Fire and EMS Operational Analysis
Fire and Emergency Medical Services
Long Beach, New York
January 2015

FIRE/EMS OPERATIONS

CENTER FOR PUBLIC SAFETY MANAGEMENT

Submitted by and reply to:
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ICMA
Leaders at the Core of Better Communities

General Information

About ICMA

The International City/County Management Association (ICMA) is a 100-year-old nonprofit professional association of local government administrators and managers, with approximately 9,000 members located in 28 countries.

Since its inception in 1914, ICMA has been dedicated to assisting local governments in providing services to their citizens in an efficient and effective manner. Our work spans all of the activities of local government: parks, libraries, recreation, public works, economic development, code enforcement, brownfields, public safety, and a host of other critical areas.

ICMA advances the knowledge of local government best practices across a wide range of platforms, including publications, research, training, and technical assistance. Our work includes both domestic and international activities in partnership with local, state, and federal governments, as well as private foundations. For example, we are involved in a major library research project funded by the Bill & Melinda Gates Foundation and are providing community policing training in El Salvador, Mexico, and Panama with funding from the United States Agency for International Development. We have personnel in Afghanistan helping to build wastewater treatment plants and have teams working with the United States Southern Command (SOUTHCOM) in Central America on conducting assessments and developing training programs for disaster preparedness.

ICMA Center for Public Safety Management

The ICMA *Center for Public Safety Management* (ICMA/CPSM), one of four centers within ICMA's U.S. Programs Division, provides support to local governments in the areas of police, fire, emergency medical services (EMS), emergency management, and homeland security. In addition to providing technical assistance in these areas, we also represent local governments at the federal level and are involved in numerous projects with the U.S. Department of Justice and the U.S. Department of Homeland Security.

ICMA/CPSM is also involved in police and fire chief selection, assisting local governments in identifying these critical managers through original research, the identification of core competencies of police and fire managers, and assessment center resources.

Our local government technical assistance includes workload and deployment analysis, using operations research techniques and credentialed experts to identify workload and staffing needs and best practices. We have conducted approximately 140 such studies in 90 communities ranging in size from 8,000 population (Boone, Iowa) to 800,000 population (Indianapolis, Indiana).

Thomas Wieczorek is the Director of the Center for Public Safety Management. Leonard Matarese is the Director of Research & Project Development.

Methodology

The ICMA Center for Public Safety Management team follows a standardized approach to conducting analyses of fire, police, and other departments involved in providing services to the public. We have developed this approach by combining the experience sets of dozens of subject matter experts in the areas of police, fire, and EMS. Our collective team has several hundred years of experience leading and managing public safety agencies, and conducting research in these areas for cities in and beyond the United States.

The information gathered by the operations and data analysis team are based upon key performance indicators that have been identified in standards and safety regulations and by special interest groups such as the International Association of Fire Chiefs (IAFC), the International Association of Fire Fighters (IAFF), and the Association of Public-Safety Communication Officials International, and through ICMA's Center for Performance Measurement. These performance measures have been developed following decades of research and are applicable in all communities. For this reason, the data yield similar reporting formats, but each community's data are analyzed on an individual basis by the ICMA specialists and represent the unique information for that community.

The ICMA team begins most projects by extracting calls for service and raw data from a public safety agency's computer-aided dispatch system. The data are sorted and analyzed for comparison with nationally developed performance indicators. These performance indicators (e.g., response times, workload by time, multiple-unit dispatching) are valuable measures of agency performance regardless of departmental size. The findings are shown in tables and graphs organized in a logical format. Despite the size and complexity of the documents, a consistent approach to structuring the findings allows for simple, clean reporting. The categories for the performance indicators and the overall structure of the data and documents follow a standard format, but the data and recommendations are unique to the organization under scrutiny.

The team conducts an operational review in conjunction with the data analysis. The performance indicators serve as the basis for the operational review. The review process follows a standardized approach comparable to that of national accreditation agencies. Before the arrival of an on-site team, agencies are asked to provide the team with key operational documents (policies and procedures, asset lists, etc.). The team visits each city to interview fire agency management and supervisory personnel, rank-and-file officers, and local government staff.

The information collected during the site visits and through data analysis results in a set of observations and recommendations that highlight the strengths, weaknesses, and opportunities of—and threats to—the organizations and operations under review. To generate recommendations, the team reviews operational documents; interviews key stakeholders; observes physical facilities; and reviews relevant literature, statutes and regulations, industry standards, and other information and/or materials specifically included in a project's scope of work.

The standardized approach ensures that the ICMA Center for Public Safety Management measures and observes all of the critical components of an agency, which in turn provides substance to benchmark against localities with similar profiles. Although agencies may vary in size, priorities,

and challenges, there are basic commonalities that enable comparison. The approach also enables the team to identify best practices and innovative approaches.

In general, the standardized approach adopts the principles of the scientific method: We ask questions and request documentation upon project start-up; confirm accuracy of information received; deploy operations and data analysis teams to research each unique environment; perform data modeling; share preliminary findings with the jurisdiction; assess inconsistencies reported by client jurisdictions; follow up on areas of concern; and communicate our results in a formal written report.

ICMA/CPSM Project Contributors

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Executive Summary

ICMA was retained by the city of Long Beach to complete a comprehensive analysis of emergency response services in light of the closure of Long Beach Medical Center (LBMC). ICMA quickly discovered during the course of this analysis that the emergency medical service most heavily impacted by the closure was and is the Long Beach Fire Department (hereinafter, LBFD), as it handles all EMS and EMS transport services provided within the city. Additionally, because the LBFD's duties are split among EMS and fire suppression services, ICMA also evaluated the city's fire operations. Thus, this analysis is intended to provide the city with a thorough review of both fire and emergency medical services provided by the LBFD. This report provides a description of the observations made by the ICMA study team and a quantitative analysis of fire department response data. The report also provides a benchmark of the performance of the existing service delivery. Benchmark performance information can be found in the data analysis section of this report.

To begin the review, the project management staff asked the city and LBFD for certain documents, data, and information. The project management staff used this information/data to familiarize themselves with the organization's structure, assets, and operations. The information provided was also used in conjunction with the raw performance data collected to determine the existing performance and compare that performance to national benchmarks. These benchmarks have been developed by organizations such as the National Fire Protection Association (NFPA), Center for Public Safety Excellence, Inc., and the ICMA Center for Performance Measurement. City and LBFD staff was provided an electronic shared information folder to upload information for analysis and use by the ICMA project management staff.

The ICMA project management staff conducted site visits for the purpose of observing department and agency-connected supportive operations, interviewing key staff, and reviewing preliminary data and operations. Follow-up telephone calls were also conducted between ICMA project management staff and city staff so that ICMA staff could affirm the project information and elicit further discussion regarding observations.

The ICMA Study Team had an opportunity to meet with City Manager Jack Schnirman, former city manager Charles Theofan, former city manager Edwin Eaton, Fire Commissioner Scott Kemins, the fire chief, the first assistant fire chief, the executive officer of the paid staff, Assistant Corporation Counsel Robert Agostisi, the emergency communications supervisor, a part-time dispatcher, a representative of the budget/comptroller's office, Local 287 Union President Bill Piazza, and the paid-crew on shift the evening of April 14, 2014. In addition, the ICMA team visited each of the three fire stations and had an opportunity to observe a live fire burn the evening of April 15, 2014, at the Nassau County Fire Academy.

The ICMA team, while reviewing information and discussing operations with department members, always seeks first to understand the operations, then to identify ways the department can improve efficiency, effectiveness, and safety for both its members as well as the community it serves. ICMA found that the city of Long Beach and the LBFD are not unique, in that they seek to create more efficient organizations within existing financial resources.

ICMA found the LBFD is a capable department for the delivery of fire suppression and emergency medical service programs, but there is always room for improvement. Critical areas the ICMA team has identified that need improvement will be discussed.

Major Issues Confronting the Long Beach Fire Department

The Long Beach Fire Department is a capable organization that provides quality fire and emergency medical services (EMS) to the citizens and visitors of Long Beach, N.Y. However, like most organizations, there are areas with potential for improvement. The ICMA study team has identified several major issues confronting the city of Long Beach and the Long Beach Fire Department.

First is that the city is still recovering from a catastrophic fiscal crisis and near bankruptcy, coupled with the challenges of Superstorm Sandy. The city is still grappling with the financial impact of this natural disaster, and has taken an aggressive approach to find efficiencies in all city services.

Second is the overall health of the Long Beach Fire Department. It is ICMA's opinion that the organization is fractured between city leadership, the volunteer organization, and the career staff. There is a void of direction, standard operating guidelines, and many of the managerial functions that provide the necessary framework for success.

The third major issue is closely associated with the first two, as the most likely alternatives to address the budget shortfalls through new operational and fiscal efficiencies may require changes that typically strain organizations. It is ICMA's assessment that the current organizational structure is not positioned to manage such changes. The instability in the organizational structure and leadership may detract from the success of the change management processes.

The most substantive recommendations with the greatest financial impact are associated with alternative staffing and deployment models required both meeting the demand for services in EMS and accounting for the city's fiscal constraints. In addition to any necessity on the city's part to reduce overall budget expenditures, the fire department's SAFER Grant matured in December 2014, creating a new demand in personnel costs. Several alternatives are presented in this report that includes either civilianizing the EMS program, or creating a public-private partnership to provide EMS.

The ICMA study team offers numerous recommendations for consideration. These recommendations are presented in the order that they occur in the report.

Recommendations

- The city of Long Beach should revise and "right size" the LBFD organizational structure as illustrated in Figure 2 (p. 15). The proposed organizational chart reflects recommendations for the elimination of several companies as discussed later in this report.

- The city of Long Beach should retain a full time fire commissioner as the titular head of the LBFD. This person's primary responsibilities would be serving as the liaison between the fire department and city government and implementing policy within the department.
- The city of Long Beach should designate a fire chief who would be responsible for managing all day-to-day and emergency scene operations of the department. This individual needs to be empowered to fully manage and administer the department and its operations in accordance with commonly accepted best practices and current statutes, regulations, and recommended standards.
- In order to reinforce the city's support for a continued strong, primarily volunteer fire department, the number two operational position in the LBFD should be a volunteer deputy fire chief.
- All volunteer officer positions in the LBFD from lieutenant through deputy fire chief should be required to successfully complete a rank-appropriate assessment process designed to measure their knowledge, skills, and abilities prior to being promoted/appointed to a higher rank.
- All LBFD officers, career and volunteer, should be required to complete a certain number of hours of continuing education each year. This training should consist of not only emergency operations training, but also leadership and management topics as well.
- All LBFD officers should be assigned one or more ancillary duties to assist with the management and administration of the fire department.
- The LBFD needs to be provided with administrative/clerical support. The city should provide the department with at least a part-time administrative assistant to assist with the myriad administrative and management tasks that are part of the daily operations of a busy, modern, full-service fire department.
- The city of Long Beach needs to give serious consideration to updating and expanding the existing fire headquarters to adequately meet the current and future administrative and operational needs of the department. The interior of the existing facility needs to be renovated and updated. Additional apparatus bays could be added onto the existing station in the parking lot area to the left (north) side of the station to provide more effective response of various department apparatus to emergencies.
- The LBFD should implement a policy that requires that all members of the department keep their personal protective equipment in their respective station and not carry it on the apparatus or in their personal vehicles. Having all personnel (except chief officers who will be responding in their command vehicles) report to their stations upon receipt of an alarm helps to ensure crew integrity and accountability, both of which are important firefighter safety considerations. It also reduces confusion and the possibility of freelancing on the fire ground and makes it easier for the incident commander to assign resources during the early, dynamic stage of an incident. Finally, having properly staffed units responding should improve the accuracy of response time data utilized by the department.

- The city of Long Beach should give consideration to removing Heavy Rescue 232 from service. This unit is 20 years old and not really equipped as a heavy rescue. The rescue tools and equipment carried on it may potentially be relocated to smaller, more economical rescue/utility apparatus. The city and fire department could realize moderate savings in this manner.
- The city of Long Beach should place a combination hydraulic rescue tool for light vehicle extraction on Engine 2343, operated by the career staff. This unit is staffed 24/7 and is generally the first due engine at accident scenes. Since it will be on scene either simultaneously with, or possibly even prior to, arrival of an ambulance on scenes of motor vehicle accidents it should have the necessary resources to gain access to and/or free trapped occupants. It is our strong belief that almost all motor vehicle accidents in Long Beach where the occupants are trapped could be effectively and efficiently mitigated with a basic, hydraulic light vehicle rescue tool on Engine 2343.
- The city of Long Beach should remove Floodlight Unit 233 from service. At 27 years old, with increasing maintenance issues and the fact that this type of apparatus is obsolete in the modern fire service, the city and fire department could reduce expenses by reducing the size of its apparatus fleet.
- Because of the legal uncertainties existing by virtue of the union contract, the primary recommendation is for the city to adopt Alternative 1—civilianizing the EMS Program—as the first option. The ICMA study team believes that this method would result in improved service to residents, and would afford significant cost reductions.
- If however, the city elects not to adopt Alternative 1; it is recommended that the city attempt to implement Alternative 2—Development of a Public-Private Partnership for EMS. This alternative provides the greatest savings and distances the city from the financial liability associated with the delivery of EMS while assuring state-of-the-art EMS.
- The LBFD should immediately form a committee comprised of both career and volunteer personnel from all ranks within the department to begin the development of a comprehensive department training program to be adopted by the department. It is our recommendation that this committee be tasked with completing this project within one year. Units that respond to fires together should also train together.
- The LBFD should appoint a dedicated training officer who is responsible for coordinating all department training, developing training programs and lesson plans, and maintaining all training reports, records and certifications.
- Since they are integrated operationally as a combination fire department, whenever possible the career and volunteer members of the department should be required to train together. This should include both routine training conducted within the city as well as advanced training conducted at places such as the Nassau County Fire Academy.
- The career firefighters should be required to complete a minimum of one hour (two would be preferable) of training each duty day.
- The LBFD needs to make the development of a comprehensive database of training records a high priority. This database should include a detailed record of all training,

both internal and external, completed by all members of the department. It should also, at a minimum, include any certifications held along with their current expiration date. The database should be user friendly and easily searchable.

- In addition, the department should develop a training file for each member of the department. This file should contain records of training completed by the member, copies of course completion certificates, copies of current certifications such as EMT or paramedic, and any other training-related records.
- The LBFD should immediately form a committee comprised of both career and volunteer personnel from all ranks within the department to begin the development of a comprehensive standard operating procedures/guidelines manual to be adopted by the department. It is our recommendation that this committee be tasked with completing this project within one year.
- The city of Long Beach should give consideration to involving the on-duty career staff in fire prevention activities through the development of an in-service inspection program. Appropriate training and/or certification of personnel would need to be addressed.
- The LBFD should implement a prefire planning program utilizing the career firefighters for the purpose of developing pre-incident plans on all commercial and target hazard occupancies located within the city.
- As soon as possible the LBFD should begin a long-range strategic planning process. The city and department should assemble a committee for this purpose that includes a diverse cross section of the department's internal and external stakeholders. Once completed, the initial strategic plan should be formally adopted by the city. It should then be reviewed, revised, and updated as necessary and on a periodic basis.
- The LBFD should form a committee comprised of both career and volunteer personnel from all ranks within the department to begin the development of a comprehensive risk management plan and program to be adopted by the department. It is our recommendation that this committee be tasked with completing this project within one year.
- The LBFD should form a committee comprised of both career and volunteer personnel from all ranks within the department (and possibly external stakeholders as well particularly from the governing body who have to determine the acceptable level of risk, or conversely, the level of protection the community can afford) to begin the development of a Standards of Cover plan to be adopted by the department. It is our recommendation that this committee be tasked with completing this project within one year.

Organizational Analysis

Governance and Administration

The city of Long Beach, N.Y., was founded in 1880 when the first Long Beach Hotel was built. The city of Long Beach is one of two cities on Long Island and is geographically located in the town of Hempstead in Nassau County. Long Beach employs the council-manager form of government and has a five-member city council.

The Long Beach Fire Department (LBFD) dates back to 1910. The composition of the fire department is codified in the municipal code and consists of the Long Beach Volunteer Fire Department and a uniformed force employed for the purposes of fire prevention and fire extinguishment.[1] The city manager appoints a fire commissioner who is tasked with supervising the entire fire department.[2] The composition of the regular paid uniform force is determined by resolution by the city council.[3]

Finally, the municipal code has established a Board of Fire Commissioners, and which has the general authority for: the care and control of all properties belonging to the fire department, admission and removal of members, prescribing methods of extinguishment, inquiry into cause and origin of fires, and appointing deputy chiefs recommended by the fire commissioner.[4] The Board of Fire Commissioners is composed of the fire commissioner, the first and second deputy fire commissioners, a member of the city council, the volunteer fire chief, volunteer deputy chief, and the deputy chief of the paid fire department.[5]

Organizational Resources

The Long Beach Fire Department (LBFD) is the primary provider for all fire suppression, rescue, and emergency medical services for the city. The city has an estimated population of 33,480 year-round residents.[6] As a beach resort community, the population of the city surges considerably in the summer. Therefore, the population density is very high considering the approximately four square-mile jurisdiction. The total fire department budget for fiscal year ending in 2012 was $5.4 million, and through overtime reductions, the budget for the fiscal year ending in 2013 was $5.1 million.

[1] Long Beach, New York Code of Ordinances: Part II-Code of Ordinances-Chapter 11-Fire Prevention and Protection-Article III-Fire Department, Section 11-48.-Composition. Retrieved March 14, 2014 from http://www.municode.com/Resources/gateway.asp?pid=10434&sid=32
[2] Ibid. Section 11-49.
[3] Ibid. Section 11-51.
[4] Ibid. Article IV-Board of Fire Commissioners, Section 11-72.
[5] Ibid. Section 11-70.
[6] United States Census Bureau. (2012). *State and county quick facts.* Retrieved March 14, 2014 from http://quickfacts.census.gov/qfd/states/36/3643335.html

Organizational Structure

The LBFD does not have an existing formal organizational chart. Therefore, a representation of the existing department structure is provided as Figure 1.

At the time of this assessment, a part-time fire commissioner who was concurrently serving as the city's Building Commissioner was leading the LBFD. While the fire commissioner serves as the department head his duties are primarily administrative and he does not have fire ground operational authority. There were reported to be three deputy fire commissioners, but the ICMA team found that many members of the department we spoke to were unsure of who these deputy commissioners were, or what their current duties and/or responsibilities would be.

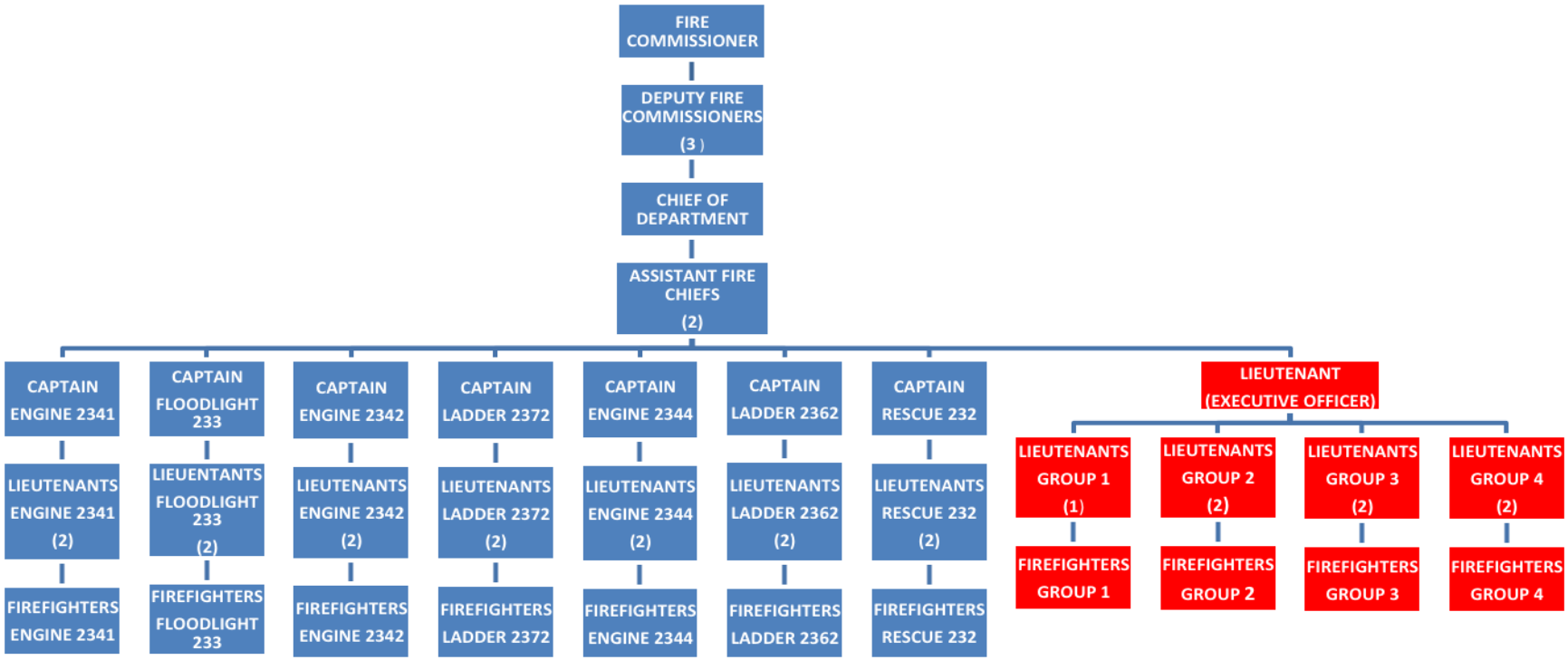
On the operational side the department has a fire chief/chief of department and two assistant fire chiefs who are responsible for commanding emergency scene operations. These personnel are volunteer members of the department who are chosen by popular vote of the volunteer membership. While the current chief officers have satisfactorily completed various fire-related training programs, the city's regulations should be updated to require advanced training and/or certifications to hold these positions.

There are seven captains in the department, one for each of the three volunteer engine companies, two ladder companies, one rescue company and one floodlight company. Each of these companies also has two lieutenants assigned for a total of 14. However, not all of those positions were filled. Firefighters round out the staffing contingent for each of these companies. While common on Long Island, assigning personnel to a specific piece of apparatus, or company, even within a specific station, is not the usual practice found in most volunteer fire departments.

Within the career division of the department there were nine lieutenants. Eight of these officers were assigned to the rotating platoons/tours that staff the department 24/7, two each to Groups One through Four. The ninth lieutenant serves as the LBFD's executive officer and is basically responsible for managing the day-to-day operations of the career division. Each group also has a minimum of five firefighters assigned.

It is the strong opinion of the ICMA study team that the current organizational structure of the LBFD is outdated. EMS response time, and the quality of services, can be improved with the introduction of a more modern system, such as those described in ICMA's proposed alternative staffing models (p. 21). This is having an impact on the department's operations. The fire commissioner and all three of the current volunteer chief officers are attempting to balance their duties and responsibilities to the department with their obligations as full-time employees in other city departments. There are 30 additional officers in the department (9 career and 21 volunteer) but many of them have no additional duties to assist with the management and administration of the department. As noted above, the career lieutenant that serves as the department's executive officer is basically responsible, by default, for managing the day-to-day operations. However, by virtue of his rank he lacks the authority to initiate change in the department, even within the career division, and has limited ability administratively to make even the most routine purchases.

Figure 1: Current Long Beach Fire Department Organizational Chart

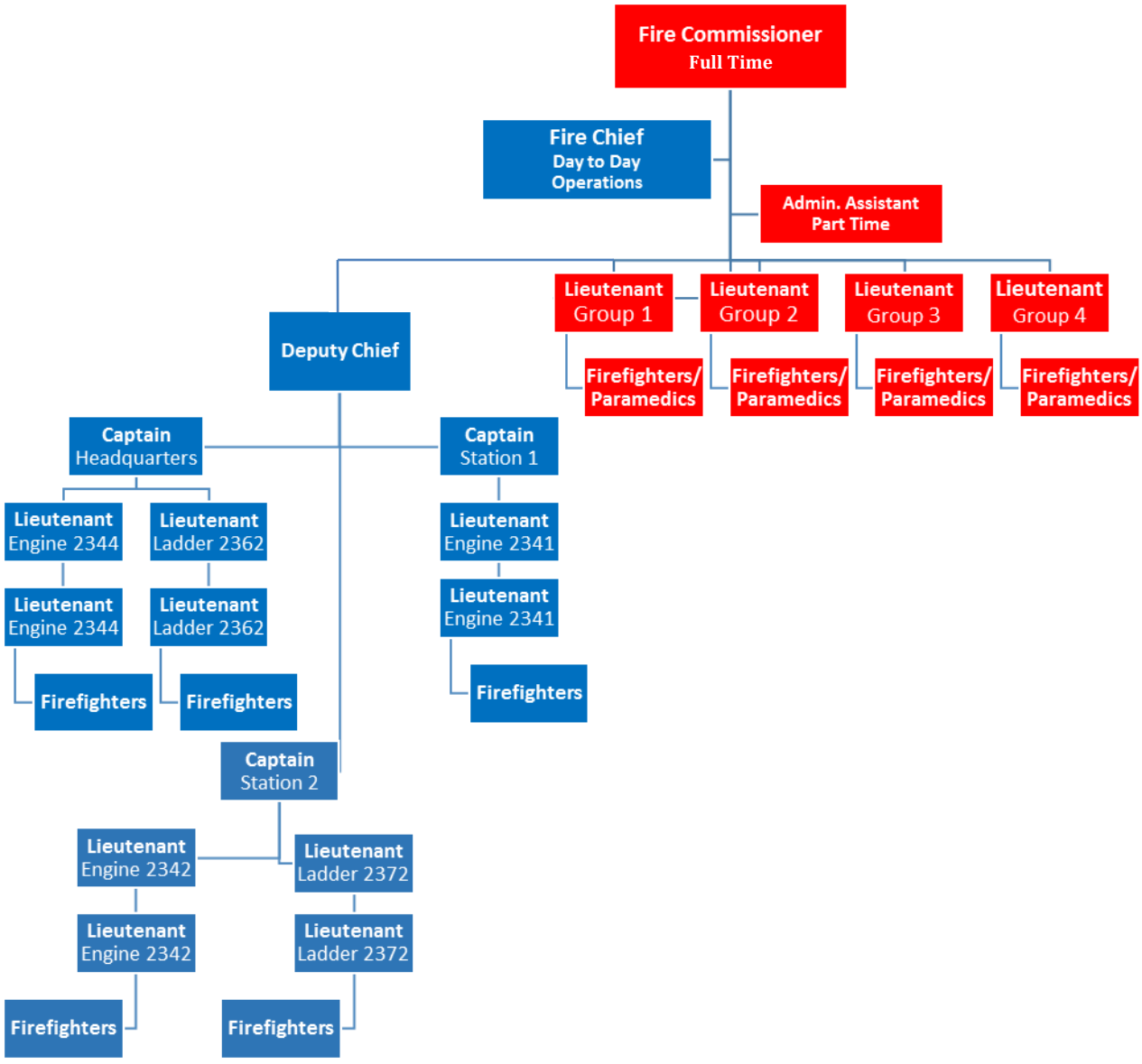


Key
Blue: Volunteer Members
Red: Career Members

Recommendations:

- The city of Long Beach should revise and "right size" the LBFD organizational structure as illustrated in Figure 2. The proposed organizational chart reflects recommendations for the elimination of several companies as discussed later in this report.
- The city of Long Beach should retain a full-time fire commissioner as the titular head of the LBFD. This person's primary responsibilities would be serving as the liaison between the fire department and city government and implementing policy within the department.
- The city of Long Beach should designate a fire chief who would be responsible for managing all day-to-day and emergency scene operations of the department. This individual needs to be empowered to fully manage and administer the department and its operations in accordance with commonly accepted best practices and current statutes, regulations, and recommended standards.
- In order to reinforce the city's support for a continued strong, primarily volunteer fire department, the number two operational position in the LBFD should be a volunteer deputy fire chief.
- All volunteer officer positions in the LBFD from lieutenant through deputy fire chief should be required to successfully complete a rank-appropriate assessment process designed to measure their knowledge, skills, and abilities prior to being promoted/appointed to a higher rank.
- All LBFD officers, career and volunteer, should be required to complete a certain number of hours of continuing education each year. This training should consist of not only emergency operations training, but also leadership and management topics as well.
- All LBFD officers should be assigned one or more ancillary duties to assist with the management and administration of the fire department.
- The LBFD needs to be provided with administrative/clerical support. The city should provide the department with at least a part-time administrative assistant to assist with the myriad administrative and management tasks that are part of the daily operations of a busy, modern, full-service fire department.

Figure 2: Proposed Long Beach Fire Department Organizational Chart



Key
Blue: Volunteer Members
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Fixed Facilities

Fire department capital facilities are exposed to some of the most intense and demanding uses of any public local government facility, as they are occupied 24 hours a day.[7] While the demands of use may be somewhat less in stations that are staffed by volunteer personnel, the very nature of the fire department's operations necessitate that all stations be functional, adequate to fulfill the department's core missions, and be well maintained. The LBFD operates seven volunteer and one career company from three fire stations located throughout the city.

Fire Headquarters is centrally located at 1 West Chester St. and is attached to the Long Beach City Hall complex. This station has two very deep bays and houses the career personnel who staff Engine Company 3 (Engine 2343) and an ALS ambulance (Ambulance 2319). Also responding from this station are three volunteer companies, Engine Company 4 (Engine 2344), Hook and Ladder Company 2 (Tower Ladder 2362), and Rescue Company 1 (Heavy Rescue 232). Two other ambulances, normally staffed as needed by volunteer personnel, operate from this station (Ambulance 2321, Ambulance 2322). In addition to quarters for the career personnel, the department's administrative functions, including an office for the fire chief and his staff, are located here. The LBFD dispatch center was also previously located in the station; however, after it was flooded during Superstorm Sandy in October 2012 it was relocated to the third floor of city hall.

The LBFD appears to have outgrown its headquarters from a functionality standpoint. For instance, Tower Ladder 2362 is parked third in line in its bay in the station, with the rear of the apparatus nearly touching the rear wall. Heavy Rescue 232, which carries the department's hydraulic rescue tools, is parked third in line in the adjacent bay. This would possibly require two other vehicles to be pulled out of the station prior to an emergency response. All three of the chief officers share one office and additional offices appear to also serve as storage areas. It appears that much of the necessary maintenance in this station, including basics like fresh paint, has been deferred over the years.

Fire Station 1, also known as Maple Fire, serves the east end of the city. It is a two-bay station located at 300 Maple Blvd. at the intersection of East Park Ave. Station 1 houses Engine Company 1 (Engine 2341), the Floodlight Company (Floodlight 233), and a Command Post unit (Command Post 234). Overall, this station appeared to be in good condition despite having suffered major water damage from flooding during Superstorm Sandy. At the time of this assessment significant repairs and renovations were still underway with completion anticipated within the next several months.

Fire Station 2, also known as West End or Indiana, serves the western end of the city. It is located at 1039 West Park Ave. at Indiana Ave. It is the newest and most up to date of the city's stations and has three apparatus bays. Engine Company 2 (Engine 2342) and Tower Ladder Company 2372 respond from this station. The city's spare engine (Engine 2352) is also stored at this location. This

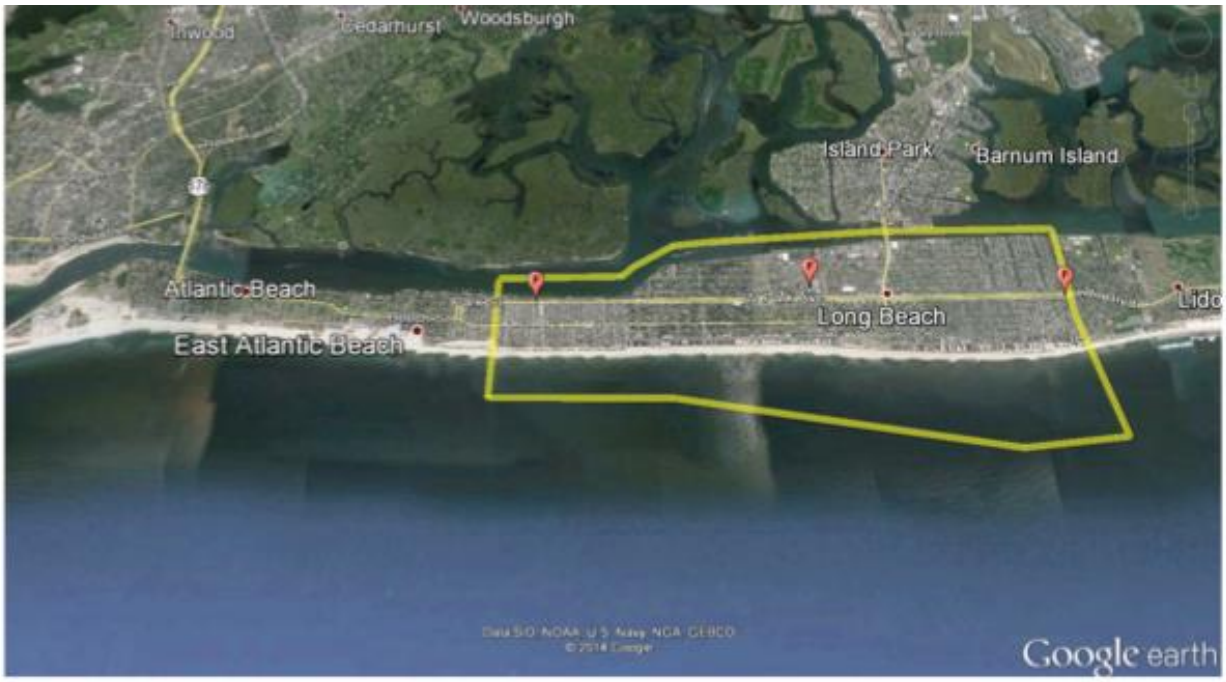
[7] Dennis Compton and John Granito, eds. (2002). *Managing Fire and Rescue Services* (Washington, DC: International City/County Management Association), 219.

station appeared to be in very good condition despite also having suffered major water damage from flooding during Superstorm Sandy. At the time of this assessment significant repairs and renovations were still underway with completion anticipated within the next several months.

All of the stations are equipped with back-up emergency generators and vehicle exhaust systems.

The fire department also has a small training facility that can be utilized for a variety of practical drills and evolutions. This facility is located to the rear of Fire Headquarters. A map of the existing fire stations in Long Beach is provided as Figure 2.

Figure 2: Map of Station Locations in City of Long Beach, NY



Recommendations:

- The city of Long Beach needs to give serious consideration to updating and expanding the existing Fire Headquarters to adequately meet the current and future administrative and operational needs of the department. The interior of the existing facility needs to be renovated and updated. Additional apparatus bays could be added onto the existing station in the parking lot area to the left (north) side of the station to provide more effective response of various department apparatus to emergencies.

Capital Vehicles

As discussed in this report, the LBFD deploys an array of fire apparatus and other emergency response units to accomplish the missions of the department. Apparatus are strategically deployed among the three fire stations and includes five pumpers (engines), one tower ladder, one ladder

tower, one rescue, one floodlight unit, and three ambulances. The LBFD also operates a water rescue unit, a command post unit, and four command vehicles. With the exception of one reserve engine (one of the five mentioned above) the department does not have any reserve apparatus to replace vehicles that are out of service for routine or long-term maintenance/repair. In fact, during the ICMA study team's field visit to Long Beach, Tower Ladder 2362 was out of service and out of the city for maintenance.

At the time of ICMA's initial assessment the LBFD apparatus fleet was in transition. Three of the department's five engines were extensively damaged by floodwaters while conducting emergency operations during Superstorm Sandy. As a result, the department was utilizing two engines that were being rented from an apparatus distributor, and one that was on long-term loan from a nearby department. Recently, the LBFD purchased four new engines. One was provided to the career unit, and the others are staffed by volunteer personnel. .

The city received four new engines from Ferrara Fire Apparatus. One has been assigned to each of the department's four engine companies. Three of the vehicles, which have been assigned to the volunteer companies, are identical to each other. The fourth engine, which has been assigned to the career staff, has some design differences, primarily some changes to compartment layout necessary for the unit to function as an advanced life support engine. This vehicle also was reported not to have a generator. The new engines a re now placed in service. The current Engine 2342, a 1998 Spartan/RD Murray engine with a 1,500 GPM pump and a 1, 000-gallon water tank, was placed into reserve status. This unit was also damaged during Sandy, but was refurbished in 2013.

Tower Ladder 2362 is a 2008 Ferrara 105' ladder tower assigned to Fire Headquarters. As previously noted it was out of service and out of town for maintenance at the time of ICMA's field visit during this assessment. It was reported to be in excellent condition.

Tower Ladder 2372 is a 2010 Seagrave 95' Aerialscope tower ladder assigned to Fire Station 2. This apparatus was found to be in excellent condition. It also was fairly well equipped. However, there was a large quantity of firefighter personal protective equipment (turnout gear) being carried in compartments on the apparatus, this was unnecessarily occupying space that could be utilized for additional firefighting and/or rescue equipment as noted below.

Heavy Rescue 232 is a 1994 Volvo that is assigned to Fire Headquarters. It appears to be in fair to good condition. This unit was equipped for basic vehicle extrication/rescue and contained tools and equipment for performing various fire and emergency scene support operations. However, despite its designation as a heavy rescue this apparatus had little in the way of technical rescue equipment.

Floodlight Unit 233, a 1987 Ford, operates out of Fire Station 1. It is in fair condition at best. At the time of this assessment it was out of service for unknown mechanical reasons. It should be noted that this apparatus is a holdover from an earlier era when pumpers (engines) were not equipped with large generators and high wattage scene lighting. This unit could now be considered obsolete.

The LBFD's newest ambulance is a 2013 Ford E450, PL Custom Type III vehicle. It was placed in service in December 2013.

With the delivery of the new engines every unit in the LBFD's primary apparatus fleet will be less than six years old and in excellent condition.

Recommendations:

- The LBFD should implement a policy that requires that all members of the department keep their personal protective equipment in their respective station and not carry it on the apparatus or in their personal vehicles. Having all personnel (except chief officers who will be responding in their command vehicles) report to their stations upon receipt of an alarm helps to ensure crew integrity and accountability, both of which are important firefighter safety considerations. It also reduces confusion and the possibility of freelancing on the fire ground and makes it easier for the incident commander to assign resources during the early, dynamic stage of an incident. Finally, having properly staffed units responding should improve the accuracy of response time data utilized by the department.
- The city of Long Beach should give consideration to removing Heavy Rescue 232 from service. This unit is 20 years old and not really equipped as a heavy rescue. The rescue tools and equipment carried on it could easily be relocated to the city's two ladder companies. The city and fire department could realize moderate savings in this manner.
- The city of Long Beach should place a combination hydraulic rescue tool for light vehicle extraction on Engine 2343, operated by the career staff. This unit is staffed 24/7 and is generally the first due engine at accident scenes. Since it will be on scene either simultaneously with, or possibly even prior to, arrival of an ambulance on scenes of motor vehicle accidents it should have the necessary resources to gain access to and/or free trapped occupants. It is our strong belief that almost all motor vehicle accidents in Long Beach where the occupants are trapped could be effectively and efficiently mitigated with a basic hydraulic light-rescue tool on Engine 2343.
- The city of Long Beach should remove Floodlight Unit 233 from service. At 27 years old, with increasing maintenance issues and the fact that this type of apparatus is obsolete in the modern fire service, the city and fire department could reduce expenses by reducing the size of its apparatus fleet.

Staffing

As of January 2015, the LBFD has more than 100 active volunteer firefighters who serve the city. In addition, the LBFD has a paid contingency of full-time uniform firefighters who work an average of a 42-hour workweek. This schedule calls for the paid staff to work one 24-hour tour and then have three days off (72 hours) before returning for another 24-hour tour.

- *This shift schedule results in the firefighters working seven or eight days per month on one of four tours. This total decreases as career firefighters utilize their accrued sick/vacation/personal/compensatory time, thus resulting in overtime expenditures by the city.*

The full-time firefighters operate a fire engine company and an ambulance; the minimum staffing of the engine is three firefighters (one is a lieutenant supervisor) and two firefighters on the ambulance. The paid staff are available 24/7 at the headquarters fire station, and as such, respond to more than 90 percent of the requests for service with or without the volunteer contingency, depending on the severity of the incident or if multiple requests for service are received at or near the same time. One of the areas where the LBFD works best is when there is actually a fire, as the volunteer and paid personnel briefly act as a cohesive unit to extinguish the fire. The current configuration has worked well; the volunteers comprise the majority of the effective response for larger incidents to meet consensus standards on fireground activities.

Currently, there are 30 full-time firefighters distributed on the four shifts. In general, there are seven firefighters on each shift (a/k/a "tour"); however, there is currently no minimum manning agreement in place. A previous agreement between the city and the firefighters union expired in 2010. Under the terms of that expired agreement, at least five firefighters were assigned to each tour at all times. Regardless, the city has maintained staffing of (at least) five firefighters per tour, sometime more, since the expiration of the agreement.

There are generally two prevailing thoughts on how to provide 24-hours-per-day, 7–days-per-week coverage. The first method, constant staffing, is to hire the exact number of firefighters needed to fill the seats and then cover any time off (vacation, sick, personal leave, compensatory time) with overtime. The trade-off is that the department balances the cost of overtime at the premium rate against not paying benefits and retirement portion of extra employees' total compensation. Generally, the costs associated with this approach are similar or may produce moderate savings compared to hiring additional staff. However, employees generally don't like this approach because it causes a less predictable work schedule, resulting in increased absenteeism or difficulties with retention.

The second approach, continuous staffing, is a strategy whereby the department estimates the hours worked by each employee and then calculates the number of additional personnel needed to provide continuous coverage, with limited need for overtime.

For example*, the average time away from work in 2013 for the 30-member employee group was 322 hours, or just under two months*.[8] Therefore, the combination of working only seven or eight days per month and nearly two months of time away from scheduled workdays requires that the city hire 4.7 employees for every "seat" on a unit.[9] Following this methodology, if one of ICMA's recommended staffing models is adopted, the city should need 24 firefighters to continuously staff the five-person minimum (engine and ambulance), while maintaining the current shift schedule and providing 24/7 coverage.

Using another example, if the city were to negotiate a different work schedule of 24 hours on-duty and 48 hours off (one day on/two days off) with the same time-off experience as it now sees, the city would need 3.4 employees for every "seat." This would equate to 18 full-time positions for the

[8] Employee Leave Report. (2013). Provided by the city of Long Beach.
[9] D. Ammons. (2009). *Tools for decision making,* 2nd ed. (Washington, DC: CQ Press).

engine and the ambulance. However, as noted earlier, legal constraints limit the city's ability to create work schedules, which are established in the collective bargaining agreement between the paid staff and the City.

The ICMA team's observation is that the city has the ability to reduce staffing and still provide at least a comparable, and probably improved, level of service.

Alternative Staffing and Deployment

Two prevailing alternative staffing and deployment models surfaced during this operational analysis. The driving force behind these recommendations is the impact that the closing of the local hospital has had on operations. The other influencing factor is the city's necessity to find new efficiencies given past, inherited structural imbalances in the budget and the immense financial impact of Superstorm Sandy. Therefore, finding alternatives that improve the response capabilities of the EMS mission is at the core of these recommendations. The two alternatives are to: 1) civilianize the EMS program, and 2) develop a public-private partnership for EMS functions. Each of these recommendations are made with the foundation that two ambulances would be put in service for at least the peak demand periods and not compromise safety or capability.

Alternative 1 – Civilianizing the EMS Program

Rising employee compensation costs have encouraged many communities to reexamine the deployment strategy of using firefighters to provide what has become primarily an EMS mission. In Long Beach the vast majority of requests for service are for EMS. One strategy is a reduction in force/attrition of firefighter positions and replacing them with single-certification paramedics in non-uniform positions. This will result in enhanced medical treatment for residents, as currently only four career firefighters out of thirty possess paramedic certification.

This deployment strategy would require either eleven or twelve civilian employees depending on the shift schedule. For example, one strategy would be to have three 12-hour shift schedules with two platoons each requiring 12 employees. This would have one ambulance in service 24 hours a day 7 days a week and the other ambulance in service 12 hours a day 7 days a week to cover the peak demand periods. This would require twelve civilian employees to staff.

A slightly different strategy would be to have a 24/48-shift schedule for the 24/7 ambulance and then a 12-hour schedule with two platoons to cover the 12-hour peak period each day. This would require eleven civilian employees to staff.

With each of these staffing choices, it is recommended that the majority of the employees be certified paramedics and the remaining members be emergency medical technicians (EMTs). Also, in each of these models, ICMA recommends maintaining a minimum staffing of three firefighter personnel (two firefighters and one Lieutenant) on the fire engine. Keeping all current leave and workweek schedules constant with current practice, this would require twelve full-time firefighters. The total cost for this staffing and deployment alternative is estimated at approximately $3,020,348

to $3,047,364.[10] This would include $835,076 to $862,092[11] (eleven civilian paramedic employees) and $2,185,272 (twelve firefighters). The cost would increase by $75,916 to $78,371 for the model with twelve civilian paramedics. Factoring in a margin of error to account for unanticipated costs, the total estimated savings after implementation would be approximately $1,750,000 to $2,000,000 by 2016[12], with little change in the firefighting mission but with improved service in EMS. Changing from the current model of EMT responders to paramedics would represent a major upgrade, especially in light of the lingering uncertainty surrounding the fate of the hospital.

In other words, Alternative 1 offers pre-deployed ambulances, more ambulances in service, and higher certifications for emergency medical personnel operating the ambulances.

Alternative 2 – Development of a Public-Private Partnership for EMS

The second alternative is to enter into a performance-based contract with a high-quality EMS service provider, such as South Nassau Communities Hospital or Northshore-LIJ that stipulates service performance and capabilities. In this alternative the city could ensure high-quality services through a contractual relationship while avoiding the costs associated with an internally provided service. This alternative would also improve EMS delivery through the delivery with Paramedics and additional ambulances. Another advantage to the city with this proposal is that the larger regional providers can backfill ambulances into the community in real time as the demand for services change. It is a more efficient method of providing services that is based on demand.

ICMA would recommend that the city not enter into a cost-centered contract. In other words, the city should dictate the performance through a contractual relationship, but allow the provider to collect its own revenue from patient transportation services. In this way, the city does not incur any need to subsidize services if they are not cost neutral or profitable.

Similar to Alternative 1, ICMA recommends a minimum three-person fire engine staffing (two firefighters and one Lieutenant). The total cost for this alternative is entirely associated with the firefighting force's compensation at $2,185,272. The alternative would require 12 full-time firefighters. The estimated fire department savings to the city would be $3,314,728 per year. Overall savings may be less or neutral based on any subsidy the city may or may not be obligated to a future EMS private contract.

The greatest advantages to this proposal is that it would provide a state-of-the-art fleet of ambulances, which can be backfilled as needed (based on demand), and which are staffed by paramedics who are pre-deployed. This alternative would allow for the largest upgrade in EMS services for the City's residents. Furthermore, it allows the City to retain some of its firefighting experience. Finally, it provides the largest cost-savings to the City.

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[10] The estimates for these alternatives are for total compensation only, which includes salaries, all fringe benefits, and pension contributions.
[11] Civilian EMS compensation ranges are based on 5% to 25% employee health care contributions.
[12] Based on a total estimated fire department budget (total compensation only) and includes the SAFER grant maturation in December, 2014.

The major, and only impediment to this proposal is the language in the fire union contract which makes the paid unit the "primary" EMS responders. It is unknown whether the fire union would be willing to relinquish this designation, or whether the City has the legal authority to change this configuration unilaterally.

In each of these proposals, the city is able to continue to provide high-quality services, and potentially improve current service capabilities, while saving $1.75 to $3.3 million per year, dependent on the chosen alternative. These savings will help alleviate the ever-increasing demands on the general fund.

Recommendations:

- Because of the legal uncertainties existing by virtue of the union contract, the primary recommendation is for the city to adopt Alternative 1—civilianizing the EMS Program—as the first option. The ICMA study team believes that this method would result in improved service to residents, and would afford significant cost reductions.
- If however, the city elects not to adopt Alternative 1; it is recommended that the city attempt to implement Alternative 2—Development of a Public-Private Partnership for EMS. This alternative provides the greatest savings and distances the city from the financial liability associated with the delivery of EMS while assuring state-of-the-art service.

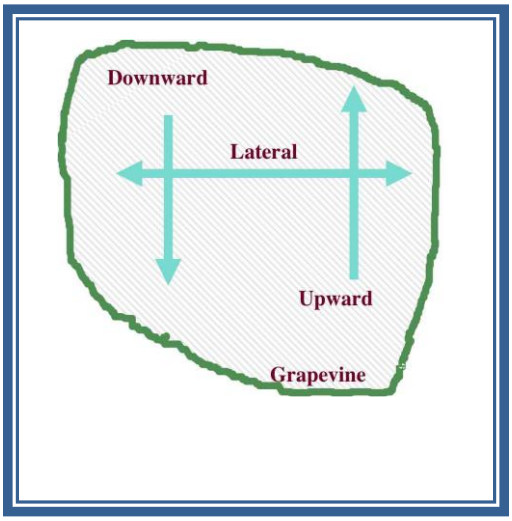
Organizational Communication

Communications in any organization is critical to its success, particularly an organization such as a fire department, in which work facilities are decentralized. The shift work schedule of rotating 24-hour shifts and a large volunteer firefighter base complicates communication. The inherent communication challenges and breakdowns throughout an organization that is decentralized, both vertically and laterally, often result in miscommunication (see Figure 3.) The lack of formal communication channels can feed communication through the "grapevine," in which most employees get their information from informal sources. This generates "fodder" for the rumor mill.

Despite the tremendous advances in communication and information technology, communication among people in organizations leaves much to be desired.[13] The importance of effective communication, established communication processes, and ongoing follow-up cannot be overstated. Developing a model that provides a consistent means for communication within and among various levels of the organization, and which encourages feedback that can be integrated into continuous improvement, supports a healthy organizational culture.

[13] See James L. Gibson, John M. Ivancevich, James H. Donnelly, and Robert Konopaske, *Organizations: Behavior, Structure, Processes*, 8th ed. (New York: Irwin/McGraw-Hill, 2002).

Figure 3: Communication Breakdown



ICMA found during the project analysis period that communication within the LBFD lacked efficiency and consistency. The ICMA study team believes that the organizational structure is insufficient to adequately account for the complexities required of a full-time firefighting staff, a large volunteer contingency, and 24-hour operations. While it is evident that the municipal code suggests that the organization is the Long Beach Fire Department and is comprised of the volunteers and the uniform staff, it was clearly evident to the ICMA team that the organization is fractured into two separate organizations and that the current communications may be detracting from service delivery.

Training and Standard Operating Guidelines/Procedures

The current organizational structure does not provide for a seamless oversight of training initiatives. While it is evident that all members, paid and volunteer are maintaining their state-required minimum training and recertification hours, there is not an organization-level approach to training. The volunteers have regularly scheduled trainings at their meetings and participate in the Nassau County Fire Academy programs. Historically, the paid staff does not participate in any cross-training opportunities, despite consistent offers to do so. However, while on-site, the ICMA team was able to observe live fire training at the Nassau County Fire Academy, and which reportedly included some paid staff. However, it is not clear whether paid staff routinely participate in this cross-training, which is typically expected of career firefighters. To some extent the volunteers tracked their personnel and the paid personnel were establishing a process for training accountability and records management with the placement of a new executive officer. However, the ICMA team found that executive officers have historically been challenged to make changes such as these, due to internal resistance from paid personnel. The executive officer's status as a member of the same union as his subordinates no doubt contributes to this problem. Once again, opportunities exist for LBFD leadership to approach decision making from an organizational level. Training records that were available were not easily accessible or searchable as customarily found with digitized systems.

The LBFD does not have a current or published document of standard operating guidelines/procedures. The lack of direction for both the paid and the volunteer firefighters contributes to the overall lack of organization-level direction and coordination. Additionally, the void of direction for high-risk activities, such as the fireground operations, may contribute to an increased risk for preventable injuries or line-of-duty deaths. The ICMA team suggests that the combination of lack of standard operating guidelines and incomplete training records may significantly increase the city's liability in the event of a line-of-duty tragedy.

Recommendations:

- The LBFD should immediately form a committee comprised of both career and volunteer personnel from all ranks within the department to begin the development of a comprehensive department training program to be adopted by the department. It is our recommendation that this committee be tasked with completing this project within one year.
- The LBFD should appoint a dedicated training officer who is responsible for coordinating all department training, developing training programs and lesson plans, and maintaining all training reports, records, and certifications.
- Since they are integrated operationally as a combination fire department, whenever possible the career and volunteer members of the department should be required to train together. This should include both routine training conducted within the city as well as advanced training conducted at places such as the Nassau County Fire Academy.
- The career firefighters should be required to complete a minimum of one hour (two would be preferable) of training each duty day.
- The LBFD needs to make the development of a comprehensive database of training records a high priority. This database should include a detailed record of all training, both internal and external, completed by all members of the department. It should also, at a minimum, include any certifications held along with their current expiration date. The database should be user friendly and easily searchable.

  In addition, the department should develop a training file for each member of the department. This file should contain records of training completed by the member, copies of course completion certificates, copies of current certifications such as EMT or paramedic, and any other training-related records.

- The LBFD should immediately form a committee comprised of both career and volunteer personnel from all ranks within the department to begin the development of a comprehensive standard operating procedures/guidelines manual to be adopted by the department. It is our recommendation that this committee be tasked with completing this project within one year.

Fire Prevention

The city building department has the primary responsibility for fire inspections, plans review, and permitting. The LBFD does not actively participate in fire prevention activities. *The analysis of the career engine workload reveals that it is on calls for approximately one and one-half hours per 24-hour tour*. Therefore, opportunities exist to more fully utilize the paid on-duty staff for non-firefighting duties and training activities. This situation is also an indication that a reduction of force may help or enhance operational efficiencies and reduce costs for the city.

Recommendations:

- The city of Long Beach should give consideration to involving the on-duty career staff in fire prevention activities through the development of an in-service inspection program. Appropriate training and/or certification of personnel would need to be addressed.
- The LBFD should implement a prefire planning program utilizing the career firefighters for the purpose of developing pre-incident plans on all commercial and target hazard occupancies located within the city.

Fiscal Resources

Funding of traditional government functions such as the provision of fire and EMS services requires an appropriate balance of needs, requests, future growth, and community vitality versus available annual or borrowed funding resources. The city of Long Beach began a process of restoring structural balance to the city's budget in 2012. Moody's rating agency has complimented the city's management for stabilizing the city's financial position. However, the city is in the process of paying down a $10 million deficit reduction surcharge.[14] This is in addition to the reported $200 million in damages that the city sustained as a result of Superstorm Sandy. The overall strategy is to maximize efficiencies in city operations, utilizing fiscally responsible budgeting without sacrificing the high quality of services that Long Beach residents have come to expect.[15]

The career unit has anticipated costs of $5.5 million in the 2014/15 fiscal year. The vast majority of the budget is associated with personal services.

Revenue

The fire department is supported through the city's general fund. In addition, revenue is generated through the ambulance transportation services which the City collects, and sends out for collection. The city has outsourced the ambulance billing functions to MultiMed, which returned $882,002 to the city in FY 11/12. The FY 13/14 revenue budget was $820,565. If EMS were considered a stand-alone program area, this revenue would be insufficient to cover the expenditures required by an amount ranging from $688,954 to $756,952 per year at the optimal continuous staffing multiplier. By way of comparison, the expenditures for employee total compensation utilized from the recent

[14] City of Long Beach. (2013). *Proposed annual budget; fiscal year 2013/2014*.
[15] Ibid.

two-year SAFER grant of $910,530 for just five employees yielded an estimated average total compensation of $91,053 annually, for brand new employees. These estimates are conservative as these expenditures only include labor costs.

The department transported approximately 2,057 patients in calendar year 2013, with an average collection ranging from $429 to $462 per trip. The costs of all billing activities are not clearly identified in the budget spreadsheet. Typically, outsourcing billing and collections activity is a preferred option for most government entities due to the complexity of the operations and the potential negative public relations of debt collection. As noted above, the city currently uses a billing service to bill patients, and, when necessary, sends overdue accounts out for collection.

Expenditures

Consistent with other labor-intensive public safety missions, the city's fire department expenditures are heavily weighted and devoted primarily toward personnel costs at approximately $5 million to $5.5 million annually for active members, and former members who now receive disability pensions from the City. This accounts for nearly 90 percent of total expenditures; all other (nonpersonnel) costs are accounted for in the remaining 10 percent of expenditures. Although there are many line item descriptions to account for these expenditures, they are not allocated to specific programs or activities, which significantly limit the ability to conduct analyses for cost/benefit or to measure the effectiveness or efficiency of any specific program activity. For example, the salaries and wages line item is not delineated between the revenue-generating patient transportation program and the fire suppression program. In addition, the expenditures for the LBFD do detail the salaries of department personnel but the costs associated with retirement and other benefits are lost in an aggregate cost center elsewhere in the budget. The city does not use a program budget or performance-based budget process at this time.

Given the city's desire to maximize efficiencies and control costs moving forward, the ICMA team identified a significant cost that will impact the fire department budget. On November 30, 2012, the city of Long Beach and the LBFD were awarded a SAFER grant to rehire previously laid-off firefighters. The grant period is for two years, with grant revenue of $910,530 to cover the costs of the rehiring of five firefighters.[16] Therefore, beginning December 1, 2014, the city is faced with this possible added expense, thus increasing the demand on the general fund by these amounts and more, after contractual step increases are factored in. In other words, to avoid this expense, aggressive strategies will have to be vetted in order to overcome the cost neutrality associated with the SAFER personnel. ICMA's alternative staffing models will provide assistance in this regard.

[16] SAFER Grant Awards. (2012). FEMA. Retrieved March 14, 2014 from http://www.fema.gov/safer-award-year-2012

Assessment and Planning

Strategic Planning/Goals and Objectives

The development of a long-range fire protection and prevention comprehensive strategic plan involves three key steps. The first step is to generate an assumption of what the community will look like at the end of the planning process. Second, the department needs to assess realistically the strengths and weaknesses of the existing fire protection system to include codes, standards, and ordinances relating to fire prevention efforts, public safety education programs, and emergency response capability. The third and final step is to project the needed capabilities and capacity of the fire protection system and its fire department component as the community changes.[17] This process helps to ensure that an adequate level of resources, including staffing and equipment, are allocated to meet the community's needs for the services delivered by the fire department as efficiently as possible. A strategic plan also assists the department in matching resources with available revenues.

Defining clear goals and objectives for any organization through a formal strategic planning document establishes a resource that any member of the organization, or those external to the organization, can view and determine in what direction the organization is heading, and as well how the organization is planning to get there.

In a strategic plan, it is essential that clear and achievable goals and objectives for each program area be developed. Each program area must then (1) define its goals; (2) translate the goals into measurable indicators of goal achievement; (3) collect data on the indicators for those who have utilized the program; and (4) compare the data on program participants and controls in terms of goal criteria. Objectives should be SMART, an acronym that stands for **s**pecific, **m**easurable, **a**mbitious/**a**ttainable, **r**ealistic, and **t**ime-bound. Additionally, these goals should link back to fiscal planning goals.

The LBFD does not have a departmental comprehensive strategic plan that focuses on the future, provides clear departmental direction, and defines resources that support the strategy for fire protection and EMS service deliverables. Figure 4 illustrates a basic strategic planning model.

Recommendations:

- As soon as possible the LBFD should begin a long-range strategic planning process. The city and department should assemble a committee for this purpose that includes a diverse cross-section of the department's internal and external stakeholders. Once completed, the initial strategic plan should be formally adopted by the city. It should then be reviewed, revised, and updated as necessary and on a periodic basis.

Risk Assessment and Risk Management Planning

Fire departments should conduct a community risk analysis within their communities for use in the comprehensive planning process. This assessment process will assist in determining the resources

[17] Grover Starling. (2010). *Managing the Public Sector* (Cengage Learning), 287.

and assets needed to accomplish the department's core mission functions. Deciding how many emergency response resources to deploy, and where, is not always an exact science. There are many factors that affect the final decisions on where and when to expand or contract these services. The final decision on a deployment model is based on a combination of risk analysis, the demand for services, capacity within the current service delivery model, professional judgment, and the governing body's willingness to accept more or less public-safety risk, based on available revenues.

Figure 4: Basic Strategic Planning Model

A community-based risk assessment is an analytical process of identifying and quantifying key factors within the community, that when combined, define risk in a way that can be compared to the LBFD's response capability. These key factors include historical incident analysis; identification of general and specific hazards; identification of community values and their relationship to departmental expectations; and potential severity, consequence, and frequency of certain events. It is this comparison that can provide a valuable strategic planning and resource deployment tool for the Long Beach Fire Department.

A critical step in the risk assessment process is to identify and categorize the types of risk that may occur within the area served. Once risk categories are identified, resources can be deployed to match the risk in the best possible manner. According to a National Fire Protection Association (NFPA) paper on assessing community vulnerability, fire department operational performance is a function of three considerations: resource availability/reliability, department capability, and operational effectiveness.[18] These elements can be further defined as:

[18] Fire Service Deployment, Assessing Community Vulnerability: From http://www.nfpa.org/assets/files/pdf/urbanfirevulnerability.pdf.

Resource availability/reliability: The degree to which the resources are ready and available to respond.

Department capability: The ability of the resources deployed to manage an incident.

Operational effectiveness: The product of availability and capability. It is the outcome achieved by the deployed resources or a measure of the ability to match resources deployed to the risk level to which they are responding.[19]

The community risk and vulnerability assessment evaluates the community as a whole, and with regard to property, measures all property and the risk associated with that property and then segregates the property as either a high, medium, or low hazard. According to the NFPA *Fire Protection Handbook*, these hazards are defined as:

High-hazard occupancies: Schools, hospitals, nursing homes, explosive plants, refineries, high-rise buildings, and other high life-hazard or large fire-potential occupancies.

Medium-hazard occupancies: Apartments, offices, and mercantile and industrial occupancies not normally requiring extensive rescue by firefighting forces.

Low-hazard occupancies: One-, two-, or three-family dwellings and scattered small business and industrial occupancies. [20]

Linking a fire department's operational performance functionality to the community risk and vulnerability assessment further assists' fire personnel in the planning process by increasing their understanding of the community risk with regard to property and life-hazard potential. Through plotting the rated properties on a map, planners can better understand how current and future fire station locations and resource capabilities relate to specific risks and vulnerabilities, and then can identify potential gaps in service delivery. In combination with response run cards and staffing patterns, the analysis can help agencies shift resources from areas at less risk to concentrate more resources where there is a greater likelihood of incidents.[21] The community risk assessment may also include determining and defining the differences in risk between a detached single-family dwelling, a multifamily dwelling, an industrial building, and a high-rise building by placing each in a separate category.

In addition to examining community risk and vulnerability, the LBFD should examine internal risk and vulnerability. Risk assessment and vulnerability analysis are not new to the fire service, as the NFPA 1500 *Standard for a Fire Department Occupational Safety and Health Program* document requires the development of a separate risk management plan for fire departments aside from the risk management plan in a local government plan.[22]

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[19] Cote, Grant, Hall & Solomon, eds., *Fire Protection Handbook* (Quincy, MA: NFPA 2008), 12.
[20] National Fire Service Data Summit Proceedings, U.S. Department of Commerce, NIST Tech Note 1698, May 2011.
[21] *Fire and Emergency Service Self-Assessment Manual*, Eighth Edition, (Center for Public Safety Excellence, 2009), 49.
[22] Robert C. Barr and John M. Eversole, eds., *The Fire Chief's Handbook, Sixth Edition* (Tulsa, OK: PennWell) 270.

In order for this process to be effective, the following components must be included in the risk management plan:

Risk identification: Actual or potential hazards.

Risk evaluation: The potential for occurrence of a given hazard and the severity of its consequences.

Prioritizing risk: The degree of hazard based upon the frequency and severity of occurrence.

Risk control: Solutions for eliminating or reducing real or potential hazards by implementing an effective control measure.

Risk monitoring: Evaluation of effectiveness of risk control measures.[23]

The risk management plan establishes a standard of safety for daily operations. This standard of safety establishes the parameters within which the department should conduct all activities during emergency and nonemergency operations. The intent is for all members to operate within this standard or plan of safety and not deviate from this process.

Recommendations:

- The LBFD should form a committee comprised of both career and volunteer personnel from all ranks within the department to begin the development of a comprehensive risk management plan and program to be adopted by the department. It is our recommendation that this committee be tasked with completing this project within one year.

Standards of Cover

The Standards of Cover (SOC) plan concept was developed with the purpose of defining the appropriate level of fire services based on a comprehensive study and benchmarking. It combines a fire department's historical performance, deployment strategies, and community fire and other risk and vulnerability in order to determine the capability and effectiveness of the department's response system.

An issue the fire service has grappled with is defining a consistent level of service to the varying risks it is confronted with. It is essential to determine whether a fire agency is prepared to provide a level of service commensurate with its responsibilities, risks, and adopted service level objectives. The National Fire Protection Association (NFPA) developed and promulgated a consensus deployment standard that was successfully adopted as NFPA 1720, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments.* This national consensus deployment

[23] NFPA 1500, *Standard for a Fire Department Occupational Safety and Health Program, Annex D*, 2007 Edition.

standard,[24] which also covers "combination" departments such as the LBFD, does not, however, recognize each and every local issue, condition, service demand, and community need.,

ICMA supports the alternative staffing models discussed above. Nevertheless, following implementation, the city should still look to develop a Standards of Cover (SOC) plan to help fine-tune staffing protocols. Generally, SOC plans set guidelines for staffing and deployment of resources, measured and benchmarked against national standards, community expectations, and outcome goals, and should be realistic and sustainable for the community. Further, the SOC document is designed to provide comprehensive information for decision makers regarding an acceptable level of service and service level goals for fire, EMS, and other all-hazards emergency responses.

The LBFD currently has no documented Standards of Cover plan.

Recommendations:

- The LBFD should form a committee comprised of both career and volunteer personnel from all ranks within the department (and other stakeholders as well particularly from the governing body who have to determine the acceptable level of risk, or conversely, the level of protection, the community can afford) to begin the development of a Standards of Cover plan to be adopted by the department. It is our recommendation that this committee be tasked with completing this project within one year.

Performance Measurement

Fire safety and prevention programs need to be planned and managed to achieve specific, agreed-upon results. This requires establishing intended results and a set of goals for the activities of any given program to achieve these results. Determining how well an organization or program is doing requires that these goals be measurable and that they are measured against desired results. This is the goal of performance measurement.

Simply defined, performance measurement is the ongoing monitoring and reporting of progress toward pre-established goals. It captures data about programs, activities, and processes, and displays data in standardized ways that help communicate to service providers, customers, and other stakeholders how well the agency is performing in key areas. Performance measurement provides organizations with tools to assess performance and identify areas in need of improvement. In short, what gets measured gets done.

The need to continually assess performance requires adding new words and definitions to the fire service lexicon. Fire administrators need to be familiar with the different tools available and the consequences of their use. In *Managing the Public Sector*, business professor Grover Starling applies the principles of performance measurement to the public sector. He writes that the consequences to be considered for any given program include:

[24] NFPA 1720, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments*, 2010 Edition.

Administrative feasibility: How difficult will it be to set up and operate the program?

Effectiveness: Does the program produce the intended effect in the specified time? Does it reach the intended target group?

Efficiency: How do the benefits compare with the costs?

Equity: Are the benefits distributed equitably with respect to region, income, gender, ethnicity, age, and so forth?

Political feasibility: Will the program attract and maintain key actors with a stake in the program area?[25]

Performance measurement systems vary significantly among different types of public agencies and programs. Some systems focus primarily on efficiency and productivity within work units, whereas others are designed to monitor outcomes produced by major public programs. Still others track the quality of services provided by an agency and the extent to which citizens are satisfied with these services.

Within the fire service, performance measures tend to focus on inputs (the amount of money and resources spent on a given program or activity) and short-term outputs (the number of fires in the community, for instance). One of the goals of any performance measurement system should be also to include efficiency and cost-effective indicators, as well as explanatory information on how these measures should be interpreted. The types of performance measures are shown in Table 1.

One of the most important elements of performance measurement within the fire service is to describe service delivery performance in a way that both citizens and those providing the service have the same understanding. The customer will ask, "Did I get what I expected?" The service provider will ask, "Did I provide what was expected?" Ensuring that the answer to both questions is "yes" requires alignment of these expectations and the use of understandable terms. The author of the "Leadership" chapter of the 2012 edition of ICMA's *Managing Fire and Emergency Services* "Green Book" explains how jargon can get in the way:

> Too often, fire service performance measures are created by internal customers and laden with jargon that external customers do not understand. For example, the traditional fire service has a difficult time getting the public to understand the implications of the "time temperature curve" or the value of particular levels of staffing in the suppression of fires. Fire and emergency service providers need to be able to describe performance in a way that is clear to customers, both internal and external. In the end, simpler descriptions are usually better.[26]

[25] Starling, *Managing the Public Sector*, 396.
[26] I. David Daniels, "Leading and Managing," in *Managing Fire and Emergency Services* (Washington, DC: 2012), 202.

Table 1: GASB Performance Indicators

Category	Definition
Input indicators	These are designed to report the amount of resources, either financial or other (especially personnel), that have been used for a specific service or program.
Output indicators	These report the number of units produced or the services provided by a service or program.
Outcome indicators	These are designed to report the results (including quality) of the service.
Efficiency (and cost-effectiveness) indicators	These are defined as indicators that measure the cost (whether in dollars or employee hours) per unit of output or outcome.
Explanatory information	This includes a variety of information about the environment and other factors that might affect an organization's performance.

From Harry P. Hatry et al., eds. *Service Efforts and Accomplishments Reporting: Its Time Has Come* (Norwalk, CT: GASB, 1990).

The LBFD collects and reports typical fire department data on response times and incident responses. However, these data sources only capture the performance of the first arriving unit, limiting the department's intuitive ability to adequately describe the full scope of performance. These statistics, although reflecting typical workload measures seen among fire service organizations today, should link department goals to specific target rates or percentages if they are to be used to justify program budgets and service delivery levels.

To accomplish this linkage, other forms of performance measures, particularly service-quality and customer-satisfaction measures, should be incorporated into the system. Staff throughout the organization should participate in developing performance measures. In addition to helping facilitate departmentwide buy-in, this could provide an opportunity for upper management to better understand what the line staff believes to be critical goals—and vice versa. For the same reason, the process of developing performance measures should include citizen input.

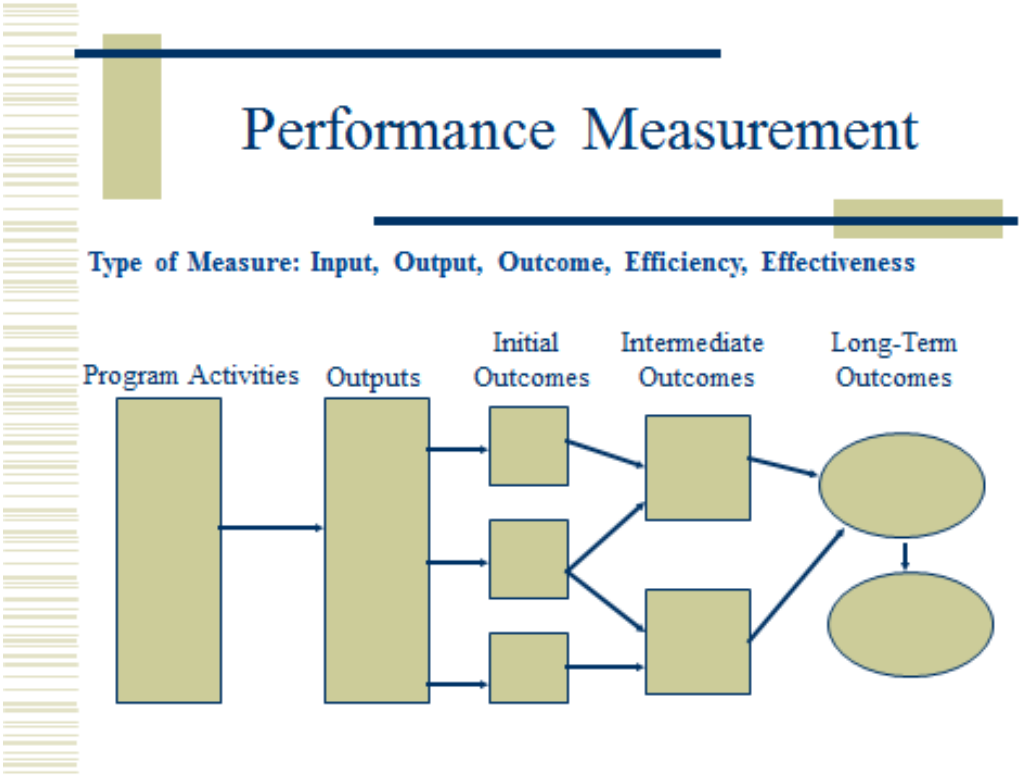
Establishing a performance management system within the framework of an overall strategic plan would help city management and elected officials gain a better understanding of what the LBFD is trying to achieve. Building any successful performance management system that measures more than outputs requires a consistent model. Figure 5 illustrates a successful program logic model[27] designed to build consistent performance measures and should be linked to the Table 1 performance measure indicators.

[27] Shows the logic by which program activities are expected to lead to targeted outcomes. (Theodore Poister, *Measuring Performance in Public and Nonprofit Organizations*. (2003). (San Francisco, CA: Jossey-Bass). 35.

Program logic component definitions:

- Type of Measure: identify the type of indicator to be measured.
- Program Activities: the provision of services provided by this program area.
- Outputs: the results of or how much is produced from the program activities.
- Initial/Intermediate Outcomes: substantive changes/improvements/benefits of the program as measured against the program goal.
- Long-term Outcomes: satisfy the stated *Goal*—links to the Budget/Strategic Plan.

Figure 5: Performance Measure Program Logic Model[28]



Medical Direction and Protocols

The LBFD follows protocols that are approved by the Nassau Regional Emergency Medical Services Council and the New York State Department of Health. The Nassau Regional EMS Council was established in 1993 by an act of the New York State Legislature. The council consists of 30 members that reside in the county of Nassau. The members of the committee consist in percentage terms of 33 percent active EMS providers, 33 percent hospital-based professionals, and 33 percent representatives of other system components such as emergency communications and disaster

[28] Poister, *Measuring Performance in Public and Nonprofit Organizations*, 44.

management.[29] The LBFD has an opportunity to influence protocols and standing orders through participation on the EMS council.

Quality Assurance (QA) / Quality Improvement (QI)

In EMS, quality assurance (QA) utilizes a historical review of services rendered and identifies areas that are not meeting expectation.[30] Quality improvement (QI) is a process of continuous study, evaluation, and improvement in the system of services delivered.[31] As previously discussed, the Long Beach Fire Department's use of performance measures to drive managerial decision-making or quality is limited. However, the agency does employ aspects of quality assurance in its operation to ensure personnel are meeting expectations in EMS patient care report writing, seminal events, and invasive skills. The QA/QI program is poorly developed and consists of patient care record reviews for completeness and accuracy each day by one of the two assigned lieutenants. The level of scrutiny of the quality of care is not fully developed and depends on the officer of the day. In addition, when the volunteer ambulance responds to a concurrent call for service, there is no oversight on the report writing. The inconsistency in quality control may have a negative effect on billing success that will ultimately impact the ambulance transport revenue. This fractured approach to organization level services is a symptom of a greater failure of the organization structure and culture between the paid and volunteer staff.

In fire suppression, the QA and QI processes should be similar in theoretical design. However, an analysis of the actions taken reports from the records management system, the National Fire Incident Reporting System (NFIRS), revealed a high degree of complacency in report writing. In addition, there is strong evidence to support the notion that the LBFD's organizational structure and management strategy is failing to provide oversight for organizational level initiatives such as quality control in fire report writing. For example, of the 37 structure fire calls in the calendar year 2013, 19 of the fire reports (51 percent of calls) had missing data. Of the 31 outside fire calls in the same calendar year, 26 of the fire reports (83 percent of calls) had missing data. In other words, 66 percent of all of the fire reports had missing data. A summary is provided in Table 2.

[29] Nassau Regional Emergency Medical Services Council. Retrieved March 14, 2014 from http://nassauems.org/council.html

[30] G. Laffel and D. Blumenthal. (1989). The case for using industrial quality management science in health care organizations. *JAMA,* 262(20), 2869-2873.

[31] D.M. Berwick. (1989). Continuous improvement as an ideal in health care. *The New England Journal of Medicine,* 320(1), 53-56.

Table 2: LBFD Actions Taken Analysis for Structure and Outside Fire Calls, 2013

Action Taken	Number of Calls	
	Structure fire	Outside fire
Fire control or extinguishment, other	1	0
Extinguishment by fire service personnel	3	1
Salvage & overhaul	2	0
Ventilate	4	3
Forcible entry	1	0
Evacuate area	1	0
Restore fire alarm system	2	0
Shut down system	2	0
Secure property	0	1
Provide information to public or media	1	0
Investigate	1	0
Missing data	**19**	**26**
Total	**37**	**31**

Programs

Operational Response and Workload

Operational Category Call Type

The Long Beach Fire Department (LBFD) operates as first responders for both fire suppression and emergency medical services, and also operates ambulance transport units. In this report, each citizen-initiated emergency service request is defined as a call. During the year studied, LBFD responded to 4,201 calls. Of these, 37 were structure fire calls and 31 were outside fire calls. Each dispatched unit is a separate "run." As multiple units are often dispatched to a call, there are more runs than calls. The department's total runs and workload are reported in the data section of this report.

Table 3: Call Types

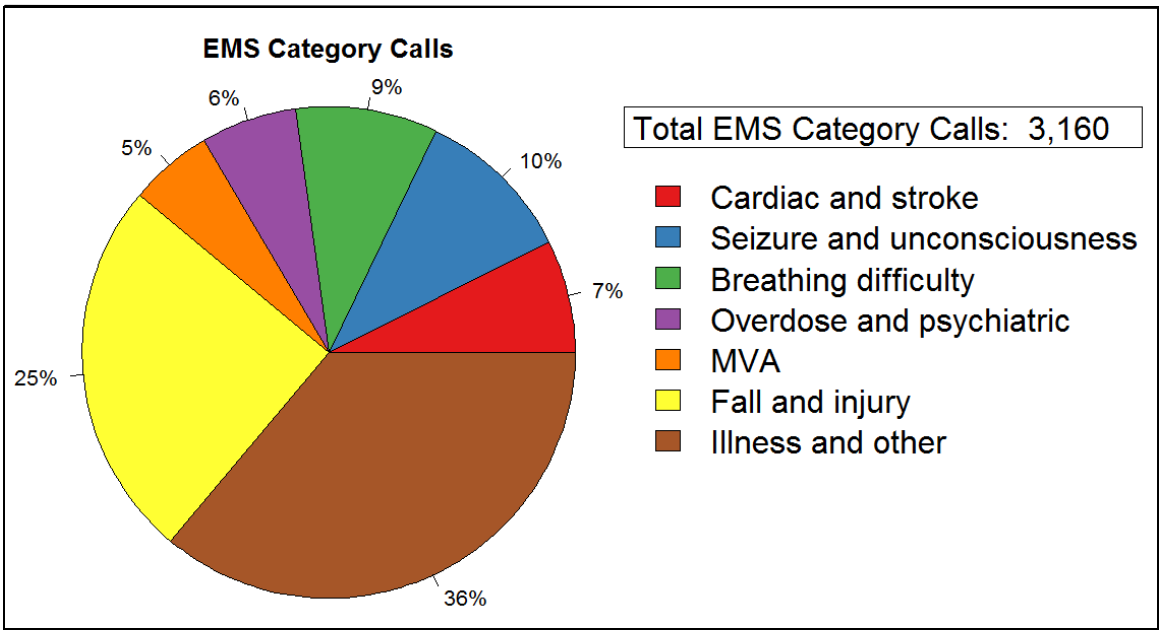
Call Type	Number of Calls	Calls per Day	Call Percentage
Cardiac and stroke	235	0.6	5.6
Seizure and unconsciousness	328	0.9	7.8
Breathing difficulty	295	0.8	7.0
Overdose and psychiatric	199	0.5	4.7
MVA	173	0.5	4.1
Fall and injury	790	2.2	18.8
Illness and other	1,140	3.1	27.1
EMS Total	**3,160**	**8.7**	**75.2**
Structure fire	37	0.1	0.9
Outside fire	31	0.1	0.7
Hazard	239	0.7	5.7
False alarm	450	1.2	10.7
Good intent	62	0.2	1.5
Public service	160	0.4	3.8
Fire Total	**979**	**2.7**	**23.3**
Mutual aid	24	0.1	0.6
Canceled	38	0.1	0.9
Total	**4,201**	**11.5**	**100.0**

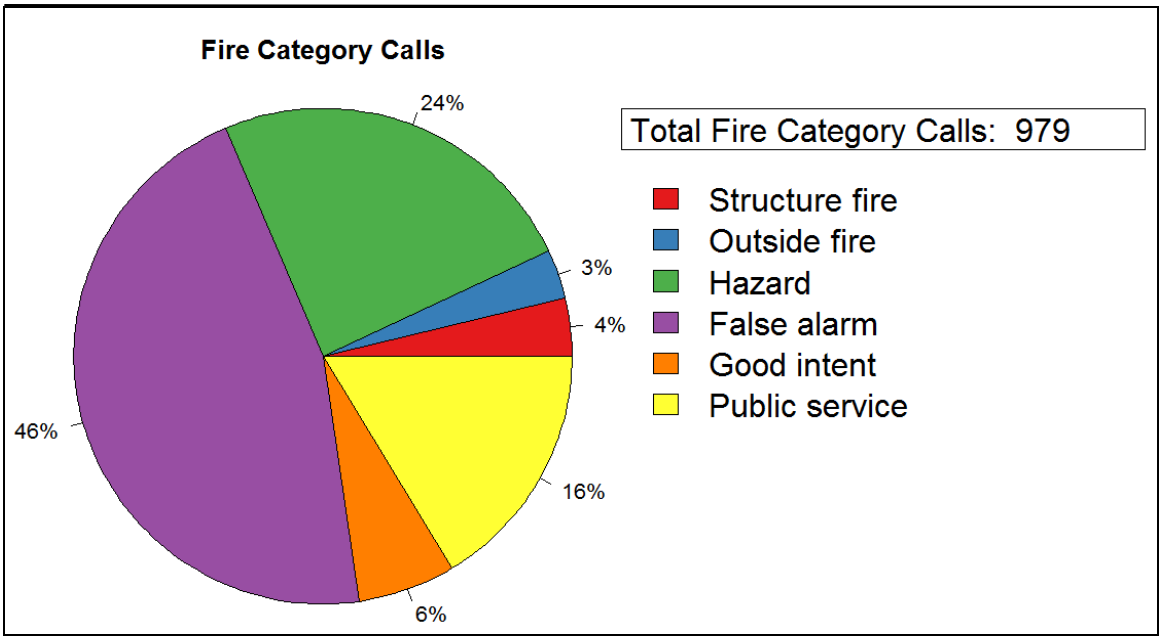
Observations:

- The department received 11.5 calls per day.
- EMS calls for the year totaled 3,160 (75 percent of all calls), averaging 8.7 per day.
- Fire calls for the year totaled 979 (23 percent of all calls), averaging 2.7 per day.

- Structure and outside fires combined for a total of 68 calls during the year, averaging one call every 5.4 days.

Figure 6: EMS and Fire Calls by Type

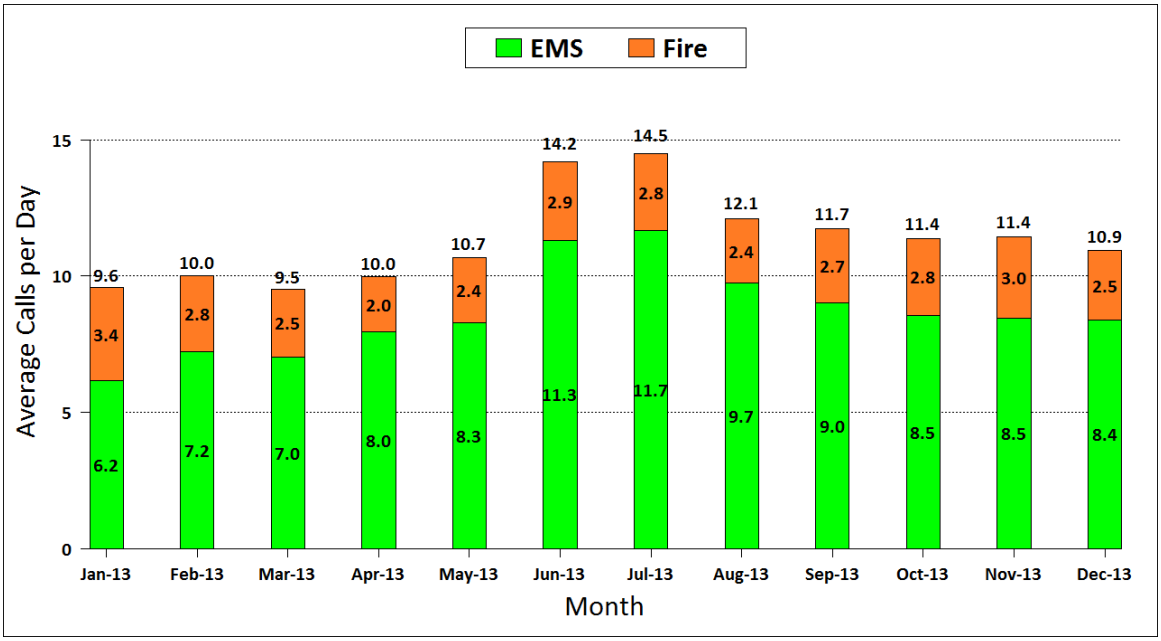




Observations:

- This analysis identifies that the total demand for actual "fire" related responses is only 7 percent of the total call volume.
- Conversely, requests for service for EMS accounted for 75% of the total call volume. As a matter of efficiency, opportunities may exist to better align personnel by service area.
- A total of 37 structure fire calls accounted for 4 percent of the fire category total.
- A total of 31 outside fire calls accounted for 3 percent of the fire category total.
- False alarm calls were the largest fire call category and made up 46 percent of the fire category total. With this large of a percentage of calls for false alarms, we would expect to see a greater false alarm revenue stream. In addition, opportunities may exist to handle this type of risk with an alternative deployment strategy.
- Illness and other calls were the largest EMS call category, accounting for 36 percent of the EMS category total.
- Cardiac or stroke calls were 7 percent of the EMS category total.
- Motor vehicle accident calls were 5 percent of the EMS category total.

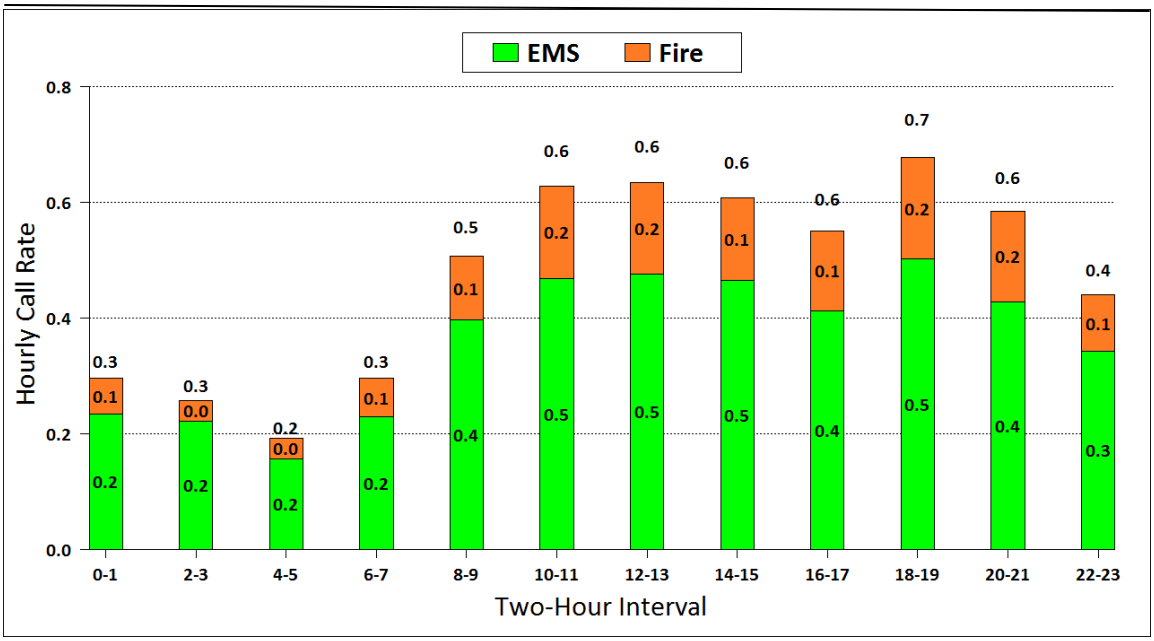
Figure 7: Average Calls per Day, by Month



Observations:

- The demand for services by month confirms the seasonal impact on EMS calls.
- The fire-related call volume didn't change due to the seasonal population.
- Therefore, the data support the conclusion that additional EMS resources may be needed to handle the summer call volume. Opportunities for alternative deployment strategies may exist.
- Average calls per day ranged from a low of 9.5 calls per day in March 2013 to a high of 14.5 calls per day in July 2013. The highest monthly average was 52 percent greater than the lowest monthly average.
- Average EMS calls per day ranged from a low of 6.2 calls per day in January 2013 to a high of 11.7 calls per day in July 2013. The highest monthly average was 89 percent greater than the lowest monthly average.
- Average fire calls per day ranged from a low of 2.0 calls per day in April 2013 to a high of 3.4 calls per day in January 2013.

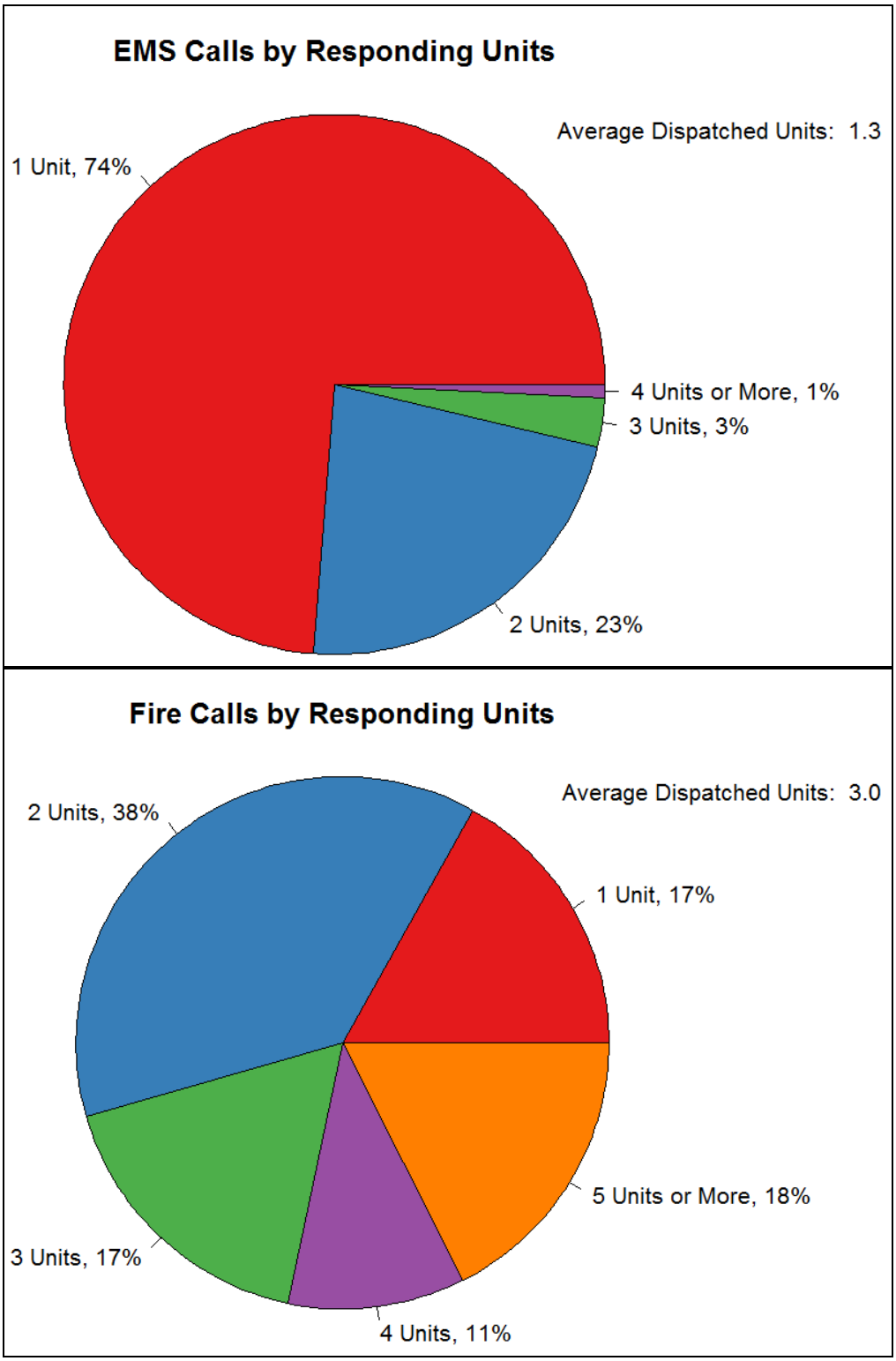
Figure 8: Calls by Hour of Day



Observations:

- The demand for services by hour of day suggests that the utilization of peak load, or demand-based, staffing may be a successful strategy for the EMS mission.
- Hourly call rates averaged between 0.19 calls and 0.68 calls per hour.
- Call rates were highest during the day between 8:00 a.m. and 10:00 p.m., averaging between 0.51 and 0.68 calls per hour. The rate peaked between 6:00 p.m. and 8:00 p.m., at an average of 0.68 calls per hour.
- Call rates were lowest between midnight and 8:00 a.m., averaging between 0.19 and 0.30 calls per hour.

Figure 9: Number of Units Dispatched to Calls



Observations:

- For structure fire calls, the volunteer personnel made up the effective response force for 97% of the calls.
- The deployment strategy that includes a second unit brings the reliability up to greater than 90% of the time that the deployment strategy meets the demand for EMS services.
- When referring to the Fire Calls portion in the Number of Units figure, above, this suggests that the paid contingency (first two units) responded to and handled 55% of the requests for service.
- It also demonstrates that 45 percent of the time the volunteers were needed and responded on calls.
- Overall, five or more units were dispatched to 4 percent of calls.
- On average, 3.0 units were dispatched per fire category call.
- For fire category calls, one unit was dispatched 17 percent of the time, two units were dispatched 38 percent of the time, three units were dispatched 17 percent of the time, four units were dispatched 11 percent of the time, and five or more units were dispatched 18 percent of the time.
- For structure fire calls, two units was dispatched once, three units were dispatched 16 percent of the time, four units were dispatched 24 percent of the time, and five or more units were dispatched 57 percent of the time.
    - For outside fire calls, one unit was dispatched 16 percent of the time, two units were dispatched 29 percent of the time, three units were dispatched 19 percent of the time, four units were dispatched 10 percent of the time, and five or more units were dispatched 26 percent of the time.
    - For EMS category calls, one unit was dispatched 74 percent of the time, two units were dispatched 23 percent of the time, three units were dispatched 3 percent of the time, four units were dispatched 1 percent of the time, and five or more units were dispatched 0 percent of the time.

TABLE 4: Annual Deployed Time by Call Type

Call Type	Average Deployed Minutes per Run	Annual Hours	Percent of Total Hours	Deployed Hours per Day	Annual Number of Runs	Runs per Day
Cardiac and stroke	47.5	245	6.9	0.7	310	0.8
Seizure and unconsciousness	37.1	289	8.1	0.8	468	1.3
Breathing difficulty	45.6	274	7.7	0.8	361	1.0
Overdose and psychiatric	41.6	172	4.8	0.5	248	0.7
MVA	25.2	169	4.8	0.5	404	1.1
Fall and injury	35.0	545	15.3	1.5	934	2.6
Illness and other	39.1	925	26.0	2.5	1,419	3.9
EMS Total	**37.9**	**2,620**	**73.7**	**7.2**	**4,144**	**11.4**
Structure fire	40.5	134	3.8	0.4	199	0.5
Outside fire	18.3	33	0.9	0.1	107	0.3
Hazard	19.6	224	6.3	0.6	683	1.9
False alarm	13.5	296	8.3	0.8	1,317	3.6
Good intent	16.1	46	1.3	0.1	171	0.5
Public service	22.7	159	4.5	0.4	420	1.2
Fire Total	**18.5**	**891**	**25.1**	**2.4**	**2,897**	**7.9**
Mutual aid	33.7	27	0.8	0.1	48	0.1
Canceled	14.1	19	0.5	0.1	81	0.2
Total	**29.8**	**3,557**	**100**	**9.7**	**7,170**	**19.6**

Note: Each dispatched unit is a separate "run." As multiple units are dispatched to a call, there are more runs than calls. Therefore, the department responded to 11.5 calls per day and had 19.6 runs per day.

Observations:

- Total deployed time for the year, or deployed hours, was 3,557 hours. This is the total deployment time of all the units deployed on all type of calls, including 27 hours spent on mutual aid. The deployed hours for all units combined averaged approximately 9.7 hours per day.
- There were 7,170 runs, including 48 runs dispatched for mutual aid calls. The daily average was 19.6 runs for all units combined.
- Fire category calls accounted for 25.1 percent of the total workload.
- There were 306 runs for structure and outside fire calls, with a total workload of 167 hours. This accounted for 4.7 percent of the total workload. The average deployed time for structure fire calls was 40.5 minutes, and the average deployed time for outside fire calls was 18.3 minutes.
- EMS calls accounted for 74 percent of the total workload. The average deployed time for EMS calls was 37.9 minutes. The deployed hours for all units dispatched to EMS calls averaged 7.2 hours per day.

In this section, the actual time spent by each unit on calls is reported in two types of statistics: workload and runs. A dispatch of a unit is defined as a *run*; thus one call might include multiple runs. The deployed time of a run is from the time a unit is dispatched through the time a unit is cleared.

Table 4: Call Workload by Unit

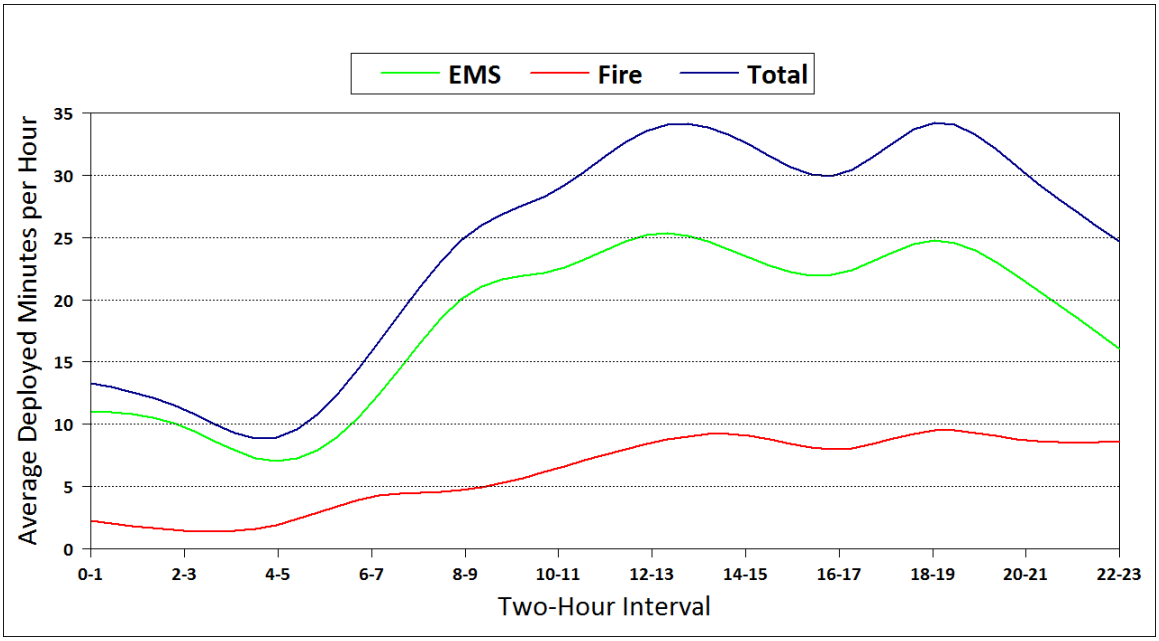
Station	Full-time or Volunteer	Unit Type	Unit ID	Average Deployed Minutes per Run	Annual Number of Runs	Annual Hours	Runs per Day	Deployed Hours per Day
HQ	Full-time	Ambulance	2319	37.2	3,215	1,995.4	8.8	5.5
	Full-time	Engine	2343	18.6	1,776	549.4	4.9	1.5
	Volunteer	Ambulance	2321	42.6	501	355.3	1.4	1.0
	Both	Ambulance	2322	34.3	191	109.3	0.5	0.3
	Volunteer	Engine	2344	22.6	219	82.5	0.6	0.2
	Volunteer	Ladder	2362	20.8	157	54.4	0.4	0.1
	Volunteer	Heavy Rescue	232	33.5	40	22.3	NA	NA
	Full-time	Command Officer	238	3.9	1	0.1	NA	NA
	Volunteer	Water Rescue	2395	20.8	24	8.3	NA	NA
	Volunteer	Jet Ski	2399	24.3	11	4.5	NA	NA
S1	Volunteer	Floodlight	233	17.1	209	59.4	0.6	0.2
	Volunteer	Engine	2341	20.6	130	44.6	0.4	0.1
	Volunteer	Command Post	234	21.3	54	19.2	NA	NA
S2	Volunteer	Ladder	2372	19.6	290	94.6	0.8	0.3
	Volunteer	Engine	2342	18.8	260	81.6	0.7	0.2
	Both	Spare Engine	2352	15.5	6	1.6	NA	NA
NUMC	NA	Ambulance	2325	52.1	86	74.7	0.2	0.2

Note: Unit 2325 is provided by Nassau University Medical Center

Observations:

- Overall, these data support the current deployment strategy that covers all but one hour of work per day.
- Ambulance 2319 was staffed by full-time firefighters and was the unit deployed the most often and had the most deployed hours. It averaged 8.8 runs and 5.5 hours of deployed time per day.
- Engine 2343 was staffed by full-time firefighters and was the unit deployed the second most often. It averaged 4.9 runs and 1.5 hours of deployed time per day.
- Overall, with approximately eight structural or "working" fires per year in Long Beach and an average of 1.5 hours of deployed time per day, alternative deployment strategies and/or optimized utilization of nonemergency time may be worthy of consideration.

Figure 10: Deployed Minutes by Hour of Day



Observations:

- Overall, these data demonstrate that the fire mission is an extremely small percentage of the citizen-initiated requests for service.
- At no time did units deploy on fire calls for greater than an average of 10 minutes in any hour of the day.
- Alternative deployment strategies may be warranted to align personnel capabilities with community-centered demand for services.
- Alternative deployment strategies may be warranted to align resources to demand by time of day.
- Hourly deployed minutes were highest during the day between noon and 10:00 p.m., averaging between 30 minutes and 34 minutes per hour. Average deployed minutes peaked between 6:00 p.m. and 8:00 p.m., averaging 34 minutes per hour.
- Hourly deployed minutes were the lowest between midnight and 8:00 a.m., averaging between 9 minutes and 16 minutes per hour.

Table 5: Total Annual Daily and Average Number of Runs by Call Type and Unit

Station	Full-time or Volunteer	Unit Type	Unit	EMS	**Structure Fire**	**Outside Fire**	Hazard	False Alarm	Good Intent	Public Service	Mutual aid	Canceled	**Total**	**Runs per Day**
HQ	Full-time	Ambulance	2319	2,519	**27**	**21**	173	283	51	110	2	29	**3,215**	**8.8**
	Full-time	Engine	2343	934	**30**	**27**	206	365	55	135	3	21	**1,776**	**4.9**
	Volunteer	Ambulance	2321	389	**12**	**6**	20	38	3	19	9	5	**501**	**1.4**
	Volunteer	Engine	2344	12	**26**	**10**	45	85	8	27	4	2	**219**	**0.6**
	Both	Ambulance	2322	125	**6**	**3**	12	30	3	9	0	3	**191**	**0.5**
	Volunteer	Ladder	2362	5	**14**	**7**	30	67	9	22	1	2	**157**	**0.4**
	Volunteer	Heavy Rescue	232	23	**6**	**4**	1	2	1	1	2	0	**40**	**NA**
	Volunteer	Water Rescue	2395	12	**0**	**0**	0	3	0	0	6	3	**24**	**NA**
	Volunteer	Jet Ski	2399	4	**0**	**0**	0	2	0	0	4	1	**11**	**NA**
	Full-time	Command Officer	238	0	**0**	**0**	0	1	0	0	0	0	**1**	**NA**
S1	Volunteer	Floodlight	233	3	**21**	**2**	44	105	14	16	1	3	**209**	**0.6**
	Volunteer	Engine	2341	1	**14**	**3**	29	61	3	17	0	2	**130**	**0.4**
	Volunteer	Command Post	234	6	**4**	**0**	10	19	4	4	4	3	**54**	**NA**
S2	Volunteer	Ladder	2372	16	**23**	**14**	64	124	11	28	8	2	**290**	**0.8**
	Volunteer	Engine	2342	12	**15**	**10**	47	130	9	30	2	5	**260**	**0.7**
	Both	Spare Engine	2352	0	**1**	**0**	1	2	0	2	0	0	**6**	**NA**
NUMC	NA	Ambulance	2325	83	**0**	**0**	1	0	0	0	2	0	**86**	**0.2**

Observations:

- Ambulance 2319 is staffed by full-time firefighters and made the most runs, an average of 8.8 runs per day. Engine 2343 is staffed by full-time firefighters and made the second most runs, an average of 4.9 runs per day.
- The eleven volunteer units combined (2321, 2344, 2352, 232, 2395, 2399, 233, 2341, 234, 2372, and 2342) made 1,891 runs, an average of 5.2 runs per day. **This accounts for 26 percent of total LBFD runs**.

Dispatch Time and Response Time

Operational Response Times

This section presents dispatch and response time statistics for different call types and units. The main focus is the dispatch and response time of the first arriving LBFD units. However, for structure and outside fire calls, we also analyze the response time of the second arriving units.

Dispatch time is the time interval that begins when an alarm is received at the communication center and ends when the response information begins to be transmitted via voice or electronic means to the emergency response facility or emergency response units in the field. *Turnout time* is the time interval that begins when the notification process to emergency response facilities and emergency response units begins by an audible alarm or visual announcement or both and ends at the beginning point of travel time. **Management has the greatest control over these segments of the total response time.** *Travel time* is the time interval that initiates when the unit is en route to the call and ends when the unit arrives at the scene. Response time (or total response time) is the time interval that begins when the call is received by the primary dispatch center (911 dispatch) and ends when the dispatched unit arrives on the scene to initiate action.

NFPA 1720, which applies to combination departments such as the LBFD, recommends a nine-minute response time for fire-related requests for service in an urban area. NFPA 1720 defines an urban area as an urban area with a population density of 1,000 per square mile. In addition, the nine-minute response time is calculated from the time of dispatch until arrival at the 90th percentile. In other words, it includes turnout and travel time.[32, 33]

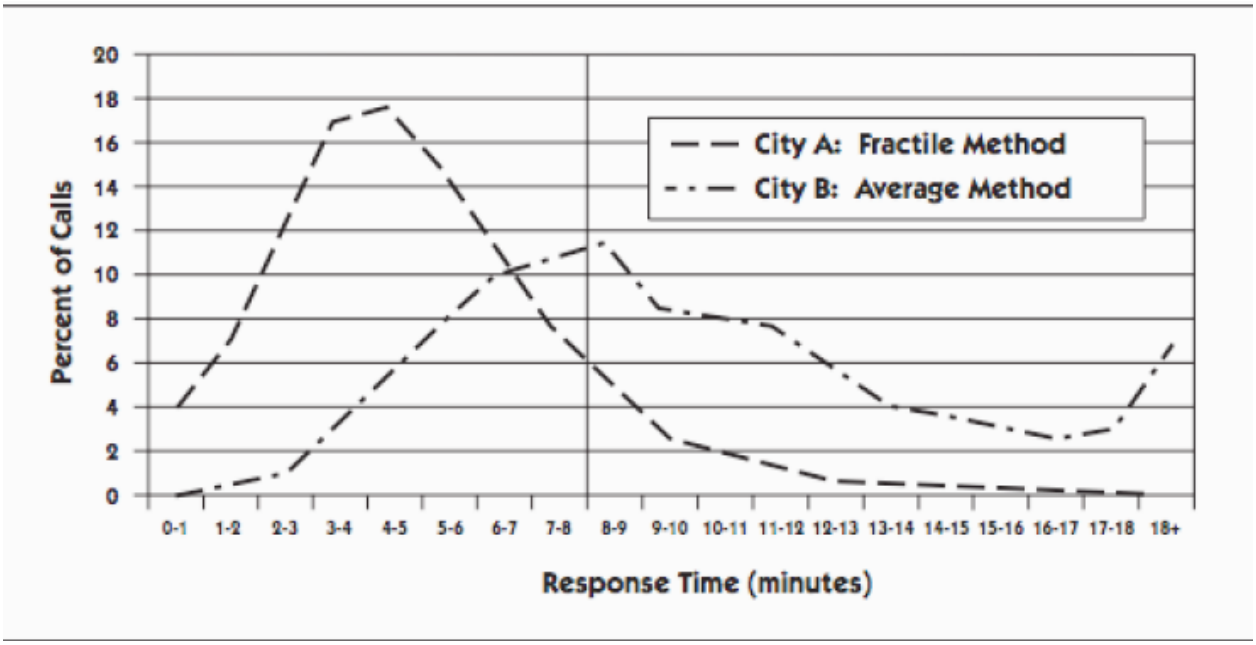
The more conservative and stricter measure of total response time is the 90th percentile measurement. Simply explained, for 90 percent of calls, the first unit arrives within a specified time. A less conservative measure of typical performance is the average. For comparative purposes, the average (mean) in a normal distribution of data will be represented near the 50th percentile. The average is more susceptible to influence from outliers such as zero response times (walk-ins) and delayed responses, so the average will generally reside between the 40th and 60th percentiles.

Systems that manage by average response times rather than by percentile or fractal methods have proven to perform more poorly. Figure 11 presents the actual results of response-time statistics from two cities, both of which require an eight-minute or less response time to life-threatening emergencies. City B uses the average method, while City A uses the percentile method (90th percentile).[34] The results reveal a significant difference in response-time reliability between providers. The vertical line at the eight-minute point indicates more patients received ALS care in eight minutes or less when the system was managed by the percentile basis (City A) than when the

[32] NFPA 1720, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments*, 2010 Edition.
[33] NFPA 1720 response time criterion is a benchmark for service delivery, but not necessarily an ICMA recommendation.
[34] J. Overton and J. Stout. (2002). System design. In: A.E. Kuehl, editor. *Preshospital systems and medical oversight,* 3rd ed. (Dubuque, IA: Kendall/Hunt Publishing Company.)

average performance was measured (City B). In other words, since the responses (data) are more evenly distributed over the average, the measure is less informative (less reliable) as an indicator of performance. Therefore, it is recommended that measures of system performance incorporate a percentile approach and that the percentile be set at a high measure of compliance, such as the 90th percentile.

Figure 11: Comparison of Response-Time Measurement Methods[35]



We used a total of 3,951 calls in our response time analysis. The average dispatch time was 0.9 minutes. The average turnout time was 2.1 minutes, and the average travel time was 2.5 minutes. The average response time for EMS calls was 5.2 minutes, and the average response time for fire category calls was 6.3 minutes. The average response time for structure fire calls was 5.3 minutes. The average response time for outside fire calls was 5.2 minutes.

The 90th percentile dispatch time was 1.4 minutes and the 90th percentile response time was 8.0 minutes.

[35] Ibid.

Table 6: Average Dispatch, Turnout, Travel, and Response Times of First Arriving Unit, by Call Type

Call Type	Dispatch Time	Turnout Time	Travel Time	Response Time	Sample Size
Cardiac and stroke	0.8	1.8	2.5	5.0	231
Seizure and unconsciousness	0.8	1.7	2.3	4.8	315
Breathing difficulty	0.8	2.1	2.4	5.3	291
Overdose and psychiatric	0.8	2.0	2.5	5.3	196
MVA	0.8	1.9	2.1	4.7	167
Fall and injury	0.8	2.0	2.4	5.2	761
Illness and other	0.9	2.0	2.5	5.4	1,093
EMS Total	**0.8**	**2.0**	**2.4**	**5.2**	**3,054**
Structure fire	0.8	2.2	2.2	5.3	32
Outside fire	0.8	2.2	2.2	5.2	24
Hazard	1.0	2.7	3.1	6.7	229
False alarm	0.9	2.6	2.6	6.1	410
Good intent	1.0	2.5	2.5	6.0	58
Public service	1.1	2.5	2.9	6.5	144
Fire Total	**0.9**	**2.6**	**2.7**	**6.3**	**897**
Total	**0.9**	**2.1**	**2.5**	**5.4**	**3,951**

Figure 12: Average Dispatch, Turnout, and Travel Times of First Arriving Unit, by EMS Call Type

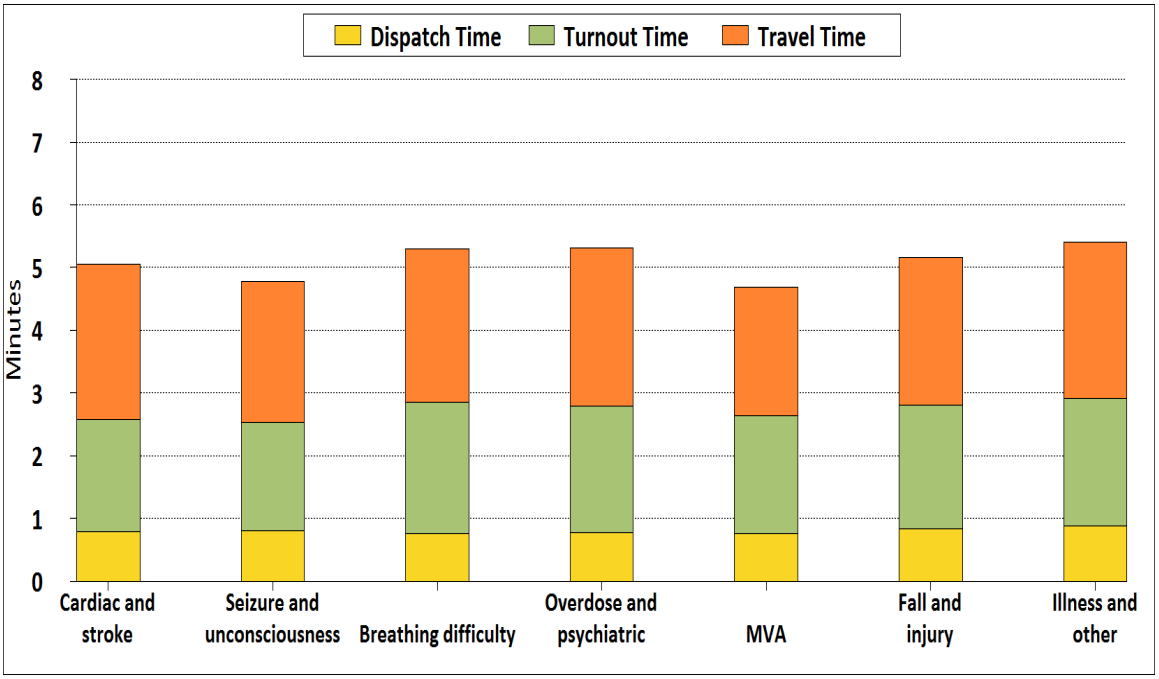
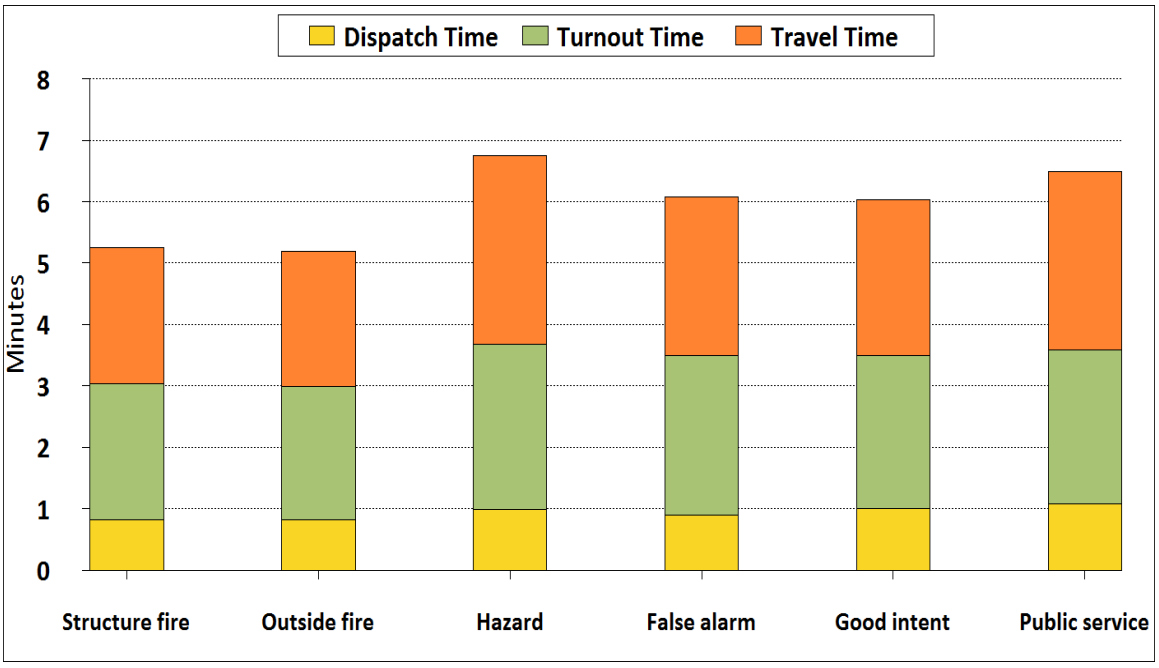


Figure 13: Average Dispatch, Turnout, and Travel Times of First Arriving Unit, by Fire Call Type



Observations:

- Overall, and at the average, LBFD response performance looks good.
- The performance is fairly consistent across the call types. The EMS performance is very consistent. The fire performance varies to some degree, but at an appropriate level for call severity.
- The average dispatch time was 0.9 minutes.
- The average turnout time was 2.1 minutes.
- The average travel time was 2.5 minutes.
- The average response time for EMS calls was 5.2 minutes.
- The average response time for fire category calls was 6.3 minutes.
- The average response time for structure fire calls was 5.3 minutes. The average response time for outside fire calls was 5.2 minutes.

Table 7: 90th Percentile Dispatch, Turnout, Travel, and Response Times of First Arriving Unit, by Call Type

Call Type	Dispatch Time	Turnout Time	Travel Time	Response Time	Sample Size
Cardiac and stroke	1.2	2.7	3.9	6.9	231
Seizure and unconsciousness	1.3	2.8	3.9	6.9	315
Breathing difficulty	1.3	3.4	4.1	7.5	291
Overdose and psychiatric	1.3	3.1	4.1	7.4	196
MVA	1.3	2.9	3.5	6.7	167
Fall and injury	1.4	3.1	4.2	7.5	761
Illness and other	1.4	3.2	4.2	7.6	1,093
EMS Total	**1.4**	**3.1**	**4.1**	**7.5**	**3,054**
Structure fire	1.2	4.3	3.9	10.6	32
Outside fire	1.2	3.4	3.6	6.6	24
Hazard	1.7	4.5	5.8	10.1	229
False alarm	1.4	4.7	4.8	10.0	410
Good intent	1.8	4.6	4.6	8.1	58
Public service	2.0	4.0	6.1	10.3	144
Fire Total	**1.6**	**4.5**	**5.3**	**10.0**	**897**
Total	**1.4**	**3.4**	**4.4**	**8.0**	**3,951**

Note: A 90th percentile value of 8.0 indicates that the total response time was less than 8.0 minutes for 90 percent of all calls. Unlike averages, the 90th percentile response time is not equal to the sum of the 90th percentile of dispatch time, turnout time, and travel time.

Observations:

The 90th percentile for dispatch time was 1.4 minutes, for turnout time was 3.4 minutes, and for travel time was 4.4 minutes. The total response time for EMS calls at the 90th percentile was 7.5 minutes. The total response time for fire calls at the 90th percentile was 10 minutes.

If benchmarked against NFPA 1720, LBFD met or exceeded recommended performance. The benchmark recommendation by both NFPA 1720 and the Center for Public Safety Excellence (CPSE) is that the dispatch time should be completed within 60 seconds 90 percent of the time.[36] While CPSE supports this benchmark it also affords a baseline (minimum acceptable performance) of 90 seconds 90 percent of the time.[37] Therefore, the Long Beach Dispatch Center performed within the baseline or minimum acceptable performance.

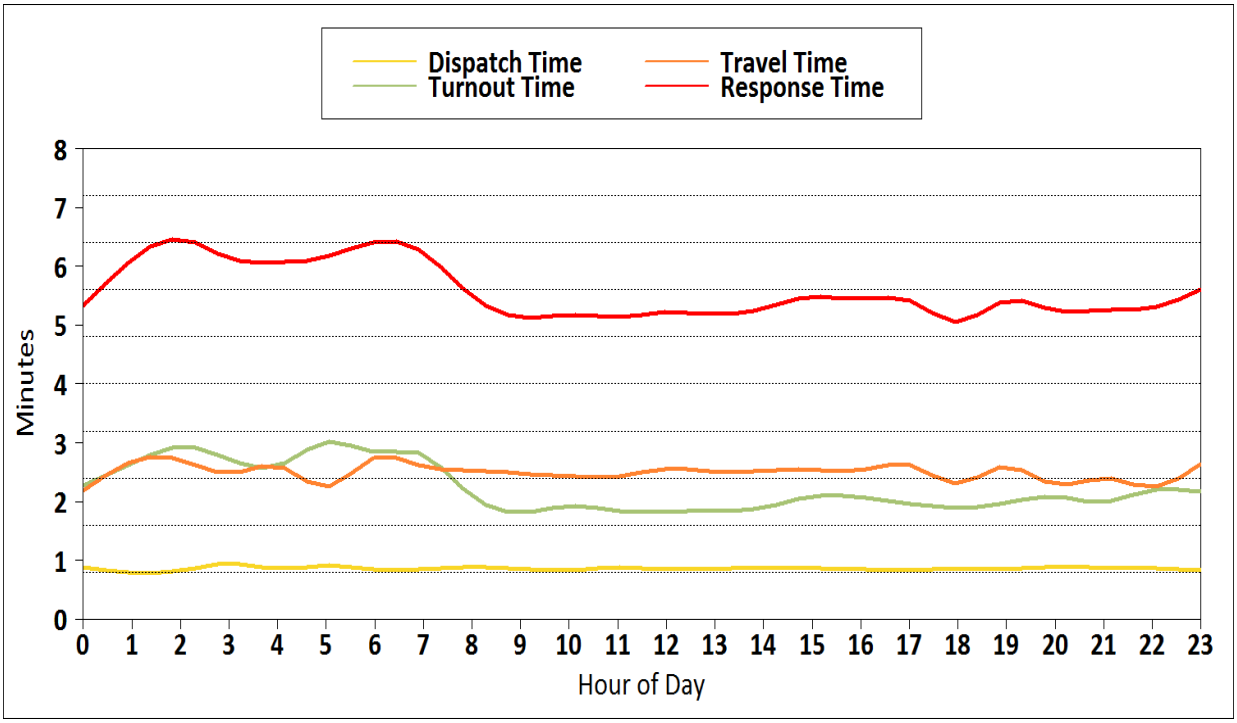
[36] NFPA 1720, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments,* 2010 Edition, 7.
[37] CPSE. (2009). *CFAI fire and emergency service self-assessment manual,* (8th ed.). p. 70.

The aggregate turnout time at the 90th percentile is 3.4 minutes with EMS and fire performing at 3.1 and 4.5 minutes, respectively. Benchmarking the paid contingency against NFPA 1710,[38] the recommendation is for turnout time to be 60 seconds 90 percent of the time for requests for emergency medical services and 80 seconds for fire-related incidents. In concert with the approach to dispatching services, CPSE supports the 60 second benchmark and also affords a 90 second baseline performance at the 90th percentile.[39] Therefore, improving the turnout time by full-time paid responding crews to meet the benchmark performance of 60 seconds would improve the total response time by 2.4 minutes at the 90th percentile and performing at the baseline would improve total response time by just less than two minutes (1.9 minutes). Notably, if the LBFD were comprised of an entirely paid department, the paid company would not be meeting the minimum standards set forth in NFPA 1710. It is only because the LBFD is structured as a combination department (subject to NFPA 1720) that the paid component is able to achieve compliance.

When considering the volunteer staff, their response and turnout is meeting or exceeding the recommendations of NFPA 1720. Of particular note, the data only capture the first arriving unit on scene, typically the paid units, but the turnout times may be captured for other units that are responding prior to the arrival of the first unit. Finally, because the paid staff delivers the service on the overwhelming majority of the incidents, the performance history would be an accurate description of their actual performance.

[38] While NFPA 1710 has no application within a combination department such as the LBFD, it is nonetheless useful to gauge the paid company's performance against the standards that are applied to other paid units throughout the country.
[39] Ibid.

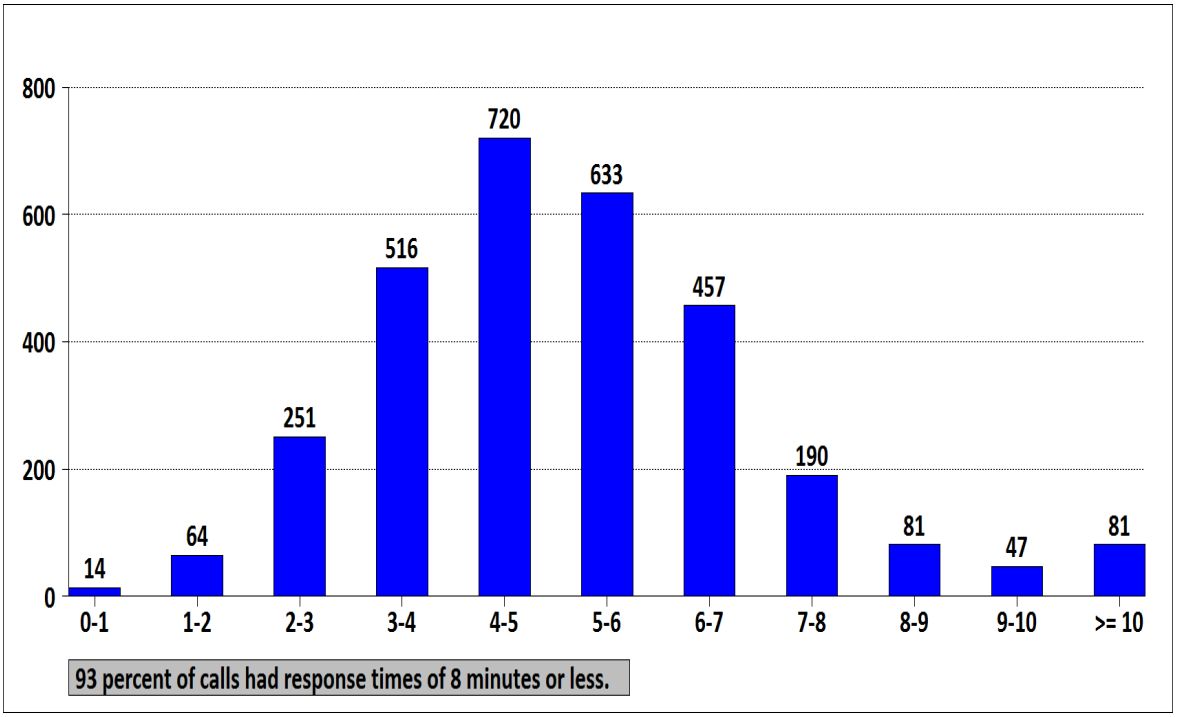
Figure 14: Average Dispatch, Turnout, Travel, and Response Time of First Arriving Unit, by Hour of Day



Observations:

- Increased response times occur during the "sleeping" hours.
- Alternative deployment strategies may be explored that would improve performance.

Figure 15: Frequency Distribution Chart of Response Time of First Arriving Unit for EMS Calls



Observations:

- Overall, the first arriving unit arrived between 4 and 5 minutes most frequently.
- The average response time for EMS calls was 5.2 minutes.
- For 93 percent of EMS calls, the response time was less than or equal to 8.0 minutes.
- For 90 percent of EMS calls, the response time was less than 7.5 minutes.

Table 8: Average Response Time for Structure and Outside Fire Calls by First Arriving Unit

Unit Type	Full-time or Volunteer	First Arriving Unit	Outside Fire		Structure Fire		Total	
			Response Time	Number of Calls	Response Time	Number of Calls	Response Time	Number of Calls
Ambulance	Both	2322	NA	0	3.8	1	3.8	1
	Full-time	2319	4.7	10	4.0	11	4.3	21
	Volunteer	2321	5.0	1	NA	0	5.0	1
Engine	Full-time	2343	5.2	11	4.8	13	5.0	24
	Volunteer	2342	NA	0	10.8	2	10.8	2
	Volunteer	2344	NA	0	5.5	3	5.5	3
Ladder	Volunteer	2362	9.7	1	8.1	1	8.9	2
	Volunteer	2372	5.6	1	12.4	1	9.0	2
Total			**5.2**	**24**	**5.3**	**32**	**5.2**	**56**

***Note: "NA" denotes missing data.

Observations:

- **Response time performance speaks to the seamless service delivery from LBFD regardless of paid status.**
- The data reveal that the first arriving volunteer engine company is within **one minute** of the paid fire engine to structure fire calls.
- When considering all fire-related calls, the first arriving volunteer fire engine is within **30 seconds** of the full-time paid staff.

GIS Mapping of Long Beach Jurisdiction

The response times in Long Beach are largely controlled by relatively short travel distances. One way to validate the table data on response time is to provide another means of analyzing travel time. GIS provides an excellent validation tool as actual road miles are used to calculate travel distances. It is understood that at certain times of day or certain times of the year, excessive traffic may produce longer response times than mapped. The map of Long Beach provided in Figure 16 demonstrates travel times of 240, 360, and 480 seconds. For example, the pink area is a four-minute response time that aligns well with NFPA 1720. The green area is representative of a six-minute response time and the blue area is an eight-minute response time. It is clear that barring any specific traffic issues, the majority of the island can be served, through pre-deployment of ambulances, at or near the four-minute travel time, confirming the table data. This validates that the station locations are capable of meeting response performance for the city.

Figure 16: Long Beach Bleed Maps of Four-, Six-, and Eight-Minute Travel Times

GIS also offers an excellent method to evaluate the appropriate station locations by looking at the demand for services. Demand for fire and EMS services are not always synonymous as there are different risk centers in communities that drive the use of the 911 system. Figures 17 and 18 provide a graphic representation of the areas of higher demand to lower demand. For example, in Figure 17, the darker blue the area the higher the demand for EMS service. As the demand for service decreases the color scheme will go to white and if no calls occurred in that grid then it will be clear. Figure 18 has a similar approach with the darkest red areas indicating the most frequent demand for fire-related calls for service. In the case of Long Beach, the mid-island area around the Headquarters Fire Station has the highest demand for services for both fire and EMS.

Figure 17: EMS Demand Map

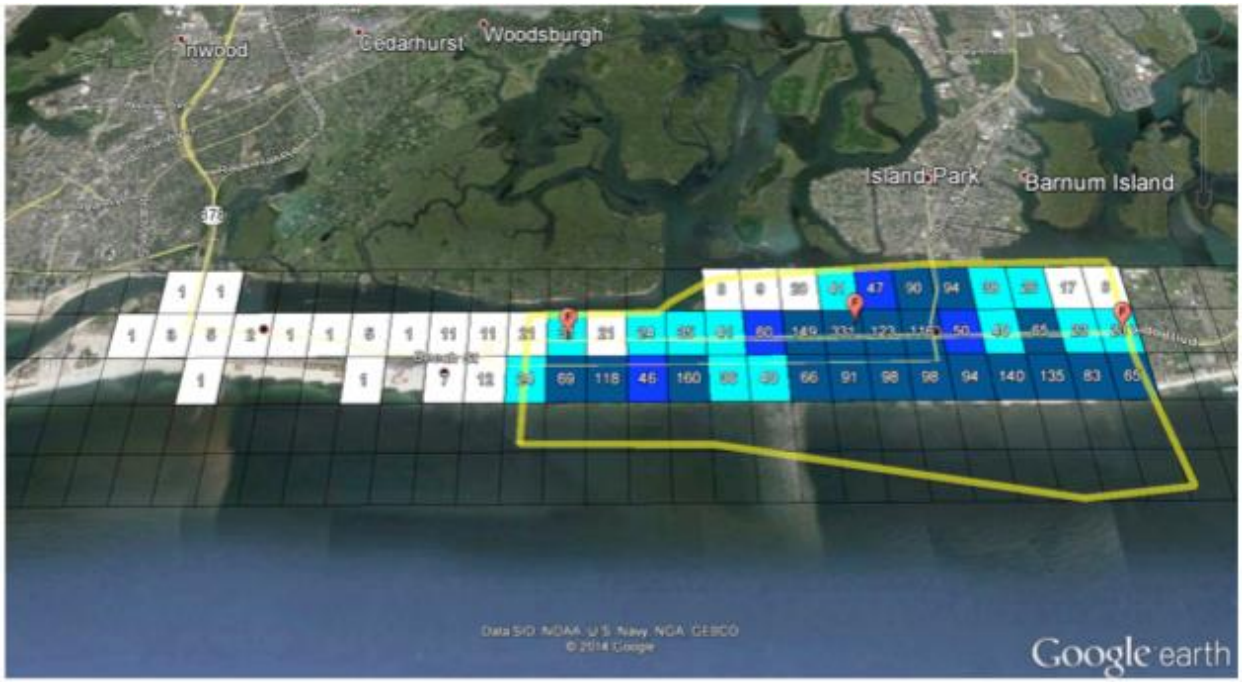
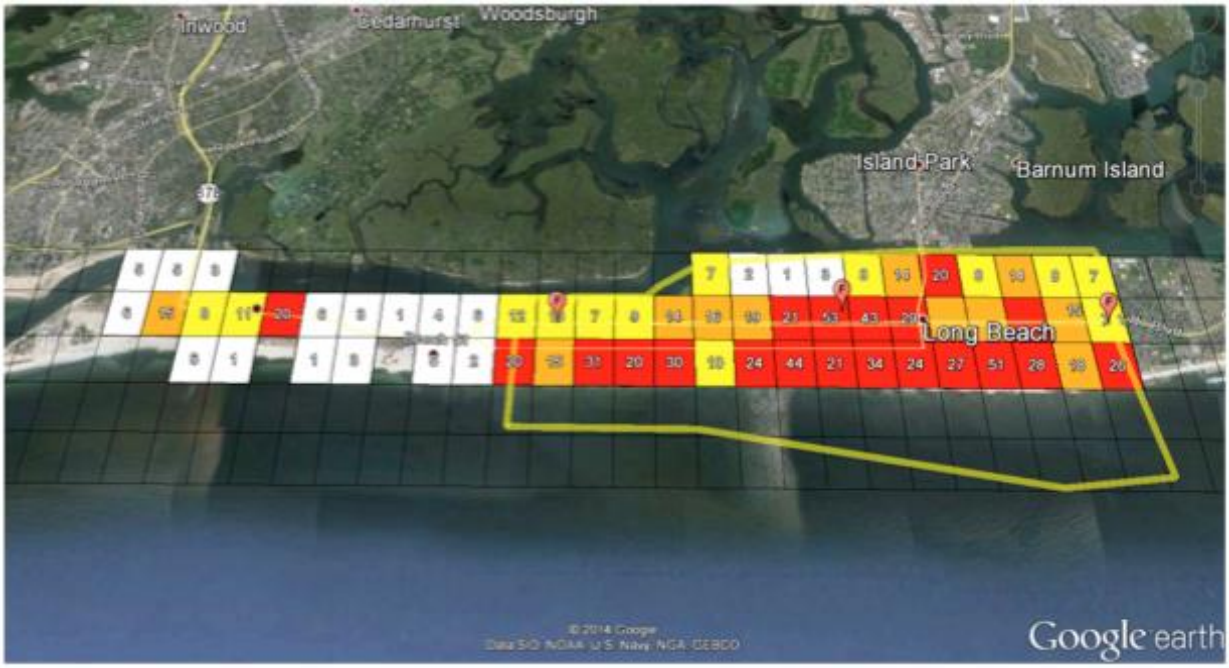


Figure 18: Fire-Related Demand Map



Transport Call Analysis

To understand how many calls involved transporting patients, and the variations of these transports by hour of day, we identified transport calls requiring that at least one LBFD responding unit have a recorded time of arriving at a hospital or a unit-clear time at a hospital. This section focuses on EMS transport analysis. Besides EMS transports, LBFD also transported patients in sixteen fire category or mutual aid calls.

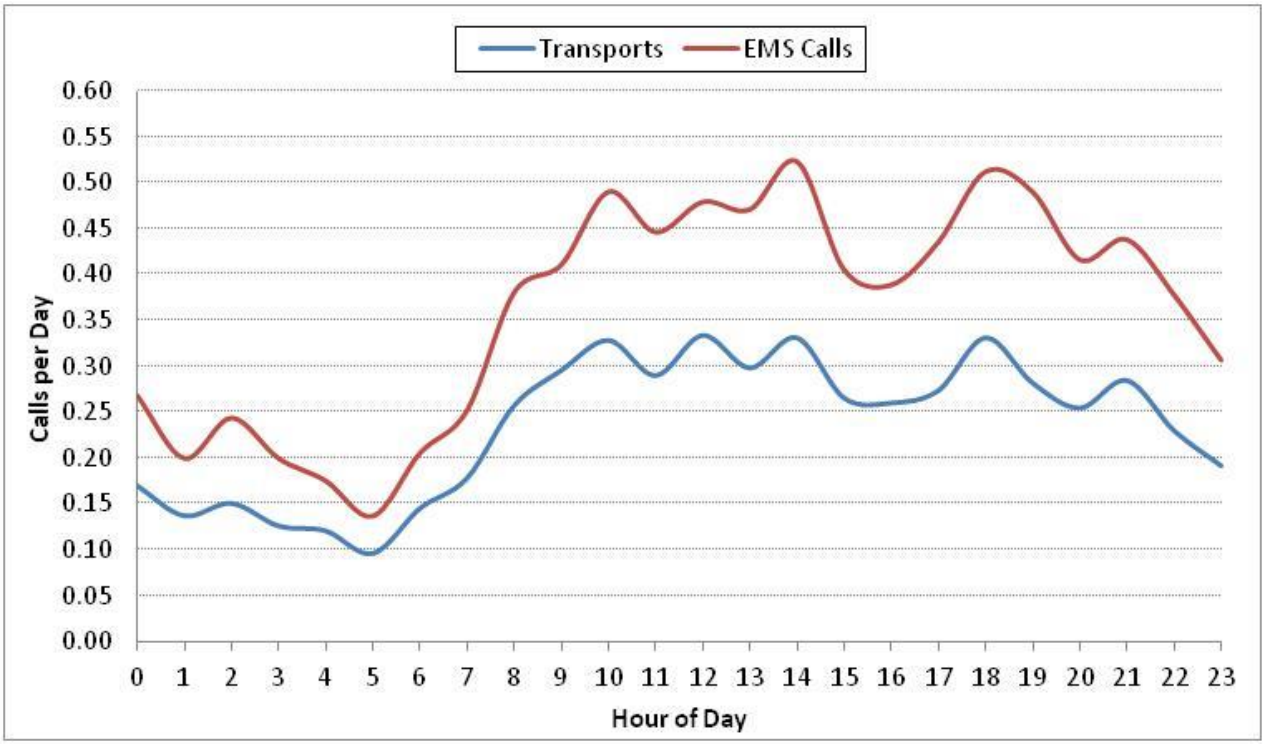
Table 9: Transport Calls, by EMS Call Type

Call Type	Number of Calls			Transport Rate
	Non-transport	Transport	Total	
Cardiac and stroke	34	201	235	85.5
Seizure and unconsciousness	114	214	328	65.2
Breathing difficulty	57	238	295	80.7
Overdose and psychiatric	52	147	199	73.9
MVA	107	66	173	38.2
Fall and injury	348	442	790	55.9
Illness and other	391	749	1,140	65.7
EMS Total	**1,103**	**2,057**	**3,160**	**65.1**
Daily Average	**3.0**	**5.6**	**8.7**	**NA**

Observations:

- Overall, 65 percent of EMS calls to which LBFD responded involved transporting patients.
- On average, LBFD responded to an average of 8.7 EMS calls per day, among which 5.6 were EMS transport calls.
- Cardiac and stroke, and breathing difficulty calls had the highest transport rates, averaging 86 percent and 81 percent, respectively.

Figure 19: Number of Transport Calls, by Hour of Day



Observations:

- The peak load demand for services drops considerably overnight. *Alternative deployment strategies may better align resources with demand for services.*
- Overall, 65 percent of incidents to which LBFD responded involved transporting patients.
- On average, LBFD responded to 8.7 EMS calls per day, and provided 5.6 transports per day.
- LBFD-responded EMS call rates and transports were highest between 8:00 a.m. and 10:00 p.m., averaging between 0.25 and 0.30 transports per hour.
- LBFD-responded call rates and transports were lowest between midnight and 8:00 a.m., averaging between 0.10 and 0.18 transports per hour.

Table 10: Duration Comparison, by Call Type

Call Type	Non-transport Calls	Transport Calls
Cardiac and stroke	22.2	62.1
Seizure and unconsciousness	22.1	57.8
Breathing difficulty	18.8	59.0
Overdose and psychiatric	23.2	55.3
MVA	17.9	54.6
Fall and injury	17.1	54.8
Illness and other	19.5	56.0
Total	**19.1**	**56.8**
Sample Size	**1,103**	**2,057**

Note: Duration of a call is defined as the longest deployed time of all units responding to the same call.

Observations:

- This analysis confirms the impact that the closure of the Long Beach Hospital has had on the turnaround time when transporting.
- It also confirms the impact of traffic and congestion on EMS operations, and the reason why the city should seek alternative EMS delivery models.
- The impact of the additional time on task will be noticed during peak times such as the summer months.
- On average, a nontransport EMS call lasted 19 minutes.
- On average, a transport EMS call lasted 57 minutes, which was 38 minutes longer than a nontransport call.

The deployed time is from unit dispatch time through unit clear time. The on-scene time is from unit arriving on-scene time through unit departing scene to hospital time. The travel to hospital time is from unit departing scene to hospital time through unit arriving at hospital time. The at-hospital time is from unit arriving at hospital time through unit clear at hospital time. The travel back to station time is from unit clear at hospital time through unit back to station or unit clear time.

Table 11: Time Component Analysis for Transport Runs

Call Type	Average Deployed Minutes per Run	Average On-Scene Time	Average Travel to Hospital Time	Average at Hospital Time	Average Travel back to Station Time	Sample Size
Cardiac and stroke	62.0	14.7	11.0	19.6	12.6	201
Seizure and unconsciousness	56.6	14.1	11.3	18.5	9.6	219
Breathing difficulty	58.8	13.9	11.4	19.8	9.2	240
Overdose and psychiatric	55.4	10.5	14.6	14.6	9.5	148
MVA	52.6	10.4	13.0	16.3	7.7	81
Fall and injury	54.6	12.0	13.4	15.5	9.5	445
Illness and other	56.1	12.0	14.8	15.8	9.9	752
Total	**56.5**	**12.5**	**13.3**	**16.8**	**9.9**	**2,086**

Observations:

- A transport run averaged 56.5 minutes from dispatch to clear.
- On average, a unit spent 12.5 minutes treating patients on scene, and spent 13.3 minutes on the road to take patients to a hospital, then spent 16.8 minutes at the hospital, and lastly spent 9.9 minutes traveling back to station. The reason why it takes longer, on average, to reach the hospital initially is because "start time" (for purposes of this analysis) is measured from the residences and commercial properties, located across Long Beach and Atlantic Beach, where emergency medical services are first administered. The "return time" is measured between the hospital and Fire Headquarters. As Fire Headquarters is located very close to the Long Beach Bridge, this has the effect of lowering the average travel time for returning ambulances.
- The average hospital time is adding to the total call duration for transporting patients. Best practice would be 20 minutes 90% of the time for "wall time."
- An interesting observation is that the crews can return from the hospital to the station more quickly than they transport a patient to the hospital.

- END -