Agenda Item #:_____

Staff Report
City of Manhattan Beach

TO: Honorable Mayor Cohen and Members of the City Council

THROUGH: Geoff Dolan, City Manager

FROM: Fire Chief Scott Ferguson

DATE: March 31, 2009

SUBJECT: Fire Department Staffing Study

RECOMMENDATION:
Staff recommends that the City Council approve the recommended staffing levels (build-out) identified within the Fire Department Staffing Study. Staff also recommends that we be directed to return to the City Council with alternatives and recommendations for an appropriate phased-in implementation.

FISCAL IMPLICATION:
Affirming build-out will have no immediate financial impact. As various comments are approved for implementation, there will be significant costs to the General Fund. These will be fully evaluated as the alternatives are proposed.

BACKGROUND:
As part of the 2008 Council Work Plan, the Manhattan Beach Fire Department (MBFD) staff was asked to conduct a comprehensive analysis of its efficiency and response capability, and return with sufficient information to identify an appropriate operational and administrative staffing level to serve the community.

DISCUSSION:
The core of the Study centers on the following aspects:

1. Education on response time, resource management, and fire behavior;
2. Analysis of fire department industry standards;
3. A comparison of similar fire departments; and,
4. A hazard versus Risk Analysis.

From this research, a recommendation has been provided relating to what an appropriate level of fire department staffing should be within the City of Manhattan Beach.

Attachments: A. Fire Department Staffing Study
B. Fire Association's Staffing Perspective

Manhattan Beach Fire Department

Staffing Study

Presentation to City Council
March 31, 2009

A tradition forged by fire, and strengthend by change

Message from the Fire Chief

As part of the 2008 Council Work Plan, the Manhattan Beach Fire Department (MBFD) staff was asked to conduct a comprehensive analysis of its efficiency and response capability, and return with sufficient information to identify an appropriate staffing and resource level for the community. While many of the findings were intuitive, others were not. Over the years, the MBFD has seen the scope of their work evolve from a group of *firemen*, whose sole purpose was to extinguish *fires*, to managing the broader responsibilities of paramedic–hazardous material–technical rescue–and public relations *firefighters*. And, while the best of fire service traditions have allowed the profession to adapt, they have not always served its membership well when it comes to sharing these changes and their impact to others outside the industry.

Ironically, one of the MBFD's greatest obstacles to analyzing its staffing needs may have been the high level of customer service already provided to the community. It is certainly not unreasonable to think that if complaints are low, then staffing must be appropriate. Essentially: "If it isn't broke, don't fix it." The problem is that, while the fire service may not be broken, the environment in which firefighters work has changed enough to warrant a closer look.

So, what has changed?

Even as technology has become increasingly critical in the control of an incident, it has also indirectly contributed to an increase in the magnitude of the hazards faced by emergency responders. Lightweight construction materials and the introduction of synthetics into home furnishings have increased the volatility of a fire. The same design features entrenched within most contemporary architecture, including many of the homes found in Manhattan Beach, have also increased the likelihood of flashover, backdraft, and early structure collapse. The result has reduced the time available to escape from a fire from 17 minutes in 1975, to currently less than three minutes. "Better living through chemistry" has essentially poured fuel on to what used to be considered a relatively routine incident.

The National Fire Protection Agency (NFPA) reports that 85% of fire deaths and nearly 78% of fire injuries occur in residential structures. According to the tax assessor, of the over 13,000 structures within Manhattan Beach, 12,273 (94%) are considered single or multi-family occupancies (2007-2008). These range from a hammer and nails-constructed 1,200-square-foot bungalow filled with natural wood furnishings, to an unsprinklered, 4,500-square-foot mansion filled with flammable synthetics and clusters of photovoltaic solar collectors.

Like many fire departments across the country, the MBFD has expanded services to make its relevance increasingly universal. The most notable of which has been the addition of emergency medical services (EMS), a practice that first emerged in California in the 1960s. The Department has also experienced gradual increases in call volume, administrative controls, state and federal mandates, and disaster preparedness. Efforts to reinvent themselves into "all-risk" agencies, has left many fire departments across the country without the requisite resources to mange their growing responsibilities. The MBFD is experiencing similar challenges.

Tough times can force a fire department to reassess and reprioritize how their budgets are spent. It is through this lens that the MBFD staff is assessing its ability to perform safely

and effectively. As a result, the purpose of the study was to find out if the current level of service is suitable for the comprehensive needs of the community. And, if not, what is?

The MBFD understands that not all our challenges can be solved by the City Council signing a check. The Department accepts the responsibility to continue analyzing those areas that we can make improvements. As such, the *study* will become one component of a more comprehensive strategic plan. This plan will become the yardstick from which future decisions will be prioritized and measured.

If staffing were managed without consideration for how it may impact other City departments or our citizens, the findings would stand alone. But decisions of this magnitude are not made in a vacuum; the firefighters are more than just employees, they are a part of the community. With this in mind, after nearly a year of research and development, the MBFD is prepared to offer what staff feels is a credible, thought-provoking analysis of Department's effectiveness as emergency responders.

The MBFD is not asking for immediate action. Instead the goal is to first, agree upon an appropriate staffing level (build-out), and second, ask the City Council to authorize a group of stakeholders to develop a plan for a phase-in implementation to include funding recommendations and an appropriate balance of operational and administrative personnel.

On a personal note, I am extremely proud of the men and women that collectively put this report together. It was the sort of test they do not face everyday, however the task was eagerly accepted and the final product is one that we can proudly present to Council.

EXECUTIVE SUMMARY

Mission Statement

The Mission of the Manhattan Beach Fire Department is to preserve life, property, and the environment through decisive action, strong leadership, teamwork, and dedicated community partnerships.

Purpose: The purpose of this Staffing Study was to conduct an objective evaluation of the effectiveness, efficiency, and safety of the Manhattan Beach Fire Department (MBFD). The assessment benchmarked the Department against other agencies and industry best practices, analyzed existing and predicted performance, and identified potential funding sources.

MANHATTAN BEACH FIRE DEPARTMENT DEMOGRAPHIC (pg. 22)

Existing MBFD resources include:

- Twenty-four paid firefighters, 3 battalion chiefs, divided equally between three rotating shifts;
- Fifteen active paid-call firefighters (48% of available positions)
- The Fire Prevention Division includes a fire marshal, fire inspector, and five reserve (part-time) firefighters that together share a 40-hour week;
- Each engine company is staffed with a firefighter-paramedic, engineer-paramedic, and captain-paramedic;
- The rescue is staffed with two firefighter-paramedics;
- Each shift of nine works 48 consecutive hours on and 96 off;
- Manhattan Beach occupies 2 fire stations;
    - Station 1 is located at 400 15th Street, and houses a battalion chief, an in-service engine with a fixed 75-foot ladder, a paramedic rescue, a basic life support (BLS) ambulance, and one reserve engine.
    - Station 2 is located at1400 Manhattan Beach Blvd, and houses one in-service engine and one reserve engine.

Summary of Incidents for 2008

During 2008 the Department responded to a total of 3,158 emergencies. This is a 6.3% increase from 2007 totals of 2,958. The majority of the responses are to emergency medical service calls (EMS), with a total of 2,160 (68%). Motor vehicle accidents accounted for 145 of the EMS runs. Firefighters provided automatic/mutual aid 196 times as they continue to expand regional cooperation with neighboring fire agencies.

Moreover, Manhattan Beach firefighters responded to the October/ November wildfires, providing assistance in Santa Barbara, LA City, and Orange County a total of nine times.

Automatic and Mutual Aid

Special types of equipment are needed to be effective on the fireground. These include engine companies, hazardous materials, ladder/truck companies, paramedic units, air and light units, and rapid intervention crews (RIC).

Industry standards recommend a minimum of 15 firefighters for a first-alarm fire. With this in mind, the MBFD has entered into automatic and mutual aid agreements with neighboring fire agencies.

The Fire Prevention Bureau

The Fire Prevention Bureau responsibilities include:

- Enforcing fire codes and City ordinances;
- Construction plan check services for fire and life safety issues;
- Inspections of existing and new commercial and residential construction;
- Public education and special events.

PERFORMANCE INDICATORS (pg. 28)

While establishing fireground standards is a key first step in evaluating operational performance, it is equally essential to develop precise benchmarks related to the elements of response time. Eleven intervals, beginning with the initial call to the 911 dispatch center and ending with the arrival of an emergency responder, are measured independently. This process is necessary in order to ensure efficiency in those areas that can be influenced by enhanced technology and training. For 2008 the MBFD cumulative response time (911 dispatch to on-scene arrival) was 4-minutes and 28 seconds; 32 seconds better than the prescribed industry standard of 5-minutes. However, fire responses were over the same five minute standard (Priority 1 by 13 seconds; Priority 2 by 22 seconds).

DYNAMICS OF FIRE GROWTH (pg. 31)

Three Stages of Fire Growth

Controlling the variation in fire dynamics lies in finding reference points common to all fires, regardless of the risk-level of the structure, the contents of the structure, or the time the fire has burned. Regardless of the rate of burning, all fires go through the same three stages of growth.

- ***Smoldering Stage*** – This is the initial stage of a fire that begins a chemical chain reaction of heat release and burning;
- ***Incipient Stage*** – When the temperature gets high enough, flames are visible, but are still limited to the immediate area of origin;
- ***Flashover*** – When everything in the room instantaneously erupts into flame. This surge generates a tremendous amount of heat, smoke and pressure resulting in enough force to extend the fire beyond the room of origin through doors and windows or breaches in walls. It is not uncommon for this to occur within 8-minutes of ignition.

The cascade of events for a fire incident starts from the point of fire ignition and will continue until there is nothing left to burn. Without some form of interference, the exposure to the heat from the fire will cause the contents to reach ignition temperature and flashover will occur. Once flashover has occurred, the room of origin is no longer tenable for occupant search and rescue or offensive firefighting operations.

STANDARDS OF RESPONSE (pg. 33)

Fireground Operations

The dynamics of fire growth and risk analysis combine to determine the number and type of fireground tasks necessary to have the desired impact. These tasks are interrelated but can be separated into two basic types: fire flow and life safety. Fire flow tasks are those related to getting water on the fire. Life safety tasks are associated with finding trapped victims and removing them from the building.

There are some fireground tasks that are deemed as “critical” to execute in order to safely fight a fire. Depending on the complexity of the incident, these tasks require between 15 and 20 firefighters to accomplish.

Truck versus Engine

Engines and trucks compliment each other while operating on the fireground, though it is true that with few exceptions, engine companies can perform truck company functions, there are distinctions between the training and resources required by each:

Engine Company Operations

- Fire control
- Water supply
- Foam
- Master streams
- Standpipe/sprinklers
- Service calls
- Wildland
- Hazardous material

Truck Company Operations

- Aerial and ground ladders
- Search and rescue
- Technical rescue
- Forcible entry
- Utilities
- Vehicle extrication
- Elevated master streams
- Ventilation
- Overhaul
- Salvage

Emergency Medical Services

Medical calls for service can range from minor cuts and bruises to life threatening illnesses. However, given the direct correlation between time and a successful outcome, EMS time and performance measures are principally founded on cardiac survivability rates.

- Studies have shown that patients who receive CPR within 2-minutes and defibrillation within 4-minutes have a 30 % survival rate.
- The American Heart Association (AHA) recommends a minimum of two emergency medical technicians (EMT) and two paramedics to sufficiently manage a cardiac related incident.

RISK AND HAZARD ANALYSIS (pg. 41)

Risk versus Benefit

A principle reason for firefighter injury and fatality is the failure of the incident commander to consider the value of what might be saved against the risk taken by the emergency responders. While fireground operations are hazardous by nature, some factors clearly present more risk than is worth the benefit. Under normal fire fighting operations, risks are assessed against such factors as structural and fire conditions, hazardous materials, and life safety.

Occupancy Risk Definitions

The MBFD has defined four community risk categories. These are classified as maximum, high, moderate, and special risk. The standard for classification was established based on the potential consequences for a catastrophic event occurring within the occupancy. Of special concern are those areas in Manhattan Beach identified as high-density housing. These areas are considered a maximum hazard because of the relationship between how long it takes to deploy resources (time) and the degradation of combustibles (safety).

INDUSTRY STANDARDS (pg. 52)

The fire service has many local, regional, state, and federal industry standards that have an impact on department staffing. Principally, these take the form of standard operating procedures (SOP) intended to ensure continuity and safety on an emergency scene. Other standards are more global, and are recognized based on emerging trends and post-incident evaluations.

OSHA Respiratory Protection Standard 29 CFR 1910.134

A two-person rapid intervention crew (RIC) is required anytime a team enters an atmosphere that is immediately dangerous to life and health (IDLH).

The National Institute for Occupational Safety and Health (NIOSH)

The Firefighter Fatality Investigation and Prevention Program (FFFIPP) was created to determine factors that cause or contribute to firefighter deaths suffered in the line of duty.

Post-incident analysis' reveal numerous references to insufficient staffing as a partial cause for injury or death of firefighters.

International City Managers Association (ICMA)

ICMA cites various controlled experiments conducted by jurisdictions and universities that revealed the following staffing conclusions:

- If at least16 trained firefighters are not operating on the scene of a working fire within the critical time period, as fire spreads, dollar loss and injuries are significantly increased;
- As firefighting tactics were conducted and judged for effectiveness:
    a. 5 -person companies were 100% effective;
    b. 4 -person companies were 65% effective;
    c. 3 -person companies were 38% effective.

Insurance Services Office (ISO)

As a result of an October 2000 survey conducted by the ISO, the City of Manhattan Beach an overall ISO rating of three. Cities "that experience a change from a Class 3 to a Class 2, often see a 3% decrease in insurance premiums." However, based on several conversations with both ISO representatives and local insurance providers, there still remains some ambiguity as to what, if any, premium discounts are available to the residents or business owners of Manhattan Beach.

National Fire Protection Agency 1710

NFPA 1710 was issued as a standard designed to set minimum criteria for the staffing of firefighting and medical crews, and how they will respond and operate at emergency scenes. Key provisions include:

- An engine company should arrive within 4-minutes; and a full alarm assignment within 8-minutes 90% of the time (2008: MBFD was compliant 43%);
- The initial arriving company shall have the capability to implement an initial rapid intervention crew (IRIC);
- Fire companies shall be staffed with a minimum of four on-duty personnel per company;
- A minimum of 15 firefighters (four or more per company) are needed within the first 8-minutes.

NFPA 1500 – Standard on Fire Department Occupational Safety and Health

The NFPA 1500 Standard contains minimum requirements for a fire service-related occupational safety and health program. It recommends that the minimum acceptable fire company staffing level should be four members responding on or arriving with each engine or each truck company responding to any type of fire.

NFPA 1410 – Training Standard on Initial Fire Attack

The NFPA 1410 Standard contains the minimum requirements for evaluating training for initial fire suppression and rescue procedures used by fire department personnel engaged in emergency scene operations. These stipulations require at least two firefighters enter the IDLH atmosphere and remain in visual or voice contact with each other at all times.

NFPA 13D – Residential Sprinkler Systems

Residential sprinkler systems buy firefighters time by limiting the spread and severity of fire. When a house fire occurs, one and two family dwellings with a wet-pipe sprinkler system and smoke alarms were found to have 100% fewer fatalities, 57% fewer civilian injuries, and 32% less direct property loss than one and two family dwellings equipped only with smoke alarms. The International Code Council (ICC) passed a proposal that, if adopted in California, may mandate that all new single-family dwellings be required to install sprinkler systems effective January 1, 2011. Manhattan Beach has a sprinkler ordinance that has a limited impact to residential buildings, and is enforced in commercial buildings over 2,000 square feet.

STAFFING COMPARISONS (pg. 63)

While there have been many staffing, safety, and efficiency studies conducted by various departments over the years, the following are a few of the more prominently referenced examples:

Bozeman Fire Department (2006)

The western United States median for agencies serving similar communities with a residential population between 25,000 and 49,999 is one firefighter per 1,000. ICMA places the national average of on-duty firefighting strength of a city fire department at 0.57 per 1,000 populations. The MBFD on-duty ratio is 0.26 per 1,000. Administratively, the support staff ratio to operational personnel is 15 to 20%. Bozeman's ratio was 12.69%; the MBFD is 12.5%.

Omaha Fire Department (2007)

The recommendations included reducing the existing staffing on engines and trucks from four personnel to three. These data suggested that staffing could be reduced while still meeting the minimum staffing and the 8-minute travel components of the NFPA 1710 response goals.

San Diego Fire Department (2008)

Business Process Reengineering (BPR) recommendations included:

- Maintaining four-person minimum staffing of engine and truck companies;
- Continuation of constant staffing;
- Continuation of the use of over-time to staff short-term vacancies in lieu of hiring additional personnel.

Dallas Fire Department (1984)

The study was performed as a series of controlled evolutions on a specified set of fire situations using different components in the range of 3 to 6 people. Findings included that a five person crew demonstrated a more coordinated and effective attack on a fire and search and rescue operation, while the four-person crew was capable of performing satisfactorily in controlling fire spread and in effecting the rescue operation.

Austin Fire Department (1993)

The study was designed to determine whether companies staffed with four firefighters were safer and more effective than the current three-person companies. The improved efficiency between the three-person and four-person crew ranged from 33% to 73%. The analysis revealed that the injury rate for four or five-person crew was 5.3 per 100 firefighters (5.3%) while the three-person companies experienced an injury rate of 7.77 injuries per 100 firefighters (46% higher).

Seattle Fire Department (1981)

This analysis indicated that the rate of firefighter injuries expressed as total hours of disability per hours of fireground exposure were 54% greater for engine companies staffed with three firefighters when compared to those staffed with four firefighters. Additionally, those companies staffed with five firefighters had an injury rate that was one-third of that associated with four-person companies.

FEMA - Report on the Survey of Fire Suppression Crew Size Practices (1982)

The study determined that there was a direct correlation between firefighter safety and the number of personnel on the initial fire attack.

Manhattan Beach – Response Time Study

An evaluation was conducted in two separate locations within Manhattan Beach. The objectives of the exercise were to: 1) analyze the impact of those high-density, limited access residential areas on response time, and 2) assess the significance of having three versus four personnel on a response apparatus.

- The first drill was conducted at an address considered typical of a neighborhood with adequate access and exposures. The results indicated that a four-person crew was 1 minute and 10 seconds faster than the three-person crew.
- The second drill was conducted at in a residential area identified as having difficult access, overhead wires, and minimal space (6 to10 feet) between occupancies. An analysis of the data concluded; the four-person evolution was nearly 3-minutes (2:46) faster than the three-person evolution;

436 36th Place, Manhattan Beach

On November 10, 2008, the MBFD was called to respond on a structure fire on 36th Place. A post-incident breakdown of the response data is provided as an example of how quickly resources are likely to respond to a structure fire when all units are available.

Flashover had already occurred by the time the first units had arrived (06:53 from initial 911 call). A full first alarm was not available on the fire until over 19-minutes (19:34) into the incident.

Comparable Reports

- National Fire Protection Association Fire Analysis and Research Division (2005) – Total number of firefighters per 1,000 in population:
  - Population 25,000 to 49,000: Low – 0.00; Median – 1.27; High – 2.83
  - Manhattan Beach has .91
- U.S. Public Law 106-398 (2002) – Average number of career firefighters per department; on-duty available to respond to emergencies, by size of community:
  - Population 25,000 to 49,000: 18.8 firefighters
  - Manhattan Beach has 9 firefighters
- Comparable cities with population ranges from 30,000 to 50,000 indicated the following firefighters per 1,000 in population:
  - Manhattan Beach: 0.26
  - Beverly Hills: 0.68
  - Brea: 0.4
  - Culver City: 0.45
  - La Verne: 0.65
  - Monrovia: 0.48
  - **Regional Median: 0.53**
- Area A and G Population Protected, firefighters per 1,000 Persons:
  - Manhattan Beach: 0.26
  - Redondo Beach: 0.3
  - Hermosa Beach: 0.36
  - El Segundo: 1.16
  - Santa Monica: 0.36
  - Torrance: 0.34
  - Beverly Hills: 0.69
  - Culver City: 0.4
- Area A and G engine and truck Staffing levels:
  - Manhattan Beach: Engine - 3; Truck - 0
  - Redondo Beach: Engine - 3; Truck - 4
  - El Segundo: Engine - 3; Truck - 4
  - Santa Monica: Engine - 4; Truck - 5
  - Torrance: Engine - 4; Truck - 4
  - Beverly Hills: Engine - 4; Truck - 5
  - Culver City: Engine - 3; Truck – 4
  - Hermosa Beach: Engine - 3; Truck - 0

Administrative Staffing Comparisons

Emergency Services Consulting recommends a 15 to 20% ratio of administration and support staff of operational personnel. The MBFD is at 12.5%. A survey of our Area A and G cities revealed that, of the administrative positions queried, the Hermosa Beach and Manhattan Beach Fire Departments were the only agencies without the support of a management analyst, receptionist, and emergency manager. Similarly, the MBFD was the only agency without a 40-hour training officer.

A City of Manhattan Beach internal study found that by comparison, the MBFD and the City Attorney's Office were the only entities that had a single person as administrative support.

Administrative Support

A second internal study indicated the MBFD front door was locked 278.5 hours during a 10 ½ -month period. Adding the one-hour lunch period, sick days, and vacation time, roughly equates to 2.3 hours of the 8-hour business day that the door is locked.

Additionally, a phone log was kept of all external calls between August 25, 2008, and November 7, 2008. The average call volume per day was 31.8, with the highest call volume occurring between the hours of 8:00am and 12:00pm at 15.8 calls.

Charted within the same study is a summary of the job responsibilities attributed to the positions of a receptionist and executive secretary. The results indicate that the current position is, a) not able to execute all specified executive secretary or receptionist job duties, and b) performs many functions traditionally filled by other job descriptions, such as management analyst, clerk, or public educator.

Emergency Management

A Battalion Chief (BC) has been filling the role of the emergency manager; however, it has had a direct impact on hours attributed toward shift members training, planning, and reacting to core job responsibilities. In supporting the Department's Community Emergency Response Team (CERT) and while preparing for the region's 2008 Golden Guardian exercise, the BC averaged approximately 60 hours per month for disaster preparedness; 6 of these hours required overtime. The BC has indicated that several areas have been adversely impacted as a result of insufficient time spent with his shift and community outreach programs.

Volunteers

In an effort to augment the front office staff, volunteers have been recruited to answer phones and do assist with filing. While the intent of the volunteers has been appreciated, to date, the successes have been marginal. Consistent scheduling and a lack of confidence and technical expertise are among the challenges encountered.

FINAL RECOMMENDATIONS FOR BUILD-OUT (pg. 81)

In order of priority, the recommendation for build-out includes:

1. Constant staff one additional firefighter on Engine 21 per shift. This would add a total of three new full time employees (3 FTEs);
2. Management Analyst (1 FTE);
3. 40-hour Training Officer/Emergency Manager (1 FTE);
4. Constant staff a second Rescue at Station 22 (6 FTEs);
5. Fire Inspector (1 FTE);
6. Administrative Receptionist (1 FTE).

It should be noted that there are those members of the Fire Association, some of which were represented on the Study Committee, that believe that if Council were to agree to any additional staffing, all sworn positions should be hired before any administrative staff are added.

Ladder Truck (12 FTEs) – While a ladder truck has not recommended as an option within the initial study, it is worthy of consideration in the years to come. The study acknowledges both the minimum staffing requirements necessary to operate effectively and efficiently on a fire scene, and the critical tasks typically managed by a truck company. However, the expense of the apparatus and the requisite equipment, combined with the cost of staffing it, has precluded it as an initial consideration for build-out.

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Manhattan Beach Fire Department Staffing Study

SECTION 1 – INTRODUCTION

Purpose

The purpose of this staffing study (study) was to conduct a comprehensive analysis of the efficiency and response capability of the Manhattan Beach Fire Department (MBFD), and return with sufficient information to identify an appropriate staffing and resource level for the community. The assessment benchmarked the MBFD against other agencies and industry standards, analyzed current and predicted performance, considered funding sources, and based on the results, has prepared a recommendation for action to the City Council (Council).

Background

As part of the 2008 Work Plan, Council provided direction to a) identify an appropriate staffing level, b) research alternative funding sources and, c) recommend an appropriate phase-in period. This guidance led to a series of meetings with each of the three Fire Department shifts to seek their continuing assistance as key stakeholders in the process.

Two teams were created as a result of the initial meetings. The goals of the first group included developing a mission statement and list of values from which the study could build. The second team was tasked with breaking down the project into manageable pieces and establishing measurable objectives. In the end, the mission committee finished their project within a few sessions, while the study committee remained active until the completion of the study for better than nine months.

Table 1 – Project Teams

Mission and Values Committee			
1	Chief Scott Ferguson	4	Firefighter Jeff Rice
2	Firefighter Tom Desmond	5	Firefighter Rudy Mejia
3	Firefighter Mike Murrey	6	Firefighter Tim Viselli
Staffing Study Committee			
Fire			
1	Chief Scott Ferguson	7	Engineer Jim Muth
2	BC Frank Chiella	8	Firefighter Matt Simkins
3	BC Ken Shuck	9	Engineer Brian Yount
4	Captain Derek Edmonds	10	Intern – Soraya Sutherlin
5	Captain Jeff Sanders	11	Exec. Secretary Cleo Vasquez
6	Captain David Shenbaum		
City Staff			
1	City Manager Geoff Dolan		
2	Assistant to City Manager – Lindy Coe-Juell		
3	Finance – Bruce Moe		
4	Human Resources – Cathy Hanson		

Soraya Sutherlin (a graduate student from California State University, Long Beach) was hired as an intern dedicated specifically to assist in the process. Her energy and perspectives proved to be a valuable asset as the study progressed. Aside from conducting much of the research, Ms. Sutherlin became the hub through which much of the information and direction was communicated. She helped facilitate the regularly

scheduled team meetings and conducted intermittent project meetings with each of the team leaders.

Mission Statement

The (new) Mission of the Manhattan Beach Fire Department is to preserve life, property, and the environment through decisive action, strong leadership, teamwork, and dedicated community partnerships.

SECTION 2 – DEMOGRAPHICS

Community Profile

The City of Manhattan Beach has a total area of 3.93 square miles. Within that area reside 36,536 residents in roughly 15,500 households including available rental space (U.S. Census Bureau, 2007). In 2008 the City's median home value was $1,572,500 (down 5.2% from 2007), ranking Manhattan Beach second, behind only Beverly Hills, in Los Angeles County (California Association of Realtors, 2008).

The City is divided into several distinct areas including the Village, Sand, Hill, Tree, Gas Lamp sections, as well as Manhattan Heights, East Manhattan Beach, Liberty Village and North Manhattan Beach. The highest combined assessed valuation of residential property is located in the Hill and Sand sections. The area with the highest population density, due to the layout of the streets and properties, is North Manhattan Beach. Of the existing housing units in Manhattan Beach, roughly 61.4% were built between 1940 and 1979. Additionally, 33% of units in Manhattan Beach average 4 to 5 rooms per dwelling (Census Bureau Fact Finder, 2009). A survey of residential building permits issued in an 11 month period between July 2007 and May 2008, shows a total of 84 new single family dwellings and 257 remodels. This construction has effectively transformed the City's housing from single family bungalows into homes ranging from 3,000 to 5,000 sq. ft. Note that the standard lot setback is 3 feet, thus allowing 6 feet from wall to wall between residences.

Additionally, commercial development has grown rapidly since the original "mom and pop" small businesses of the late 1940's, 1950's, and early 1960's. Large commercial businesses include Northrop Grumman, Raleigh Studios, the Marriott Hotel, Manhattan Village Mall, Fry's Electronics, and the Twin Towers Hi-Rise Office buildings.

The City is host to a number of large-scale special events that include the Old Hometown Fair and associated 10K run, the International Surf Festival/6-Man Volleyball Tournament, the Manhattan Beach AVP Volleyball Open, and the Holiday Fireworks display. Consequently, these events attract a large transient population, swelling the city population by 30,000 persons a day/event.

Proposition 13 (Jarvis-Gann Tax Initiative)

Between 1975 and 1978 the property values in California increased by 70%. Consequently, property taxes increased proportionally, inflating property tax values to unprecedented levels. Seen as financially burdensome by many homeowners, in 1978 a tax reform initiative (Jarvis – Gann/Prop 13) was approved by the voters. Included in the terms of the initiative was a substantial decrease in property taxes, as well as stringent

limitations on raising future property taxes therein. The initiative passed and was implemented in June of 1978. Property taxes decreased substantially to an average of 57% per dwelling and were restricted to no more than a 2% increase per year (Moore, S., 1998).

Many public services such as police and fire were impacted directly by the initiative, leaving cities struggling to find alternative funding mechanisms. In an effort to offset the loss of property tax revenue, cities were forced to re-adjust their budgets to compensate for the lost revenue. Other revenue streams included sales tax from retail stores, "big box" outlets (shopping malls), and an increase of cities' fee schedules. Noting the commercial development since 1978, Manhattan Beach has gained a good number of large square footage retail outlets as well as commercial/industrial business, all in keeping with alternate revenue generation.

Fire Department Profile

Things have changed over the past 100 years. What was once a vocation predicated entirely on putting out fires, and requiring only a limited education, has evolved into a profession that calls for specialized education and training in medical services, hazardous materials, technical rescue, and disaster preparedness.

In 1912, as the City of Manhattan Beach became incorporated, a group of volunteers organized a fire task force to protect its citizens and their properties. Run by a hardware company, volunteers responded to fires as they occurred. In 1923, the Lion Tamers Club organized the City's first volunteer department. It was not until 1924, that firefighting for the city became a paid profession and not until 1941, during World War II that firefighters first began working 24-hour shifts (www.ci.manhattan.info).

The MBFD participates in both automatic and mutual (requested) aid programs with the other South Bay cities as well as on a state level during larger events such as wildland fires. Manhattan Beach has responded to numerous brushfires including those in Malibu, Ventura, Santa Barbara, Laguna, San Diego, Julian, Santa Clarita, Pine Mountain Club, Orange County, Camp Pendleton, as well as to Los Angeles during the civil unrest in 1992. Significant events in the City have included fires involving the El Sombrero restaurant, Champion Chevrolet, TRW (now Northrop Grumman), Coronet/Five and Dime building, as well as the more common single and multi-family dwellings.

In addition to fire suppression and prevention, all members are trained paramedics, hazardous materials first responders, and are also versed in both disaster and terrorism response. Individual assignments include paramedic inventory control, breathing apparatus maintenance, fire investigation, fire apparatus maintenance, fire hose inventory and testing along with a host of other specialties.

Existing MBFD resources include:

- Twenty-four paid firefighters, 3 battalion chiefs, divided equally between three rotating shifts;
- Fifteen active paid-call firefighters (48% of available positions);

- The Fire Prevention Division includes a fire marshal, fire inspector, and five reserve (part-time) firefighters that together share a 40-hour week;
- Each engine company is staffed with a firefighter-paramedic, engineer-paramedic, and captain-paramedic;
- The rescue is staffed with two firefighter/paramedics;
- Each shift of nine works 48 consecutive hours on and 96 off;
- Manhattan Beach occupies 2 fire stations;
    - Station 1 is located at 400 15th Street, and houses a battalion chief, an in-service engine with a fixed 75-foot ladder, a paramedic rescue, a basic life support (BLS) ambulance, and one reserve engine;
    - Station 2 is located at1400 Manhattan Beach Blvd, and houses one in-service engine and one reserve engine.

Auto and Mutual Aid

***First Alarm*:** The dispatching of pre-designated type and number of fire department resources targeted to address specific emergencies (Appendix E).

As an example:

- Chest Pain: 1 engine company and 1 paramedic unit (5 personnel);
- Structure Fire: 1 battalion chief, 3 engine companies, 1 truck company, and 1 paramedic unit (16 personnel);
- Commercial Building Fire: 1 battalion chief, 4 engine companies, 1 truck company, 1 paramedic unit (19 personnel);
- Major Vehicle Accident**:** 1 battalion chief, 2 engine companies, 1 truck company, 1 paramedic unit (13 personnel).

***Greater Alarms*:** Incidents deemed complicated and/or large enough to warrant the request of many resources; typically duplicating a first alarm and defined a second, third, or fourth Alarm. Unless otherwise requested, each alarm duplicates the type and number of resources of the first.

***Automatic Aid*:** Fire department units are automatically and immediately dispatched on a first alarm into another jurisdiction as part of a pre-arranged agreement.

***Mutual Aid*:** Fire department units respond after being requested by the incident commander (IC) to assist when the emergency situation exceeds the initial alarm or jurisdictional capabilities. By definition, mutual aid creates a delay in the arrival of those resources by requiring an initial dispatch, arrival, size-up and request before additional units can respond.

The MBFD daily staffing of nine on-duty firefighters is just over half (60%) of what has been identified by industry standard (NFPA 1710) to perform the critical tasks required to suppress a house fire involving a single room and contents, and a much smaller percentage of what is necessary to combat commercial building fire. To make up for this

shortage of resources, the Manhattan Beach Fire Department has entered into automatic aid agreements with neighboring fire agencies including the L.A. County, Redondo Beach, and Hermosa Beach Fire Departments. These agencies have all signed reciprocal contracts to provide fire units to each other on first alarm assignments.

To date, the El Segundo Fire Department has been hesitant to enter into a written automatic aid agreement. Although, they will respond a truck at our request, MBFD has not been successful in memorializing a formal contract. Discussions in this regard have centered on their constant staffing levels (18) being twice that of Manhattan Beach's (9), and that such an agreement would be perceived as subsidizing our community with their tax payer's dollars. El Segundo has enough on-duty personnel to fill a complete first alarm without calling for additional help from regional resources (El Segundo Fire Chief Kevin Smith, personal communication, February 15, 2009).

For structure fires, Hermosa Beach provides Manhattan Beach with a single engine company, Redondo Beach contributes a truck company and L.A. County provides an engine company to specific target hazards. In turn, Manhattan Beach has agreed to provide an engine company to Redondo Beach, Hermosa Beach, and L.A. County on their first alarms fire responses. The three cities of Manhattan Beach, Redondo Beach, and Hermosa Beach also provide paramedic units to each other when multiple and concurrent medical emergencies occur.

Complicating these agreements is the issue of delayed responses due to separate dispatch centers, different radio frequencies, and extended travel distances. When a Manhattan Beach Incident Commander requests a second alarm or greater, the responding units are dispatched from five different fire departments and operate on four unique radio frequencies. This may create delays in response, missed assignments, and an increase in radio traffic as units call for incident location, status, and assignments.

Summary of Incidents for 2008

During 2008 the Department responded to a total of 3,158 emergencies. This is a 6.3% increase from 2007 totals of 2,958. The majority of the responses are to emergency medical service calls (EMS), with a total of 2,160. Motor vehicle accidents accounted for 145 of the EMS runs. Firefighters provided automatic/mutual aid 196 times as they continue to expand regional cooperation with neighboring fire agencies. Manhattan Beach firefighters also responded to the October/November wildfires and assisted at fires in Santa Barbara, LA City, and Orange County a total of nine times.

Table 2 - Response Types

Call Type	Call Volume	Daily Average
Fires	**124***	**.34**
Emergency Medical Calls	**2,160**	**5.9**
Other Incidents	**426**	**1.2**
Hazardous Condition	**252**	**.69**
Out of City Responses	**196**	**.54**
Total Incidents	**3,158**	**8.65**

** Includes out of City responses to fires*

Table 3 - Fire Incidents

Type of Fire	2005	2006	2007	2008
Structure	53	61	58	46
Contained to room of origin	79%	82%	83%	87%
Mobile	12	7	10	15
Brush	9	11	9	18
Refuse	11	14	3	19
Other	13	10	4	26

The City experienced 124 fire responses in 2008. Of these, 46 (37%) were structure fires. Most (87%) of the fires were confined to the "room of origin." Fire damage was down this year with total losses of $251,247, and there were no fire fatalities in 2008.

Table 4 - Emergency Medical Incidents

EMS	2005	2006	2007	2008
Total Calls	1,868	1,871	1984	2,160
Daily average	5.1	5.1	5.4	5.9

The largest percentage of emergency calls in Manhattan Beach is for EMS. In 2008 the MBFD responded to 5.9 EMS calls a day. In 2007, 868 (29%) of these occurred concurrently with other emergencies requiring the MBFD to rely on neighboring auto-aid cities to provide back-up response. This number was up to 957 (31%) in 2008.

Table 5 - Out of City Incidents

Auto/Mutual Aid	2005	2006	2007	2008
Total Calls	175	101	136	196
Frequency/Week	3.4	1.94	2.6	3.8

Currently the fire department responds to an automatic or mutual aid request nearly four times per week (196). Conversely, in 2008 another fire agency responded into Manhattan Beach on 186 occasions.

Table 6 - Auto/Mutual Aid Exchange Rate

Department	Gave Auto/Mutual Aid	Received Auto/Mutual Aid
El Segundo (mutual only)	4	3
Hermosa Beach	139	125
Los Angeles County	12	6
Los Angeles City	2	-
Redondo Beach	39	52
Torrance	1	-

Computer Aided Dispatch Records Management System, 2008

Fire Prevention Bureau

> "The complexity of the fire alarm and sprinkler systems combined with technological advances in performance-based design makes the fire prevention division one of the most technical positions in the fire department."
>
> *- Fire Marshal Brett Lacey, Colorado Springs Fire Department*

Effective fire prevention and inspection programs pay off, not just in terms of reducing civilian losses, but in reducing firefighter injuries and the many costs associated with them (NIST, 2004). The driving force of the size and composition of a fire prevention bureau is dictated by the level of services it will provide to the community it serves. The duties of the fire prevention bureau are structured to function in concurrence with other divisions of the Department and share in the overall mission.

While the present demands placed on fire prevention call for a technically well-trained and motivated staff, bureaus can be staffed with any combination of sworn or civilian personnel. Recommendations on staffing recruitment and retention lie in the aptitude to understand what services the department must provide and what skills the existing workforce has to offer to provide those services (Lacy, B., & Valentine, P., 2007).

The MBFD Fire Prevention Bureau (FPB) is currently staffed with two sworn, full-time personnel. The Fire Marshal and the Fire Inspector each work a weekly schedule that consists of four work days of ten consecutive work hours (4-10). The schedules are staggered accordingly to allow for seamless coverage. The terms of both positions range from 18 to 24 months; again, spaced accordingly to provide the best possible service. The FPB also has five part-time inspectors, hired from the paid-call firefighter ranks. They each work an 8-hour day, one day per week, and are equivalent to one fulltime employee (FTE) working five days per week. The hours are coordinated through the FPB.

Inspections are managed through a computer-based inspection program called *Fire RMS*. This program is utilized by fire prevention and fire suppression personnel. It is maintained by a contracted civilian and the Fire Marshal.

Duties

The responsibilities of the FPB include enforcing the California Fire Code, the Uniform Fire Code, the Life Safety Code, and partnering with the City's Community Development/Building and Safety Division to enforce all building codes and City ordinances. The Fire Inspector is also responsible for enforcing fire and life/safety compliance for special events such as the Hometown Fair, the Six-Man and AVP volleyball tournaments, and the Holiday Fireworks.

The FPB provides fire construction plan check services and is responsible for inspections of all existing and new commercial and residential construction in the city. For FY 2008, the FPB completed 359 sprinkler, hood and duct (commercial kitchens), fire alarm, final fire commercial, and certificate of occupancy inspections. Of the 517 plans checks, 411 were conducted through the FPB and 106 were reviewed and then forwarded to a private contractor. Depending on the complexity, they were once again reviewed by the FPB for accuracy.

These inspections are augmented by engine company personnel from the fire suppression ranks. Single family residence inspections are provided by the MBFD upon request. For FY 2008, of the 1,100 assigned to fire prevention and suppression; 64% were completed.

The FPB manages the Hazardous Materials Program, which oversees the cleanup of spills, leaks, and illegal dumping. Additionally, the FPB provides hazardous material first responder training to MBFD suppression personnel.

Of special interest is the code and life/safety agreement managed between Raleigh Studios and the MBFD. The FPB oversees inspections and the permitting process at the complex. These duties occupy approximately 50% of the Fire Inspector's work day**.**

Public Education

Arguably, the best defense against disaster is that of prevention through education. The FPB is responsible for all public education efforts including those within Manhattan Beach elementary schools. While some requisite time is spent annually (October is Fire Prevention Month) on proactive public education, it has taken a back seat to emergency response and training. Given the MBFD's limited resources, the decision may seem prudent, however it should be noted that public education, as with fire inspections and pre-fire plans, has had a proven impact on life-saving efforts. To illustrate this point, consider the effect that educating the public about the importance of installing a smoke alarm (or detector):

- 96% of all homes have at least one smoke alarm. Overall, three-quarters of all U.S. homes have at least one working smoke alarm;
- 65% percent of reported home fire deaths in 2000-2004 resulted from fires in homes with no smoke alarms or no working smoke alarms;
- No smoke alarms were present in 43% of the home fire deaths;
- In 22% of the home fire deaths, smoke alarms were present but did not sound;
- The death rate per 100 reported fires is twice as high in homes without working smoke alarms as homes with working smoke alarms;
- An estimated 890 lives could be saved each year if all homes had working smoke alarms.

Improving public safety awareness on topics such as smoke detectors, fall prevention, disaster preparedness, residential sprinkler systems, CPR, and child safety are worthy strategic goals. Prevention saves lives (Mirkhah, P., 2007).

SECTION 3 – PERFORMANCE INDICATORS

Response Time Continuum

The Commission on Fire Accreditation International (CFAI) has defined response time elements as a cascade of emergency response. This sequence is similar to that used by the medical community to describe the events leading up to the initiation, mitigation, and ultimate outcome of a cardiac arrest (2003). Certain intervals are directly influenced by the fire service. Others, such as the discovery and notification intervals, may be impacted through public education and engineering initiatives. The fire service can also influence the call processing interval through its ability to define standards and help to improve performance by dispatch centers. The following chart demonstrates the elements of emergency response progression.

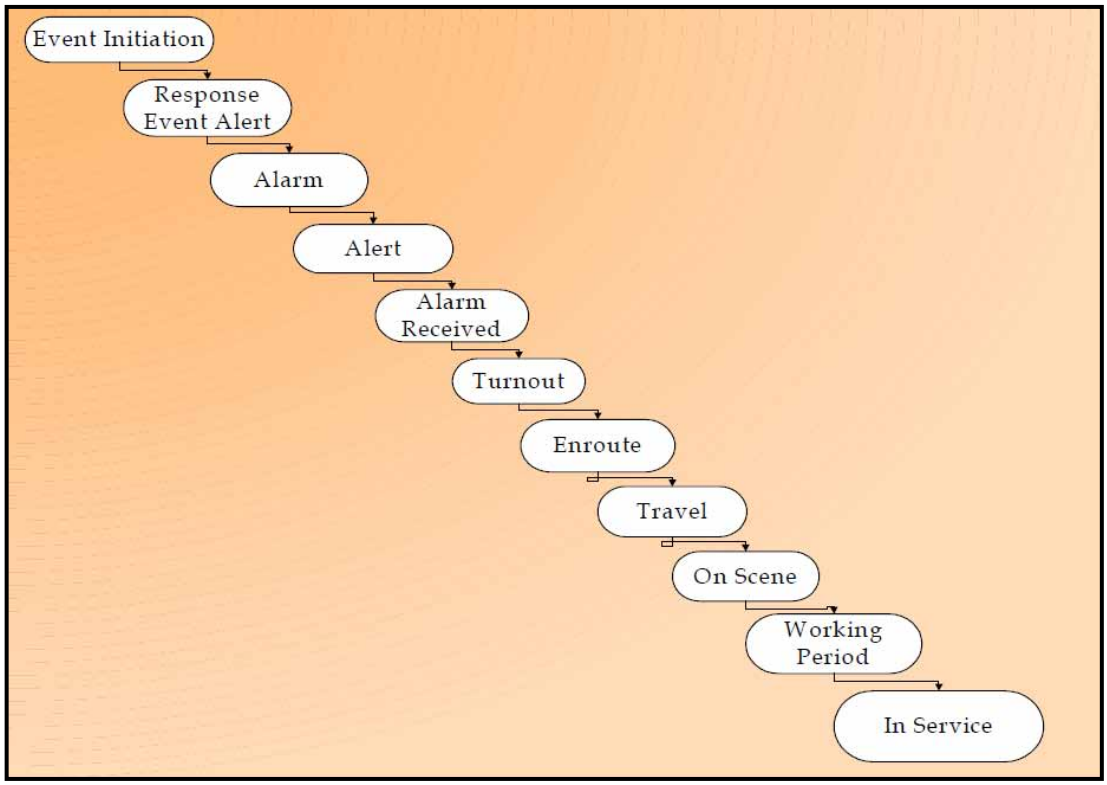


Figure 1 – Cascade of Emergency Response

Careful definition of terminology is essential to any conversation about response performance standards. It becomes even more critical when an organization attempts to benchmark its performance against other emergency service providers. The following definitions are utilized from the CFAI to standardize the discussion of response performance parameters:

- *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. An example is the patient who ignores chest discomfort for days until it reaches a critical point at which he/she makes the decision to seek assistance (point of emergency event awareness). It is rarely possible to quantify the point at which event initiation occurs;
- *Response Event Alert* — The point at which a human being or technologic "sentinel" (i.e., smoke detector, infrared heat detector, etc.) becomes aware that conditions exist requiring activation of the emergency response system. This is considered the point of awareness;
- *Alarm* – The point at which awareness triggers an effort to notify the emergency response system. An example of this time point is the transmittal of a local or central alarm to a Public Safety Answering Point (PSAP). Again, it is difficult to determine the time interval during which this process occurs with any degree of reliability. An interval exists between the awareness point and the alarm point. This interval can be significant, as the alarm may be transmitted to a distant

commercial alarm monitoring organization, which then re-transmits the alarm to the local 911 and dispatch facility. Another delay could be the delay in initiating the local emergency 911 notification system;

- *Alarm Received* – The interval between the first ring of the 911 telephone or the first alert of the alarm panel at the dispatch center and the time the computer aided dispatch (CAD) operator activates station and/or unit alerting devices;
- *Turnout time* – The interval between the activation of station and/or unit alerting devices and the time when the responding crew notifies the dispatcher by voice or mobile data computer (MDC) that the unit is responding. During turnout time, crews cease other activities, don appropriate protective clothing, determine the location of the call, board and start the fire apparatus. It is expected that the "responding" signal will be given when personnel are on board the apparatus and the apparatus is beginning to roll toward the call;
- *Enroute* – The time that the unit indicates that it has begun responding;
- *Travel Time* – Begins at the termination of the turnout time and ends when the responding unit notifies the dispatch center that it has arrived on the scene;
- *On-Scene* – The point at which the responding unit arrives on scene;
- *Working Period* – The point at which operations to mitigate the event begins. This may vary greatly with arrival on scene. An example would be treating a patient on the 3rd floor of an office building;
- *In Service* – The point at which a unit(s) has completed the assignment and is available to respond to another request for service.

Consistent with NFPA 1710, the MBFD has and adopted three compressed response time measures. These targets include:

- A one-minute dispatch processing time – 90% of the time;
- A one-minute turnout or "reflex" time – 90% of the time ;
- Four minutes or less from en-route to on-scene – 90% of the time.

The following is a record of the MBFD 2008 EMS and fire responses times. The chart excludes non-emergency service calls.

Table 7 – Response Time Report

Date Range: 01/01/2008 – 12/31/2008

	# Calls	Initiate to Entry	Entry to Dispatch	Initiate to Dispatch	Dispatch to Enroute	Enroute to On-scene	Dispatch to On-scene	Initiate to On-scene
Medical Calls	1,993	00:41	00:19	**01:01**	**01:16**	**02:50**	04:07	05:09
Fire – Priority 1	801	01:02	00:24	**01:27**	**01:29**	**03:44**	05:13	06:41
Fire – Priority 2	111	01:08	00:37	**01:45**	**01:37**	**03:45**	05:22	07:07
Totals	2,905	00:48	00:21	**01:10**	**01:20**	**03:07**	04:28	05:39

South Bay Regional Communications Center

Using NFPA 1710 as a guideline:

- Initiate to Dispatch (processing time) was 10 seconds over the prescribed standard. An analysis of other dispatching records indicates that call-taking falls within the 1-minute window 58% of the time (NFPA 1221 requires that the dispatch is completed within 1-minute, 95% of the time);
- Dispatch to on-scene (response time) was 32 seconds under the prescribed standard of 5-minutes. However, fire responses were over the same 5-minute standard (Priority 1 by 13 seconds; Priority 2 by 22 seconds).

Although the system's processing and turnout time was a combined 29 seconds over 1710's recommendations, the cumulative total is nearly a half a minute under the prescribed allowance.

SECTION 4- DYNAMICS OF FIRE GROWTH

Three Stages of Fire Growth

Controlling the variation in fire dynamics lies in finding reference points common to all fires, regardless of the risk-level of the structure, the contents of the structure, or the time the fire has burned. Regardless of the rate of spread, all fires go through the same stages of growth (Kennedy, P. M., & Kennedy, K. C., 2003).

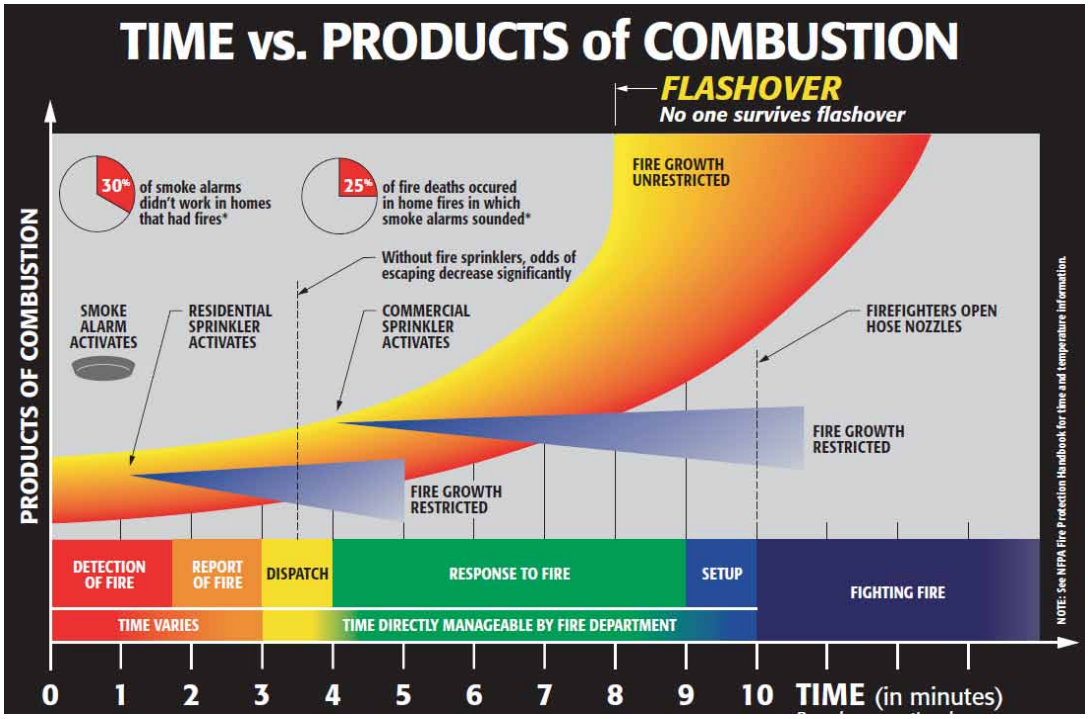
- *Smoldering Stage* – This is the first stage of any fire. When heat is applied to a combustible material, the heat oxidizes the material's surface into combustible gases. The oxidation process is exothermic, meaning that the oxidation process itself produces heat. The heat from oxidation raises the temperature of more material, which increases the rate of oxidation and begins a chemical chain reaction of heat release and burning. A fire can progress from the smoldering phase immediately or slowly, depending on the fuel, nearby combustibles and the surrounding air. For example, a wad of newspapers will smolder only a few seconds before progressing to the next stage, but a couch with a burning cigarette may continue smoldering for more than an hour.
- *Incipient Stage* – When the temperature gets high enough, flames can be seen. This stage is called incipient or open burning. The visible burning at this stage is still limited to the immediate area of origin. The combustion process continues to release more heat, which heats nearby objects to their ignition temperature, and they begin burning.
- *Flashover* – Not all the combustible gases are consumed in the incipient stage. They rise and form a superheated gas layer at the ceiling. As the volume of this gas layer increases, it begins to bank down to the floor, heating all combustible objects regardless of their proximity to the burning object. When flashover occurs, everything in the room instantaneously erupts into flame. This surge generates a tremendous amount of heat, smoke, and pressure resulting in enough force to extend the fire beyond the room of origin through doors and windows or breaches in walls. It is not uncommon that this condition would occur within 8-minutes of ignition.

The cascade of events for a fire incident starts from the point of fire ignition and continues until there is nothing left to burn. Without some form of interference, the exposure to the heat from the fire will cause the contents to reach ignition temperature and flashover will occur. Once flashover has occurred, the room of origin is no longer tenable for occupant search and rescue or offensive firefighting operations (Kennedy, et. al., 2003).

Time/Temperature Curve

The following chart depicts a typical flashover curve for interior structure fires. This is the point at which a fire shifts from "room and contents" to a "structure" fire – involving a wider area of the building and posing a potential risk to the structures surrounding the origin of the fire.

Figure 2 – Time vs. Products of Combustion



Fire Sprinkler Association, September, 2001

Note that this exhibit depicts a fire from the moment of inception, not from the moment that a fire is detected or reported. This demonstrates the criticality of early detection and fast reporting as well as rapid dispatch of responding units. This also shows the critical need for a rapid (and sufficiently staffed) initial response – by quickly initiating the attack on a fire, flashover can be averted. The following bullets describe in detail the major changes that occur at a fire when flashover occurs:

- It represents the last moment for effective search and rescue in a room involved in the fire. It means that likely death of any person trapped in the room – either civilian or firefighter;
- After this point in a fire is reached, portable extinguishers can no longer have a successful impact on controlling the blaze. Only larger handlines can provide enough water to affect the fire;
- The fire has reached the end of the "growth" phase and has entered the fully developed phase. During this phase, every combustible object is subject to the full impact of the fire;
- Structural collapse begins to become a major risk at this point and reaches the highest point during the decay stage of the fire (after the fire has been extinguished).

It should be noted that not every fire will reach flashover – and that not every fire will wait for the 8-minute mark to reach flashover. A crew can prevent or delay the occurrence by:

- The application of portable extinguisher or other *fast attack* methodology;
- Venting the room to allow hot gases to escape before they can cause the ignition of other materials in the room;
- Not venting a room – under some circumstances this will actually stifle a fire and prevent flashover from occurring.

In the absence of automatic fire suppression systems, access to interior fires can again limited by a safety requirement related to staffing levels. OSHA and related industry standards require the presence of at least 2-firefighters on the exterior of a building before entry can be made to a structure in which the environment has been contaminated by a fire (OSHA, 29 CFR 1910, 2005).

Table 8 graphically illustrates the importance of reaching the seat (point of origin) of a fire before flashover.

Table 8 – Death and Injury Rate per 1,000 Fires

Extension	Civilian Deaths	Civilian Injuries	Dollar Loss per Fire
Confined the fire to room of origin	2.45	38.09	$3,261
Confined to the floor origin	21.08	107.81	$23,742
Beyond the floor of origin	28.58	70.65	$35,834
Note: Residential structures include dwellings, duplexes, and manufactured homes, apartments, townhouses, hotels, motels, dorms and barracks.			

Source: NFPA Fire Experience Survey and National Fire Incidence Reporting System

SECTION 5 – STANDARDS OF RESPONSE

Minimum Company Standards (MCS) are established to measure response time and crew performance objectives. The results are applied as guidelines in the development of fireground procedures such as raising ladders, hose evolutions, and vehicle extrication.

Fireground Operations

The dynamics of fire growth and risk analysis combine to determine the number and type of fireground tasks necessary to have the desired impact. These tasks are interrelated but can be separated into two basic types: fire flow and life safety. Fire flow tasks are those related to getting water on the fire. Life safety tasks are associated with finding trapped victims and removing them from the building.

Fire flow tasks are typically accomplished with hand held hoses (handlines) or master streams (nozzles usually attached to the engine or truck). Each 1-3/4" hose requires a minimum of two firefighters. The hose can flow 130 gallons per minute (GPM), so when these lines are used, the fire flow is 65 GPM per firefighter. The 2-1/2" hose can flow 320 GPM and requires a minimum of three firefighters, yielding a flow of just over 106 GPM per firefighter. Master streams can flow from 500 to 2,000 GPM each. They take relatively fewer firefighters to operate because they are designed to be immobile.

The decision to use handlines or master streams depends upon the stage of fire and threat to life safety. If the fire is in a pre-flashover stage, firefighters can make an offensive fire attack into the building with handlines. The lines are used to attack the fire and shield trapped victims until they can be removed from the building. If the fire has extended beyond the capacity or mobility of handlines or the building damage is a threat to the firefighters' life safety, then the structure is declared lost and master streams are employed to keep the fire from advancing to surrounding buildings.

The life safety tasks are based upon the number of occupants, their location, their status (awake vs. sleeping), and their ability to take self-preserving action. For example, ambulatory adults need less assistance than non-ambulatory. The elderly and small children always require more assistance. The key to a success at a fire is adequate staffing and coordinated teamwork, regardless of whether the fireground tasks are all fire flow related or a combination of fire flow and life safety.

The MBFD performs aggressive offensive attacks whenever possible. The primary objectives are to put a hoseline between the victims and the fire and to contain the fire to the room of origin. Once an incident has been assessed (sized-up), an incident commander must make a determination of whether the fireground will operate under an offensive or defensive strategy. A defensive strategy is one that allows for no interior fire attack, and therefore no rescue of trapped victims is attempted. All firefighting is performed from the outside of the structure with a goal of containing the fire to the initial structure involved. Conversely, the offensive strategy is an aggressive interior fire attack with the principle priority being rescue.

Critical Tasks

Critical tasks are defined as those fireground responsibilities identified as necessary to complete in order to prevent flashover. In determining an appropriate level of response, an assessment must be conducted to establish the capabilities required to achieve those tasks within a timely manner.

A sampling of the individual critical tasks required at structure fires are listed below. When performing a critical task, personnel may be assigned to functions that are simultaneously performed if the incident objectives are to be successfully accomplished.

- *Attack Line* – A medium sized hose that produces 100+ GPM and is handled by a minimum of two firefighters, or a larger hose that produces 200+ GPM and is handled by three or more firefighters. Each engine carries a set of attack lines that are either pre-connected to the pump, folded on the hosebed, or in a special pack for carrying into high-rise buildings.
- *Search and Rescue* – A minimum of two firefighters assigned to search for victims and remove them from danger while a crew with an attack line protects them form the advancing fire. 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 ambulatory or capable of self-preservation.
- *Ventilation Crew* – A minimum of two firefighters assigned 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 multiple crews. Ventilation allows superheated gases and obscuring smoke to escape, reducing the possibility of flashover and providing attack crews with better visibility and reduced heat. It also provides the fire an exit route so that the attack crew can "push" the fire through the opening, thereby separating it from endangered people and unburned property.
- *Back-up Line* – Usually the same size as the initial attack 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 larger line staffed by three or more firefighters will be used for back up instead of a medium line where the type of fire is one that could grow rapidly if not stopped by the attack line.
- *Rapid Intervention Crew/Team (RIC)* **–** A minimum of two firefighters equipped with Self Contained Breathing Apparatus (SCBA) and available near the entry point to enter the structure and rescue the attack, search and rescue, or back up crew if something goes wrong. When the first four firefighters are on scene, the two outside firefighters are also known as the initial RIC. When the balance of the effective response force arrives and interior fire attack is continuing in hazardous atmospheres and conditions, a full company is assigned to be the rapid intervention crew.
- *Exposure Line* – Any sized attack line or master stream appliance staffed by two or more 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.
- *Pump Operator* – One firefighter assigned to deliver water under the right pressure to the various hoselines in use (attack, backup and exposure lines), monitor the pressure changes caused by the changing flows on each line and ensure that a water hammer does not endanger any of the hoseline 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 engine is near a hydrant (50 feet), but the hydrant location sometimes precludes this.

- *Water Supply* – A crew of one or more firefighters who must pull the large diameter hose between the engine and the nearest hydrants if not laid out on the way in, provide hookup to the hydrant and deliver a water supply to the engine before the engine's water tank runs dry. Depending on the required fire flow, this could take several additional vehicles with the resultant number of operators.
- *Command* – An officer assigned to remain outside of the structure to coordinate the attack, evaluate results and redirect the attack, arrange for more resources, and monitor conditions that might jeopardize crew safety.
- *Safety Officer* – An officer assigned within the Incident Command System (ICS) to ensure that department members on scene are following department policies and procedures to ensure the safety of the entire crew.
- *Utilities* – At least one firefighter to secure natural gas, electrical supply, and water to the affected structures.
- *Aerial Truck Operations* – If an elevated ladder operation is performed, at least one firefighter is needed to set-up the aerial to provide roof access and/or a master stream (1,000+ GPM).
- *EMS/Rehabilitation* – At least one firefighter to establish a treatment and rehabilitation sector to prepare for any victims found and any firefighters who are injured or physically drained.

The majority of structure fires in Manhattan Beach occur within high to moderate risk occupancies. Illustrated below are those critical tasks identified within NFPA 1710 to as being necessary to safely and effectively manage an initial first alarm assignment.

Table 9 – Critical Tasks for Initial Response

Task	Number of Firefighters
Attack Line	2
Search and Rescue	2
Back-up Line	2
Water Supply	1
Support for Hoselines	2
Pump Operator	1
Ventilation Crew	2
Utilities Support	1
Truck Operations	1
Command/Safety	1
Safety Officer	1
Rescue (RIC)	2
Total:	**16 – 18**

As indicated in the table, a minimum of 15 (16 with a safety officer) firefighters are needed to simultaneously accomplish the critical tasks necessary to control a moderate risk fire 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, and that the engine and truck companies are staffed with four firefighters each on a full alarm. The MBFD employs nine firefighters per shift, necessitating a request for additional units.

In the event of a maximum or high-risk fire, chief officers, and captains assigned to staff are expected to arrive on scene to provide command support. This expectation supports the on-duty response by adding up to 10 personnel for command functions such as planning, logistics, and administration.

The fire scene is unpredictable in many ways. While it is possible to state what critical tasks must be accomplished in order to extinguish the fire, it is not always possible to predict how many firefighters it will take to accomplish those tasks. For example, maximum and high-risk fires require additional firefighters to cover the various points of attack and incident management.

The number of personnel and equipment necessary to accomplish the critical tasks may vary as a result of the following factors:

- Delayed response
- Building construction
- Number of occupants
- Physical and emotional condition of occupants
- Extent of fire upon arrival
- Built-in fire protection
- Area of fire involvement
- Firefighter or civilian injuries
- Equipment failure

Critical tasking represents the number of firefighters needed on scene at the early stages of the fire. Several other tasks, such as salvage and overhaul, must be performed prior to termination of the scene. Additional units summoned for these tasks will increase the number of firefighters on scene.

Table 10 – Fireground Risk Assessment

TASK	MAXIMUM	HIGH	MODERATE	REMOTE
Search and Rescue*	4	4	2	2
Back-Up Attack Line*	4	4	4	4
Ventilation Crew*	2-3	2-3	2-3	2-3
Water Supply*	1	1	1	1
Pump Operator*	2	2	1	1
Utilities Support*	1	1	1	1
Truck Operations*	2	2		
Incident Command*	1	1	1	1
Safety Officer*	1	1		
EMS*	2-4	2-4		
Rehabilitation*	1-4	1-4	Handled by EMS	
IRIC Team*	2	2	2	2
RIC Team	4	4	4	4
Exposure Line*	2-4	2-4	0-2	0-2
Forcible Entry*	1-2	1-2	0-1	0-1
Accountability*	1	1	Handled by Command	
Salvage	Variable	Variable	Variable	Variable
Overhaul	Variable	Variable	Variable	Variable
Critique Officer	1	1		
Operations Officer	1			
Logistics Officer	1			
Administration Officer	1			
Planning Officer	1			
*indicates those activities that must be completed by first arriving units				
Totals	32-43	28-39	15-21	15-21

What is the Difference between an Engine and a Truck?

As noted, a first alarm assignment for the MBFD consists of Manhattan Beach E21, E22, R21 and B21, and relies on mutual aid from neighboring cities for an additional engine and truck company. The specified functions of a truck and engine are designed to complement each other by dividing the fireground tasks.

One common misconception about the role of a truck company (also referred to as ladder company), is that, given its ability to reach several floors above grade, it is designed strictly for high-rise functions. In fact, a truck company better describes the specialized training and responsibilities, not just the functional capability of the equipment.

Though it is true that with few exceptions, engine companies can perform truck company functions, there are distinctions between the training and resources required by each:

Figure 3 Engine and Truck Company Functions

ENGINE

- Fire Control
- Water supply
- Foam application
- Master streams (large water volume)
- Standpipe/sprinkler connection
- Service Calls
- Wildland
- Hazardous Materials

TRUCK COMPANY

- Arial and ground ladders operations
- Search and rescue
- Technical Rescue
- Forcible entry
- Secure Utilities
- Vehicle Extrication
- Elevated Master Streams
- Ventilation
- Overhaul
- Salvage

Emergency Medical Services

The MBFD responds to over 2,000 EMS calls per year. These calls include car accidents, childbirth's, strokes, heart attacks, difficulty breathing, and full codes (i.e., not breathing, heart has stopped). The Department also routinely responds to EMS calls that require treatment for more than one patient. These calls include vehicle accidents, chemical exposures, construction or industrial accidents, and any other event that occurs with several people in close proximity. Patient conditions can range from minor cuts and bruises to life threatening injuries.

Dispatchers are responsible for screening calls to establish the correct initial response. The first fire officer on scene may amend the response once conditions have been assessed. Standard operating procedures are used to request adequate personnel and resources.

Cardiac Patient Survivability

Rapid emergency medical response is essential in improving survival rates among patients experiencing a heart attack (Cummins, R., Ornato, J. P., Thies, W. H., et al., 1991).

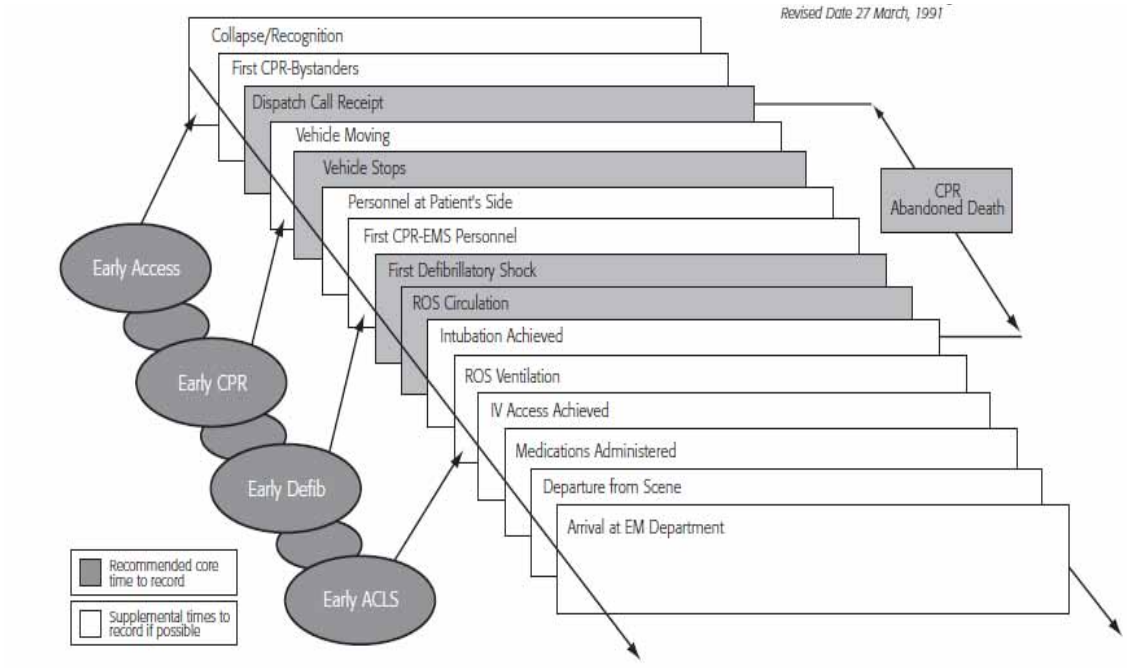
Table 11 – EMS On-Scene Time

Task	#	Type of Treatment Administered
Compressions	1	Compression of chest to circulate blood
Ventilate/Oxygenate	1	Mouth-to-Mouth, Bag-Valve-Mask, Apply O2
Defibrillate	1	Electrical defibrillation of dysrhythmia
Airway control	1	Manual techniques/Intubation/Cricothyroidomy
Establish I.V.	-	Peripheral or central intravenous access
Control hemorrhage	-	Direct pressure, pressure bandage, tourniquet
Splint fractures	-	Manual, board splint, HARE traction, spine
Interpret ECG	-	Identify type and treat dysrhythmia
Administer drugs	-	Administer appropriate pharmacological agents
Spinal immobilization	-	Prevent or limit paralysis to extremities
Extricate patient	-	Remove patient from vehicle, entrapment
Communicate with Hosp.	-	Receive treatment orders from Physician
Treat enroute	2	Continue to treat/monitor/transport patient
Total required per patient	4-6	

The American Heart Association (AHA) recommends a minimum of two emergency medical technicians and two certified emergency paramedics to adequately operate an emergency cardiac scene (Journal of the American Medical Association, AHA, 1992).

The following chart shows the cascade of events for a cardiac arrest.

Figure 4 – Events Associated with Cardiac Arrest Resuscitation Attempts



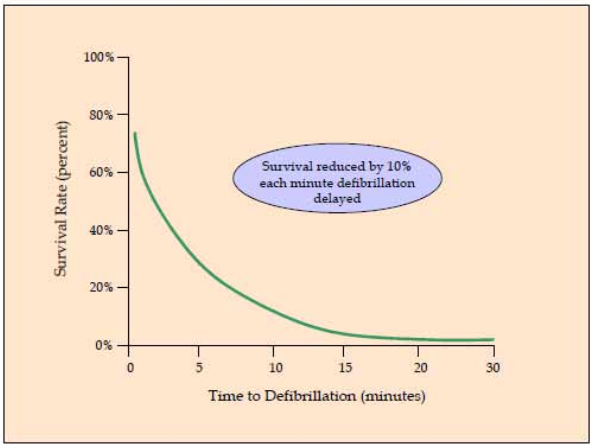
The cascade of events for emergency medical incidents starts with the occurrence of an injury and in some cases can end with the death of the victim. The American Heart

Association (AHA) recognizes that without oxygen, brain death begins in 4 to 6 minutes and damage is irreversible after 10 minutes (Cummins, et. al., 1991).

The AHA's Chain of Survival includes early Cardio-Pulmonary Resuscitation (CPR) and electrical defibrillation (Cummins, R. O., 1993). Early defibrillation is the single most important factor for survivability of the cardiac patient (Cummins, 1993). The AHA has supported for many years that the earlier CPR is initiated the better the chance the patient has for survival. Studies have shown that patients who have received CPR within 2-minutes and defibrillation within 4-minutes, there is a 30 % survival rate. Conversely, for those patients who did not receive CPR and/or delayed defibrillation, the survival rate drops to between 0 and 2%.

Figure 5 illustrates that the chances of survival of cardiac arrest diminish approximately 10% for each minute that passes before the initiation of CPR and/or defibrillation.

Figure 5 – Survival Rate for Cardiac Arrest



The MBFD engines and rescue are equipped with Advanced Life Support. Each company has the ability to perform CPR, defibrillation, advance airway techniques, and drug therapy (JAMA, 1992).

SECTION 6 - RISK AND HAZARD ASSESSMENT

Risk versus Benefit

A principle reason for firefighter injury and fatality is the failure of the incident commander to consider the value of what might be saved against the risk taken by the emergency responders. While fireground operations are hazardous by nature, some factors clearly present more risk than is worth the benefit. Under normal firefighting operations, risks are assessed against such factors as, structural and fire conditions, hazardous materials, and life safety. What is not always understood is the mechanism used for assessing the risk of injury or death against a benefit that may be gained from the actions firefighters are prepared to take.

Historically, firefighters have died in buildings that had been damaged to the point that they were destined to be torn down. This prompted the enforcement of a simple principle that is increasingly being accepted among most fire service organizations:

- ***Firefighters will risk a lot to rescue savable lives;***

  In essence, firefighters will take a risk by entering a burning building engulfed in fire when it is believed that there may be a person trapped inside. The risk is managed by ensuring that the crews are wearing adequate personal protection and that their actions are deliberate and traceable within an organized system of accountability;

- ***Firefighters will take some risk to protect savable property;***

  If a company were to arrive at a building where a fire has yet to be consumed or compromised, crews will attempt to extinguish the fire and mitigate further damage;

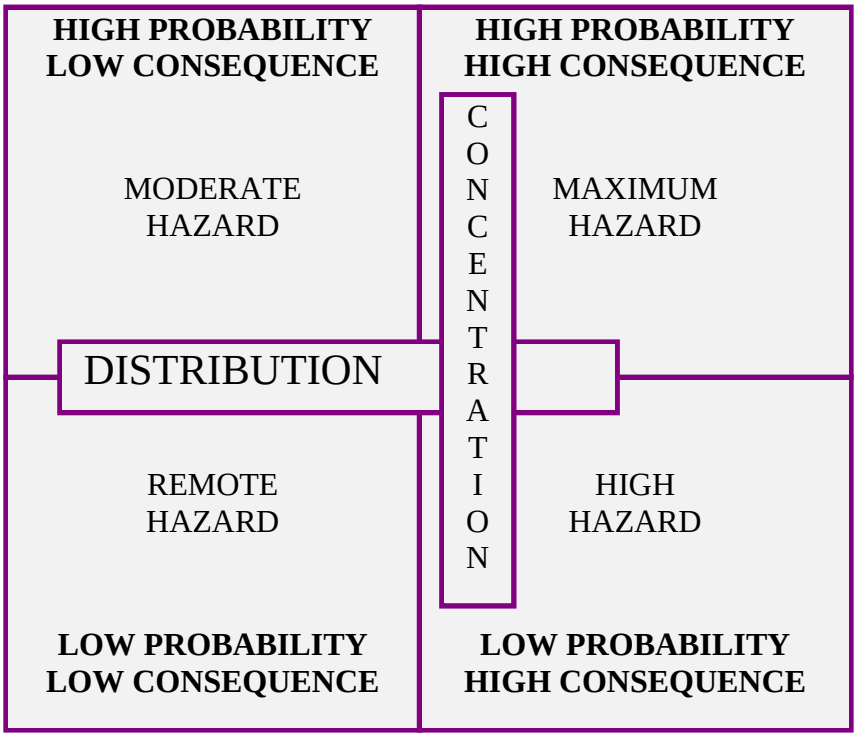
- ***Firefighters will take NO risk to save a life or protect property that has already been lost;***

  One of the more difficult decisions an incident commander must make is that of refusing initial entry or pulling crews out of a building that is quickly becoming untenable. When threats to safety clearly out weigh the benefits, a firm decision must be made to not commit resources to a losing situation. More lives lost, regardless of any heroic intentions, are not worth the risk (Firehouse.com, 2006).

High Risk and Low Frequency

The figure below is representative of the risk assessment a fire officer must consider as he or she responds to incidents within each community.

Figure 6 – High Risk and Low Frequency



There are four possible relationships between structures or conditions and the distribution and concentration of resources:

- Low probability, low consequences;
- Low probability, high consequences;
- High probability, low consequences;
- High probability, high consequences.

Distribution and Concentration

Each quadrant of the chart represents a different requirement within the community for a commitment of resources. For example, appropriate consideration should be given to the *distribution* (location of stations) and *concentration* (number of resources located at the station) of resources in an area that experiences a large number of calls for service, regardless of there perceived significance (i.e. EMS calls within residential areas). Conversely, equal consideration must be given to those areas that experience relatively few calls, but have a greater potential for risk and require more resources to mitigate the hazards.

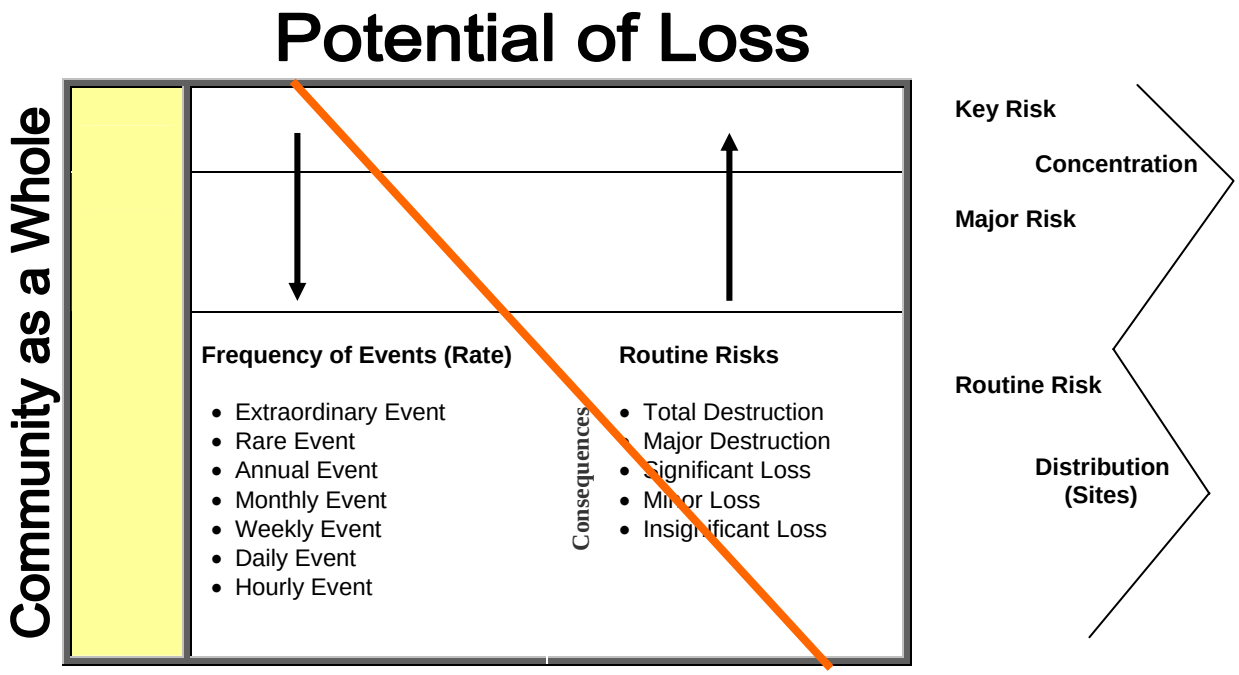
Low probability, high consequence zones are the areas where "high-risk" and "low-frequency" events are most likely to occur. These present the greatest challenges for emergency responders. While the probability of an event occurring may be remote, the impact may have a devastating effect. Gordon Graham, a well known risk manager, puts it this way:

> Each of the job descriptions in your fire department is a series of incidents. We want things done right. Doing things right is the key for eliminating liability, maximizing customer service, and protecting your personnel. Most incidents you encounter in the fire service end up going right. Everything goes right, no one gets hurt and everyone goes home. I have no worries when you get involved in high frequency events…it low frequency events that cause us grief. (Graham, 2002)

The definition exists on a sliding scale. What may be considered a typical occurrence for a metropolitan department replete with resources may otherwise be overwhelming for a department with far fewer assets and requisite training. Local examples might include high-density residential areas, hotels, and commercial or industrial buildings. Well-attended City events such as the AVP, 10-K Run, Hometown Fair, and the Holiday Fireworks also present a high-risk, low-frequency challenge.

The following chart provides a model that relates the various elements of risk to the relationship between the community as a whole, the frequency of events that occur, the severity of potential losses, and the usual distribution of risks. This chart demonstrates that the overall community may have a wide range of potential risks. If the community is like most, there will be an inverse relationship between risk and frequency. In short, the daily event is usually the routine or remote risk category (Clark, F. B., Bukowski, R. W., Stiefel, W. S., et. al, 1990).

Figure 7 – Risk Assessment



As we move up the chart toward the highest risk levels, the events are less frequent. If the risk management system is working in the community, a catastrophic loss should be an extraordinary event. In most communities the majority of losses occur in the smallest percentage of emergencies that reach the significant, major or total destruction loss ranges. The objective of risk assessment technique is to reduce the truly serious loss to a very unusual event in the community. This involves trying to keep routine emergencies from becoming serious loss situations.

Risk Factors

In order to effectively evaluate risk within the City of Manhattan Beach, the pertinent risk factors must first be identified. The MBFD defines a risk factor as any aspect that:

- Increases the need for the Department to arrive quickly;
- Increases the number of firefighters needed to control the situation;
- Negatively impacts the financial well being of the community;
- Negatively impacts the historic properties of Manhattan Beach.

Specific factors identified include:

- Potential loss of life
- The ability to take self-preserving actions
- Nature of the occupancy and contents
- Construction features
- Fire loss potential
- Built in fire protection
- Historical value
- Fire flow
- Economical impact to the community

While risk factors all share a common thread, the rationale for placing an occupancy within any risk assessment category is to assume the worst. Fire flow is one such factor used as a risk assessment criteria or requirement that is based on defining the problem that will occur if the occupancy is totally involved, and therefore creates the maximum demand upon fire suppression services (Scottsdale Fire Department, 2006).

Fire Flow

Fire Flow is an assessment of the number of gallons per minute (GPM) needed to extinguish a fire should a structure become fully involved. It would be cost prohibitive for the City to prepare and maintain fire flow calculations on all occupancies. However, every new commercial and industrial building is required to perform flow test to measure its potential output. Additionally, the City Water Department maintains the water supply system, periodically performing fire flows on its hydrants.

The MBFD recognizes that:

- For interior firefighting (offensive operations) 250 GPM is expected from each on-scene company (NFPA);
- Master streams result in a minimum of 500 GPM fire flow (NFPA);
- Handlines have a maximum of 300 GPM fire flow (NFPA);
- In one-and-two family dwellings (less than 3,600 square feet) the minimum fire flow and flow duration required is 1,000 GPM (Uniform Fire Code/UFC);
- A 75% reduction in fire flow is allowed when the building has approved automatic sprinkler system. The resulting fire flow shall not be less that 1,500 GPM. Therefore, a minimum response to commercial or industrial buildings shall produce at least 1,500 GPM fire flow (UFC);
- Appendix III-A of the 1997 UFC outlines the minimum required fire flows and flow duration's for structures.

Occupancy Risk Definitions

The MBFD has defined four community risk categories. The Department acknowledges the possibility of several other possible risk categories, however given our demographics, it seemed appropriate to limit the zones to make it manageable. The four primary demand zones are classified as maximum, high, moderate, and special risk. The standard for classification was based on the potential consequences of a catastrophic event occurring within the occupancy.

Maximum Risk – For a structure to be classified as maximum risk it should be of substantial size and contain properties presenting a high risk of life loss, loss of economic values to the community or large loss damage to property if there is a fire. Ordinarily, they would also be the highest fire flow areas. These structures may or may not lack built in fire protection features and may contain occupants not capable of self-preservation.

Examples include:

- Main shopping and business centers, large department stores, shopping malls and multi-story hotels, and office properties;
- Concentrations of high risk industrial and commercial properties including Group three hazardous materials facilities;
- Concentrations of theaters, cinemas, clubs, dance halls, bars and other areas with potential for large life loss;
- Buildings over two stories high with or without built in fire protection;
- Occupancies with occupants that may require assistance such as non-ambulatory restrained persons (i.e. nursing homes and hospitals);
- Build up of residential properties adjacent to maximum and high-risk areas;
- Any occupancy over 10,000 square feet without built in fire protection.

These risks frequently impact the need for a fire agency to have multiple alarm capability and to have an adequate assessment of their ability to concentrate resources. Failure to identify these risks often results in an agency's inability to control the loss once a fire has occurred on this class of risk. These also are fundamental to the assessment of mutual and automatic aid requirements to support an individual agency.

High Risk Hazards – For a structure to be classified as a high hazard it should contain 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:

- Strip shopping centers and business centers not exceeding two stories;
- Concentrated areas of revenue generating properties or high job loss to the community if business is lost;
- Infrastructure facilities, such as city, state and federal facilities;
- Large residential buildings exceeding 5,000 square feet (mansions);
- Properties deemed to be of historical value to the community;
- Any building with life safety and fire load beyond the reach of pre-connected hose lines (200').

Moderate Risk – For a structure to be classified as a moderate risk it should contain built-up areas of average size, where the risk of life loss or damage to property if there is a fire in a single occupancy is usually limited to the occupants, although in certain areas such as small apartments complexes the risk of death or injury may be relatively high. Concentrations of property may vary, but will generally be of limited extent. Examples include:

- Areas deemed as high-density, single-family residential housing;
- Apartments with pre-connected hose line access (200');

- 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 assure a fair and equitable access to initial attack capability.

Special Risks – The structures require special attention due to their potential for loss of life over that which is typically appropriate for buildings of that size and arrangement. Examples include:

- Isolated maximum or high-risk structures when they are in other risk areas;
- Railroad lines and interstates;
- Elementary, junior and high schools with or without built in fire protection;
- Churches and synagogues (Chandler Fire Department, 2004).

Using the fundamental principles within the Risk, Hazard and Value Evaluation program (RHAVE), ten reporting districts or "demand zones" were established within the City of Manhattan Beach. Within those zones buildings were classified in order to better identify and prioritize the hazards found within the community. The following charts are the products of the analysis.

Table 12 – Manhattan Beach Response Demand Zones

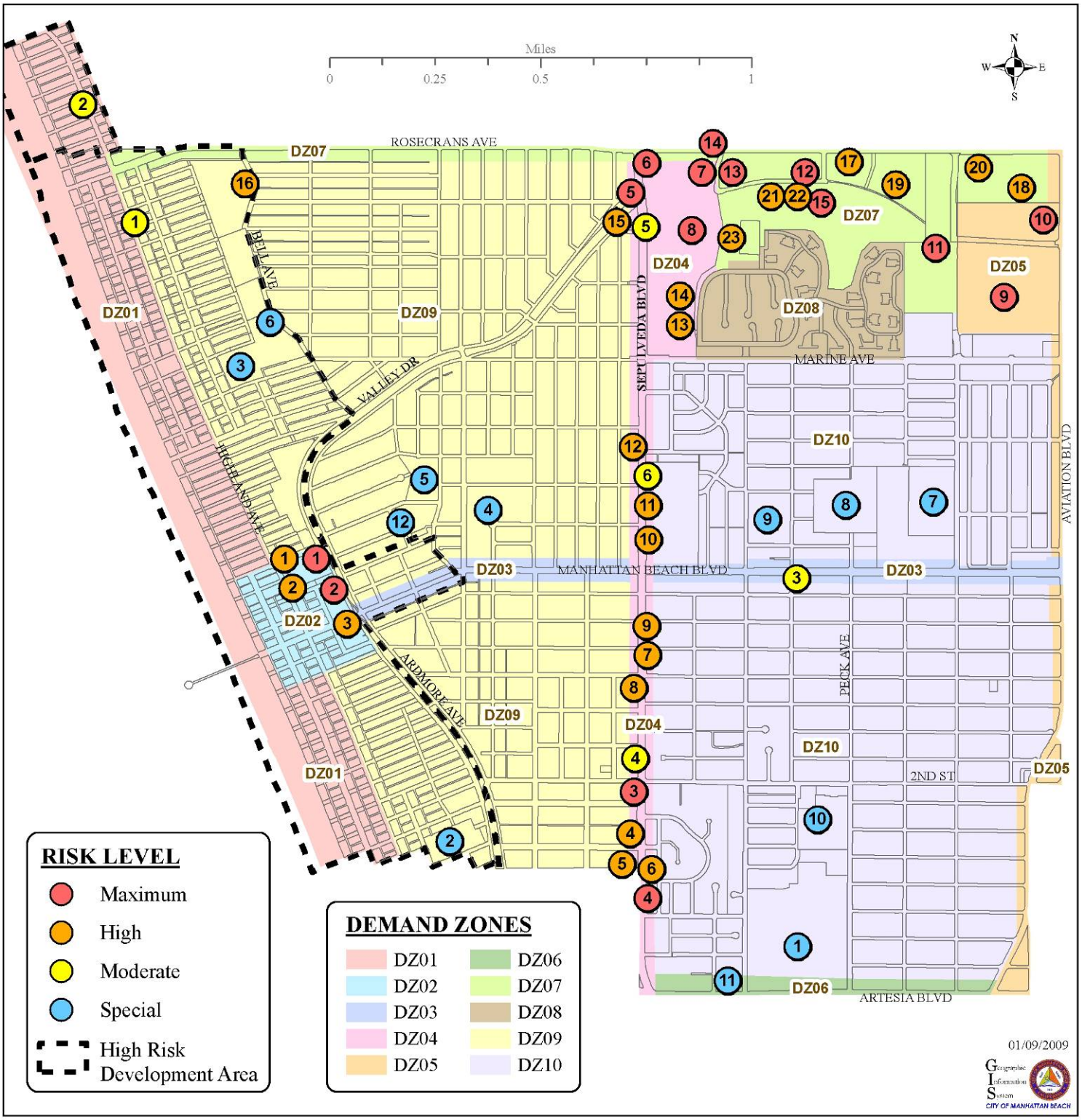
Maximum Risk				
1	Police/Fire Facility	400/420 15 Street	Public Safety Building	Zone 2
2	Shade Hotel	1221 Valley Dr.	Hotel/Bar	Zone 2
3	Office Bldg.	111 N. Sepulveda	Multi-Story Office Building	Zone 4
4	Remax Office Bldg.	400 S. Sepulveda	Multi-Story Office Building	Zone 4
5	Belamar Hotel	3501 N. Sepulveda`	Hotel/Dining	Zone 4
6	Fry's Electronics	3600 N. Sepulveda	Electronics Super Store	Zone 4
7	Pacific Movie Theater	3560 N. Sepulveda	Multiplex Cinema	Zone 4
8	Manhattan Village Mall	3100-3400 Sepulveda	Shopping Center	Zone 4
9	Northrop Grumman	3001 N. Aviation	Research/Manufacturing	Zone 5
10	Northrop Grumman	3301 N. Aviation	Storage	Zone 5
11	Raleigh Studios	1600 Rosecrans	Movie Studio/Sound Stages	Zone 7
12	Kinecta Credit Union	1440 Rosecrans	Multi-Story Office Building	Zone 7
13	Twin Towers	1240/1230 Rosecrans	Highrise Office Buildings	Zone 7
14	Medical Office	1200 Rosecrans	Medical Office Plaza	Zone 7
15	Marriott Hotel	1400 Parkview	Hotel/Dining	Zone 7

High Risk				
1	City Hall	1400 Highland Avenue	City Government	Zone 2
2	County Public Library	1320 Highland Avenue	County Library	Zone 2
3	Von's Grocery	410 Man. Beach. Blvd.	Grocery Store	Zone 2
4	Sketchers	225 S. Sepulveda	Multi-Story Office Building	Zone 4
5	BMW Auto Dealership	317 S Sepulveda	Auto Dealership	Zone 4
6	Sketchers	330 S. Sepulveda	Multi-Story Office Building	Zone 4
7	Comfort Inn	850 N Sepulveda Blvd	Motel	Zone 4
8	Mercedes Auto Dealership	707 N. Sepulveda	Auto Dealership	Zone 4
9	Holiday Inn	900 N Sepulveda Blvd	Hotel	Zone 4
10	Target	1200 N. Sepulveda	Department Store	Zone 4
11	Manhattan Toyota	1500 Sepulveda	Auto Dealership	Zone 4
12	Hawthorn Suites	1871 N Sepulveda	Hotel	Zone4
13	Ralph's Market	2700 N. Sepulveda	Grocery Store	Zone 4
14	CVS Pharmacy	2900 N. Sepulveda	Drug Store	Zone 4
15	Ross Manhattan Terrace	3400 Valley Drive	Senior Housing	Zone 4
16	National Guard Armory	3521 Bell Avenue	Armory	Zone 5
17	24-hour Fitness	1500 Rosecrans	Office and Fitness Center	Zone 7
18	Manhattan Gateway	1800 Rosecrans	Shopping Center	Zone 7
19	Manhattan Market Place	1550-70 Rosecrans	Shopping Center	Zone 7
20	Office Depot	1700 Rosecrans	Office Supply	Zone 7
21	Manhattan Bch Country Club	1332 Parkview	Recreation/Dining	Zone 7
22	Manhattan Bch Country Club	1334 Parkview	Multi-Story Office Building	Zone 7
23	Manhattan Village	1304 Parkview	Senior Villas	Zone 9

Moderate Risk				
1	Sea View Inn	3400 Highland	Motel	Zone 1
2	Motel	4017 Highland Avenue	Motel	Zone 1
3	Fire Station #2	1400 Man. Beach Blvd	Fire Station	Zone 3
4	Seahorse Inn	233 N Sepulveda	Motel	Zone 4
5	Manhattan Village Motel	3301 N Sepulveda	Motel	Zone 4
6	Residence Inn	1700 Sepulveda	Extended Stay Hotel	Zone 4

Special Risk			
Education			
1	Mira Costa High School	1401 Artesia Blvd.	Zone 6
2	Robinson Elementary School	80 Morningside Dr	Zone 9
3	Grandview Elementary School	455 24th Street	Zone 9
4	Pacific Elementary School	1214 Pacific	Zone 9
5	American Martyrs School	1701 Laurel	Zone 9
6	Ladera Pre School	2617 Bell	Zone 9
7	Manhattan Beach Middle School	1501 Redondo Ave	Zone 10
	Manhattan Beach Intermediate School	1431 15 Street	Zone 10
8	Begg's Transitional School	1431 15th Street	Zone 10
9	Meadows Elementary School	1200 Meadows	Zone 10
10	Pennekamp Elementary School	110 S Rowell	Zone 10
Churches			
11	Journey of Faith	1243 Artesia	Zone 6
12	American Martyrs	624 15th Street	Zone 9

City of Manhattan Beach
Fire Department Response Zones
And Target Hazards



High Density Housing

Of special concern are those areas in Manhattan Beach identified as high-density housing (outlined by the dotted line in the target hazard/response zone map). Limited access, the existence of power lines, and the close proximity of each of these residences can present a significant challenge during fire suppression activities. These areas are considered a maximum hazard (NFPA 1710; A.3.3.21) in Manhattan Beach because of the relationship between how long it takes to deploy resources (time) and the degradation of combustibles (safety).

In August of 2004, a series of full-scale laboratory experiments at the National Institute of Standards and Technology (NIST) were designed to simulate house-to-house fire spread. It was determined that it took less than five minutes for flames from a simulated house with combustible exterior walls to ignite a similar "house" six feet away.

The experiments were conducted at the NIST Large Fire Facility. The tests were part of a program to develop computer models for predicting the spread of fire in residential communities.

Each experiment conducted at NIST involved two 16-foot structures clad in vinyl siding that simulated neighboring houses. The outside walls for each structure included windows. In each test, typical furnishings were ignited in one "home" and the fire spread was recorded, along with heat release rates and other data. In less than five minutes, flames shattered the window of the home with the original fire, spread across the gap, and ignited the exterior of the second structure.

As the preponderance of high density housing increases, so does the risk of fire incidents involving multiple structures. "As land prices continue to rise, homes are being built closer together, many without fire-resistant materials. Building officials need information about the rate of fire spread in communities under various house spacing, construction methods and materials, and weather conditions. Fire departments also have to understand the time required for fire spread from one house to another in order to provide adequate response" (NIST, 2004).

Section 7 – Industry Standards

The fire service has many local, regional, state, and federal industry standards that have an impact department staffing. Principally, these take the form of standard operating procedures (SOP) intended to ensure continuity and safety on an emergency scene. Others are more global, and are recognized based on emerging trends and post-incident fire investigations.

Occupational Safety & Health Administration (OSHA)

Under the Occupational Safety and Health Act of 1970, employers are responsible for providing a safe and healthy workplace for their employees. "OSHA's mission is to promote the safety and health of America's working men and women by setting and enforcing standards; providing training, outreach and education; establishing partnerships; and encouraging continual process improvement in workplace safety and health" (United States Department of Labor, 2005).

OSHA Respiratory Protection Standard 29 CFR 1910.134

A two-person RIC is required anytime a team enters an atmosphere that is immediately dangerous to life and health (IDLH). In deference to its parent agency, Cal OSHA also adopted the "two-in; two-out" rule, prescribing that a dedicated company must be prepared to make an immediate rescue of interior crews.

California Code of Regulations, Title 8, Section 5144

Procedures for interior structural firefighting: In addition to the requirements set forth under subsection (g) (3), in interior structural fires, the employer shall ensure that:

- At least two employees enter the IDLH atmosphere and remain in visual or voice contact with one another at all times;
- At least two employees are located outside the IDLH atmosphere; and
- All employees engaged in interior structural firefighting use SCBAs.

Responding to an inquiry by United States Senator Jeff Bingaman to interpret the applicability of the OSHA two-in; two-out standard, U. S Department of Labor Assistant Secretary Charles N. Jeffress wrote the following:

> The respiratory protection standard requires that workers engaged in fighting interior structural fires work in a buddy system; at least two workers must enter the building together, so that they can monitor each other's whereabouts as well as the work environment. There must also be at least two standby personnel outside the fire area prepared to rescue the inside firefighters should the need arise. One of these outside firefighters must actively monitor the status of the inside fighters but the second outside firefighter may perform a variety of other duties, such as pump operations, incident commander or outside hose line operation. There are no provisions in the standard to waive the requirements for either the "two-inside firefighters" or the "two-outside firefighters", although the circumstances under which this provision applies are more limited than generally understood (1998).

The National Institute for Occupational Safety and Health (NIOSH)

The Occupational Safety and Health Act of 1970 created both the National Institute for Occupational Safety and Health (NIOSH) and the Occupational Safety and Health Administration (OSHA). While OSHA is in the U.S. Department of Labor and is responsible for developing and enforcing workplace safety and health regulations, NIOSH falls under the U.S. Department of Health and Human Services and is an agency established to help assure safe and healthful working conditions for working men and women by providing research, information, education, and training in the field of occupational safety and health.

The Firefighter Fatality Investigation and Prevention Program (FFFIPP) is a principle aspect of NIOSH – it was created to determine factors that cause or contribute to fire fighter deaths suffered in the line of duty. Identification of causal and contributing factors enable researchers and safety specialists to develop strategies for preventing future similar incidents. The program does not seek to determine fault or place blame on fire departments or individual firefighters.

A search of the NIOSH website reveals numerous references to insufficient staffing as a partial cause in the injury or death of firefighters. Equally prevalent are the recommendations for adherence to NFPA 1710. A noted example of this is the January, 2008 release of the NIOSH fatality report examining the circumstances behind the death of one and the injury of another Pennsylvania firefighter. Identified within a prominent list of recommendations were 1710 minimum staffing levels for engine and truck companies, including:

> The NFPA standard states that both engine and truck companies shall be staffed with a minimum of four on-duty personnel. The standard also states that in jurisdictions with tactical hazards, high hazard occupancies, high incident frequencies, geographical restrictions, or other pertinent factors identified by the authority having jurisdiction, these companies shall be staffed with a minimum of five or six on-duty members (NIOSH, 2008).

International City Managers Association (ICMA)

Since 1914 International City/County Management Association (ICMA) has provided its nearly 9,000 members with publications, data, information, technical assistance, and training and professional development. Its mission is to "create excellence in local governance by advocating and developing the professional management of local government worldwide" (ICMA Organizational Overview, 2009).

In the book *Managing Fire Services, 2nd Edition*, ICMA cites various controlled experiments conducted by jurisdictions and universities that revealed the following staffing conclusions:

1. Fire suppression operations have three basic functions: a) rescue; b) work involving a ladder, forcible entry, and ventilation; and c) the application of water;

2. To raise ladders, ventilate, search, and rescue simultaneously takes quick action by at least four and often eight or more firefighters, each under the supervision of an officer;
3. If about 16 trained firefighters are not operating at the scene of a working fire within the critical time period, then dollar loss and injuries are significantly increased as is fire spread.
4. As firefighting tactics were conducted and judged for effectiveness:
    a. 5 -person companies were 100% effective;
    b. 4 -person companies were 65% effective;
    c. 3 -person companies were 38% effective.

Insurance Services Office (ISO)

The Insurance Services Office (ISO) was established through the Public Protection Classification (PPC) program to help institute appropriate fire insurance premiums for residential and commercial properties. Using this tool, insurance companies can better find reliable, up-to-date information about a community's fire-protection services.

By classifying a community's ability to suppress fires, ISO helps evaluate their public fire-protection services. The goal of ISO is to "provide an objective, countrywide standard that helps fire departments in planning and budgeting for facilities, equipment, and training" (ISO, 2008). And by securing lower fire insurance premiums for communities with better public protection, the PPC program purports to provide incentives and rewards for communities that choose to improve their firefighting services.

PPC ratings are based primarily on three areas: receiving and handling alarms, fire department personnel and equipment, and water supply. These factors comprise the ISO's Fire Suppression Rating Schedule. Different weights are applied to each area. The effectiveness of alarm response comprises 10% of a community's rating; the personnel and equipment of the fire department contribute to 50% of a community's rating, and the community's water supply system comprises 40% of a rating. For purposes of this study, it is worth noting that the largest of the evaluation criteria measured within the fire department component is that of company personnel at 15% (ISO, 2008).

The overall PPC rating reflects the total capability of the department to respond to, and meet the fire protection demands of the community. A PPC is then assigned on a scale from one to 10. Class 1 represents exemplary public protection, and Class 10 indicates that the area's fire-suppression program doesn't meet ISO's minimum criteria. Within this range, insurance companies practice a method of price-setting for one-and-two family dwellings known as *banding.* In an effort to provide competitive pricing premiums, insurance companies will group ISO ratings. Common *bandings* are ISO ratings from 1-3, 4-5, and 6-9, offering little to no variance between the selected band.

The PPC ratings generated by ISO are only one of the many factors that affect insurance premiums. Age of the structure, construction material, and loss history in a particular area also affect the base rate. Factors such as property value, deductible amount, multiple policies, security systems, and credit ratings affect an individual's rates. Although some companies in some states have elected not to use PPC ratings as part of their premium

calculations, in California it is still a major factor in setting property and casualty insurance rates.

According to ISO statistics: “Cities that experience a change from a Class 3 to a Class 2 often see a 3% decrease in insurance premiums” (ISO insurance representative, personal communication, August 1, 2008). Commercial businesses will also see a decrease in company premiums if their community PPC improves. However, based on several conversations with both ISO representatives and local insurance providers, there still remains some ambiguity as to what, if any, premium discounts are available to the residents or business owners of Manhattan Beach (ISO insurance representative, personal communication, February 12, 2009).

Manhattan Beach – ISO Class 3

As a result of an October 2000 survey conducted by ISO, the MBFD received a total credit of 71.89 out of 100 possible points, equating to an overall ISO rating of three on a scale of 1 to 10.

Table 13 – ISO Classification Details: Manhattan Beach

Measurable Criteria	Maximum Credit	Manhattan Beach
Receiving and Handling of Fire Alarms (10%)		
Telephone Service	2.00	2.00
Operators	3.00	3.00
Dispatch Circuits	5.00	3.15
Total credit	10.00	8.15
Engine Companies	10.00	7.81
Reserve Engines	1.00	0.76
Pump Capacity	5.00	5.00
Truck Companies	5.00	1.89
Res. Truck Companies	1.00	0.62
Distribution System	4.00	2.48
Company Personnel	15.00+	7.48
Training	9.00	6.66
Total Credit	50.00+	32.70
Water System	35.00	32.25
Hydrants	2.00	1.76
Insp/Condition - Hydrants	3.00	1.92
Water Supply	40.00	35.93

Table –14 ISO Credit Summary

Feature	Credit Assigned	Maximum Credit
Receiving and handling Fire Alarms	8.15%	10.00%
Fire Departments	32.70%	50.00%
Water Supply	35.93%	40%
Divergence	-4.89%	
Total Credit	71.89%	100.00%
*Divergence is a reduction in credit to reflect a difference in the relative credits for Fire Department Water Supply		

Figure – 9

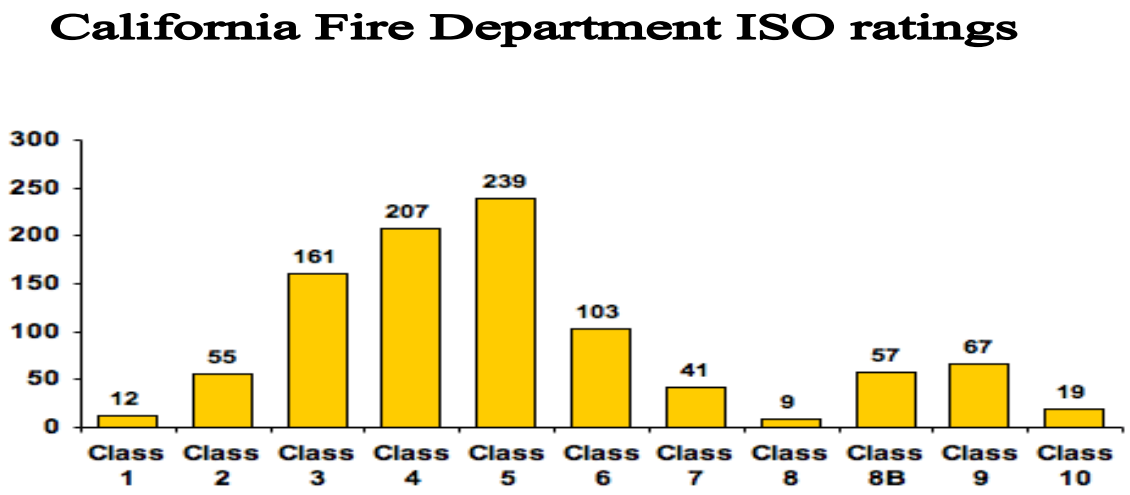


Table 15 – ISO Public Protection Class Percentage Credits

Class	%
1	90.00 or more
2	80.00 to 89.99
3	70.00 to 79.99
4	60.00 to 69.99
5	50.00 to 59.99
6	40.00 to 49.99
7	30.00 to 39.99
8	20.00 to 29.99
9	10.00 to 19.99
10	0 to 9.99
The above classification has been developed for use in property insurance premium calculations.	

Of note, assuming nothing else changed, if the MBFD were to garner the remaining 7.52 available points from the maximum staffing (Company Personnel) credits available (15), the City would only be .58 points from a Class 2.

National Fire Protection Association (NFPA)

The mission of the international nonprofit NFPA is to reduce the worldwide burden of fire and other hazards on the quality of life by providing and advocating consensus codes and standards, research, training, and education. Established in 1896, NFPA serves as the world's leading advocate of fire prevention and is an authoritative source on public safety.

NFPA 1710 *- Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*

In 2001 NFPA 1710 (1710) was issued as a standard designed to set minimum criteria for the staffing of firefighting and medical crews, and how they will respond and operate at emergency scenes. The standard is widely considered important because it applies the documented and proven science of fire behavior and emergency medicine to the basic resource requirements for effective fire and emergency service deployment. This application allows a community to determine if the resources allocated for the different types of fires, emergencies, medical calls and other incidents are sufficient to effectively control the incident and protect lives and property.

Outlined within 1710 are the specific tasks, personnel, and response time requirements necessary to complete each fire suppression task safely and effectively. Although the elements listed within the standard are not requirements, the document has become an industry yardstick by which fire departments are measured.

According to NFPA 1710:

- A fire department's fire suppression resources shall be deployed to provide for the arrival of an engine company within a 4-minute response time (2008: MBFD compliant (43%) and/or the initial full alarm assignment within an 8-minute response time to 90% of the incidents (2008: MBFD compliant 38%);
- Personnel assigned to the initial arriving company shall have the capability to implement an initial rapid intervention crew;
- Fire companies, whose primary functions are to pump and deliver water and perform basic fire fighting at fires, including search and rescue...shall be staffed with a minimum of four on-duty personnel. Fire companies whose primary functions are to perform the variety of services associated with truck work, such as forcible entry, ventilation, search and rescue, aerial operations for water delivery and rescue, utility control, illumination, overhaul and salvage work shall [also] be staffed with a minimum of four on-duty personnel;
- A minimum of 15 firefighters (four or more per company) are needed within the first 8-minutes to safely and effectively handle a fire in a residential structure.

There are three time components defined within 1710 relating to emergency response system performance. The components and definitions are listed as follows:

- Call receipt and processing time – the interval between receipt of the 911 call and the moment when the dispatcher dispatches the units;
- Turnout time – the interval between the acknowledgement of the emergency by the responding units and when they actually respond (wheels roll);
- Response (travel) time – the interval from when units are en-route to the emergency incident (wheels rolling) and when units arrive on scene (wheels stopped at the incident address).

It is important to note that combined these time frames are typically referred to as "response time." However, to evaluate an emergency response system's performance, these components should be assessed and reported individually as described within the standard.

Equivalency

Equivalency statements are common features within the NFPA. The language contained within the 1710 standard allows jurisdictions to use other "systems, methods or approaches" to meet requirements of the standard if they can validate and document in writing that such avenues are equal or superior to the requirements contained in the standard. It is not intended to allow for any jurisdiction or fire department to reduce the requirements in the standard and still claim compliance.

Liability

Because the NFPA 1710 is the first international standard to establish a benchmark for fire and emergency medical response capabilities, there is little precedence governing how the standard might be used in such lawsuits. California Government Code, sections 850 and 850.2 do provide broad immunity for both failure to provide fire protection or for failure to maintain sufficient personnel to provide adequate fire protection (Robert Wadden, personal communication, February 15, 2009).

1710 Questions Answered

Is Manhattan Beach mandated to adopt NFPA 1710?

The short answer is NO – the City of Manhattan Beach is not required to adopt NFPA 1710. To date, there is no provision within the firefighter's collective bargaining agreement, and neither the State of California nor the federal government has mandated an automatic adoption of the standard. As such, the only way that it becomes obligatory is if it is self-imposed through local ordinance. Manhattan Beach has not made such an adoption.

Should NFPA 1710 become part of the Manhattan Beach long-range planning process?

Yes. Regardless whether Manhattan Beach adopts NFPA 1710, the standard does provide statistically proven criteria from which a customized strategic plan can be formulated. Remember, *implementation* of NFPA 1710 does not require *adoption* of NFPA 1710. It is not necessary, and for legal reasons, may not be advisable, for any department, city, county, district or town to formally "adopt" NFPA 1710.

Can Manhattan Beach use mutual and auto-aid agreements to meet the standard?

Yes. Such agreements can apply to all aspects of emergency response, including suppression, EMS, hazmat, technical rescue and all other specialized areas addressed in the standard.

I know that NFPA 1710 is a consensus document, but if I still disagree with it can my community develop its own equivalent standard?

The Equivalency section (1.3) of 1710 was developed to ensure that a community can develop its own standard. For example, such a standard could distinguish between response staffing for a report of fire in a sprinklered building and a report of fire in a non-sprinklered building. (NFPA 1710 does not draw this distinction.) To be legally defensible, any community standard should itself be based on reasonable and rational principles—principles that could be explained satisfactorily to a jury.

If a community decides to develop an equivalent standard, the fire department must develop the technical documentation and provide it to the Authority Having Jurisdiction (AHJ) or local government. In its *NFPA 1710 Decision-Making Guide*, the International Association of Fire Chiefs comments, "To the extent that any community develops its own standard, that community assumes full responsibility for complying with its own standard. The IAFC believes that a 'bogus' or 'paper' standard, intended to simply endorse a community's fire response *status quo* and avoid the issues raised by 1710, is professionally as bad a strategy as ignoring NFPA 1710"(2007).

National Fire Protection Association, NFPA 1500 Standard on Fire Department Occupational Safety and Health Program, August 1997

The NFPA 1500 Standard contains minimum requirements for a fire service-related occupational safety and health program. These requirements are applicable to public, governmental, military, private and industrial fire department organizations providing rescue, fire suppression, emergency medical services, hazardous materials mitigation, special operations and other emergency services.

The following are pertinent excerpts from NFPA 1500:

> *6-4.1* – The fire department shall provide an adequate number of personnel to safely conduct emergency scene operations. Operations shall be limited to those that can be safely performed by the personnel available at the scene. No member or members shall commence or perform any fire-fighting function or evolution that is not within the established safety criteria of the organizational statement as specified in 2-1.2 of this standard.
>
> - *A-6-4.1* – The limitation of emergency scene operations to those that can be safely conducted by the number of personnel on the scene is intended to reduce the risk of firefighter death or injury due to understaffing. While members can be assigned and arrive at the scene of an incident in many different ways, it is strongly recommended that interior firefighting operations not be conducted without an adequate number of qualified firefighters operating in companies under the supervision of company officers.

It is recommended that a minimum acceptable fire company staffing level should be four members responding on or arriving with each engine and each truck company responding to any type of fire. The minimum acceptable staffing level for companies responding in high-risk areas should be five members responding or arriving with each engine company and six members responding or arriving with each truck company.

These recommendations are based on experience derived from actual fires and in-depth fire simulations and are the result of critical and objective evaluation of fire company effectiveness. These studies indicate significant reductions in performance and safety where crews have fewer members than the above recommendations. Overall, five-member crews were found to provide a more coordinated approach for search and rescue and fire suppression tasks.

Of special interest: In 1993, the NFPA included in its NFPA 1500 Consensus Standard on Fire Department Occupational Safety and Health a requirement addressing the minimum number of firefighters necessary to initiate an offensive interior attack on a structural fire. This Tentative Interim Agreement (TIA) to the fire fighter safety standard states:

> *"At least four members shall be assembled before initiating interior fire fighting operations at a working structural fire."*

Consequently, in 1994, Mr. M.E. Hines, Director of the Texas Commission on Fire Protection, sought formal clarification from the NFPA on this issue. NFPA's formal interpretation of how the four fire fighters should be assembled is as follows:

> *"…when a company is dispatched from a fire station together as a unit (which includes both personnel responding on or arriving with apparatus), rather than from various locations, the standard recommends that the company should contain a minimum of 4 fire fighters".*

NFPA 1410 – Training Standard on Initial Fire Attack

The NFPA 1410 Standard contains the minimum requirements for evaluating training for initial fire suppression and rescue procedures used by fire department personnel engaged in emergency scene operations. This standard specifies basic evolutions that can be adapted to local conditions and serves as a standard mechanism for the evaluation of minimum acceptable performance during training for initial fire suppression and rescue activities. The following are pertinent excerpts from NFPA 1410:

> *3-2.2* – In addition to the requirements set forth in 3-2.1, the company officer shall ensure that the following are accomplished in interior structural fires:
>
> - At least two fire fighters enter the immediately dangerous to life and health (IDLH) atmosphere and remain in visual or voice contact with each other at all times;
> - At least two fire fighters are located outside the IDLH atmosphere;
> - All fire fighters engaged in interior structural fire fighting use SCBA;

- A-3-2.2 One of the two individuals located outside the IDLH atmosphere could be assigned an additional role, such as incident commander in charge of the emergency, or safety officer, as long as this individual is able to perform assistance or rescue activities without jeopardizing the safety or health of any fire fighter working at the incident. Nothing in this section is meant to preclude fire fighters from performing rescue activities before an entire team has been assembled.

NFPA 13D – Residential Sprinkler Systems

Between 2002 and 2005, it was estimated that there are 300,000 residential fires in the United States. As a result of those fires, there were 2,566 civilian deaths and 10,188 civilian injuries. Each year it is estimated that residential fires cost $5.3 billion in direct property loss in the United States (United States Fire Administration, 2007). In an effort to try and minimize loss on civilians and property, many cities and counties across the United States have adopted sprinkler ordinances or some modification therein.

With Sprinklers ~~~~~~~~~~ Without Sprinklers

Since the adoption of the residential sprinkler standard, NFPA 13D (*Standard for the Installation of Sprinkler Systems in One- and Two- Family Dwellings and Manufactured Homes*) in 1975, residential sprinkler systems are a proven technology that saves lives (National Fire Protection Association, 2008). According to a study conducted by the United States Fire Administration in collaboration with the National Institute of Standards and Technology, National Association of Home Builders, The Protection Engineering Group, and the American Society of Mechanical Engineers, found that when a house fire occurs, one and two family dwellings with a wet-pipe sprinkler system and smoke alarms were found to have 100% fewer fatalities, 57% fewer civilian injuries, and 32% less direct property loss than one and two family dwellings equipped only with smoke alarms (USFA, 2007).

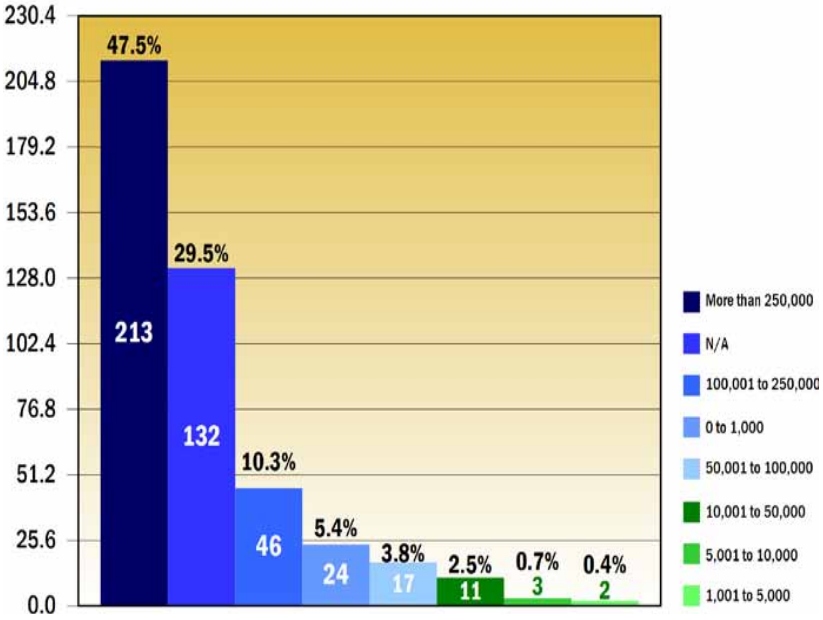


Figure10 -Estimated range dollars saved by activation

The National Fire Sprinkler Association (NFSA) estimates that over 200 communities in the United States now have regulations requiring residential sprinkler systems. Additionally,

homeowner's insurance credits for residences equipped with sprinkler systems have been estimated between 8% and 25% *(See figure 10.)* In California, it was estimated between 0% and 10%, with an average premium of 7% (Fire Protection Research Foundation, 2008). Moreover, cost estimations for homeowners ranged from between $.38 to $ 3.66 per square foot. But while there is growing recognition of the ability of residential sprinkler systems to protect life and property from fires, less than 2 % of all existing one- and two-family dwellings involved in a structure fire in 2005 had a sprinkler system (Fire Protection Research Foundation, 2008).

Summary of City of Manhattan Beach Ordinance 2108

Commercial

- An automatic sprinkler system shall be installed throughout all new structures that exceed 2,000 square feet in gross floor area or exceeds two stories in height, and any additional attached structures.
- With few exceptions, all existing occupancies shall install an automatic sprinkler system whenever:
  - An addition or remodel causes the occupancy to exceed 2,000 square feet in gross floor area, or exceeds two stories in height;
  - The occupancy is 2,000 square feet in gross floor area and an addition, alteration, or remodel in excess of 50% of the value of the building is constructed. Existing building value shall be determined as set forth in the Uniform Building Code.

Residential

- Sprinklers are required in the garage:
  - In new dwellings with an attached garage;
  - For residential remodels and additions, including condominiums, duplexes and single family dwellings, when the remodel causes a change in square footage to the garage, or when the remodel causes living to be next to that garage, or when the common wall between the house and the garage is being altered.
- Sprinklers are required throughout the entire structure:
  - For all condominium buildings;
  - For buildings with two stories and a basement, with one exit only, if such exit is located at the basement level or at a level between the basement and the first story;
  - An automatic sprinkler system shall be installed all attached or detached two family or condominium dwellings when the gross floor area exceeds 2,000 square feet, or which exceeds two stories in height.

Of special interest, the International Code Council (ICC) passed proposal (RB64-07/08) that, if adopted in California, would mandate that all new single-family dwellings will be required to install sprinkler systems effective January 1, 2011. This standard will be

added to Chapter 43 of the NFPA standard 13D. However, it only becomes a law when the state or local jurisdiction has adopted this new edition of the IRC.

Previously, sprinkler mandates and regulations have been left to cities, counties, or states to legislate. While opponents of the proposal, including the National Association of Homebuilders (NAHB), continue to support sprinklers as an option, they continue to oppose the mandate. It is expected that an effort to repeal the decision at the state level will occur before the Code takes effect (IAFF, 2008).

According to the United States Fire Administration, cities in Los Angeles County with existing mandatory sprinkler ordinances for one and two family dwellings are; Burbank, Agora Hills, Arcadia, Beverly Hills, Culver City, Brentwood, Glendale, Redondo Beach, and Santa Monica (Note: Redondo Beach only requires sprinklers in buildings and residential occupancies if they exceed 750 square feet).

SECTION 8 – STAFFING COMPARISONS

Corresponding Staffing Studies

An analysis of emergency service staffing begins with comparison of available emergency service personnel to other communities of similar size and organization. The number of operational personnel maintained by a fire department provides some measure of the ability of the agency to assemble enough emergency workers to respond to requests for assistance (Emergency Services Consulting Group, 2006).

Many of the studies available through sources like the National Fire Academy are conducted by executive fire officers tasked with analyzing the safety and efficiency of their organizations. While some of the data used stems from an internal review, a preponderance of the information reflects other studies conducted on a much larger scale. Independent contractors such as the Matrix and Emergency Services Consulting Groups, presumably offer unbiased recommendations based on a system of data collection and analysis. Like many studies completed by individual departments, industry standards, in particular NFPA 1710, are sited as benchmarks.

Bozeman Fire Department, Montana

An independent study conducted by Emergency Services Consulting in 2006 indicated that the western United States median for agencies serving similar communities with a residential population between 25,000 and 49,999 is one firefighter per 1,000. It is similarly stated that the ICMA places the national average of on-duty firefighting strength of a city fire department at 0.57 per 1,000 populations. The MBFD on-duty ratio is 0.26 per 1,000. Administratively, the consultant placed support staff ratio to operational personnel at 15 to 20%. Bozeman's ratio was 12.69%; the MBFD (including Fire Chief, Fire Marshal and Fire Inspector, and Executive Secretary) is 12.5%.

Omaha Fire Department, Nebraska

In July of 2007, the Matrix Consulting Group published an efficiency study for the Omaha police and fire departments. The results generated a great deal of local interest, when for efficiency sake, the recommendation included reducing the existing staffing on

engines and trucks from four personnel to three in order to save just over $5 million per year. These data suggested that staffing could be reduced while still meeting the minimum staffing and the 8-minute travel components of the NFPA 1710 response goals at a 93% level of compliance.

City of San Diego, California

On May 20, 2008, the City Council voted to adopt San Diego Mayor Jerry Sanders' Business Process Reengineering (BPR) recommendations for Fire-Rescue Department. "The Mayor's effort for the Fire-Rescue Department has validated that it is employing staffing strategies that are efficient, cost-effective and consistent with the best management practices of leading fire service agencies." The study reviewed 19 areas of operations and developed 60 recommendations. The areas of focus included staffing practices (overtime versus hiring more personnel), training, improving the functionality of the automated staffing program, and reducing overtime staffing for the Light and Air Unit. Recommendations approved for the Department included:

- Maintaining four-person minimum staffing of engine and truck companies
- Continuation of constant staffing
- Continuation of the use of over time to staff short-term vacancies in lieu of hiring additional personnel.

While the BPR referenced many of the same standards used within this study, their rational for four-person staffing was based on the following:

> Fireground operations are inherently labor intensive and require rapid, coordinated efforts to quickly and safely mitigate the incident. At fire emergencies, the fourth crewmember allows for operational flexibility to provide more effective, efficient and safe interior fire attack and search operations. In jurisdictions where three-person staffing is employed, it is often the case that interior attack and search operations are compromised and/or delayed due to insufficient personnel to handle the myriad of tasks that must be completed in the early stages of a firefighting operation.

Dallas Fire Department, Texas

Perhaps the most frequently quoted staffing studies have been conducted on behalf of the Dallas Fire Department (DFD); the most prominent of these was conducted in 1984. The study has since become a benchmark analysis of the link between crew size and fire suppression effectiveness. The study was performed as a series of controlled evolutions on a specified set of fire situations using different components in the range of three to six people. The study found that "fatigue was a serious problem for smaller groups" (McManis & O'hagan, 1984). The investigation also noted that:

> Five person crews demonstrated a more coordinated and effective attack on a fire and search and rescue operation, while the four-person crew was capable of performing satisfactorily in control of the fire and in effecting the rescue operation. The study's conclusion regarding the three-person crew was that not all the required tasks could be accomplished within a given time span…at this level, there was little margin for error and any appreciable delay in arrival might place the control of the fire beyond their capability (McManis & O'Hagan, 1984).

National Fire Academy, Executive Development Program III, "Fire Engines are Becoming Expensive Taxi Cabs: Inadequate Manning"

Similarly, a 1977 National Fire Academy research project conducted to measure fireground efficiency found revealing differences in DFD staffing levels. The exercise was designed around a simulated fire involving several rooms at the rear of the third floor of an old school. The objectives intended to determine how long it took a three, four, or five-person team to advance its line to this area, get water on the fire, and to check each individual's physical condition afterwards.

> Timing began as each engine company entered the schoolyard. The first consisted of a three-man [*sic*] team and their average was 18.18 minutes. All personnel were exhausted, rubber legged, had difficulty standing up and all three were unfit for further fire fighting. The four-man [*sic*] team conducting the very same test, averaged 10.29 minutes and upon completing they were nearing exhaustion. Next came the five-man [*sic*] team, which averaged 6.15 minutes and afterwards, all showed little evidence of fatigue.

Austin Fire Department, Texas

The Austin Fire Department (AFD) conducted a study in 1993 to determine whether companies staffed with four firefighters were safer and more effective than the three-person companies the department was currently deploying. In order to compare the effectiveness of fire companies, the physiological impact on fire fighters and Austin fire department injury rates at various staffing levels, the Fire Department conducted drills consisting of a series of common fireground tasks divided into three scenarios. They included a simulated two-story residential fire; aerial truck evolution; and engine company high-rise fire.

These simulations concluded that, regardless of the experience, preparation or the training of firefighters, "loss of life and property increases when a sufficient number of personnel are not available to conduct the tasks required in an efficient manner" (Roberts, 1993). The severity and the degree of hazard increases until controlled or the fire passes the critical point. Consequently, the AFD found that firefighter effectiveness improves when a company is increased from three to four personnel.

In the two-story residential fire, the efficiency or time improvement between the three-person and four-person crew was 73%. In the aerial truck evolution, the efficiency improvement between three-person and four-person crews was 66%. In the high-rise fire, the efficiency improvement between the three-person and four-person engine company crew was 35%.

In addition to the fireground simulation, the AFD also reviewed injury reports involving 136 emergency incidents from 1989 to 1992 to which 1,938 firefighters responded. The analysis revealed that the injury rate for four or five-person crews was 5.3 per 100 firefighters while the three-person companies experienced an injury rate of 7.77 injuries per 100 firefighters. The injury rate for three-person companies was 46% higher than the rate for larger crews (Roberts, 1993).

Pittsfield Township – Ann Arbor, Michigan

This study was conducted at a training burn in Pittsfield Township in August of 2002, using a predetermined scenario and four different sized crews. Each crew completed seven defined tasks and the time for completion of each task was recorded. The completion times of the required tasks are outlined in the table below:

Table 16 –Timing of Task Completion

Tasks	Crew of 1	Crew of 2	Crew of 3	Crew of 4
Scene Size-Up	1 min 30 sec	1 min	25 sec	20 sec
Pull Attack Line	2 min 41 sec	1 min 30 sec	1 min 40 sec	30 sec
Charge Line	3 min 35 sec	2 min 10 sec	1 min 50 sec	59 sec
Forcible Entry	4 min	2 min 10 sec	40 sec	32 sec
Advance Line to Fire	4 min 38 sec	2 min 35 sec	2 min 10 sec	46 sec
Extinguish Fire	4 min 45 sec	2 min 40 sec	2 min 15 sec	1 min 21 sec
Search and Rescue	6 min 40 sec	3 min 10 sec	2 min 16 sec	1 min 40 sec
Total Completion Time	6 min 40 sec	3 min 10 sec	2 min 16 sec	1 min 40 sec

Timing started when the respective crew exited the apparatus and began their assignment. A stopwatch was used to track the completion time of each task and was then recorded in the table above. It is important to note: all four fires were of approximately the same size with the same smoke condition, the same equipment was used each time, and a constant water supply was already initiated with large diameter supply hose. Safety personnel were positioned throughout the structure with a charged hose line in case of an emergency.

After completion of the tasks, the one and two man crews were physically exhausted and it was questionable whether they would be able to perform a rescue if a victim was located. Another concern identified was that if a fire fighter were to be injured or incapacitated during this type of operation with a one or two man crew, the rescue effort would be seriously delayed due to lack of manpower. There is an obvious increased risk to the fire fighter when an interior fire attack is undertaken without the support necessary to complete it. Additionally, the one and two man crews noted that they experienced a burden of stress and urgency while trying to cope with the lower staffing levels. With the three and four man crews, all interior tasks were completed with a minimum of two fire fighters, leaving no one alone in the structure. The fact that multiple tasks could be accomplished simultaneously decreased the completion time, thereby lessening property damage and increasing the chance for victim survival (Gleason, 2002).

Seattle Fire Department - Report to Executive Board, Minimum Manning as Health & Safety Issue

In 1981, the Seattle Fire Department analyzed the link between staffing and firefighter injuries by reviewing the average severity of injuries suffered by engine companies of fewer than four firefighters as compared to companies with four or more firefighters. The

study concluded that the average time per disability increased as company strength decreased for both types of companies. This analysis indicated that the rate of firefighter injuries expressed as total hours of disability per hours of fireground exposure were 54% greater for engine companies staffed with three personnel when compared to those staffed with four firefighters, while companies staffed with five personnel had an injury rate that was only one-third that associated with four-person companies (Cushman, 1981).

FEMA - Report on the Survey of Fire Suppression Crew Size Practices

In 1982, the United States Fire Administration conducted a survey of over 150 fire departments to evaluate current crew size and standard response practices. The study determined that there was a direct correlation between fire fighter safety and the number of personnel on the initial fire attack. When asked to identify those factors most important in determining crew size and initial response, fire chiefs and city managers ranked crew safety at the top of the list (Centaur Associates, June 1982, p. 18-20).

Phoenix Fire Department, Arizona

The FIREDAP Study was initiated by the NFPA as part of its Urban Forums activities to objectively evaluate fireground operations and precisely identify the tasks and functions required to safely and efficiently conduct an interior attack. The project's Select Committee included representatives from seven jurisdictions, as well as the U.S. Fire Administration, the ICMA, ICHIEFS, IAFF, the Insurance Services Organization (ISO) and a number of technical subject matter experts. The observational study gathered empirical data from validated fireground simulations for the purpose of providing a comprehensive list of all key tasks that must be performed to rapidly and effectively confine a fire. Based upon these findings, the Select Committee concluded that control of an emergency incident is a function of how these specific tasks are performed. The Committee also relied on the findings to establish deployment criteria for a benchmark structural fire; command evolutions for a third alarm structural fire; and deployment criteria on a single patient medical response using BLS engines, ALS engines and ambulances (FIREDAP, December 1991, p. 1).

Manhattan Beach – Response Time Study

While a number of applicable studies have been conducted over the years, the MBFD SSC decided to conduct its own staffing analysis. On September 24 and 25, 2008, an evaluation was conducted in two separate locations within Manhattan Beach. The objectives of the exercise were to 1) analyze the impact of those high-density, limited access residential areas on response time, and 2) assess the significance of having three versus four personnel on a response apparatus. It is important to note that, given the countless number of critical tasks discussed within this section, the exercise was only a piece of the overall resources necessary to manage a structure fire. However, it was determined that this sampling would be indicative of the nexus between response time and the onset of a flashover.

The premise is entrenched within several studies and an assertion made by the International City Manager's Association (ICMA) that apparatus staffed with four personnel are significantly safer and more efficient than those staffed with three.

For consistency, each evolution used the same personnel and incorporated the following steps:

1. Engine response to address
2. Establish a water supply
3. Conduct a full four sided (360-degree) walk-around of the structure
4. Ladder the second floor
5. Place a charged 1 ¾ inch attack line at the front door
6. Pump the line at the appropriate pressure
7. Don full personal protective equipment (PPE)
8. Show water outside the door

Time started when the engine breached the threshold of the Station 21 (400 15 Street) bay door, and stopped when the crew from Engine 21 was prepared to make entry. No specific direction as to process was provided; instead, the officer was instructed to manage the exercise as safely and efficiently as possible, given the personnel (three or four) he was provided.

Note: the following assessment includes a standard two-minute aggregate dispatch and turnout time.

Table 17 – 656 18th Street

#	Stage in Evolution	Time	
		3-person	4-person
1	Dispatch call processing time	1:00	1:00
2	Turnout time	1:00	1:00
3	Door to hydrant	1:25	1:25
4	Hydrant to stage	:10	:10
5	Hydrant charged	2:08	2:08
6	Pressurized line at door; ladder; full PPE/Air	2:47	1:32
	Total	8:25	7:15
	Difference	**+1:10**	

Observations

1. The four-person evolution proved to be a minute and ten seconds faster than the three-person evolution.
2. The three-person evolution exceeded the standard 8-minute time frame for flashover by 25 seconds
3. The four-person company completed the evolution 45-seconds before the 8-minute mark.

Table 18 – 444 33rd Place

#	Stage in Evolution	Time	
		3-person	4-person
1	Dispatch call processing time	1:00	1:00
2	Turnout time	1:00	1:00
3	Door to hydrant	2:53	2:53
4	Hydrant to stage	:54	:54
5	Hydrant charged	2:02	2:02
6	Pressurized line at door; ladder; full PPE/Air	4:54	2:08
	Total	12:43	9:57
	Difference	**+2:46**	

Observations

1. The four-person evolution was nearly three minutes (2:46) faster than the three-person evolution.
2. The three-person evolution exceeded the standard 8-minute time frame for flashover by 4:46 seconds
3. The four-person company completed the evolution nearly 2-minutes after the 8-minute mark.

Conclusions

While it is impossible to predict each aspect of a dynamic fire event, the exercise clearly indicates that a four-person over a three-person company can make a difference in the outcome of an incident. Operationally speaking, the first two priorities of any emergency incident are life and property. Given that flashover typically occurs within eight minutes of ignition, it can be reasonably stated that response time and crew deployment has a direct correlation with firefighter safety and efficiency.

436 36th Place, Manhattan Beach

While there is certainly value in conducting local, regional, and even national studies, researchers involved in this study anticipated that there may be some interest in the direct application of existing resources on a room and contents fire within an area that has been deemed of maximum hazard.

To that end, an analysis was conducted on a residential structure fire that occurred on November 6, 2008 at 436 36th Place, Manhattan Beach. This incident was selected because of its location, building construction, date of occurrence, and the fact that the fire was captured on video by a news helicopter. It was also determined that the occurrence was typical of the number of regional resources available to respond.

Table 19 – Two – Alarm Structure Fire - November 6, 2008

Fire Incident No.	083110042	**Address**	436 36th Place (Grandview and Bell)		
Split times measured from initial dispatch to action taken					
#	**Entry**	**Time**	**Split**	**Unit(s)**	**Comments**
1	911 Call	23:04:49	N/A	South Bay Dispatcher	911 Call initiated
2	Dispatch	23:05:13	00:24	Manhattan: BC21, E21, E24, R21 Hermosa: E11 Redondo Beach: T61	First Alarm Structure Fire: a. Reported as "fully engulfed inside" b. 1 BC, 3 Engines, 1 Truck, and 1 Rescue c. From three separate agencies d. Manhattan Beach has no additional resources **Note:** despite location of incident, El Segundo Fire Department was not called on the initial alarm (run card)
3	Dispatch	23:06:24	01:35	T61	Notified to respond by Redondo Dispatch 1:11 after initial dispatch
4	Enroute	23:07:19	02:30	R21	
5	Enroute	23:07:38	02:49	E21	
6	Enroute	23:08:12	03:23	E24	
7	Enroute	23:08:28	03:39	E11	
8	Enroute	23:09:24	04:35	BC21	First out of Station 21; delayed acknowledgement on MDC
9	Update	23:09:33	04:43	PD 97	Reporting fully engulfed fire; possibly more than one unit
10	Enroute	23:09:43	04:54	T61	Enroute 03:19 from Redondo Beach Dispatch; nearly five minutes from initial 911 call
11	On-Scene	23:11:42	06:53	BC21	Size-up
12	On-Scene	23:11:46	06:57	E21	Assigned: fire attack and supply line (Rescue 21 arrived, but did not clock in through MDC until 23:20:42; assigned to assist E21); fire attack occurred within one minute of assignment (23:12:46; 07:57 from 911 call)
13	2nd Alarm	23:12:20	07:31	BC21	BC, 3 engines, 1 truck
Eight Minute Flashover Threshold: BC and 1 Engine and 1 Rescue on scene (six firefighters)					

14	Coverage	23:13:52	09:03	LA County	Providing station coverage for Manhattan Beach
15	On Scene	23:15:09	10:20	E24	Assigned: separate water supply and exposures (east and west)
16	On Scene	23:15:12	09:34	E11	Assigned; separate water supply and exposure fires to the west
17	Notified	23:15:15		LACo 161	Notified to divert to fire scene from Station 21 assignment
18	Notified	23:16:06		E95 (Torrance)	Notified to backfill Hermosa Beach station
19	Water Supply	23:16:15	12:26	E21	"Have hydrant, awaiting water"
20	Notified	23:16:23		E62 Redondo	04:03 after call for second alarm
21	Notified	23:18:05		LACo E21	Requested to respond to fire
22	Knock Down	23:20:21	15:32	BC21	Exterior attack; knockdown after 07:35 of initial fire attack
23	Dispatch	23:22:45	17:34	BC31 (El Segundo)	Notified to respond
24	Notified	23:20:49		Air and Light Unit (Torrance)	Part of 2nd Alarm Response
25	Available	23:23:09	18:20	E33 (El Segundo)	E33 assigned to rapid intervention crew (RIC) 02:48 after knockdown
26	On-Scene	23:24:13	19:24	T61	17:49 minutes after initial T61 Redondo Beach Dispatch
27	On-Scene	23:28:06	23:14	BC31	
28	On-Scene	23:40:25		LACo E21 and BC21	

Summary:

1. Flashover can occur within eight minutes;
2. NFPA 1710 recommends that the first unit on the scene arrive within four minutes and all first alarm units are on-scene within eight minutes of dispatch, 90% of the time;
3. The first Manhattan Beach Battalion Chief and Engine 21arrived at: 23:11:42 (06:53 from 911 call);
4. The first Hermosa Beach Engine arrived at: 23:15:12 (09:34 from 911 call);
5. The first El Segundo Engine arrived at: 23:23:09 (17:34 from 911 call);
6. The first Redondo Beach Truck arrived at: 23:24:13 (19:24 from 911 call);
7. The first LA County Engine arrived at: 23:40:25; (25:49 from 911 call);
8. The first Torrance Air and Light unit arrived at unspecified time.

Flashover had already occurred by the time water was first applied to the fire. Though an attempt was made to extinguish the fire through the front door, crews were forced to abandon their initial position and apply water through the windows. The fire was knocked down 15:32 after the initial 911 call. A full first alarm was not available on the 36th Place Fire until 19:34 into the fire, when T61 from Redondo Beach arrived.

While two water supplies were secured, limited resources kept the incident commander from checking for extension, ventilation, and a search of the neighboring and adjoining occupancies.

Comparable Reports

An analysis of emergency service staffing often begins with comparison of available response personnel to other communities of similar size and organization. The number of operational personnel maintained by a fire department provides some measure of the ability of the agency to assemble emergency workers to respond to requests for assistance.

In 2005, the NFPA Fire Analysis and Research Division conducted a staffing study focusing on United States career fire departments. The following chart (Table 20) shows the number of career personnel maintained by Manhattan Beach Fire Department per 1,000 residents, and compares that benchmark to the western United States median for agencies serving similar communities with a residential population between 25,000 and 49,999.

Table – 20
Career Firefighter Rates
By Population Protected, Per 1,000 Persons

Population	Low	Median	High
1,000,000 or more	0.31	1.35	1.91
500,000 to 999,999	0.48	1.38	2.51
250,000 to 499,999	0.63	1.32	2.34
100,000 to 249,999	0.53	1.32	2.62
50,000 to 99,999	0.00	1.39	3.08
25,000 to 49,999	0.00	1.27	2.83

Source: NFPA Survey of Fire Departments for U.S. Fire Experience, 2005

The figures listed above are based on data reported to the NFPA, and do not reflect a recommended rate or defined fire protection standard. Still, while the rates of a particular size of community may vary due to policy and demographics, they do provide some insight. Using the table as a guide, Manhattan Beach (.91) is roughly at 70% within the 25,000 to 49,999 range. At a population just short of 35,000, the MBFD has a staffing of 27; the recommended range is 1.27 to 2.83 per 1,000, or a span of 44.5 to 99 firefighters. At minimum, the MBFD falls 17 short of the national average. As a side note, from the same report the number of stations per 1,000 residents for a community of 25,000 to 49,999 is .094.

A similar study authorized by U.S. Public Law 106-398, was conducted in 2002. A cooperative needs assessment of the U.S. fire service analyzed the average number of career/paid firefighters per department who are on duty available to respond to

emergencies, by size of community the department protects. These figures do not indicate the average number of firefighters per department on duty, because volunteers are not included and every community-size interval has some departments that are not all-career departments.

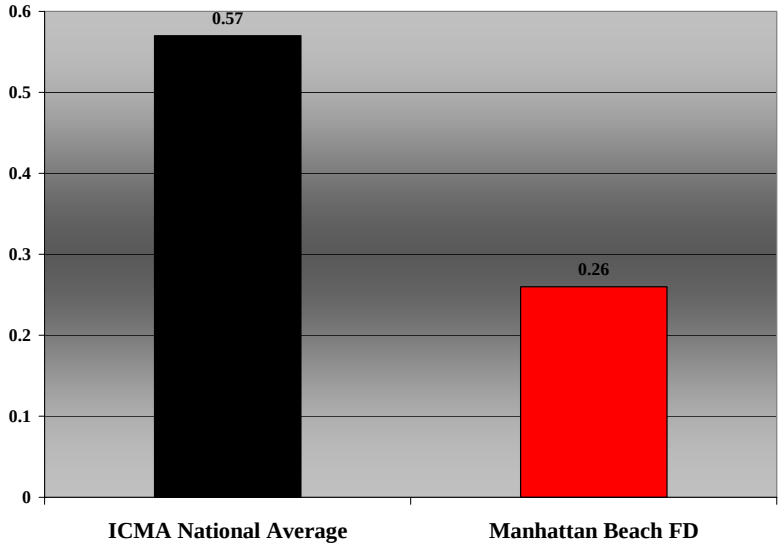
Table 21 – Average Number of Career Firefighters per Department; on Duty Available to Respond to Emergencies, by Size of Community

Population	# of Firefighters
1,000,000 or more	355.1
500,000 to 999,999	217.4
250,000 to 499,999	127.2
100,000 to 249,999	52.9
50,000 to 99,999	24
25,000 to 49,999	18.8
10,000 to 24,999	7.3
5,000 to 9,999	3.6
Under 2,500	1

The above projections were based on 3,177 departments reporting on Question 9 of the survey, "What is the average number of career/paid firefighters on duty available to respond to emergencies?"

Studies by the International City Manager's Association (ICMA) place the national average of on-duty firefighting strength of a city fire department at 0.57 per 1,000 persons. With daily staffing levels of 9 firefighters available for response, the MBFD on-duty staffing equates to 0.26 per 1,000 persons, or about 50% of the national average.

Figure 11 – ICMA National Average On-Duty Firefighters 30K-50K



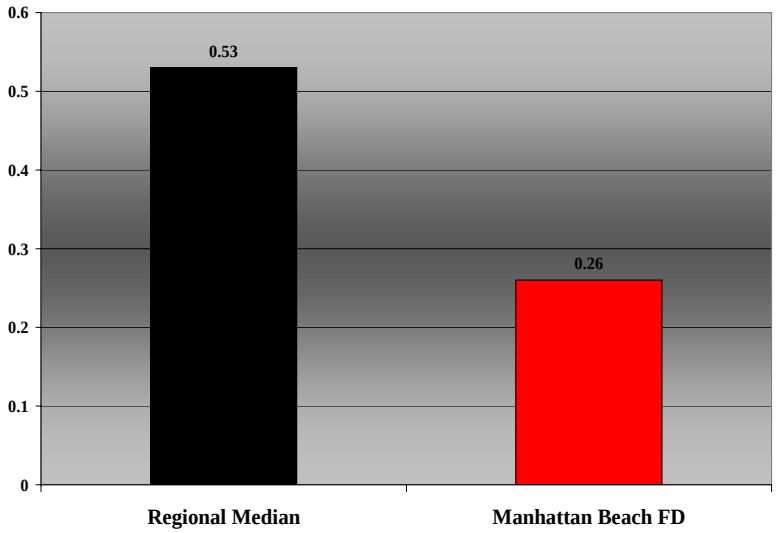
Regional comparisons were also evaluated. The parameters included cities within Los Angeles and Orange counties, with population ranges between 30,000 and 50,000 persons.

Table 22 – Regional Comparisons: Firefighters per 1,000 Persons

Fire Department	Population Size	Sq. Miles	County	Number of FF on Duty/Shift	FF/1,000 Ratio
Manhattan Beach	33,852	3.9	LA County	9	.26
Beverly Hills	35,000	5.5	LA County	24	.68
Brea	40,081	16	Orange County	16	.4
Culver City	40,000	5	LA County	18	.45
La Verne	32,400	9.2	LA County	21	.65
Monrovia	39,137	13.75	LA County	13	.48

The regional median equated to 0.53 per 1,000 persons (MBFD: .26).

Figure 12: Regional Comparisons: Firefighters per 1,000 Persons

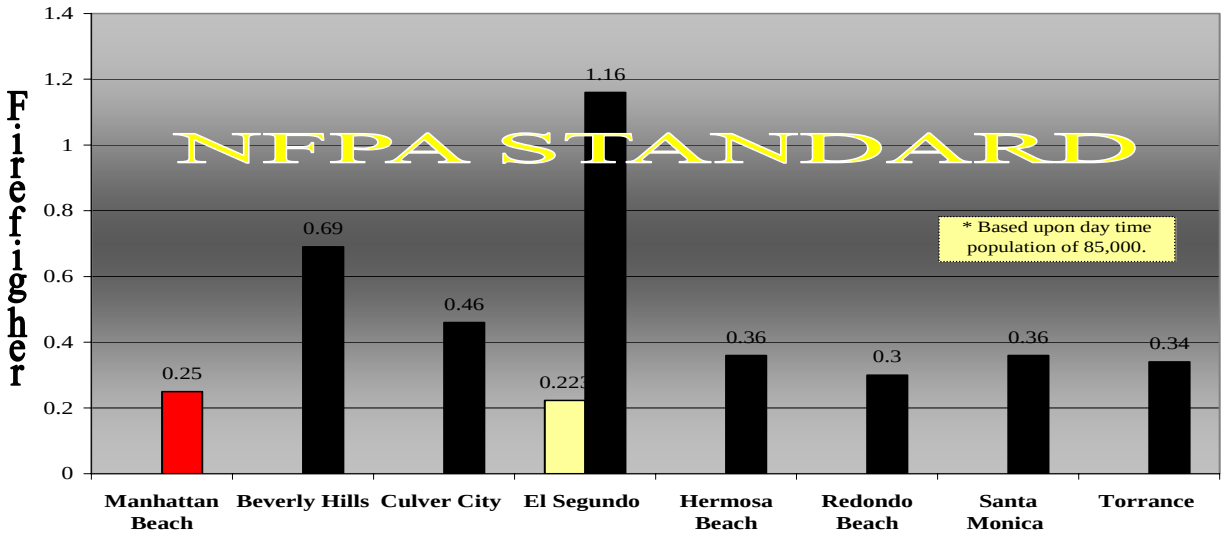


Within Los Angeles County, cities are grouped into areas based on their geographic location and relative size. Regional area's A and G were determined to be the closest comparables considering location, size, and automatic and mutual aid resources.

Figure 13 identifies that number of firefighters in Manhattan Beach per 1,000 in population is .26; the lowest among the Area A and G cities.

Area A and G Staffing Comparisons

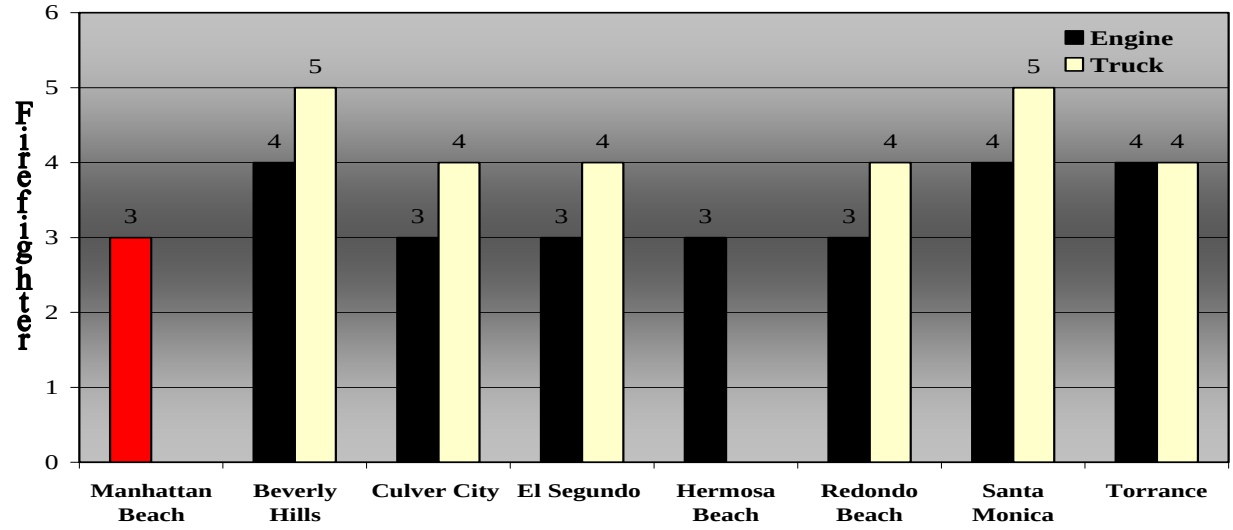
Figure 13 – Areas A and G Fire Departments: FF per 1,000 Persons



**Population estimates based upon 2007 US Census data*

Figure 14 illustrates that of the eight comparable cities, Santa Monica, Torrance, and Beverly Hills staffs their engines with four personnel. However, while Culver City, El Segundo, and Redondo Beach staff their engines with three, their truck would add an additional four responders to a structure fire. Manhattan Beach and Hermosa Beach are the only departments with three-person engine companies and no truck.

Figure 14 Area A & G Fire Departments: Apparatus Staffing Levels



MBFD Staffing Study Survey, 2008

Fire Service Hierarchy

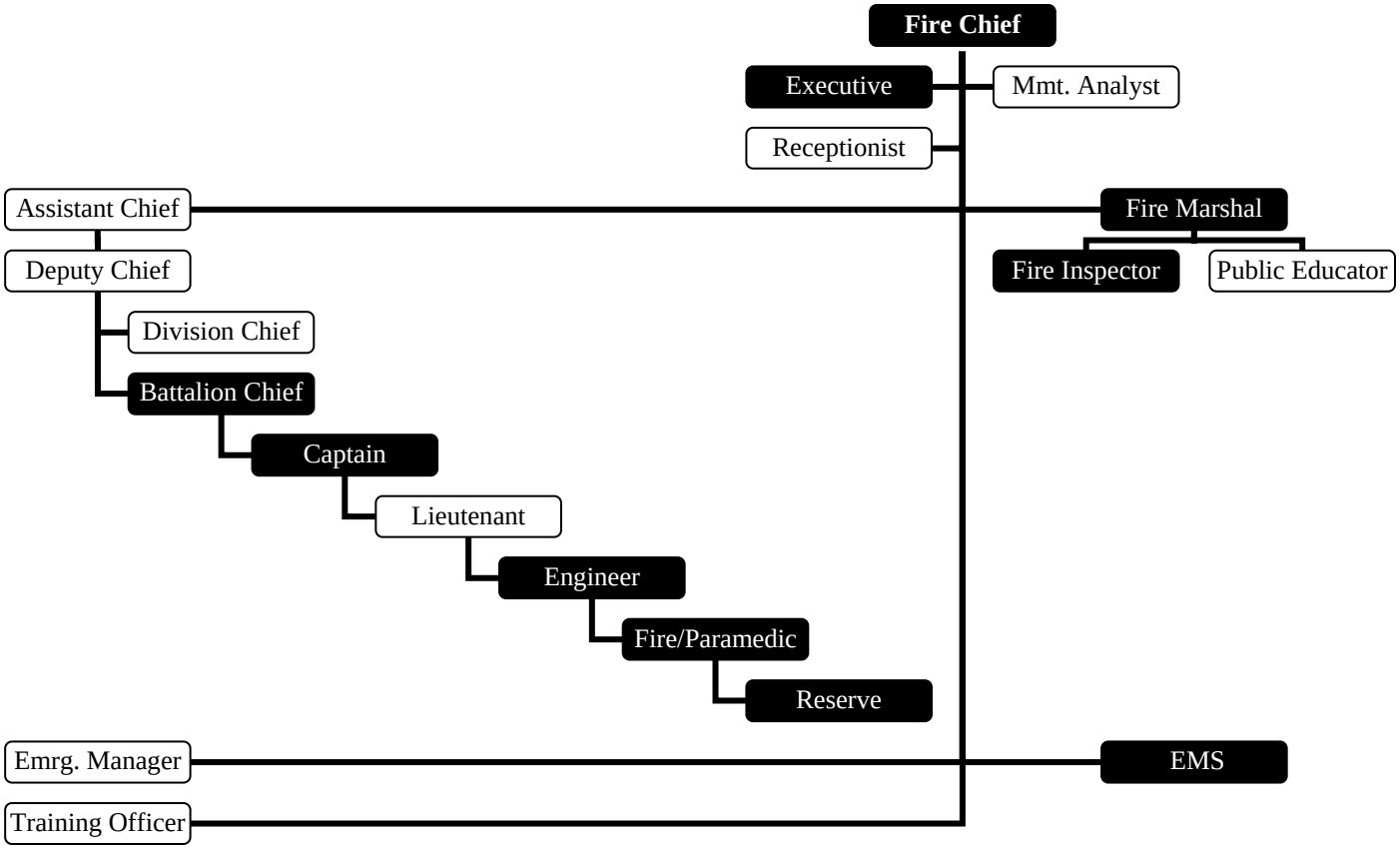


Figure 15 Fire Service Hierarchy

While the ratios may be similar, it is largely understood that the number and type of sworn positions found within a fire department is dependant on the population and demographic the agency serves. Still, there may be some value understanding the breadth of job descriptions available to some organizations. Within a typical emergency response hierarchy there exist as many as eleven layers. Manhattan Beach employs eight: those currently staffed are listed in black.

Several administrative or program specialties may also exist; of the eight most common positions; Manhattan Beach employs two plus a contract EMS Coordinator.

- Fire Marshal*
- Fire Inspector*
- EMS Coordinator*
- Training Officer
- Emergency Manager
- Special Operations
- Public Educator
- Public Information Office

Administrative Staffing Comparisons

Administrative support is typically defined by the nature and complexities of the expectations and benchmarked against comparable organizations. However Emergency Services Consulting recommends a 15 to 20% ratio of administration and support staff of operational personnel. The MBFD is at 12.5%.

One of the Study areas of interest has been that of administrative support. By nature of the three-shift schedule, state and federal training and reporting mandates, inspection and code enforcement issues, budget and other legal obligations, a percentage of the MBFD staff must be dedicated to managing the business of the organization. The question at hand is how the MBFD determines the range between what is minimally reasonable and that which is excessive or fiscally unreasonable.

Table 23 – Area A and G Administrative Support

City	Emergency Manager	Training Officer	Management Analyst	Administrative Assistant	Receptionist
Manhattan Beach				x	
Santa Monica	x	x	x	x	x
Torrance	x	x	x	x	x
Beverly Hills	x	x	x	x	x
Redondo Beach	x	x*	x	x	x
El Segundo	x	x	x	x	x
Culver City	x	x*	x	x	x
Hermosa Beach		x*		x	
Note: * - responsibilities split with other administrative roles					
Source MBFD Staffing Study Survey, 2008; confirmed by South Bay Chief's Meeting on October 16, 2006					

Table 23 indicates that Manhattan Beach as the least administrative support among the comparables. Hermosa Beach is the next closest city with an administrative assistant and one training officer that splits his responsibilities between his primary assignment and other projects.

Table 24 – City of Manhattan Beach Administrative Support

City	Mmt. Analyst	Exec. Secretary	Receptionist	Other
Fire Department	-	1	-	-
Police Department	1	2	Front Desk - Records Tech	Detectives Secretary 2 – Records Matrons
Management Services	-	Admin. Assistant	Temporary	Admin. Clerk
City Attorney's Office	-	Legal Secretary	-	-
Finance Department	Budget Analyst	1	-	-
Human Resources	HR Analyst	1	-	HR Ass. Intern
Risk Manager	-	1	-	HR Technician
Parks and Recreation	-	1	Recept./Clerk Facilities Clerk	2- Admin Clerks 1-Part-time Clerk
Community Development	-	1	-	Secretary 2- Permit Techs Part-time Admin.
Public Works	1 (1–Senior MA)	1	-	2- Secretaries

Source: City of Manhattan Beach Human Resource Department – January 23, 2009

A City of Manhattan Beach internal study (Table 24) found that by comparison, the MBFD and City Attorney were the only departments that had a single person as administrative support.

Fire Department Internal Customer Service Analysis

Customer service continues to be a hallmark of the City of Manhattan Beach. As such, some consideration was given to those areas not currently staffed with full-time employees.

Administrative Support

There has been some speculation as to the value and nature of customer service currently afforded by the existing administrative staff. The following is an analysis of the key factors related to this support; the first of which is customer contact. Beyond those tasks traditionally assigned (by job description), the MBFD Executive Secretary is the first point of contact for all visiting and phoning guests. In her absence, the doors may be locked and the phones may go unanswered. In a self-reporting study, the Executive Secretary documented the dates and times the lobby door was locked.

Table 25 – Fire Department Front Door Locked

Survey - Locked Lobby Door 01/01/08-11/17/08				
Reason	***Holiday***	***Sick***	***Vacation***	***Other***
Total Hours by Category	**56**	**72**	**72**	**78.3**
Total Hours	**278.5**			

The results indicate the lobby door was locked 278.5 hours during 10 ½ -month period. Fifty-six hours were attributed towards holidays; the remaining three areas were nearly evenly split at just over 70 hours apiece. That is roughly an average of 1.3 hours a day. Adding the one-hour lunch period, that roughly equates to 2.3 hours of the eight-hour business day.

Additionally, a self-reporting phone log was kept between August 25, 2008 and November 7, 2008. The average call volume per day was 31.8, with the highest call volume occurring between the hours of 8:00am and 12:00pm at 15.8 calls.

Table 26 – Business Day - Phone Log

Phone Log Between 8/25/08-11/07/08			
	8:00am-12:00pm	***12:00pm-1:00pm***	***1:00pm-5:00pm***
Call Volume	**869**	**121**	**756**
Average Call Volume	**15.8**	**2.2**	**13.7**
Daily Call Average	**31.7**		

Charted within the same study is a summary the job responsibilities attributed to the positions of a Receptionist and Executive Secretary. A comparison was conducted between these assignments and those of the role currently performed by the existing MBFD Executive Secretary. The results indicate that the current position, a) is not able to execute all specified Executive Secretary or Receptionist job duties, and b) she performs many functions traditionally filled by other job descriptions, such as Management Analyst, Clerk, or Public Educator. Anecdotally, the nature and frequency of the responsibilities assigned to the existing Executive Secretary prohibits her from obtaining the training normally associated with the job description.

Table 27 – Administrative Task Analysis

Task	Exec. Sec.	Receptionist	Current Position
Answer Telephones	X		X
Create Memos, Letters and Charts		X	
Create Statistical Reports and Graphs		X	
Greet Visitors	X	X	X
Compose/Edit Correspondence/Agendas		X	
CERT Correspondence			X
Public Education Requests			X
Coordinate Station Tours and Requests		X	X
Assist with the ordering of Department Supplies			X
Assist with Community Events			X
Secretarial Support for Battalion Chiefs	X		X
Secretarial Support for Fire Prevention	X		X
Hermosa Beach Mutual Aid Billing			X
Coordination of HAZMAT pickup			X
Schedule all service requests			X
Coordination with Ambulance Billing		X	X
Maintain Department Calendar		X	X

Emergency Management

A Battalion Chief (BC) has been filling the role of the emergency manager; however, it has had a direct impact on hours attributed toward shift members training, planning, and reacting to core job responsibilities. In supporting the Department's Community Emergency Response Team (CERT) and while preparing for the region's 2008 Golden Guardian exercise, the BC averaged approximately 60 hours per month for disaster preparedness; 6 of these required overtime.

The BC has indicated that the following areas have been adversely impacted as a result of insufficient time spent on the program:

- Training oversight and coordination with city departments
- Attend more training classes and seminars and coordinate with Area G Disaster Group
- Community outreach: CERT, Neighborhood Watch, School District, Seniors, and Churches

The BC's attention to his primary shift responsibilities has also been impacted. Examples where there needs to have more attention include:

- SOP and budget development
- Fire and EMS training
- Personnel management, including succession planning, mentoring, and employee recognition
- Managing the department's information systems, including the website
- Safety committee and accident prevention

Volunteers

In an effort to augment the front office staff, volunteers have been recruited to answer phones and do assist with filing. While the intent of the volunteers has been very appreciated, to date, the successes have been marginal. Consistent scheduling and a lack of confidence and technical expertise are among the challenges encountered. To an address recruitment and consistency, Eve Kelso (Recreation Services Manager) offered the following commentary:

> Here is a little history of our clerical volunteers over the past six years since I've been here. Our volunteer ambassador program has been the most successful at City Hall. Typically volunteers work one morning or afternoon a week. All ambassadors are currently retired from their careers, though we have trained high school students over the summer. Ambassadors indicate planned time off on a central calendar and call in sick to keep us informed. 3 of our 5 volunteers have been with us for over 10 years.
>
> In our Community Development Department, staff typically utilize up to four volunteers at one time. In the past year, one of those volunteers has been out on disability for over 6 months; and two others have had sporadic schedules. Another two volunteers were assigned to that department this year, and both moved on to other jobs or responsibilities outside of the city within a month of their assignment.

The Finance Department has utilized clerical volunteers on an ongoing basis. In the summers, high school students have assisted with filing and data entry. There have been a number of volunteers who've come and gone quickly in that department.

Human Resources utilizes volunteers to cover staff meetings, holiday luncheons…

In most instances volunteers have been great to assist in augmenting the workload of staff, however, it can be difficult to find and keep good volunteers. I do recommend that you interview potential volunteers for your department.

I'll be in touch regarding our two potential volunteers who may be ready to begin in January.

SECTION 9 – FINAL RECOMMENDATIONS FOR BUILD-OUT

Again, the MBFD is not asking for immediate action. Instead our goal is to first, agree upon an appropriate staffing level (build-out), and second, ask Council to authorize a group of stakeholders to develop a plan for a phase-in implementation to include funding recommendations and an appropriate balance of operational and administrative personnel. In order of priority, the Fire Chief's recommendation for build-out includes the following additions:

1. ***Constant staff one additional firefighter on Engine 21 per shift (3 FTEs) –*** While this would only add a single person to the fireground, it enables an incident commander the option of splitting a crew of four into two teams; thereby addressing an additional critical fireground factor in an area of the City considered the most hazardous.

2. ***Management Analyst (1 FTE) –*** The duties associated with budget, payroll, grant and records management, and data analysis would be given the appropriate attention.

3. ***40-hour Training Officer/Emergency Manager (1 FTE) –*** As proposed, the position would hold the rank of Division or Battalion Chief. The officer would provide much needed stability and consistency across all three shifts, and give direction to City staff in the area of emergency planning and operations.

4. ***Constant staff a second Rescue to Station 22 (6 FTEs) –*** This would add a total of six FTEs. Given that EMS calls are more prevalent than fire response, a second rescue has the advantage of increasing the level of advanced life support to the community, while still increasing response personnel by two on structure fires. There would also be an offset for those EMS typically lost to other agencies when Rescue 21 is unavailable.

5. ***Fire Inspector (1 FTE) –*** A prominent impact could be made with the addition of a third member to the Bureau, thereby reducing the workload and improving

the level of customer service related inspections, plans reviews, and public education.

6. ***Administrative Receptionist (1 FTE) –*** By answering phones, addressing walk-in customers, and other clerical tasks, the Executive Secretary would be available to support the Chief Officer staff.

Ladder Truck (12 FTEs) – This piece of equipment is expensive and, relative to other calls for service, used sparingly. However, it can be critical in the successful operation of most structure fires, regardless of their size or scope. While a ladder truck has not recommended as an option within the initial study, it is worthy of consideration in the years to come. The study acknowledges both the minimum staffing requirements necessary to operate effectively and efficiently on a fire scene, and the critical tasks typically managed by a truck company. However, the expense of the apparatus and the requisite equipment, combined with the cost of staffing it, has precluded it as an initial consideration for build-out.

It should be noted that there are those members of the Fire Association, some of which were represented on the Study Committee, that believe that if Council were to agree to any additional staffing, all sworn positions should be hired before any administrative staff are added.

Fire Department Strategic Plan

The Department understands that not all challenges can be solved by Council signing a check. The MBFD accepts the responsibility to continue analyzing those areas that we can make improvements. As such, the *Study* will become one component of a more comprehensive strategic plan. This plan will become the yardstick from which future decisions will be prioritized and measured.

The MBFD strategic plan will endeavor to address the following challenges:

Operations

- ***Auto and Mutual Aid Partners*** – There is room from improvement with other South Bay agencies. A lack of a single dispatch center generates response delays and communication breakdowns with each of the other agencies. Automatic aid would be better facilitated with boundary drops and an Automatic Vehicle Locator (AVL) system;
- ***EMS*** – The program is strong. Our paramedics are effectively trained and supported by a nurse educator. However, the MBFD is not well represented at local meetings, and thus has been out of touch with significant changes in regional policy and administrative practice.
- ***Fire Response –*** MBFD staffing levels are insufficient to safely fight fires that extend beyond the initial room and contents. While the job generally gets done, the incident commander is often unable to fill key positions such as RIT and safety officer, or complete such tasks as checking for extension or roof ventilation before neighboring agencies have arrived;

- ***Response Times*** – Fire Stations 21 and 22 are adequately spaced to meet the response needs of the community. Statistically, the first EMS or fire units on-scene are also meeting the MBFD response goals. Conversely, all first-alarm and subsequent fire responses do not meet industry standards.

Administration

- ***Association*** – The Fire Association and Administration "get-along" fine, but there exists more opportunities to strengthen the relationship through proactive planning and communication while determining the Department's future.
- ***Battalion Chiefs*** – Chief Officers are expected to wear many hats, especially in a two-station fire department, but this Department's Battalion Chiefs' time and efforts are spread thin. They spend too little time with their crews working on personnel management, training, program development, pre-fire plans and regional partnerships. Their time is equally stretched on administrative issues such as budget, emergency management, and payroll. Some areas have simply gone unaddressed, due to either a lack of time, support, or insufficient training.
- ***Budget*** – The Department budget process has been going through an overhaul to include sound tracking and decision-making principles.
- ***Emergency Management*** – The City has appropriately committed to being prepared for natural and man-made disasters, and the Fire Department has committed to taking the lead. The MBFD needs the support and resources to give the program the attention it deserves.
- ***Fire Prevention Bureau*** – The number of fire inspections and plans checks annually assigned is greater than the combined resources currently provided by the Bureau, operations personnel, and reserves. While occupancy walk-throughs are conducted at the officer's discretion, formal pre-fire plans have not been updated in several years. Working with Raleigh Studios in the inspection and permit process takes nearly 50% of the fire inspector's available day. The fee for this service should be reevaluated to ensure that it is representative of the time spent on the campus.
- ***Industry Standards*** – The MBFD is not compliant with OSHA, NIOSH, ICMA, or NFPA standards and recommendations for fire department training or staffing configurations.
- ***Performance Appraisals –*** The appraisal process is inadequate and is scheduled to be reviewed with the Human Resource Department and the Fire Association.
- ***Public Education –*** The Fire Inspector's duties include all the planning and organizing of school programs, station visits, and the annual open house. Ideally, fire prevention should be given more attention by including such programs as Senior Citizen Fall Prevention, smoke detectors, and other public safety initiatives. However given the Division's other responsibilities, the tasks have been relegated to a lower priority.

- ***Records Management*** – Some of the intended research for this study was either unavailable or difficult obtain. Training records have not consistently been maintained, and only the absolute minimum response information is entered into a database. More training and direction is necessary so ensure that mandates are adhered to and target hazards are suitably addressed. Station 2 Captains spend an inordinate amount of time managing personnel schedules (filling sick and vacation hours). Effective automated software systems are currently used in other fire departments, but they take a combined commitment and trust from the City and the Association to make them work.
- ***Regional Comparison*** – the MBFD is at, or near the bottom of all comparable cities in operational and administrative resources.
- ***Safety*** – Fire's approach has been passive; that needs to change.
- ***Standard Operating Procedures –*** Many of the requisite policies are outdated or non existent. The issue is being prioritized against the other opportunities for improvement.
- ***Training*** – Without a dedicated position, training occurs, but no federal (OSHA) or industry benchmarks have been set from which the Department can be measured against. Until recently, there has also been no formal mentoring or officer development programs. Again, the aptitude and motivation is there, but the administration has been minimal.
- ***Wellness*** – A proactive approach to maintaining mental health and physical health needs to be cultivated. A comprehensive evaluation and training plan is available through the IAFC and IAFF.

Limitations

Auto and Mutual Aid – Jurisdictional relationships range from those contracted through agencies such as the Orange County Fire Authority (22 cities) and the Los Angeles County Fire Department (58 cities), to rural communities with a similar population as the City of Manhattan Beach, but less density. Local agreements may also be dependant on the political landscape. Lastly, the scope and definition of auto or mutual aid may vary depending on the use of a common dispatch center, the number of available frequencies, and the availability of advanced technology such as an Automatic Vehicle Locator (AVL).

Population – Population estimates may vary depending on the reporting agency. The State Department of Finance places Manhattan Beach at 36,505, while the Census Bureau uses 2000: 33,852, and 2007: 36,536. Researchers chose 34,000 as a conservative estimate while figuring each of the Manhattan Beach staffing ratios.

Report Management System (RMS) – Much of the information regarding the nature of the MBFD emergency responses and type and quantity of training was unavailable. Discussions with the person contracted to manage the MBFD database indicates that the existing RMS system is capable of such queries, but that the information had not been entered.

Survey Results – Of the 66 California departments surveyed, 38 (58%) were returned. The criteria used in determining which agencies were surveyed included: a) career-only departments, b) square miles, c) population, d) number of firefighters and staffing configurations, and f) those departments recognized as having unique funding mechanisms. The final published results limited the comparable cities to those located within Area A and G (within LA County) and those cities with populations ranging from 30 to 50,000. Survey results may have been varied based on the interpretation of the questions by each agency's representative responding to the instrument.

Glossary of Terms

6 min. Response Standard - Combines three time elements of total response time; dispatch time of 60 seconds, turnout time of 1 minute, driving time of 4 minutes.

Attack Line– A medium sized hose that produces 100+ GPM and is handled by a minimum of two firefighters, or a larger hose that produces 200+ GPM and is handled by three or more firefighters.

Alarm – The point at which awareness triggers an effort to notify the emergency response system. An example of this time point is the transmittal of a local or central alarm to a Public Safety Answering Point (PSAP).

Advanced Life Support (ALS) – The ALS units have a minimum of one paramedic and one EMT, can administer medications, and have advanced airway equipment, cardiac monitors, advanced cardiac life support equipment and blood glucose testing equipment.

Automatic Aid – Fire department units are automatically and immediately dispatched on a first alarm into another jurisdiction as part of a pre-arranged agreement

ALS Engine Company - An engine company with at least one paramedic on the crew. Each Salem engine has at least one paramedic assigned daily.

Apparatus Operator (AO) - Also known as the "Equipment Operator", "Engineer" or "Driver" in the fire service. That position which is responsible for the driving and operation of fire apparatus.

Apparatus - The term apparatus is used to signify the difference between vehicles and other fire equipment.

Back-up Line – Usually the same size as the initial attack 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.

Basic Life Support (BLS) – Basic Life Support Units that are designed for inter-facility transportation and pre-hospital response to ill or injured patients. Each unit is staffed with 2 licensed emergency medical technicians.

BC - Battalion Chief - The Battalion Chief is trained to be the primary Incident Commander.

BLS - Basic Life Support - Basic field medical procedures performed by fire or medic crews, including first aid, cardiopulmonary resuscitation (CPR), clearing blocked airways, and use of automatic or semi-automatic heart defibrillators.

Captain - Also known as a company officer. An individual that is responsible for directing a fire company, usually an engine or ladder crew.

Chief Officer - Any officer of Battalion Chief, Deputy Chief, Training Chief, or Fire Chief rank.

Constant Staffing – Positions are filled everyday; if a firefighter that normally works is off, the role is filled by overtime.

Concentration - Method of placing multiple fire engines in a specific area or station with an increased average call load. Helps improve response times in a given area. (See also Distribution.)

Dispatch Time - The time from the receipt of a call at the 911 dispatch center to the notification of emergency response personnel.

Distribution - Method of placing fire stations to adequately cover the geographic boundaries of a fire response area. (See also Concentration.)

Driving Time - The time from the first emergency response unit going en route to the arrival of the first emergency response unit on scene.

EMS - Emergency Medical Service

EMT - Emergency Medical Technician

Engine - Often called a "Pumper". Primary vehicle for fire, advanced and basic life support service delivery. Vehicle carries 750 gallons of water, a 1500gpm pump, and a variety of fire hoses for water delivery. An engine company is generally the smallest increment of service allocated to a fire station.

EOC - Emergency Operations Center - The EOC is instituted whenever an emergency or disaster exists that is beyond the ability of normal City Department resources to handle. The EOC centralizes major decision-making and priority of resources. When activated, Fire Department personnel along with operational supervisors from Police, Public Works and General Services participate in staffing.

Extrication – The removal of trapped victims/patients from a motor vehicle.

Fast Attack – process by which the initial operations are focused on the immediate isolation and/or extinguishment of the fire; typically to prevent flashover.

Firefighter/Paramedic - Position classification with combined firefighter and medic unit program duties. Incumbents must carry an advanced life support (EMT-P) classification.

Fire Flow – An assessment of the number of gallons per minute (GPM) needed to extinguish a fire.

First Alarm – The dispatching of pre-designated type and number of fire department resources targeted to address specific emergencies.

Flashover - Phenomenon that describes the point in the growth of a fire where all combustible surfaces in the room ignite and the room becomes completely involved in fire.

Greater Alarms – Incidents deemed complicated and/or large enough to warrant the request of many resources; typically duplicating a first alarm and defined a second, third, or fourth Alarm.

HAZMAT - First Responder Operational level of trained HAZMAT response that generally handles simple, straightforward HAZMAT incidents.

Immediately Dangerous to Life or Health (IDLH) – National Institute for Occupational Safety and Health (NIOSH) definition for situations for which respiratory protection is required.

Incipient Stage – When the temperature gets high enough, flames can be seen. This stage is called incipient or open burning. The visible burning at this stage is still limited to the immediate area of origin. The combustion process continues to release more heat, which heats nearby objects to their ignition temperature, and they begin burning.

Incident Commander - "Command" - The term given to the individual that assumes the authority to direct Fire Department operations at an emergency incident. This could be any member of the Department; however, it is often someone of Chief Officer rank.

Initial Full Alarm Assignment Capability - The fire department shall have the capability to deploy an initial full alarm assignment within an 8-minute response time to 90 percent of the incidents.

Insurance Services Office (ISO) - Evaluates City Fire Department, Dispatching, and water supply for community fire insurance premium rate scheduling

Ladder Truck - Specialized aerial platform fire apparatus with a full complement of ground and roof ladders, heavy-duty generator, and forcible entry tool system. Crew is trained in ventilation, forcible entry, cutting electrical service, rescue, salvage and overhaul, and water tower use among other functions.

Medic Unit - Ambulance staffed by at least two personnel and all ALS equipment required for patient transport.

Mutual Aid - Agreement through which fire departments assist neighboring departments during a major incident by either standing by to respond to subsequent alarms or by assisting at the actual incident. This helps all agencies cope in a major situation as well as avoid the extra costs of maintaining a larger staff and more equipment.

NFPA - National Fire Protection Association.

Cal OSHA 2-In; 2-Out – State mandate requiring personnel that enter an atmosphere that is immediately dangerous to life or health (IDLH), they shall use the buddy system and shall establish a two person rapid intervention crew (RIC) for monitoring the safety of the interior crew and be prepared to make an immediate rescue of interior personnel.

Paramedic - EMT-P Emergency Medical Technician certified for Advanced Life Support.

Rapid Intervention Crew/Team (RIC) – A minimum of two firefighters equipped with self-contained breathing apparatus (SCBA) and available near the entry point to enter the structure and rescue the attack, search and rescue, or back up crew if something goes wrong.

Rehabilitation – At least one firefighter to establish a treatment and rehabilitation sector for firefighters who are injured or physically exhausted.

Safety Officer – An officer assigned within the Incident Command System (ICS) to ensure that department members on scene are following department policies and procedures to ensure the safety of the entire crew

Search and Rescue – A minimum of two firefighters assigned to search for victims and remove them from danger while a crew with an attack line protects them form the advancing fire.

Self Contained Breathing Apparatus (SCBA) - Consists of a compressed air tank (similar to a scuba tank) and an individually fitted full-face mask. This equipment is used in all environments that contain a hazardous atmosphere, such as smoke, gas and strong chemicals. The SCBA mask is also configured with a radio microphone that can connect to the firefighter's handheld two-way radio.

Shift - A period of staffing. Manhattan Beach runs a 3-shift system (A, B, and C). Each shift begins at 8:00 am and lasts for 48 hours.

Smoldering Stage – This is the first stage of any fire.

Truck Company – Typically staffing configurations are 4 to 5 firefighters. Operations include search and rescue, technical rescue, forcible entry; secure utilities, vehicle extrication, elevated master streams, ventilation, overhaul, and salvage.

Turnouts - Also referred to as "Bunker Gear", turnouts are the usual protective clothing worn by a firefighter when fighting structural (building) fires, or performing rescues.

Utilities – At least one firefighter to secure natural gas, electrical supply and water to the affected structures before interior firefighters can open any concealed spaces such as an attic utilities must be secured

Ventilation Crew – Ventilation allows superheated gases and obscuring smoke to escape, reducing the possibility of flashover and providing attack crews with better visibility and reduced heat. It also provides the fire an exit route so that the attack crew can “push” the fire through the opening, thereby separating it from endangered people and unburned property.

Water Supply – A crew of one or more firefighters who must pull the large diameter hose between the engine and the nearest hydrants if not laid out on the way in, provide hookup to the hydrant and deliver a water supply to the engine before the engine’s water tank runs dry.

Wildland Fire - Synonymous with “Natural Cover Fires”. Fire that occurs in natural growth such as grass, brush, or trees.

Wildland/Urban Interface - The area where natural vegetation fuels (forests and grasslands) and human-made fuels (structures) meet.

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Appendices

APPENDIX A
FUNDING MECHANISMS

Manhattan Beach EMS Service Charges

The City contracts with an ambulance billing firm to collect EMS transport fees. They charge us a flat rate percentage of the fees they collect. In Fiscal year 2008, there were approximately 570 Advanced Life Support (ALS) and 140 Basic Life Support (BLS) patients transported. In addition, approximately 250 transports were provided by other fire departments (Hermosa Beach for example) or private ambulance companies when MBFD units were not available. These trips were billed at the current rates of $659 (ALS) and $430 (BLS).

Biennially, the County of Los Angeles Department of Health Services (DHS) reviews and sets the maximum allowable fees for ALS and BLS ambulance transports. The most recent update was effective on January 1, 2009. The new base rates are $1,146.50 for ALS and $803.25 for BLS transports. Other ancillary fees may be added to this base rate. These include charges for medical supplies, oxygen, backboards and mileage (see attached revenue estimates). Given these new allowable rates, the City's potential rates are $1,350.75 for ALS and $941 for BLS transports plus supply costs.

Historically, the City of Manhattan Beach has charged well below County rates for ALS and BLS transport without any of the add-ons.

Among the revenue and fee options Council may want to consider:

- Increase the fees to reflect allowable maximum rates as set by the County of Los Angeles (ALS $1,146.50 and BLS - $803.25)
- Charge a flat mileage rate from the City to Little Company of Mary Hospital (6 miles @ $15.75 = $94.50/transport)
- Charge the lights and siren fee for ALS response ($109.75)
- Charge the urgent fee for BLS response ($43.25)
- Charge for allowable equipment and supplies from $23.00 to $77.25
- Or, charge a flat rate add-on to include all the above (ALS - $1,319.25 and BLS - $909.50)

Based on last year's experience, as well as historic collection rates and expenses, we estimate that we could realize a total increase in revenue of $357,104.

There are a variety of funding mechanisms fire departments can utilize. The major types of funding for fire departments are subscription fees, federal grants, benefit assessments, taxes and user fees. These mechanisms provide supplemental funding resources to improve fire departments effectiveness in the United States. However, supplemental funding resources are not expected to cover all the costs of hiring additional personnel.

Subscription Programs

Much like an insurance policy, subscription services allow community members to pay into a subscription plan, allowing them to receive paramedic services at little or no marginal cost.

In an effort to offset some of the costs associated with providing Emergency Medical Care, Fire Departments have implemented subscription-based programs. The program is typically run under the auspices of the Fire Department. The program is designed to provide a quasi-insurance program for community members in an effort to avoid the extensive costs associated with Emergency Medical Response. Currently, the following cities have implemented subscription programs; Anaheim, Arcadia, Burbank, Compton, Corona, Downey, Fullerton, Glendale, Huntington Beach, Monterey Park, Sierra Madre, South Pasadena, Santa Ana, and Westminster. Membership fee ranges from $45/yr to $60/yr, with an average participation rate of 12%. Monthly installments are acceptable as well. Deductions are taken from the member's utility or water bill. All incumbents living in the home covered under the program are covered under the policy.

How the program works – Based upon preference, a one time payment can be paid, or a monthly deduction can be deducted from the water or utility bill. This payment shields members in the program from the additional cost of providing Emergency Medical Response. Additionally, it produces additional revenues for the Fire Department.

If you have insurance – Insurance policies do not cover the entire costs of treating and transporting patients. Insurance companies do not always pay for ambulance transport, often leaving the patient with the entire medical expense. Additionally, on average patients are left to pay the residual balance after insurance reimbursement. By participating in a subscription program, patients do not have to worry about the additional costs not paid by their insurance providers. The program is designed to collect only what the insurance pays for members participating in the program.

If you do not have insurance – If you are not covered by an insurance policy and are in need of emergency medical response treatment, you will be responsible for all costs associated with response, treatment, and transport. However, if you are a member a subscription program, you will receive a 20% deduction from your invoice for the services provided.

Federal Grants

In 1972, President Nixon appointed a Presidential Commission on Fire Prevention and Control. The commission published a report titled *America Burning*, indicative of the deficiencies within the United States Fire Service. Paradoxically, the study found that the United States had the worst per capita death and property losses as a result of fire in the entire industrialized world (FEMA, 1987). However, the report was a point of reference

for further inquiry, resulting in the establishment of the Federal Fire Prevention and Control Act of 1974, and the National Fire Academy (FEMA, 1987).

Today, these organizations are auspices under the Department of Homeland Security. While the Federal Emergency Management Agency encompasses the purview of all Emergency Service related grants, authorization for the Assistance to Firefighters Grant (AFG), Fire Prevention and Safety Grant (FP&S), as well as the Staffing for Adequate Fire and Emergency Response Grant (SAFER) are derivatives from preceding legislation (FEMA, 2001).

Assistance to Firefighters Grant (AFG)

Congress began allocating funds to Fire Departments in 2001 through the (AFG). The primary purpose of the AFG grant is to assists Firefighters and other Emergency Responders to obtain the necessary equipment, training; emergency vehicles, protective paraphernalia, and additional resources needed to safely and effectively fulfill fire department operations. AFG grants are sub classified as such:

- *Operations and Safety Program Area* – The grants for fire departments and nonaffiliated EMS organizations are limited to training, equipment, personal protective equipment, wellness and fitness, and modifications to facilities.
- *Vehicle Acquisition Program Area* – Grants to fire departments under this program area include, but are not limited to apparatus including engines, brush trucks, tankers/tenders, rescue vehicles, ambulances, aerials, foam units, and fireboats.

For FY 2008, congress has appropriated $560 million dollars to fulfill operations encapsulated under AFG requests. Currently, AFG grants are managed under the office of Grants and Training, (formerly the Office for Domestic Preparedness (ODP)) within the Department of Homeland Security (FEMA, 2008).

- Manhattan Beach Fire Department received an AFG grant in the amount of $67,393, in FY 2005.

AFG Grant Pros

- Grants could be used to purchase protective gear, emergency vehicles such as an aerial ladder, and other training mechanisms necessary to maintain compliance with Cal/OSHA standards.
- Manhattan Beach Fire Department has a successful history of receiving such a grant in previous years.

AFG Grant Cons

- A Grant Writer would be recommended to achieve this course of action.
- AFG grants have matching requirements ranging from 10 to 20%, depending upon the amount awarded.

Fire Prevention and Safety Grant (FP&S)

Included under the AFG grant, the Fire Prevention and Safety Grant (FP&S), is provided to Fire Departments for Fire Prevention and Safety activities. Appropriate projects would

include fire prevention and public safety education campaigns, juvenile programs, media campaigns, and programs designated for arson prevention and community awareness (FEMA, 1999).

Staffing for Adequate Fire and Emergency Response Grants (SAFER)

Staffing for Adequate Fire and Emergency Response Grants (SAFER) was created to provide direct support to Fire Departments in the recruitment and acquisition of firefighters within their respective communities (FEMA, 2001). The purpose of the SAFER grant is to assist Fire Departments in the United States abilities to comply with NFPA and OSHA standards pertaining to staffing levels and response and operational standards. SAFER grants are sub categorized into two compartments:

- Hiring of Firefighters: A five-year period of performance grant providing funding to pay a *portion* of the salaries and benefits of newly hired firefighters.
- Recruitment and retention of volunteer firefighters: Only applicable to volunteer Fire Departments for purposes of hiring and retaining new firefighter personnel.

SAFER grants are contingent upon the following:

- For the hiring of firefighters, SAFER grants provide federal contributions up to $103,000 per firefighter dispersed over a 5 year period.
    - Year 1: Grant covers 90% or up to $36,000 per FF
    - Year 2: Grant covers 80%
    - Year 3: Grant covers 50%
    - Year 4: Grant covers 30%
    - Year 5: Grantee covers total expense
        - The fifth year of the period of performance must be paid in full by the grantee. Failure to do so will result in a total refund of all monies allocated to the grantee over the five-year period.
- Grantee cannot eliminate a position created under SAFER grant money.
- Grantee must maintain their staffing level at equal or greater than their staffing level at the time of application.
- Populations less than 500,000 may not receive grant funds in excess of $1,000,000 in any program year.
- Grants will not be rewarded to municipalities whose operational budgets have been reduced below 80% of the average annual funding in the three years prior to the date of application. If such a condition is present, the applicant will be disqualified.

NOTE: Under the American Recovery and Reinvestment Act of 2009, Congress has allocated $500 million dollars for to the Firefighters Assistance grants to assist in the construction, upgrading or modifications to fire stations. Additionally, Congress has waived SAFER grant local match requirements for 2009 and 2010. Moreover, $53 billion

dollars has been allocated to the State Fiscal Stabilization Fund. Of which, $9 billion dollars, (18.2 %), is designated for state governors to fund public safety and other government services.

Taxes and Fees

There is a variation of taxation methods cities can use to help generate revenue for services or general operations. While these measures may provide answer for deficiencies within municipal budgets, many forms of taxation are highly restrictive and encompass a variety of limitations on the way by which tax generated revenue is appropriated. Variant upon the type and purpose of the tax, limitations may exclude municipalities from adapting these types of funding mechanisms (FEMA, 1999).

General Tax

A "general tax" is one which goes into the General Fund, is not dedicated to any particular purpose, and is available to be used for any municipal expense at the annual discretion of the Council. A general tax may take the form of any tax which may legally be levied by a municipality, e.g. utility user tax, business tax, production tax, transient occupancy tax, et al. There is an appellate decision where such a tax was combined on the ballot with an "advisory" measure which suggested that if the voters approved the revenues from the "general tax" the funds would be used for specific purposes. The court upheld this as a general tax because it was not legally dedicated to any particular expense, and was placed into the General Fund.

General Tax Pros

- requires only a 50%+ majority
- May be used for Operations & Maintenance as well as capital costs.

General Tax Cons:

- More susceptible to litigation challenges.
- Because the proceeds of such a tax may not be dedicated to a specific use, the connection between the tax levy and the proposed project must be clearly and carefully explained without a legal commitment of funds.

Special Tax/Paramedic Tax

Similar to general taxes, special taxes require a higher threshold of approval by voters. Special taxes are a specific tax, specifically earmarked for a particular service. An example of a special tax would be the Paramedic tax. Fire departments, in keeping with the efforts to become "all-risk" departments, respond to emergency medical calls as well as fire suppression. As a result, departmental operations are much higher than they were pre-EMS service providers. However, to help and off-set this cost, fire departments enacted a paramedic tax. In times of fiscally restrictive budgets, this tax can help fulfill departmental deficits to provide essential services to the aggregate population.

Currently, the City of Brea is a participant in the Paramedic Tax Program and has been since 1976. Brea Fire Chief Nero provided information pertaining to anticipated revenue by this special tax. The department receives between 2 and 3 million dollars in revenue

for their Paramedic program. The Paramedic tax is applied to the entire jurisdiction the department serves and the rates are determined by assessed property value. The city of Brea charges $0.49 per $1,000.00 of assessed value of the property. Other cities charge similar rates with a variance of one or two cents. This is connected to the Consumer Price Index (CIP) and each year, is adjusted accordingly. In 2008, the assessed valuation of Manhattan Beach was $11.7 billion. Based upon this value, if a special tax was implemented at $0.40 per $1,000 of assessed value, anticipated revenue is estimated at $4.68 million annually.

However, unlike general taxes, special taxes require a 2/3rds vote to pass. Other cities such as Fremont, Oakland, Berkley, and Davis all invoke paramedic taxes. While paramedic taxes are one form of special taxes, there are additional taxes that may be earmarked for fire protective services. They include sales tax and special parcel taxes. In 2004, Los Angeles County passed *Measure A* which included a half a cent sales tax increase earmarked for public safety services. Records indicate high success rates for special taxes earmarked for emergency services.

Special Tax Pros

- Because funds are designated for a specific purpose, an easy correlation can be made between the tax and public safety improvements

Special Tax Cons

- Requires a 2/3 voter approval to pass

Transient Occupancy Tax (TOT)

Transient Occupancy Tax (TOT), sometimes referred to as a "bed" tax, is typically associated with hotels, although in Manhattan Beach, it also applies to vacation rentals. One perceived benefit of TOT is that the revenue is generated by visitors, not by residents. Currently, our TOT rate is 10%, which generates an estimated $3.6 million each year (85% allocated to the general Fund, 15% to the Capital Improvements Project fund). Typically any increase in taxes requires voter approval. However, in 1988, when residents approved an increase in TOT, they also authorized further periodic adjustments in rates based on economic need and consumer price index changes. Based on these parameters, a 2% increase in the TOT is possible, which would yield an additional $720,000 based on current trends.

Pros of Transient Occupancy Tax

- Residents do not bear the burden of increased tax rates.
- In keeping with the Consumer Price Index and , increasing TOT's from 10% to 12% would yield $720,000 annually for the city

Parcel Tax

A parcel tax is flat fee levied on each parcel, rather than on the assessed value of the property. Parcel taxes can be classified as general tax or special tax depending upon where the revenue generated by the tax is allocated. These determinations are made prior to a vote taking place. Conversely, if determined that the Parcel tax will be earmarked for a particular service, under Prop. 218 may require 2/3rds voter approval. County records

indicate that Parcel taxes are commonly utilized for paramedic operations within municipalities. Senior citizens can be exempt if desired and different fees can be determined based upon type of structure (residential or commercial)

Currently, the City of Manhattan Beach has 12,840 taxable parcels. A flat tax of $8.00 per year would yield $100,000 annually.

Parcel Tax Pros

- If levied as a general tax, does note require 2/3rds voter approval
- Exemptions for seniors are available
- Burden is placed equally among all residents within the City

Parcel Tax Cons

- If designated as a "special tax", a 2/3rds voter approval is required
- Regressive by nature, impacting each socio-economic class

Utility User Tax

Manhattan Beach is one of few cities in the South Bay that does not have a utility user tax (UUT). This tax, which is added as a percentage of utility bills (telephone, gas, electric, water, trash, cable, etc.) and collected by the utilities for remittance to the City, has the potential of adding $700,000 per one percent of tax. With South Bay UUT rates averaging up to 6.8% (and some cities as high as 10%) similar rates could generate between $4.76 million and $7 million annually in General Fund revenue. A portion of this could then be used to fund additional safety personnel in the Fire Department.

Utility User Taxes, while common, can be difficult to audit and monitor to ensure we are collecting the appropriate amount. Over the years, the utilities, which collect and remit the taxes for cities, have become more obstinate in terms of opening their books for auditing. Also, the tax may be seen as burdensome for utility-intensive businesses (Northrop Grumman and the studios for example) and are unpopular with residents (and are often times the subject of referendums to repeal).

Utility User Tax Pros

- Small percentages yield high returns
- Common among other cities in the South Bay and Los Angeles County

Utility User Tax Cons

- Requires majority voter approval to pass
- Can be difficult to collect

Annual Fire Inspection Fee

Some agencies have begun charging for the time it takes to conduct annual business fire inspections. The required annual fire inspection for all occupancies, including vacant occupancies, is necessary to ensure that all buildings and occupancies are in compliance with the Fire Code. This is a proactive approach to identify issues and have them

corrected before a situation develops. The fees that are assessed have been developed to cover the expense of inspecting the properties. One such method of accounting provides a graduated fee schedule; the initial inspection is based only on the square footage of the occupancy. A follow up re-inspection, should any violations be discovered, is performed at no charge. If any subsequent inspections after the first re-inspection are necessary to follow up on violations, the initial inspection fee would be assessed. The following is an example of a fee schedule used by the Peoria, Arizona Fire Department.

Table 1 –Fire Inspection Fees

Square Feet:	Fee:
1-1249	$50
1,250-3,000	$75
3,001-5000	$110
5,001-7,500	$150
7,501-10,000	$200
10,001-15,000	$250
15,001-20,000	$350
20,001-30,000	$450
30,001-40,000	$650
40,001-50,000	$850
50,001-75,000	$1,050
75,001-100,000	$1,550
>100,000	$1,950
First re-inspection	No charge
Third inspection/each additional inspection	Same as initial inspection

Benefit Assessment Fee

A benefit assessment fee is based upon valuation of properties and their estimated benefits received by fire department personnel. Instead of prorating the cost of service, property owners would be charged a fee proportional to benefits received. However, charges are based upon a variety of variables including square feet, type of property, fire flow requirements, and geographic location of the property with relation to respective fire stations. Fee determinations are specific for each city.

Impact Fees

An impact fee is a voluntary fee levied upon new developments or substantial redevelopments based upon the proposed projects' impact on community resources. This is permitted under the Article XI, § 7, of the California Constitution. Under Article XIII A, § 4, the fee must be reasonably related to the cost of the service provided by the local agency. If a development impact fee "does not relate to the impact created by development or exceeds the reasonable cost of providing the public service, then the fee may be declared a special tax and must then be subject to a 2/3rds voter approval" (League of California Cities, 2003).

Assessments may be levied upon entire jurisdictions, or may be sectioned to specific areas or zones based upon location and potential utilization of additional fire protection. However, such specific sanction requests must be approved by the City or County by means of a resolution or ordinance establishing a uniform standard including schedules and rates proportionate to the type of property and the *risk classification* of the structures or other improvements on the property. Determinations of risk classifications are made based on the amount of water required for fire suppression, structure size, type of construction, purpose of structure, and additional factors pertaining to heightened fire hazards and the costs related to providing fire suppression.

Legal Implications

Local agencies providing fire suppression services are authorized to levy assessment charges for function of obtaining, furnishing, operating, and maintaining fire suppressions equipment or apparatus. Conversely, if determined that the fee would constitute a form of taxation, legislative measures must be passed in order to impose such provisions.

Other Considerations

While the benefit assessment fee can provide a steady stream of revenue for cities, it may prove cumbrous to undertake. Legislative as well as state restrictions could present additional complications towards levying benefit assessment fees. It is recommended that cities explore state and county restrictions before undertaking this type of funding mechanism.

Comments by Finance Director Bruce Moe

Funding Priorities

I have reviewed the funding options in your draft report, and rather than providing a top three, I prefer to select one, and tell you why I would recommend it.

First, there are several objectives in selecting a funding mechanism for these important services: 1) stability, 2) growth and 3) nexus to the purpose.

Stability is obviously important, and a critical factor since economic cycles (and the amount of our revenues) come and go, but staffing in safety remains a constant. We need a source of revenue that won't fluctuate (dramatically at times) in a recession or down turn. For those same reasons we also do not want to rely on grant funding for staffing, although we certainly would want to pursue those options whenever possible – we just won't build a program around it.

Growth in the revenue stream also needs to be considered. We know that safety salaries and benefits have traditionally escalated annually through provisions in labor contracts. As a result, we need to have a revenue source that generally grows outside the ebb and flow of the economic cycle, or at a minimum, does not have a high degree of correlation to those cycles (particularly the down cycles).

Finally, as we look at the various options and methods in which to raise revenues, I believe that a clear nexus with the purpose of the funds and the revenue stream will ultimately help persuade those asked to contribute. However, this may cause the need for a super majority approval rate (66.6%) as a special, not a general tax.

The City's current revenue streams in the General Fund are clearly inadequate to fund the additional staffing that is being considered. I believe that the best source of revenue involves a new voter-approved tax. The tax may take the form of a sales transaction tax, a parcel tax, a utility user tax, a fire protection tax, or any number of other general or special purpose taxes. Each has its plusses and minuses:

- A sales tax is paid by residents and visitors alike, but is subject to the business cycle. We are currently seeing the effects of the recession on this revenue source, which if used to pay for fire protection, would result in a declining funding.
- A parcel tax is regressive by nature, and hits poor and wealthy alike, although seniors may be exempted from the tax. The tax cannot be based on the assessed value, but a CPI factor can be included.
- The utility user tax is another option, however, those can be difficult at best to audit since we are dealing with independent entities.

In looking at the options available, a tax specific to fire protection, and similar to what the city of Brea utilizes, would meet the objectives. The tax is tied to assessed value giving it maximum stability and generally-predictable growth. In my view, it would also be acceptable to the community which rallies behind and supports its public safety services.

Of key concern with any special tax is the ability to garner the 2/3rds majority needed to achieve voter approval. However, there are ways to characterize the levy as a general tax with an accompanying advisory ballot measure indicating that the City may use the funds for fire protection. If approached in this manner, the threshold is that of a general tax, or 50%.

By way of order of magnitude, if we were to pursue the fire protection tax, based on assessed value, the economics are as follows:

Total Net Taxable Assessed Value:	$11.7 billion
First Year Funding Required:	$ 1,500,000
Cost per One Hundred Thousand of AV	$ 13.00
Average Assessed Value (2007)	$ 750,000
1st Year Fire Protection Tax	$ 97.50
Cost Per Day	$ .27
Median Assessed Value (2007)	$ 535,000
1st Year Fire Protection Tax	$ 69.55
Cost Per Day	$ .19

APPENDIX B
FIRE DEPARTMENT JOB DESCRIPTIONS

Executive Secretary

The purpose of this position is to perform a variety of responsible, confidential and complex secretarial and administrative duties for a department head or comparable member of the City's executive management team. The executive secretary has a greater amount of independence and discretion in judgment to operate within the scope of assigned responsibilities than other clerical support positions; may oversee the work of assigned clerical support staff; and perform related work as required. Other duties include:

- Providing direct secretarial support to a department head
- Managing the department's office support activities including participating in budget preparations
- Assists in monitoring expenses and revenues relative to the department budget
- Review work for accuracy
- Compile and assemble data for comprehensive reports
- Establish and maintain files, records and calendars on department programs, projects, and activities
- Screen office and telephone callers
- Respond to inquiries from the public and City staff regarding departmental procedures; requests for information, and complaints
- Type and proofread a wide variety of reports, letters, memos, statistical charts; type from rough draft, verbal instruction, or transcribing machine recordings
- Independently compose correspondence related to assigned responsibilities
- Maintain calendar of appointments
- Receive visitors; prepare correspondence; route information to appropriate people; serve as department representative, as assigned; prepare agendas and materials in accordance with established procedures

Management Analyst

The purpose of this position is to serve as a management assistant in performing staff functions. This is accomplished by:

- Compiling statistical and financial data for various reports
- Compiling questionnaires on various department operations
- Conducting special surveys in gathering data from other communities on their operations

- Conducting studies on a wide variety of City operations and procedures, as assigned, and make recommendations on how to resolve problems and improve efficiency
- Prepare forms and other administrative devices to improve procedures and operations
- Research and write grant proposals
- Prepare procedural manuals as needed
- Prepare correspondence for signature
- Prepare drafts of special reports on studies conducted
- Assist in the City's public relations efforts
- Conduct a variety of special personnel studies
- Answer public inquiries regarding procedures, operations, and regulations; and investigate, submit, and coordinate federal and state grant applications.

Note: The MBFD currently contracts with a private contractor for report management systems

EMS Coordinator

The purpose of this position is to track, plan, and implement emergency services programs within the Fire Department, assist in the certification process, and act as liaison to other departments, agencies and the public. The MBFD currently contracts with a paramedic nurse educator. This is accomplished through:

Continuing Education:

- Provide continuing education that meets the criteria established by the Department of Health Services (DHS) EMS Agency to fulfill EMT-Basic and Paramedic recertification requirements.
- With the Department's CE Program Director, coordinate and develop a master calendar of dates and times to deliver two to three hours of continuing education at the fire department on each of the three shifts each month.
- Deliver state of the art continuing education presentations that are based on quality improvement findings, mandated education and the department needs assessment.
- Serve as the Clinical Director for the department's DHS EMS Agency approved Continuing Education Program.
- Provide the DHS EMS Agency the schedule of dates/topics in advance. Provide the DHS EMS Agency updates as the schedule changes due to quality improvement findings or direct observation.

- Perform a continuing education needs assessment at the end of each calendar year.
- Complete and maintain all paperwork required by the DHS EMS Agency including sign-in sheets, clinical skill competency sheets, examinations and scoring sheets, student evaluations and certificate copies.
- Prepare for the DHS EMS Agency Continuing Education audit. Follow-up on any items requiring action and coordinate the preparation of correspondence from department to the EMS Agency.
- Coordinate the distribution of completion cards, certificates, and/or CE records for students meeting all course requirements.
- Serve as an on-site liaison with the client while at the department.
- Monitor individual and overall department performance including identifying strengths, weaknesses and areas for remediation. Develop remediation plans to address individual or department weaknesses.
- Demonstrate excellence in communication with department leadership and rank and file employees.
- Serve as a mentor for department paramedic trainees in the emergency department and during field internships.
- Serve as role model for department students, modeling appropriate conduct, behavior and attitude.

Quality Improvement

Develop, coordinate and maintain a quality improvement plan for department including:

- A system to review Department's patient care reports, including developing patient care report review criteria.
- Maintaining summary information on department and individual performance
- Reviewing patient care reports, coordinating quarterly quality improvement meetings.
- Providing direct field observation by riding along on emergency calls.
- Developing a plan to evaluate the competency of department personnel.
- Assisting in fact-finding for specific incidents
- Attending the Los Angeles County EMS Agency Quality Improvement Committee meetings to gather information regarding updates and changes to policies and/or procedures and reporting to the Department.

- Reporting QI activities and findings to both the department and UCLA Program Directors.
- Prepare for and participate in the Los Angeles County EMS Agency EMS Quality Improvement audit each year and follow-up on any action items.

Aside from the salary savings, the following has been determined as advantages to contracting out the EMS Coordinator position:

- Current certification as a Registered Nurse with Mobile Intensive experience
- Experience in a critical care setting
- Pre-hospital Care Coordinator for a base hospital
- Baccalaureate degree in health related field, nursing, health care administration, health
- Care education, emergency medical services or a related field
- Teaching experience in emergency medical services or equivalent health care setting.
- Previous experience coordinating education course or time management and organizational skills.
- Current provider certification in BLS and ACLS from the American Heart Association.
- Current instructor certification from the American Heart Association in BLS, ACLS and PALS
- Detailed knowledge in the cognitive, psychomotor, and affective objectives required for EMTs and Paramedics.
- Detailed knowledge and experience in the application and techniques of clinical equipment and supplies.
- Working knowledge of the different scopes of practices for EMTs, paramedics, registered nurses, and physicians.
- Ability to translate complex concepts into understandable parts
- Skill in working independently and following through with minimal direction.
- Interpersonal skills to excel in relations supervisor, staff, students, and the public.

Emergency Manager

The purpose of this position is to coordinate citywide emergency response plans, provide training, manage budgets, and act as emergency liaison for the city. The Coordinator works both internally and externally with a wide variety of departments and agencies. This is accomplished by:

- Overseeing the development of emergency preparedness plans

- Coordinating efforts with other City departments
- Providing training
- Overseeing the CERT program
- Representing the city to local, state and federal jurisdictions
- Managing all budget and grant funding requests
- Optional: The Emergency Manager position could be split with the Training Officer Position. It is recommended that this be a sworn position to ensure conformance with the Department of Homeland Security regulatory requirements and internal training standards.

Fire Marshal

The purpose of this position as is to oversee the Fire Prevention Bureau, which includes the Fire Inspector and five part-time reserve Fire Inspectors. This is accomplished by:

- Oversees and performs new construction/equipment plan reviews and indicates necessary corrections for evaluating fire protection/ life safety systems, above-ground storage tanks, storm water systems, hazardous materials risk management programs, and hazardous materials facilities;
- Coordinates plan check activities with City functions and outside agencies; attends meetings and performs liaison role for fire/life safety, water supply issues, and environmental issues;
- Ensures plans meet the requirements of related federal, state, and local fire protection, life safety and environmental codes, regulations and restrictions.
- Manages and oversees all public education efforts for the Fire Department including Fire Prevention week, school fire safety programs, and the annual Fire Department open house.
- Reviews proposed projects with and provides technical assistance to developers, consultants, engineers, architects, contractors, City personnel and the public; interprets and explains requirements and restrictions relative to fire/life safety and environmental codes, ordinances, regulations, statutes, policies and procedures; develops alternative methods to comply with requirements and restrictions.
- Oversees and enforces fire code compliance at Raleigh Studios
- Oversees inspection program and inspects businesses for fire hazards, proper operation of suppression devices, adequacy of fire escapes and exits, and general compliance with fire codes, aboveground storage tank provisions, industrial waste provisions, storm water regulations, and general compliance with environmental regulations and statutes.
- Enforces fire code compliance within city limits special events such as the Hometown Fair, Volleyball Tournaments and the Holiday Fireworks Festival, the Fire Prevention Officer is responsible for enforcing fire code compliance and compliance with life/safety requirements
- Manages the Hazardous Materials program, which oversees the cleanup of spills, leaks, and illegal dumping.
- Provides hazardous material first responder training to suppression personnel.

Fire Inspector

The purpose of this position is to serve as a civilian Fire Inspector in the Fire Prevention Bureau for the Fire Department. This is accomplished by:

- Performing fire inspections of all occupancy group classifications and enforces laws and ordinances pertaining to fire safety and prevention;
- Performing general and specialized inspections, fire and life safety plan review inspections, sprinkler and fire alarm inspections and hazardous materials permit inspections;
- Conducting building plan reviews and assists with final building inspections, consults with building contractors as required;
- Performing fire safety permit inspections for issuance of special permits.
- Inspects public displays or gatherings;
- Inspects installations and removal of underground and aboveground fuel facilities and the storage and handling of flammable, combustible, toxic corrosive and other hazardous materials;
- Investigates citizen complaints and performs follow-up on fire company inspections to initiate enforcement activities;
- Reviews findings of inspections with owner/occupants and explains requirements for meeting compliance with codes and regulations; conducts follow-up inspections for violation abatements; acts as the liaison between the fire prevention bureau and the City prosecutor;
- Maintains records of findings, prepares reports, and prepares complaints and files with City prosecutor;
- Assisting fire suppression personnel in inspection functions and problem inspections;
- Maintaining responsibility for a variety of Fire Prevention programs such as: fire sprinkler retrofit; brush abatement; hazardous-materials; lock boxes; iron bars; fire drills; mandated fire system inspections; Christmas tree inspections; and Fire Prevention Bureau requirements;
- Educating public on fire safety issues, speaks to large groups, and presents fire prevention program information at fairs, schools and other special events.

Training Officer

The purpose of this position is to oversee and develop training activities for all personnel, analyze and develop budget needs, and respond to general alarms to assist with emergencies. This is accomplished by:

- Assessing training needs
- Maintaining proficiency skills
- Researching and evaluating training materials
- Maintaining records
- Developing and assisting with promotional exams
- Responding to incidents

- Developing Budgets
- Recommending educational opportunities, and developing training policies

Survey Results: Of the cities within Area A and Area G, all departments have a 40/hr Training Officer assigned to the Fire Department except Manhattan Beach.

Battalion Chief

The purpose of this position is to coordinate and direct all fire prevention and suppression activities; supervise the work of Fire Captains and perform related duties as required by the Fire Chief. Duties include:

- Command major Fire Department emergency operations
- Plan and direct fire station operations
- Establish strategic objectives and direct fire suppression operations and emergency medical personnel
- Supervise the evaluation and training of department personnel
- Ensure compliance with department policies, rules, procedures, and modern firefighting, prevention, and equipment maintenance techniques
- Maintain clear, timely, and accurate communication between fire suppression, investigation and other organizational units
- Provide technical assistance to Fire Captains and other staff
- Apprise the Chief of problems or issues which need to be addressed and propose recommended actions for consideration
- Prepare plans and specifications for the purchase of fire apparatus and equipment
- Identify ways to improve fire suppression training and equipment maintenance operations and programs
- Coordinate the City's Emergency Preparedness Program
- Project a positive image as a professional, competent, and helpful manager
- Serve on the City's Safety Committee
- Keep abreast of fire suppression issue, problems, and hazards and take initiative to find reasonable solutions
- Prepare, write, and present reports; and assist in preparing the annual budget.

APPENDIX C
STAFFING COMMENTARY

Staffing Choices – Bruce Martin

The economic slowdown now gripping the country could eventually squeeze fire department budgets. And that means chiefs must take a hard look at all aspects of their departments, including their staffing model.

One model calls for keeping a large enough crew so as to not pay overtime to cover leaves. Another model calls for having smaller staff and using overtime to cover leaves. The latter has resulted in significant and ongoing fiscal savings. However, as the axiom goes, there's no such thing as a free lunch.

Therefore, it is important to identify the fiscal results, non-monetary costs and unintended consequences of implementing the constant-staffing model. In tight or emergency budget conditions, constant staffing has been a life ring to grab on to. Its consequences have been slow to appear, but are real nonetheless.

Constant staffing means staffing an operation with just enough positions to cover all seats — leaves or vacancies are covered with overtime assignments for off-duty employees. Overstaffing also is a common staffing model. As the name implies, overstaffing means carrying enough personnel to cover leaves without incurring overtime expenses. Both models assume a base staffing for necessary operational coverage. Take, for example, a three-platoon fire department with three-firefighter operational (or minimum) staffing on each of its six companies. That results in daily operational staff of 18.

With constant staffing, the department would employ 18 firefighters for three work shifts or 54 shift employees. With overstaffing, the department would estimate the annual leave liability by aggregating annual employee vacation leave use, estimating likely sick leave use, adding any discretionary overtime use affecting operational staffing, and estimating on the job injury leave (often the most volatile leave and the toughest to estimate). This calculation can result in a wide variety of leave and staffing approximations (*see right*).

Rough estimates can serve for calculating leave. This example department would estimate its memorandum of understanding-allowed annual vacation use, plus an average of half the annually accrued hours of sick leave per employee, plus cost equivalent of two full-time employees of on-the-job injury for a staff of 21 per shift or 63 total. Put another way, constant staffing is three full-time employees per seat, giving 18 per shift, and overstaffing is 3.5 full-time employees per seat, giving 21 per shift. Some will simplify this by overstaffing to the number of allowed vacation leaves per shift.

By switching this department to constant staffing, the fiscal savings would come from the cost difference between nine full-time employees and annual overtime liability for operational staffing. In the example department, a fully loaded employee (salary plus benefits) costs 156%. Overtime costs are 150%. Therefore the savings equals the nine

full-time employees multiplied by the annual salary savings of a fully loaded employee less overtime costs. The savings come because extra employees (known as vacation relief, spare, ship-out, rovers, etc.) cost more and are not always efficiently used. There are days when they are not needed, and they bring their own leave liability to the equation.

The positions have to be vacant to shift a department from overstaffing to constant staffing. A department can plan for this transition by holding open positions vacated through attrition, rather than laying off employees.

So, what are some other consequences of moving to constant staffing? There is a re-allocation of the cost of overstaff employees, less the savings, to all the remaining employees in the form of overtime. In the example department, there's $1.28 million for the nine employees with a savings of $375,000, which comes to an average of $16,759 per employee.

There is a lot of discussion in the firehouse about value of overtime compensation. These topics can include firefighters not raising their standard of living to the extra pay, that it's great, to not always count on it, some wanting to work overtime at one station but not another, and complaints of unfairly losing a place on the overtime list. On the up side, employees can earn more money on their primary occupation. On the down side, there is administrative, labor and contractual energy invested to ensure equity and reduce or prevent grievances. The equity of overtime compensation often is a point of debate — if it is absolute, if it is offered rank for rank, and if the department uses acting positions and fill behind. Questions regarding what to do about those who choose not to work overtime and how mandatory hiring works must be addressed.

This overtime compensation increase has other impacts as well. While base salary compaction doesn't occur, annual earnings compaction does. And while that's not a factor between ranks that can earn overtime, it matters greatly for ranks that do not. For example a battalion chief, who is exempt from overtime earnings, may earn 15% more than a captain. But that captain can earn more actual money than the battalion chief by working overtime shifts.

There evolves a new disincentive to promote to an overtime-exempt position. An officer may ask why make battalion commander, when he or she earns more money as a captain. The additional income also has allowed firefighters to move farther from their jurisdiction. The reasons are personal and understandable. But combining these consequences shrinks the pool of qualified internal candidates who want a promotion to the chief officer levels and of those who can be called back in an emergency.

The greater availability of full-shift overtime allows employees to be more discriminating in choosing to not work short overtime during the day, take department-driven special assignments, or even fire-relate side employment (such as instructing at a college fire academy). Rational self-interest results in people turning down short overtime in favor of the full shift.

One consequence of a constant staffing is more operational challenges. Some departments have seen an increase in mandatory hiring for short-duration overtime to accomplish critical department business. One college fire academy routinely has instructors not showing up because they've accepted or been forced into an overtime shift.

There is also the loss of the added capacity that overstaffing provides. On the days when the extra positions were available, coverage for things like special details and meetings was easy. In the constant staffing model, it is an overtime cost that is often unachievable. Mid-shift vacancies, due to emergency leave or department business, could be covered more easily in the overstaff model. In the constant-staffing environment, special consideration and arrangements must be made for reliable, quick coverage. On a number of occasions, companies have been short staffed for up to 12 hours while overtime replacements were sought. Those departments have considered paging available off-duty staff, but that may become a compensation issue.

Fundamentally, in the constant staffing model every single vacancy — hourly, daily or longer — requires a personnel move that may include hiring. That could mean rank-for-rank hiring of relief or moving qualified reliefs into the vacancy and backfilling the source with overtime.

“On the flip side of the lean staffing example, if overtime dollars are available and used for staff assignments and special projects, you could wind up masking a real need for 40-hour staff positions,” says Gerry Kohlmann, a retired fire chief from Redwood City, Calif.

Departments have a wide variety of systems and norms. Even the periodic hiring of new firefighters, and their placement as probationary firefighters, can result in moving a permanent employee. Some departments have negotiated which stations are “probie” stations, and others deal with it case by case. For departments that have enjoyed flexibility in assignments, the constant-staffing model may mean less opportunity to make such an adjustment, and employee expectations must change.

Health and wellness also can be affected. More 24-hour overtime shifts means fewer nights at home. Kevin Gilmartin's book *Emotional Survival for Law Enforcement* documents the effects of increased work shifts on what he calls a hyper-vigilance cycle and reduced recovery time. He also points to the loss of diversity in individual's lives, meaning less resilience when challenges occur. Those challenges apply to the fire service as well and can be personal or organizational.

Continuous work hours policies are exercised far more in a constant staffing environment. No matter what the shift rotation is, departments run into situations where employees choose, or the employer mandates, continuous work hours. There are frequent cases of 72-hour work lengths, 96-hour slightly less so, and 120-hour within many agency guidelines. From time to time there are situations where employees work far greater hours. And, including shift-trade hours in continuous-work policies has the

potential for trouble. There was a recent on-duty apparatus accident involving a driver on duty for several shifts. Initial reports in the media said that those hours could have been a factor.

A weakness in the constant-staffing model is its susceptibility to over-work employees if department staffing is not managed. That is, too many vacancies drive more overtime as employees begin to de-select from voluntary overtime or use leave on regularly scheduled shift days in order to recover from too much overtime. The anecdotal assessment seems to be that if vacancies are over 5% of the total staffing level, overtime will drive more overtime. However, there are employees who will work every possible minute of overtime if allowed by policy or practice. Departments must assess if that behavior is a risk. One department requires employees to sign a document verifying fitness for duty prior to working extended hours.

Most departments went from a two-platoon to a three-platoon schedule in the 1960s based on increasing workloads and the need for rest. Much of this push was from unions and for health and safety reasons. However, if firefighters were willing to work overtime, what would a fiscal analysis of the two-platoon system show for future savings? The largest fire department in California works a 72-hour shift in operations in both its rural and urban stations.

The firefighter union's desires are intertwined with the consequences of constant staffing, which may not be homogenous. Some members value income generation highest. Others value maximum personal flexibility. The union may value off-duty access to employees for labor purposes. Employees accustom overstaffing, with arguably greater work assignment flexibility, have felt more constrained or unfairly treated when their personal desires get less attention in a constant-staffing environment. Memorandum of understanding language around staffing issues must be more explicit in a constant-staffing department.

Just as there is no homogenous deployment or staffing formula implemented across fire departments, there also is no one way to fill staffing. Perhaps a hybrid of staffing drivers and officers at three per seat and firefighters at 3.5 per seat offers a balance. Nonetheless, careful contemplation of the pros and cons of staffing strategies, and an explicit understanding of the why's and how's help departments operate efficiently, safely, and with satisfied employees, elected officials, and citizens. A panic implementation of the constant-staffing model may save money, but it may cost in unexpected ways.

Bruce Martin is fire chief in Fremont, Calif., and has 27 years in the fire service. He has been fire chief in San Rafael; captain in Redwood City; battalion chief in Mountain View and Palo Alto; and deputy chief, fire marshal, and emergency services coordinator in Sonoma County. Martin is an assistant professor of fire science and fire technology coordinator at the College of San Mateo. He instructs command and management classes for chief officers at the California Fire Academy. He holds a bachelor's degree in business from the College of Notre Dame and an associate's degree in fire science from Indian Valley.

Table 2 – Staffing Calculations

2004 Jurisdiction Population	Budgeted Field Operations Positions	On-Duty Staffing	Firefighters per 1,000 Population	On-Duty Staffing per 1,000 Population	Firefighters per seat
38,953	66	20	1.69	0.51	3.30
76,000	105	29	1.38	0.38	3.62
80,000	60	20	0.75	0.25	3.00
93,000	84	25	0.90	0.27	3.36
93,100	78	23	0.84	0.25	3.39
103,300	69	19	0.67	0.18	3.63
107,204	153	39	1.43	0.36	3.92
145,800	157	39	1.08	0.27	4.03
209,000	128	38	0.61	0.18	3.37
409,000	470	131	1.15	0.32	3.59
759,000	1637	341	2.16	0.45	4.80
940,000	677	193	0.72	0.21	3.51

Information provided by Gerry Kohlmann

Raymond G. Kammer – Director National Institute of Standards and Technology

The value density and fire damage vulnerability of the contents of factories, offices and even homes are increasing with increasing dependence on highly sophisticated equipment and systems. Thus, for fire risk to continue to decline, fire protection technologies must become more proactive and reliable in function. Otherwise, new gaps will open, bringing new fire risks. These new risks may become manifest in loss of life, property, productive capacity or security events; in upward trends in the cost of losses; in increasing costs of protection; or combinations of all of these possibilities. For example, consider the following catastrophic events:

- A post earthquake fire in a high density urban complex fanned by high winds,
- Team of fire fighters trapped in a blazing warehouse or factory fire

Alternatively, consider the following, more pleasant outcomes such as:

- Structural systems that will not collapse catastrophically in the event of a fire,
- Fires that can be sensed before they become significant,
- Fire fighters who can actually extinguish building fires without significant personal risk of loss of life to themselves

Source: Testimony on the U.S. Fire Administration Authorization for Fiscal Years 2000- March 23, 1999. http://www.ogc.doc.gov/ogc/legreg/testimon/106f/kammer0323.htm

APPENDIX D
FIRE SERVICE LINE OF DUTY INJURIES AND FATALITIES

Historical Overview

Each year in the United States approximately 100 firefighters are killed while on duty and tens of thousands are injured. Although the number of firefighter fatalities has steadily decreased over the past 20 years, the incidence of firefighter fatalities per 100,000 incidents has actually risen. Despite a downward dip in the early 1990's, the level of firefighter fatalities is back up to the same levels experienced in the 1980's.

California State Statistics

The United States Fire Administration reports that over the past 30-years there have been 163 California State firefighter fatalities, from 69 (42%) separate fire agencies. Between 2001 and 2005, California lost 52 firefighters to: asphyxiation (3.85%), burns (15.38%), electrocution (1.92%), heart attack (28.85%), and trauma (50%). In 2008, California lost eight firefighters (7% of the 114 lost in the U.S.).

Firefighter Fatalities per 100,000 Fire Incidents 1996-2006

In the last decade, several high-profile incidents involving firefighter fatalities have brought national attention to the issue of firefighter mortality in the United States. While the attention from the national media has been fleeting, the awareness of the continued high level of fatalities has changed the fabric of the fire service and prompted many organizations and fire departments to initiate programs to protect firefighters.

Ultimately, some forces and circumstances that lead to firefighter fatalities are simply beyond human control. However, through research, study, training, improved operations, development of new technologies, the appropriate use of staffing, and other factors, it should be possible to significantly reduce the number of firefighters killed each year.

Firefighter Fatality Retrospective Study 1990-2000

Nature of Fatal Injury

The leading nature of fatal injuries to firefighters is heart attack (44 %); trauma, including internal and head injuries, is the second leading type of fatal injury at 27 %. Asphyxia and burns combined account for 20 % of fatalities. More firefighters die from trauma than from asphyxiation and burns combined. Firefighters under the age of 35 are more likely to be killed by traumatic injuries than they are to die of medical causes (e.g., heart attack, stroke). After age 35, the proportion of deaths due to traumatic injuries decreases, and the proportion of deaths due to medical causes rise steadily.

Age

Approximately 60% of firefighter fatalities were over the age of 40 when they were killed and one-third were over 50. Nationally, firefighters over the age of 40 comprise 46 % of the fire service, with those over 50 accounting for only 16% of firefighters. Although older firefighters possess a wealth of invaluable knowledge and experience, they are killed while on duty at a rate disproportionate to their representation in the fire service. Also, these older firefighters tend to be affiliated with volunteer agencies. About 40 % of volunteer firefighters are over the age of 50, compared to only 25 % of career firefighters.

Affiliation

The majority of firefighter fatalities (57 %) were members of local or municipal volunteer fire agencies (including combination departments, which are comprised of both career and volunteer personnel). Full-time career personnel account for 33% of firefighter fatalities; they comprise only approximately 26% of the American fire service. Numerically more volunteer firefighters are killed than career personnel, yet career personnel are killed at a rate disproportionate to their representation in the fire service.

Emergency Medical Services (EMS) Fatalities

In many fire departments, EMS calls account for between 50 and 80 % of emergency call volume. These incidents result in only 3 % of firefighter fatalities. Trauma (internal/head) accounts for the deaths of 50 % of firefighters who were involved in EMS operations at the time of their fatal injury; another 38 % involved in EMS operations died from heart attacks.

Type of Duty

Of those firefighters killed while en route to an incident, 85 % were volunteers. For firefighters killed performing in-station duties, 69 % were career personnel; the majority of those deaths were the result of heart attacks. These variations can be attributed to differences between career and volunteer agencies. Generally, unless they are on a call or other fire department business, career personnel are required to be in the fire station for the duration of their shift, which is generally between 10 and 24 hours long. As a result, volunteers are more likely than career firefighters to die while responding.

Motor Vehicle Collisions (MVCs)

Since 1984, MVCs have accounted for between 20 and 25 % of firefighter fatalities annually. One quarter of firefighters who died in MVCs were killed in private/personally owned vehicles (POVs). Following POVs, the apparatus most often involved in fatal collisions were tankers, engines/pumpers, and airplanes. More firefighters are killed in tanker collisions than in engines and ladders combined.

About 27 % of fatalities killed in MVCs were ejected from the vehicle at the time of the collision; only 21 % of firefighters were reportedly wearing their seatbelts prior to the collision.

Most volunteer departments do not require personnel to stand by in the fire station; members are allowed to respond directly to incidents from their homes or workplaces, often in their POVs. As a result, volunteers are more likely than career firefighters to be killed in POV collisions. Moreover, they are more likely to be involved in collisions involving tankers, which are predominantly used in rural areas without hydrants or other readily available sources of water. Such areas are almost exclusively protected by volunteer fire departments.

Training

In the last decade, approximately 6 % of firefighter fatalities occurred during training activities, a larger proportion than in the previous decade. Over time, the leading type of training activity resulting in fatalities has remained physical fitness, followed by equipment/apparatus drills and live fire exercises.

Multiple Firefighter Fatality Incidents

Between 1990 and 2000, 8 % of fatal incidents involved the death of more than one firefighter; these incidents accounted for 18 % of firefighter fatalities. About 14 % of firefighters were killed in incidents that resulted in the deaths of two or three firefighters. Incidents involving the death of more than four firefighters are rare, and accounted for only 3 % of fatalities. These findings represent an increase from an earlier USFA study that found that between 1982 and 1991, only 4 %of incidents involved the death of more than one firefighter; those incidents accounted for 13 % of firefighter fatalities. Approximately 90 % of firefighters killed in multiple-fatality incidents die of traumatic injuries. In contrast, only 37 % of those killed in single-fatality incidents die from traumatic injuries.

U.S. Fire Administration, 16825 S. Seton Ave., Emmitsburg, MD 21727
(301) 447-1000 Fax: (301) 447-1346 Admissions Fax: (301) 447-1441

Number of 2008 On-Duty Firefighter Fatalities: 114

Classification:

- 56 Volunteer 49.1%
- 30 Career 26.3%
- 13 Wildland Contract 11.4%
- 4 Part-Time (Paid) 3.50%
- 4 Paid-on-Call 3.50%
- 4 Wildland Part-Time 3.50%
- 3 Wildland Full-Time 2.63%

Number of Multiple Firefighter Fatality Incidents: 5
Number of Firefighter Fatalities Associated with Wildland Incidents 26

Type of Duty:

- 31 On-Scene Fire 27.1%
- 29 Other On-Duty 25.4%
- 19 Responding 16.6%
- 12 On-Scene Non-Fire 10.5%
- 11 After 9.64%
- 9 Training 7.89%
- 2 Returning 1.75%
- 1 Other 0.87%

Percent of Fatalities Related to Emergency Duty: 64.9%
Number of firefighter fatalities associated with incendiary fires: 2

Type of Incident:

- 37 Not Incident Related 32.4%
- 31 Structure Fire 27.1%
- 22 Wildland 19.2%
- 12 MVA 10.5%
- 4 EMS 3.50%
- 4 Other 3.50%
- 2 Vehicle Fire 1.75%
- 1 Tech Rescue 0.87%
- 1 Rescue/Extrication 0.87%

Cause of Fatal Injury:

- 50 Stress/Overexertion 43.8%
- 29 Vehicle Collision 25.4%
- 14 Struck by 12.2%
- 10 Caught/Trapped 8.77%
- 3 Fall 2.63%
- 2 Collapse 1.75%
- 2 Unknown 1.75%
- 1 Lost 0.87%
- 1 Assault 0.87%
- 0 Terrorist Attack
- 1 Contact with 0.87%
- 1 Other 0.87%

Nature of Fatal Injury:

- 47 Trauma 41.2%
- 46 Heart Attack 40.3%
- 7 Asphyxiation 6.14%
- 4 Burns 3.50%
- 4 CVA 3.50%
- 2 Violence 1.75%
- 2 Unknown 1.75%
- 1 Electrocution 0.87%
- 1 Other 0.87%

Age of Firefighter When the Fatal Injury Was Sustained:

- 6 - Under 21
- 13 - 21 to 25
- 9 - 26 to 30
- 23 - 31 to 40
- 28 - 41 to 50
- 15 - 51 to 60
- 20 - 61 and Over

Percent of Firefighter Fatalities under Age 40: 41.2%

Type of Activity:

- 50 Not On Scene 43.8%
- 19 Responding 16.6%
- 14 Advance Hose Lines 12.2%
- 7 Other 6.14%
- 5 Unknown 4.38%
- 5 Unknown 4.38%
- 4 Scene Safety 3.50%
- 3 S&R 2.63%
- 3 IC 2.63%
- 2 Support 1.75%
- 1 Extrication 0.87%
- 1 Ventilation 0.87%

Time of Fatal Injury:

- 4 0100-0259
- 1 0300-0459
- 11 0500-0659
- 9 0700-0859
- 9 0900-1059
- 12 1100-1259
- 8 1300-1459
- 13 1500-1659
- 11 1700-1859
- 18 1900-2059
- 4 2100-2259
- 4 2300-0059
- 10 Unknown

Month of the Year:

- 13 January 11.4%
- 12 February 10.5%
- 11 March 9.64%
- 10 April 8.77%
- 6 May 5.26%
- 7 June 6.14%
- 11 July 9.64%
- 15 August 13.1%
- 7 September 6.14%
- 4 October 3.50%
- 10 November 8.77%
- 8 December 7.01%

Firefighter Fatalities by State by Location of Fatal Incident:

- 2 Alabama 1.75%
- 1 Arkansas 0.87%
- 2 Arizona 1.75%
- 18 California 15.7%
- 4 Colorado 3.50%
- 1 Delaware 0.87%
- 2 Florida 1.75%
- 2 Georgia 1.75%
- 6 Illinois 5.26%
- 2 Indiana 1.75%
- 1 Kentucky 0.87%
- 3 Louisiana 2.63%
- 3 Maryland 2.63%
- 1 Maine 0.87%
- 2 Michigan 1.75%
- 1 Minnesota 0.87%
- 6 Missouri 5.26
- 3 Mississippi 2.63%
- 1 Montana 0.87%
- 11 North Carolina 9.64%
- 2 New Jersey 1.75%
- 1 New Mexico 0.87%
- 3 Nevada 2.63%
- 7 New York 6.14%

- 6 Ohio 5.26%
- 1 Oklahoma 0.87%
- 1 Oregon 0.87%
- 9 Pennsylvania 7.89%
- 2 Rhode Island 1.75%
- 1 South Carolina 0.87%
- 4 Texas 3.50%
- 2 Virginia 1.75%
- 2 Wisconsin 1.75%
- 1 West Virginia 0.87%

APPENDIX E
MAHATTAN BEACH RCC DISPATCH CODES

As indicated by dispatch "type" code to be entered by complaints.

Rescue

- Rescue (1 rescue, 1 engine) or (auto-aid rescue), if R-21 not available
  - Emergency Medical Service (EMS) request

  Rescue Minor (1 engine)
  - Minor injury below the knee, below the shoulder (No head injury)
- Multi-Victim Incident (MVI) (1 B/C, 1 rescue, 2 engines)
  - 5 or more patients
  - Bus accident w/ injuries
- Vehicle Accident (1 rescue, 1 engine)
  - 1 or 2 vehicles
- Vehicle Accident - Major (1 B/C, 1 rescue, 2 engines, 1 truck)
  - 3 or more vehicles
  - Overturned vehicle
  - Vehicle accident with fire
  - Vehicle accident with MVI
  - Persons trapped
  - Head-on
  - Vehicle into a structure
  - Bus Accident
- Assault (1 B/C, 1 rescue, 1 engine)
  - Shooting
  - Stabbing
  - Battery
- Ocean Rescue (1 B/C, 1 rescue, 1 engine)
  - Drowning in the ocean
  - Near drowning in the ocean
  - Missing swimmer in the ocean
  - Boat in distress in the ocean
- Roof (1 B/C, 1 rescue, 2 engines)
  - Roof collapse
  - Building collapse
  - Tree down on a building/car

Fire

- Commercial Fire Alarm – Citizen or Alarm Company R/P
  - With/without reset (1 B/C, 1 rescue, 2 engines)
- Residential Fire Alarm – Citizen or Alarm Company R/P (no fire or smoke seen)
  - With/without reset (1 engine)
- Investigation (1 engine)
  - Carbon Monoxide (CO) Alarm, chemical alarm

    - Electrical appliance/outlet hot or smoking
    - Smell of smoke/odor
    - Misc. incident, not found in other complaint codes
- Aircraft Down (1 B/C, 1 rescue, 2 engines, E-11)
- Fire Vehicle (1 engine)
- Brush/Grass (1 B/C, 1 rescue, 2 engines)
- Fire Vehicle - Major (1 B/C, 1 rescue, 2 engines)
    - Tractor/Trailer
    - Trash truck
    - Gasoline tanker
    - Propane/LPG truck
    - Delivery truck (UPS, FedEx, Etc.)
    - Motor home
    - Bus
- Fire Commercial/Industrial (1 B/C, 1 rescue, 2 engines, E-11, 1 truck)
    - Commercial or industrial building
    - Gas station
    - Schools
    - City building: City Hall, fire/police station or jail, etc
    - Under ground or above ground parking structure
    - Shopping mall
    - Hotel/Motel
    - Public assembly: theater, church, etc.
- Fire High Rise (1 B/C, 1 rescue, 2 engines, E-11, 1 truck)
    - 55’ or higher commercial
    - 4 stories or more
- Fire Multi-Residence (1 B/C, 1 rescue, 2 engines, E-11, 1 truck)
    - Condos or apartments of 3 units or more
- Fire Single Residence (1 B/C, 1 rescue, 2 engines, E-11, 1 truck)
    - House and/or detached garage
    - Condos or apartments of 2 units
    - Vehicle fire in a garage or carport
- Fire Non-Structure (1 engine)
    - Dumpster
    - Trash
    - Fence
    - Tree/bushes

Public Assist

- Public Assist (1 engine)
    - Lock-in/Lock-out
    - Odor removal
    - Flooding, water removal inside
    - Bee Swarm
    - Elevator entrapment
    - Patient assist: off the floor, into bed, etc.

Police Assist

- Police Assist (1 B/C, 1 engine)
  - Ladder
  - Forcible entry
  - Fire/EMS standby (SWAT)
  - Bomb threat
  - Bio-Hazard/Terrorist threat

Hazardous Materials

- Haz Mat spill or leak (1 B/C, 1 rescue, 2 engines)

Natural Gas Leak Inside

- 1 B/C, 1 Rescue, 2 Engines)

Hazardous Condition

- Natural Gas Leak Outside (1 engine)
- Hydrant Knocked Off/Leaking (1 engine)
- Electrical (1 engine)
  - Wires Down
  - Wires Sparking
  - Pole/Transformer Fire
  - Vault Fire
- Vehicle leaking fuel (1 engine)
- Weather caused: tree down, loose tarp, etc. (1 engine)

Overcrowding Investigation

- Check for over occupancy (1 B/C, 1 engine)

Special Responses

- Station Cover (2 engines per Area "G" Mutual Aid Manual)
- 2nd Alarm (2 engines for station cover, 1 engine to the fire)
- 3rd Alarm (1 B/C, 3 engines, and 1 truck to the fire, plus 2 engines for station cover per Area "G" Mutual Aid Manual)
- 4th Alarm (2 B/C, 5 engines, and 2 trucks to the fire, plus 2 engines for station cover per Area "G" Mutual Aid Manual)
- Automatic Aid (Per agreements)
- Mutual Aid (As requested)
- Strike Team (1 B/C STL and 1 engine) or (1 engine)
- Medical Strike Team (1 B/C, 3 medic units, 2 engines per Area "G" Mutual Aid Manual)
- Plan "A" (2 Fire Investigators)
- Plan "B" (1 B/C, 4 or 5 engines for Area "G" brush response)
- Plan "H" (1 Helicopter Air Squad & 1 "LZ" engine from LA County Fire)
- Plan "M" (3 paramedic units per Area "G" Mutual Aid Manual)

APPENDIX F
LACoFD CONTRACT STAFFING ANALYSIS

Contracting municipal fire services with larger agencies is not uncommon. In fact, it is an attractive option for cities facing economic disparity. Los Angeles County Fire Department (LAcoFD) provides fire service to 58 cities, of which, 11 cities are provided fire service through contractual agreements. The benefits of contracting fire services with LACoFD are additional regional resources, an increase in firefighting personnel, special resources such as Urban Search and Rescue (USAR) and HazMat, and potential cost savings for the city. Over the past 10 years, the City of El Monte saw a cost savings of $40 million by contracting their fire services with Los Angeles County. However, while contracting fire services may prove cost effective for some cities, not all cities are the same, and in some cases the cost of contracting fire services was projected at a higher price than current practices (Debbie Aquire, Los Angeles County Fire Department Division Planning Chief, personal communication, February 27, 2009). All tentative projections are revealed after an initial survey is done by LACoFD Planning Division.

Considerations

1. City must be contiguous with LACoFD boundaries;
    a. Cities surrounding Manhattan Beach contracting with Los Angeles County Fire Department are Lawndale, Inglewood, and Hawthorne;
    b. The beaches are not considered contiguous boundaries.

However, Association participation of the jurisdiction represented, Manhattan Beach, is necessary in soliciting County fire services. Without such approval, LACoFD will not conduct a survey. Recent controversy surrounding Montebello Fire Department highlighted the negative political implications of union and city disagreement. After years of expensive litigation costs, LACoFD terminated negotiations.

Inasmuch as union support is warranted, contractual agreements must work operationally fon both ends. Financial stability of the City is of high importance. The County will look at a city's reserve funds as well as financial obligations. Additional considerations include;

1. Independent Police Department;
    a. LACoFD will look at current Police Department wages and increases over the next 5 years;
    b. Contract Fire Services are paid through the public safety general fund;
    c. *Example:* El Monte Police Department is proposing closure of one of the three fire stations contracted with LACoFD.

Over the past 10 years, the City of El Monte has saved approximately $40 million dollars by contracting with the County for fire protection. Negotiations are currently underway.

Downsizing by Regional Approach

Yet, contracting with County Fire does not always guarantee the same staffing protocol. Based on the topography of the City and regional County resources, staffing and station adjustments can be made.

1. Contract City: Lynwood;
    a. Before contracting with County Fire;
        i. Two stations staffed.
    b. After contracting with County Fire;
        i. Two stations staffed;
            1. Different apparatus at each station;
            2. Staffing configurations significantly altered.

To Request an Initial Survey

The City Manager must contact the LACoFD Fire Chief Freeman, requesting a survey. It is highly recommended for the reasons abovementioned, that the Fire Chief along with the Association support this request. The cost of the survey is $7500.00.

Consolidation Summary

Operational Consolidation – Separate fire departments with similar staffing levels and run the same kinds of calls combine into a single department.

- ***Advantages*** **-** Efficiencies may be achieved by sharing resources such as apparatus, staffing, and equipment. An organization may also see improvements in safety and cohesiveness through combined training, personnel management, and common policies and procedures. Others may include:

  - Increase ISO rating
  - Decrease costs
  - Increase services
  - Reduce response times to emergencies
  - Increase resources, staffing and safety at emergencies
  - Staff specialization
  - Communications
  - Joint training facilities
  - Efficient personnel allocation
  - Share special equipment
  - Promotional selectivity
  - Retention of personnel

- ***Disadvantages*** – Combining resources does not always result in improved efficiency. The consolidation of two departments lacking in resources may offer some advantages, but still may require an additional investment in staffing and/or equipment to meet the community's needs.

  - Loss of local control
  - Blending of history/cultures
  - Scheduling conflicts
  - Merging contracts and seniority lists
  - Staffing of stations and apparatus
  - Integrating command structure
  - Resources inequities

Types of Consolidations

A **Joint Powers Authority** (**JPA**) is an institution permitted under the laws of some states, whereby two or more public authorities can operate collectively. Joint Powers Authorities may be used where:

- An activity naturally transcends the boundaries of existing public authorities;
- By combining their commercial efforts, public authorities can achieve economies of scale or market power. An example would the South Bay Regional Communications Center.

Fire District – A fire district is a political subdivision of the State, formed for the protection of persons and property in an area approved by the county. The District is governed by an elected board by the voters. Board members are elected to alternating four-year terms. The board establishes policy and approves the annual budget.

Merger – One department combines with another department thereby sharing resources.

Partial Consolidation – Separate fire departments are retained, and a special agreement is formed to handle specific challenges. An example is shared staffing of a single fire station to serve more than one jurisdiction.

Contract for services – One department pays for fire services from another department.

Consolidating Specialized Fire Department Divisions – Examples of areas where efficiencies may be realized by merging specific divisions within multiple departments.

Examples

Training – A single training center with a dedicated teaching staff may provide a more-consistent curriculum, using common industry benchmarks to ensure compliance with stated goals, operating standards, and industry standards.

Dispatch communications – Shared costs and resources relating to regional dispatching (South Bay Regional Public Communications Authority).

Hiring/Promotion – One agency that recruits, tests, hires and promotes personnel for the consolidated fire departments may reduce costs and prevent the duplication of efforts for each city.

Purchasing – Cost reduction through volume purchasing for fire equipment, paramedic supplies and apparatus. The effort may facilitate a volume rate when negotiating a better price.

Apparatus repairs – Share costs of one central repair facility for vehicles and apparatus.

APPENDIX H
ASSOCIATION PERSPECTIVE