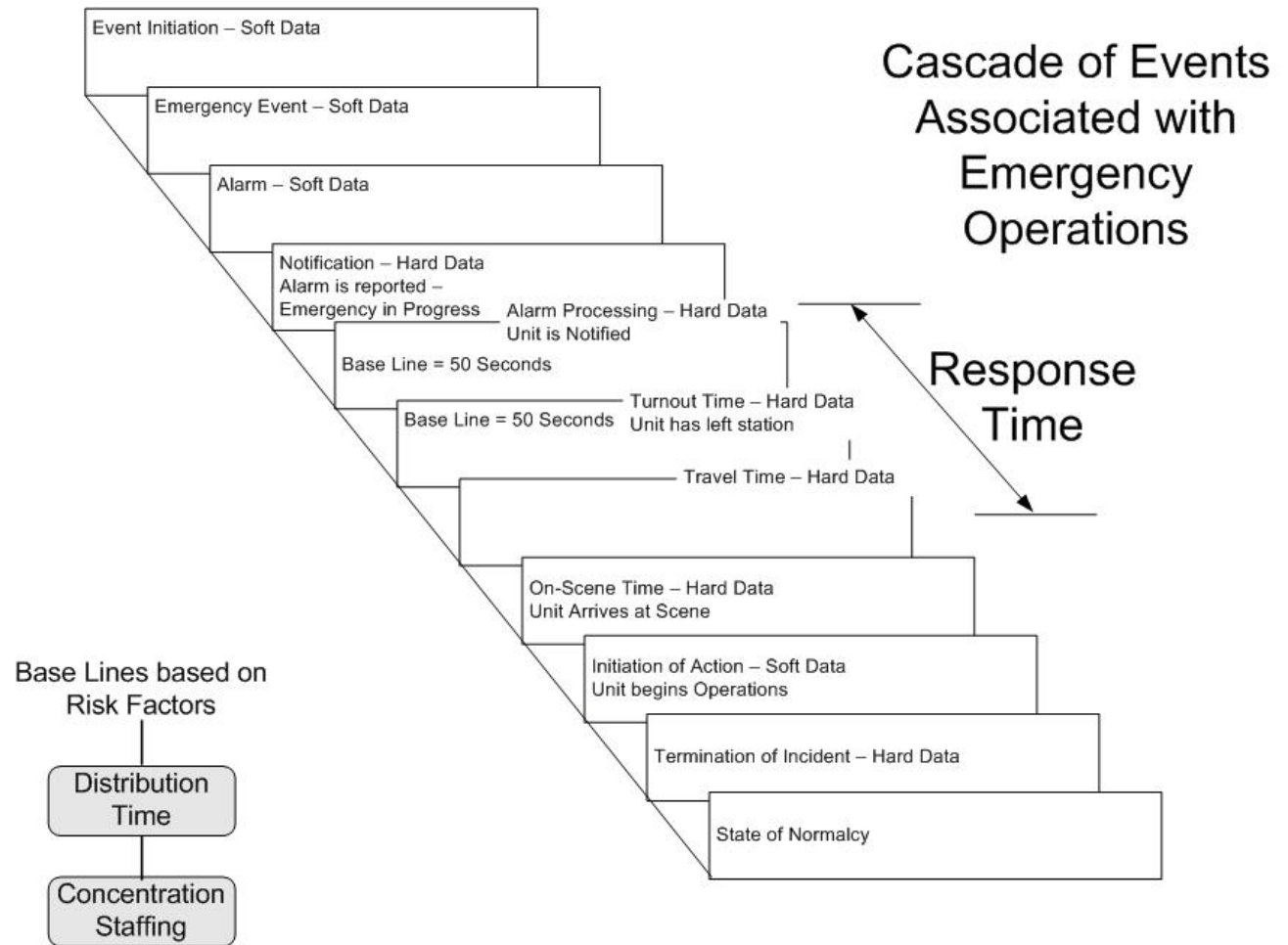


IX. APPENDICES



Appendix A - Cascade of Events Associated with Emergency Operations



Appendix B - Building Code: Occupancy Descriptions

Group & Division	Description of Occupancy
A-1	A building or portion of a building having an assembly room with an occupant load of 1,000 or more and a legitimate stage.
A-2	A building or portion of a building having an assembly room with an occupant load of less than 1,000 and a legitimate stage.
A-2.1	A building or portion of a building having an assembly room with an occupant load of 300 or more without a legitimate stage, including such buildings used for educational purposes and not classed as a Group E or Group B Occupancy.
A-3	A building or portion of a building having an assembly room with an occupant load of less than 300 without a legitimate stage, including such buildings used for educational purposes and not classed as a Group E or Group B Occupancy.
A-4	Stadiums, reviewing stand and amusement park structures not included with other Group A Occupancies.
B	A building or structure, or a portion thereof, for office, professional or service-type transactions, including storage of records and accounts; eating and drinking establishments with an occupant load of less than 50.
E-1	Any building used for educational purposes through the 12 th grade by 50 persons for more than 12 hours per week or four hours in any one day.
E-2	Any building used for educational purposes through the 12 th grade by less than 50 persons for more than 12 hours per week or four hours in any one day.
E-3	Any building or portion thereof used for day-care purposes for more than six persons.
F-1	Moderate-hazard factory and industrial occupancies include factory and industrial uses not classified as Group F, Division 2 Occupancies.
F-2	Low-hazard factory and industrial occupancies include facilities producing noncombustible or nonexplosive materials that during finishing, packing or processing do not involve a significant fire hazard.
H-1	Occupancies with a quantity of material in the building in excess of those listed in Table 3-D that present an explosion hazard as listed in Section 307.1.1.
H-2	Occupancies with a quantity of material in the building in excess of those listed in Table 3-D that present a moderate explosion hazard or a hazard from accelerated burning as listed in Section 307.1.1.
H-3	Occupancies with a quantity of material in the building in excess of those listed in Table 3-D that present a high fire or physical hazard as listed in Section 307.1.1.
H-4	Repair garages not classified as Group S, Division 3 Occupancies.
H-5	Aircraft repair hangers not classified as Group S, Division 5 Occupancies and heliports.
H-6	Semiconductor fabrication facilities and comparable research and development areas when the facilities in which hazardous production

Group & Division	Description of Occupancy
	materials are used, and the aggregate quantity of material is in excess of those listed in Table 3-D or 3-E.
H-7	Occupancies having quantities of material in excess of those listed in Table 3-E that are health hazards as listed in Section 307.1.1.
I-1.1	Nurseries for the full-time care of children under the age of six (each accommodating more than five children), hospitals, sanitariums, nursing homes with nonambulatory patients and similar buildings (each accommodating more than five patients).
I-1.2	Health-care centers for ambulatory patients receiving outpatient medical care which may render the patient incapable of unassisted self-preservation (each tenant space accommodating more than five such patients).
I-2	Nursing homes for ambulatory patients, homes for children six years of age or over (each accommodating more than five persons).
I-3	Mental hospitals, mental sanitariums, jails, prisons, reformatories and buildings where personal liberties of inmates are similarly restrained.
M	A building or structure, or a portion thereof, for the display and sale of merchandise, and involving stocks of goods, wares or merchandise, incidental to such purposes and accessible to the public.
R-1	Hotels and apartment houses, congregate residences (each accommodating more than 10 persons).
R-3	Dwellings, lodging houses, congregate residences (each accommodating 10 or fewer persons).
S-1	Moderate hazard storage occupancies including buildings or portions of buildings used for storage of combustible materials not classified as Group S, Division 2 or Group H occupancies.
S-2	Low-hazard storage occupancies including buildings or portions of buildings used for storage of noncombustible materials.
S-3	Repair garages where work is limited to exchange of parts and maintenance not requiring open flame or welding, and parking garages not classified as Group S, Division 4 Occupancies.
S-4	Open parking garages.
S-5	Aircraft hangers and helistops.
U-1	Private garages, carports, sheds and agricultural buildings.
U-2	Fences over 6 feet high, tanks and towers.

Appendix C - Glossary of Technical Terms

This glossary defines terms used in Comprehensive Planning which may be unfamiliar to the reader, and/or which have special meaning within the context of fire protection Comprehensive planning.

ABILITY TEST: A test of maximum performance designed to reveal the level of the organization or individual's ability to carry out specific tasks or activities.

ACCEPTED RISK: The amount or level of risk that is allowed by policy. The question of whether a risk is acceptable must be gauged against a benchmark or standard that has been deemed adequate by a particular Authority Having Jurisdiction (see definition below under AHJ), at a specific point in time. The unprotected portion of what there is to burn, defined by the policies, and accepted by the community through approval of the objectives. Examples would vary according to the level of government involved, i.e. District, fire District, county, region through law, regulation or level of service.

ADEQUACY: The quality or state of being adequate; sufficient for a purpose; equal to; proportionate to; or fully sufficient for a specified or implied requirement.

ADVANCED LIFE SUPPORT (ALS): Special Services designed to provide definitive pre-hospital emergency medical care such as cardiopulmonary resuscitation, cardiac monitoring, cardiac defibrillation, advanced airway management, intravenous therapy, administration of specified drugs, and other specified techniques or procedures administered by authorized personnel under the direct supervision of a base hospital or utilizing approved standing orders.

ADVANCED LIFE SUPPORT UNIT (ALS Unit): Emergency vehicles, such as vans, engine companies, truck companies, squad companies, helicopters, and other emergency vehicles that are especially equipped and staffed by certified emergency medical technicians – paramedics to provide Advanced Life Support to the sick and injured at a medical emergency.

ADVISORY COMMITTEE: A body of community representatives that reviews and guides the work of the Planning Team. See also TASK FORCE.

AHJ: Acronym for Authority Having Jurisdiction.

ALARM PROCESSING TIME: The elapsed time from the receipt of an alarm by the dispatch center and the notification of specific fire companies that are to respond.

ALTERNATIVE: (n) One of two or more things, courses, or propositions to be chosen. (adj) Offering or expressing a choice.

ALTERNATIVE SYSTEM CONCEPT: One of two or more ideas for a fire protection system.

ANALYSIS: Examination of a complex, its elements, and their relations.

APPARATUS: Fire suppression equipment such as engine companies, aerial trucks, crash fire rescue, and command officer vehicles.

ARSON: The willful or malicious burning of property with criminal or fraudulent intent.

ASSUMPTION: A situation or condition which must be considered as existing if the organization is forced to operate in a specific manner and over which the organization does not exercise any control.

AUTOMATIC AID: A contract between two or more agencies agreeing to an exchange of emergency response units, such as Fire apparatus, paramedic units, etc., to a predetermined geographical area, regardless of political boundaries to deal with day to day emergencies

BASIC LIFE SUPPORT (BLS): Minimum acceptable level of pre-hospital care; emergency First Aid and cardiopulmonary resuscitation (and may include EMT-IV) procedures to include recognition of respiratory and cardiac arrest and starting the proper application of cardiopulmonary resuscitation to maintain life support without invasive techniques until the victim receives advanced life support services in the field, or until the patient is transported to a medical facility.

BASELINE SYSTEM: The current system with modifications to the resource levels necessary to meet the organizations situation and objectives.

BENCHMARK: A benchmark is defined as a standard from which something can be judged. Searching for a “best practice” to use as a benchmark helps define superior performance of a product, or services; includes both public and private organizations, apparatus, equipment, fixed and mobile, facilities, methods, human resources and policies by the authority having jurisdiction.

BUDGET: A plan for the coordination of resources and expenditures.

CHARACTERISTIC: An attribute or feature.

CERTIFICATE: A special document issued to an individual by a recognized medical authority denoting competence in a named area of pre-hospital care.

CERTIFIED: Having in one’s possession a currently valid certificate or card issued by a recognized medical/Fire authority denoting personal competence in a named area of prehospital care or fire service delivery.

CERTIFICATION: Certification is a process whereby an individual is tested and evaluated in order to determine their mastery of a specific body of Adequacy – The quality or state of being adequate; sufficient for a purpose; equal to; proportionate to; or fully sufficient for a specified or implied requirement.

CERTIFIED TRAINING: Training that is sponsored or recognized by an organization that is capable of issuing certification to a person completing that training that meets the minimum specifications.

CHARACTERISTIC: An attribute or a feature of something.

CHIEF of DEPARTMENT: The person in the department who is charged with carrying out the policy established by the District governing body.

COMMUNITY/DISTRICT: A population area wherein there is a clear responsibility, and statutory basis, for fire protection.

COMMUNITY RISK ASSESSMENT: The evaluation of fire and other risks taking into account all pertinent facts that increase or decrease hazard in order to define standards of coverage (See OCCUPANCY RISK ASSESSMENT).

COMPETENCY-BASED CURRICULUM: A curriculum in which the specific objectives are defined for each of the separate skills taught in training and education programs with integrated didactic and practical instruction and upon which the successful completion of an examination demonstrates mastery of each skill tested.

COMPLEX: Something made up of or involving an often intricate combination of elements.

CONCEPT: Something conceived in the mind; an abstract or generic idea generalized from particular instances.

COST-BENEFIT: A term used to express the value of a benefit-producing system. Can be expressed as a ratio of cost (negative value) to benefit both in equivalent terms such as dollars, person-hours, etc.

CPR: Cardio Pulmonary Resuscitation.

CRITERION: A measure on which a judgment or decision may be based. Plural are criteria.

CURRENT: Occurring in or belonging to the present time.

CURRENT SYSTEM: The fire protection system in place at present.

DEPLOYMENT: The strategic assignment and placement of fire agency resources such as fire companies, fire stations and specific staffing levels for those companies.

DOCUMENT: (v) Write, record. (n) Book, paper.

DRIVER/OPERATOR: (DO) A state certified apparatus engineer

EDUCATION: a term often used as a synonym for training. In the context of this review it is used to describe training that has been given in a formal fashion and is acquired through or in cooperation with degree granting institutions.

EFFECTIVENESS: Marked by a quality of being influential or exerting positive influence; exerting authority over outcomes producing positive results.

EFFICIENCY: To produce desired results with a minimum expenditure of time, energy, money or materials. Marked by quality, characteristics or facility to serve the performance of a task in the best possible manner. The ratio of “effective” is based upon useful output in relation to the total output of the system.

EMERGENCY: A condition or situation in which an individual perceives a need for immediate medical attention or where the potential for such a need is perceived by emergency medical personnel or a public safety agency.

EMERGENCY MEDICAL SERVICES (EMS): Those services, resources and methodologies utilized in responding to medical emergencies.

EMERGENCY RESPONSE: Response to the scene of an incident that threatens lives or property that requires the use of emergency warning devices in accordance with Colorado state statute.

EMERGENCY MEDICAL SERVICE: Medical service required for the immediate diagnosis and treatment of medical conditions, which if not immediately diagnosed and treated, could lead to serious physical or mental disability or death.

EMERGENCY MEDICAL SERVICES SYSTEM (EMSS): A specially organized arrangement which provides for the personnel, facilities and equipment for the effective and coordinated delivery of services in an EMS area of medical care services under emergency conditions.

EMERGENCY MEDICAL TECHNICIAN – An individual trained in Basic Life Support according to the standards prescribed by Colorado State statute and who has a current and valid certificate in the State of Colorado.

EMERGENCY MEDICAL TECHNICIAN – PARAMEDIC (EMT-P): An individual who has received additional training in Advanced Cardiac Life Support according to the

standards prescribed by the Colorado State Statute and who has a current and valid certificate pursuant to the statute.

EMPIRICAL: Originating in or based on observation or experience.

ENGINE COMPANY: Fire apparatus that is equipped with fire hose, a water tank, and a pump. This is the basic equipment used for initial attack on fires.

EVALUATION: Analysis and comparison of actual performance versus prior plan and stated goals and objectives.

EXPLORATORY METHODS: A set of methods which is used to explore what is possible given present capabilities.

FEES FOR SERVICE: Funds paid directly to the provider by the patient for charges. These funds are derived from patient's income and other personal assets.

FIRE MANAGEMENT AREA (FMA): The elemental building block upon which planning is based. An area in which it is desired to define and manage the fire situation.

FIRE PRE-PLAN: A document or other information source developed by a fire agency to identify hazardous situations, building information, owner information, and a variety of other data.

FIRE PREVENTION: That part of fire protection activities exercised in advance of the outbreak of fire to prevent such outbreaks and to minimize loss when fire does occur.

FIRE PROTECTION: The act of shielding from loss or injury due to fire.

FIRE PROTECTION ENVIRONMENT: The conditions, circumstances, and influences, under which the fire protection system must operate. Includes population, land use, physical, structural and non-structural, financial and water supply environments.

FIRE PROTECTION SYSTEM: A regularly acting or interdependent group of items employed in fire protection. Includes public and private agencies, apparatus, equipment, facilities, procedures, and people.

FIRE SITUATION: The state or condition of the community with regard to fire protection. Includes fire related (what there is to burn) and fire system management situations.

FIRE SUPPRESSION: The total work of extinguishing a fire beginning with its discovery.

FIRST RESPONDERS: Personnel who have responsibility to initially respond to emergencies such as firefighters, police Highway Patrol officers, Life guards and ambulance attendants

FLASHOVER: Thermal radiation feedback from the ceiling and upper walls, which have been heated by the fire. This radiation feedback gradually heats the contents of the fire area. When all the combustibles in the space have become heated to their ignition temperature, simultaneous ignition occurs (NFPA Handbook, Fourteenth Edition).

FUNCTION: One of a group of related actions contributing to a larger action.

GENERAL OPERATING GUIDELINES: Written guidelines that suggest courses of action, usually provided in a manual format. Acronym for this term is GOG; Often considered being comparable with Standard Operating Procedures.

GOAL ACHIEVEMENT: The means of verifying through indicators, either quantitative or qualitative that the end result being desired is being accomplished. Goal measurement does not imply that the goal is totally resolved.

GOALS: The general end toward which effort is directed. In the context of fire protection, Comprehensive planning goals are fundamental, inclusive, nonspecific, qualitative, future-oriented, time independent.

IGA: Intergovernmental Agreement

IMPLEMENTATION PHASE: The period in which the Comprehensive Plan is carried out, updated, and modified.

INCIDENT COMMAND SYSTEM (ICS): A management system that is based on the NIMS. System of controlling resources at the scene of an emergency. The ICS defines roles, relationships and functions of the different individuals responding to an emergency situation.

IFSTA: Acronym for the International Fire Service Training Association.

ISFSI: Acronym for the International Society of Fire Service Instructors.

ISO: Insurance Services Office. An insurance grading organization, which establishes community rankings, based on the capability of the fire organization.

JURISDICTION: A population area wherein there is clearly defined responsibility, based on statutory authority, to provide fire and/or emergency medical services. Also called authority having jurisdiction or AHJ.

LEVEL OF SERVICE: The magnitude of the supply for a public demand. In terms of fire protection the magnitude may be expressed in many ways, such as percent of people protected, percent of buildings protected, area protected, monetary value of property protected, etc.

LFPD: Louisville Fire Protection District

MASTER PLAN: A documented program of action, which defines and controls subordinate activities by virtue of vested authority.

MASTER PLAN WORKING GROUP: A group of community representatives, led by a professional, which performs the pre-planning effort.

MAXIMUM: The greatest quantity or value attainable or attained.

MEASURABLE TERMS: A word or expression that has a precise meaning and that may be measured.

MEDICAL CONTROL: The medical direction and management of an emergency medical services system as set forth in Colorado State Statutes.

MEDICAL DIRECTOR: The physician appointed to provide medical control and to assure medical accountability in accordance with Colorado State Statutes.

MEDICAID OR MEDICARE: A reimbursement from the State or Federal government for eligible services charged to a covered patient.

MEASUREMENT: A quantity or quantitative expression indicating acceptability.

MINIMUM: The least quantity assignable, admissible, or possible.

MOU: Memorandum of Understanding

MUTUAL AID: Wherein fire departments agree to assist each other when an emergency occurs that exceeds the capabilities of any one agency. The Mutual Aid Plan is a County-wide effort that can result in any one agency receiving assistance from any or all of the other agencies in the County. An example would be a large traffic accident or hazardous material exposure to several people. An MCI is larger than the normal day-to-day incident, but smaller than a disaster.

NIST: National Institute of Standards and Technology

NFIRS: National Fire Incident Reporting System.

NFPA: National Fire Protection Association.

NFPA Standards: Publications adopted by the NFPA through the consensus process setting a level of standard for fire service related dimensions or equipment specification.

NORMATIVE METHODS: A set of methods, based on goal setting, which are used to determine what capability is needed to achieve some stated objective.

OBJECTIVES: The specific end toward which effort is directed. In the context of fire protection, comprehensive planning objectives are independent of the means by which they may be reached, attainable within the planning period, quantitative. Objectives must be achievable within a certain planning period and be able to be measured in some quantifiable way.

OCCUPANCY CATEGORY: The classifications of occupancies used in the building codes. The structural occupancy categories used in this Planning Guide are from the Uniform Building Code, and the non-structural occupancy categories are from the NFPA 901 Code.

OCCUPANCY RISK ASSESSMENT: An assessment of the potential severity of a specific structure in relation to the fire agency's ability to handle the type and severity of emergencies within that structure. Occupancy risk assessment often includes classifying these risks into categories. See RISK CATEGORIES.

OFG: Operations Focus Group – LFD Process Improvement Team

OPERATIONAL CONTROL: A day to day supervision of personnel who are assigned different tasks and responsibility in a provider agency. Operational control includes but is not limited to, the areas of scheduling, workload allocations, risk distribution, disciplining, and the setting of priorities for personnel that are hired and work for the provider agencies.

OPTIMAL: Most desirable or satisfactory.

OPTIMUM: Greatest degree attained under implied or specified conditions.

OSHA 29 CFR 1910.120 (q) (3): The citation for the Federal Occupational Safety and Health Administration Program.

OUTPUTS: The specifically intended types of results that can be expected from the activities and inputs that are placed into service. An example of outputs might be comparing the number of fire inspections to the number of staffing hours used to complete them.

PLANNING RISK: That risk, within an FMA, which is selected as the risk, which drives the fire protection planning for that FMA. The planning risk is selected from the major, key, and typical risks, using the historical and statistical risks within the FMA.

PLANNING PHASE: The period in which the community is identified and the fire situation defined; the goals, objectives, selection characteristics and measurements

defined; alternative systems defined and analyzed; a preferred system selected; and a Comprehensive Plan prepared to acquire and maintain the system.

PLANNING PROPOSAL: A document produced during the Pre-planning Phase, which sets forth the need, outlines the approach, and presents a budget for doing fire protection Comprehensive planning.

PLANNING TEAM: A group of community representatives, led by a professional, which performs the planning effort.

PRE-PLANNING PHASE: The period in which the need for a Plan is identified, commitment to planning is made, and the planning effort is organized.

PRIMARY FUNCTION LEVEL: The first level of a function tree; a major system function (such as suppression, prevention, etc.)

PRIVATE SECTOR: That portion of a community that is not in the public sector; generally used as a synonym for citizens groups and private industry.

PRIVATE INSURANCE: A reimbursement from a private medical insurance company for eligible services charged to a covered patient.

PROVIDER AGENCIES: Local governmental entities and agencies that elect to provide a complete pre-hospital care system.

PROTECTIVE CLOTHING: Personal items of clothing and equipment issued to individual firefighters for protection against heat, flame, abrasion, puncture or other traumatic injury during combat operations. Includes, but is not limited to, coats, trousers, boots, gloves, helmets, personal alarm devices, fire shelters, and any other special equipment issued for evaluating exposure such as dosimeters, communicable disease shields, etc. Sometimes referred to by the acronym PPE.

PROJECTED: Extended into the future; forecasted based on present trends.

PUBLIC SECTOR: That which belongs to the public at large; generally used as a synonym for governmental agencies.

PUBLIC SAFETY ANSWERING POINT (PSAP): A single telephone answering point within a given geographical area. A term associated with the countywide 911 system.

PURPOSE: That which is expected to be achieved if the organization is successful in completing their mission. It can be expressed in either qualitative or quantitative terms, within the parameters to be able to objectively verify them. Those, which we hope to create, accomplish, or change with view towards influencing the solution to a problem.

QUALITY ASSURANCE: A process through which a desired level of care is defined, monitored, achieved and maintained by detecting and correcting factors which present the achievement of the established desired quality.

QUALITATIVE: Having to do with the basic nature or kind of a characteristic; such as capital cost, fire loss, etc.

QUANTITATIVE: Having to do with the property by which a characteristic can be measured; such as capital cost not to exceed ten million dollars reduction in fire loss, etc.

QUINT: This is a type of apparatus that combines the functions of an engine company and truck company. It usually carries less hose and less water than an engine. It usually has less ladder reach and amount of ladders than a truck company. The term QUINT is short for quintuplet. This is because the apparatus can do five jobs.

RANKING: The ordering of quantitative scores or qualitative ratings from the highest to the lowest.

RECEIVING HOSPITAL-PARAMEDIC: A hospital contracted with and certified by the Emergency Medical Services Agency that provides an agreed upon level of care to all patients served by EMT-paramedics and transported under medical care.

RELIABILITY: The degree to which a test or other examination is free from chance errors of measurement. The extent to which scores are stable, dependable, and similar upon repeated measurements, consistent scores in successive ratings even with different raters.

RESOURCE FACTOR: An attribute of a function. Specifically as used in Comprehensive planning, the level in a function tree at which the functions may be described in terms of quantities (such as fire flow, person-hours, etc.).

RISK: Possibility of loss, as in fire risk.

RISK: Exposure to a hazard based on the probability of an outcome when combined with a given situation with a specific vulnerability. The level of risk can be described as the probability of a specified loss over a given period of time. All structures, for example, are subject to destruction by fire; however, individual structures vary considerably as to the possibility of loss as a result of their construction, contents and built in protection.

SAFETY EQUIPMENT: Tools and equipment used by individual firefighters to perform firefighting, hazardous entry or rescue work upon which the individual must rely on for personal safety. This equipment is normally not assigned to the individual, but rather carried on the apparatus. Includes, but is not limited to, respiratory equipment,

hazardous materials entry suits, carabineers, lifelines, etc. Does not include nozzles, hoses, ladders, etc.

SELECTION CHARACTERISTICS: Qualitative features used to compare and select systems. Examples are cost, benefits, legislative, political, etc.

SELECTION MEASUREMENTS: Quantitative selection characteristics.

SENSITIVITY: In system analysis, the degree to which a quantity is sensitive to change in its component parts. For example, the sensitivity of total cost to change in estimated.

SERVICE LEVEL OBJECTIVES: Service level objectives are statements of performance unique to a given jurisdiction. These statements should be developed by the agency based upon several factors: nationally recognized standards and practices for fire and ancillary services. The service level objectives should be written based upon a community's specific profile that 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.

STAFFING: The level of personnel assigned to perform the anticipated emergency tasks of a specific fire company for the risk identified in a given District or community; the number of personnel required to perform multiple emergency operations functions such as fire suppression versus EMS or hazardous materials operations.

STANDARDS OF RESPONSE COVERAGE: A written statement that combines service level objectives with staffing levels to define how and when fire agencies resources will respond to call for service.

STANDARD OPERATING PROCEDURES: A term used to describe written direction provided to personnel in a manual format. Similar to the General Operating Guideline, but may be more specific requiring specific actions.

STANDARDIZATION: A process by which a product or service is assessed against some fixed standard or performance or quality.

SYSTEM: A regularly interacting or interdependent group of items forming a unified whole; as a group of devices or artificial objects or an organization forming a network especially for distributing something or serving a common purpose.

SYSTEM CONCEPT: An idea for a fire protection system.

UNCERTAINTY: Lack of sureness; a lack of definite knowledge about an outcome or result.

TASK FORCE: A body of community representatives which reviews and guides the work of the Planning Team. See also ADVISORY COMMITTEE.

TOTAL RESPONSE TIME: It is the total elapsed time from the point of notification to a responding fire company and the arrival of that unit at the scene. Total Response Time equals notification, plus Alarm Processing/Dispatch time plus Turnout Time plus Travel Time.

TRUCK COMPANY: This is apparatus designed to carry ground ladders and aerial apparatus (ladder, snorkel, or boom) and equipment to assist in ventilation and salvage operations.

TURNOUT TIME: The time it takes a fire company to discontinue routine operations and begin to respond.

TURNOUT CLOTHING: A synonym for protective clothing, also called “bunker gear”; acronym PPE is used in many codes and standards. Stands for Personal Protective Equipment.

UNCERTAINTY ANALYSIS: As used herein, an analysis aimed toward gaining more knowledge about the utility and acceptance of a fire protection system in the community.

VULNERABILITY: A measure of adverse consequence that might occur to a structure as a result of exposure to an uncontrolled fire. It is usually expressed as an indication of the difference between a level of risk and a level of service. For example, if a building has a calculated fire flow of 4000 gpm and the level of service can only deliver 2,000 gpm; the structure is vulnerable to total loss unless the fire is controlled at the compartment level. Vulnerability is increased as the size and complexity of a risk exceeds the resources available to contain a fire to a limited level.

Appendix D - Critical Tasking per NFPA 1710

Critical tasks are tasks that must be conducted in a timely manner by firefighters at structure fires in order to control the fire prior to flashover. In creating standards of response coverage, the capability of arriving companies and individual firefighters to achieve these tasks must be assessed. Furthermore, there may be need for critical tasks to be developed for each risk category, if there is a higher level of expectation due to size or complexity of the risk. Firefighter safety must be emphasized when identifying critical tasks. Whenever interior fire operations require the use of at least a 1 ¾ inch hose and protective clothing including turnout gear and self contained breathing apparatus (SCBA), additional personnel must be staged to perform rescue functions for interior firefighters. In this situation, a command structure must also be in place. Critical tasks are described below. These descriptions are supplemented by a table that outlines the tasks that must be accomplished by the initial response force if a department is to control a fire in a typical fire risk if a fire is in progress upon their arrival.

Attack Line - a 1 ¾ inch hose that produces 125-150 gpm and is usually handled by a minimum of two firefighters, or a 2 ½ inch hose that produces 250 gpm handled by two or three firefighters. Generally each engine company carries a set of attack lines preconnected to the pump, one folded on the hose bed, and a special pack designed to be carried into high-rise buildings. The selection of attack line for a given situation depends on the type of structure, the distance to the seat of the fire, and the stage of the fire. The pre-connected lines are the fastest to use but are limited to fires within 200 feet of the pumper. When attack lines are needed beyond this limit, the hose bed or high-rise lines are used. 2 ½ inch attack line will be used when the fire has passed the flashover stage and threatens exposed unburned portions of the structure.

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

Ventilation Crew - a minimum of two firefighters to open horizontal or vertical ventilation channels 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, thereby preventing flashover and allowing attack crews to see and work closer to the seat of the fire. Ventilation also gives the fire an exit route so the attack crew can "push" the fire out the opening they choose and keep it away from endangered people or unburned property. Ventilation must be closely timed with the fire attack. If it is performed too soon, the fire will receive additional oxygen and grow. If performed too late, the attack crew cannot push the fire in the desired direction. Instead, the gases and smoke will be forced back toward the

firefighters and their entry point, endangering them as well as any victims and unburned property they are protecting.

Back-up Line - a 1 ¾ inch or 2 ½ inch line that is taken in behind the attack crew to provide cover in case the fire overwhelms them or a problem develops with the attack line. Back-up lines require a minimum of two firefighters per 1 ¾ inch line. A 2 ½ inch line is used for back up when the fire is one that could grow rapidly if not stopped by the 1 ¾ inch attack line.

Rapid Intervention Crew - a minimum of two firefighters equipped with SCBA and available near the entry point to go into the structure, performs search and rescue, or serves as the backup crew if something goes wrong. OSHA, as of October 1998, requires this critical task.

Exposure Line - a 1 ¾ inch attack line staffed by two firefighters and taken above the fire in multi-story buildings to prevent fire expansion. This line is also used externally to protect nearby structures from igniting due to radiant heat. In situations where the heat release is great or structures are built close together, a 2 ½ inch line or deluge gun is used. The use of 2 ½ inch lines doubles the staffing requirement.

Pump Operator - one firefighter assigned to deliver water under the correct 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 does not endanger any of the hose line crews. This firefighter also completes the hose hookups to the correct discharges and the water supply hookup to the 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 pull large diameter hose between the pumper and the nearest hydrants, hookup at the hydrant, and deliver a water supply to the pumper before its water tank runs dry. A pumper has about four minutes of water if one 1 ¾ -inch line is flowing. Once a hydrant line is in place, this person can often be given additional assignments.

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

Utilities - at least one firefighter to secure natural gas, electrical supply, and water to the affected structures. Utilities must be secured before interior firefighters can open a concealed space such as an attic.

Ladder Operations - at least one and preferably two firefighters to set up the aerial ladder and a ground ladder to provide access to the roof of the structure when vertical ventilation is performed.

EMS/Rehabilitation - at least one firefighter to establish a treatment and rehabilitation sector in preparation for any victims found and any firefighters who are injured or physically drained. This latter event is a common occurrence during periods where there are high temperatures.

Safety Officer - one firefighter dedicated to the exterior of the structure with the sole responsibility of firefighter and scene safety. The majority of structure fires occur in moderate/typical risk occupancies. The table below shows the standards of cover required for the initial response force to accomplish the critical tasks necessary to mitigate a moderate/typical risk occupancy fire.

Table 14 - Critical Tasks for Initial Response

Initial Attack Line	2-3 personnel	1st Engine
Water Supply	1-person	1st Engine
Pump Operator	1-person	1st Engine
RIC Crew	2-personel	2nd Engine
Ventilation Crew	2-personnel	2nd Engine
Utilities	1-support person	1st Truck
Ladder Operations	1- person	1st Truck
Incident Command	1-person	1st Chief
EMS/Rehabilitation	1-person	3rd Engine
Exposure Line	2-personel	3rd Engine
Total	14-15 personnel	

As shown above, 14-15 firefighters are needed to accomplish the critical tasks necessary to control a moderate risk fire (2000 sq. ft.) in an efficient and effective manner. It should be noted that the table assumes the availability of three engine companies, one truck company, and a chief officer.

Appendix E - Risk Categories

Once risk factors have been identified by a fire agency, then risk categories should be developed. The fire service acknowledges the possibility that hundreds of different types of risk categories could exist within any individual community. Nevertheless, for a risk assessment to be effective, it must be manageable. Every occupancy should be placed into one of the following five risk categories.

Maximum Risk

An area or building to be classified as maximum risk should be of substantial size and contain properties presenting a high risk of life loss, loss of economic value to the community, or large loss in damage to the property in the event of a fire. Such areas would ordinarily be the highest fire flow areas. The structures within them may lack built in fire protection features and may contain occupants not capable of self-preservation. Examples of maximum risk areas include the following:

- a) main shopping and business centers, large department stores, shopping malls, multi-story hotels, and office properties;
- b) concentrations of high-risk industrial and commercial properties including hazardous materials facilities;
- c) concentrations of theaters, cinemas, clubs, dance halls, bars and other areas with potential for large life loss;
- d) buildings over two stories high with or without built in fire protection;
- e) occupancies with occupants that may require assistance such as nonambulatory or restrained persons (i.e., nursing homes and hospitals);
- f) build up of residential properties adjacent to maximum and high-risk areas;
- g) any occupancy over 10,000 square feet without built in fire protection. Maximum risks frequently impact a fire agency's needs for multiple alarm capability and an adequate assessment of its ability to concentrate resources. Failure to identify these risks often results in the inability to control loss when a fire of this category of risk occurs. Proper risk identification of maximum risks is also fundamental to the assessment of need for an individual agency's mutual and automatic aid resources.

High-Risk

A high-risk area or building is defined as one that contains properties presenting a substantial risk of life loss, a severe financial impact on the community, or unusual

potential damage to property if there is a fire. Examples of such areas include the following:

- a) strip shopping centers and business centers not exceeding two stories;
- b) concentrated areas of revenue generating properties or high job loss to the community if business is lost;
- c) infrastructure facilities such as District, state, and federal facilities;
- d) large residential buildings exceeding 5000 square feet (mansions);
- e) properties deemed to be of historical value to the community; and
- f) any building with life safety and fire load beyond the reach of preconnected hose lines (200 feet).

Moderate/Typical Risk

An area or building is classified as a moderate risk when it contains built up areas of average size and the risk of life loss or damage to property if there is a fire in a single occupancy is usually limited to the occupants. In certain areas such as small apartment complexes, the risk of death or injury may be relatively high. Concentrations of property may vary, but generally will be of limited extent. Examples of moderate risk areas include the following:

- a) developments of generally detached single family housing;
- b) apartments with pre-connected hose line access (200 feet);
- c) industrial or commercial buildings under 10,000 square feet with built in fire protection not classified as maximum or high hazards. These risks are often the greatest factor in the distribution of fire stations to ensure fair and equitable access to initial attack capability.

Remote/ Isolated /Rural Risks

Areas or buildings may be classified as remote or rural risks if they are isolated from any centers of population and contain few buildings. Examples include the following:

- a) rural land with minimal occupied structures; and
- b) recreational areas.

Special Risks

Certain small areas, whether comprised of single buildings or complexes, require a first due response beyond that which is appropriate to the predominant risk of the surrounding area. These premises or small areas should be treated as special risks and given an appropriate predetermined response. Examples of such areas include the following:

- a) isolated maximum or high-risk structures when they are in other risk areas;
- b) railroad lines and interstates; and
- c) elementary, junior high, and high schools with or without built in fire protection.

Appendix F – Results of Community Survey

Please rate each of the following characteristics as they relate to the LFPD	Excellent	Good	Fair	Poor	% Responding
Overall value of the FD to the community	77%	21%	2%	0%	92
Overall appearance of fire dept apparatus	76%	24%	1%	0%	94
Overall appearance of fire dept staff & responders	68%	30%	2%	0%	81
Overall appearance of District facilities	67%	31%	2%	0%	93
Overall support to local businesses or residents	65%	32%	3%	1%	68
Overall support of community events and activities	64%	32%	3%	1%	75
Overall response times to your emergencies	64%	30%	4%	1%	48
Overall image or reputation of the LFPD	63%	34%	3%	0%	84
Overall rating of the fire department	62%	36%	2%	1%	87
Overall presence of dept & members in community	52%	40%	6%	1%	78
Overall accessibility to employees & board members	50%	37%	10%	2%	38
Opportunities to become LFD volunteer firefighter	48%	43%	7%	2%	39

The following data is from only those respondents who indicated that the LFD has responded to their residence.

Please rate each of the following characteristics as they relate to the LFPD	Excellent	Good	Fair	Poor	% Responding
Overall value of the fire dept to the community	81%	17%	1%	1%	28%
Overall appearance of fire dept apparatus	79%	21%	1%	0%	29%
Overall appearance of fire dept staff & responders	71%	27%	1%	0%	26%
Overall appearance of District facilities	70%	29%	1%	0%	29%
Overall support to local businesses or residents	69%	28%	3%	0%	21%
Overall support of community events and activities	67%	29%	3%	1%	23%
Overall response times to your emergencies	65%	30%	4%	1%	15%
Overall image or reputation of the LFPD	67%	30%	3%	0%	26%
Overall rating of the fire department	63%	34%	2%	1%	27%
Overall presence of dept & members in community	54%	39%	6%	1%	23%

Please rate each of the following characteristics as they relate to the LFPD	Excellent	Good	Fair	Poor	% Responding
Overall accessibility to employees & board members	50%	37%	9%	4%	12%
Opportunities to become LFD volunteer firefighter	49%	41%	7%	2%	12%
Please rate how protected (safe) or unprotected (unsafe) you feel from the following:	Very safe	Safe somewhat	Neither safe or unsafe	Very unsafe	% Responding
Business fires	64%	27%	8%	1%	78
Residential Fires	63%	32%	5%	1%	94
Assisted living facility fires	63%	27%	8%	1%	62
Haz-Mat fires	57%	32%	10%	2%	78
Natural disasters	40%	40%	17%	3%	75
Terrorist incidents	40%	34%	22%	4%	67
Please rate the quality of each of the following services or activities we provide	Excellent	Good	Fair	Poor	% Responding
Fire suppression	59%	37%	3%	1%	58
Ambulance services	58%	38%	4%	0%	61
Response to inquiries and complaints	51%	40%	7%	2%	37
Fire Marshal's office	47%	43%	8%	2%	24
Public education programs	46%	43%	9%	2%	54
Overall performance of LFPD government	46%	45%	7%	2%	54
Building inspections	44%	46%	8%	2%	33
Website	44%	42%	13%	1%	25
Public information	43%	43%	11%	3%	60
Public input/access to LFPD business/planning	34%	47%	13%	6%	37
City of Louisville Survey – Fire Services	60%	37%	3%	0%	Unknown
City of Louisville Survey – Ambulance Services	53%	42%	4%	1%	Unknown
Please rate your impressions of the following characteristics of LFPD employees and volunteer members	Excellent	Good	Fair	Poor	% Responding
Courtesy	69%	28%	3%	1%	63
Responsiveness	67%	30%	3%	1%	58
Overall impression	63%	34%	3%	1%	65

Please rate each of the following characteristics as they relate to the LFPD	Excellent	Good	Fair	Poor	% Responding
Knowledge	62%	35%	3%	1%	60
Response times within natl standards	79%	18%	3%	1%	92
Important to maintain Louisville specific fire dept	79%	17%	2%	1%	92
Build stations where they can meet above standards	60%	32%	6%	2%	91
Important to maintain station in old town	55%	32%	9%	4%	79
Have amb response times improved since LFD took over	53%	39%	6%	2%	27
Support 5,000 sq ft sprinkler ordinance - new structures	43%	38%	12%	7%	85
Consider \$5/month tax increase to support round the clock career staffing	38%	39%	13%	10%	92
Important to maintain mostly volunteer dept	29%	46%	19%	6%	70
As the District completes implementation of its comprehensive plan, to what extent do you support or oppose each of the following development questions or characteristics in the LFPD	Strongly Support/ Agree	Somewhat Support/ Agree	Somewhat Oppose/ Disagree	Strongly Oppose/ Disagree	% Responding
Maintaining low property tax more important than building a new fire station	22%	30%	33%	14%	86
Support bond to build new station	20%	44%	21%	15%	88
Maintaining low property tax more important than quick response times	15%	26%	35%	25%	89
Consider joining LFD to maintain low tax rate	13%	21%	15%	50%	71
Establish special improvement District tax	38%	39%	12%	10%	81
Should LFD provide prescribed burns	39%	45%	10%	5%	86
How important, if at all, is each of the following questions	Essential	Very Important	Somewhat Important	Not at all Important	% Responding
Smoke/carbon monoxide detectors important in homes	62%	28%	9%	1%	96
Important to meet natl response time guidelines	50%	37%	12%	2%	94
Important to work or do business in sprinklered bldg	34%	37%	25%	4%	96
Important for LFD to maintain family's	32%	38%	25%	6%	96

Please rate each of the following characteristics as they relate to the LFPD	Excellent	Good	Fair	Poor	% Responding
quality of life					
How important is it that each fire station be staffed with a minimum number of 3 firefighters, 24/7	27%	38%	29%	6%	93
Important for LFD to reduce ISO	21%	42%	33%	4%	89
Important to maintain volunteer fire dept	13%	24%	41%	22%	94
Important for dist to televise board meetings	9%	14%	41%	36%	96
Please select how often you use the following sources of information about the LFPD	Always	Frequently	Sometimes	Never	% Responding
District newsletter	18%	18%	28%	36%	97
Louisville Times	13%	18%	33%	36%	98
Boulder Daily Camera	12%	18%	28%	42%	97
District volunteer members or employees	3%	7%	19%	71%	97
LFD website	2%	2%	13%	83%	96
District Board meetings	1%	1%	6%	92%	96

Appendix F – 2005 Action Plan Completion Summary

Priority	Finding Number	Recommendation	In Effect	Responsible Party
1	4	<i>Strongly consider transitioning the volunteer pager on-call program to the “Duty Crew” model, (complemented by “pager on-call” volunteers). Complete new staffing implementation plan as an interim measure to improve staffing coverage.</i>	Complete	<i>Fire Chief</i>
1a	4	<i>The department should consider transitioning to a” reserve firefighter” program to reduce operating costs.</i>	Complete	<i>Fire Chief</i>
1b	3	<i>As an interim measure the department should consider re-engineering existing response procedures to reduce response times and maximize available personnel. Implementing a QRV or initial attack concept would minimize the need for highly qualified engineers for every call. This concept would also include placement of an additional type #6 or equal apparatus to be added to the fleet.</i>	Complete	<i>Fire Chief</i>
2	14	<i>All verbal mutual and auto aid agreements should be formalized. The department should also strongly consider joining the Denver Metro mutual aid agreement for the purpose of mass casualty and natural disaster incidents.</i>	Complete	<i>Fire Chief</i>
3	3	<i>Implement a staffing strategy that will ensure District coverage 24/7. A “combination” type staffing profile will improve; response times, initial attack capabilities, EMS intervention and survivability.</i>	Complete	<i>Fire Chief</i>
3a	3,5	<i>Hire a minimum of nine firefighter / paramedics and firefighter / EMTs. Personnel will also support all Fire, EMS and Fire Prevention programs to minimize operating costs.</i>	Complete	<i>Fire Chief</i>
3b	3,5	<i>As an alternative, policy makers must consider other ALS staffing requirements (should the preferred paramedic transport option not be feasible) i.e., Paramedic Engine Companies.</i>	Complete	<i>Fire Chief</i>
3c	14	<i>Board of Director's to adopt, by resolution, the departments performance and standards of cover goals. Seek the necessary public funding and support to implement the proposed programmatic need of the District.</i>	Complete	<i>Board of Directors</i>
3d	3	<i>Develop a communication system to help ensure a smooth transition to a combination department.</i>	Complete	<i>Fire Chief</i>

Priority	Finding Number	Recommendation	In Effect	Responsible Party
3e	3	<i>If the District implements an in-house ALS transport program, consideration should be given to eliminate redundancies and improve cost effectiveness. The District should consider a regional delivery approach by teaming with the City of Lafayette and Rocky Mountain Fire Authority. Each department will maintain local control; however resources and equipment can be shared to improve the eastern Boulder County EMS delivery system.</i>	Complete	Fire Chief
4	10,11	<i>Implement a fleet management replacement plan as outlined in the comprehensive planning document. The department should add one (1) Quint or Type -1 Engine to maintain the required fire flow for the District. Additionally, two (2), type-I ambulances should be procured to support implementation of transport ALS. The department should also strongly consider adding an additional type 6 apparatus to facilitate the QRV, initial attack concept. Finally, Refurbish 2716 by 2008.</i>	Complete	Fire Chief
4a	12	<i>Implement a computer based maintenance management system. Program will aid management in identifying reoccurring problems and help to predict apparatus and equipment life expectancy.</i>	Complete	Fleet & Facilities Division
5	15	<i>Develop a more formalized SOG and policy implementation program. The Department lacks many basic infrastructure support documents. The FD Management Team should develop as a minimum the Volunteer program manual and a more comprehensive SOG manual. Reformat current procedures to meet a "Code" format, Develop a comprehensive Safety plan (NFPA 1500 Occupational Safety and Health Program), develop Job descriptions for all current and future positions.</i>	Complete	Fire Chief
6	2	<i>Rebuild Station # 1 in the current location resulting in a building which is up-to-date with respect to current Building Codes. A third fire station should be constructed in the southeast part of the District to decrease response times for the high-risk occupancies in the area and to support the City of Louisville's planned commercial and residential growth.</i>	Complete	Fire Chief
6a	13	<i>Implement a graded approach to upgrade the department's antiquated information management systems including but not limited to; telecommunications, wake-up alert systems, NFIRS data reporting system, NEXTEL phones for all command and career staff, etc.</i>	Complete	Fire Chief

Priority	Finding Number	Recommendation	In Effect	Responsible Party
7	1	<i>Develop a more comprehensive risk inventory system. This includes an expansion of the existing pre-fire plans. It is also desirable to complete at least 10 high hazard target occupancies each year. The Department should consider contracting this activity to facilitate completion.</i>	Complete	Fire Chief
8	7	<i>Develop a Fire Prevention Program manual that outlines how all prevention and life safety programs are managed. Develop a set of procedures that outlines the programs expectations and outlines the program elements</i>	Complete	LSFPD
8a	7	<i>Upgrade the LSFPD inspection reporting and tracking system. Strongly consider transitioning to computer generated inspection reports. This should reduce unnecessary manipulation of inspection documents and reduce duplication of efforts. A computer based system will also assist in developing a much needed trends analysis to identify reoccurring hazards.</i>	Complete	LSFPD
8b	8	<i>Evaluate public educational opportunities. To the extent possible, provide at least 4 CPR classes each year to the public. Expand PubEd programs.</i>	Complete	LSFPD
9	6	<i>Hire a full time training and professional development officer.</i>	Complete	Fire Chief
9a	6	<i>Develop and implement a comprehensive training program manual and support SOGs. This objective is critical to maintain program continuity and safety.</i>	Complete	Training Division
9b	6	<i>Upgrade the existing learning resource center at Station #1. Until a new facility can be constructed, the existing facility must have the necessary tables, chairs & AV equipment to meet the department's continuing education requirements.</i>	Complete	Training Division
9c	6	<i>Transition all certifications programs to IFSAC. To the extent possible train a group of personnel to NWCG-S190/130 (for the purpose of supporting mutual aid and to improve wildland safety).</i>	Complete	Training Division
9d	6	<i>Evaluate the feasibility of constructing a small training facility within District boundaries. Also evaluate the possibility of locating a county training facility in the District.</i>	Evaluation Complete	Fire Chief
10	9	<i>Initiate an annual review of department specific goals and objective of each program element. This review should include baseline and benchmark performance measures for fire services. Consider utilizing a retreat concept to facilitate this process.</i>	Complete	Board of Directors

Priority	Finding Number	Recommendation	In Effect	Responsible Party
12	14	<i>Continue to support the City of Louisville and Boulder County disaster management plan.</i>	Complete	<i>Fire Chief</i>

Appendix G - Financial Comparison of Local Fire Protection Districts (2010 Data)

