Evans FIRE & RESCUE

Master Plan

January 2010

ESCI Emergency Services Consulting International

Emergency Services Consulting International
www.esci.us • info@esci.us • 800.757.3724

Letter of Transmittal

January 5, 2010

Mr. Lyle Achziger
Mayor
City of Evans
1100 37th Street
Evans, CO 80620-2036

Dear Mr. Achziger:

Enclosed please find the final report in response to your request for a Master Plan Analysis for Evans Fire Rescue. The associates of ESCI have appreciated the opportunity to work with the city staff and fire department employees in preparing this report for your fire agency.

We have presented this report in three major sections: review of current service delivery analysis, future system demand projections, and long-term strategies. A number of appendices are attached that will provide helpful information for the department and city. In particular, Appendix C: Summary Table of Recommendations and Appendix D: Fire Facility Concept. Appendix D provides a contemporary look at ideas when developing a new fire facility.

It is our intent to meet and exceed your expectations and to be available to you after the project is complete. Should you have questions do not hesitate to contact me at our headquarters office in Wilsonville, Oregon, at (503) 570-7778. It has been our pleasure to work with the professional and highly dedicated staff of Evans Fire Rescue.

Sincerely,

Jack W Snook
President, COO

Evans Fire & Rescue

Master Plan

Prepared by
Bruce Caldwell
Martin Goughnour
Steve Trunck
Robert McNally

Emergency Services Consulting *International*
25200 SW Parkway Ave. Suite 3
Wilsonville, Oregon 97070
800-757-3724
www.ESCI.us

January 2010

Table of Contents

Acknowledgements

Emergency Services Consulting International (ESCI) would like to acknowledge that without the assistance and support of the Mayor, Council, staff, and personnel of the City of Evans and Evans Fire Rescue, this project could not have been completed.

Mayor and City Council

Lyle Achziger, Mayor

Fred Burmont, Mayor Pro Tem-Ward 3

Laura Brown, Ward 1

John Morris, Ward 1

Tom Hamblen, Ward 2

David Carrier, Ward 2

Debbie Lambert, Ward 3

City Manager

Aden Hogan, Jr.

Fire Chief

Warren Jones

Fire Department Command Staff

Assistant Fire Chief, Rob Standen

Fire Marshal, Doug Melby

Training and Volunteer Coordinator, Ryan Fuller

Captain, Brian Eckstine

Captain, Joe DeSalvo

Captain, Lance Homann

Section I: Current Service Delivery Analysis

Organizational Overview

Introduction

This report includes an in-depth study of all aspects of the administrative, operational, and support services of Evans Fire and Rescue located in the City of Evans, Colorado, by Emergency Services Consulting International (ESCI). The evaluation and assessment includes a comprehensive review and discussion of the following subject areas:

- Organizational and Community Overview
- Management Components
- Planning for Fire Protection, Rescue and EMS
- Personnel Management
- Incident Staffing
- Training Program
- Capital Assets
- Fire Prevention and Public Education Development and Review
- Current Deployment Strategies and Performance
- Information Technology
- Disaster Preparedness (Emergency Management)
- Fiscal Analysis

Using operational, staffing, and geographic information systems (GIS) models, the study provides potential benefits and improvements in services to the community through cooperative efforts. The basis of the evaluation, analysis of data, and reference information is from Colorado State law and regulations, National Fire Protection Association (NFPA) standards, Center for Public Safety Excellence (CPSE)[1] self-assessment criteria, health and safety requirements, federal and state mandates, and generally accepted best practices in the emergency services community.

[1] CPSE was previously known as the Commission on Fire Accreditation International (CFAI), and is associated with the International Association of Fire Chiefs. It is the industry-sanctioned accreditation agency for the fire service in the United States.

Each section in the report provides the reader with general information about that objective, observations, analysis, and a discussion of any significant issues or conditions that are pertinent. ESCI's observations are supported by data collected as part of reviewing documents and an interview process. Finally, specific recommendations are included to address identified issues or to take advantage of opportunities that may exist.

Responsibilities and Line of Authority

Governance of the Evans Fire & Rescue (EFR) is by the Evans City Council. The council is elected directly by the voters, with day-to-day oversight of the city being the responsibility of a city manager who is hired by the city council.

Evans Fire and Rescue is a municipal service provided by the City of Evans. Evans is a full service city offering a wide array of services to the Evans community. The position of fire chief is appointed by, works for, and is under direct supervision of the Evans City Manager. The fire chief works at the pleasure of the City of Evans and is not covered with an employment contract, nor is the authority of the fire chief well defined or documented.

Periodic performance evaluations are conducted by the City Manager on the Fire Chief. It should be noted that our field visit included a stakeholder meeting with the City Manager. We believe that the City Manager and Fire Chief have a close professional working relationship and communications lines between them is free flowing, with the City Manager accessible on a daily basis.

Positive Attribute 1: There is a positive working relationship between the City Manager, Fire Chief, and Evans Fire Rescue personnel.

Recommendation 1: The position of fire chief should be included in the City Charter with authority and reporting structure defined.

City and Organizational Overview

The City of Evans is one of earliest cities founded in Colorado. The city ranks as a bedroom community with a population of over 18,888. Over the past few years the city of Evans has experienced a growing business base. Established in 1869 when Colorado was still a territory, the City takes its name from Colorado's second territorial governor, John Evans. Major employers located in Evans include Asurion Corporation, Anadarko Petroleum Corporation, Kerr Mc Gee, and Envision.[2]

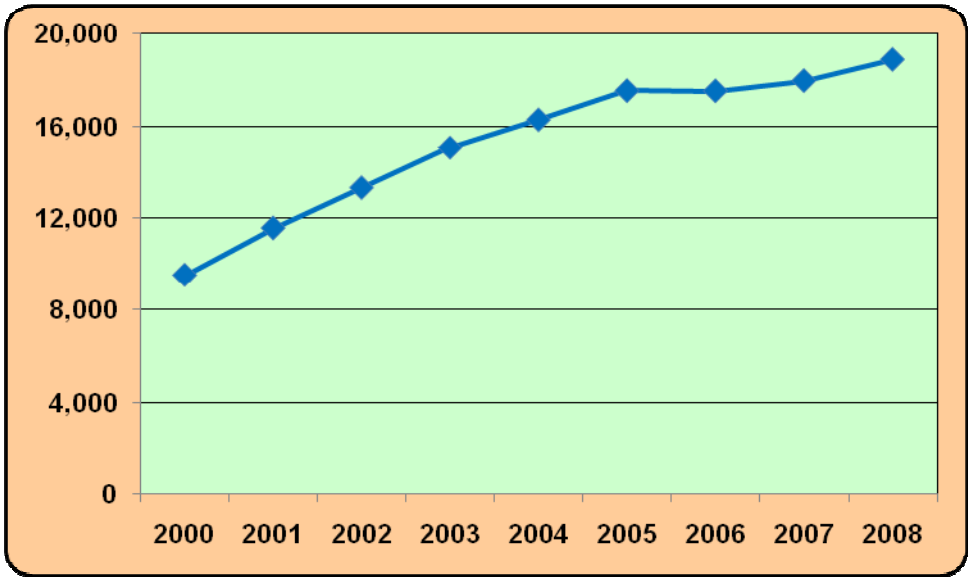
Evans Fire & Rescue (EFR) protects 10.5 square miles from two fire stations. The headquarters (main station) is located at Fire Station No. 2 at 2100 37th Street. EFR maintains three engines and one ladder truck.[3]

EFR protects and area that is approximately 5 percent urban, 60 percent suburban, and 35 percent rural. Total residential units in the City of Evans in 2008 were 3,286. Total jobs in the Evans service area was reported to be 4,434.

[2] Northern Colorado/Upstate Colorado Economic Profile, 2008.
[3] Note: At the time of ESCI's site visit, the ladder truck was out-of-service with issues of serviceability and was in need of repairs.

The following chart (Figure 1) shows the historical population growth of the City of Evans from 2000 through 2008.

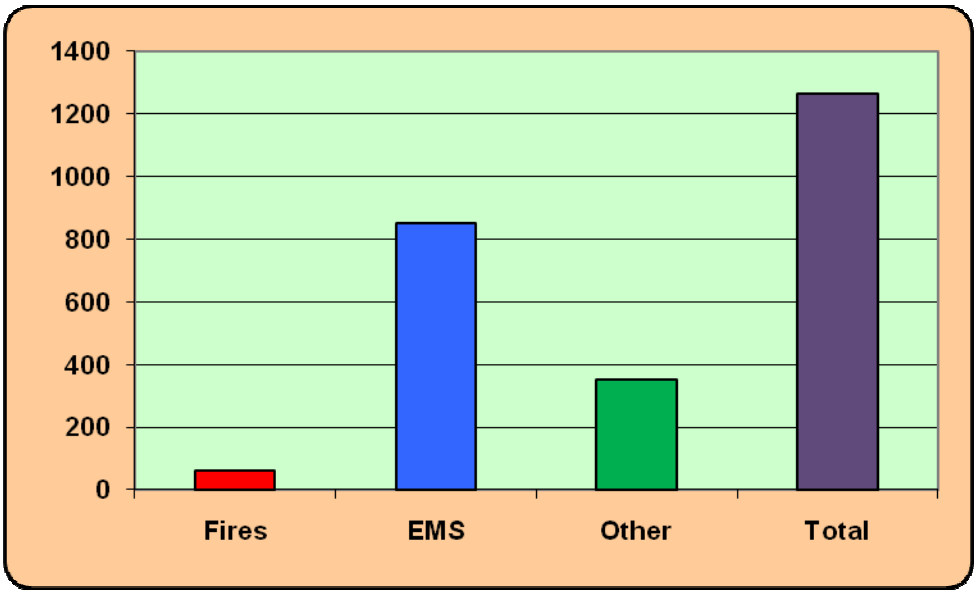
Figure 1: City of Evans Historical Population 2000 – 2008



During the nine-year period, the population of the City has grown 98.53 percent; an annual average of 10.95 percent.

The following chart shows the 2008 calls for service for EFR. As noted, fire calls in most communities account for the least activity level and this is the case in Evans. Emergency medical service (EMS) activity accounts for the greatest workload in most organizations providing an EMS response.

Figure 2: EFR Calls for Service, 2008



Of a total 1,264 requests for service, 853 (67.48 percent) were for emergency medical services (EMS). Fire accounted for 61 (4.83 percent) and other type calls, 350 (27.69 percent).

Insurance Services Office (ISO)

The ISO (Insurance Services Office) property class rating is important to a community. Many property insurance companies base the fire risk portion of property insurance premiums on the community's ISO rating; as an ISO Class improves to about Class 5, fire insurance rates of homeowners' decreases dramatically. Businesses generally benefit from further reductions down to Class 1; however, property use affects the fire insurance premium on commercial properties and many such commercial properties are individually rated. According to ISO:

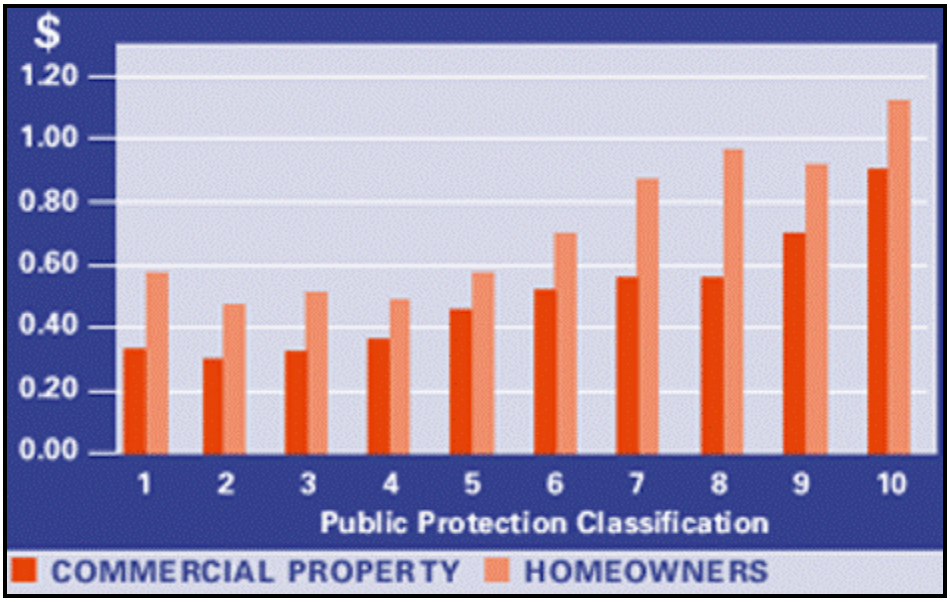
> *Virtually all U.S. insurers of homes and business property use ISO's PPC (Public Protection Classification) in calculating premiums. In general, the price of fire*

insurance in a community with a good PPC is substantially lower than in a community with a poor PPC, assuming all other factors are equal.[4]

ISO reviewed the total cost of fire claims per $1,000 worth of insured property by PPC for communities around the country. Five years of data for homeowners and commercial property insurance show that the communities with better classifications (ISO rating) experienced noticeably lower fire losses than the communities with poorer classifications.[5]

Figure 3 shows the relative cost of fire claims in communities with rating Class 1 through 10. Class 5 communities experience roughly half the fire claims as Class 10 communities do. This does not directly affect the revenue of the fire department, but it equates to an overall financial benefit to the community for the local support of the fire department. Evans Fire and Rescue has a Class 4 ISO rating.

Figure 3: ISO Fire Claims per $1,000 of Insured Property



[4] ISO, Jersey City NJ, "*ISO's PPC Program, Better Fire Protection – as measured by the PPC program*." ISO's Public Protection Classification (PPC) Service gauges the capacity of the local fire department to respond if flames engulf a property in which an insurance provider has a financial stake.

[5] *The impact of municipal fire protection and insured property loss on your book of business*, by Mike Waters, Vice President, Risk Decision Services, ISO, Property Resources Online.

The cost of fire claims is based on premium and loss information that insurers reported to ISO; excluded is data from statistically rated cities.[6] Out of almost 46,000 fire departments in the United States, only 43 have achieved a PPC of 1; therefore, the data sample for Class 1 is not statistically credible.

The ISO uses a 1 to 10 rating scale, with Class 1 being the best level of service (and lowest fire insurance premium cost) and Class 10 represents no service at all. The ISO reviews fire protection in three major categories:

- Communication (10 percent)
- Water Supply (40 percent)
- Fire Department (50 percent)
    - Credit for Ladder Service
    - Credit for Distribution
    - Credit for Company Personnel (15.00+ points)[7]
    - Credit for Training

Divergence points represent a reduction of score to reflect a deviation between the relative ISO Class of the fire department compared to water supply. For example, if a water supply system scores at a relative Class 3 and the fire department surveys at a relative Class 6, the overall rating is very likely to include a significant penalty in the form of divergence points.

The Insurance Services Office last surveyed EFR in September 2005; at that time, ISO assigned a Class 4 rating. A rating breakdown of the most recent EFR ISO survey is shown in the table below (Figure 4).

Figure 4: Summary of ISO Credit by Criteria

ISO Criteria	Actual	Maximum
Communication – Receiving and Handling Alarms	7.50	10.00
Water Supply	34.43	40.00
Fire Department Creditable Points	25.34	50.00
Divergence Reduction	(7.08)	N/A
Total Creditable Points	**60.19**	**100.00**

[6] Statistically rated cities are generally larger municipalities with sufficient data for formulating a rating.
[7] Fire departments that meet the ISO standard for emergency personnel on duty receive the maximum credit. Departments that exceed requirements are awarded credit above the maximum.

EFR received a total credit of 60.19 points out of a possible 100. The fire department section of the FSRS (Fire Suppression Rating Schedule) reviews engine and ladder-service companies, equipment carried, response to fires, training, and number of available firefighters. The following figure (Figure 5) is a detailed breakdown of the classification details assigned to EFR from the ISO survey of September 2005.

Figure 5: ISO Credit – Evans Fire and Rescue

Fire Department Classification	Actual Percent	Maximum Percent
Credit for:		
Engine Companies	8.02	10.00
Reserve Pumpers	0.78	1.00
Pump Capacity	5.00	5.00
Ladder-Service Companies	3.56	5.00
Reserve Ladder-Service Companies	0.37	1.00
Distribution	2.35	4.00
Company Personnel	3.55	15.00
Training	1.71	9.00
Total	**25.34**	**50.00**

In the fire department classification, the areas that would have the greatest impact on the ISO rating are increased emphasis on training, maintaining engine company staffing, and an in-service truck company. Since the ISO survey, EFR has made improvements to training and is working to maintain and increase personnel as allowed by fiscal realities.

The recent decision to remove the aerial device from service may impact the future ISO Rating for EFR. The ISO Fire Suppression Rating Schedule states that response areas with five buildings that are three stories or 35 feet or more in height, or with five buildings that have a Needed Fire Flow (NFF) greater than 3,500 gpm, or any combination of these criteria, should have a ladder company. The height of all buildings in the city, including those protected by automatic sprinklers, is considered when determining the number of needed ladder companies.

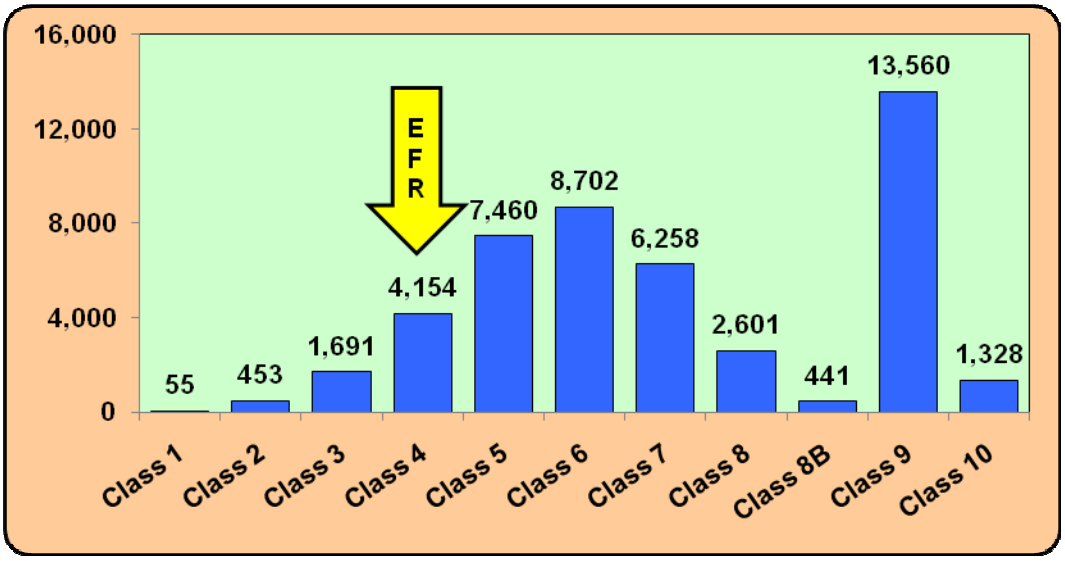
When no individual response area alone requires a ladder company, at least one ladder company is needed if buildings in the city meet the above criteria.[8]

[8] Fire Suppression Rating Schedule – page 23, 540. Number of Needed Ladder Companies (NL)

Recommendation 2: Develop an ISO improvement plan for EFR that addresses maintaining strengths and improving identified deficiencies.
Recommendation 3: Determine the effect of no in-service ladder company on the current ISO rating.

The following chart shows the ISO protection classifications and the number of public fire agencies that fall into each classification nationwide. With an ISO Class 4, EFR is in an elite class of emergency service organizations.

Figure 6: EFR Insurance Services Office Ranking



The majority of property owners in Evans have property insurance as protection in the event of catastrophic loss from theft, fire, water, or any number of other incidents. A portion of premium paid is for fire insurance. To determine the insurance premium, insurance companies generally rely on a third party to supply claim data to calculate risk.

ISO is embarking on a project to review and, if warranted, update the content of the Fire Suppression Rating Schedule (FSRS). The objective of the project is to identify portions of the current evaluation worthy of potential revision. The first point noted is that there will be an increased reference to National Fire Protection Association (NFPA) standards.[9] Possible revisions include:

[9] Source: *Draft Concept FSRS 2009*, Insurance Services Office, Inc., 2008.

- A requirement that for a PPC (fire department rating) better than 10 the fire department must have sufficient membership to assure response by at least six members (including the chief) to fires in structures.
- Eliminating the current ISO equipment inventory and replacing it with reference to pumper and ladder/service equipment listed in *NFPA 1901*.
- Recognition of Initial Rapid Intervention Crew and Rapid Intervention Crew teams, according to *NFPA 1500*.
- An increase in minimum pump capacity from 50 gpm (gallons per minute) to 250 gpm for engines for Class 9 communities, in accordance with NFPA standards.
- Additional emphasis on firefighter safety and training:
    - Training and credentialing for fire officers in accordance with National Incident Management System (NIMS) recommendations and *NFPA 1021*.
    - Training for fire apparatus drivers and operators in accordance with *NFPA 1002* and *1451*.
    - No credit for training without proper documentation.
    - Reference to firefighter safety requirements.
    - Requirement for personal protective equipment (PPE) clothing for all fire-suppression personnel at structure fires.
- Recognition of automatic-aid personnel responding to first-alarm structure fires.
- Extension of full credit for automatic-aid response plans to first-alarm structure fires when the departments have satisfied certain criteria for interoperability.

The second key point noted is an increased reference to the American Water Works Association (AWWA) standards. Possible revisions include:

- Recognition for fire hydrants that produce flows up to 1500 gpm, in accordance with ANSI (American National Standards Institute) and AWWA (American Water Works Association) standards, according to manufacturers' descriptions.
- More emphasis on hydrant inspection programs, including hydrant flow testing.
- A reference to implementation of master or strategic planning.
- Recognition of partial or full Commission on Fire Accreditation International (CFAI) accreditation through the Center for Public Safety Excellence (CPSE) — or equivalent achievement of all the core competencies outlined by the CFAI with regard to operations and procedures for firefighting.
- Recognition for adoption and enforcement of model building and fire-prevention codes.
- Recognition for public fire-safety education programs.
- Recognition for adoption of fire department standard operating procedures via NIMS standards or Federal Emergency Management Agency (FEMA) publication *FA-197*.
- Recognition for adoption of a fire department incident management system according to *NFPA 1561*.

Additional revisions under consideration include:

- Increased recognition of fire sprinklers in residential properties for determination of needed fire flows (NFF).
- Reduction of needed fire flow (NFF) duration for one and two-family dwellings to one hour.
- Increased recognition for technology-based systems, such as geographic information systems (GIS).
- Reconsideration of the credit value for reserve pumper and ladder apparatus.

Many of the proposed changes may have a dramatic impact on Evans Fire and Rescue's ISO rating. Continued pursuit by Evans to improve the ISO Rating should be factored with the possible ISO changes now being contemplated.

Organizational Structure and Chain of Command

A well-designed organizational structure should reflect the lines of responsibility and authority within the agency, provide for the equitable distribution of the workload, and clearly define the official path of internal communication. The lines of an organizational chart visually clarify accountability, coordination, and supervision. Detailed job descriptions should provide the particulars of each job within the organization, helping to ensure that each individual's specific role is clear and focused on the overall organization mission.

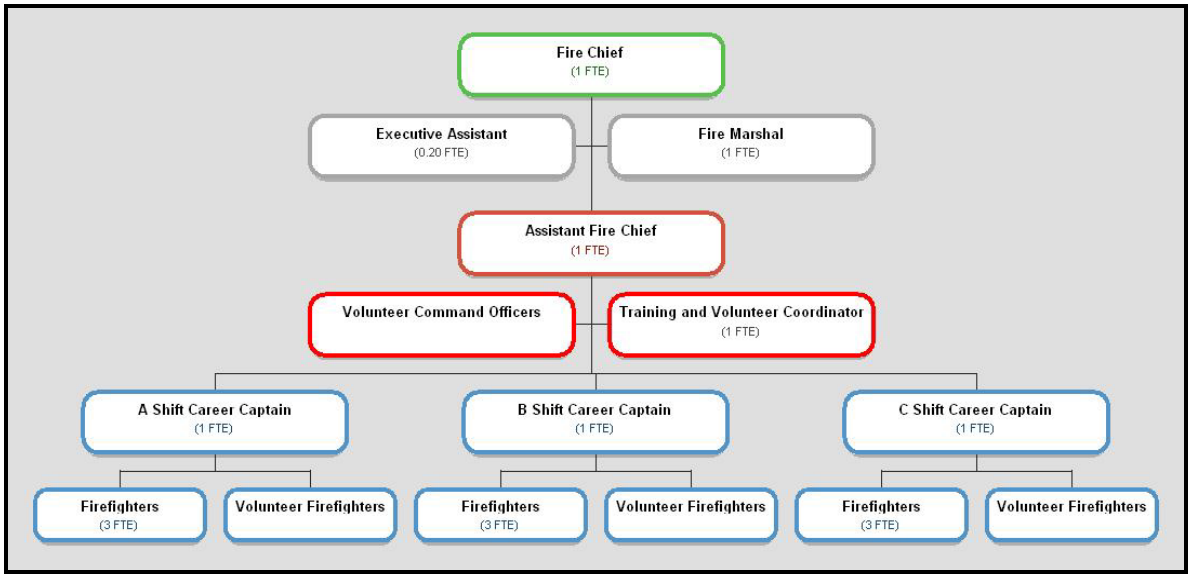
Span of control, also known as span of management, is a human resources management term that refers to the number of subordinates a supervisor can effectively manage. Developed in the United Kingdom in 1922 by Sir Ian Hamilton, the concept of span of control evolved from the assumption that managers have finite amounts of time, energy, and attention to devote to their jobs. In his research of British military leaders, Hamilton found that leaders could not effectively control more than three to six people directly.

This generally accepted rule of thumb for span of control is still considered relevant today and applies not only to the military, but also correspondingly to the fire service. It is important to note that all managers experience a decrease in effectiveness as their span of control exceeds the optimal level. In other words, the limitations implied by span of control are not shortcomings of individual managers, but rather of managers in general. In addition, it is important to understand that span of control refers only to direct reports rather than to an entire corporate hierarchy (all personnel in the fire department).

> *Extending span of control beyond the recommended limits engenders poor morale, hinders effective decision making, and may cause loss of the agility and flexibility that give many entrepreneurial firms their edge.*[10]

The following organizational chart (Figure 7) shows the current Evans Fire and Rescue organizational structure.

Figure 7: EFR Organizational Structure, 2009



As depicted in the preceding organizational chart, EFR is a top-down organization with a clearly defined reporting structure. The fire chief has three direct reports, appropriately within accepted industry standards.

Volunteer members of EFR make a commitment to a minimum number of hours monthly. Volunteer command officers respond from home to assume command of multi-company incidents on a shared rotating on-call schedule. Volunteer command officers do not have non-emergency supervisory responsibilities. Volunteer firefighters work a minimum of 36 hours per month and are assigned to apparatus by the career captain based on an individual's qualification.

Operating Budget, Funding, Fees, Taxation, and Financial Resources

For several years, budgeting for cities in the United States has been an increasingly challenging undertaking. After years of economic growth, public entities are experiencing a flattening or a

[10] Hendricks, Mark, *Span Control*, Entrepreneur. January 2001.

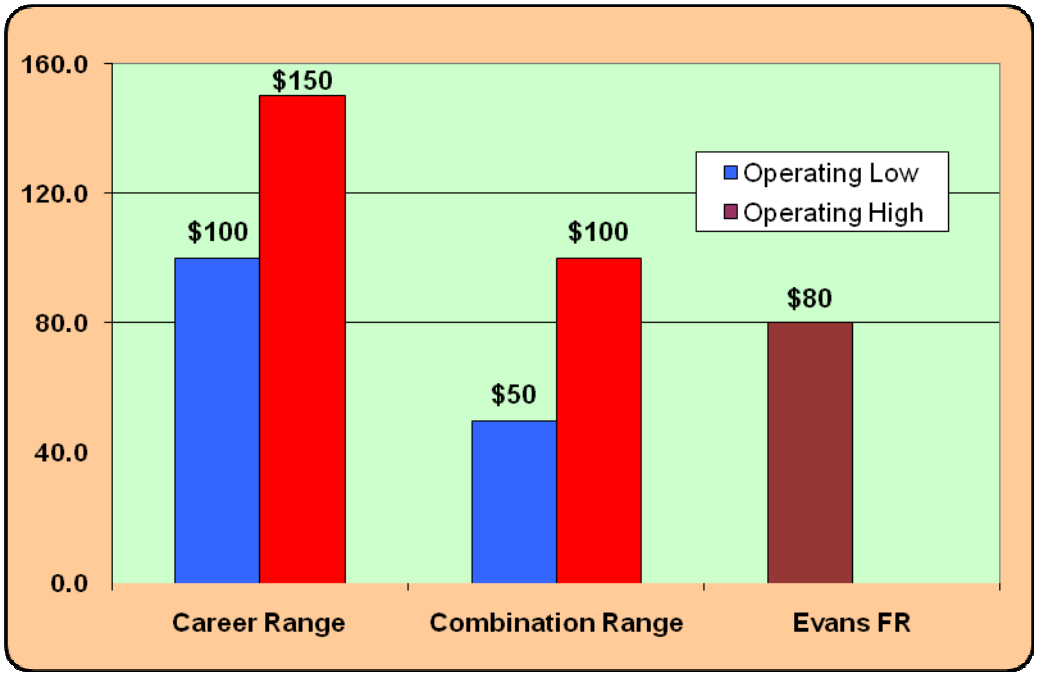
downturn in revenue growth. There are a number of factors influencing governmental revenues, including the current housing crisis and its potential reduction in appraised taxable value (causing a reduction in overall property tax revenue) and an overall slowing of economic growth. Like other cities, the City of Evans is being affected in its ability to fund essential and emergency services, like fire and police protection. Additionally, the City is restricted by tax limitations under the Taxpayers Bill of Rights (TABOR) and the Gallagher amendments.

The designated fiscal year for the City of Evans is January 1 through December 31. Total assessed property value in 2009 was $125,880,350. The general fund property tax city levy for fiscal year 2009 is $1,718,262; this equates to 13.65 mils. There is an additional public safety sales tax of 0.005 for police and fire; however, there is no financial policy as to the distribution of these monies to either the police or fire departments.

Recommendation 4: Develop a financial policy for the distribution of the supplementary police and fire sales tax monies.

ESCI uses national, regional, and local comparators when assessing emergency service agencies. We caution that individual data comparisons by themselves are interesting facts but do not reveal the entire picture of an organization. Other factors related to a single item may well explain variations in the norm. With this disclaimer, we began by showing the comparison of tax cost per capita for EFR for combination and career staffed fire departments (Figure 8).

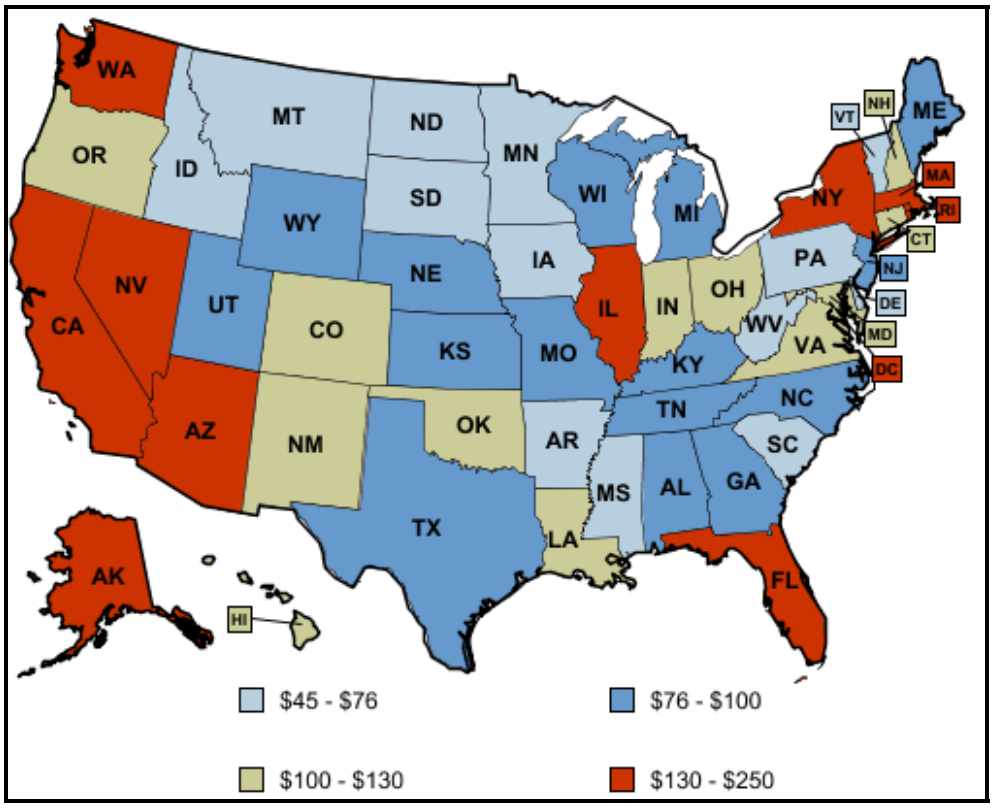
Figure 8: Fire Protection Cost per Capita



EFR's cost per capita of $79.86 is 53.24 percent of the median high range of career and 79.86 percent of fire departments that staff with a combination of career and volunteer personnel.

For comparison purposes, the following figure shows the various levels of local fire protection spending per capita for all 50 states. As illustrated (Figure 9), Colorado is one of the higher states in per capita spending.[11]

Figure 9: Per Capita Spending by State

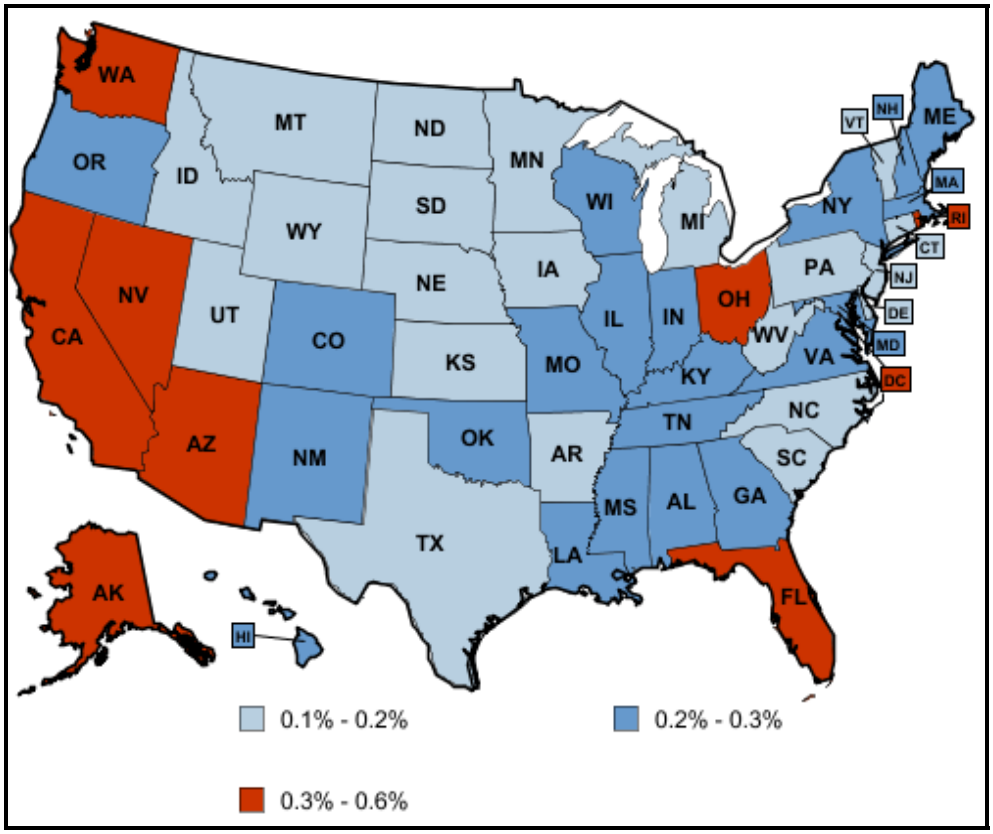


In the most recent available data, spending on fire protection in Colorado averaged $112 per capita. Per capita spending in Evans was $79.86 in 2009; approximately 71 percent of the State average.

[11] *Government Sourcebook*, State and Local Fire Protection Spending Per Capita, 2006.

As a contrast, the following figure (Figure 10) shows spending on fire protection as percentage of personal income for all 50 states.[12]

Figure 10: Fire Protection Spending as a Percentage of Income by State



As illustrated (above), Colorado is among the states in the middle of spending as a percentage of personal income (0.3 percent). In 2006, Colorado spent $532,000,000 on fire protection.

In 2008, taxes were the largest source of Evan's general fund revenue, $6.7 million (70 percent). EFR has very limited sources of revenue outside of taxes. One source of funding for capital purchases is the fire/rescue impact fee. The purpose of the City of Evans Municipal Code, Title 15 Buildings and Construction, Chapter 15.50, Fire/Rescue Impact Fees is:

> *15.50.020 Purpose. In order to provide or to assist in providing the financing required to acquire, develop and maintain fire stations and apparatus, the fire/rescue impact fees shall be established by the City Council by ordinance to be paid by property owners desiring to develop property with improvements. (Ord. 168-02)*

[12] *Government Sourcebook*, State and Local Fire Protection Spending Per Capita, 2006.

Effective January 1, 2009, the Fire/Rescue Impact Fees were:

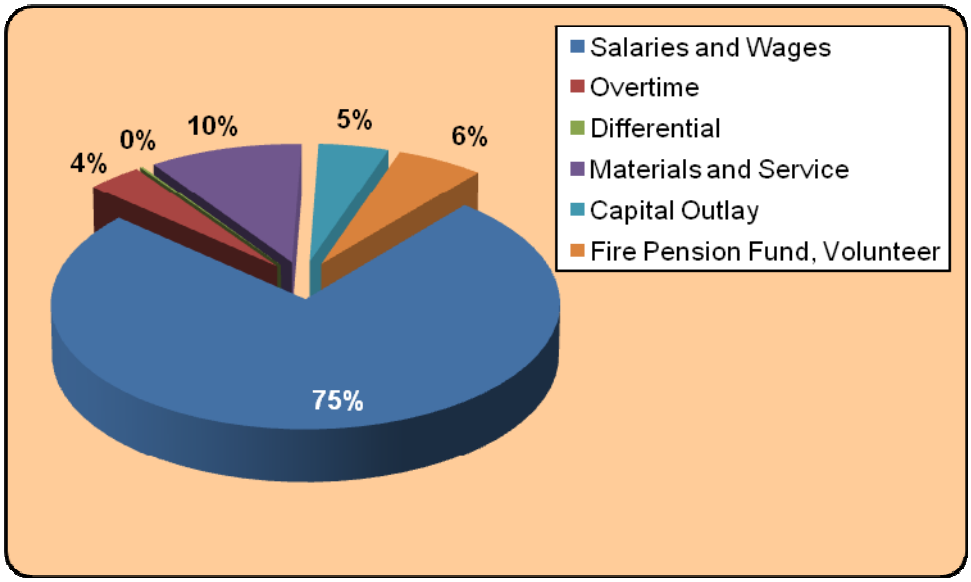
Figure 11: City of Evans Fire/Rescue Impact Fees

Fire/Rescue Department Impact Fees	
Each residential unit other than a motel or hotel.	$723.00 per dwelling unit
Non-residential uses, but including a motel or hotel. *Exception: Any detached accessory structure related to a single family residential use.*	$0.42 per square foot of each floor level of the building area

The fees are updated annually to reflect inflation, as reflected in the Engineering News Record Construction Index.[13]

Figure 12 and Figure 13 show the expenditures of EFR by category, dollar amount, and percentage for fiscal year 2009.

Figure 12: EFR Expenditures by Category and Percentage, 2009



[13] City of Evans (Ord. 458-08: Ord. 417-07: Ord. 389-06: Ord. 357-05: Ord. 303-04: Ord. 245-03: Ord. 168-02).

Figure 13: EFR Expenditures by Category and Dollar Amount, 2009

Revised Fire Department Budget Expense Accounts, General Fund	
Personnel	
Salaries and Wages	1,137,048
Overtime	56,000
Differential	2,854
Materials and Service	154,000
Capital Outlay	70,450
Fire Pension Fund, Volunteer	88,000
Total	**1,508,352**

Personnel services are 79 percent of EFR's 2009 budget. This is slightly higher than ESCI usually sees in comparable fire departments. It appears that this is related to the low level of budgeting for materials and services and for capital outlay.

Fire Suppression Infrastructure

The delivery of fire suppression and rescue services is no more effective than the sum of its parts. It requires efficient notification of an emergency, rapid response from well-located facilities in appropriate apparatus with sufficient staffing, and following a well-practiced plan of action.

The most visible and valued of the services provided by EFR is the response to and control of emergency events. EFR provides a variety of emergency response services, including:

- Fire suppression
- First response EMS
- Hazardous materials emergency response (Operations level with some technician level members)
- Emergency management for the City of Evans
- Other specialized rescue services

To effectively operate in the emergency response environment, fire departments must capitalize on managing various aspects of a large business enterprise. A lion's share of this effort goes into supporting the primary mission, including those components shown in the bullet points above. However, there are additional requirements that have to be met and a substantial infrastructure that must exist for the organization to function at its best.

In support of the emergency response component, EFR provides a comprehensive training program for its members. In stakeholder interviews conducted during the course of this project, training was viewed as one of Evans Fire and Rescue's most positive strengths. Another positive point often expressed was the dedication of the department's volunteers; several have served up to 20 years in volunteer and career positions.

Positive Attribute 2: Training is viewed internally by the membership as a positive attribute of Evans Fire and Rescue.
Positive Attribute 3: The dedication of the department's volunteer membership.

Management Components

In this survey objective, ESCI considered management of the department's day-to-day operations. This included an examination of EFR philosophical ideals as expressed by its mission, vision, and values statements. We look to assure that such visionary principles conform to the core values of managers and members and address several other important questions: Are goals and objectives consistent with the City's direction? Are operating procedures documented, current, and available? Are appropriate financial controls in place? What are the current critical issues and future challenges facing the City of Evans and the Evans Fire and Rescue? Communication internal to the City and EFR is checked, as is external communication to the community. Last, we review security issues concerning hard records, electronic data, offices, and buildings and check to ensure that all necessary reports and records are produced and maintained.

Mission (Vision) Statement

Mission and vision statements, goals, and objectives provide key organizational management foundations. Development of such organizational underpinnings is important, but communication of them is paramount. Leaders and workers alike need to understand why the organization exists, where it is headed, and how to identify success. While the mission of a fire department may seem obvious, if the organization's purpose is left to an individual's imagination, many individual missions will result--which in the end may cause agency members to work at cross-purposes.

The Evans Fire Rescue has adopted a mission statement that provides the compass for the organization. The current EFR mission statement is:

> *Providing Professional Emergency Services with Compassion, Dedication and Excellence*

Strategic Planning

EFR understands the value of long-term strategic planning. EFR adopted its mission statement in 2008. It is predominately displayed throughout the organization. Additionally, EFR has identified values and an organizational focal point of *service* to the community.

To date, the City of Evans has not adopted the EFR Strategic Planning initiatives. Adoption of the strategic planning initiatives by the governing body provides a level of importance to the

process and links the initiatives to a larger vision, that being the City of Evans. It should be noted that the City of Evans already has a number of strategic plan initiatives that include emergency services.

EFR indicates that internal strategic planning is reviewed annually but is not tied to organizational, personnel performance statements, nor are planning objectives linked to specific programs. Performance objectives or benchmarks have not been established to measure outcomes or performance of those responsible for the plan's forward progress.

For the planning process to be effective, individual responsibly should be assigned to each planning initiative as well as timelines and measurement criteria.

Recommendation 5: The City of Evans should endorse and adopt the EFR's strategic planning initiatives.
Recommendation 6: Planning process outcomes should be linked to performance statements that provide accountability to the process and outcomes of the plan.

Goals and Objectives

Goals and measurable objectives are critical components in a strategic planning initiative. Goals should be clearly stated and objectives tied to completing or actuating the goal. EFR has developed specific goals or initiatives to be initiated; however, they have not taken the next step to assign benchmarks or measurements to the initiatives or to monitor those responsible to move the goal or initiative forward.

Recommendation 7: Develop benchmarks or measurements for each planning initiative and track progress to completion.

Rules and Regulations

Rules, regulations, and codes are the policy-level direction provided by a governing body, such as a city council or board of directors. Administrative rules are the responsibility of the organization's highest-level administrator. (In the case of the City of Evans, authority resides with the city manager.) They provide instruction and direction for compliance with the organization's policies and provide guidance and instruction to all employees/members.

Operational policies or guidelines, when developed by a department, will provide agency-specific guidance.

Policies and Standard Operating Guidelines

Organizations that operate successfully are typically governed by a set of clear policies that provide a pathway towards the agency's vision and that lay the foundation for an effective organizational culture. These policies set the boundaries for both expected and acceptable behavior, while not discouraging creativity and self-motivation. Policy and procedure manuals at multiple levels should be maintained.

Regardless of the quality or condition of such policies and guidelines, their availability and familiarity to all personnel is critical. A significant financial and legal risk exists when day-to-day practice does not follow guidelines, procedures, or policy. A number of factors can cause a practice to shift gradually away from policy. An out-of-date policy is one of the factors where practice commonly does not match policy. When this occurs, the policy-making authority must either enforce the policy or change it to match the practice. Also, standard operating guidelines (SOGs) must reflect any legal mandates impacting the department. When policies are driven by regulation, the practice must match the policy.

Evans Fire Rescue (EFR) has an adopted policy manual. The *Evans Fire Rescue Policy Manual* 3rd Edition consists of three chapters:

- Part 1 Administrative Policies
- Part 2 General Operating Guidelines (GOG)
- Part 3 Volunteer Handbook

In addition to the three chapters, the policy manual describes the development process required to enact a new or modify an existing policy.

The policy development process is participative, where all members have an opportunity to initiate, review, and comment on all policies. While every effort is made to make the development process as inclusive as possible, the fire chief has the final say to adopt the policy and procedures.

Our review of the manual shows that at the conclusion of each policy directive, the fire chief signs the new or amended policy and the adoption or modification date is included. Each officer

and staff member is issued a hard copy of the policy manual. It is the responsibility of the individual to keep his/her copy of the manual updated and current with the master policy document. The master document is maintained on the city computer server. Officers have accountability to inform subordinates of additions, deletions, and changes to policies.

When there is a need to develop and implement a policy or GOG expeditiously, without benefit of a full participative process, the policy is marked as interim. The scope of an interim policy will state the time period of application or a special review process.

Policies in the *City of Evans Supervisors Handbook* and related city procedures must follow the adopted or changed procedures of the policy, including required city council action.

Critical Issue

It is extremely important that there be a clear understanding of critical internal issues facing EFR. Without such an understanding, organization leaders are not prepared to face these concerns. Additionally, the enunciation of critical issues to employees and members increases their awareness of the organization's priorities and assists them in becoming focused on solutions.

During stakeholder interviews, many employees raised the same topics as critical issues for the Department. The following critical issues are listed in non-priority order:

- Deficiency of fire deployment resources (apparatus and personnel)
- Concern for firefighter safety and safety of the community related to (real or perceived) deployment deficiencies
- Inability of EFR to handle more than one emergency request for service at a time
- Current economics
- Growth of the community and the ability of the department to service future annexations
- Long-term apparatus replacement funding
- Political environment not conducive to automatic-aid between some emergency service providers

Internal Evaluation of Future Challenges

Equally important as identifying critical issues is the task of ascertaining the challenges EFR will face EFR in the future. Having an appropriate level of forward thinking permits an agency to identify what external challenges may present themselves to the agency in the coming years.

This awareness of future challenges ensures that EFR does not miss opportunities or blindly stumble into a crisis unprepared.

EFR senior management, together with the City of Evans administration, should look critically at future issues during management meetings. The following items have been identified as being of concern by the fire chief:

- Role of volunteers at EFR in the future
- Succession planning of leadership of the department

EFR and the City of Evans appear to have an ongoing dialog and information sharing with employees to communicate and clarify areas of concern or identification of critical issues. ESCI witnessed this process while we were on the initial site visit. The City Manager was visiting every city department to discuss critical issues and financial concerns facing the City. This is a critical element in getting all members on the same page as management and focusing on the agency's core challenges.

Internal Communications

Communication in public safety organizations is paramount, especially to individuals in positions that contain an element of personal risk. Organizations with clear and effective internal communications perform at a safer and higher level than organizations that do not communicate well. Internal communication must occur in all directions and at all levels to be most successful.

Similarly, external communication and community relations programs must be well structured. These systems can take any number of forms. In some organizations, all members are responsible for communicating with the public. In others, public information or public affairs are handled by a specific person or group.

Successful organizations utilize a multi-faceted approach to communication. Whether for internal or external communications, each agency must determine its own approach. Many of the following elements, among others, are used in communications by fire departments.

EFR, like most agencies, has a well developed *informal* communications process. Face-to-face meetings and other informal means of communicating provide a basic knowledge level throughout the department. Common elements of successful internal communication plans include:

- A formal internal communication plan is established and communicated throughout the organization.
- All personnel (top to bottom) are held responsible for communication and the distribution of information.
- Personnel are coached or provided with listening skills training.
- Employee satisfaction surveys are utilized to determine if the communication plan is effective.
- Affected personnel are required to acknowledge critical written information.
- Open-door policies are communicated at all levels and codified (chain of command is not subverted).
- Procedures provide direction regarding the use and organization of bulletin boards.
- Face-to-face meetings and forums that include members at all levels are offered on a periodic basis.
- Staff meetings occur on a regularly scheduled basis, have a time limit, and have an agenda that describes what is to be accomplished and who is invited.
- Meeting minutes are provided to all personnel.
- Technology is used to supplement instead of supplant communication between members.
- Email is limited (if possible) to the distribution of orders, meeting minutes, critical information, and short memorandums.
- Shift personnel are provided time to exchange information and to communicate during shift change periods.
- Telephone, web, or video conferencing are utilized in remote locations.
- Organizational sub units meet on a regular basis (division or station level).
- Sub unit representatives are sent to broader organizational meetings.
- Upper level management visits sub unit meetings on a periodic basis.
- A newsletter (paper or web-based) is published for the distribution of non-critical information.

More formalized internal communications practices are also in place in EFR and consist of the following components:

- Information exchange with chief officers, including the fire chief daily.
- Officer meeting monthly just prior to all-hands meeting.

- Open Door Policy – fire chief available to all personnel on a scheduled basis.
- Bulletin board availability.
- Use of ad hoc committees to meet individual needs of the department.
- Voice mail available for all career employees.
- E-mail availability.

Email is available for all career members and this is the predominant means of distributing memorandums. There is no internal publication, such as a member's newsletter. Newsletters are used to provide employees with happenings, issues and current news and can be an excellent method to memorialize department activities.

The key to a successful open door policy is open communication, while not subverting the chain of command. Informal communication should always be encouraged and heard. When the communication goes beyond information or advice or reaches a decision-point that belongs at a different level of the organization, it should be referred to the correct person.

There is a stated, open door policy that exists for EFR; however, this policy has not been memorialized in writing. The familiarity and family atmosphere of EFR lends itself to a more informal communications model; however, as the agency grows and new members are included, this mode of communication may need to be more formal.

A defined chain of command communication path has been clearly established; however, for reasons noted, members feel free to move around the stated chain of command. The inherent danger in this practice is a breakdown of command structure, people being left out of the loop, and multiple decisions or conflicting messages being received by the membership.

The City of Evans and EFR strives to maintain good labor relations with its employees. Senior management expresses a willingness to work with members and provide an opportunity for input members to participate in various policy decisions, GOG development, and the day to day operation of the department.

External Communications

Equality important is the external communications process. Elements of successful external communication and community relations programs include a number of common components. A listing of the frequently used components includes:

- A formal external communication plan for the department is established, set in procedure, and communicated throughout the organization.
- A complaint process procedure is established.
- Personnel are coached or provided with training on public relations.
- Response personnel are empowered to provide value-added service beyond normal response services.
- A public information officer is identified and his/her deployment identified in procedures.
- Citizen satisfaction surveys are utilized.
- Relationships with the media are established.
- Media and press release procedures are identified.
- Citizen focus groups are used to acquire feed-back on specific issues.
- An advisory committee is seated to discuss ongoing issues.
- A Key Communicators group of influential people is used to provide feed-back and to inform the community.
- Community group and service club meetings are attended on a regular basis.
- An annual fire station open house is held.
- A website is available and kept up to date. Dynamically linked information is preferable.
- An email distribution list is used to disseminate news and information.
- A newsletter (paper or web-based) is published and distributed throughout the community.
- Newsletters from other public entities and industry are used to distribute information.

Soliciting and accepting public input is an important task for fire departments. All too often, agencies fail to take advantage of this powerful communication tool. Discovering what the public wants, what they like and/or dislike about the organization, and what they need and expect appears to be a priority for the City of Evans and EFR. Currently the department does not have a written formal community relations or communication plan but rather relies on the parent organization the City of Evans to distribute a communications message that involves all city services.

Consideration should be given to establishing a citizen's advisory group that can meet occasionally with senior staff to provide the customer perspective on issues in the EFR service

area and assist in planning efforts. This process encourages a close connection between agency management and the consumer of its services and serves as a positive public relations tool.

Another means of external communication is the use of public focus groups or a Key Communicator group. Typically, these groups are comprised of citizens that represent a cross-section of the community. Focus groups are usually convened for a single purpose or task and provide advice to the agency on a single issue. A key communicator group is typically a larger group of patrons that can provide advice and, in turn, serve as an information source for the community.

Recommendation 8: Develop and implement a written internal communication plan that would include a regular newsletter or similar component.
Recommendation 9: Develop and implement a multi-faceted external communication plan that includes community forums and/or advisory groups and public surveys.

Decision-Making Processes

It is widely recognized that when employees are provided with the opportunity to engage in the decision-making process, the organization benefits from a higher level of commitment and ownership in the success of the organization.

For fire departments, the opportunities to delegate decision-making down through the organization are quite numerous. Chief officers (assistant, division, and battalion chiefs) are often given the task of making staffing decisions. Company officers can be given responsibility and/or authority for scheduling, program management, training, and station operations. Firefighters can make determinations as to patient care or station and apparatus maintenance.

The decision-making process for EFR is defined and participatory where appropriate. Because of the relative small size of the organization, it lends itself to a more personal and informal decision making process. The fire chief encourages and practices communications at the most basic levels. This is not to say management has a duty to explain every decision it makes. Where participation is solicited by management in the decision-making process, those involved should be knowledgeable of the key findings by which the decision was made. This process may go a long way in acceptance of the decision and providing a sense of worth and value in the employees, even though the decision may not reflect their input.

Positive Attribute 4: By encouragement and practice the fire chief and department staff involve the membership in the decision making processes that affect EFR.

Document Control

Records management is a critical function for any organization. A variety of uses are made of written records and, therefore, their integrity must be protected. Colorado State law[14] requires public access to certain fire and EMS department documents and data. Clear written procedures are currently in place which provide for public and media access to public records.

Paper records (hard copy files) are adequately secured in a locked office in fire department administration. Important computer files are backed-up locally. An off-site location for secure data storage is not currently used. The backup system recently crashed and has not been replaced. Plans are in process to replace this system.

The Health Insurance Portability and Accountability Act (HIPPA) includes regulations that require all individually-identifiable health care information be protected to ensure privacy and confidentiality when stored, maintained, or transmitted. Medical incident records contain protected medical information and sufficient personal information regarding the patient to create a concern over HIPPA requirements. EFR has adequate security provisions in place to protect this sensitive information.

Security

EFR maintains an inventory of its capital assets. The inventory is used for financial statements and during the annual audit of the City of Evans. Adequate financial controls are in place within EFR and the City of Evans.

EFR has a significant investment in facilities, apparatus, small equipment, and other items, along with its financial assets. Protecting these assets is very important. Fire stations are reported to be consistently locked and secure from unauthorized entry. Public access to the buildings is limited to business areas or when accompanied by an employee or department member. No type of vehicle theft deterrent system is employed.

Cipher locks are used to prevent unauthorized entry to the fire stations, but offices are not secured in any way. Security alarm systems are not employed on department facilities. Their

[14] CRS 24-72-201.

use is intended to provide for automatic notification of unauthorized entry or break-in. Fire stations have smoke detectors installed but lack monitored fire alarm systems. Perimeter protection is not employed at either fire station or the training grounds. Perimeter protection would limit unauthorized access to department grounds.

Department computers are programmed with password protection for access to software and files to provide a level of security and data integrity. Firewall protection is in place for department computers accessing the internet and between outside servers, with selected sites being locked out. The protection is sufficiently up to date and capable of preventing most unauthorized network intrusions. Up-to-date virus protection software is used on all incoming email and files. Operating systems are regularly scanned to detect virus infection.

Reporting and Records

EFR record and reporting systems appear to be adequate and efficient. Personnel records appear to be complete and maintained in a manner that protects private medical information. Records are maintained on employment history, discipline, commendations, work assignments, injuries, and exposures. Self-contained breathing apparatus, gas monitors, ladder, and pump testing are completed and records maintained. Breathing air sampling is conducted. Vehicle test and maintenance records are archived for future reference.

The records management system for incidents is computerized using Microsoft's XP Professional operating platform on a series of networked PCs (personal computers). The data collection method used is compliant with NFIRS (National Fire Incident Reporting System) standards. Incident information, activity summaries, and other analyses are available to fire department management.

Financial activities, including budgets, expenditures, revenues, and other encumbrances are logged by the City of Evans Finance Department. A financial management report is prepared monthly for delivery to the City Council.

Planning for Fire Protection, Rescue, and EMS

Emergency services agencies exist in a rapidly changing environment. Tools and methods used to provide service are constantly changing, which comes with increased regulation of tasks and activities. There are new construction methods and risks to protect and challenges that can quickly catch the unwary off guard. An organization must continuously monitor the internal and external fire protection environment in order to stay ahead of these challenges. When change occurs, the organization must also make course corrections in order to provide an appropriate level of service.

In order 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 is able to 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 three distinct levels:

1. Tactical planning
2. Operational planning
3. Master and strategic planning

Tactical planning is the practical preparation of incident strategies for potential emergency incidents. Operational planning is the preparation for ongoing agency activities and its integration into other regional response networks. Strategic planning supports the agency's mission and sets short-term departmental goals. Master or long-range planning is preparation for the agency's future service delivery effectiveness based on projections of the future service delivery environment.

Strategic and master planning processes give decision-makers targets by which the organization's service delivery can be measured. These plans include well-defined objectives that provide clear performance quantification. In addition, plans must provide for the safest and most efficient emergency response, while ensuring that future goals and objectives are met.

Current Planning Process

The process of planning for future needs requires both discipline and organization. EFR has recognized the importance of planning by undertaking a variety of tactical and operational planning steps in the past; however, long-range, *big picture* planning has been somewhat limited. The Department's decision to undertake this Agency Evaluation and Master Plan demonstrates the organization's appreciation of the value of effective planning.

Many of the essential components of an effective planning strategy are in place (as will be discussed below). However, the methodology and process is not institutionalized by policy that addresses how EFR will conduct and maintain planning undertakings. A formally adopted planning policy, including community involvement where needed, is recommended.

Recommendation 10: Develop and implement a policy that addresses how EFR will conduct and maintain the planning process.

EFR is currently engaged in short-term organizational planning, using the budget process as a primary tool for determining what will be accomplished during the fiscal year. Day-to-day activity planning also occurs at the operations level by shift captains.

Identifying Critical Issues – Current and Future Services

Any planning process must take into consideration various critical aspects of EFR's current and future operation. As noted, it is essential that there be a clear understanding of current and future critical issues that confront EFR.

While EFR is clearly well-versed with the critical issues and challenges that face the organization on a daily basis, it does not have a formally structured process in place for systematic identification of them. ESCI encourages EFR to establish a system by which it routinely seeks to uncover these issues, thoroughly evaluate the individual items of concern, and develop plans to address them.

Tactical Planning

It is crucial that emergency workers and command staff have accurate and detailed information at hand to identify hazards and conduct tactical operations while working at the scene of an emergency. Firefighters are often making their first visit to the work site when responding to a call for assistance. If the emergency is a structural fire, firefighters are encountering a building

at a time when the internal environment is at its worst. A lack of familiarity with the building can easily lead a firefighter to become disoriented or injured.

It is important that firefighters be knowledgeable not only of a building's floor plan, but also of unique hazards, access issues, and built-in fire resistive features of local buildings to enable them to safely and effectively fight a fire. This can be accomplished via building familiarization tours, development of pre-fire plans, and conducting tactical exercises either on-site or by tabletop simulation.

Pre-incident plans should be easy to use quick reference tools for company officers and command staff. At a minimum, a pre-incident plan should include information such as:

- Building construction
- Occupant characteristics
- Incorporated fire protection systems
- Capabilities of public or industrial responding personnel
- Water supply
- Exposure factors
- Facility layouts

NFPA 1620[15] provides excellent information concerning the development and use of pre-incident plans and should be used as a reference.

In addition to pre-fire planning, a defined list of target hazards should be developed and aggressive efforts should be taken to ensure response crews have copies of these plans available. Target hazards are defined by:

- Buildings with large potential occupancy loads
- Buildings with populations who are partially or completely non-ambulatory
- Buildings of large size (greater than 12,000 square feet)
- Buildings that contain process hazards; such as hazardous materials or equipment

EFR's tactical planning includes pre-incident planning as well as targeted planning for dealing with specific hazards as with the large gas plant located southwest of the city. Line personnel conduct pre-incident plans on a regular basis, typically in concert with fire prevention inspection

[15] *NFPA 1620*: *Recommended Practice for Pre-Incident Planning*, National Fire Protection Association, 2003.

visits. The program appears to be effective and aggressive, resulting in a hard copy of pre-plans as well as being posted on the department intranet.

Operational Planning

Operational planning includes the establishment of minimum staffing policies, standardized response plans or protocols, National Incident Management System (NIMS) compliant regional incident command planning, mutual aid planning (local and regional), resource identification and planning, and disaster planning.

Maintaining a comprehensive and current emergency plan and resource list is the best opportunity for EFR 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, as well as in an emergency operations center.

Operational planning falls under the responsibility of the fire chief or the assistant chief at EFR. The department conducts operational planning on a day-to-day basis. Other than disaster planning, EFR is not well prepared from an operational planning perspective. The process now underway will provide necessary information to assist EFR in long-term operational planning.

Recommendation 11: Develop and implement an operational planning policy that is long-term.

No individual fire department can be expected to single handedly provide all of the personnel and equipment resources necessary to mitigate every potential large emergency event. Therefore, it is important to provide plans for accessing outside resources before such an event occurs. At a minimum, EFR should have regional, mutual, and automatic aid response plans in place.

An important operational planning component is identification of response protocols for routine fire and EMS incidents. These are pre-determined emergency apparatus assignments based on incident magnitude and dispatch procedures for additional resources that may be needed at a large scale emergency. These assignments are found in the *Evans Fire Rescue Policy Manual* 3rd Edition, Section 5.0; updated on January 15, 2009.

One of the critical issues identified by EFR and ESCI is that no regional automatic aid agreement is in effect. Under terms of an automatic aid agreement, emergency response is

automatically dispatched to by area and type of call within the region. The primary reason given for the lack of an automatic aid structure being in place is political views between neighboring emergency agencies.

A properly developed automatic aid protocol would assure that not only is needed assistance dispatched immediately, but also that the closest available response resource is sent to an emergency. The establishment of an automatic aid practice is recommended since civilian and emergency responders' safety should be paramount over political discord or philosophical differences.

Recommendation 12: Develop and implement automatic aid agreements with adjoining and regional emergency service providers.

The Superfund Amendment and Reauthorization Act, found in Title III of the Federal Code (SARA Title III), defined requirements for the tracking of hazardous materials used in fixed facilities and required that extremely hazardous substance (EHS) facilities develop comprehensive emergency plans for their sites. EHS facilities are those using over a threshold limit of certain materials. The Act requires local fire departments to coordinate with the involved industries to ensure quality responses to emergencies.

EFR is in tune with SARA Title III requirements. Evans Fire Rescue Policy 6.0 of the GOGs addresses all aspects of hazardous materials incidents, storage, reporting requirements, and mitigation and abatement measures.

The fire chief of Evans Fire Rescue is appointed as the emergency manager for the city. Responsibilities of the emergency manager involve disaster preparedness and planning for natural and man-made disasters. The City of Evans coordinates its plans and activities with Weld County Emergency Management.

Strategic Planning

Strategic planning is often confused with long-range or master planning. Strategic plans address the organization's most immediate critical issues, as well as short-term strategies for meeting long-range or master planning initiatives. The document, like a business plan, charts a clear direction for the future, clarifying an organization's mission, articulating its vision for the future, and specifying the values within which it will conduct itself.

EFR has undertaken strategic planning efforts in the past. Upon completion of this master planning process, a strategic plan is a logical and highly valuable next step; facilitating the effective implementation of recommendations contained in this report. An updated strategic planning process is recommended pursuant to this project. The ESCI *Customer Centered Strategic Planning* model is further recommended as a means by which to achieve this goal.

Recommendation 13: Update the EFR strategic plan following the completion and adoption of the department's master plan.

Master Planning

Master, or long-range planning, offers a broader perspective of where the organization will be in the future, and is typically developed for a 10 to 20-year period. Long-range planning can support the health of an organization by predicting important future changes and the organization's potential response to that change. Master planning analyzes an organization's current community demographics, service delivery, and finances and projects these elements into the future by considering how the community will look after certain periods of time.

Master planning takes a big picture look at a fire department's long-range challenges and needs. Fire and EMS master planning focuses on three simple questions:

- Where are we now?
- Where will we need to be in the future?
- How do we get there?

With a clearly defined master plan, policy makers and city and fire department management are better armed to identify the desired level and composition of emergency services and determine when they have been achieved or are deteriorating.

This study process is EFR's first experience with undertaking the process of developing a master plan for the organization. The City of Evans and EFR leadership are commended for having the foresight to take on a project of this magnitude. A clear picture will soon begin to emerge with which the organization can anticipate and prepare for the future. This report, however, is not an end to the planning process. We encourage the City of Evans and EFR continue and expand the planning work. EFR will need to establish a process for updating the master plan that is generated by this study. ESCI recommends an annual review and biennial

update of the master plan. It should involve a review of organizational and community changes and adjustments to the master plan where needed.

Recommendation 14: Review the EFR master plan annually and update biannually. Communicate internally and externally with the department, city, and community changes to the plan.
Recommendation 15: Complete a strategic plan in conjunction with the master planning process.
Recommendation 16: Develop benchmarks and quantifiable measurements to measure accomplishments, response time goals, and program performance.

Capital Replacement and Improvement Planning

Fire agencies need a balance of three basic resources to successfully carry out their emergency mission: people, equipment, and facilities. The adequacy of personnel resources is, of course, a primary concern; but no matter how competent the firefighters are, if a fire agency does not have sufficient facilities and equipment, it cannot achieve its mission.

Planning for replacement, major maintenance, and improvement of capital facilities and fire apparatus is vital to a fire department. Too often, departments fail to adequately forecast and prepare financially for capital needs and, as a result, find themselves confronted with large needs that cannot be met.

EFR owns several million dollars in capital assets that are necessary to provide service, and these assets must at some point receive maintenance, updates, and replacement. Maintenance and replacement plans help to forecast and predict costs. Organizations with capital asset plans for facilities, apparatus, and equipment avoid the financial impacts of unplanned capital outlays. Capital improvement plans (CIP) identify when an asset is likely to need replacement and identify the funding mechanism.

The City of Evans has established a multi-year vehicle replacement schedule; however, it is not inclusive of facilities and capital equipment. This long-term look at apparatus replacement is valuable and offers the City a forward look and preparation for apparatus replacement needs. A vehicle replacement schedule is an excellent step toward a comprehensive capital improvement plan; however, it does not capture the long-range replacement costs of. The City has done a commendable job to date in terms of capital asset maintenance and replacement. They have done so, however, in the absence of a complete and comprehensive CIP. Doing so carries risks, many of which may be mitigated by the development and adoption of a capital plan.

A capital facilities plan should include a variety of items, such as:

- Location, timing, and cost of any planned facilities
- Identified and anticipating maintenance requirements on existing facilities
- Funding plan

ESCI recommends the development of a capital improvement plan for facilities, apparatus, and capital equipment (a vehicle replacement plan can be found in this report under Capital Assets and Capital Improvement Programs).

Recommendation 17: Develop a facilities, apparatus, and capital equipment improvement plan.

Insurance Rating Improvement Planning

EFR has not developed a plan for maintaining and improving the department's Insurance Services Office (ISO) rating. An analysis of the most recent ISO evaluation can provide insight as to steps or actions that when put in place would enable EFR to maintain its current Class 4 insurance rating. Failure to take action could lead to a retro-grade or higher ISO rating. This may have a negative financial consequence on certain commercial and industrial businesses by increasing premiums for fire insurance.

Personnel Management

Evans Fire Rescue uses a combination of career and volunteer personnel to accomplish its mission and responsibilities to the citizens, guests, and workforce employed in the city. Administrative functions are generally the responsibility of staff officers. However, some programs and support functions are under the authority of operational personnel and city employees in other divisions. Staffing for emergency response to fire, emergency medical services (EMS), and related incidents is provided by career personnel on a rotating 48 hours on and 96 hours off 56-hour workweek schedule and volunteers. Volunteers are assigned 36 hours monthly of training and participation in staffing of operations of the department. A stipend of $50 per month is provided to volunteers meeting minimum training and certification criteria. Increases in the stipend are based on certifications above the minimum and years of service (longevity) with EFR.

Career personnel are on a 24-day, 192-hour FLSA (Fair Labor Standards Act) cycle. In a 24-day FLSA cycle, 180 are considered FLSA "straight time" hours, and 12 hours are FLSA overtime hours. If a firefighter is called into work extra duty during this work period and, as a consequence, works more than the scheduled hours, he/she must be compensated for this additional time at 1.5 times the regular rate.

For FLSA purposes, hours worked means time when the employee is actually performing services for the employer. These are the only hours which must be included when determining if FLSA overtime is due. Thus, for example, Kelly days or other paid leave days do not count as hours worked for FLSA purposes.

Compensatory Time

Government employers are permitted to pay some FLSA overtime with compensation time in lieu of cash wages. To be permitted to pay FLSA overtime with compensation time instead of cash, there must be an agreement with the employees before the FLSA overtime work is performed. If the employees are represented by a union, this agreement must be collectively bargained. If not, it may be a condition of employment or contained in individual agreements. Compensation time in lieu of cash wages for FLSA overtime must be paid at the appropriate FLSA overtime rate. Employees must be permitted to use their accrued FLSA compensation time. An employer may not prohibit an employee from using accrued FLSA compensation time unless the time off would create a disruption in fire department operations. Given that the

number of fire suppression personnel is equal to minimum staffing on the department, the use of compensation time would have little benefit.

Policies, Rules, and Regulations

It is important that members of the organization know to whom they should go when they have a problem, question, or issue related to their relationship with the department. In large organizations, a HR (human resources) department typically handles this function. Staff within an HR department handle questions, issues, and tasks related to appointments, benefits, performance, discipline, promotion, or termination of employees.

The City of Evans has combined the services of HR (human resources) and risk management as a single function under general government. Human resources and risk management includes providing the organizational framework to recruit, select, classify, compensate, and develop the City's workforce, while ensuring a safe environment that optimizes productivity, efficiency and effectiveness.[16]

There are two primary sets of documents that describe the employer-employee relationship and explain in detail how employees are expected to conduct themselves in a variety of emergency and non-emergent situations: the City of Evans policy manual and GOG (general operational guidelines). A third set of documents is used to set job performance requirements for EFR's firefighters, State Firefighter Certification JPR (job performance requirements).[17]

Beginning at the time of appointment to the fire department, probationary career and volunteer employees are instructed in all applicable policies related to their employment and association with EFR. Employees have access to the City's personnel policies via a desk manual and in electronic format. Signatures are required acknowledging receipt of updates and changes related to personnel issues (anti-harassment for example). An original set of GOGs (general operating guidelines) are provided to each employee in hard copy format.

Reports and Records

Internal fire department record and reporting systems appear to be adequate with some limitations. As a department of the city of Evans, EFR is networked into the municipal IT network. The system operates using Microsoft Windows XP.

[16] *2010 Budget, Building our Vision for the Future*, City of Evans, page 11.
[17] Colorado Division of Fire Safety, certification rules.

Records are maintained on employment history, discipline, commendations, work assignments, injuries, health and exposures by the city HR department. Applications for membership or employment for the fire department are initially reviewed by the fire department. If the application passes the initial screening it is forwarded to human resources.

Self-contained breathing apparatus, gas monitors, ladder, and pump testing are completed and appropriate records are maintained. A sampling of breathing air is submitted for testing quarterly. Vehicle test and maintenance records are produced and achieved.

The records management system (RMS) for incidents is computerized. Data collection using ERS (Emergency Response System) is compliant with NFIRS (National Fire Incident Reporting System) standards. Incident information, activity summary, and other analyses are available. Patient care reports are generated electronically and are used for statistical analysis and to comply with reporting requirements.

Figure 14 provides a summary of the RMS method for each activity in the fire department.

Figure 14: RMS Methods

Report	System
Fire Reports	ERS (Emergency Response System)
EMS Reports	ERS (Emergency Response System)
Training	ERS (Emergency Response System)
Vehicle Maintenance	City shops records apparatus
Hose Testing	Hard copy
Ladder Testing	Hard copy
Hydrant Records	Hard copy
Inventory	ERS (Emergency Response System)
Personnel Records	Hard copy
Exposure Records	Not used
Staffing	ERS (Emergency Response System)
Pre-plans, Facility Plans	ERS (Emergency Response System)
Occupancy Inspections	ERS (Emergency Response System)
Fire Investigation	Hard copy
Public Education Activity	Hard copy
Hazardous Materials	ERS (Emergency Response System)
Mobile Incident Command	Hard copy (tactical worksheet and PAR)
Fire Inspections	ERS (Emergency Response System)
Mapping – GIS	Yes
Occupancy Records	ERS (Emergency Response System)
CAD (Computer Aided Dispatch)	Yes
CAD Interface(s) with other RMS	No
MDC/MDT	Yes
Emergency Response Units	Engine 1 MDT
Command Units	No
AVL (automatic vehicle locator)	No
AVL with Mutual/Auto Aid Agencies	No
IS (Information System) Analysis and Planning Software	Yes
Dedicated IS Staff	No

Financial activities, including budgets, expenditures, revenues, and other encumbrances are provided by the City finance department. This system was reported to be working satisfactorily but current data is not always available. A system upgrade is in process that will allow City department heads access to real-time data and create reports. Currently division heads are not able to retrieve budget status reports.

EFR does not produce a standalone annual report. However, in the Weld County Dispatch Center (WCDC) annual report, a recapitulation on each of the participating organizations includes EFR's response data. The report is well produced and has relevant information of interest to elected officials and city administrators.

Fire Department Accreditation

Institutions have long used professional member associations and accreditation to establish a level of professionalism. Groups like the JCAHO (Joint Commission on Accreditation of Healthcare Organizations) for hospitals, WASC (Western Association of Schools & Colleges) for higher education, and CALEA (Commission for Accreditation of Law Enforcement Agencies) for police agencies are but a few. Accreditation is also seen as a way for member groups to provide a standard of excellence and a forum for collaborative industry efforts.

Likewise, the IAFC (International Association of Fire Chiefs) functions as the key professional organization of the fire service. The IAFC was founded in 1873 on the recognized need to provide standards across the fire protection industry for equipment and practices (such as standard hose and hydrant threads). That pursuit continues today, represented by the IAFC's active partnership with other organizations to form the CFAI (Commission on Fire Accreditation International).[18] The CFAI accreditation program grants accreditation to fire and emergency service agencies upon the successful completion of a comprehensive self-assessment and on-site evaluation. The Commission on Fire Accreditation International is:

> *"…[D]edicated to assisting the fire and emergency service agencies throughout the world in achieving excellence through self assessment and accreditation in order to provide continuous quality improvement and the enhancement of service delivery to their communities. The CFAI process is voluntary, and provides an agency with an improvement model to assess their service delivery and performance internally and then work with a team of peers from other agencies to evaluate the self-assessment completed."*[19]

Fire departments have used the accreditation course of action as a tool for continuous improvement. Accreditation is also a public way of demonstrating professionalism in emergency services to the community served by a department.

Recommendation 18: Make application and begin the steps necessary to become an accredited fire agency.

[18] The name of the CFAI (Commission on Fire Accreditation International) was changed to the Center for Public Safety Excellence, Inc., in March 2006.

[19] www.cfainet.org/home/aboutus, *Who are We?* – Commission on Fire Accreditation International website, April 2006.

Labor-Management Relationship and Issues

Labor management relations are the rules and policies which govern and organize employment. It deals with the establishment and implementation of the regulations and how they affect the needs and interests of employees and employers. How the interaction between management and labor develops often has as much to do with the individual members' background and the growth of the organization. For EFR, most of the career personnel served in a volunteer role prior to becoming employees of the department. Someone who comes to the department from the "outside" would not have the historical knowledge.

EFR has seen substantial growth and opportunity for its membership during the last decade. The department has grown from an all volunteer organization to a point where nearly all emergency responses are dependent on the paid firefighters with back-up from volunteers. To this point the transition from a predominantly volunteer to career fire department has been positive. The challenge will be to keep opportunities for volunteers active to maintain their interest and skill level at a level that is beneficial for both.

ESCI observed that members at all levels of the department are actively involved in department programs, operations, and planning. In interviews with ESCI, employees expressed their involvement and commitment to the department. Issues and concerns of employees and management are addressed at the earliest time possible.

Disciplinary Process

Maintaining discipline in a public safety organization is crucial component of a well run department. Members must be allowed latitude to perform using wisdom and judgment but must also be held accountable for actions, whether good or less agreeable. It is important to establish a method by which employees are encouraged to exhibit behavior that reflects a high moral standard and creates and maintains a safe and healthy working environment. Disciplinary policies that focus on coaching, counseling, and behavioral modification instead of punishment have been shown to produce positive results.

The City of Evans has published and adopted a formal, progressive disciplinary process that applies to all city personnel. The rules are clearly communicated to fire department members during orientation and are available to all employees for review at the fire stations. A grievance procedure is available for individuals who believe the process, penalty, or discipline was in error.

There was no pending litigation or other legal action reported to ESCI related to employment in the fire department.

Counseling Services

Emergency services bring otherwise ordinary people into life and death situations that sometimes end tragically. Even though department personnel are trained responders, they do not have an impregnable shield that prevents them from being affected by traumatic events. Critical incident stress is a very real condition that affects all emergency service workers to some degree or another. Every emergency worker handles stress in a different way and, at times, may be unable to adjust or compensate. The trigger for significant psychological trauma may be a single event or a series of compounding events.

Fire and EMS departments recognize the need to provide a support system for emergency workers who are exposed to traumatic incidents. Critical incident stress interventions by this group are short-term processes only. Although normally enough to help emergency personnel cope with the event, on occasion longer-term support is needed. Failure to provide that support can ultimately lead to the loss of a very valuable member.

Employee Assistance Programs (EAP) are offered by organizations to personnel as a long-term stress intervention tool. Typical plans allow the member a fixed number of counseling visits per year with no out-of-pocket cost. The counseling provides additional support for other life problems that may affect a member's motivation and work quality, such as substance abuse, marital difficulties, and financial problems.

The City of Evans offers employees an EAP and counseling services on a confidential basis.

Application and Recruitment Process

Recruitment of personnel is a critically important function for emergency service agencies. The community places a tremendous amount of trust in fire department personnel. Applicants should be assessed for those attributes considered most important to effectively perform emergency services job functions. The process used to select personnel should be comprehensive.

The Americans with Disabilities Act (ADA) prohibits discrimination against individuals with physical disabilities but permits employers to establish the physical standards that are required to perform the primary functions of any job safely and effectively. History has shown that the

most effective method of avoiding a litigation suit involving ADA is through reasonable and consistent application of job-relevant pre-employment physical ability testing. Applicants for positions in emergency response in the department are subjected to a formal physical ability test to measure the applicant's ability to perform critical physical tasks and functions. The ability assessment is described as a modified version of CPAT (Candidate Physical Ability Test©). The process has not been validated.

Developed under a Fire Service Joint Labor Management Wellness/Fitness Initiative, the CPAT is a sequence of events requiring a candidate to progress along a predetermined path from event to event in a continuous manner. This test was developed to allow fire departments a means for obtaining pools of trainable candidates who are physically able to perform essential job tasks at fire scenes. The CPAT is a timed pass/fail test that consists of eight separate events:

1. Stair Climb
2. Hose Drag
3. Equipment Carry
4. Ladder Raise & Extension
5. Forcible Entry
6. Search
7. Rescue
8. Ceiling Breach & Pull

Recommendation 19: Validate the physical ability process or consider adopting a validated assessment tool.

Modern firefighting and medical response also require extensive technical training, much of which is presented at the college level. Career applicants for EFR must demonstrate their aptitude to learn and perform the necessary mental skills to do the work through a written aptitude test and by proof of existing certifications.

All applicants offered employment at EFR are required to pass a pre-employment medical physical assessment. The physical assessment conducted by ErgoMed follows DOT

(Department of Transportation) guidelines and is non-job specific to the fire service. Elements of the assessment include:

- Rapid drug test
- Medical history review
- Workers' compensation history check
- Baseline ROM (range of motion) measurements
- Specialty testing – designed to pick up pre-existing/current injuries
- Functional testing – designed to ensure the conditional hire can safely perform essential job functions.
- Hearing Test

A psychological assessment is also required after a contingent offer of employment. Qualifications of potential employees are verified, references contacted, and background checks are conducted by the Evans Police Department.

Recommendation 20: Medical physical assessments should follow standards that are job related. NFPA 1582[20] has medical requirements applicable to fire department candidates.

One method to increase the depth of candidates is through the use of cooperative testing. A number of fire departments in the area use a cooperative screening and testing program for entry-level firefighter candidates – the Firefighter Intraregional Recruitment and Employment (FIRE) program. FIRE uses validated testing procedures; by passing the written exam, candidates become eligible for placement in the pool of qualified candidates for employment. The program, administered by the Denver Regional Council of Governments (DRCOG) on behalf of the 13 metro area fire department and districts, is held quarterly.[21]

[20] *NFPA 1582: Standard on Comprehensive Occupational Medical Program for Fire Departments*, current edition 2007.

[21] Fire departments and districts include Boulder, Boulder Rural, Federal Heights, Frederick-Firestone, Larkspur, Littleton, Longmont, Mountain View, North Metro, North Washington, Parker, Thornton, and Westminster.

Recommendation 21: Consider the use of a cooperative testing and screening process for entry level candidates.

Testing, Measuring, and Promotion Processes

Once on staff, personnel should be evaluated periodically to ensure their continued ability to perform job duties safely and efficiently. Technical and manipulative skills should be assessed on a regular basis. This provides documentation about a person's ability to perform responsibilities and provides valuable input into the training and education development process.

It is important to maintain such programs whenever possible; it has long been known that members sincerely wish to be a contributing part of any organization. This basic desire to succeed is best encouraged through feedback that allows each member to know what he/she is doing well and what skills may need improvement. Honest and effective feedback encourages members to reinforce mastered skills and abilities and to work harder to improve the areas where performance may fall short.

Regular evaluation and feedback for personnel is critical to behavior modification and improvement. A formal performance evaluation system is currently in place for all employees of the fire department. Performance evaluations are conducted annually in accordance with City policy.

Technical and manipulative skills should be evaluated regularly. This provides documentation about a person's ability to perform their responsibilities and provides valuable input into the training and education development process. Evans Fire Rescue provides for on-going skills training under the direction of the department's training officer and three captains. A formal competency evaluation of fire skills for all employees with emergency response job duties is conducted following state firefighter certification job performance requirements.

Incumbent uniformed career fire department personnel are required to participate in and pass the physical ability assessment on a yearly basis. Annual medical physical examinations are not required for current employees.

Annual medical physical examinations should be considered for all (career and volunteer) department personnel. Examinations should follow *NFPA 1582*. Baseline values for all

firefighters should be established at time of hire that include: titer level, vision, spirometry, audiometry, hepatitis, B, C, and tetanus.

Recommendation 22: Establish medical baselines for all new firefighters at the time of hire.

A stress test is used to determine the amount of stress that a heart can manage before developing either an abnormal rhythm or evidence of ischemia (inadequate blood flow to the heart muscle). The test provides information about how the heart responds to exertion. It usually involves walking on a treadmill or pedaling a stationary bike at increasing levels of difficulty, while an electrocardiogram, heart rate, and blood pressure are monitored. The test helps to determine if there is adequate blood flow to the heart during increasing levels of activity and the likelihood of having a coronary event or the need for further evaluation.

Medical physical assessment should involve periodic stress tests of incumbent employees; every two to five years, based on age and risk factors. We recommend that a stress test be performed at the time of hire to determine if a candidate has an underlying heart defect or disease that would put them at risk while performing the duties of a firefighter. The leading cause of death for firefighters is heart attack (44 percent). Death from trauma, including internal and head injuries, is the second leading cause of death (27 percent). Asphyxia and burns account for 20 percent of firefighter fatalities.[22]

Recommendation 23: Administer a stress test at the time of hire and periodically on incumbent employees based on age and risk factors.

Health and Wellness Programs

Keeping members safe and healthy is an important component of a fire department's method of operation. It has been clearly documented that it is by far cheaper to prevent injury than to pay for rehabilitation and work replacement.[23] Modern, progressive departments are incorporating numerous methodologies into the daily routine of firefighters to help in this regard.

[22] The United States Fire Administration (USFA), *The USFA Firefighter Fatality Retrospective Study: 1990-2000, October 2002*.
[23] American Journal of Industrial Medicine, Volume 43, Issue 4; *The Economic Consequences of Firefighter Injuries and Their Prevention,* National Institute of Standards and Technology, Pgs 454 – 458, March 2005.

The City of Evans and EFR have established safety committees and a safety officer. The City committee meets monthly, and the department meetings are conducted quarterly. The committees review all personnel and vehicle accidents, as well as items of general concern, and make recommendations to the city manager or fire chief (in cases related to the fire department). Minutes of the city meetings are available. No meeting minutes are kept of the internal meetings.

Recommendation 24: Capture, retain, and post meeting minutes of the fire department safety committee.

There is a need for fire departments to have access to a group of professionals with expertise in the occupational medicine field. Occupational medicine is dedicated to promoting and protecting the health of workers through preventive services, clinical care, research, and educational programs. One aspect of a program is keeping up-to-date with health and safety regulations, standards, and current practices. Occupational medicine specialists review current practices to see if they meet the regulations, make modifications if needed, and assist the department in adopting any changes. Another aspect of a holistic occupational medicine system is fitness programs. Fitness programs are used to monitor and develop required physical training to keep personnel ready for the tasks to be preformed and reduce the possibility of injury while on the job.

The importance of employee health and welfare, and the potential liability associated with the lack of such programs, necessitates that fire departments establish close professional relationships with occupational medicine specialists to assure that emergency workers are protected by the most up-to-date occupational health and safety programs possible.

Occupational safety and health programs (sometimes referred to as Industrial Medicine) vary in depth, form, and delivery. A fire department may employ a physician full-time, contract with a provider organization, or conduct a program partially in-house while contracting for the remaining services. Any number of hospitals or medical centers in the area have programs that may meet the needs of EFR.

One such occupational medicine program that we are familiar with uses the fire department wellness coordinator to conduct audiometric, spirometric, and vision screenings before personnel complete their annual physical evaluation. The occupational medicine provider then

conducts blood draws at individual fire stations. Consequently, at the time of the medical physical, the physician has at his/her disposal the firefighter's historical and current medical screening records.

The medical physical, stress test, and all other components of the evaluation are done as part of the fire department's regular training rotation at a regional training center. Through a professional relationship developed with a medical service provider over several years, the fire department in this example was able to receive this level of service, at a very competitive price.

The legal requirements for a fire department occupational safety and health program have been established. How a fire department administers and supports the program determines the success and the resultant benefit. In the example, the department previously had to hire extra staff or pay employees overtime to take annual medical physicals. The occupational medical program resulted in the saving of more than $15,000 through reduced overtime cost; however, some funding is still required for medical follow-ups and for employees not able to meet the schedule.

An additional advantage of using a local occupational safety and health provider is the ability to quickly evaluate and treat non-threatening injuries suffered by employees.

Recommendation 25: Provide a fire-service related occupational and health program.

Incident Staffing

It takes an adequate and well-trained staff of emergency service responders to put the apparatus and equipment to its best use in mitigating an emergency incident. Too few workers at an emergency scene lessen the effectiveness of the response and increase the risk of injury to those at the scene.

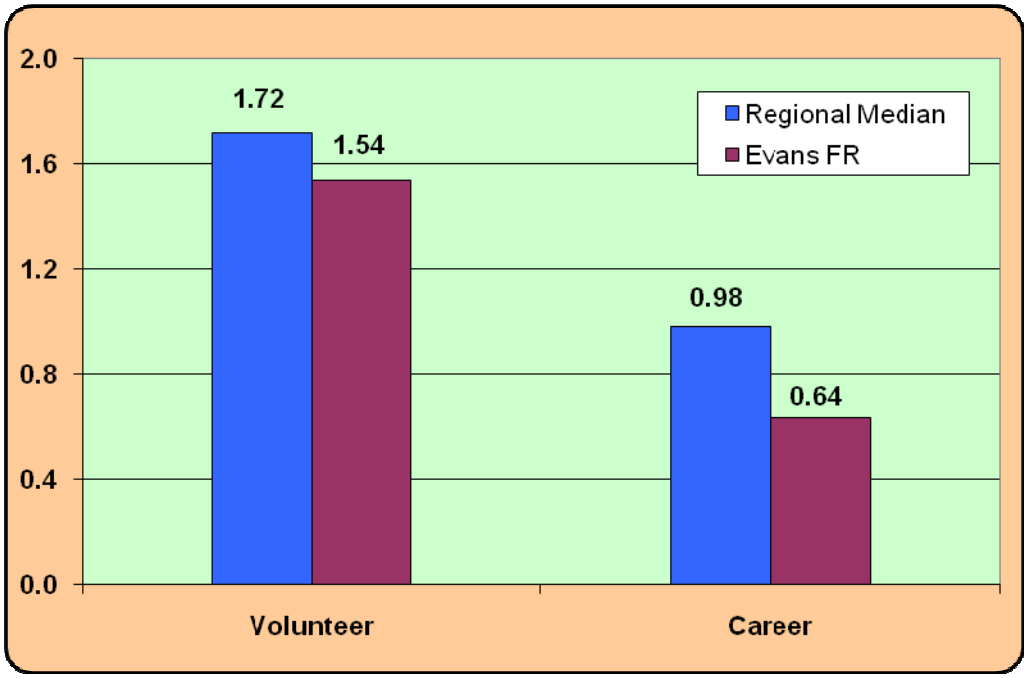
Direct customer services in field operations are provided with 12 career FTE (full time equivalency) and 29 active volunteer personnel. EFR has nine recruits that are scheduled to complete recruit academy training in December 2009. Figure 15 lists the number of operational personnel by position and title.

Figure 15: Operations/Field Personnel

Position – Title	Number of Personnel
Fire Captain	3.00
Firefighter	9.00
Volunteer Firefighter	29.00
Total	**41.00**

Examination of emergency service staffing begins with available emergency service personnel compared to other communities of similar size and nature. The following chart (Figure 23), using benchmark data from the National Fire Protection Association's Fire Department Profiles 2007, provides an overview of the staffing level of the department on the basis of firefighters per 1,000 population.[24]

Figure 16: Firefighters per 1,000 Population

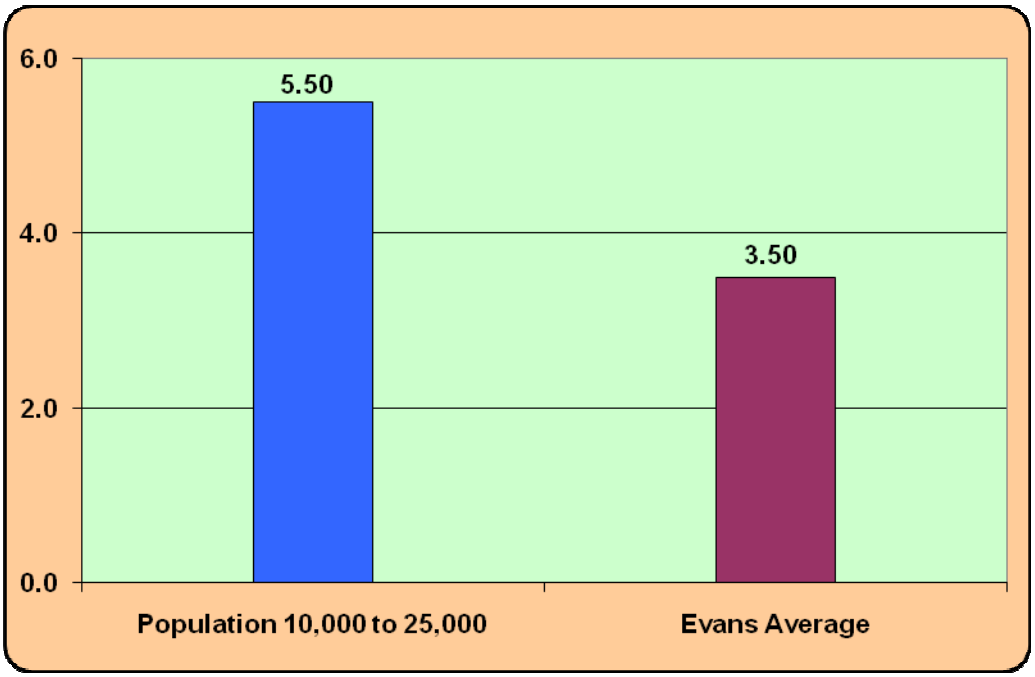


The chart (Figure 23) illustrates that EFR has fewer career firefighters (89th percentile) than the median compared to other western cities of similar size and character. EFR has slightly fewer volunteer firefighters than the comparable median. In our experience, ESCI has found that four active volunteers are necessary to equal the response capability of one on-duty career firefighter.

[24] NFPA, "NFPA Report: U.S. Fire Department Profile Through 2007", November 2008, by M.J. Karter, Jr. and Gary P. Stein.

While the number of career firefighters maintained by a department is important, a measurement of response-ready personnel provides some indication of the ability of the agency to react quickly to emergencies. The chart below (Figure 17) compares the average number of on-duty firefighters with the national average of on-duty firefighters in similar communities.

Figure 17: Average On-Duty Firefighters per 1,000 Population



The on-duty staffing of EFR compares to about the 64th percentile of the national average of similarly sized (population) cities.

Work at fire emergencies can be categorized into two key components — life safety and fire flow. Life safety relates to the number of building occupants, their location within the structure, their status, and their ability to take self-preservation action. Life safety tasks involve the search, rescue, and evacuation of victims. The fire flow component is the delivery of enough water to extinguish the fire and create an environment within the building that allows entry by firefighters, or the escape of occupants.

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. These tasks include command, scene safety, search and rescue, fire attack, water supply, pump operation, ventilation, and back-up/rapid intervention.

An initial full alarm assignment should provide for the following:

- Establishment of incident command outside of the hazard area for the overall coordination and direction of the initial full alarm assignment. A minimum of one individual shall be dedicated to this task.
- Establishment of an uninterrupted water supply of a minimum 1520 L/min (400 gpm) for 30 minutes. Supply line(s) shall be maintained by an operator who shall ensure uninterrupted water flow application.
- Establishment of an effective water flow application rate of 1140 L/min (300 gpm) from two handlines, each of which shall have a minimum of 380 L/min (100 gpm). Each attack and backup line shall be operated by a minimum of two individuals to effectively and safely maintain the line.
- Provision of one support person for each attack and backup line deployed to provide hydrant hookup and to assist in line lays, utility control, and forcible entry.
- A minimum of one victim search and rescue team shall be part of the initial full alarm assignment. Each search and rescue team shall consist of a minimum of two individuals.
- A minimum of one ventilation team shall be part of the initial full alarm assignment. Each ventilation team shall consist of a minimum of two individuals.
- If an aerial device is used in operations, one person shall function as an aerial operator who shall maintain primary control of the aerial device at all times.
- Establishment of an IRIC (Initial Rapid Intervention Company, Rapid Intervention Team) that shall consist of a minimum of two properly equipped and trained individuals.

The Commission on Fire Accreditation International (CFAI) provides a sample critical tasking analysis for the number of emergency workers required for various levels of risk.[25] That analysis is summarized in the figure below (Figure 18).

Figure 18: Sample Critical Task Staffing Need Based on Level of Risk

Critical Task[26]	Maximum Risk	High Risk	Moderate Risk	Low Risk
Attack line	4	4	4	2
Search and rescue	4	2	2	
Ventilation	4	2	2	
Backup line/rapid intervention	4	3	2	2**
Pump operator	1	2	1	1
Water supply	1	1	1	
Utilities support	1	1	1	
Command/safety	2	2	2	1***
Forcible entry*	0			
Salvage*	0			
Overhaul	1			
Communication	1			
Chief's aide	1	1		
Operations section chief	1	1		
Logistics	1			
Planning	1			
Staging*	1			
Rehabilitation	1	1		
Division/group supervisors*	2			
High-rise evacuation*	10			
Stairwell support*	10			
Total Required	**51**	**20**	**15**	**4 to 6**

* At maximum and high-risk fires, additional personnel may be needed for these tasks.
** Backup line may not be required for certain incidents.
*** Can often be handled by the first due officer.

Delivering sufficient numbers of personnel to the scene to accomplish all the various tasks required to effectively control an emergency is essential. The most labor-intensive incidents are structure fires. As is shown by the preceding figure (Figure 18), national criteria suggests at least 15 personnel be on scene of a fire in a single family home for safe and effective operations. More personnel are needed as the size of the structure, the complexity of the incident, or the life safety risk increases or when special hazards exist.

[25] Commission on Fire Accreditation International (CFAI) is now a subsection of the Center for Public Safety Excellence.
[26] All tasks may be functional during the early moments of firefighting, but sometimes certain duties take place in sequence depending on the situation, thus reducing the total number of people needed.

At minimum daily staffing levels, EFR has three emergency personnel available to immediate response to all emergencies. If fully staffed, the daily workforce can be as high as the maximum of eight personnel.[27]

Automatic aid is the procedure of sharing resources and automatically sending the closest available units to emergency incidents regardless of jurisdictional borders. In a traditional mutual aid agreement, mutual aid is requested from surrounding jurisdictions when the scope of a single incident or series of incidents exceeds the resources of the responsible agency. Automatic aid assistance is dispatched automatically by contractual agreement between two communities. For a fire department to receive credit for automatic aid under ISO (Insurance Services Office), the aid must:

- Be prearranged for first-alarm response according to a definite plan, preferably through a written agreement.
- Be dispatched to a reported structure fire on the initial alarm.
- Be provided 24 hours a day, 365 days a year.
- Offset a need in the community. For example, if a community needs a ladder company and the fire department does not have one but a neighboring community's ladder company responds by automatic-aid agreement, credit may be available. The aiding ladder company must cover at least 50 percent of the needed ladder company standard.

EFR realizes that use of automatic aid is imperative to augment its firefighting force. For this reason, the department participates in automatic response on structure fires with adjoining fire agencies. EFR also provides automatic response to other fire departments at the regional level. However, the availability and willingness of all neighboring fire departments to participate in automatic aid has been sporadic.

Recommendation 26: Maintain current automatic aid agreements and establish new agreements to assure an effective firefighting force is available for critical task staffing for all risk levels found in the City.

As a part of the stated mission of EFR, personnel provide first response EMS at the basic life support level (BLS). BLS response includes automatic external defibrillator (AED) capability. Transport functions are provided by WCPS (Weld County Paramedic Services).

[27] Total includes the fire chief, assistant chief, fire marshal, and training officer.

WCPS was formed on September 16, 1974, when the Greeley Ambulance Company (a privately owned company) failed financially. Pre-hospital emergency medical care was considered an essential service and a joint agreement between Weld County and the City of Greeley provided tax support during the transition to a Weld County Department. One station for WCPS, Station No. 2, is located at 3401 South 11th Avenue in Evans.

Recommendation 27: Consider the option of joint housing of fire and EMS units with WCPS.

WCPS supports fire department first responders of Weld County with educational opportunities and replacement of expendable medical supplies without charge.

Career vs. Volunteer

Most fire departments in Colorado and across the country are volunteer fire departments, but career firefighters account for a much larger share of population protected than volunteer departments. Volunteers are concentrated in rural areas, while career firefighters are found in larger communities. Career or mostly-career fire departments account for more than half of the departments where communities have a population of 25,000 or greater. A report prepared on fire services needs in Colorado had 165 fire departments reporting; of those, 151 were all or mostly volunteer.[28]

[28] *Four Years Later – A Second Needs Assessment of the U.S. Fire Service, COLORADO,* A cooperative study between: US Fire Administration (USFA), Directorate for Preparedness, Department of Homeland Security, and National Fire Protection Association (NFPA), June 2004, Quincy, MA.

In the same study, the NFPA posed a question to Colorado fire departments that use all (or mostly) volunteers for emergency response.[29] The departments were asked to identify the number of volunteer firefighters who respond to a mid-day house fire. The responses are categorized by community size as summarized in Figure 19 below.[30] For comparison, the second population range shown in the table (10,000 to 24,999) coincides with the effective and residential populations of the City of Evans (highlighted).

Figure 19: Average Number of Volunteer Firefighters Responding

Population of Community	1 or 2	3 or 4	5 to 9	10 to 14	15 to 19	20 or more	Total
25,000 to 99,000	2.60%	9.40%	23.00%	28.30%	15.20%	21.50%	100.00%
10,000 to 24,999	3.70%	11.70%	32.80%	26.50%	13.00%	12.40%	100.00%
5,000 to 9,999	2.90%	11.40%	39.50%	26.10%	12.70%	7.30%	100.00%
2,500 to 4,999	3.10%	12.20%	45.90%	25.60%	9.70%	3.60%	100.00%
under 2,500	3.00%	18.30%	48.00%	22.10%	6.10%	2.50%	100.00%

The table (above) demonstrates the difficulty fire departments have in achieving an adequate number of volunteers for a routine structure fire (house fire) mid-day. For the majority of departments, they did not assemble the number of personnel required to conduct interior fire suppression operations.

Many volunteer and rural fire departments are struggling to attract and maintain volunteers, as is illustrated by the following quote.

> *"Rural fire departments say the challenge of finding volunteer firefighters—for whom camaraderie and a sense of community service are repayment enough—is getting tougher."*[31]

While attracting and retaining volunteers is made especially difficult by the unique geography and demographics of Evans and Weld County, very few departments and fire districts have risen to the challenge.

In communities around the country, the number of fire calls has declined over the past decade. Yet as the frequency of fires has diminished, in part due to stricter fire codes and safety education, the workload of fire departments has risen sharply—medical calls, hazardous

[29] Ibid.
[30] A mostly-volunteer department might respond with some career firefighters as well, but this question asked only about volunteers responding.
[31] "With Fewer Volunteers, Rural Towns Raising Funds for Full-time Firefighters," *Milwaukee Journal Sentinel,* August 25, 2006.

materials calls, and every sort of household emergency is now addressed by fire departments. Therefore, although the frequency of fires has diminished, the need for a ready group of firefighters has increased.

Although modern codes tend to make fires in newer structures more infrequent, today's energy-efficient construction (designed to hold heat during the winter) also tends to confine the heat of a hostile fire. In addition, research has shown that modern furnishings generally burn hotter (due to synthetics), and roofs collapse sooner because prefabricated roof trusses separate easily after a very short exposure to flame. In the 1970s, scientists at the NIST (National Institute of Standards and Technology) found that after a fire breaks out, building occupants had about 17 minutes to escape before being overcome by heat and smoke. Today, that estimate is three minutes.[32] The necessity of firefighters arriving on the scene of a fire in the shortest span of time is more critical now than ever.

Along with a quick response, a robust, well-trained, and appropriately equipped compliment of emergency workers is needed to successfully mitigate structural fires. Too few firefighters at an emergency scene decreases effectiveness and increases the risk of injury to all.

Availability of volunteers can also affect response times. Typically volunteer availability increases in the evening and during the weekends. However, response time during late evening and early morning hours may lengthen due to the necessities of awakening the volunteer contingent and traveling to the station.

The time required to place workers on the scene of an emergency is crucial to the quality of service. Long response times, especially in the urban and suburban zones of the City demonstrate the greatest demand for service and the area at the highest risk. Increased demand for service in the future will only exacerbate the issue.

Another strategy used by many volunteer fire departments to shorten turnout time requires all volunteers to serve a given number of on-duty shifts each month. Typically, each member signs up for a minimum of two 12-hour shifts; members are usually reimbursed by a nominal stipend for the work in accordance with the Fair Labor Standards Act (FLSA). Recently, in a letter to the International Association of Fire Chiefs, the U.S. Department of Labor defined "nominal" as an

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

amount that does not exceed 20 percent of what the public agency would otherwise pay to hire a full-time position. Therefore, while we assume that volunteers would succeed in shortening turnout time, we also anticipate that the cost of doing so will likely increase the overall cost of a volunteer program. This practice is established and working well for EFR.

Nationally, the number of volunteer firefighters available during daytime hours is declining. While it was once common for departments to rely on employees from local businesses to respond during emergencies, the practice is much less prevalent now. Today, people frequently work more than one job. Family responsibilities and long commutes only compound the difficulties for volunteers; lessening the time available for training and emergency duty.

A higher percentage of calls occur during the time of day when the lowest numbers of volunteer personnel are available. EFR will continue to require and benefit from volunteers now and for the foreseeable future. We recommend that the Department continue to recruit and cultivate a volunteer fire suppression contingent.

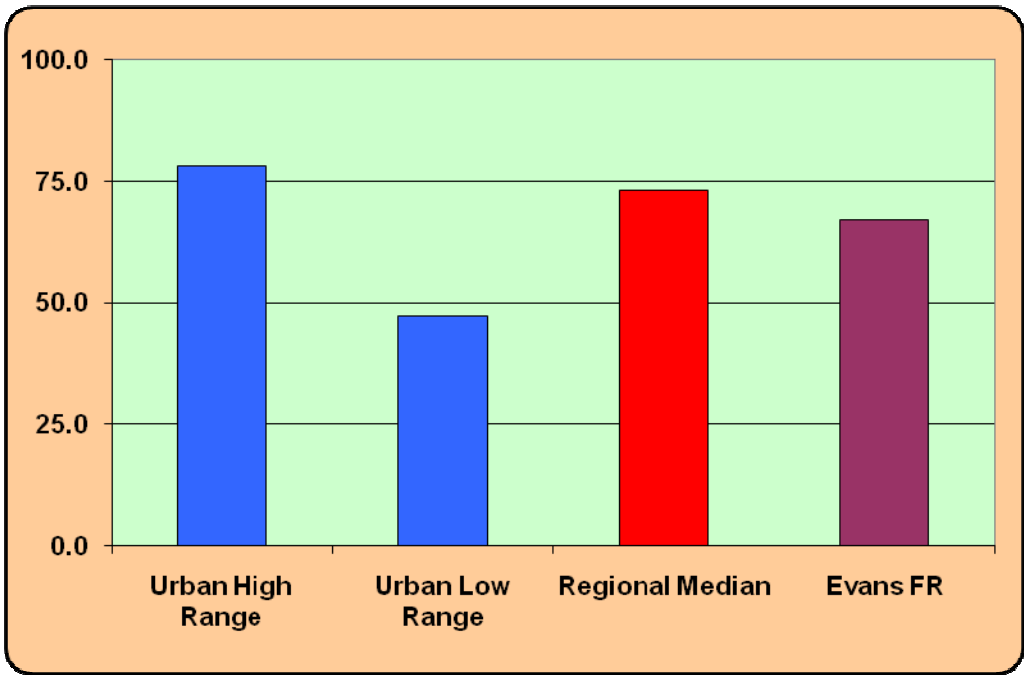
Recommendation 28: Continue to recruit and cultivate a volunteer fire suppression contingent while expanding the use of career firefighters.

If EFR were to depend exclusively on the response of volunteers, turnout time (the time required for volunteers to assemble and leave the fire station with a fire apparatus) would be incrementally higher.

Emergency Response Activity

The following chart (Figure 20) compares the total emergency responses per 1,000 population for the calendar year 2008. This illustration gives the reader a sense of the relative number of responses between comparable emergency responders.[33]

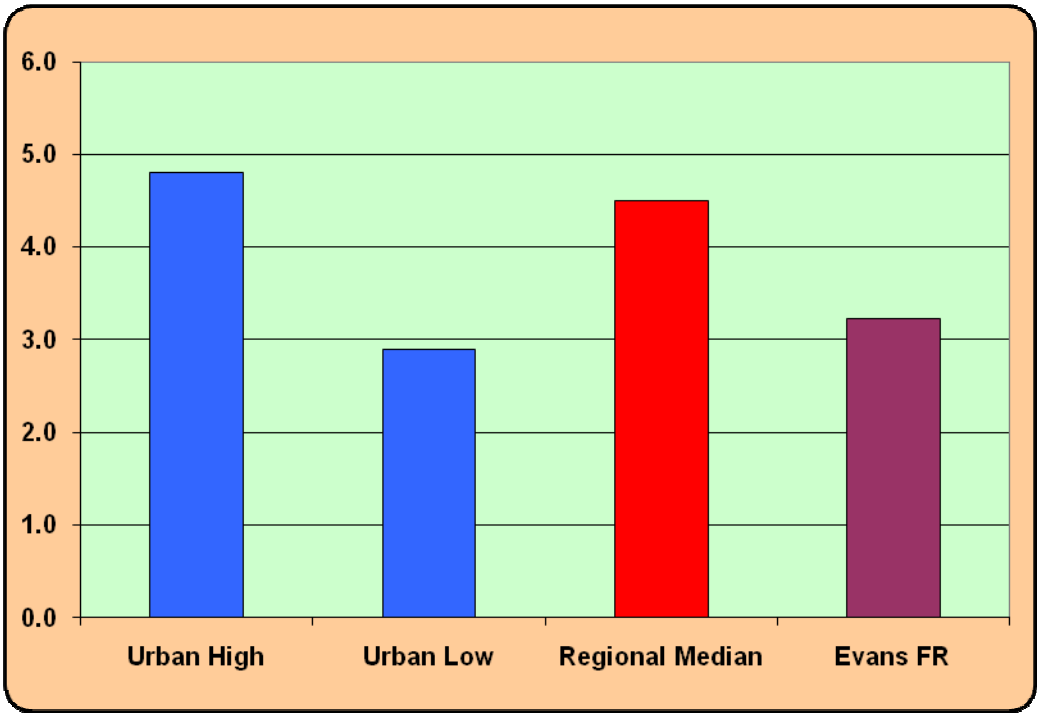
Figure 20: All Incidents per 1,000 Population



[33] Accurate call data was not available for Santa Ana and Torrance and was not included.

EFR was in the mid-range between the urban high and urban low for incidents per 1,000 population and just slightly below the regional median. While the majority of EMS calls generally require one or two fire units, a single fire response will often commit all of the internal resources of EFR. For that reason, we compare the number of fire calls per 1,000 population separately in Figure 21.

Figure 21: Fire Incidents per 1,000 Population



There were 3.23 fires for every 1,000 people living in Evans. The data shows that EFR had fewer fires per 1,000 population, than the urban high and regional median.

Fire Department Training

Training Program

Importance of Training & Skills Development

Firefighters operate in an increasingly complex, dangerous, and dynamic environment, as demonstrated by over 100 fatalities and 3,000 serious injuries annually.[34] Effective training of firefighters is the single most important factor that prepares them to meet the challenges of the situations and environments in which they work. The delivery of safe and effective fire and emergency medical services is, therefore, clearly dependent on a well-trained response force.

Firefighter safety and survival is the first and foremost reason for establishing and maintaining an effective training program. Given the risk and complexity of the EFR service area, the need for continuous firefighter and officer training and skills development is critical. The City of Evans has plans for annexation and is positioning itself to continue to grow, resulting in increased service demand for the fire department. There is also the potential of mergers with adjacent fire agencies. As the City grows, firefighters will most likely face new hazards and challenges.

Without a high quality comprehensive training program, emergency outcomes are compromised, response personnel are at risk, and the City of Evans may be exposed to liability for the actions of its employees. Training and education of personnel is viewed as a critical function for EFR. Anthony Granito, author of *Fire Service Instructor's Guide*, states the following:

> *A good training program is undoubtedly the single most important factor producing and maintaining a high proficiency in any fire department. It not only produces high efficiency initially, but also affects future efficiency when we consider that the rawest recruit now being trained may be chief of the department or at least a senior officer in 20 or 30 years.*

The function of a training program is not merely one of imparting personal knowledge and technical skills to an individual, it is developing the self-confidence to perform correctly under stressful, if not hostile, conditions. A training program must be systematic and must provide constructive feedback to the trainee, firefighter, or officer. The goals of training should always focus on performance; never merely on acquiring a certain number of training hours.

[34] Source: NFPA.

The International Fire Service Training Association (IFSTA) states that,

> *…regardless of the particular system used, an effective training program will include (1) the continuous training of all levels of personnel in the department (2) a master outline or plan; (3) a system for evaluating the scope, depth, and effectiveness of the program; and (4) revising the program, as required, to include advances in equipment, products, and technique.*

Key elements of an effective training program should include:

Training administration	Training division staffing
Training schedules	Training facilities
Training goals and objectives	Motivation for training
Methodology for success	Company operations and performance
Varied types of reinforcement	Member targeted training
Organizational priority for training	Peer group commitment to training

General Training Competencies

To ensure quality emergency performance the training provided should be based on established standards of practice. EFR has addressed its training program in the *General Operating Guidelines* (GOG), Chapter 22.0. The GOG states required hours and training opportunities provided by EFR.

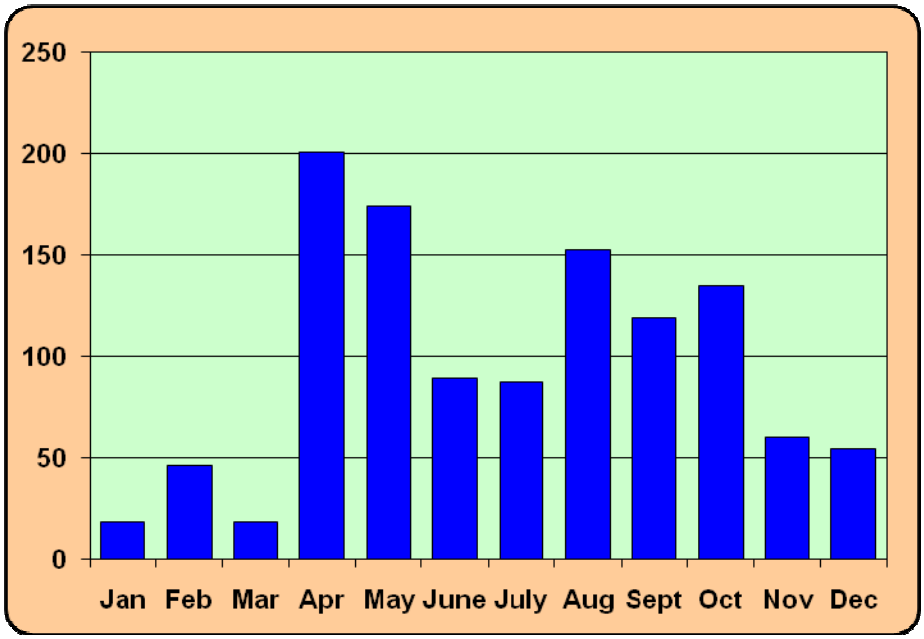
EFR is committed to a competency-based training methodology. A competency is a demonstrated ability to perform a defined skill successfully according to an established standard. EFR uses standards and other best practices documented by the National Fire Protection Agency, International Fire Service Training Association, and Colorado Division of Fire Safety. Competency-based training ensures that firefighters will be capable of responding and providing service to the community in an effective and safe fashion.

Performance-based training requires that skills (e.g., hose evolutions, ladders, etc.) are identified, taught, practiced, and tested on. Evaluation and certification of firefighters is a critical component of the training process. Evaluating skill sets helps identify where future efforts should be directed. A good evaluation process lends credence to certification and allows firefighters to demonstrate competency. Certification is used to ensure that minimum performance standards are met. The department uses certification as one qualification for

promotion, maintaining credibility with the community, and to manage the City of Evans' liability exposure.

The following table (Figure 22) shows the number of training hours for EFR personnel by month in 2008.

Figure 22: Training Hours by Month, 2008



Training Administration

EFR's training and volunteer coordinator is responsible for the coordination, development, and implementation of all training for the department. This position is not ranked at the battalion chief level or program director level. The qualifications of the training and volunteer coordinator include a background in heavy equipment operation, volunteer service (six years in a volunteer capacity), and three years as a career firefighter. The training coordinator is Fire Instructor 1 certified and has attended National Fire Academy (NFA) classes. He is clearly highly motivated for the job but has not received a great deal of formal education that is specific to training program management. We recommend that the training coordinator attend the National Fire Academy (NFA) Training Program Management course.

Recommendation 29: Have the training/volunteer coordinator attend the NFA Training Program Management course.

Training goals and objectives are identified by conducting an annual needs assessment. This assessment includes both required (mandatory) training as well as specialized training. The training coordinator is currently transitioning whereby shift captains have a greater responsibility in the delivery of training. As this transition moves forward, it is important to determine accountability and reporting functions. The development of measurable benchmarks should also be included, enabling accountability and as a planning tool for future training.

Recommendation 30: Continue the transition to operations captain delivery of training. Develop measurable benchmarks for training to enable accountability and as a planning tool for future training.
Recommendation 31: Consider changing the title and rank of the training/volunteer coordinator position.

Training Schedule

The training coordinator coordinates and schedules the activities for the training program. An annual training calendar with required training is listed by month and day. EFR develops and coordinates a Firefighter I Academy in collaboration with Aims Community College.

The monthly outline for department training is:

- First Thursday of every month is the all department meeting
- Second Thursday of every month is new member training
- Third Thursday of every month is regular department training
- Fourth Thursday of every month is EMS training

Requirements for new members of EFR consist of the following elements:

- State of Colorado Firefighter I certification or higher within 90 days following the completion of a fire academy.
- New members who attend an Evans-sponsored Firefighter 1 Academy that cannot complete certification due to extenuating circumstances, may be allowed an additional 90 days to complete Firefighter 1 certification after conclusion of the fire academy.
- CPR certification within three months. Basic life support (BLS) for the health care provider.
- State of Colorado first responder certification or higher within 18 months.
- NIMS-700 and ICS-100 (upon completion of fire academy).

- Successful completion of new member orientation and new member training.

Training Facilities

EFR maintains a training and drill facility located at the Municipal Operations Center. Constructed in 2002, the burn building features include a two-story residential/industrial unit, attic, three burn rooms, gabled roof, interior stairs, chop cuts, metal floor decks and parapet walls. Props include a roof, flammable fuel pit, propane simulator, surface area for apparatus maneuvering, and an extrication area. The property is served by a municipal water system with hydrants. The training facility is well maintained by EFR personnel.

Training Procedures, Manuals, and Protocols

It is the intention of the department's training program to follow an organized method to develop and provide training. EFR's training approach follows a cycle of needs assessment, curriculum development, program delivery, testing, and evaluation.

The training program delivery must meet state certification requirements for firefighter, as well as the needs of department members. EFR's training program appears to deliver the required hours of training and addresses Job Performance Requirements (JPR) for department personnel to maintain compulsory certifications.

EFR places a high value on training; this philosophy is supported by both administration and operational personnel. The 2008 budget for training was $26,000 (exclusive of personnel services costs). Though the dollars budgeted may appear relatively small, EFR has a training plan, training manual, and an established curriculum. The program appears to be functioning well but should be included as a component of the department's future strategic plan.

The key to successful company operations is a standard set of procedures that are woven together to take advantage of the synergy of teamwork. Procedures begin with the tasks performed by individual company members and culminate in the functions various companies perform together. Company training and company cohesion is essential to the safety of the operating personnel and for effective delivery of service. Beyond the *position* level training, EFR has a company-based program, focusing on how to function as a team, which clarifies the roles and responsibilities of each member.

A comprehensive training plan includes:

- Identification of performance standards for each title and rank of operations personnel
- Provisions for periodic review of individual and company level performance
- Competency-based training (must have 100 per cent competency on job performance requirements)
- Physical standards or requirements
- Night training
- Multi-agency drills
- Scheduled training to prevent skills degradation
- Scheduled skills improvement training
- Comprehensive training objectives for each training session presented
- Process for evaluating the amount of learning (retention) that occurred
- Scheduling outside training opportunities
- Benchmarks and performance measurement tools
- Annual performance evaluations are conducted

In developing a training program, the training division needs to ask several questions, including:

- What should the mission of the training division be?
- In what direction should the training program be steered?
- What is the purpose of developing the training program?

The questions (above) will help guide the establishment of goals and objectives (along with benchmarking measurements) of the program, what the programs and curriculum requirements, and clarify member expectations of the training program. With an established training plan, achieving training goals and objectives is possible. A training manual with goals, objectives, strategies, and additional pertinent information is the foundation for the training program.

EFR should consider establishing a mentoring program. Mentoring is designed to help prepare company officers to be chief officers and firefighters to become officers. Succession planning and mentoring is important for the transition time to new leadership to be seamless.

Recommendation 32: Include the training program as a part of the strategic planning process.

Recommendation 33: Consider development of a mentoring program to prepare future company and chief officers.

Annual performance evaluations are conducted on all career staff by the individual's direct supervisor. Performance evaluations are not conducted on the volunteer membership of the department. The reason offered is that volunteers interact with a number of different supervisors making it difficult to gauge and monitor performance. Volunteers require feedback on their performance just as career members do. Performance evaluations provide another means of face-to-face communications that is critical in training and retention of volunteer members.

Recommendation 34: Add volunteer personnel to the performance evaluation process.

Adherence to safety standards is a concern when training emergency responders. EFR incorporates safety into each drill or training session. A captain is designated as safety officer and is responsible to ensure safety deficiencies are addressed; safety procedures are established and followed in all fire department activities. Post incident critiques of emergency event are conducted on an as needed basis.

New members to EFR must complete a department-specific orientation/training program. Elements of the orientation include education, instruction, and completion of:

- EFR policies and GOGs
- EFR structure and role in the City of Evans
- Operational and tactical procedures
- Expectations of new members
- Training on EFR emergency response system (ERS)
- Training on all EFR equipment
- Fireground skills check off, completed by company officers
- Apparatus check off on the operation and placement of equipment and tools

To qualify for minimum staffing designation, new members must complete the EFR task book. In addition to completing the EFR task book, recruit requirements include successful completion of Firefighter I, hazardous materials awareness, and first responder.

EFR has a physical agility testing GOG. The physical agility test consists of eight events that must be completed in ten minutes or less. The eight events are:

1) Stair climb
2) Equipment carry
3) Forcible entry
4) Rescue
5) Uncharged hose drag
6) Ladder arise and extension
7) Search
8) Ceiling breech and pull

Annual fitness and agility testing began in 2004; with all EFR personnel required to successfully complete the agility course in ten minutes or less beginning in 2005.

Record Keeping and Clerical Support

Accurately recording, maintenance, and preservation of training records is an important component of the training program management. As referenced in *NFPA 1401*[35], training records:

- Are necessary to meet legal and statutory requirements
- Assist training management in decisions on planning and budgeting
- Are used to develop training objectives
- Provide a base from which to analyze compliance or deficiencies in the training program.
- Enables staff and employees to monitor an employee's progress of on educational, certification, and career path development.

EFR is limiting liability exposure by maintaining accurate, complete, and timely entered training records in accordance with NPFA standards.

[35] *NFPA 1401: Fire Service Training Reports and Records*, 2006.

Individual training records are kept in hard copy and electronic format. Electronic records are managed, using Windows™ networked computers, and Emergency Reporting System© RMS (records management system) software. Lesson plans are provided for all training sessions.

There is no administrative secretarial support for training functions. Office space is adequate for the current staffing of the program.

Capital Assets and Capital Improvement Programs

Capital Improvement Plan

The City of Evans recognizes the importance and value of a Capital Improvement Plan (CIP). A CIP has a significant impact on the both the image and operation of a city and its capital assets.

> *The City must preserve its current physical assets and plan in an orderly manner for future capital investments, including the operating costs associated with these projects. In addition to amenity improvements, the City must make the capital investment needed to support and enhance the delivery of basic service.*[36]

Policies have been designed to help ensure that current and future assets/projects are maintained at a quality level and capital projects do not restrict the City's ability to provide basic services. Unfortunately the current economic situation does not allow the City to adequately fund the CIP.

The City of Evans uses a five-year planning window for its CIP. Appropriation is tied to annual funding availability. Though coordinated by the finance department, the development of the CIP is a cooperative effort between the various departments of the City. Each is involved in the planning and implementation of their respective projects. Submitted proposals for capital improvement projects are initially prioritized according to need and identified work program goals and availability. Projects are then submitted to the team of City executive staff and key operational staff for review and prioritization according to need and funding availability. The project list is then forwarded to the City Manager for inclusion in the proposed budget. The City Council makes the final determination of which projects/programs are funded. Projects with specific, identified funding sources (e.g., grants, redevelopment funds, etc.) usually receive high priority; conversely, those projects without specific, identified funding sources must compete for the limited amount of general fund dollars available.

Recommendation 35: Continue to actively participate in the City CIP process.

EFR has established an asset maintenance plan (AMP) for all capital assets with a replacement value of $1,000 to $100,000. The department is in the process of developing a Capital

[36] Source: Fiscal Year 2008 – 2009 Adopted Financial Policies, City of Evans, page 12.

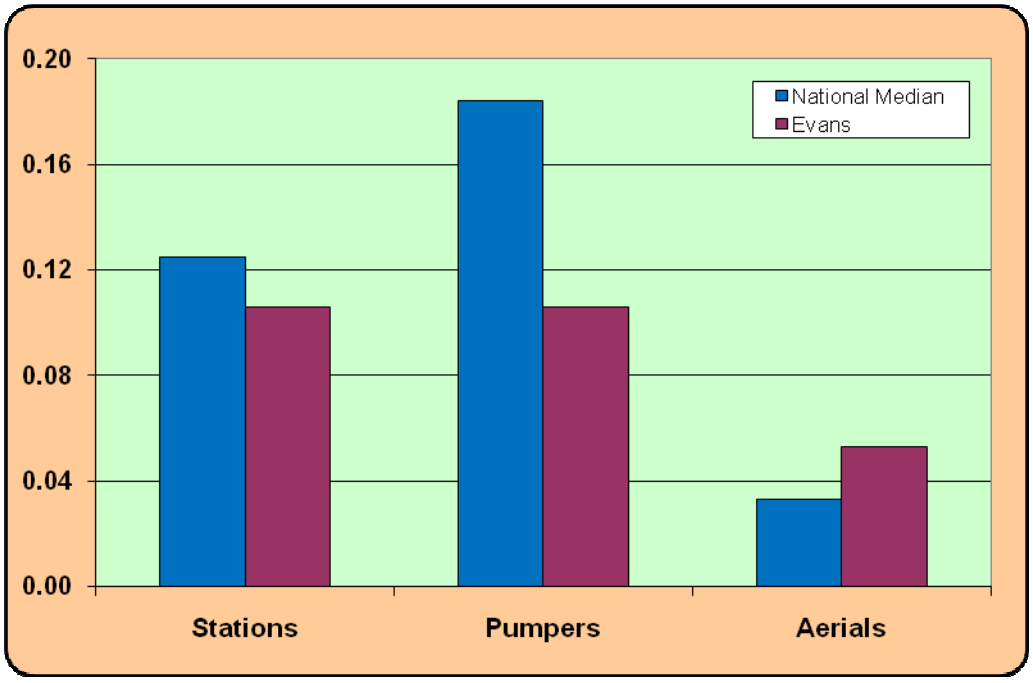
Improvement Plan to plan for asset replacement and additions with a value of greater than $100,000 and a useful life expectancy of greater than one year.

Recommendation 36: Complete the capital asset maintenance plan and develop a capital improvement plan for the Department.

ESCI recommends that EFR consider aggregating like multiple items with a value of more than $1,000 that are acquired in quantity for purposes of capital asset replacement planning. Examples include firefighter PPE (personal protective equipment) and SCBA (self-contained breathing apparatus). Establishing these items as a capital asset, including them in the asset management plan, and contributing to an annual replacement fund is appropriate. While a single set of firefighter's PPE is approximately $2,000, acquiring 10 complete sets would exceed $20,000. It is understood that funding would need to follow the normal budget process, but anticipating the purchase requirement is prudent.

Comparisons of resources against those of similar size communities or service population are made for fire stations, engines, and aerials per 1,000 population served. The following chart (Figure 23) compares Evans Fire Rescue's resources against those of communities with similar size population.

Figure 23: Resource Comparison per 1,000 Population



EFR has a slightly lower number of fire stations than the median of communities of similar population. The department has fewer pumpers and only a slightly higher number of aerials than the median of comparable organizations serving a like population. A higher number of aerials are expected given ISO requirements. The department aerial has recently been placed in reserve status. It will be used primarily as a reserve engine and secondarily as an elevated fire stream. The department has determined that maintaining this unit as a frontline aerial is neither operationally nor financially effective and is a safety concern.[37]

Fire Stations

Fire stations play an integral role in the delivery of emergency services for a number of reasons. A station's location will dictate, to a large degree, response times to emergencies. A poorly located fire station can mean the difference between stopping a fire in a single room or losing a complete structure, possibly even saving or losing a life. The design of stations needs to be adequate to house equipment and apparatus, as well as meet the needs of the organization's members. It is essential to research needs based on call volume, response time, types of emergencies, and projected growth prior to making a station placement commitment. Locating fire stations is a matter of the greater community (region) need.

EFR delivers emergency services out of two fire stations (primarily Fire Station No. 2) within the city limits of Evans. Administrative and support offices for the department are located in Fire Station No. 2; offices of the Fire Chief are located in the Evans Municipal Center.

Condition of Fire Facilities

Consideration should be given to a facilities' ability to support the department's functions as it exists today and into the future. The primary functions that should take place within the fire station environment should be closely examined to ensure it will be adequate and efficient and space for all functions is provided. Examples of these functions may include:

- Housing and cleaning apparatus and equipment
- Residential living for on-duty crew members (male and female)
- Administrative office duties
- Firefighter training/library area

[37] Source: Fire Chief communiqué Aug. 09 and *Issue Paper Ladder Truck Status & Replacement Recommendation.*

- Firefighter fitness area

While this list may seem elementary, the lack of dedicated space compromises the ability of the facilities to support all of these functions and can detract from its primary purpose.

The following table (Figure 24) provides a summary of each EFR fire facility, its condition, year built, general appearance, and square footage.

Figure 24: Facilities Overview and Summary of Condition

Fire Station/Facility	Year Built/Addition	Square Footage	Condition	General Appearance
Fire Station No. 2	1993/2006	10,952	Good	Excellent
Fire Station No. 1	1975	2,160	Fair	Fair
	Out Bldg.80's	1,500		
Training Facility	2002	N/A	Good	Good
Fire Administration – Municipal Building	1999/2003	Chief's Office 400	Good	Good

The following figures give a more detailed inventory, appraisal, and condition of Evans Fire Rescue's facilities.

Figure 25: Fire Station No. 2 (Westside)

2100 37th Street	
	Fire Station No. 2, built in 1993, underwent a major addition in 2006. The original structure had a total of 1,800 square feet, two back-in apparatus bays, and a total of 432 square feet for storage and bathrooms. The addition added two drive-through bays (3,720 square feet) training room/offices (2,500 square feet), and living quarters and kitchen (2,500 square feet). Total square footage of the fire station is now 10,952.
Design	This two-story station is attractive and fits in well with the neighborhood.
Construction	New expansion Type III, original building Type V, with a composite roof.
Safety	The station has smoke and carbon monoxide detectors that are not monitored; no heat detectors or sprinkler system. Key pad entry. There is no intrusion alarm. No emergency eye wash station is available. The turnout gear is stored in the apparatus area. There is a mobile back-up generator with a 60KW capacity and a manual start.
Environment	A vehicle exhaust removal system is provided. There is an oil and sand separator in the bay drainage system of the new bay, with just a cleanout pit in the old bay.
Code Compliance	Construction of the station was within compliance with the fire and life safety codes in the place at the time. The station is not ADA compliant.
Staff Facilities	There is adequate space for living quarters and office space. No mixed gender facilities; open dormitory. The station has only residential type washers and dryers. There is a limited exercise fitness area for personnel.

Figure 26: Fire Station No. 1 (Eastside)

3918 Denver Street

Fire Station No.1 was built in 1975. This 2160 sq ft facility consists of two back-in type apparatus bays and houses reserve engine No. 3 and a vintage 1949 pumper. A small out building was later added (1500 sq ft) which currently houses exercise equipment.

Design	The station was designed to fit in with the surrounding community structures. It is designed as a volunteer station and has no living quarters. The station is equipped with gender specific bathrooms.
Construction	Type V, brick exterior, wood trusses, with a composite roof.
Safety	There is no fire sprinkler system, smoke detectors, or heat detectors. The station has a key pad entry system with no intrusion alarm. Turnout gear is stored in the apparatus bay. There is no eye wash facility. The station does not have an auxiliary generator.
Environment	A vehicle exhaust removal system is provided. There is no oil or sand separator in the building drainage system, just a clean out pit.
Code Compliance	Construction of the fire station was in compliance with fire and life safety codes in place at the time. The station is not ADA compliant.
Staff Facilities	There is some storage space and ample room to work around apparatus and on equipment. The station is maintained and cleaned. The out building is used for fitness work out area with lockers and showers, not gender specific, and is not secure.

Figure 27: Training Facility, Municipal Operations Center

1800 40th Street

The training center is located at the municipal operations center. The center is a modern facility that provides an efficient training environment. It consists of a two-story burn building, training props, and an open training area.

The burn building features include a two-story residential/industrial unit, attic, three burn rooms, gabled roof, interior stairs, chop cuts, metal floor decks, and parapet wall.

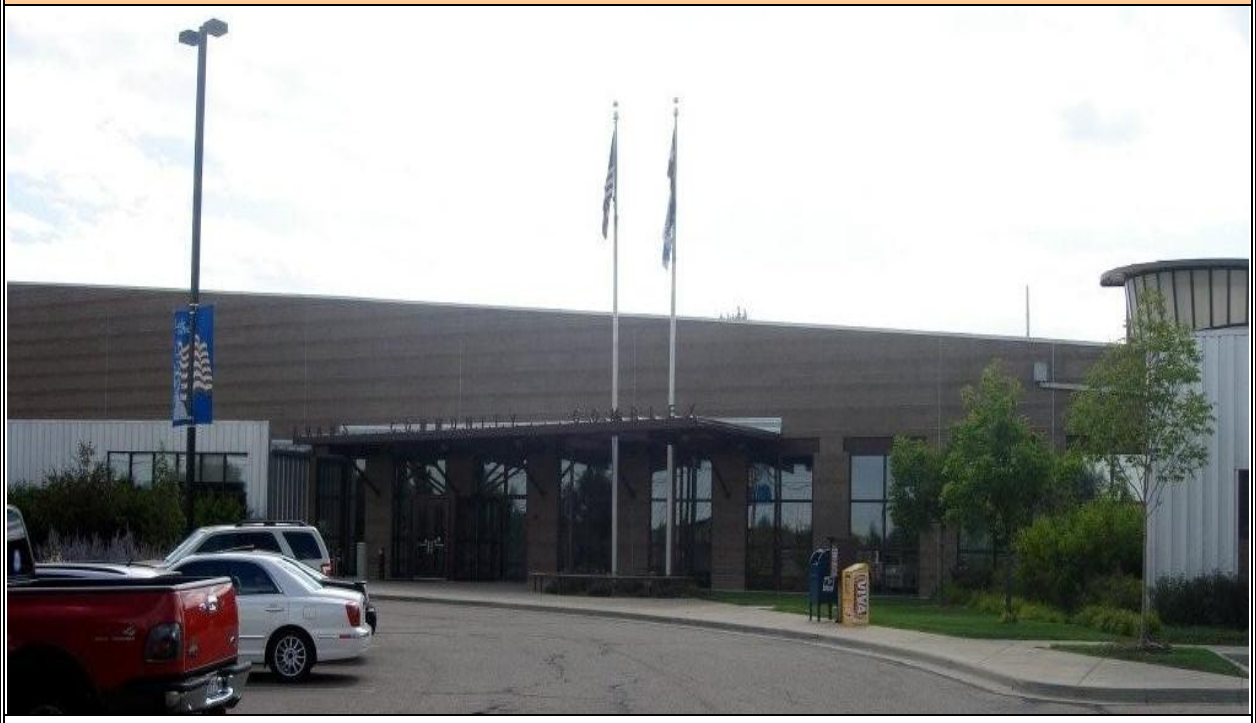
The outside training area and props include an area for fire extinguishers training, vehicle extrication, confined space, propane simulator, and driving.

Two trailers are stored at the facility: 1) special rescue/hazardous materials and 2) live fire

training equipment, as well as a generator with 12KW capacity.	
Design	The training center is a modern facility which provides for a safe and efficient training environment.
Construction	The building is Type III- block, concrete, steel and rebar with a fire resistive Paginite® interior.
Safety	The facility has adequate space for multiple operations to occur simultaneous in a safe manner. The facility has a security fence and locked gates.
Environment	The training facility complies with environmental requirements.
Code Compliance	The center met all fire and life safety code requirements at the time of construction.
Staff Facilities	N/A

Figure 28: Fire Administration, Municipal Building

1100 37th Street



The Municipal Building is an attractive modern building built in 1999 and remodeled in 2003.

Design	The building has a modern attractive design that fits in well with buildings in the area. Office space is adequate with ample conference/meeting rooms and areas for training. There is adequate parking for staff and public.
Construction	The building is a Type III concrete, steel and rebar. The roof is a combination of both composite and metal.
Safety	The building is partially covered with an automatic sprinkler system (basement only) and smoke detection throughout. The building is secure and has multiple access controls. A backup generator is stored in case of a power outage. The building is designed as a Red Cross shelter. There is a defined area for a limited Emergency Operation Center in case of a disaster.
Environment	The interior offers a comfortable and professional environment and includes meeting and conference rooms, classrooms, and individual offices. The city supports the protection of the environment and provides recycling bins and uses green cleansing supplies.
Code Compliance	Construction is compliant with current ADA standards and was built to adopted standards. The building met fire and life safety standards at the time it was constructed.
Staff Facilities	The building has an exercise/workout area, showers and lockers are available. A full kitchen is available along with several areas with sinks, microwaves, etc. There is a residential washer and dryer available. Multiple training and meeting areas are available.

While this section of the report deals only with an overview of existing facilities, ESCI recommends that a long-range capital improvement plan is developed for the EFR.

Fire Apparatus

Other than the human resources of firefighters assigned to the stations, response vehicles are probably the next most important resource for effective emergency response. Services are delivered through a combination of personnel, apparatus, and equipment. If the personnel cannot arrive on emergency scenes quickly due to unreliable apparatus or the equipment does not function properly, then the delivery of emergency services is severely compromised.

Fire apparatus are typically very unique and expensive pieces of equipment, customized to operate efficiently for 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 designed 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 are very expensive and offer 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 have efforts in place to plan ahead for the cost of replacement. To properly do so, communities often turn to the long-accepted practice of establishing a life cycle for the apparatus that result in a replacement date anticipated well in advance. Many communities set aside incremental funds during the life of the vehicle so replacement dollars are ready when needed. This decision is influenced by many factors:

- Actual hours of use of any specific piece of equipment can vary significantly in comparison to other similar apparatus even within the same fire department. Attempts to shuffle like apparatus among busy and slower fire stations to more evenly distribute hours of use have proven difficult. Frequent changes in apparatus create familiarity and training challenges.
- Actual hours of use, even if evenly distributed, do not necessarily equate to intensity of use. For example, a pumper making mostly emergency medical responses will not age as rapidly as a pumper with a high volume of working fire incidents that require intense use of the pump or hydraulics. Likewise, road mileage can also be a poor indicator of deterioration and wear.
- Technology, which is increasingly a factor in fire equipment, becomes outdated even if the apparatus wear is not as significant. In some departments, crews at different fire

> stations deal with widely different technology on their pumpers based simply on age of the equipment. Like steam engines and modern electric locomotives, these differences can be significant, affecting everything from safety and lighting systems to automated digital pump pressure controls to injection foam generation.

NFPA 1901, the *Standard for Automotive Fire Apparatus* is a nationally recognized industry standard that defines the requirements for new automotive fire apparatus designed to be used under emergency conditions for transporting personnel and equipment and to support the suppression of fires and mitigation of other hazardous situations.[38] The issue of replacement cycles for various types of apparatus has been discussed in the committee that develops the standard for many years. In developing its latest edition, the NFPA committee called for a life cycle of 15 years for front-line service and five years in reserve status for engines, and 15 years in front-line service and five years in reserve status for ladder trucks.

Does this mean that a fire engine cannot be effective as a front-line pumper beyond 15 years? A visit at many departments in the United States might prove otherwise. Small, volunteer fire departments with only a hundred or so calls per year often get up to 25 years from a pumper, though the technology is admittedly not up to date. Likewise, busy downtown city fire stations in some urban communities move their engines out of front-line status in as little as eight years.

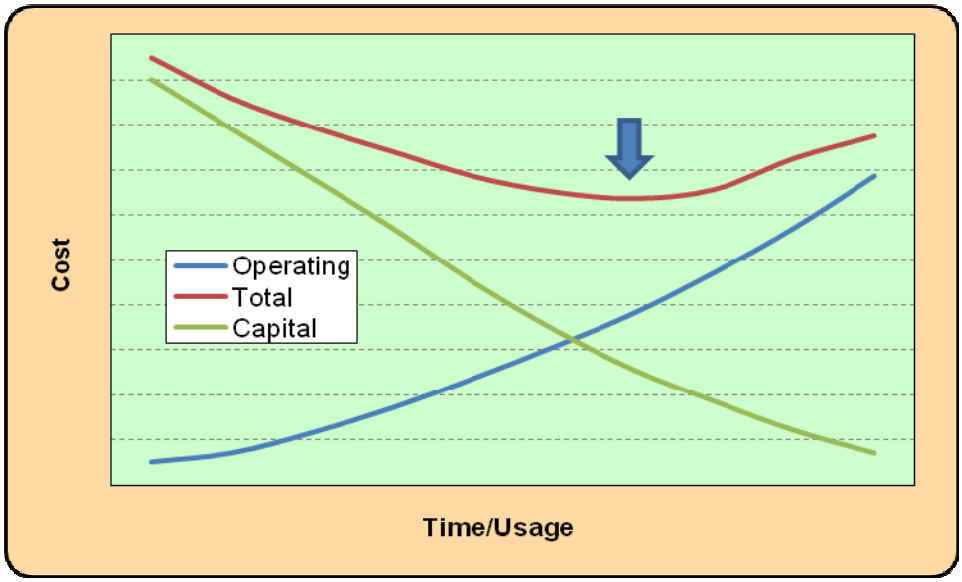
The reality is that it may be best to establish a life cycle that would be used in the development of replacement funding for various types of apparatus, while applying a different method for actually determining the replacement date in real life, in an effort to achieve greater cost efficiency where possible. EFR has done this by recommending 10 years for front-line service and 5 years in reserve status for engines and 15 years in front-line service and 5 years in reserve status for ladder trucks. The rescue also has been recommended to be in front-line service for 10 years and reserve for 5 years. The staff vehicles have a recommended replacement cycle of seven years.[39]

A conceptual model that may be used when a replacement cycle is considered is the Economic Theory of Vehicle Replacement. The theory states that, as a vehicle ages, the cost of capital diminishes and its operating cost increases. The combination of these two costs produces a total cost curve. The model suggests the optimal time to replace any piece of apparatus is when the operating cost begins to exceed the capital costs. This optimal time may not be a

[38] NFPA 1901: Standard for Automotive Fire Apparatus, 2009 edition.
[39] The City of Evans Fire Department- Apparatus Replacement Plan – June 2008.

fixed point, but rather a range over time. The flat spot at the bottom of the total curve in the following figure (Figure 29) represents the replacement window.

Figure 29: Economic Theory of Vehicle Replacement



Shortening the replacement cycle to this window allows for an apparatus to be replaced at optimal savings to the department. If the agency does not routinely replace equipment in a timely manner, the overall reduction in replacement spending can result in a quick increase of maintenance and repair expenditures. Officials who assume that deferring replacement purchases is a good tactic for balancing the budget need to understand that two events may occur:

1) Costs are transferred from the capital budget to the operating budget
2) Such deferral may increase overall fleet costs

Regardless of its net effect on current apparatus costs, the deferral of replacement purchases unquestionably increases future replacement spending needs. ESCI notes that the down time and repair expense for Engine No. 1 and Tower No. 2 have been ongoing and significant.

EFR has apparatus of varying types and life spans. The department maintains a front line fleet of two engines (pumpers), one brush truck, and one rescue. Reserve apparatus includes an aerial ladder truck and one engine. The apparatus fleet also includes a number of staff and support vehicles.

The following chart (Figure 30) provides a summary of the front line apparatus used by EFR to deliver service.

Figure 30: EFR Frontline Apparatus Summary[40]

Apparatus Designation	Type	Year	Make	Condition	Minimum Staffing	Pump Capacity (gpm)	Tank Capacity (gallons)
Engine No. 1	Pumper	2000	American LaFrance	Fair	3	1,250	400
Engine No. 2	Pumper	1995	E-1	Good	Career/ Volunteer 2	1,250	500
Engine No. 3	Pumper	1985	TeleSquirt	Fair	Career/ Volunteer 2	1,250	400
Rescue No. 2	Rescue	1995	T-300 Kenmore	Fair	Career/ Volunteer 2	N/A	N/A
Brush Truck	Brush	1983	GMC	Poor	Career/ Volunteer 2	250	250
Tower No. 2	Aerial	1991	LTI	Poor	Career/ Volunteer 2	1500	400

Figure 31: Engine No. 1

Make:	American LaFrance
Year:	2000
Seating Capacity:	6
Pump Capacity:	1,250 gallons per minute (gpm)
Tank Capacity:	400 gallons (gal)
Condition:	Fair
NFPA Compliant:	Yes
Mileage:	54,309

Additional Comments or Observations: This engine is very well equipped; equipment is mounted securely, organized, and clean. Engine has a Mobile Data Transmitter (MDT), a 10 KW generator and is the primary response unit. This unit is nearing its front line service life.

Figure 32: Engine No. 2

Make:	E-1
Year:	1995
Seating Capacity:	6
Pump Capacity:	1,250 gpm

[40] Tower No. 2 has been decommissioned as an aerial and is used only as a reserve engine and elevated water stream.

Tank Capacity:	500 gal
Condition:	Good
NFPA Compliant:	Yes
Mileage:	39,851

Additional Comments or Observations: The engine is well equipped; includes extrication equipment and a 10 KW generator. No MDT.

Figure 33: Engine No. 3

Make:	Tele-squirt
Year:	1985
Seating Capacity:	5
Pump Capacity:	1,250 gpm
Tank Capacity:	400 gal
Condition:	Fair
NFPA Compliant:	Yes
Mileage:	24,124

Additional Comments or Observations: This *engine is not completely equipped. Equipment is securely mounted, organized, and clean.*

Figure 34: Rescue No. 2

Make:	T-300 Kenmore
Year:	2000
Seating Capacity:	5
Pump Capacity:	N/A
Tank Capacity:	N/A
Condition:	Fair
NFPA Compliant:	Yes
Mileage:	22,949

Additional Comments or Observations: This apparatus carries specialty equipment, heavy duty extrication equipment, specialized rescue equipment (tripod, ropes, etc.), and hazardous materials. It is equipped with a 10 KW generator.

Figure 35: Brush Truck

Make:	GMC
Year:	1983
Seating Capacity:	2/3
Pump Capacity:	250 gpm

Tank Capacity:	250 gal
Condition:	Poor
NFPA Compliant:	No
Mileage:	21,364

Additional Comments or Observations: Apparatus is capable of "pump and run". It carries minimal equipment.

Figure 36: Tower No. 2

Make:	LTI – GMC
Year:	1991
Seating Capacity:	2/3
Pump Capacity:	250 gpm
Tank Capacity:	250 gal
Condition:	Poor
NFPA Compliant:	No
Mileage:	21,364

Additional Comments or Observations: Aerial portion of unit is out of service and is only used as a reserve engine and elevated water tower. It is fully equipped as an aerial (e.g. ground ladders, tools, and small equipment) and a 5 KW generator. Unit has reached the end of its frontline service life.

ESCI found the front line vehicles to be generally well maintained. An issue of concern addressed with EFR staff is the condition of Tower No. 2. Frontline apparatus appeared to be properly equipped. ESCI found apparatus and equipment upkeep, cleanliness, and organization of the department's apparatus—above what we typically observe.

Positive Attribute 5: Evans Fire Rescue apparatus maintenance, upkeep, cleanliness, and organization are a reflection of the organizational culture.

EFR maintains a vehicle replacement schedule and has projected apparatus replacement costs through the year 2016. The service life of apparatus has been defined with anticipated replacement dates scheduled, including inflation predictors. Yearly allocations to the budget are calculated, as are differentials that will occur in years when sufficient funding would not be available in the operating budget. This allows for the flexibility to extend the service life of a vehicle as appropriate. Currently the financial situation of the city does not allow for funding the replacement apparatus.

Positive Attribute 6: Evans Fire Rescue has developed an apparatus replacement plan that forecasts department needs through 2016.

Evans Fire Rescue's apparatus replacement schedule was updated in early 2009. A copy of the schedule is provided in Figure 37. The table includes the year of each vehicle, an equipment number, a city assigned number, Weld Co. number, make, type/model, and the forecast replacement year.

Figure 37: Apparatus Replacement Schedule

Year	Equipment No.	City No.	Weld Co. No.	Make	Type	Replacement Year
2008	Command car	4103	2460	Ford Expedition	SUV	2015
2002	Chiefs car	4104	2454	Dodge Intrepid	Sedan	2009
1984	Battalion No. 2	4105	2452	Chevrolet Suburban 4x4	SUV	1991*
1989	Battalion No. 1	4106	2451	Chevrolet Suburban 4x4	SUV	1996*
2003	Fire Marshal Pick-up Truck	4107	2453	GMC	2500	2010
2009	Training Pick-up Truck	4108	2458	Ford	F-150	2016
1983	Brush Truck	4202	2431	GMC	Brush	O&M
1985	Engine No. 3	4203	2403	TeleSquirt	Pumper	2000*
1995	Engine No. 2	4204	2402	E-1	Pumper	2010
2000	Rescue No. 2	4205	2425	Kenmore T-300	Rescue	2015
2000	Engine No. 1	4206	2401	American LaFrance	Pumper	2015
1991	Tower No. 2	2408	2416	L T I	Aerial	2011**

* Unit has reached the end of its service life
** Tower No.2 has been decommissioned as an aerial

Replacement costs generally include emergency response vehicles but not always the capital equipment that goes on the vehicles. Capital equipment includes radios, breathing apparatus, hose, appliances, rescue tools, and ground ladders. This equipment is sometimes overlooked in replacement planning. ESCI recommends that the replacement schedule and costs always include capital equipment.

Recommendation 37: Include the capital equipment in vehicle replacement cost estimates.

Other Capital Assets

Support and Small Equipment

Small equipment can be a significant part of a fire department's annual budget. It is expensive to acquire, maintain, and often has a limited technological life. ESCI surveyed a sampling of EFR small equipment and found most equipment to be in good condition. Small equipment inspected by ESCI included:

- Self contained breathing apparatus
- Equipment
- Radios
- Hydraulic rescue tools
- Power saws
- Automatic External Defibrillators
- Small tools
- Computers
- Breathing air compressors
- Rescue tools
- Generators

Small equipment maintenance and repairs are handled both in house and with private sector vendors.

Pump, Hose, and Ladder Testing

Pump and hose testing are two important procedures that need to be performed annually and documented.

The purpose of the testing fire hose is to have a reasonable assure of safety for firefighters and that the hose and couplings will work as designed. This should apply to the care of all types of fire hose, appliances, and nozzles. The life expectancy of a section of fire hose is determined by the care it receives. Hose is susceptible to mechanical injury, heat and fire damage, mold and mildew, and damage due to chemical contact and excessive pressure. An inventory of all fire hoses should be maintained and recorded along with a history of each section of hose.

Recordkeeping and hose-testing program meet all *NFPA 1961* standards.[41] Annual hose testing is assigned to the operational personnel of EFR.

Fire pumps are one of the most important and expensive parts of any fire apparatus. The care and routine check of a fire pump is a necessity and should be completed by personnel on a regular schedule. Annual pump test are performed on Evans's pumpers by Colorado State Fire Mechanics Association at its annual training conference. Records are maintained in electronic format in the department's RMS. Ground ladders and aerials are tested by a third party annually.

Personal Protective Equipment (PPE)

Statistical data has shown that buildup of contaminants on turnout gear has a direct impact on the health and safety of firefighting personnel. Firefighters who are exposed to contaminated PPE (turnouts) have a much higher risk of disease or medical condition.

The health and safety risks associated with contaminated turnout gear are addressed in *NFPA 1500*, *1581*, and *1971*. The standards recommend that firefighting protective clothing be cleaned at least once every six months. While this standard may seem excessive, ESCI has found that regular cleaning and maintenance will extend the life expectancy of turnout gear. Proper care enables fire departments to lengthen the replacement cycle of PPE.

EFR currently does not have the capability for in-house cleaning of firefighting PPE. Both fire stations have a residential washer and dryer but no commercial washer/extractors. Extractors are the only units approved for cleaning PPE when used in conjunction with approved cleaning solutions. Separate turnout drying and storage areas are not provided in each fire station; PPE is located in the apparatus bays of the fire stations. In future fire stations or during station upgrades, a separate ventilated space for turnout drying and storage should be included. The fire department has completed a grant application to purchase commercial extractors.

Recommendation 38: Continue to pursue the acquisition of commercial washer/extractors.
Recommendation 39: Include capital equipment in vehicle replacement cost estimates.

[41] NFPA 1961: Standard on Fire Hose, standard defines the design and construction requirements for new fire hose, the testing required to verify the design and construction, and the inspection and testing.

EFR is in the process of establishing an asset management plan (AMP) for capital assets. The city has not established a minimum value for capital assets. In an effort to capture all capital items, the department is referring to capital assets as minor and major (depending on cost). Assets are being categorized by value and life expectancy (a year or more usable life)

Recommendation 40: Complete development of the asset management plan.

ESCI recommends that EFR consider aggregating like multiple equipment which is purchased in quantity with a total value of over $5,000. Examples include firefighter PPE and SCBA (self-contained breathing apparatus). Establishing these items as a capital asset and contributing to an annual replacement fund is appropriate. While a single set of firefighter's PPE is approximately $2,000, acquiring ten complete sets would exceed $20,000. It is understood that funding would need to follow the normal budget process, but anticipating the purchase requirement is prudent.

Recommendation 41: Aggregate like multiple equipment which is purchased in quantity with a total value of $5,000 or more and include in the department's asset management plan.

Fire Prevention/Public Education/ Development Review Programs

When ESCI evaluates life safety services (fire prevention programs), legal obligations, national standards, and best practices are reviewed. These laws, mandates, and standards are specified in state laws, local codes, National Fire Protection Association (NFPA) Standards and Codes, International Building Codes (IBC), and International Fire Codes (IFC). These laws, ordinances, and codes establish the authority and responsibility under which a fire department delivers fire prevention and life safety services. Laws and codes usually provide for the promulgation of regulations governing hazardous conditions, fire safety, life safety, and explosive safety.

A community's fire problem should be addressed in a continuous manner with each resource and function supporting the goal of reducing the danger and incidence of fires.

This cycle includes the following:

- Engineering and code enforcement: To ensure that community structures are appropriately constructed and maintained.
- Public education: Public awareness of hazards, prevention, and what to do if fires occur.
- Fire suppression: Fires are mitigated when there is a failure of education and code enforcement.
- Fire investigation: To determine fire cause, and create a method or process for mitigating future incidents.

Aggressive risk management programs, delivered as a part of an active fire prevention program, are a department's best opportunity to minimize the losses and human trauma associated with fire. The International Association of Fire Chiefs (IAFC) has defined proactive fire service as:

> *…Embracing new, proven technology and built-in protection, like automatic fire sprinklers and early detection systems, combined with aggressive code enforcement and strong public education programs.*

A fire department should actively encourage the use of fire resistive construction and built-in early warning and fire suppression systems. Fire departments should also strive to develop an educated public, trained to minimize their risk to fire.

The charge of the fire prevention division of EFR is:

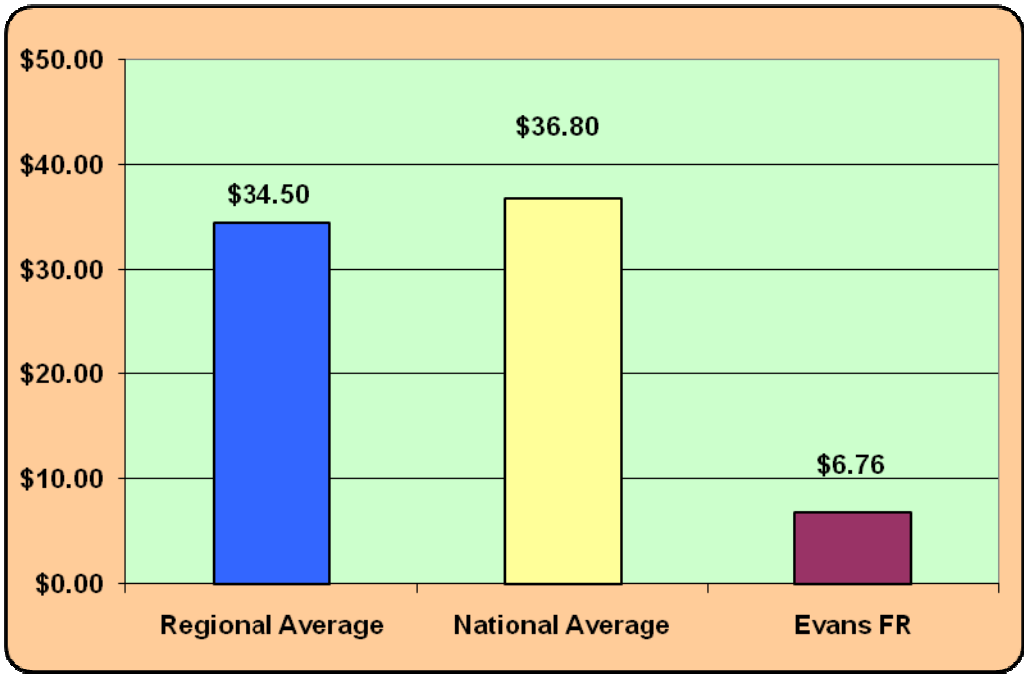
> *This unit provides fire protection and fire protection related regulatory services. It is staffed with a fire marshal. These services include inspection of commercial buildings, plan review and construction inspections of new buildings, fire investigation and public education. Much of the work of this unit is in cooperation with the city building division in public works and the code enforcement division in police.*[42]

Fire loss is a valuable measure or benchmark by which the effectiveness a fire department's fire prevention program can be evaluated. The City of Evans uses fire loss as one of its service level indicators, with a stated goal to achieve a five-year average estimated loss of $10 or less per capita. Using a population of 18,888, and a four-year average fire loss of $127,700, the fire loss is $6.76 per capita. Based on this data, it appears that EFR has been proactive and effective with its fire and life safety efforts.

The following chart (Figure 38) shows the comparison of fire loss per capita for fire departments serving similar size and population areas to EFR. These numbers can be deceiving, since one large value fire can drive up the fire loss in any given year. Conversely, a year in which there were few fires and very little fire loss could result in a significant reduction. For this reason, the historical fire loss for the City of Evans (2005 through 2008) was averaged. An examination of a multi-year average to track fire losses is helpful to obtain a more accurate comparison.

[42] Source: Fiscal year 2008 – 2009 adopted budget, City of Evans, page11.

Figure 38: Comparison of Fire Loss per Capita



Compared to the average regional and national fire loss for departments serving comparable sized populations, EFR losses were significantly lower--approximately 19.61 percent of the regional average and 18.38 percent of the national average.

Positive Attribute 7: The City of Evans' fire losses are significantly less than the regional or national average loss for comparable cities.

Generally, an effective strategy for fire prevention and education includes the following fire prevention activities:

Fire Code Enforcement

- Proposed construction plan review
- Proposed development/site plan review
- New construction inspections
- Existing structure/occupancy inspections
- Special risk inspections
- Fire protection systems design review and inspection
- Storage and handling of hazardous material

Fire Safety Education

- Public education
- Specialized education
- Juvenile fire setter intervention
- Prevention information dissemination

Fire Suppression

- Building familiarization and preplanning
- Existing structure/occupancy inspections
- Public education

Fire Investigation

- Fire cause and origin determination
- Fire death investigation
- Arson investigation and prosecution

Overview

The fire prevention division of EFR operates under the leadership of the department's fire marshal. The current fire marshal has many years of experience and training and has much of the "*institutional memory*" of the department.

The position of fire marshal position requires technical knowledge and time to establish a strong, positive working relationship with the building/development community and building officials. Authority commensurate with the position necessitates a close working relationship with the fire chief and other city and community officials.

The fire marshal job description addresses some areas of experience and competency; however it does not establish recognized levels of educations and certification.

Recommendation 42: Establish minimum education, certification, and experience requirements for the position of fire marshal and/or personnel assigned to fire prevention duties.

The division provides a spectrum of prevention services, including code enforcement, investigation, and a public education program. In discussions with the fire chief, activities are based on three guiding principles: education, engineering, and enforcement.

The department's support of a fire prevention program is evidenced by committing over 25 percent of with fire administrative and support staff and nearly seven percent (13 percent including firefighter safety education) of the available FTEs to prevention.

Fire Code Enforcement/Engineering

An element of a fire prevention program is plan review of new construction, remodel, modifications, and tenant improvement plans. When proposed construction projects are examined for compliance with the fire code requirements, the reviewing agency has the opportunity to identify critical issues early on in the process reducing the likelihood of problems during construction.

When a new structure is proposed to be built in the city, it becomes the protection responsibility of the fire department for the life of the building. If it is not constructed according to code, it may well become a future problem. The more a fire department is involved in the plan review and construction, the less potential of future fire protection issues.

Structure design, construction, contents, and use of occupancies all have fire safety consequences. The design and construction of a building can help contain or accelerate a fire. Placement of walls and exits affect the ability of people to exit a building in the event of an emergency. Contents of a building can slow or accelerate flame spread. The proposed use of a building may increase the probability of a fire occurring and influences the consequences of a fire. Inspection and maintenance of a building and its fire protection systems may well affect fire behavior; clear path to exits, operating fire extinguishers, fire sprinklers, detection system, and operating emergency lighting, all rely on maintenance and inspection on a regular schedule.

The fire marshal of EFR oversees the fire and life safety plan reviews for new construction and site development. Reviews include all new development and transportation construction projects in Evans. The fire marshal monitors fire and life safety code compliance during the construction of buildings with periodic inspections. Building permits and final occupancy permits will be approved by the Evans Building Department only with approval and sign-off of the EFR. The process is well established, and provides the fire department with involvement in new construction in the City

Positive Attribute 8: Establishment of routine meetings between the fire marshal/fire chief and the building department has created a positive, effective, and progressive working relationship.

The building department and fire department use the 2003 International Codes. Adoption of the 2009 codes is in process. It is anticipated they will be approved in 2010. A major change in the 2009 edition is the inclusion of requirements for the installation of residential sprinklers in new housing units.

While sprinklers are required under the International Fire Code (IFC) in most commercial buildings, over three-fourths of the fire deaths experienced each year in the United States occur in single-family homes, where sprinklers are not required. Sprinkler systems provide a level of protection that is often overlooked. The installation of residential fire sprinklers in homes is by far the most effective way to prevent the loss of lives and property and is becoming a trend in many communities across the country. With new system designs, the cost of sprinklers has become readily affordable and their reliability and effectiveness is exceptional.

There are many misconceptions regarding sprinkler systems, ranging from expense, appearance, and how they operate. A study on the effectiveness of residential sprinklers was conducted in Prince George's County, Maryland. In 1992, Prince George's County enacted an ordinance mandating the installation of automatic fire sprinkler systems in new one and two-family structures. Prince George's County's experience with this ordinance between 1992 and 2007 is below.

> *The most obvious benefit of the ordinance is the direct impact that home fire sprinkler systems have made in saving lives and reducing fire-related injuries. From 1992-2007 there were 101 fire deaths and 328 civilian injuries in single-family or townhouse fires that were not protected with fire sprinkler systems. No fire deaths occurred in sprinklered structure fires during the period studied, and there were only six civilian injuries.*
>
> *Property protection is another important benefit. Looking at the average loss per event in a structure that did not have a residential sprinkler system installed, the damages averaged $9,983 per incident and $49,503 per incident when there was a fatality. The average loss for a single-family/townhouse structure protected by fire sprinklers was $4,883 per event. Having sprinklers cut the property loss by almost one-half.*[43]

ESCI recommends that the City of Evans adopt and enforce the 2009 IFC; including the provisions for residential sprinklers.

Recommendation 43: Adopt the 2009 International Fire Code, including the provisions for residential sprinklers.

[43] Benefits of Residential Fire Sprinklers: Prince George's County 15-year History; page 9.

Existing Occupancy Inspection Program

Occupancy inspections are designed to find and mitigate potential fire hazards, thus preventing or reducing the loss from fire. The health, safety and welfare of citizens and firefighters are in the balance. Facilities that house processes for or storage of hazardous materials often require a permit to operate. Inspections to assure compliance with applicable codes ensure that activities are carried out in the safety possible manner.

ESCI found EFR recognizes the importance of conducting fire and life safety inspections on a routine basis; however, inspections are not being conducted.

Fire departments use inspection time as an opportunity for education of occupants and to mitigate hazards in existing buildings. Inspections of commercial, industrial, places of assembly, and facilities open to the public are designed to identify and eliminate potential fire hazards before an emergency occurs. They are the next line of defense after plans review and inspections during construction.

The recommended frequency of fire safety inspections varies by the type of occupancy. Generally, inspections are classified by the degree of hazard. The following table (Figure 39) indicates the recommended frequency of inspection, by hazard class and facility type:

Figure 39: NFPA Recommended Inspection Frequency

Hazard	Example Facilities	Frequency
Low	Apartment common areas, small stores and offices, medical offices, storage of other than flammable or hazardous materials.	**Annual**
Moderate	Gas stations, large (>12,000 square feet) stores and offices, restaurants, schools, hospitals, manufacturing (moderate hazardous materials use), industrial (moderate hazardous materials use), auto repair shops, storage of large quantities of combustible or flammable material.	**Semi-annual**
High	Nursing homes, large quantity users of hazardous materials, industrial sites with high process hazards, bulk flammable liquid storage, facilities classified to handle “extremely hazardous substance.”	**Quarterly**

EFR has an inspection program in place for the periodic inspections of existing facilities (primarily as part of issuing business licenses); however, it does not implement the program on a regular or routine schedule. The department goal is to inspect the higher risk occupancies, including assemblies, schools, and buildings that have sprinkler or detection systems annually.

The fire marshal indicated that he strives to meet the stated inspection frequency but does not. The reason given is his current workload and the fact that he has several other project assignments.

The frequency of inspections is less that the NFPA recommended standard. ESCI recommends that EFR establish inspection goals to align with the NFPA standards. While we recommend striving to achieve the NFPA standard, it is acknowledged that the lack of personnel assigned to inspections may preclude meeting the goal at this time.

Recommendation 44: Adopt the NFPA recommended inspection frequency standard.

The number of inspections conducted by EFR in 2008 was not determined. All inspections were conducted by the fire marshal. A common method of inspecting low hazard occupancies is via on-duty firefighters and company inspections. Company level inspections serve several purposes: building familiarization; pre-fire planning and training; identification of conditions that violate the fire code and may lead to a fire or endanger lives; and to supplement inspections by the fire prevention division. Normally company inspections are conducted in the company's first due response area, keeping them available for immediate response.

Company inspections are not assigned to the on-duty crew(s). Company inspections should include the low and a portion of the moderate hazard category of occupancies (Figure 39: NFPA Recommended Inspection Frequency). ESCI recommends that the fire department establish a company inspection program.

Recommendation 45: Establish a company inspection program.

Fire and life safety inspections that include high hazards, unusual, detailed, or complex technical inspections are generally completed by fire marshal or fire chief. The fire marshal conducts special risk inspections as requested. Special risks include flammable liquid storage tanks, examination and permitting, among a variety of other technical inspections.

ESCI recommended that a segment of the inspections could be conducted by on-duty firefighters (company inspections). The fire marshal is experienced and trained to complete

inspection work; this is not the case for operational/suppression personnel. It is reasonable that operational crews are not held to the same training and educational levels as fire prevention personnel. However, operational personnel should receive in-house instruction in conducting fire and life safety inspections. Given the technical nature associated with inspection work, the department should assure that personnel who have inspection roles are adequately trained. ESCI recommends EFR train and certify line personnel to conduct fire and life safety inspections.

Recommendation 46: Train and certify EFR line personnel to conduct fire and life safety inspections.

Some fire departments use a self-inspection program for smaller, low risk occupancy inspections. Properly administered, these programs are effective in addressing inspection concerns in small business occupancies while reducing the workload on prevention staff. ESCI recommends that EFR evaluate successful programs and institute the one most compatible with its current inspection program.

Recommendation 47: Consider establishing a self-inspection program for small, B-type occupancies.

Public Education Program

Providing fire and life safety education to the public to minimize the occurrence of fire and increase emergency preparedness should be a priority for all fire agencies. Given the potential loss to a community, prevention provides the best chance for minimizing the affect of hostile fires, medical emergencies, and natural and man-made disasters. All segments of the community's population should receive education that is demographically appropriate.

EFR's fire prevention division includes a fire and life safety program that is under the direction of the fire marshal. ESCI found the program to be generally comprehensive (the framework of the program is in place but lacks the personnel and training).

EFR's priority on fire and life safety education is high but has limited resources. The department should determine how to provide additional resources, albeit in a time of economic challenge. The use of additional volunteers, Fire Corps, and cooperative efforts with surrounding jurisdictions should also be considered.

Recommendation 48: Evaluate opportunities for cooperative fire prevention and public education efforts with surrounding jurisdictions.

Components of the public education programs offered by EFR are summarized in Figure 40.

Figure 40: NFPA Fire Prevention and Public Education Programs

Public Education Program Components	EFR
Calling 9-1-1	No
EDITH (exit drills in the home)	No
Smoke alarm program	Yes, limited; no carbon monoxide program
Fire safety (heating equipment, chimney, kitchen/cooking, etc.)	Yes, limited
Injury prevention (falls, burns, bike helmets, drowning, etc.)	Limited, a child car safety seat program with nearly all career personnel trained as CPS technicians
Fire extinguisher use	Yes, Demonstrations for business upon request and routine at Envision
Fire brigade training	No
Elderly care and safety Informal	No.
Curriculum used in schools	No
Baby-sitting classes offered	No
CPR, blood pressure checks	Yes, blood pressure checks are provided by engine company personnel
Publications available to public	Yes
Bilingual information available	Yes, Spanish and English
Annual report distributed to community	No
Juvenile fire setter program offered	Yes

As detailed in the table above, EFR addresses some of the elements of an effective fire/injury prevention education program. The department understands the scope and value of a comprehensive public education program, however, the difficulty is balancing limited resources to needs. Programs provided by EFR beyond those previously listed follow.

Child Passenger Safety Program

Motor vehicle injuries are the leading cause of death among children in the United States.[44] Scores of these deaths can be prevented, by placing children in age and size appropriate car seats and booster seats reduces serious and fatal injuries by more than half.[45] Many child safety seats are not installed properly. EFR is proactive in addressing this problem, by

[44] CDC. Web-based Injury Statistics Query and Reporting System, National Center for Injury Prevention and Control, Centers for Disease Control and Prevention. www.cdc.gov/ncipc/wisqars.
[45] Department of Transportation (US), National Highway Traffic Safety Administration (NHTSA), Traffic Safety Facts 2006.

certifying some career staff as Child Passenger Safety (CPS) technicians. Certified technicians check for and provide assistance with proper installation of car and booster seats. The department offers certified CPS technicians during scheduled check-up events, by appointment, and drop-in visitors to the fire station.

An objective identified by the EFR staff is to continue to support this program to meet the continued need of city residents. Department members report that this is probably the single most important public education service the department provides to the community.

Positive Attribute 9: The fire department is proactive by providing a Child Passenger Safety (CPS) program.

Fire Station Tours

Tours of the fire station are available for residents of the city upon request. Requests may also be made for personnel to visit at birthday parties, community activities, health fairs, and other special events in the city.

Fire Prevention week in October is the busiest month for public education activities. During the month, EFR personnel conduct fire prevention activities at Evan's schools.

Puppet and Characterization Team

EFR is a member of the Northern Colorado Fire Safety Training Association (NCFSTA). Through this association, the department participates in the Puppet and Characterization Team; Just for Life and Fire Safety (Just for LAFS). Just for LAFS is NCFSTA's puppet and characterization team. Team members plan and present to elementary aged students programs on topics related to injury prevention. One team member is an Evans firefighter trained as a clown. As a member, the department is able to bring the team's expertise to the city. This education program is important as all of the schools in the City of Evans are elementary.

Smoke Alarm Program

Smoke alarms are a very effective means of decreasing fire-related fatalities. A fire breaks out every 20 seconds in the United States, and most of these fires occur in residential occupancies. In 2008 fires caused 3,320 civilian deaths and 16,705 civilian injuries.[46] During the past two decades, there have been a decreasing number of fire-related fatalities in the U.S. In 1971,

[46] NFPA, An Overview of the U.S. Fire Problem January 2009

there were approximately 9,000 fire deaths in the U.S.; in 1978 there were 8,100; in 1990 there were 5,195; and in 2001 there were 3,745.[47] At least 83 percent of all fire deaths occur in residences.[48] This decreasing trend in residential fire fatalities is primarily due to the increased use of smoke alarms.

In 1975, less than 5 percent of homes in the U.S. had working smoke alarms. Approximately 20 percent of homes had smoke alarms in 1977. This number increased to 50 percent by 1980 and 80 percent in 1990. As of 2000, approximately 88 percent of U.S. homes have at least one smoke alarm. Currently, 80 percent of the residential fire deaths occur in occupancies where no working smoke alarm is present. Unfortunately, there is still a long way to go with smoke alarms. Seventy percent of residential fires occur in homes without a working smoke alarm. Working smoke alarms are least often found in the residences that need them the most.[49] Every home in the Evans should be equipped with a working smoke detector.

EFR provides smoke detectors to some individuals and families, though there is no a formal program in place. Department members conduct testing of smoke detectors and replace batteries (by request) for residents who need assistance. However, the smoke alarm program does not appear to be well communicated to the community and specifically the at-risk population. The needs of these citizens often dictate special features in the design of smoke alarms or in other aspects of smoke alarm programs. Those at-risk populations include:

- Children, differentiating young children from older children
- Older adults
- Disabled populations (addressed by disability type)
- Non-English speakers
- Adults with low literacy levels in their native language
- Renters, whose protection may be partly or wholly the responsibility of a landlord

EFR should develop a program and actively publicize and target at-risk citizens.

Recommendation 49: Develop a smoke detector program that actively publicizes and targets the at-risk citizens of Evans.

[47] NFPA, Fire Analysis and Research Division, Fire Loss in the United States During 2001, 2002, page 2.
[48] NFPA, Fire Analysis and Research Division, January 2009.
[49] USFA, 1994.

Public Information and Media Relations

Public relations are the responsibility of all members of EFR. Educating citizens on the services provided by the department and how to support those services can play a critical role in determining whether there is a successful outcome to an emergency incident-when and how to call 9-1-1, planning and practicing home escape plans, and CPR instruction. Public information is important in developing positive public attitudes about the department and fire and life safety in general. Establishing and maintaining a good working relationship with the news media will assist in meeting the department's public education goals and communicating with citizens it serves.

Evans mails monthly utility bills to residents of the city. The fire department can include inserts with public education and fire prevention information. This would be an effective means to publicize and promote the Smoke Detector and Child Passenger Safety programs.

Public Information Staff

The City has a public information team composed of representatives from the city manager's office, police, fire, public works and parks and recreation. The fire chief is the current chairperson of the PIO (public Information Officer) team. PIO functions that impact only one area are handled by the department PIO team representative. City PIO duties that cross functions are handled by the team spokesperson selected dependant on the subject, intensity of the issue, and availability.

The fire marshal and one operations firefighter are assigned to public education. One way to address the need for additional personnel for public education is with operational and non-operational volunteers. This practice has proved helpful and effective to many fire departments.

Recommendation 50: Consider adding volunteer personnel to the public education program.

Effective public education delivery should be connecting educational content to fire causes and risks identified in the community. Fire and life safety risk is not necessarily the same in all communities; customizing public education efforts to community needs, experiences, and trends is valuable. The department's public education program and the operations division are not

closely aligned in this regard. ESCI recommends that steps be taken to connect fire cause experience with fire prevention and public education planning.

Recommendation 51: Connect fire experience and prevention/public education activities.

Statistical Collection and Analysis

The primary purpose for maintaining a record of emergency responses is to evaluate the effectiveness and performance of fire/rescue prevention and suppression programs. This effort includes deployment strategies, training requirements, and the effectiveness of fire prevention, code enforcement, fire investigation, and fire and life safety education programs. If a coordinated data collection and analysis process is in place, incident records can be analyzed to determine a number of important incident factors, including:

- Types of incidents and frequency of occurrence
- Types of properties most often involved
- Fire causes
- Types of injuries and the age of the person affected

EFR uses Emergency Reporting System® (ERS) records management system (RMS) to record emergency response data, training information, and various other fire department activities. This includes the department's fire prevention activities.

Fire cause and origin information is documented in ERS® and included in the department's NFIRS record of the incident. Doing so provides the ability to monitor why fires are occurring in a given area, allowing the prevention division to target fire prevention and public education activities to areas of concern.

EFR appears to appropriately use the ERS® program in management of fire prevention division records. However, the fire prevention division related to ESCI that data is not routinely analyzed. Analysis should be used to identify fire risk and occurrence issues and then correlate those findings to the department's planning activities. It is recommended that the department increase the use and analysis of collected data for operational and planning purposes.

Recommendation 52: Incorporate the use of prevention data and findings into department operations and planning activities.

The department uses a community survey instrument to provide post incident feedback on services they have provided. A survey is mailed out at the conclusion of incidents where a verifiable address of the customer is known. ESCI believes that improvements could be made to the instrument to provide information on EFR programs and citizen concerns. We recommend the continued use of a feedback instrument for improving program effectiveness and meeting customer needs and expectations.

Recommendation 53: Modify the community survey instrument to capture feedback from the public on programs, services, and citizen concerns.

The department is in the process of establishing a citizen advisory committee. The advisory committee will be used to provide input on various programs, projects, services of the department. ESCI believes this can be a great resource and advocate group for EFR.

Recommendation 54: Finalize plans and establish a citizen advisory committee.

A well maintained historical record serves as a valuable tool for planning and decision making. It allows quick recollection of how the division has adapted to changes in the community and provides valuable historical data to outside agencies (such as Insurance Services Office) for evaluation purposes. It also allows for permanent memory of the people who have contributed to the success of the division in its service to the community. A well produced annual report on prevention activities can serve to satisfy this need. Additionally an annual report is an excellent communication tool to share the efforts and activities with the division with both the City Council and the public.

At a minimum the division annual report should include:

- Brief overview of the division
- Summary of events and activities during the report year
- Description of major programs and projects of the division

- Description of new or improved services and programs
- Financial summary, including revenues (permit and inspection fees) and expenditures, grants, hazardous material funding
- Statistical analysis, with trends, of key community service level indicators

Recommendation 55: Publish an annual fire prevention report containing an overview of major events, significant changes, and analysis of performance trends.

Fire Cause Determination

Fire prevention programs involve investigating how fires start, then targeting inspection and education programs to mitigate identified causes of fire. Fire cause determination results may suggest education, code changes, fire department training needs, resource and deployment strategies, and help to identify community fire problems.

The fire marshal for EFR has responsibility for determining the cause and origin of a fire. The fire marshal is an experienced investigator and is assigned as the lead investigator, with the fire chief and operations captains acting as fill-in and back up. Weld County has a fire investigation team that the department participates in and can use in the event of a major fire or when additional assistance is needed. Evans Police Department assists and provides law enforcement expertise.

Historically department fire prevention staff have been provided fire cause determination education but without minimum education and certification requirements. ESCI recommends that EFR have equipment and follow fire investigation practices and procedures as recommended in *NFPA 921*.[50]

[50] *NFPA Standard 921*, *Conducting Fire Investigations*, Section 12.4.1

Figure 41 is a summary of fire causes for all fire during the four-year period of 2005 through 2008.

Figure 41: Historical Fire Cause – All Fires, 2005 – 2008[51]

Cause of Ignition	Count	Percentage of all Fires
Cause, Other	7	3.0%
Intentional	20	8.0%
Unintentional	33	14.0%
Failure of Equipment or Resource	17	7.0%
Cause under Investigation	14	6.0%
Cause Undetermined under Investigation	17	7.0%
Average Number of Fires per Year	**59**	
Total Incidents	**236**	

For the years reviewed (2005 – 2008), only 45 percent of fire incidents had the origin and cause reported.

Figure 42: Historical Fire Cause – Structure Fires, 2005 – 2008[52]

Cause of Ignition	Count	Percentage of all Fires	Estimated Total Loss $	Percentage of all Fire Losses
Cause, Other	1	3%	90,000	18%
Intentional	2	6%	500	0.1%
Unintentional	10	28%	309,300	61%
Failure of Equipment or Resource	5	14%	0	0%
Cause under Investigation	5	14%	111,000	22%
Cause Undetermined under Investigation	2	6%	0	0%
Average Number of Fires per Year	**9**		**Average $ loss per Year**	**$127,700**
Total Incidents	**36**		**Estimated Total Loss:**	**$510,800**

For the years reviewed (2005 – 2008), only 71 percent of structural fire incidents had the origin and cause reported.

Operational personnel of the department have limited training in fire cause and origin determination. Generally, all investigations are handled by the fire marshal, fire chief or on-duty captain. While the practice is appropriate, it is expected that operational personnel receive basic fire cause determination training. The ability of suppression personnel to recognize an

[51] Losses were reported only on structure fires for the years 2005 – 2008.
[52] Losses were reported only on structure fires for the years 2005 – 2008.

accidental fire or one of a suspicious origin is important. The department is encouraged to assess the adequacy of the fire cause determination skill set and training of line personnel.

Recommendation 56: Assess the adequacy of operational personnel's fire cause determination skill set and training.

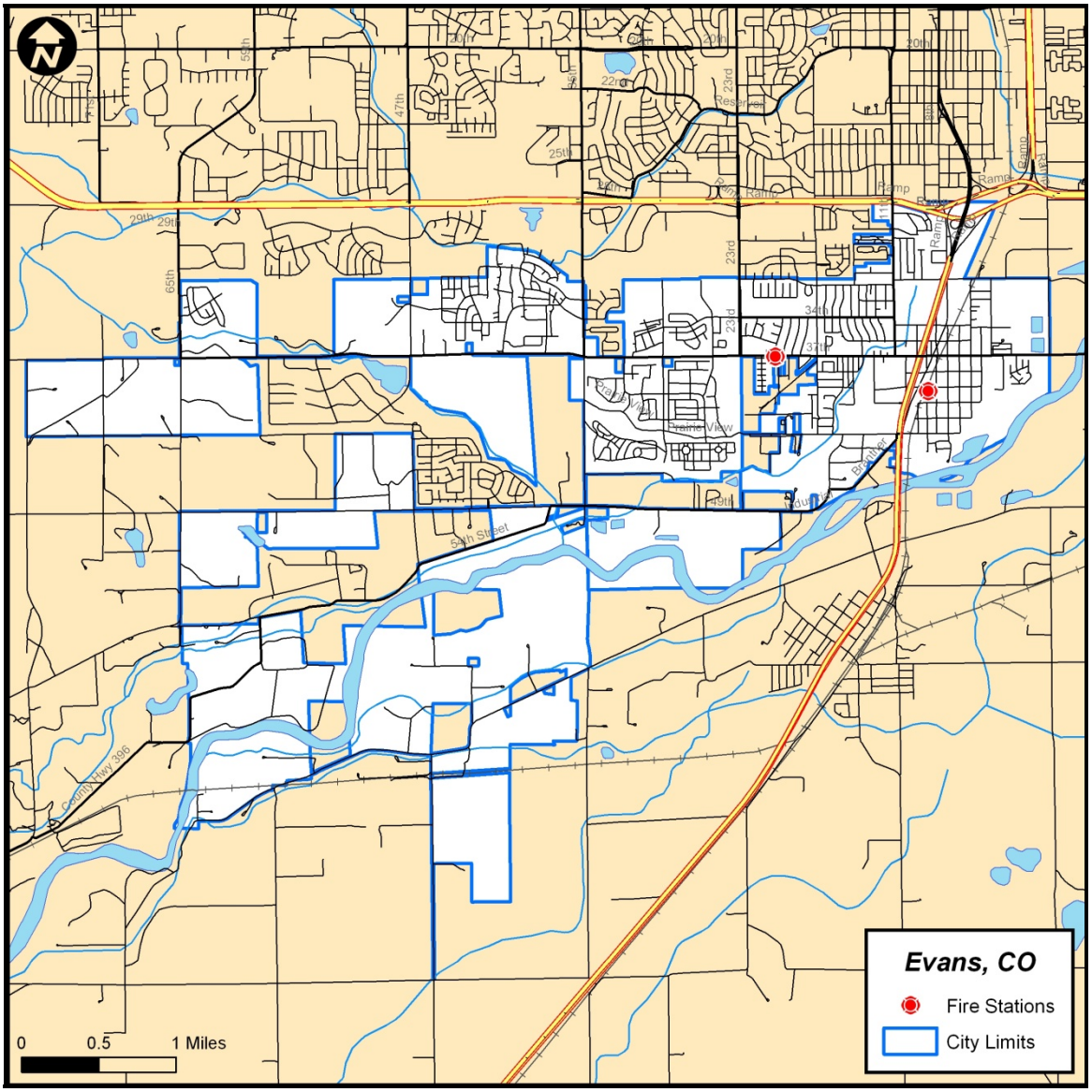
Current Deployment Strategies and Performance

In this section, an analysis of current conditions as they relate to the Evans Fire Rescue's facility resources, service demand, and performance is conducted.

Distribution Analysis

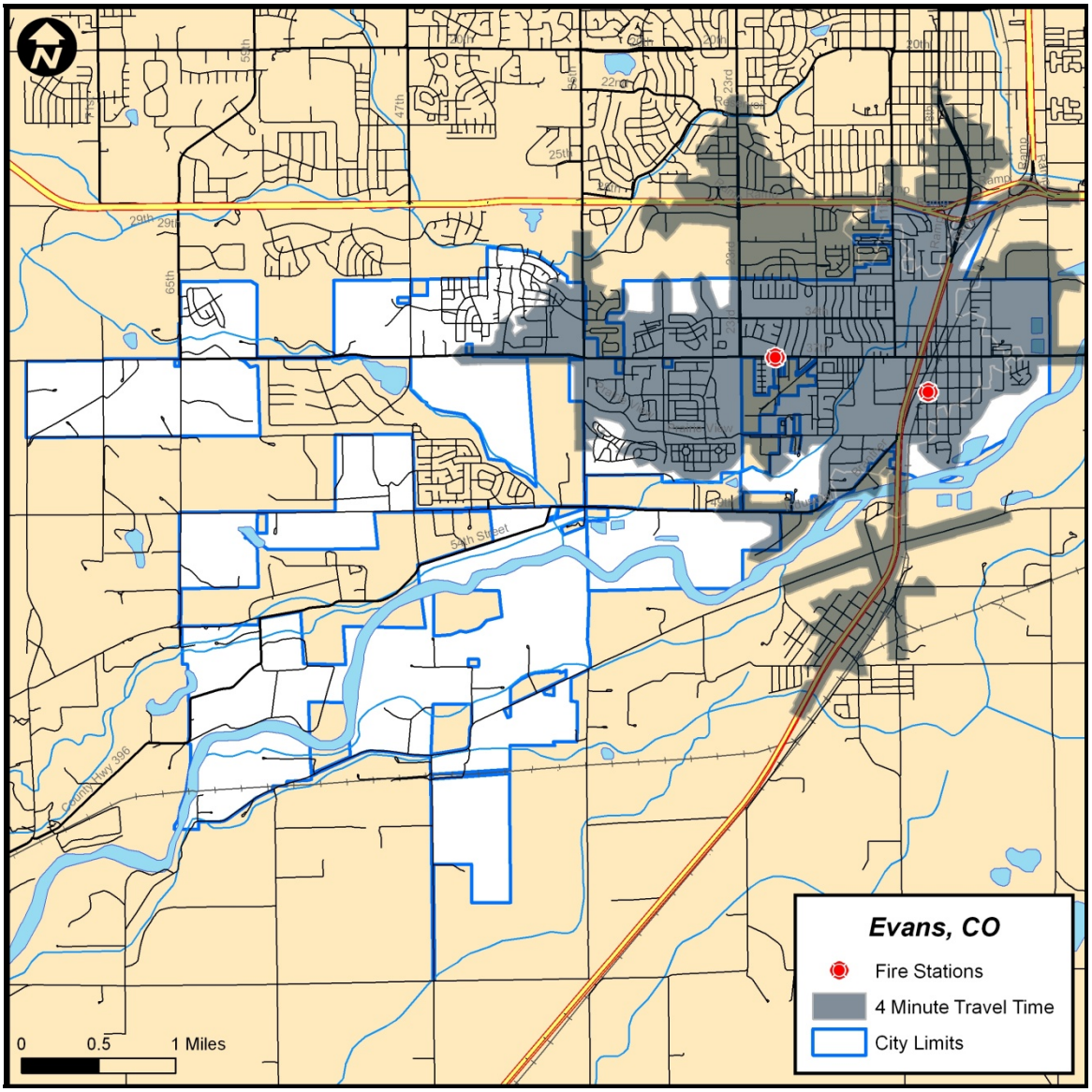
Evans Fire Rescue operates two facilities in a 10.5-square mile area that are located in the confines of the City of Evans due south of the City of Greely, Colorado. The following figure (Figure 43) depicts the fire stations locations inside the city limits.

Figure 43: Current Facility Deployment



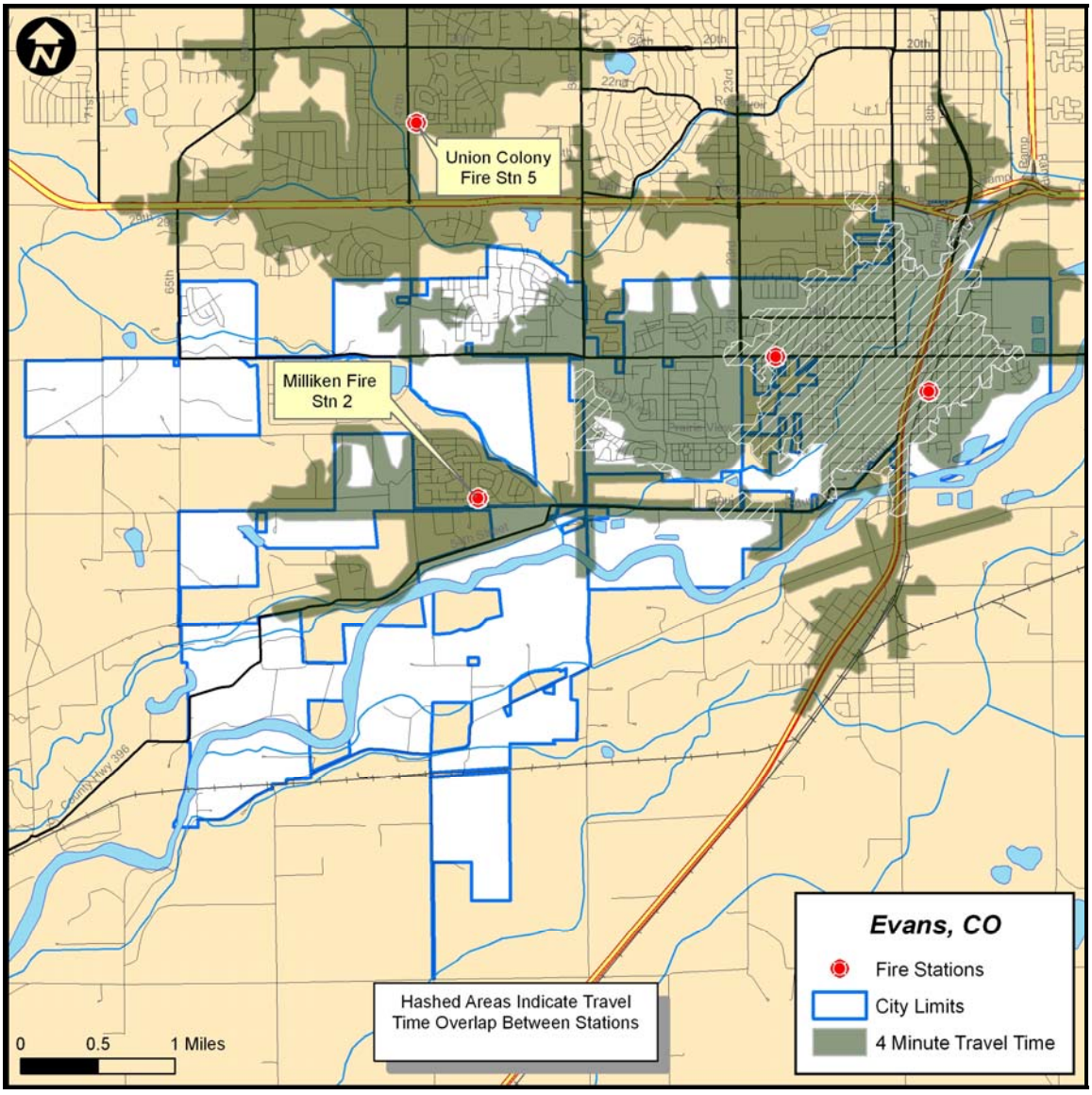
The extent of the city that can be reached in a certain travel time exists from each fire station regardless of staffing patterns. The following map (Figure 44) demonstrates the travel time capability of emergency apparatus when it leaves the firehouse. Adjustments to speed capability of the streets were made to account for negotiating turns and intersections.

Figure 44: Travel Time Capability



A four-minute travel time was used as the response time for EFR. Much of the developed area in the city can be reached in that timeframe. A notable exception is the western extent of the city, which would require additional travel time. However, nearby fire stations for the Union Colony Fire District in Greeley and Milliken Fire Protection District can also reach into areas of Evans in the same timeframe as illustrated by the following figure (Figure 45).

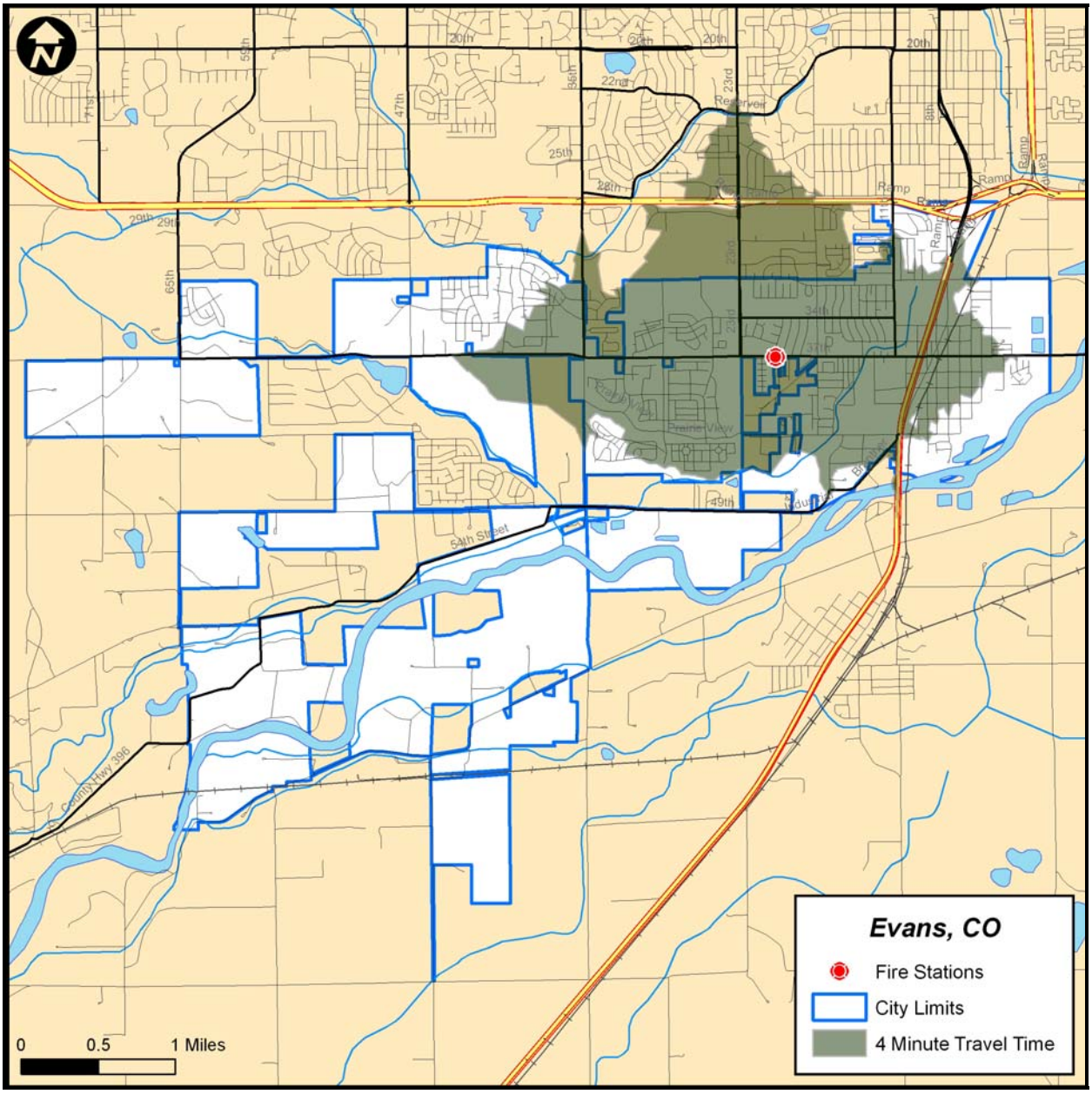
Figure 45: Travel Time Capability from Mutual Aid Fire Stations



There is an area between the two EFR fire stations that have overlap travel time coverage. Considering the current staffing pattern where Fire Station No. 1 is used as an unstaffed resource, this is not an issue. Apparatus responding from Fire Station No. 2 can reach the eastern area if availability of volunteers staffing Fire Station No. 1 is an issue.

Figure 46 shows the travel time capability of EFR Fire Station No. 2 independent of Fire Station No. 1.

Figure 46: Travel Time Capability Fire Station No. 2



A portion of the east and southeast section of Evans is outside of a four-minute travel time from Fire Station No. 2.

Distribution Analysis – Community Fire Protection Insurance Rating

The next set of maps examines EFR's coverage based upon credentialing criteria for the Insurance Services Office (ISO). The ISO reviews the fire protection resources within communities and provides a Public Protection Classification™ (PPC) rating system from which insurance rates are often based. The rating system evaluates three primary areas: the

emergency communication and dispatch system, the fire department, and the community's pressurized hydrant or tanker-based water supply.[53]

The following figure (Figure 47) shows how insurance premiums might vary for two typical structures under a couple of insurance companies' current rating schedules. While these figures are reasonable examples of the impact the PPC™ can make on insurance premiums, the value of the premium credits for the different PPC™ ratings will vary between insurance companies. This example chart was obtained from a report published by the League of Minnesota Cities entitled "The ISO Fire Protection Rating System".

Figure 47: Representative Insurance Premiums by Fire Protection Class

Fire Class	$150,000 Residence	$1,000,000 Office Building
1	$670	$2,950
2	$670	$2,980
3	$670	$3,020
4	$670	$3,040
5	$670	$3,060
6	$670	$3,120
7	$670	$3,230
8	$777	$3,330
9	$972	$3,440
10	$1,072	$3,710

According to the report, there are some points to note regarding the insurance premium chart above:

- *In this schedule, no additional credit is given on residential property for a fire class better than 7. The reason has largely to do with the role that water supply plays in the ratings. Having a better water supply helps in fighting fires in larger commercial structures, and therefore is reflected in a better rating. But for most residential fires a lesser water supply is actually needed, and having more than that available really doesn't help the fire department fight that particular residential fire any better. There's some variation among insurance companies (e.g., some might allow additional credit for class 6, others might lump classes 7 and 8 together for rating purposes, etc.) but this general pattern is fairly typical for residential premium structures.*
- *Not all insurance companies use the ISO classifications. This is especially true for residential coverage. Some companies have their own rating systems based on their own historical loss data for the area rather than on an evaluation of the fire protection in*

[53] A full discussion on EFR's ISO rating can be found in the section titled, Insurance Services Office (ISO).

the area. Other insurance companies use their own systems for rating the fire protection for a particular property; a company might classify properties based on the individual property's distance from a fire station and water supply, for example.

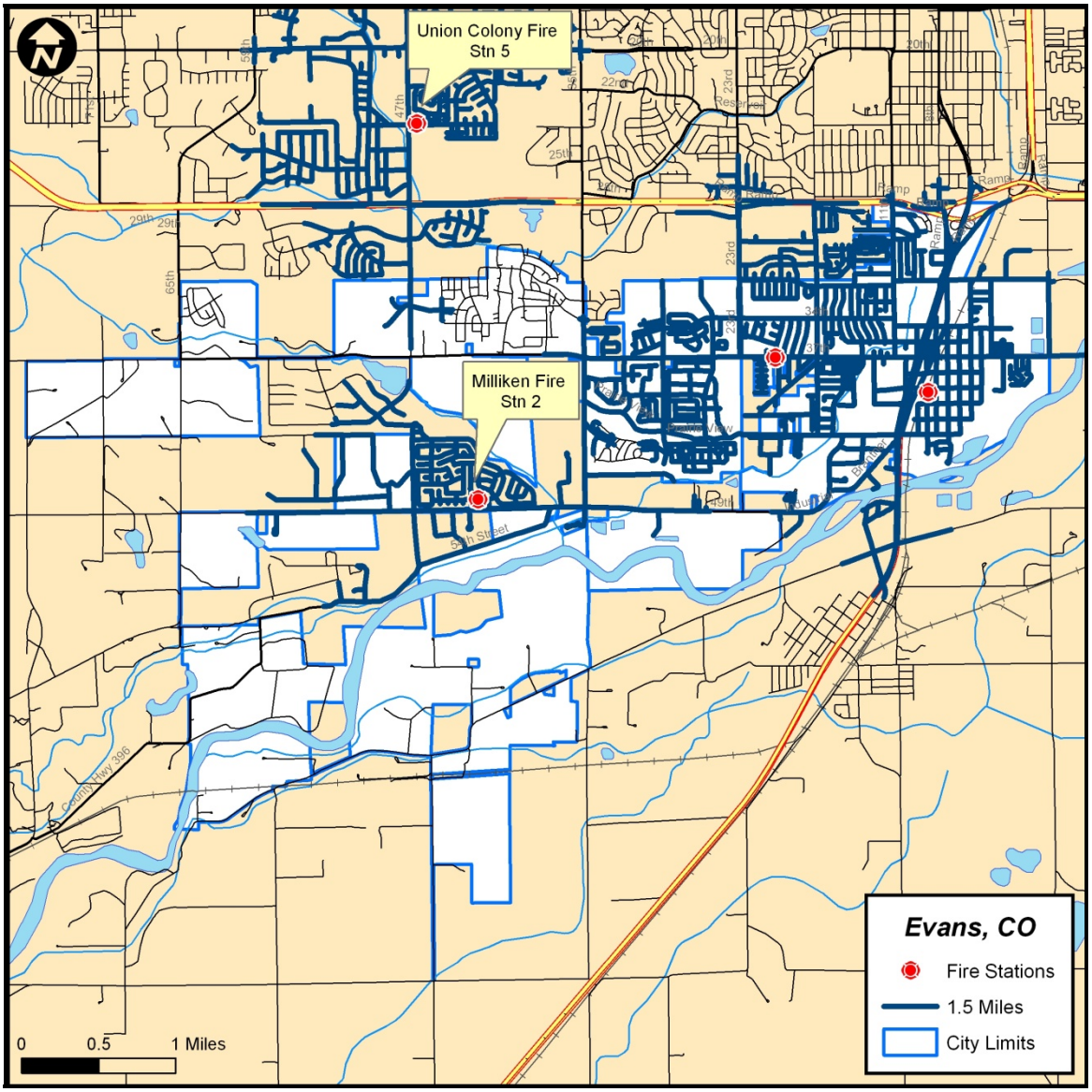
The location of fire stations affects ISO ratings through engine and ladder company distribution credit in Section 561 of the PPC™ schedule. This section accounts for just a four-point maximum out of 50 possible points for the fire department. Because of the relatively few points awarded for distribution, it is rarely the most effective way to pursue PPC™ improvement. For example, the number of personnel available (Section 570) is worth 15 of the possible 50 points, and firefighter training (Section 580) is worth 9 points. In a typical fire department, significant improvements in the quality, quantity, and documentation of training can result in greater credit improvements at much less cost than the addition or movement of fire stations to improve credit under the distribution section.

While distribution credits in the PPC™ may not be the most important factor in the decision to add facilities, this issue affects the community's rating classification and should be given consideration.

An examination of travel coverage based upon the PPC credentialing criteria by the Insurance Services Office reveals that to receive maximum credit for coverage, all "built-upon" portions of a community need to be within 1.5 road miles of an engine company and 2.5 road miles of a ladder or service company. In order to determine the distribution of engine companies across built-upon areas, ISO reviews the response area of each existing engine and identifies the number of fire hydrants within that area. ISO analyzes whether there are geographic areas of a city/district outside of the existing engine company response zone where at least 50 percent of the number of hydrants served by the largest existing response area that could be served by a new engine.

For ISO purposes, the response area is measured at 1.5 miles of travel distance from each engine company over existing roadways. In order for a structure to be in a protected rating for insurance purposes, it should be within five miles of a fire station. There are a few areas of the contract service areas that would be affected by a five-mile distance.

Figure 48: ISO Engine Distance Coverage, 1.5 Miles



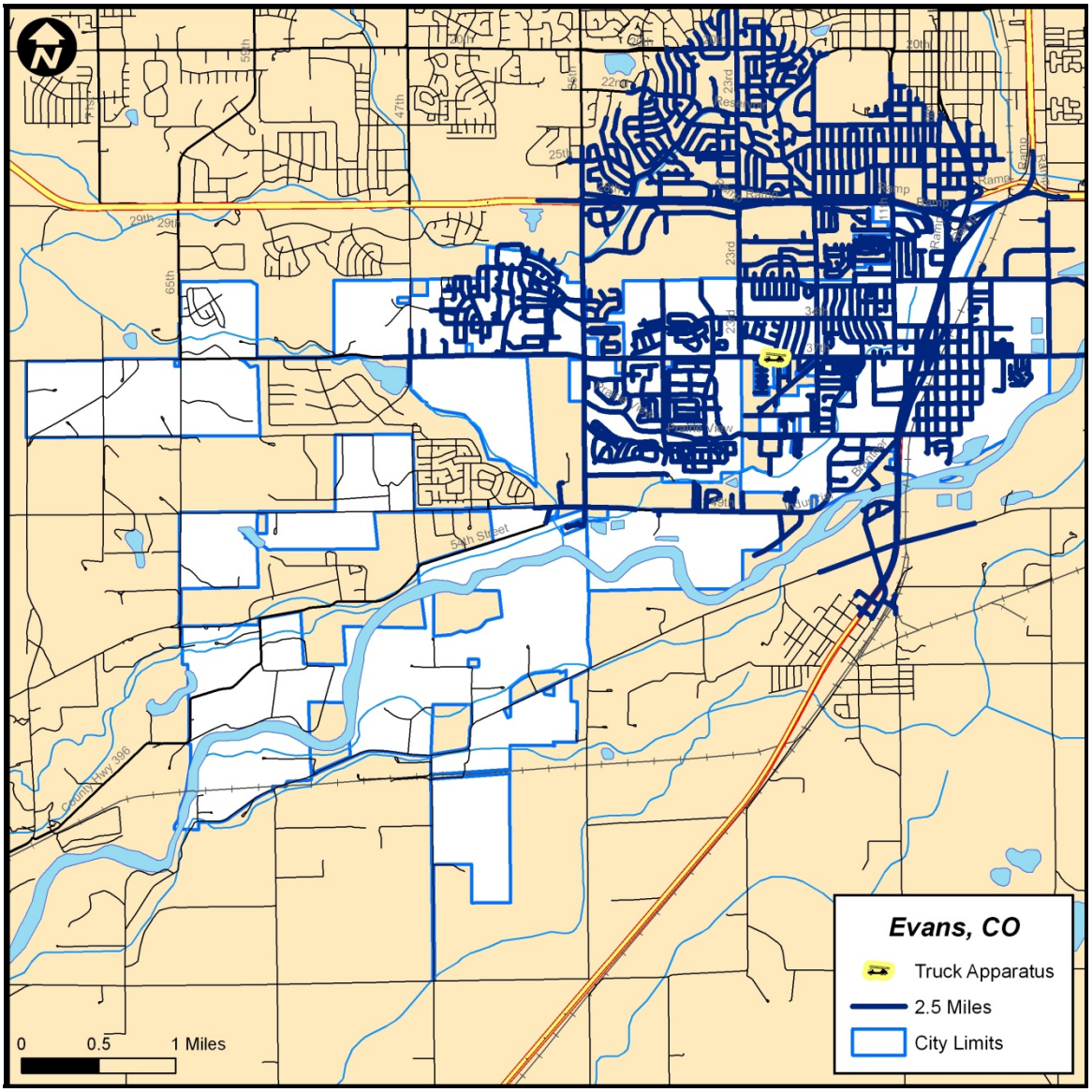
Some sections of the City in the west, northwest, and south are outside of a 1.5-mile travel distance from a fire station. The largest area being more recently developed portions in the northwest section of the City.

Similarly, to achieve optimum credit for the number of truck companies,[54] ISO reviews the response area of each existing ladder company and identifies the number of fire hydrants within

[54] The term ladder truck is synonymous with ladder, aerial device, elevating platform, and aerial platform. The terms have to do more with the equipment carried on the apparatus and the tasks they are used for on the fire ground.

those zones. ISO analyzes whether there are additional geographic areas of the City outside of existing ladder response areas where at least 50 percent of the number of hydrants served by the largest existing response area could be served by a new truck. For ISO purposes, the response area is measured at 2.5 miles of travel distance from each ladder company over existing roadways.

Figure 49: ISO Truck Distance Coverage, 2.5 Miles



A ladder company is not required to have an elevating ladder or aerial device unless there are a sufficient number of buildings that would meet the three-story height and square footage limits. Other areas can receive similar credit for a service company without the requirement of an elevated device. Partial credit is possible if other apparatus, such as an engine, carry a

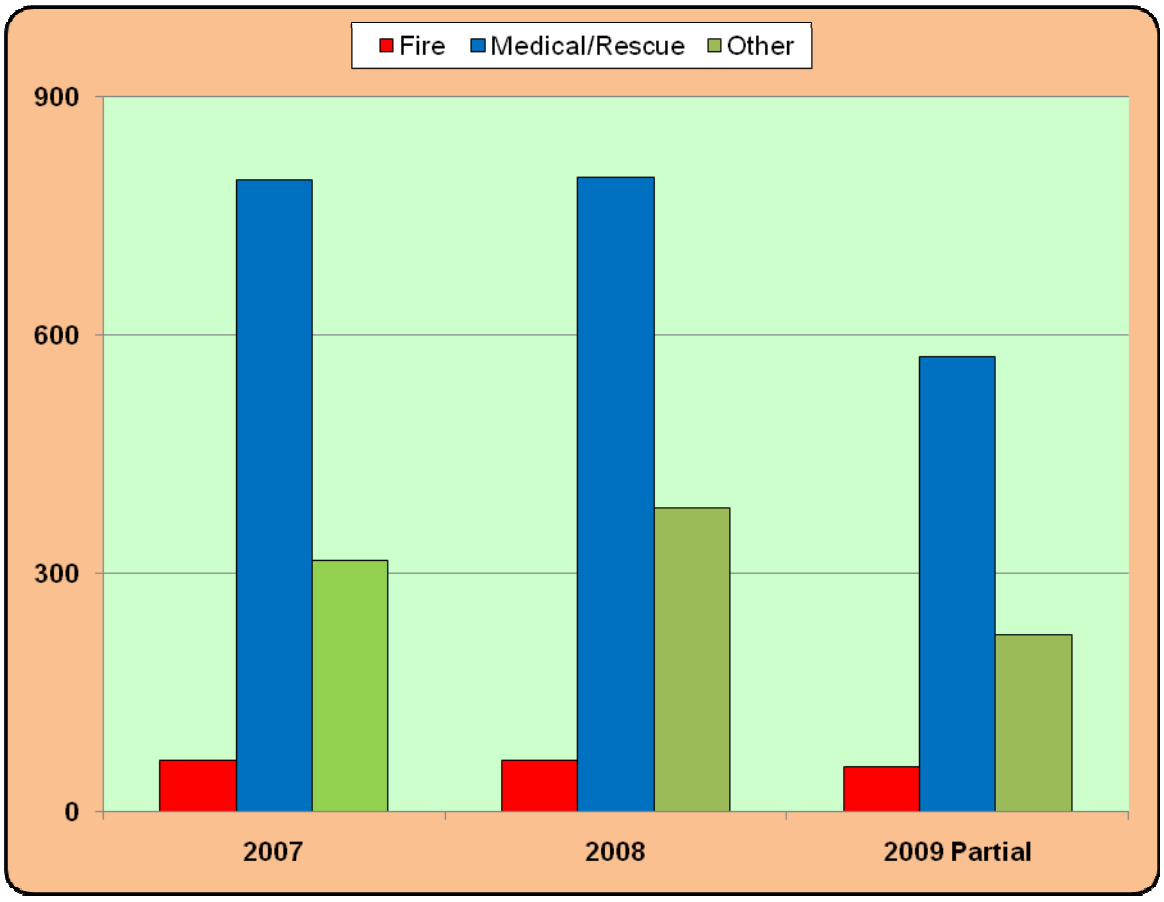
complement of service company equipment. This is important for the City of Evans as the elevating portion of the ladder truck was removed from service shortly after ESCI's visit.

Recommendation 57: Determine how Evans Fire Rescue will provide aerial device coverage to the City. Options include: repair existing truck, purchase a new aerial device, automatic aid, or contract for service via an intergovernmental agreement.

Demand Analysis

EFR provided access to its ERS (Emergency Reporting System) for call data between 2007 and partially through 2009. The following details the volume of calls by type over the last 2.75 years.

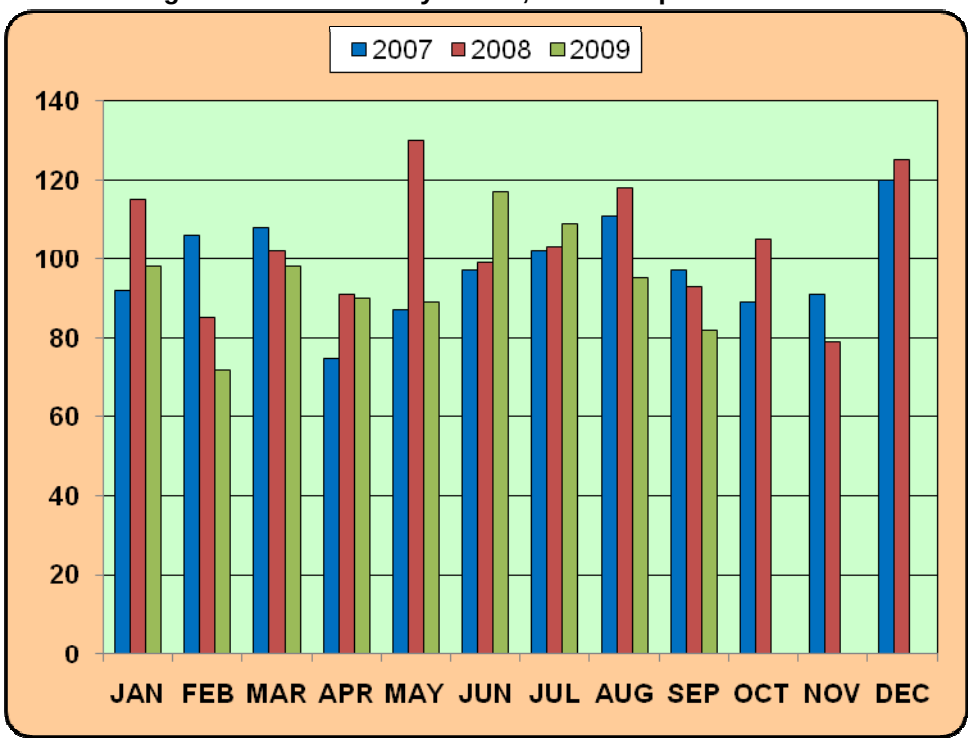
Figure 50: Historical Workload, 2007 – September 2009



The number of actual fire incidents has remained relatively stable, which is evidence of code enforcement and public prevention education activities. For the study period calls for medical assistance made up the majority of the total incidents. This is not unusual for fire departments which provide either first responder EMS or ambulance transport services.

A review of incidents by time of occurrence reveals when the greatest response demand is occurring. The following charts show how activity and demand changes for EFR based on various measures of time. ESCI began by breaking down the yearly workload into monthly increments (Figure 51).

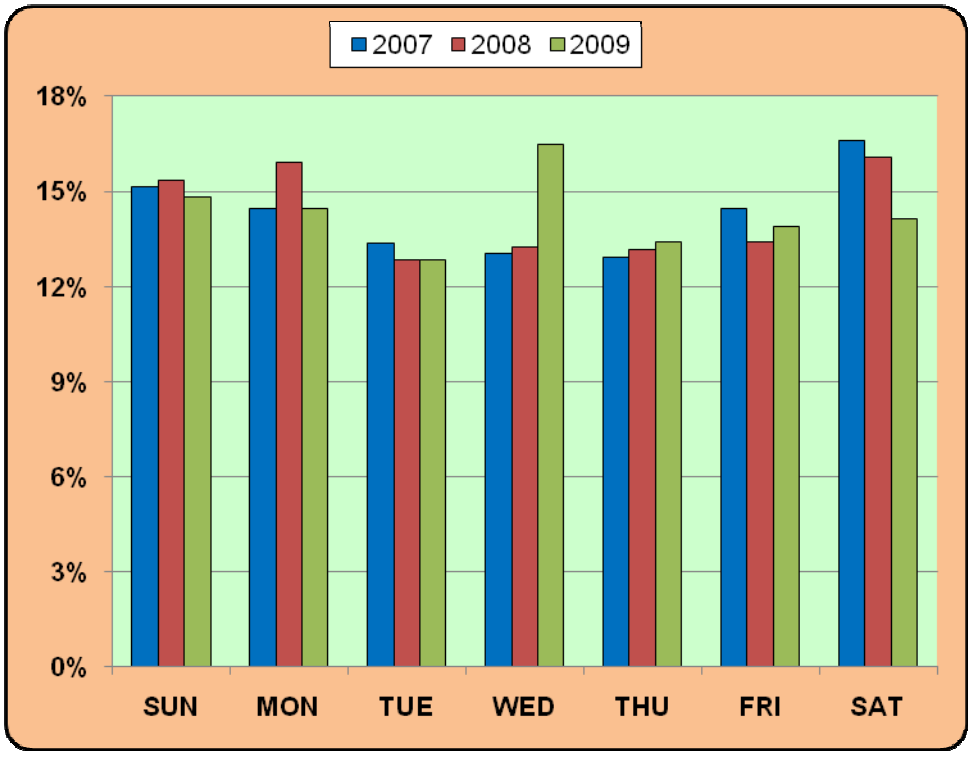
Figure 51: Workload by Month, 2007 – September 2009



Monthly workload for fire calls varied between the years. Generally, service demand was higher in the summer months and in the month of December.

Further analysis involves an examination of workload by the day of the week (Figure 52).

Figure 52: Workload by Day of Week, 2007 – September 2009

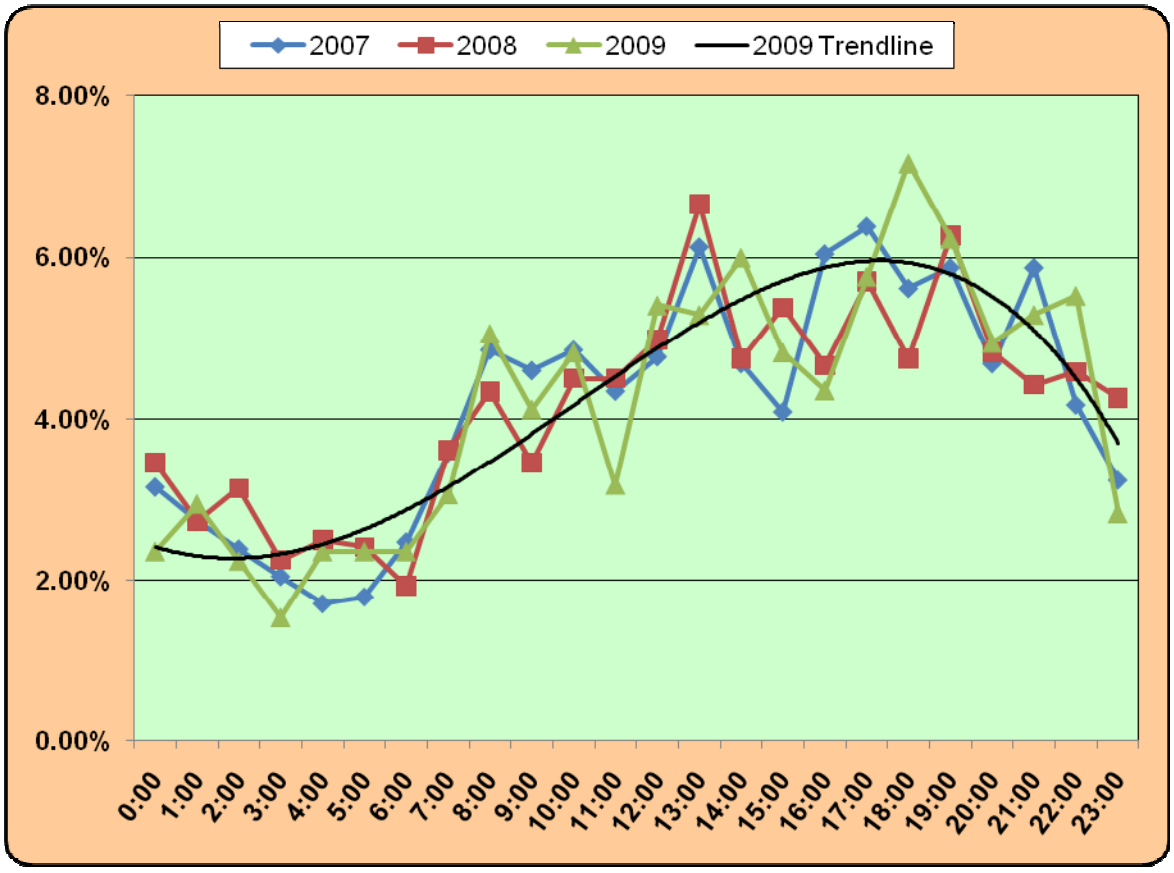


In 2008, the busiest day of the week was Saturday. This changed in 2009, with Wednesday becoming the busiest day of the week, approximately 2 percent higher than Saturday.

Analysis of historical workload concludes with the examination of calls by hour of day. When hours of peak activity occur, they can strain an under-equipped or under-staffed fire department and its ability to supply service. Understanding when peak activity occurs begins the process of developing deployment strategies and needs assessment.

Figure 53 looks at the responses for EFR for 2007 through the first nine months of 2009. A trend line based on the first nine months of 2009 give an indication of a full year of responses might look.

Figure 53: Workload by Hour of Day, 2007 – September 2009

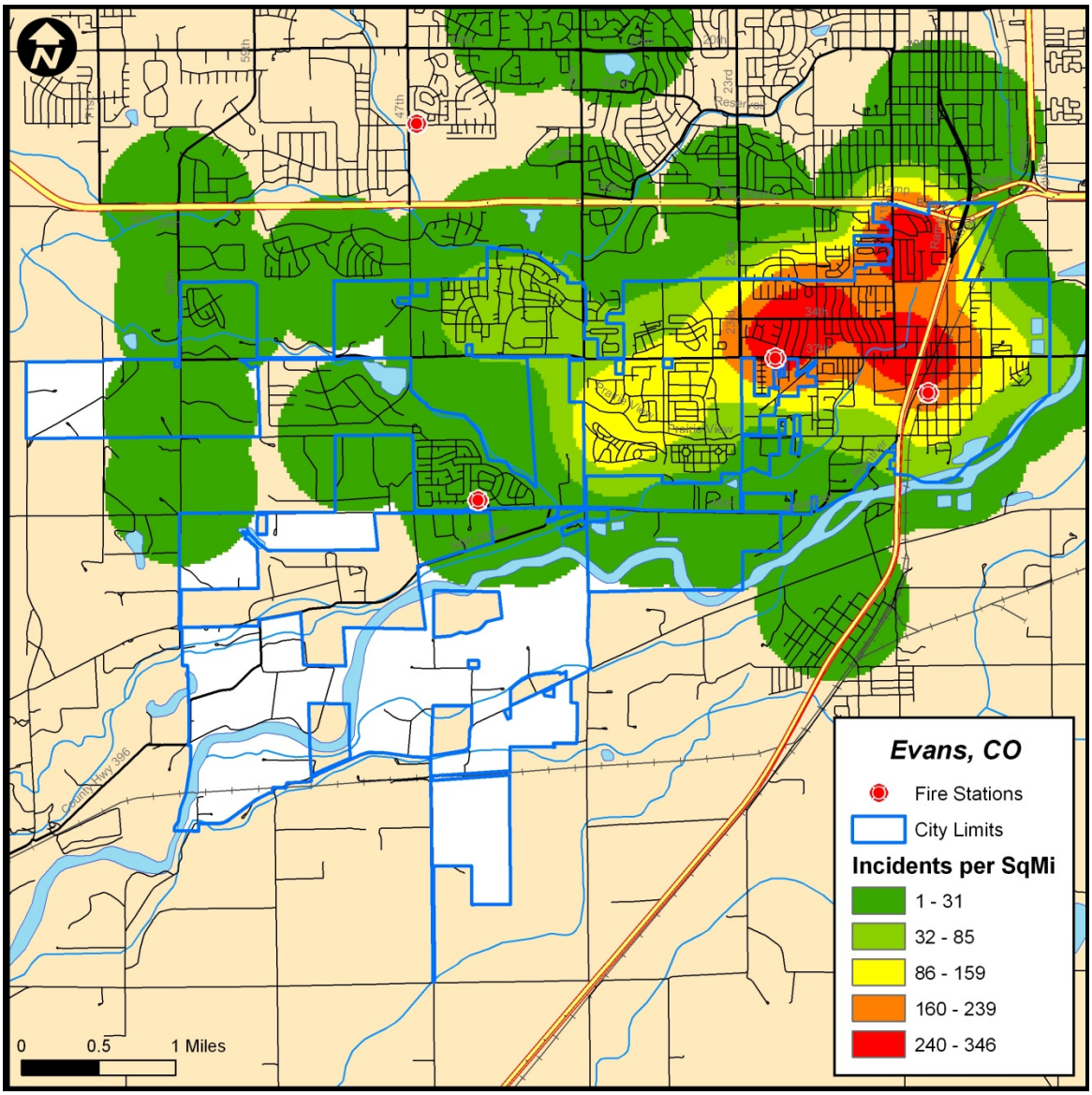


Response activity generally begins to increase at 6:00 a.m., peaking during the afternoon hours before gradually declining the rest of day and the evening. In certain instances peak activity times can be reflected in response time performance. The impact of response time on the outcome of emergency incidents has been exhaustively studied, both in the laboratory and in historical data, with a predictable correlation between the two. Though seemingly intuitive, it is still useful to review how longer response times can have a negative effect on the ability to suppress fires, particularly in structures, or to successfully intervene in a life-threatening medical emergency. Response time performance is examined in a separate section of this report.

In addition to the temporal analysis of the current service demand, it is useful to examine geographic distribution of service demand. This will allow for assessing the location of fire stations in comparison to the actual service demand of the area.

The following map (Figure 54) indicates the distribution of incidents responded to by EFR using the last 12 months of data (October 2008 through September 2009).

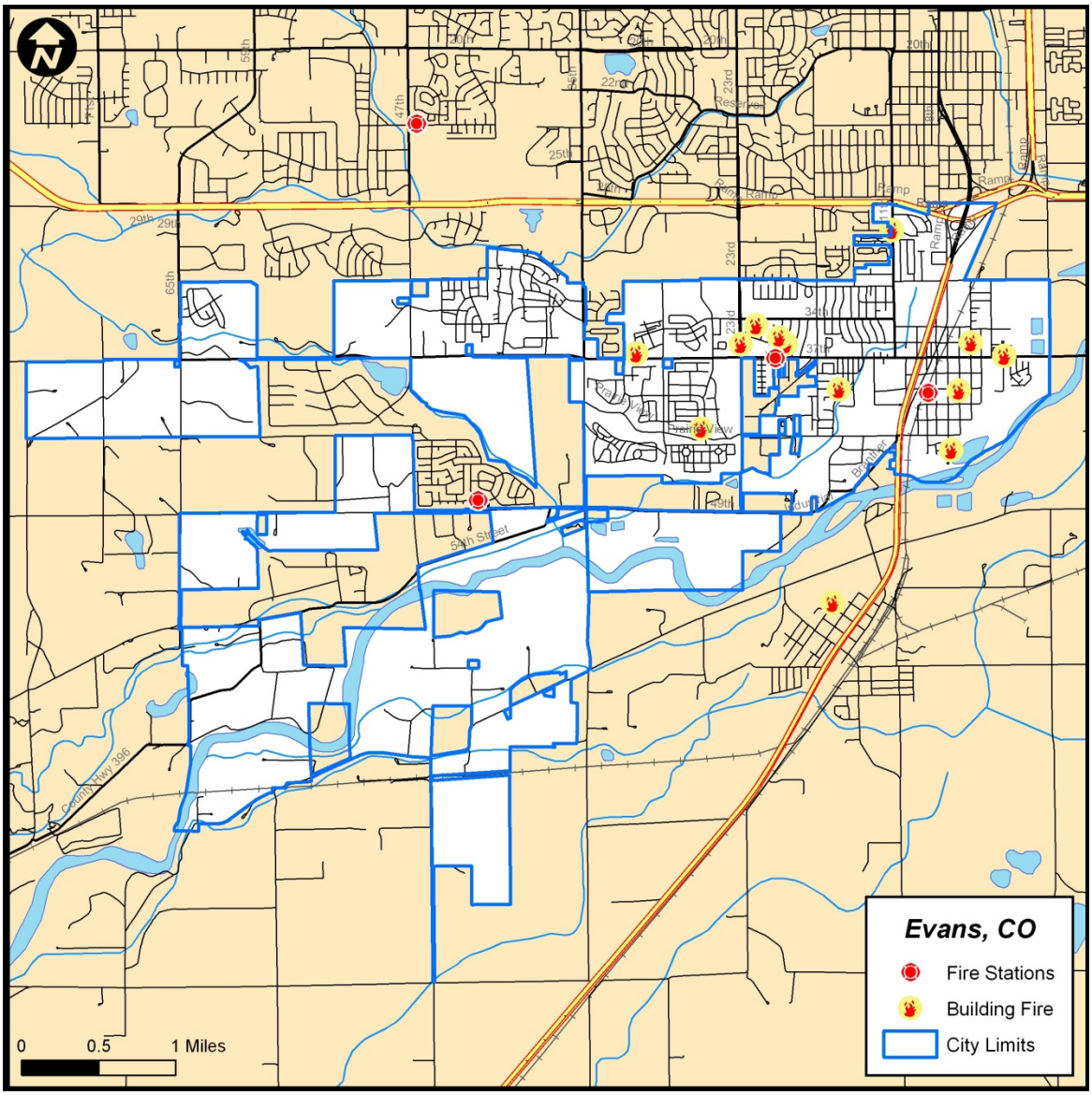
Figure 54: Service Demand Concentration



The previous figure (Figure 54) indicates the highest volume for fire service calls exists in the core (downtown) area of Evans where development is established. However, the statistics can be influenced by a predominance of medical requests in the dataset.

The following figure (Figure 55) isolates only those incidents where a structure fire occurred in the City.

Figure 55: Structural Fire Service Demand Concentration



Similarly, fires occurred in areas of the City with the greatest development (and near the two existing fire stations).

Reliability Analysis

Workload and Failure Rates

The workload on 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. Figure 56 and Figure 57 show the number of incidents and percentage by apparatus.

Figure 56: Workload Percentage by Apparatus[55]

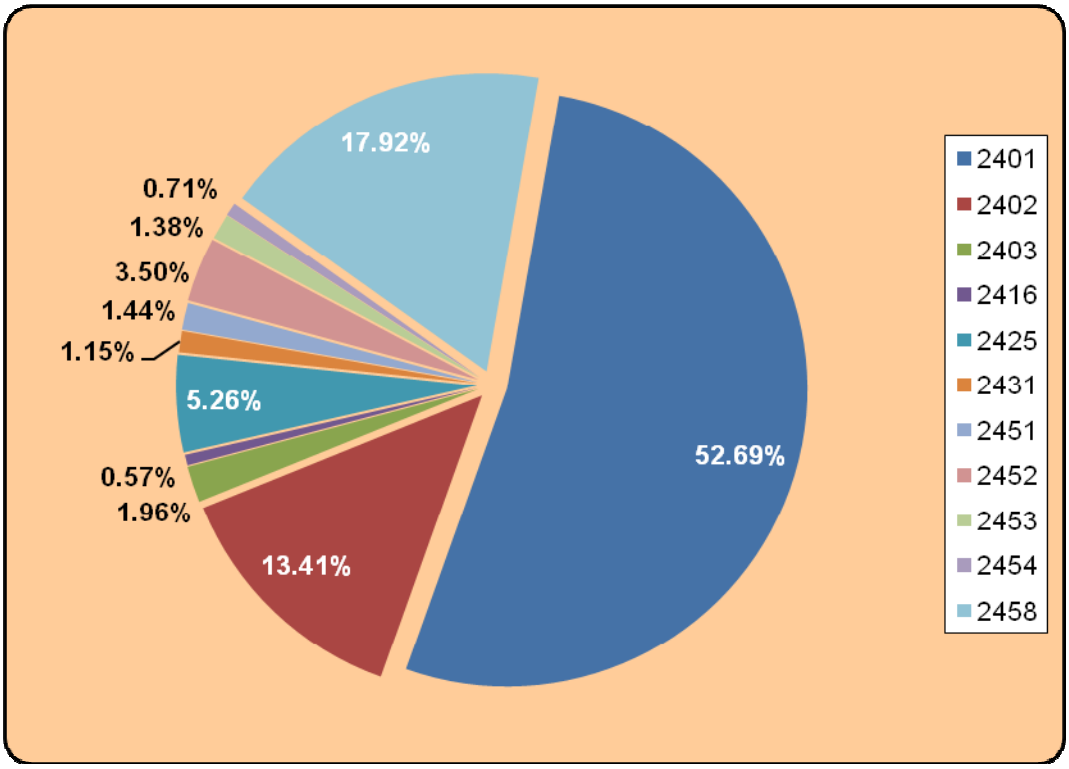


Figure 57: Incidents by Unit and Percentage

Unit ID	Incidents	Percentage
2401	2,664	52.69%
2402	678	13.41%
2403	99	1.96%
2416	29	0.57%
2425	266	5.26%
2431	58	1.15%
2451	73	1.44%
2452	177	3.50%
2453	70	1.38%
2454	36	0.71%
2458	906	17.92%

[55] Data from February 27, 2007 through September 28, 2009.

Some distortion in the number of responses occurred as 2402 responded as 2401 during the times that 2401 was out of service for maintenance and repairs.

One way to look at resource workload is to examine the amount of time multiple calls happen within the same time frame on the same day. ESCI examined the calls each year to find the frequency that apparatus is handling multiple calls in any time frame. This is important because the more calls occurring at one time can stretch available resources and extend response times from distant responding available apparatus.

Figure 58 examines those times when single and multiple calls for service were received by EFR during the first nine months of 2009.

Figure 58: Call Concurrency Table, 2009

Level	Number of Calls	Percentage
Single	767	90.45%
2	61	7.19%
3	12	1.42%
4	6	0.71%
5	1	0.12%
6	1	0.12%

As in most communities, the majority of calls happen singularly. However, as communities grow and mature the propensity for concurrent calls increase. When the concurrency reaches a level to which it stretches resources to near capacity, response times begin to extend. Although multiple medical calls will cause drawdown especially as concurrency increases, they usually occupy only one unit at a time. Concurrent fire calls, however, are of more concern as they may require multiple unit responses, depending upon the dispatch criteria. "Other" calls that are not actual fires nor medical calls have similar rates of concurrency and depending on the dispatch criteria, may create period of extensive resource drawdown. This is of particular importance since EFR has only one or two units immediately available for dispatch.

Recommendation 58: Develop response plans that provide for emergency response coverage of concurrent calls.

Figure 59 details the level of resource drawdown experienced over the previous 30 months.

Figure 59: Resource Drawdown[56]

Number of Apparatus	Incident Count	Percentage
1	1,686	55.12%
2	900	29.42%
3	382	12.49%
4	62	2.03%
5	20	0.65%
6	6	0.20%
7	3	0.10%

With a single staffed fire station, it does as expected, have the greatest workload and the highest incidence of concurrent calls. This requires response units from other fire departments or callback personnel to respond. Other fire stations will, therefore, also have higher concurrencies proportional to their workload. The impact on reliability can be affected by several factors such as:

- Out of service for mechanical reasons
- Out of service for training exercises
- Out of area on move-up deployment
- Lack of staffing
- Concurrent calls

When these factors impact the reliability of an apparatus from a fire station to respond in its prescribed territory, response time performance measures for the back-up station/apparatus can be negatively affected.

Response Time Standards

The ultimate goal of any emergency service delivery system is to provide sufficient resources (personnel, apparatus, and equipment) to the scene of an emergency in time to take effective action to minimize the impacts of the emergency. This need applies to fires, medical emergencies, and any other emergency situations to which the fire department responds. Before discussing Evans Fire Rescue's current performance, it is important to gain an understanding of the dynamics of fire and medical emergencies.

[56] Data from February 27, 2007, through September 28, 2009.

Dynamics of Fire in Buildings

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

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

At this phase, the spread of the fire continues quickly. Soon, the flammable gases at the ceiling reach ignition temperature causing an event termed *flashover* where all flammable materials in the room ignite. Once flashover occurs, the damage caused by the fire is significant and the environment within the room can no longer support human life.

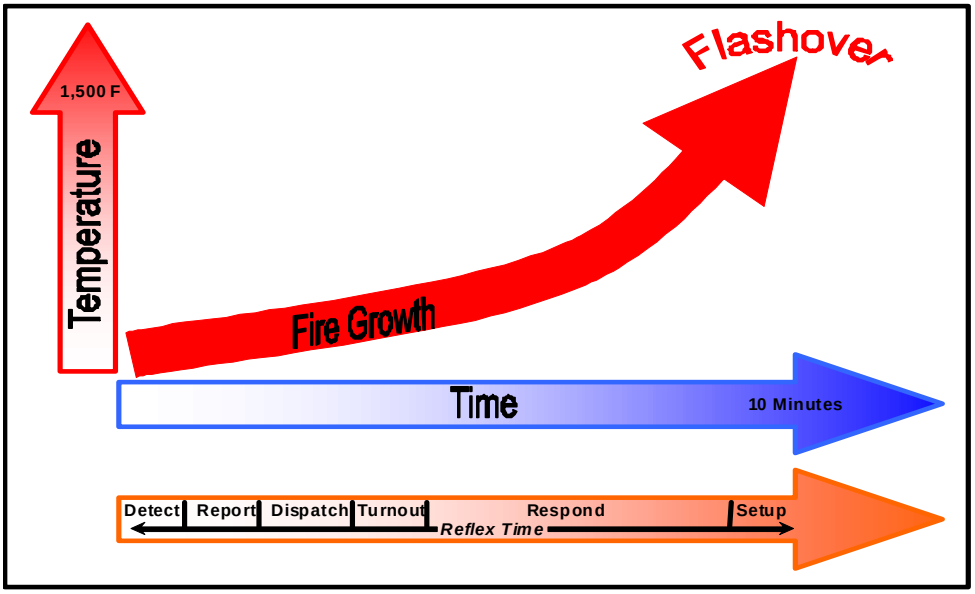
Flashover usually happens about five to eight minutes from the appearance of flame in typically furnished and ventilated buildings. Since flashover has such a dramatic influence on the outcome of a fire event, the goal of any fire agency is to apply water to a fire before flashover takes place.

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

In addition, the contents of buildings today have a much greater potential for heat production than in the past. The widespread use of plastics in furnishings and other building contents rapidly accelerate fire spread and increase the amount of water needed to effectively control a fire. All of these factors make the need for early application of water essential to a successful fire outcome.

A number of things must happen quickly to make it possible to achieve fire suppression prior to flashover. Figure 60 (below) illustrates the sequence of events.

Figure 60: Fire Growth vs. Reflex Time



The continuum of reflex time includes six steps, beginning with ignition/detection and concluding with (most commonly) the application of water. The time required for each of the six components varies. The policies and practices of the Fire Department may directly influence four of the steps, but two are only indirectly manageable. The six parts of the continuum are:

1) **Ignition/Detection**: The detection of a fire may occur immediately if someone happens to be present or if an automatic system is functioning. Otherwise, detection may be delayed, sometimes for a considerable period.
2) **Report**: Today most fires are reported by telephone to the 9-1-1 center. Call takers must quickly elicit accurate information about the nature and location of the fire from persons who are apt to be excited. A citizen well trained in how to report emergencies can reduce the time required for this phase.
3) **Dispatch**: The dispatcher must identify the correct fire units, subsequently dispatch them to the emergency, and continue to update information about the emergency while the units respond. This step offers a number of technological opportunities to speed the process including computer aided dispatch and global positioning systems.
4) **Turnout**: Firefighters must don firefighting equipment, assemble on the response vehicle, and begin travel to the fire. Good training and proper fire station design can minimize the time required for this step.
5) **Response**: This is potentially the longest phase of the continuum. The distance between the fire station and the location of the emergency influences reflex time the

most. The quality and connectivity of streets, traffic, driver training, geography, and environmental conditions are also a factor.

6) **Set up**: Last, once firefighters arrive on the scene of a fire emergency, fire apparatus are positioned, hose lines stretched out, additional equipment assembled, and certain preliminary tasks performed (such as rescue) before entry is made to the structure and water is applied to the fire.

Clearly, the application of water in time to prevent flashover is a serious challenge for any fire department. That notion is supported by national research. The National Fire Protection Association (NFPA) studied data from residential structure fires occurring between 1994 and 1998 in order to analytically quantify the relationship between the growth of a fire beyond the room of origin and losses in life and property.

The National Fire Protection Association found that fires contained to the room of origin (typically extinguished prior to or immediately following flashover) had significantly lower rates of death, injury, and property loss when compared to fires that had an opportunity to spread beyond the room of origin (typically extinguished post-flashover). Incidents in which a fire spreads beyond the room where it originates are likely to experience six times the amount of property loss and have almost nine times greater chance of resulting in a fatality (Figure 61, below).

Figure 61: Table of Fire Growth Compared to Life and Property Loss[57]

Fire Extension in Residential Structure Fires, 1994 – 1998			
Fire Extension	**Rates Per 1,000 Fires**		
	Civilian Deaths	**Civilian Injuries**	**Loss Per Fire**
Confined to room of origin	2.32	35.19	$3,385
Beyond room of origin but confined to floor of origin	19.68	96.86	$22,720
Beyond floor of origin	26.54	63.48	$31,912

Emergency Medical Event Sequence

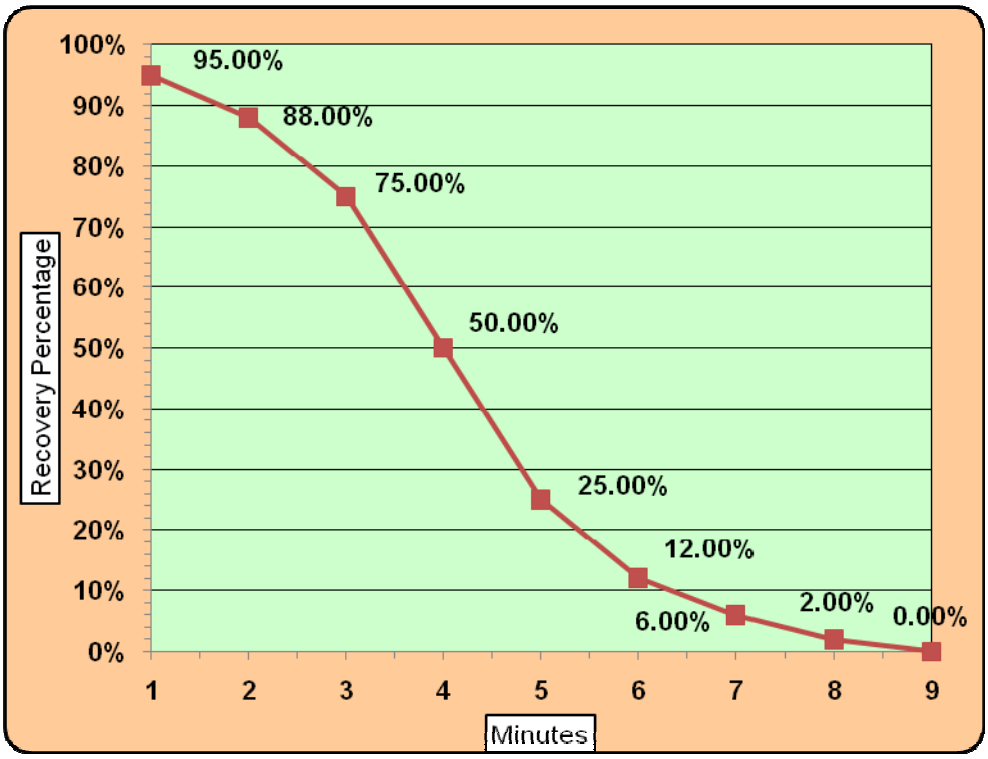
Cardiac arrest is the most significant life threatening medical event. A victim of cardiac arrest has mere minutes in which to receive definitive lifesaving care if there is to be any hope for resuscitation.

[57] Data from NFPA *Annual Fire Experience Survey* and United State Fire Administration *National Incident Reporting System*.

Recently, the American Heart Association (AHA) issued a new set of cardiopulmonary resuscitation guidelines designed to streamline emergency procedures for heart attack victims, and to increase the likelihood of survival. The AHA guidelines include new goals for the application of cardiac defibrillation to cardiac arrest victims. Heart attack survival chances fall by 7 to 10 percent for every minute between collapse and defibrillation. Consequently, the AHA now recommends cardiac defibrillation within five minutes of cardiac arrest.

As with fires, the sequence of events that leads to emergency cardiac care can be shown visually (Figure 62).

Figure 62: Cardiac Arrest Event Sequence



The percentage of opportunity for recovery from cardiac arrest drops quickly as time progresses. The stages of medical response are very similar to the components described for a fire response. Recent research stresses the importance of rapid cardiac defibrillation and administration of certain drugs as a means of improving the opportunity for successful resuscitation and survival. An Oregon fire department recently studied the effect of time on cardiac arrest resuscitation and found that nearly all of its “saves” were within 1.5 miles of a fire station, underscoring the importance of quick response.

The EMS system should have structures in place to measure the effectiveness and performance of personnel. Standardized performance levels allow the system regulators to not only evaluate performance but also to take steps to improve performance and measure those improvements.

Recommendation 59: Develop structures to measure the effectiveness and performance of personnel in EMS activities.

People, Tools and Time

Time matters a great deal in the effective outcome to an emergency event. Time, however, is not the only factor. Delivering sufficient numbers of properly trained, appropriately equipped, personnel within the critical time period completes the equation. For medical emergencies, this can vary based on the nature of the emergency. Many medical emergencies are not time critical. However, for serious trauma, cardiac arrest, or conditions that may lead to cardiac arrest, response time is very critical.

Equally critical is delivering enough personnel to the scene to perform all of the concurrent tasks required to deliver quality emergency care. For a cardiac arrest this can be up to six personnel; two to perform CPR, two to set up and operate advanced medical equipment, one to record the actions taken by emergency care workers, and one to direct patient care.

Thus, for a medical emergency the real test of performance is the time it takes to provide the personnel and equipment needed to deal effectively with the patient's condition, not necessarily the time it takes for the first person to arrive.

Fire emergencies are even more resource critical. Again, the true test of performance is the time it takes to deliver sufficient personnel to begin applying water on the fire, as this is the only practical method to reverse temperature increase and to prevent flashover. The arrival of one person with a portable radio does not provide fire intervention capability and should not be counted as arrival by the fire department. In order to enter a building to conduct interior firefighting properly, at least four personnel must be on the emergency scene. Consequently, EFR should document the end of the reflex continuum as the time when (at least) four properly trained personnel are assembled at the fire and are ready to take action.

For example, emergency service agencies should have clearly defined performance objectives established to allow evaluation of capability and service delivery. An organization's performance objectives should clearly state both the current and desired emergency service capabilities in measurable terms. For emergency response, performance objectives should define response performance using both time and resource criteria. For example:

- Provide for the arrival of adequate resources to initiate basic emergency medical services at the scene of any medical emergency within "X" minutes following dispatch, 90 percent of the time.
- Provide for the arrival of adequate resources to initiate interior fire suppression operations at the scene of any fire within "X" minutes following dispatch, 90 percent of the time.

NFPA 1710

The National Fire Protection Association (NFPA) has issued a response performance standard for all or mostly career staffed fire departments. This standard, among other things, identifies a target response time performance objective for fire departments and a target staffing standard for structure fires. Though not a legal mandate, *NFPA 1710* does provide a useful benchmark against which to measure the fire department's performance.

NFPA 1710 contains time performance standards for structure fire response as well as emergency medical response. Each will be discussed individually.

NFPA 1710 recommends that the first company arrive at the scene of a structure fire within five minutes of dispatch, 90 percent of the time. NFPA uses the 90th percentile rather than average. This allows an evaluation of a department's performance on the vast majority of its incidents.

The standard establishes that a response "company" consists of four personnel. The standard does not require that all four be on the same vehicle, but does expect that the four will operate as a single functioning unit once on scene. The *NFPA 1710* response time standard also requires that all four personnel be on scene within the recommended five minutes, 90 percent of the time.

There is another reason the arrival of four personnel is critical for structure fires. Current safety regulations require that before personnel can enter a building to extinguish a fire at least two personnel must be on scene and assigned to conduct search and rescue in case the fire attack

crew becomes trapped. This is referred to as the "two-in, two out" rule. The only exception to this regulation is if it is known that victims trapped are inside the building.

The NFPA standard calls for the arrival of the entire initial assignment (sufficient apparatus and personnel to effectively combat a fire based on its level of risk) within nine minutes of dispatch, 90 percent of the time. This is to ensure that enough people and equipment arrive soon enough to be effective in controlling a fire before substantial damage occurs.[58]

NFPA 1710 describes the following performance as meeting the structure fire response criteria of the standard:

- Turnout time within one minute, 90 percent of the time
- Arrival of the first "company" within five minutes of dispatch, 90 percent of the time, or
- Arrival of the entire initial response assignment (all units assigned to the call) within nine minutes of dispatch, 90 percent of the time

There are three time standards within the *NFPA 1710* Standard for emergency medical responses:

- Turnout time within one minute, 90 percent of the time
- Arrival of a unit with first responder or higher level of capability (basic life support) within five minutes of dispatch, 90 percent of the time
- Arrival of an advanced life support unit, where this service is provided by the fire department, within nine minutes of dispatch, 90 percent of the time

NFPA 1720

The National Fire Protection Association (NFPA) has issued a response performance standard for all or mostly volunteer staffed fire services. In recognizing that volunteer departments across the United States cover a variety of communities, the recommended standards are classified according to population densities.

- **Urban**: Population greater than 1000 persons per square mile
    - Within these types of communities, NFPA 1720 recommends that the first company arrive at the scene of a structure fire within nine minutes of dispatch, 90 percent of the time.
- **Suburban**: 500-1000 persons per square mile in population

[58] See previous discussion about the "time/temperature curve" and the effects of flashover.

  - 10 minutes from time of dispatch, 80 percent of the time
- **Rural**: Less than 500 persons per square mile
  - 14-minute response time, 80 percent of the time
- **Remote**: Greater than eight miles from a fire station
  - No response time requirement

The standard establishes that a response "company" consists of four personnel. The standard does not require that all four be on the same vehicle, but does expect that the four will operate as a single functioning unit once on scene. The *NFPA 1720* response time standard also requires that all four personnel be on scene in the recommended time frame.

With measurable performance criteria, EFR can develop deployment methodologies to achieve the desired level of service, and can quickly identify when conditions in the environment degrade performance.

Recommendation 60: Develop deployment methodologies to achieve desired level of service and for the purpose of identification of changes in performance.

Recorded System Response Time Performance

Throughout this document, certain descriptive statistical measures are used which may not be familiar to all readers. In an effort to reduce confusion or the drawing of inaccurate conclusions, ESCI will provide a brief explanation of these terms. The measures most often used which require clarification are average, median, and percentile.

Average

The 'average' measure is a commonly used descriptive statistic also called the mean of a data set. It is a measure which is a way to describe the central tendency, or the center of a data set. The average is the sum of all the points of data in a set divided by the total number of data points. In this measurement, each data point is counted and the value of each data point has an impact on the overall performance. Averages should be viewed with a certain amount of caution because the average measure can be skewed if an unusual data point, known as an outlier, is present within the data set. Depending on the sample size of the data set, the skewness can be either very large or very small.

As an example, assume that a particular fire station with a response time objective of six minutes or less had five calls on a particular day. If four of the calls had a response time of eight minutes while the other call was across the street and only a few seconds away, the average would indicate the station was achieving its performance goal. However, four of the five calls, or 80 percent, were beyond the stated response time performance objective.

The opposite can also be true where one call with an unusually long response time can make otherwise satisfactory performance appear unacceptable. These calls with unusually short or long response time have a direct impact on the total performance measurements and the farther they are from the desired performance, the greater the impact.

The reason we do compute the average is because of its common use and ease of understanding that is associated with it. The most important reason for not using averages for performance standards is that it does not accurately reflect the performance for the entire data set. As illustrated above, one extremely good or bad call skewed the entire average. While it does reflect all values, it does not really speak to the level of accomplishment in a strong manner.

Median

Median is the middle of a set of points. If the number of points is uneven, the median is the point precisely in the center making the same number of points above it as are below. If the number of points is even, the median is the average of the two points closest to the center. Median is often confused with average (mean); however, remember that average is dependent on the *sum* of the points while just the number of points determines a mean. ESCI typically uses median to illustrate the middle of a benchmark range where the same number of points exist above it as below.

Percentile

With the average measure, it is recognized that some data points are below the average and some are above the average. The same is true for a median measure which simply arranges the data set in order and finds the value in which 50 percent of the data points are below the median and the other half are above the median value. This is also called the 50^{th} percentile.

With percentiles (or fractiles), the actual value of the individual data does not have the same impact as it did in the average. The reason for this is that the fractile is nothing more than the

ranking of the data set. The 90th percentile means that ten percent of the data are greater than the value stated, and all other data are at or below this level.

Higher fractile measurements are used normally to establish response objectives and to measure outcome because percentiles show that the majority of the data set has achieved a specified level of performance. This can be compared to the desired objective to determine the degree of success in achieving the goal.

Total response time is the amount of time a resident or business waited until an apparatus arrived at the scene of emergency beginning when they first called the designated emergency number, often 9-1-1. It is made up of several elements which were discussed earlier (see Response Time Standards). Since EFR has only limited influence on call processing time, fire departments are measured on response time from the time of dispatch to the arrival on scene. To report the most accurate response time performance, dispatch data was used for this analysis. Due to the nature of the reporting which recorded each unit's time intervals as well as the 'announcement' alarm time, the first arriving unit on scene was used for the analysis.

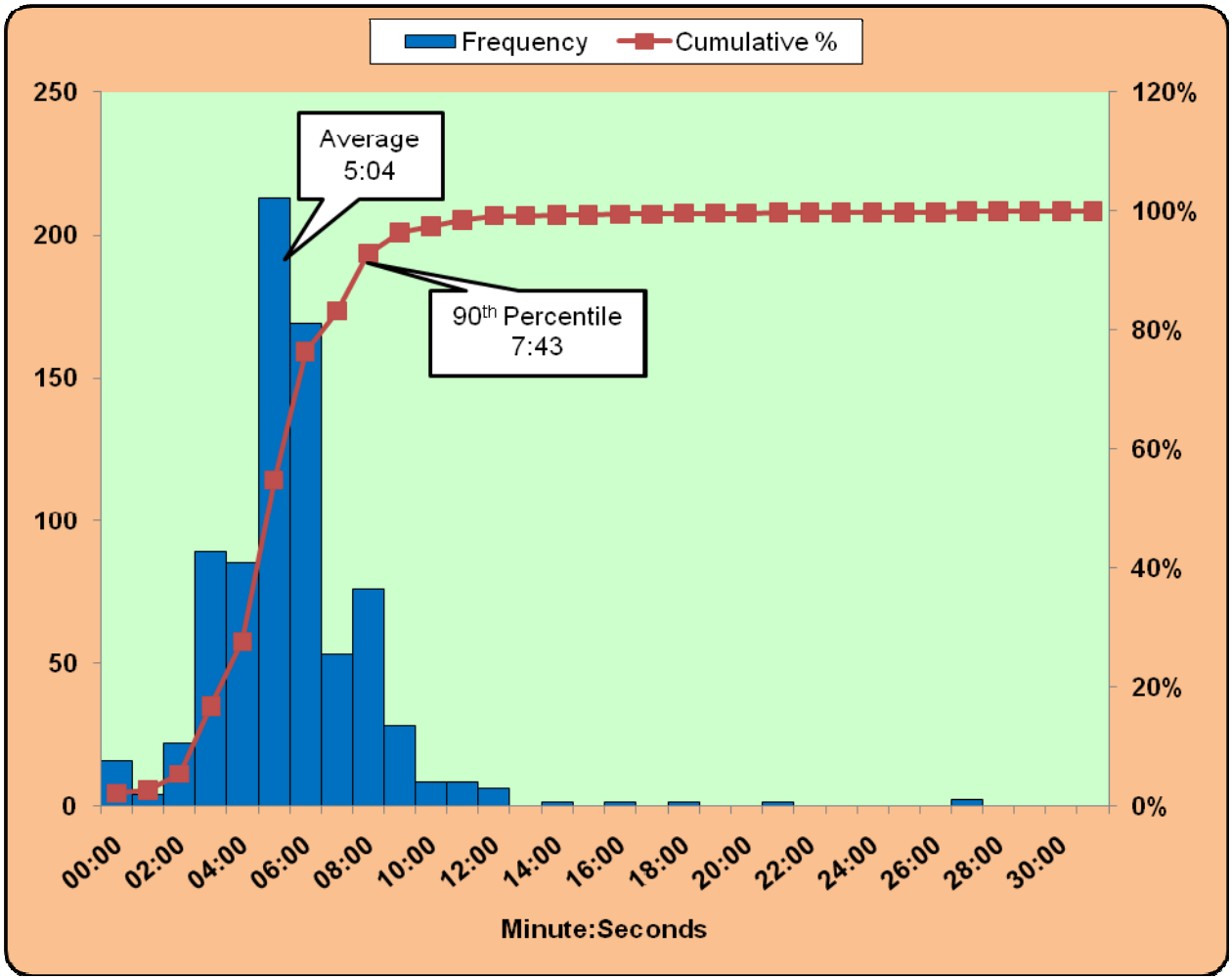
Response data that captures response and deployment time beyond arrival of the first unit is necessary to measure performance. A lack of response data is an impediment to analyzing current deployment and for forecasting performance. ESCI recommends that EFR establish a short-term goal of implementing a system to capture the time elements of emergency response. At a minimum response data should consist of:

- Time of receipt of call at the dispatch center
- Call ring time
- Call processing time
- Dispatch processing time
- Turnout time
- Response time
- Arrival time of first unit
- Arrival time of the entire initial response assignment

Recommendation 61: Establish a short-term goal of implementing a system to capture the time elements of emergency response.

The following charts illustrate the response time frequency for Evans Fire Rescue over the last full year of data.[59] Figure 63 shows the average and 90th percentile response time history for EFR.

Figure 63: Response Time Performance History



The most frequently recorded response times for calls were between five and six minutes. Specifically, the average is 5 minutes 4 seconds with 90 percent of all calls answered in less than 7 minutes 43 seconds.

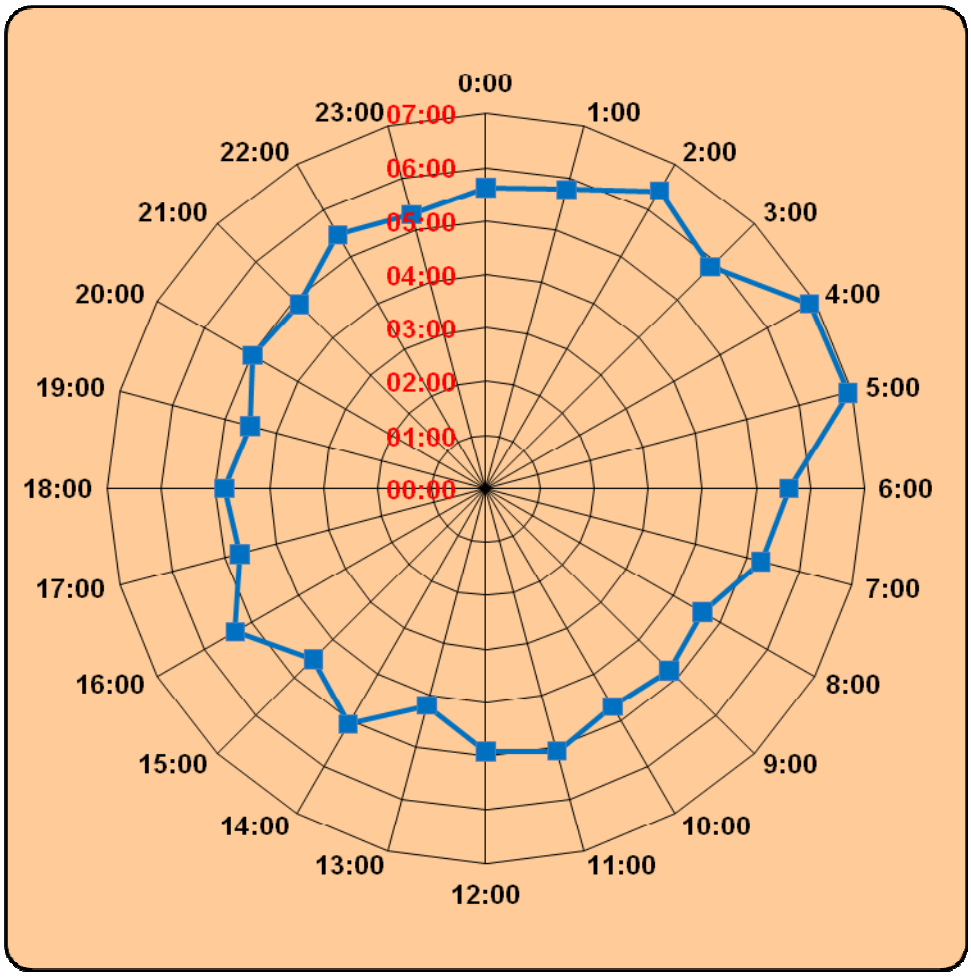
Response times can vary by time of day; a reflection of service demand workload, traffic congestion, weather, and distance to the call from the fire station. The *average* total response

[59] Mutual aid calls and non-emergent calls were removed from response time analyses.

time for calls ranged from a high average of 6 minutes 55 seconds for all calls between the hours of 5:00 a.m. and 6:00 a.m., to a low average of 4 minutes 12 seconds for incidents between the hours of 1:00 p.m. and 2:00 p.m.

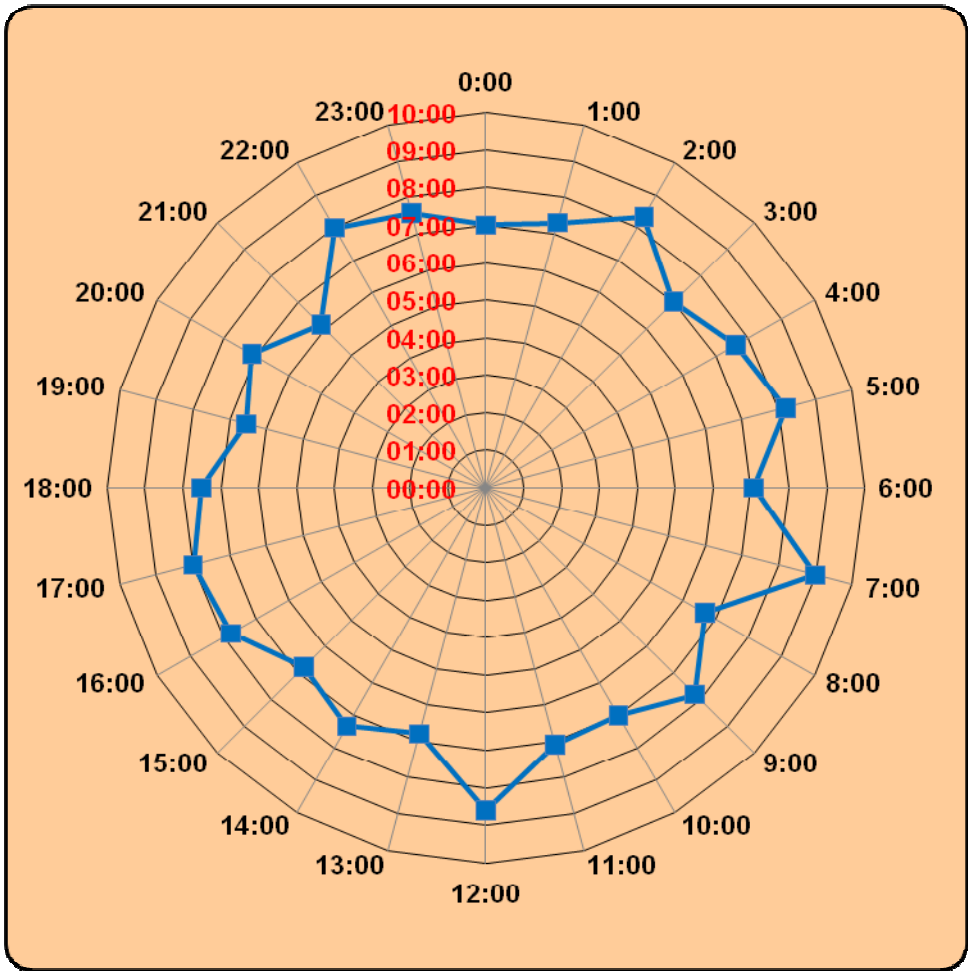
The following chart (Figure 64) illustrates how the average response time performance varies by the hour of day.

Figure 64: Average Response Time by Hour of Day



Average response time is one useful measure to determine how well geographic-based coverage is achieved. As discussed previously, more significant is how well the majority of emergency response demand is being serviced. A way to determine how well demand-based coverage is achieved is by determining maximum response time to a larger percentage of the incidents. The following figure (Figure 65) displays the 90th percentile response time performance by hour of day.

Figure 65: 90th Percentile Response Time by Hour of Day



The *90th percentile* response time for all calls occurring in Evans ranged from a high of 9 minutes during the 9:00 a.m. to 10:00 a.m. hour to a low of 6 minutes 9 seconds during the 9:00 p.m. to 10:00 p.m. hour.

There are several factors that affect overall response time including, but not limited to, weather, distance, construction, and traffic congestion. However, one element of the overall response time performance that firefighters can control is the turnout time interval. The fire department data did not include the time stamp indicating apparatus to be en route; therefore this interval could not be analyzed.

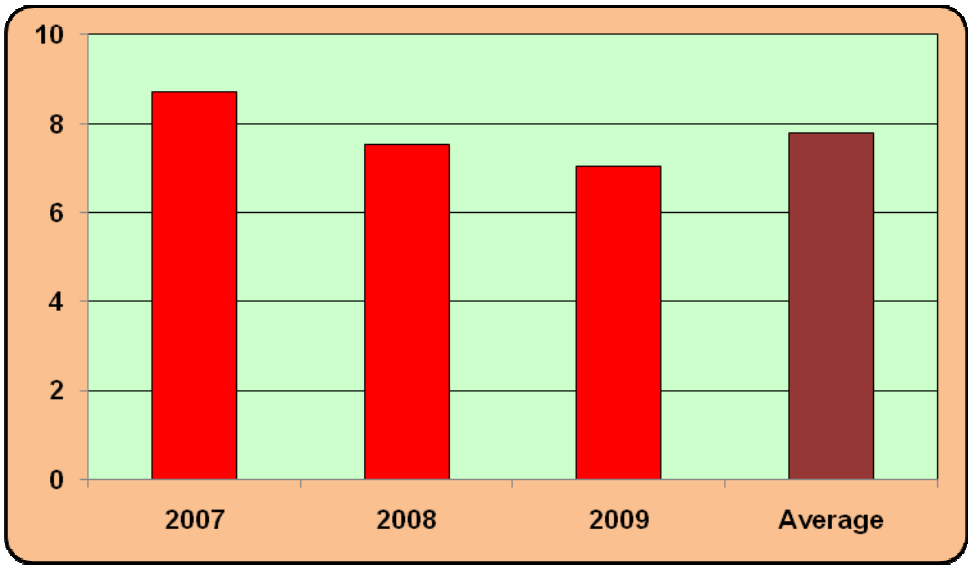
Personnel Deployment

A fire department can have facilities and emergency apparatus in locations that allow for response to a service area, but without adequate personnel, the ability to affect a positive

outcome is limited. A full discussion on personnel deployment can be found in People, Tools and Time beginning on page 138.

ESCI reviewed the number of EFR personnel that responded to emergency incidents in 2007, 2008, and for the first nine months of 2009. Figure 66 shows the average number of personnel that responded to all incidents in 2007 through September 2009.

Figure 66: Number of Personnel Responding – All Incidents, 2007 – 2009[60]

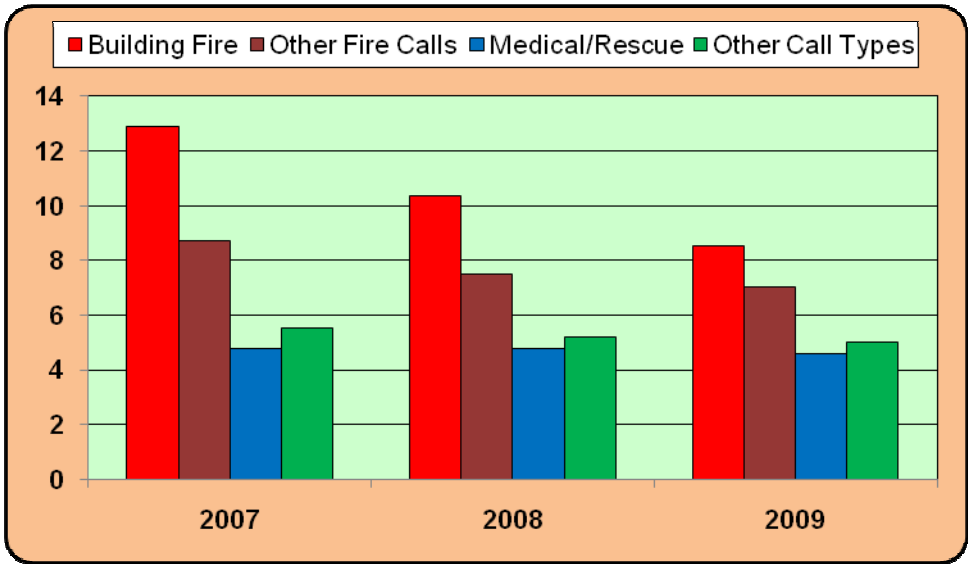


The average number of personnel responding has decreased from a high of 8.72 in 2007 to 7.02 during the first nine months of 2009. The average number of personnel responding in 2007 through 2009 was 7.79.

[60] 2009 includes response data for the first nine months of the year.

In the following figure (Figure 67) the number of personnel responding is broken-down by incident type for the same time period.

Figure 67: Number of Personnel Responding – by Incident Type, 2007 – 2009[61]

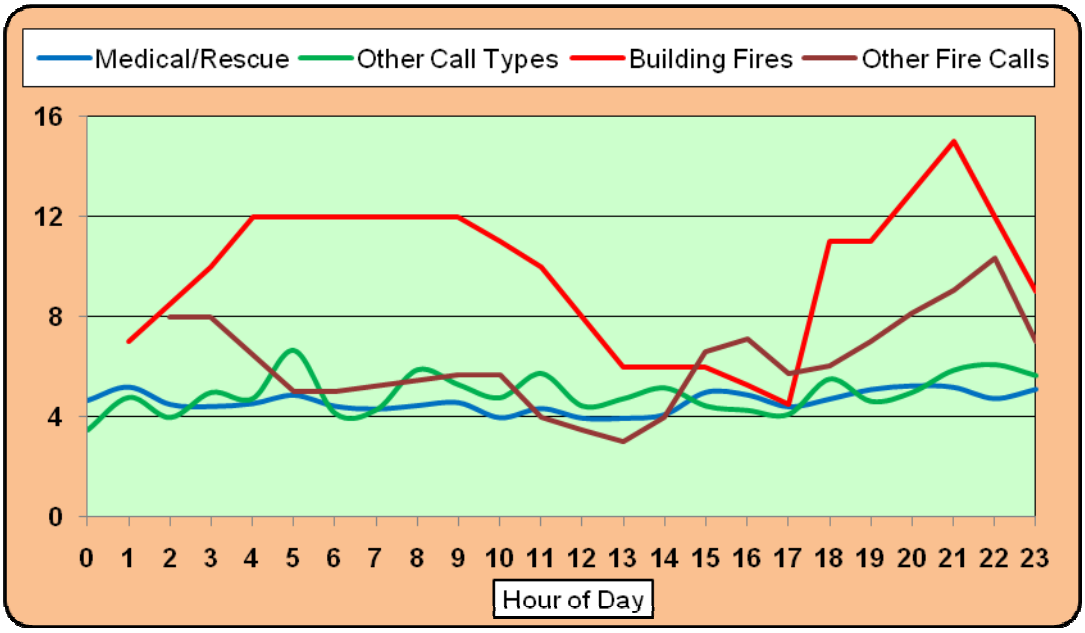


For the study period, the average number of personnel responding has declined for all types of incidents. The concern is greatest for building fire incidents, where the number of personnel responding in 2009 is averaging 8.53.

[61] Ibid.

In Figure 68 we reviewed the average number of personnel that responded by incident type and hour of day in 2009.

Figure 68: Number of Personnel Responding by Hour of Day, 2009[62]



The lowest recorded average number of personnel responding for all incident types occurs between midnight and 3:00 a.m. and again between 1:00 p.m. and 5:00 p.m.

Recommendation 62: Develop a plan to increase available staffing to have a minimum of ten firefighters at reported structural fire incidents within ten minutes.

[62] Ibid.

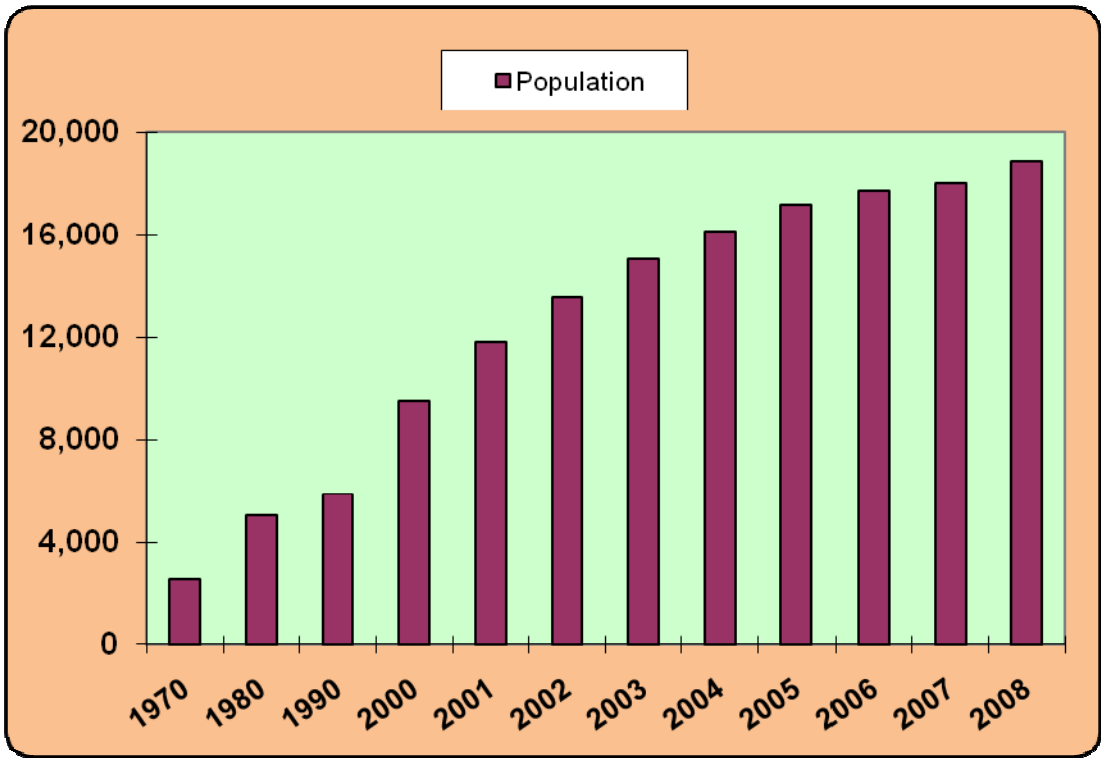
Section II - System Demand Projections

The process of forecasting growth in the community begins with an overview of current demographic and risk categories.

Current Population Information

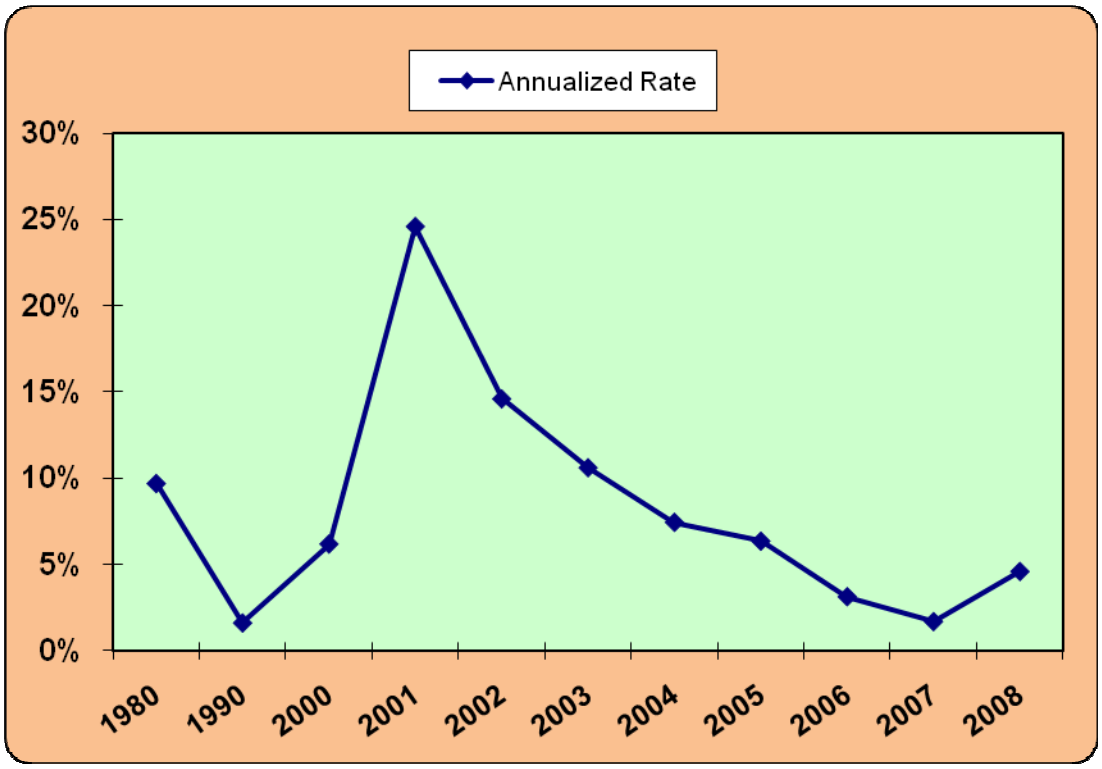
According to the U.S. Census Bureau, the estimated population of Evans was 18,842 persons in 2008. This is almost a doubling of the population since 2000, when a population of 9,514 was recorded. Figure 69 shows the annual population for the City between 1970 and 2008.

Figure 69: Population Growth History, 1970 – 2008



The average annual growth rate this decade has been 8 percent, but has reached as high as 24.6 percent in 2001. The average annual growth rate has slowed in recent years. A depiction of the yearly percentage of change of the population is depicted in the figure that follows (Figure 70).

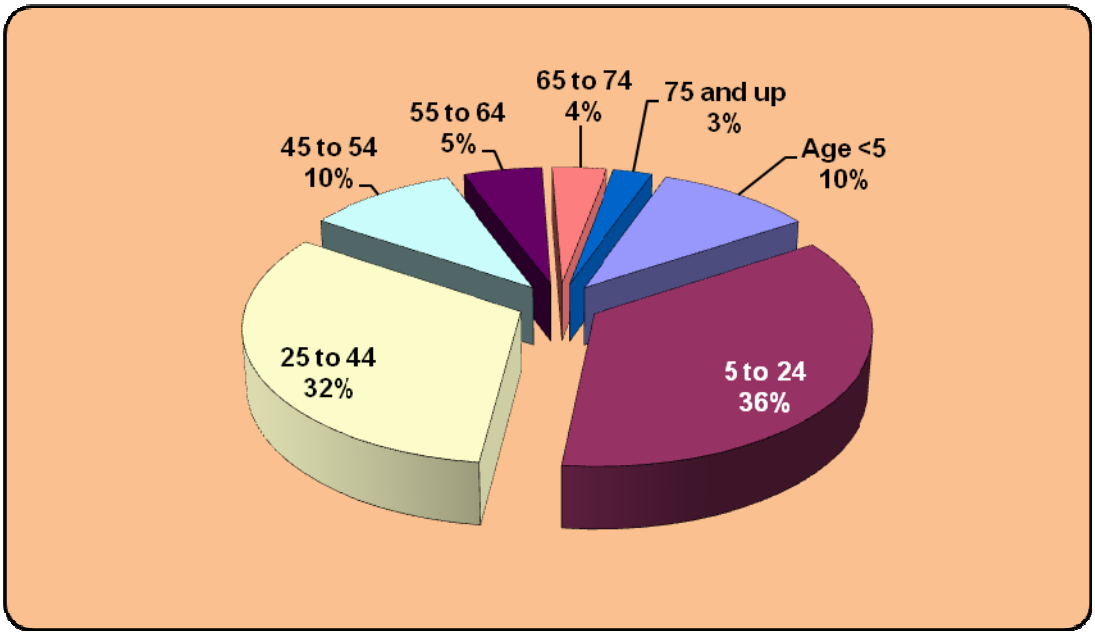
Figure 70: Annual Percentage of Population Change, 1970 – 2008



The population of the City of Evans has increased from 2,570 in 1970 to 18,888 in 2009; an increase of over 600 percent.

The composition of this population by age group can have a significant effect upon the fire services. The following chart (Figure 71) distributes the population into age groups based on the estimated census block group information for 2007.

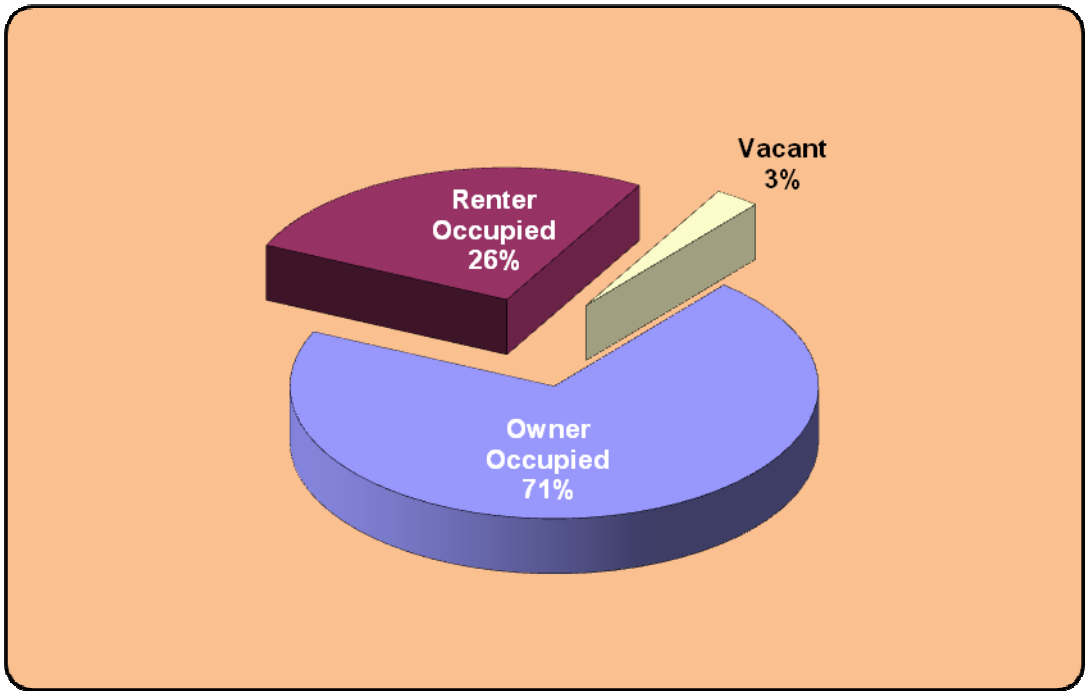
Figure 71: Population by Age



Approximately 7 percent of the population is 65 years of age or older and 10 percent of the population is under 5 years of age, placing a total of 17 percent of the area's population in the significant target age groups that pose the highest risk for fatalities in residential fire incidents. It is also worth noting that the median age in the City of Evans is relatively young at 26.9 years of age, compared to 35.3 nationally.

The following chart (Figure 72) examines the housing by occupancy type in the City. Higher rental and vacant properties may signal negative economic conditions (except in university and resort areas), which can correlate with higher incidences of emergency incidents.

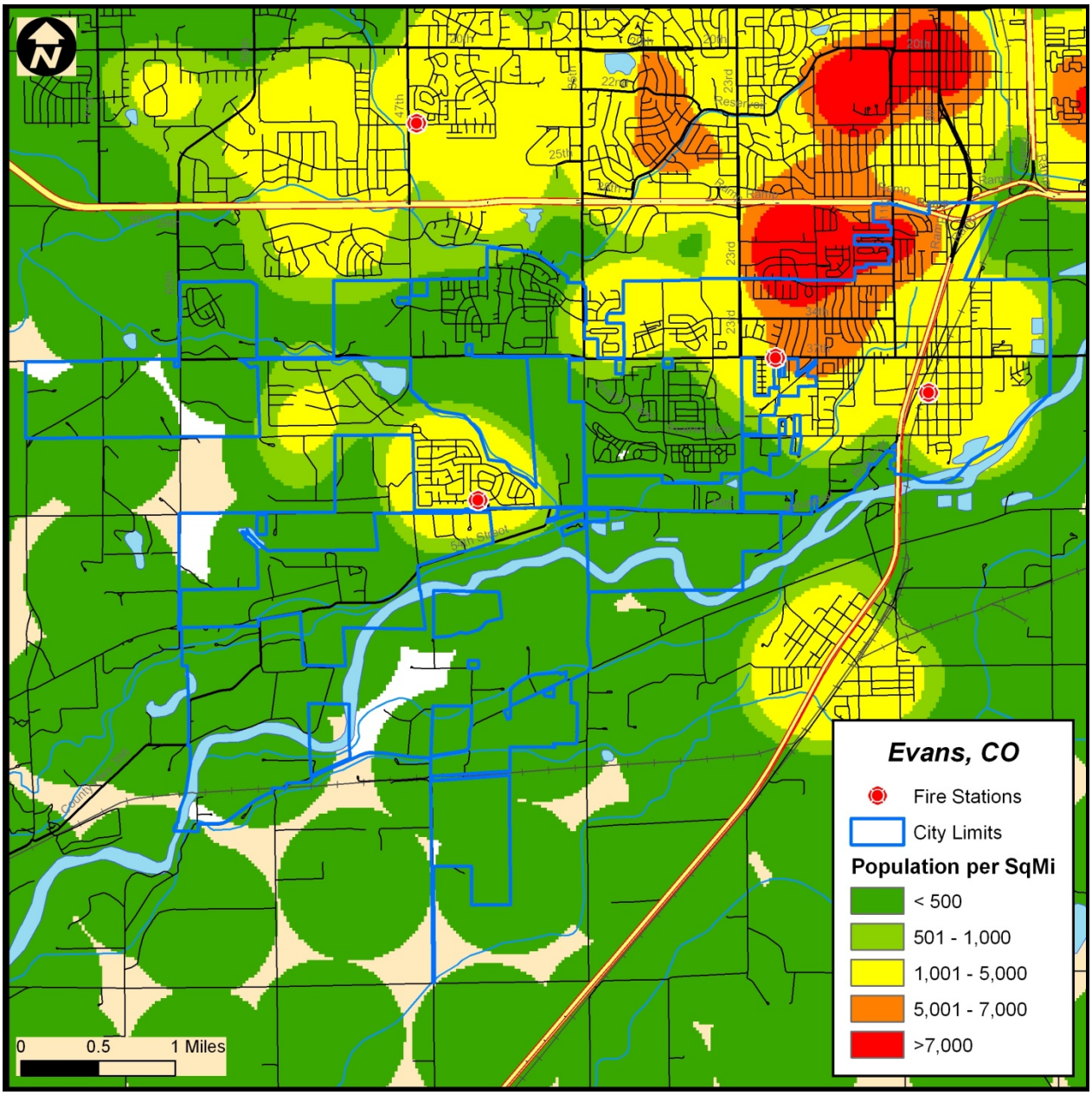
Figure 72: Housing by Occupancy



The high level of owner-occupied housing indicates a stable economic environment that relates to an investment in the community by wage earners.

It is also useful to assess the distribution of the population within the area, since there is a direct correlation between population density and service demand. The following map (Figure 73) displays the population density in the city.

Figure 73: Population Density



The greatest concentration of population within Evans is located near the two fire stations on the north and northeast side of the City.

Population Growth Projections

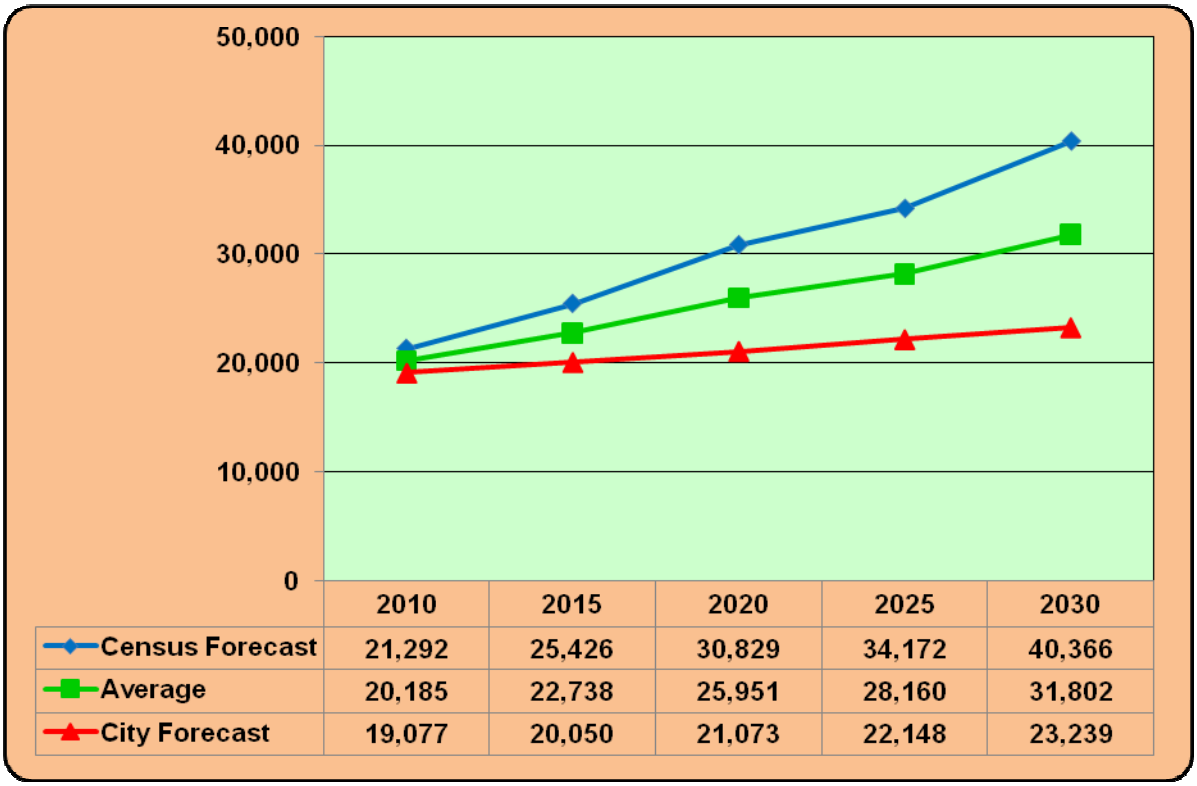
As indicated earlier in this section, the population in Evans has increased significantly this decade. However, local planning officials anticipate that additional growth may continue, but at a much slower rate than previously experienced. In developing forecasts for population growth, ESCI typically develops a forecast based on several years of census experience. For Evans, ESCI used census and estimate figures from 2001[63] through 2008 from the U.S. Census Bureau to create a mathematical forecast through the year 2035.

While census-based population projections provide a mathematically based estimate of future population based on historical data, they often fail to account for expected trends in the growth rate of an area. These changes often result from redevelopment, annexation, changes in employment capacity, or other socio-economic factors not reviewed in a census-based projection. For this reason, we also offer population projections based on review of available local development and business information.

[63] Excludes 2000; removing the influence of significant growth between 2000 and 2001 that would skew forecasts.

In this case, we reviewed information from the population growth forecast by the City; estimated at one percent. This population forecast is much lower than the census-based population forecast primarily due to local, regional and national issues. These issues are expected to impede development opportunities, including transportation improvements, and housing infrastructure capacity. The population forecasts from the census-based method and the city appear in Figure 74.

Figure 74: Population Forecast[64]



	2010	2015	2020	2025	2030
Census Forecast	21,292	25,426	30,829	34,172	40,366
Average	20,185	22,738	25,951	28,160	31,802
City Forecast	19,077	20,050	21,073	22,148	23,239

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 our recommendations for future fire protection needs on a reasonable association with projected service demand. Since we know that the service demand for emergency agencies is based almost entirely on human activity, it is important to have a population-based projection of the future size of the community. While we can see variation in the population projections discussed here, it is certain Evans Fire Rescue will continue to be an emergency service provider to a growing population, likely exceeding 20,000 in 2030. Planning

[64] Would be affected by municipal annexations

should begin now to have sufficient resources to meet a growing demand for emergency services.

Community Risk Analysis

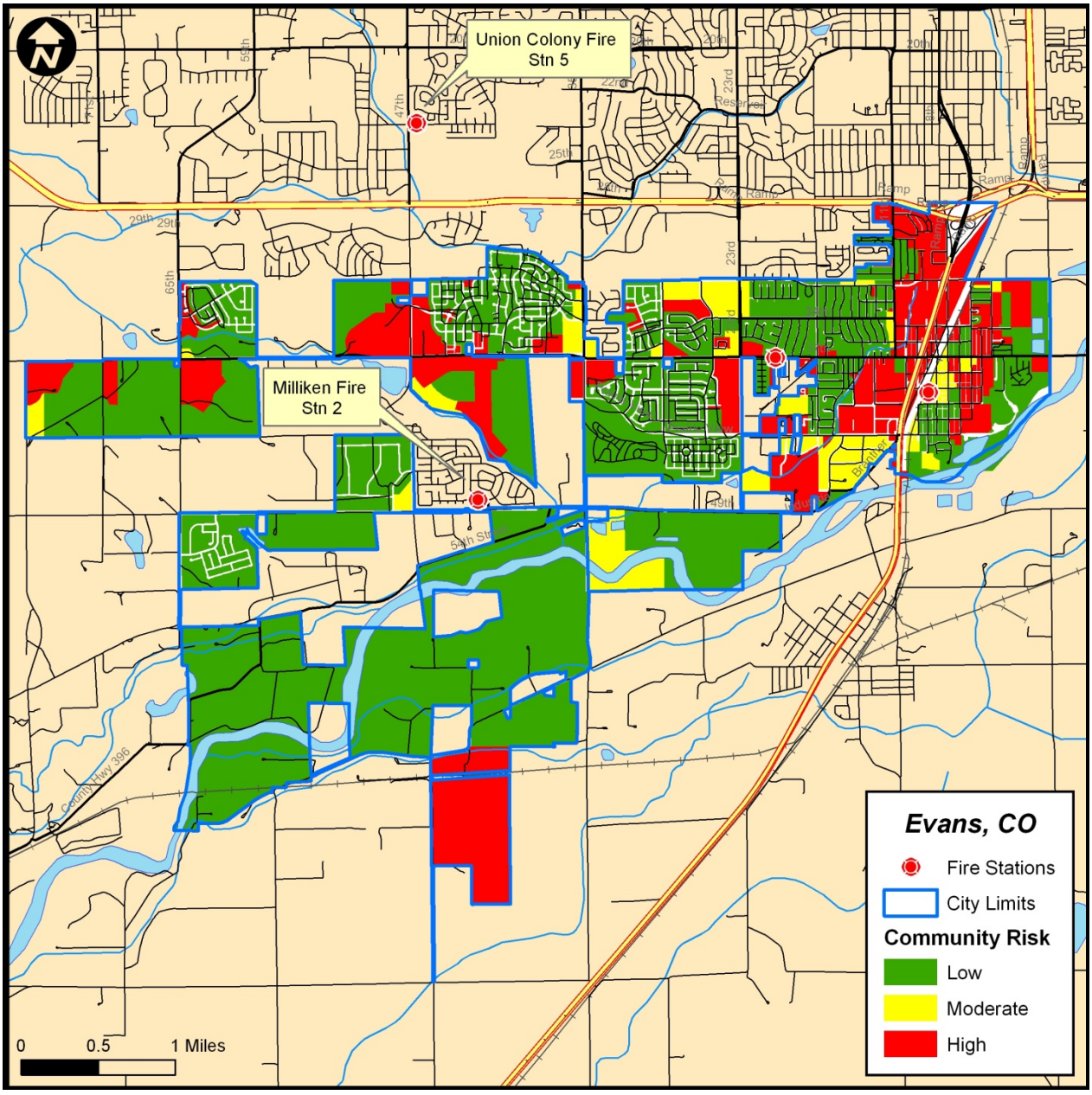
The fire service assesses the relative risk of properties based on a number of factors. Properties with high fire and life risk often require greater numbers of personnel and apparatus to effectively mitigate a fire emergency. Staffing and deployment decisions should be made with consideration of the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

A community's risk assessment is developed based on potential land use within its anticipated future boundaries. These potential uses are generally found in city and county development plans and zoning designations. Risk is then translated into land use maps (potential scale and type of development within geographic sub-areas) that show categories of relative fire and life risk.

- Low risk – Areas zoned and used for agricultural purposes, open space, low-density 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.

Figure 75 is the community risk assessment of the City of Evans using the three categories.

Figure 75: Community Risk Assessment



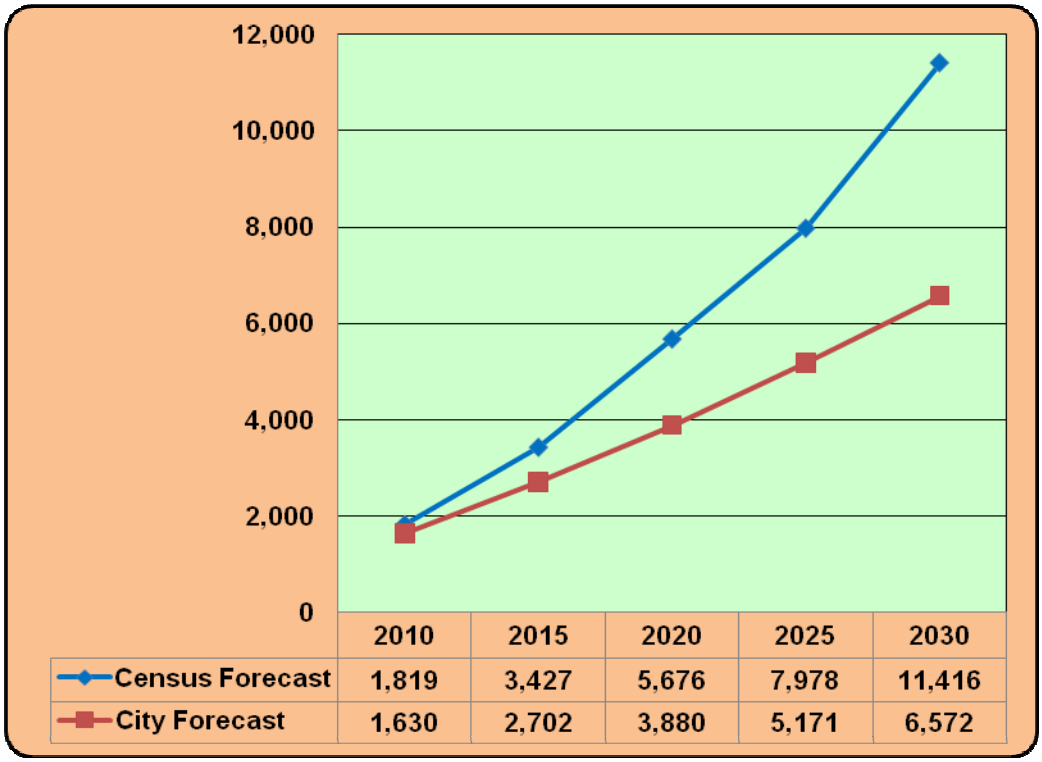
The city contains mostly low risk properties. The predominance of high risk properties is located on the north side of the city and in certain non-residential developments along arterial and U.S. Highway 85. These properties include industrial, heavy commercial, mid-rise, mixed-use, institutional, and multi-family occupancies.

Service Demand Projections

In evaluating the deployment of facilities, resources, and staffing, it is imperative that consideration be given to potential changes in workload that could directly affect such deployment. Any changes in service demand can require changes and adjustments in the deployment of staff and resources in order to maintain acceptable levels of performance.

For purposes of this study, we used population projections obtained through community development research and multiplied these by a forecasted incident rate. The incident rate was derived from a two-year history of incidents per capita to forecast workload through the year 2030. The results of the analysis are shown in the following chart and table (Figure 76).

Figure 76: Total Workload Forecast



	2010	2015	2020	2025	2030
Census Forecast	1,819	3,427	5,676	7,978	11,416
City Forecast	1,630	2,702	3,880	5,171	6,572

The increase in actual fire incidents is forecast to be relatively low during the study period, but this is a reflection of trends for fire incident rates per capita and is believed to be a result of improvements made in building codes and public fire education during the last several decades. EMS is expected to continue to be the predominate factor in service demand. Other emergency service calls not involving actual fires is forecasted to increase in part due to the use of automatic fire alarm and water flow systems.

Section III - Future Delivery System Models

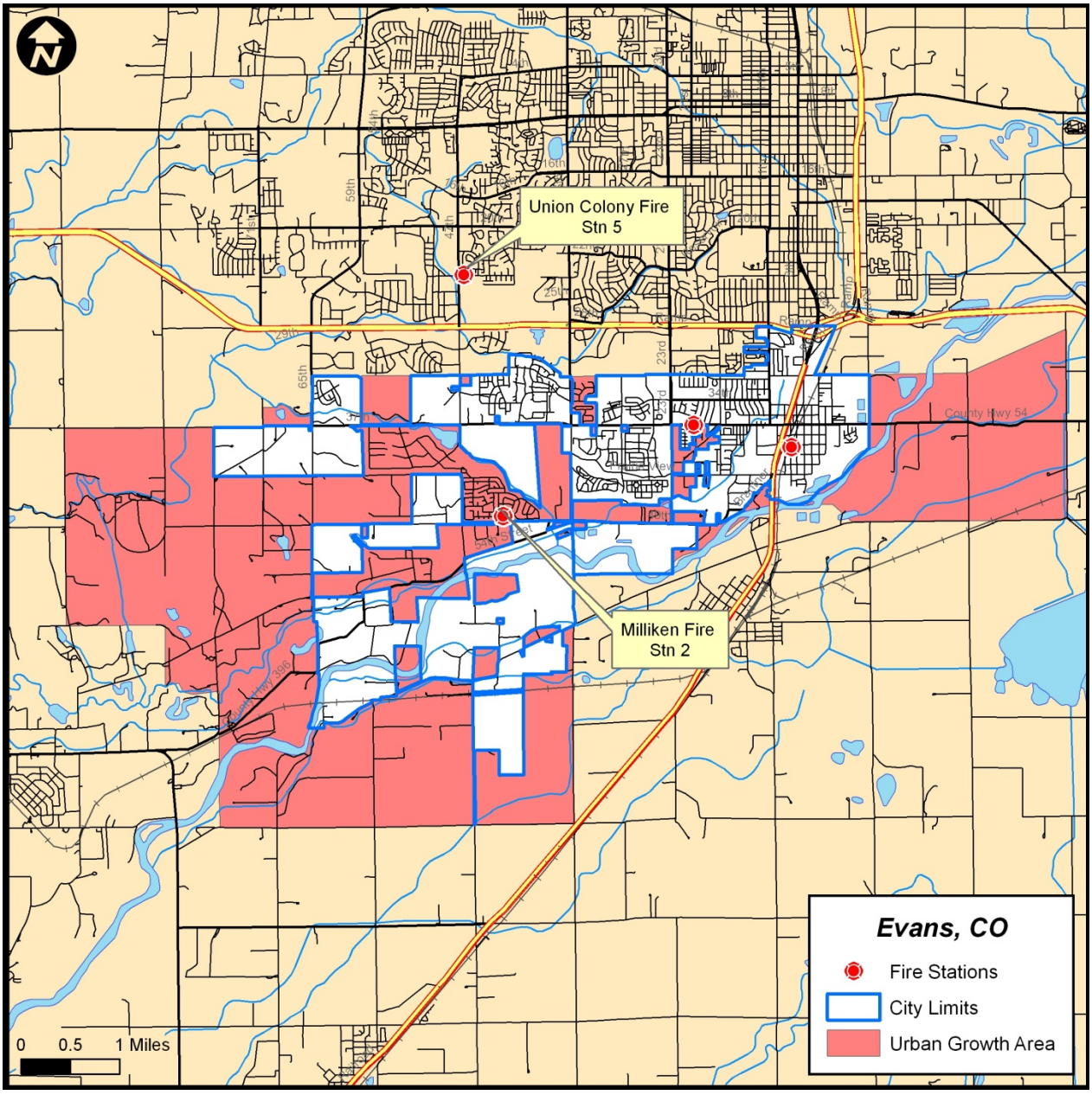
The information contained in this study provides an in-depth analysis of Evans Fire Rescue and its delivery of services. In the evaluation section, we described our findings and provided a review of conditions or issues that require the attention of the department. In many cases, these issues require relatively short-term effort or corrective action. We have assembled a list of such short and mid-term planning strategies in the next section of this report.

However, a Fire Protection Master Plan is intended to provide strategies that are long-term in nature. Its purpose is to identify the most critical issues the agency will face over the long term, out as much as 20 years in the future. We initiated that process in the previous section of this report where we reviewed community growth, identified risks, and evaluated service demands. Now, we will compile the information learned in that section as well as the evaluation of future service demand to provide a recommended long-term strategy for the growth and development of a healthy EFR organization, capable of providing the services that are valued most by its customers.

Future Deployment Recommendations

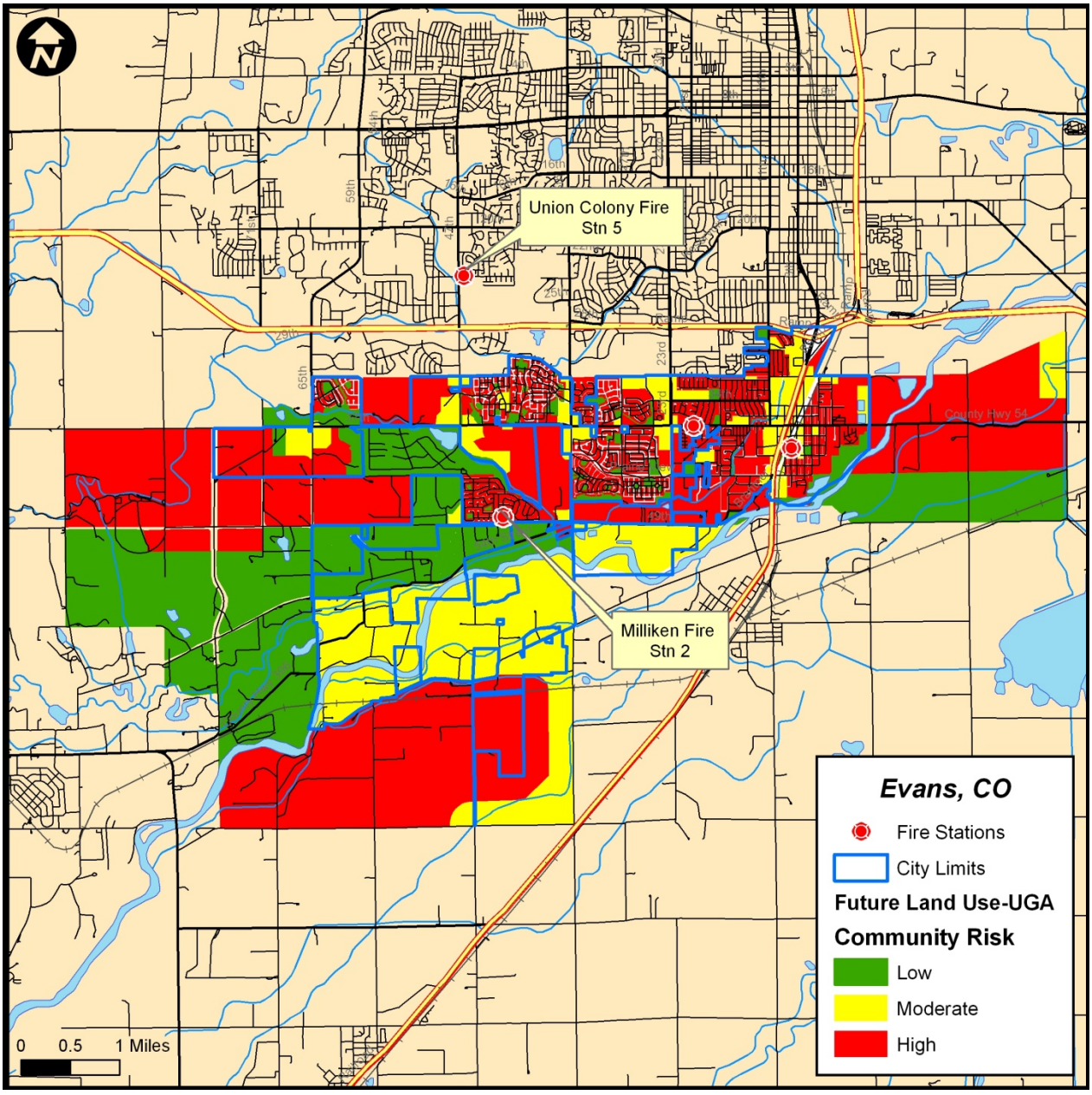
The following long-term resource deployment strategies are intended to allow Evans Fire Rescue to continue its existing level of service as the community grows. Where possible, improvements to the level are offered toward target performance objectives. The City of Evans has defined an Urban Growth Area in its community planning process. It expresses where potential annexations might occur and future land use plans. The following figure (Figure 77) illustrates these areas in relation to the current city limits.

Figure 77: City of Evans Urban Growth Area



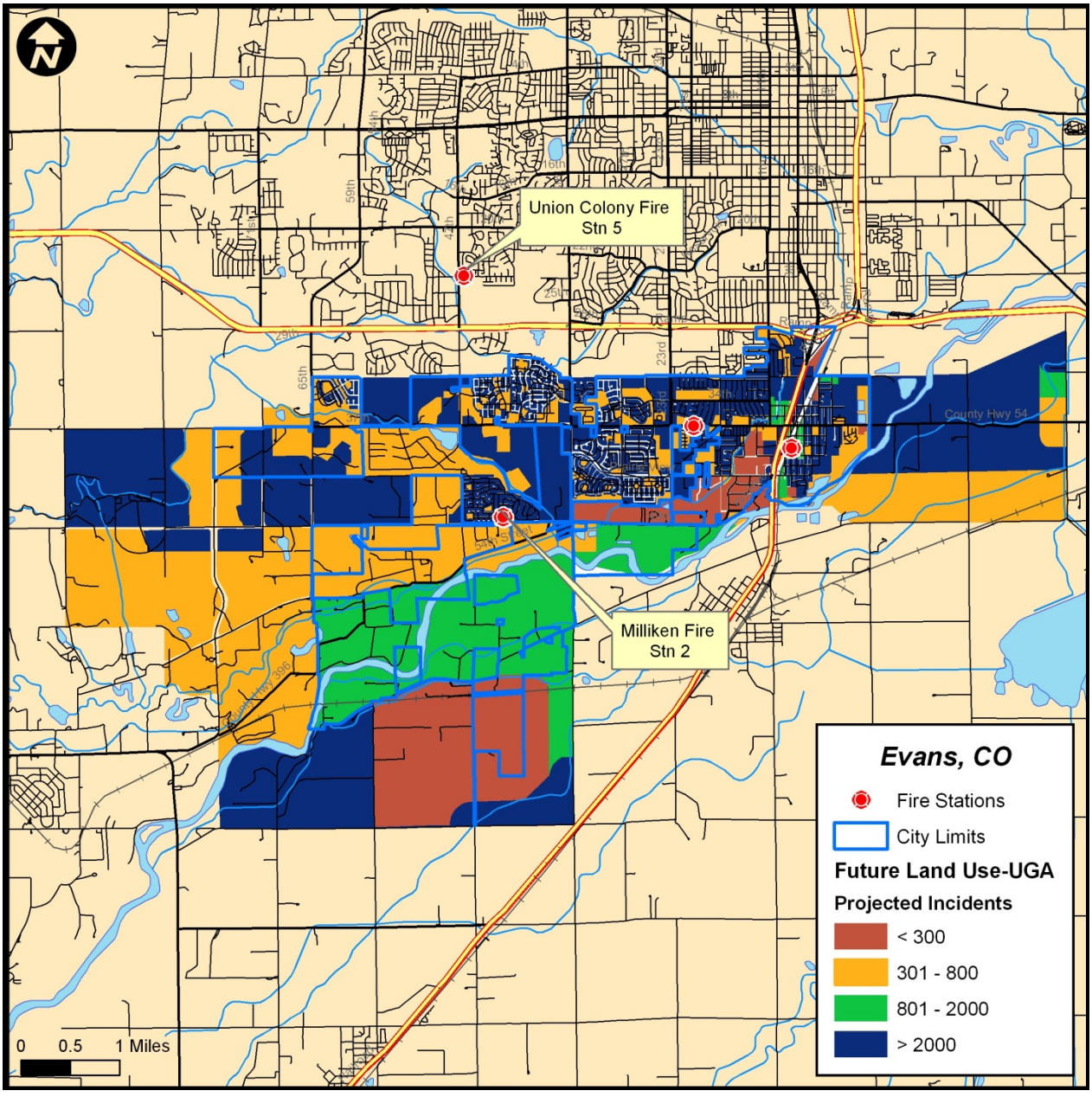
Since this area has been identified by the City of Evans in its future land use plans, ESCI used this information in developing future deployment strategies. Figure 78: Future Land Use Community Risk, illustrates the risk of these areas based upon the future land use designation; categorized similarly to the existing community risk map in the previous section (Figure 75: Community Risk Assessment).

Figure 78: Future Land Use Community Risk



Projected future service demand was determined using several measures developed earlier and appears in the following figure (Figure 79). Information such as historic service demand, population density growth, zoning designations figure into model since the fire department must consider all these factors at once when in view of apparatus and facility appropriations.

Figure 79: Projected Service Demand



Because of the planned commercial and residential growth, service demand is expected to remain high in the downtown area and expand westward and southwest from the core area of

the City. There are three notable developments in the City, Grapevine, Tuscany, Neville's Crossing subdivisions. Grapevine and Tuscany are existing subdivisions that are not fully built out, and Neville's Crossing is a proposed development.

Standards of Response Coverage

Station Strategies

The extensive use of a geographic information system (GIS) allows for the scientific modeling of response times of apparatus against the road network using appropriate speed levels during straight-aways and turns. This process, compared against projected service demand, allows us to evaluate current deployment and future strategies with accuracy and detail. In certain strategies, specific locations are described for future fire station construction or relocation. It should be noted that these specific locations provide the point at which the performance projection data was achieved and represent our recommended "best case" location. It is understood that additional factors such as land availability, zoning, traffic patterns, and acquisition costs will also impact any decision on a specific fire station site. For these reasons, we suggest that variations to the listed locations are acceptable within a range of the equivalent of two or three city blocks. Any such variations will impact the performance projection of the strategy but not significantly enough to render it inaccurate.

All scenarios use the Milliken Fire Station No. 2 as automatic aid to the extent that responders can travel within the current and potential future city limits for scenario performance calculations. Because of the natural barrier of the South Platte River, the LaSalle Fire Station to the south of the City was modeled as mutual aid.

A four-minute response time is an aggressive performance objective typical of well funded all career fire departments operating in an urban setting; comparable to *NFPA 1710*. For volunteer, partially paid, or combination staffed departments, benchmarks found in the *NFPA 1720* is more appropriate model. *NFPA 1710* relies upon the strategic locations of multiple fire stations that are fully staffed while *NFPA 1720* relies upon the assembly of a combination of volunteer/partial paid crews to fight fires. In *NFPA 1720* the assembly of staff requirement and response time of collective apparatus is extended.

The projected service demand levels and future land use descriptions do not indicate that the City plans to become a completely urban center. There will be areas of urban concentrations, along with suburban and more characteristically rural landscapes. However, because of the pattern of expected land use and development, clear delineations between areas for a tiered response performance objective structure prove too cumbersome for effective implementation. Therefore, a single response time objective would be the most manageable to continue to strive

for. A reasonable response objective mirroring NFPA 1720 guidelines would be a response protocol of 10 to 15 firefighters within ten minutes of dispatch.

Recommendation 63: Develop a deployment standard that delivers 10 to 15 firefighters to reported structure fires within 10 minutes 90 percent of the time.

Staffing stations can be achieved in several ways: fully paid, partially paid supplemented by on-call personnel, or partially paid supplemented by on-duty volunteer personnel. Whichever staffing pattern is adopted, the most advantageous to a response time objective is to have a full crew available regardless of compensation at a fire station ready to respond. A full crew at the fire station would be expected to respond within one to two minutes of dispatch while a partial crew awaiting volunteer support would be delayed another three minutes before having apparatus rolling to the incident. This determines the travel time model scenarios and the statistical coverage of projected service demand.

The LaSalle Fire Department, being volunteer-staffed, cannot reach significantly into the Evans UGA to an extent to be included as an automatic aid resource. Additionally, Milliken Fire Station No. 1 is too distant to be of value, even if fully career staffed, to aid much more than a mile in on County Highway 396. Even Union Colony Fire Station No. 5 provides only redundant coverage. It is recommended that EFR and Milliken Fire Protection District enter into a cooperative agreement for staffing at MFD Fire Station No. 2. A fully staffed crew at EFR Station No. 2 and MFD Station No. 2 would only be able to provide 64 percent coverage of future service demand. Were EFR Fire Station No. 1 also to have full paid crew, the coverage would increase to 68 percent. This did not differ significantly should Fire Station No. 1 be relocated to a different site in the old town area of Evans.

Recommendation 64: EFR and Milliken FPD enter into a cooperative agreement for staffing at Milliken Fire Station No. 2.

Milliken Fire Station (Firehouse) No. 2 is located at 4225 Yosemite Drive in Greeley, Colorado, in the Hill North Park subdivision. Fire Station No. 2 was built in 1976 with modifications over the past 30 years. The station serves Hill North Park, Dos Rios, Indian Hills, Knaus, and the Arrowhead Subdivisions. Fire Station No. 2 has living quarters for firefighters and houses three pieces of apparatus: an engine, brush unit, and water tender.

The following picture (Figure 80) provides a visual perspective of Milliken's Fire Station No. 2 on Yosemite Drive.

Figure 80: Milliken FPD Fire Station No. 2

Full-time staffing of EFR's two current fire stations plus Milliken Fire Station No. 2 would result in 68 percent projected service demand coverage. (Note: All calculated coverage percentages include the proposed construction of a bridge on 35th Street over the South Platte River; the river is a natural barrier restricting travel time capabilities of fire apparatus.)

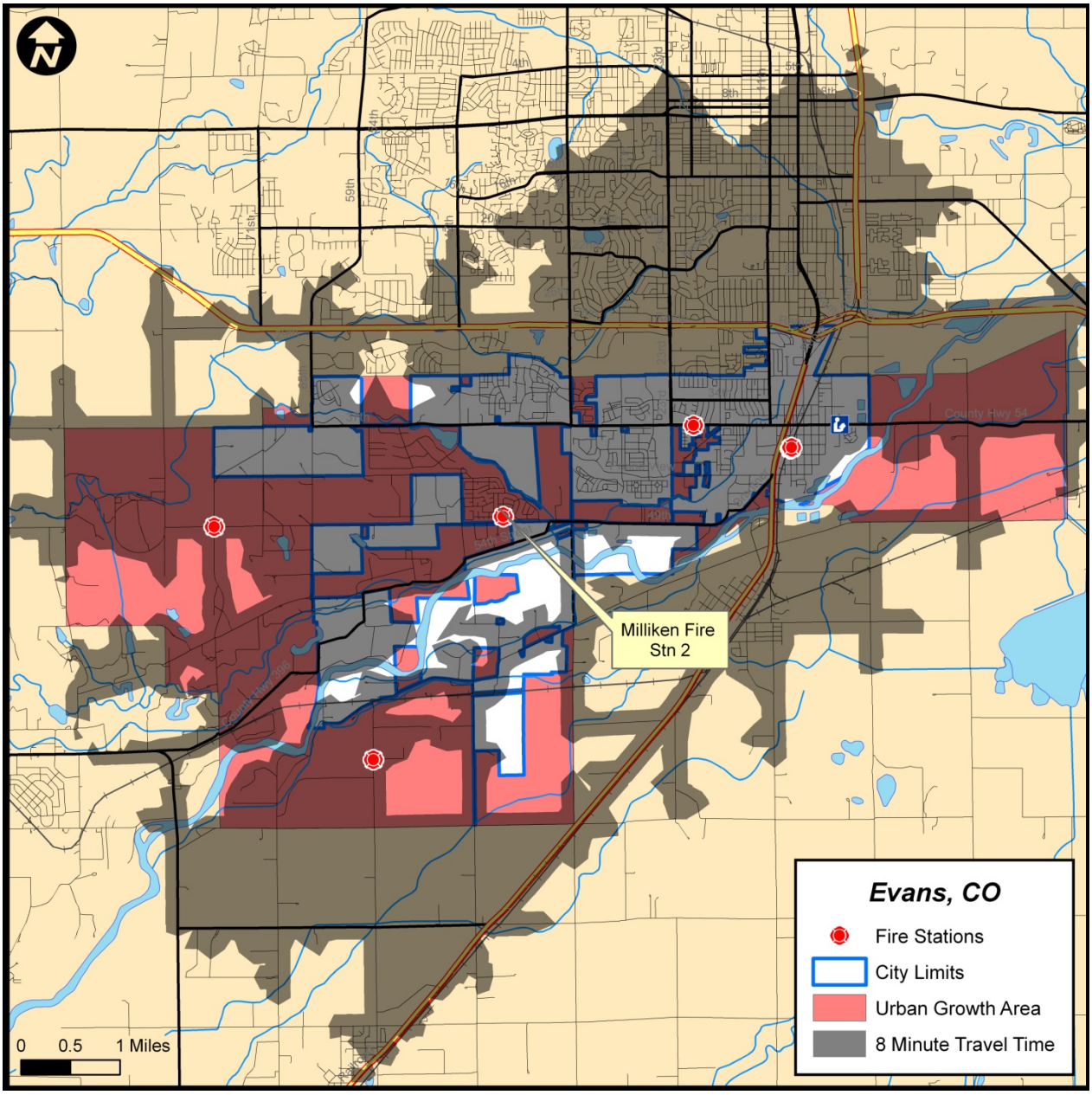
For EFR to achieve a minimum of 80 percent projected service demand coverage, an additional full-time staffed fire station would be necessary. This fire station location would be near the intersection of 49th Street and 77th Street (EFR Fire Station No. 3) in the western portion of the Evans UGA. This station, along with EFR Fire Station No. 1 (staffed partial), EFR Fire Station No. 2 (staffed full-time), and Milliken Fire Station No. 2 (staffed full-time), would allow EFR to reach the 80 percent threshold. Changing EFR Fire Station No. 1 to a full-time staffed station increases the coverage of projected service demand to 84 percent.

In order to reach the threshold of 90th percentile of projected service demand, a fire station south of the river near the 22600 block of County Highway 31 (EFR Fire Station No. 4) would need to be constructed. A caveat to any new facility is the proviso that enough trained volunteers would be available in the area to respond to the fire station within five minutes. Allowing for a five-minute travel time, coverage of projected service demand can be obtained with the two new fire stations (partial staffed) and Fire Station No. 1 (Fire Station No. 1 would remain partial staffed).

However, providing a ready full-time crew in all except EFR Fire Station No. 1 boosts the demand coverage to well within the 90th percentile. (A summary table of the fractiles follows Figure 81: Future Deployment and Travel Time Capability (Full Staffing)).

The following figure (Figure 81) illustrates the coverage of the City and UGA with the proposed fulltime staffed first due fire stations.

Figure 81: Future Deployment and Travel Time Capability (Full Staffing)



The determination of when these fire stations may be necessary will correspond with development and the expected service demand it generates.

Public Safety Facility

Public safety facility buildings house the administration and operations for law enforcement, fire department, and municipal emergency services. Consolidating all of a city's emergency functions in a single facility allows for collaboration, sharing of resources, and continuity during natural and man-made emergency events. The cost of construction is a factor when deciding if a public safety facility is appropriate for a city. An additional factor is location; the facility must be in a location that would meet or improve the emergency response objectives of fire and EMS services.

While many other elements apply in the determination of whether or not to construct a public safety facility, cost and the emergency response capabilities are the two most important. Based on the current and forecast emergency response activities of EFR, constructing a public safety building would require the replacement of EFR Fire Station No. 2. For this reason alone a public safety facility is not recommended at this time.

Projected Performance

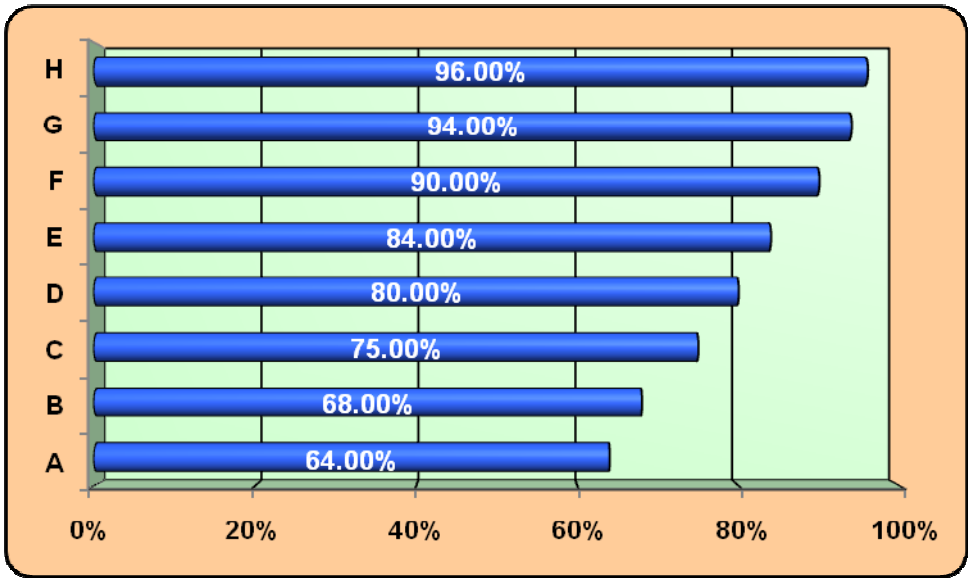
The following table (Figure 82) details the various facility deployment and staffing options along with the resultant projected service demand coverage. In each case the only way to achieve an acceptable level of coverage is to jointly staff MFPD Fire Station No. 2.

Figure 82: Projected Service Demand Coverage by Staffing Scenario

Staffing				
Scenarios		Full-time	Partial	Projected Demand Coverage
	Turnout Time	1 to 2 Minutes	5 Minutes	
	A	EFR Fire Station No. 2 MFPD Fire Station No. 2	EFR Fire Station No. 1	64%
	B	EFR Fire Station Nos. 1 & 2 MFPD Fire Station No. 2		68%
	C	EFR Fire Station Nos. 1 & 2 MFPD Fire Station No. 2	EFR Fire Station No. 3	75%
	D	EFR Fire Station Nos. 2 & 3 MFPD Fire Station No. 2	EFR Fire Station No. 1	80%
	E	EFR Fire Station Nos. 1, 2, & 3 MFPD Fire Station No. 2		84%
	F	EFR Fire Station No. 2 MFPD Fire Station No. 2	EFR Fire Station Nos. 1, 3, & 4	90%
	G	EFR Fire Station Nos. 2, 3 & 4 MFPD Fire Station No. 2	EFR Fire Station No. 1	94%
	H	EFR Fire Station Nos. 1, 2, 3, & 4 MFPD Fire Station No. 2		96%

Figure 83 sums up the projected service demand for each of the scenarios and displays the coverage by percentage

Figure 83: Projected Service Demand Coverage Percentage by Scenario



Percentages associated with scenarios F, G, and H that achieve a 90 percent or greater service demand coverage would meet recommended response standards.

With an increase in the number of fire stations that are staffed full-time there is a parallel incremental improvement to the projected service demand coverage.

Joint Staffing of Fire Stations and Apparatus

Practicality and external influences seldom allow fire station placement to match perfectly with a fire department's deployment strategy. Reasons include the availability of property, land use laws, roadway infrastructure, construction cost, traffic patterns, geography, and projected station workload. Given that the area protected by a fire department may change through annexation, development, and contracted protection (intergovernmental agreement), a perfect station location today may be a poor location in the future. Because of these and other factors, it is virtually impossible to place fire stations in an ideal location and not overlap the response areas of other fire stations or departments. Jointly staffed stations and/or response units create more alternatives for fire departments studying the deployment of emergency resources.

Fire departments often know how many firefighters are needed for the best possible protection; however, departments are infrequently able to afford to staff at such levels. Sharing personnel from different agencies can help bring staffing levels closer to the optimum.

If fire departments create a single training division, some provision is needed to offer response area coverage while other emergency units travel to a training center. Jointly staffing a PAU (Peak Activity Unit) with multi-agency personnel could protect vacant response areas during those times. Jointly staffing fire apparatus can also be a very practical option for providing resources from a fire station located in an area able to serve more than one jurisdiction. Last, cooperatively providing specialty apparatus used for infrequent (but often high-risk) emergencies is an effective means to distribute the cost of such apparatus over a wider financing base.

The NFPA published an updated state-by-state study of the needs of the U.S. fire service. The Colorado version of the June 2004 report, *A Needs Assessment of the Fire Service – Colorado*, states that while statistics specific to Colorado have not been developed:

> *Using maximum response distance guidelines from the Insurance Services Office and simple models of response distance as a function of community area and number of fire stations, developed by the Rand Corporation, it is estimated that three-fifths to three-fourths of fire departments nationally have too few fire stations to meet the guidelines.*

EFR and neighboring fire departments now rely on each other for resources during routine and non-routine emergencies. Without question, if facilities are distributed and personnel deployed regardless of jurisdictional boundaries (and consistent with a regional standard of cover) the likelihood of those resources being located where needed most increases. The crucial question is how to pay for shared resources in a manner that assures equity for all taxpayers.

The funding of jointly staffed fire stations and apparatus should be based on local law, authority, and policy. There are many examples of innovative cooperative agreements between jurisdictions that maximize the value of emergency resources. For instance, the cities of Portland and Gresham, Oregon, jointly staff a fire station that is located to respond efficiently to emergencies in both cities. For the first five months of each year, a three-person ALS fire company is housed and supported in the station by the City of Gresham. During the remaining seven months of the year, a Portland Fire and Rescue four-person ALS engine responds from the station. As change occurs in the protected area, the two cities can easily adjust liability by altering the time each operates the station. The agreement assures timely and effective

emergency response while a financial balance is maintained that benefits the taxpayers of both cities.

Some examples of methods used to jointly staff stations and apparatus include:

- Combined personnel from different fire departments staff a station.
    - Such as – One fire department supplies a firefighter for each shift and another fire department contributes an apparatus operator/engineer and an officer. The workforce is made up each day of personnel from both fire departments.
- Personnel from different fire departments staff a station on a set schedule.
    - Such as – One fire department staffs the station on two of three shifts. The other department staffs the station on the third shift.
- Fire departments apportion responsibility for staffing and support of a station for a given number of months.
    - Such as – One fire department staffs and supports the station for a given number of months each year. During the remaining months, the other fire department provides staff and support.
- Two fire departments jointly staff a fire station with personnel from both fire departments, and operate more than one piece of emergency apparatus.
    - Such as – One fire department staffs a fire engine and the other department staffs a medic unit in the same station.
- One fire department staffs a fire station but extends first alarm response from that station to another jurisdiction. The second fire department compensates the first based on an agreed cost/benefit formula.
- Two fire departments exchange in-kind first alarm response.
    - Such as – One fire department provides first alarm response into another fire department's area in exchange for like service from that agency.

The idea of sharing facilities and apparatus can be beneficial for the participating agencies. However, through experience we have developed a list of items that will lessen the potential for complications. The information is divided into to two sections, guidance and fiscal considerations.

Guidance

- Training issues
    - The personnel used for joint staffing of fire stations and apparatus should be trained to provide a service level (including EMS) equal to or greater than that of the cooperating fire departments.

  - While it is preferable to use a single dispatch center when joint staffing, it is not considered essential to the success of the partnership.

- Deployment considerations
  - Deployment standards for the partnering agencies should be developed and adopted.
  - The fire departments should execute deployment plans between the agencies prior to entering joint staffing agreements.
  - Several of the joint staffing examples involve personnel from different fire departments staffing stations and apparatus together. Developing a single pay and benefits schedule will help to alleviate real or perceived issues of equity between personnel.
  - Provide a regional IC (Incident Command) for supervision of emergency operations and for oversight of on-duty personnel during routine operations.
- Financial considerations
  - Marginal costs of deploying personnel in joint staffing ventures will be determined based on the agency and on personnel costs.
  - Startup costs may include additional training as well as the supplies and equipment needed to support the stations and fire response units. A portion of the cost for additional training and equipment could be immaterial, if as part of the cooperative initiatives the fire departments also adopt deployment standards, training standards, and a joint purchasing program.

Fiscal Considerations

- Joint staffing of fire stations and apparatus is often foreseen only as an interim step towards a more regional fire department or fire district.
- Joint staffing provides fire departments with a way to meet deployment standards when:
  - It is not economically feasible for a fire department to staff a station or fire apparatus independently.
  - Fire departments have common borders and underserved territories.
- Joint staffing provides the political entities with an emergency service exit strategy where future annexation may remove or transfer territorial responsibility.

Cost Allocation

Cost allocation is the identification of costs with cost objectives, also called cost apportionment, cost assignment, cost distribution, and cost reapportionment. There are basically three aspects of cost allocation: (1) choosing the object of costing (e.g., products, processes, jobs, or divisions); (2) choosing and accumulating the costs that relate to the object of costing (e.g., manufacturing expenses, selling and administrative expenses, joint costs, common costs,

division costs, responses, and fixed costs); and (3) choosing a method of associating (2) with (1). For example, a cost allocation base for allocating firefighting costs would typically be labor-hours, unit-hours, or responses.

If the City of Evans and Milliken FPD determine that joint staffing of Milliken Fire Station No. 2 is beneficial to both organizations, what options are there for the allocation of costs? Allocation can be based on:

- Population served
- Estimated runs/calls in the City and District
- Appraised property value
- A percentage of approved operational budget, including capital apportionment (annual allocation)
- A percentage using all four factors (annual allocation)

1) Allocate cost based on population served

The population of Evans is 18,888; the population of the Milliken FPD is estimated to be 8,000. Based on these numbers, 70.25 percent of the total 2009 budget for operating Milliken Fire Station No. 2 would be charged to the City of Evans.

2) Allocate cost based on estimated runs/calls

EFR had 1,264 responses in the calendar year 2008 while Milliken FPD had approximately 500.[65] If this percentage turned out to be the correct number, the apportionment of operating Milliken Fire Station No. 2 would be 71.66 percent to the City of Evans and 28.34 percent to Milliken FPD.

3) Allocate cost based on appraised property value

The 2009 taxable property value for the City of Evans is $135,048,630 and the property value in Milliken FPD is $140,479,320.[66] Based on these numbers, 48.98 percent of the operational costs of Fire Station No. 2 would be charged to the City of Evans and 51.02 to Milliken FPD. This is one way of listing the at-risk value for each of the entities.

[65] The number of responses for MFPD was estimated based on 471 responses in 2007.
[66] Weld County Assessor, December 2009 abstract report.

4) Allocate cost annually on a percentage of approved operational budget, including capital apportionment

Based on the annual operational budget of the two fire agencies, the cost would be allocated to operate Milliken Fire Station No. 2. Budget information was not available for Milliken FPD in time to be included in this report.

5) Allocate cost annually on a percentage using all four factors

A combining of the four previous allocation factors could be used to arrive at a cost apportionment for operating Milliken Fire Station No. 2.

Cost Recovery

Fire departments often operate from multiple budgetary funds in addition to the general fund. These funds are dedicated cost recovery, enterprise funds, or revenue accounts that are funded from services like EMS, ambulance transport, and fire safety inspection fees. Cost recovery, like other revenue sources, helps provide a measure of funding stability. For most emergency service systems, significant cost recovery alternatives are limited primarily to emergency medical services (EMS), where charges tend to be underwritten by health insurance providers and Medicare. Additional possibilities for cost recovery exist in the area of hazardous materials response, fire suppression response, and code enforcement.

Some operating expense can be reclaimed from hazardous materials response, where (so-called) "spiller pays" laws frequently require that hazardous material handlers reimburse fire departments for emergency mitigation; but such reimbursement is typically limited only to actual expenditure. Consequently, except for a few very active hazardous materials teams located in major metropolitan areas, this cost recovery strategy provides little in the way of a predictable revenue stream.

Some fire departments bill for fire suppression response, primarily to insured structures; however, most insurance carriers provide very limited coverage for such fees. Thus, revenue from fire suppression is rarely worth the political, public relations, and administrative challenges to collect it. As a result, many such efforts have failed.

Code enforcement service often provides the most reliable, consistent, and predictable source of revenue aside from EMS. Many communities have established a fee ordinance for the code enforcement division, initiating a billing for all code enforcement service from routine inspections to licenses and plan review. Code enforcement fees can be based on occupancy type

(reflecting the relative complexity of the inspection), while plan review fees are often based on the square footage of the structure reviewed.

Recommendation 65: EFR and the City of Evans expand the fee for service schedule to include a schedule for fire and EMS services provided outside of the City.

System Expansion Costs

The Influence of Economic Factors on Future Cost

Many factors influence the amount of revenue (and thus the dollars available for expenditures) related to the operation of the City and EFR. Some of the factors include unemployment, the fluctuating cost of products and services, the potential for decrease revenue from property taxes based on the current housing crisis, inflation (CPI-U), and the impact of property annexations into the City.

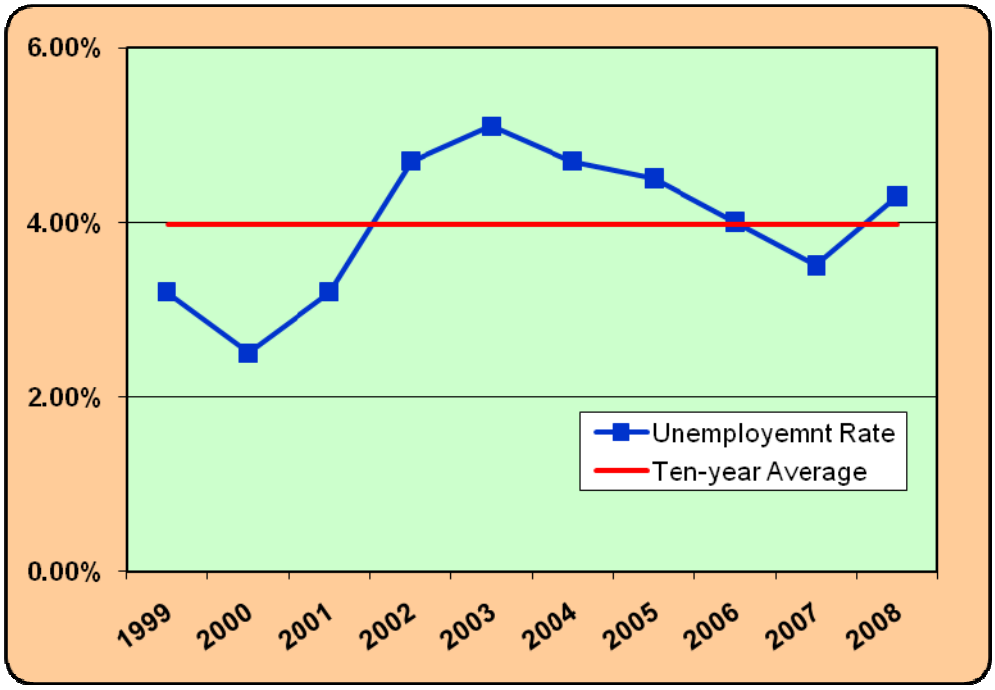
Annual Unemployment Rate

The U.S. Department of Labor, Bureau of Labor Statistics produces an assortment of data sets and reports that are useful for economic analysis and trending. One such data set (the Local Area Unemployment Statistics program) produces monthly and annual employment, unemployment, and labor force data for census regions and divisions, states, counties, metropolitan areas, and many cities by place of residence. Estimates in these reports are considered key indicators of local economic conditions. Unemployment is one gauge of economic health and is a statistic that is familiar to most everyone.

Unemployment statistics are based on persons aged 16 years and older who had no employment during the reference week, were available for work (except for temporary illness), and had made specific efforts to find employment during the four-week period ending with the reference week. Persons who were waiting to be recalled to a job from which they had been laid off need not have been looking for work to be classed as unemployed.

Figure 84 is a ten-year historical review and annual average of the unemployment for the Fort Collins-Loveland (CO) Metropolitan Statistical area.[67]

Figure 84: Historical Unemployment Rate, 1999 – 2008



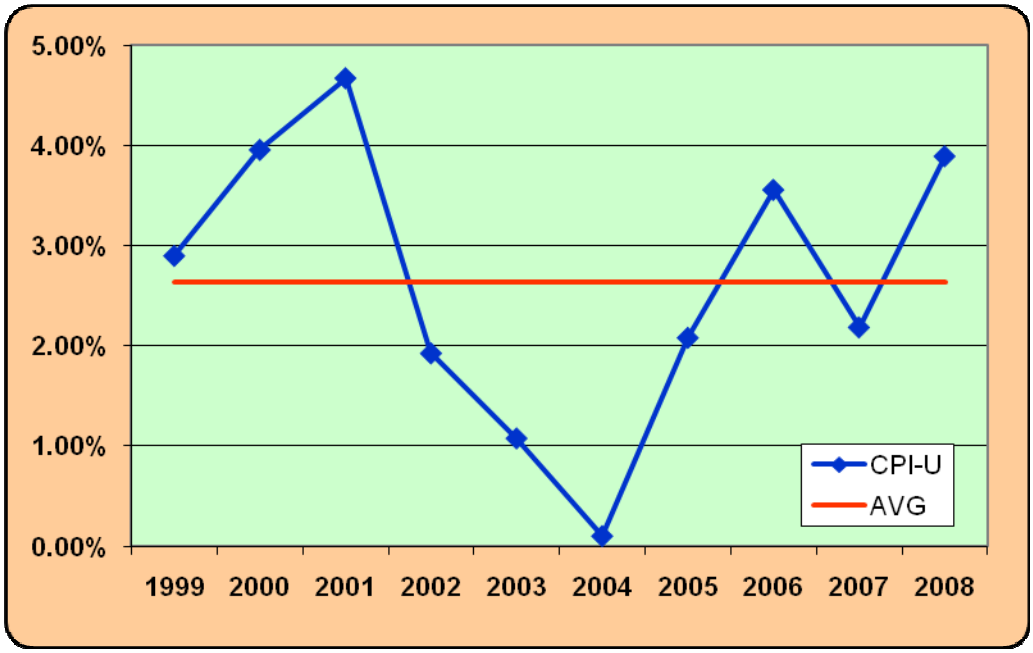
Unemployment has averaged 3.97 for the ten-year period 1999 through 2008. Preliminary unemployment data for the first ten months of 2009 in the Fort Collins metro area is averaging 6.21 percent.[68]

[67] U.S. Department of Labor, Bureau of Labor Statistics, Local Area Unemployment Statistics Series, LAUS Unit, LAUS system output file, Fort Collins-Loveland, CO Metropolitan Statistical Area.
[68] Ibid.

Annual Inflation Rate

Inflation is also an important consideration when forecasting cost. For the purpose of this analysis, we use the consumer price index for all urban consumers (CPI-U) during the period 2000 through 2008 for the Denver-Boulder-Greeley urban region as compiled by the U.S. Department of Labor.[69]

Figure 85: Historical CPI-U, 1999 – 2008

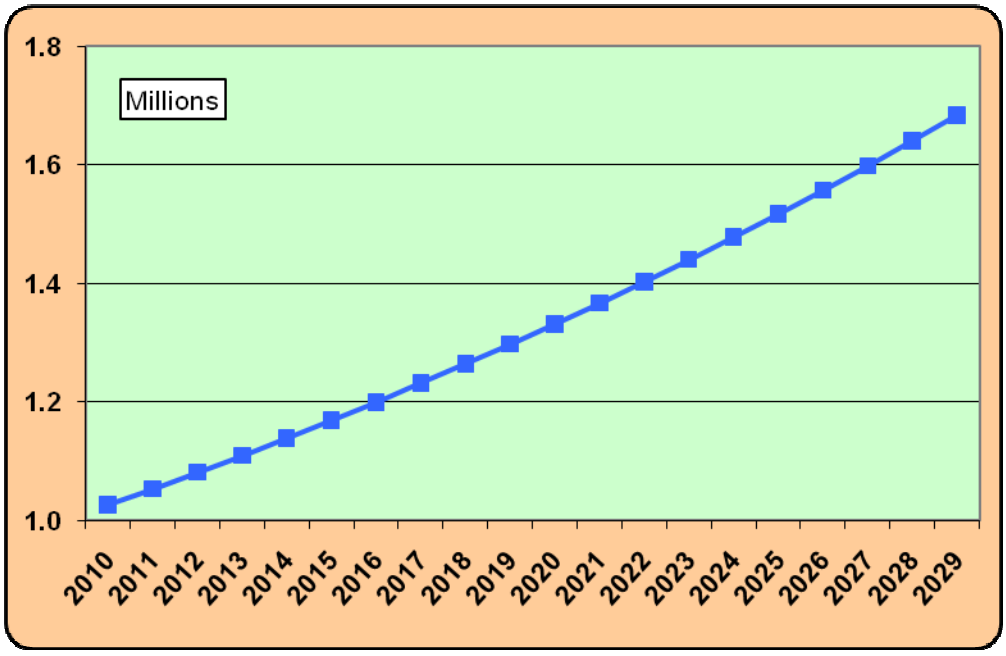


The historical ten-year CPI-U for Denver-Boulder-Greeley (CO) average between 1999 and 2008 was 2.64 percent.

[69] U.S. Department of Labor, Bureau of Labor Statistics, Consumer Price Index - All Urban Consumers, Denver-Boulder-Greeley, CO, not seasonally adjusted, Series Id: CUURA433SA0, CUUSA433SA0.

The following figure (Figure 86) uses the historical CPI-U data to forecast the impact on the EFR's budgets through 2029. This rate is used for analysis purposes during the feasibility study (the actual CPI-U for any given year could be higher or lower).

Figure 86: Projected CPI-U, 2010 – 2029

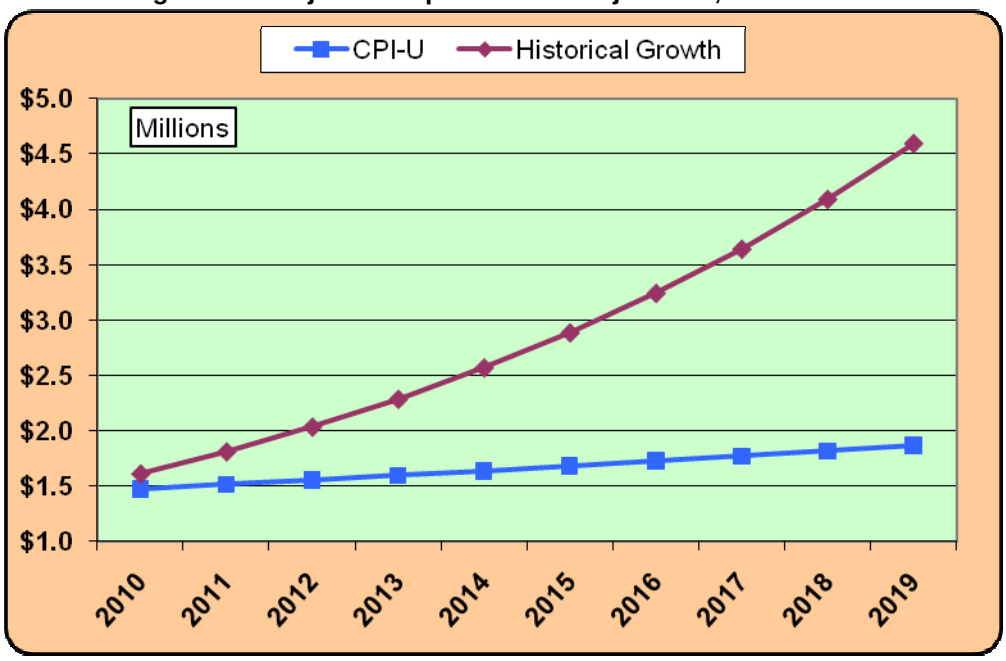


The annual average CPI-U increase is applied to the approved 2009 budget to forecast the impact on the future financial stability of EFR.

Operating Expense

Figure 87 shows the extrapolation of the 2009 expenditures for EFR (less capital purchases) and forecasts the costs based on the CPI-U and on the average historical growth of the City of Evans.

Figure 87: Projected Expenditures Projections, 2010 – 2019



Based on the CPI-U, the annual expenditures for EFR would increase to approximately $1.9 million in 2019. Applying the City of Evans historical annual average increase in population of 12.32 percent increases projected expenditures in 2019 to nearly $4.6 million.

Discussion and Financial Analysis

Deployment scenarios and future staffing for EFR involve shared services at Milliken FPD Fire Station No. 2. This should be only an initial step for shared services. Consideration of the value of increased cooperative efforts should be considered. Cooperative efforts could include administration and support services, training, fire prevention, and purchasing.

Recommendation 66: EFR and the City of Evans should investigate all options for cooperative efforts with Milliken FPD.

During the last decade, EFR has transitioned from an all volunteer to a mostly career fire department. This is not unusual given that the City of Evans has grown from a smaller town into a generally suburban residential community. The ability to recruit, train, and retain a volunteer firefighting force will continue to be more difficult. While the reasons are many, the amount of time commitment of time and effort by individuals (volunteers) has increased. It is difficult to expect them to meet a greater number of hours for mandated training requirements and more emergency responses.

To determine the number of additional FTEs assigned to emergency operations should EFR and Milliken FPD reach an agreement to jointly staff Milliken Fire Station No. 2, ESCI developed a computer-driven model budget for EFR. A modeled budget is designed to fairly represent the monetary policies of the department, to neutralize the normal differences usually found in unilateral fiscal practices, and to account for any financial peculiarities (such as budgetary back loading or off-book programs). The modeling allows an estimation of the *public cost* of operation and provides a means for financial evaluation of the outcome of shared services. The modeled budget yields a baseline estimate of the public cost of service; in addition, the methodology also provides the ability to project the outcomes into the future. In this case, we establish a financial baseline for EFR in fiscal year 2010.

We emphasize one point: This analysis provides a "snapshot" estimate of the cost for the fiscal year 2010. Many forces may act to change the level of funding support in the future, including changes in law, revenue, politics, or contracts. Our process uses current revenue and appropriation to generate an estimate of the amount of support relative to existing levels of fire and medical services. The analysis allows comparison with the predicted cost of cooperative efforts between EFR and Milliken FPD.

Figure 88 details the current number of full-time and volunteer members EFR is budgeted for in fiscal year 2010 and then lists a staffing plan that includes personnel for joint staffing of Milliken Fire Station No. 2.

Figure 88: EFR Operational and Joint Staffing with MFPD, Fiscal Year 2010

Position – Title	Current Number of Personnel	Forecast Number of Personnel
Fire Captain	3.00	6.00
Firefighter	9.00	15.00
Volunteer Firefighter	29.00	35.00
Total	**41.00**	**56.00**

The initial staffing plan for joint staffing of Milliken Fire Station No. 2 for EFR would include 21 FTE full-time firefighters (including the fire captains) and 35 volunteer members. The staffing plan illustrated in Figure 88 results in the following modeled baseline budget for the proposed cooperative effort (Figure 89).

Figure 89: Baseline Cost of Joint Staffing with MFPD, Fiscal 2010

FY 2010 Operating Budget		
Component	**Baseline**	**Joint Staffing**
Administrative	$270,931	$270,931
Operational	550,729	972,571
Overtime	56,001	98,896
Benefits	296,093	452,880
Personal Services Total	**1,173,754**	**1,795,278**
Materials and Services	154,000	205,113
Volunteer Services	122,500	147,845
Materials & Services Total	**276,500**	**352,957**
Total Requirements	**$1,450,254**	**$2,148,236**

The above table shows that the total requirements of adding staffing to Milliken Fire Station No. 2 would be $2,148,236, an increase of $697,982 (approximately 48 percent). While in this example all of the firefighters are shown as EFR employees it is by no means the only option. Other alternative methods are clearly possible as are the methods of cost sharing.

Allocation of the increased cost to joint staff Milliken Fire Station No. 2 could be based on the assessed valuation of the City of Evans and Milliken FPD. Based on these numbers, 48.98 percent of the operational costs of Fire Station No. 2 would be charged to the City of Evans and 51.02 to Milliken FPD. The shared cost to Evans would be $356,110 and Milliken's portion would be $341,871.

Recommended Long-Term Strategy

ESCI has developed a number of recommendations that are short to mid-term in nature. A summary listing of them is found in Appendix C: Summary Table of Recommendations. This portion of the report is an abstract of all prior material in this report and includes recommendations for where, when, and how many fire stations, personnel, and apparatus. To begin, a discussion of how the facts are merged with theory and a long-term strategy was created for EFR.

Response Time Thresholds and Triggers

Introduction

When a community creates a fire department and builds its first fire station, a response time criterion is usually established. This response time anticipates that it applies to 100 percent of the area covered by the boundaries of that fire station. This is especially true when there is only one fire station and a small area to cover. Simply speaking, a central fire station is among the first public buildings created in most communities, no matter how small. As the community grows away from that station in incremental steps, the expectation is that the original fire station will still provide adequate coverage.

However, that expectation is fraught with many problems. In the simplest of terms, the total area covered by a fire department may or may not be initially highly developed; and even if a crew from the fire station responds, it may not do so in a timely manner. As EFR did, most fire departments begin as totally volunteer organizations. They usually are operated with volunteer staffing for economic reasons. When population and service area increases, there is often pressure to add full-time staff and to consider adding additional fire stations.

In fact, there are many variations on this theme. Older, established cities tended to be denser and smaller in dimension, but they often annexed new areas. Newer communities may be created from a much larger area than the first fire station could cover. Urban sprawl, which is an active topic of discussion in areas of public policy, has resulted in the timing for construction of additional fire stations and staffing.

Fire Station Siting

Usually when a fire department constructs its first fire station in the area, the values at risk and hazards to be protected are within a close driving distance. In effect, the first fire station in a

community is a centroid. That is, the local fire station is the center of the response capacity of the jurisdiction. Early in the 20th century, fire stations were often characterized on maps by having a circle drawn around the fire station with an l.5 mile radius. This was sometimes used to describe the area of coverage. However, fire apparatus responds using the roadbed that consists of angles and distances that did not result in the circle being the true description of the coverage. Not only that, but one cannot place fire stations exactly three miles apart and have the two circles overlap. When they are placed closer together than the 1.5 radius, there is not only overlap, but also gaps where there does not appear to be coverage.

Later, the circle was replaced by diamond-shaped templates that could be overlaid over the fire station and rotated to estimate the relative advantage of road distances. The contemporary method used to evaluate fire stations is based on using the actual road-network in a computer model (GIS). This system uses time and distance to create a network that more closely represents how far the company can respond from its fire station, using the adopted time standard. A few years ago, the method that was in vogue was called FLAME. This is an acronym for Fire Station Location and Mapping Environment. From the time the first fire station is built, it creates an expectation that the facility can and will provide a timely response to calls for service in an area surrounding that facility.

When the original criterion was set for response time from that facility, there is an immediate location – allocation created by that fire station. The fire station provides a response to a given area within a reasonable time in a pattern that essentially is an overlay on the streets and highways that radiate outward from that location. Even before any incidents occur in a community, the road-network geography and the topographical attributes of a community create a dynamic segmentation that results in the ability of fire professionals to reasonably predict what areas can be and those that will not be covered. Today, the preferred tool for conducting this type of analysis is through geographical information systems (GIS).

There are many infrastructure components that have an effect on the location allocation concept. Among these are road and highways networks, impedance factors such as traffic patterns and processes (stoplights and signs), and turn impedance, i.e.: roadbed configuration and elevation impedance (slope). It is axiomatic that there is an inverse distance-weighting factor that results in longer response times to areas further away from the centroid of the station. This is called distance decay. The manner and means of response involve the use of the roadbed, but also involve dealing with differences in elevation and competing vehicles on

the roadbed. In short, the further away from the location of an incident and the higher the impedance for response, the less effective any specific resource is in dealing with the initial stages of an emergency event as you move away from the fire station's location.

The use of the concept of using travel time itself is not exactly new. However, for many years the basic criterion was road mileage only. The standard that was normally applied was that fire apparatus or an engine company was expected to be able to reach any incident within 1.5 miles of the fire station within five-minutes of driving time. Time was a secondary consideration. That standard was based on data from the 1940s with respect to road conditions and traffic patterns.

A lot has changed since then. For decades, the Insurance Services Office (ISO) has based fire station locations on a 1.5-mile separation. In general, this has served as rule of thumb, but it does not deal with the vagaries of physical response (such as geography, transportation, and weather). Secondarily, it does not place any emphasis on response needed for emergency medical service (EMS) incidents, such as basic life support (BLS) or advanced life support (ALS).

The concept of using actual travel time today is based on a more accurate representation of the level of service for an all-risk approach. It is more performance-based. Today, most fire agencies set a time standard that includes three elements, two of which were missing from the strict use of mileage for station location; specifically, alarm processing time and turnout time. The actual time of road travel has often been used to set the communities expectation of performance.

Using this approach, fire stations are seldom located in a linear fashion. This concept is based on the time intervals identified in the Standards of Response Coverage section of the Self Assessment Manual published by the Commission on Fire Accreditation International. This process leads to the development of a standard of response cover, or a time and level of staffing designed to control an emergency at a minimum level of loss. The process is however, a policy choice based on risk and local conditions.

The basic performance standards for time goals are based on the rapid speed of fire growth and consequences of emergency medical situations over a short time frame. It has been determined that both fires and medical emergencies can gain a foothold that result in excessive losses when the times are excessive.

The most common benchmark time standards used are:

- Alarm processing time — 60 seconds
- Turnout time — 60 seconds
- Travel time
    - Fire response – five minutes, 90 percent of the time
    - BLS response – five minutes, 90 percent of the time
    - ALS response – eight minutes, 90 percent of the time

The contemporary method of measuring performance looks at response time on incidents as an indicator of levels of service. The way this is done is two-fold. The first is to measure the actual performance during emergencies; the second is to monitor the system to determine when the system fails to achieve the performance goals.

One point of caution--response time criterion should only be applied to calls that are emergency calls.[70] When incidents are analyzed, the data should be reviewed to assure that non-emergency calls are not used when calculating performance. There are many calls for service that fire departments log as incidents that are non-threatening scenarios and the responding companies will handle them on an as needed basis. To include these times in the analysis of emergency services tends to skew the outcome, leading to a false service indicator.

Options for Improving Call Processing Time

Options for improving call processing time include:

- Update existing guidelines for call taking
- Review current standard for dispatch processing time
- Require a performance level
- Recommended standard of call processing time of; less than one minute, 90 percent of the time on priority assignments
- Benchmark and monitor call processing time

[70] For response analysis in this report, ESCI used only (clean data) emergency responses. Responses that were non-emergent, recalled en route, and responses with incomplete data were removed.

Response Failure

To understand when response failure occurs, we must define first what is being measured and how we measure the performance goal. For example, a basic question to be answered is whether a fire department is protecting the dirt or the incidents? Are we going to measure percentage of performance by first-due area, or department-wide?

Generally, fire protection practitioners try to position fire stations to cover 90 percent of the ground in each first-due area, to provide overlap for concentration, redundancy for multiple calls, and for equity of access for customer service. It is economically impossible to cover 100 percent of the ground. Based on actual call loading, we could strive for 80 to 90 percent of the calls within a first-due area and concentration total reflex measures.

If the measure for either area or incidents is set at 80 to 90 percent effectiveness, how much slop over the performance measure is acceptable? For example, if an historical incident measure is at the 85 percentile, but the other five percent are covered in the next 60 seconds, is that acceptable? Maybe yes, maybe no. It is important to understand that values at risk, type of unmet calls and the total number of calls can combine to create a need. If the deficiency is only five percent or 25 calls out 500, depending on the size of the measurement area the gap may or may not be significant.

For example, if the performance requirement was to arrive at the scene of an emergency within five minutes of travel time, 90 percent of the time, this criterion could be applied to one year of response data to see if the goal was achieved. We note that this criterion allows for 10 percent of the calls to be beyond the five minutes traveling time over a given reporting period. This provides flexibility in the assessment of coverage to cope with anomalies such as extra-ordinary response conditions such responding from out of City, or for delays caused by simultaneous alarms.

This raises an additional question. Of the 10 percent overage, how many of the incidents are covered within the next 30 to 60 seconds? The first indication of a problem of providing service is when a number of alarms that exceed the performance standard are documented. This may or may not be function of new growth. It could be the result of in-fill that causes a higher number of alarms for the company than it can service. This is especially true when alarms come in simultaneously.

Moreover, when areas are being developed that begin to extend travel times, they do not automatically become the source of new alarms. In fact, new construction often has a period of several years before adding to fire service demand. The same is not necessarily true from the perspective of emergency medical service.

When a New Station is Needed

The question that many communities have to address, including Evans, is when is a second, third, or fourth fire station required to meet time goals? Obviously, this has been answered in any community that has more than one fire station. The problem comes in finding a quantifiable threshold to determine that point for each specific situation because it varies from community to community and even within a specific jurisdiction. The overall answer is part financial and part professional judgment. In fact, in the literature of the fire service today, there is very little definitive guidance on how this should be accomplished.

There are several steps that can be identified. They consist of:

- Identifying areas with minimum coverage
- Identifying feasible locations for a new facility
- Evaluating those locations using specific criteria

The description in this document is based on a growing body of knowledge aimed at quantifying this process. What is unfortunate is that there is no universally acceptable algorithm. The fire protection planning process does allow for an evaluation of potential loss as a result of deteriorating response times. One form of measurement is to assess the road and transportation network to ascertain the percentage of road mileage that theoretically is covered by the time criterion. This is done using computer-based modeling to create a polygon that describes the areas of coverage. In fact, this process will also identify gaps and deficiencies where response time is not adequate.

It should be noted that as long as a department operates a totally volunteer force, the time established as a turnout time will be a factor. Generally speaking, volunteers take more time to get out of a station than a permanent crew. This statement does not place any prejudice on the use of volunteers. This is mentioned only to remind the readers that total response time must be considered when evaluating alternatives.

As growth and development extends beyond the range of travel time of one station, the percentage of calls that exceed the performance requirement should begin to increase. We note that growth, in and of itself does not create an instantaneous demand. New construction has the advantage of better codes, a higher level of owner interest, and limited deterioration of fire-breeding conditions.

A more subtle difference in today's fire service is the fact that community demand for medical services exists almost from day one of occupancy. In short, this means that new construction may place more values and lives at risk, but the demand for service will be incremental. When demand for service does begin, it will be based upon two factors – nature of the occupancy and hazards that are present.

Incident increase may first appear as a change in the performance of an existing company in the annual analysis of emergency calls. For example, if a station has 1,000 alarms and a 90 percent compliance rate with the response standard, there would be about 100 alarms per year that were beyond the goal. This would be the baseline for existing response performance. If the following year, the number of alarms was 1,200 and percentage dropped to 85 percent, this would indicate that the department is losing ground on response performance. If the change in the number of alarms had merely increased because of more calls in the same area, the response time percentage should have remained fairly similar. (One exception to this rule is when a single company has such a high call volume that it cannot handle all calls without call queuing.)

However, since the alarm rate went up and the performance went down, the failure threshold may be approaching. The change in alarms that were not met may now go to 180 (15 percent of the overall). As stated earlier, analysis needs to be performed on the deficiency to determine how many of those incidents were handled in the increment of 60 seconds beyond the performance time.

Based on actual response time analysis, one threshold that needs to be considered is the increase in alarms and the percent of calls handled under the criterion adopted. Anything more than a 10 percent increase in calls and a 10 percent reduction in performance is a signal to evaluate the level of service being provided.

In larger departments, most practitioners are factoring out non-emergency calls and, for actual incident performance, only looking at core emergencies. The definition of core emergencies

can be made locally based on risk and importance to the community, but they are usually structure fires and moderate to severe status EMS calls.

In general, if more than one measure must be slipping, an evaluation of all Standards of Coverage factors, along with the reason why the data is slipping, is required. A one-year snapshot may not be valid if the agency had a big storm event, a catastrophic weather event, a major wildland fire, and stacked a bunch of calls for just a month or the year.

Incident analysis approach depends upon having emergencies, which does not address what is at risk. That is where the mapping technology applies. As structures and different types of fire problems are constructed on the ground, they may represent additional lives and property that are at risk that deserve equity in protection. One of the elements for creating a governmental entity is to control land use and to create mechanisms for collecting taxes and determining ownership. Furthermore, these same individuals and properties are paying the taxes, fees, and permits for the level of service being provided. In one sense when growth occurs, the new properties are usually safer than the older part of the community because they are constructed to a higher standard. What is clear to almost any community is that being slightly out of the response standard range does not trigger a new facility.

One threshold that needs to be carefully monitored is the revenue stream that accrues from development. That revenue stream should provide a threshold when different elements of future fire stations can be determined. For example, it takes several years to evolve a location into a fire station site. As the revenue stream proceeds, funds could be available for site acquisition, initial plans and specifications, site treatment, and construction. This may be a multi-year process.

The threshold for construction should be to provide a new fire station into any zone in the City that has more than 35 to 50 percent of its parcels developed. Some of the secondary measures currently being used are 300 to 500 calls for service for any individual fire company. The following criterion grid (Figure 90) illustrates a series of measures that may be useful deciding when a new fire station should be deployed within a city. Similar grids could be developed to help establish triggers for the deployment of additional emergency equipment and personnel.

Figure 90: Determination Grid for New Station

Criterion Grid to Determine When a New Station is Needed				
Action Choices	**Travel Distance**	**Criteria**		
		Response Time Parameter	**Out of Area Calls**	**Building/Risk Inventory**
Maintain status quo	Enter local information	First due company Enter local response time	Enter existing out of area calls	Enter local building/risk inventory
Temporary facilities and minimal staffing	Risks 1.5 to 3.0 miles from existing station	First due company Exceeds 5-minute travel time 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 4.0 miles from the station	First due company Exceeds 5-minute travel time 20-25% of the time. Some calls <8 minutes.	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 5.0 miles from the 1st station	First due company Exceeds 5-minute travel time 30% of the time. Some calls <10 minutes.	More than 30% of calls are in outlying area	New area has 50% of same risk distribution as in initial area

The decision process has to be placed into the context of staffing pattern decisions. It is not uncommon to have a fire station constructed, and have the staffing pattern evolve over years from one system to another. In the case of a station under consideration, it should be anticipated that a policy decision needs to be made with respect to the staffing system to be used as soon as possible. It is anticipated that a completely volunteer system would not be viable for this type of facility. Conversely, a fully staffed, paid company has a significant price tag to it. A combination staffing system would seem to be the most practical for the first five years of consideration. These are the staffing configurations used in the matrices developed to describe thresholds and triggers that should be evaluated in the future.

ESCI's experience has been that it takes multiple elements of the Standards of Coverage to be out of balance, along with having additional economic resources, to justify an additional paid company or staffing increase of one or more companies.

Emergency Response – Tiered by Geographic Composition

While service demand is forecast to remain high in areas of dense population, those areas with anticipated population and infrastructure growth will see service demand increases. Light call volume will continue in areas of sparse population and little development. Evans Fire Rescue is four distinct types of communities consisting of a densely populated area, a growing suburban area, a rural area, and to a lesser degree, remote or frontier.

The differing communities present diverse risks of fire incident impact as well as varying levels of service demand. Thus, each area has unique fire protection and emergency service requirements. These areas are delineated "service delivery planning zones," and are suitable for considering tiered response levels and system capacity.

It is a simple truth that the cost of fire protection and emergency services increases as the number of facilities, resources, and personnel increase. Resources are typically increased to achieve a reduced response time, faster assembly of an effective firefighting force, increased system capacity, and the ability to protect higher levels of risk. However, in Evans where there exists a wide variation in the levels of service demand and risk, it is also recognized that a single level of service delivery performance may not be appropriate.

In other words, a fire department that provides protection for a jurisdiction that is primarily dense urban residential, commercial, and industrial development may find a single service delivery performance plan to be perfectly appropriate. A department serving a community mix of dense urban areas as well as rural farmland will find this much more difficult. Were such a fire department to attempt to achieve the same level of response performance and resources for its rural area as in the urban area, costs would be prohibitive. A smaller number of taxpayers and lower assessed valuation of the rural region would not generate sufficient revenue to support the service. This is why many communities choose to deliver urban, suburban, and rural levels of service; levels that more closely match the risk and demand, as well as the expectations of the citizens.

Previously the City of Evans and EFR have not made use of service delivery zones. These are offered as a starting point of discussion for the elected officials and staff of the City.

Consideration can be given to forecast levels of population density, types of property use, and anticipated levels of relative risk. Proposed service performance standards can be developed for each service delivery zone. The performance levels should be reviewed and (if acceptable) adopted by the City's elected officials. Adoption is appropriate since they form the foundation for the current and future deployment of emergency services and, thus, the resulting levels of service anticipated by the taxpaying citizens.

Response Zones

Urban Response Zones

Urban Response Zones are areas with high population density and greater community risk properties, corresponding with current higher service demand levels. Projected to remain an area of high service demand, these areas should adhere to response time objectives consistent with at least *NFPA 1720* for the fire stations that primarily serve this area. Response time performance relies on road network and speed limit levels. While the amount of road ways in the urban zones account for a small percentage of total roadway miles within the City, there are hindrances to fire response capability typical in urban environments. In the urban area more turns are necessary to arrive at a destination, reducing the ability of a multi-ton fire apparatus to maintain speed. This, along with daytime traffic, signaled intersections, and narrow residential streets, impedes response performance potential. These Urban Response Zones are within the core of the City. New developments may cause population densities to increase to the urban level.

Suburban Response Zones

Suburban Response Zones extend from urban zones (usually along major arterials) and generally are the most recently developed or have high growth potential. A suburban area extends around the perimeter of the City, along State Route 85, and several other pockets of residential/commercial development. The response time objective within the suburban zone is slightly longer than the urban zone because of moderate call volume and a reduced level of community risk.

Rural Response Zones

Rural Response Zones are areas with low population density and lower community risk properties, corresponding with low service demand levels. Population is forecast to remain low, with a low service demand. These areas should adhere to response time objectives consistent with *NFPA 1720* for the fire stations that primarily serve this area. Fewer streets can create

connectivity issues; but the lack of traffic congestion, signalized intersections, and more straight-aways allow for increased travel speed. Development potential in a rural response zone is expected to remain light in the near future, but will likely increase with an improvement in the economy.

Remote Response Zones

Remote Response Zones are considered low risk. These zones usually are located in the furthest reaches of the geographical area, and contain mostly wildland, with minimal or no structures or inhabitants. Development potential in remote response zones is not expected to occur and will maintain a remote character over time. These areas should adhere to response time objectives consistent with *NFPA 1720* for the fire stations that primarily serve these areas. While some of the furthest reaches of the City could be considered remote, however, the long-term outlook is for even these areas to experience some development.

The following table (Figure 91) details two scenarios which can be utilized in a tiered response strategy.

Figure 91: Table of Response Zone Performance Objectives

NFPA 1720			Modified Tiered	
Zone	**Response Time (min)**	**Percentile**	**Response Time (min)**	**Percentile**
Urban	9	90	7	90
Suburban	10	80	10	90
Rural	14	80	12	90
Remote	N/A[71]	90	14	90

These response time objectives apply to the first due unit (engine company or rescue). Specialty vehicles such as truck companies and brush units are permitted to have longer response time objectives; they are fewer in number and typically cover a larger response area.

Recommendation 67: EFR and the City of Evans adopt modified tiered response time objectives as outlined in Figure 91: Table of Response Zone Performance Objectives.

[71] *No response time is established, staffing with a minimum of four personnel on scene. Upon assembling the necessary resources at the emergency scene, the fire department should have the capability to safely commence an initial attack within two minutes 90 percent of the time.

Appendices

Appendix A: Table of Figures

Appendix B: Summary Table of Positive Attributes

Appendix C: Summary Table of Recommendations

Appendix D: Fire Facility Concept

Fire Station Structure

Constructing a new fire station is a large financial commitment for any community, and the facility and the community will live with the design for a considerable time.

Every community has a sense of itself, and construction and design features of any new station should reflect the local image. Further, communities around the country have incorporated special design features that expand the public use of a structure and the surrounding property. Some features have included: meeting rooms, museums, gardens, parks, fountains, clock towers, edifices, and memorials. These types of features foster an ownership bond with the community, and can provide an impetus for community support.

Station Visuals

The following fire station visuals are provided to illustrate the variety and range of size and features that could be incorporated into a headquarters fire station.

This following illustration (Figure 92) is a headquarters fire station with 28,000 square feet, seven apparatus bays (two-vehicle depth), and three ambulance bays. The structure has separate areas for EMS and fire functions, medical supply storage and "clean" rooms for medical equipment. Provisions incorporated into the design provide for a safe area to clean fire and police vehicles on the side of the building.

Figure 92: Concept No. 1 of Headquarters Fire Station

The next photograph (Figure 93) shows the public entrance and the public parking. The section for administrative functions is separated from the operational area of the building. A public meeting room was designed into the structure with consideration for building security and privacy for on duty responders.

The multi-purpose meeting room can be used for fire department training or meetings and was designed to be dividable via a sliding wall system. The room is easily converted into a community emergency operations center.

Figure 93: Fire Facility Parking and Public Access

The following photograph (Figure 94) shows a side street elevation with an incorporated a fire museum area. This feature was a selling point to the public. It has been well received by the community. Special lighting provides night time illumination of a vintage fire apparatus and equipment with visibility from an adjacent arterial.

Figure 94: Facility Side Elevation

Another feature included in this building that has been very popular with the community is a bell tower. The bell was electrified with Clarion Chimes and audible chimes announce the hour for visitors to the downtown area. Practically, the bell tower serves the department as a hose drying tower and a storage area.

Figure 95: Fire Facility Bell Tower

Below (Figure 96) is another example of a public safety facility. Built in 1993, this public safety building serves the City of Milwaukie, Oregon, as well as the Ardenwald, Linwood, Lewelling, Island Station, and Hector-Campbell neighborhoods.

The building houses the administration and operations for the city of Milwaukie Police Department, a fire station, and several community rooms. The fire station houses 12 career personnel who work three separate 24-hour shifts. The secure facility has all of the resources that are expected of a modern public safety structure.

Figure 96: Public Safety Facility

The following two tables provide a breakdown of the cost to construct an 18,500 square foot fire station. While the City of Evans may choose a different design, materials, square footage, and amenities, the illustration provides an idea of the costs to construct a modern fire station.

Figure 97: Headquarters Project Illustration

Illustration Project Information			
Projected Size – square feet	18,500	Projected Location	TX - Houston
Building Height	36.6	Projected Date	Jun 2008
Building Use	Civic/Government	Foundation	CON
Number of Buildings	1	Exterior Wall	MAS
Site Size	426,888	Interior Wall	DRY
1st Floor Size		Roof Type	ASP
1st Floor Height		Floor Type	CON
Number of Floors	1	Project Type	NEW

Figure 98: Headquarters Fire Station Construction Cost Illustration

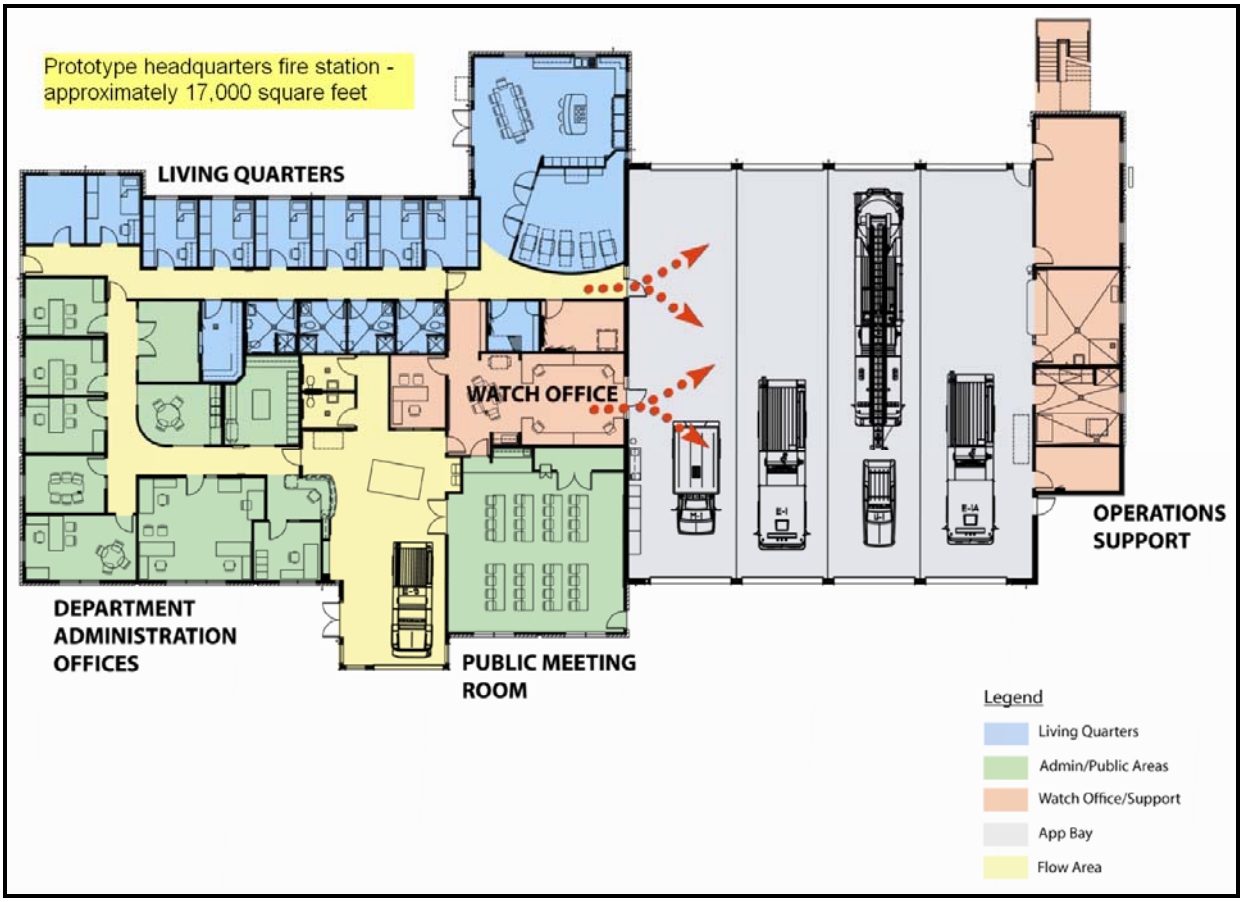
Building Costs			
Label	**Projected Percent**	**Projected Square Foot Cost**	**Projected**
Bidding Requirements	7.02%	$17.55	$324,675.00
Bond	0.86%	$2.15	$39,775.00
General Conditions	6.16%	$15.40	$284,900.00
General Requirements	3.27%	$8.18	$151,237.50
Credits	-0.15%	($0.38)	($6,937.50)
Mobilization	0.68%	$1.70	$31,450.00
Overhead & Profit	2.40%	$6.00	$111,000.00
Utility Fee Allowance	0.34%	$0.85	$15,725.00
Concrete	13.18%	$32.95	$609,575.00
Masonry	19.74%	$49.35	$912,975.00
Metals	4.63%	$11.58	$214,137.50
Wood & Plastics	5.33%	$13.33	$246,512.50
Thermal & Moisture Protection	3.87%	$9.68	$178,987.50
Doors & Windows	2.57%	$6.43	$118,862.50
Finishes	8.85%	$22.13	$409,312.50
Specialties	1.87%	$4.68	$86,487.50
Equipment	1.12%	$2.80	$51,800.00
Mechanical	20.10%	$50.25	$929,625.00
Electrical	8.46%	$21.15	$391,275.00
Total Building Costs	**100.00%**	**$275.75**	$5,101,375.00
Site Work	100.00%	$1.67	$713,314.88
Total Project Costs	**100.00%**	**$277.42**	**$5,814,689.88**

Figure 99: Concept No. 2 of Headquarters Fire Station

Figure 100: Headquarters Fire Station Side View

Figure 101: Interior View of Public Entry

Figure 102: Overhead View Headquarters Fire Station Concept



The following picture illustrates what can be done to use an existing fire station in a remodel and preserve a sense of history. This building, built in 1922, was the former city hall and fire station. The city wanted to keep the building because of its historical value and decided to remodel it instead of constructing a building at a new site. The building is now a divisional headquarters fire station.

Figure 103: Concept No. 3 of Headquarters Fire Station

Site limitations (as discussed in site criteria) can make the building of a large single story structure difficult or impossible. In those instances the only direction to go is up. The next concept is of a three-story headquarters fire station on a smaller lot.

Figure 104: Concept No. 4 of Headquarters Fire Station

This headquarters fire station was constructed at a cost of $12.7 million for the Honolulu Fire Department. The facility includes: a new 32,000 square foot station, offices, and a 50-stall parking lot. The headquarters fire station houses: administrative functions of the fire department, operations, fire prevention, administrative services and the chief officers of the department. A small museum contains exhibits and displays, a retail sales counter for souvenirs, a meeting room, and offices.

Appendix E: Apparatus Replacement Cost Analysis

Weld County Number	City Number	Purchase Date	Make	Type	Useful Life	Service Life as of 1/1/2010	Replacement Cost	Reserve Requirement @ 1/1/2010	Annual Reserve Requirement
2460	4103	2008	Ford Expedition	SUV	7	5	$65,000	18,571	9,286
2454	4104	2002	Dodge Intrepid	Sedan	7	0	$28,000	28,000	4,000
2452	4105	1984	Chevrolet Suburban 4x4	SUV	10	0	$65,000	65,000	6,500
2451	4106	1989	Chevrolet Suburban 4x4	SUV	10	0	$65,000	65,000	6,500
2453	4107	2003	GMC	2500	7	0	$32,000	32,000	4,571
2458	4108	2009	Ford	F-150	7	6	$32,000	4,571	4,571
2431	4202	1983	GMC	Brush	20	0	$185,000	185,000	9,250
2403	4203	1985	TeleSqurt	Pumper	20	0	$865,000	865,000	43,250
2402	4204	1995	E-1	Pumper	15	0	$535,000	535,000	35,667
2425	4205	2000	Kenmore T-300	Rescue	15	5	$485,000	323,333	32,333
2401	4206	2000	American LaFrance	Pumper	15	5	$535,000	356,667	35,667
2416	2408	1991	LTI	Aerial	20	0	$985,000	985,000	49,250
Total Annual Funding Requirement								**$3,463,143**	**$240,845**