

**Corte Madera Fire Department**

**Standard of Coverage**

**SERVICE LEVEL OBJECTIVES**

## **SERVICE LEVEL OBJECTIVES**

*This section sets performance standards or objectives for each risk type. It matches deployment needs and required tasks to meet stated objectives or outcomes for the department, set by the community and necessary for mitigating emergencies.*

To meet community expectations, on scene operations require an effective response force, within an established response time, in order to control the various risks found within our community. Determining service level objectives requires a study of staffing levels, the number of units needed, and the duties to be performed on the emergency scene by either fire or medical personnel. Critical tasking is an essential component used to define staffing levels. The dynamics of fire growth and the time for resources to arrive on scene is a milestone in controlling a fire. Of equal importance are the time intervals of first responders in medical emergencies when initiating CPR and beginning defibrillation.

## **DYNAMICS OF FIRE**

Fire suppression forces meet a variety of conditions at each fire. If the arriving suppression force is to save lives and limit property damage, they must arrive within a short period of time, with sufficient resources to control the growth of the fire. Regardless of the speed of fire growth or length of burn time, fires go through the same stages of growth. A particular stage emerges as very significant because it makes a critical change in conditions. This particular stage is referred to as flashover. The following is the industry accepted phasing of fire development, which consists of four stages for a fully developed fire.

### **Stages of Fire Development:**

*Ignition* – Ignition describes the period when a heat source is applied to a combustible fuel package, in the presence of oxygen, and a continuous chemical chain reaction known as combustion begins. At this point the fire is small and generally confined to the material (fuel) first ignited.

*Growth* – Shortly after ignition, a fire plume begins to form above the burning fuel. For example, a cigarette left smoldering in a chair causes ignition of the chair. A column of smoke, flame, and heated gasses forms. As the hot gasses rise, they begin to spread outward when they hit the ceiling. The gasses continue to spread until they reach the walls of the compartment. The depth of the gas layer then begins to increase. The growth stage will continue if enough fuel and oxygen are available. Fires in the growth stage, when within compartments (buildings or enclosed portions of buildings), are generally fuel

controlled. As the fire grows, the overall temperature in the compartment increases, as does the temperature of the gas layer at the ceiling level.

*Flashover* – Flashover is the transition between the growth and the fully developed fire stages, and is not a specific event, such as ignition. During flashover, the conditions in the compartment change very rapidly, and the fire changes from one that is dominated by the burning material first ignited, to one that involves all of the exposed combustible surfaces within the compartment. The hot gas layer that develops at the ceiling level during the growth stage causes radiant heating of combustible materials remote from the origin of the fire. These materials are eventually heated to their ignition temperature. At this point, flashover can suddenly occur. The smoke-filled room can burst into flames, and a rapid escalation occurs, resulting in a full-room fire involvement.

Flashover has killed many firefighters. The most dangerous phase of a fire's development is when it goes from its growth stage to the fully developed stage. Flashover signals the transition from a fire's growth stage to the fully developed stage.

*Fully Developed* – The fully developed fire stage occurs when all combustible materials in a compartment are involved in fire. During this period of time, the burning fuels in the compartment are releasing the maximum amount of heat possible for the available materials, and producing large volumes of fire gasses. A fire at this stage requires significantly more resources (water, hoses, and personnel) to control, due to the massive amount of heat energy involved. Also, during this stage, hot unburned fire gasses are likely to begin flowing from the compartment of origin into adjacent spaces or compartments. These gasses ignite as they enter a space where air is more abundant, causing the fire to spread further.

#### Fire Spread:

Heat transfer is the most common method of fire spread. Heat from fire is transferred in three basic ways: conduction, convection, and radiation. Routes of fire travel are often the movement of flames or super heated gasses through open doors, unenclosed stairwells or shafts, and by "auto exposure" (flames leaping from an open window directly into a window above).

*Conduction* – Conduction is the transfer of heat from one body to another through direct contact. An example of conduction is when flames rise and heat the underside of a corrugated metal roof, and heat is conducted through the metal roof, igniting combustible roof decking on the other side. In general, heat transfer early in the development of all fires is due to conduction (direct flame contact with combustible materials).

*Convection* – If you hold your hand above a candle, you are able to feel the heat, even though your hand is not in direct contact with the flame. This is heat transfer by convection. An example of fire spread through convection is when heated fire gasses travel up through open wall spaces, causing fire to break out in the attic space.

*Radiation* – Radiation is defined as the transmission of energy by electromagnetic waves. Because it is an electromagnetic wave, the energy travels in a straight line at the speed of light. The best example of heat transfer by radiation is the sun warming the earth. Heat transfer by radiation is a major fire spread problem at large fires. Fires in fully involved heavy timber or wood-framed dwellings will spread to adjacent combustible structures by radiation.

Fire station location and staffing levels are predicated on a particular point where the fire's growth causes a significant shift in the fire's behavior and moves into the flash point. At this point, the room has been untenable for some time before flashover. Arrival of resources, pre-flashover, may limit the fire to a single room. Post-flashover requires larger hose lines and additional resources.

Flashover is a critical stage of fire growth for two reasons. First, no living thing in the room of origin will survive, so the chance of saving lives drops dramatically. Second, flashover creates a quantum jump in the rate of combustion and a significantly greater amount of water is needed to reduce the burning material below its ignition temperature. A post-flashover fire burns hotter and moves faster, compounding search and rescue problems in the remainder of the structure. At the same time, more firefighters are needed for fire attack.

The following is a visual description of what occurs in pre-flashover and post-flashover.

Pre-Flashover

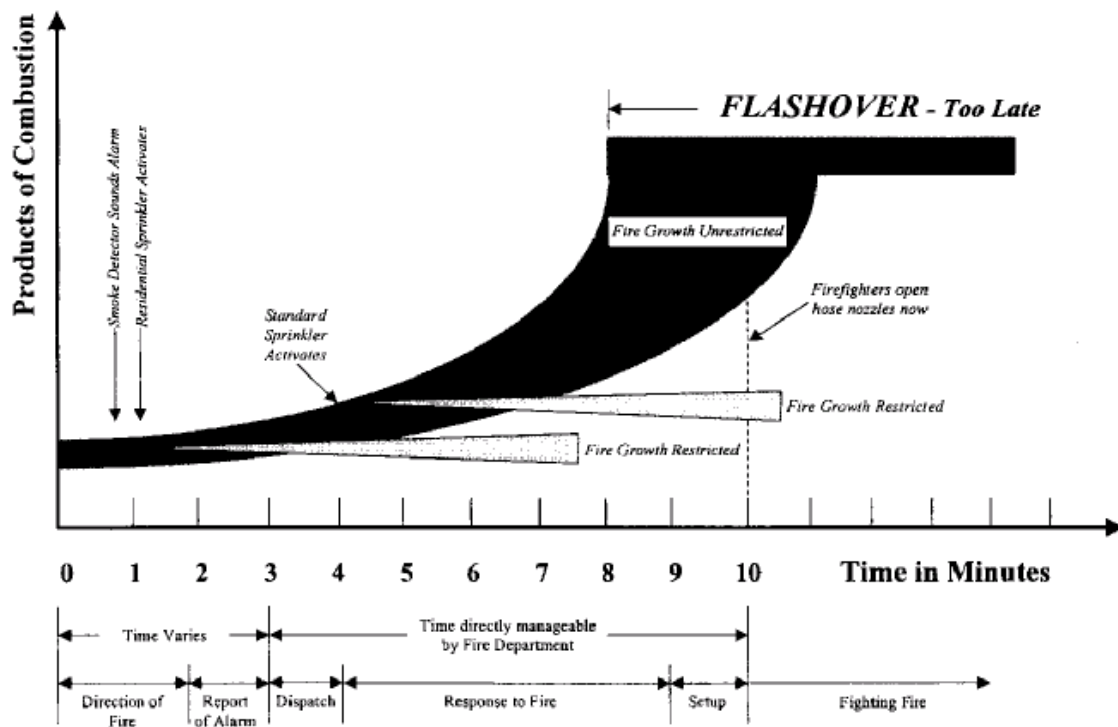
- Limited to one room
- Requires smaller attack lines
- Search and rescue is easier
- Initial assignment can handle

Post-Flashover

- May spread beyond one room
- Requires larger, more attack lines
- Confounds search and rescue
- Requires additional companies

**TIME VERSUS PRODUCTS OF COMBUSTION**

*NOTE: All Times are Based Upon National Averages*



To summarize, the stage of a fire affects staffing and equipment needs. Both can be predicted for different risk levels and fire stages. This ability to correlate staffing and equipment needs with a fire’s stage of growth is the basis for a standard of response coverage analysis by a fire department. Nevertheless, it is unreasonable to expect a fire department to reach all fires before flashover, even in the most heavily staffed and best-equipped department.

The previous graphic shows the relationship of time and fire growth. Depending on the amount and combustibility of a room’s contents, it will reach the flashover point anywhere from six to ten minutes after free burning starts. This is important to remember, for even if the fire is reported at the beginning of the free burning

stage, it is highly likely that the room will be at flashover prior to the fire department's arrival. And it takes a fire company a few minutes to set up hoses and actually start flowing water onto the fire. By this time, the fire can be very serious.

The community's expectation may be that the fire department will arrive at all fires prior to flashover. The reality is that some fires will reach flashover before the arrival of the fire department. The value of sprinkler systems, especially residential sprinkler systems, comes into sharp focus when considering the effects of preventing flashover. The graph on page 18 shows the impact of fire sprinklers on flashover.

The challenge for fire departments today is to provide a deployment policy that is cost-effective, while matching that deployment to a specific point in the fire growth to prevent flashover. The deployment cannot be solely based on the dynamics of fire, but must also include the arrival of resources at medical emergencies prior to irreversible brain damage.

A fire company, once on scene, must accomplish a variety of tasks simultaneously if lives are to be saved and property losses kept to a minimum. This requires that tasks be completed within a short time period, with adequate resources. Specific performance measurements, like travel times, are not difficult to obtain, and will indicate how long is required for deployment resources to arrive on scene at fire or medical emergencies.

Performance capabilities of a fire department are not easy to interpret, as the task varies based on the fire threat and number of tasks required. Large fires or complex medical emergencies require a greater number of firefighters; whereas, a single room and contents fire, or single vehicle accident, requires less tasks, thus, fewer firefighters.

To provide a valid comparison of a fire department's capability, one must evaluate fire threat, fire ground tasks, fire station locations, built-in fire protection, existing staffing pattern, fire flow required, and risk level. A method to determine the capability of arriving companies is required. For a typical fire, the use of the RHAVE score is the best way to identify the tasking of each risk type.

### **TOTAL REFLEX TIME**

Time has many meanings in the fire service, and it must be clearly defined. Are we talking travel time, on scene time, turnout time, total response time, or total reflex time? We also need to determine if the response time is based on a statistical average or if we are using fractals.

Performance measurements using only travel time do not consider the other tasks, such as processing and handling the 911 call, notification of the crew, turnout time, or time for the crew to begin their response. Travel time and the time it takes to arrive on scene must also be considered. The total of all of the phases is known as Total Reflex Time. For those who call in an emergency, the time begins when they provide the information to the dispatcher and ends when firefighters arrive at the scene.

## **CASCADE OF EVENTS**

There is a cascade of response events that begins with a state of normalcy where there is no emergency and extends through termination of the incident. When an event occurs, the degree of loss of life and property is directly related or impacted by the passage of time. The benchmark for a fire department to gauge or evaluate their response criteria is the three Cascade Response Elements of Alarm Processing, Turnout Time, and Travel Time. These three factors form the baseline for evaluation in responding to calls for service, and are manageable by the fire department through performance standards.

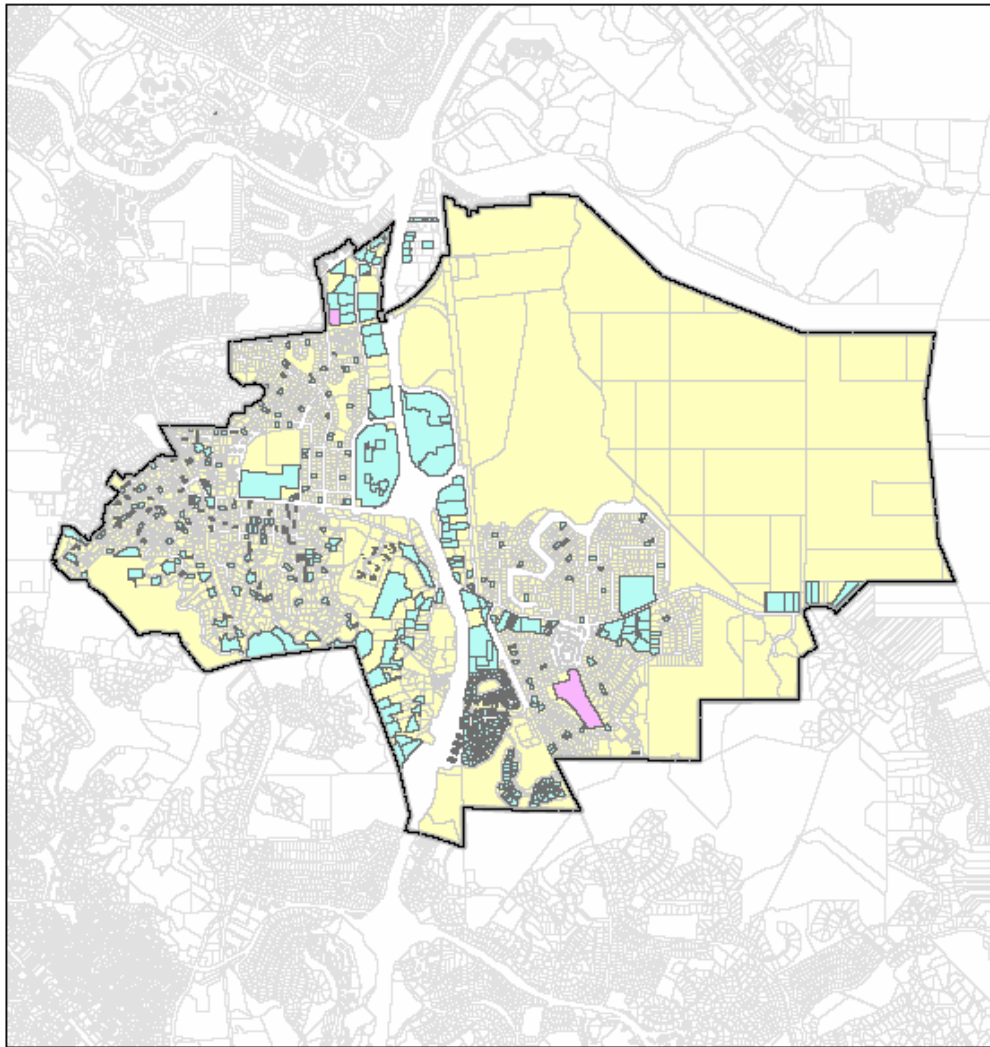
The nine steps in the Cascade of Response Elements can be further reduced into three management responsibilities: Pre-Response, Response, and Incident Command. The pre-response is the responsibility of the property or building owner, and includes fire prevention measures and proper implementation of fire and building codes. Response is primarily the fire chief's responsibility in designing an effective response force, and finally the incident command, or the person responsible for mitigation of the actual incident.

In 1974 the Town Council began a process of sharing and partnering with the private sector to limit or reduce the occurrence of fire through the adoption of commercial sprinkler and smoke detector ordinances. Contained within the ordinance was the requirement to have all sprinklers and smoke detector systems terminate at a UL approved central station, thus enhancing the pre-response element of alarm and notification.

It was further improved through the adoption of a residential sprinkler ordinance and retroactive requirements for new construction in both residential and commercial buildings in 1979.

The number of sprinklered buildings has increased significantly with the retroactive requirements for sprinkler systems when major remodels take place. Please see the map on page 48 for sprinklered buildings.

# Corte Madera Fire Department

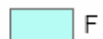


## Legend

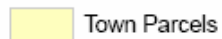
 Town Limit

## Parcels w/Sprinkler

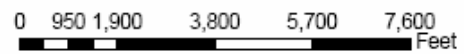
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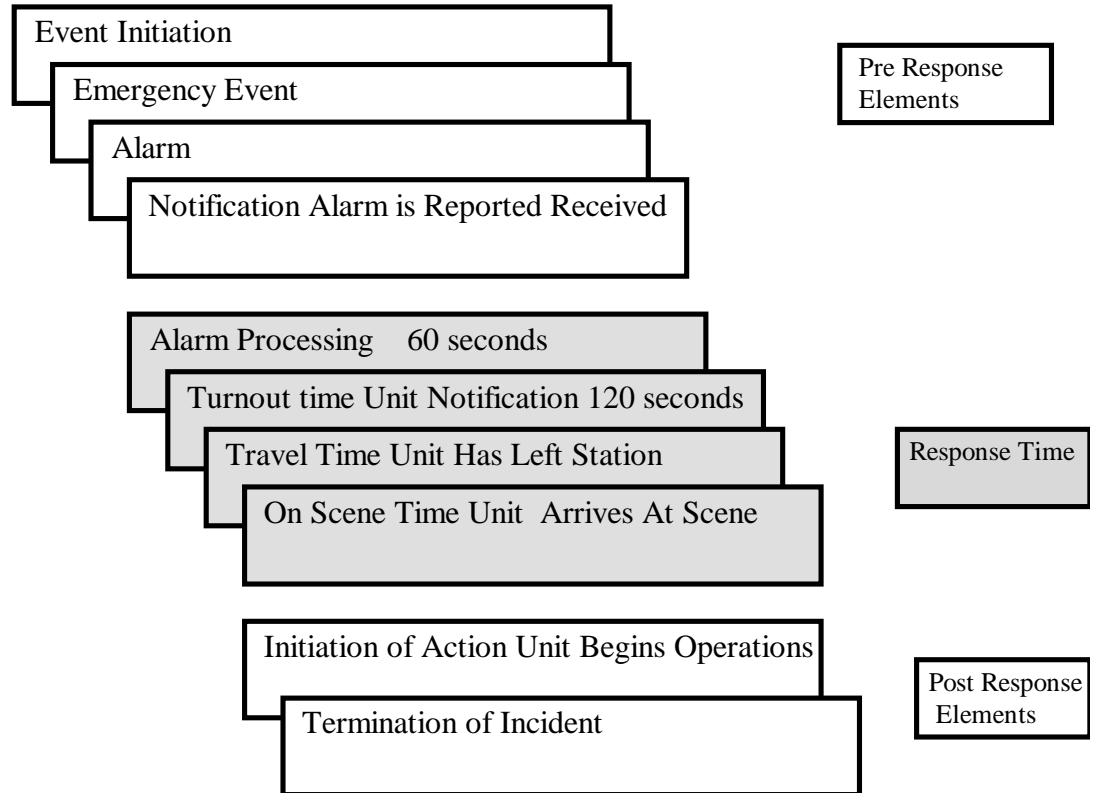
 Town Parcels

 Marin County Parcels



## Emergency Operations Cascade of Responses Elements

### STATE OF NORMALCY



The definitions below should provide an increased understanding of the Cascade of Response Elements:

*Event Initiation* – The point at which factors occur that may ultimately result in an activation of the emergency response system. Precipitating factors can occur seconds, minutes, hours, or even days before a point of awareness is reached. For example, a patient who ignores chest discomfort for days until it reaches a critical point, at which the patient makes a decision (point of awareness) to seek assistance. Rarely is it possible to quantify the point at which event initiation occurs.

*Emergency Event* – The point at which an awareness of conditions exists that requires an activation of the emergency response system. Considered the point of awareness, this may be the recognition by an individual that assistance is needed, or it may consist of a mechanical or electronic recognition of an event, such as smoke or heat detector activation.

*Alarm* – The point at which the emergency response system activation is initiated. The transmittal of a local or central alarm to the dispatch center is an example of this time point. Again, it is difficult to determine with any degree of reliability the time interval during which this process occurs.

*Notification* – The time point at which an alarm is received by the agency. This transmittal may take the form of an electronic or mechanical notification to the point at which a call is received and answered by dispatchers.

*Alarm Processing* – The time interval from the point at which a request or alarm is received and transmitted to emergency responders. Alarm processing time is the time interval between the realization that an emergency exists up to the point that this information is retransmitted, via the internal alarm system, to the attention of the specific agency's resources.

*Turnout Time* – The time point at which responding units acknowledge receipt of the call from the dispatch center. Total turnout time begins at this point and ends with the beginning of travel time.

*Travel Time* – The point at which units are en route to the call. When responding from a fixed facility, the point at which the apparatus exits the facility. Total travel time begins with this initial time point and ends with the on-scene time.

*On-Scene Time* – The time point at which the responding unit arrives on the scene.

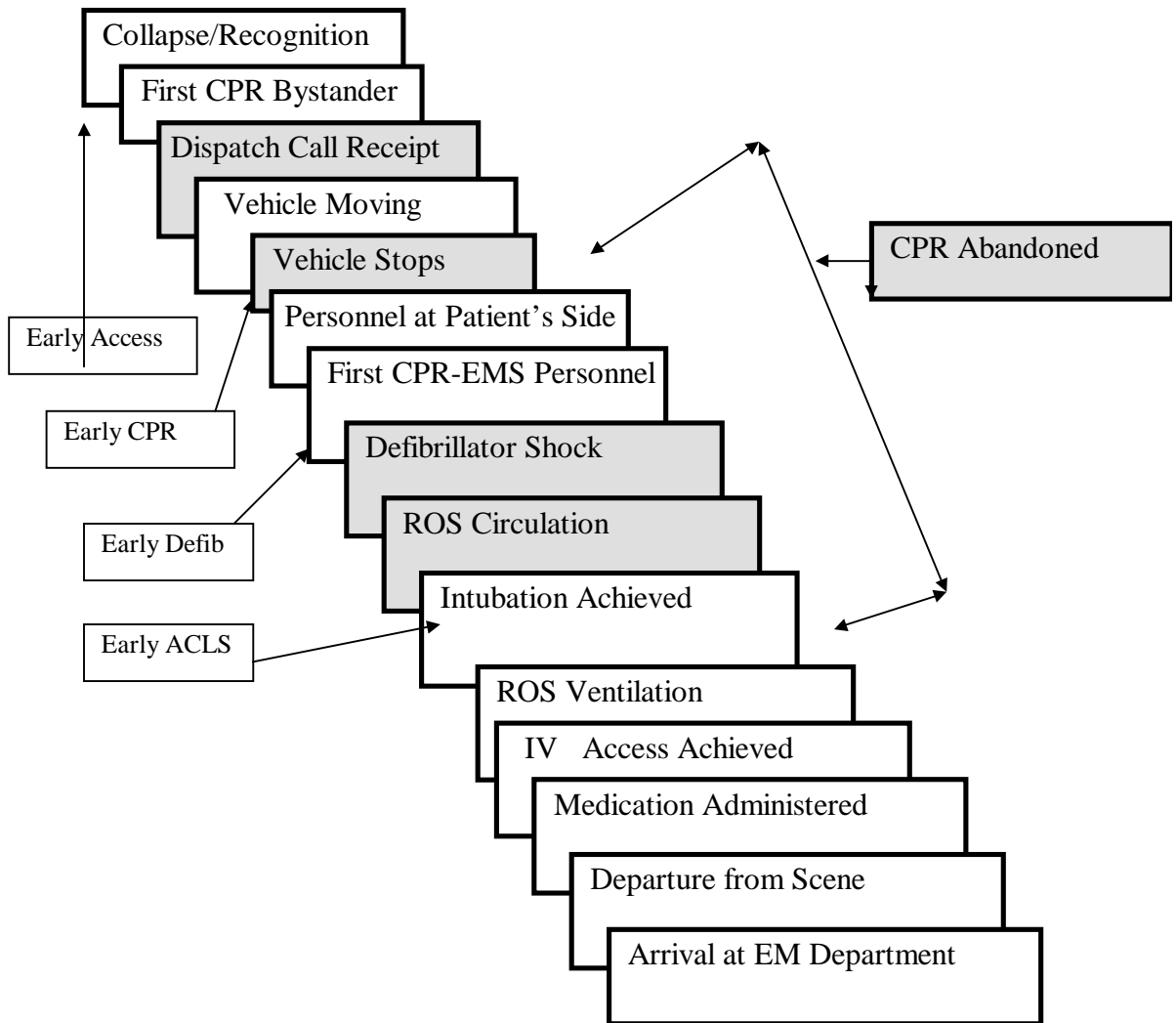
*Initiation of Action* – The time point at which operations to mitigate the event begin. This may include size-up, straightening hose lines, etc.

*Termination of Incident* – The time point at which units have completed the assignment and are available to respond to another assignment or emergency request.

*Total Response Time* – Calculated from the time point at which the alarm is reported (notification) to the time point when units arrive at the emergency event (on scene).

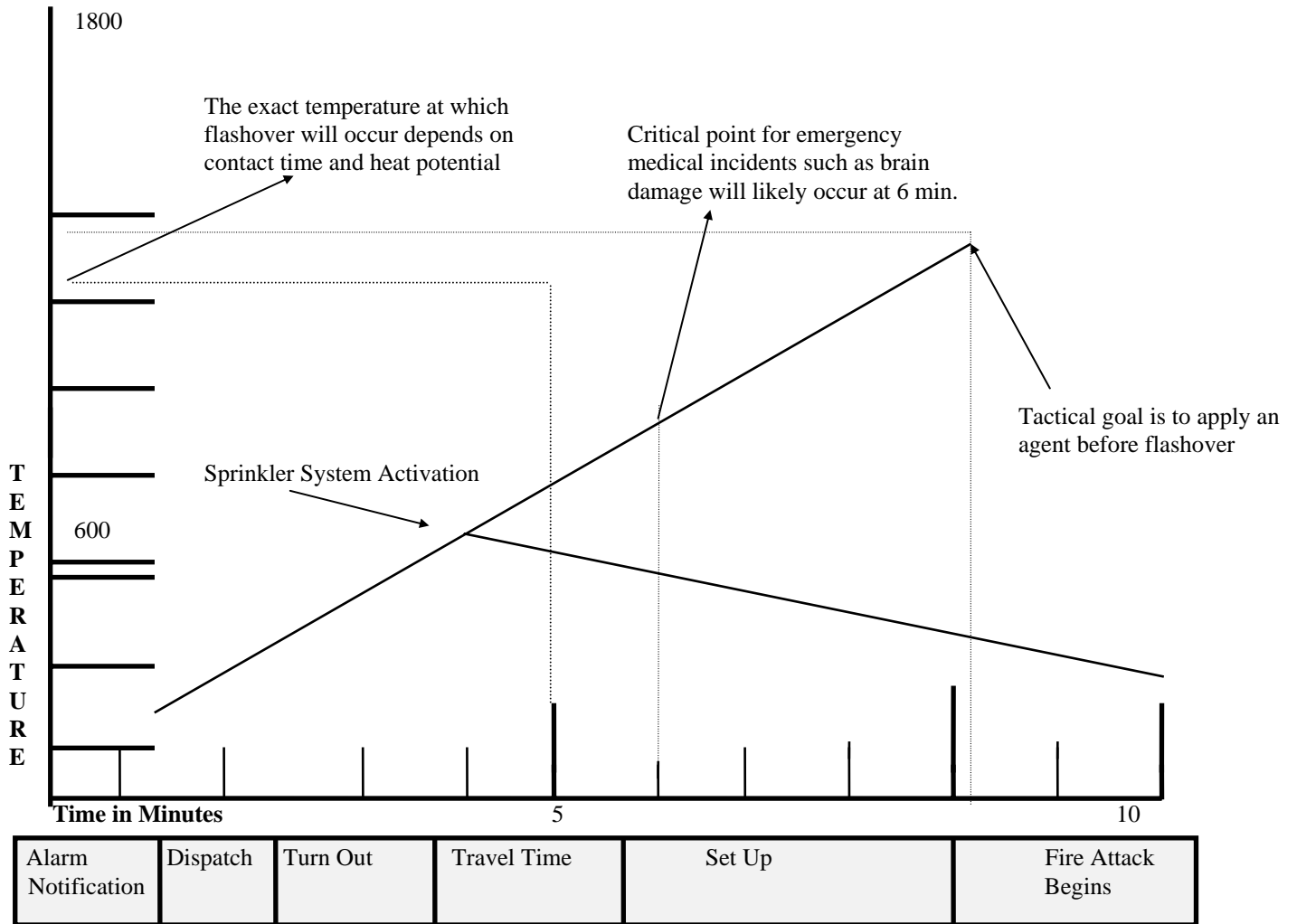
In the field of cardiac arrest research, the medical community has established a timeline in which irreversible brain damage will occur. The guideline is known as the Utstein Model. The model on the following page defines the cascade of events that leads to initiation, mitigation, and outcome of a cardiac arrest.

Utstein Criteria Chart



ROS = Resume on scene

The following chart provides a baseline of operation for fire and medical related emergencies within a ten-minute window. The chart is predicated on distribution and concentration of resources to arrive at the scene of the emergency in a time sequence that intervenes and mitigates the emergency before flashover or, in the case of medical emergencies, before brain damage.



The fire department's performance measurements are based on total reflex time, using fractals or percentages rather than statistical averages. The main reason for not using averages is that they do not accurately reflect performance for all incidents. Fractals or percentages deal with the actual value of individual data, whereas using statistical averaging does not. A more appropriate method to define a performance measurement is to achieve a total reflex time interval of X minutes in Y percentage of responses. This is the method recommended for use in Corte Madera, and is reflected in the following performance measurements:

- |   |
|---|
| ➤ To maintain a code 3 service capability, based on total reflex time, that will ensure on scene arrival of the first unit within seven minutes to all areas served with a high potential for life loss, economic value, or fire flow, and eight minutes to all areas served with a moderate or low potential for life loss, economic value, or fire flow, from receipt of a 911 call in 90% of requests for service. |
| ➤ To confine 90% of all structure fires within 30 minutes of receipt of a 911 call to the area of involvement as reported by the first arriving unit, using an effective response force of 15 firefighters, with a flow application rate of 1500 gpm.   |
| ➤ To maintain a code 3 service capability, based on total reflex time, that will ensure on-scene initiation of wildland structural fire protection with the first arriving unit within eight minutes, and first alarm companies within 12 minutes from receipt of a 911 call in 90% of responses to all areas served.   |

### **SELF DISPATCH**

Self-dispatch is a process utilized by the fire department for a number of years, to reduce turnout time and, in effect, reduce the overall total reflex time. Self-dispatch provides flexibility for stations and equipment to self-initiate their response prior to a formal dispatch. Typically, pre-alert tones are used with a lengthy dispatch. Personnel hearing the pre-alert will begin moving equipment and personnel, without waiting for an entire dispatch. This is also used when listening to police frequencies and other fire frequencies.

When shift personnel know the incident is in their response area, they dispatch themselves prior to the formal dispatch. En route they are receiving the dispatch via radio and other responding units acknowledge this response. On structure fires or other multiple-company responses, self-dispatch is also applicable. This system is especially effective on medical emergencies to quicken turnout time, which in effect reduces total reflex time.

### **EMS TIME**

There is no doubt that for EMS responses it is critical to respond quickly, especially to increase survivability from cardiac arrests. The Emergency Medical Directors Association of California (EMDAC), in a position paper, stated, "Defibrillation within ten minutes of a patient collapse is an achievable goal in urban systems." The paper further states, "Allowing for a two-minute interval from collapse to 911 activation, the time from receipt of call to defibrillation should not exceed eight minutes." The EMDAC paper concludes with the following recommendation regarding response time performance: "Current best medical evidence suggests that response time intervals, measured from the time of first ring at the dispatch center until arrival at the scene, should be five minutes

for responders capable of performing CPR and defibrillation, ten minutes for providers capable of performing ALS, and 12 minutes for a transport capable vehicle.”

Total Response Time in Minutes							
Ignite & Free Burn	Detection/Notify	Call Handle	Turnout Leave	Travel To Scene	Arrival At Scene	Set Up Time	Combat
Incremental	0	1:00	2:00	4:00	7:00	2:00	9:00
		1:00	3:00		7:00	9:00	9:00
Total							
Cardiac Arrest				Brain Death Begins 4 to 6 Minutes	Biological Death		

It must be realized that the above recommendation is specific to cardiac arrest, though this response criterion benefits other patient complaints. The shorter the response time, the higher probability for resuscitation, along with higher system cost. The challenge for those managing EMS systems is to balance or integrate cost and response times. The fire department is recommending the following performance measures, which should be adopted by the Town Council:

- To maintain a code 3 level of emergency medical response of EMT-D and EMT, based on total reflex time, that will ensure the arrival of an engine company within seven minutes of receipt of an EMD processed 911 call in 90% of requests for service to all areas served.
- To maintain a code 3 level of emergency medical response, based on total reflex time, which will ensure the arrival of a paramedic unit within ten minutes of receipt of a 911 call in 90% of requests to all areas served.

The fire department has partnered with the community to adopt smoke detector and sprinkler ordinances to provide advance notification and extinguishment of fire prior to the arrival of the fire department. This partnership with the community is also critical for first aid and CPR training.

Early CPR and defibrillation within the first three to five minutes after collapse, plus early advanced care, can result in high (greater than 50%) long-term survival. The value of early CPR by bystanders is that it can “buy time” by maintaining some blood flow to the heart and brain during cardiac arrest (sudden cardiac death).

**AUTOMATED EXTERNAL DEFIBRILLATORS (AED)**

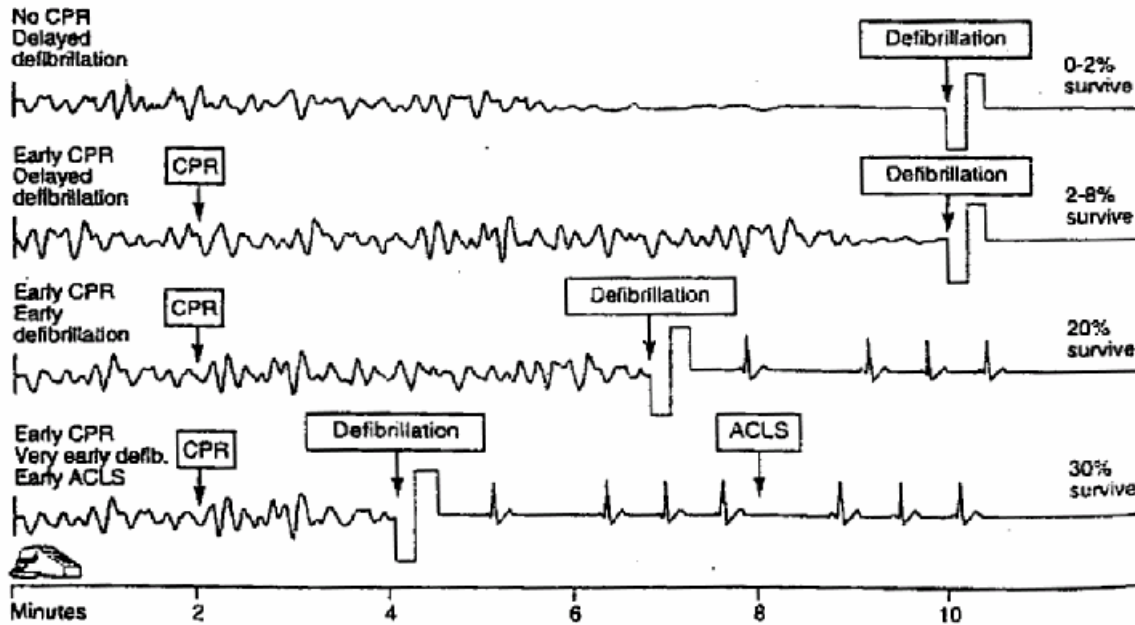
The use of Automated External Defibrillators (AED) has proven statistically that when used early in cardiac arrest, along with CPR, there is an increased

survivability rate. In today's technological society, an AED machine can be safely used by laypersons to increase the survivability rate of cardiac arrest patients.

To increase survivability and reduce irreversible brain damage, public AED programs should be encouraged. AEDs need to be placed in public access locations and be included in the initial response force. Good locations could include shopping malls, convention centers, movie theaters, and special event sites with large audiences. The fire department's role will be to encourage the use of AED's in public access areas, provide American Heart Association AED instructors, and increase public awareness that defibrillation can improve survivability of cardiac arrest patients.

Some recent studies have documented the positive effect of lay rescuer AED programs in the community. These programs all ensure adequate training, and a planned response to ensure early recognition of cardiac arrest and call to EMS, immediate bystander CPR, early defibrillation, and early advanced care. Lay rescuer AED programs, consisting of police in Rochester, MN, security guards in Chicago's O'Hare and Midway airports, and security guards in Las Vegas casinos have achieved 50 – 74 percent survival for adults with sudden, witnessed, VF cardiac arrest. These programs are thought to be successful because rescuers are trained to respond efficiently and all survivors receive immediate bystander CPR plus defibrillation within three to five minutes.

Fire department public CPR classes are scheduled on the first Saturday of every month. CPR and first aid classes are also given to businesses and other groups that request them, on an as-needed basis. For those residents unfamiliar with CPR, the Marin County Communications Center has trained emergency medical dispatchers, who will provide pre-arrival instruction on CPR. There is also a take home CPR program, with videotape, provided to the public on loan from the fire department.



## **CRITICAL TASKS**

The variables of fire growth dynamics and property/life risk combine to determine the fireground tasks that must be accomplished to stop the fire loss. These tasks are interrelated, but can be separated into two basic types: fire flow tasks and life safety tasks. Fire flow tasks are those related to getting water on the fire. Life safety tasks are those related to finding trapped victims and removing them from a structure.

The required fire flow is based on the building's characteristics, including its size, structural material, distance from other buildings, horizontal and vertical openness (lack of partitions), and its contents – type, density, and combustibility (BTUs per pound). Fire flow tasks can be accomplished with hand-held hoses or master streams (nozzles usually attached to the engine or ladder). Each 1¾" hose requires a minimum of two firefighters. These hoses can flow 150 gallons per minute (gpm).

The 2½" hoses can flow 250 gpm, and require a minimum of two or three firefighters. Master streams can flow from 500 to 1,000 gpm each. Three or more firefighters are required to place a master stream in service. Once in place, they take fewer firefighters to operate, as the base and attached hoses remain stationary.

The decision to use hand lines or master streams depends upon the stage of the fire and its threat to life safety. If the fire is in a pre-flashover stage, the

firefighters make an offensive attack into the building with hand lines. The lines are used to attack the fire and shield trapped victims until they can be removed from the building. If the fire is in its post-flashover stage and the structural damage is a threat to the firefighters' life safety, e.g., weakened roof or stairs, then the structure is declared lost, and master streams are employed to keep the fire from spreading to surrounding buildings.

As the number of larger commercial occupancies (over 10,000 square feet) and occupancies with high value contents increase, the required fire flow increases. Areas with very large and very valuable buildings can require fire flows of 4,000 gpm. The staffing needed to generate these fire flows can also be calculated.

The life safety tasks are based upon the number of occupants, their location (e.g., a low-rise vs. mid-rise), their status (awake or asleep), and their ability to take self-preservation action. For example, ambulatory adults need less assistance than non-ambulatory. Elderly people and small children always require more assistance. The key to a fire department's success at a fire is coordinated teamwork, regardless of whether the fireground tasks are all fire flow related or a combination of fire flow and life safety.

Two emergency scenarios may help illustrate the importance of simultaneous and coordinated action, and demonstrate why different levels of fire risk require different amounts of staffing and equipment.

The first scenario is a fire in a detached, single-car garage, and the second scenario is a house fire. The house fire is a higher risk than a burning garage. The first factor is size. Garages are much smaller than houses, and thus require less water to extinguish than house fires. Another factor is life risk. A garage fire is not likely to be a threat to life. Exposure is another factor. If the garage is not physically attached to the house it will take a much larger volume of fire to produce enough heat to cause the fire to spread to another structure.

Compared to the garage example, a house fire poses a higher level of risk and requires a correspondingly larger force of firefighters. A house's larger area and contents generate hotter and faster growing fires that require more water – and consequently more hose lines – for extinguishment. The threat to occupants requires search and rescue be conducted simultaneously with fire suppression. And the fire attack cannot be safely done without the simultaneous ventilation of rooftop or wall openings. A backup crew is necessary any time the firefighters are inside the building, adding to the staffing need.

These two examples show a significantly greater number of firefighters and equipment is needed for a house fire than for a detached garage. As the discussion below will explain, the tasks must be performed simultaneously; so, the necessary staffing must arrive in a minimum amount of time so the crews can coordinate their actions.

Other structures, such as apartments, nursing homes, or large warehouses, pose still higher risks than house fires because they require greater levels of staffing and equipment to arrive in a reasonable time and work in a coordinated manner.

Fire attack practices are similar for organized fire departments throughout the country. Activities at fires should also conform to nationally recognized safe firefighting practices for structural fires and comply with Occupational Safety & Health Administration (OSHA) rules. (Two in, two out.)

When identifying critical tasks, firefighter safety must be emphasized. A command structure should be in place whenever interior fire operations requiring the use of protective equipment (including turnout gear, SCBA, and a minimum 1¾" hose line) are started. Additional personnel must be staged to perform rescue functions for those interior firefighting personnel.

Some sample individual critical tasks are:

*Attack Line* – A 1¾" hose that produces 150 gpm and is usually handled by a minimum of two firefighters, or a 2½" hose that produces 250 gpm and is handled by two or three firefighters. Each engine carries a set of attack lines that are either pre-connected to the pump, folded on the hose bed, or in a special pack for carrying into high-rise buildings.

The selection of which attack line to use depends on the type of structure, the distance to the seat of the fire, and at what stage the fire is. The pre-connected lines are the fastest to use, but are limited to fires within 150-250 feet of the pumper. When attack lines are needed beyond this limit, 1¾" hose bundles, extended from a 2½" attack line, are used.

A 2½" attack line will be used when the fire is already beyond the flashover stage and threatens an unburned portion of a structure.

*Search & Rescue* – A minimum of two firefighters are assigned to search for living victims and remove them from danger, while the attack crew moves between the victims and the fire to stop the fire from advancing to them. A two-person crew is normally sufficient for most moderate risk structures, but more crews are required in multi-story buildings or structures with people who are not capable of self-preservation.

*Ventilation Crew* – A minimum of two firefighters to open a horizontal or vertical ventilation channel when the attack crew is ready to enter the building. Vertical ventilation, or ventilation of a multi-story building, can require more than two firefighters. Ventilation removes superheated gases and obscuring smoke, preventing flashover and allowing attack crews to see and work closer to the seat of the fire. It also gives the fire an exit route so the attack crew can "push" the

fire out the opening they choose and keep it from endangered people or unburned property.

Ventilation must be closely timed with the fire attack. If it is performed too soon, the fire will get additional oxygen and grow. If performed too late, the attack crew cannot push the fire in the direction they want. Instead, the gases and smoke will be forced back toward the firefighters and their entry point, which endangers them, any victims they are protecting, and unburned property.

*Backup Line* – A 1¾” line that is taken in behind the attack crew to cover the attack crew in case the fire overwhelms them or a problem develops with the attack line. This needs a minimum of two firefighters.

A 2½” line will be used for back up instead of a 1¾” line where the type of fire is one that could grow rapidly if not stopped by the attack line.

*Rapid Intervention Team* – A minimum of two firefighters equipped with self-contained breathing apparatus (SCBA), available near the entry point to enter the structure, perform search and rescue, or back up crew if something goes wrong. This particular requirement is an OSHA rule.

*Exposure Line* – A 1¾” attack line staffed by two firefighters and taken above the fire in multi-story buildings to prevent fire expansion. Also used externally to protect nearby structures from igniting from the radiant heat. In situations where the heat release is great (flammable liquids), a 2½” line or deluge gun would be used.

*Pump Operator* – One firefighter assigned to deliver water under the right pressure to the attack, back up, and exposure lines, monitor the pressure changes caused by changing flows on each line, and ensure that water hammer doesn't endanger any of the hose line crews. This firefighter also completes the hose hookups to the correct discharges, and completes the water supply hookup to the correct intake. The pump operator can sometimes make the hydrant hookup alone if the pumper is near a hydrant, but the hydrant spacing for moderate risk fires normally precludes this.

*Water Supply* – A crew of one or two firefighters who must stretch the large diameter hose between the pumper and the nearest hydrants, hookup at the hydrant, and deliver a water supply to the pumper before the pumper's water tank runs dry. A pumper has about four minutes of water if one 1¾” line is flowing.

*Incident Command* – An officer assigned to remain outside the structure to coordinate the attack, evaluate results, and redirect the attack, arrange for more resources, and monitor conditions that might jeopardize crew safety.

**MEDICAL TASK ANALYSIS**

Tasks Representative of Medical/Cardiac Arrest Incident

<b>TASK</b>	<b>PERSONNEL</b>	<b>COMPANY</b>
Airway Management /EMT Skills	1	1 <sup>st</sup> Engine
CPR	1	1 <sup>st</sup> Engine
Defibrillation EMT-D Skills	1	1 <sup>st</sup> Engine
ALS Intervention (Transport)	2	1 <sup>st</sup> Paramedic
Recorder/Information Management	1	Chief Officer
<b>TOTAL</b>	<b>6</b>	

**VEHICLE ACCIDENT TASK ANALYSIS**

Tasks Representative of a Vehicle Accident – No Extrication

<b>TASK</b>	<b>PERSONNEL</b>	<b>COMPANY</b>
Scene Safety	1	1 <sup>st</sup> Engine
Patient Person	1	1 <sup>st</sup> Engine
C-Spine	1	1 <sup>st</sup> Engine
ALS Intervention (Transport)	2	1 <sup>st</sup> Paramedic Unit
<b>TOTAL</b>	<b>5</b>	

**VEHICLE ACCIDENT TASK ANALYSIS**

Tasks Representative of a Vehicle Accident – With Extrication

<b>TASK</b>	<b>PERSONNEL</b>	<b>COMPANY</b>
Scene Safety	1	1 <sup>st</sup> Engine
Patient Person	1	1 <sup>st</sup> Engine
C-Spine	1	1 <sup>st</sup> Engine
Extrication	3	2 <sup>nd</sup> Engine
ALS Intervention (Transport)	2	1 <sup>st</sup> Paramedic Unit
Command	1	Chief Officer
<b>TOTAL</b>	<b>9</b>	

**VEHICLE ACCIDENT TASK ANALYSIS**

Tasks Representative of a Multi-Vehicle/Multi-Victim Accident

<b>TASK</b>	<b>PERSONNEL</b>	<b>COMPANY</b>
Scene Safety	1	1 <sup>st</sup> Engine
Patient Person(s)	2	1 <sup>st</sup> Engine
C-Spine/Patient(s)	3	2 <sup>nd</sup> Engine
Extrication	3	3 <sup>rd</sup> Engine
ALS Intervention (Transport)	2	1 <sup>st</sup> Paramedic Unit
ALS Intervention (Transport)	2	2 <sup>nd</sup> Paramedic Unit
Command	1	Chief Officer
<b>TOTAL</b>	<b>14</b>	

**STRUCTURAL FIRE ANALYSIS**Task Representative of Structure Fire  
(One-story, single-family room and contents)

<b>TASK</b>	<b>PERSONNEL</b>	<b>COMPANY</b>
Attack Line	2	1 <sup>st</sup> Engine
Search and Rescue	2	1 <sup>st</sup> Paramedic Unit
Ventilation/Utilities	3	1 <sup>st</sup> Truck
Exposure Line	2	3 <sup>rd</sup> Engine
Safety Back-up Line	2	2 <sup>nd</sup> Engine
Pump Operator/Water Supply	1	1 <sup>st</sup> Engine
Safety Officer	1	Battalion Chief
Command	1	Chief Officer
RIT	3	4 <sup>th</sup> Engine
<b>TOTAL</b>	<b>17</b>	

**STRUCTURAL FIRE ANALYSIS**Tasks Representative for a Apartment Complex  
(Two-story office building)

<b>TASK</b>	<b>PERSONNEL</b>	<b>COMPANY</b>
Fire Attack Hose Line	2	1 <sup>st</sup> Engine
Search and Rescue	2	1 <sup>st</sup> Rescue Unit
Ventilation	3	1 <sup>st</sup> Truck
Exposure Line	2	2 <sup>nd</sup> Engine
Pump Operator/Water Supply	1	1 <sup>st</sup> Engine
Air Supply	1	Breathing Air
Safety Officer	1	Battalion Chief
Command	1	Chief Officer
Safety Back-Up Line	3	3 <sup>rd</sup> Engine
RIT	3	4 <sup>th</sup> Engine
<b>TOTAL</b>	<b>19</b>	

**STRUCTURAL FIRE ANALYSIS**Tasks Representative of a Special Risk Structure  
(Above Ground/Major Fire/Potential for Extension)

<b>TASK</b>	<b>PERSONNEL</b>	<b>COMPANY</b>
Fire Attack (one hose line)	2	1 <sup>st</sup> Engine
Fire Attack (one hose line)	2	2 <sup>nd</sup> Engine
Search and Rescue 1	2	1 <sup>st</sup> Rescue
RIT	3	4 <sup>th</sup> Engine
Ventilation/Utility	3	1 <sup>st</sup> Truck
Pump Operator/Water Supply	1	1 <sup>st</sup> Engine
Air Supply	1	Breathing Air/Mobile Compressor
Staging	3	6 <sup>th</sup> Engine
Operations	1	2 <sup>nd</sup> Chief Officer
Command	1	1 <sup>st</sup> Chief Officer
Safety	1	3 <sup>rd</sup> Chief Officer
Safety Back-Up Line	2	3 <sup>rd</sup> Engine
Ventilation/Salvage	3	2 <sup>nd</sup> Truck
Exposure Line	3	5 <sup>th</sup> Engine
Rehab	2	2 <sup>nd</sup> Rescue
<b>TOTAL</b>	<b>30</b>	

**HAZARDOUS MATERIALS TASK ANALYSIS**

Actions Taken by First On-Scene Corte Madera Engine Companies  
County Hazardous Materials Team to Assume Control

<b>TASK</b>	<b>PERSONNEL</b>	<b>COMPANY</b>
Command – Make Proper Notifications	1	Chief Officer
Isolate and Deny Entry	3	First Engine Company
Safety Officer	1	Chief Officer
<b>Total</b>	<b>5</b>	

**PROFICIENCY INDEXES**

Performance measures, in the form of performance standards, as used in Corte Madera, are employed to evaluate yearly engine company performance on evolutions, which replicate fireground operations. The standards can be as simple as donning SCBA, a standard of one minute, to multiple-company operations.

Performance standards, in turn, provide the incident commander with an indication of the time required to complete a fireground evolution. Standards also provide a basis for company training, either individual or multi-company operations.

Some examples of the department's performance standards are found on the following pages.

**TASK: 03-05-01  
TAKING THE HYDRANT**

**GIVEN:**

1. EXPLANATION ON THE PRINCIPLE BEHIND ATTACHING LDH COUPLING.
2. SINGLE FIREFIGHTER PERFORMANCE
3. HANDS-ON MANIPULATIVE TRAINING WITH COUPLING AND HYDRANT.

**PERFORMANCE:** EACH FIREFIGHTER WILL, IN FULL PROTECTIVE EQUIPMENT, COMPLETE ALL ASPECTS OF THE STANDARD. TIME STARTS WHEN THE FIREFIGHTER STEPS ON THE PAVEMENT FROM THE ENGINE. TIME ENDS WHEN THE ENGINEER HAS WATER AT THE PUMP.

**STANDARD:** SAFELY COMPLETE ALL OPERATIONS WITHIN THREE MINUTES.

<b>OPERATION</b>		<b>KEY POINT</b>
1. REMOVE COUPLING FROM ENGINE.	PASS/FAIL	1a. UNHOOK STRAP FROM TOP OF COUPLING. GRASP COUPLING WITH BOTH HANDS. REMOVE FROM MOUNT.
2. CARRY COUPLING FROM REAR OF ENGINE AND WRAP THE HYDRANT.	PASS/FAIL	2a. GRAB ACCESSORY BAG AND COUPLING. STEP BACKWARD TO CLEAR 15' OF HOSE FROM THE BED, THEN WALK TO THE HYDRANT AND WRAP IT WITH A 360-DEGREE TURN.
3. SIGNAL ENGINE TO DRIVE AWAY.	PASS/FAIL	3a. VERBAL AND VISUAL COMMAND "GO" TO THE DRIVER, WHO WILL THEN DRIVE AWAY. (DRIVER SIDE)
4. REMOVE REDUCER IF NOT NEEDED, THEN REMOVE THE HYDRANT CAP.	PASS/FAIL	4a. EMPTY CONTENTS OF THE ACCESSORY BAG NEXT TO THE HYDRANT AND REMOVE THE REDUCER IF A 4½" PORT IS AVAILABLE.
5. PLACE THE 4½" COUPLING ONTO THE HYDRANT.	PASS/FAIL	5a. WHILE FACING THE HYDRANT PORT, SWING COUPLING AND HOSE OVER THE HYDRANT. SCREW THE COUPLING ONTO THE 4½" PORT.
6. CHARGE HYDRANT.	PASS/FAIL	6a. PLACE THE APPROPRIATE HYDRANT SPANNER ON THE STEM AND TURN VALVE COUNTER CLOCKWISE UNTIL IT IS OPEN FULLY. BACK OFF ONE HALF TURN FROM THE FULL POSITION.
7. STRAIGHTEN THE HOSE AND REMOVE KINKS.	PASS/FAIL	7a. REMOVE KINKS AND STRAIGHTEN HOSE BY GRABBING THE HOSE EITHER BY HAND OR HOSE STRAP. PAY ATTENTION TO USING LEG MUSCLES, NOT BACK MUSCLES.

**TASK: 03-05-03**  
**INITIAL ATTACK 2½"**

**GIVEN:**

1. EXPLANATION OF THE EVOLUTION
2. SINGLE FIREFIGHTER PERFORMANCE
3. HANDS-ON TRAINING

**PERFORMANCE:** THE FIREFIGHTER WILL, IN FULL PROTECTIVE EQUIPMENT, COMPLETE ALL ASPECTS OF THE STANDARD. TIME STARTS ON THE TRAINER'S MARK, AND ENDS WITH THE FIREFIGHTER FLOWING WATER AND BREATHING AIR.

**STANDARD:** SAFELY COMPLETE ALL OPERATIONS WITHIN FIVE MINUTES.

<b>OPERATION</b>		<b>KEY POINT</b>
1. DON SCBA	PASS/FAIL	1a. TO STANDARD 3-08-01 IN JUMP SEAT
2. FACE HOSE BED	PASS/FAIL	2a. ON TAILBOARD
3. PULL HOSE	PASS/FAIL	3a. 150 FEET OF 2½" HOSE 3b. OUT OF HOSE BED 3c. USING HOSE LOOPS
4. TURN	PASS/FAIL	4a. FACING DIRECTION OF TRAVEL
5. STEP FROM TAILBOARD	PASS/FAIL	5a. CAREFULLY
6. WALK AWAY	PASS/FAIL	6a. FROM ENGINE 6b. UNTIL 150' CLEARS THE HOSE BED
7. GROUND HOSE	PASS/FAIL	
8. UNCOUPLE HOSE	PASS/FAIL	8a. AT THIRD COUPLING
9. CONNECT HOSE	PASS/FAIL	9a. TO 2½" DISCHARGE
10. ADVISE ENGINEER	PASS/FAIL	10a. OF WHICH DISCHARGE
11. PICK UP HOSE & NOZZLE	PASS/FAIL	11a. WHERE GROUNDED 11b. USING LOOPS
12. LAY HOSE	PASS/FAIL	12a. TOWARDS FRONT OF ENGINE
13. LOOP HOSE	PASS/FAIL	13a. NOZZLE UNDER HOSE 13b. SECURE WITH STRAP
14. SIGNAL FOR WATER	PASS/FAIL	14a. SIGNAL ENGINE OPERATOR 14b. WHEN IN POSITION 14c. CONTROL NOZZLE
15. HOOK UP SCBA MASK	PASS/FAIL	15a. REGULATOR INTO FACE PIECE
16. FLOW WATER	PASS/FAIL	16a. WITH HOSE STRAP ON 16b. 30-DEGREE FOG 16c. 250 GPM

**TASK: IG-11-06**  
**INITIAL ATTACK 1¾" LINE**  
**WITH SUPPLY LINE**

**GIVEN:**

1. EXPLANATION OF THE EVOLUTION
2. A 3-PERSON ENGINE COMPANY
3. HANDS-ON MANIPULATIVE TRAINING WITH PRE-CONNECT HOSE LINE

**PERFORMANCE:** EACH FIREFIGHTER WILL, IN FULL PROTECTIVE EQUIPMENT, COMPLETE ALL ASPECTS OF THE STANDARD. TIME STARTS ON THE TRAINER'S MARK, FROM THE JUMP SEAT, WITH SCBA ON

**STANDARD:** SAFELY COMPLETE ALL OPERATIONS WITHIN THREE MINUTES

OPERATION		KEY POINT
1. DON SCBA	PASS/FAIL	1a. FF AND OFFICER TO BA-01
2. TAKE THE HYDRANT	PASS/FAIL	2a. FF ATTACH A 4½" SUPPLY LINE
3. LAY LDH SUPPLY LINE	PASS/FAIL	3a. ENGINEER, 200', SPOT ENGINE, BREAK COUPLING
4. PULL 150", 1¾"	PASS/FAIL	4a. OFFICER, TOWARD FRONT OF ENGINE
5. CHARGE LINE	PASS/FAIL	5a. ENGINEER ON ORDER FROM OFFICER
6. COMPLETE LDH HOOK UP	PASS/FAIL	6a. ENGINEER, ATTACH TO 4½" SUCTION
7. DEMONSTRATE CHANGEOVER	PASS/FAIL	7a. ENGINEER OPEN A 4½" SUCTION
8. FLOW WATER	PASS/FAIL	8a. FF AND OFFICER WITH HOSE STRAP, 30-DEGREE FOG, 150 GPM, SCBA'S BREATHING AIR

**TASK: IG-08-02  
TWO-PERSON ROOF VENTILATION**

**GIVEN:**

1. EXPLANATION OF THE 2-PERSON VENT
2. A 2-PERSON ENGINE COMPANY (FIREFIGHTER AND OFFICER)
3. ENGINE 50' FROM BUILDING

**PERFORMANCE:** EACH PERSON WILL DEMONSTRATE ALL ASPECTS OF THE STANDARD, IN A SAFE AND APPROPRIATE MANNER. TIME STARTS WHEN BOTH PERSONS ARE STANDING NEXT TO THE OFFICER'S DOOR ON THE ENGINE, IN FULL PROTECTIVE GEAR AND WEARING SCBA. TIME ENDS WHEN BOTH PERSONNEL ARE ON THE ROOF.

**STANDARD:** SAFELY COMPLETE ALL OPERATIONS WITHIN TWO MINUTES, 45 SECONDS

<b>OPERATION</b>		<b>KEY POINT</b>
1. REMOVE PICK-HEADED AXE	PASS/FAIL	1a. FF OR OFFICER PLACE AXE INTO BELT
2. REMOVE CHAIN SAW AND START	PASS/FAIL	2a. CHOKE AND START SAW AT ENGINE, CARRY TO SPOT OF OPERATION
3. REMOVE RUBBISH HOOK	PASS/FAIL	3a. CARRY TO SPOT OF OPERATION
4. REMOVE LADDER	PASS/FAIL	4a. FF & OFFICER CARRY LADDER 50' TO SPOT OF OPERATION, RAISE LADDER, TIE LADDER OFF.
5. CLIMB LADDER (OFFICER)	PASS/FAIL	5a. OFFICER WITH RUBBISH HOOK TO SOUND ROOF, STEP DOWN OFF LADDER ONTO ROOF
6. CLIMB LADDER (FIREFIGHTER)	PASS/FAIL	6a. FF WITH CHAIN SAW STEP DOWN OFF LADDER ONTO ROOF.

At a typical emergency there is an aggregating of tasks by assigned companies who, based on standard operating procedures, perform assigned functions or tasks in support of mitigating the emergency. Tasks normally assigned engine companies are usually different from those assigned truck companies, but are performed simultaneously in support of incident operations. In our case, some of these assignments are completed by engine companies, due to the extended response by truck companies. Tasks assigned engines included laying and advancing of hose lines of various sizes, pump operations, attacking the fire, and providing back up lines. Truck companies, on the other hand, conduct search and rescue, ladder the building with ground or aerial ladders, force entry, ventilate, secure utilities, check for extension of the fire, and conduct salvage operations.

An understanding of the multiple and simultaneous tasks that are required to mitigate an emergency leads to an understanding of why multiple units are dispatched to various types of emergency incidents. This also leads to an improved understanding of a department alarm structure and the advantages of additional resources to stop the escalation of fire.

The aggregating of companies of different types also applies to medical emergencies where multiple tasks must be performed.

Engine companies usually are first on the scene of medical emergencies from cardiac arrests to vehicle accidents. Their distribution throughout the community ensures their arrival within eight minutes Total Reflex Time in 90% of all requests for service from initiation of a 911 call. Arriving within this stated objective stops deterioration of the patient's condition and provides relief from further suffering.

The following charts show for both a Moderate Risk Structure Fire and Two-Car Vehicle Accident and the sequential tasks performed by the arriving units.

### MODERATE RISK STRUCTURE FIRE

(Two- or Three-Person Crews – Engine, Truck; Two-Person Crews – Paramedic Unit)

<b>First Due Engine Company</b>
<ul style="list-style-type: none"> <li>➤ Lay in a hydrant supply 4" hose</li> <li>➤ Operate pump and connect supply line</li> <li>➤ Conduct size up, assume command or request 2<sup>nd</sup> due engine to assume command on arrival</li> <li>➤ Pull 1¾" pre-connect or larger line to attack fire</li> </ul>
<b>Second Due Engine Company</b>
<ul style="list-style-type: none"> <li>➤ Insure water supply to first due company</li> <li>➤ Assist with advance of initial attack line if necessary</li> <li>➤ Provide back up line for fire extension/forcible entry (bring tools)</li> </ul>
<b>First Paramedic Unit</b>
<ul style="list-style-type: none"> <li>➤ Provide initial search and rescue as directed by first due engine company</li> <li>➤ Patient care</li> <li>➤ Two in, two out back up responsibilities</li> <li>➤ Initial forcible entry</li> <li>➤ Utility control</li> </ul>
<b>Chief Officer Arrives</b>
<ul style="list-style-type: none"> <li>➤ Contact captain IC briefing</li> <li>➤ Assume command</li> <li>➤ Determine strategy and tactics of mitigation of incident</li> <li>➤ Determine need for additional resources</li> </ul>
<b>First Due Truck Company</b>
<ul style="list-style-type: none"> <li>➤ Search and rescue (if not performed by 1<sup>st</sup> paramedic unit)</li> <li>➤ Ventilation</li> <li>➤ Forcible entry</li> <li>➤ Ladder building</li> <li>➤ Control utilities if not accomplished by first due paramedic unit</li> </ul>
<b>Third Due Engine Company</b>
<ul style="list-style-type: none"> <li>➤ Initial rapid intervention team deploy tool and equipment to fulfill RIT function</li> <li>➤ Provide for emergent fire ground operations and directed by IC</li> </ul>
<b>Fourth Due Engine Company (2<sup>nd</sup> Alarm)</b>
<ul style="list-style-type: none"> <li>➤ Supply additional water to fire ground</li> <li>➤ Extend hose line</li> <li>➤ Become RIT if third due engine was committed</li> </ul>

**VEHICLE ACCIDENT**

## Two-Car Vehicle Accident – Four Patients with Extrication

<b>First Due Engine Company</b>
<ul style="list-style-type: none"> <li>➤ Engine arrives, captain assumes IC</li> <li>➤ Assesses need for helicopter for Level II trauma center transport</li> <li>➤ Operate pump and stretch pre-connect 1¾" hose line if necessary</li> <li>➤ Scene safety, lights, traffic cones</li> <li>➤ Patient triage</li> <li>➤ EMT initial emergent treatment, patient stabilization</li> <li>➤ Prepare patients removal from vehicle, backboards</li> <li>➤ Move patient to transport area</li> </ul>
<b>First Due Paramedic Unit</b>
<ul style="list-style-type: none"> <li>➤ Contact IC on arrival</li> <li>➤ Assume medical command</li> <li>➤ Provide ALS treatment as triaged by engine company</li> <li>➤ Further assess need for helicopter to Level II trauma center</li> <li>➤ Remove patient from vehicle on backboard for transport</li> <li>➤ Transport patient</li> </ul>
<b>Second Due Engine Company</b>
<ul style="list-style-type: none"> <li>➤ Contact IC on arrival</li> <li>➤ Captain – Treatment Unit Leader</li> <li>➤ EMT treatment and patient stabilization</li> <li>➤ Prepare patient for vehicle removal on backboard</li> <li>➤ Move patient to transport area</li> </ul>
<b>Chief Officer Arrives</b>
<ul style="list-style-type: none"> <li>➤ Contact captain IC briefing</li> <li>➤ Assume IC</li> <li>➤ Determine need for additional resources</li> </ul>
<b>Third Due Engine Company or First Truck</b>
<ul style="list-style-type: none"> <li>➤ Contact IC on arrival</li> <li>➤ Remove rescue tools hydraulic/mechanical to vehicle area</li> <li>➤ Assess vehicle for extrication</li> <li>➤ Stabilize vehicle</li> <li>➤ Extricate patient</li> <li>➤ Remove patient from vehicle on backboard</li> <li>➤ Move patient to transport area</li> </ul>
<b>Second Due Paramedic Ambulance</b>
<ul style="list-style-type: none"> <li>➤ Contact IC on arrival</li> <li>➤ Prepare patient for transport</li> <li>➤ Transport</li> </ul>

Though proficiency indexes are designed to evaluate company performance and replicate fireground operations, they do not, in all cases, provide an overall time measurement of simultaneous steps necessary for a desired outcome. Arriving on the scene of an emergency is when the total reflex time clock stops and then starts again with set up time until mitigation of the incident.

### Performance Objectives by Risk Type

The following performance measures are based on risk types and total reflex time, utilizing both Corte Madera and mutual aid resources.

#### STRUCTURE FIRE – MODERATE RISK

##### Goal

An effective response force of three (3) engines, one (1) truck, one (1) paramedic unit and one (1) chief officer, and support staff; a deployment of 15 personnel.

##### Measure

The initial engine shall arrive within eight minutes total reflex time, to all areas served, in 90% of requests for service. The second engine shall arrive within nine minutes, with the third engine, truck, and chief officer arriving within ten minutes total reflex time, to all areas served, in 90% of requests for service.

##### Performance Objective

To confine 90% of all structure fires to the area of involvement, as reported by the first arriving engine. Tasks will include search and rescue for victims; confining the fire to the area of involvement; and limiting heat, smoke, and water damage to the immediate area. The first unit on scene will start rescue or advance hose line to attack aid, and confine the fire to the area of involvement. The first paramedic unit conducts search and rescue or utility control. The truck company initiates ventilation and salvage. The second and third engine companies provide personnel for additional hose lines to confine fire, or completes tasks as required, establish RIT. Mutual aid units cover stations.

#### STRUCTURE FIRE – SIGNIFICANT RISK

##### Goal

An effective response force of four (4) engines, two (2) trucks, one (1) paramedic unit, one (1) chief officer, and support staff; a deployment of 25 personnel.

##### Measure

The initial engine shall arrive within seven minutes total reflex time, to all areas served, in 90% of requests for service. The second and third engine, along with the first due truck, chief officer, and paramedic unit will arrive within ten minutes total reflex time. The remainder of the assignment shall arrive within 12 minutes total reflex time, in 90% of all areas served.

Performance Objective

To confine 90% of all serious fires to the area of involvement, as reported by the first due company. Tasks typically include search and rescue; advancement of attack lines; confining the fire to the area of initial involvement; limiting the spread of the fire, heat, and smoke to the floor of origin; establishment of RIT, salvage of property, and rehab of personnel. The first paramedic unit conducts search and rescue, utilities, or other assignments. The first truck forces entry and ventilates. The second truck assists with ventilation, salvage, and overhaul. The remaining units, on arrival, provide additional personnel for tasks ongoing or as assigned. Mutual aid units cover stations.

Measure

The initial engine shall arrive within seven minutes total reflex time, to all areas served, in 90% of requests for service. The second and third engines, first truck, and chief officer will arrive within ten minutes total reflex time. The fourth engine and second truck shall arrive within 12 minutes total reflex time. The fifth and sixth mutual aid engines shall arrive within 15 minutes total reflex time.

STRUCTURE FIRE – MAXIMUM RISKGoal

An effective response force, utilizing mutual aid resources of six (6) engines, two (2) trucks, two (2) paramedic units, one (1) chief officer, and support staff; a deployment of 30 personnel.

Measure

The initial engine shall arrive within seven minutes total reflex time, to all areas served, in 90% of requests for service. The second, third, and fourth engine, along with the first truck and chief officer, shall arrive within 10 minutes total reflex time. The second truck shall arrive within 12 minutes. The fifth and sixth mutual aid engines shall arrive within 15 minutes total reflex time.

Performance Objective

To confine 90% of all major fires to the area of involvement, as reported by the first arriving company. Tasks include conducting search and rescue, advancement of hose lines to confine the fire to the area of involvement, limiting heat/smoke damage to the floor of involvement, ventilation, establishing RIT, and rehab of personnel. The first paramedic unit conducts search and rescue, utilities, or other assignments. The first truck conducts forcible entry or ventilation. The second and third engine companies provide additional hose line to support fire attack. The second truck supports ventilation, salvage, forcible entry, overhaul, and assigned tasks. The remaining units, on arrival, provide additional personnel for tasks ongoing or as assigned. Mutual aid units cover stations.

TARGET HAZARD – SPECIAL RISKS (RESCUE, HAZARDOUS MATERIAL, TRENCH, FIRES, CONFINED SPACE)Goal

An effective response force of two (2) engines, two (2) trucks, one (1) paramedic unit, one (1) chief officer, one (1) hazardous material or USAR unit, and support staff; a deployment of 20 personnel.

Measure

The initial engine shall arrive within seven minutes total reflex time, to all areas served, in 90% of requests for service. The second engine, first truck, chief officer, and first paramedic unit shall arrive within 12 minutes total reflex time in 90% of requests for service. The remaining units shall arrive within 15 minutes total reflex time.

Performance Objective

To mitigate the effects of, or spread of, a hazardous material spill or release, rescue those trapped, and contain flammable liquid or compressed gas fires to the area of origin.

WILDLAND INTERFACE – HIGH/EXTREMEGoal

An effective response force of five (5) engines, one (1) paramedic unit, and four (4) chief officers; a deployment of 21 personnel. In addition, in wildland areas adjacent to Corte Madera, an effective response force from Marin County Fire of eight (8) type three engines, two (2) water tenders, one (1) dozer, and two (2) chief officers; a deployment of 42 personnel.

Measure

The initial Corte Madera engine shall arrive within seven minutes total reflex time, to all areas served, in 90% of requests for service. The second and third engines, paramedic unit, and chief officer, shall arrive within 12 minutes total reflex time in 90% of requests for service. The fourth and fifth engines shall arrive within 15 minutes total reflex time. The Marin County Fire initial unit, with the remainder of units, shall arrive within 20 minutes total reflex time in 80% of requests for service.

Performance Objective

The first engine initiates structure protection. If no structures need protection, begin to control the fire to the area of origin. The second and third engines provide structure protection or begin to control the fire. The fourth and fifth engines provide structure protection or control the fire. The paramedic unit deploys as assigned. The Marin County Fire units provide structural protection or control the fire to the area of origin or from escalating in size. Mutual aid units cover stations.

WILDLAND INTERFACE – LOW/MEDIUMGoal

An effective response force of three (3) engines, one (1) paramedic unit, and two (2) chief officers; a deployment of 12 personnel. In addition, in open space surrounding Corte Madera, an effective response force from Marin County Fire of two (2) type three engines and one (1) chief officer for low, and five (5) type three engines, two (2) water tenders, one (1) dozer, and two (2) chief officers for medium fire weather days.

Measure

The initial Corte Madera engine shall arrive within seven minutes total reflex time, to all areas served, in 90% of requests for service. The second and third engines, paramedic unit, and chief officer shall arrive within 12 minutes total reflex time in 90% of requests for service. The first Marin County Fire units shall arrive, with the remainder of units, within 15-20 minutes total reflex time in 80% of requests for service.

Performance Objective

The first engine initiates structure protection. If no structures need protection, begin to control the fire to the area of origin. The second engine continues structural protection or assists in controlling the fire to the area of origin. The third engine and paramedic unit support the first or second engines in controlling the fire, or as assigned. The Marin County Fire units arrive within 15-20 minutes total reflex time in 80% of requests for service. Mutual aid units cover stations.

EMERGENCY MEDICAL – LOW RISKSGoal

An initial response force of one (1) engine and one (1) paramedic unit; a deployment of five personnel.

Measure

The first engine shall arrive within seven minutes total reflex time, to all areas served, in 90% of requests for service. The paramedic unit shall arrive within ten minutes total reflex time, to all areas served, in 90% of requests for service.

Performance Objective

The engine shall provide defibrillation if required, assess the patient, and provide relief from further suffering utilizing EMT skills. The paramedics assess the patient, provide ALS skills, and transport the patient to the emergency room, or have the patient transported by BLS ambulance.

EMERGENCY MEDICAL – MODERATE RISKS

Goal

An effective response force of three (3) engines, one (1) truck, one (1) paramedic unit, and one (1) chief officer; a deployment of 17 personnel.

Measure

The initial engine shall arrive within seven minutes total reflex time, to all areas served, in 90% of requests for service. The second engine, truck company, and chief officer shall arrive within ten minutes total reflex time, with the third engine and paramedic unit arriving within ten minutes total reflex time.

Performance Objective

The first engine shall assess the patient, provide patient relief, cause reduction from further suffering and deterioration of the patient, and provide the appropriate level of medical intervention. The truck arrives and provides extrication, if required, and vehicle stabilization. The second engine pulls a protection line, if required, and assists with patient assessment and care. The third engine assesses and provides care of patients, and prepares for patient transport, either ALS or BLS, to the emergency room. The paramedic unit provides ALS skills, and transports the patient to the emergency room, or has the patient transported by BLS ambulance. Mutual aid units cover stations.

EMERGENCY MEDICAL – SIGNIFICANT RISKGoal

An initial response force of three (3) engines, two (2) trucks, three (3) paramedic units, and two (2) chief officers; a deployment of 25 personnel

Measurement

The initial engine shall arrive within seven minutes total reflex time, to all areas served, in 90% of requests for service. The second engine, first paramedic unit, truck company, and first chief officer shall arrive within ten minutes total reflex time, with the third and fourth engines, second paramedic unit, and second chief officer arriving within 12 minutes total reflex time.

Performance Objective

The first engine shall assess patients, provide patient relief, cause reduction from further suffering and deterioration of the patients, and provide the appropriate level of medical intervention. The first truck arrives and provides extrication, if required, and vehicle stabilization. The second engine pulls a protection line, and assists with patient assessment and care. The second truck provides extrication and vehicle stabilization. The third and fourth engines provide patient assessment and treatment, and prepare the patient for ALS or BLS transport to the emergency room. The paramedic units provide ALS intervention, and package and transport patients to the emergency room. Mutual aid units cover stations.

EMERGENCY MEDICAL – MAXIMUM RISKGoal

An initial response force unitizing mutual aid resources of five (5) engines, two (2) trucks, five (5) paramedic units, and three (3) chief officers; a deployment of 42 personnel.

Measurement

The initial engine shall arrive within seven minutes total reflex time, to all areas served, in 90% of requests for service. The second and third engines, first truck, paramedic unit, and first chief officer shall arrive within ten minutes total reflex time. All remaining engines, trucks, paramedic units, and chief officer should arrive within 15 minutes total reflex time.

Performance

The first engine shall assess patients, provide patient relief, cause reduction from further suffering and deterioration of the patients, and provide the appropriate level of medical intervention. The first truck provides extrication, if required, and vehicle stabilization. The second engine pulls a protection line or assists with patient care. The second and third trucks assist with extrication, vehicle stabilization, or patient care. The third, fourth, and fifth engines assess patients, provide the appropriate level of medical intervention, and prepare patients for transport, either BLS or ALS, to the emergency room. Paramedic units provide ALS intervention, treat patients, and transport to the emergency room. Mutual aid units cover stations.

The following schedules are examples of critical task measurements for a moderate risk structure fire and a three-patient vehicle accident with extrication, which is typical of an accident on Highway 101.

**STRUCTURE FIRE MODERATE**

3 Engines, 1 Truck, 1 Paramedic Unit, 1 Chief Officer

911 Call	0.00	
Call Handling	1.00	
Turnout Time Interval	2.00	
Travel Time Interval for First Arriving Unit	4.00	
<b>Response Time Subtotal</b>		<b><u>7.00</u></b>
<i>Critical tasks and completion times (3-person crew) are:</i>		
1. First engine on-scene at hydrant	0:00	
2. Lay supply line from hydrant	1:20	
3. Captain size up and assumes IC	1:50	
4. Attack line pulled	2:00	
5. Second engine arrives receives assignment	2:10	9:10
6. Supply line connected to pump	2:15	
7. Firefighters ready for entry SCBA	3:00	
8. Paramedic unit arrives	3:50	10:50
9. Chief officer arrives transitions to IC	3:50	10:50
10. Attack line ready for entry	4:05	
11. Paramedics forcibly open door/primary search begins	4:30	
12. Attack line enters structure	4:45	
13. Attack line flowing water on fire	5:00	
14. Third engine arrives provides RIT with tools	5:30	
15. Second engine enter structure back up line	6:00	
16. Truck arrives	7:00	14:00
17. Truck company ladders building 1 <sup>st</sup> ladder	11:00	
18. Paramedic completes search (all clear)	14:00	
19. Ventilation begins chain saw on roof started	20:00	
20. Paramedic control utilities	20:10	
21. Roof cut opening ventilation occurring	26:00	
22. Fire reported knocked down	28:00	
 Time from 911 Call		<b><u>35:00</u></b>

**MODERATE EMERGENCY MEDICAL**Multi-Vehicle Accident 2-3 Patients with Extrication  
2 Engines, 1 Truck, 1 Paramedic Unit, 1 Chief Officer

911 Call	0.00	
Call Handling	1.00	
Turnout Time Interval	2.00	
Travel Time Interval	5.00	
<b>Response Time Subtotal</b>		<b><u>8.00</u></b>
<i>Critical tasks and completion times (3-person crew) are:</i>		
1. First engine on-scene	0:00	
2. Captain size up assumes IC	1:00	
3. Firefighter first engine patient #1 (extrication needed)	2:00	
4. Firefighter first engine patient #2 assessment	2:30	
5. Paramedic unit arrives	3:00	11:00
6. Second engine unit arrives	3:10	
7. Paramedic assessment of patients	3:20	
8. Second engine pulls protection line	3:50	
9. Chief officer arrives transitions to IC	5:45	13:45
10. Firefighter second engine patient #3 assessment	6:15	
11. Truck arrives	7:40	15:40
12. Car #1 stabilized for extrication	10:15	
13. Rescue equipment/hydraulic tool (patient #1)	10:50	
14. Hydraulic tool started	11:00	
15. Firefighter in car patient #3 cervical collar	12:30	
16. Firefighter in car patient #2 cervical collar	14:10	
17. Patient #2 removed by backboard	16:50	
18. Car door patient #1 vehicle removed	22:50	
19. Patient #3 removed by backboard	24:10	
20. Roof cut patient #1 vehicle	25:20	
21. Patient #2 and #3 packaged ready for transport	26:30	
22. Patient #1 removed on backboard	28:40	
23. Patient #1 packaged ready for transport	31:00	
<b>Total Time</b>		<b><u>39:00</u></b>