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ATTENTION: Public Safety and Neighborhood Services Committee
Agenda of January 28, 2004

SUBJECT: Acceptable Standards of Emergency Response Coverage for San
Diego Fire-Rescue Department

SUMMARY

THIS IS AN INFORMATION ITEM ONLY. NO ACTION IS REQUIRED ON THE PART OF THE COMMITTEE OR THE CITY COUNCIL.

BACKGROUND

During the City Council meeting of June 9, 2003, regarding the Fiscal Year 2004 proposed budget, San Diego Fire-Rescue Department (SDFD) was directed to return to the Public Safety and Neighborhood Services Committee to review and provide recommendations regarding the current six-minute response time for structure fires. An acceptable standard of response coverage needs to be determined for emergency response services including fire, medical, and lifeguard services within the City of San Diego.

INTRODUCTION

The City of San Diego is geographically challenging to cover with emergency response services due to our complex waterways, freeways, road networks and the 230 miles of linear canyon rim that impede routes of response throughout the City. To meet a reasonable standard of coverage for emergency services, fire stations and lifeguard towers need to be positioned to optimize their ability to effectively respond. In the center of the City, where city development originated, fire stations were typically spaced one-to-two miles apart. In the more recent past, in areas of the City experiencing significant growth, fire stations are being spaced four-to-five miles apart making coverage for

emergency fire and medical services even more difficult and challenging. The spacing of fire stations needs to return to the one-to-two mile parameter for effective coverage.

Lifeguards have the responsibility of covering 17 miles of Pacific Ocean coastline and 27 miles of beaches in Mission Bay Park. This equates to 32,640 acres of water coverage along the coast and 2,300 acres of water coverage in the bay area. Staffing criteria, expressed in terms of lifeguard requirements, would necessitate lifeguard towers to be spaced every 1/10-of-a-mile or 10-towers-per-mile. These criteria are based on the Lifeguard Service's experience with local beach and surf conditions, weather influence, beach access problems, type of beaches and tourists. Population and city growth have currently stretched lifeguard tower spacing on average to 2.41 lifeguard towers per mile, making coverage in certain areas particularly challenging. In addition, staffing levels do not allow for two lifeguards to patrol in a single vehicle. This creates an unsafe situation when the lone lifeguard leaves the vehicle to perform a rescue. There is essentially no back up creating an increased risk of injury to both the lifeguard and the victim.

To determine an acceptable standard of coverage for the City of San Diego, there are several tools or methods available. First, consideration must be given to what type of performance measure is most appropriate; i.e., average response time versus fractal response time. A city-wide average response time may meet response times in one community, but not in another. Under our paramedic program we utilize a fractal response where the target goal is met a certain percentage of the time, typically 90 percent of the time. These concepts and methods are discussed in more detail below.

DISCUSSION

Current Standards of Coverage:

Historically, the annual performance measure for San Diego Fire-Rescue's emergency response to structures has been based on the average city-wide response time calculated for the first arriving engine company's response time in minutes. Average response times are measured from the time the engine is dispatched to the earlier time of either "at scene" or "staged." The response time 20 years ago was four minutes and has slowly increased to the six-minute or less criterion utilized today. Historical engine company average response time is outlined in Attachment 1.

For the past 15 years, the Fire-Rescue Department has utilized a Geographic Information System (GIS) application developed in ArcInfo called the Emergency Response Management System (ERMS) to calculate how far an engine company could travel in six minutes or less, provided the engine company was in quarters at the time of the alarm. This program utilizes the speed limit and the road network to calculate how far a unit can travel in six minutes, but does not take into account traffic congestion. Another consideration with this program is it does not take into account "chute" or turnout time. Turnout time is the time it takes a crew to secure the station, locate the incident on the map, don the appropriate personnel protective equipment and exit the fire station. Currently, this time ranges from a minute-and-a-half to two minutes added onto the travel

time. This chute time would either need to be subtracted from the overall travel time or added on to the total response time criterion. For instance, a six-minute criterion, with a two-minute chute time, would only have four minutes of actual travel time or the actual total response time would include the chute time and be a total response time of eight minutes.

The six-minute response area identified by ERMS has been utilized for evaluation of Environmental Impact Reports (EIRs) to determine whether or not a project is within a six-minute response time of the station. If the project is beyond the six-minute criteria, the contractor would either have to sprinker the buildings or wait until a fire station was built that could cover this area within six minutes or less before proceeding with the project. Effective today, Response Planning is using a five-minute travel time and a one-minute chute time to identify projects inside or outside of the six-minute criterion.

Today, the Fire-Rescue Department's mission has substantially evolved into an emergency medical-based system with a paramedic on every engine; and all personnel, including Lifeguards, trained to at least the Emergency Medical Technician (EMT) level. With these changes in our mission, 85 percent of requests for assistance are now for medical aids.

For the current paramedic system a criterion of an eight-minute response time, 90 percent of the time, is utilized as the compliance time for first responders on a city-wide basis. The response time for the Advanced Life Support (ALS) medic unit is 12 minutes, 90 percent of the time, for each of the four geographical medical demand zones. This performance criterion was established by Fitch and Associates when the current medical service delivery model was redesigned. The Department has met this response time since the inception of the San Diego Medical Services Enterprise Program in 1997, and this coverage continues to be comparable to other metropolitan cities.

The medical aid component of our emergency services has not been a consideration when EIRs are considered and sprinklers have been accepted in lieu of the six-minute response time criteria. If a developer's project is nine minutes away from a fire station, and they elect to install sprinklers, the permits have been granted.

The Lifeguard Service performance is based on being proactive rather than reactive. Vigilance (water observation and response) is the foundation of our success in this public safety arena. Because of the nature of the emergency, (a victim in the water is usually spotted by the lifeguard on observation) the time to respond is extremely limited. This is the main reason why location of lifeguard towers must be strategically placed to insure adequate coverage. The most important component of successful lifeguarding is to prevent near-drowning incidents. This is accomplished through an extensive execution of preventative acts and warnings both along the beach and in the water. One of the factors constantly monitored is the correlation between preventative acts and the number of rescues. Ideally these two aspects are inversely related (more warnings will result in a smaller number of rescues). Unfortunately, statistics from the last few years show an

increased trend in both, proving that our staffing levels are not keeping up with the growing population and increased beach attendance.

Proposed Standards of Coverage:

In 2001, the National Fire Protection Association (NFPA) developed a national benchmark standard, NFPA 1710, detailing the minimum criteria for addressing the effectiveness of career public fire suppression operations and emergency medical service delivery in protecting citizens and fire department employees. NFPA 1710 envisions implementation as a multi-year process to be part of the long-range planning activities for a fire department. Below are the criteria set forth in NFPA 1710. These are fractal response times where the performance level is met 90 percent of the time.

FIRE SUPPRESSION RESPONSE TIME: (90 percent of the time)

<u>Dispatch Time</u>	<u>Turnout Time</u>	<u>Response Time</u>
1 minute	1 minute	4 minutes, first arriving engine

**Acceptable Alternative: Initial Full Alarm Assignment at Scene
(14 personnel at scene, if the aerial ladder is not put into operation.)**

<u>Dispatch Time</u>	<u>Turnout Time</u>	<u>Response Time</u>
1 minute	1 minute	8 minutes

EMERGENCY MEDICAL RESPONSE TIME: (90 percent of the time)

<u>Dispatch Time</u>	<u>Turnout Time</u>	<u>Response Time</u>
1 minute	1 minute	4 minutes, first responder with AED

<u>Dispatch Time</u>	<u>Turnout Time</u>	<u>Response Time</u>
1 minute	1 minute	8 minutes, Advanced Life Support (Two paramedics and two EMTs at scene)

The time standard of four minutes or less was chosen by NFPA based on several criteria:

- Clinical brain death occurs in four-to-six minutes for a non-breathing patient.
- Every one minute without defibrillation decreases survival rate by 10 percent.
- Flashover can occur within the first several minutes during a structure fire.
- Lightweight truss systems can fail within 10 minutes during a structure fire, causing roof collapse.

To evaluate the effectiveness of our current fire and medical emergency response coverage for the City of San Diego, San Diego Fire-Rescue has two new software tools available. Unfortunately, these tools are based on medical and fire computer-aided dispatch information and are not applicable to evaluating lifeguard coverage.

Computer Aided Dispatch (CAD) Analyst

CAD Analyst is a software program that helps analyze current workloads and response times by performing powerful analysis of our existing Computer Aided Dispatch (CAD) incident data. CAD Analyst visually displays actual CAD incident workloads and performance of fire and medical units over a user defined specified period of time. This software program allows the user to change the criteria for performance measures, and to look at the overall agency's workload or actually click through the icons all the way down to the incident itself. Response time criteria are shown in color-coded maps where green indicates acceptable performance and red indicates unsatisfactory performance. Currently incident data can be analyzed from July 1998 through June 2003.

Apparatus Deployment Analysis Module (ADAM)

ADAM is a modeling tool which utilizes actual CAD incident data and road network routing to estimate time-distance relationships. ADAM can be utilized to evaluate station locations, relocations and additions; and apparatus relocation and additions. Like CAD Analyst, it displays information as color-coded maps. The base response analysis map of a six-minute response to structure fires shows the Department's overall standard of cover for engines using the current established criteria and established response coverage goals. ADAM does not assume apparatus are always at their stations when estimating workloads and availability. Alternate fire station and apparatus location scenarios can be created and the software automatically recalculates and graphically displays response performance for the current location scenario.

ADAM provides two models which offer different perspectives: Incident Performance and Coverage Performance. Incident performance weighs each response zone's performance with its workload. Coverage Performance weighs each response zone's performance with its square miles. Currently ADAM utilizes FY 2003 Fire/EMS data and is the most accurate tool to predict the actual response time to a specific property or street address. The time is calculated from time of dispatch to at scene and based on actual response data.

Both of these tools will be utilized during the accreditation process we have undertaken to bench mark our agency against similar metropolitan emergency services.

Accreditation

Fire-Rescue has begun the process of becoming nationally accredited through the Commission on Fire Accreditation International. This National Fire Service accreditation system is a self-assessment process which focuses on the evaluation of activities and services an entity provides to protect life and property. This process is a proven model to assist fire service professionals in continually improving the quality and performance of their organizations, and to determine if the programs and services being provided are

effective in meeting the needs of the community. This effort will require 18 months to complete a thorough assessment of our Department's performance against national standards and community needs. A critical component of the Accreditation process is the standards of coverage report which is considered an equivalency for NFPA 1710 and takes into consideration community specific issues. These are the written procedures to determine the distribution and concentration of fixed and mobile resources of a fire department.

The Lifeguard Division of the San Diego Fire-Rescue is accredited through the United States Lifesaving Association (USLA). The Division's responsibilities and areas of coverage include: swift water rescue, cliff rescue, dive rescue and boat rescue. For this reason, the San Diego Lifeguard Service goes well beyond what many other lifesaving agencies around the country are able to provide. The San Diego Lifeguard Service is often recognized as a standard to achieve by other lifesaving agencies. Fire-Rescue has identified Los Angeles County Lifeguard Service as a comparable standard of service. In the coming year, as part of the Department-wide accreditation study, the Lifeguard Service will be initiating a benchmark study to determine gaps in the area of coverage and operations that need to be addressed.

CONCLUSIONS

The City of San Diego has evolved over the past 20 years with tremendous development in the outlying areas of the City away from the central core, spreading our population growth over the entire 320 square miles. Recently, in-fill growth has accelerated, particularly in the downtown area, as the land available for development in the outlying areas has diminished. Traffic continues to increase and gridlock situations often impede the ability of emergency response units to respond in a timely manner.

Development plans that were reviewed and approved even 10 years ago were completed prior to the Department's change in mission to that of paramedic first responder based system. The performance goals of averaging response times for engine company response times to structure fires does not provide a clear analysis of the level of service being provided today. Planning for the future needs to incorporate NFPA 1710 standards of five minute response goals 90 percent of the time for both fire and medical emergencies.

Current lifeguard staffing patterns are a result of historical lessons learned since the Lifeguard Service was first created in 1918. Population growth, increased tourism, residential infill and base closures have affected the coastal areas, and impacted the lifeguards' ability to deliver services as the primary emergency responders. While the area of responsibility remains relatively static for the lifeguards, their ability to maintain a safe environment for our citizens is impacted not only by weather and ocean conditions, but by the increasing beach and bay attendance. During non-typical days of extremely heavy beach attendance, the lifeguards should staff up any reserve towers and callback additional staff to assist in handling these atypical situations. A similar practice is done

on the fire response side. During red-flag warning days, additional staff is brought in, on an overtime basis, to staff up the brush apparatus in preparation for extremely high fire activity. This would be an effective interim solution while the accreditation and bench marking analysis is completed.

A decision must be made on what is the acceptable standard of coverage and levels of service to meet the needs of our communities. Fire-Rescue will return with recommendations on standards of coverage and a plan to mitigate any problem areas through a long range planning effort following completion of the accreditation process. Interim recommendations for additional fire and lifeguard response resources are included in the Fiscal Year 2005 proposed budget.

Respectfully submitted,

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TKJ

Attachment(s): [1. San Diego Fire-Rescue Historical Data – Fire and Medical](#)
[2. San Diego Fire-Rescue Historical Data – Lifeguard Service](#)