EMS System Analysis for the Fire Department

CITY OF PLANO, TEXAS

matrix consulting group
1255 W. 15th St., #445
Plano, TX 75070
v.972.423.3960 f.972.423.3964

May 14, 2008

TABLE OF CONTENTS

		Page
1.	INTRODUCTION AND EXECUTIVE SUMMARY	1
2.	ANALYSIS OF THE ORGANIZATION OF EMS	7
3.	ANALYSIS OF EMS OPERATIONS	19
4.	DESCRIPTIVE PROFILE	65

1. INTRODUCTION AND EXECUTIVE SUMMARY

This first chapter provides an introduction to the final report for the Emergency Medical Service System Analysis conducted for the Fire Department and the City of Plano. This study took place in the winter and spring of 2007 – 2008 and was focused on the delivery of pre-hospital medical care by the Plano Fire Department. The focus of the study was on the following area of interest for the Department and the City:

- Evaluate the organizational structure and management of the EMS program within the Fire Department.
- Evaluate the staffing model and approach utilized to provide emergency medical services including qualifications and certification of personnel, and deployment of resources.
- Evaluate system performance based on performance indicators such as response times, time to patient, dispatch time, chute time, etc.
- Evaluate the provision of equipment and supplies by the Fire Department.
- Evaluate the system policies, directives, and protocols used to direct the provision of emergency medical services within the Department.
- Evaluate dispatch policies related to the nature and level of care provided and required including the use of emergency medical dispatch and other triage methods.
- Evaluate local policies and practices for compliance with national and state regulations including evaluation of infection control and safety programs, and contract provision for these safeguards.
- Evaluate the Department's continuing education, training, and skills assessment program for emergency medical personnel.
- Evaluate the cost of providing EMS within the City of Plano and compare these costs to industry benchmarks.
- Evaluate billing methods and compliance with federal regulations.
- Evaluate potential cost savings and overall cost effectiveness of the EMS program.

In order to conduct the study and to achieve the objectives identified by the Fire Department and the City in the Request for Proposals, the project team from the Matrix Consulting Group performed the following steps during the course of the study:

- Conducted extensive interviews both within the Fire Department and with a wide range of stakeholders. Interviews were conducted with the following:
  - Deputy City Manager
  - Fire Chief
  - Assistant Chief for EMS and Training
  - EMS Battalion Chief
  - EMS Captain
  - EMS Quartermaster
  - Other members of the Fire Department command staff including all Assistant Chiefs
  - Current Medical Director
  - Former Medical Director
  - Representatives of IAFF Local 2149
  - Line staff including Paramedics, EMTs and company officers were interviewed individually and in focus groups
  - Representatives from the Emergency Department of the Medical Center of Plano
  - EMS Support representatives from the Medical Center of Plano
  - Representatives from the Emergency Department of the Presbyterian Plano Hospital
  - South West General Services
  - Representatives from the Emergency Department of the Baylor Regional Medical Center at Plano and the Heart Hospital
  - City of Plano Public Safety Communications staff

- Representatives from Plano Fleet Services

- The project team collected data from the following sources to enable us to conduct our analyses:

  - Management plans, strategic plans, memos and other sources of internal information were collected and reviewed by the project team.

  - Computer Aided Dispatch and Records Management System (CAD/RMS) data were extracted to enable the project team to evaluate the distribution of calls for service, the times associated with calls, etc.

  - Data were extracted from the PFD's TeleStaff system to document deployment and staffing information.

  - Data were taken from the Department electronic patient care report (ePCR) system, SafetyPAD, to document various interventions, drugs utilized, call types and other pertinent information.

- The project team also worked closely with a steering committee comprised of Fire Department staff (both management and labor were represented) and medical control (both the current and former physicians). This group reviewed several interim documents and also provided the project team with feedback and guidance throughout this process.

- As part of the process, the project team developed several interim documents, including:

  - Descriptive Profile – a summary of factual information describing the Fire Department and the delivery of pre-hospital emergency care in particular.

  - Issues List – a preliminary summary of the issues that are addressed in this document.

  - Draft Final Report – this was reviewed with the steering committee to ensure that our factual information was correct and to ensure that we had identified and addressed key issues.

The project team also worked with the Fire Department to develop an understanding of the community that Plano currently is, as well as to develop an

understanding of where the community is headed in terms of demographics. The following provide some summary information about the community[1]:

Area	Plano	Collin County
2005	250,096	698,851
2025	270,000	1,046,919
% Change	7.96%	49.8%

The preceding exhibit shows that the significant growth that has been the primary driver in the City of Plano has essentially ceased, with annual growth rates of less than 0.5% over the next 20 years. At the same time, Collin County is forecast to continue to grow rapidly over the time period, with growth rates in excess of 2% per annum. An issue which is likely to have more significance for the City of Plano is the projected shift in the age demographics for the community and the resulting change in the median age for the community which will move from 35.8 years in 2005 to 39.1 years in 2007. This is shown, in the table, below[2]:

	2005		**2025**	
Age Category	**Number**	**Percent**	**Number**	**Percent**
Under 5 years	17,225	6.8%	19,980	7.4%
5 to 9 years	16,800	6.7%	18,630	6.9%
10 to 14 years	20,015	8.0%	16,740	6.2%
15 to 19 years	17,407	6.9%	15,660	5.8%
20 to 24 years	16,539	6.6%	11,610	4.3%
25 to 34 years	35,493	14.1%	38,070	14.1%
35 to 44 years	45,257	18.0%	31,860	11.8%
45 to 54 years	41,623	16.5%	29,160	10.8%
55 to 64 years	24,953	9.9%	38,340	14.2%
65 years and over	16,336	6.5%	49,950	18.5%
Total	**251,648**		**270,000**	
Median Age	**35.8 years**		**39.1 years**	

The impact of these demographic changes is a significant area of concern for the entire government of the City of Plano. The key issues include:

[1] Information taken from "A Future of Excellence: A Strategic Plan for the Plano Fire Department 2007 – 2011," Appendix B. Information in the table was derived from various sources including the US Census' 2005 American Community Survey and the North Central Texas Council of Governments.

[2] See the preceding footnote.

- A significant change in the proportion of those who are 65 and over. This age cohort is expected to increase from 6.5% of the population to more than 18.5% in 20 years. At the same time, the age cohort for 55 to 64 years increases from 9.9% to 14.2%. These age groups are major users of emergency medical services, the focus of this study.

- This change is largely derived from a corresponding decline in the age cohorts between 35 and 54 years of age which drop from 18.0% to 11.8% and from 16.5% to 10.8% respectively.

- The other age cohorts do not show significant changes over the time period 2005 – 2025.

While the City of Plano is essentially "land-locked" and will not grow through any significant annexation, workload will grow and change for the Fire Department (and other services in the City) over the next 20 + years as the City ages.

EXECUTIVE SUMMARY

This section of the introduction provides an Executive Summary of our findings and recommendations. In addition to the improvement opportunities identified by the project team, this section also provides a summary of the key strengths that the project team identified in the course of our work with the Fire Department. These relate to the delivery of pre-hospital emergency medical care, as delivered by the PFD:

- The Plano Fire Department has ardently worked to become accredited by the Commission on Fire Accreditation International as well as the Commission on Accreditation of Ambulance Services (CAAS). This illustrates a commitment to continual internal evaluation and pursuit of best practices in fire and EMS.

- The PFD has an excellent system of EMS Medical Control and well documented and detailed emergency medical directives. The EMS Director and his team take an active role in the delivery of continuing education, paramedic training, and quality assurance and control.

- The PFD has implemented an electronic patient care reporting system (EPCR) to automate the documentation of patient care, improved the efficiency of the EMS billing, and has begun to develop performance metric to assess EMS delivery and performance.

- The PFD has an excellent field-training program for new paramedics, which includes multiple points for observation, a phased training approach culminating in a "mega-code", and extensive interaction between preceptors, new paramedics, and the Medical Director.

- The Plano Fire Department has developed a strategic plan, which identifies clear goals and objectives for the future and opportunities to enhance fire, rescue, and emergency medical care.

- The PFD is actively involved in research on pre-hospital emergency care regionally and nationally including participation in CARES, NAEMS, and Eagles. The Department also continues to explore opportunities to learn about best practices from other Departments and service providers.

In addition to these strengths, the project team has noted the following opportunities for improvement or resource needs in order to maintain the high service levels targeted by the Fire Department and the City of Plano. These are summarized in the table, below:

Report Section	Major Findings	Primary Recommendations	Fiscal Impact
2.3	The current organizational structure of the EMS division is appropriate as an oversight function.	Make no changes to the organizational structure of the EMS and Training Division as it relates to presence of a dedicated EMS unit or to the dedication of two command staff positions to this unit.	N/A
2.4	EMS operational oversight and field supervision an be enhanced by increasing the involvement of Battalion Chiefs.	Increase the responsibilities of the on-duty Battalion Chiefs to including: random non-emergency EMS incident response, all emergency EMS incidents response, additional management of system resources, follow-up with patient families on a selection of EMS calls to assess service levels and improvement opportunities, policy review and evaluation, and follow-up on complaints.	N/A

Report Section	Major Findings	Primary Recommendations	Fiscal Impact
3.1.3	The Plano Fire Department should utilized additional performance metrics to evaluate EMS operations.	The PFD should contact its electronic patient care vendor to evaluate the feasibility of incorporating additional performance measures into a dashboard reporting system. If this is not possible, the PFD should explore purchasing a new EPCR with these capabilities. See the body of this report for recommended performance measures. The Department should also involve public safety communications in capturing additional performance data in the computer aided dispatch system.	N/A
3.3	There are opportunities to improve the current approach to paramedic staffing and deployment.	The Plano Fire Department and the City should change its approach to paramedic staffing by requiring 1 paramedic FRS position on each engine, truck, and ambulance unit per shift. All other positions should be made EMT level positions. This approach has the least amount of impact on paramedic response capabilities and will improve paramedic utilization. These personnel can also more effectively be rotated between the ambulance units and the engine and truck companies. Finally, this approach will reduce the burden of EMS educators and trainers to meet paramedic certification requirements. The PFD and the City should take a phase approach to making this change to mitigate the impact on employee compensation. Each year, the City should change the ordinance to reduce the top step paramedic certification pay for Officers, Apparatus Operators, and non-practicing FRS paramedics by one step.	$1.2 million over the next 4 years

Report Section	Major Findings	Primary Recommendations	Fiscal Impact
3.4	The PFD should not implement an ambulance driver position or ambulance pay.	The Plano Fire Department should not adopt the Ambulance Driver Position option or Ambulance Pay option under consideration. To address equity and workload concerns and to enhance paramedic and EMT exposure to various patient care situations, the Department should rotate personnel to ensure 30% of all FRS shifts are worked on the ambulance units.	N/A
3.6	The Plano Fire Department's EMS protocols are consistent with medical research, clear, and concise. Additional steps can be taken to improve regional EMS service delivery.	Continue the process of developing a committee of local physicians and nurses to review PFD EMS protocol and discuss issues as they arise. This committee should meet at least once yearly and on an ad hoc basis.	
3.7	Infection control and safety programs are consistent with industry standards.	The Fire Department should continue its own internal policies and vigilance regarding infection control for line personnel. In light of the recent elimination of certain key provision from the Ryan White law, the Fire Department should, in conjunction with the medical director and the hospitals in Plano, continue to work to ensure proper notification and cooperation between the Department's Infection Control Officer and the hospitals who may be treating the source-patient in an infection exposure situation.	N/A
3.8	The Department utilizes a number of best practices related to EMS training and QA/QC. However, there are opportunities for improvement.	Implement the recommendations as detailed on page 69 of this report. Purchase additional simulation equipment for EMS training and consider regionalization and leasing of a training facility.	$560,000 for additional training resources recoverable within 2 years if regionalized .

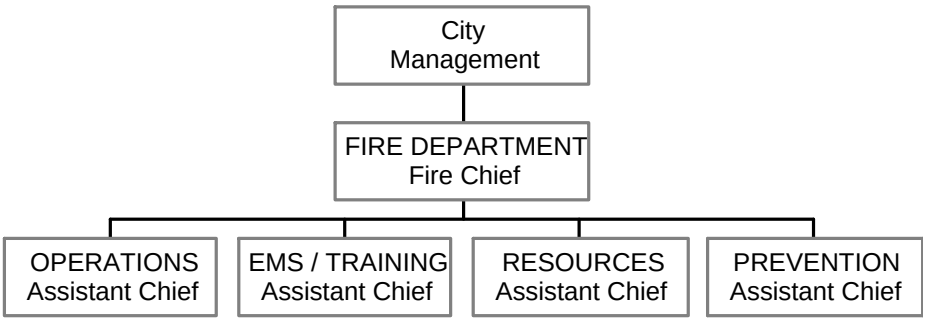
The next chapter focuses on the organization and management issues related to the EMS and Training Division as they relate to the delivery of emergency medical services.

2. ANALYSIS OF THE ORGANIZATION OF EMS IN THE PLANO FIRE DEPARTMENT

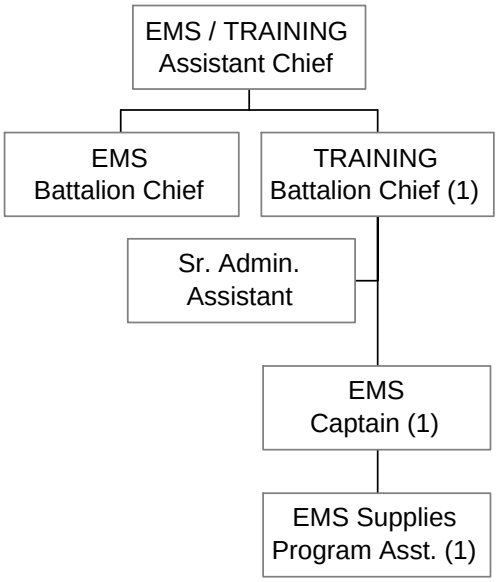
This chapter provides the project team's evaluation of the organization of the emergency medical services program within the Plano Fire Department. Issues discussed include the appropriate level of supervision and management within the EMS unit in the EMS and Training Division as well as the organization of functions that support the provision of pre-hospital care in Plano.

1. CURRENT ORGANIZATION OF THE EMS DIVISION

The Plano Fire Department is organized along both functional and support lines with the Fire Chief as the overall manager of the Department. Four Assistant Fire Chiefs provide management over operational, support and functional units as shown, below:



The EMS / Training Division is broken into two functional units, each managed by a Battalion Chief. The organization chart, which follows, provides a detailed organizational structure of the EMS portion of the Division:



It should be noted that this organizational structure requires that the EMS command staff interact regularly with the Operations command staff. The primary allocation of responsibility between the two Divisions is as follows:

- **Operations** is responsible for the day-to-day activities of the personnel. This includes immediate reaction to performance, deployment of staff, responding to calls for service, etc.

- **EMS / Training** is responsible for providing initial and continuing education for both EMT-B's and Paramedics. The EMS Division is also responsible for the monitoring of quality control / assurance for PFD personnel functioning as medical responders.

The key roles and responsibilities for the personnel in the EMS Division are summarized in the Descriptive Profile that is provided as an Attachment to this Final Report. In summary, the personnel are responsible for the following:

- **Assistant Chief** – manages and directs all EMS and Training division support services. This includes interacting with the medical control physician to ensure that communication is open in both directions.

- **Battalion Chief** – is responsible for the day-to-day management of all EMS programs. This includes the direct supervision of the EMS Captain as well as participation in a number of EMS programs including quality assurance, training development for EMS and other elements of the EMS services.

- **EMS Captain** – is responsible for overseeing all EMS supplies and medications. This includes the distribution and re-supply of controlled substances onto front line units in the PFD. The Captain supervises the FRS responsible for EMS supplies.

- **EMS Supplies Program Assistant** – this position (classified as an FRS) is responsible for overseeing, restocking and distributing all EMS supplies within the PFD. This includes inventory management and the distribution of supplies to units in the field.

It should be noted that none of these positions have direct, day-to-day management responsibility for oversight of the line staff who provide fire and EMS services in the City of Plano. Rather, this Division is responsible for the management of EMS services and programs to ensure delivery at the highest possible level.

2. THE PROJECT TEAM ESTABLISHED CRITERIA FOR THE EVALUATION OF THE EMS PROGRAM WITHIN THE PFD.

In order to assess the overall organizational structure of the EMS Division, the Matrix Consulting Group developed several criteria. These criteria can be applied to almost any organizational structure – not simply this Division. These criteria include:

- **Program Oversight** – Is the program large enough or of a critical nature so as to warrant stand-alone management? Could these management tasks be handled through some other organizational approach? Does the organizational structure negatively impact overall program delivery?

- **Operational Oversight** – Are direct services managed and supervised on a day-to-day basis in a manner that ensures effective service delivery? Are the programmatic elements fully integrated into operations? Does the organizational structure negatively impact operational oversight?

- **Quality Control and Accountability** – Does the agency provide for effective quality improvement for the services provided by the program? Can oversight, accountability, training and discipline be effectively utilized to ensure that the services are provided at the highest possible levels? Does the current organizational structure interfere with holding staff accountable?

- **Support Services and Operational Services** – Does the current organizational structure provide for proper oversight and provision of both support and operational services? Are these functions separated where necessary – i.e., delivery of narcotics, assessment of quality of service delivery, etc. – to ensure that services are delivered at high levels?

The project team provides an assessment of the current organizational structure of the EMS functions in the PFD using these criteria. These analyses are presented in the following sections – the first focusing on the administrative oversight element and the second focusing on the way in which EMS is managed in the field by Operations staff.

3. THE CURRENT ORGANIZATIONAL STRUCTURE OF THE EMS DIVISION IS APPROPRIATE AS AN OVERSIGHT FUNCTION.

The Plano Fire Department's EMS unit is focused on providing oversight of the Fire Department's emergency medical services system. As has been discussed elsewhere in this report, this oversight includes ensuring that sufficient paramedics are available and well trained, that paramedics maintain their certifications through attainment of sufficient continuing education credits and that the overall quality of pre-hospital medical care provided by the PFD is of the standard of care expected by the community, City government, staff and the Department's medical director. The exhibit, which follows, provides the project team's assessment of the current administrative oversight team's organizational structure:

Criteria	Findings
Program Oversight	• The current organizational structure provides direct oversight of the EMS programs in the Fire Department. • Emergency medical service is the single-most frequent service provided by the PFD – and represents the majority of the person-hours dedicated to service delivery by the Fire Department. • The Assistant Chief is splitting attention between the EMS program and training programs for the Fire Department (both fire and EMS related). The Assistant Chief will participate in major policy decisions, quality assurance reviews and will work with Operations command staff. • The Battalion Chief provides direct program management for EMS. This includes interaction with command staff in the Operations Division regarding specific paramedics or systemic issues. This position also coordinates skills training for EMS providers in the Department.

Criteria	Findings
Operational Oversight	• This is split from the EMS unit and is handled by command staff in the Operations Division of the Fire Department. This provides for effective separation of responsibility for overseeing the program and for ensuring that paramedics are held accountable and that they maintain certifications necessary to practice pre-hospital medicine. • The division of labor between the EMS and Operations Divisions also provides some separation in terms of narcotics, drugs and other supplies – thereby providing checks and balances on these items. • EMS command staff have no responsibility for field oversight or for the utilization of paramedics and EMTs as operational assets. These decisions are made by the shift commanders (Battalion Chiefs) and the Assistant Chief for Operations. • The current organizational structure of the EMD Division contributes to this approach.
Quality Control and Accountability	• While the Operations Division is responsible for staffing, deployment and day-to-day service delivery, the EMS Division – in conjunction with the medical control physician and the continuing education staff working for the physician – is responsible ensuring that paramedics (individually and as a group) are providing the highest level of service possible. • The organizational structure also provides checks and balances here with the Operations Division command structure. • The Operations Division does not currently have a methodology nor the resources to directly participate in the assessment of EMS quality in the City of Plano. This is the focus of the EMS Division. • Both Divisions work closely with one another to hold paramedics and EMT's accountable for service issues, to ensure that training is provided to all personnel on a timely basis and to address any necessary modifications to services, service delivery approaches or deployment. • The current organizational structure of the EMS Division contributes to the success of this approach.
Support Services and Operational Services	• There is a clear distinction between operations and support services provided in the Fire Department. Several Divisions have been created in the Department in order to facilitate a proper focus on critical support functions. • The Captain and FRS positions are directly associated with providing the support services (narcotics, medication and supplies control). • The current structure mimics that found in other support functions in the Fire Department.

The project team's assessment of the current organizational structure for the EMS Division raises the following points:

- The Division has two positions that are entirely support in nature – the EMS Captain and the FRS position assigned to materials control for EMS. These positions are critical and would not be altered if any change was made to the organizational structure.

- The current organizational structure provides, overall, institutional focus on a critical program – emergency medical services – that would not be present in the Fire Department without this structure.

- The current approach also provides for effective checks and balances between EMS oversight and operational concerns.

- The current structure does not provide for dedicated field supervision for emergency medical services.

Given our findings, the Matrix Consulting Group does not recommend that any changes be made to the current organizational structure in the EMS Division. The current structure provides clear benefits to the organization and to the overall delivery of pre-hospital services in the City of Plano.

Recommendation: Make no changes to the organizational structure of the EMS and Training Division as it relates to presence of a dedicated EMS unit or to the dedication of two command staff positions to this unit.

4. THE PROJECT TEAM EVALUATED ORGANIZATIONAL ALTERNATIVES FOR EMS OPERATIONS MANAGEMENT.

The Plano Fire Department has two Battalion Chiefs assigned to provide general oversight for shift command in the Operations Division. These two positions, per shift, report to the Assistant Chief for Operations and are responsible for all aspects of operations, staffing and deployment of personnel in the Fire Department. The current role of the Battalion Chiefs as they relate to pre-hospital care include the following:

- Ensuring that the daily schedule and roster provides for the deployment of paramedics on all front-line apparatus in the Plano Fire Department.

- Providing direct incident command at major incidents with an EMS component (mass casualty, technical rescue, confined space rescue, extrication, and structure fire). Battalion Chiefs do not typically respond to “routine” medical calls – no matter how serious they are in nature – unless there are special circumstances as noted above.

- The Battalion Chiefs have no direct or on-going responsibility for providing quality control or direct medical supervision. They are not currently involved in the control or distribution of controlled substances, other medications or supplies.

- The Department does not have any specific on-shift individuals responsible for the oversight of EMS services as a separate program.

The approach to providing EMS shift command varies across the United States and in the Metroplex. The project team finds that, among communities the size of Plano and larger, it is common to maintain shift command for EMS services. These positions typically have responsibilities that are a combination of roles including chart review, quality control, medication coordination and so on. The project team considered several alternatives to address this issue, including the following:

- **Maintenance of the status quo**. This model would remain essentially the same as the approach that is currently in effect with perhaps changes mentioned elsewhere in this report.

- **Maintenance of the current approach with some enhancements**. These enhancements could include the following:

  - Increasing the involvement of the Battalion Chiefs in a range of activities in support of pre-hospital medical services. These roles could include:

    - Distribution of controlled substances, other medicines and EMS supplies on shift to the medical units in their respective Battalions. This would reduce the need for the current EMS Captain to restock units during non-scheduled hours. This would also add another level of accountability for these materials.

    - Increase their response to serious medical calls beyond those that involve other special circumstances (i.e., extrication, technical rescue, multiple injuries, structure fire). The purpose of this would be to ensure that the system functions as it is intended to. Battalion Chief responses could be set for a range of call types including:

      - Working cardiac arrest or other resuscitation.

      - Drowning.

      - Vehicle accident with serious injuries.

      - Any call where the ambulance will have a delayed response.

    - Provide for Battalion Chief response to several randomly selected emergency medical calls for service, independent on the nature of the call, throughout their shift.

    - Conduct follow-up contacts with patients and their families to determine if there are opportunities to improve the level of care

provided by the PFD. These calls could be made by the Battalion Chief on the second following shift to allow for some time to have elapsed following the call and to provide for some checks and balances in the contact and reporting of any issues.

- **Creation of an "EMS-1" type position at the rank of Captain that would have wide ranging shift-based EMS responsibilities**. This position would have the following responsibilities:

  - This position would be new shift position. This Captain would be assigned to a "fly car" as a response vehicle to enable them to work around the City.

  - This Captain would be assigned to report to the EMS Battalion Chief but would also take direction from on-duty Battalion Chiefs on their shift.

  - Provision of chart review for serious cases for the preceding shift – this would provide near immediate feedback and would also provide for some checks and balances in identification and reporting of issues.

  - Distribution of controlled substances, other medications and supplies to the medical units on their shift. This would include active participation in auditing the use, age and quantity of medications and supplies on the units on their shift.

  - Response to all major medical calls – both those types that already receive a Battalion Chief response due to their special nature and to those that are of a serious nature that currently do not routinely receive a Battalion Chief response, including:

    - Working cardiac arrest or other resuscitation.

    - Drowning.

    - Vehicle accident with serious injuries.

    - Any call where the ambulance will have a delayed response.

  - In addition, the EMS Captain would be expected to respond to structure fires and other major non-EMS incidents to provide support to the Battalion Chief as a safety officer, to manage accountability and rehabilitation, function as the EMS section chief in the incident command system or any other roles as assigned. In this capacity, they would not be expected to routinely direct other Captains.

- **Creation of a new classification of paramedic on shift**. This position would have the following responsibilities:

  - This position would be new shift position. This paramedic would be

assigned to a "fly car" as a response vehicle to enable them to work around the City.

- This paramedic would be assigned to report to the EMS Battalion Chief but would also take direction from on-duty Battalion Chiefs on their shift.

- Provision of higher levels of medical care on-scene for certain call types. This might include the authority to distribute or administer certain drugs or to initiate certain protocols.

- Provision of chart review for serious cases for the preceding shift – this would provide near immediate feedback and would also provide for some checks and balances in identification and reporting of issues.

- Distribution of controlled substances, other medications and supplies to the medical units on their shift. This would include active participation in auditing the use, age and quantity of medications and supplies on the units on their shift.

- Response to all major medical calls – both those types that already receive a Battalion Chief response due to their special nature and to those that are of a serious nature that currently do not routinely receive a Battalion Chief response, including:

  - Working cardiac arrest or other resuscitation.

  - Drowning.

  - Vehicle accident with serious injuries.

  - Any call where the ambulance will have a delayed response.

- In addition, this paramedic would be expected to respond to structure fires and other major non-EMS incidents to provide support to the Battalion Chief as a safety officer or to manage accountability and rehabilitation. In this capacity, they would not be expected to direct superior officers.

The exhibit, that follows, provides the project team's analyses of each of these options. This analysis addresses the benefits and disadvantages of each option as well as highlighting any major differences with the current approach that each represents.

Benefits	Challenges	Comparison Points
Enhancement of Current Approaches		
• Increases the PFD's focus on EMS issues on the shift. • Makes shift Battalion Chiefs responsible for overseeing the service delivery on their shift. • Increases the accountability of the command staff in Operations for EMS services. • Adds a layer of checks and balances to controlled substance and other supplies distribution. • Reduces the need for the EMS Captain to restock critical supplies while off-duty. • Allows increased management focus on the paramedic engine company program. • Most cost effective way of providing for on-shift improvement. • Would underscore current efforts at creating checks and balances between EMS and Operations.	• Increased response expectations for Battalion Chiefs would increase their workload and reduce their availability for other assignments. • Does not provide any additional resources for quality control, issues identification, medical instruction, etc. • Could benefit from additional time by medical director and nursing staff conducting ride alongs with PFD units to observe field implementation of protocols.	• Makes greater and more focused use of existing resources (Battalion Chiefs) in the EMS area. • Would not require any positions to be eliminated and would require the creation of a single new position.
Creation of "EMS-1" Captain		

Benefits	Challenges	Comparison Points
• Increases focus of PFD on EMS issues on shift. • Identifies specific supervisory linkage between EMS and Operations. • Would add another level of checks and balances in controlled substance management. • Would provide shift-based re-supply position linked only to EMS. • Reduces the need for the EMS Captain to restock critical supplies while off-duty. • Allows increased management focus on the paramedic engine company program.	• With rank of Captain, would be in chain of command under the Battalion Chiefs. • Would blur checks and balances between EMS and Operations. • Would require the creation of three new Captain positions. This would have an annual cost of $343,746 including salaries and benefits. This is based on a base of $89,245 and an average actual benefit cost of $25,336 per position. • Could benefit from additional time by medical director and nursing staff conducting ride alongs with PFD units to observe field implementation of protocols.	• Many roles of typical "EMS-1" Captain are fulfilled in other ways in the PFD (QA/QC; controlled substance management, training development, precepting new paramedics). • These support roles would not be appropriate for assignment to a shift Captain as they require continuity and availability during business hours.
Creation of New Medic Classification		
• Increases focus of PFD on EMS issues on shift. • Identifies specific oversight linkage between EMS and Operations. • Could add another level of checks and balances in controlled substance management. • Would provide shift-based re-supply position linked only to EMS. • Would provide medics and EMT's a peer that they can go to with medical questions.	• May reduce effectiveness of medical control if line personnel tend to focus on the "super medic" for answers to their questions. • Would potentially reduce effectiveness of medics in general if they choose to wait for the "super medic" to arrive on scene before initiating aggressive treatments. • If these medics are provided with higher level of training, would there be a tendency to extend field treatment times rather than transporting the patient to nearby hospitals? • Could also reduce the efficacy of the ALS-fire apparatus as those units wait for the arrival of the roving medic. • Would require the creation of at least three new Firefighter-Paramedic positions. This would have an estimated cost of $251,397 including $64,299 in salaries and $19,500 in average benefits per position.	• Many roles of typical "EMS-1" position are fulfilled in other ways in the PFD (QA/QC; controlled substance management, training development, precepting new paramedics). • These support roles would not be appropriate for assignment to a shift Medic as they require continuity and availability during business hours. • The PFD already has senior medics who work as preceptors on each shift. • The preceptors could take on some of these roles of increased involvement, but in many cases this has already happened.

The Fire Department should take immediate steps to increase the involvement of the shift Battalion Chiefs in the management and supervision of EMS services in the City. The project team recommends the following specific changes to current approaches:

- **Battalion Chiefs should be included on all life threatening calls for service as triaged by the dispatch center.** The Battalion Chief's role on these calls is not to provide medical supervision, but rather to provide for system management and oversight, to support the victim's family, to provide for scene safety and other oversight roles. These roles do not require the Battalion Chief to be a paramedic – they rely on these mid-level managers as the connection between the line employees who are delivering the EMS services and the Department's and City's senior management team.

- **Battalion Chiefs should be dispatched to non-life-threatening calls for service on a random basis.** In order to be enhance management oversight EMS, the Battalion Chiefs must also respond to some of the less serious calls for service that make up the majority of EMS calls. The project team recommends that these responses approximate 3% to 5% of calls for service per week. These should span the entire shift.

- **The following shift Battalion Chief should make contact with the victim or their family to ascertain whether the PFD could have provided enhanced services on the call.** The Fire Department should make one attempt to contact the victim's family to ensure that they view patient care as a positive experience and to determine if there were other steps that the Fire Department could or should have taken to improve their support of the victim and their family. Issues should be cataloged and summarized and passed on to EMS command, Operations command, EMS training staff and to the Medical Director for inclusion in future training. While it is not practical to contact all victims, the PFD should target initiating contact with at least 25% of calls – these should be randomly selected, but should include 100% of life threatening calls.

- **Battalion Chiefs should take on additional responsibilities to ensure the efficient delivery of emergency medical services including** serving as a field representative of the Operational Medical Director with the authority as approved, assisting with hospital status (reroute) and issues, following up on complaints about patient care, and reviewing and updating policies and procedures related to EMS delivery.

These changes would require some changes in policies as they relate to controlled substance distribution and call responses. In addition, there would be

modifications required for the Battalion Chief vehicles to allow them to carry controlled substances and other medications in a secure and climate controlled environment.

Recommendation: The Matrix Consulting Group recommends that the Plano Fire Department increase the responsibility of the current Battalion Chiefs. There is no estimated recurring cost associated with this recommendation.

3. ANALYSIS OF EMS OPERATIONS

This chapter presents the project team's analysis of the current level of service provided by emergency medical services personnel within the City of Plano. Issues addressed include: the deployment of resources, the utilization of paramedic personnel within the system, response times to emergency incidents, and the efficacy of emergency medical protocol for critical EMS incidents.

1. THE DEVELOPMENT OF SERVICE LEVEL TARGETS IS A CRITICAL FIRST STEP IN EVALUATING EMS SYSTEM PERFORMANCE.

An important first step in evaluating any emergency response system is the development of service level performance objectives. The first section, which follows, describes current service level targets utilized by the Plano Fire Department.

(1) The Plano Fire Department Has Established Some Service Level Objectives for EMS Provision.

As part of its strategic planning process, the Plano Fire Department has established a number of goals, objectives, and performance measures for each of its divisions. The following points describe the goals and objectives established for the Department which relate to EMS performance and service delivery within the City of Plano:

- Respond to emergencies in 6 minutes and 59 seconds or less 90% of the time.
- Achieve a turnout time of 1 minute or less 70% of the time.
- Achieve a cardiac arrest save rate of 15%.
- Measure performance and operational readiness with written test, skills test and customer surveys.
- Provide and support a comprehensive program of medical education that includes:

- Initial paramedic training
- Continuing medical education
- Attend local, state and national conferences
- Internships
- Annual EMT & Paramedic skills and Protocol testing
- Company level EMS performance drills
- MCI drills
- Research CCMP

• Provide a comprehensive program to monitor, maintain and distribute EMS supplies, equipment, medications represented by:

- Weekly supply order distribution
- Timely replacement of expiring medications and supplies
- Contract renewals
- Equipment replacement schedules
- Provide security, tracking, and distribution of controlled medications.

The Department has established additional objectives, however, these are more task specific and relate to the administration and oversight of the EMS program. The next section discussed research on the effectiveness of EMS system design that can be utilized to identify additional performance objectives for the PFD.

(2) The Majority of EMS Research Focuses on Improving Cardiac Arrest Survivability.

Research on pre-hospital emergency medicine is somewhat limited. However, there have been a number of important studies of pre-hospital emergency medical services worth discussing. The landmark Ontario Pre-Hospital Advanced Life Support (OPALS) Study is the largest pre-hospital study yet conducted worldwide with some 17

cities and 18,000 cases included overall. The study was designed to evaluate the impact of pre-hospital interventions on four major groups of adult patients: 1) cardiac arrest, 2) major trauma, 3) respiratory arrest, and 4) chest pain in 17 Ontario cities. The cardiac arrest component of the study was comprised of three sequential phases. Phase I, 36 months of baseline basic life support with defibrillation (BLS-D) EMS, demonstrated the importance of bystander CPR in patient survival in 4,690 patients. Phase II demonstrated, in an additional 1,641 patients, that the inexpensive optimization of an existing defibrillation program could lead to significant improvements in survival. Phase III, 36 months with a full ALS paramedic program, enrolled an additional 4,247 patients and showed no incremental benefit in survival from ALS but was the first study to quantify the importance of the links in the cardiac arrest chain of survival.

The major trauma component enrolled 2,884 patients with ISS > 12 during two 36-month periods before and after the introduction of ALS programs in the OPALS Study cities and found no benefit from ALS interventions. The respiratory distress aspect of the study enrolled 8,138 patients presenting with shortness of breath secondary to a variety of conditions including congestive heart failure, chronic obstructive pulmonary disease, asthma, and pneumonia. According to Steill:

> This study demonstrated an important decrease in patient mortality and improvement in numerous secondary outcomes in the ALS phase. The chest pain component has enrolled 13,000 patients and preliminary results indicate a very important reduction in mortality during the ALS phase. The OPALS investigators have also been very active in unique work to evaluate the quality of life of cardiac arrest survivors as well as other important findings[3].

Steill et al. also evaluated the results of the OPALS study to identify modifiable factors for cardiac arrest survival. Associations between multiple patient and EMS

[3] Ian G. Stiell: Final OPALS Report on the effect of ALS over BLS with AED in Cardiac Arrest Survival. Canadian Health Service Research Foundation: Ontario Pre-hospital ALS Study Feb 2005

factors and survival to discharge were assessed using univariate and stepwise logistical regression. The authors found that "patient survival may be improved by optimization of EMS response intervals, bystander CPR, as well as first-responder CPR by fire or police." [2]

Callaham and Madsen conducted a prospective observational study of adults in out-of-hospital cardiac arrest treated by both first responders and paramedics in an urban EMS systems between July 15, 1992 and May 27, 1993. The authors found that "faster response by medics, or any individual ALS intervention other than first responder defibrillation, demonstrated no benefit in this urban population with short intervals between responder arrivals. The benefit of rapid ALS backup to first responder/defibrillators needs further study in other system." [3]

Other studies have focused on the optimal defibrillation response intervals for maximum cardiac arrest survival. A study by De Maio et. al. utilized logistical regression and the results of the OPALS study to study optimal defibrillation response time. The authorized concluded that "the 8-minute target established in many communities is not supported by our data as the optimal EMS defibrillation response interval for cardiac arrest. EMS system leaders should consider the effect of decreasing the 90th percentile defibrillation response interval to less than 8 minutes."[4]

---

[4] Stiell et. al.: Modifiable Factors Associated With Improved Cardiac Arrest Survival in a Multicenter Basic Life Support/Defibrillation System: OPALS Study Phase I Results. Presented at the Society for Academic Emergency Medicine Annual Meeting. Washington DC May 1997

[5] Callaham M, Madsen CD: Relationship of timeliness of paramedic advanced life support interventions to outcome in out-of-hospital cardiac arrest treated by first responders with defibrillators. Ann Emerg Med May 1996; 27:638-648

[6] De Maio, Stiell, Wells, and Spaite: Optimal defibrillation response times for maximum out-of-hospital cardiac arrest survival rates: Ann Emerg Med 2003:42:242

Overall, the research on the effectiveness of ALS EMS programs is somewhat limited. While some research indicates that ALS responders have an impact on patient outcomes (e.g. respiratory distress), other studies indicate that rapid defibrillation, CPR, and early detection in the field are the most important factors in cardiac survivability. As indicated by the EMS subcommittee report of the Emergency Medical Services: At the Crossroads report, "although there is widespread belief in the EMS community that strong medical direction is need to improve performance, this has never been conclusively demonstrated."[5]

(3) The Plano Fire Department Should Utilize Additional Service Level Objectives for Assessment of the EMS Program.

The Journal of Emergency Medical Services (JEMS) conducts an annual survey of EMS systems across the United States to document how agencies measure performance. Survey respondents were asked what clinical measures they routinely track. Not surprisingly, the most common clinical measures were related to cardiac arrest. Much of today's system design and the impetus for strict response time reliability stem from attention to improving the out-of-hospital survival of cardiac arrest patients. Although it represents a small fraction of the EMS call volume, it has defined measurements (i.e., Utstein Template), and EMS has a proven influence on survival.7 Three-quarters (77.1%) of cities report tracking cardiac arrest data. A quarter (25.4%) report tracking a bystander CPR rate, with an average 26.0% receiving it prior to arrival.

[7] Committee on the Future of Emergency Care in the United States Health System: Emergency Medical Services at the Crossroad: Institute of Medicine 2001

Return of spontaneous circulation (ROSC) is measured by a third (33.8%) of respondents with a reported average ROSC rate of 20.1%. Another predictor, conversion by an AED to a viable rhythm prior to ALS arrival, is tracked by 20.4% with a reported rate of 8.31%. Only 16.2% of cities report monitoring all three indicators. In addition to cardiac arrest, other monitored clinical measures included advanced airway management (68.8%), such as intubation success; trauma management (56.3%), such as scene times and pain management (25.0%).

Survey respondents were also given an option to input other clinical measures not asked in the survey, and responses included compliance to protocols related to stroke and STEMI (ST-elevation myocardial infarction) patients, and BLS compliance with administering aspirin or albuterol. Several indicated a heavy emphasis on retrospective review of individual calls for errors or compliance rather than measuring system wide performance. In addition to response times and clinical indicators associated with call requests, another approach to consider when developing an organization's scorecard is to look at where the money is spent. Designing measures that provide a glimpse at achieving desired outcomes in these areas are beneficial and complement any clinical measure.

In developing a list of performance measures for the Plano Fire Department, the Matrix Consulting Group utilized best practices from work with agencies across the country as well as recommendations made by the EMS Performance Measures Project co-sponsored by the National Association of State EMS Officials and the National Association of EMS Physicians. Given the research limitations and the unknown impact of various EMS interventions, the project team tried to focus on issues, which are under the control of the PFD (e.g. intubation success rates, adherence to protocol, etc). The

following is a description of the reasons for each type of measure, as well as specific metrics, which may be incorporated into a dashboard application.

Recommended EMS Performance Measures for the Plano Fire Department

Function / Area	Measure	Target	Frequency	Comment
Operations / Response Times	1 minute dispatch processing time for code 3 (priority 1) emergency incidents.	90%	Daily	This measure is based on NFPA 1710 and is a best practice nationally. This measure should be part of an automated dashboard.
	1 minute reflex time for code 3 (priority 1) emergency incidents.	90%	Daily	This measure is based on NFPA 1710 and is a best practice nationally. This measure should be part of an automated dashboard.
	6 minutes of drive time for the first arriving EMS resource to the scene for code 3 incidents.	90%	Daily	This measure is based on the Department's strategic plan. This measure should be part of an automated dashboard.
	7 minutes 59 seconds aggregate response time from first PSAP contact to arrival on scene of first unit for code 3 incidents	90%	Daily	This cumulative response time measure based on the previous thee response time metrics. This measure should be part of an automated dashboard.
	2-minute elapsed time from arrival on scene by first unit and time at patient for code 3 (priority 1) incidents.	90%	Daily	This measure is a BMP recommended by the project team. This measure should be part of an automated dashboard.
Out of Hospital Cardiac Arrest	Mean interval time between 911 initiation and first attempt at defibrillation	Trend	Monthly	This is a BMP recommended by the project team and part of the EMS Performance Measure project. This is not a target but a metric that the PFD should monitor and use as a management tool.
	The 90th Percentile of time between 911 initiation and first attempt at defibrillation	Trend	Monthly	This is a management tool to minimize the time to first attempt at defibrillation. While no target is recommended, the PFD should monitor the trend in performance.

Function / Area	Measure	Target	Frequency	Comment
	Mean time from 911 initiation until initial analysis of EKG rhythm	Trend	Monthly	Similarly, this a trend metric focused on minimizing the time to initial analysis of EKG rhythm.
	Percentage of Patients receiving bystander CPR prior to EMS arrival	Trend	Quarterly	This is also a trend metric focused on evaluating the use of pre-arrival instructions and community CPR programs.
	The 90th Percentile of times between 911 initiation and initial analysis of EKG rhythm	Trend	Monthly	This is not a target but a metric that the PFD should monitor and use as a management tool.
	Percentage of patients receiving defibrillation prior to arrival of EMS.	Trend	Monthly	This is not a target but a metric that the PFD should monitor and use as a management tool.
	Percentage of patients experiencing Return of Spontaneous Circulation (ROSC) prior to arrival at hospital.	Trend	Monthly	This is not a target but a metric that the PFD should monitor the effectiveness of EMS care.
	Percentage of patients experiencing cardiac arrest prior to arrival of EMS surviving to ED Discharge.	Trend	Monthly	This is not a target but a metric that the PFD should monitor the effectiveness of EMS care.
Trauma	Percentage of potential trauma patients appropriately triaged as trauma according to protocol/criteria	Trend	Monthly	This is not a target but a metric that the PFD should monitor and use as a management tool.
	Mean on-scene time for code 3 incidents.	Trend	Monthly	This is not a target but a metric that the PFD should monitor and use as a management tool to identify issues with extended scene times.
	90th percentile on-scene time for code 3 incidents.	Trend	Monthly	This is not a target but a metric that the PFD should monitor and use as a management tool to identify issues with extended scene times.

Function / Area	Measure	Target	Frequency	Comment
	Percentage of trauma patients whose blood pressure upon facility arrival was 1). Greater, 2) Lesser and 3) no-change from original blood pressure evaluation.	Trend	Monthly	This is not a target but a metric that the PFD should monitor the effectiveness of EMS care for trauma patients.
Chest Pain Management	Percentage of patients with suspected cardiac chest pain who received 12-Lead EKG application.	100%	Daily	This is a recommended target to measure chest pain care and should be used as a management tool. Should be incorporated into an automated dashboard.
	Percentage of patients with suspected cardiac chest pain received aspirin.	100%	Daily	This is a recommended target to measure chest pain care and should be used as a management tool. Should be incorporated into an automated dashboard.
	Percentage of patients with field 12-Lead EKG indicating STEMI transported to facility with emergency interventional catheterization capabilities.	100%	Daily	This is a recommended target to measure chest pain care and should be used as a management tool. Should be incorporated into an automated dashboard.
	Comparison of first and last Oxygen blood saturation readings for patients presenting with chest pain.	Trend	Monthly	This is a BMP recommended by the project team and part of the EMS Performance Measure project. This is not a target but a metric that the PFD should monitor the effectiveness of EMS care.
	Difference from initial to final Oxygen saturation via pulse oximetry in patients with respiratory distress.	Trend	Monthly	This is not a target but a metric that the PFD should monitor the effectiveness of EMS care.
	Percentage of successful intubations with endotracheal tube	90%	Daily	This is target to monitor the effectiveness of EMS care as well as a management tool. Note that the 2007 JEMS Survey average is 81%. This metric should be part of an automated dashboard.

Function / Area	Measure	Target	Frequency	Comment
	Percentage of unsuccessful endotracheal tube intubations that received a successful rescue airway	100%	Daily	This is target to monitor the effectiveness of EMS care. This metric should be part of an automated dashboard.
	Percentage of esophageal (or other errors in) intubations.	0%	Daily	This is target to monitor the effectiveness of EMS care. This metric should be part of an automated dashboard.
	Percentage of calls in which intubation errors are detected.	100%	Monthly	Tracked daily, but reported monthly. Tracking through percentage of errors.
	Percentage of cases where end tidal CO2 was used	100%	Daily	This is target to monitor the effectiveness of EMS care. This metric should be part of an automated dashboard.
	Percentage of intubated cases in which end tidal CO2 was used to confirm success initially and then just prior to off load	100%	Daily	This is target to monitor the effectiveness of EMS care. This metric should be part of an automated dashboard.
	In conscious patients, percentage reduction in use of endotracheal intubutation due to use of CPAP.	Trend	Quarterly	This is not a target but a metric that the PFD should monitor the effectiveness of EMS care.
Pain Management	Comparison of first and last pain scale values, percentage of patients older than 13 year of age reported decreased pain, increased pain or no change in pain.	Trend	Monthly	This is not a target but a metric that the PFD should monitor the effectiveness of EMS care.
	Percentage of patients older than 13 years of age reporting pain value of “7” or greater on a 1-10 scale received a subsequent intervention associated with pain relief consistent with protocol.	Trend	Monthly	This is not a target but a metric that the PFD should monitor the effectiveness of EMS care.

Function / Area	Measure	Target	Frequency	Comment
Other	IV success rates	90%	Daily	This is a target that the PFD should incorporate into a dashboard tool.
	IV success rates on critical (code 3) cases	90%	Daily	This is a target that the PFD should incorporate into a dashboard tool.
	Use of IO success rate.	90%	Daily	This is a target that the PFD should incorporate into a dashboard tool.

2. THE DEPARTMENT'S ELECTRONIC PATIENT CARE SYSTEM (EPCR) MAKES IT DIFFICULT TO EVALUATE PATIENT CARE PERFORMANCE.

The use of Electronic Patient Care Systems to document EMS performance is a best practice in EMS delivery. EPCR system allow agencies to efficiently track patient care, measure adherence to medical protocol, document supplies and equipment, efficiently process billings, and increasingly are used to measure performance. As indicated in the 2007 JEMS survey, two-third of EMS organizations utilize some for of electronic patient care reporting. This trend it likely to increase as electronic reporting requirements increase nationally.

While the use of Electronic Patient Care Systems are a best practice, the Plano Fire Department's EPCR, SafetyPAD, does not allow the Department to track many of the recommended performance measurements discussed in the previous section. There are a number of problems with performance tracking, including the following:

- The system has a number of canned reports and a query based reporting feature. However, many of these reports provide counts of various incident types. Details related to the timing of treatments, success rates, and patient outcomes cannot be queried.

- Based on a review of the reports included in the system, it is likely that timestamps entered into the system are not accurate. This may be due to the way time information is entered into the system or due to errors in the queries. For example, the SafetyPAD system has a report, which documents the time from dispatch to first defibrillation. However, the report shows that the average time to defibrillation is over 20 minutes. As shown in subsequent sections, the average response time achieved by the Plano Fire Department to EMS incidents is 6 minutes from call receipt to arrival on scene. It is highly unlikely that that average time from arrival on scene to first attempt at defibrillation is 14 minutes. Timestamp data is likely to be inaccurate for a number of reasons including:

    - The time in which a procedure or medical intervention is performed is not always captured in real time. Information is entered into SafetyPAD after the procedure is performed during transit to the hospital or upon arrival at the hospital.

    - The information and times capture by the LifePack 12 are not always accurate with synched with SafetyPAD. For example, a patient who had a

finding of "Asystole" had several entries with pulse over 60 and duplicate vital sign entries. These entries must be corrected manually after review by QA/QC.

- There are no required fields in SafetyPAD. The Department has not established a policy that requires that certain fields must be captured. In addition, the system itself does not require that certain fields be populated before a report is completed.

The current process for documenting and evaluating system performance is manual and consists of reviewing paper patient care reports. The two nurses who perform QA/QC review all of these reports and keep a separate list of EMS procedures and performance measures. The following points describe the information captured by this group:

- For non-traumatic CPRs, the following information is tracked:
  - Total number discharged from Hospital
  - Number of patients with 100% Recovery
  - Number of patients with Functional Status
  - Number transferred to a continuous care facility
  - Number of patients that regained pulse in the field
  - Total number admitted to the hospital
  - Number who expired in the emergency room.
  - Number who expired after hospital admittance
  - Overall non-traumatic CPR survivor rate (which was approximately 12% in 2007 and 9% in 2006)
- For traumatic CPR patients, the following information is tracked separately:
  - The type of trauma: blunt, penetrating or other (burns, electrocution, drowning).
  - The number of patients admitted to the hospital
  - The number of patients discharged home

- The overall survivor rate (which was approximately 0% in 2007 and 14% in 2006)

- The number of transports by priority and type (ALS vs. BLS) as well as the facility.
- Overall patient outcomes for all transports including
  - Total admissions to MCP.
  - Number of critical care patients including ICU/CCU.
  - Number of Stepdown / Telemetry
  - Number of medical surgery / pediatric / and labor and delivery patients
  - Number of transfers
- The number of intubations and the outcome for each incident, by month and year.
- The intubation success rate, by month and year.

While the PFD and medical control should be commended for ongoing tracking of the information above, the current process for monitoring system performance is limited and overly time consuming. Given the large amount of information actually captured by SafetyPAD, additional system performance metrics should be captured automatically. In order to accomplish this, the Fire Department should do the following:

- The PFD should develop a policy for capturing the timestamps and treatment information needed to monitor the performance measures recommended in the previous section. Particularly for critical incidents (cardiac arrest, difficulty breathing, trauma, etc.), a policy should identify which data elements must be captured in SafetyPAD. For example, for cardiac arrest incidents, the time at patient and the time of first defibrillation attempt should be captured. The list of performance measures in the previous section can be utilized to develop these policies.
- The PFD should consider utilizing Public Safety Communications more often to capture patient care information, particularly time data to evaluate performance.
- The Fire Department should discuss the feasibility of incorporating the performance measures, recommended in the previous section, into a dashboard

reporting system with its current EPCR vendor. If the current system is not capable of providing these metrics, the Department should pursue acquiring a new system.

Recommendation: The PFD should develop a policy for capturing performance data in the EPCR system. The Department should utilize the recommended performance measures as a guide to developing these policies.

Recommendation: The PFD should consider involving dispatch more often to track patient care.

Recommendation: The PFD should discuss the feasibility of incorporating a dashboard reporting system, based on the recommended metrics, into the EPCR. If the system is not compatible with reporting needs, the Department should pursue acquisition of a new system.

3. ANALYSIS OF THE FIRE DEPARTMENT'S PARAMEDIC PROGRAMS INDICATES THERE ARE OPPORTUNITIES TO IMPROVE THE EFFECTIVENESS OF THIS PROGRAM.

This section evaluates the Plano Fire Department's current deployment and utilization of personnel and equipment within the emergency response system.

(1) Research Regarding the Effectiveness of Paramedic Level EMS Programs Is Limited.

There is a limited but growing body of research that addresses the medical efficacy of paramedic engine company programs. This research focuses on the additional benefit gained from an ALS system, "single tier" (e.g. uniform ALS or BLS response), and "two tier" (e.g. BLS initial response and ALS transport) EMS systems. A study by Callaham and Madsen (1995) looked at whether the interval between the arrival of first response/defibrillators and paramedic advanced life support inventions is associated with patient outcome. The authors found that faster response times by paramedics demonstrated no significant benefit in urban populations with short intervals between responder arrivals. Similarly, a 1993 study of the incremental cost effectiveness of improvements to EMS systems on out of hospital cardiac arrest by Nichol et al. found that the most cost effective EMS system options consisted of

improving response times in a two-tier EMS system or changing from a one-tier to a two-tier system. The cardiac arrest component of the OPALS study also suggests that the greatest impact on cardiac arrest survivability was due to improvements in EMS response intervals, bystander CPR and first responder CPR by police or fire. A recent article by Stiell et al. (2007) however, indicates that for respiratory distress patients in the OPALS study, the introduction of ALS treatment had a statistically significant, positive improvement on mortality.

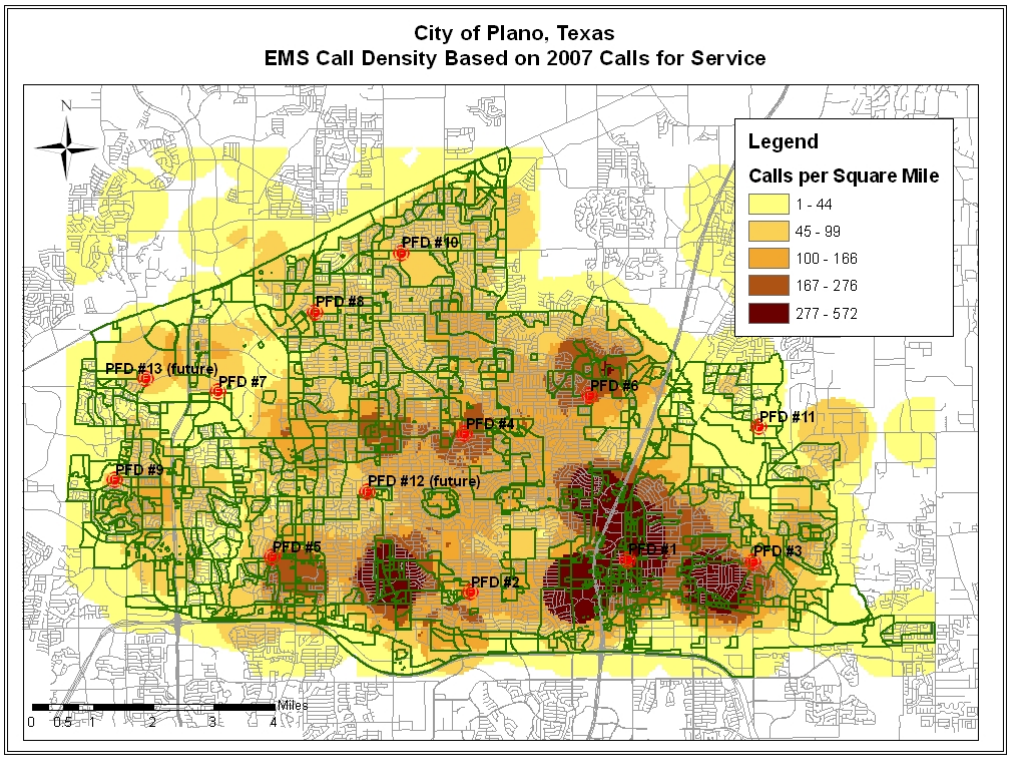
While the clinical efficacy of ALS EMS systems is unclear, the practical benefit of an ALS engine company program is the ability to provide highly trained EMS personnel quickly to the scene of an emergency incident. The ALS engine company is designed to provide paramedic level service in the absence, or prior to the arrival of the transport unit. In addition, the ALS engine is available to provide support to the personnel on the ambulance during critical incidents. Overall, paramedic engine company programs provide greater medical skills in a shorter response time. These skills are particularly important during incidents which require intravenous administration of medication, cardiac arrest, and advanced airway management. As a result, the focus of the project team's analysis is on ways to improve the existing program.

(2) Current EMS System Design Provides A Large Number of Paramedics in A Short Amount of Time.

The project team evaluated the current response "coverage" based on the current deployment of personnel and resources within the City of Plano. Using the recommended performance measures for initial response and ALS response, the project team evaluated the level of resources capable of responding in each area of the City. The project team utilized GIS software to estimate the ability of department personnel to respond within targeted response times to actual call for service locations.

In addition, CAD data was collected to document actual response times achieved over the past three years. By comparing the results of the GIS analysis to the response times documented in CAD, the project team can identify potential response time issues.

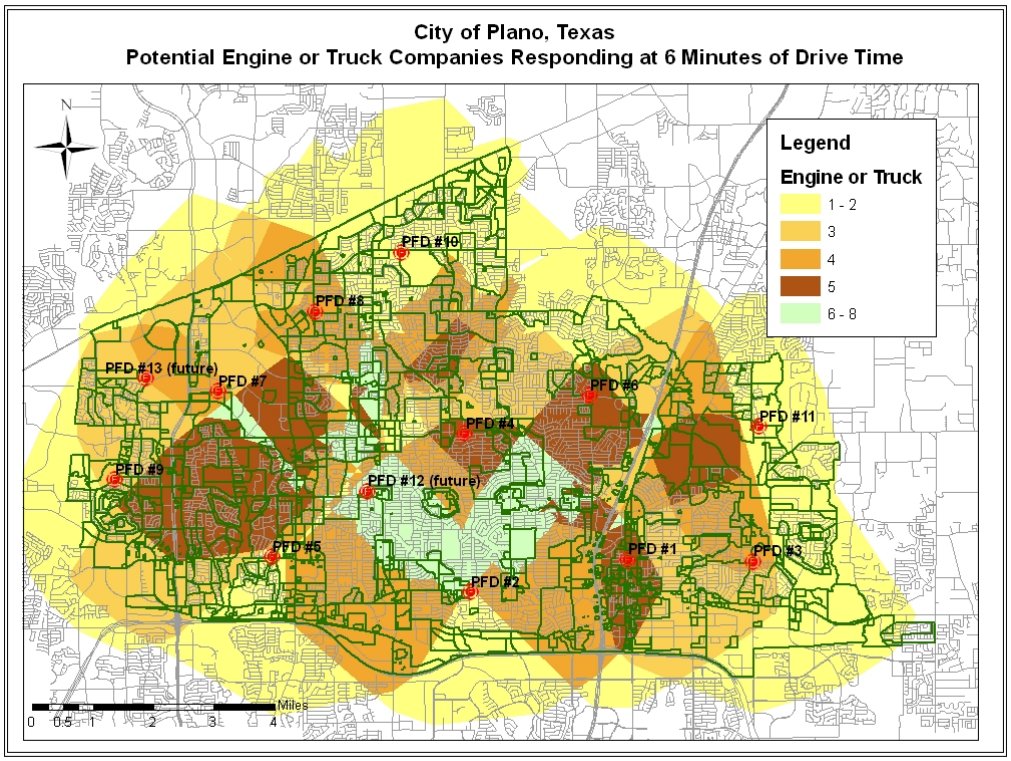
The first map, below, shows the distribution of EMS calls for service throughout the City of Plano. An EMS call density map was developed to show the clustering of calls throughout the City.



As illustrated above, the greatest density of EMS calls for service during 2007 occurred in the south central areas, just north of the George Bush turnpike, and along I-75, on the eastern side of the City, near Station 1. The concentration of calls was more dispersed on the outer edges of city.

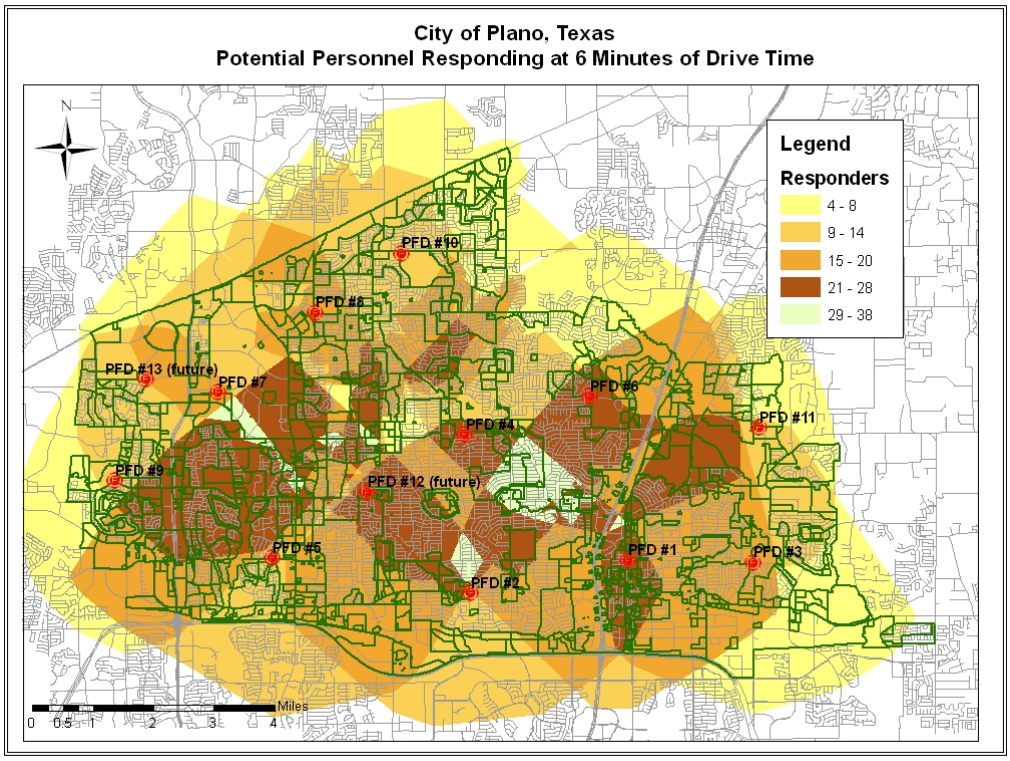
The next map, below, shows the number of engine and truck companies capable of responding within 6 minutes of drive time. This target is based on the Department's

response time goal of 6 minutes and 59 seconds from dispatch (one minute is excluded for turn-out time).



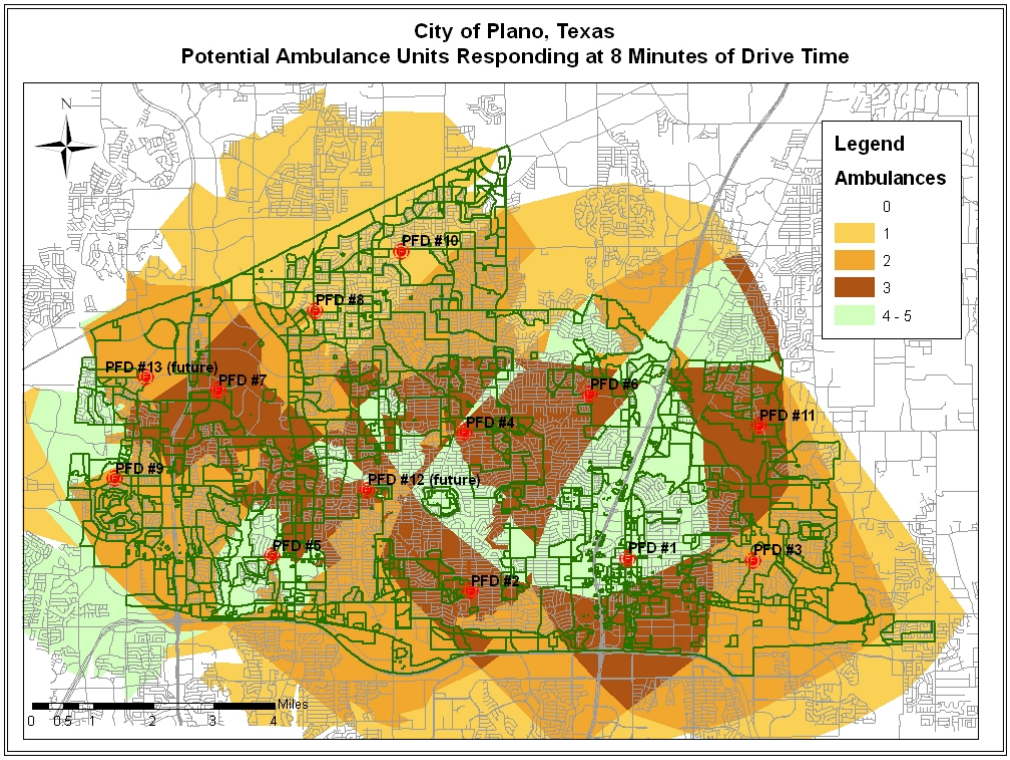
As shown above, the current deployment of engine and truck companies provides a significant amount of resources within the initial response time target. The light yellow colors indicate where 1 or 2 trucks (not including ambulance units) can reach in 6 minutes of drive time, the orange indicates 3 or 4 trucks, dark brown indicates 5 trucks, and light green indicates 6 or 8 units. Note that this assumes all units are available for immediate response. However, the map indicates that the Department can handle multiple EMS calls for service at once within targeted response times.

The next map, below, shows the number of personnel (including ambulance personnel) available for response within the 6-minute initial response time target:



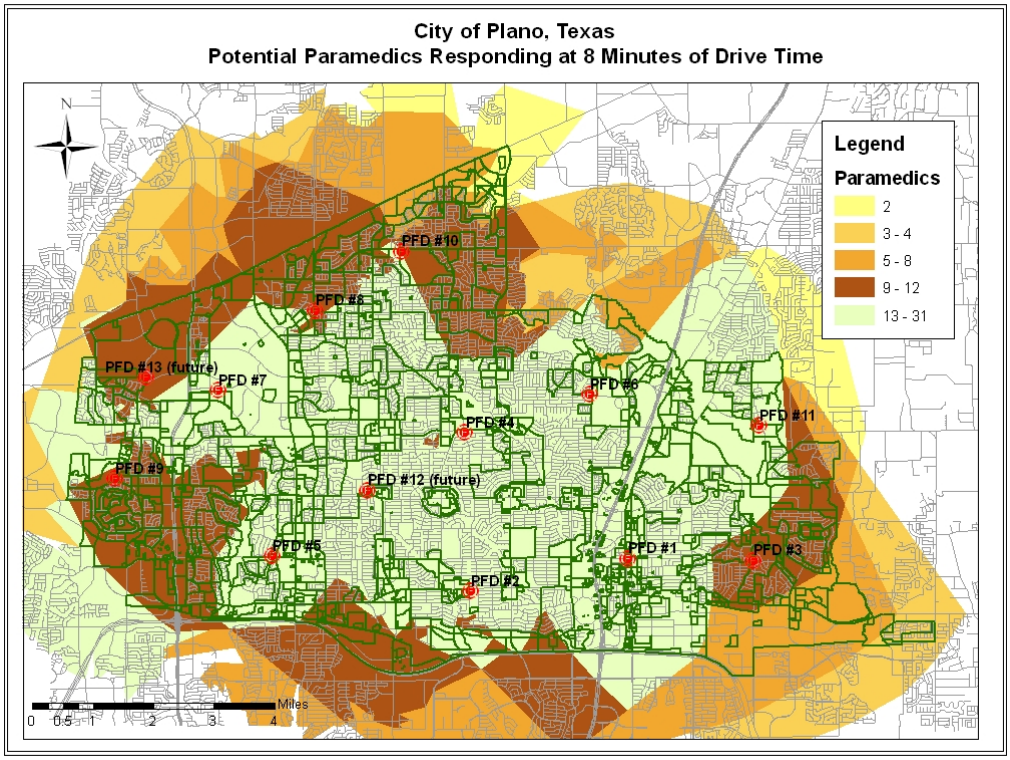
The map above shows that throughout most of the City 10 or more personnel (orange areas) can provide a response of 6 minutes of drive time or 7 minutes of response time from dispatch (note this assumes a 1 minute reflex or turnout time). The map also shows that 21 or more personnel (dark brown) can respond to the central areas of the City within 6 minutes.

The project team also evaluated the Department's ability to provide paramedic resources throughout the City within 8 minutes of drive time. This target is based on NFPA guidelines for ALS response. The map, below, shows the number of ambulance units capable of responding within 8 minutes:



As shown above, the Department can deliver 1 or more ambulance units to the entire City within 8 minutes of drive time. Again, this assumes that all units are available for immediate response. The map also shows that 3 or more ambulance units are capable of responding within 8 minutes to the majority of the City (dark brown and light green).

The final map, below, shows the number of potential paramedic responders within the 8-minute drive time target:



Potential Responders in 6 Minutes of Drive Time

Personnel	No. of Calls	Percentage
2 to 4	8,016	94%
5 to 8	7,497	88%
9 to 12	5,077	60%
13 to 15	1,436	17%
16 or more	218	3%
Total Matched	**8,526**	**100%**

Potential Ambulance Units Responding at 8 Minutes of Drive Time

Ambulance Units	No. of Calls	Percentage
1	8,042	94%
2	7,486	88%
3	5,341	63%
4	2,851	33%
5	860	10%
Total Matched	**8,526**	**100%**

The following points highlight the information presented in the tables, above:

- As shown above, approximately 94% of EMS calls for service received in 2007 could potentially be reached within 6 minutes of drive time. The table also shows that 88% of calls for service could be reached by 5 to 8 responders within the same amount of time, 9 to 12 responders could reach approximately 60% of calls, and 13 to 15 responders could reach 17% of calls. This assumes that all personnel are available for immediate response. However, the analysis above shows that the PFD can handle multiple calls for service at once and still meet the 6-minute drive time target (6 minutes 59 second overall target from dispatch to on-scene).

- Using the 8-minute target for ALS transport response shows that 94% of EMS calls for service could be reached by at least one ambulance unit. The table also shows that 88% of calls could be reached by 2 or more units, 63% could be reached by 3 units, and 33% could be reached by 4 or more units.

The next step in the project team's analysis was to compare modeled performance to actual response times achieved by the PFD during 2007. The tables, below, show actual performance against each of the response time targets utilize by the PFD and those recommended by the project team:

Plano Fire Department
2004 to 2007 1 Minute Reflex Time to EMS Calls

Station / District	2004	2005	2006	2007
FD1	47%	59%	60%	65%
FD10	32%	52%	46%	56%
FD11			75%	62%
FD2	57%	65%	66%	67%
FD3	44%	54%	53%	61%
FD4	48%	57%	45%	64%
FD5	46%	57%	54%	64%
FD6	46%	52%	57%	67%
FD7	40%	55%	50%	61%
FD8	39%	53%	56%	62%
FD9	35%	52%	44%	61%
Total	**46%**	**57%**	**55%**	**64%**
Average	**1.25**	**1.10**	**1.11**	**1.01**

Plano Fire Department
2004 to 2007 Total Response Time (Dispatch to Arrival)
Less than 7 Mins to EMS Calls

Station / District	2004	2005	2006	2007
FD1	93%	93%	91%	89%
FD10	89%	85%	89%	77%
FD11			86%	77%
FD2	94%	94%	93%	90%
FD3	91%	91%	90%	88%
FD4	93%	92%	92%	89%
FD5	94%	94%	92%	89%
FD6	91%	91%	92%	92%
FD7	90%	87%	88%	78%
FD8	90%	94%	92%	86%
FD9	92%	91%	91%	87%
Total	**92%**	**92%**	**91%**	**87%**
Average	**5.04**	**5.09**	**5.07**	**6.07**

The following points summarize the tables above:

- As shown above, the Fire Department has improved its reflex time performance over the past four years, from 46% of calls in less than 1 minute in 2004, to 64% of calls in 2007. The table also shows that the average reflex time was 1 minute 15 seconds in 2004, and approximately 1 minute in 2007. Despite the improvement, reflex time performance is below the PFD's target of 70%. It should be noted however, that there may be issues with the way calls are prioritized by public safety communications. Of the 18,230 calls in the 2007 database, less than 0.5% were labeled "emergency."

- Overall response times by the Fire Department (from dispatch to arrival on scene) have increased significantly since 2004. The average response time has increased from just over 5 minutes in 2004 to 6 minutes in 2007. In addition, the percentage of calls responded to in less than 6 minutes 59 seconds of fire department response time declined from 92% in 2004, to 87% in 2007. This is slightly below the Department's stated goal of 90%.

Overall, the Department is able to meet the targeted response times set out in its strategic plan and those recommended by the project team. However, the Department should evaluate its current prioritization policy. There are two primary benefits of ensuring that calls for service are prioritized correctly. The first is that response times can be more accurately tracked. The second is a community risk management issue. The Department should limit the number of times that vehicles respond lights and siren

to the scene of an incident given the risk of traffic accidents and injuries to both citizens and employees.

Recommendation: The Department should review its call prioritization policy to ensure that 1: Calls are accurately prioritized and response times are accurately tracked; 2: The risk of accidents and injuries due to emergency response is limited by only responding lights and siren to true emergency calls for service.

(3) Analysis Indicates That Paramedic Engine and Truck Companies Have A Positive Impact on EMS Care.

While the clinical efficacy of ALS EMS systems is unclear, the practical benefit of an ALS engine company program is the ability to provide highly trained EMS personnel quickly to the scene of an emergency incident. The ALS engine company is designed to provide paramedic level service in the absence, or prior to the arrival of the transport unit. In addition, the ALS engine or truck is available to provide support to the personnel on the ambulance during critical incidents. As a result, in evaluating the Fire Department's paramedic engine company program, the project team focused on the following issues:

- How often is a paramedic engine company reaching the scene of an emergency EMS incident before the ambulance unit.
- Was patient assessment performed by the paramedic engine company? Was patient care initiated prior to the arrival of the ambulance unit? How much time was saved?
- What impact did the arrival of the paramedic engine company have on patient care? Did cardiac arrest survival rates increase? Were patients stabilized more quickly due to the presence of paramedic personnel?

The project team was limited in its ability to answer the questions above due to the fact that the EPCR data does not track which unit performed a specific task at the scene of an incident. For example, the data in SafetyPAD does not indicate whether a paramedic on the engine company performed initial patient assessment prior to the arrival of the ambulance unit or what types of treatment were delivered. As a result, the project team focused on those issues, which could be answered using the call for service data available in CAD. Specifically, we focused on the number and percentage of times where the engine company was first on-scene, and in those instances, whether an engine companies first on-scene status had an impact on the time on scene spent by the ambulance unit. The assumption here is that the arrival of paramedic personnel on an engine or truck should decrease the amount of time spent on-scene by the ambulance unit since these personnel are available to perform initial patient assessment and begin patient care.

The first step was to identify the number of instances where an engine or truck company arrived on scene prior to the ambulance unit. The table, below, shows the number and percentage of EMS incidents by first arriving unit:

First Arriving Unit to EMS Incidents 2007

Apparatus	Total	Percent
M171	1,266	11%
M176	1,018	9%
M175	860	8%
M173	794	7%
E171	770	7%
M178	714	6%
E176	576	5%
E174	549	5%
E175	515	5%
E172	498	4%
M179	475	4%
E182	390	3%
E173	385	3%
M184	356	3%
E177	336	3%
E178	292	3%
M172	291	3%
E179	262	2%
E180	262	2%
T171	201	2%
T175	159	1%
T174	154	1%
T177	92	1%
E181	89	1%
Engine/Truck		49%
Medic		51%

As shown above, approximately 50% of incidents were reached by an engine or truck company first and 50% were reached by an ambulance unit first. The project team next looked at how much faster engine or truck companies arrived on scene, during those incidents where they were first to arrive. The tables, below, shows the average and 90th percentile time between the first arriving unit and the second arriving unit, when the engine or medic was first on-scene:

Average Time Between First Arriving Unit and Second Arriving Unit By Unit Arrival

District / Station	Medic First	Engine First	Total
FD1	0.98	2.27	1.82
FD10	1.95	3.64	3.42
FD11	1.92	3.34	2.97
FD2	1.27	2.85	2.51
FD3	0.67	2.20	1.54
FD4	2.00	3.18	2.99
FD5	1.03	2.29	1.91
FD6	0.79	2.60	1.97
FD7	1.23	3.02	2.51
FD8	1.09	2.44	2.07
FD9	0.64	1.63	1.29
(blank)	0.32		0.32
Total	**1.06**	**2.66**	**2.21**

90th Percentile Time Between First Arriving Unit and Second Arriving Unit By Unit Arrival

District / Station	Medic First	Engine First	Total
FD1	4.10	7.70	6.64
FD10	6.74	8.92	8.72
FD11	5.59	8.81	8.12
FD2	4.63	7.52	7.06
FD3	2.62	7.83	6.13
FD4	7.12	8.27	8.21
FD5	4.38	7.94	7.09
FD6	3.48	9.25	7.73
FD7	4.34	8.99	7.91
FD8	4.41	8.56	7.65
FD9	1.96	6.01	4.99
(blank)	0.32	-	0.32
Total	**4.28**	**8.17**	**7.31**

The following points highlight the tables, above:

- As shown in the average time table, when the medic unit was first on scene, the average time between first and second arriving units was just over one-minute. The average difference in time was greatest in Station 4's first due area, which average approximately 2 minutes between medic and engine arrival.

- When an engine or truck company was first on-scene, the average difference between first arriving and second arriving units was over 2.5 minutes. The largest difference was in Station 10's first due area, which averaged over 3.5 minutes.

- The 90th percentile difference between first arriving unit and second arriving unit

was almost twice as high when looking at those calls where the medic unit was first on scene compared to when an engine or truck was first on scene. As shown in the table above, the 90th percentile difference between medic first arrival and engine or truck arrival was 4.28 minutes compared to 8.17 minutes when an engine or truck was first on scene.

As shown above, during those incidents where an engine or truck company was first on scene, those crews had a significant amount of time before the arrival of the medic unit. The project team next evaluated the impact of the first arrival of an engine or truck company on ambulance on-scene time. In this analysis, we considered incidents where the medic was less than and greater than 5 minutes behind the engine or truck. The tables, below, show the average on-scene handling time when the medic was less than and greater than 5 minutes behind the engine or truck company:

Average On-Scene Time During Incidents
Where Engine or Trucks Arrived 5 Minutes Before Medic Unit

District / Station	Engine < 5 Min	Engine > 5 Min	Grand Total
FD1	25.20	20.75	24.46
FD10	24.72	20.57	23.86
FD11	34.02	28.67	32.43
FD2	21.43	17.77	20.83
FD3	29.57	23.59	28.51
FD4	24.15	21.40	23.62
FD5	22.77	18.04	21.86
FD6	27.77	23.51	26.82
FD7	25.33	19.15	24.30
FD8	26.17	19.92	24.95
FD9	21.08	14.57	20.19
(blank)	26.40		26.40
Total	**24.61**	**20.47**	**23.85**

As shown above, the average on-scene time for the medic when an engine or truck company was on-scene for 5 minutes or more prior to the arrival of the medic was approximately 20 minutes and 30 seconds. During those incidents where the engine or truck was on-scene for less than 5 minutes prior to the arrival of the medic, the average medic on-scene time was just over 24 minutes and 30 seconds. This is a difference of

approximately 4 minutes. The analysis above indicates that the first arrival of the ALS engine or truck has a positive impact on medic on-scene time and reducing the overall amount of time that patients must wait before receiving medical care or transport to the hospital.

(4) There Are Issues With the Current Deployment and Assignment of Paramedic Personnel.

While it is difficult to evaluate the true impact of the ALS engine and truck program within the City of Plano given the limited data sources, the project team has identified additional issues throughout the course of its interviews with PFD personnel. These issues primarily relate to the role of personnel on engine or truck companies and the frequency with which EMS skills are actually practiced in the field. The points, which follow, describe these issues:

- Interviews indicate that paramedics assigned to engine and truck companies do not perform a significant share of patient care and do not practice ALS skills. Part of this issue is due to the fact that the majority of paramedics assigned to an engine or truck company are “front-seat” medics, meaning they are company officers or drivers. These personnel have a special role at emergency scene. A company officer is in charge of scene safety in the absence of the Battalion Chief, and overall scene management. The driver or Apparatus Operator, is responsible for apparatus positioning and pump operations. This limits the ability of these personnel to perform patient care at incidents where these positions are responsible for other roles.

- Personnel also indicated that paramedics assigned to the engine or truck companies do not have the same skills levels as paramedics assigned to ambulance units due to limited practice of these skills. Particularly for those “front-seat” medics, the number of ALS interventions actually performed is a significant issue. Given the relatively low number of advanced cases, engine and truck company medics get limited practice performing advanced cases which require CPR and intubation, as shown below:

Procedure	2007	2006
CPR	102	84
Intubation	143	142

A review of the Department's EMS certification records indicates that the "front-seat" medic issue is a problem. The table, below, shows that only half of paramedics are "back-seat" medics or Fire Rescue Specialists.

Position	EMT	Paramedic	Not Available	Total	% Paramedic	% EMT
Rescue Specialist	111	79		190	42%	58%
Apparatus Operator	18	33		51	65%	35%
Captain	9	28	1	38	74%	24%
Lieutenant	6	15	3	24	63%	25%
Battalion Chief	6	3		9	33%	67%
Assistant Chief	1	2	1	4	50%	25%
Fire Chief	1			1	0%	100%
Total	**152**	**160**	**5**	**317**	**50%**	**48%**

Part of the problem with company officers and drivers acting as paramedics is that pay is tied to certification. Many "front-seat" paramedics keep their certification because they receive additional compensation, which is established by City Ordinance. The table, below, shows the current annual paramedic certification pay:

Plano Fire Department
Paramedic Certification Pay

Paramedic Pay	Monthly	Annual
< 48 mos	$149	$1,788
48-95 mos	$297	$3,564
96-143 mos	$446	$5,352
144 + mos	$594	$7,128

As shown above, for those personnel who are officers and drivers and who have been with the Department for 4 or more years, the additional paramedic certification pay is significant. As a result, there is little incentive for employees to drop their paramedic certification.

(4) Analysis of Paramedic Deployment Options Indicates that 83 Paramedic Positions are Needed Under the Recommended Approach.

The project team identified three options to address the front-seat / back-seat paramedic issue. These options include the following:

- Eliminate the paramedic engine and truck companies and utilize an additional paramedic on each ambulance unit. Under this option, all personnel assigned to engine and trucks will be EMT level responders and 2 paramedics per ambulance unit, per shift will be deployed. This results in a minimum of 14 paramedics per shift.

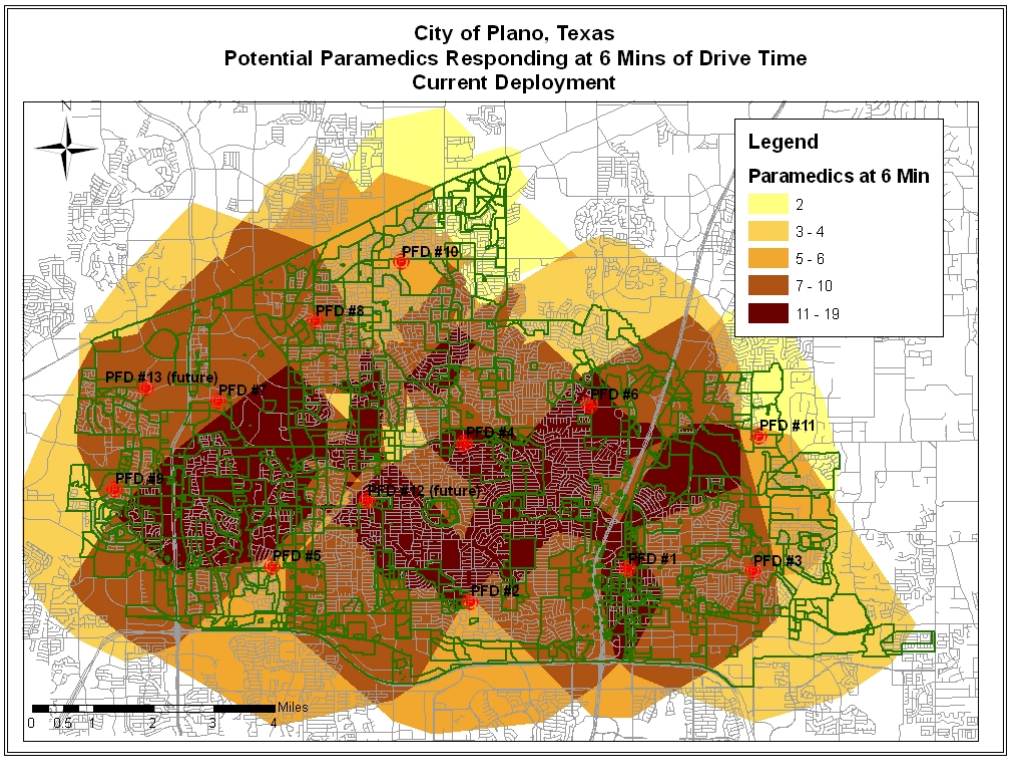
- Reduce paramedic staffing on engines and trucks and maintain the current staffing plan of 1 paramedic and 1 EMT on each ambulance unit. Under this approach, 1 paramedic will be assigned to each engine and truck company as well as each ambulance unit. All other personnel will become EMT level responders. This approach requires a minimum of 23 paramedics per shift.

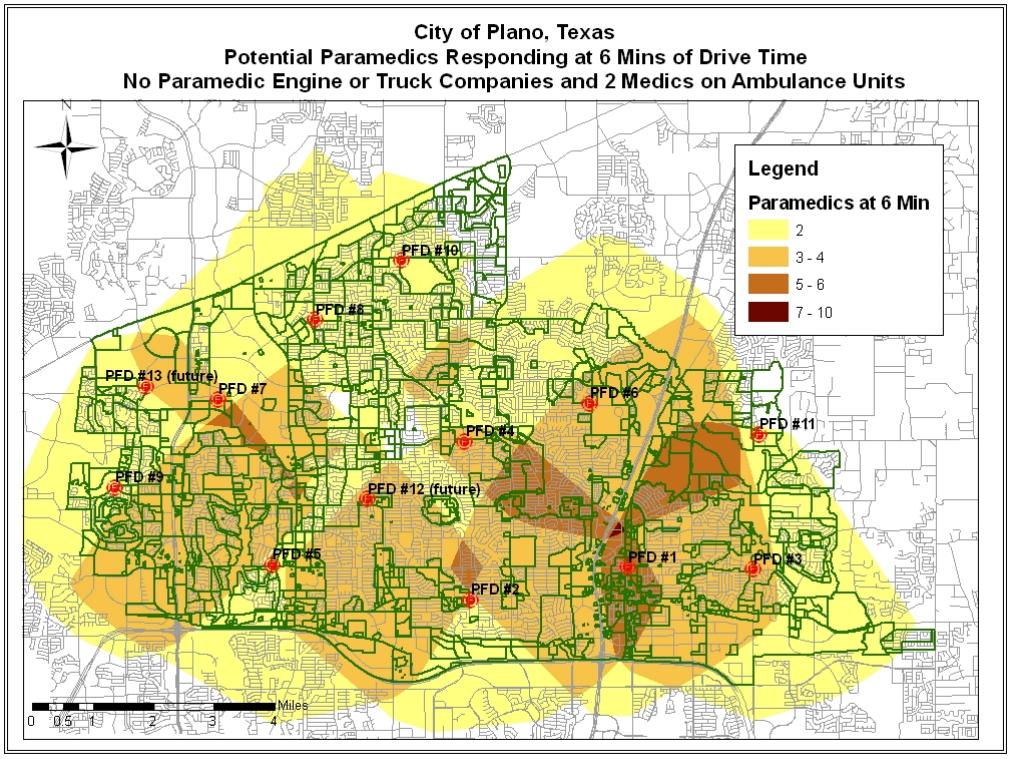
- Deploy 1 paramedic on each engine and ambulance unit per shift. All other units and personnel will become EMT responders. This approach requires a minimum of 19 paramedics per shift.

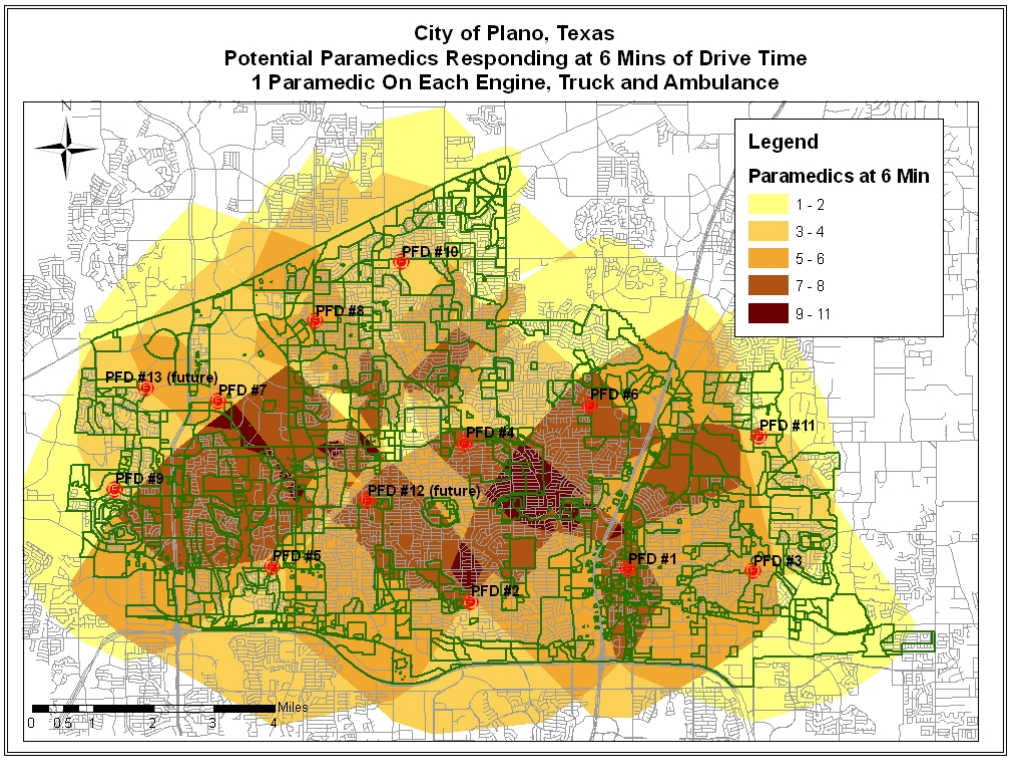
It should be noted that for each of these options, the project team assumes that paramedics will be “back-seat” personnel. As a result, Officers and Apparatus Operators will no longer be required to maintain paramedic certification. The project team discusses an approach to phasing paramedic certification pay out for these personnel as well as current surplus paramedic Fire Rescue Specialists later in this section.

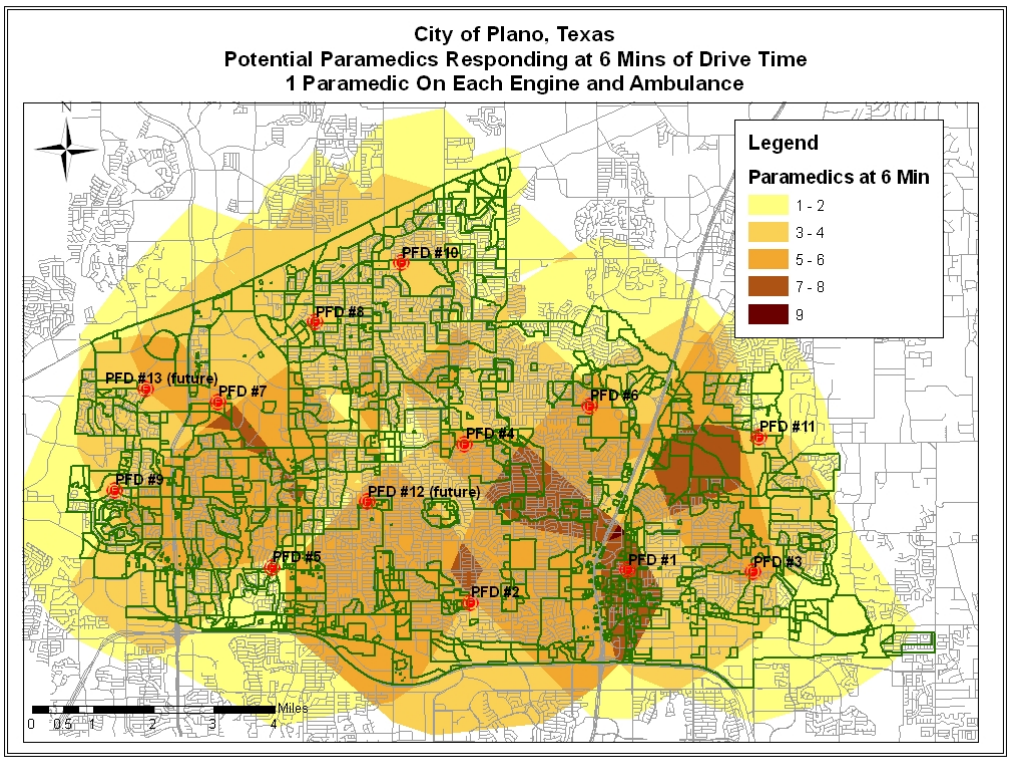
For each of the three options, the project team evaluated the impact on response capabilities to EMS incidents. Since the current approach to paramedic staffing provides a paramedic initial response throughout the City, the project team utilized the Department’s response time target of 6 minutes and 59 seconds to EMS incidents. This approach also allows the PFD to identify the impact of staffing changes compared to the current deployment approach.

The maps, which follow, show projected response capabilities at 6 minutes of drive time (this allows 1 minute for reflex time) under each deployment option.


City of Plano, Texas
Potential Paramedics Responding at 6 Mins of Drive Time
Current Deployment
Legend
Paramedics at 6 Min
2
3 - 4
5 - 6
7 - 10
11 - 19
PFD #10
PFD #8
PFD #13 (future)
PFD #7
PFD #6
PFD #4
PFD #11
PFD #9
PFD #12 (future)
PFD #5
PFD #1
PFD #3
PFD #2
Miles
0 0.5 1 2 3 4


City of Plano, Texas
Potential Paramedics Responding at 6 Mins of Drive Time
No Paramedic Engine or Truck Companies and 2 Medics on Ambulance Units
Legend
Paramedics at 6 Min
2
3 - 4
5 - 6
7 - 10
PFD #10
PFD #8
PFD #13 (future)
PFD #7
PFD #6
PFD #4
PFD #11
PFD #9
PFD #12 (future)
PFD #5
PFD #1
PFD #3
PFD #2
Miles
0 0.5 1 2 3 4


City of Plano, Texas
Potential Paramedics Responding at 6 Mins of Drive Time
1 Paramedic On Each Engine, Truck and Ambulance
Legend
Paramedics at 6 Min
1 - 2
3 - 4
5 - 6
7 - 8
9 - 11
PFD #10
PFD #8
PFD #13 (future)
PFD #7
PFD #6
PFD #11
PFD #4
PFD #9
PFD #12 (future)
PFD #5
PFD #1
PFD #3
PFD #2
Miles
0 0.5 1 2 3 4


City of Plano, Texas
Potential Paramedics Responding at 6 Mins of Drive Time
1 Paramedic On Each Engine and Ambulance
Legend
Paramedics at 6 Min
1 - 2
3 - 4
5 - 6
7 - 8
9
PFD #10
PFD #8
PFD #13 (future)
PFD #7
PFD #6
PFD #11
PFD #4
PFD #9
PFD #12 (future)
PFD #5
PFD #1
PFD #3
PFD #2
Miles
0 0.5 1 2 3 4

In addition to the maps above, the project team developed estimates of response time capabilities under each scenario. The table, below, shows the results of this analysis:

Projected Response Time Performance Under 3 Paramedic Deployment Options

No. of Paramedics	Current	2 PM Amb	1 E & A	1 E, T&A
1 or more	94%	90%	94%	94%
2 or more	94%	90%	90%	91%
3 or more	91%	62%	87%	88%
5 or more	88%	11%	51%	71%
7 or more	79%	0%	9%	33%
8 or more	71%	0%	2%	15%
Total Matched	**8,526**	**8,526**	**8,526**	**8,526**

The following points highlight the information in the table, above:

- Under the current deployment plan, 94% of EMS incidents can be reached by at least one paramedic. Performance is similar under the options which call for one paramedic on each engine and ambulance, and one paramedic on each engine, truck, and ambulance. However, under the plan which deploys 2 paramedics on each ambulance only, 90% of calls are reached within 6 minutes of drive time.

- The main difference in performance is revealed as we look at those incidents where 5 or more paramedics could response within 6 minutes. Under the current model, 88% of EMS incidents are within reach by 5 or more paramedics. Under the 2 paramedics per ambulance model, only 11% of incidents receive this level of coverage. Under the 1 paramedic per engine and ambulance option, 51% of calls receive this level of coverage, and 77% of calls receive this level of coverage under the 1 paramedic per engine, truck, and ambulance unit.

As shown above, the 2 paramedics per ambulance model significantly reduces response capabilities. The level of paramedic coverage is important in a large system like Plano for responding to multiple calls for service at once as well as responding to second due areas when another unit is out of service. As shown in the descriptive profile, the PFD responds to an average of 2 to 3 calls per hour. As a result, in order to meet the initial response target with an ALS resource 90% of the time, the PFD needs a high level of paramedic coverage throughout the City.

The project team next evaluated the number of paramedic personnel needed to meet the staffing plan under each of the three options and compared these calculations to the number and cost of current paramedic personnel. As indicated previously, the project team assumed that paramedic certification pay for both "front-seat" (Captain, Lieutenants, and Apparatus Operators) paramedics and surplus FRS paramedics would be phased out over time to mitigate the financial impact on staff. One approach would be to eliminate the top step certification pay for personnel each year. The tables, that follows, show the estimated cost impact of each option compared to the current staffing plan for paramedics:

Breakdown of Paramedic Pay by Rank/Grade

Rank/Grade	Total per Pay Period	Number	Total Pay	Avg./Position
CAPT	6,649	25	172,870	6,914.80
Capt-Staff	1,097	4	28,512	7,127.90
FAO	6,995	32	181,860	5,683.14
FAO-Staff	274	1	7,128	7,127.90
FRS	12,486	78	324,626	4,161.88
FRS-Staff	480	3	12,492	4,164.07
LT	2,948	12	76,656	6,387.98
LT-Staff	686	3	17,832	5,944.03
Total	**31,614**	**158**	**821,976**	**5,202.38**

Cost Per Option	Number per Shift	Number Needed with Leave	Current FRS Medics	Net	Avg. Annual Paramedic Cost/Savings	FRS Annual Savings / (Cost)
No Medics on Engines or Trucks & 2 on Amb	14	51	78	-27	1,780.00	(48,060.00)
1 Medic on all units (except Utility)	23	83	78	5	1,788.00	8,940.00
1 Medic on Engines and Ambulances	19	69	78	-9	1,780.00	(16,020.00)

Paramedic Pay Under Current and Recommended Approach

Position	Year 1	Year 2	Year 3	Year 4
Current Approach	848,640	875,364	923,364	978,456
Phase out of Top Step	758,064	645,224	535,296	445,608
Savings	**$(90,576)**	**$(230,140)**	**$(388,068)**	**$(532,848)**

Total Cost Savings Under Phase Out of Paramedic Pay and Deployment Options

Option	Year 1	Year 2	Year 3	Year 4
No Medics on Engines or Trucks & 2 on Ambulances	$(138,636)	$(278,200.00)	$(436,128.00)	$(580,908.00)
1 Medic on Engines and Ambulances	$(106,596)	$(246,160.00)	$(404,088.00)	$(548,868.00)
1 Medic on all units (except Utility)	$(81,636)	$(221,200.00)	$(379,128.00)	$(523,908.00)

The following points highlight the information above:

- The first table shows the breakdown of paramedic certification pay by rank. As shown above, total paramedic certification pay is currently $821,976. Of this amount, $484,857 is paid to Captain, Lieutenants and Apparatus Operators.

- Table 2 shows the number of FRS Paramedics needed under each option. **The total number of paramedics needed is determined by determining the daily minimum staffing number for paramedics, multiplied by the number of shifts (3), and then divided by the availability rate of 83% (total hours worked / total hours scheduled).** As shown above, there are currently 78 FRS paramedics in the Department. Under the first option (2 paramedics per ambulance), a total of 51 paramedics are needed, resulting in a net decrease of 27 paramedics. Since the distribution of paramedic tenure for those paramedics retained was unknown, the project team assumed that each year, a reduction of $1,780 in paramedic pay per surplus FRS paramedic would occur. This results in a net savings of $48,000 each year. Under option 2 (1 paramedic per engine, truck and ambulance) there is a net cost of $8,940 per year since 83 FRS paramedics are needed. Under the third option, there is a cost savings of $16,020 each year.

- The third table shows the reduction in “front-seat” medic pay by year based on a reduction of the top step certification pay. As shown in the table, the first year results in cost savings of $90,576, year 2 results in savings of $230,140, year 3 results in cost savings of $388,068, and year 4 results in savings of $532,848 compared to the current approach. In total, the Department can save $1,241,632 over the next 4 years. It should be noted that these costs are include expected increases in paramedic certification pay due to increases in the number of months worked as a paramedic.

- Finally, the last table above shows the total costs savings for each option. This tables includes the cost savings from phasing out paramedic pay for "front seat" paramedics, and the costs / savings from each paramedic deployment option. As shown above, the 2 paramedics on each ambulance unit option yields the largest savings, followed by 1 paramedic on each engine and ambulance, and then 1 paramedic per unit. Each option results in savings of more than $500,000 in year 4, and over $1.2 million in total savings over the 4-year period.

The overall costs and benefits of each of the three options are summarized in the table, below:

Option	Description	Costs	Benefits
Eliminate the paramedic engine and truck company program and add 1 additional paramedic per ambulance	All engine and truck companies would be staffed with EMTs instead of paramedics. 2 Paramedic per shift per ambulance unit would be assigned.	Reduction in the level of paramedic response to EMS incidents under the initial response time target. As shown previously, while 90% of incidents can be reached by at least 1 paramedic, only 62% can be reached by 3 or more paramedics. This reduces the ability of the Department to response to multiple EMS incidents or larger incidents with paramedic personnel within the initial response target.	Savings of $ 1.43 million over 4 years. A reduction in the number of training hours needed to meet paramedic re-certification requirements. Increase in the distribution of ALS cases by Paramedic. Solves the issues of "front-seat" medics.
Reduce minimum paramedic staffing to 1 paramedic on each engine, truck, and ambulance. Require that these position be FRS grade positions.	Each engine, truck, and ambulance unit would be staffed with 1 paramedic. All other units will be staffed with EMTs.	Slight reduction in the level of paramedic "overlap" coverage. May reduce the ability of Officers and more senior personnel to supervise ALS service delivery.	Savings of $1.205 million over 4 years. A reduction in the number of training hours needed to meet paramedic re-certification requirements. Increase in the distribution of ALS cases by Paramedic. Solves the issues of "front-seat" medics.

Option	Description	Costs	Benefits
Reduce minimum paramedic staffing to 1 paramedic on each engine and ambulance. Require that these positions be FRS grade positions.	Each engine and ambulance unit would be staffed with 1 paramedic. All other units will be staffed with EMTs.	Reduction in the level of paramedic "overlap" coverage. May reduce the ability of Officers and more senior personnel to supervise ALS service delivery.	Savings of $1.305 million over 4 years. A reduction in the number of training hours needed to meet paramedic re-certification requirements. Increase in the distribution of ALS cases by Paramedic. Solves the issues of "front-seat" medics.

Based on the preceding analysis, the project team makes the following recommendations related to paramedic staffing and deployment:

Recommendation: The Plano Fire Department and the City should change its approach to paramedic staffing by requiring 1 paramedic FRS position on each engine, truck, and ambulance unit per shift. All other positions should be made EMT level positions. This approach has the least amount of impact on paramedic response capabilities and will improve paramedic utilization. These personnel can also more effectively be rotated between the ambulance units and the engine and truck companies. Finally, this approach will reduce the burden of EMS educators and trainers to meet paramedic certification requirements.

Recommendation: The PFD and the City should take a phase approach to making this change to mitigate the impact on employee compensation. Each year, the City should change the ordinance to reduce the top step paramedic certification pay for Officers, Apparatus Operators, and non-practicing FRS paramedics by one step. This approach will mitigate the salary decreases associated with this change and also result in savings of $1.2 million over the next four years.

4. THE DEPARTMENT IS CONSIDERING A NUMBER OF ALTERNATIVE APPROACHES TO EMS OPERATIONS.

The Plano Fire Department is currently considering several options, which would modify the way in which EMS services are delivered. These options include:

- Create a Driver position for each ambulance unit. This approach would provide a higher classification similar to Apparatus Operator currently utilized on Engine and Truck companies. This position would receive a higher salary than the current firefighter EMT position assigned to the ambulance unit or provide a stipend for staffing this position.

- Create a stipend or provide incentive pay for personnel to work on the ambulance unit. This approach would pay personnel for each shift worked on the ambulance and would act as an incentive for personnel to meet the daily staffing needs on the ambulance units.

In evaluating the proposed changes to the EMS system, the project team focused on the following issues:

- Does the proposed change increase the efficiency or effectiveness of the system?

- Does the proposed change provide an incentive for personnel to increase or improve their EMS skills?

- Does the proposed change improve the flexibility of the system? In other words, does the proposed change create obstacles or promote the utilization of personnel in several difference roles within the system?

- Is the proposed change consistent with operational practices of fire based EMS providers throughout the country?

For each of these evaluation criteria, the project team assessed the costs and benefits of the proposed changes. The table, below, summarizes our findings:

Option	Effectiveness/ Efficiency	Incentives	Flexibility	Best Practices
Ambulance Driver Position	Does little to change the current approach to ambulance staffing. Does not change the effectiveness of the current system. Makes the system less efficiency due to additional burden of meeting staffing requirement for an ambulance driver.	Creates an incentive for personnel to work as a driver on the ambulance.	Limits the ability of the Department to utilize FRS EMT's to staff the ambulance unit without the Driver certification, if one is utilized.	Very few Departments utilize a driver classification on the ambulance unit. Many Departments in Florida require firefighters to be able to drive all emergency apparatus before completing probation.
Ambulance Pay	Does not significantly change the effectiveness or efficiency of the current EMS system.	Creates an incentive for personnel to work as a driver on the ambulance.	May enhance the flexibility of the system if more personnel volunteer for ambulance work than without the ambulance pay. However, this approach also reduces funds available for overtime needed to staff other units system-wide.	Very few Departments utilize ambulance pay to incentivize personnel to work on the ambulance. Some Departments also require rotation of personnel (particularly at the Firefighter classification) between ambulance and engine / truck companies to minimize the perceived disincentive to work on ambulance units.

Based on the preceding analysis, the project team makes the following observations:

- The first option of creating an ambulance driver position does little to improve the flexibility and efficiency of the current EMS system. Creating a new position creates a new staffing requirement, which limits the ability of the Department to utilize its pool of personnel to meet daily staffing requirements. The primary benefit of this option is to provide an incentive for personnel to work on the ambulance unit as a driver.

- The second option does not create a new staffing requirement for the PFD but is primarily focused on increasing the incentives to work on the ambulance. The issue with this approach is that it indicates that ambulance work is a special job that requires additional compensation, not simply something that is part of being a firefighter with the PFD. Focus groups with Department personnel indicate that ambulance work is viewed differently than work on an engine or truck company due to workload and level of responsibility at EMS incidents. This issue is also compounded by the belief that paramedics and EMTs currently assigned to the engine and truck companies do not have the same level of responsibility at EMS scenes.

Both of the options considered by the PFD are attempts to deal with two issues: workload and fairness. Since the personnel assigned to the ambulance units are responsible for transport, completing the final patient report, and dealing with hospital personnel, line personnel view the job of working on the ambulance unit differently than work on an engine or truck company. As a result, the project team recommends that the PFD do a better job of rotating personnel between ambulance units and engine and truck companies. Specifically, the project team recommends the following:

- For Fire Rescue Specialist Paramedics, at least 30% of the shifts worked should be spent working on the ambulance based on the fact that, as recommended, 23 paramedics will be on duty each day (1 per unit) and there are 7 ambulance units. This means that 30% of on-duty personnel are needed to work on the ambulance units.

- For Fire Rescue Specialist EMTs, at least 30% of the shifts worked should also be spent working on the ambulance unit. Given that a Driver and Officer are assigned to each engine company and 1 FRS-Paramedic is assigned per unit, a total of 7 FRS-EMT's out of 23 minimum staffing positions are required to work on the ambulance. If personnel work 30% of their shifts or 1 out of every 3, all personnel could be rotated between ambulance units and engine/truck companies.

Both options will require that the Department manages personnel scheduling within multi-company houses as rotating personnel from single company stations to stations with an ambulance unit. However, this approach would ensure that all

personnel are exposed to working on the ambulance unit, which will improve skills and mitigate equity and workload concerns.

Recommendations: The Plano Fire Department should not adopt the Ambulance Driver Position option or Ambulance Pay option under consideration. To address equity and workload concerns and to enhance paramedic and EMT exposure to various patient care situations, the Department should rotate personnel to ensure 30% of all FRS shifts are worked on the ambulance units.

5. THE DEPARTMENT HAS AN EFFECTIVE PARAMEDIC SELECTION, ASSIGNMENT, AND DISCONTINUANCE POLICY IN PLACE.

The project team reviewed the current approach utilized by the Plano Fire Department to determine which personnel should be sent to paramedic school and under what circumstances paramedic personnel discontinue their paramedic certification. In evaluating the Department's approach, the project team utilized the following criteria:

- Is the policy in place clear, logical, and intended to ensure consistency in operations and support the mission of the Fire Department?
- Are there clear guidelines in place for personnel who are not paramedics, to enter into the paramedic program? Are these guidelines reasonable? Does this approach promote internal equity?
- Are there clear guidelines in place for personnel who are currently paramedics, to discontinue participation in the paramedic program? Are these guidelines reasonable? Does this approach promote internal equity?
- Is the current approach consistent with the emergency response system design recommended by the project team. In other words, will the current approach ensure that a sufficient number of highly trained paramedics are available to meet recommended paramedic staffing?

Based upon our review of the Department's policy, the project team makes the following findings:

- The Policy clearly states who is authorized to function as a paramedic within the Plano EMS system.
- The Policy is reasonable in that it establishes a system of voluntary assignments and discontinuance, which is utilized prior to the use of mandatory assignments.

This system is based on seniority and evidence of good standing with the Medical Director.

- The Policy establishes criteria by which permanent and temporary discontinuances will be granted. These criteria include a priority to meet sufficient paramedic staffing to maintain the EMS system.

Overall, the Policy provides the Department the flexibility to meet paramedic-staffing needs while promoting a fair system of assignment and discontinuance.

Recommendation: Make no change to the current paramedic selection, assignment, and discontinuance procedures.

6. THE PLANO FIRE DEPARTMENT'S EMS PROTOCOLS ARE CONSISTENT WITH MEDICAL RESEARCH, CLEAR, AND CONCISE. ADDITIONAL STEPS CAN BE TAKEN TO IMPROVE REGIONAL EMS SERVICE DELIVERY.

The project team reviewed the Department's current medical protocols for delivery of EMS care. In reviewing these documents, the project team focused on the following issues:

- Are medical protocols comprehensive? Do they cover the critical incidents that require medical direction on patient treatment?
- Are medical protocols clear and concise? Do these documents allow EMS personnel to make clear decisions about various patient interventions without significant interpretation? Are protocols symptom based as much as possible?
- Are medical protocols consistent with current medical research?
- How effective is the process for reviewing and updating medical protocols?

A review of the Department's EMS protocols indicates that the current protocols in place are very good. These documents are clear and detailed and allow paramedics to operate fairly independently without constant radio contact to medical control. The protocols are also focused on symptoms as much as possible, however when there are critical differences in treatment, a diagnostic entity is provided to allow paramedics to make treatment decisions. The Department's protocols are also consistent with current medical research.

Another best practice in EMS treatment protocol is the use of a committee of regional physicians and nurses to regularly review treatments to ensure that all hospitals are operating consistently. This approach ensures that all agencies are clear as to how patients are being treated and what protocols are followed as patients are delivered to the hospital. It also creates a system of collaboration and can promote problem solving. The Medical Director and the PFD have begun the process of reaching out to each of the Plano Hospitals to review PFD medical protocols and discuss service delivery coordination. The project team believes that these efforts should be continued.

Recommendation: Continue the process of developing a committee of local physicians and nurses to review PFD EMS protocol and discuss issues as they arise. This committee should meet at least once yearly and on an ad hoc basis.

7. INFECTION CONTROL AND SAFETY PROGRAMS ARE CONSISTENT WITH INDUSTRY STANDARDS.

The basis of infection control in any EMS service is based on the concept of proactively managing risk and exposure prior to any infection occurring and then providing for rapid identification and treatment of any risks should a firefighter or other healthcare provider become exposed to a potentially infectious patient or material. The primary guiding references for any infection control program in the fire service include the following:

- **NFPA 1500 – Fire Department Occupational Safety and Health Program (2007 Edition)** provides for a wide range of occupational and safety guidelines for the fire service.
- **NFPA 1581 – Standard on Fire Department Infection Control Program (2005 Edition)** addresses specific issues on preventing, tracking, monitoring, reporting and responding to potential exposures to infection agents.
- **CFR 1910.1030 – Occupational Safety and Health Standards – Bloodborne Pathogens** is a set of federal regulations addressing how all employees who are at risk should be protected and how infection control should be managed and implemented.

- **NFPA 1999 – Standard on Protective Clothing for Emergency Medical Operations (2008 Edition)** provides specific standards on the clothing and other protective and productive equipment that should be provided to emergency medical responders.

- **Ryan White Act (Public Law 101-381 and Public Law 101-415)** addressed, among a wide range of other topics, the need for notification of emergency responders if a patient was found to be carrying a bloodborne or other pathogen. The law put emergency responders in charge of responding to these potential exposures. Changes in the law deleted the emergency response provisions removing the obligation from hospitals to provide critical infection status information within 48 hours of a request for the infection control officer.

Each of these standards and regulations puts into effect the critical elements of an infection control program. The summary that follows, provide the project team's assessment of the current program in the Plano Fire Department:

- All emergency response staff are provided with the full range of protective clothing, equipment and tools described in the aforementioned standards and regulations. Examples include:
  - Protective clothing specifically designed and appropriate for a range of medical, firefighting and other hazardous response tasks.
  - Various hand, eye, face and respiratory protection including gloves, masks, goggles, etc.
  - Appropriate work shoes and boots for various response categories.
- The Fire Department has an Infection Control Officer who meets the requirements laid forth in the various standards and regulations.
- The Fire Department's infection control program meets the requirements of NFPA 1581 including the following:
  - Presence of an Infection Control Officer.
  - Written policy specifically addressing infection control and response protocols.
  - Training, education and policy statements that address a range of critical issues including:
    - Standard procedures for infection control.
    - Safe work practices, use of protective equipment.

    - Disposal of medical waste.
    - Decontamination of equipment, apparatus, etc.
    - Exposure management.
    - Medical follow-up for common infection risks.
  - Involvement of the Department physician in responses to potential infections.
  - Apparatus and facilities (where new or under renovation) are designed with the intent to reduce the risk of infection.
  - Policies require frequent hand washing by staff and provides a wide range of examples of when this should be performed.

- The Plano Fire Department has a process for tracking and ensuring appropriate immediate and long-term follow-up for infection exposures.

The Plano Fire Department's current infection control program is designed to function in accordance with all relevant standards and regulations. Like other emergency medical providers, the Fire Department must work closely with its hospitals to ensure that they continue to receive high levels of cooperation during potential exposure incidents. This cooperation should include:

- Continued utilization of rapid tests for HIV, hepatitis C, tuberculosis and meningitis.
- Continued notification of the Fire Department of patient-source test results when there is risk of an exposure – as identified by the Fire Department.
- Focus by the medical director on these issues to ensure continued infection control monitoring, testing and training as a critical focus of medical support provided to the Fire Department.

Recommendation: The Fire Department should continue its own internal policies and vigilance regarding infection control for line personnel. In light of the recent elimination of certain key provision from the Ryan White law, the Fire Department should, in conjunction with the medical director and the hospitals in Plano, continue to work to ensure proper notification and cooperation between the Department's Infection Control Officer and the hospitals who may be treating the source-patient in an infection exposure situation.

8. THE FIRE DEPARTMENT'S CLINICAL TRAINING AND EDUCATION PROGRAMS UTILIZE A WIDE RANGE OF APPROACHES.

The Plano Fire Department has a comprehensive training and education program that incorporates a wide range of approaches to deliver new concepts and on-going continuing education to experienced providers. The program also has key elements in place to ensure training and development of new paramedics in-house to augment the training that these personnel receive from the paramedic school they attend. The current program contains the following key elements:

- **New paramedics are brought into the Fire Department preceptor program.** Line staff cannot work in a paramedic position and are not compensated as a paramedic until they clear this program. The Department is somewhat limited, at times, based on the number of paramedic preceptors who are currently allowed to sign off on the new medics. However, this is not a continuous problem but is more often circumstantial. This is a best practice approach, particularly for large agencies (who have the capacity to maintain well-qualified preceptors) and even more so for agencies with such specific focus on quality of service delivery and patient care as the Plano Fire Department.

  This element of the training program is run using a model similar to other effective field training officer programs found in fire / rescue, law enforcement and emergency communications. All daily activities are documented, progress is noted against specific criteria, issues are identified for corrective steps and supervisor review is built into the evaluation process. Extensions are granted to new paramedics who need to address specific issues. Medical director sign off is required before the new medic can work within the system.

- **The medical director and nursing staff are directly involved in aspects of training.** The project team found that the current program has all of the following positive aspects:

  - The Medical Director and associated nurses provide live lectures and lead discussions with paramedics throughout the year. These seminars cover a variety of new topics, refreshers, addresses on-going issues, etc. This personal level of involvement is not typical in large systems such as Plano and represents a very high level of commitment on both sides.

  - Training is derived from issues identified in the quality control process. These are either addressed by the Medical Director and his staff or by use of other training materials provided to staff.

- Online resources and hardcopy texts are available to all paramedics to obtain additional information or to allow staff to research issues on their own.

- Staff at all ranks attend a variety of conferences to solicit new information and to then return to the Fire Department to disseminate this information.

- All lectures are taped and are made available to staff who need to "make up" a lecture they missed due to call activity, vacation, etc.

- The Fire Department and Medical Director have made mandatory the majority of topics offered for continuing education credit. This underscores the importance that the Medical Director and senior Fire Department staff place on these topics. This also avoids the over-use of on-line education and also avoids the temptation by medics to focus on the "easy" topics rather than those that are important to the system or the Medical Director.

• **Likewise, the Department has a well functioning quality assurance program.** The project team found the following positive aspects of the Fire Department's program for reviewing cases and identifying potential issues:

- Medical Director's nursing staff is directly involved in reviewing selected cases for quality control purposes. The types of cases selected are determined by the Medical Director.

- Issues identified in the quality control process are included in the training program for Fire Department medical responders.

- There is a peer review process that looks at selected charts and provides for an in-depth review. The Medical Director is involved in this process as well, and will be present when specific issues are addressed with specific personnel.

- Certain call types generate a page to the Medical Director so that he can become involved in the review process while the case is on-going. An example of this is when a paramedic intubates a patient.

While the program is current functioning at very high levels of clinical care, training and quality control, the project team identified several opportunities for enhancing these services:

• The Fire Department and Medical Director should track and review specific procedures accomplished by paramedics and, where possible, evaluate the quality of their implementation. Examples include:

- Number of intubations and success rates.
- Needle thoracotomies and success rates.
- Cardiac arrests.
- Major trauma (of all types).
- Respiratory distress (all types).
- Obstetrics delivery.
- Cardioversion.
- Use of advanced medications.

- Increased use of scene supervision has been addressed elsewhere in this study. The project team recommends that Battalion Chiefs respond to a much broader range of calls for service to provide direct oversight at scenes.

- Provide for improved data capture and utilization from the EPCR system. The current software is reportedly very limited in this regard. This is a major shortcoming that must be addressed in any software upgrade or in any new software purchase in the future.

- Quality control should focus more on specific case studies of clusters of call types and compare services delivered to protocols in place, Medical Director expectations, etc.

- Quality control should provide for a direct linkage with the quality control process performed in emergency communications. The use of call prioritization, emergency medical dispatch and pre-arrival instructions are critical elements in the overall delivery of EMS to patients in the City of Plano but currently these processes are not included in the Fire Department / Medical Director quality control review.

- The nursing staff should review all non-transports.

- All missed intubations should be chart-reviewed by nursing staff and the Medical Director personally.

- Non-ETT intubations should require some form of pulse-OX or end tidal CO_2 to be taken to ensure that adequate ventilation was achieved. These should be reviewed by nursing staff on a trend-basis to ensure that non-ETT intubation is being utilized appropriately.

- Medium term consideration should be given to obtaining access to SimMan and SimBaby technologies (or similar machines). While these machines cost

$30,000 each, several studies indicate that they provide a highly superior training result. In an effort to offset the costs of this, several regions of the country have formed cooperatives to purchase and operate mobile simulation laboratories. This distributes the cost and provides for a pre-determined number of opportunities for all participating agencies to utilize the equipment. Plano could consider serving as a host agency, and potentially generate additional revenue in the Fire Department, as shown, below:

Cost of SimMan	$30,000
Cost of SimBaby	$30,000
Cost of Bus for Lab	$400,000
Cost of Bus Modifications	$100,000
Total Cost	$560,000
Potential Rental Days / Year	200
Days for Use in Plano	30
Net Days for Rental	170
Daily Rental Target (w/Instructor)	$2,000
Annual Income @ 50% Rental	$170,000
Years to Reach Cost	3.29
Annual Income @ 80% Rental	$272,000
Years to Reach Cost	2.06

This analysis shows, simplistically, that sharing the cost of such a mobile lab – or incurring the whole cost and then renting out the facility – would make this technology something that provides for significant improvements in an economically feasible manner. It should also be noted that regional applications such as this have netted grants in excess of $460,000 in the past year – vastly improving their economic viability.

Recommendations: The Fire Department should work in conjunction with the Medical Director to implement the recommendations noted above.

APPENDIX: DESCRIPTIVE PROFILE OF THE PLANO FIRE DEPARTMENT EMS DIVISION

This document provides summary information regarding the current organization and operation of the Plano Fire Department EMS Division, which serves as the context for the EMS system study. The various types of data were developed through interviews with Medical Control, PFD management and personnel, local hospitals, review of available documents and records, as well as access to computerized records and data sets. This profile provides information that will be utilized by the project team to analyze workloads, organization, management and service levels provided by the PFD. The organization of this profile is as follows:

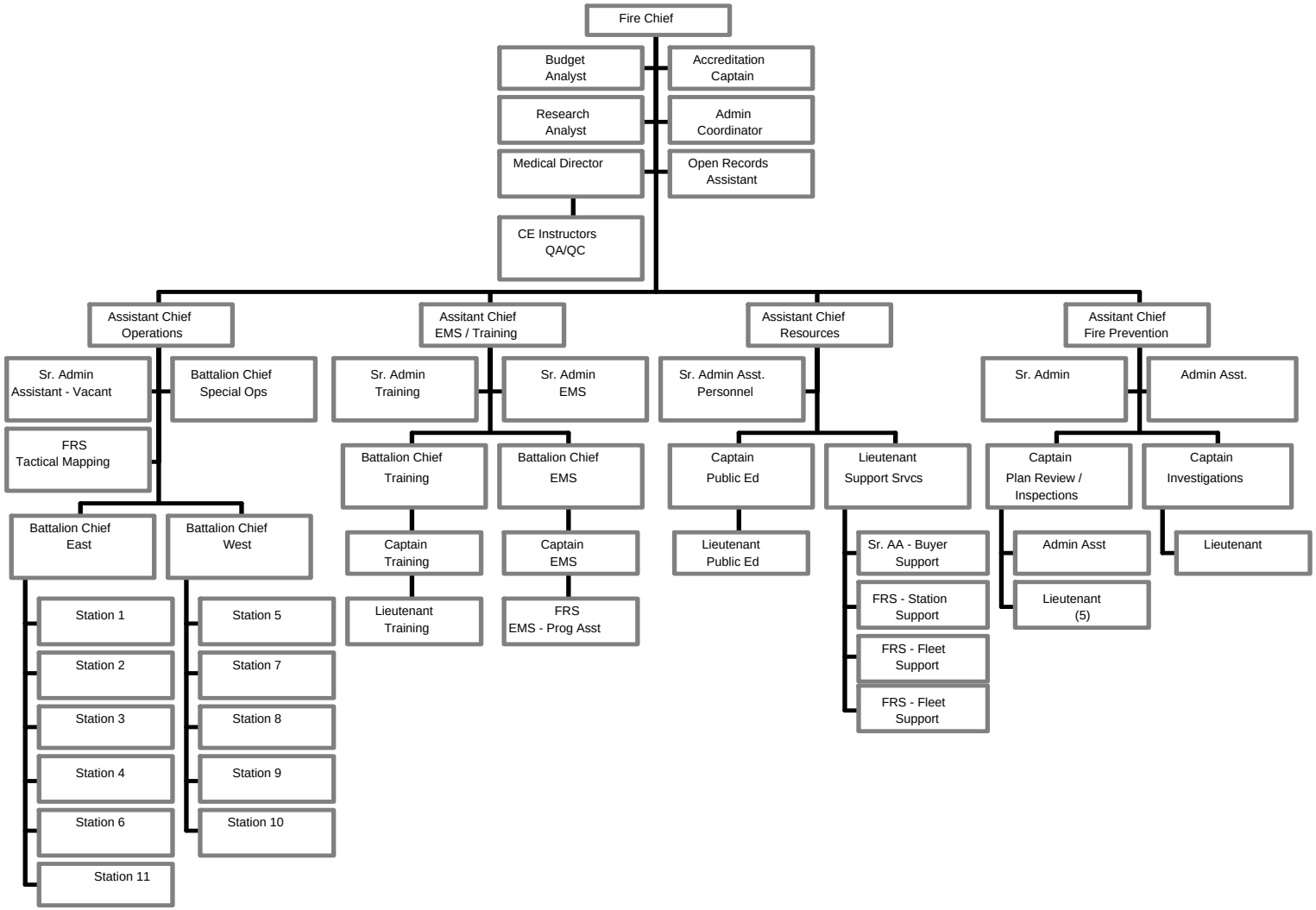
- Organization and Staffing
- Roles and Responsibilities
- Department Budget and Personnel Costs
- Emergency Operations
- Calls for Service and Response Times
- EMS Training and Quality Control

The first section that follows provides the general overview of the PFD, including its organization and authorized staffing.

1. ORGANIZATION AND STAFFING OF THE PLANO FIRE DEPARTMENT

The Plano Fire Department is currently authorized 342 total positions, of which 329 are sworn positions and 13 are civilian positions. The overall organization of the department is shown in the organizational chart, which follows:

Organization of the Plano Fire Department – FY 2007-08



The table, which follows, shows the number of authorized positions allocated to the Fire Department for the past current and past two fiscal years:

Plano Fire Department
Authorized Positions, FY 2005-2008

Position	2005-06 Actual	2006-07 Budget	2006-07 Estimate	207-08 Budget	% Change 05-06 vs. 07-08
Fire Chief	1	1	1	1	0%
Assistant Chief	4	4	4	4	0%
Battalion Chief	8	8	8	9	13%
Captain	38	38	38	39	3%
Lieutenant	21	23	23	24	14%
Fire Apparatus Operator	51	51	51	51	0%
Fire Rescue Specialist	186	195	195	201	8%
Total Sworn	**309**	**320**	**320**	**329**	**6%**
Administrative Assistant	1	3	3	3	200%
Administrative Assistant, Sr.	5	6	6	6	20%
Administrative Coordinator	1	1	1	1	0%
Administrative Records Clerk	1	1	1	1	0%
Fire Budget Analyst	1	1	1	1	0%
Fire Research Analyst	1	1	1	1	0%
Total Civilian	**10**	**13**	**13**	**13**	30%
Total Department	**319**	**333**	**333**	**342**	**7%**

The following points highlight the information in the table, above:

- As shown above, the Department is authorized a total of 342 positions for fiscal year 2007-08. This includes 9 new positions: 1 Battalion Chief, 1 Captain, 1 Lieutenant, and 6 Fire Rescue Specialist positions. Note that 329 authorized positions are sworn and 13 are civilian positions. No new civilian positions have been added for the current fiscal year.

- Overall, the number of authorized sworn positions has increased by 6%, from 309 during fiscal year 2005-06 to 329 in the current fiscal years. The number of civilian positions has increased by 7% over the same time period, from 10 to 13.

Currently 4.5 positions are assigned to EMS management and administration. This includes the EMS/Training Assistant Chief (counted as half-time), Sr. Administrative Assistant, EMS Battalion Chief, EMS Captain, and Fire Rescue Specialist EMS Program Assistant. The table, which follows, shows the current medical certification, by positions, within the Plano Fire Department (as of December 15, 2007):

Plano Fire Department
Medical Certification by Position, Dec. 2007

Position	EMT	Paramedic	Not Available	Total	% Paramedic	% EMT
Rescue Specialist	111	79		190	42%	58%
Apparatus Operator	18	33		51	65%	35%
Captain	9	28	1	38	74%	24%
Lieutenant	6	15	3	24	63%	25%
Battalion Chief	6	3		9	33%	67%
Assistant Chief	1	2	1	4	50%	25%
Fire Chief	1			1	0%	100%
Total	**152**	**160**	**5**	**317**	**50%**	**48%**

As shown above, approximately 50% of the Fire Department is Paramedic certified and 48% is certified at the Paramedic level (medical certification information was not available for 5 personnel). By position, the largest number of Paramedic certified personnel are within the Rescue Specialist classification, followed by Apparatus Operator, Captain, and then Lieutenant. Also note that based on the current staff list, the Department has 12 positions that are either vacant or in the process of being filled as of December 15, 2007.

2. EMS DIVISION ROLES AND RESPONSIBILITIES

This section provides information on the roles and responsibilities of personnel within the EMS Division. Note that these descriptions provide a summary of the key elements of each job and are not meant to be detailed job descriptions. The table, which follows, summarizes these key roles and responsibilities:

Plano Fire Department – EMS Division Roles and Responsibilities

Position	Number	Summary of Roles and Responsibilities
Fire Chief	1	• Responsible for the overall management and direction of the Fire Department. • Develops Department policy and sets goals and objectives for each Division of the PFD. • Develops and approves Fire Department budget. Identifies current and future fire department operating and capital needs consistent with City Council goals and objectives. • Directly oversees 4 Assistant Chiefs. • This is a 40-hour per week position.
Assistant Chief EMS/Training	1	• Responsible for management and supervision of the EMS Division. • Develops policies and procedures and ensures Division performance is in line with Department goals and objectives. • Directly supervises the EMS Battalion Chief and Training Battalion Chief. • Responsible for oversight of EMS contracts and medical control agreement with Medical Center of Plano. • This is a 40-hour per week position.
Admin Assistant	1	• Provides general administrative support to the EMS Division and Assist Chief for Training and EMS. • Performs other administrative duties as needed. • This is a 40-hour per week position.
Battalion Chief EMS	1	• Responsible for management and supervision of day to day EMS activities. • Participates in Quality Assurance / Control programs, training topic development, monthly EMS meetings, and ensures that Division goals and objectives are met. • Participates in a number of EMS committees to represent the PFD and discuss regional/national trends in EMS research and operations. • Responsible for supervision of the EMS Captain. • This is a 40-hour per week position.
EMS Captain	1	• Responsible for management of EMS supplies and equipment including narcotics control, inventory, and distribution. • Participates in monthly EMS meetings to discuss quality control, training, documentation, and other quality assurance issues. • Directly supervises the FRS EMS Program Assistant. • This is a 40-hour per week position.
FRS – EMS Program Asst.	1	• Responsible for maintenance, inventory, and distribution of EMS equipment and supplies (with the exception of narcotics which are distributed by the EMS Captain). • Performs other administrative duties in support of the EMS Captain. • This is a 40-hour per week position.

Position	Number	Summary of Roles and Responsibilities
Medical Director	1	• This is a contract position with the Medical Center of Plano, who contracts with a local medical group for Emergency Medical Control. • Responsible for overall management and oversight of the emergency medical system within the PFD. • Develops and reviews emergency medical protocol for patient care. • Performs quality assurance and control for the PFD. Reviews all Priority 1 incidents for adherence to medical protocol. • Delivers continuing education to PFD personnel. • Holds monthly EMS meetings to discuss training and quality assurance issues with PFD EMS managements. • Directly supervises 2 EMS Trainers.
EMS Trainers	2	• These are contract positions with the Medical Center of Plano. • Two Nurse Practitioners provide EMS training to the PFD and performs quality assurance/control functions for the Medical Director. • These personnel maintain continue education and recertification information for all Plano Fire Department sworn personnel. • Participates in EMS monthly meetings to discuss incident trends, documentation, training, and quality assurance issues.
Captain – EMT / Paramedic	38	• Captains are responsible for management and supervision of personnel assigned to their respective stations. • Captains are also the officer in charge for their respective engine and truck companies. • Paramedic Captain perform initial patient assessment and deliver BLS and ALS patient care at the scene of emergency EMS incidents. • EMS Captains perform initial patient assessment and delivery BLS patient care at the scene of emergency EMS incidents. • This is a 56-hour per week position. Emergency operations personnel work a 1 day on, 2 days off rotation of 24-hour shifts.
Lieutenant – EMT / Paramedic	24	• Lieutenants are responsible for management and supervision of personnel assigned to their station personnel in the absence of a Captain. • Lieutenants are also the officer in charge for their respective engine and truck companies. • Paramedic Captains provide incident management at the scene of emergency EMS incidents. • EMS Captains perform initial patient assessment and delivery BLS patient care at the scene of emergency EMS incidents. • This is a 56-hour per week position. Emergency operations personnel work a 1 day on, 2 days off rotation of 24-hour shifts.
Apparatus Operator – EMT / Paramedic	51	• Apparatus Operators drive the engines and ladder trucks and are acting officers in charge in the absence of a Lieutenant or Captain. • Provide patient care at the BLS or ALS level depending on certification. • This is a 56-hour per week position. Emergency operations personnel work a 1 day on, 2 days off rotation of 24-hour shifts.

Position	Number	Summary of Roles and Responsibilities
Fire Rescue Specialist – EMT / Paramedic	190	• Fire Rescue Specialist EMTs and Paramedics work on both ambulance units and ladder trucks or engines. • When working on an ambulance, FRS paramedics are primarily responsible for initial patient assessment and patient care. FRS EMTs drive the ambulance during transport to allow the paramedic to provide care. • When working on an engine or ladder truck, FRS paramedics provide initial patient assessment and care in support of or in the absence of the paramedic assigned to the ambulance. A paramedic FRS may also assist the ambulance crew with patient care during transport to the hospital. • This is a 56-hour per week position. Emergency operations personnel work a 1 day on, 2 days off rotation of 24-hour shifts.

The next section provides information on the PFD's budget and personnel costs.

3. DEPARTMENT BUDGET AND PERSONNEL COSTS

This section provides information on personnel and equipment costs. The table, which follows, shows the overall Department budget for FY 2007-08.

Budget Item	2005-06 Actual	2006-07 Budget	2006-07 Estimate	2007-08 Budget	% Change 05-06 vs. 07-08
Sworn Personnel					
Salaries & Wages	$30,137,024	$35,202,120	$32,771,106	$35,690,188	18%
Operations & Maintenance	$4,019,906	$4,890,545	$4,831,416	$5,475,155	36%
Reimbursements	$(7,364)	$-	$-	$-	-100%
Capital Outlay	$376,594	$54,000	$134,562	$305,500	-19%
Total	$34,526,160	$40,146,665	$37,737,084	$41,470,843	20%
Civilian Personnel					
Salaries & Wages	$491,002	$690,774	$675,095	$714,043	45%
Operations & Maintenance	$32,388	$74,221	$78,331	$73,670	127%
Reimbursements	$-	$-	$-	$-	N/A
Capital Outlay	$-	$-	$-	$-	N/A
Total	$523,390	$764,995	$753,426	$787,713	51%
Grand Total	**$35,049,550**	**$40,911,660**	**$38,490,510**	**$42,258,556**	**21%**

The 2007-08 Fire Department Budget includes $1,939,596 in supplemental program funding. Full-time personnel additions total $961,891 and include (6) Fire Rescue Specialists, (1) Lieutenant, (1) Captain, and 1) Battalion Chief. Operations and maintenance program additions total $510,887. Fire ERF supplements total $415,000 for LifePak 15 Defibrillators and equipment for a 10th Medical Unit. Items funded in the PC Replacement Funding total $28,818 and include EMS laptops and printers, and a mapping printer/scanner. Equipment Replacement funds of $23,000 are included to purchase a hybrid sedan for Fire Administration use. Enhancements to the Fire Program relate to the City Council goal of "Service Excellence".

As shown above, the Department's total budget, for both Sworn and civilian personnel, is $42,258, 556 for the current fiscal year. This represents an increase of $7.2 million from FY 2005-06 expenditures or 21%. Salaries and Wages accounted for 80% of the total increase or $5,776,205.

The next table, that follows, shows the current revenue generated by EMS transports and fees collected by the PFD:

Revenue Source	2005-06 Actual	2006-07 Budget	2006-07 Estimate	2007-08 Budget	% Change 05-06 vs. 07-08	$ Change 05-06 to 07-08
Ambulance Service	2,906,236	2,790,863	3,092,180	3,107,641	7%	201,405

As shown above, total revenues generated from EMS transports is expected to increase by over $200,000 or by 7% from FY 05-06 to FY 07-08.

The project team also collected salary and benefit data that show the current salary range, by position, and the estimated costs of benefits for personnel with the PFD:

Plano Fire Department
Total Personnel Costs by Position

Position	Annual Salary	Monthly Salary	Average Benefit Cost	Total Cost
Fire Rescue Specialist				
Base	$54,526	$4,544	19,500	74,026
6 Months	$54,526	$4,544	19,500	74,026
12 Months	$58,368	$4,864	19,500	77,868
24 Months	$64,299	$5,358	19,500	83,799
Fire Apparatus Operator				
Base	$70,711	$5,893	23,542	$94,25
Lieutenant				
Base	$79,666	$6,639	23,719	103,38
Captain				
Base	$89,245	$7,437	25,336	114,58
Battalion Chief				
Base	$101,45	$8,455	30,746	132,20
6 Months	$110,06	$9,172	30,746	140,80
Assistant Chief				
Base	$120,88	$10,074	30,893	151,78

Note that the table above shows the average cost of benefits by position based on actual expenditures for insurance, retirement, and other benefits. Also note that the same benefit cost was applied to each step in a classification and uses the average for 56-hour employees for positions with the exception of the Assistant Chief. This was done since the majority of employees work a 56-hour schedule.

The Plano Fire Department also pays for paramedic certification based on the length of time the certification is maintained. This information is shown in the following table:

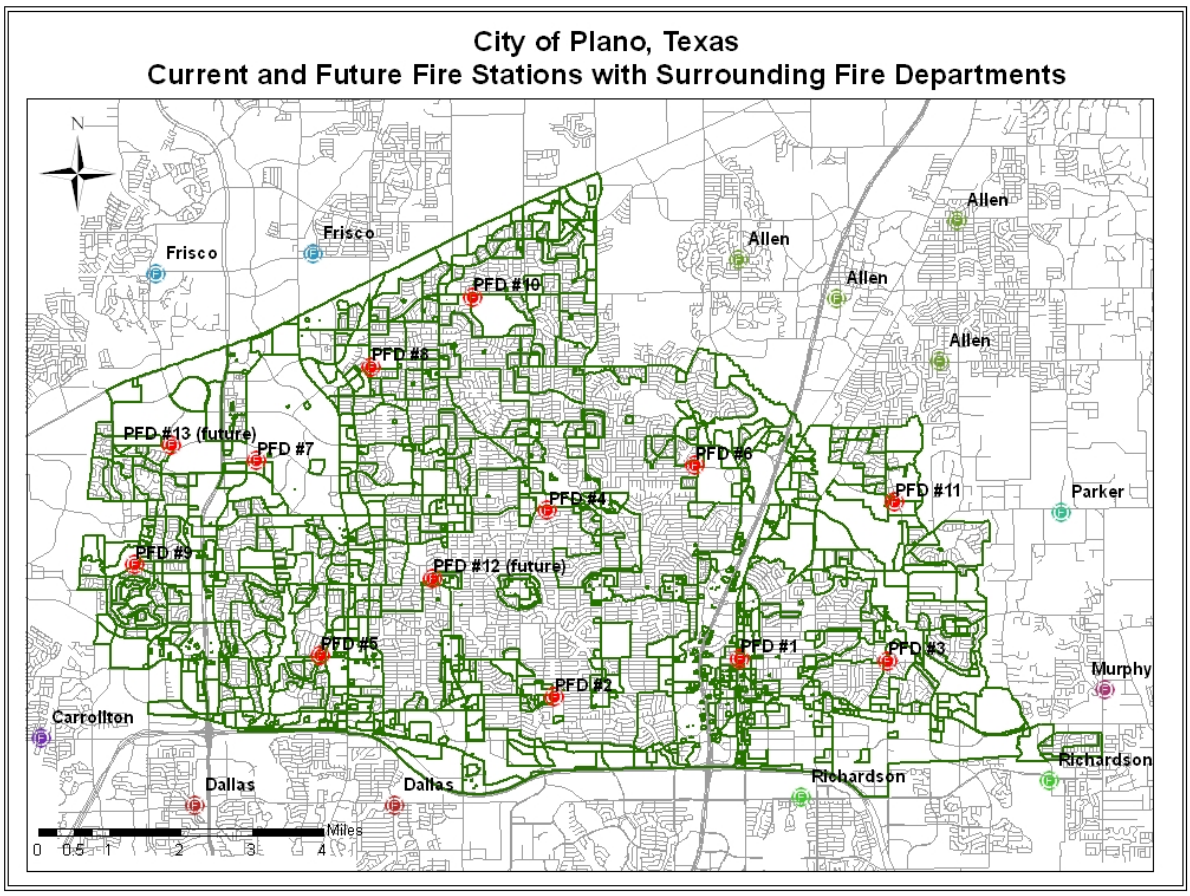
Plano Fire Department
Paramedic Certification Pay

Paramedic Pay	Pay Period	Annual
< 48 mos	$149	$1,788
48-95 mos	$297	$3,564
96-143 mos	$446	$5,352
144 + mos	$594	$7,128

As shown above, paramedic pay increases every four years and ranges from $1,788 annually for less than 4 years to $7,128 annually for 12 or more years of service as a paramedic.

4. OVERVIEW OF EMERGENCY OPERATIONS

The Plano Fire Department currently operates 11 fire stations throughout the City. A new station (station 12) is current under construction, and a 13th station is planned for the next fiscal year. The map, which follows, shows the location of current and future fire stations as well as adjacent fire departments:



As shown above, the City of Plano (in green) is surrounded by the cities of Frisco, Allen, Parker, Murphy, Richardson, Dallas, and Carrollton.

The following table shows the current assignment of apparatus to each fire station and the current minimum daily staffing:

Fire Station	Front-line Apparatus	Minimum Daily Staffing
Station 1 1901 Ave. K Plano, TX 75074	• Engine 1 • Medic 1 • Truck 1	• 4 • 2 • 4
Station 2 2630 W. 15th St. Plano, TX 75075	• Engine 2 • Engine 21 • Medic 2	• 4 • 4 • 2

Fire Station	Front-line Apparatus	Minimum Daily Staffing
Station 3 3520 Sherrye Dr. Plano, TX 75074	• Engine 3 • Medic 3	• 4 • 2
Station 4 6000 Roundrock Trail Plano, TX 75023	• Engine 4 • Truck 4	• 4 • 4
Station 5 5115 W. Park Blvd. Plano, TX 75075	• Engine 5 • Medic 5 • Truck 5	• 4 • 2 • 4
Station 6 900 Seabrook Dr. Plano, TX 75023	• Battalion 6 • Engine 6 • Medic 6	• 1 • 4 • 2
Station 7 5602 Democracy Dr. Plano, TX 75024	• Battalion 7 • Engine 7 • Truck 7	• 1 • 4 • 4
Station 8 4555 Hedgecoxe Dr. Plano, TX 75024	• Engine 8 • Medic 8	• 4 • 2
Station 9 6625 W. Parker Rd. Plano, TX 75093	• Engine 9 • Medic 9	• 4 • 2
Station 10 3540 McDermott Dr. Plano, TX 75025	• Engine 10	• 4
Station 11 4800 Los Rios Blvd. Plano, TX 75074	• Engine 11 • Utility 11	• 4 • 1
Total	**12 Engines** **7 Medics** **4 Trucks**	**81 Personnel / Shift**

As shown above, the Plano Fire Department deploys 12 engines, 7 ambulance units, 4 ladder trucks and 1 utility truck throughout the City. Daily minimum staffing, including Battalion Chiefs, is 81 personnel.

5. CALL FOR SERVICE WORKLOAD AND RESPONSE TIMES

This section provides information on historic call for service workload handled by the Plano Fire Department and response times. The first table, that follows, shows the total number of incidents handled, by type, from 2004 to 2007. Note that 2007 data in all tables is estimated since the project team only had data from January 1st to December 12th, 2007.

Plano Fire Department
2004 - 2007 Calls for Service, by Call Type

Call Type	2004	2005	2006	2007	Percent of Total
Fire	466	562	547	417	3%
Overpressure Rupture, Explosion (no fire)	17	25	17	17	0%
Rescue & EMS Incident	9,739	10,564	11,299	11,891	61%
Hazardous Condition (No Fire)	677	882	698	767	4%
Service Call	886	1,000	1,152	1,131	6%
Good Intent Call	2,450	2,466	2,767	2,867	15%
False Alarm & False Call	1,832	1,900	1,692	1,878	10%
Severe Weather & Natural Disaster	14	9	3	23	0%
Special Incident Type	21	42	11	12	0%
Undetermined incident type	39	33		119	0%
Total	**16,141**	**17,483**	**18,186**	**19,121**	**100%**

The following points highlight the table, above:

- As shown above, during 2004, the Plano Fire Department responded to 16,141 total incidents. In 2007, a total of 19,121 incidents were handled. This represents an increase of 18% over the four-year period.

- EMS incidents represented an average of 61% of total calls for service over the four-year period. In addition, from 2004 to 2007, EMS incidents increased from 9,739 to 11,891, an increase of 22%.

The next table, which follows, shows the distribution of calls for service by time of day and day of week:

Plano Fire Department
Total Calls for Service by Hour and Day of Week

Hour	2004	2005	2006	2007	Total	Avg./Hour	2004-07 Change
0000	421	446	471	527	1,865	1.28	25%
0100	394	354	398	386	1,532	1.05	-2%
0200	313	369	355	434	1,471	1.01	39%
0300	297	283	319	310	1,209	0.83	5%
0400	265	307	270	288	1,130	0.77	9%
0500	264	301	337	308	1,210	0.83	17%
0600	368	424	411	445	1,648	1.13	21%
0700	551	591	647	626	2,415	1.65	14%
0800	734	789	840	932	3,295	2.26	27%
0900	812	882	891	964	3,549	2.43	19%
1000	857	923	1,011	1,056	3,847	2.64	23%
1100	943	995	1,083	1,030	4,051	2.77	9%
1200	906	1,037	1,063	1,102	4,108	2.81	22%
1300	923	1,058	1,035	1,075	4,091	2.80	16%
1400	942	963	1,016	1,064	3,985	2.73	13%
1500	917	1,038	1,074	1,143	4,172	2.86	25%
1600	966	1,108	1,026	1,128	4,228	2.90	17%
1700	931	1,048	1,094	1,112	4,185	2.87	19%
1800	895	978	1,111	1,104	4,088	2.80	23%
1900	855	901	874	1,036	3,666	2.51	21%
2000	774	767	802	894	3,237	2.22	15%
2100	753	775	822	802	3,152	2.16	7%
2200	590	648	644	761	2,643	1.81	29%
2300	470	498	592	592	2,152	1.47	26%
Total	**16,141**	**17,483**	**18,186**	**19,121**	**70,931**	**48.58**	**18%**

The following points should be noted regarding the information above:

- On average, the Plano Fire Department responded to 49 total calls for service each day. In 2004, the average number of daily incidents was 44 compared to 52 daily incidents during 2007.

- The busiest hours of the day are from 0800 to 1900 when total calls average between 2.26 calls and 2.5 each hour. Note the hour with the largest percentage increase since 2004 was 0200, when the average number of incidents increased by 39%.

The next table, on the following page, shows total incidents by first due station:

Plano Fire Department
2004 to 2007 Calls for Services, by First Due Station

Station / District	2004	2005	2006	2007	Avg./Day
BCW		3		7	N/A
BCE		2	1		N/A
FD1	3,082	3,202	3,439	3,574	9.11
FD10	842	857	929	962	2.46
FD11			65	404	1.10
FD2	1,549	2,101	2,340	2,497	5.81
FD3	1,211	1,451	1,557	1,531	3.94
FD4	2,165	2,271	2,462	2,608	6.51
FD5	2,021	2,242	2,322	2,313	6.09
FD6	1,752	1,823	1,759	1,699	4.82
FD7	748	1,103	1,302	1,328	3.07
FD8	1,016	1,057	1,080	1,001	2.84
FD9	905	981	930	1,076	2.67
(blank)	850	390		120	0.93
Total	**16,141**	**17,483**	**18,186**	**19,121**	**48.58**

The following points summarize the information in the table, above:

- From 2004 to 2007, the busiest station was station 1, which averaged 9 calls each day for a total of 3,082 incidents in 2004 and 3,574 incidents in 2007. The least busy station, as of 2007, was Station 11, which averaged 1 call per day for a total of 204 incidents.

- The Department has four stations where workload is particularly high – Stations 1, 2, 4, and 5 where annual calls for service are greater than 2,000.

The next two tables show EMS calls for service from 2004 to 2007. The first table, which follows, shows the number of EMS incidents per hour:

Plano Fire Department
EMS Calls for Service by Hour and Day of Week

Hour	2004	2005	2006	2007	Total	Avg./ Hour	2004-07 Change
0000	272	276	309	353	1,210	0.83	30%
0100	247	246	278	261	1,032	0.71	6%
0200	213	236	224	285	958	0.66	34%
0300	194	195	204	198	791	0.54	2%
0400	174	190	175	201	740	0.51	16%
0500	159	186	210	196	751	0.51	23%
0600	214	253	248	306	1,021	0.70	43%
0700	337	355	425	407	1,524	1.04	21%
0800	433	489	510	574	2,006	1.37	32%
0900	477	534	534	597	2,142	1.47	25%
1000	504	518	633	653	2,308	1.58	30%
1100	541	593	669	636	2,439	1.67	17%
1200	560	626	689	702	2,577	1.76	25%
1300	559	625	663	657	2,504	1.71	17%
1400	548	558	641	669	2,416	1.65	22%
1500	541	639	636	680	2,496	1.71	26%
1600	586	653	614	661	2,514	1.72	13%
1700	557	612	678	660	2,507	1.72	18%
1800	517	589	660	699	2,465	1.69	35%
1900	526	537	540	638	2,241	1.53	21%
2000	485	461	500	517	1,963	1.34	7%
2100	437	489	513	501	1,940	1.33	15%
2200	367	393	379	476	1,615	1.11	30%
2300	291	311	367	364	1,333	0.91	25%
Total	**9,739**	**10,564**	**11,299**	**11,891**	**43,493**	**29.79**	**22%**

The following points summarize the table, above:

- Over the four-year period, an average of 30 EMS calls for service were handled each day. During 2004, an average of 27 daily incidents were responded to, while in 2007, an average of 32 calls were handled.

- The busiest hour of the day was the hour between noon and 1:00 p.m. when the Department received almost 2 calls for service. The hour with the largest increase in workload, on a percentage basis, since 2004, was the hour from 0200 to 0300 which experienced an increase of 34%.

The next table shows the distribution of EMS incidents by first due station over the same time period:

Plano Fire Department
2004 to 2007 EMS Calls for Services, by First Due Station

Station / District	2004	2005	2006	2007	Avg./Day
BCW		2			N/A
BCE					N/A
FD1	1,981	2,115	2,355	2,380	6.05
FD10	475	479	512	554	1.38
FD11			36	246	0.68
FD2	1,011	1,343	1,559	1,598	3.77
FD3	783	954	970	1,009	2.55
FD4	1,307	1,373	1,530	1,672	4.03
FD5	1,122	1,219	1,275	1,307	3.37
FD6	1,171	1,132	1,138	1,125	3.13
FD7	398	645	797	801	1.81
FD8	606	605	632	611	1.68
FD9	463	485	495	585	1.39
(blank)	422	212		1	0.43
Total	**9,739**	**10,564**	**11,299**	**11,891**	**29.79**

As shown in the table above, the busiest station, measured by EMS workload, was Station 1, which handled an average of 6 EMS calls for service each day. Also note that workload in this station's first due area increased by 20% over the four-year period, from 5.5 daily EMS calls in 2004 to 6.5 calls each day in 2007. It is interesting to note that workload in Station 3's first due area increased by 58% from 2004 to 2007.

The last table, on the following page, shows the number of apparatus runs during 2007 to EMS incidents:

Plano Fire Department
2007 Apparatus Responses to EMS Incidents

Apparatus	Total	Avg./Day
M1	2,448	6.71
M6	2,094	5.74
M5	2,001	5.48
E1	1,919	5.26
M8	1,690	4.63
M3	1,524	4.18
E4	1,313	3.60
E6	1,139	3.12
E5	1,066	2.92
M9	1,043	2.86
E3	1,015	2.78
E2	920	2.52
E2	842	2.31
M4(R)	716	1.96
E7	715	1.96
M2	695	1.91
T1	690	1.89
E8	680	1.86
E9	592	1.62
E10	562	1.54
T5	425	1.16
T4	398	1.09
T7	366	1.00
E11	267	0.73
BC7	81	0.22
BC6	77	0.21
Total	**25,369**	**69.50**

The following points summarize the table, above:

- The unit with the most EMS incident responses during 2007 was Medic 1, which averaged almost 7 responses each day, followed by Medic 6 at 5.75, Medic 5 at 5.5, and Engine 1 at 5.25 daily responses. An average of 70 unit responses were made each day to EMS incidents.

- The busiest ladder truck had 690 total responses for an average of 1.90 responses each day.

- Battalion Chiefs responded to an average of 1 EMS incident every other day during 2007.

- Based on the number of EMS incidents and apparatus runs to those incidents, an average of 2 units were sent to EMS calls during 2007. This is consistent with the Department's practice of sending an engine and ambulance unit to each call for service.

The Plano Fire Department has developed response time targets in it's 2007-2011 Strategic Plan. These goals include a response time of 6 minutes 59 seconds or less 90% of the time to emergency incidents. In addition, the Department has targeted a 1 minute or less reflex time 70% of the time. It is important to note that response time has several elements including:

- The time, once reported, required to process information by the public safety communications center before dispatching fire department personnel. This time interval is typically called "dispatch-processing time."
- The time, once dispatched, needed by Fire Department personnel to gather equipment, get dressed, and begin responding in apparatus. This time interval is typically called "turn-out time" or "reflex time."
- The time, once en-route to a call for service to arrival by the first unit, at the scene of an emergency incident. This time interval is typically called "drive time" or "travel time".
- As a result, total response time includes the time from receipt of a 911 call in the public safety communications center to the arrival of the first unit on scene.

The project team determined the average response times achieved by the Plano Fire Department for each of the following elements: "reflex" time, "travel" time, and total response time. It should be noted that the project team utilized all EMS incidents since the number of "emergency" incidents in the call for service data was less than 0.5%. The tables, which follow, show the average response time for each element as well as the percentage of EMS calls reached within the targeted response times:

Plano Fire Department
2004 to 2007 Average Reflex Time to EMS Calls

Station / District	2004	2005	2006	2007
FD1	1.22	1.05	1.06	0.99
FD10	1.37	1.12	1.21	1.05
FD11			0.81	1.01
FD2	1.26	1.00	0.99	0.96
FD3	1.20	1.12	1.17	1.05
FD4	1.18	1.09	1.20	1.00
FD5	1.28	1.14	1.10	0.99
FD6	1.26	1.16	1.14	1.02
FD7	1.35	1.14	1.13	1.03
FD8	1.30	1.12	1.08	1.04
FD9	1.48	1.18	1.22	1.09
Total	**1.25**	**1.10**	**1.11**	**1.01**

Plano Fire Department
2004 to 2007 1 Minute Reflex Time to EMS Calls

Station / District	2004	2005	2006	2007
FD1	47%	59%	60%	65%
FD10	32%	52%	46%	56%
FD11			75%	62%
FD2	57%	65%	66%	67%
FD3	44%	54%	53%	61%
FD4	48%	57%	45%	64%
FD5	46%	57%	54%	64%
FD6	46%	52%	57%	67%
FD7	40%	55%	50%	61%
FD8	39%	53%	56%	62%
FD9	35%	52%	44%	61%
Total	**46%**	**57%**	**55%**	**64%**

The following points summarize the information in the tables, above:

- As shown above, the average reflex time achieved by the Plano Fire Department to EMS incidents in 2007 was approximately 1 minute. Reflex time has declined since 2004 by approximately 15 seconds. Also note that reflex time was fairly consistent from station to station.

- The percentage of calls within the 1 minute target for reflex time in 2007 was approximately 64%. This is slightly below the Department's target of 70%. However, reflex time performance has improved from 46% in 2004 to 64% in 2007. Again, performance was fairly consistent from station to station, although Station 6 and Station 2 had the best performance at 67%.

The next pair of tables show travel time performance from 2004 to 2007. Note the project team used a target of 5 minutes for travel time based on the total response target of 6 minutes 59 seconds. This amounts to 1 minute for dispatch processing, 1 minute for reflex time, and 5 minutes for travel or drive time.

Plano Fire Department
2004 to 2007 Average Drive Time to EMS Calls

Station / District	2004	2005	2006	2007
FD1	3.23	3.25	3.48	4.60
FD10			3.96	6.07
FD11	3.78	4.03	3.93	5.97
FD2	3.24	3.39	3.47	4.56
FD3	3.30	3.49	3.57	4.37
FD4	3.52	3.43	3.44	5.16
FD5	3.34	3.35	3.62	4.62
FD6	3.65	3.47	3.47	4.49
FD7	3.68	4.06	4.13	5.48
FD8	3.66	3.25	3.68	5.02
FD9	3.40	3.56	3.46	4.39
Total	**3.43**	**3.45**	**3.57**	**4.81**

Plano Fire Department
2004 to 2007 5 Minute Drive Time to EMS Calls

Station / District	2004	2005	2006	2007
FD1	89%	88%	84%	70%
FD10	82%	77%	78%	40%
FD11			68%	48%
FD2	89%	88%	87%	67%
FD3	88%	86%	85%	76%
FD4	86%	87%	87%	56%
FD5	89%	89%	85%	71%
FD6	84%	86%	88%	78%
FD7	84%	76%	77%	48%
FD8	85%	90%	86%	65%
FD9	88%	85%	84%	75%
Total	**87%**	**86%**	**85%**	**66%**

The following points summarize the information in the tables, above:

- As shown above, the average drive time achieved by the Plano Fire Department to EMS incidents in 2007 was approximately 4.8 minutes. Drive time has increase since 2004 by approximately 1.4 minutes. Also note that drive time is highest in Station 10's first due area, with an average of 6 minutes.

- The percentage of calls within the 5 minute target for drive time in 2007 was approximately 66%. Note that performance against this target varies significantly by first due station, from a high of 78% in Station 6's area, to a low of 40% in Station 10's first due area. Also note that performance has declined by approximately 20% in 2007 from 2006, 2005 and 2004.

The final set of tables show total response time performance from 2004 to 2007. This is defined as the time from receipt of a 911 call to arrival on scene by the first arriving unit.

Plano Fire Department
2004 to 2007 Average Total Response Time (Call Receipt to Arrival) to EMS Calls

Station / District	2004	2005	2006	2007
FD1	4.76	4.75	5.00	5.83
FD10	5.45	5.72	5.51	7.33
FD11			4.86	7.18
FD2	4.85	5.04	4.93	5.74
FD3	5.01	5.03	5.08	5.71
FD4	5.08	5.36	4.96	6.56
FD5	4.96	5.02	5.09	5.85
FD6	5.26	5.02	4.89	5.55
FD7	5.41	5.90	5.73	6.78
FD8	5.29	4.83	5.11	6.30
FD9	5.21	5.17	4.97	5.71
Total	**5.04**	**5.09**	**5.07**	**6.07**

Plano Fire Department
2004 to 2007 Total Response Time (Call Receipt to Arrival) Less than 7 Mins to EMS Calls

Station / District	2004	2005	2006	2007
FD1	91%	90%	88%	79%
FD10	84%	81%	83%	54%
FD11			83%	58%
FD2	91%	90%	90%	77%
FD3	89%	88%	88%	82%
FD4	89%	89%	90%	67%
FD5	90%	90%	90%	80%
FD6	88%	88%	90%	84%
FD7	85%	81%	84%	63%
FD8	87%	92%	89%	75%
FD9	87%	88%	89%	82%
Total	**89%**	**89%**	**89%**	**75%**

The following points summarize the information in the tables, above:

- As shown above, the average response time achieved by the Plano Fire Department to EMS incidents in 2007 was approximately 6 minutes. Total response time has increased since 2004 by approximately 1 minute. Also note that response time is highest in Station 10's first due area, with an average of 7.33 minutes.

- The percentage of calls within the 5 minute target for total response time in 2007 was approximately 75%. This is below the Department's goal of 90%. Note that performance against this target varies significantly by first due station, from a high of 84% in Station 6's area, to a low of 54% in Station 10's first due area. Also note that performance has declined by approximately 14% in 2007 from 2006, 2005 and 2004.

The next section provides information on EMS training and the quality control / assurance program within the PFD

6. EMS TRAINING AND QUALITY CONTROL

As described in the section on roles and responsibilities, the Plano Fire Department has a contract with Medical Center of Plano for medical control. Three personnel provide medical direction, quality assurance, and continuing education for the EMS Division. The table, that follows, describes the key components of the EMS training and quality assurance program within the PFD:

Program	Key Components
EMS Preceptor Program	• New hires are sent through a 3-month preceptor program after they are sent through paramedic school. • This program consists of 4 phases: - 1: Initial paperwork phase - 2: Ride engine - 3: Ride ambulance - 4: Perform a "megacode" with the Medical Director. During each phase, the intern's daily progress is monitored by his/her assigned preceptor. If unsuccessful at any phase, the intern must go through remediation before going on to the next phase.

Program	Key Components
EMS CE Training and Recertification	• MCOP provides all mandated training and provides reports to Fire Department on current status of employee certifications on a monthly basis. • Hospital provides 12 3-hour modules/year: 7 are on site (Each is 3 days – 3 classes/day – 3 hours long); 5 are CD/ROM based. Live sessions are taped and placed on CD. • Training includes large scale incident/disaster training. CES is also moving toward integrating hospital employee CE with Medic CE (e.g. 12-lead EKG interpretation and system activations). • Each Paramedic is responsible for all CE hours (36 hours/year – this provides the state minimum 144 hours/4 year requirement).
EMS Quality Assurance and Control	• The Department uses the following criteria to perform chart reviews: - 100% of Priority I calls receive full chart audit. - 10% of remaining calls receive chart audit. - All AMA/No transports receive audit. • Medical control utilizes QA/QC to identify trends and remediation efforts are built into the CE syllabus for the following year/quarter. • The Department utilizes a peer review process. Peer reviews are conducted approximately 1 x per month. The peer review committee consists of volunteers. Potential remediation actions include: - Amending report - Continuing Education - Medical Director Review - Independent Research - Independent Practice - Credential suspension

As part of the EMS QA/QC process, the EMS Educators monitor a number of statistics related to the EMS program. The table, on the following page, provides an example of the statistics tracked:

Plano EMS Statistics, 2007

Measure	1/07	2/07	3/07	4/07	5/07	6/07	7/07	8/07	9/07	10/07	11/07	12/07	Totals
TRANSPORTS													
Priority 1/3	65	63	54	62	76	60	68	54	67	71	59		699
Priority 2/3	20	18	12	12	16	12	27	22	24	13	27		203
Priority 2/2	113	140	129	158	120	120	85	79	92	106	107		1,249
Priority 2/1	50	66	53	48	70	48	67	62	56	57	61		638
Total Priority 2	183	224	194	218	206	180	179	163	172	176	195	-	2,090
Priority 3/1	523	481	462	475	569	511	533	557	545	596	566		5,818
Other Priorities	-	-	-	-	-	-	-	-	-	-	-		-
Total Transports	771	768	710	755	851	751	780	774	784	843	820	-	8,607
Total No Transports Called in	37	40	50	33	55	41	49	41	56	51	55		508
Total # of No Transports	179	183	210	201	235	230	240	200	259	228	200		2,365
Grand Total	950	951	920	956	1,086	981	1,020	974	1,043	1,071	1,020	-	10,972
ALS Transports	376	392	392	373	459	381	423	407	402	446	400		4,451
PATIENT OUTCOMES													
Total Admissions to MCP	158	181	136	174	174	159	170	169	165	167	173	-	1,826
Critical Care Totals	91	125	97	113	112	97	102	111	109	101	109	-	1,167
CCU/ICU	22	35	28	28	25	30	23	19	28	25	33		296
Stepdown/Telemetry	69	90	69	85	87	67	79	92	81	76	76		871
Med Surg/Peds/L&D	67	56	39	61	62	62	68	58	56	66	64		659
Transfers	14	19	16	17	21	22	20	24	16	18	20		207
PATIENT DESTINATION													
Medical Center of Plano	437	426	377	408	469	429	424	456	467	481	484		4,858
Medical Center of McKinney	4	2	5	3	3	3	4	5	4	4	4		41

Measure	1/07	2/07	3/07	4/07	5/07	6/07	7/07	8/07	9/07	10/07	11/07	12/07	Totals
Richardson Regional	7	14	7	9	16	7	20	11	9	18	12		130
Presbyterian of Plano	153	146	137	153	163	147	157	146	167	160	158		1,687
Medical City of Dallas	5	3	1	1	2	4	1	3	1	5	6		32
Presbyterian of Dallas	4	2	4	5	4	3	5	4	2	2	3		38
Parkland	3	2	1	1	1	1	1	1	2	1	-		14
Trinity Medical Center	4	-	2	3	2	2	-	-	2	-	4		19
Methodist	-	-	-	1	-	-	-	-	-	-	-		1
Presbyterian of Allen	9	18	16	16	20	15	11	16	17	14	9		161
Centennial	51	52	50	55	59	59	48	41	38	48	49		550
Baylor Hospital of Plano	91	102	99	95	103	80	98	88	72	97	84		1,009
Baylor Heart Hospital of Plano										12	6		12
Other	3	2	7	4	9	2	5	3	3	1	1		40
NON TRAUMATIC CPR	9	10	8	9	6	7	10	9	9	7	6		90
Total # DC from Hospital	1	1	1	4	-	-	2	-	-	-	-		9
# With 100% Recovery	-	1	1	2	-	-	1	-	-	-	-		5
# With Functional Status	-	-	-	-	-	-	-	-	-	-	-		-
# To Cont. Care Facility	1	-	-	2	-	-	1	-	-	-	1		5
Regained Pulse in the Field	2	2	2	5	-	1	3	1	-	1	3		20
Total Admitted to Hospital	2	4	2	4	-	1	5	1	1	1	3		24
# Expired in ED	7	6	6	5	6	6	5	8	8	6	3		66
# Exp. After Hospital Admit.	1	3	1	-	-	1	3	1	1	1	2		14
Survivor Rate	11%	10%	12.5%	44%	0%	0%	20%	0%	0%	0%	0%	0%	11.7%

Measure	1/07	2/07	3/07	4/07	5/07	6/07	7/07	8/07	9/07	10/07	11/07	12/07	Totals
TRAUMATIC CPR	1	1	0	0	1	2	1	1	3	2	1		13
Blunt	1	1	0	0	0	0	1	0	2	2	1		8
Penetrating	0	0	0	0	1	1	0	0	0	0	0		2
Other (burns, electrocution, drowning)	0	0	0	0	0	1	0	1	1	0	0		3
Admitted to the Hospital	0	0	0	0	0	1	0	1	1	2	0		5
# DC Home	0	0	0	0	0	0	0	0	0		0		0
Survival Rate	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
TOTAL CPR'S	10	11	8	9	7	9	11	10	12	9	6		102
TOTAL SURVIVORS	1	1	1	4	0	0	2	0	0	1	0		10
SURVIVAL RATE	10%	9%	12.5%	44%	0%	0%	18%	0%	0%	11%	0%	0%	10%