that fire departments track and report all the components of total response time.[15] The following figure displays the emergency response performance recommendations from the NFPA 1710 standard.

Figure 58: NFPA 1710 Response Performance Recommendations

Response Element	NFPA Recommendation
Call Processing[16]	60 Seconds @ 90th Percentile
Turnout Time	60 Seconds @ 90th Percentile for EMS 80 Seconds @ 90th Percentile for Fire
Travel Time (First unit on scene-Fire or EMS)	4 Minutes @ 90th Percentile
Travel Time-Full First Alarm (Fire Suppression Incident)	8 Minutes @ 90th Percentile

The following figure illustrates BFD FY 2017 response performance for the various components of total response time.

Figure 59: BFD Overall Emergency Response Performance, July 2016–July 2017

	Call Processing	Turnout Time	Travel Time	Total Response Time
Average	01:34	01:28	04:16	07:18
90th Percentile	02:45	02:39	07:28	10:57

BFD has not developed or adopted formal response performance goals, however the department reports that the NFPA 1710 Standard for Career Fire Department is used as the informal guideline for measuring response performance. Comparing the BFD FY 2017 response performance in Figure 59 to the NFPA 1710 recommendations in Figure 58 demonstrates that currently BFD does not meet any of the NFPA criteria for the various components of emergency response performance.

[15] Center for Public Safety Excellence (CPSE) *Community Risk Assessment: Standards of Cover, 6th Edition*; *NFPA 1710, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments* (National Fire Protection Association, 2016).

[16] *NFPA 1221: Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*.

Call Processing Time

BFD call processing time exceeds the NFPA 1710 goal for emergency call processing by nearly two minutes, measured at the 90th percentile. The Billings City/County 911 Center is the primary public safety answering point (PSAP) for Yellowstone County. The center dispatches police, fire, sheriff's office, and EMS agencies throughout Yellowstone County. Billings 911 utilizes the Medical Priority Dispatch System (MPDS) to triage medical calls and provide pre-arrival instructions. ESCI recommends that BFD work cooperatively with Billings 911 (which reports to the Fire Chief) to reduce call processing time. Many high volume, high performance dispatch centers such as Billings have discovered that call processing and turnout time performance can be improved by immediately notifying response personnel as soon as the location and general nature of the emergency call is determined.

Turnout Time

The second component of the response continuum, and one that can be directly affected by response personnel, is turnout time. Turnout is the time it takes personnel to receive the dispatch information, move to the appropriate apparatus, and proceed to the incident. The NFPA 1710 performance standard for turnout time is within 80 seconds, 90 percent of the time for fire and special operations incidents and within 60 seconds, 90 percent of the time for EMS incidents.

As displayed in Figure 59, BFD personnel required 2 minutes, 39 seconds to assemble and begin travelling to an emergency in FY 2017.

While BFD turnout time performance does not meet the NFPA 1710 standard, it is ESCI's experience that the NFPA standard is difficult to achieve and turnout time standards of 90 to 120 seconds for career staffed fire jurisdictions are more realistic and achievable. This is affirmed in a study[17] published in 2010 by the NFPA research foundation. This said, there is room for BFD to reduce response performance by improving turnout time performance. ESCI recommends that BFD routinely monitor turnout time performance, identify deficiencies, and take steps to reduce turnout time. Turnout time is an area of total response performance that field personnel have some ability to control, given adequate information and facilities that allow for rapid and efficient movement of personnel.

Travel Time

The NFPA 1710 standard calls for a travel time of 4 minutes for the arrival of the first arriving unit to an emergency incident (Fire/Special Operations or EMS). Travel time is potentially the longest component of total response time.

Again, comparing Figure 59 to Figure 58 reveals that BFD emergency travel time performance does not meet the NFPA 1710 standard. From July 2016 to July 2017 travel time for the first BFD unit to arrive at an emergency incident was 7 minutes, 28 seconds, 90 percent of the time.

[17] Quantitative Evaluation of Fire and EMS Mobilization Times, May 2010, available at www.nfpa.org/foundation.

As discussed in the Distribution Analysis, nearly 86 percent of FY 2017 emergency service demand occurred within 4 minutes travel of a BFD station, based on the GIS travel time model. However, incident response data reveals that only 51 percent of emergency incidents were reached in 4 minutes travel or less.

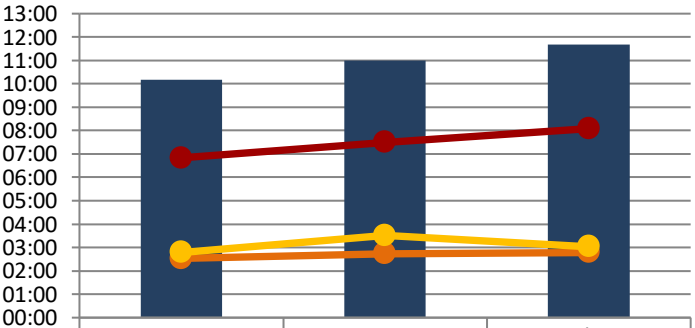
Factors that can affect travel time performance include traffic flow during morning and evening peak traffic periods, concurrent incidents which call for units from a more distant station to respond, or inadequate distribution of resources to cover the geographic service area. All these factors may to some degree affect travel time performance in the BFD service area.

Total Response Time-First Unit on Scene

The NFPA 1710 standard does not specify a performance goal for total response time. Combining the components of response time cited in NFPA 1710 results in a total response time of 6 minutes or less (90th percentile) for EMS emergencies, and 6 minutes, 20 seconds (90th percentile) for Fires and all other emergency incidents.

Figure 60 displays total response time summarized as Fire, EMS, and Other emergencies in FY 2017. In this figure "Fire" refers to any incident coded as a fire in the BFD data. The "EMS" category includes emergency calls for medical service including motor vehicle accidents and rescue calls. The "Other" category includes hazmat incidents, alarms (no fire), gas/odor investigations, and any other miscellaneous emergency incident.

Figure 60: BFD Total Response Time by Incident Category (90th Percentile), July 2016 to July 2017



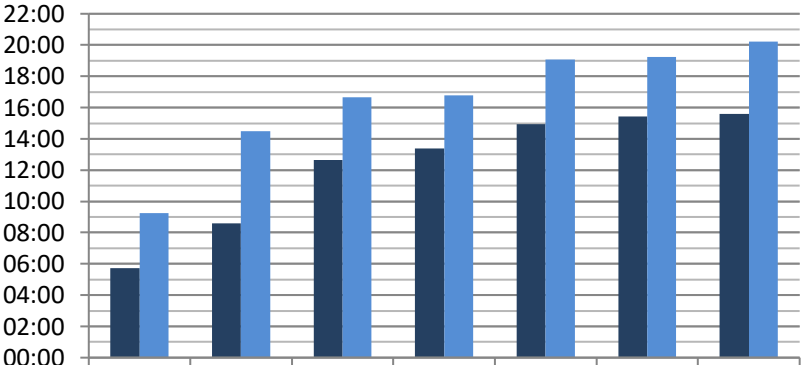
	EMS	Fire	Other
Total Response Time	10:11	10:59	11:40
Travel Time	06:50	07:30	08:05
Turnout Time	02:32	02:44	02:47
Call Processing Time	02:47	03:31	03:02

As displayed in this figure, BFD total response time performance exceeds the implied NFPA total response time goal for EMS incidents by over four minutes. Total response time performance for fire suppression incidents also does not meet the NFPA goal of 6 minutes, 20 seconds. The first unit on scene arrived at 90 percent of emergency incidents categorized as Other in 11 minutes, 40 seconds. Note that travel time performance seems to be the primary factor affecting total response time performance in this figure.

Travel Time – Full First Alarm (Structure Fire)

The NFPA 1710 standard calls for the arrival of the full first alarm assignment to arrive at a fire suppression incident in eight minutes travel time or less, 90 percent of the time. The BFD full first alarm assignment for a structure fire calls for five apparatus plus the Battalion Chief. The following figure displays BFD response performance (travel time and total response time) for the first through the seventh apparatus to arrive at a structure fire in FY 2017.

Figure 61: BFD Structure Fire Response Performance by Arrival Order, July 2016 to July 2017



	First On Scene	Second	Third	Fourth	Fifth	Sixth	Seventh
Travel Time (90%)	05:43	08:35	12:40	13:22	14:55	15:25	15:34
Total Response (90%)	09:16	14:29	16:40	16:47	19:04	19:14	20:13

Figure 61 demonstrates that BFD required 14 minutes, 55 seconds travel time for the fifth apparatus (15 minutes, 25 seconds for the sixth apparatus) to arrive at a BFD structure fire, measured at the 90th percentile. This results in a total response time of slightly over 19 minutes for the fifth apparatus and sixth apparatus. This represents a difference of approximately 10 minutes between the arrival of the first apparatus and the fifth or sixth fire unit (total response time). Similarly, there is an approximately 10-minute difference in travel time between the first apparatus and the fifth or sixth apparatus, measured at the 90th percentile.

BFD travel time performance does not meet the NFPA 1710 benchmark of eight minutes travel for the arrival of a full first alarm assignment at a structure fire. As discussed in the Concentration Analysis there are large portions of the BFD service area that are beyond eight minutes travel of sufficient resources to assemble full first alarm assignment, i.e. effective response force. The travel time required to assemble multiple resources and lack of availability due to concurrent incidents are most likely the two factors negatively affect the assembly of multiple resources in the BFD service area.

While BFD response performance does not meet the NFPA 1710 emergency response performance goals, ESCI does not infer that the BFD is performing poorly. However, it is important that fire department leaders and governing bodies be aware of the jurisdiction's current performance. The NFPA 1710 standard is not codified or mandated; but does represent an industry best practice that is based on current research that is periodically reviewed and updated.

Response Performance by Area

The Billings Fire Department provides service to an area of over 91 square miles. The service area includes the City of Billings and the Billings Urban Fire Service Area (BUFSA). As discussed previously, the city is an urban center; and the BUFSA is a primarily rural area surrounding the city. The BUFSA contracts with the BFD for fire department services.

The following figure illustrates BFD emergency response performance summarized as City or BUFSA emergency incidents.

Figure 62: BFD Response Performance by Response Area, July 2016–July 2017

	Average			90th Percentile		
Response Area	Turnout Time	Travel Time	Total Response Time	Turnout Time	Travel Time	Total Response Time
City	01:27	04:08	07:09	02:37	07:10	10:37
BUFSA	01:47	07:04	10:28	02:56	11:29	15:42

This figure displays turnout time, travel time, and total response time; call processing time is included in the calculation of total response time, but is not displayed since there is little variation between call processing time between City and BUFSA incidents. BFD currently serves the BUFSA from the seven fire stations located inside the City of Billings. While turnout time is relatively consistent between City and BUFSA emergency responses, the increased travel time required to reach many BUFSA incidents results in a corresponding increase in total response time.

The following figure summarizes BFD emergency response performance by first due district, from July 2016 to July 2017.

Figure 63: BFD Response Performance by Station Area, July 2016–July 2017

	Average			90th Percentile		
Station Area	Turnout Time	Travel Time	Total Response Time	Turnout Time	Travel Time	Total Response Time
Station 1	01:23	03:19	06:14	02:29	05:38	09:08
Station 2	01:26	03:28	06:19	02:26	06:04	09:28
Station 3	01:19	04:20	07:27	02:43	06:59	10:33
Station 4	01:17	04:15	07:24	02:42	07:23	10:54
Station 5	01:31	04:27	07:27	02:39	07:39	11:21
Station 6	01:38	04:31	07:31	02:41	07:38	10:59
Station 7	01:48	06:26	09:45	02:56	10:13	13:50

As in the previous figure, Figure 63 includes call processing time in total response time, but call processing time is not displayed. Measured at the 90th percentile, turnout time varies slightly in a range of 27 seconds. Station 1 and Station 2 demonstrate the lowest travel times at 5 minutes, 38 seconds (Station 1), and 6 minutes, 4 seconds (Station 2). Station 7 located on the western perimeter demonstrates the longest travel time performance; which is to be expected, since a large portion of the Station 7 response area is in the BUFSA. Total response performance at all the BFD stations correlates with travel time performance; with Station 7 demonstrating the longest response time performance and Stations 1 and 2 experiencing the shortest total response times.

Mutual and Automatic Aid Systems

Communities have traditionally forged limited agreements to share resources under circumstances of extreme emergencies or disasters. These agreements, known as mutual aid agreements, allow one community to request the resources of another to mitigate an emergency situation or disaster that threatens lives or property. Mutual aid is typically employed on an "as needed" basis where units are called for and specified one by one through an Incident Commander. Automatic aid agreements differ from mutual aid agreements in that under certain mutually agreed upon criteria, resources from the assisting agency are automatically dispatched as part of the initial response. These agreements facilitate closest unit dispatch to emergencies in boundary areas and allow for the dispatch of additional apparatus and personnel to specific predefined emergencies.

BFD participates in the Yellowstone Emergency Operations Plan and County Mutual Aid Agreement. The department has mutual aid agreements with the three oil refineries in the area; and Lockwood Fire Department and Laurel Volunteer Fire Department where two of the three refineries are located. There is a mutual aid agreement in place between Billings Fire and the Billings Logan International Airport Aircraft Rescue and Firefighting Department (ARFF). BFD also contracts to provide equipment and personnel to the Montana DNRC office located in Billings; additionally, BFD works cooperatively with other wildland firefighting agencies during wildland fire season. The department also routinely cooperates with law enforcement agencies; and responds with American Medical Response (AMR) to EMS incidents in the BFD service area. Traditional mutual aid represents a small portion of BFD service demand. The 2016 NFIRS data shows that BFD received aid 13 times and provided aid 25 times in 2016.

FIRE AND EMS TRAINING DELIVERY

Training is the foundation of a professionally administered, operationally proficient and effective fire and emergency service. Without a comprehensive training program that is based in the latest fire service knowledge and technology, the outcomes of emergency service delivery are hampered, and staff members are put at a higher risk for mistakes, injury or even failure during a response.

For training to be fully effective, it should be based on established and recognized industry standards. There should also be consideration given to third-party based testing and certification for the completion of training as it provides not only the highest level of skills and ability verification, it also provides the department a greater level of protection from liability.

In this section, ESCI reviews the department's training practices and compares them to national standards and best practices. Recommendations for strategic changes or areas of where opportunities for improvement exist are noted where appropriate.

General Training Competencies

There are a variety of sources for training standards. BFD references the National Fire Protection Association (NFPA), uses International Fire Service Training Association (IFSTA) resources, and complies with applicable Montana regulations and standards. It also follows the Montana state mandated requirements and standards for Emergency Medical Technicians and Paramedics.

The following figure summarizes the general training competencies that are addressed in the department's basic training program.

Figure 64: General Training Competencies

Survey Components	Billings Fire Department Observations	Comments and Recommendations
General Training Competency		
Incident command system	All staff ICS 100, 200, 700, 800; 300 for Captains, 400 for Battalion Chiefs, Flame-Sim used for practice.	Adopt and train all staff to a fireground incident command standard.
Accountability procedures	Passport system in place	
Policy and procedures	Trained in recruit school, repeated in Officer Development Program, changes delivered via email.	
Safety procedures	Safety Officer Program, only two Training Officers are trained to this.	Current plan of training more Safety Officers to provide 24-hour coverage should be supported.
Recruit training	12-week, 480-hour program. Internal certifications for Firefighter I (FFI) & Firefighter II (FFII).	Third party FFI & FFII certifications should be utilized for quality assurance and risk management purposes.
Special rescue (high angle, confined space, etc.)	Operations and Technician training throughout year, two 8-hour days a year devoted to training.	Team training should be increased to at least once quarterly, preferably monthly for skill maintenance and team proficiency.
Hazardous materials	Two-year refresher requirements met via core training 9 times a year.	Team training should be increased to at least once quarterly, preferably monthly for skill maintenance and team proficiency.
Wildland firefighting	Annual RT 130, S 190 training in May, delivered in four modules to meet NWCG minimum standards.	
Vehicle extrication	Part of Rescue Operations	
Defensive driving	Part of Engineer Development Program and annual refresher	
Use and care of small tools	Company level training	
Radio communications & dispatch protocol?	Annual training on procedures	
EMS skills and protocol	Target Solutions for online education, up to 12 hours per year for EMT recertification. Quarterly, 5–6 topics delivered in 8 hours of hands on training.	

Discussion

Proper training of emergency services personnel starts prior to hire or joining an agency. Specific knowledge and skills must be obtained to achieve a basic understanding of the roles and responsibilities of an emergency responder. The BFD recruit-training program affords the new recruit a total of 120 annual hours in a wide variety of areas. As a result of current work levels, the Fire Chief has limited engagement in incident command training. ESCI believes the Fire Chief will be able to prioritize and participate in regularly scheduled training with all crews, including all incident command level activities, once additional administrative positions are filled. The BFD is commended for a very robust, well managed, well led, and effective overall training program that includes all requisite elements.

New Personnel Training

BFD currently trains their recruits to an internal Firefighter I and II standard. This process should be enhanced by training recruits to a third-party FFI/FFII standard, such as the Montana Fire Service Training School's certifications in these areas or a similar standard that can be assessed and tested. This will provide a motivation for a stronger foundation during training while reducing BFD's liability for the type of training utilized and the manner it is provided.

Incident Command Training

BFD should adopt a formal fireground incident command standard beyond the FEMA ICS 100 through 800 courses (such as Blue Card, ITAC, etc.) and train all members of the department on it. This is critically important and will provide for increased safety and accountability, formalized, risk management based decision making and a common communications standard that all will understand.

In addition, a formal after-action review standard should be established so performance improvement can be achieved in a non-judgmental environment that encourages sharing lessons learned.

Safety Officer Program

Both of BFD's Training Officers are trained Safety Officers and are responding to incidents in that capacity as much as possible. The current goal of expanding the number of BFD members trained as Safety Officers should be supported and a formal standard for their use should be created as part of the department's operational risk management model 24 hours a day.

Key Recommendations

- Train recruits to a third-party FFI/FFII standard, such as the Montana Fire Service Training School's certifications.
- Adopt a formal fireground incident command standard beyond the FEMA ICS 100 through 800 courses (such as Blue Card, ITAC, etc.) and train all personnel.
- Expand the number of personnel trained as Safety Officers.

Training Program Management and Administration

To function effectively, a training program needs to be managed. Administrative program support is important, though often weakly addressed. An additional element of effective administration is the development of program guidance in the form of training planning, goals, and defined objectives.

The next figure reviews the BFD Training Program administration and management practices.

Figure 65: Training Program Administration and Management

Survey Components	Billings Fire Department Observations	Comments and Recommendations
Training Administration		
Director of training program	Matt Hoppel	
Education or background	Fire service since 1991 as volunteer FF & EMT; BFD since 1998; Deputy Fire Marshal, then Captain before taking this position. NFA program trainings and seminars.	Working bachelors in fire administration.
Program Goals and objectives identified	Company Officer training for leadership, future goals. It will transform department as it is not provided. Priority on Captains and BCs before promotions.	
Governing body support and concurrence	Training has not been supported historically.	Department should attempt to educate governing body on benefits of and requirements for training.
Personnel knowledge and understanding	Captains are tested on SOPs.	
Recordkeeping		
Individual training files maintained	Electronic through Target Solutions. Certifications are kept as papers copies, scanned into software when possible.	
Records and files computerized	Yes	
Daily training records	Instructors do instructor led entries, Captains are doing company level entries.	
Company training records	Yes	
Lesson plans used	8 lessons a month on the average, at least 8 hours of training total.	
Pre-fire planning included in training	Some simulations made from plans and preplan training at company level.	

Survey Components	Billings Fire Department Observations	Comments and Recommendations
Administrative Priority		
Budget allocated to training	$43,150 for non-personnel costs $30,000 for EMS training	Training budget should reflect size of department, technical team training requirements, and officer development needs,
Using certified instructors	When budget allows, utilize outside trainers or send staff to trainings. All EMS Coordinators EMS Lead Instructors.	Use of instructors certified in their subject matter is highly recommended for skill competency and liability management
Annual training report produced	As part of the annual report and Target Solutions annual breakdown printed.	
Adequate training space/facilities and equipment	Fire training facility at the airport training center. Training tower at Station 2.	
Maintenance of training facilities	Yes, done in-house by fire personnel as time allows by 19 certified live fire instructors.	
Training Program Clerical Support		
Administrative secretary support	No, but the Administrative Coordinator & administrative support will assist with special projects.	Administrative support in this area could increase ability of Training Officers to deliver curriculum.
Records computerized software used	Yes	

Discussion

As a result of current work levels and the additional, non-training duties assigned to them, both Training Officers have a limited ability to engage in their primary responsibilities. This reflects the relative low priority placed on training and has hampered the development of the training program.

To function properly and effectively, a training program needs to be well managed and its administration needs an effective training structure, starting with identified goals, planning, and clear, supported objectives. To assist with this, a training manual should be created to outline the above and provide the information and direction needed for all staff members to utilize.

The BFD training program has no regular administrative support, which is an area that could provide the current Training Officers greater ability to work within their assigned roles by freeing them from collateral and clerical duties.

The training program's budget limits the ability to deliver training within the department as well as effectively preventing members from seeking training elsewhere. An increased investment in this area is needed to provide enhanced safety and proficiency of personnel in all areas of performance.

Department training delivery has been difficult due to the limited amount of training space available and the distribution of department personnel over seven different locations. A drill tower is located at Station 2, and a training ground is located at the airport with multiple and well-developed props, drafting pit, live fire facilities, and driving area. However, space for classroom instruction is limited at all locations, compromising didactic delivery. In the future, when fire stations are remodeled, replaced, or new facilities constructed, the inclusion of classroom training facilities should be prioritized. In the interim, an investment in smartboards or similar technology is strongly encouraged to provide uniform, department-wide training regularly.

Key Recommendations

- Evaluate opportunities to provide administrative and clerical support to the training program.
- Increase investment in the training program budget.
- Include classroom and meeting space in future fire station revisions or construction.
- Seek options for smart board or other electronic solutions to limited training space and facilities.

Training Resources, Scheduling, and Methodology

In order to deliver effective training to fire and EMS personnel, some tools and resources are necessary for the trainer to provide adequate educational content. In addition to tools, effective methodologies must be used for delivery to sufficiently meet department needs.

The next figure reviews BFD's training resources and practices.

Figure 66: Training Resources, Scheduling, and Methodology

Survey Components	Billings Fire Department Observations	Comments and Recommendations
Training Facilities and Resources		
Training facilities (tower, props, pits)	Drill tower at Station 2. Shipping containers, breaching and breaking, and live fire props at the airport training site.	
Live fire prop	Flashover container and propane prop at the airport.	
Fire and driving grounds	At the airport	
Classroom facilities	Station 1 has small meeting rooms; Station 4 community room rarely used. Small space at the airport training room also used.	Due to lack of facilities in all stations, smartboard or similar technology should be used to deliver training department-wide.
VCR, projectors, computer simulations	Computer lab Station 1 currently, may be distributed to other stations. Updates needed.	
Books, magazines, instructional materials	Library available, DVD, and books. Each station has minimal IFSTA materials. Fire Engineering is available at all stations.	Increase availability of training materials by creating online resources in all stations.
Training Procedures Manual		
Manual developed and used	Working on BC development program.	A training manual should be developed for all categories of training in the department. Specifically, recruit training, firefighter regular skill maintenance, technical rescue and hazardous materials training and maintenance, as well as Officer development for all levels in the department.
IFSTA manuals used	Yes	
Training Scheduling		
Career training schedule	As assigned by training division and carried out by station Captains.	Department-wide training schedule should be adopted to ensure delivery and continuity.
Volunteer training schedule	N/A	
Minimum training hours, competencies	8 hours per month	Training hours should be increased to meet ISO requirements and to maintain NFPA competencies.
Methodology Used for Training		
Manipulative	Yes	
Task performances	Yes	
Annual training hours	228 hours targeted (ISO), Captains 16 hours of leadership training, 12 hours of engineer training.	Documented training should be increased to at least 19 hours a month to meet ISO minimum standard.
Use of lesson plans	Yes	

Survey Components	Billings Fire Department Observations	Comments and Recommendations
Night drills	Twice a year	
Multi-agency drills	CENEX refinery, not with other fire departments beyond Lockwood.	Seek to increase participation with other county fire agencies to have interoperability during large/complex events.
Inter-station drills	Limited	Multi-company drills should be increased to enhance department efficiency and safety.
Physical standards or requirements	Firefighters can take an annual physical, not required, given $300 a year to pass pack test HM annual physicals are still needed.	Annual physicals would be beneficial to enhance firefighter wellness, should be mandatory for hazardous materials team members.
Annual performance evaluation conducted	Self-appraisals which are not viewed as productive no feedback provided.	Annual performance evaluations for all staff members with measurable goals should be instituted.
Employee development program	Tuition assistance program $25,000 a year department-wide.	
Operations and Performance		
Disaster drills conducted	Internally and participate in the two-year 'coyote' exercise with LEPC.	
Attention to safety	Fireground safety pretty good; overall safety of fireground needs education.	Establish robust and structured safety and risk management program for fireground operations decision-making.
Post incident critique (After Action Review)	Done but not enough. Unusual, significant events. Some are being critiqued on scene informally. CISD if needed, if admin aware.	Establish a formal after-action review standard, encouraging discussion and improvement through non-judgmental conversation and sharing.
Priority by management toward training	Low Priority Assigned	Current Interim Chief has begun to place a much higher priority on training.

Ongoing Skills Maintenance

The current three to four-year rotation for training on all disciplines should be reduced so there are not prolonged gaps in skill maintenance. ESCI recommends that the rotation be reduced to annual training on critical skills and subject matter, and biannually for non-critical skills and tasks.

In order to achieve this, BFD will need to examine its current standard of 8 hours of monthly training and look for areas that have not been addressed. BFD has a self-identified goal of training firefighters at least 228 hours a year to meet the Insurance Services Office (ISO) minimum standards but will need to increase training to at least 19 hours a month to meet this target.

BFD should perform an evaluation of the community hazards and the requisite technical skills needed to address them so that proper training objectives can be identified and a training schedule established that meets the needs. The National Fire Protection Association (NFPA) standards provide much information in this area. Pertinent standards should include, but not be limited to:

- NFPA 1410—Standard on Training for Emergency Scene Operations
- NFPA 472—Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents
- NFPA 1006—Standard for Technical Rescue Personnel Professional Qualifications

Indeed, BFD may find that it is necessary to increase training beyond the current annual training goals so that all anticipated hazards are address meet all minimum job performance requirements. Within this area is the need to have regular training of the hazardous materials and technical rescue teams. Reinforcing required skills alone do not produce a robust response during emergencies as specialty teams need to train together to improve team dynamics and efficiency.

BFD is commended for its current training of Emergency Medical Technicians along with Paramedics in advanced life support topics. It is an outstanding approach to creating improved emergency services delivery and should be continued. In addition, the inclusion of patient care scenarios during hazardous materials and technical rescue training is also a strong approach to continuity and efficiency during responses.

Employee Physical Standards

Annual physicals are not required for firefighters, which is a missed opportunity to detect preventable injuries which are common in the fire service. An examination of the NFPA 1500, *Standard on Fire Department Occupational Safety, Health, and Wellness Program* is encouraged, and an adoption of minimum physical standards would be greatly beneficial and potentially life-saving.

Key Recommendations

- Amend skills maintenance training frequency to annual training on critical skills and subject matter, and biannually for non-critical skills and tasks.
- Increase monthly minimum training hours.
- Evaluate community hazards and target training delivery accordingly.
- Require annual physical examinations to all personnel consistent with NFPA 1500 and adopt minimum physical standards.

FIRE PREVENTION AND PUBLIC EDUCATION PROGRAMS

An aggressive risk management program, through active fire and life safety services, is a fire department's best opportunity to minimize the losses and human trauma associated with fires and other community risks.

> The National Fire Protection Association recommends a multifaceted, coordinated risk reduction process at the community level to address local risks. This requires engaging all segments of the community, identifying the highest priority risks, and then developing and implementing strategies designed to mitigate the risks.[18]

A fire department needs to review and understand the importance of fire prevention and public education, appreciating their role in the planning process of a community with diversified zoning including residential, commercial, and industrial properties.

The fundamental components of an effective fire prevention program are listed in the following figure, accompanied by the elements needed to address each component.

Figure 67: Fire Prevention Program Components

Fire Prevention Program Components	Elements Needed to Address Program Components
Fire Code Enforcement	Proposed construction and plans review New construction inspections Existing structure/occupancy inspections Internal protection systems design review Storage and handling of hazardous materials
Public Fire and Life Safety Education	Public education Specialized education Juvenile fire setter intervention Prevention information dissemination
Fire Cause Investigation	Fire cause and origin determination Fire death investigation Arson investigation and prosecution

Fire and Life Safety Code Adoption and Enforcement

Code adoption and enforcement are foundational components of a community's fire and life safety success. To the extent that effective code enforcement is in place, a community will be provided consistent and known construction, access, and protective systems in and for buildings. A well-developed code enforcement program will provide a fire department with a road map of where public education efforts should be focused and improve the efficiency of emergency responders in mitigating a variety of incidents. These advantages of effective code application and enforcement aide individuals, families, businesses, and communities be resilient in the face of emergencies and minimize the risk of catastrophe and community-wide disruption.

[18] Kirtley, Edward, *Fire Protection Handbook*, 20th Edition, 2008, NFPA, Quincy, MA.

Figure 68: Fire Prevention Code Enforcement

Survey Components	Billings Fire Department Observations	Comments and Recommendations
Code Enforcement		
Fire codes adopted	Yes	
Code used – year/version	International Fire Code (IFC) 2012	
Local codes or ordinances adopted, amendments	Yes	Local amendments to code made to better address local needs.
Sprinkler ordinance in place	No – Using IFC requirements	Work to adopt state amendments to IFC and/or local ordinance for residential sprinklers.
New Construction Inspections and Involvement		
Consulted in proposed new construction	Yes	All within Billings city limits and also subdivision plans in BUFSA.
Perform fire and life safety plan review	Yes	Some reviews are contracted out.
Sign-off on new construction	Required for issuance of the building permit	
Charges for inspections or reviews	No direct charges	Fees are part of the building permitting process and paid directly to the City and outsourced plans review firm.

Discussion

The State of Montana adopted the 2012 edition of the International Fire Code (IFC) and the City of Billings has supplemented the code with local amendments. Administration of the fire code and enforcement is the responsibility of the Fire Prevention Bureau.

The state adopted code is not the most recent edition of the IFC but, as with many states, it is not unexpected to be an edition behind. States have processes, legislative cycles, and political considerations that cause lags in amending, adopting, and implementing newly released model codes. As it has done previously, it is in the Billings Fire Department's interest to participate in the code adoption process and to lobby for statewide and local amendments. Prior efforts with partner agencies and interest groups were unsuccessful in having Montana adopt residential fire sprinklers in the code. A significant limitation in addressing local concerns is the State of Montana's determination of building requirements. Without the ability to modify those at the local level, the City must continue to be active at the state level to gain greater protection for its citizens. Within the constraints of adopted codes, Billings may have the latitude to incentivize the installation of sprinklers. This is often accomplished by working with a developer or builder to identify trade-offs that provide a higher level of protection (i.e., sprinklers) to offset another requirement of the code. This may encourage sprinkler installations as it can help to reduce other construction costs.

Additionally, the City of Billings may want to review the International Wildland-Urban Interface Code (IWUIC) for its application in its interface areas, specifically in the BUFSA. This code would be supplemental to the Billings' building and fire codes. The IWUIC's minimum regulations are intended to safeguard life and property from wildland and adjacent structure fires and to prevent structure fires from spreading to wildland fuels. The City may choose to adopt the code in its entirety or portions of it as part of the City's fire code.

Key Recommendations

- Lobby for the inclusion of residential sprinklers with the state's next code adoption.
- Seek avenues to require or incentivize the installation of residential sprinklers.
- Review International Wildland-Urban Interface Code for potential amendments to City fire code.

New Construction Plan Review and Inspection

An essential component of a fire prevention program is new construction plan reviews. When a new building is proposed within Billings city limits, the fire department is responsible for the ongoing life safety and fire protection of the building and its occupants. Billings Fire Department has a vested interest in ensuring new construction is built to code in order to protect the public and businesses.

Within the city limits, the fire department is responsible for the plans examination and inspection for new construction. However, due to insufficient capacity within the fire department, the City of Billings has been contracting out its fire protection systems plan reviews for eight years. With that exception, the fire prevention office is responsible for other fire and building code related plans examinations and construction inspections for three-unit and greater residential, commercial, and change of use projects. One of the Deputy Fire Marshals (DFMs) is presently funded by the building department for building code-specific work.

Due to limited staffing, the Fire Prevention Bureau is currently only capable of conducting inspections of systems upon the completion of construction. This has proven inadequate locally and across the nation. Inspections throughout the installation of fire protection systems provides greater assurance that systems will function correctly, reduce installation mistakes or fraud, and reduce the impact of fire.

Within the Billings Urban Fire Service Area, the fire department is responsible for subdivision plan review. The Montana State Fire Marshal's Office and the State Building Department are responsible for plans review and construction inspection of all new occupancies outside of the city but within the BUFSA.

The Fire Marshal has proposed an additional full-time position to assume plans examination duties. Filling of this position will allow the agency to bring the fire protection systems plans review back in-house and will provide customers with a local contact and direct control of the review process. The position may largely be funded by receipts from conducting plan reviews.

Key Recommendations

- Evaluate fees for plans review and inspection processes for adequacy of cost recovery. This should be reviewed and adjusted annually to account for reasonable review and inspection costs.
- Bring all plans review back in-house. Hiring a Fire Protection Engineer/Plans Examiner may be largely funded by revenue from review services.
- Conduct inspections at regular intervals through the installation process of various fire protection systems (e.g., fire alarms, sprinkler systems).

Existing Occupancy Inspection Program

Existing property inspections, to find and eliminate potential life hazards, are an essential part of the overall fire protection system. These efforts are most effective when completed by individuals having the proper combination of training and experience and when completed with appropriate frequency. Often referred to as business inspections, these walk-throughs provide an opportunity for agencies to gain site specific knowledge, build relationships with the business community, and to identify hazards before they become incidents. Inspectors aide businesses in reducing hazards through elimination, engineering, education, and enforcement solutions.

Figure 69: Existing Occupancy Inspection Program

Survey Components	Billings Fire Department Observations	Comments and Recommendations
General Inspection Program		
Perform existing occupancy inspections	Yes	Inspection program needs additional resources to meet industry standards
Special risk inspections	Yes	
Storage tank inspections	Yes	
Key-box entry program in place	Yes	
Hydrant flow records maintained	Yes	Maintained by Public Works
Self-inspection program in place	Yes	
Frequency of inspections	12 months – schools 24 months – businesses As requested	
Citation process in place and formally documented/adopted	Yes	Violation of fire code is misdemeanor. Court often dismisses violations if fixed.
Court-cited to	City Court	
Inspections computerized	Yes	Toughpads for prevention staff; requesting Toughpads for firefighters.
Community feedback system in place	No	Should implement system.
Number of personnel devoted to program	?	DFMs cover multiple assignments within bureau. No dedicated staff.
Fees for specialty inspections	No	Should consider fees.

Discussion

Billings Fire Department provides existing occupancy inspections for assembly, schools, businesses, and identified high-risk facilities. However, only mandated inspections are completed annually (i.e., schools). In addition to the forty-three school inspections, the bureau inspects high-risk occupancies only as requested due to limited staffing. Otherwise, these high-risk occupancies are inspected biannually by the fire suppression companies. In 2016, the Fire Prevention Bureau completed 489 inspections.

There are many gaps in providing inspections on industry accepted cycles. Several types of occupancies currently lack adequate inspections yet have significant life-loss potential. Examples include: buildings with hazardous materials, high-rise buildings, assembly occupancies (e.g., churches), night clubs, and apartments. These "target hazard" occupancies are presently inspected every other year by the fire suppression companies and instead should be inspected annually by certified fire inspectors. While it is common for the fire service to use trained fire suppression companies for retail, offices, and light commercial occupancies, fire suppression companies typically do not have the training or certifications necessary to thoroughly inspect higher complexity and higher risk occupancies (e.g., hazardous materials). Due to the hazards and potential for loss (i.e., life, property, economic, environmental) associated with these occupancies, best practices dictate inspection by certified inspectors with specialized training. Deputy Fire Marshals are required to be certified fire inspectors within their first year. Whereas the fire suppression companies are likely not certified but have received basic inspection training.

Providing adequate fire prevention inspections not only reduces the incidence and severity of fire events but reduces the fire department's exposure to liability should a fire event occur. For example, earlier this year, the City of Oakland, California was named as one of several defendants in Ghost Ship fire lawsuits. In addition to the potential expense, being party to a lawsuit can be a distraction from other work and negative public opinion are impacts of situations such as the Ghost Ship fire.

The current business licensing fee includes $15 identified as dedicated to fire inspections. This amount is inadequate if intended to fully recover the cost associated with inspections. While dependent on the occupancy type and building size, even a simple mercantile or office inspection will take a minimum of 30–45 minutes. This includes time for the inspection, review with business owner/manager, and documentation. Complex (e.g., manufacturing) or large (e.g., warehouse) businesses may require substantially more time.

The business licensing fee is currently received into the City's general fund. There may be an opportunity during the budget process to identify fees from inspections and designate those as additional revenue dollars to the Fire Prevention Bureau. Additional dollars may be designated for the Fire Prevention Bureau from fines related to code violations. Businesses that repeatedly fail to comply with inspection correction requirements are subject to fines administered by the court.

Key Recommendations

- Review business licensing fees. While full cost recovery may not be attainable, reasonable inspection costs may be recovered and reinvested to enhance the fire prevention division.
- Identify and inspect high-risk occupancies (e.g., institutional, assembly, hazardous materials, high-rises) annually with certified fire inspectors. Consider fees for identified categories of occupancies or building size.
- Implement a community feedback program to identify strengths and opportunities for program improvement.

Fire and Life Safety Public Education Program

Effective public education is focused on prevention and mitigation of common and likely fire and life safety hazards. A proactive effort, public education has proven to be an effective and cost-efficient means of caring for communities across the United States. Fire and life safety education programs help inform citizens to recognize, to mitigate hazards, initiate response, and to report emergencies early. These actions comprise the best opportunity to minimize the effects of fire, injury, and illness to the community. An overview of Billings Fire Department's public education efforts is provided in the following figure.

Figure 70: Fire Safety and Public Education

Survey Components	Billings Fire Department Observations	Comments and Recommendations
Fire Safety and Public Education		
Public education/information officer in place	No	Due to licensing obligations, DFM is unable to commit sufficient time to public education.
Feedback instrument used	No	Feedback should be collected and utilized for program review.
Public education in the following areas:	Limited	Limited capacity for public education due to insufficient prevention staffing and competing priorities.
Calling 911	Limited	
EDITH (exit drills in the home)	Fire station open houses	During fire prevention week at each station.
Smoke alarm program	Yes	Successful program.
Fire safety (heating equipment, chimney, electrical equipment, kitchen/cooking, etc.)	Limited	
Injury prevention (falls, burns/scalding, bike helmets, drowning, etc.)	No	
Fire extinguisher use	Limited	
Fire brigade training	No	
Elderly care and safety	No	
Curriculum used in schools	No	
Baby-sitting classes offered	No	
CPR courses, blood pressure checks offered	No	
Publications available to public	Yes	Increase outreach and distribution of materials.
Bilingual information available	No	
Annual report distributed to community	Yes	
Juvenile fire setter program offered	Yes (as requested)	Typical of many "Youth Who Misuse Fire" programs.
Wildland interface education offered	No	Insufficient capacity to implement programming.

Discussion

For the fire service, public education and outreach are frequently high profile, resource intensive, and potentially impactful programs. However, the department's staffing limitations compromise the level of attention that can be paid to these programs. The Deputy Fire Marshal in charge of public education is also responsible for business license and final construction inspections, smoke alarm installations, and fire investigations.

The thrust of the department's Public Education Program is during fire prevention week in October. This is a well-attended program which is presented at each of the fire stations on one day of the week. Approximately 2,000 children attend this program annually. The agency also provides fire prevention outreach at a few large community events annually and presents fire safety talks when requested. The fire suppression companies participate in public education through station tours and outreach activities.

The Public Education Program has been more robust previously. For example, the Firefighters and Clowns Teaching Safety program had been a successful program for schools. However, due to increased demand for other services, this program was shuttered. Critical business functions such as business license inspections, plans reviews, and construction inspections continually require increasing amounts of the Deputy Fire Marshals time. However, the bureau is able to provide support for other public education and outreach activities at several local events annually.

The Fire Prevention Division also offers a free fire detector installation program. This program is popular with residents and has also required additional time. This is a critical program to protect lives. As with the essential business functions, this program's success has required additional capacity to maintain at the cost of other programming. With the programs intermittent nature and varied installation locations, utilizing fire suppression companies to perform the installations may prove an efficient manner to install the detectors while preserving prevention staff for other efforts.

The Public Education Program is in need of additional staff time. This may be achieved through restructuring the delivery of existing programs (e.g., utilizing fire suppression companies, overtime), building efficiencies into program administration (e.g., technology solutions, streamlining processes), or adding paid staff.

Key Recommendations

- Review workflow of fire prevention activities to identify and implement efficiencies.
- Fund an additional full-time position to increase public education and outreach capacity.
- Support programs with other capacity (i.e., fire suppression companies) or overtime until able to fund additional position.
- Establish sudden cardiac arrest program (i.e., hands-only CPR training, AEDs in police cars).

Fire Cause and Origin Investigation

Accurately determining the cause of a fire is an essential element of a fire prevention program. The identification of how fires are occurring is key in defining a community's fire risk. When fires are set intentionally, identification and/or prosecution of the responsible offender is critical in preventing additional fires and potential loss of life. The results of fire investigations, if used appropriately, identify public education focus areas, the need for code modifications, and adjustment of fire deployment and training.

Figure 71: Fire Investigation

Survey Components	Billings Fire Department Observations	Comments and Recommendations
Fire Investigation		
Fire origin and cause determination	Yes	Qualified at Certified Fire Investigator or Fire Investigation Technician levels.
Arson investigation and prosecution	Yes	
Arson Investigation Training Provided	Yes	
Person responsible for investigations	Fire Prevention Bureau	
Local FIT membership (fire investigation team)	A joint City/County team is in place	Sheriff, Billings Police Department.
Process for handling juvenile suspects	Referred to law enforcement and/or juvenile fire setter program	
Liaison with law enforcement	Fire Marshal (primary contact)	
Scene control practices in place	Yes	
Photographer available	Prevention Bureau staff	Trained personnel.
Adequate and appropriate equipment issued/supplied	Yes	
Evidence collection process in place	Yes	
Reports and records of all incidents made	Yes	
File, record, and evidence security	Yes	
Pre-Incident Planning		
Pre-plans completed	Yes	
Frequency of review	As needed during inspections	
Accessibility of plans	On Mobile Data Terminals in fire apparatus	
Statistical Collection and Analysis		
Records kept by computer	Yes	
Type of operating platform		
Software used	New World/Aegis record management system	
Information collected in the following areas:		
Fire incidents	Yes	
Time of day and day of week	Yes	

Survey Components	Billings Fire Department Observations	Comments and Recommendations
Method of alarm (how received)	Yes	
Dispatch times	Yes	
Response times	Yes	
Information analyzed & used for planning	Yes, on large scale incidents	Aggregate data of all incidents should be regularly reviewed for trends and benchmarking.
Reports made & distributed	Yes	
FTEs used in data collection & analysis	0	No dedicated staff available. Analysis is done on an as needed basis.

Discussion: Fire Investigation

Initial fire origin and cause investigation is conducted by the Fire Officer on scene. As indicators warrant (e.g., life loss, extent of fire loss, suspicious conditions), Billings Fire Department uses trained Fire Investigators to document, investigate, and determine the cause of fires. The Fire Prevention Division's personnel include three certified Fire Investigators and one Fire Investigation Technician. Additionally, one DFM is in the process of becoming a certified Fire Investigation Technician.

The Investigators follow the industry standard, NFPA 921: *Guide for Fire and Explosion Investigations*. The Investigators are available on-duty and are each on call 92 days per year. The Fire Marshal reports that this on-call duty is excessively burdensome on Investigators. All Investigators are deputized to provide for their application of "peace officer" duties as related to arson investigation. In addition to the origin and case investigations within the Billings Fire service area, Investigators participate in the Billings Fire Investigation Team with the County Sheriff and Billings Police. This provides additional resources within the fire department's jurisdiction and allows for it to aid other jurisdictions as needed.

With the volume of investigations, demands of other activities, and limited staffing, the Investigators are routinely behind in finalizing fire investigation reports. These reports should typically be completed in a matter of weeks to a month. However, the department currently is backlogged, and reports are prioritized (e.g., arson, insurance company requests) for completion. Current internal estimates place report completion in the six to nine-month range which is months longer than industry standards. The prevention bureau does not have a consistent expectation for new staff to obtain Fire Investigator certification. In order to better identify future capacity, it would be advantageous for the department to establish a standard timeframe for investigation certification.

Discussion: Pre-Incident Planning and Data Collection

The Fire Prevention Bureau is the primary record management entity for the Billings Fire Department. The record management system houses run reports (including investigations), occupancy information, and inspection records. The Fire Marshal submits response data to the National Fire Incident Response System database. The data should be utilized as a foundation for the analysis of department activities, service demand, and is typically subject to public information requests.

The bureau provides pre-incident plans for the fire suppression companies. The bureau will initiate and enter new pre-plans while the fire suppression companies are responsible for updating them. Additionally, the bureau has made pre-plans and information regarding protections systems available on the MDTs in the fire apparatus. These pre-plans for most larger/major buildings also include floor plans.

Key Recommendations

- Increase investigation capacity through additional DFM or similar position.
- Identify standard length of service by which DFMs will become certified Fire Investigators.
- Seek opportunities to share on-call duty with other agencies to reduce impact on Billings Fire and cooperator personnel.
- Maintain existing pre-plan program and seek opportunities for enhancing end-user utility.

Future System Demand Projections

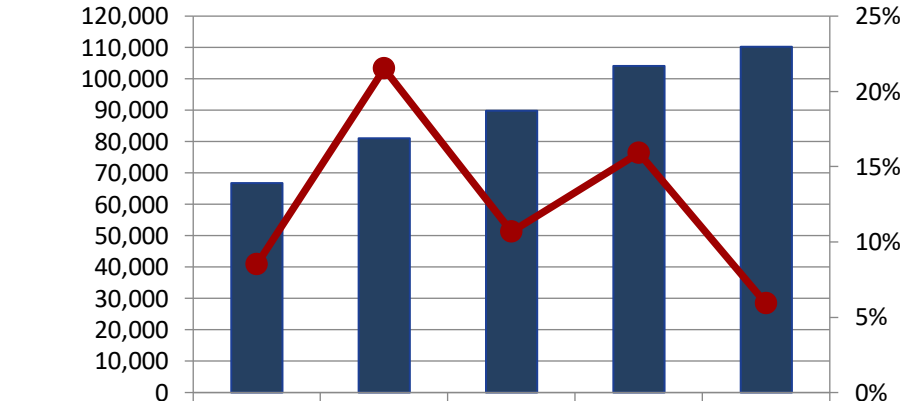
In evaluating the deployment of facilities, resources, and staffing, it is imperative to consider potential changes in workload that could directly affect such deployment. Future demand is largely dependent on changes over time to population, demographics, economics, and the local infrastructure. For the purposes of this study, ESCI utilizes data from the US Census Bureau, the City of Billings 2016 Growth Policy, and the 2014 Billings Urban Area Long-Range Transportation Plan (LRTP) prepared by *Kittelson and Associates, Inc.*

Population Growth Projections

Population History

The official US Census Bureau 2016 estimate (most recent available) for Billings is approximately 110,323 as of July 1, 2016. The following figure illustrates historical population change in Billings from 1980 through 2016.

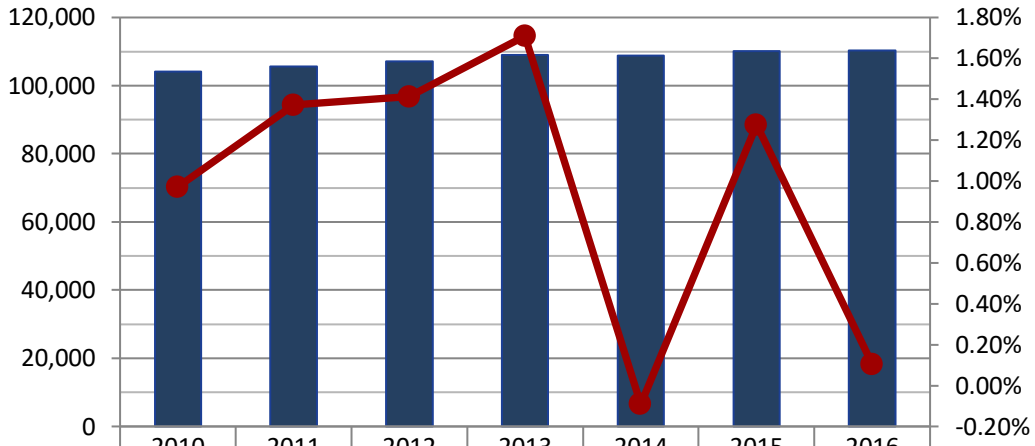
Figure 72: Billings Historical Population Change, 1980–2016



	1980	1990	2000	2010	2016 Estimate
Population	66,798	81,151	89,847	104,170	110,323
% Change	8.50%	21.50%	10.70%	15.90%	5.90%

Overall, the population of Billings grew by 65.2 percent between 1980 and 2016. The average annual growth rate during this time was approximately 1.5 percent. Although growth slowed between 2000 and 2016, the population of Billings grew by nearly six percent between 2010 and 2016. The next figure uses annual estimates from the Census Bureau to examine population change between 2010 and 2016.

Figure 73: Billings Annual Population Change, 2010–2016



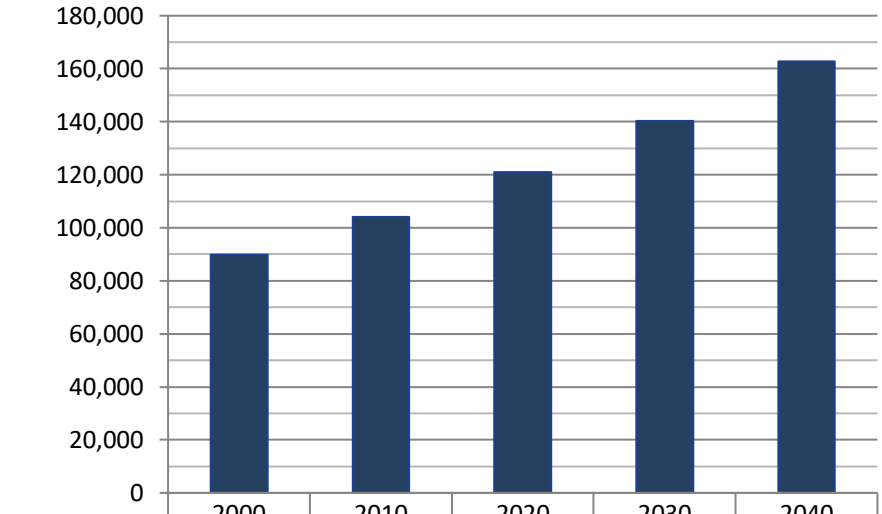
	2010	2011	2012	2013	2014	2015	2016
Population	104,170	105,599	107,090	108,920	108,820	110,208	110,323
Annual Growth Rate	0.97%	1.37%	1.41%	1.71%	-0.09%	1.28%	0.10%

Based on the Census Bureau estimates, the average annual growth rate from the end of 2010 through 2016 slowed to approximately one percent (0.96 percent). Overall, the population of Billings grew by nearly six percent. Planning department documents indicate population growth has increased since the 2016 Census Bureau estimate. Applying a growth rate of two percent to the 2016 estimate provides an estimated population of 112,500 in 2017.

Population Projection

Based on historical census data, local planning documents, and current economic data; the 2014 Billings Area Long-Range Transportation Plan (LRTP) provides a population projection for the City of Billings.

Figure 74: Population Projection, 2014 Billings LRTP

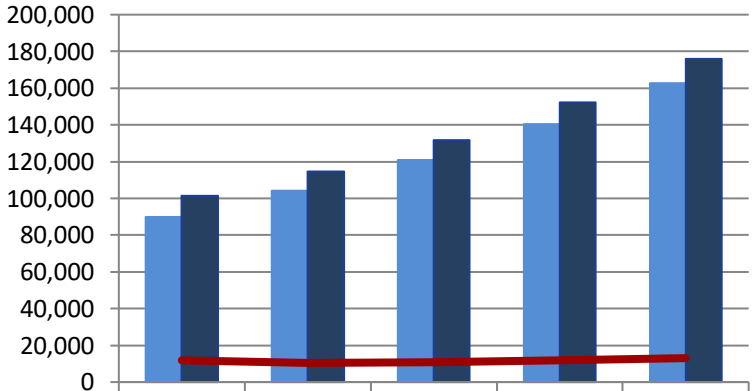


	2000	2010	2020	2030	2040
City of Billings	89,847	104,170	120,894	140,303	162,828

The projection displayed in Figure 74, illustrates the population of Billings increasing to nearly 163,000 by 2040. This represents a 56.3 percent increase over the 2010 population; resulting in an average annual growth rate (AAGR) of 1.9 percent. According to the 2016 City of Billings Growth Policy document prepared by the City/County Planning Division, based on historical census data, annual population growth has averaged approximately 1.5 percent from 1990 to the present. Note that due to recent increases in economic trends, City planners expect the growth rate to increase to approximately two percent in the near future.

The population inside Billings is obviously the primary driver of BFD service demand. However, the department also serves the residents and businesses in the BUFSA. In 2002, BFD estimated the population residing in the BUFSA as approximately 12,000. Currently the population of the BUFSA is estimated at approximately 10,000. The population decrease in the BUFSA may be attributed to the annexation of developed areas which has occurred since 2002. The following figure displays the estimated population of the BFD combined service area (City of Billings and BUFSA) through 2040, based on the LRTP projected growth rate of 1.9 percent.

Figure 75: BFD Service Area (City and BUFSA) Estimated Population



	2000	2010	2020	2030	2040
City of Billings	89,847	104,170	120,894	140,303	162,828
BFD Service Area	101,527	114,587	131,774	152,229	175,854
BUFSA	11,680	10,417	10,880	11,926	13,026

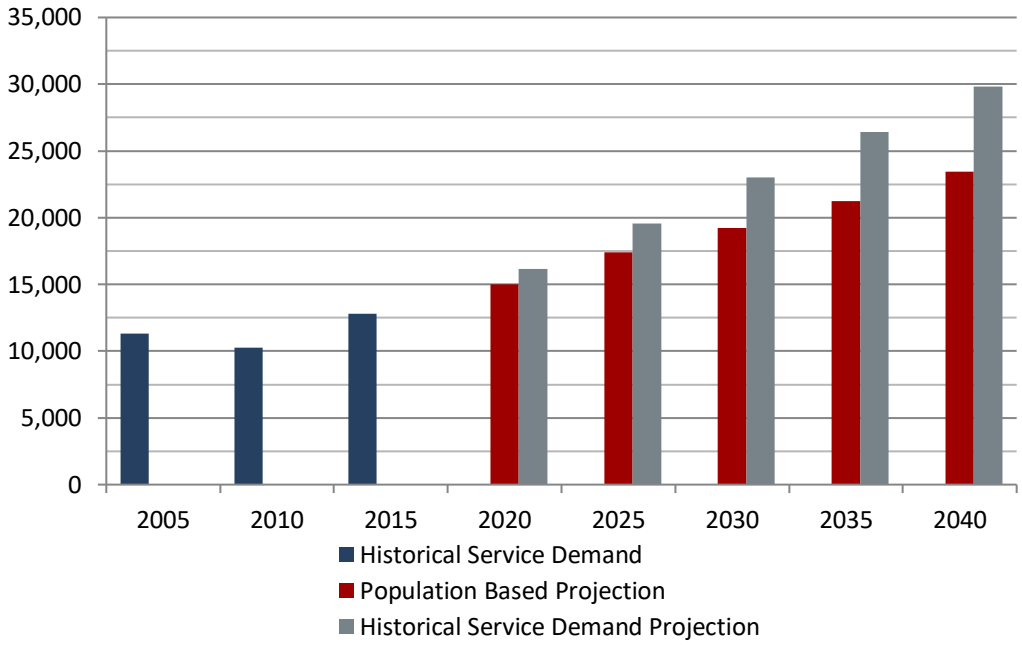
As displayed in this figure, the population of the combined BFD service area increases to over 175,000 by 2040. The population of the BUFSA remains relatively static, rising to just over 13,000 by 2040. It is likely that for the city to grow as predicted; portions of the BUFSA will continue to be annexed into the City when development occurs, and City infrastructure is extended into the area.

Service Demand Projections

The most significant predictor of future incident workload is population; 100 percent of requests for emergency medical service are people-driven. The National Fire Protection Association reports that approximately 70 percent of all fires are the result of people either doing something they should not have (i.e., misuse of ignition source) or not doing something they should have (i.e., failure to maintain equipment). Thus, it is reasonable to use future population growth to predict future fire department response workload.

The following figure displays two possible projections of future service demand in the BFD Service area.

Figure 76: BFD Service Demand Projections



The projection labeled Historical Service Demand is based on historical service demand from 2005 through 2016. A linear forecasting formula is applied to historical annual service demand and calculated forward through 2040. BFD service demand grew by approximately 20 percent between 2005 and 2016; this includes a dip in incident activity in 2008 and 2009. Service demand grew by nearly 31 percent between 2010 and 2016.

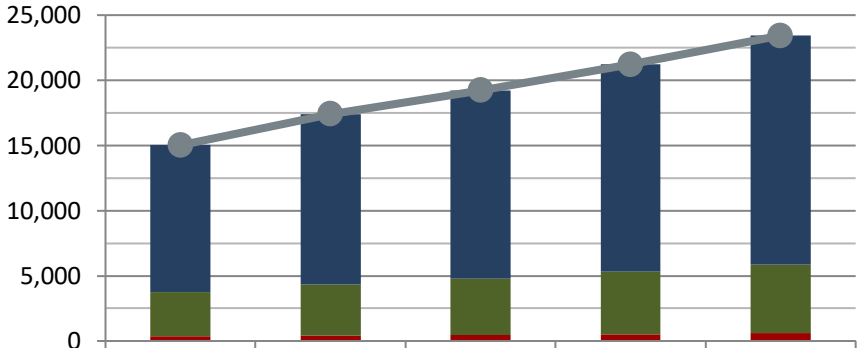
The mathematical forecast demonstrates BFD calls for service increasing to nearly 30,000 incidents by 2040, an increase of over 123 percent (123.3 percent). Note that the average annual increase is approximately 3.4 percent in this scenario, with annual rate of change decreasing from approximately five percent in the near future, to just over two percent in 2040. BFD service demand has increased on average 4.9 percent annually since the end of 2009.

In the projection labeled Population Based, ESCI calculates a per capita utilization rate of 110 incidents per 1,000 population based on service demand for the last five years (2011 through 2016). The result is applied to the projected service area population displayed in Figure 76. In addition, since BFD service demand has outpaced population growth, a factor of two percent annual growth is added.

The population-based projection provides a more conservative projection of service demand based on population growth. As displayed, BFD projected service demand increases by approximately 75 percent to 23,434 incidents in 2040. This represents an average annual increase in service demand of approximately 3.1 percent.

In this figure, ESCI uses the population-based projection from Figure 76 and summarizes the per capita utilization rate (incidents per 1,000 population) as Fire, EMS, or Other incident categories. As discussed in the Service Delivery analysis, ESCI finds that EMS related incidents represent 70 to 75 percent of current BFD service demand. This is not reflected in the BFD NFIRS data. ESCI uses a value of 75 percent for future EMS incidents in this figure to provide a more accurate picture of future service demand.

Figure 77: BFD Projected Service Demand by Incident Category, 2020–2040



	2020	2025	2030	2035	2040
EMS	11,265	13,059	14,418	15,919	17,576
Other	3,379	3,918	4,325	4,776	5,273
Fire	375	435	481	531	586
Total	15,020	17,412	19,224	21,225	23,434

In this figure, Fires (includes all types of fire incidents) demonstrate the lowest rate of increase. This reflects a national trend and can be attributed to improvements in building codes and fire prevention over the last several decades. EMS incident will continue to be the predominant factor affecting service demand. Other emergency service calls not involving actual fires are predicted to increase in part due to the use of automatic alarm systems; which decrease the number of actual fires but increase service demand.

It is not the intent of this study to be a definitive authority for the projection of future population in the service area but rather to base recommendations for future fire protection needs on a reasonable association with projected service demand. Since human activity is a primary driver of emergency service demand, it is important to have a population-based projection of the future size of the community. Although population projections can vary, and may change over time, it is clear that BFD will continue to be an emergency service provider to a growing population, likely reaching over 175,000 in the City of Billings and the BUFSA by 2040; and responding to over 23,400 calls for service. Planning should begin now to deploy and maintain the resources needed to meet the continuing demand for services.

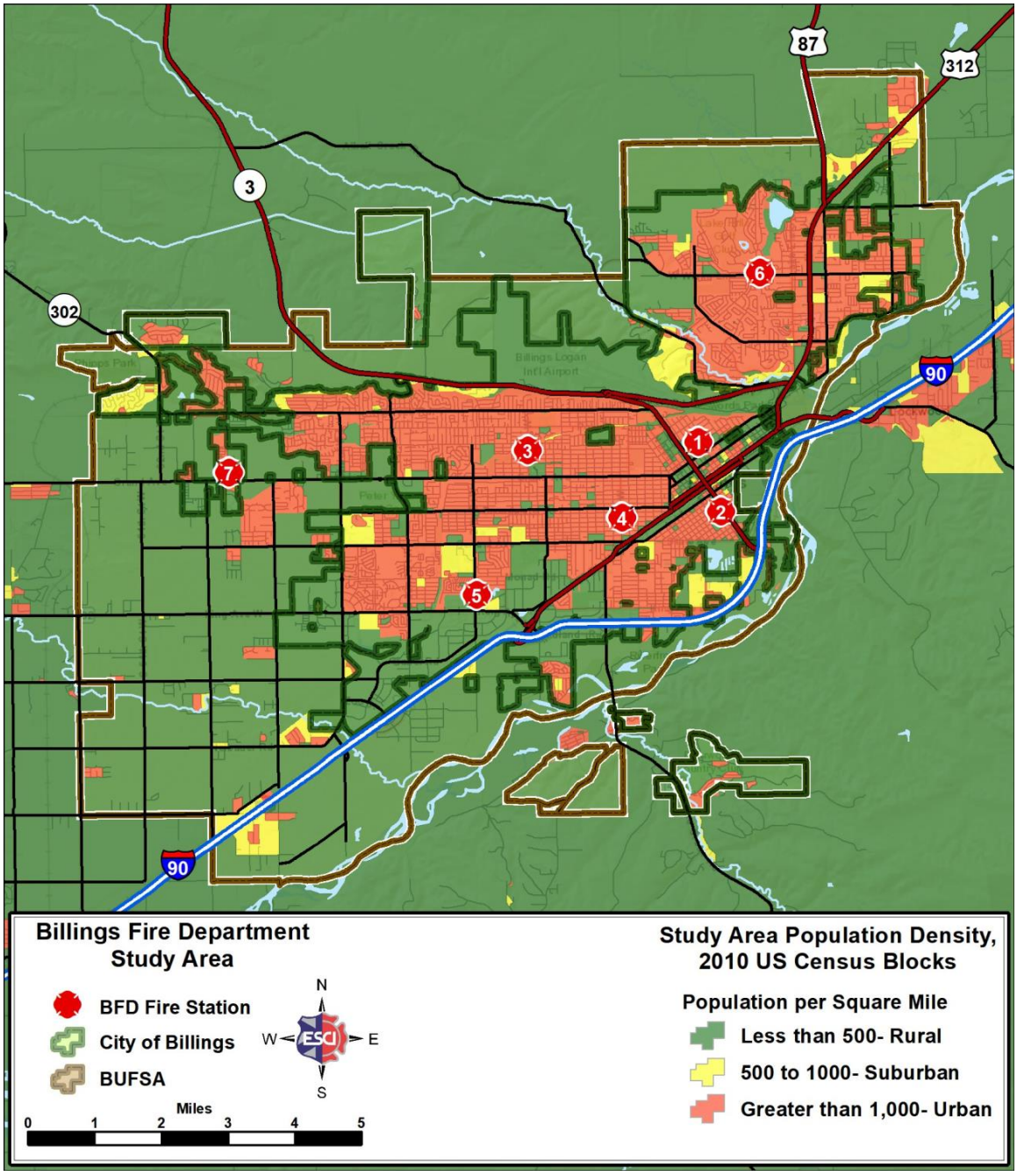
Community Risk Analysis

Community risk is assessed based on several factors: the service area population and population density, the demographics of the population, local land use and development, and the geography and natural risks present within the community. These factors affect the number and type of resources—both personnel and apparatus—necessary to mitigate an emergency.

Demographics

The following figure, examines population density in the BFD service area.

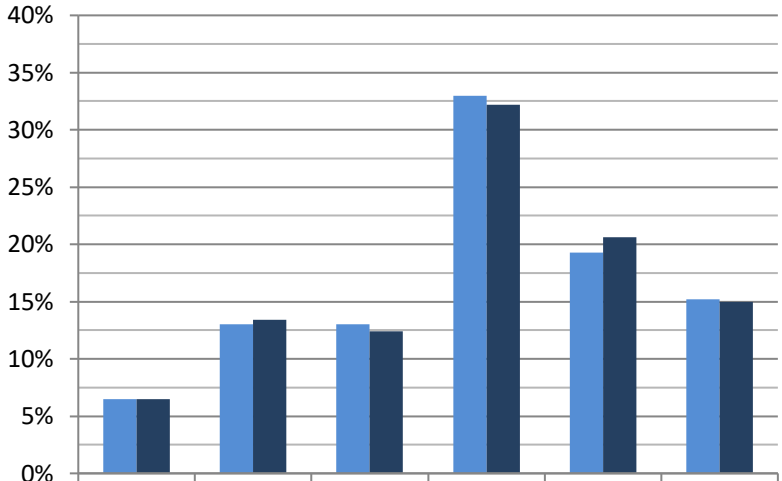
Figure 78: BFD Study Area Population Density, 2010 Census Data



As discussed in the Distribution Analysis, the population density inside the City of Billings is predominantly urban. The BUFSA outside of Billings is largely rural with pockets of urban and suburban population density.

In addition to the distribution of the population, the demographics of the population can affect the amount of service demand and the risk within a community. The following figure displays population distribution by age group within the City of Billings and Yellowstone County.

Figure 79: Study Area Population by Age Group, 2015 Census Bureau ACS Data



	Under 5 Years	5 to 14 Years	15 to 24 Years	25 to 49 Years	50 to 64 Years	65 and Over
Billings	6.5%	13.0%	13.0%	33.0%	19.3%	15.2%
Yellowstone County	6.5%	13.4%	12.4%	32.2%	20.6%	15.0%

The 2015 Census Bureau American Community Survey (ACS) estimates the median age in Billings as 36.8 years of age. The estimated median age in Yellowstone County is approximately 38 years. The median age in both Billings and Yellowstone County is slightly lower than the median age in Montana, which is approximately 39.7 years. The population group over age 65 is the fastest growing age group in the nation. National medical industry studies suggest that persons over 65 years of age are three times more likely to access local emergency services than other age groups. Also note that NFPA studies indicate the population over 65, or less than 5, is at higher risk for fatalities in residential fires. The following figure displays additional demographic factors that can affect community risk in the BFD service area.

Figure 80: BFD Study Area Demographics, 2015 US Census American Community Survey (ACS)

Demographic	City of Billings	Yellowstone County
Occupied housing Units	93.7 %	93.4%
Owner-occupied Housing	62.90%	68.30%
Median household income	$51,012	$52,802
Persons without health insurance	14.3%	14.0%
Personal income below Federal Poverty Level	12.8%	11.5%

The demographics displayed in this figure, are factors that indicate a population group that is more or less likely to use fire department services than other populations. Individuals with lower incomes and no health insurance are more likely to use local EMS resources compared to individuals with health insurance and a personal physician. A high percentage of occupied housing units, and a high percentage of owner occupied homes, generally equates to wage earners willing to invest in the community. Note that the 2016 update to the City of Billings Growth Policy identifies a lack of affordable housing as a contributing factor to an increasing homeless population. This population group is identified as a frequent user of fire department EMS services, across the country.

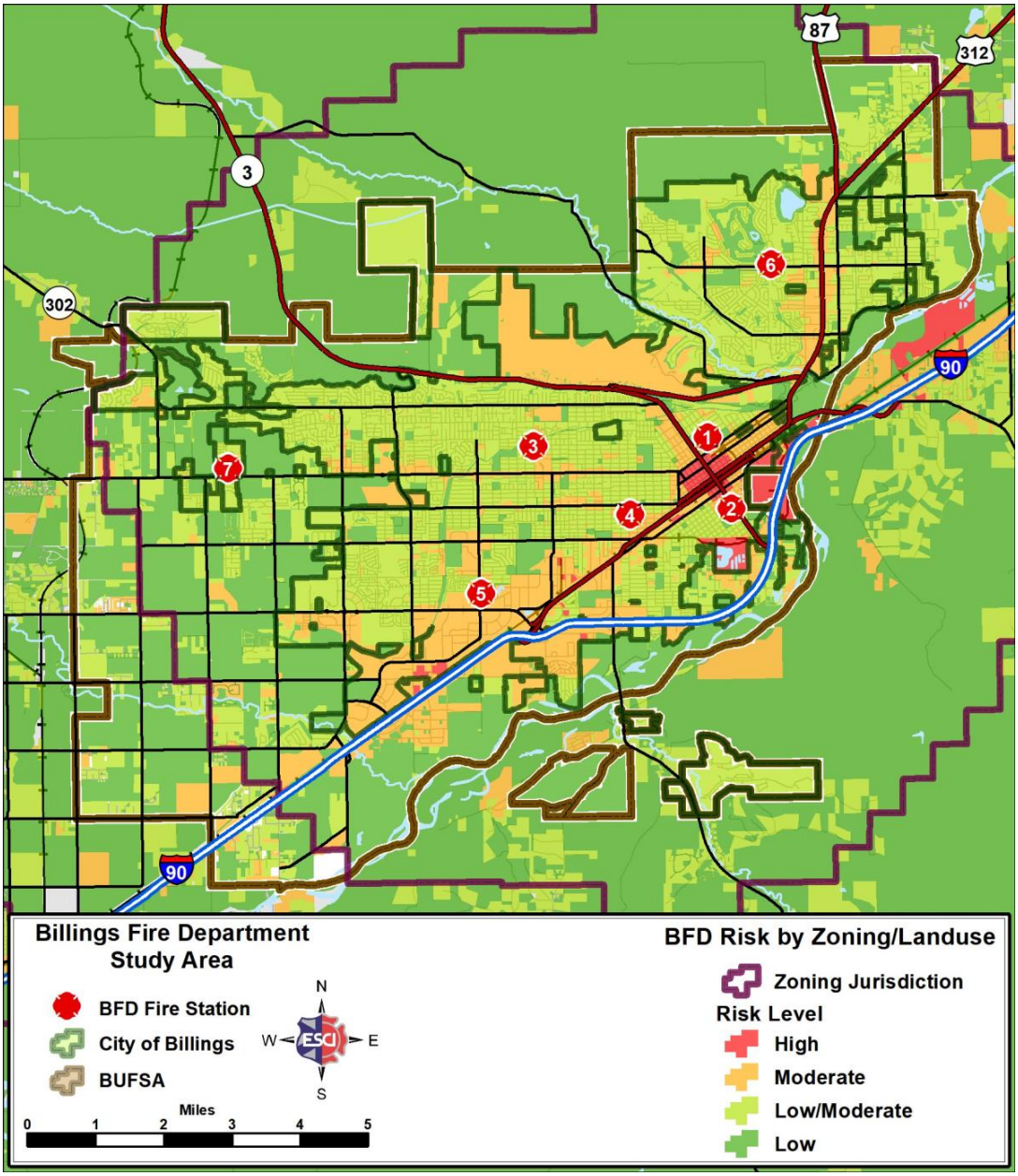
Land Use

ESCI uses City of Billings and Yellowstone County parcel data and current zoning classifications in the BFD service area to examine current land use. A risk level is assigned based on the following definitions:

- Low risk – Areas zoned and used for agricultural purposes, open space, low-density rural residential, and other low intensity uses.
- Moderate risk – Areas zoned for medium density single family properties, small commercial and office uses, low-intensity retail sales, and equivalently sized business activities.
- High risk – Higher-intensity business districts, mixed use areas, high-density residential, industrial, warehousing, and large mercantile centers.

The following figure displays relative community risk within the BFD service area using the criteria listed above.

Figure 81: BFD Community Risk by Zoning and Land Use



The BFD service area is a mix of low, moderate, and high-risk properties. Residential properties are primarily single-family dwellings. While single-family dwellings are usually categorized as a moderate fire risk, they represent a lower risk when compared to commercial properties or multi-family residential properties (apartment complexes, condominiums, other medium density residential). Single-family residential properties are categorized as "Low/Moderate" in the figure above; to distinguish primarily residential areas from commercial properties distributed throughout the service area. Low risk areas are largely vacant land, agricultural land, rural residential properties, and parks. Areas designated as moderate risk are predominantly commercial properties or commercial/residential mixed-use areas. The areas classified as high risk in this figure represent land designated as industrial use, high density residential and high density mixed use, and the central business district in the downtown area.

Note that the portions of the BUFSA are outside of the Billings/Yellowstone County Zoning Jurisdiction. Parcel property use data included in the GIS data is used to determine current property use for the purpose of assigning a risk classification to these properties.

It is also helpful when discussing community risk to examine incident data to determine the types of properties that actually generate demand for fire department services. The next figure uses National Fire Incident Reporting System (NFIRS) data provided by BFD to display the actual property use associated with 2016 incidents.

Figure 82: BFD Incidents and Property Use, 2016

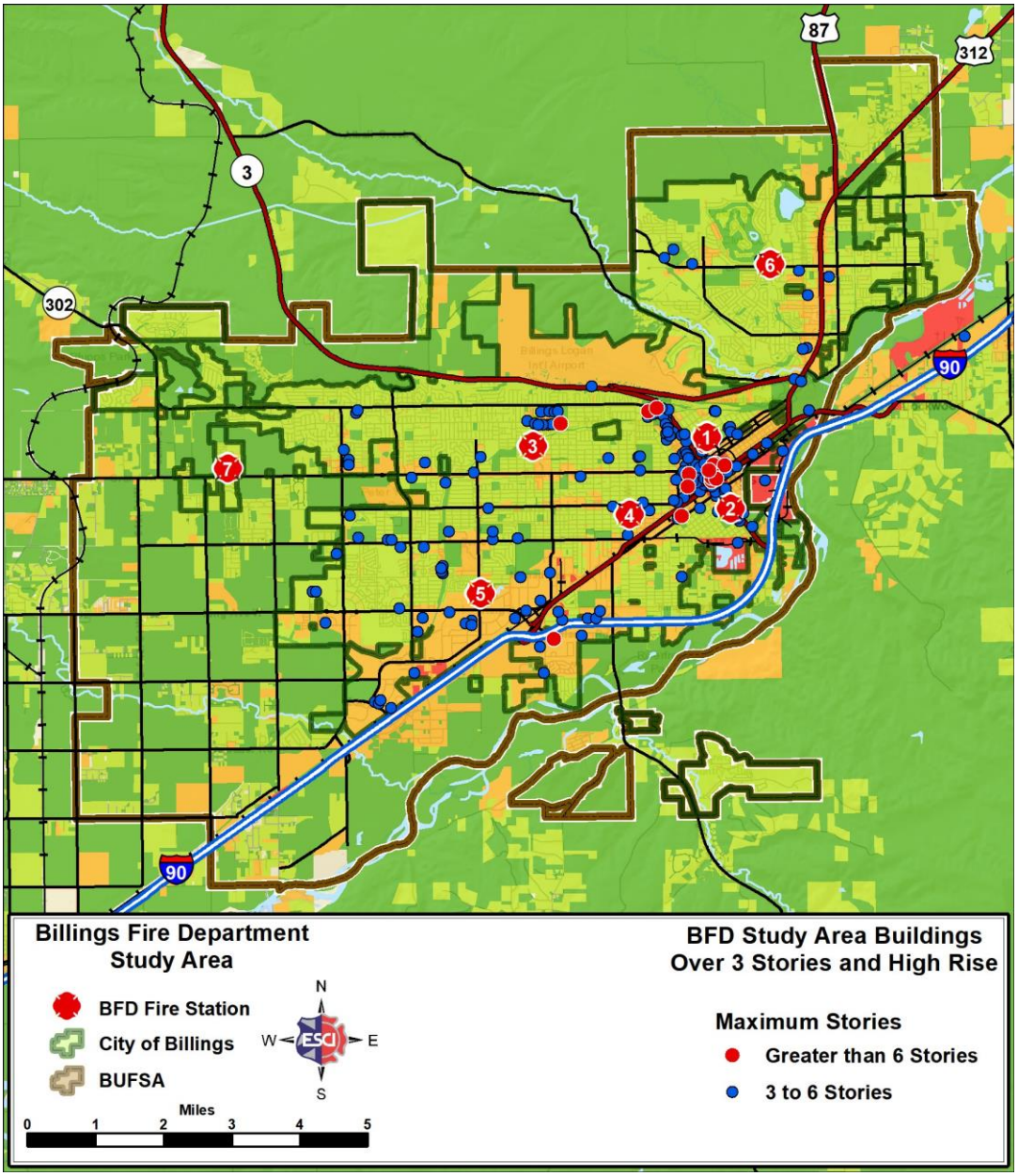
NFIRS Property Use Category	Percent of 2016 Incidents
1 – Assembly (Restaurant, Bar, Theater, Library, Church, Airport Passenger Terminal)	6.9%
2 – Educational (Private/Public School, Daycare Center)	1.2%
3 – Health Care, Detention & Correction (Nursing Home, Hospital, Doctor Office, Jail)	5.4%
4 – Residential (Private Residence, Hotel/Motel, Residential Board and Care)	54.0%
5 – Mercantile, Business (Grocery Store, Service Station, Business Office, Other Retail)	6.7%
6 – Industrial, Utility, Agriculture, Mining	0.2%
7 – Manufacturing	0.1%
8 – Storage	0.9%
9 – Outside Property, Highway, Residential Street	20.1%

Approximately 54 percent of BFD service demand occurred at residential properties, principally one or two-family dwellings and multi-family residences. Over 20 percent of incidents took place on outside properties, most of these incidents happened on the transportation network (streets in commercial area, residential streets, parking areas, highways or divided highways). Assembly properties represent 6.9 percent of service demand (primarily eating or drinking places). Mercantile and retail properties comprised 6.7 percent of 2016 service demand. Nursing homes, doctor's offices, clinics, and hospital represent the majority in the Health Care/Detention category. The remaining incidents were distributed at various other property types as displayed above. Note that approximately 600 incidents (4.6 percent) were marked as unknown, or simply "XXX." ESCI encourages BFD to monitor data collection and report writing to ensure that complete and accurate incident data is collected and reported.

As the largest city in Montana and a regional economic center, Billings supports a robust downtown business district with a significant number of buildings that are categorized as high-rise structures according to the NFPA 1710 Standard for Career Fire Jurisdictions.[19] The NFPA standard defines a high-rise structure as "a building with the highest floor greater than 75 feet above the lowest level of fire department vehicle access." The following figure uses GIS data provided by the City of Billings to display the distribution of high-rise buildings in the BFD service area.

[19] *NFPA 1710, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*-5.2.4.4.1 (National Fire Protection Association 2016).

Figure 83: BFD Study Area High-Rise Buildings



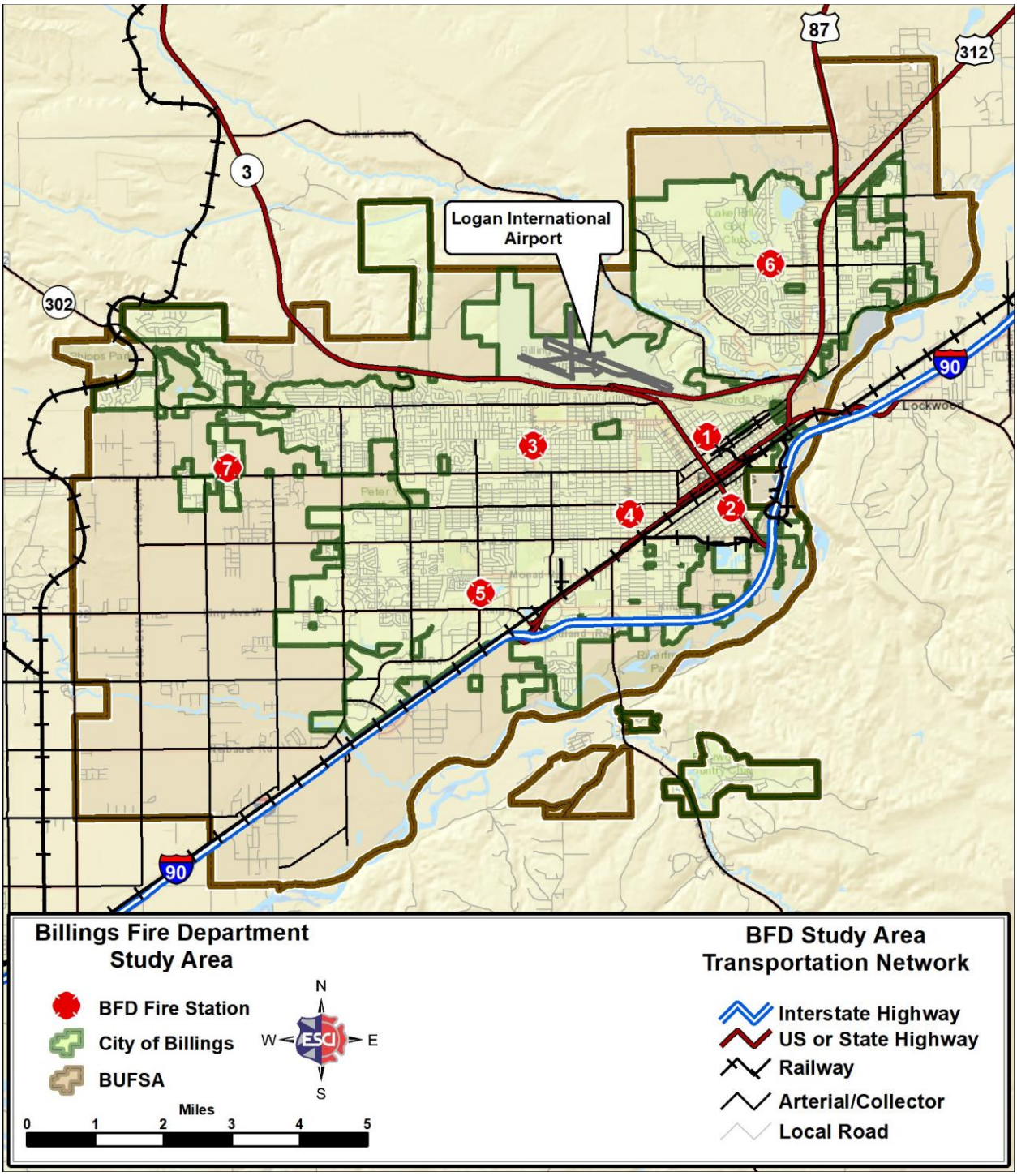
High-rise buildings in Billings are primarily located in the downtown business district. Other high-rise buildings are located north of Station 3, adjacent to Rocky Mountain College; south of Interstate 90, on Midland Road; and two buildings on the Montana State University campus north of downtown. High-rise buildings represent a maximum level of risk for fire suppression activities.

In addition to high-rise structural risk, many buildings in the city are used for purposes that create a higher level of risk. Governmental buildings, high occupancy buildings, facilities providing care to vulnerable populations, schools, hospitals, and others may require greater numbers of response resources during an emergency. Fire Prevention division, building department and tax assessor data can be utilized to identify and map higher risk occupancies.

Transportation Risk

The nature and configuration of the transportation network through a fire jurisdiction can affect the response capabilities of emergency services and the types of risk present in the fire department's service area. This is especially true in the BFD service area. The following figure displays the elements of the transportation network in the BFD service area.

Figure 84: Transportation Network in the BFD Service Area



Interstate 90 is a major limited access interstate highway which runs from southwest to northeast through the BFD service area. Federal and state highways run through the BFD service area and connect to the interstate. State Highway 10E (US 87) is the primary north south route through the Heights area. Burlington Northern and the Montana Rail Link operate rail lines which parallel Interstate 90. Rail sidings in Billings and adjacent to Billings in the BUFSA serve the industrial areas in Billings; the BUFSA; and Lockwood, just east of Billings. The transportation routes through the BFD service area increase the level of risk present; based on the chemicals products, flammable liquids, and toxic materials that move through the BFD service area. Additionally, these transportation routes produce increased service demand due to traffic related emergencies. As previously discussed, service demand on the road network represent a significant portion of BFD service demand (approximately 20 percent).

Other Risk Factors

The Yellowstone County Emergency Operations Plan (EOP) is intended to provide public officials and emergency services providers in Yellowstone County with an overarching strategy for responding to natural or human caused disaster in the county, that is beyond the capacity of the appropriate emergency service provider to control.

As part of the EOP, a risk based assessment was conducted in 2004 and updated and adopted in 2012. The Yellowstone County multi-jurisdictional Pre-Disaster Mitigation (PDM) Plan is utilized in the EOP to identify and provide a risk severity ranking of the identified risks. The City of Billings and the Billings Fire Department participated in the update to the PDM plan; and the City is a signatory to the document. The following figure displays a summary of the hazards identified.

Figure 85: Yellowstone County EOP Natural and Man-Made Hazards

Natural Hazards	Probability of Disastrous Event	Magnitude (Impact to Community)	Priority Rank
Flood	Moderate	High	1
Wildfire	Moderate–High	Moderate	2
Wind and Hail Storms	Moderate	Moderate–High	3
Tornado	Moderate–High	Moderate	4
Winter Storms	High	Moderate–High	5
Drought	Moderate–High	Moderate–High	6
Insect Infestations	Moderate	Moderate–High	7
Urban Fire	Moderate	Moderate	8
Dam Failure	Low–Moderate	Low–Moderate	9
Expansive Soil	Moderate	Moderate	10
Land slide	Low–Moderate	Moderate–High	11
Earthquake	Low	Low	12
Volcanic Ash	Low	Low	13

Man Made Hazards	Probability of Disastrous Event	Magnitude (Impact to Community)	Priority Rank
Transportation/Mobile Incident	Moderate	High	1
Hazardous Materials Incident—Fixed	Moderate–High	Moderate	2
Terrorism/Bio-Terrorism	Low–Moderate	Moderate–High	3
Civil Disturbance/Riot/Labor Unrest	Moderate	Moderate	4
Enemy Attack	Low	Low–Moderate	5

Flooding, wild fire, severe weather events, and hazardous material spills (mobile and fixed), are categorized as high or moderate risk hazards in the PMD. These hazards are most likely to affect BFD operations when they occur.

The BFD service area experiences seasonal and weather-related flooding along the Yellowstone River, Canyon Creek, and Alkali Creek. West Billings and the portions of the BUFSA west of Billings are subject to flooding from storm run-off. Federal flood insurance rate maps (FIRM) are published which display flood plains within Yellowstone County and the City of Billings. BFD should utilize available flood risk data to identify areas prone to flooding, which may affect fire department emergency operations.

Billings is identified as a community within the wildland urban interface (WUI) in the Yellowstone County Community Wildfire Protection Plan (CWPP). BFD works cooperatively with state and federal wildland fire fighting agencies during fire season, especially the Montana Department of Natural Resources and Conservation (DNRC). ESCI encourages BFD to work proactively in wildland fire prevention and education projects as part of the county CWPP.

BFD is the first responder to hazardous materials incidents within the BFD service area. In addition, the department houses the State of Montana Regional Hazardous Materials Response Team resources at Station 5. BFD personnel serve as members of the regional response team. The additional training and expertise required to participate on a regional response team is a valuable asset for the BFD, given the potential for a significant hazardous material incident in the BFD service area.

Summary

The purpose of the community risk assessment presented above is to provide an overview of the nature of community risk in the BFD service area. ESCI recommends that BFD develop a Community Risk Assessment Plan that includes the following components:

- Identification of risks
- Categorization of risks (Low, Moderate, High)
- Development of strategies and tactics to mitigate risks
- Determination of the appropriate level of fire department resources (apparatus and personnel)
- Monitoring, evaluation, and modification of the Community Risk Plan

Future Delivery System Models

Although the foregoing sections of this report focused primarily on the conditions that currently exist within the Billings Fire Department, the intent of this study is to combine that evaluation with a look into the future and provide policy makers with information necessary to carry the system forward over the next 10 to 20 years. This portion of the report provides comments and recommendations related to the deployment of facilities, apparatus, and personnel with a focus on future service delivery and an improvement in overall efficiency within the system.

ANALYSIS OF RESPONSE STANDARDS AND TARGETS

BFD has not established formalized response standards and targets. However, the Fire Chief articulated that the agency's goal is that of compliance, to the extent possible, with NFPA Standard 1710, Standard for Career Fire Departments. In the absence of established standards, ESCI offers the following discussion to BFD leadership and City of Billings decision makers.

ESCI emphasizes the importance of the establishment of response performance metrics by the BFD. Once established, these standards establish measurable goals for service delivery which then form the foundation upon which planning for deployment of resources is based. Absent these processes, the organization is not able to determine where it needs to go, nor is it able to know when it is achieving its goals and meeting the community's expectations.

Response standards must be developed by the individual community, based on the expectations of elected officials and citizens balanced against the financial aspect of what a community is able and willing to afford. For this reason, ESCI cannot establish these standards for BFD but rather will provide guidance and examples of what we consider to be acceptable metrics. In the following figure, ESCI offers sample statements that are representative of community expectations for common types of emergencies in the BFD service area.

Figure 86: Community Expectations-Response Objectives[20]

Service	Community Outcome Expectations
Fire Suppression	For all fire incidents, responders shall arrive in a timely manner with sufficient resources to stop the escalation of the fire and keep the fire to the area of involvement. An effective concentration of resources shall arrive within time to be capable of containing the fire, rescuing at-risk victims, and performing salvage operations, while providing for the safety of the responders and general public.
Wild-land Fire Suppression	For all wildfire incidents, the department shall arrive in a timely manner with sufficient resources to first protect homes and other buildings, then to begin controlling the rate of fire spread.
Emergency Medical Services	For emergency medical incidents, the department shall arrive in a timely manner with sufficient 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. When warranted, timely transportation of victim(s) to appropriate medical facilities shall be accomplished in an effective and efficient manner.
Hazardous Materials Response	For all hazardous materials incidents, responders shall arrive in a timely manner with sufficient resources to stabilize the situation and establish an action plan for the successful conclusion of the incident. For incidents requiring more extensive technician-level functions, personnel will call for and support additional specially trained and organized regional resources to perform the necessary containment, stabilization, and/or clean-up functions while providing for the safety and security of the responders, public, and the environment.
Vehicle Extrication	For vehicle accidents where rescue of victims is required, responders shall arrive in a timely manner with sufficient resources to stabilize the situation and extricate the victim(s) from the emergency situation without causing further harm to the victim, responders, public, and the environment.
High-Angle Rescue	For all high-angle rescue incidents, the department shall arrive in a timely manner with sufficient resources to stabilize the situation and establish an action plan for the successful conclusion of the incident. Working in conjunction with additional specially trained and organized regional resources, the department will perform the necessary rescue functions while providing for the safety and security of the responders, public, and the environment.
Swift-Water Rescue	For all swift-water rescue incidents, responders shall arrive in a timely manner with sufficient resources to stabilize the situation and establish an action plan for the successful conclusion of the incident. Working in conjunction with additional specially trained and organized regional resources, the department will perform the necessary rescue functions while providing for the safety and security of the responders, public, and the environment.

[20] Based on examples provided in the publication Commission on Fire Accreditation International, Inc. (now Center for Public Safety Excellence), *Creating and Evaluating Standards of Response Coverage for Fire Departments*, 5th edition.

Note that the response objectives presented in Figure 86 do not address specific staffing or response time performance. Defining and identifying the critical tasks, the staff, and the response time necessary to meet the response goals is something that should be accomplished by the fire jurisdiction.

Critical Tasks, Risk, and Staffing Performance

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

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

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

The CPSE has a sample critical tasking analysis for the number of personnel required on scene of a fire suppression event for various levels of risk. This information is shown in the following figure, illustrating an example of critical tasking only; and is not intended to conclusively define the actual personnel necessary based on risk.

Figure 87: Sample of Critical Task Staffing by Risk[21]

Sample Critical Tasking Analysis Firefighter Personnel Needed Based On Level of Risk (Fire Suppression Incident)				
	Structural Maximum Risk	Structure Significant Risk	Structure Moderate Risk	Non-Structure Low Risk
Attack line	4	4	2	2
Back-up line	4	2	2	(2)
Support for hose lines	4	3	2	
Search and rescue	4	4	2	
Ventilation	4	2	2	
Rapid intervention team	4	4	2	
Pump Operator	2	1	1	1
2nd apparatus/ladder operator	1	1	(1)	
Command	2	1	1	1#
Safety	2	1	1#	
Salvage	4			
Rehabilitation	2			
Division/group supervisors	(2)			
Total	**37–39**	**23**	**14–16**	**3–6**

() indicates tasks may not be required at all such incidents
 # indicates task may, at times, be completed concurrently with other position

The first 15 minutes is the most crucial period in the suppression of a fire. How effectively and efficiently firefighters perform during this period has a significant impact on the overall outcome of the event. This general concept is applicable to fire, rescue, and medical situations.

Critical tasks must be conducted in a timely manner to control a fire or to treat a patient. Three scenarios of commonly encountered emergencies are routinely utilized by fire departments when conducting field validation and critical tasking: a moderate risk structure fire, a traffic collision with a trapped victim, and a cardiac arrest. Each scenario is conducted using standard operating procedures and realistic response times based on actual system performance. Each scenario is normally run multiple times with a variety of fire companies to validate and verify observations and times.

To further validate the analysis process, results are compared with records from actual working fires and similar incidents from previous years. Overall results are reviewed to determine if the actions taken within the early minutes of an incident resulted in a stop loss or not and if additional resources were required. The critical task analysis process demonstrates the rate in which the current deployment plan results in stopping loss, a high percentage of time within initial critical time goals.

[21] Based on examples provided in the publication "Creating and Evaluating Standards of Response Coverage for Fire Departments," 4th edition; Commission on Fire Accreditation International, Inc. (now Center for Public Safety Excellence).

Again, critical tasks are those activities that must be conducted in a timely manner by firefighters at emergency incidents in order to control the situation, stop loss, and to perform necessary tasks required to ensure the life safety of both victims and emergency responders. BFD is responsible for assuring that responding companies are capable of performing all of the described tasks in a prompt, efficient, and safe manner.

All Risk Critical Resource Tasking

Fire departments respond to many incidents other than structure fires, including hazardous materials (dangerous goods) releases, motor vehicle collisions, basic and advanced life support medical emergencies, and non-structural fires. Personnel responding to these types of incidents should be assigned tasks similar to structure fires.

The following figures are provided as an example for these types of incidents, although ESCI recommends BFD conduct its own field validation exercises with its crews, including mutual aid resources, to verify the critical tasking analysis provided. After field validation is complete, the department may find that the critical tasking can be adjusted appropriately upward or downward for each incident type.

Figure 88: Sample Non-Structure Fire Critical Tasking

Task	Personnel
Command	1
Pump Operator	1
Primary Attack Line	2
Total	**4**

Figure 89: Sample Hazardous Materials Incident Critical Tasking

Task	Personnel
Command	1
Pump Operator	1
Primary Attack Line	2
Back-Up Line	2
Support Personnel	7
Total	**13**

Figure 90: Sample Motor Vehicle Collision with Entrapment Critical Tasking

Task	Personnel
Command	1
Pump Operator	1
Primary Attack Line	2
Extrication	3
Patient Care	2
Total	**9**

Figure 91: Sample Emergency Medical Incident Critical Tasking

Task	Personnel
Command	1
Patient Care	2
Total	**3**

Again, these critical tasks are presented as examples. ESCI recommends BFD conduct field validation exercises with its crews to verify the critical task analyses provided. After field validation is complete, the department may find that the critical tasking can be adjusted appropriately upward or downward.

Response Time Performance Objectives

Once BFD has established response objectives and identified the critical tasks and number of personnel necessary to achieve those critical tasks; the department can begin the process of defining emergency response time performance objectives.

The process of setting response time performance objectives will include two primary questions:

- What are the expectations of the community and elected officials regarding initial response times of the fire department to an emergency incident? What is the public's perception of quality emergency services where response time is concerned?
- What response time performance would be reasonable and effective in containing fire, stopping the loss, and saving lives when considering the common types of incidents and fire risks faced by BFD?

BFD is a fully career fire department and therefore references the national consensus standard for career fire departments (NFPA 1710 Standard for Career Fire Departments). Although the NFPA performance recommendations are considered an industry best practice; fire departments working with their governing bodies can implement response performance goals that better suit their communities. Because BFD services a large geographic area that consists of a range of urban and non-urban areas, ESCI recommends tiered response performance objectives be developed based on the population and risks present. This methodology will effectively segregate the service area into response zones that reflect community expectations and fire department capabilities within these zones. The following two figures provide examples of response performance goals based on population and risk response zones.

The first example is the "first due" response of a single unit utilizing the industry best practice response time metric, from the time the call is received at 911 to arrival, 90 percent of the time:

Figure 92: First Due Response Standard Example

First Due, Single Unit Response	
Urban (> 1,000 per square mile)	9 minutes to 90 percent of incidents
Suburban (500–1,000 per square mile)	12 minutes to 90 percent of incidents
Rural (<500 per square mile)	15 minutes to 90 percent of incidents

The next example represents a first alarm response to a moderate risk structure fire, utilizing the industry best practice response time metric, from the time the call is received at 911 to arrival, 90 percent of the time:

Figure 93: First Alarm Response Standard Example

First Alarm, Response of 3 Engines, 1 Truck, and 1 Battalion Chief	
Urban (> 1,000 per square mile)	11 minutes to 90 percent of incidents
Suburban (500–1,000 per square mile)	16 minutes to 90 percent of incidents
Rural (<500 per square mile)	18 minutes to 90 percent of incidents

The practice of establishing risk zones based on risk and population density is used by fire jurisdictions across the country. The use of risk or "demand" zones provides a more accurate picture of service delivery performance. This is especially relevant for jurisdictions such as BFD, with a large and diverse service area.

As with the critical task figures, the response standards above are presented as examples. The above discussion provides BFD with the information necessary to begin the process of establishing response standards and targets. Establishing response standards and performance goals should be viewed as a strategic planning tool for community loss control. The department is encouraged to begin the process as soon as feasible to assist with future planning needs.

SHORT AND MID-TERM STRATEGIES

The previous sections of this report detail a considerable volume of observations and comments and recommendations relating to BFD management and operations. The process of understanding, prioritizing, and implementing the recommended enhancements can be daunting, simply due to the amount of work that may be involved. To help the organization navigate through the process, the following discussion further defines the short and mid-term priorities that ESCI has identified as the most important initially.

Span of Control

Organizational management theory posits the importance of both unity of command and rational span of control. Unity of command refers to the principal that each person should have one boss. In the modern work place, multiple lines of authority and communication have become commonplace, but the idea that each employee has, ultimately, one commander is implicit in any organizational chart. Billings Fire Department is no exception.

Span of control refers to the importance of keeping the number of direct reports to each manager or supervisor within reason. The number of five reports, or subordinates, is generally accepted, although the nature of the mission and the needs of the specific organization can cause this number to shrink or expand at times.

Unity of command is not an issue within BFD, but there are two areas where span of control is. The first is at the Fire Chief's level. As noted in the staffing section of this report, the current span of control is too great. This results in one of two possible outcomes. Either the Fire Chief will be unable to efficiently manage his direct reports, giving them the feedback and direction that they need, or he will have to neglect his other responsibilities within the organization. This may include the responsibility for communicating effectively with other department heads, the City Manager, or policy makers. It may also include the failure to adequately and properly identify the organization's future needs, challenges, and opportunities.

ESCI has recommended that Billings Fire Department plan for the addition of at least one, and possibly two, additional Assistant Chief Officers. Recognizing that these are expensive positions to fill and that there may be other ways to alleviate this span of control issue at a lower level within the organization's structure, the ESCI team acknowledges that fire management should be the entity to decide how to address this issue in an efficient and timely fashion.

The second area where span of control is an issue is at the Battalion Chief to station officer juncture. With one BC per shift and seven stations to supervise, BFD's first line Chief Officers have stretched beyond an effective span of control. They are not only responsible for supervising at least seven (if not more) company officers on a daily basis, there is a significant geographic distance between the location of each direct report.

The current number of stations presents an awkward problem for span of control theory. Seven stations are too many for one BC, but when divided into two battalions, span of control of only three (or four) stations may be deemed to be too light a work load. There are two ways to address this concern.

The first is to recognize that Battalion Chiefs are also a supervisory resource to whom can be assigned both on-going and one-time-only projects or responsibilities. Additional BCs with available capacity can be a welcome addition to the administration's capacity to manage the overall fire department.

Another way to address this concern is to maintain the current Battalion Chief complement and to create a new position—Station or Senior Captain—assigned the responsibility for managing each station. At current staffing, this would result in seven new station supervisors to whom the other company officers within the station would report, and who would in turn report to one of the three BCs. Each of the BCs would respond to calls and support the companies on his or her shift, but overall management and supervision for each station and its personnel would be delegated downwards to the station level.

Support Staff

As noted in the staffing section of this report, the ESCI team is concerned about the lack of dedicated support to both the training function and to the administration function. While not extremely expensive, the addition of these kinds of positions represents an increase in personnel costs and needs to be planned for carefully. The failure to properly staff these functions has resulted in the less efficient promulgation of a training and prevention program and in less efficient administration of the fire department overall.

BFD can decide not to dedicate resources to these needs. After all, they do not ride on fire apparatus, and they do not respond directly to the citizens' call for help. But an effective training program is what ensures that when the firefighters arrive, they are properly prepared to serve the publics' needs, and an efficiently administered fire department is what keeps the organization up-to-date and ahead of the growth curve that communities like Billings face.

Work Week Change

As described in the Emergency Staffing section of this report, Billings Fire Department may have an opportunity to increase the availability of full-time equivalent positions through an increase in the average number of hours its incumbent firefighters work. Such a change would require working with the firefighters to adjust their working agreement to allow for this change. We have explained that there are several available straight time hours between the current work week and the maximum hours allowed under Federal Law.

There have been cases in other parts of the country where employers have attempted to add hours to their firefighters' work weeks without adjusting compensation. In almost all cases they have failed legally, and in all cases they have been detrimental to their departments and communities. However, both the City and the firefighters should have a mutually shared interest in adding to the number of FTEs available to respond to emergencies. Extending the work week in a mutually agreed way could provide a win-win.

Alternate Response Units

Alternative Response Units (ARUs) are a slightly different model than the Peak Activity Units, whose primary mission is responding flexibly to peak demand for emergency services. The Alternative Response Unit is focused on non-emergency, lower acuity emergency medical calls. Its purpose is to keep the primary fleet of emergency response vehicles and crews in service and available for the higher acuity, true emergency calls. Tualatin Valley Fire & Rescue (TVF&R) in Washington County, Oregon implemented a twelve-month pilot of this program in 2011, and Spokane Fire Department (SFD) implemented a six-month pilot of this program in 2013 and recently extended it an additional eighteen months. Both agencies have experienced positive results, with TVF&R permanently incorporating the units into its daily operation.

The premise behind the unit is to reduce the expensive staffing and vehicle response to likely non-life-threatening calls for service. The units are sport utility vehicles, staffed by one Firefighter/Paramedic in both Spokane's and Tualatin Valley's model. The units are dispatched according to a protocol used by the dispatch centers, which medically triages the calling party. In SFD's case, the communication specialists at the Spokane Combined Communication Center are trained to Emergency Medical Technician/Emergency Medical Dispatch (EMT/EMD) certification. In TVF&R's model, the communication specialists at Washington County Communications Center are not necessarily EMTs but are trained to the EMD certification.

In both cases, the dispatcher triages and categorizes a patient over the phone using a series of questions following an EMD algorithm. The calls are placed into one of typically five categories; Alpha, Bravo, Charlie, Delta, and Echo responses. Alpha is lowest on the severity/acuity scale and is not a life-threatening call type. Echo is the highest severity/acuity and the most urgent, immediate life-threatening call type. ARUs respond to Alpha and Bravo calls routinely but may also respond to higher acuity calls if the unit happens to be closer than emergency response units to improve response time. It is important to note that both agencies recognize that a single paramedic in an ARU cannot effectively deal with a higher acuity call type alone, thus the focus on lower acuity call types.

In TVF&R, the ARUs also responded to minor non-medical calls such as lockouts, smoke detector problems, and burning complaint investigations. The four TVF&R ARUs responded to 2,134 incidents in twelve months, which represents 7.2 percent of the agency's total call volume for that year.

Spokane's ARU pilot included three units deployed strategically within the SFD service area. Initially, they were deployed Tuesdays through Fridays from 8:00 AM to 6:00 PM using peak activity to drive deployment times. The deployment model was later modified to provide increased employee flexibility. In the six-month pilot, the units handled 1,193 incidents that would have been handled by an engine company, medic unit, or ladder truck.

A unique feature of the SFD ARUs is that assignment/recruitment of staff on these units emphasized paramedic assertiveness as a desirable trait, since the unit lends itself to "jumping" calls to provide a fast response, assessment, and potential cancellation of more traditional response units where the ARU is closer and available. In fact, each unit's call load was made up of at least 40 percent of calls that were "jumped" versus dispatched initially. In over 72 percent of the incidents responded to, the incident was

handled alone by a single ARU. In over 29 percent of the calls where other units also responded, those additional units were cancelled, keeping them available for higher acuity calls which might occur simultaneously. In 204 incidents, the ARU requested additional units either while responding or once on scene. During an initial response by an ARU, a second simultaneous response was requested in the same area 370 times, improving those units' reliability.

It is noted that ARUs do not provide recognized credit through the Insurance Service Office. Emergency medical services response capability is not evaluated by ISO since they are focused on property conservation and property risk. However, response time and unit reliability are improved by the use of ARUs, and SFD states that, "the public perception of the program has been overwhelmingly supportive and accepted throughout the community as simply, 'smart government.'"

If BFD deployed ARUs using peak activity data to determine location and hours in service, the units would likely have a positive effect on station/unit reliability, reduce wear and tear on heavy apparatus, and contribute to a positive public perception similar to what Spokane Fire has experienced. The initiative could be accomplished via use of the "squad" type vehicles that were purchased for a similar purpose in the past but have since been removed from service.

Prevention Division Staffing

After review of the workload and staffing of the Fire Prevention Bureau, it is evident that there is a need for additional resources. The staff of the Fire Prevention Bureau is overburdened. Excepting the outsourcing of fire systems plans review, the bureau has maintained the same level of staff over the last thirty years. As the population of Billings and the surrounding communities have grown, so has the demand for services from the bureau. Increasingly so over the last three decades, the Fire Marshals have prioritized services to around the business community and new construction.

While responsive to requests for inspections and public outreach events, the Fire Prevention Bureau is unable to push out much programming to reduce the incidence and impact of fire, injury, or illness. The annual fire prevention week activities are well attended, but this is insufficient for the size and complexity of the Billings community.

The bureau has implemented some actions to aid in the delivery and efficiency of programs (e.g., fire suppression company inspections, mobile reporting). There are more opportunities identified in the section recommendations above. However, in sum the bureau needs additional personnel in order to become the proactive agency it seeks to be, to reduce strain on existing personnel, and to enhance succession planning.

The Billings Fire Prevention Bureau staff are well trained and dedicated professionals. The work load in the bureau is exhaustive. The constant burden is over-stressing, prevents attendance at training, and impacts work product quality and/or timeliness. With the amount of on-call time (ninety-two days per year), members often are not off-duty. This continual engagement with the bureau prevents adequate relief time and negatively impacts individuals' personal time and activities.

Further, as stated previously, the Fire Marshal has proposed an additional full-time position to assume plans examination duties. Filling of this position will allow the agency to bring the fire protection systems plans review back in-house, and will provide customers with a local contact and direct control of the review process. The position may largely be funded by receipts from conducting plan reviews.

To this end, ESCI recommends the following steps:

1. Prioritize existing workload changes and develop an implementation strategy (e.g. technology, staffing, transfer).
2. Estimate future workload demand increases due to population growth, service area gains, and community risk changes.
3. Identify staffing priorities and determine cost efficient means to achieve results (e.g. Administrative Assistant, Public Education Specialist, non-combat volunteers, Deputy Fire Marshal).
4. Bring all plans review back in-house. Hiring a Fire Protection Engineer/Plans Examiner may be largely funded by revenue from review services.

Community Risk Reduction

In addition to the above, and considering that staffing of the Billings Fire Department Fire Prevention Division is limited, the following recommendation is offered in the interest of making the most effective use of the division's personnel resources.

An emerging trend in the fire service nationally is a concept called Integrated Community Risk Reduction (CRR). CRR is an integrated approach to risk management that marries emergency operations and prevention strategies into a more cohesive approach to reducing risks in any community. It includes the fire department partnering with the community, non-profit organizations, and private sector agencies with a mission nexus to an identified community risk.

The concept starts with the fire department mining data to quantify community risk. Once the community risks have been identified, they are prioritized based on frequency of emergency service demand or consequence (to the victim, to the community, to the local economy). Upon prioritizing the risks, strategies are developed to mitigate the risks. These strategies are incorporated into a CRR plan, which integrates resources across the fire department, partner agencies and the community to implement the various strategies in an integrated way. After plan implementation, the results are reviewed to determine the impact on the risks. Adjustments are made, as necessary, based on the results and the process is refined and continuously re-implemented.

The risks are not limited to structure fires. They can include falls, drowning, interface exposure, or any risk requiring fire department response. Risk can also be localized by station area. Station Captains, in collaboration with fire prevention staff, can develop and manage a station-specific CRR plan as a subset of the fire department's plan.

Medical Priority Dispatch System

Appropriate triage and dispatching of emergency medical calls is a component of maintaining the viability and integrity of an EMS service delivery system. The use of a Medical Priority Dispatch System (MPDS), allows for a more efficient utilization of emergency and non-emergency resources. Instead of sending a full complement of EMS responders, travelling with lights and sirens to every medical incident, including minor ones, calls are triaged at the dispatch center. Using a nationally accepted system of screening and prioritizing information for a caller, the appropriate level of response is then determined to assure an effective level of resource allocation to a serious emergency, while also limiting the volume and speed of response to minor incidents. Once the EMS system is appropriately triaging and dispatching medical emergency calls, both departments will be able to better utilize resources, allowing them to adapt to future increased call volume and expanded service delivery.

While current medical priority dispatch protocols are being utilized by Billings City/County Communications Center, BFD is not fully leveraging the advantages of the MPDS process. The fire department responds to all medical incidents, regardless of level of priority. However, MPDS prioritization is used to determine whether fire units will respond with lights and siren or if the incident will be handled as a non-emergency response.

As discussed earlier in this report, BFD responds to a higher number of cancelled EMS calls than is typically seen, as detailed in the following table.

Call Type	Count	% of Total Incidents
Good Intent Calls	4,823	35.2%
Cancelled Calls	4,256	31.1%
EMS Cancelled Calls	3,113	22.7%

The high number of cancelled EMS calls is likely related to the fact that the department responds to all EMS incidents, rather than screening lower acuity calls that can be handled by the ambulance provider and to which dispatching a fire unit is not necessary. Implementation of a more robust Medical Priority Dispatch System approach would result in two benefits:

1. The approach would reduce unnecessary responses to non-emergency incidents; and,
2. Doing so will increase availability of response crews to address other incidents.

RECOMMENDED LONG TERM FUTURE STRATEGIES

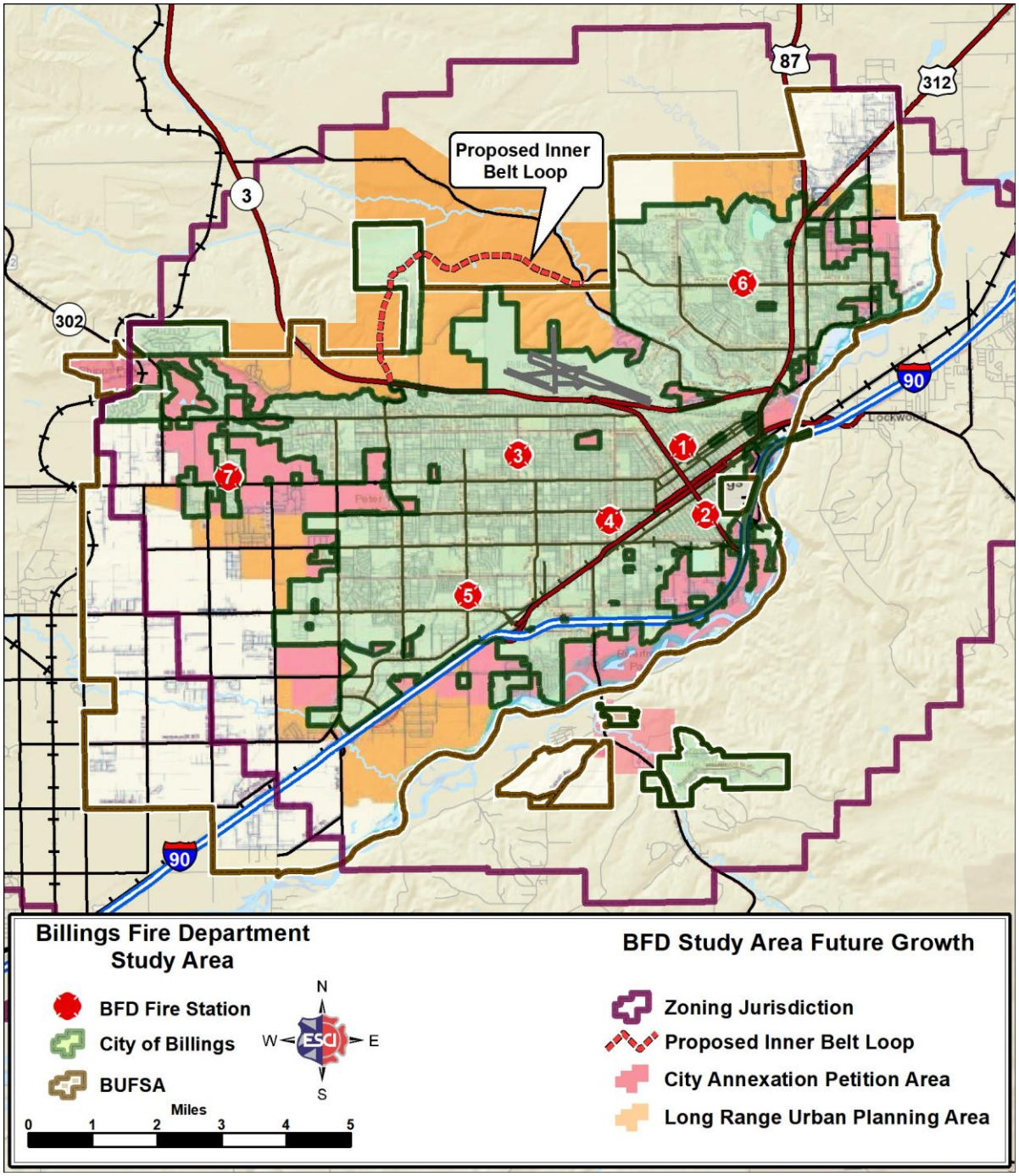
The short and mid-term strategies discussed will move the organization forward substantially. A longer-term, high-level view of future needs is also important to provide a "big picture" view of how the organization needs to continue with future initiatives. Primarily, long-term strategies are centered around community growth and related workload and how both impact the future deployment of fire stations and personnel.

The analysis of long-range future resource deployment is an ongoing process, not one that is decided at one point in time and remains static. Circumstances change over time as the risk profile and population demographics within the BFD service area changes. The deployment options presented here should be periodically reviewed and modified as needed. The options presented below are intended to provide general guidelines for future station deployment based on existing conditions and future growth and development in the service area.

Current and Future Conditions

As discussed in the Community Risk Assessment, the BFD service area is a mix of agricultural (primarily in the BUFSA), residential, commercial, industrial, and public lands. The 2016 City of Billings Growth Policy indicates that the Billings area is expected to grow and change over the coming years. Some of this growth will occur inside the city; however additional land will be required to support the housing and associated needs of the future population. These lands are primarily located adjacent to the city in the BUFSA. The following figure displays the City of Billings and area around the city most likely to be affected by future growth.

Figure 94: BFD Study Area and City of Billings Future Growth



The growth policy statement from the adopted City of Billings Growth Policy states the following:

> *In the next 20 years, Billings will manage its growth by encouraging development within and adjacent to the existing city limits, but preference will be given to areas where city infrastructure exists or can be extended within a fiscally constrained budget and with consideration given to increased tax revenue from development.*

The growth policy statement indicates that growth in Billings will occur as the result of infill within the city and annexation of land adjacent to the city, as needed. Land identified as "City Annexation Petition Area" in this figure, are areas that meet the current City of Billings criteria for annexation into the city. The areas identified as "Long-Range Urban Planning Area" represent land that may be considered for future development or annexation. The 2016 Growth Plan utilizes public input to establish where growth should occur. Infill development, the area along the proposed Inner Belt Loop route (extending from Highway 3 to the Heights neighborhood), and the area west of the present city limits were preferred areas based on public input.

The proposed Inner Belt Loop is a major transportation project connecting the Heights neighborhood to Highway 3, west of the Billings Airport. The 2016 Growth Plan identifies a preferred growth scenario along the proposed Inner Belt loop; that includes a mix of residential, commercial and mixed use, light industrial, institutional (schools), and parks. The area for the potential development extends from Highway 3 around the top of the Billings Airport to the Heights neighborhood. Future growth and development also extends west of the proposed Inner Belt Loop and Highway 3 intersection into the Indian Cliffs subdivision area.

Other growth scenarios in the 2016 growth policy identify possible growth scenarios in the area west of Billings outside the current city limits and for infill development inside the existing city limits. Public input for the area west of Billings, preferred a mix of land use types similar to the preferred growth scenario in the Inner Belt Loop area. Infill development inside the city is defined by densities and land use permitted by existing zoning in the city.

Future Fire Station Deployment Strategies

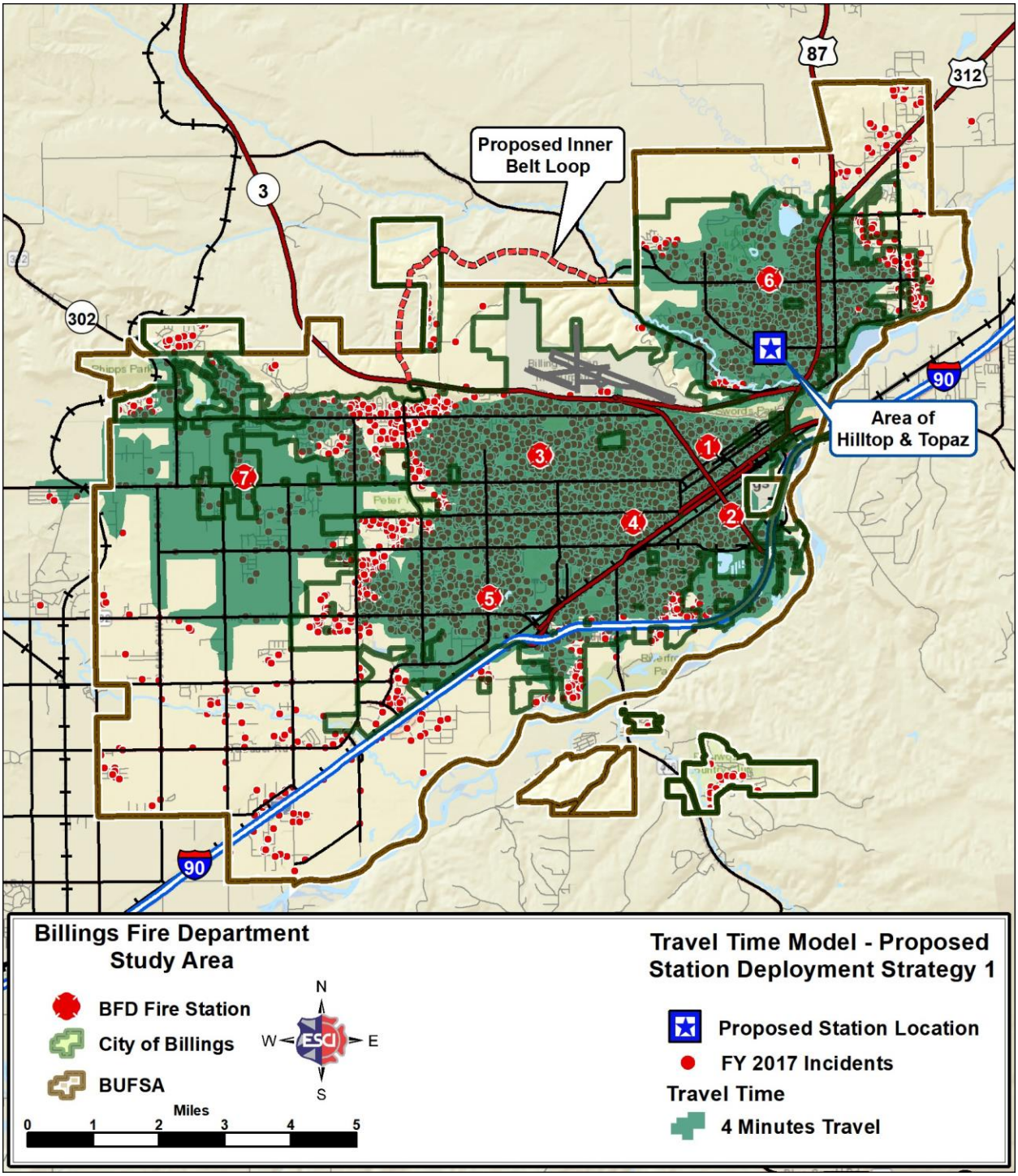
The strategies presented in this analysis are intended to provide general guidelines for future station deployment based on existing conditions and future growth and development in the BFD service area. To identify optimum station locations, travel time is modeled at four minutes travel (NFPA 1710 standard) from various station locations. The analysis uses a location allocation GIS model to identify potential station locations. The analysis is based on the closest station by street network, relative to service demand (incident locations). The percentage of FY 2017 incidents within four minutes travel or less is calculated to determine the degree of coverage provided by each strategy. In addition, ESCI considers the portions of the service area where future development and growth is predicted.

The following station deployment strategies address improvements that may be considered to enhance response coverage and address areas that are currently under served or will be underserved with future development. The strategies do not identify when they should be implemented. The question of timing needs to be based on the development of response time standards and targets, measurement of actual response experience relative to those targets, and benchmarking to identify the trigger point at which a new, or relocated, station should be undertaken.

Station Deployment Strategy 1—Current Station Locations Plus One Additional Station

The first possible station deployment utilizes the current BFD stations and adds one additional station in the Heights neighborhood; in the area of Hilltop Road and Topaz Avenue.

Figure 95: BFD Future Station Deployment Strategy 1 – Travel Time Model



As discussed in the Service Delivery analysis, 86 percent of FY 2017 incidents occurred within four minutes travel of the seven stations that BFD operates out of currently. Adding the station displayed above, while improving response in the Heights, also increases the coverage of current service demand to just over 90 percent (90.1 percent) for the rest of the city. This meets the NFPA 1710 recommendation for the arrival of the first unit on scene at an emergency incident. Additionally, a second station in the Heights neighborhood improves the resource concentration and response reliability of resources available; both in the Heights neighborhood and the downtown area east of Station 1.

The city will need to balance the cost of building and staffing a new station against the relative gains achieved by the response reliability improvement.

Increasing service demand and a lack of resources available to handle additional responses in the Heights and the downtown area was identified by BFD personnel and other stakeholders as a concern, during ESCI's site visit in August 2017. As discussed in the Service Delivery analysis, actual travel time performance in fiscal year 2017 in the Station 6 first due area exceeded seven minutes thirty seconds (07:38 measured at the 90th percentile). Only Station 5 (07:39) and Station 7 (10:13) demonstrated longer travel time performance.

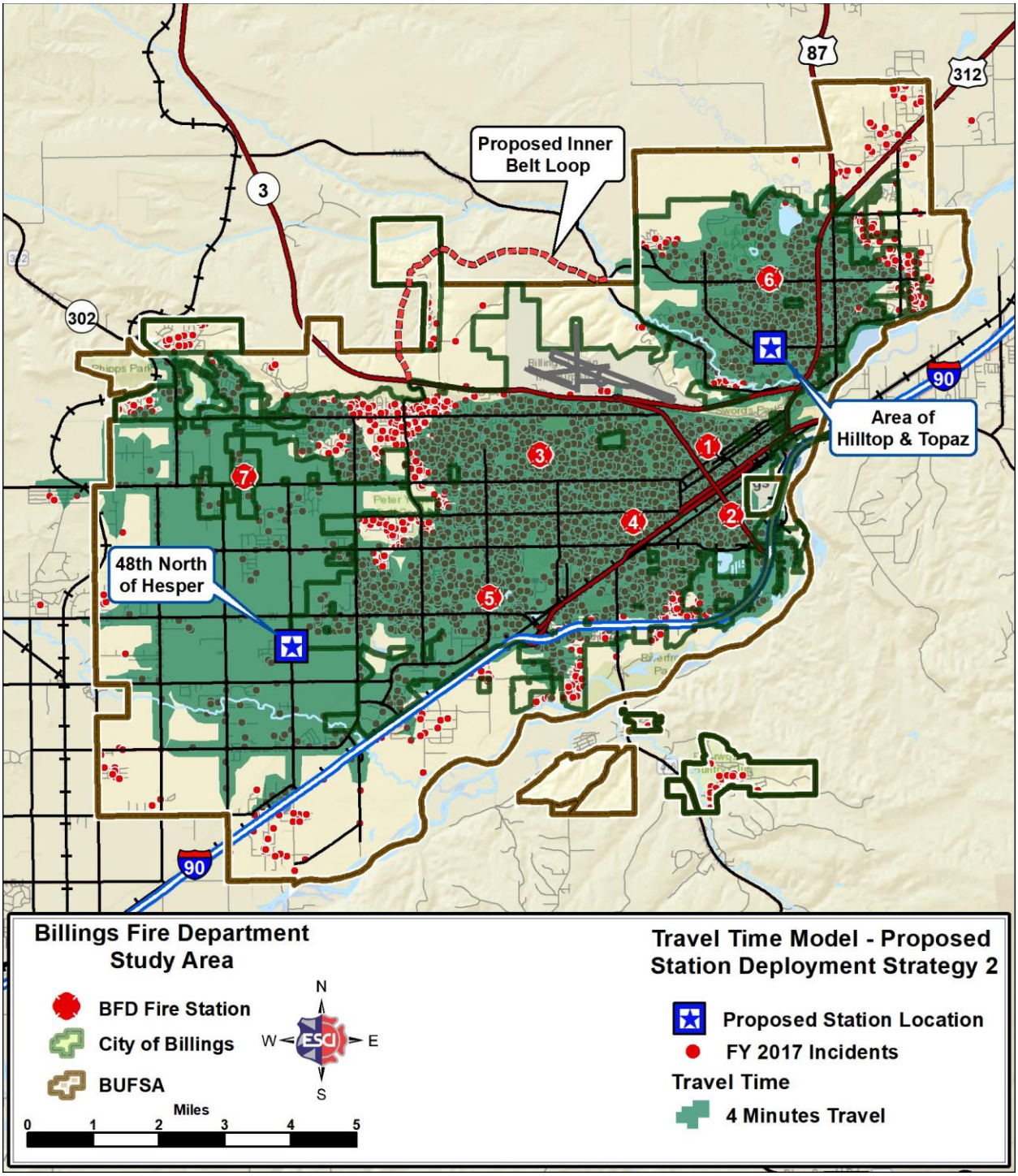
Station Staffing and Apparatus

This station deployment strategy proposes a single new fire station. ESCI recommends that at a minimum, this station house a structural fire engine. The station should have the capacity to house additional apparatus such as wildland engines, tenders, quick response units, or specialty apparatus. The total number of stations in this strategy is eight. At the current BFD minimum staffing level, this would result in a minimum daily staffing level of 24 plus the Battalion Chief.

Station Deployment Strategy 2—Current Station Locations Plus Two Additional Stations

This possible station deployment model utilizes the current existing BFD stations and adds two additional stations. One station in the Heights neighborhood (Hilltop and Topaz) and another station on 48th Street north of Hesper Road.

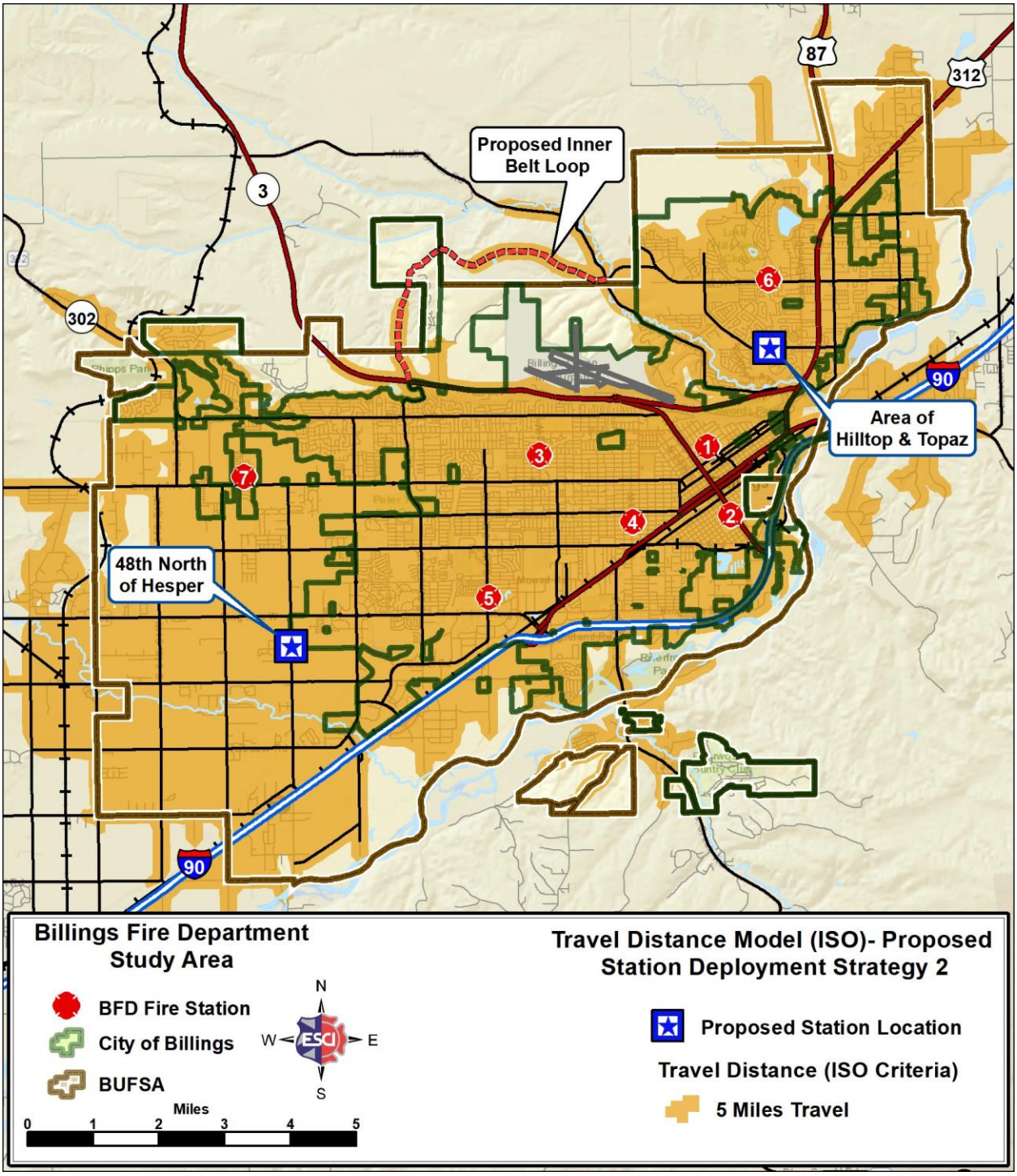
Figure 96: BFD Future Station Deployment Strategy 2 – Travel Time Model



In this deployment model, approximately 92 percent of FY 2017 incidents are within four minutes travel of a BFD station. This nine station deployment model addresses what could be considered an immediate need in the Heights neighborhood; and improves coverage in the portions of the city between Station 5 and Station 7. Additionally, the station in the area of South 48th Street West and Hesper Road also provides improved coverage in a portion of the BUFSA that is currently beyond four minutes travel of a BFD fire station. As displayed in Figure 94, much of the area currently in the BUFSA, along the western edge of Billings is identified for future development and possible annexation into the city. The extended travel time performance experienced in 2017 (Station 5 – 07:39 and Station 7 – 10:13) may be attributed to the time needed to travel from a current BFD station to the area served by the proposed station location.

In addition to improving current travel time performance, by increasing the number of incidents within four minutes travel of a fire station; the deployment model displayed above increases the number of properties within five miles travel distance of a fire station, a threshold used by the Insurance Services Office (ISO) in determining insurance rates. The following figure displays the portions of the service area within five miles travel of a BFD fire station in this station deployment strategy.

Figure 97: BFD Future Station Deployment Strategy 2 – Five Miles Travel Distance (ISO Criteria)



As discussed in the Service Delivery analysis, there are portions of the BFD service area, both in the City of Billings and the BUFSA, that are beyond five miles travel from a fire station. This negatively affects fire insurance costs and can affect new development. Comparing this figure to Figure 43 in the Service Delivery analysis reveals that the additional station in the area of 48th Street north of Hesper Road brings the area in the southwest corner of the BUFSA, within the five-mile service area of a BFD station. Examination of the GIS data reveals that this station deployment model results in approximately 900 additional structures within five miles travel of a BFD fire station.

Station Staffing and Apparatus

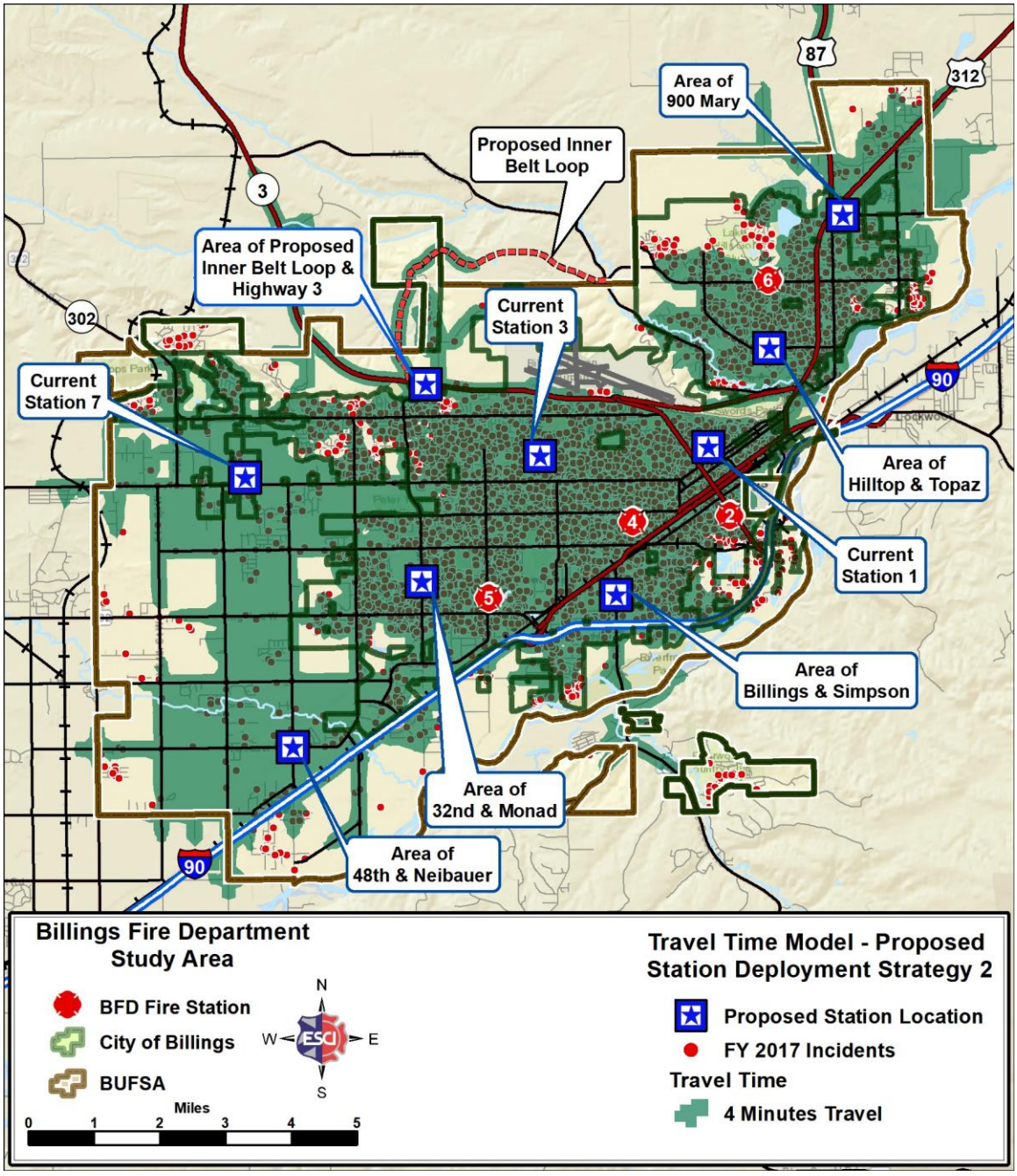
This station deployment strategy proposes two new fire stations. ESCI recommends that each station house at a minimum, a single response company staffing a structural fire engine. The stations should have the capacity to house additional apparatus such as wildland engines, tenders, quick response units, and specialty apparatus. The total number of stations in this strategy is nine. ESCI recommends that all stations house a staffed structural engine and cross-staff additional specialty apparatus. At the current BFD minimum staffing level, this would result in a minimum daily staffing level of 27 plus the Battalion Chief. Should BFD decide to staff the ladder truck instead of cross staffing, the daily staffing level would increase to 30 plus the Battalion Chief.

Station Deployment Strategy 3—Optimized Nine Stations

While the preceding strategy results in a future total of nine fire stations by adding two new facilities, the Strategy 3 station deployment approach utilizes a mix of current stations, relocated stations, and new station locations to distribute nine stations throughout the BFD service area. The location allocation model utilized to identify the best station locations includes the current stations; however, they are not given a higher priority than any other possible location.

The optimized nine stations are detailed in the following figure:

Figure 98: BFD Future Station Deployment Strategy 3 – Travel Time Model

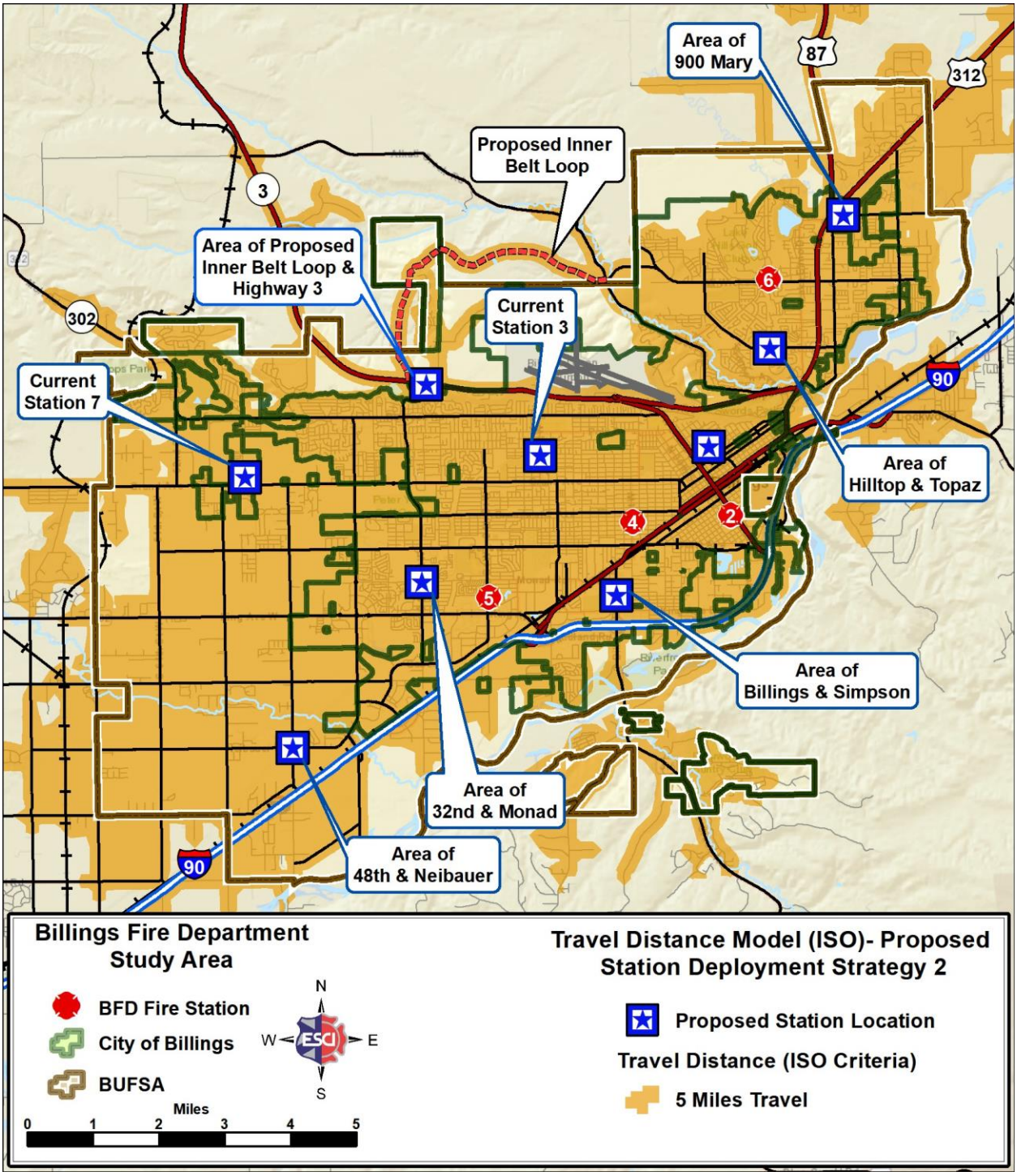


In this model, 96 percent of FY 2017 service demand is within four minutes travel or less of a proposed station location. Note that current station locations that are not used in this model are still displayed on the map, specifically Stations 2, 4, 5, and 6. This deployment model contains multiple elements:

1. It continues to use the current Station 1, Station 3, and Station 7 locations.
2. A new station in the area of South Billings Boulevard and Simpson Street replaces the current Station 2 and handles a portion of the Station 4 service area.
3. Station 5 is relocated to the area of 32nd Street and Monad Road.
4. New stations are located near the intersection of 48th Street and Neibauer Road (instead of the location displayed in Strategy 2); and the area of Highway 3 and the proposed Inner Belt Loop.
5. In the Heights neighborhood, the current Station 6 is replaced with two stations; one located near Hilltop and Topaz and one in the area of the 900 block of Mary Street.

The following figure displays the coverage provided by the optimized nine station model, measured at five miles travel distance.

Figure 99: BFD Future Station Deployment Strategy 3 – Five Miles Travel Distance (ISO Criteria)



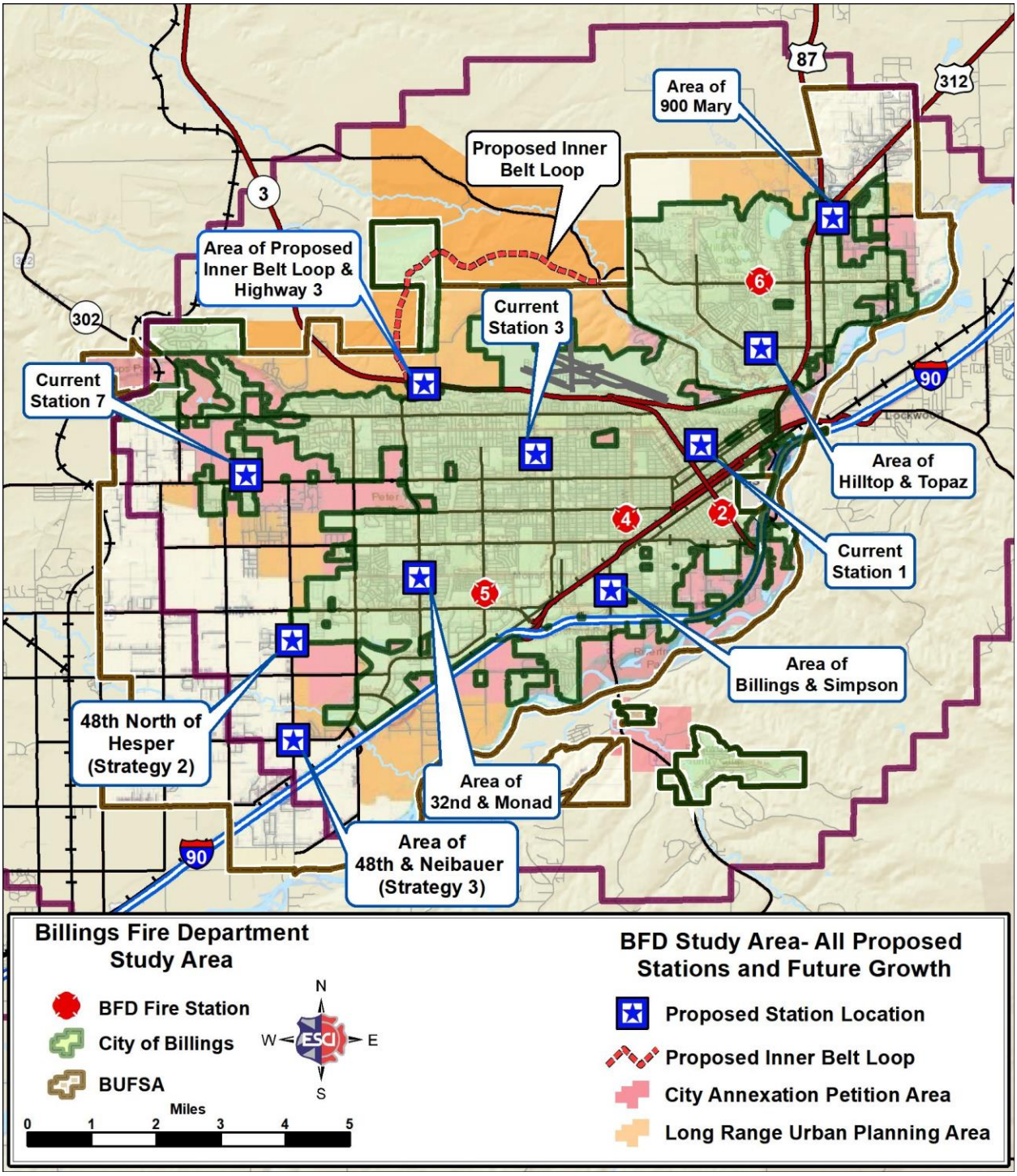
Based on travel distance from the stations in this deployment model, all of the currently developed portions of the BFD service area (both City of Billings and BUFSA) are within five miles travel of a BFD fire station. The proposed station at South Billings and Simpson is within five miles travel of the Briarwood subdivision; which is just beyond five miles travel from a fire station in the previous station deployment model. There are approximately 350 structures (primarily single-family dwellings) in this area.

Station Staffing and Apparatus

This deployment strategy provides the same daily staffing level of 27–30 personnel plus a Battalion Chief, as discussed in Strategy 2.

This deployment model utilizes the same total number of stations, to cover the BFD service area as Strategy 2. However, by relocating some stations (Station 2 and Station 5), replacing Station 6 with a new station (area of 900 Mary Street), and building new stations in the area of the proposed Inner Belt Loop and Highway 3, Hilltop and Topaz, and 48th Street and Neibauer; this deployment model increases the coverage of current service demand, improves coverage based on ISO criteria, and more effectively addresses future growth in the BFD service area. The following figure displays the proposed stations locations from the three Future Deployment Strategies over the data from the Future Growth map (Figure 94).

Figure 100: BFD Study Area – Future Growth and Proposed Stations



To maintain current response performance in the face of future growth and development or to improve response performance to a desired goal of meeting the NFPA 1710 standard; it will be necessary for BFD to distribute resources across the service area in a manner that decreases the travel time required respond throughout the service area. The following discussion summarizes advantages and disadvantages of the proposed station locations displayed in this figure.

Proposed Stations Primarily for Future Growth

The proposed stations located in the area of the Inner Belt Loop and Highway 3, 48th Street north of Hesper, and the area of 48th Street and Neibauer Road are all intended to improve travel time performance in the portions of the BFD service area to the west and north identified in the 2016 Growth Plan for future growth.

- Locations at 48th Street north of Hesper and 48th Street and Neibauer would improve travel time performance in the portions of the BUFSA which are already experiencing increased service demand.
- The 48th Street north of Hesper location is preferred if Station 5 is not relocated.
- 48th Street and Neibauer is preferred if Station 5 is moved to the 32nd and Monad location.

ESCI notes that the 48th Street and Neibauer location is outside the current city limits of Billings, but in an area identified for future growth and possible future annexation. Either of these locations also improve travel time performance and the concentration of resources in the Station 7 service area and the Station 5 service area south of Interstate 90.

The area along Highway 3 and the Inner Belt Loop is identified in the 2016 Growth Plan for significant land use changes and future growth. The area currently experiences extended travel times due to access issues from the valley floor. As previously discussed, a station in the area proposed will improve travel time and bring all portions of the BFD service area along Highway 3 within five miles of a fire station, which may result in reduced insurance costs for constituents in this area. However, ESCI notes that the Inner Belt Loop is still not completed and much of the projected growth in this area is dependent on completion of this project.

Additionally, the Highway 3 corridor is part of a regional transportation study, which may affect development in the area. ESCI encourages BFD leaders to consider this station a long-term future strategy. Working with City/County planners and developers will provide a clearer picture of where and when to construct this proposed station. Also, ESCI has observed jurisdictions open new fire stations in newly developed areas or proposed development, by partnering with developers. These partnerships have utilized development agreements to secure land, construction, equipment, and incremental operational costs. In some cases, these development agreements have resulted in securing land at a designated location in accordance with established development master plan and service delivery plans.

Proposed Relocated Stations

In Future Station Deployment Strategy 3, three stations (Station 5, Station 2, and Station 6) are relocated or replaced with two stations in the case of Station 6. These proposed station locations are primarily intended to improve current response performance and address future growth within the current city and BUFSA boundaries.

Station 6 located in the Heights neighborhood currently demonstrates extended travel time performance and total response time performance. In addition, timely response of additional resources into the area is hindered by access and distance from other BFD stations. The two proposed stations (Hilltop/Topaz and Mary Street) improve the travel time performance, increase the concentration of resources, and anticipate future growth to the northeast and west of the currently developed portions of the Heights. ESCI notes that these stations are included in the Optimized Nine Station strategy (Strategy 3). Deployment Strategy 1 provides an opportunity for an eight-station deployment strategy that meets current needs and improves response performance. Replacing Station 6 with new station northeast of the current location can be deferred until growth and increased service demand indicate the station relocation is needed.

The proposed 32nd and Monad location is a relocation of the current Station 5. The proposed location improves travel time performance to the west of the current station and mitigates access and travel flow issues identified during ESCI's site visit.

The proposed station located in the area of South Billings Boulevard and Simpson Street is relocation of the current Station 2. The proposed location improves travel time performance in the area between Montana Avenue (State Highway 10E) and Interstate 90. This location also improves travel time to the area south of the Yellowstone River. As previously discussed, this proposed station location is within five miles travel distance of the Briarwood subdivision, an island of city land that currently underserved based on ISO criteria. As discussed in the Capital Assets Assessment, Station 2 is the oldest current BFD facility and needs refurbishment or replacement. Relocating this station provides an opportunity to more effectively meet the future needs of the department.

Existing Stations

All three future station deployment strategies presented utilize the existing BFD stations to some degree. Deployment Strategy 1 and Strategy 2 rely on the current station locations and one or two additional stations to distribute resources throughout the BFD service area. Strategy 3 employs Station 1, Station 3, and Station 7 as part of a nine-station deployment strategy.

Station 1 is well located to handle the call volume and nature of risks in the central business district and the area around the downtown core. As discussed in the service delivery analysis, Station 1 experiences the highest service demand of the current BFD stations. It is important to note that as part of the optimized nine station strategy the Station 1 first due area will grow as the result of moving Station 2, resulting in increased call volume for Station 1 apparatus. It is important to consider readjusting first due areas and additional staffing needs at this station.

Station 3 is appropriately located to serve current and future service demand in the Station 3 service area. However, as noted in the Capital Assets assessment, the station is over 50 years old and at capacity for staffing and apparatus. BFD should carefully consider the advantages or disadvantages of remodeling the current station compared to building a new facility at the same location or a location in the same general area.

Station 7 is the newest BFD station and currently serves a large area which includes a large portion of the BUFSA experiencing growth and new development. Station 7 currently demonstrates the longest travel time and therefore longest total response time performance of the current stations. As discussed, an additional station in the area south of Station 7 will improve travel time performance and the concentration of resources in the Station 7 service area.

Station 4 is a large facility with some minor maintenance issues, which is not utilized in the Strategy 3 Optimized Nine-Station Deployment. If BFD moves forward with some iteration of Strategy 1 or Strategy 2, this station should be regarded as an effective and fiscally responsible opportunity to meet the future needs of the department. The station is located in an area which currently demonstrates high service demand. Additionally, the location is well located to provide additional resources such as a peak demand unit or alternative response unit to improve response performance and reliability in the center of Billings. If, or when, development and population growth in the Billings area leads to the projected increase in service demand (between 24,000 and 29,000 annual incidents); resources at Station 4 most likely will be a part of any BFD station deployment.

ESCI realizes that the strategies presented above represent a momentous fiscal investment that may not be achievable in the near future and may only be partially attainable in the long-term perspective. As discussed, the options and discussion presented are intended to provide guidelines for future stations in the BFD service area based on current conditions and possible future growth and development in the service area. As discussed below, the decision of when or where to deploy additional resources is a local determination based on expectations, conditions, and the community's ability or willingness to fund additional resources.

Findings, Observations, and Recommendations

The preceding sections of this report are intended to form the basis by which future decisions can be made concerning the deployment of resources. The overall intent is to provide Billings Fire Department policymakers and fire department leaders with the necessary information that will allow them to make an informed decision about the future of deployment of fire department facilities in their community.

The decision of when or where to deploy additional resources is a distinctively local determination that should be tailored to match community expectations, community conditions, and the ability of the community to fund the additional resources. BFD and Billings policy makers may or may not choose to adopt some or all of the following recommendations. It is the responsibility of policy makers to be aware of current performance (predicted performance and actual performance); and make decisions concerning future station deployment based on what the community expects and what the community can afford. Demand for BFD services has increased steadily since 2010, and has accelerated since 2012. This trend is expected to continue in the future. Based on the analysis detailed in the Current Conditions section of this report, approximately 86 percent of current service demand is within four minutes travel of a BFD fire station. Currently, the first BFD apparatus arrives at approximately 51 percent of emergency incidents in four minutes or less travel time. Overall, the first apparatus on scene arrives at 90 percent of emergency incidents in 10 minutes, 57 seconds, from the time the emergency call is received at the 911 center to the arrival of the first apparatus on scene.

In the case of BFD, the argument can be made that there is an immediate need to add additional stations; based on the analysis of current conditions and some of the criteria presented in the preceding sections. ESCI recommends that BFD move forward with a phased Fire Department Facility Master Plan with goals of improving response performance by decreasing travel time and improving the concentration of resources available in the BFD service area. The facilities can be constructed in an incremental, systematic manner; using the future station deployment strategies previously discussed. Priority should be given to providing coverage in the portions of the service area currently beyond four minutes travel time (or whatever goal is adopted) from a BFD fire station; especially where future development is expected to increase service demand.

When a New Station or Response Resource is Needed

In many communities, the question that must be addressed is: when is a new fire station, additional response resource, or alternative response program required to meet response goals? In many cases the overall answer is part financial and part professional judgement on the part of policy makers and fire department leaders. The problem comes in identifying a quantifiable trigger point for adding resources; since it can vary from community to community or even within a specific jurisdiction. While there is an abundance of opinion, there is very little definitive guidance in fire service literature on how this should be accomplished. One way to identify variables and decision points in deciding whether an additional station area is needed would be to place them into a matrix. The following figure is an example and is not meant to recommend response time parameters or given decision points.

Figure 101: New Station Deployment Decision Matrix

Action Choices	Travel Distance	Criterion		
		Response Time Parameter	Out of Area Calls	Building/Risk Inventory
Maintain status quo	All risks within 1.5 miles.	First due company is within 4 minutes travel, 90% of the time.	100% of calls in station area.	Existing inventory and infill.
Temporary facilities and minimal staffing	Risks 1.5 to 3 miles from existing station.	First due company exceeds 4 minutes travel, 10% of the time, but never exceeds 8 minutes.	More than 10% of calls are in adjacent area.	New area has 25% of same risk distribution as in initial area.
Permanent station needed	Risk locations exceeding 4 miles from the station.	First due company exceeds 4 minutes travel, 20-25% of the time.	More than 20–25% of calls are in outlying area.	New area has 35% of same risk distribution as in initial area of coverage.
Permanent station essential	Outlying risk locations exceeding 5 miles from any station.	First due company exceeds 4 minutes travel, 30% of the time.	More than 30% of calls are in outlying area.	New area has 50% of same risk distribution as in initial area.

In general, more than one of the criterion measures displayed in this matrix must be slipping to initiate the decision to position another station. For example, it is not uncommon to have new commercial and industrial occupancies protected by automatic fire protection systems outside of a station's coverage area. Simply because an area is out of the range of the response standard does not trigger a new fire facility. It is ESCI's experience that multiple elements of response performance and risk need to be out of balance—along with having additional economic resources—to justify additional stations or staffing.

Station Configuration and Costing

Construction of any fixed facility, like a fire station, represents a considerable cost to a fire department. Not only is the cost of building a station significant, but the ongoing cost of a new facility's continued, ongoing operation needs to be considered. The actual cost of construction varies widely based on several factors and variations in design, function, capacity, and site conditions. As part of a Fire Department Facility Master Plan, ESCI recommends that BFD consider the following:

- Conduct a facilities study of the current fire stations and conditions that provides recommendations and costs to address current essential facility, ADA, dual gender, and industry safety and functionality best practice standards.
- Conduct a fire station prototype study. A qualified architect firm utilizing a cross section of department members, fire administration, City representatives, and other desired stakeholders should conduct this study. The study should address basic spatial and square footage requirements for single, dual, and headquarters apparatus configurations. The study should also address station functions; workflow modeling and room adjacencies resulting in an BFD station configuration standard. Station lay out consistency can lead to economies of scale, enhanced productivity, and increased employee satisfaction.
- Establish a capital fire facility funding and finance strategy. Work with City staff to evaluate and develop a funding strategy. Based on the findings and development of fire station prototype requirements, a City (general or City capital fund) or community (essential facilities bond program) fund should be established. As fire stations are normally amortized as long-term assets and capital or debt financing is frequently limited, a phased or incremental approach to upgrade existing facilities or construct new fire stations is a common and often preferred approach.

Careful consideration should be given to the current and future needs of the jurisdiction prior to breaking ground for a new station. A relocated or new station represents a large investment in both time and money for a fire department; constructing a facility that will not meet the needs of the organization well into the future is a costly oversight that is not easily remedied. EMS incidents comprise most of BFD service demand, however constructing single bay EMS stations will not meet the future needs of Billings. While it is not necessary to construct large headquarters style facilities throughout the service area, BFD should consider stations with two or three double depth bays; and living quarters for at least five to seven 24-hour personnel as the minimum facility for new or relocated. Note that while small single bay stations may not be a good long-term facility solution; many jurisdictions deploy resources in temporary facilities with good success in reducing travel time performance.

In general terms, a fire station can be expected to represent a range from $150 to $250 per square foot and can be higher in some instances. Square footage of a typical facility as described above, can be expected to range from 6,000 to 8,000 square feet. A larger headquarters station can be expected to range from 10,000 to 12,000 square feet or larger.

Due to the broad variations possible, ESCI is not able to provide specific cost projections. However, to offer some general guidance, a 7,000-square foot station similar to that described in the previous paragraph would cost approximately $1,050,000 at $150 per square foot and $1,750,000 at $250 per square foot. Note that this does not include the cost of land.

Conclusion

The ESCI project team began collecting information concerning the Billings Fire Department in August of 2017. The team members recognize this report contains a large amount of information and ESCI would like to thank Billings Fire Department command staff, members and many City Council members, and employees for their assistance in bringing this project to fruition. ESCI would also like to thank the individuals that participated in stakeholder interviews for their input, opinions, and candid conversations throughout this process. It is ESCI's sincere hope the information contained in this report is used to its fullest extent and the emergency services provided to the citizens of Billings will be improved by its implementation.

Appendix A: Table of Figures