

Eagle-Vail Fire Station Assessment
A Limited Standards of Cover Study

Eagle River Fire Protection District

October 30, 2014

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DRAFT

Acknowledgment

This report derives from efforts by Eagle River Fire Protection District staff to develop rational, data-driven tools by which to assist the Fire District's Board of Directors and the governing bodies of its partnering communities with policy-level decisions regarding the provision of fire protection and emergency services. The following members of the Fire District's Command Staff and Operations Group were instrumental in this report's development:

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Note

In 2014, the Eagle River Fire Protection District initiated an extensive assessment of its information technology (IT) systems. This assessment revealed numerous opportunities to improve the Fire District's capability to collect, analyze and report salient data regarding its services. As future budgets allow, staff will implement numerous improvements to the District's IT infrastructure, which will result in a more powerful level of data analysis and array of exhibits than what is currently possible for this report.

Executive Summary

As communities expand, so do their needs for comprehensive fire protection and emergency services. First developed in the early 1970's the community of Eagle-Vail provided for its citizens a level of fire protection commensurate with a relatively small, residential community, whose demand for fire protection included an occasional structure fire which was largely fulfilled by a small contingent of fire protection personnel, comprised mostly of volunteers or student-residents.

As the community of Eagle-Vail and those which surround it grew, the need to form the Eagle-River Fire Protection District (ERFPD) became apparent; and by 2000, with the creation of the ERFPD, the Eagle-Vail Metropolitan District abandoned its power to provide fire protection in favor of inclusion in the Fire District. Through an Inter Governmental Agreement between the Eagle-Vail Metropolitan District and the newly formed Fire District, the ERFPD obtained usage, but not ownership, of the Eagle-Vail Fire Station, currently designated as Fire Station Number 6.

Though it has historically used the Eagle-Vail Fire Station to provide housing for student-resident firefighters and supplement the District's overall system of fire protection and emergency services, the ERFPD has not relied on the Eagle-Vail Fire Station as a primary, staffed fire station for many years. This fact has periodically prompted the question of whether or not the District should continue to use the Eagle-Vail Fire Station or return it to the community of Eagle-Vail as provided for in the IGA.

Key Findings

To assist the community of Eagle-Vail and the Eagle River Fire Protection District Board of Directors with answering the question of whether or not the Fire District should continue to use the Eagle-Vail Fire Station, Fire District Staff conducted a limited Standards of Cover study (SOC) following principles found in the Fire Service Accreditation model as promulgated by the Center for Public Safety. As its title implies, this SOC study is limited to the Eagle-Vail Fire Station, and resulted in the following key findings:

- A panel of seasoned ERFPD staff determined that wildland urban interface (WUI) fires constitute the greatest risk to the Eagle-Vail Community.
- The Eagle-Vail Board of Governors listed wildland fire as the community's leading risk.
- From 2009 through 2013, the Fire District responded to a total of 10 structure fires in Eagle-Vail, for a total dollar loss of \$412,100 and total dollar save of \$10,675,200.
- Actual Fire District travel times to the two structure fires that occurred in Eagle-Vail in 2013 were 1 minute 51 seconds and 2 minutes 18 seconds.
- In a recent community survey, 44.9% of respondents expressed either extreme or just under extreme satisfaction with the Fire District's response times. Another 40.6% stated that they either did not know, or had no opinion regarding, the Fire District's response times.

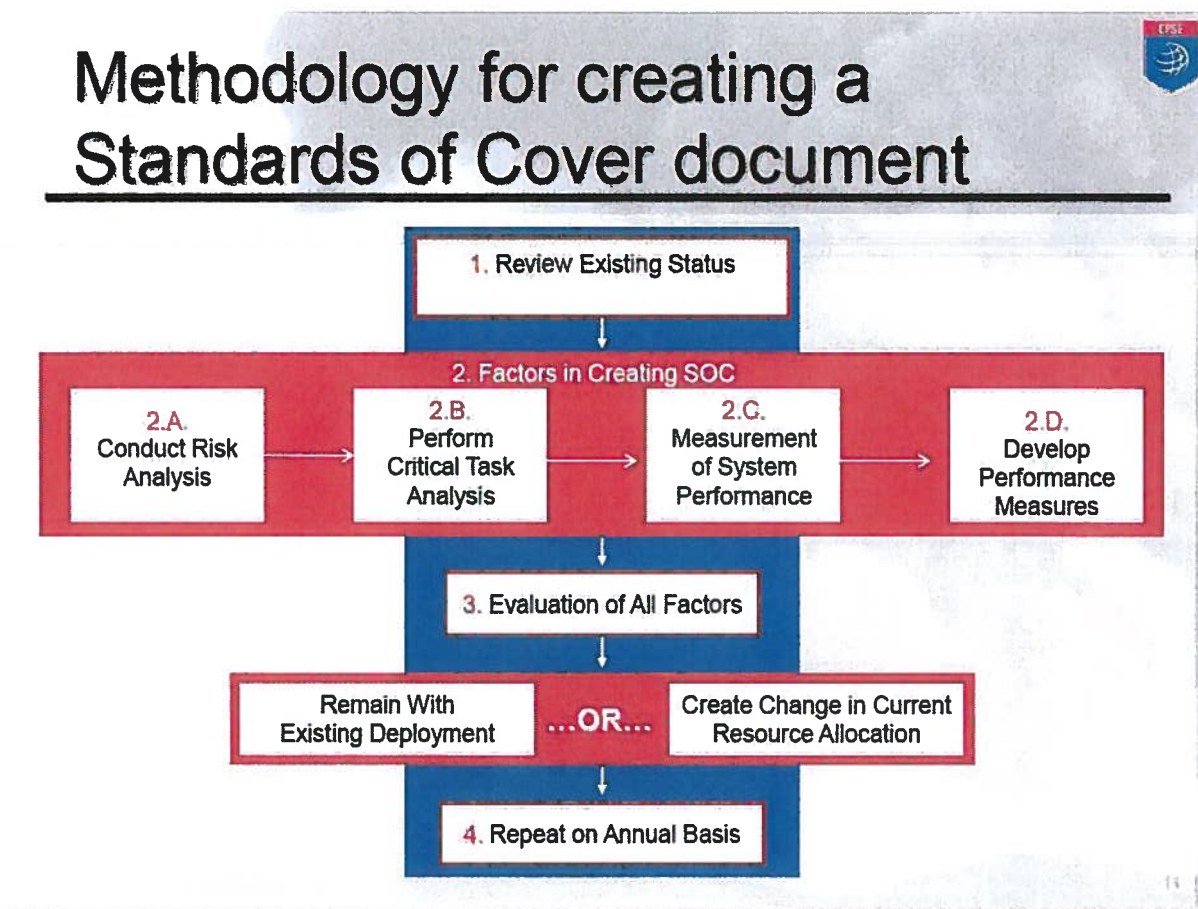
Intent

The intent of this study is to provide relevant information to the community of Eagle-Vail and the Board of Directors of the Eagle River Fire Protection District as they collaboratively determine the efficacy of staffing and responding from the Eagle-Vail Fire Station (Station 6) as a component of the Fire District's system of fire protection and emergency response.

General Methodology

This study applies elements of the Standards of Cover (SOC) methodology as developed by the Center on Public Safety Excellence (CPSE). Figure 1 (below) describes the various steps for creating a SOC document.

Figure 1- Methodology



(Commission on Fire Accreditation International, 2010)

Because the intent of this study is to provide the Eagle-Vail Community and the Fire District's Board of Directors with sufficient information to determine whether or not to staff and respond from Station 6, this study includes the following components of the aforementioned methodology:

- A review of existing status, which establishes the community's current baselines of fire protection and emergency response
- An assessment of community risk
- Critical task analyses relevant to structural fire protection and other types of incident response
- Performance assessment of the current system of fire protection and emergency response; and,
- Community perspective.

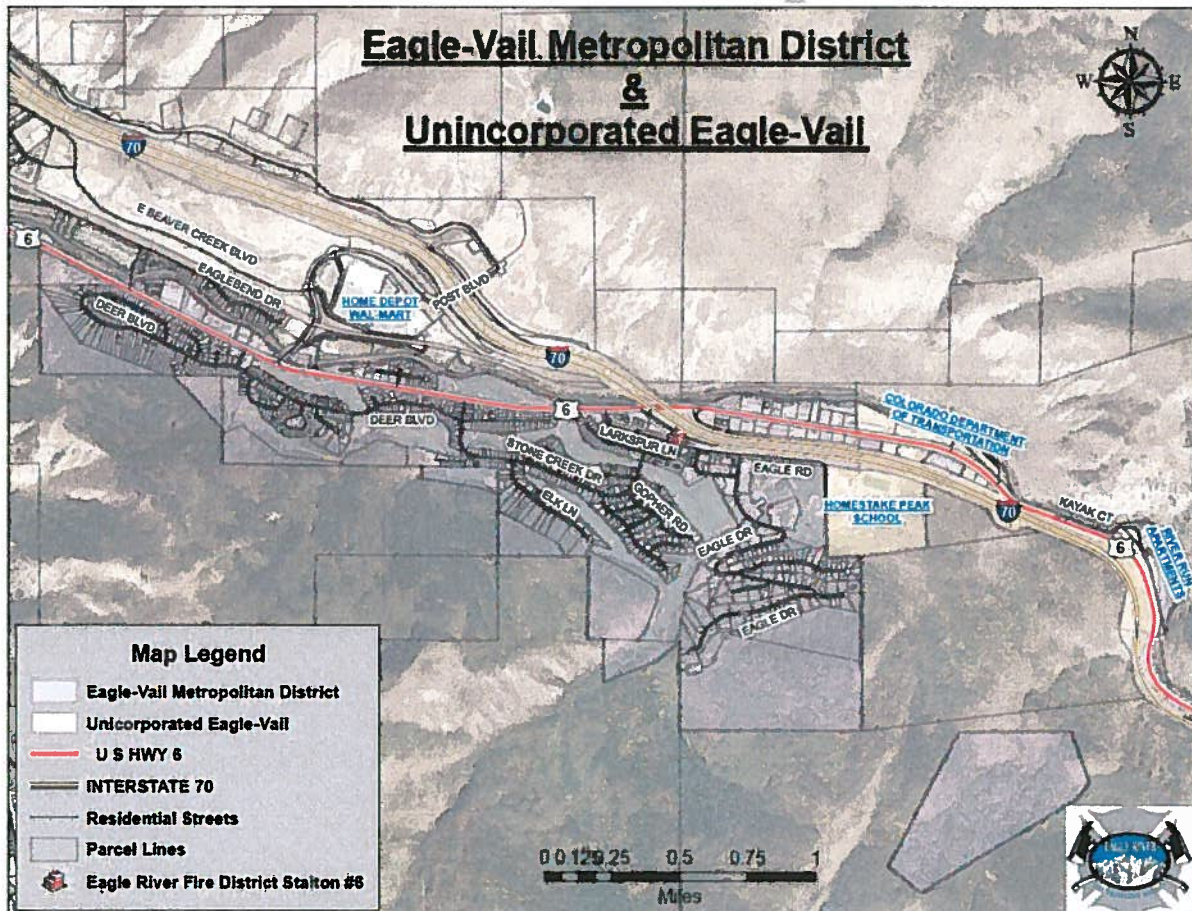
Because the intent of this study is to provide information to the community of Eagle-Vail and the Fire District Board of Directors, it does not attempt to answer the question of whether or not the Fire District should staff and respond from the Eagle-Vail Fire Station.

Because this study does not assess the remainder of the Eagle River Fire Protection District (except for responses from the Avon and Minturn Fire Stations into Eagle-Vail) it amounts to a *limited* SOC study document rather than a full SOC document.

Section 1: Community Overview

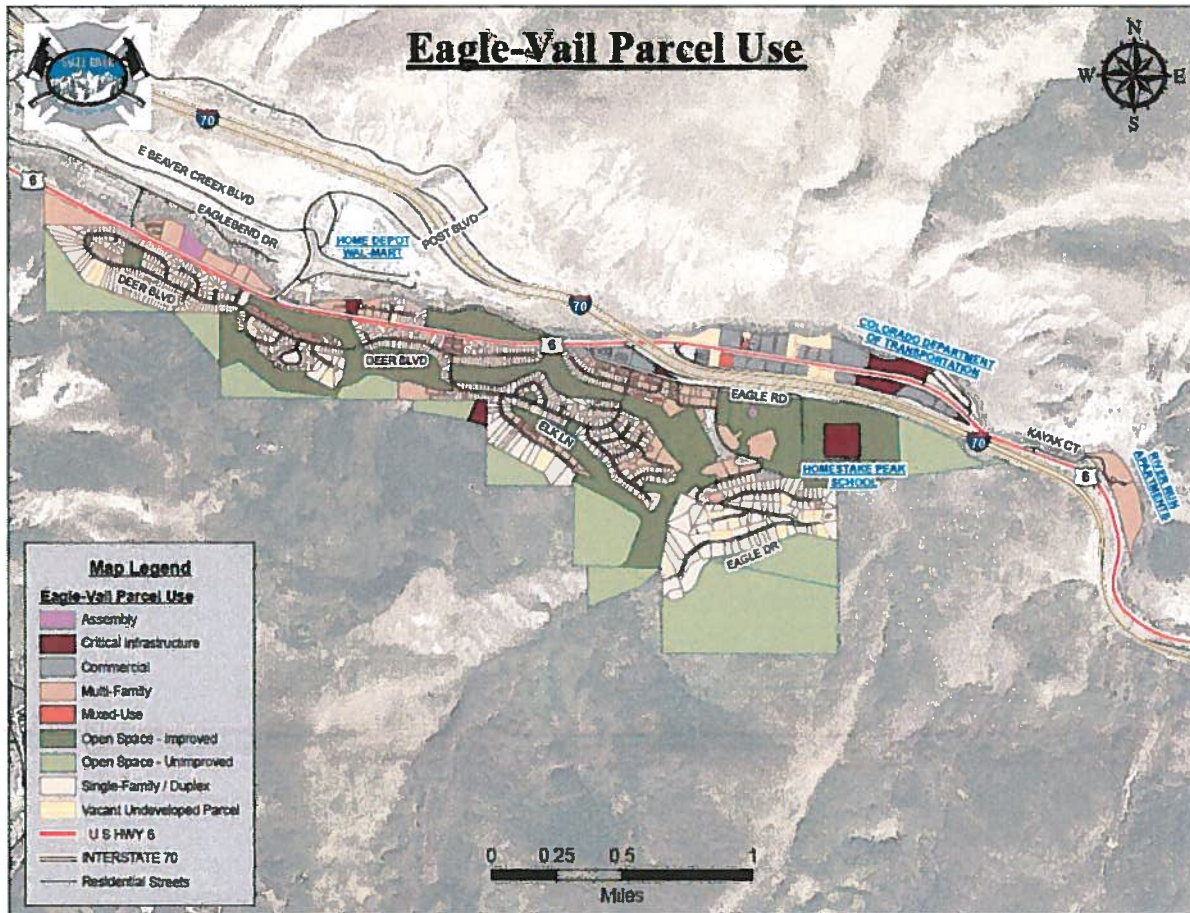
A planned community nestled in the eastern portion of Eagle County, Colorado, Eagle-Vail occupies an enviable position between two world-class ski resorts: Vail and Beaver Creek. With its reputation as a family-oriented residential mountain community, Eagle-Vail's physical plan remains substantially unchanged from its original vision, established by the community's developer, Fred Green, in the early 1970s (ULI - the Urban Land Institute, 2008, p. 7). Figure 2 (below) provides a general map of the community.

Figure 2 – Eagle-Vail Metropolitan District and Unincorporated Eagle-Vail



Eagle-Vail includes approximately 1,480 residential units; a 104-acre golf course; 46 acres of pocket parks; swimming, tennis, various community facilities; and two schools. Eagle-Vail experienced continuous development from the 1970s through the 1990s; and now, with only about a dozen platted and vacant parcels remaining available, the community has entered into a more mature phase marked by a slower pace of development (ULI - the Urban Land Institute, 2008, p. 7). Figure 3 (below) provides a parcel use map of the community.

Figure 3 – Eagle-Vail Parcel Use Map



As a political subdivision of the state of Colorado, the Eagle-Vail Metropolitan District (EVMD) is governed by an elected board of five directors. Originally established to provide fire protection, water distribution, parks and recreation facilities, the EVMD now focuses almost exclusively on the maintenance and operation of the parks and recreational facilities within Eagle-Vail (ULI - the Urban Land Institute, 2008, p. 10). In addition to the EVMD, the Eagle-Vail Property Owner's Association (EVPOA) oversees the protection and enhancement of property values and ensures homeowners' rights to the enjoyment of their properties (p.10). Together, the EVMD and the EVPOA form the Eagle-Vail Board of Governors.

Because the EVMD's original service plan included fire protection as one of the services provided by the metropolitan district, Eagle-Vail maintained throughout much of its developmental years a community fire station, located at 0249 Eagle Road. When the EVMD abandoned its role in providing fire protection in favor of inclusion in the Eagle River Fire Protection District (which formed in 2000), the EVMD conveyed use, but not ownership, of the Eagle-Vail Fire Station to the ERFPD through an Inter-Governmental Agreement (IGA). Currently, the ERFPD does not staff the Eagle-Vail Fire Station (Station 6) for emergency response and has not for many years, relying, instead, on the Avon (Station 7) and Minturn (Station 5) Fire Stations as the primary fire stations that serve the Eagle-Vail community.

Section 1.1: Eagle-Vail Facts and Figures

This section provides various facts and figures regarding Eagle-Vail, the accuracy of which the Fire District determined to the best of its ability, acknowledging that the community no longer constitutes an official government census point. Much of the information provided herein derives <http://www.city-data.com/city/Eagle-Vail-Colorado.html> and http://en.wikipedia.org/wiki/Eagle-Vail,_Colorado.

Square Miles and as a Percentage of Total Protected by ERFPD

2014 Assessed Valuation and as a Percentage of Total Protected by ERFPD

Population and as a Percentage of Total Protected by ERFPD

Population Density

1.98 mi ²	0.82%
\$67,306,110	7.9%
3,477	13.9%
1,760/mi ²	

Demographics

Households

Households with children < 18

Households with w/someone alone 65 or older

Population < 18

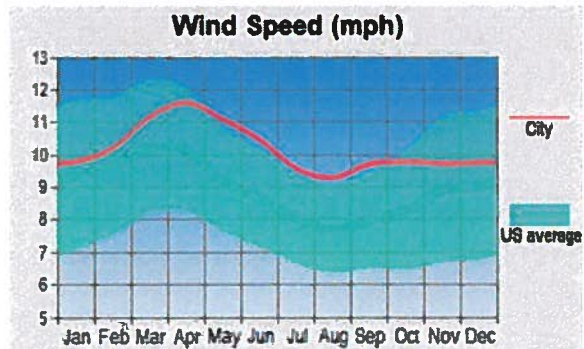
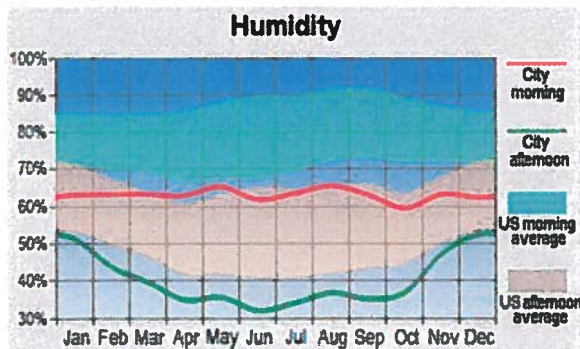
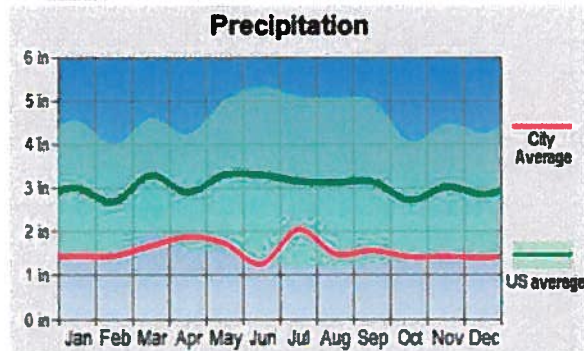
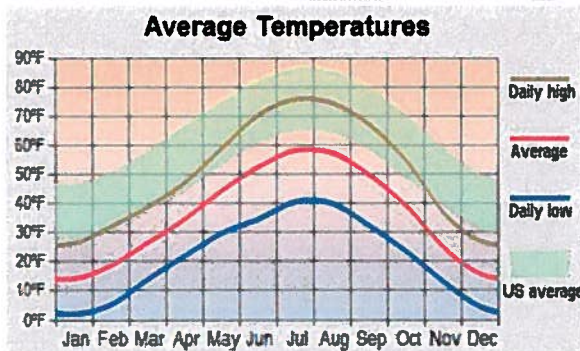
Population 65 or older

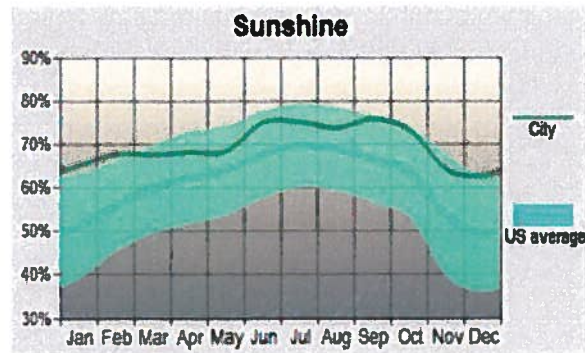
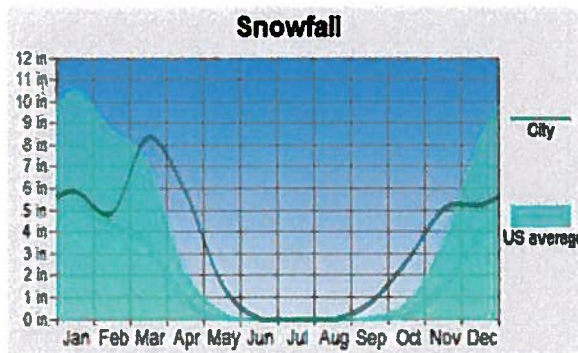
Average household size

Population living < poverty line

1083
28.2%
0.6%
18.8%
1.7%
2.7%
3.0%

Climate





Section 1.2: Current Level of Service – General Discussion

The Eagle-Vail Community receives fire protection and related emergency services from the Eagle River Fire Protection District, a quasi-municipal corporation formed on May 11, 2000 by Court Order under Section 32-1-101, *et seq.*, C.R.S. ERFPD's Service Plan provides that

The Services shall be those Eagle River is authorized to provide pursuant to its Service Plan and the Colorado Revised Statutes: to respond to all hazards, including but not limited to, emergency response for fire suppression and/or emergency medical services, fire prevention, public education, technical rescue operations, hazardous material response and containment, fire prevention inspection, construction plan review, structural pre-fire planning assistance, fire watch, attendance at community events and meetings, fire alarm and sprinkler inspection, urban-wild land interface, firefighting training and certification, and statistical information gathering and periodic reporting.

ERFPD provides all-hazards services through reliance on the following staff:

Figure 4 - ERFPD Staffing

Position	Number
Firefighter	27
Engineer	15
Lieutenant	15
Battalion Chief (Line)	3
Battalion Chief (Planning and Logistics)	1
Training Chief (shared with Vail Fire Dept.)	1
Fire Chief	1
Asst. Fire Marshal	1
HR Director	1
Finance Officer	1
Community Risk Manager	1
Total	67

The following chart lists ERFPD's facilities, their current use and staffing status:

Figure 5 - ERFPD Facilities and Staffing Status

<i>Location</i>	<i>Use</i>	<i>Status</i>
Station 5 – Minturn Fire Station	Emergency Response	Staffed Full-Time
Station 6 – Eagle-Vail Fire Station	Equipment Storage, Employee Housing	Not Staffed
Station 7 – Avon Fire Station	Emergency Response	Staffed Full-Time
Station 8 – Wildridge Fire Station	Seasonal Wildfire Emergency Response, Employee Housing	Staffed During Wildfire Season
Station 12 – Edwards Fire Station	Emergency Response	Staffed Full-Time
Station 15 – Cordillera Fire Station (Chaveno)	Emergency Response	Staffed Full-Time
Station 16 – Cordillera Fire Station (Summit)	Equipment Storage, Employee Housing	Non Staffed

In addition to the facilities listed above, the Fire District partially staffs through contract the Beaver Creek Metropolitan District's fire station, located in Beaver Creek.

The District's administrative offices are located at 90 Benchmark Rd., Avon, CO.

Insurance Services Office (ISO) Considerations

ISO collects and evaluates information from communities in the United States on their structure fire suppression capabilities. ISO analyzes data using a Fire Suppression Rating Schedule (FSRS) and then assigns a Public Protection Classification (PPC) number between 1 (exemplary protection) to 10 (no recognized fire protection) the community. At their own discretion, local insurance companies may then choose to establish insurance rates based in part on the assigned PPC.

The PPC rating for the area protected by the Eagle River Fire Protection District is 5/9. This means that the PPC rating of 5 applies to properties located within 5 road miles of an ISO recognized fire station and 1,000 feet of a fire hydrant or alternate water supply. The PPC rating of 9 applies to properties that are located beyond 1,000 feet of a fire hydrant but within 5 road miles of an ISO recognized fire station.

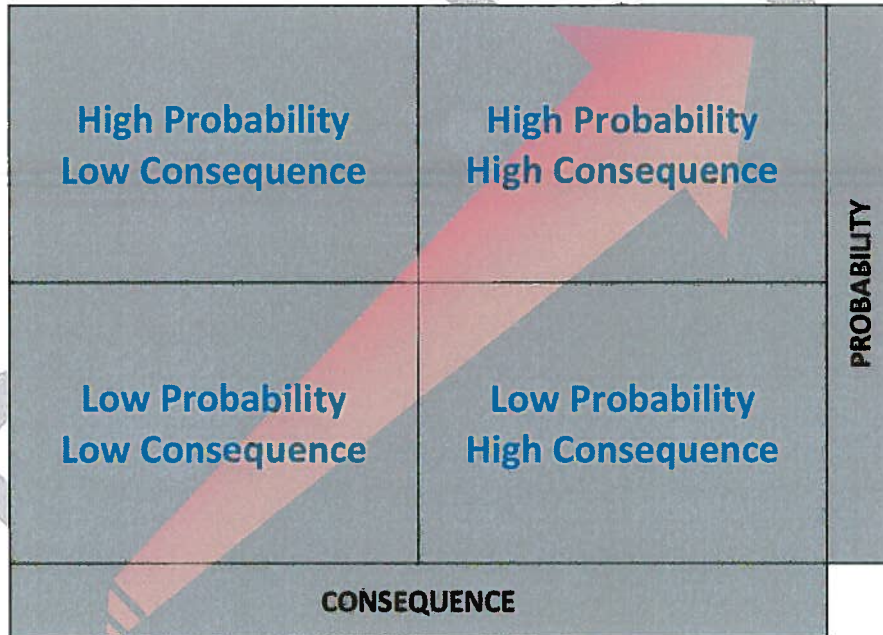
Because it is not staffed, the Eagle-Vail Fire Station (Station 6) does not qualify for designation as an ISO recognized fire station. However, the entirety of the Eagle-Vail Community is located within 5 road miles of the Avon Fire Station, which does qualify as an ISO recognized fire station, so the PPC rating of 5 applies to all Eagle-Vail properties also located within 1,000 feet of a fire hydrant.

Section 2: Assessing Community Risk – General Discussion

Conducting a community risk assessment involves an evaluation of the level of exposure to various calamities, actually or potentially, endured by a community. This evaluation includes an estimation of the likelihood or “probability” that a particular event will occur as well as the significance or “consequence” to the community, should the event actually take place. For example, while a powerful windstorm may constitute a relatively rare event, certain types of windstorms can easily threaten many lives and cause widespread property damage. Conversely, medical emergencies constitute a legitimately significant event for those involved, but they usually do not precipitate widespread community harm. By assessing both the probability and consequence of various events, the community and its fire department gain the ability to more appropriately match fire protection and emergency services—and most particularly the resources they require—to the community’s level of risk.

Figure 6 (below) illustrates the relationship between probability and consequence. As one might assume, in general, as the probability and consequence of a given event rises, so does a community’s overall level of risk.

Figure 6 – Probability and Consequence



With the level of risk assessed, and with input from the community, the fire department can determine the objectives to be achieved through emergency response (known as service level objectives) and the resources that are required to achieve them (known as the effective response force or ERF). In this way, the fire department can more effectively and efficiently match its services to the community’s risk.

Service Level Objectives- Statements of performance unique to a given jurisdiction. They should be developed by the agency based upon nationally recognized standards and practices for fire and ancillary services and should be based upon a community's specific profile which includes both existing and future risk levels. The community risk profile should examine the makeup of occupancies, types of uses what the probability/ consequences are of anticipated incidents and the historical response trends and patterns.

Effective Response Force (ERF)- The minimum amount of staffing and equipment that must reach a specific emergency zone location within a maximum prescribed total response time and which is capable of initial fire suppression, EMS and/or mitigation. The ERF is the result of critical tasking analysis conducted as part of a community risk assessment.

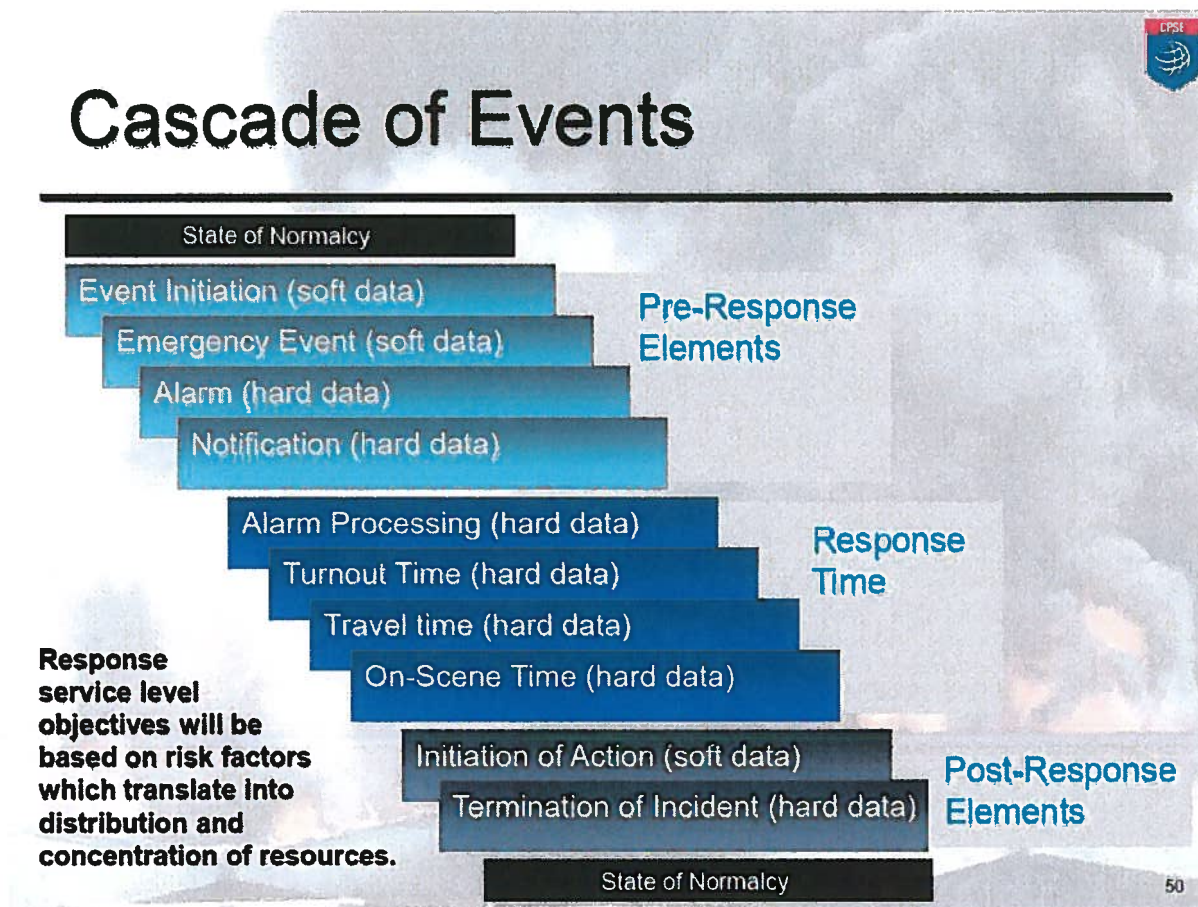
(Center for Public Safety Excellence, 2009)

With respect to certain types of risk, namely structure fires and medical emergencies, fire departments should also take into consideration applicable scientific data and national industry standards when determining service level objectives.

Section 2.1: The System of Emergency Response

When an emergency occurs and someone calls 911, a series of specific actions take place, each in rapid succession, and all designed to send the appropriate type and level of resources to quickly bring the incident under control. When considered together, these actions constitute the Cascade of Events, which starts with event initiation and ends with termination of the incident. As the following figure depicts, on either side of event initiation and incident termination lies a general state of normalcy, which is the ultimate goal of emergency response; to return the community to as much a state of normalcy as possible.

Figure 7 - Cascade of Events



(Commission on Fire Accreditation International, 2010)

Viewing emergencies in this manner provides a method for breaking down the elements of an incident into discrete segments, thereby making it possible to distinguish between those which allow for the measurement of system performance (hard data) and those which do not (soft data). By measuring hard data, fire departments can more accurately assess the degree to which they meet service level objectives and determine which elements of the system, if any, contribute to underperformance.

Depicted in Figure 7 (above), Pre-Response Elements consist of events that lie outside direct control of the fire department. Through prevention measures such as community education, fire code application and other risk mitigation strategies fire departments can contribute to the reduction and severity of certain types of emergencies; nevertheless, emergencies will still occur in a manner that lie outside the fire department's direct influence.

Specific to the Eagle-Vail community, when someone calls 911 to report an emergency, the Vail Public Safety Communications Center (VPSCC) receives and processes the information and then notifies the appropriate agency. Though depicted in Figure 7 (above) as a component of Response Time, alarm processing, a direct function of VPSCC, also lies outside the ERFPD's direct control.

Once VPSCC notifies ERFPD of the emergency, the District deploys the appropriate resources based on the information that it receives from VPSCC. The amount of time that elapses between receipt of this notification and when the first resource initiates its response constitutes turn-out time, which does lie under the direct control of the ERFPD, as do the remaining segments in the Cascade of Events.

Drive time, the measurement of which begins from the moment a resource initiates response to the time at which it arrives at the incident, depends heavily on the road network upon which resources respond, fire station locations and, at certain times of the year, weather conditions. The remaining elements in the Cascade of Events depend to a significant degree on the type and scope of the emergency event.

Taking the aforementioned elements into consideration, fire departments attempt to design a system of emergency response that appropriately matches the commitment of resources to the type and scope of a particular emergency event. By placing fire stations in strategically advantageous locations, fire departments attempt to distribute first-due resources in a manner that appropriately balances concentrations of community risk (the frequency and consequence of emergency incidents) against the cost of providing service and which enable it to effectively concentrate additional resources when and where an emergency event demands more than one resource. This distribution and concentration of resources constitutes the system of fire protection and emergency response.

Distribution- The number of resources placed throughout neighborhoods and/or districts.

Concentration- The spacing of multiple resources, arranged close enough together so that an initial effective response force can be assembled on-scene within adopted public policy timeframes. This varies: increased risk equals increased concentration.

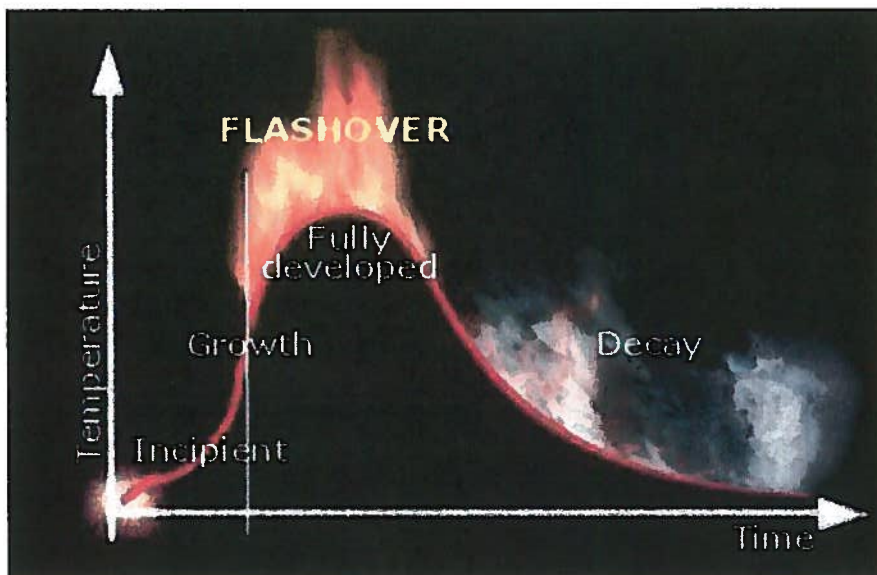
(Commission on Fire Accreditation International, 2010)

By conducting an assessment of risk, the fire department and community gain a better understanding of the factors that should be considered when developing a strategy for both the distribution and concentration of fire protection and emergency response resources.

Section 2.2: Structure Fire Risk – *The Science of Structure Fires*

Most structure fires, whether commercial or residential in nature, begin small and then grow rapidly. The speed at which they develop depends on numerous factors, including the composition of the burning items and those which immediately surround the fire, building construction and the presence or absence of built-in protection systems such as fire sprinklers. The rate and degree of fire growth has traditionally followed what has come to be known as the standard time/temperature curve, depicted in the following graphic:

Figure 8 - Standard Time/Temperature Curve



Fire requires three things in their proper amounts in order to sustain combustion: a readily available source of fuel, sufficient amounts of oxygen and enough heat (fire also depends upon a complicated chemical chain reaction, a description of which lies outside the scope of this study).

As depicted in Figure 8 (above), with these three elements present in the right ratios, fire begins to grow at an increasing rate. During the fire's incipient stage, surrounding, but as yet, uninvolved fuels begin absorbing heat produced by the incipient fire; at this stage the fire can still be extinguished readily, typically by cooling the burning fuel or limiting the amount of available oxygen (such as what happens when one places a lid on a small fire in a frying pan).

In short order the fire begins to grow. As immediately surrounding fuels continue absorbing heat, they too combust, increasing the amount of heat produced by the fire, causing even more fuel to heat-up and subsequently ignite. Now the fire has entered its growth stage and, as this cycle of heating, combusting and heating additional fuels continues, fire growth becomes extremely rapid and the fire becomes significantly harder to suppress.

Unless interrupted, this process will soon lead to "flashover," a phenomenon in which all of the available fuel within the room reaches its ignition temperature and ignites. The onset of flashover represents a significant change in the fire's development for several important reasons:

- Given the amount of heat in a room once the fire has undergone flashover (which can easily exceed 1,000° F) survival and the chance of saving lives becomes extremely unlikely
- Once flashover occurs, the rate of combustion significantly increases, placing firefighters at much greater risk.
- The extreme heat and accelerated rate of spread in a post-flashover fire environment creates several complications to effective fire suppression:
 - The fire now requires significantly more water
 - Firefighting tactics require more resources

- Impediments to search and rescue operations are compounded

Following flashover, the fire enters the fully involved stage in which it burns freely. It easily consumes all of the contents in the room and quickly spreads to other rooms or portions of the structure. At some point, the fire will begin burning-up the available fuel, at which time its intensity will decrease. This is known as the decay stage of a fire.

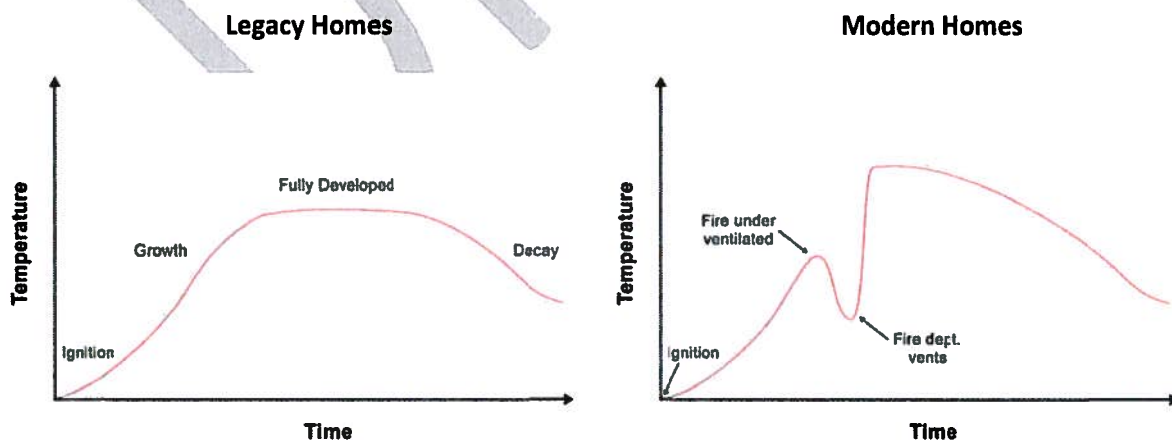
Depending on construction features, the fire may consume a portion of the room's available oxygen to the point that its activity significantly abates. However, given the degree to which modern buildings—particularly residential structures—install heat retaining features such as heavily sealed, double-paned windows, heat from the fire will remain even though the room contains insufficient levels of oxygen to support active burning.

This represents a very dangerous stage in the fire, for it only needs a steady flow of oxygen to rapidly reignite. Such a flow of oxygen can be provided by spontaneous window failure or it can be precipitated by arriving firefighters who open a door to enter the structure and attack the fire.

Recent experiments conducted by Underwriters Laboratories demonstrate that, in contemporary structures, fire often follows a novel pattern of growth as compared to the growth pattern depicted in Figure 8 (above). While fires in legacy homes follow the familiar growth pattern depicted in Figure 8, contemporary homes experience fire growth in a very dissimilar pattern. Because of modern construction features, fire growth actually diminishes as the fire quickly consumes available oxygen and becomes "under ventilated." Then, as firefighters begin firefighting operations ("Fire dept. vents") fire growth rapidly increases.

Figure 9 (below) depicts the difference in fire growth between legacy homes and modern homes (Kerber, Impact of Ventilation on Fire Behavior in Legacy and Contemporary Residential Construction, 2010, p. 285).

Figure 9 - Time/Temperature Curves in Legacy and Modern Homes



Underwriters Laboratories underscores the implications of this new phenomenon in fire growth by calling specific attention to the need for coordinating firefighting activities:

If you add air to the fire and don't apply water in the appropriate time frame the fire gets larger and safety decreases. Examining the times to untenability gives the best case scenario of how coordinated the attack needs to be. Taking the average time for every experiment from the time of ventilation to the time of the onset of firefighter untenability conditions yields 100 seconds for the one-story house and 200 seconds for the two-story house. In many of the experiments from the onset of firefighter untenability until flashover was less than 10 seconds. These times should be treated as being very conservative. If a vent location already exists because the homeowner left a window or door open then the fire is going to respond faster to additional ventilation opening because the temperatures in the house are going to be higher. Coordination of fire attack crew is essential for a positive outcome in today's fire environment (Kerber, 2010, p. 3)

More than ever, safely, effectively and efficiently suppressing a structure fire involves the concurrent implementation of multiple tasks ranging from deploying fire hose to the seat of the fire and searching for trapped people, to tactically opening windows and/or cutting a hole in the roof to release hot, toxic smoke. For purposes of a community risk assessment, the preceding passage from Underwriters Laboratories underscores the need for ensuring coordination of these critical fireground tasks.

Because flashover represents such a significant and potentially deadly change in the fire's progression, it constitutes the signature event before which fire departments often attempt to intervene. In other words, successfully attacking a structure fire prior to the onset of flashover increases the chances that the fire department will ensure a higher degree of firefighter safety while maximizing the likelihood of successfully rescuing trapped people. Once flashover has occurred, fire complexity dramatically reduces the chances for victim survival while materially increasing the risk to firefighters.

The requisite level of coordination for implementing fire ground tasks necessary for achieving these objectives demands that fire departments assemble an ERF at the scene of a structure fire *prior* to flashover, which in some cases can occur in as little as five minutes from the time the fire starts (Kerber, 2012). Therefore, as recommended by the Center for Public Safety Excellence, the fire department should attempt to deploy their fire stations and staff their engine companies in such a manner that minimizes the amount of time it takes to assemble an ERF and suppress structure fires prior to flashover (Center for Public Safety Excellence, 2009, p. 57). However, as also pointed out by the Center for Public Safety Excellence, it is not reasonable to expect that fire departments will suppress all structure fires prior to flashover (p. 57), as numerous factors over which fire departments and their communities have little control (arson, for example) can affect the speed at which flashover occurs.

Considering the previous discussion regarding the importance of suppressing structure fires prior to the onset of flashover, most communities would likely choose to have their local fire department deploy resources in a manner that ensures the arrival of an ERF prior to the onset of flashover. However, communities and fire departments alike should also consider the cost of resource deployment, as the goal of achieving a ubiquitous five minute travel time could, depending on a variety of circumstances, exceed available funding.

Section 2.3: Structure Fire Risk - *Distribution and Concentration Emergency Response Resources*

To assist with achieving an appropriate balance between service delivery and affordable cost, communities and fire departments should also consider national performance standards for travel times when determining how and where to deploy fire department resources. This consideration should take into account both the location of fire stations and first responding (first-due) fire engines within a given area (known as the distribution of resources) as well as the locations of subsequently arriving resources that are necessary to constitute a structure fire ERF (known as the concentration of resources).

By considering national travel time performance standards, communities and fire departments gain a better understanding of how well their fire department's deployment model compares to standard industry recommendations. The National Fire Protection Association (NFPA) provides a general travel time standard for professional fire departments of 240 seconds (4 minutes) or less for the arrival of the first engine company and 480 seconds (8 minutes) or less for the deployment of the full first alarm at a fire suppression incident (National Fire Protection Association, 2009); however this standard does not consider community size, complexity and various other risk factors.

The Center for Public Safety Excellence (CPSE) also establishes national travel time standards for fire departments, but in a manner that accounts for the high degree of variability in risk factors that often exists between wilderness, rural, suburban, urban and metropolitan communities. For an example of the differences in travel time standards between communities of varying size and complexity, see Figure 10 (below), which provides travel time performance standards for rural, suburban and urban communities as promulgated by the CPSE (Center for Public Safety Excellence, 2009).

Figure 10 - Rural, Suburban and Urban Community Performance Standards

<i>Rural: an incorporated or unincorporated area with a population of less than 10,000 people or with a population density of less than 1,000 people per square mile.</i>				
	1st Unit	2nd Unit	Balance of a 1st Alarm	Performance
Benchmark	10 Min	14 Min	14 Min	90%
Baseline	13 Min	18 Min 12 Sec	18 Min 12 Sec	90%
<i>Suburban: an incorporated or unincorporated area with a population of 10,000 to 29,999 people and/or any area with a population density of 1,000 to 2,000 people per square mile.</i>				
	1st Unit	2nd Unit	Balance of a 1st Alarm	Performance
Benchmark	5 Min	8 Min	10 Min	90%
Baseline	6 Min 30 Sec	10 Min 24 Sec	13 Min	90%
<i>Urban: an incorporated or unincorporated area with a population of over 30,000 people and/or a population density over 2,000 people per square mile.</i>				
	1st Unit	2nd Unit	Balance of a 1st Alarm	Performance
Benchmark	4 Min	8 Min	8 Min	90%
Baseline	5 Min 12 Sec	10 Min 24 Sec	10 Min 24 Sec	90%

As can be seen in Figure 10 (above), the maximum recommended travel time for the first-arriving fire engine (Baseline) in a rural community is 13 minutes, while the goal (Benchmark) is 10 minutes. Therefore, following recommendations from the CPSE, for responses to structure fires in rural communities, a fire department should strive to locate (distribute) its fire station(s) such that the first-due fire engine will meet a travel time standard of between 10 and 13 minutes, 90% of the time. Figure 10 also provides recommended travel time performance standards for the second-arriving (2nd Unit) and subsequently arriving fire engines (Balance of 1st Alarm).

Using the standards promulgated by the CPSE, this same kind of travel time performance evaluation can be conducted for responses to structure fires in larger, more complex communities.

With respect to structure fires, then, the decision of how to deploy fire department resources becomes one of assessing community risk and, in partnership with the community, determining the appropriate balance between desired service, national standards and, of course, cost.

Section 2.4: EMS Risk – The Science of Cardiac Emergencies

While medical emergencies typically denote events for which response time constitutes a significant element of the overall service level objective, perhaps no medically-related incident requires a more rapid response than cardiac emergencies. Often referred to as a “heart attack,” the sudden interruption of blood-flow from the heart can quickly lead to irreversible brain damage and death. As

the following graphic represents, a patient suffering from cardiac arrest may begin to suffer brain damage in as little as four minutes, with brain death following in as little ten minutes.

CPR TIME LINE (B.E.CPR, 2014)



- 0-4 mins.-** brain damage unlikely
- 4-6 mins.-** brain damage possible
- 6-10 mins.-** brain damage probable
- over 10 mins.-** probable brain death

The sooner effective intervention begins—such as cardio-pulmonary resuscitation (CPR)—the greater likelihood of patient recovery.

CPR saves lives. Statistics show that the earlier CPR is initiated, the greater the chances of survival. In fact, 100,000 to 200,000 lives of adults and children could be saved each year if CPR were performed early enough (according to the American Heart Association estimates) (B.E.CPR, 2014).

In addition to CPR, the rapid application of an Automated External Defibrillator can also have a material outcome on patient survival. In fact, according to some estimates, for each minute defibrillation is delayed, the chance of survival is reduced approximately 10% (American Red Cross, 2014). With these time constraints in mind, the Fire Service generally attempts to effect as rapid a first-response as possible to suspected cardiac emergencies. However, given the aforementioned time elements, sole reliance on the Fire Service for intervention in cardiac emergencies ignores the role that bystanders often play in patient survival rates through early access to the 911 system, early CPR and even early defibrillation, particularly now that modern technology makes it possible for lay-people to apply an AED to someone suffering from a cardiac emergency. As part of the well-established “Chain of Survival” by-standers can begin patient care, keeping the patient alive until the fire department and more advanced medical care (e.g. paramedic ambulances) arrive.

Figure 11 - Cardiac Chain of Survival



Given the impracticality of ensuring the presence of a fire station within four minutes response time of virtually everyone living in, working within or visiting a given fire department’s jurisdiction, reliance on the general public as a bona fide link in the Chain-of-Survival not only increases the likelihood of a

patient surviving a cardiac emergency, but assists the Fire Service in meeting community expectations for effective emergency services at an affordable cost.

Section 2.5: EMS Risk – *Distribution and Concentration of Emergency Response Resources*

As presented in Section 2.4, cardiac emergencies typically represent the most time-sensitive type of emergency medical incident; the sooner a patient receives effective CPR, followed by more advanced medical care, the greater likelihood that they will survive a cardiac event. With respect to early intervention by trained emergency medical care providers, then, travel time represents the most salient factor; obviously, the longer it takes for basic life support (BLS) or advanced life support (ALS) providers to arrive at the scene of a cardiac emergency, the “weaker” becomes this particular link in the cardiac chain-of-survival (Figure 11).

Similarly to how they respond to fires, fire departments typically distribute engine companies in a manner which minimizes travel times to cardiac emergencies for the initial arriving resource; and, which maximizes their ability to concentrate additional resources as needed, depending on the scope and complexity of the incident. Because travel time requirements for effectively responding to cardiac emergencies align very closely with those for effectively responding to structure fires, the same deployment models (distribution and concentration of engine and ladder companies) work equally well.

In some communities, the fire department also provides ambulance and ALS services, while in other communities a separate organization serves as the primary ambulance and ALS response agency, with the local fire department serving to provide BLS level care until such time as the primary ambulance/ALS service provider arrives on scene. Commonly known as a “tiered” EMS system, the emphasis on rapid response remains, while the system also adjusts response levels by first determining the nature of the medical incident before it assigns resources. This is the type of EMS system in effect in Eagle County.

Section 3: Eagle Vail Risk Assessment

Risks to a community derive from a variety of potential incident types. Some large, some relatively small in scope, each type of risk constitutes a hazard to the community, the overall assessment of which provides various perspectives by which to determine the community's need for emergency response resources.

To assist with assessing the relative probability of a large-scale event occurring within the community of Eagle-Vail, as well as the potential consequences should one take place, the Fire District convened a panel of experienced firefighters and fire officers to conduct a comparative/qualitative risk analysis of various incidents types. Figure 12 (below) provides an example of this comparative/qualitative risk analysis matrix:

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Figure 12 – Comparative/Qualitative Risk Analysis Matrix

Hazards		History WF = 2	Vulnerability WF = 5	Maximum Threat WF = 10	Probability WF = 7	Total Score
	WF X SR Subscore	2 X ____ =	5 X ____ =	10 X ____ =	7 X ____ =	
	WF X SR Subscore	2 X ____ =	5 X ____ =	10 X ____ =	7 X ____ =	
	WF X SR Subscore	2 X ____ =	5 X ____ =	10 X ____ =	7 X ____ =	
	WF X SR Subscore	2 X ____ =	5 X ____ =	10 X ____ =	7 X ____ =	
	WF X SR Subscore	2 X ____ =	5 X ____ =	10 X ____ =	7 X ____ =	
	WF X SR Subscore	2 X ____ =	5 X ____ =	10 X ____ =	7 X ____ =	
	WF X SR Subscore	2 X ____ =	5 X ____ =	10 X ____ =	7 X ____ =	
	WF X SR Subscore	2 X ____ =	5 X ____ =	10 X ____ =	7 X ____ =	
	WF X SR Subscore	2 X ____ =	5 X ____ =	10 X ____ =	7 X ____ =	
	WF X SR Subscore	2 X ____ =	5 X ____ =	10 X ____ =	7 X ____ =	

As its name implies, the Comparative/Qualitative Risk Analysis Matrix evaluates the threat posed by various incident types (also known as hazards) through an assessment of their historical precedence, the community's vulnerability to each, the maximum threat which they pose and the probability of their occurrence; and applies both a weight factor (WF) and severity rating (SR) to each hazard in order to determine an absolute score. Comparing the absolute scores then provides a ranked order of the hazards' probability and severity within the Eagle-Vail community.

Because components of the overall evaluation derive from the perspectives of individual assessors, this assessment is qualitative in nature. However, it is precisely the assessors' experience and expertise in the field of fire protection and emergency response that lends a high level of credibility to the overall rank-order of hazard potential.

To ensure a standardized methodology when completing the Comparative/Qualitative Risk Analysis Matrix, the assessors followed the instructions listed below:

COMPLETING THE HAZARD ANALYSIS MATRIX

In this analysis, *severity ratings* are applied to the four categories of history, vulnerability, maximum threat (worst-case scenario), and probability based as follows:

LOW = choose the most appropriate number between 1 to 3 points

MEDIUM = choose the most appropriate number between 4 to 7 points

HIGH = choose the most appropriate number between 8 to 10 points

Weight factors also apply to four categories as shown below:

HISTORY (weight factor for category = 2) wherein history is the record of previous occurrences as follows:

LOW – score at 1 to 3 points based on: 0 - 1 event in the past 25 years

MEDIUM – score at 4 to 7 points based on: 2 - 3 events in the past 25 years

HIGH – score at 8 to 10 points based on: 4 + events in the past 25 years

VULNERABILITY (weight factor for category = 5) wherein vulnerability is the percentage of population and property likely to be affected under an “average” occurrence of the hazard, as follows:

LOW – score at 1 to 3 points based on: < 1% affected

MEDIUM – score at 4 to 7 points based on: 1 - 10% affected

HIGH – score at 8 to 10 points based on: > 10% affected

MAXIMUM THREAT (weight factor for category = 10) wherein maximum threat is the highest percentage of population and property that could be impacted under a worst-case scenario, as follows:

LOW – score at 1 to 3 points based on: < 5% affected

MEDIUM – score at 4 to 7 points based on: 5 - 25% affected

HIGH – score at 8 to 10 points based on: > 25% affected

PROBABILITY (weight factor for category = 7) wherein probability is the likelihood of future occurrence within a specified period of time, as follows:

LOW – score at 1 to 3 points based on: one incident likely within 25 to 50 years

MEDIUM – score at 4 to 7 points based on: one incident likely within 10 to 25 years

HIGH – score at 8 to 10 points based on: one incident likely within 1 to 10 years

By multiplying the *weight factors* associated with the categories by the *severity ratings*, assessors derived a subscore for the history, vulnerability, maximum threat, and probability for each hazard. Assessors then added the subscores to produce an absolute score for each hazard.

By itself, the absolute score provides limited information regarding a particular hazard. However, by comparing the absolute scores of each hazard, a rank-order emerges, giving the community and Fire District a rational suggestion as to how to dedicate finite resources to hazard mitigation.

Figure 13 provides results of the Comparative/Qualitative Risk Assessment for the Eagle-Vail Community:

Figure 13 - EV Comparative/Qualitative Risk Assessment

<i>Hazard</i>	<i>Assessor 1</i>	<i>Assessor 2</i>	<i>Assessor 3</i>	<i>Assessor 4</i>	<i>Assessor 5</i>	<i>Assessor 6</i>	<i>Assessor 7</i>	<i>Total</i>	<i>Mode</i>	<i>Rank</i>
WUI Fire (Threat to life or real property damage)	5	5	7	5	7	6	6	41	5	1
Snow/Ice/Extreme Cold (Threat to life, real property damage, extended disruption to transportation)	7	6	5	2	5	7	5	37	5	2
Hazmat (Threat to life, real property damage, extended disruption to transportation)	6	7	6	7	3	1	7	37	7	2
Structure Conflagration (Significant damage to more than 2 unattached exposures)	3	2	1	6	6	2	2	22	2	3
Natural Flood (Real property damage)	2	4	2	2	4	5	3	22	2	3
Windstorm (Threat to life or real property damage)	2	3	3	4	2	4	1	19	2	4
Land/Debris Flow (Threat to life, real property damage, extended disruption to transportation)	4	1	4	2	1	3	4	19	4	4

To obtain a perspective or risk as viewed by the community, the Fire District provided a survey to members of the Eagle-Vail Board of Governors, in which Board members were asked to assign numerical values corresponding to their level of concern over various hazards, as defined by their assessment of the potential severity of each hazard and the likelihood that their hazard of highest concern might actually take place.

In similar fashion to the Comparative/Qualitative Risk Assessment previously discussed, the numerical values provided by each participant in the survey were used to derive a rank order of the potential hazards according to the participants' severity assessment. Figure 14 (below) provides the results of this assessment.

Figure 14 - EV Hazard Severity Ranking

Hazard	Person 1	Person 2	Person 3	Person 4	Person 5	Person 6	Person 7	Person 8	Total	Mode	Avg Rank
Severity											
Wildland Fire	1	1	1	2	1	1	1	3	11	1	1.375
Structure Fire	3	6	2	3	4	2	2	2	24	2	3
Snow/Ice/Extreme Cold	2	2	3	1	3	4	5	7	27	2	3.375
Land/Debris Flow	5	3	6	6	2	5	7	1	35	5	4.375
Flood	4	4	4	4	7	6	3	6	38	4	4.75
High Wind	6	7	5	5	5	3	4	5	40	5	5
Hazardous Materials Spill	7	5	7	7	6	7	6	4	49	7	6.125

Perhaps of more importance to understating the community's perspective with respect to risk, the aforementioned survey also asked participants to explain why they ranked their number one risk above the other hazards. What follows is a recapitulation of their explanations:

Wildland Fire

- This seems to be at the forefront of everyone's fears. They seem hard to control and cover a large area, as opposed to structure fires which are more manageable.*
- EagleVail is surrounded by national forest.*
- Wooded environment with lots of dry spells.*
- Due to the "forest" coming right down to homes and the valley floor of most homes in Eagle-Vail.*
- Since 50% of EV backs up to forest and there is a high chance of lightning strikes on the hillside, that (wildland fire) would be the most likely and then that flowing into the residential areas making that (structure fires) second.*
- Wildland Fire in the area, including national forest lands surrounding Eagle-Vail, strikes me as the largest single threat.*

Snow/Ice/Extreme Cold

- Ice dams cause major home damage.*

Land/Debris Flow

- *With the volume of truck traffic seemingly increasing and the weather conditions that we experience, it's likely that the risk of these types of incidents will increase.*

Lastly, the survey asked participants to provide a numerical value for their opinion as to the likelihood that their number one hazard would actually occur (1 = extremely likely; 2 = somewhat likely; 3 not very likely) as well as their rationale for the numerical value they assigned to it:

Wildland Fire	Average of 2 (six people ranked this as the hazard of highest concern)
Snow/Ice/Extreme Cold	Average of 2 (one person ranked this as the hazard of highest concern)
Land/Debris Flow	Average of 1 (one person ranked this as the hazard of highest concern)

Wildland Fire

- *Due to the recent drought years.*
- *Some parts of Eagle-Vail are hard to mitigate.*
- *Overgrowth of brushes and combustible foliage very near a lot of Eagle-Vail homes. Flying cinders make almost all Eagle-Vail home vulnerable. Plus one home catches on fire, the ones next to it are very close and will likely catch, as well.*
- *We are taking precautions along those areas that back up to forest lands. But human error can also be a factor. We have had a mild summer with lots of rain, some wind, so least likely this year. But one dry season can change things quickly, but hopefully we continue to use preventive measures to ensure our well-being and make this a not very likely situation.*
- *The amount of natural land surrounding the community*

Snow/Ice/Extreme Cold

- *Improper roofing materials and extreme snowfall*

Land Debris Flow

- *They already occur and the likelihood is high that they'll continue. We also have a fair number of industrial-type of businesses in our business center. It's likely that they may experience such an event, as well.*

By examining the history of emergency incidents that have occurred within Eagle-Vail, the community and Fire District can develop a retrospective analysis by which to estimate the degree to which various incident frequencies may change over time. Obviously, the accuracy of this type of analysis depends

heavily on such factors as community growth and redevelopment, but as previously discussed, Eagle-Vail has reached a state of development maturity. While opportunities may exist for redevelopment, particularly in its commercial area north of Interstate 70, the community likely will not appreciably grow in size or density, making a retrospective analysis particularly useful.

To examine the history of incidents within the Eagle-Vail Community, staff queried the Fire District's records management system (RMS) for incident frequencies during the years 2009 – 2013. Figure 15 (below) provides the results by displaying both incident frequency and the percentage of incident frequency as measured against incident type totals for the entire Fire District, for various incidents that occurred within the study area.

Figure 15 - EV Incident Totals and as District Percentages

	2013		2012		2011		2010		2009	
	Number	% District Total	Number	% District Total	Number	% District Total	Number	% District Total	Number	% District Total
Structure Fire	2	1%	4	2%	2	1%	2	2%	0	0%
Vehicle Fire	1	1%	1	1%	2	1%	0	0%	1	1%
EMS	45	30%	53	33%	59	35%	52	39%	46	38%
Motor Vehicle Accident	27	18%	15	9%	8	5%	7	5%	1	1%
Hazmat	4	3%	4	2%	6	4%	6	5%	6	5%
Technical Rescue	0	0%	1	1%	0	0%	2	2%	1	1%
Wildland/ WUI Fire	0	0%	0	0%	0	0%	0	0%	0	0%
General Service Call	8	5%	19	12%	12	7%	15	11%	10	8%
Good Intent Call	28	19%	28	17%	29	17%	22	17%	20	16%
False Alarm/Call	35	23%	36	22%	49	29%	27	20%	37	30%
Totals	150	7%	161	8%	167	8%	133	6%	122	5%

Examining the historical record for fire dollar loss versus dollar saved also provides a measure of risk with respect to the financial impacts that fires have historically had on the community. Figure 16 (below) provides this data.

Figure 16 - EV Fire Dollar Loss/Save and as District Percentages

	2013		2012		2011		2010		2009	
	Amount	% District Total	Amount	% District Total	Amount	% District Total	Amount	% District Total	Amount	% District Total
Fire Dollar Loss	\$ 30,500	1%	\$ 175,000	5%	\$ 100	0%	\$ 205,000	39%	\$ 2,000	1%
Fire Dollar Save	\$ 5,135,500	11%	\$ 1,025,000	7%	\$ 839,450	2%	\$ 3,673,250	17%	\$ 2,000	0%

Water Supply constitutes an additional consideration, or perspective, when assessing community risk. The Eagle River Water and Sanitation District provides the community's domestic and firefighting water

supply. Approximately 48 fire hydrants serve the area, making sufficient water flow for emergency operations a reliable factor.

Section 3.3: Structure Fire Risk

As previously discussed, Figures 15 and 16 (above) provide statistical information related to structure fires that occurred within the Eagle-Vail Community during the period 2009 – 2013. As listed in the charts, the annual number of structure fires in Eagle-Vail accounted for approximately 1% - 2% of the District's total number of structure fires during the aforementioned five-year period of time. This statistic provides a perspective on the degree of structure fire risk within the Eagle-Vail community as it compares to the remainder of the Fire District.

In addition to this retrospective view, a community's structure fire risk should also derive from an analysis of the concentration and distribution of buildings that warrant greater focus by the fire department. The need for great focus may arise from a variety of building attributes such as the co-location of multiple residential or commercial units (particularly in the absence of built-in protection systems); mixed-use occupancies (e.g. residential built over commercial); configurations that potentially facilitate fire spread; or, building uses that constitute critical community infrastructure, such as schools or water treatment and electric facilities.

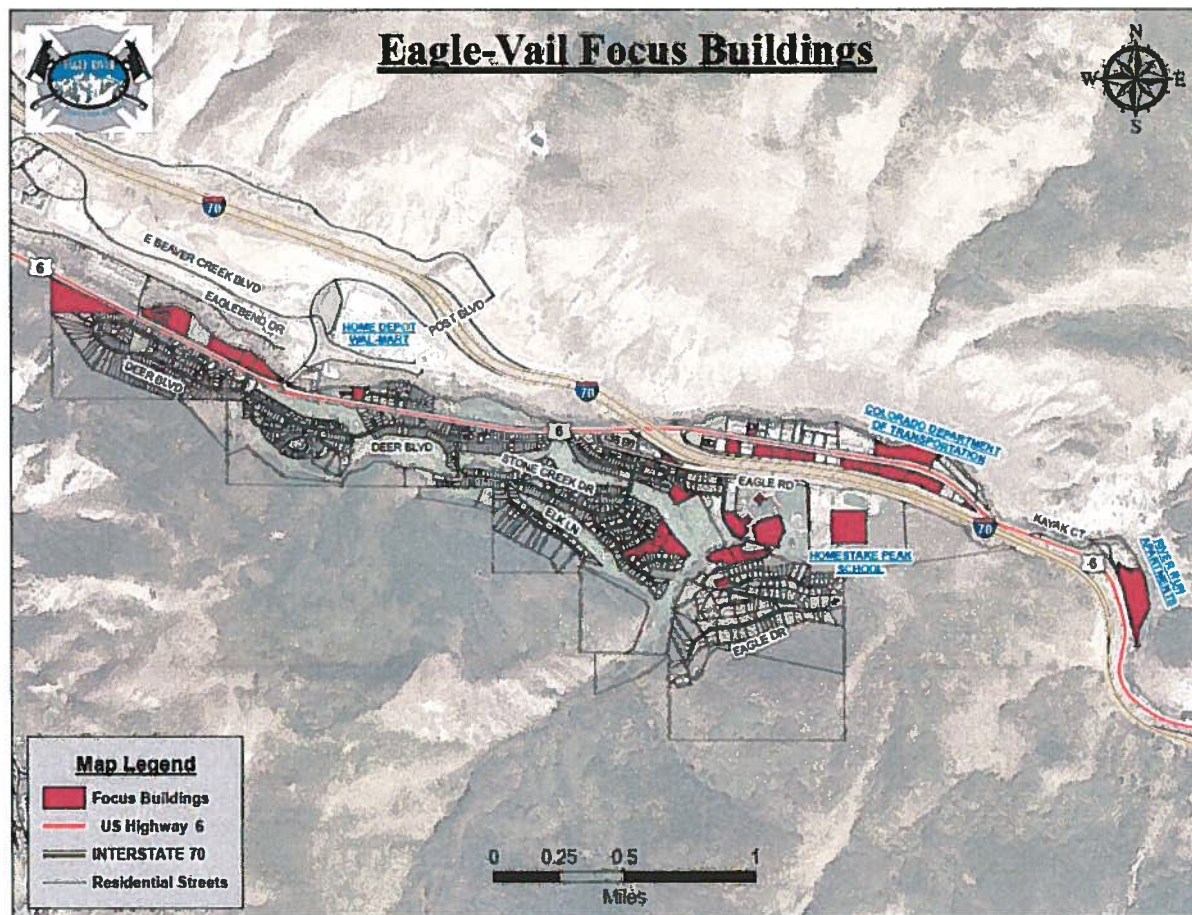
Figure 17 (below) provides a list of buildings on which the Fire District focuses its efforts to ensure public safety through enhanced fire prevention education, visits by District personnel to encourage the reduction in the occurrence of common structure fires causes and the application of fire codes designed to decrease the likelihood that a fire will start.

Figure 17 - EV Focus Buildings

<i>Eagle-Vail Focus Building Locations</i>		
Homestake Peak School	750 Lift Rd	School
CDOT Maintenance Facility	41413 US HWY 6	Infrastructure
Eagle County Sheriff's Substation	249 Eagle Rd	Infrastructure
CenturyLink	39729 US HWY 6	Infrastructure
Holy Cross Electric	41226 US HWY 6	Infrastructure
Eagle-Vail Pavillion	0538 Eagle Rd	Infrastructure
ERFPD Station 6	249 Eagle Rd	Infrastructure
Market Place	41184 US HWY 6	Commercial
Michel's Bakery	40815 US HWY 6	Mixed
Vail Daily Building	40780 US HWY 6	Mixed
Eagle-Vail Business Center	41010, 41000, 40928, 40814 US HWY 6	Strip Mall
Eagle-Vail Industrial Center	41266 - 41394 US HWY 6	Strip Mall
River Oaks	38596 US HWY 6	Multi-Family Dwelling
River Run Apartments	41929 US HWY 6	Multi-Family Dwelling
Riverview Apartments	39169 US HWY 6	Multi-Family Dwelling
Sun River	39377 US HWY 6	Multi-Family Dwelling
Mountain Stream Condos	39211 US HWY 6	Multi-Family Dwelling
Whitewater	38965 US HWY 6	Multi-Family Dwelling
Mountain Terrace Townhomes	225 Eagle Dr	Multi-Family Dwelling
Stone Creek Meadows	264 Eagle Dr	Multi-Family Dwelling
Clubhouse Condos	411 Eagle Dr	Multi-Family Dwelling
Whiskey Hill Condos	596 Eagle Dr	Multi-Family Dwelling
Cornerstone Condos	142 Eagle Dr	Multi-Family Dwelling
Juniper Park Condos	194 Eagle Dr	Multi-Family Dwelling
Nineteenth Fairway Condos	54 Columbine Cir	Multi-Family Dwelling
Sundown Condos	120 Gopher Rd	Multi-Family Dwelling
Par 6 Condos	17 Gopher Rd	Multi-Family Dwelling

Figure 18 provides a map depicting the locations of these focus buildings.

Figure 18 - EV Focus Buildings



As Figure 17 (above) demonstrates, Eagle-Vail contains twenty-seven (27) focus buildings, which constitutes approximately 5% of the community's total building stock of 512 buildings (Anchor Point, 2011, p. 52). Of the community's twenty-seven (27) focus buildings, multi-family structures (defined by the District as containing 4 or more connected units) constitute the greatest percentage of the focus buildings located within Eagle-Vail (55%). None of the multi-family units listed in Figure 17 have built-in fire protection systems (e.g. sprinklers).

Section 3.4: Non-Structure Fire Risk

Because the Eagle River Fire Protection District provides not only structural fire protection but also all-hazards emergency services as established in the District's Service Plan, any risk assessment of the Eagle-Vail community must also consider hazards not related structure fires. Such hazards include wildfire and wildland urban interface (WUI) fires, technical rescues, hazardous materials (Hazmat) and various incidents related to emergency medical services (EMS). Each of these incident types places a load on the District's system of response and, therefore, creates a measureable demand for resources, the accounting of which provides an additional perspective of the community's overall risk.

Wildland and Wildland Urban Interface Fire

Figure 19 (below) provides statistics for the occurrence of wildfire/WUI Fires during the period 2009 – 2013.

Figure 19 - EV Wildfire Incidents 2009-2013

	2013		2012		2011		2010		2009	
	Number	% District Total	Number	% District Total	Number	% District Total	Number	% District Total	Number	% District Total
Wildland/ WUI Fire	0	0%	0	0%	0	0%	0	0%	0	0%

In 2011, the Fire District commissioned Anchor Point to prepare a Community Wildfire Protection Plan (CWPP) for the purposes of assessing the wildland and WUI fire risk in all communities protected by the Fire District, including Eagle-Vail. As stated in that document,

The Eagle River Fire Protection District Community Wildfire Protection Plan (CWPP) is the result of a community-wide planning effort that included extensive field data gathering, compilation of existing documents and geographic information system (GIS) data, and scientific analyses and recommendations designed to reduce the threat of wildfire-related damages to values at risk. Values at risk include people, property, ecological elements, and other human and intrinsic values within the project area. Values at risk are identified by inhabitants as important to the way of life in the study area, and are particularly susceptible to damage from wildfire (Anchor Point, 2011, p. 10).

Following their assessment, Anchor Point concluded that Eagle-Vail's overall hazard rating for wildfire is moderate, but recommended good defensible space and home construction as the principle means by which the community should prepare for a wildland or WUI fire (Anchor Point, 2011, p. 52). Recommendations for specific defensible space and fuel reduction projects consisted of the following prioritized items (p. 54):

Category	Priority	Description
Home Construction	1	<p>Discourage the use of combustible materials for decks, siding, and roofs, especially where homes are upslope from heavy vegetation.</p> <p>Replace any shake-shingle or slab-wood siding and roofs with noncombustible types.</p> <p>Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.</p>
Landscaping/Fuels	2	<p>Remove all standing dead lodgepole trees that are near structures, power lines, and roads.</p> <p>Clean leaf and needle litter from roofs and gutters and away from foundations.</p> <p>Thin vegetation along side roads and driveways. This is especially important for narrow driveways and road segments, and for any areas where ravines with heavy fuels are below the access. Focus on removing vegetation in drainages that cross roads.</p> <p>Encourage individual landowners to mow fuels near homes and along roadways and fence lines during times of high fire danger.</p>
Preparedness Planning/ Evacuation	3	<p>Public education is one of the most important steps for this community. Keeping the public apprised of fire danger and ways to prevent wildfire is key in reducing the fire hazard in the district.</p> <p>Add reflective addressing to all driveways or homes. A good guideline is to use all metal white markers that are 4" in width on a green background. These should be placed 3-5' above ground.</p> <p>Develop an evacuation plan for the community, including identifying escape routes and an evacuation center.</p> <p>Develop safety brochures that can be distributed and made available to guests in the summer months.</p> <p>Where available, large safety zones should be maintained and identified in all evacuation planning. These safety zones will need to be of adequate size and quality in order to be effective.</p>
Infrastructure	4	<p>Provide adequate turnarounds for fire apparatuses throughout the community.</p> <p>Ensure that all gates in the community are removable and/or have access codes that are known to all residents and the FPD.</p> <p>Identify all water sources within the community, including hydrants, cisterns, and ponds. Make sure that they are viable, maintained, and operable.</p>

In response to this assessment, the Eagle-Vail Community has aggressively pursued wildfire mitigation, to the degree that it may soon qualify for designation as a Firewise Community through the Firewise Communities recognition program.

Technical Rescue

Figure 20 (below) provides statistics for the occurrence of technical rescue incidents during the period 2009 – 2013.

Figure 20 - EV Technical Rescues 2009 - 2013

	2013		2012		2011		2010		2009	
	Number	% District Total	Number	% District Total	Number	% District Total	Number	% District Total	Number	% District Total
Technical Rescue	0	0%	1	1%	0	0%	2	2%	1	1%

Technical rescues typically include incidents that involve the use of rope systems or require firefighters to extricate people from entrapment or entanglement in water, ice, confined spaces and trenches. Such incidents require a response by personnel whom have received specialized training and possess the type of equipment necessary to effect rescues in technically challenging environments.

Technical rescue incidents can occur in most any community. Community lakes, rivers and even golf course water features can become hazardous depending on a variety of conditions, such as freezing temperatures or spring run-off. Additionally, construction sites often contain trenches, the walls of which may become unstable and cave-in, potentially trapping people below grade, while steep inclines may necessitate the implementation of complicated rope systems in order to rescue people whom have fallen. While perhaps ubiquitous in nature, no inordinate risk for technical rescue appears to arise within the Eagle-Vail community.

Hazardous Materials

Figure 21 (below) provides statistics for the occurrence of hazardous materials incidents during the period 2009 – 2013.

Figure 21 - EV Hazardous Materials Incidents 2009 - 2013

	2013		2012		2011		2010		2009	
	Number	% District Total	Number	% District Total	Number	% District Total	Number	% District Total	Number	% District Total
Hazmat	4	3%	4	2%	6	4%	6	5%	6	5%

Emergencies involving hazardous materials can include a variety of substances from the familiar (e.g. Propane) to the esoteric (e.g. Arsenic bromide). Much like technical rescue incidents, emergency events involving hazardous materials can occur in most any type of community and require a response by personnel whom have specialized training and possess equipment specifically designed for the type of hazardous material involved in the incident.

Given the federal government's broad definition of hazardous materials (Electronic Code of Federal Regulations, 2014), Figure 22 (below) may provide a useful assessment of the types of hazardous materials incidents that have occurred in Eagle-Vail from 2009 through 2013. As found in Figure 22, the types of hazardous materials events that have occurred in Eagle-Vail typically involved spills of gasoline, vaporous gas releases such as natural gas and Propane, and Carbon monoxide leaks, such as those which oftentimes occur when home heating appliances malfunction.

Figure 22 - EV Hazmat Incidents by Type 2009 -2013

	2013	2012	2011	2010	2009
Flammable Liquid Spill (e.g. Gasoline)	1	1	2	0	0
Gas Leak (e.g. Propane)	3	1	1	5	0
Carbon Monoxide	0	2	2	1	0
Other	0	0	0	1	0

Emergency Medical

Emergency medical incidents include a variety of medically related events including the activation of non-specific medical alarms, various forms of trauma, strokes and heart attacks. As a provider of basic life support (BLS) services, the ERFPD typically responds to emergency medical incidents either to provide initial patient care until arrival of the Eagle County Paramedic Service (ECPS) or assist paramedics from the ECPS in the provision of more advanced patient care. Figure 23 (below) provides statistics regarding the number of EMS incidents that occurred in the Eagle-Vail community during the period 2009 – 2013.

Figure 23 - EV EMS Incidents 2009-2013

	2013		2012		2011		2010		2009	
		%		%		%		%		%
	Number	District Total	Number	District Total	Number	District Total	Number	District Total	Number	District Total
EMS	45	30%	53	33%	59	35%	52	39%	46	38%

As previously discussed in Section 2.4, cardiac events typically constitute the most time-sensitive form of EMS incident. During the period January 1, 2009 – December 31, 2013, the Fire District responded to a total seventeen (17) EMS incidents within Eagle-Vail that were specifically related to cardiac events.

Section 4: Service Level and On-Scene Performance

ERFPD currently *distributes* its four staffed fire stations in such a manner as to designate the Avon Fire Station (Station 7) as Eagle-Vail's closest staffed fire station. Except for a few locations on Highway 6, along Eagle-Vail's eastern-most boundary, the Minturn Fire Station (Station 5) constitutes the community's second closest fire station.

Structure Fire

Once Fire District resources arrive at the scene of a structure fire, firefighters must perform a series of defined tasks, all of which place initial priority on rescuing trapped people and extinguishing fire as quickly as possible, while maintaining a maximum degree of firefighter safety. The National Fire Protection Association has promulgated a staffing standard for first-alarm responses to residential structure fires, which consists of various numbers of personnel assigned to the following fireground tasks (National Fire Protection Association, 2009):

<i>Fireground Task</i>	<i>Staffing Requirement</i>
Incident Command	1
Pump Operator (per operating pump)	1
Water Flow (2 attack lines)	4
Attack Line Support (2 attack lines)	2
Search and Rescue Team	2
Ground Ladder and Ventilation Team	2
Initial Rapid Intervention Crew (Firefighter Rescue)	2
Aerial Device Operator (per aerial device)	1
Total	15

To ensure its ability to comport with the aforementioned standard and thereby provide an effective response force (ERF) to residential structure fires, the Fire District's staffing plan requires four-person staffing at all four of its staffed fire stations, including the Avon and Minturn Fire Stations; and, it responds to all first-alarm structure fires, including those occurring in Eagle-Vail, with a minimum of three fire engines, one ladder truck and a chief officer, for a total ERF of seventeen.

By staffing its fire stations with four persons, the Fire District also enhances its ability to perform critical fireground tasks in a manner that minimizes the amount of time required to effect rescue and suppress fire, as confirmed in numerous fireground experiments conducted by the National Institutes on Standards and Technology (National Institutes of Standards and Technology, 2010):

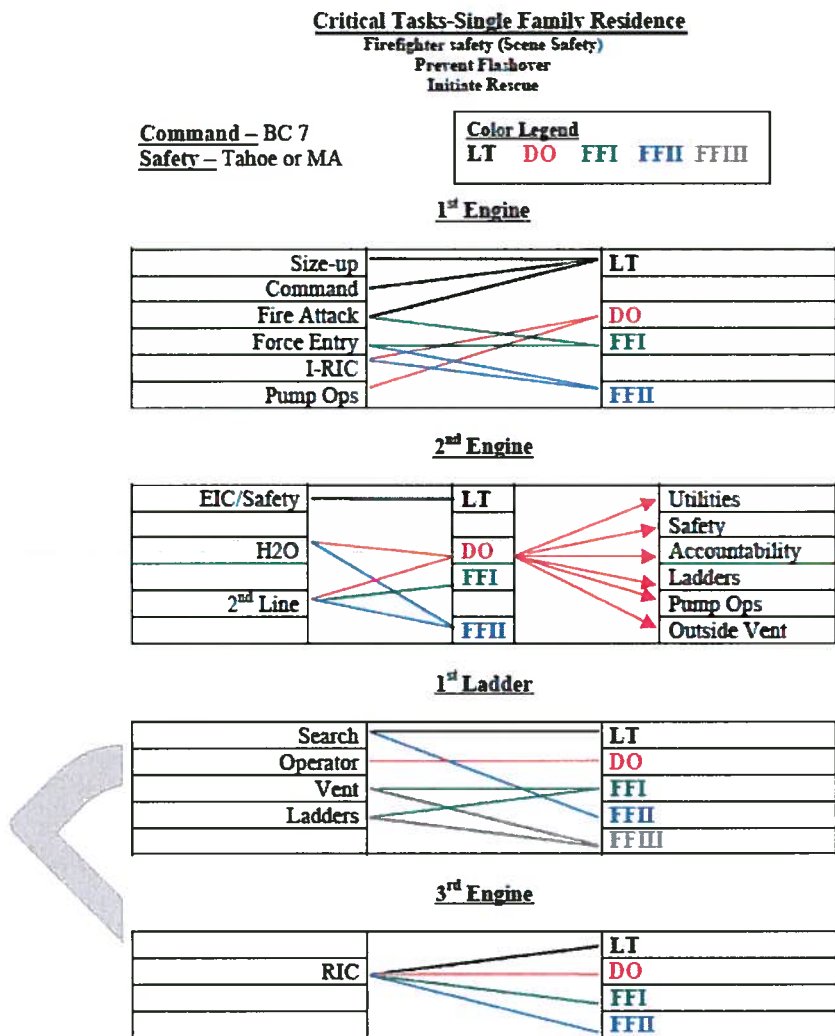
The four-person crews operating on a low-hazard structure fire completed all the tasks on the fireground (on average) seven minutes faster—nearly 30 %—than the two-person crews. The four-person crews completed the same number of fireground tasks (on average) 5.1 minutes faster—nearly 25 %—than the three-person crews (p. 10).

Section 4.1: Critical Task Analysis – Structure Fire

In addition to NFPA 1710 and the aforementioned study by National Institutes of Standards and Technology, the Fire District conducted its own analyses of the various critical fireground tasks that its personnel must perform in order to meet the initial incident objectives of maintaining

firefighter safety, effecting rescue and preventing flashover. Figures 24 and 25 (below) provide the results of this analysis for single-family and multi-family residential structure fires, respectively:

Figure 24 - Critical Task Analysis Single Family Residential Structure Fire



(Assumes a 2,000 ft² residential structure with no more than two floors and no basement)

Figure 25 - Critical Task Analysis Multi-Family Residential Structure Fire

Critical Tasks-Multi-Family Structure (Confirmed structure Fire)

Firefighter safety (Scene Safety)
Prevent Flashover
Initiate Rescue

Automatic 1st Alarm
Command – BC 7
Safety – Tahoe or MA

Color Legend

LT DO FFI FFII FFIII

1st Engine

Size-up		LT
Command		
Fire Attack 1 st Line		DO
Force Entry		FFI
I-RIC		
Pump Ops		FFII

2nd Engine

EIC/Safety		LT		Utilities
				Safety
Est. Water Supply		DO		Accountability
		FFI		Ladders
Ast stretch 1 st Line				Pump Ops
Extend 1 st line		FFII		Outside Vent

3rd Engine

Stretch 2 nd Line		LT
		DO
		FFI
		FFII

1st Ladder

Search		LT
Operator		DO
Vent		FFI
Ladders		FFII
		FFIII

4th Engine

		LT
Assist Stretch 2 nd Line		DO
Extend 2nd line		FFI
		FFII

5th Engine

		LT
RIC		DO
		FFI
		FFII

2nd Ladder

Assume Fire Attack of		LT
1 st line. 1 st Engine to		DO
Rehab		FFI
		FFII
		FFIII

Assumption

Basic Alarm

3-Engines

1-Truck

1-command staff

1-ISO

1st Alarm

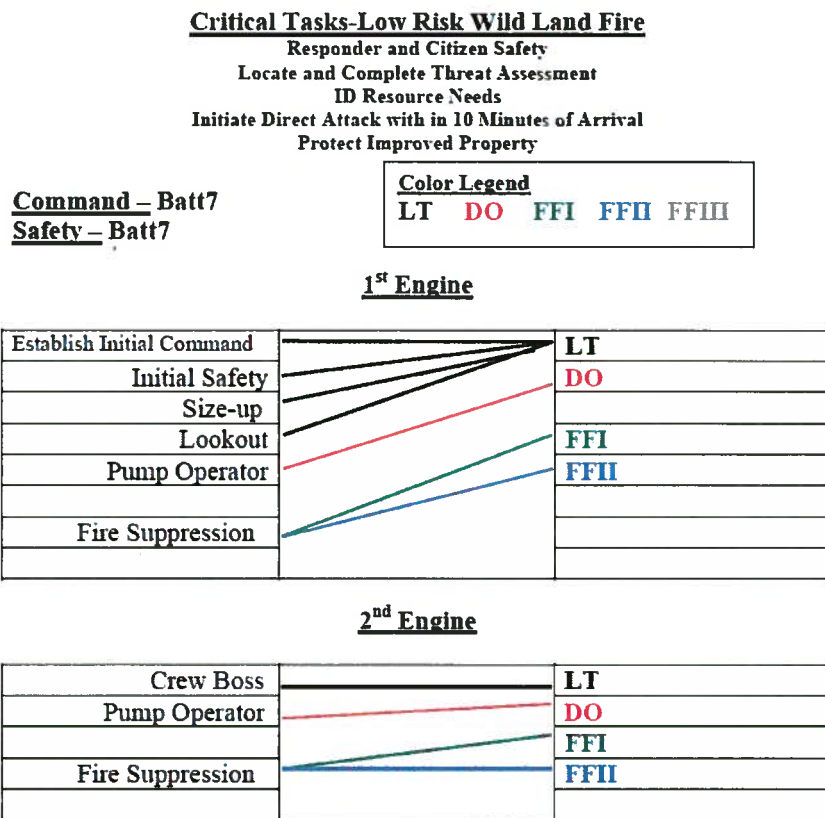
2-Engines

1-Truck

Section 4.2: Critical Task Analysis - Non-Structure Fire

In similar fashion, the Fire District conducted analyses of critical tasks that firefighters must perform when responding to the other incident types. Figures 26 through 39 (below) provide the results of this analysis:

Figure 26 – Critical Task Analysis Low Risk Wildland Fire



****An Alignment of Fuel, Weather and Topography May change the risk level either up or down(a low risk can escalate to a medium or high risk if the Fuel, Wx, Topo align and make the fire a higher risk and vice versa)**

Figure 27 - Critical Task Analysis Medium Risk Wildland Fire

Critical Tasks-Medium Risk Wild Land Fire

Responder and Citizen Safety
 Locate and Complete Threat Assessment
 ID Resource Needs
 Initiate Direct Attack with in 10 Minutes of Arrival
 Protect Improved Property

Overhead

Size Up		A Chief
Incident Command		
Safety		SR-ISO
Lookout-Division A		SR-Single Resource
Lookout-Division Z		SR-Single Resource
Structure Protection		
Group Supervisor		Battalion Chief

***Order overhead early in the incident

1st Engine

Division A Supervisor		LT
		DO
Division A		FFI
		FFII

2nd Engine

Division Z Supervisor		LT
		DO
Division Z		FFI
		FFII

3rd Engine

Structure Protection		LT
		DO
		FFI
		FFII

*An Alignment of Fuel, Weather and Topography May change the risk level either up or down (a low risk can escalate to a medium or high risk if the Fuel, Wx, Topo align and make the fire a higher risk and vice versa)

**Due to the complexity of the wildland fires, its demands and its ability to expand so rapidly. This Critical Task Analysis is by no means a start to finish outline but rather a starting point for initial tasks and resource allocation.

Figure 28 - Critical Task Analysis High Risk Wildland Fire

Critical Tasks-High Risk Wild Land Fire

Responder and Citizen Safety
 Locate and Complete Threat Assessment
 ID Resource Needs
 Initiate Direct Attack with in 10 Minutes of Arrival
 Protect Improved Property

Overhead

Size Up		A Chief
Incident Command		
Safety		SR-ISO
Lookout-Division A		SR-Single Resource
Lookout-Division Z		SR-Single Resource
Structure Protection Strike Team Leader		Battalion Chief

***Order overhead early in the incident

1st Engine

Division A-Task Force Leader		LT
Task Force-A		DO
plus 4-Additional Engines		FFI
		FFII

2nd Engine

Division Z-Task Force Leader		LT
Task Force-Z		DO
plus 4-Additional Engines		FFI
		FFII

3rd Engine

Structure Protection Strike Team (5-Engines)		LT
		DO
		FFI
		FFII

*An Alignment of Fuel, Weather and Topography May change the risk level either up or down (a low risk can escalate to a medium or high risk if the Fuel, Wx, Topo align and make the fire a higher risk and vice versa)

**Due to the complexity of the wildland fires, its demands and its ability to expand so rapidly. This Critical Task Analysis is by no means a start to finish outline but rather a starting point for initial tasks and resource allocation.

ERFPD Wildland Risk Definitions
(LOW, MEDIUM, HIGH)

The following four (4) criteria are used to classify a wildland fire event into a low, medium or high risk category:

- 1-WUI-Wildland Urban Interface.
- 2- Control or Containment Problems
- 3-Threat to life or improved property
- 4-Threat to special Hazards

LOW

To be classified as a **LOW** risk fire the answer of "NO POTENTIAL" must be obtained to the each of the above 4 criteria questions.

No Potential for a WUI Fire.
No Potential for Control or Containment Problems
No Potential for Threat to life or improved property
No Potential for Threat to special Hazards

MEDIUM

A wildland fire will be classified as a **MEDIUM** risk fire if there is Potential risk to any one of the 4-criteria.

- 1-WUI-Wildland Urban Interface
- 2- Control or Containment Problems
- 3-Threat to life or improved property
- 4-Threat to special Hazards

HIGH

A wildland fire will be classified as a **HIGH** risk fire if there is an immediate risk to any one of the 4-criteria.

- 1-WUI-Wildland Urban Interface
- 2- Control or Containment Problems
- 3-Threat to life or improved property
- 4-Threat to special Hazards

Figure 29 - Critical Task Analysis Technical Rescue (Low Angle Rope)

Critical Tasks-Technical Rescue

Rope Rescue-Low Angle

Life safety (Scene Safety)
Size up/Risk Analysis
Rescue
Site Control
Notify/Request Resources

Overhead

Incident Command	←	Batt Chief
Safety	←	ISO

***Order overhead early in the incident

1st Engine

Initial IC	→	LT	→	Rescue Support
Size Up	→	DO	→	Shall Perform-
Locate/Initiate Contact	→	FFI	→	Equipment Staging
Rescue Group Supervisor	→		→	Ropes & Rigging
Rescue	→		→	Lighting
Rescue Support	→	FFII	→	Haul Team

2nd Engine

	→	LT
Rescue	→	DO
	→	FFI
Rescue Support	→	FFII

**If Either Engine is staffed with 3 crewmembers a 3rd Engine shall be dispatched.
Identified tasks requires at a minimum 2-fully staffed engines
(4-crew members on each engine).

High Angle-For Events that ERFPD Engine Companies are trained for: a 3rd Fully Staffed Engine should be dispatched for the Haul Team

Figure 30 - Critical Task Analysis Technical Rescue Ice

Critical Tasks-Technical Rescue

Ice Rescue

Life safety (Scene Safety)
Size up/Risk Analysis
Rescue
Site Control
Notify/Request Resources

Overhead

Incident Command	←	Batt Chief
Safety	←	ISO

***Order overhead early in the incident

1st Engine

Initial Incident Command	---	Lt
Size Up	---	
Locate/Initiate Contact	---	DO
Rescue Group Supervisor	---	
Rescue	---	FFI
Rescue Support	---	FFII
Pt Care requires 4-FF Total 2-firefighters from each Engine	---	

2nd Engine

Safety	---	LT	Rescue Support
Rescue Support Group Supervisor	---		
Rescue Support	---	DO	Equipment Staging
	---	FFI	Ropes
	---		Lighting
Pt Care 4-FF	---	FFII	Haul Team

For animal rescues, entry should be delayed until 2-rescuers are appropriately dressed in the necessary gear

For rescue of people, entry can be made prior to the arrival of the second rescuer.

Recoveries should be delayed until the arrival of the second entry crew.

Figure 31 - Critical Task Analysis Technical Rescue Swift Water

Critical Tasks-Technical Rescue
Swift Water Rescue
Reach or Throw Operations Only

(This Critical Task Analysis does Not Apply to Row or GO operations)

Life safety (Scene Safety)
Size up/Risk Analysis
Rescue
Site Control
Notify/Request Resources

Due to the Complexity of identifying the exact location of the victim or victims during swift water incidents: 3-engines and Batt7 shall be dispatched to all Swift water rescues.

Closest Unit (1st due Engine or Battalion Chief) based on initial dispatch information and en-route updates will go to the location/area obtained from dispatch.

2nd Due will respond down stream (at an intermediate location) to either a predetermined location or as assigned.

3rd Due will respond down stream and stage.

Once the location of the victim(s) has been identified, all units will be reassigned to that area. The first due officer or Battalion Chief will assume command.

OK

Overhead

Incident Command	←	Batt Chief
Order Resources	←	
Safety	←	ISO

***Order overhead early in the incident

1st Engine

Throw Bags		LT
Rescue		DO
Throw Bags		FFI
Rescue Support		FFII

2nd Closest Engine

Throw Bags		LT
Rescue		DO
		FFI
		FFII

3rd Closest Engine

As Assigned		LT
Down River Protection		DO
Staging of Equip.		FFI
Support		FFII

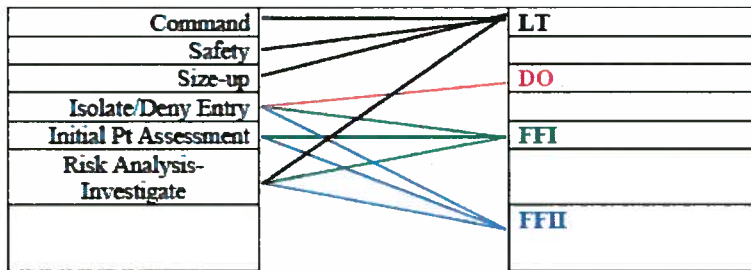
Figure 32 - Critical Task Analysis Hazmat Carbon Monoxide (outside)

Critical Tasks-HAZMAT
CO Alarm/Odor of Natural Gas (outside)

Life safety (Scene Safety)
 Size up/Risk Analysis
 Implement Protective Actions
 Site Control
 Emergency Decon
 Notify/Request Resources

Color Legend				
LT	DO	FFI	FFII	FFIII

1st Engine



****Confirmed IDLH requires 2in/2out.**

If the 1st due engine is staffed with a crew of three (3) a 2nd Engine should be dispatched.

Figure 33 - Critical Task Analysis Hazmat Confirmed Gas Leak or Order Inside Building

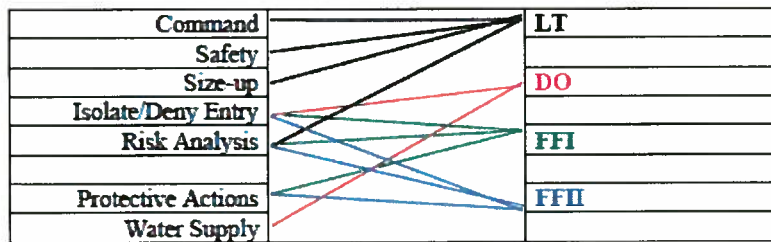
CT-Hazmat
Confirmed Gas Leak or Odor in a Building

Firefighter safety (Scene Safety)
 Access to the pt
 C-Spine Splint/Life Threatening injuries
 A-B-C
 Pt packaging
 Transport &/or Transfer of pt care

Command – Batt7
Size Up Batt7

<u>Color Legend</u>				
LT	DO	FFI	FFII	FFIII

1st Engine



2nd Engine

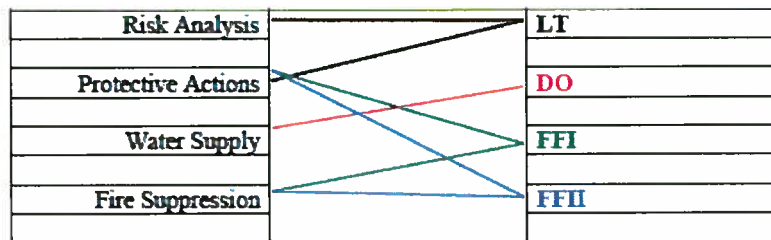


Figure 34 - Critical Task Analysis Hazmat Confirmed

Critical Tasks-Hazmat
Confirmed HAZMAT

Life safety (Scene Safety)
Size up/Risk Analysis
Implement Protective Actions
Site Control
Emergency Decon
Notify/Request Resources

Overhead

Size Up		Batt Chief
Incident Command		
Safety		ISO
Action Plan		
Protective Actions		Chief
PIO		
Notifications		

***Order overhead early in the incident

1st Engine

Risk Assessment		LI
Technical Advisor		DO
Hazmat Branch		FFI
Isolate/Deny Entry		FFII

2nd Engine

Risk Assessment		LI
Protective Actions		DO
		FFI
		FFII

Figure 35 - Critical Task Analysis Motor Vehicle Accident (1 Patient)

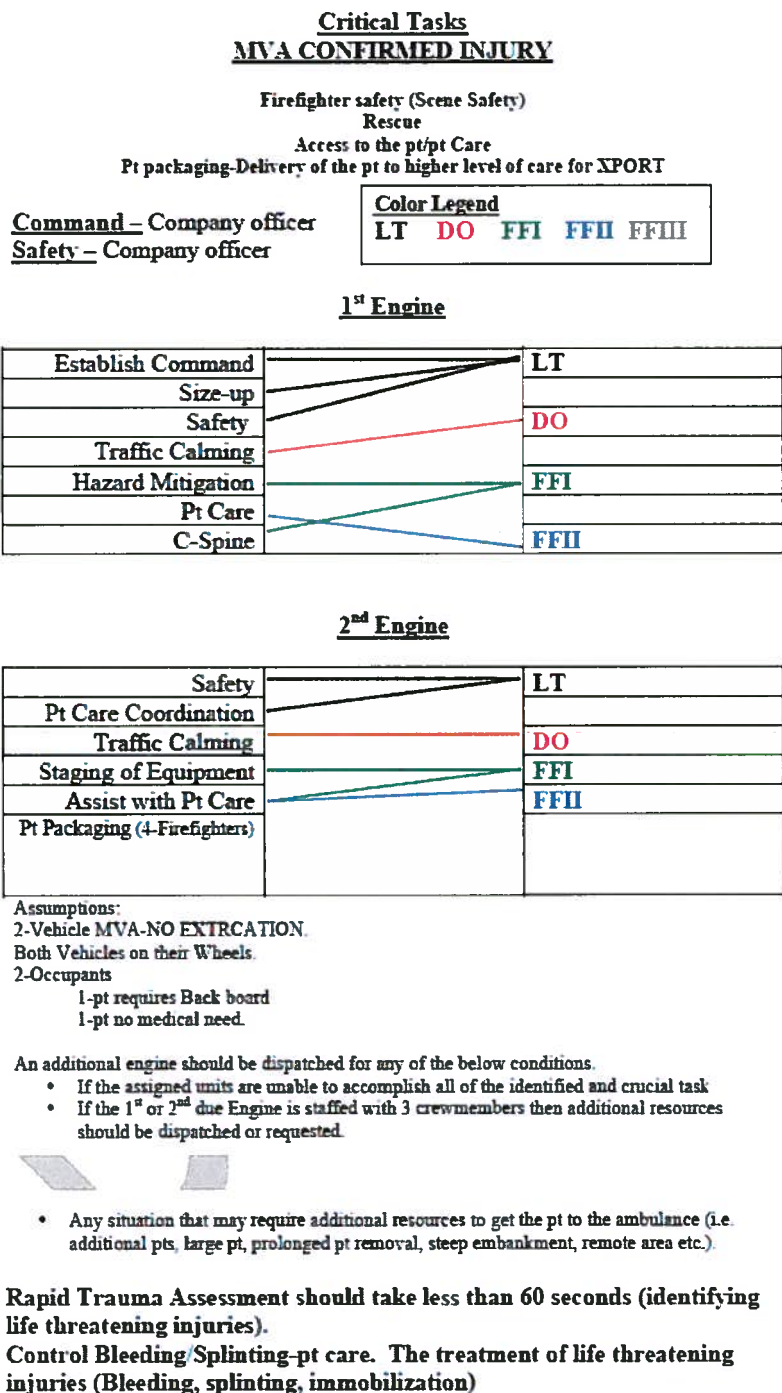
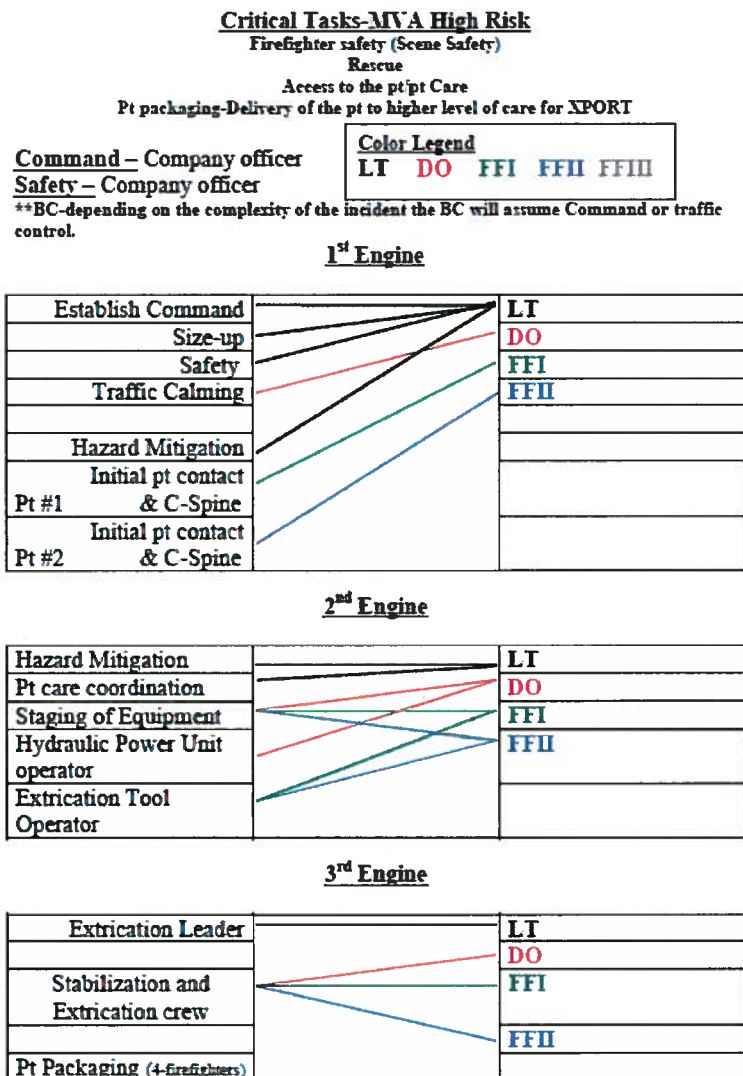


Figure 36 - Critical Task Analysis Motor Vehicle Accident High Risk



Assumptions:

2-Vehicle MVA

-Advanced EXTRICATION Required

Extrication equipment (shoring and Stabilization equipment) required from the Rescue or a 3rd Engine.

Both Vehicles on their Wheels

2-Occupants

2-pt's both require Backboard

An additional engine should be dispatched for any of the below conditions.

- If the assigned units are unable to accomplish all of the identified and crucial task
- If the 1st or 2nd due Engine is staffed with 3 crewmembers then additional resources should be dispatched or requested.
- Any situation that may require additional resources to get the pt to the ambulance (i.e. additional pts, large pt, prolonged pt removal, steep embankment, remote area etc.).
- Rapid Trauma Assessment should take less than 60 seconds (identifying life threatening injuries).
- Control Bleeding/Splinting-pt care. The treatment of life threatening injuries (Bleeding, splinting, immobilization)

Figure 37 - Critical Task Analysis Motor Vehicle Accident Unknown Injuries

Critical Task Analysis
MVA-Unknown Injury

Firefighter safety (Scene Safety)

Rescue

Access to the pt/pt Care

Pt packaging-Delivery of the pt to higher level of care for XPORT

Command – Company officer

Safety – Company officer

Color Legend

LT DO FFI FFII FFIII

1st Engine

Command	LT
Size-up	DO
Traffic Control	FFI
Vehicle Hazards	FFII
Pt Assessment	Batt7
Scene Control	

An additional engine should be dispatched for any of the below conditions.

- If the assigned units are unable to accomplish all of the identified and crucial task
- If the 1st or 2nd due Engine is staffed with 3 crewmembers then additional resources should be dispatched or requested.
- Any situation that may require additional resources to get the pt to the ambulance (i.e. additional pts, large pt, prolonged pt removal, steep embankment, remote area etc.).

Figure 38 - Critical Task Analysis EMS Trauma

12-10-1 Critical Task Analysis EMS Trauma Multi-System Trauma

Firefighter safety (Scene Safety)
Access to the pt
C-Spine/Splint/Life Threatening injuries
A-B-C
Pt packaging
Transport &/or Transfer of pt care

Command – Company officer
Safety – Company officer

Color Legend
LT DO FFI FFII FFIII

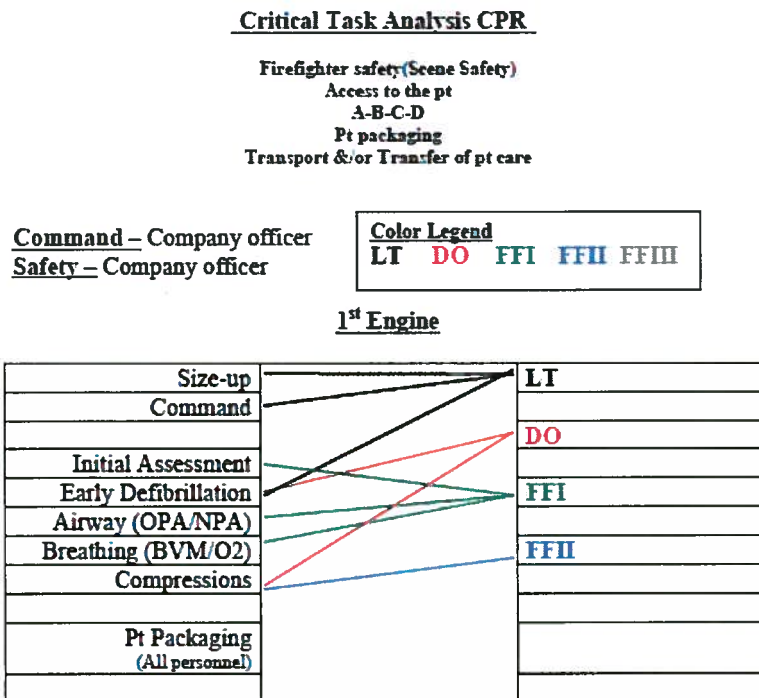
1st Engine

Size-up	LT
Command	
C-Spine	DO
Initial Assessment	FFI
Rapid Trauma Assessment	FFI
Control Bleeding/Splinting	FFII
Detailed Assessment	
Pt Packaging (All personnel)	
XPORT	

A second engine should be dispatched for any of the below conditions.

- If 1st due Engine is staffed with 3 crewmembers than the BC and/or a 2nd engine will be dispatched.
- Any situation that may require additional resources to get the pt to the ambulance (i.e. large pt, prolonged pt removal, steep stairs, remote area etc.).
- Rapid Trauma Assessment should take less than 60 seconds (identifying life threatening injuries).
- Control Bleeding/Splinting-pt care. The treatment of life threatening injuries (Bleeding, splinting, immobilization)

Figure 39 - Critical Task Analysis CPR



A second engine should be dispatched for any of the below conditions.

- If 1st due Engine is staffed with 3 crewmembers than the BC and/or a 2nd engine will be dispatched.
- Any situation that may require additional resources to get the pt to the ambulance (i.e. large pt long narrow hallways, steep stairs etc.).

Section 4.3: Baseline and Benchmark Response - Service Level Objectives

While its overall population falls far below the minimum threshold for designation as a suburban community, the population density of Eagle-Vail, estimated at 1,760 people per square mile, lies within the range of this particular classification. Therefore, following recommendations from the Center for Public Safety Excellence for responses to structure fires in suburban-sized communities, the Fire District should strive to deploy its resources to Eagle-Vail such that it maintains a travel time performance standard as found in Figure 40 (below):

Figure 40 - EV Travel Time Standards

Suburban: an incorporated or unincorporated area with a population of 10,000 to 29,000 and/or any area with a population density of 1,000 to 2,000 people per square mile.				
	1 st Unit	2 nd Unit	Balance of a 1 st Alarm	Performance
Benchmark	5 Min	8 Min	10 Min	90%
Baseline	6 Min 50 Sec	10 Min 40 Sec	13 Min	90%

As found in Figure 40 (above), 6 minutes and 50 seconds constitutes the recommended baseline—or maximum travel time—for the first fire engine to arrive in the Eagle-Vail community, while 5 minutes represents the travel time goal, or benchmark, for the first-arriving fire engine. This travel time standard of between 6 minutes, 50 seconds and 5 minutes (90% of the time) helps both the community and the Fire District to determine the best location for the fire station that is designated as the community's first-due fire station (also known as *Distribution*).

Section 5: Distribution and Concentration of Fire District Resources

Using GIS modeling, the following maps (Figures 41, 42 and 43) establish expected travel times for ERFPD from its Avon and Minturn Fire Stations into Eagle-Vail, as well as theoretical travel times from the currently unstaffed Eagle-Vail Fire Station into Eagle-Vail, were the District to staff it:

Figure 41 - Travel Time Analysis, Avon Fire Station to Eagle-Vail

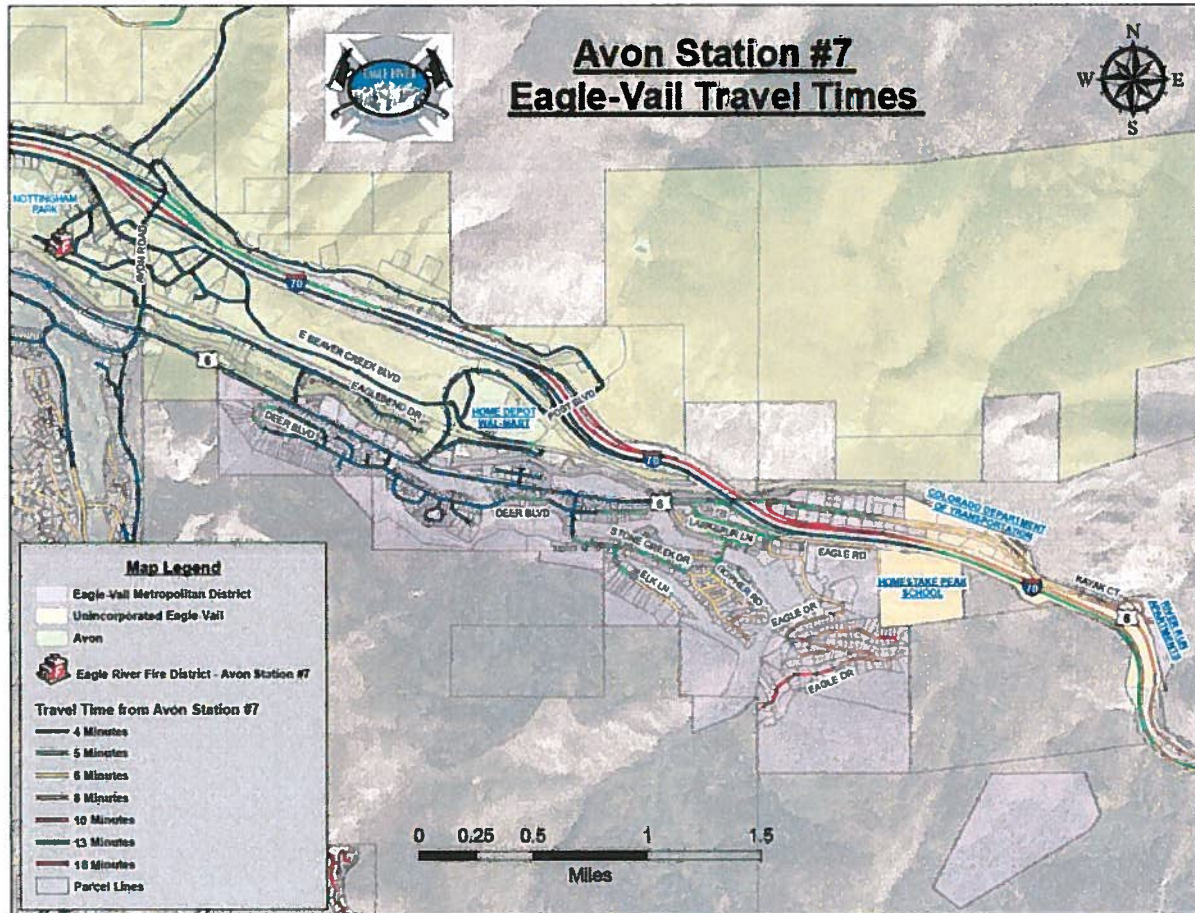


Figure 42- Travel Time Analysis, Minturn Fire Station to Eagle-Vail

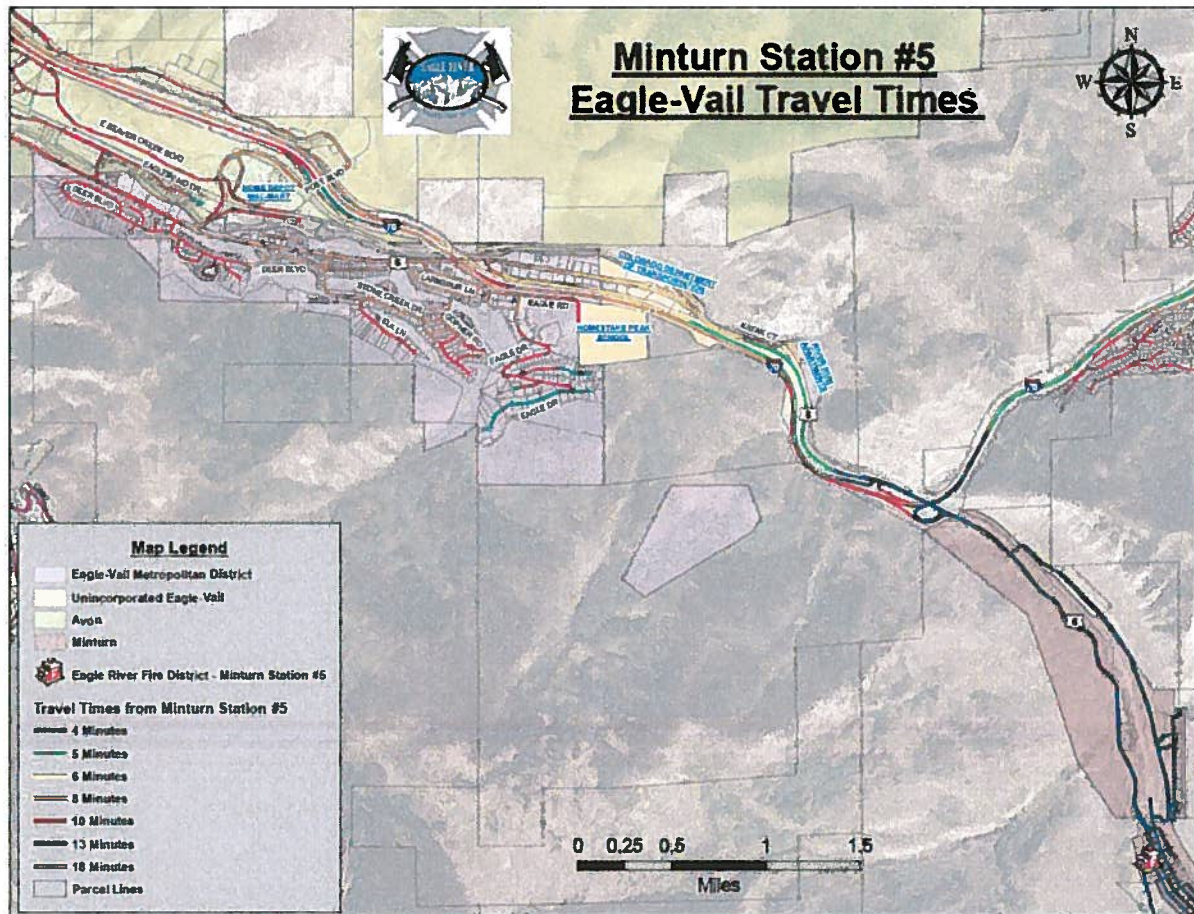


Figure 43 - Travel Time Analysis, Theoretical Travel Time from Eagle-Vail Station to Eagle-Vail

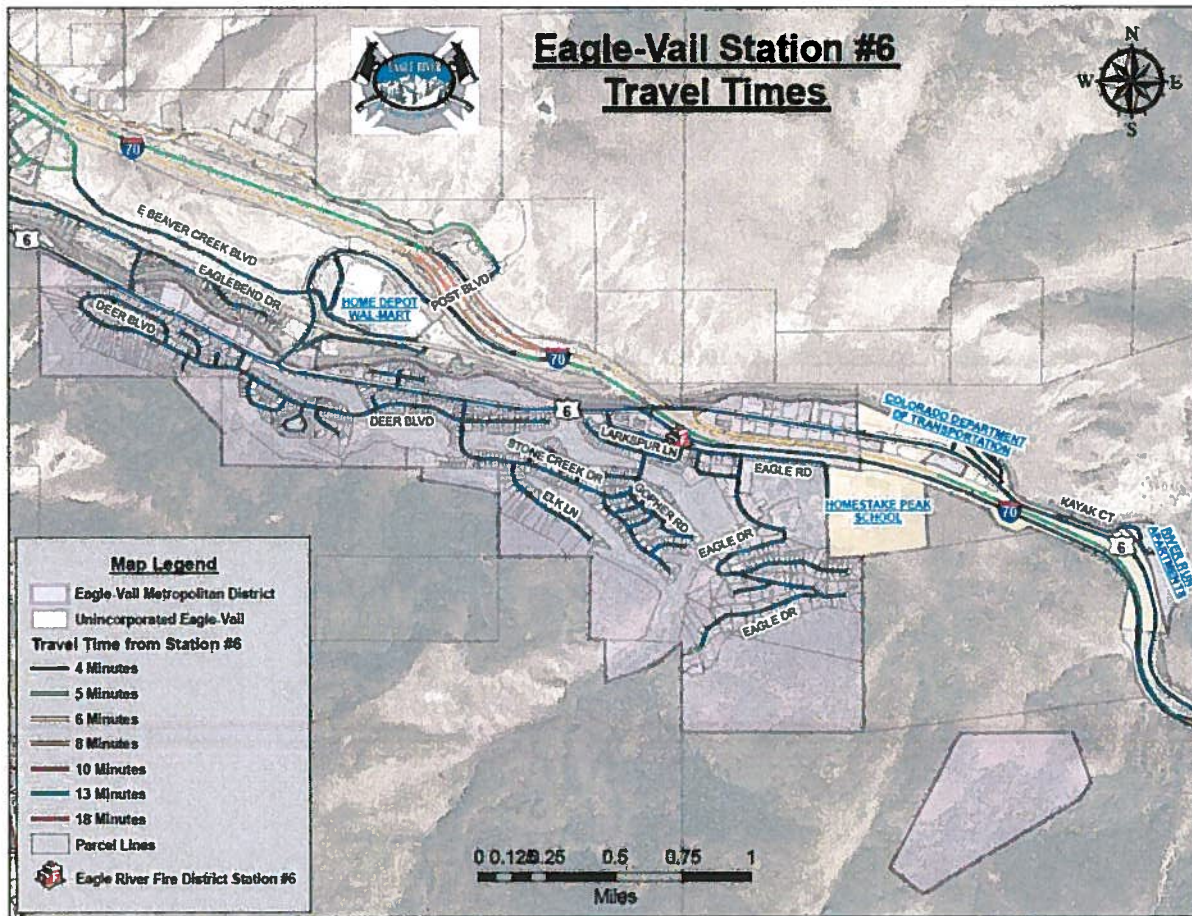


Figure 4 provides a fractal analysis of actual structure fire response times, from turnout time to on-scene time (see Figure 7) for the Fire District's first arriving unit to the Eagle-Vail community in 2013¹:

Figure 44 – EV Structure Fire Fractal Analysis of Response Times to Structure Fires 2013

Incident Date	Enroute	Onscene	Elapsed Time	Fractal	
9/15/2013	19:27:42	19:29:33	0:01:51	2 Min	Benchmark
11/13/2013	9:23:26	9:25:44	0:02:18	3 Min	Benchmark

As Figure 44 shows, the first arriving ERFDP unit met the benchmark travel time of 5 minutes in both instances.

¹ The Fire District began capturing data on subsequently arriving units in June, 2014.

Section 6: Community Perspective

As stated at the outset, the intent of this study is to provide appropriate information to the community of Eagle-Vail and the Board of Directors of the Eagle River Fire Protection District as they collaboratively determine the efficacy of staffing and responding from the Eagle-Vail Fire Station (Station 6). To the degree that the Fire District can ascertain public sentiment, the perspective of the Eagle-Vail community also plays a vital role in determining the answer to the question of whether the Fire District should staff and respond from the Eagle-Vail Fire Station as part of its overall system of fire protection and emergency response.

A recent survey of the Eagle-Vail Community revealed the following opinion regarding the service provided to the community by the Fire District, at least with respect to response times:

Survey Question: EagleVail is in unincorporated Eagle County and relies on other organizations for many services. How satisfied are you with these services?

Survey Answers:

	5 - Extremely Satisfied	4	3	2	1 - Extremely Unsatisfied	Don't Know/No Opinion	Rating Count
Fire Department response time (Eagle River Fire Protection District)	21.4% (41)	22.9% (44)	13.0% (25)	1.6% (3)	0.5% (1)	40.6% (78)	192

As can be seen in the aforementioned result, 44.9% of respondents expressed either extreme or just under extreme satisfaction with the Fire District's response times. Another 40.6% stated that they either did not know or had no opinion regarding the Fire District's response times, which may arise from their not having requested service from the Fire District in the past.

Though beyond the scope of this report, the cost of staffing the Eagle-Vail Fire Station might play a significant role in shaping public sentiment with respect to the question of whether or not the District should staff the Eagle-Vail Fire station. Salaries and Benefits for staffing a fire station total about \$1.2M/year; and, other costs would include the acquisition of a suitable fire engine and potential station renovations likely necessary to accommodate engine company staff and the size of modern fire apparatus.

Future Studies

As the Fire District enhances its ability to develop data, it will conduct a full Standards of Cover study for the entire District, including all of the communities that it protects. In particular, with the recent restructuring of its records management system, the District has now gained the ability to track response times, including call processing time, turnout time and travel time, for individual response units, which will enable the District to conduct fractal analyses on its responses to all incident types and for all units. This data will, in turn, make it possible for the District to more fully develop response time and on-scene performance standards for individual service demand zones and track its compliance with those standards.

DRAFT

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From Yuri Kostick:

The following information is not listed in the cover letter but I thought that your board may be interested to know where the other partner jurisdictions, organizations, and businesses stand to date:

Hardscrabble Trails Coalition - **\$500**
Rocky Mountain Sports Riders - **\$500**
Vail Valley Mountain Bike Association - **\$500**
John Shipp - **\$2,500**
East West Resorts - **\$1,500** (minimum, verbal not yet signed)
Sonnenalp Hotel - **\$2,500** (minimum)
Elevation Resorts at Solaris - **\$2,500**
Access Real Estate of Colorado - **\$500**
Town of Vail - **\$15,000** (verbal not yet signed)
Town of Avon - **\$15,000** (verbal not yet signed)
Eagle County - **\$25,000** (verbal not yet signed)

Total committed to date: **\$66,000**

Total fundraising goal: **\$94,000**

\$2,500 was requested from the Town of Gypsum and they are actually considering committing to \$10,000 because they have an economic development fund and are strongly supporting the plan.

The Town of Minturn, Town of Eagle, and more private businesses are all considering their level of funding commitment and we expect positive results from these organizations.

Next steps:

We will continue to meet with individuals, groups, and businesses that are aligned with the vision of the trails plan and seek to participate. Our next update will include a fundraising report towards the budgeted goal and an invitation to the first "Founding Member" steering committee meeting.



To: October 30, 2014
EagleVail Board of Governors
PO Box 5660
Avon, CO 81620

From: Momentum Trail Concepts
PO Box 3368
Eagle, CO 81631
www.momentumtrail.com

Dear EagleVail Board of Governors,

We are pleased to propose our trail master planning services to the EagleVail Board of Governors. For over one year, a group of passionate trail enthusiasts, volunteers, elected, and appointed officials from throughout Eagle County have been meeting to discuss the existing condition and the future potential of the soft-path network of trails in the community. The result of these meetings is the attached proposal from Momentum Trail Concepts. The goal is simple; to create a united effort which will collectively quantify, manage, develop, and promote the overall trail network throughout Eagle County and across all jurisdictions. Described in greater detail in the attached proposal, the main focus will be on three tasks; 1) create an Eagle County trails master plan; 2) complete an IMBA ride center designation seeking "Gold" status; and 3) seek grant funding for additional trails in all communities.

The group is seeking "Founding Members" to serve as the key stakeholders on the steering committee that will guide the effort as we commence this fall. To date, we have received positive feedback and support from both the private and public sector and from the non-profit trails groups representing the community. The Founding Members so far include the Town of Avon, the Town of Vail, the Town of Gypsum, Hardscrabble Trails Coalition, Vail Valley Mountain Bike Association, Rocky Mountain Sports Riders, John Shipp, East West Resorts, the Sonnenalp Hotel, Elevation Resorts at Solaris, and Access Real Estate of Colorado.

Please review the attached trails proposal. Through conversations with your Community Manager, Jeff Layman, and with the Chair of your trails committee, Howard Tuthill, we understand that EagleVail has an interest to be part of this effort but needed to be informed of the project in greater detail and to understand the scope, deliverables, and outcomes of the project.

Thank you in advance for your time to review our proposal. We are available to meet in person and we look forward to answering any questions that you may have. We would be honored to include EagleVail as one of the Founding Members.

Sincerely,

Momentum Trail Concepts
Yuri Kostick, Matt Thompson, Amy Cassidy



INTRODUCTION

Momentum Trail Concepts is honored to submit this letter of interest to the Eagle County Trails Group that has organized with the goal to improve trail conditions throughout Eagle County. Momentum Trail Concepts ("MTC") has over 30 years of combined experience in professional trail construction, maintenance, and consultation. We have worked on projects across the country and internationally.

Momentum Trail Concepts was created to help others experience the joy we get from riding our bikes. Simple, right?

Our shovels, bikes, and machines have accompanied us on adventures across the globe. MTC exists to ensure that great trails continue to proliferate and act as a catalyst. The best trails are only revealed in the smiles on the way down, the stories at the end of the ride, the memories. Those experiences are what the best trails provide, and what we are constantly pursuing in our craftsmanship. We are our own harshest critics, constantly chasing perfection. We bring that maniacal dedication to every project, every trail, every corner. We wouldn't have it any other way.

The trail experience does not have to be a selfish pursuit. We pride ourselves on our ability to work with the land through the toughest environments to create sustainable trails that last for years. Properly built trails can allow forests to flourish, water to be managed, and erosion to be mitigated.

We are pleased to announce the recent addition of Yuri Kostick, landscape architect and planner, to our team. With Yuri's skill set and experience, MTC is now able to offer full-service assistance to the Eagle County Trails Group and will help achieve your goals of becoming an IMBA gold-certified ride center by the Fall of 2015. Yuri has public sector master-planning experience and facilitated similar projects to what is envisioned by the Group. In addition, Yuri has had extensive grant-writing experience that has successfully provided over \$7 million to the organizations that he has worked for since 2008. His successful grant writing experience brings a valuable asset to the team that matches the goals of the Eagle County Trails Group and gives the team a very good chance of success to get significant grant money to fund trail projects in Eagle County.

We are also excited to partner with Amy Cassidy, owner and operator of Take Aim Marketing. Amy brings extensive experience as a local marketing expert who understands the valley and what makes this a special place. She has been very successful recently serving as the Town of Eagle's marketing and event coordinator and that experience will relate directly and efficiently towards the goals of the Eagle County Trails Group. Amy's additional skill set includes marketing, public relations, consensus building and project management to include budget and deadline adherence.

Our bottom line is that MTC has a track record of building some of the finest single-track and multi-use trails in the world including Eagle County, we have professional design and planning capabilities, and are focused on and aware of grant opportunities sought for the Eagle County Trails Group ("the Group"). Our team is uniquely assembled with the specific experience needed to fulfill the goals of the Group. We have the local knowledge and contacts, professional experience, and passion and reliability to get the job done.

IDENTIFICATION OF THE ISSUE

While there has been a long history of stewardship, interest, and use of the soft path trails network in Eagle County, there has never been a unifying effort to collectively quantify, manage, develop, and promote the overall network throughout Eagle County and across all jurisdictions.

Momentum Trail Concepts proposes to complete three related tasks for the Group:

1. TRAILS PLAN:

A comprehensive trails plan will be completed for Eagle County. The trails plan is a necessary first step to completing a comprehensive and connected trail system within Eagle County. It will lend credibility to the budgetary and capital improvement decisions made by the elected and appointed leaders in our community. The plan will also provide a basis by which the community can leverage its funds from granting agencies for the construction and acquisition of trails. Finally, the plan will serve as the background information needed for the IMBA ride center designation.

The scope of the plan includes soft-path trails from Vail Pass to Gypsum. This proposal includes soft-trail path planning for non-motorized users including hiking, equestrian, and bike users but could be expanded to include motorized users if desired by the Group. The focus of this plan will be prioritized to mountain biking as per IMBA's requirements but will include multiple stakeholder groups and advocates for trail use. The steering committee for the trails planning effort will consist of the Eagle County Trails

Group and additional interested stakeholders.

It is additionally important to note that while this plan is geared towards the IMBA ride center application, it will not be exclusive of trails users and stakeholder groups, such as hikers, equestrian users, and motorized groups.

This plan will incorporate soft-trail system trails on USFS (including areas on Vail Mountain managed by Vail Resorts with their permission), BLM, Eagle County open space, municipally owned open space, and privately owned lands. This comprehensive plan will incorporate existing area trail plans and evaluate and incorporate all area trail agencies' future trails plans and priorities. The plan will include a written portion detailing existing conditions, goals and objectives, trail design standards, opportunities and constraints, acknowledgement and identification of wildlife areas and mitigation strategies, soils conditions, and outline a vision for establishment of new trails and maintenance and enhancement of existing trails. The plan will provide guidance on and address the following issues:

- a. Trail locations, connections, usage, and access;
- b. Inventory of existing conditions, description, and length of existing network trails;
- c. Trail surfaces, soil conditions, and drainage (sustainability);
- d. Trail stewardship and management objectives for establishment of resilient trail conditions;
- e. Agency responsibilities, coordination, and communications with local governments, federal jurisdictions, non-profit partners, and stakeholders;
- f. Environmental and wildlife impacts;
- g. Future and proposed trail additions, connections, usage, and facilities;
- h. Signage and way-finding strategies;
- i. Trail project resource requirements and mobilization strategies (including coordination of volunteers and other agency participation such as the Colorado Youth Conservation Corps).

The plan will also incorporate a mapping exercise to identify and inventory all current and proposed trail networks. As discussed by the Group, this may be accomplished through an agreement with Latitude 40. For now, the mapping scope has NOT been accounted for in this proposal until a resolution has been decided on by the Group.

As part of the development of the comprehensive plan, MTC proposes to host three open house meetings between the Fall of 2014 and the Spring of 2015. The goal of the open houses will be to receive stakeholder input, to get new information and input from users, to raise awareness in the community for the effort of the Group, and to lay the groundwork for active participation by the public at large for soft surface paths in Eagle County. MTC will host, coordinate, advertise, and record and document the results of the open houses and incorporate the results into the plan.

An additional deliverable of the plan will be a two to three minute long promotional video piece that will accompany the maps and written narrative. The video will highlight the trail network, riding conditions, local flavor of the biking culture, and will showcase the community as a destination for mountain biking. This video will be produced to be used as needed by all stakeholders for advertising, promotion, and general awareness for the area. It will be optimized for social media and web distribution.

2. IMBA RIDE CENTER APPLICATION

MTC will lead the effort to obtain IMBA ride center status in the fall of 2015 and complete the application. There are four steps required to apply for ride center designation; an invitation to apply from IMBA is required, a detailed application submittal must be completed, IMBA performs a detailed application review process, and ongoing evaluation is additionally required. The critical task that MTC will perform is to complete the detailed application submittal. The format of this submittal is purposefully undefined by IMBA to encourage a creative and unique application. MTC has already met and consulted with the Regional Colorado and Wyoming Director and have previously been invited to apply for ride center status. MTC will develop a multi-media application that will primarily be based on the work developed for the comprehensive trails plan, will include the narrative and maps, and showcase the proposed video as described above. Additional components of the ride center application may be required and will be completed as needed by MTC.

The IMBA ride center application is a points based evaluation tool developed by IMBA that takes multiple factors into consideration to judge a community's overall access to mountain biking. The tool employs a multi-faceted, holistic approach and evaluates multiple factors. The categories are: trail experience, services, community involvement, tourism and marketing, and "above and beyond." The judging criteria scores a diversity of items such as total number of miles of beginner, intermediate, and advanced trails; way-finding and signage for the trail network; airport access within an hour of the location; availability of camping, lodging, and restaurants; evaluates whether or not there are marketing efforts; and our personal favorite - the

area actually can score one point out of a total of one-hundred possible points if there is a "Brew Pub" located in the community (we currently have four!).

MTC will coordinate work with Vail Valley Mountain Bike Association, Hardscrabble Trails Coalition, local municipalities, federal agency partners and the County government, and with local businesses interested in participating including but not limited to bike shops, lodging operations, guiding services, restaurants, and specialty service providers in the recreations tourism industry. The goal of the IMBA ride center designation is Gold status equaling Park City, UT, the only other currently designated Gold ride center. As part of the scope of services offered by MTC, we will spearhead, coordinate, and submit the actual application to IMBA.

In addition to the application there is a significant amount of infrastructure needed to achieve this designation from IMBA. It is important to understand that a majority of the work required to earn the designation will be mostly out of the hands of MTC – there will be a high level of commitment required from multiple parties involved from Vail to Gypsum in order to achieve this prestigious level of recognition from IMBA. The benefit is that if it can be achieved, the Gold status points to the fact that the trail network in Eagle County will truly be world-class and the results in the valley will meet the established goals of the Group. MTC has already consulted directly with representatives from IMBA to understand and prepare for the ride center application process.

3. GRANT FUNDING

In conjunction with the planning and IMBA application, MTC will seek appropriate grant funding to offset the investments made by the public and private sector into this effort. While grant funding is reliant on many uncontrollable factors, MTC has a reasonable expectation based on available grants that are applicable to trail planning funding and trail construction funding that we can bring \$25,000-\$100,000+ in 2015. If this proposal is accepted, MTC and the Group will work to establish a reasonable fundraising goal through writing successful grants. Grant funds will either be used for additional planning work, construction of trails, maintenance of trails, or for acquisition of land or easements for future trails or amenities such as bike parks, skills courses, and pump tracks.

TIMELINE

In order to complete the goal of an IMBA ride center application by the fall of 2015, MTC requests that a decision is made by the Group for funding by September 30th in order to begin the planning efforts in October.

Proposed Timeline with Associated Tasks:

TASK	Oct-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15
Project Start-up Meetings												
Grant Writing												
Data Collection												
Trail Standards												
Public and Stakeholder Meetings												
Existing Conditions and Field Evaluation												
Proposed Trail Additions and Connections												
Video Production												
Draft Trails Plan												
Draft Trails Plan Public Open House												
Final Trails Plan												
Final Trails Plan Public Presentation to Elected Officials and Stakeholders												
IMBA Ride Center Application												

PROJECT MANAGEMENT

As managers of the Group, MTC will be responsible for scheduling and administering meetings, status updates, coordination with Eagle County volunteer groups (Hardscrabble Trails Coalition, Vail Valley Mountain Bike Association, and others), and adhering to established deadlines and

budgets. In addition, MTC will evaluate and attend industry related trade shows and events as deemed appropriate and beneficial to the Group.

Communication, relationships and accountability are vital to the success of this project. MTC will assist with presentations to stakeholders for initial funding and provide regular status updates. MTC will also write and distribute locally, regionally and nationally, press releases for key milestones reached, such as trail / project ground breakings, project completion and grants awarded. A hallmark of MTC's team is our ability to build and maintain relationships with partners, other communities and key industry professionals.

In addition, MTC will promote the project through social and digital media, and recommending print media if warranted, to maintain and build upon the momentum surrounding the effort. We will compile and maintain an asset library to include photos, video, logos, etc. and produce information and promotional materials as needed, including a 2-3 minute marketing video optimized for social media channels to promote Eagle County trails. MTC will also work with each community to develop a unifying county-wide signage plan. Once the application has been submitted to IMBA, MTC will develop a marketing plan and budget for promoting Eagle County as an IMBA Gold Ride Center.

Each stakeholder group that contributes financially to the proposal will offered the opportunity to appoint a representative to the steering committee. There will be approximately 5-6 steering committee meetings during the scope of the project. Steering committee members will monitor progress, assist with development of the vision and comprehensive trails plan, and represent their constituency as needed.

PROPOSED FUNDING REQUEST

Below is the funding request generated by the Group. MTC believes that the Group has come up with a smart and innovative way to begin investment into the trail infrastructure in Eagle County. In recognition that this effort is a win-win for multiple stakeholders and the idea that a modest investment borne across multiple entities helps all involved parties, the Group has discussed the following funding proposal:

Town of Vail	\$ 15,000.00
Town of Avon	\$ 15,000.00
Town of Minturn	\$ 1,000.00
Town of Eagle	\$ 10,000.00
Town of Gypsum	\$ 2,500.00
Eagle County	\$ 25,000.00
Eagle-Vail	\$ 1,000.00
Singletree	\$ 1,000.00
Beaver Creek Resort Company	\$ 7,500.00
Vail Valley Mountain Bike Association	\$ 500.00
Hardscrabble Trails Coalition	\$ 500.00
Private Businesses	\$ 15,000.00
Total:	\$ 94,000.00

Our proposed scope of work and tasks can be completed for proposed amount of funding. As described above, MTC is confident that we can access grants worth \$25,000-\$100,000 bringing the total investments in trails to Eagle County to over \$150,000.

PROPOSED BUDGET

TASK	COST	TASK	COST	TASK	COST
Project Start-up Meetings	\$ 6,000.00	Public and Stakeholder Meetings	\$ 6,000.00	Draft Trails Plan	\$ 10,000.00
Grant Writing	\$ 5,000.00	Existing Conditions and Field Evaluation	\$ 10,000.00	Draft Trails Plan Public Open House	\$ 5,000.00
Data Collection	\$ 10,000.00	Proposed Trail Additions and Connections	\$ 10,000.00	Final Trails Plan	\$ 5,000.00
Trail Standards	\$ 6,000.00	Video Production	\$ 6,000.00	Final Trails Plan Public Presentation to	\$ 5,000.00
				IMBA Ride Center Application	\$ 10,000.00
				Grand Total:	\$ 94,000.00

FUTURE STEPS AND ADDITIONAL CONSIDERATIONS

Although not included as deliverables for this proposal, MTC will continue the vision of the Group to facilitate additional goals. The Group has discussed some of the following thoughts and ideas as part of their

aspirations for trails in Eagle County. A partial list is as follows:

- Form 501(c)3 or 501(c)7 - There have been discussions about forming a non-profit for the promotion, maintenance, and construction of trails in Eagle County. MTC will coordinate the effort to explore the feasibility and need of a new non-profit organization for these purposes.
- Sustainable Funding Source - The Group and the broader community at-large has recognized the need for more reliable funding sources for efforts such as the Eagle County trails initiative. It is clear that annual appropriations from municipal partners, private organizations, and grant-funding are not reliable strategies for long-term success. In recognition of this fact, MTC will research and coordinate a multitude of different options for reliable funding sources including but not limited to; Eagle County Open Space tax-based funding revisions to the ballot measure, a new additional tax either permanent or temporary, additional coordination of existing resources such as coordination with the Recreation Districts, municipalities, and private entities.
- Valley-Wide Effort - The Group and MTC realize that collaboration between all Eagle County communities will benefit each individual community and will work to foster a united effort that brings benefits to all parties involved to ensure that each community is recognized for its efforts and partnership within the Group.

CONCLUSION

MTC does not believe in planning for planning's sake. The goal of this exercise will be judged by its success on the ground through establishment of more and better trails for mountain bikers, by an accepted IMBA application for gold ride center designation, and by increased awareness of our community for its outstanding trail network and the accompanying economic impact that this recognition brings to our local businesses. This plan will also address the daily use for local riders to enhance quality of life in the community, the regional network of users that are attracted to use our system, and to entice additional out-of-town guests to recreate here and grow our recreation-based tourist economy.

It is important to note that these efforts bring increased economic activity during times of the year that haven't been focused on by the economic activity that the ski areas traditionally bring to the local economy. There is an increased awareness that filling our vacancies and increasing tourism impacts to our economy in our slow-times is a reality of our new economic conditions.

MTC believes in the work that the Group has begun and is philosophically aligned with the mission. An additional point that we would like to make is

that we believe that if the Group can continue the work that it has started with a more organized and focused effort, the summer economic activity can begin to equal the winter economy in the valley. It is an ambitious goal but one that will benefit all who choose to live, recreate, and do business in our community. MTC has fully bought into and agrees with the vision laid out by the Eagle County Trails Group and will work to implement the Mission:

Our Mission is to have a coordinated and county wide effort to enhance our lifestyle, bring people together, and drive economic vitality in all of Eagle County by:

- ***Increasing the soft trails in Eagle County***
- ***Have a coordinated guide to the trails***
- ***Have trails for hikers, fishermen, dirt bikes, mountain biking, and other uses***
- ***Obtain IMBA Gold Ride Center Designation in 2015***
- ***Market Eagle County to the state, country, and the world***
- ***Eagle County will become world renowned for our soft trail network that enables people of all physical capabilities to enjoy the outdoors.***

This will be accomplished through a vigorous Public-Private Partnership.

FINANCIAL COMMITMENT:

The undersigned Community Partners and Stakeholders agree to complete the scope of work outlined above in the Eagle County Trails Proposal and agrees to partner financially according to the following table:

Town of Vail	\$15,000.00
Town of Avon	\$15,000.00
Town of Minturn	\$ 1,000.00
Town of Eagle	\$10,000.00
Town of Gypsum	\$ 2,500.00
Eagle County	\$25,000.00
Eagle-Vail	\$ 1,000.00
Singletree	\$ 1,000.00
Beaver Creek Resort Company	\$ 7,500.00
Vail Valley Mountain Bike Association	\$ 500.00
Hardscabble Trails Coalition	\$ 500.00
Private Businesses	\$15,000.00
Total:	\$94,000.00



Adam Palmer, President, Hardscrabble Trails Coalition

Name, Title, Date, (Steering Committee Member Name if different, and amount pledged if private business)

Name, Title, Date, (Steering Committee Member Name if different, and amount pledged if private business)

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