THE SMALL BUSINESS FIRM AS PROVIDER OF FIRE DEPARTMENT AND EMERGENCY MEDICAL SERVICES IN AMERICAN COMMUNITIES

May 1981

Prepared for:
THE SMALL BUSINESS ADMINISTRATION
Office of The Chief Counsel for Advocacy

By
John A. Campbell
GAGE-BABCOCK & ASSOCIATES, INC.
135 Addison Avenue
Elmhurst, IL 60126

Conducted under SBA contract/grant. Statements and conclusions herein are the contractor's/grantee's and not views of the U.S. Government or Small Business Administration.
Contents

1. INTRODUCTION
   1.1 Scope of Study
   1.2 Objectives and Scope
   2. EXECUTIVE SUMMARY
3. HISTORICAL BACKGROUND
   3.1 Fire Suppression
   3.2 Emergency Medical Services
4. ECONOMICS OF SUPPLYING PUBLIC SERVICES
   4.1 Collective Demand and Consumption
   4.2 Levels of Service
   4.3 Problems of a Monopoly
   4.4 Fire Department Economic Features
   4.5 Economic Theory
   4.6 Demand Elasticity
   4.7 Consumer Preferences
5. PROVIDER SERVICE & COSTS
   5.1 Overall Service Parameters
   5.2 Travel Time/Distance
   5.3 Costs
   5.4 Emergency Medical Services
6. PRIVATE SERVICE PROVIDERS
   6.1 Rural/Metro Fire Department
   6.2 Elk Grove Township Fire Protection District
   6.3 Subscription Fire Services
   6.4 Contract Fire Department EMS
   6.5 Case Study - San Diego, California
   6.6 Other Fire Department Contract Operations
   6.7 Other Private EMS
   6.8 Reason for Cost Effectiveness
7. BARRIERS TO PRIVATE ENTERPRISE
   7.1 Acceptance
   7.2 Capital Costs
   7.3 Public Fire Service Concerns
   7.4 Risk of Extraordinary Costs
   7.5 Other Barriers
8. CONCLUSIONS & GUIDELINES
   8.1 Business Opportunities & Advantages
   8.2 Problem Areas
   8.3 Contracting Techniques and Guidelines
   8.4 Goals & Objectives
   8.5 Principal Public/Private Options
   8.6 Proposal Request and Evaluation
1. INTRODUCTION

1.1 Scope of Study

This work was performed by Gage-Babcock & Associates under contract with the U.S. Small Business Administration, Office of Chief Counsel for Advocacy. The purpose of this study was to examine existing public and private providers of firefighting and emergency medical services, to compare their costs and cost-effectiveness in providing the level of service desired by the community which they serve and to establish guidelines which will enable increased participation of small businesses in these activities.

Personnel contributing to this program included: Bert M. Cohn, William E. Backes, Robert D. Barnes, Patrick Ward and John Campbell of Gage-Babcock, and Gary S. Jensen of American Emergency Service Corporation and Robert Deacon, visiting associate professor of economics at the University of Washington.

1.2 Objectives and Scope

The objective of this project was to examine existing public and private providers of firefighting and emergency medical services, to compare their costs and effectiveness in providing the level of service desired by the community which they serve, and finally, to establish guidelines which will enable increased participation of small businesses in these activities.

Service and performance of fire department and emergency medical services in the United States were reviewed to identify what levels are commonly acceptable in American communities. Costs of providing these services were analyzed and compared between communities in which the service was supplied by governmental or public agency and those in which a private business supplied such services. Detailed consideration was given to the private supplying of:
Fire suppression to Scottsdale AZ.
Fire suppression and emergency medical services (EMS) to Elk Grove Township Fire Protection District.
Paramedic EMS to the City of San Diego.
Paramedic EMS to several suburban Chicago Fire Departments.

The service level and costs of these private fire department and EMS suppliers were compared to similar communities with public service suppliers. Barriers and impediments to private suppliers were identified and, where practical, ways of circumventing the barriers were discussed. General guidelines were developed for communities wishing to consider contracting for these services.
3. HISTORICAL BACKGROUND

3.1 Fire Suppression

As civilization has advanced, local governments have assumed the obligation and responsibilities for providing service to protect life and property. Indeed, the reason many governments were formed was for the purpose of public safety. Providing fire safety services is largely a recent development, although some government fire services were provided in ancient Rome. The combination of disastrous conflagrations with the development of the technology to extinguish fires resulted in public fire protection as we know it today. Nowadays, citizens in the United States assume, sometimes incorrectly, that their local government has taken on the obligation of seeing that fire suppression service is provided. Although there are many areas even in populated regions with no fire protection services, the majority of communities in the U.S. have some fire suppression service. Fire suppression services within a community can be provided by:

1. A public fire department operated by a local governmental unit, such as a municipality, township, fire district, or county.

2. Formation of an independent, not-for-profit fire department or association which may or may not receive financial support from the governmental unit. This is a common arrangement for many volunteer fire departments.

3. The local governmental unit contracting for fire department services with another public authority or a private organization.

4. Individual contract or subscription with a public or private organization.

Although public fire departments and officially sanctioned and/or supported volunteer fire departments are the most common arrangement, privately operated fire departments serve some communities in the U.S. and in Europe. Some of the early fire suppression services in this country were provided by fire insurance companies for their customers. Insured properties were identified by a "fire mark"; the insurance companies fire brigades would fight fires in buildings they insured. A similar arrangement has
been carried over into recent times in the form of the subscription-supported fire department. These may be independent, not-for-profit volunteer departments or private, profit making operations. These departments may only respond to subscribers, or they may respond to any fire and bill non-subscribers for the cost of the service. However, there have been reported recent incidents in which an independent volunteer subscription-supported fire department stood by while a non-subscriber's property burned. Similar incidents are not infrequent with some municipal fire departments when a fire occurs just outside the corporate limits.

The cost of providing fire protection has been increasing because of often justified demands by fire department personnel for higher salaries and reduced working hours. This, combined with current inflationary forces plus responsibilities for increased fire prevention, training, and education, are producing significant increases in fire department operating budgets. The alternatives to these increased costs are either reducing the level of services provided or improving the cost effectiveness of operations. For cities operating full-paid fire departments, personnel costs typically represent about 90% of the total operating budget. Manpower utilization is therefore the major consideration in reducing or containing costs. The productivity of many fire departments is low because their responsibilities or scheduling often result in low time utilization. A study a number of years ago in a major city, indicated the average time utilization on a 24-hour shift was:

- 67% - eating, sleeping, and standing by
- 15% - housekeeping duties related to the live-in system
- 17.7% - training and equipment maintenance
- 1.3% - responding to alarms

This amounts to 10.6 hours per 56 hr. week of productive work. The level of productivity will be much higher for many busy central city fire department companies and may be lower for some suburban or small-town departments. Training and maintenance would amount to about 4½ hours per 24-hour day and about 3-1/3 hours allocated to live-in related housekeeping. The daily total of productive plus live-in related housekeeping time is not low compared to private industry on a daily basis, although on an annual basis, it is.

* Numbers refer to reference at end of report.
3.2 Emergency Medical Services

Public provision of emergency medical service is relatively recent in the U.S. Some of the first public ambulance services were established in New York in 1869 and San Francisco in 1874. However, in many communities, ambulance service was only available from private operators, which included a large number of funeral homes. The expansion of governmental units into EMS has been partially the result of:

Changing business practices which resulted in many funeral directors withdrawing from the ambulance service.

The Federal Highway Safety Act of 1966 and Medicare, which required each state to establish standards and requirements for ambulance service. Many marginal ambulance operators could not comply and still be profitable; this also accelerated the withdrawal of funeral homes from the business.

As private operators either cut back or eliminated ambulance services, many governmental units entered the field. This was accelerated by grants for equipment and training available from the U.S. Department of Transportation. Many governments assigned this EMS responsibility to the fire departments because:

The departments has been traditionally oriented to rescue and life-saving work, and

The deployment of fire stations provided an excellent base for response to medical emergencies.

However, in many communities, including some large and concentrated population centers, private operators are still the principal EMS delivery system.

Recent technological advances also made possible pre-hospital advanced life support work commonly referred to as paramedic service. Until about 15 years ago, the majority of all emergency ambulance services were what was often described as snatch and run with first aid, immobilizing fractures and using an inhalator to assist in breathing. The EMS personnel would do little in the field. However, this new technology combined with enabling legislation has permitted trained field personnel to perform many life-stabilization and maintenance functions that were once restricted to the hospital emergency room.
An emergency medical service system to provide advanced pre-hospital care can be a very important element in a community's public safety services. The Advanced Coronary Treatment Foundation estimates that of the 600,000 annual fatalities attributed to the class "heart attack," 100,000 could be prevented if proper pre-hospital aid were available. Studies and actual EMS experience has also shown that advanced pre-hospital care can reduce traffic accident fatalities by 20-25%. Although advanced life support services have been demonstrated as both technically and economically feasible in almost all but sparsely populated areas, a 1974 federal report indicated that less than half of ambulance personnel nationwide had completed even the basic DOT 81-hour course or its equivalent. There are large and concentrated population centers where advanced pre-hospital care is not available from either public or private agencies; in some cases it is not even legally permitted.

A properly functioning advanced EMS system in a community can be very beneficial and cost-effective in terms of life preservation. On the average, 2.2 lives per thousand population can be saved. If a cost of $300,000 is allocated to an untimely death, the dollar value of the annual savings becomes $660,000 per thousand population. The advanced life support is likely to provide a higher benefit-cost ratio than a community's fire and police services combined.
4. ECONOMICS OF SUPPLYING PUBLIC SERVICES

4.1 Collective demand and consumption

Demands for fire protection and public EMS service are collectively expressed in a community by public opinion reflected by the elected officials. The decision making process is generally oriented to a joint consumption process; one source provides the services to the entire community. The exceptions to the joint consumption process are likely to occur in large facilities that may provide a source of such services for their own use. Occasional examples of such facilities include: industrial complexes, hospital campuses, military bases and governmental laboratories.

However, for most of the community, joint single-source consumption is logical, from economic considerations.

Economists have long recognized that it is often more efficient to express demands for "public services" as a group rather than on an individual basis. Likewise, it is often more efficient for groups to share in consumption of such services rather than each to individually provide his or her own supply. The key concepts underlying this distinction between private and public services are economies from joint consumption and the problem of excluding individuals in a population from consumption. However, these arguments relate only to the most efficient means for arranging consumption and expressing demands, and say nothing about the appropriate way to organize production. Thus, the fact that most public goods are produced by government enterprises rather than private firms has both puzzled and interested economists for some time.

Public demand for a service and the decision of joint consumption need not automatically lead to a public supply source for these services. In fact, there are many publicly demanded services that are jointly consumed which are commonly provided by private sources, such as gas, telephone and electricity. A perfectly reasonable and common alternative to the public supply monopoly is the collective demand being satisfied by arranging to purchase services from whatever sources are available. However, at present, most fire departments and many emergency medical services are supplied by local governments.
4.2 Levels of Service

Although the public may collectively demand fire department and emergency medical services, this demand does not automatically define the level of service desired. The citizens who register this demand and who ultimately must decide on service levels are fairly passive with respect to fire departments and EMS until they either have or observe an incident requiring the service. Because these direct or observed needs are so infrequent, there is an insulating factor between the public and the level of service provided. Most such decisions are made by public officials, without the citizens registering a direct input. It is not uncommon for these public officials to be only indirectly accountable to the public they serve. For example, officials governing fire protection districts may be appointed rather than elected. This appointment may come from elected county or state officials who are responsible to a much larger electorate than those in the particular district. Collective demand for services and reactions to the level of service are difficult to enforce by the affected citizens.

Level of service is also very difficult to measure; unlike a road, water, electrical, or sewer system, there are no established specifications. Output parameters such as lives lost and saved, number of fires, fire loss, etc., vary widely between communities. Many variables over which the service provider has no control contribute to the value of these output parameters. In addition, smaller communities, which is where the greatest opportunities exist for private businesses, are too small a statistical sample to yield meaningful results over a short-term period.

4.3 Problems of a Monopoly

Public supply of fire department and emergency medical services is a monopolistic situation similar to that of many other city service organizations. Criticism of all public services for excessive cost and inefficiency is not uncommon. E.S. Savis, then First Deputy City Administrator in the Office of the Mayor of New York, writing in the December 1971 issue of Harper's, sums up what may be the problem: "Our cities are not working well. Sanitation, safety, transportation, housing education -- even electricity and telephones -- all seem to be failing. The taxpayer complains about waste, inefficiency, and mismanagement, and blames his public servants. . . . Since most city agencies are monopolies, their staffs are automatically tempted to exercise that monopoly power for their own parochial advantage -- and
efficiency is rarely seen as an advantage. . . The inefficiency of municipal services is not due to bad commissioners, mayors, managers, workers, unions, or labor leaders; it is a natural consequence of a monopoly system. The public has created the monopoly, the monopoly behaves in predictable fashion, and there are no culprits, only scapegoats."

The above generalization is not appropriate to all public fire departments; many departments operate in a very cost effective manner. However, whenever a monopoly exists, whether public or private, the incentive for efficiency is reduced, particularly when output productivity is difficult to measure.

4.4 Fire Department Economic Features

In cases where the productivity output is difficult to measure, rewards to the service providers is generally based on the input contribution. The larger the fire department, the higher the salary of the managers. The chief of a full-paid department is likely to be paid more than the chief of a part-paid, part-paid-on-call department even though the latter may be more cost-effective and also requires greater management skills to operate. Improved productivity in the public department is not likely to result in increased rewards. However, increasing the size of the department is. It is difficult to dispute expansion in services since most expansions will improve the level of service to some degree. The improvement may be small and inefficient but it is still present.

Some additional unique economic features of a public fire department as a producer include:

The staff is paid whether or not they perform any services; how well they perform the services does not usually influence their pay.

The rewards for management are likely to vary inversely with how well the services are performed.

A high incidence of fires may be categorized as a fire department failure in prevention or education. Failure to contain a fire may be categorized as a failure in fire suppression. However, unless these failures are associated with blatant incompetence, the result is likely to be more manpower, more equipment, and, coincident with increased responsibilities, higher management salaries.
4.5 Economic Theory

At the theoretical level, conceptual comparison of resource allocation in private versus public organizations has led the majority of economists to hypothesize that costs will tend to be lower (or, equivalently, the productivity of inputs higher) in private firms than in public enterprises. This conclusion is based on a comparison of the structure of incentives and rewards in the two types of regimes. The profits and losses incurred in private organizations provide a strong correlation or relationship between the productivity of management and ownership of the firm (when both are separated, e.g., stockholders vs. management in corporations). Profit provides a graphic signal regarding the productivity of management and possibilities for improvement. Such direct signals and monetary incentives are largely absent in public enterprises; hence the efficiency of management is frequently lower in such organizations. Empirical analysis of this hypothesis in a variety of industries served by both private and public sector suppliers tends to confirm its validity. The service industries that have been examined are: refuse collection, fire protection, airline transportation, banking, electricity generation, insurance claims processing, and health care.

In addition to the central hypothesis on general cost levels in public and private organizations, a number of related subhypotheses have also been formulated.

1. If production is carried out by the same governmental jurisdiction responsible for expressing a collective demand, then the production activity may be too small to achieve economies of scale. An example would be a small local flood protection district that builds or maintains its own levees, culverts, etc. This will be shown to be very applicable to fire departments and EMS operations in smaller communities.

2. Direct competition from private sector suppliers tends to increase the efficiency of government producers. This is particularly true if the survival of the public enterprise depends upon its ability to attract customers.

3. The more mobile is the citizenry served by a public enterprise, the more efficient that enterprise will tend to be. In small political jurisdictions, particularly in suburban areas, citizens often have
considerable latitude to "shop" among alternative school districts, police departments, etc. when choosing a community in which to reside. Hence this form of "indirect" competition (from alternative jurisdictions), and its tendency to promote efficiency, is expected to increase with the possibilities for mobility among jurisdictions. However, the data obtained on this study has not been able to substantiate the subhypothesis.

The above represent the major hypotheses that have been postulated regarding production and resource allocation in public versus private enterprises. Empirically, it is often difficult to provide exact comparisons between costs and productivity in alternative systems. One reason is that public organizations often have legally based cost advantages, such as: exemption from paying various taxes, fees, etc. as well as legal authority to carry out certain activities over private enterprises. These advantages are often difficult to quantify. Furthermore, the production is services, and, hence, measurement is frequently problematic. For example, with fire protection, analysts have been forced to look at output proxies such as fire insurance rates, or fire losses as a fraction of property value, allowing for such factors as climate, water pressure, structural conditions, etc. Despite these difficulties, a number of such studies have been completed and have generally produced results that are consistent with prior hypotheses.

4.6 Demand Elasticity

Fire department services are also an excellent example of the concept of demand elasticity. As the cost of fire department services has gone up, the quantity of services demanded has gone down. Thirty-five years ago, paid fire departments commonly worked a 72-hour week with a 24-hour on and 24-hour off schedule. Departments operated on a two shift or platoon schedule; continuous coverage could be provided by employing twice the number of firefighters that were to be on duty at any time. Six and seven man fire companies with fire stations located 1½ - 2 miles apart were common. Requests for shorter work week and more days off have reduced typical work week to 40-56 hours. Fire departments are now on a 3 or 4 platoon system; to allow for off-days and sicknesses, a municipality must employ from 3.4 to 4.5 men for every position it wants continuously manned. This has led to significant reduction in the level of fire department services demanded by many municipalities. Instead of 6 and 7 man
companies, 2 to 4 man companies are frequent. Fire stations are closed; stations are built further apart in newly developed areas. The level of fire department services demanded is definitely changed; although some technical improvements have improved productivity slightly, firefighting is still a labor intensive task. Much of the work is strictly manual, dirty and dangerous. These changes in demand have evolved with the framework of conventional public service economics in which the same government entity responsible for registering a demand for fire department services is also responsible for supplying the services.

4.7 Consumer Preferences

A consumer in a competitive market expresses his preference for a private good or service in the marketplace. His actions informs the producer of the acceptance of the good or service at the established price. Because the consumer has a personal investment at stake, he has an incentive to evaluate the alternative sources of goods or services. His evaluation is generally assisted by advertising information supplied by most competitive producers. However, fire department and emergency medical services are public rather than private services and generally not available on an individual basis. The consumer can only express his preference by voting, lobbying or moving to another location. However, before a consumer can even express his preference, he must be able to make an informed evaluation of the current level of service. Measuring the level of service is difficult for emergency medical services and extremely difficult for fire department services. In addition, much of the information necessary may not even be available and when it is available, it is completely unaudited. For example, an EMS system may report an average response time of 4 minutes which would appear very good. The two major uncertainties associated with this claim are how response time is measured and what is the percentile distribution above the average response time. The "advertised" response time may start when the unit leaves quarters; if the system includes a communications-dispatching time of several minutes and 1-2 minutes reaction time, the effective average response time would be considerably higher than 4 minutes. Similarly, averages can also be misleading if no percentile distribution or maximum times are reported.
5. PROVIDER SERVICE & COSTS

5.1 Overall Service Parameters

The principal function of fire department services is to protect life and property from unfriendly fires. Measures of the effectiveness of a fire department should be how well these tasks are performed. Theoretically this would be indicated by:

1. Fire loss per capita
2. Life loss per capita
3. Average loss per fire
4. Number of working fires
5. Number of large loss fires
6. Number of multiple death fires

Fire department service parameters which should be related to the above include:

1. Average and percentile response times which is associated with area per station and simultaneous fire incidence probability.

2. Firefighters on duty per capita and total firefighting force per capita available for major emergencies.

3. Population served per station.

4. Apparatus deployment at stations (this generally would be effectively included in the above unless there were major deficiencies in type for the hazard).

Values and costs of some of fire department service parameters are presented in Table I for 21 cities with an average population of 585,000. Cities of these sizes should be capable of obtaining the full benefits of scale economics and also have a sufficient number of fire losses to present a statistically significant sample. However, even in these cities, the significance of some service parameters may be misleading. For example, both Jacksonville and Oklahoma City have annexed large areas of sparsely populated rural land surround the communities. The result is extremely low population densities and large average service areas per fire.
Table 1
Service Parameters for Some Large (500,000 avg. Population) Fire Departments

<table>
<thead>
<tr>
<th>City</th>
<th>Population (1000s) per Sq. Mile</th>
<th>Population (1000s) per Fire Sta.</th>
<th>Area Sq. Mile per Fire Sta.</th>
<th>Fire Fighters per 100k Population</th>
<th>Cost Per Capita</th>
<th>Paramedic Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atlanta, GA</td>
<td>2.9</td>
<td>13.8</td>
<td>4.72</td>
<td>1.57</td>
<td>32.96</td>
<td>No</td>
</tr>
<tr>
<td>Baltimore, MD</td>
<td>9.1</td>
<td>13.9</td>
<td>1.53</td>
<td>2.11</td>
<td>58.97</td>
<td>Yes</td>
</tr>
<tr>
<td>Buffalo, NY</td>
<td>8.7</td>
<td>12.7</td>
<td>1.46</td>
<td>2.57</td>
<td>50.41</td>
<td>No</td>
</tr>
<tr>
<td>Cincinnati, OH</td>
<td>5.5</td>
<td>15.1</td>
<td>2.72</td>
<td>1.96</td>
<td>35.57</td>
<td>Yes</td>
</tr>
<tr>
<td>Cleveland, OH</td>
<td>8.7</td>
<td>21.0</td>
<td>2.40</td>
<td>1.47</td>
<td>38.00</td>
<td>No</td>
</tr>
<tr>
<td>Columbus, OH</td>
<td>3.4</td>
<td>21.9</td>
<td>6.53</td>
<td>1.40</td>
<td>40.35</td>
<td>Yes</td>
</tr>
<tr>
<td>Dallas, TX</td>
<td>2.4</td>
<td>19.0</td>
<td>8.04</td>
<td>1.68</td>
<td>34.53</td>
<td>Yes</td>
</tr>
<tr>
<td>Denver, CO</td>
<td>4.3</td>
<td>17.3</td>
<td>4.00</td>
<td>1.77</td>
<td>46.15</td>
<td>No</td>
</tr>
<tr>
<td>Jacksonville, FL</td>
<td>.7</td>
<td>12.8</td>
<td>19.00</td>
<td>1.36</td>
<td>32.10</td>
<td>Yes</td>
</tr>
<tr>
<td>Memphis, TN</td>
<td>2.4</td>
<td>14.6</td>
<td>6.18</td>
<td>1.82</td>
<td>51.62</td>
<td>Yes</td>
</tr>
<tr>
<td>Miami, FL</td>
<td>10.6</td>
<td>25.9</td>
<td>2.42</td>
<td>1.75</td>
<td>58.81</td>
<td>Yes</td>
</tr>
<tr>
<td>Minneapolis, MN</td>
<td>7.4</td>
<td>21.7</td>
<td>2.93</td>
<td>1.16</td>
<td>39.21</td>
<td>No</td>
</tr>
<tr>
<td>New Orleans, LA</td>
<td>1.6</td>
<td>15.1</td>
<td>9.32</td>
<td>1.59</td>
<td>38.98</td>
<td>Yes</td>
</tr>
<tr>
<td>Oklahoma City, OK</td>
<td>.6</td>
<td>12.7</td>
<td>21.63</td>
<td>1.91</td>
<td>35.52</td>
<td>No</td>
</tr>
<tr>
<td>Phoenix, AZ</td>
<td>2.3</td>
<td>22.1</td>
<td>9.60</td>
<td>1.10</td>
<td>30.44</td>
<td>Yes</td>
</tr>
<tr>
<td>Pittsburgh, PA</td>
<td>9.0</td>
<td>12.2</td>
<td>1.35</td>
<td>2.23</td>
<td>40.59</td>
<td>No</td>
</tr>
<tr>
<td>San Diego, CA</td>
<td>2.1</td>
<td>21.7</td>
<td>10.32</td>
<td>.86</td>
<td>27.87</td>
<td>No</td>
</tr>
<tr>
<td>San Francisco, CA</td>
<td>14.1</td>
<td>15.1</td>
<td>1.06</td>
<td>2.45</td>
<td>98.33</td>
<td>No</td>
</tr>
<tr>
<td>San Jose, CA</td>
<td>3.6</td>
<td>19.9</td>
<td>5.57</td>
<td>1.16</td>
<td>32.44</td>
<td>No</td>
</tr>
<tr>
<td>Seattle, WA</td>
<td>5.3</td>
<td>14.3</td>
<td>2.68</td>
<td>1.49</td>
<td>50.50</td>
<td>Yes</td>
</tr>
<tr>
<td>District of Columbia</td>
<td>10.4</td>
<td>22.4</td>
<td>2.15</td>
<td>1.87</td>
<td>70.78</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Mean: - 17.4, Standard Deviation: - 4.2
station. The figures for firefighters per 1000 population tend to be influenced more by the average number of hours worked per week than by other factors. The work week of firefighters in these cities varies from 40-56 hrs; with shorter work weeks a larger number of personnel are required to staff the department.

The study described in reference 10 found no correlation between either life or property loss and the level of any fire department service parameters within the range of those provided in these cities. Life loss ratios were found to be primarily related to socio-economic factors and property losses to the vulnerability of the city in terms of the age of buildings, construction, congestion, etc.

However, a very interesting comparison can be between those fire departments in this set which provide paramedic service and those that do not, Table II. There appears to be no statistically significant difference in the average firefighters per 1000 population, per capita cost, population served per station or area served per station between the cities that do and do not provide paramedic service. These results suggest that on the average there may be a potential for improved productivity in fire departments not providing paramedic service, particularly since paramedic calls frequently equal or exceed fire calls. Of course, the potential productivity improvement may not be valid for each city in this grouping.

In smaller communities the possibility of correlating losses with fire department service levels is even less practical because:

- Fire incidents are normally too low to obtain a meaningful sample.
- A single large loss can distort performance.
- Some communities have low resident populations but very high daytime industrial and/or commercial population.
- Jurisdictional configuration or large undeveloped areas can distort the significance of area coverages.

However, smaller communities can be compared on the basis of fire department input parameters such as those described in Table I. The average number of total and on-duty firefighters per thousand population are presented in Table III for 344 U.S. cities and compared with 19 of the cities previously described.
<table>
<thead>
<tr>
<th>Fire Dept.</th>
<th>Fire Fighters per 1000 Population</th>
<th>Per Capita Fire Dept. Cost</th>
<th>Population (1000s) served</th>
<th>Area Served per Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>All 21 Fire Depts:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>1.69</td>
<td>44.97</td>
<td>17.4</td>
<td>6.0</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>.44</td>
<td>16.46</td>
<td>4.2</td>
<td></td>
</tr>
<tr>
<td>Those Which Provide Paramedic Service:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>1.71</td>
<td>44.15</td>
<td>16.8</td>
<td>5.5</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>.58</td>
<td>20.15</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>Those Not Providing Paramedic Service:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>1.65</td>
<td>45.7</td>
<td>17.9</td>
<td>6.4</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>.30</td>
<td>13.2</td>
<td>14.5</td>
<td></td>
</tr>
</tbody>
</table>
Table III
Average Fire Department Manpower

<table>
<thead>
<tr>
<th>Fire Department</th>
<th>Total Fire Fighters Per 1,000 pop.</th>
<th>On-Duty Fire Fighters Per 1,000 pop.</th>
</tr>
</thead>
<tbody>
<tr>
<td>19 Major Cities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Platoons</td>
<td>1.62</td>
<td>.42</td>
</tr>
<tr>
<td>Avg. Pop. 600,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cities on 3 Platoons</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population of:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 - 50,000</td>
<td>1.81</td>
<td>.54</td>
</tr>
<tr>
<td>50 - 100,000</td>
<td>1.53</td>
<td>.45</td>
</tr>
<tr>
<td>Cities on 4 Platoons</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population of:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 - 50,000</td>
<td>2.2</td>
<td>.48</td>
</tr>
<tr>
<td>50 - 100,000</td>
<td>1.96</td>
<td>.43</td>
</tr>
</tbody>
</table>
The communities are categorized in a population group and whether their fire department is on a 3 or 4 platoon system. The cities on a 3 platoon system will usually be on a 24 hr. on-24 hr. off duty schedule so that normally 3 men are needed to fill each on-duty position. However, because of vacations, allowances for illness and other absences, more than 3 men must be kept on the staff for each on-duty position. On a 4 platoon system, the men usually work either 8 hr. shifts or on 10 and 14 hr. shifts so over 4 men are needed for each on-duty position including allowances for absences.

As expected, the total number of firefighters provided is strongly dependent on the length of the work week. However, those cities with shorter work weeks tend to maintain a slightly lower level of on-duty manpower; this is likely the result of increased costs due to the need for more total personnel. The benefits of scale are also apparent as the small communities have more on-duty and total firefighters per 1,000 population than the larger cities.

There is a lower limit of on-duty or immediately available personnel needed to provide effective services. It takes a minimum number of men to handle a working fire and provide, if included, advanced life support services. Small communities often have to have more men per capita on duty than larger cities merely to provide the minimum needed to perform these services.

5.2 Travel Time/Distance

Another parameter which can also provide a partial indication of the level of service is the response time for fire departments to an incident. Response time of fire service delivery systems is primarily a function of travel distance from a station to an incident. Assuming normal apparatus distribution in stations, the average area covered per station is an indication of travel distance in large communities. This indicator may not be appropriate for smaller communities if it is distorted by irregular jurisdictional boundaries. Insurance Services Office standards and qualitative experience suggest that 1/4 mile travel distance provides every good response for most industrial, commercial and multi-unit residential properties. Two miles is very good for single family residential areas and small commercial buildings. Maximum area per station would be 4.5 sq.mi. with 1.5 mi. travel and 8 sq.mi. with 2 mi. travel. The average area per station in large cities, Table I, is 6 sq.mi. per station although some cities had considerable larger values.
GBA experience has indicated that smaller communities with better fire departments generally have about 90% of commercial and industrial areas within 1 1/2 mile station travel and 90-95% of residential areas within 2 mile station travel.

Travel distance can be correlated with average good weather travel time. GBA measurements have indicated average speeds in suburban communities of about 30 mph for fire engines and 35 for other vehicles including ambulances. Studies by Rand Corporation in more densely populated cities indicated average travel speeds of 22-28 mph.

There have been a number of studies which have attempted to correlate response time or travel distance with life or property loss. This parameter would be directly related to the previous parameters of area per fire station. One study of 529 structural fires in Wichita, KS, indicated a zero to negative correlation between response time and dollar damage. Evaluation of about 50,000 fires in the United Kingdom indicated the value (in 1973 dollars) of a minute of response time to be $25-$250 for dwellings and $2,500 for industrial and commercial occupancies. Another study covering 115,000 fire in the New York City, 1968-70, indicated that although there are too many other variables to obtain a reliable answer, but one minute of response is probably worth 100 to 10,000 dollars. Obviously, this range is too broad for any cost effectiveness evaluation and really it does little more than corroborate the intuitive conclusion that shorter response times should have some favorable effect.

One study in New York City indicated that response distance tends to be slightly longer at fatal fires than at similar non fatal fires. However, no distance-life saving relationship could be developed and the same tendency may not be encountered in all communities.

5.3 Costs

Comparative costs of various fire department service levels can be related to the:

1. Total cost per capita.
2. Cost per on-duty firefighter.
3. Cost per total firefighting manpower pool.

These costs, all related to personnel, are very significant since personnel represent 90% of fire department costs in many full-paid fire departments.
A comparison of costs of some fire departments to assessed value or market value of properties was attempted and determined not feasible because:

1. Assessment to market value ratios varied widely, often between communities in the same metropolitan area.

2. In some areas the assessment to market value ratio was different for different classes of property and the breakdown in assessed valuation by property was not published.

3. Assessments remained constant for a number of years while costs escalated as a result of inflation; then the assessments jumped in a large step.

The average costs for the grouping of communities previously discussed are presented in Table IV.

The smaller cities do have an advantage over the larger communities in terms of unit costs for providing fire department services as shown in Table IV. The main reason for this difference is that the larger cities on the average pay higher salaries than the smaller ones.

5.4 Emergency Medical Services

While the level of fire department service is at the option of the local community, the same is not true for paramedic level of emergency medical services. It is up to the community to determine whether or not this EMS is provided. However, if a local government decides to provide this service, the levels of service of advanced life support EMS programs are partially or entirely dictated by public health officials and/or cognizant hospitals. The paramedics must be certified to a specific standard and the MICUs equipped to a standard. The number of MICUs per thousand population, maximum response times, availability of backup MICUs, etc., may or may not be specified. Unlike fire suppression programs, there are criteria on which EMS goals can be based. Physiological considerations indicate that for the pulseless, non-breathing patient, the probability of resuscitation and recovery diminishes rapidly unless basic life support action is started within 4 min. After 8 minutes, permanent brain damage is almost certain. (There are exceptions such as a person immersed in cold water which slows down physiological processes and may extend the time available for resuscitation.) One goal commonly adopted in
Table IV

Some Average Fire Department Costs

<table>
<thead>
<tr>
<th>Fire Department</th>
<th>Per Fire Fighter ($1,000)</th>
<th>Per On-Duty Fire Fighter ($1,000)</th>
<th>Per Capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>19 Major Cities, 3 Platoons</td>
<td>27.19</td>
<td>101.46</td>
<td>44.91</td>
</tr>
<tr>
<td>Avg. Pop. 600,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cities on 3 Platoons and Population of:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 - 50,000</td>
<td>20.90</td>
<td>70.64</td>
<td>36.84</td>
</tr>
<tr>
<td>50 - 100,000</td>
<td>25.70</td>
<td>86.94</td>
<td>37.24</td>
</tr>
<tr>
<td>Cities on 4 Platoons and Population of:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 - 50,000</td>
<td>19.36</td>
<td>89.38</td>
<td>43.19</td>
</tr>
<tr>
<td>50 - 100,000</td>
<td>22.60</td>
<td>99.70</td>
<td>41.85</td>
</tr>
</tbody>
</table>
small to medium size communities in that basic life support assistance be provided within 4 min. for 90% of all calls and within 6 min. for 100% of all calls (except possibly those during major weather emergencies). Advanced life support assistance should be available shortly thereafter although some community systems are designed for 15 min. maximum advanced life support response when used in a two tier response.

General goals to which ALS systems are designed will vary but typically are:\textsuperscript{2,18}

1. Population served per MICU: 30-35,000; up to 70,000 on 2 tier* response of 6-8 MICUs deep.

2. Examples of Response Time or sometimes specified as travel time:

   - 5-7 average
   - 4 min. 90th percentile
   - 5 min. maximum
   - 7 min. 90-95th percentile

In many smaller communities, the program was set up with little, if any, consideration given to either service population or response time. Because of the size of the community, the results were reasonable. Changes, if any, were based on experience.

In addition, in the smaller communities the population served per MICU is often low because of jurisdictional boundaries. Low service population has a disadvantage of a low workload for paramedics. If they do not have an adequate workload their skills will decay; however, optimum or minimum workloads have not been established.

\* A 2 tier response refers to a basic life support ambulance (BLS) or squad plus the mobile intensive care unit (MICU). On routine cases the BLSU transports, the MICU is only committed on services cases.
6. PRIVATE SERVICE PROVIDERS

6.1 Rural/Metro Fire Department

Organization and Operations

The classic U.S. example of a private contract fire department is Rural/Metro Fire Department, Inc. of Scottsdale, Arizona. It is the example used by proponents of private enterprise and the target of the proponents of public fire suppression services. Rural Metro provides contract fire department services for the City of Scottsdale and 13 other Arizona fire departments. It recently contracted to serve Hall County Georgia.

Rural/Metro was founded in 1948 to serve what was then the very small community of Scottsdale, AZ. It has grown with Scottsdale and expanded into other Arizona communities. The fire protection in Scottsdale is a joint public-private effort and includes not only fire suppression services but also prevention and education. It provides basic life support assistance in medical emergencies but private ambulance services handle all transport in Scottsdale. Cost to residents of Scottsdale is less than 1/3 the average fire department cost to U.S. citizens in similar size municipalities.

Some features which contribute to Rural/Metro's cost effective service include:

1. Use of city employees as paid-on-call firefighters to provide a quickly available manpower pool that both live and work in the city. This overcomes a major problem many communities encounter with part-paid fire departments - the unavailability of many members during the normal working day.

2. Buildings which represent an above average fire risk are required to assume some of the cost of their fire protection by installing automatic sprinklers. Scottsdale's fire code mandates sprinkler installation in:

   a. All mercantile, industrial and commercial structures in excess of one story in height.
b. All mercantile, industrial and commercial structures in excess of 7,500 sq.ft. of ground floor area.

c. Any areas in excess of two stories in apartment construction.

This code was adopted to provide fire protection for larger and/or taller structures at a lower cost than if provided by a larger fire department.

3. Full-paid men work longer hourly week than other Arizona fire departments but get paid more per hour. Many public fire department members work longer total hours because they have a second job so the net effect on real hours of work and income may not be that different.

4. This reduces the cost of many fringe benefits since some such costs are a function of the number of employees rather than their salaries. This policy may be difficult to maintain in the future; we have found that younger men entering the fire service are very interested in time off even at the expense of higher salaries.

5. Purchase of no frills fire apparatus.

6. Construction of some of the fire apparatus needed by Rural/Metro.

7. Use of mini pumpers or attack trucks for fast response and initial attack.

8. Innovative features such as use of large diameter supply hose, a portable remotely operated pump that can be dropped at a hydrant by a pumper, and a "robot" fireman for interior fire attack in hazardous locations.

9. Spreading much overhead over the entire service area thereby attaining some economics of scale.

These features are not unique to Rural/Metro although some, but not all, were pioneered by them. Other public fire departments in the U.S. and Europe have incorporated some of these features in their operation. Rural/Metro has consolidated these into their operation, originated others, and integrated all into a level of service meeting the needs and demands of the citizens.
Rural/Metro as a private firm must make a profit to stay in business. It is faced with the competitive threat from public fire department operation so it must be both cost and service conscious. Scottsdale, for example, could easily form its own department since the city owns about half the apparatus and has public works employees trained in firefighting. Since Rural/Metro has served Scottsdale for over 30 years, there is little doubt that the citizens and officials believe Rural/Metro is providing an acceptable level of service at an attractive cost.

Performance and Economic Analysis

Rural/Metro Fire Departments Scottsdale operation provides an economical level of fire service with identifiable outputs similar to communities spending considerably more. Rural/Metro in Scottsdale has an overall manning per 1000 population ratio of .49 for full-paid personnel and 1.02 if auxiliary or part-time firefighters are counted. On-duty firefighters are provided at a ratio of .2 per 1000 population; if the average auxiliary response is included, the ratio increases to .32. While these values are below the averages for other communities of this size, they are far from the lowest. The auxiliary included average is in the upper second quartile and the total is in the upper third quartile. The full-time manpower ratios are about 1/3 that of the cities compared in Table III.

The population served per fire station is about 22,500 and the area covered by each station is about 16.5 sq.mi. This is on the high side when compared to larger cities, Table I, although it falls within the tabulated range. Scottsdale has a very low density population and much of the area is not developed. Fire department coverage has intentionally not been extended to provide complete and rapid coverage of underdeveloped or very sparsely settled areas.

The per capita cost was $11.28 in Fiscal year 1977-78 which would correspond to an estimated $13.90 in 1979 dollars which was used in the Table IV costs in other cities. This cost is about 37% of the lower cost in Table IV for cities in the 50-100,000 population range. The cost, in thousands for total and on-duty personnel is about $23 and $69 respectively which is 10 and 20% below that of similar cities covered in Table V. The per capita cost is also considerably lower than that of other Arizona cities with public fire departments and these cities' per capita costs are all well below the national average, Table V.
<table>
<thead>
<tr>
<th>City</th>
<th>Normalized Per Capita Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phoenix</td>
<td>2.0</td>
</tr>
<tr>
<td>Tuscon</td>
<td>2.7</td>
</tr>
<tr>
<td>Scottsdale</td>
<td>1.0</td>
</tr>
<tr>
<td>Tempe</td>
<td>1.7</td>
</tr>
<tr>
<td>Mesa</td>
<td>2.1</td>
</tr>
<tr>
<td>Glendale</td>
<td>2.1</td>
</tr>
<tr>
<td>Yuma</td>
<td>2.4</td>
</tr>
<tr>
<td>Flagstaff</td>
<td>2.3</td>
</tr>
<tr>
<td>National Average</td>
<td>3.2</td>
</tr>
</tbody>
</table>

Source: Ref. 11
These comparisons support the economic hypothesis that:

1. Private producers of public services will be more efficient than public producers.

2. Presence of a private producer will increase the efficiency of nearby public producers.

However, when comparing costs with other cities, it is important to remember that Scottsdale Fire Department does not provide full (paramedic) emergency medical services while some other city fire departments do.

The low on-duty manpower and costs are not reflected in output measurements. The city classification for fire insurance purposes is 5. When compared with other cities of that size, Scottsdale would be in the third quarter. The Insurance Service Office classification may even improve in the future because of the new rating method which is described in Appendix B.

The average per capita fire loss in Scottsdale in 1978 (FY 1977-78) was $8.49 and the previous three year average was $7.07. This compares very favorably with the corresponding national average of about $13.00. Obviously, there is no indication that the fewer number of personnel and lower operating costs have had an adverse effect on Scottsdale's fire losses.

The economic theory that private producers are more efficient than the public was investigated by Ahlbrandt. Ahlbrandt developed an empirical cost function model for fire departments using a least-square multiple regression technique. He used neoclassical production theory and derived the cost function from the production function and marginal productivity relationships. The private fire department function was assumed to be profits maximizing producer. He used this relationship to estimate fire department costs for Scottsdale and 5 other Arizona cities and compared them to actual costs, Table VI. He found that his model underestimated actual costs of the public sector providers and overestimated that of the private producer. He concluded that his model of the cost function supported the economic theory that the private producer was more efficient than the public producer.
### TABLE VI

Regression Analysis of Public/Private Fire Department Costs  
(6 Arizona Cities)

<table>
<thead>
<tr>
<th>City Evaluated</th>
<th>Normalized Actual</th>
<th>Cost Estimated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glendale</td>
<td>2.54</td>
<td>1.91</td>
</tr>
<tr>
<td>Yuma</td>
<td>3.28</td>
<td>2.79</td>
</tr>
<tr>
<td>Flagstaff</td>
<td>3.45</td>
<td>3.36</td>
</tr>
<tr>
<td>Tempe</td>
<td>1.64</td>
<td>1.29</td>
</tr>
<tr>
<td>Phoenix</td>
<td>2.50</td>
<td>1.80</td>
</tr>
<tr>
<td>Private:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scottsdale</td>
<td>1.00</td>
<td>1.39</td>
</tr>
</tbody>
</table>

Analysis made in 1973; data 1971
6.2 Elk Grove Township Fire Protection District

The unincorporated area of Elk Grove Township, IL, is served by a private contract fire department whose operations are patterned after that of Rural/Metro. This community is located adjacent to Chicago's O'Hare field and includes residential, commercial, tank farm and industrial properties including corporate headquarters of United Airlines and McDonalds Corporation's Hamburger Univ. The basic residential population of about 8,000 swells to 20,000 during the business day.24

The private contract fire department provides both fire suppression and paramedic emergency medical services; fire prevention inspections are made but the department has no enforcement authority. The department has both full-paid and paid-on-call members. It purchases no frills equipment and also uses equipment which the on-duty men refurbish. The equipment was quartered in a garage provided by a materials supply company but a fire station will be under construction shortly.

Elk Grove Township Fire Department serves a resident population below the minimum level at which normally on-duty firefighters can be maintained at a reasonable cost. Consequently its cost per capita, $58, is high when compared on resident population; although if compared on the basis of the daytime population, estimated at 20,000 the per capita cost of about $20 would be well below that in other communities. Its cost per on-duty firefighter is low when compared to that in other cities, Table III. Its cost per full-paid firefighter is also lower. Elk Grove Township fire department is compared with a number of other full-paid and part-paid midwestern fire departments in Table VII. This table illustrates the fact that when first response depends on on-duty personnel, as contrasted to volunteers or paid-on-call men, there is a minimum number of men required regardless of population. It also shows then the cost per on-duty man in part-paid public fire departments is higher than in full-paid departments. However, Elk Grove Township's cost per on-duty firefighter is considerably lower than in other part paid departments shown in Table VII. Cost of on-duty personnel in part-paid departments can be reduced using some of the work schedule options described in Appendix A.

Although Elk Grove Township does not have the economies of scale encountered with Rural/Metro, it still supports the hypothesis that a private profit making firm will provide service at a lower cost than a public supplier.
<table>
<thead>
<tr>
<th>Item/City</th>
<th>Glenbrook FPD</th>
<th>Glenview</th>
<th>Niles, IL</th>
<th>Morton Grove</th>
<th>Elk Grove Township, IL</th>
<th>Glendale, WI</th>
<th>Shorewood, WI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>27,000</td>
<td>25,900</td>
<td>32,400</td>
<td>26,400</td>
<td>7,000</td>
<td>13,700</td>
<td>14,000</td>
</tr>
<tr>
<td>Characteristics</td>
<td>Residential, some industry &amp; commercial</td>
<td>Residential, some industry</td>
<td>Residential, major industry</td>
<td>Residential, light commercial industry</td>
<td>Industrial, Commercial</td>
<td>Industrial, Residential</td>
<td>Residential, Commercial</td>
</tr>
<tr>
<td>Full-Paid Fire Fighters</td>
<td>25</td>
<td>36</td>
<td>48</td>
<td>34</td>
<td>9</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>Paid-On-Call</td>
<td>17</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>25</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td>Minimum on-duty</td>
<td>7</td>
<td>10</td>
<td>14</td>
<td>10</td>
<td>6</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>EMS Service base year</td>
<td>Paramedic</td>
<td>Paramedic</td>
<td>Paramedic</td>
<td>Paramedic</td>
<td>Paramedic</td>
<td>Basic</td>
<td>Basic</td>
</tr>
<tr>
<td>Adjusted per capita cost 1980 dollars</td>
<td>29.60</td>
<td>33.50</td>
<td>42.00</td>
<td>32.73</td>
<td>58.0</td>
<td>47.15</td>
<td>41</td>
</tr>
<tr>
<td>Cost per on-duty fire fighters (1000s) 1980 dollars</td>
<td>100.66</td>
<td>78.73</td>
<td>89.51</td>
<td>78.53</td>
<td>78.5</td>
<td>129.2</td>
<td>114.8</td>
</tr>
</tbody>
</table>

**NOTE:** Costs are given in 1980 dollars although some data comes from mid & late 1970s.
6.3 Subscription Fire Services

Rural Metro Fire Department of Tennessee, a joint venture of Rural Metro of Arizona and the West Knoxville Fire Department, a private subscription fire department, provides fire suppression services to approximately 100,000 Knox County residents. This partnership evolved as a result of faltering fire protection services in Knox County which occurred as the City of Knoxville expanded and annexed county areas.25 Fire suppression for Knox County residents had been provided by a number of private subscription fire departments. In many other parts of the country, volunteer fire departments would have provided coverage; however, in the south and particularly Tennessee there has never been a strong movement towards volunteer fire departments. Private businesses were formed to satisfy the need for fire suppression services which were provided on a subscription basis. When the City of Knoxville annexed an area, it provided fire suppression services for the residents. The private firms lost customers and some were not able to stay in business with those customers that remained. In addition, the uncertainties associated with possible annexations reduced the incentive for private firms to expand or invest additional capital. This situation led to the formation of Rural Metro Fire Department of Tennessee which now serves all county area residents on a subscription basis.

Rural Metro of Tennessee uses full-paid firefighters to drive apparatus, paid officers and paid-on-call firefighters. An on-duty firefighter drives the apparatus to the fire; paid-on-call firefighters and off duty paid men are alerted by radio through personal pagers and report directly to the scene. The company provides fire protection even for non-subscribers and bills them at an hourly rate. Rural Metro of Tennessee used many similar cost control techniques as Rural Metro does in Arizona, particularly in area of rehabilitation and specification of apparatus. However, Rural Metro of Tennessee has no legal authority for fire prevention, code enforcement or fire investigation.

In many respects the organization and operation is similar to that of public part-paid/volunteer fire departments found in other parts of the country. The public fire department would normally have advantages in additional legal authority for prevention, enforcement and investigation. The private subscription fire department also requires a sales staff which is not necessary for a public fire department.

Other private subscription fire services include West Richmond County, GA with an annual fee of $1/1000 assessed valuation, some Arizona areas served by Rural Metro Fire Dept. Inc., and
in Montana and Oregon. These serve largely residential areas at an annual fee of $35-$50 per house. In general, the private subscription fire departments provide only suppression services and serve low density population and valuation areas. The level of protection is therefore considerably lower than what is provided by public or contract fire departments in populated areas.

6.4 Contract Fire Department EMS

A number of communities are now providing fire department and EMS services as a joint public-private service supply system. The fire department contracts with a private firm to provide paramedics and a mobil intensive care unit to supplement fire department basic life support services. The MICU operates out of the fire station under the control of the fire department. Markings on the ambulance and the uniforms are, in most cases, fire department identification. The paramedics may also supplement the fire suppression personnel; they respond with the fire department on fires and assist. This assistance varies from outside work such as pulling hose to actual interior fire fighting. Many of the contract paramedics are also certified firefighters. Some Illinois communities using this service are:

Carol Stream
Glenside (Glendale Heights)
Elmhurst
Franklin Park
Lincolnwood
Leyden Township
Burbank
Bartlett - Countryside

The contractor has full responsibility for all paramedic salary and fringe benefit costs and ambulance operating and maintenance expenses. Because he may serve more than one fire department, as well as his private operations, economy of scale is obtained.

The City of San Diego, CA recently contracted for private paramedic emergency medical services to work in cooperation with the fire department. Most of the paramedic units are housed in fire stations and the fire department responds on all calls with a paramedic ambulance. Since the fire department is more widely deployed than the paramedic ambulances (mobile intensive care units, MICUs) they frequently arrive on the scene first. All firefighters have received emergency medical training to enable them to provide basic life support services until arrival of paramedics. They also assist the paramedics as necessary.
Some specific features of several of these contract EMS operations are presented in Table VIII; a comparison of these contract EMS services which some public fire department EMS serves is presented in Table IX.

Although the cost benefits of contract EMS services do not appear to have the potential cost benefit of private fire department services, they are more generally accepted in many communities. Data, summarized in Table VII, indicates a 10-15% cost savings for the same level of service can be obtained by using a private contractor. Some of the economies of scale cannot be achieved since in many cases the population served per paramedic unit is very small, constrained by corporate limits. Medical authorities believe one MICU can serve a population of 35,000; some believe that when used with joint fire department response 70,000 people can be served per MICU. To achieve such scale effects, at least 6-8 paramedic units must operate in a contiguous area and the fire department must transport persons not requiring advanced life support services.

However, many economies of scale can be achieved since the contract EMS is, in most cases, provided by a private ambulance company that also operates general commercial ambulance service. Although the contract units cannot be optimally deployed, the fact that the company operates a number of ambulances provides cost advantages in administration, purchasing maintenance and personnel utilization.

Since many communities do not have advanced level EMS, the contract approach is a cost effective way to implement the service in a short period of time. By integrating the service into the fire department and training the contract paramedics, it is also possible to improve the overall fire department capabilities. This contract advanced EMS service appears to offer considerable opportunities to small businesses.

6.5 Case Study - San Diego, California

An excellent example of considering private sources of supply for a service demand registered by a public entity can be found in the establishment of paramedic level emergency medical service in the City of San Diego, California. The demand for this service was registered by the citizens in the general election of Nov. 1977 by their response to a question placed on the ballot by the City Council. The City identified a level of service desired and
### Table VIII
Features of Some Contract Advanced Life Support Services

<table>
<thead>
<tr>
<th>Community</th>
<th>San Diego, CA</th>
<th>Elmhurst, IL</th>
<th>Carol Stream, IL</th>
<th>Glenside, IL</th>
<th>Franklin Park, IL</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of MICUs Specified</td>
<td>16</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>As wanted by month or day</td>
</tr>
<tr>
<td>Response Time Goals</td>
<td>5 min.</td>
<td>none</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>Manning Criteria per MICU</td>
<td>5.5</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>As ordered</td>
</tr>
<tr>
<td>Total On Duty</td>
<td>2 pm</td>
<td>1 pm or EMT</td>
<td>2 pm</td>
<td>2 pm</td>
<td></td>
</tr>
<tr>
<td>Personnel Approval Required</td>
<td>no</td>
<td>no</td>
<td>Yes</td>
<td>Yes</td>
<td>Can be rejected</td>
</tr>
<tr>
<td>Community Supplied</td>
<td>Radios, Fuel Quarters</td>
<td>Quarters</td>
<td>Quarters</td>
<td>Quarters</td>
<td>Quarters</td>
</tr>
<tr>
<td>Community Supervision by</td>
<td>Paramedic Coordinator</td>
<td>Fire Chief</td>
<td>Fire Chief</td>
<td>Fire Chief</td>
<td>Fire Chief</td>
</tr>
<tr>
<td>Duties Other than EMS</td>
<td>CPR training</td>
<td>Demonstrations, CPR Training</td>
<td>Demonstrations, CPR Training, Blood Pressure</td>
<td>Demonstrations, CPR Training, Blood Pressure</td>
<td>As directed by Fire Chief</td>
</tr>
<tr>
<td>Identification on MICU Uniforms</td>
<td>NS</td>
<td>Contractor's Name</td>
<td>Fire Dept.</td>
<td>Fire Dept.</td>
<td>NS</td>
</tr>
<tr>
<td>Relation with Fire Dept.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMS</td>
<td>Joint run</td>
<td>none</td>
<td>Joint run</td>
<td>Joint run</td>
<td></td>
</tr>
<tr>
<td>Fire</td>
<td>none</td>
<td>Runs, do outside work</td>
<td>Runs &amp; assists</td>
<td>Runs &amp; assists</td>
<td>-</td>
</tr>
<tr>
<td>Community or Fire Prevention District</td>
<td>Population (1000s)</td>
<td>Type of ALS Service</td>
<td>Number of MICU's in Service</td>
<td>Cost Per MICU (1000s)</td>
<td>Cost Per Capita</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>--------------------</td>
<td>---------------------</td>
<td>-----------------------------</td>
<td>-----------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>San Diego, CA</td>
<td>826</td>
<td>Contract</td>
<td>15</td>
<td>240</td>
<td>4.35</td>
</tr>
<tr>
<td>San Francisco, CA</td>
<td>665</td>
<td>Public</td>
<td>14 max. staggered</td>
<td>257</td>
<td>6.61</td>
</tr>
<tr>
<td>Elmhurst, IL</td>
<td>44</td>
<td>Contract</td>
<td>1</td>
<td>160</td>
<td>3.64</td>
</tr>
<tr>
<td>Glenside, IL</td>
<td>28*</td>
<td>Contract</td>
<td>1</td>
<td>187**</td>
<td>6.68</td>
</tr>
<tr>
<td>Carol Stream, IL</td>
<td>18*</td>
<td>Contract</td>
<td>1</td>
<td>210**</td>
<td>11.67</td>
</tr>
<tr>
<td>Elk Grove Township</td>
<td>14*</td>
<td>Contract</td>
<td>1</td>
<td>189</td>
<td>13.50</td>
</tr>
<tr>
<td>North Maine, IL</td>
<td>35*</td>
<td>Public</td>
<td>1</td>
<td>254***</td>
<td>7.26</td>
</tr>
<tr>
<td>Lombard, IL</td>
<td>44*</td>
<td>Public</td>
<td>1</td>
<td>250***</td>
<td>5.68</td>
</tr>
</tbody>
</table>

* Population estimated since service area includes fire protection district for which census data is not available.

** Incremental cost of ALS service.

*** Incremental cost from fire department budgets analysis.
"In order to provide a high quality of paramedic service in the most cost effective manner to the citizens of San Diego, paramedic service providers were solicited through a formal request for proposal process."

The City established very comprehensive criteria in their solicitation which required a true technical proposal response rather than a simple bid. The proposers were given the opportunity to submit alternative approaches if they considered it appropriate. Proposals were received from 6 providers including 4 private firms plus the San Diego Fire Dept. and the San Diego Police Dept. The public agencies of the City of San Diego competed directly with the private providers in the proposal evaluation. A proposal Evaluation Committee was appointed by the City's Public Services and Safety Committee. The Evaluation Committee included members drawn from both the public and private sector who had specific knowledge of the various topics of concern in the selection process.

A selection criteria matrix was set up to evaluate proposal covering:

1. Technical Competence
2. Communications
3. Emergency Response
4. Personnel Policies
5. Program Costs
6. Administration

The selection process was described as being very competitive; both the fire and police departments were strongly interested in providing this service. The final selection was between 3 private firms and the fire department with the private firm winning by less than 5% on the selection matrix. The private company selected had also submitted an alternate proposal which contained some features that were eventually adopted by the City.

The City of San Diego's paramedic coordinator described a unique and mutually cooperative arrangement between the City and the private supplier. The City realizes that any private company is in business to make a profit and the private company realizes they must perform well to keep the business. In a sense, the private EMS operation is similar to that of other city departments; it must prepare and justify a budget in the same manner as any City department. The operating budget is fully funded by the City including direct costs and overhead; profit comes from a percentage of user fees collected by the private company. Any unused portion of the operating budget is returned to the City; corporate taxes are paid out of profits.
Elements of the city-contractor relationship that are unique include the fact that there is a mixed but well defined responsibility for different elements of the service. Most of the MICU ambulances are housed in fire stations and the fire department is a first responder along with the MICU units. All dispatching and communications are handled by the fire department and firefighters are receiving additional emergency medical training so they can both provide aid if they are first on the scene and also assist the paramedics.

In a major disaster, the fire department has overall command of all emergency forces including the paramedics. The City of San Diego also provides and maintains all communications equipment for the paramedic service and provides fuel for all of the mobile units. Because of quantity purchasing, the city could provide both at considerable savings and thereby reduce the total cost to the citizens.

The San Diego case is an excellent example of public-private cooperation to provide a service to citizens in a cost effective manner. However, it does not fully capitalize on the profit incentive of private business since operating costs are fully funded by the city. This removes much of the risk to the private firm and, with low risk generally lower, profits are justified. However, in order to keep the business the private firm must both control costs and provide a quality service. One can expect both public agencies and other private firms to be available if the current contractor does not provide quality cost-effective services.

The paramedic service in San Diego was compared to that provided by a public agency in a city of similar population, San Francisco. The comparison points are illustrated in Table X. San Diego operates with 2 paramedics per MICU but responds jointly with the fire department. San Francisco has 3 paramedics on each ambulance but responds alone on calls. San Diego will, when the program is fully implemented, have all MICUs manned "round the clock" while San Francisco has more MICUs in service during busy periods than in "slack" periods. This arrangement appears more practical in a city with concentrated population than in a city spread out like San Diego. In addition, the budget for San Francisco includes considerable salaries for services of consulting physicians and staff nurses not included in San Diego. The comparison indicates that these two communities are providing a different level of paramedic services in a different manner. The complete cost of the San Diego emergency medical service delivery system includes fire department response which is not reflected in the tabulated comparison. Therefore, it is not justified to state one city is
<table>
<thead>
<tr>
<th>Item</th>
<th>San Francisco (Public Agency)</th>
<th>San Diego (Contract Private Firm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Ambulances</td>
<td>14 maximum available</td>
<td>15 continuous</td>
</tr>
<tr>
<td>Ambulance Type</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Paramedics per Ambulance</td>
<td>Modular MICU</td>
<td>Van MICU</td>
</tr>
<tr>
<td>Special Program Features</td>
<td>Number of ambulances manned varied with day and time</td>
<td>-</td>
</tr>
<tr>
<td>Joint Response with Fire Department</td>
<td>No</td>
<td>Fire Dept. designated as 1st responder on all calls</td>
</tr>
<tr>
<td>Cost to City, millions (80-81 budget or estimated)</td>
<td>4.4</td>
<td>3.6</td>
</tr>
<tr>
<td>User Fee</td>
<td>$68 each</td>
<td>$102 each</td>
</tr>
<tr>
<td>Items not included in cost to City</td>
<td>Quarters</td>
<td>Quarters for 11 ambulances at fire stations</td>
</tr>
<tr>
<td>Special costs included in above</td>
<td>Part time fees to physicians and staff nurses, $564,000</td>
<td>-</td>
</tr>
<tr>
<td>Profit Based On</td>
<td>NA</td>
<td>10% of the collected user fees</td>
</tr>
</tbody>
</table>
providing too low (or too high) a level of service. The level of service provided is the prerogative of the citizens to select. In both cases if the service is evaluated on an annual cost per citizen or more significantly on the cost per life probably saved, both services would be classified as extremely cost effective.

Although it appears that the San Diego paramedic service costs considerably less per capita than San Francisco, the difference is not what it appears. San Francisco MICUs respond alone with 3 paramedics while in San Diego a 3-4 man engine company responds with a 2 man paramedic ambulance. If the incremental cost of each engine company response were $84.55 per run (based on an estimated 22,000 runs per year) both communities would have the same per capita cost.

6.6 Other Fire Department Contract Operations

Some government facilities and airport authorities also contract for fire department and/or ambulance services. All NASA centers (except those served by military fire departments) and some military bases use private contractors for fire protection. In addition, some airports, including Oklahoma City, Madison, WI, Green Bay, WI, have contracted for fire department services to comply with FAA standards. All of the above which we encountered were personnel service purchases. In some locations, the airport fire protection contract was added on to one providing security services.

Airport fire protection services are often an example of very low fire department productivity. Considerable benefit to the airport authority and users and the contractor could be attained by productivity improvements.

6.7 Other Private EMS

Private ambulance services are the major and often only EMS delivery system in many communities. These may operate as independent competitive firms or with some contract or franchise arrangement with the local government. Levels of service vary widely from merely basic transport to full paramedic services. One of the larger private EMS delivery systems is Arcadian Ambulance of Louisiana. It provides full paramedic services over a large rural and urban area and is supported by subscriptions and user fees. Other private ambulance service may be supported entirely by user fees or by a subsidy from the local government.
There is not uniform agreement among private ambulance operators as to the most desirable arrangement. Some feel that to provide advanced life support services with the desirable prompt response time necessitates local government funding rather than user fee dependence. Others believe a contract with a small subsidy or a franchise is adequate. Competition within an area has lead to suggestions of corruption and complaints of favoritism. Police have been accused of referring calls to specific services in return for gratuities. There can also be complaints from operators if they do not feel government emergency services are giving them the proper number of calls. One central police dispatching unit uses a map and ruler to determine what private ambulance service to call; this is obviously not the most efficient way to select resources in an emergency.

6.8 Reasons for Cost Effectiveness

The major reasons and methods by which private fire department and EMS providers operate cost effective services are outlined below.

**Effects of Scale**

This is a major factor in the cost effectiveness of the contract EMS services investigated and a significant contributor to the cost effectiveness of Rural/Metro. The private organization provides various levels and types of services over a larger area than any individual community served. This results in:

- Backup personnel to cover vacations and illnesses can be spread over a wide base.
- Less reserve equipment is needed.
- Apparatus and equipment can be purchased to uniform specifications and in volume.
- Administrative overhead can be spread over a broad base.

**Auxiliary Staff**

Use of part time personnel is a major contributor to the cost effectiveness of all the private fire departments evaluated. However, this is certainly not unique to private organizations; volunteer and paid-on-call personnel commonly supplement full-paid personnel in many communities.
Numerous effective and highly rated fire department and EMS systems in the U.S. are manned partly or entirely by on-call personnel. It is less common to have on-call firefighters in a city the size of Scottsdale; however, it is done in the U.S. and is common in Europe in even larger cities. There are two problems commonly encountered with on-call personnel supplementing full-paid members.

1. Unavailability during normal work periods in most communities.

2. It is more difficult an organization to manage than either a full-paid or all on-call staff.

Scottsdale has solved the first by committing other city employees as on-call personnel. The private firm, being competitive, has a strong incentive to overcome the second difficulty; many public departments drift from part-paid to full-paid because it is an easy solution to management difficulties.

Personnel Productivity

This is the major technique by which private fire departments provide more cost effective services. This technique is not limited to private departments; however, there is a stronger incentive in a private department. This productivity can be in the form of performing specific tasks for the local government as well as many fire department related tasks. Some of the major costs associated with a private fire department and possible improved productivity are presented in Table XI.

Apparatus Refurbishing or Building

Although on an annual basis apparatus costs may only be 10% of the total operating costs of a full-paid department, their cost becomes a greater factor as personnel costs are reduced. A 20-30% savings in apparatus costs can be very significant in a private firm's profit and in reducing capital requirements. Both Rural Metro and Elk Grove Rural increase productivity by building apparatus in the 1st case and refurbishing it in the second.

Working Hours of Full-Paid Personnel

Most public fire departments operate on a 40-56 hr. work week with various duty tours typically 10 and 14 hr. on a 40 hr. week and 24 hrs. on longer work weeks. It is not
Table VI

Major Cost Factors - Fire Dept. with Paramedic Service -
Minimum On-Duty Fire Response

<table>
<thead>
<tr>
<th>Cost Item</th>
<th>Unit Cost or Quantity</th>
<th>Possible Productivity Improvements</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fire Stations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>with Dormitory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-bay</td>
<td>$150-420,000</td>
<td>Partial finish</td>
<td>Can cause Trade Union problems</td>
</tr>
<tr>
<td>3-bay</td>
<td>175-490,000</td>
<td>done by fire fighters</td>
<td></td>
</tr>
<tr>
<td><strong>Fire Apparatus</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pumper</td>
<td>$ 65-100,000</td>
<td>Assemble and finish or</td>
<td>30% saving possible on new</td>
</tr>
<tr>
<td>Ladder</td>
<td>140-230,000</td>
<td>refurbish used apparatus</td>
<td></td>
</tr>
<tr>
<td>Ambulance</td>
<td>15-25,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Salaries &amp; Fringes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Starting</td>
<td>$ 14-20,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>18-24,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Manning/1000 pop.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-Paid</td>
<td>.6-4.0</td>
<td>Use POC</td>
<td>Minimum rate applicable</td>
</tr>
<tr>
<td>On-Duty</td>
<td>.2-.6</td>
<td>See manning options,</td>
<td>18-20,000 population</td>
</tr>
<tr>
<td>Manpower Pool,Total</td>
<td></td>
<td>Appendix A</td>
<td></td>
</tr>
<tr>
<td><strong>Maintenance of Apparatus</strong></td>
<td>$1500/yr/unit</td>
<td>Self Maintenance</td>
<td></td>
</tr>
<tr>
<td><strong>Pension Contribution</strong></td>
<td>Public Employee</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 - 7% typical</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fire Dept.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>17-24% typical</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Private Optional</td>
<td>Use profit sharing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15% each man</td>
<td>instead</td>
<td></td>
</tr>
</tbody>
</table>

*Possible Productivity Improvements:
- Partial finish done by fire fighters
- Assemble and finish or refurbish used apparatus
- 30% saving possible on new apparatus
- Use POC
- See manning options, Appendix A
- Minimum rate applicable
- Self Maintenance
- Use profit sharing instead
uncommon for individual staff to hold a full time second job with 24 hr. fire department duty tours. Rural Metro staff work a longer week but get paid more per hr. than members of nearby public fire departments. From an individual viewpoint, this obviates the need for a second job at the sacrifice of possible free time. With a longer work week, the cost of fringe benefits as a percentage of salary decreases.

Paramedic Training

For most professions, the individual must obtain the necessary training on his own in order to qualify for a job. The public firefighter/paramedic is an expensive exception; the fire department usually must both pay for his training and his salary or even overtime while he is training. This can cost from $10,000 - $15,000 per person. The private EMS or fire department can hire persons who are already certified paramedics.

Salaries

Many more people are interested in obtaining these jobs than there are openings. Public service providers often have based their salaries on those in major cities where there is a higher workload and often higher costs of living. The public provider must also keep salaries high because turnover is more costly; public fire departments are usually prohibited by law from giving hiring preference to trained personnel. Therefore, the full cost of training must be borne by the public department and if an experienced man resigns, he must be replaced by a raw recruit. Private firms have more salary flexibility and can arrange it based on supply and demand. However, too low a salary schedule will lead to either a low level of personnel or a very high turnover rate. Salary alone is not recommended as an effective way to control costs; in fact, the most successful private fire department pays a higher hourly rate than its public counterparts.

Self Evaluation

To contract for private services requires a governmental unit to carefully decide what level of service will meet the needs and demands of the community. Experience has failed to develop a correlation between fire losses and fire protection over a wide range of levels of fire department
services. The community by consciously determining what level it wants has in the case of private contract fire departments, resulted in lower manpower and fewer stations than would likely occur if the protection level developed gradually through the common steps of a volunteer to part-paid to full-paid department.
7. BARRIERS TO PRIVATE ENTERPRISE

7.1 Acceptance

There appears to be a reluctance among some public officials and members of the public fire service to accept a private fire department. There have been many published criticisms of Rural-Metro fire department by representatives of the paid fire service. Private EMS provision is common and generally accepted because until recent years it was the only EMS available in many parts of the country. Private EMS is still common although it is often supplemented by public services. Federal and state standards and new technology have increased the cost of EMS and made it more difficult for many private providers to remain in business. The result has been consolidations or demise of some private firms while others such as many funeral homes got out of the business. Many fire departments also expanded the extent and level of EMS they provided. The net result is a wide variety of public, private and mixed EMS provision with a wide variation in the level of service provided the public. EMS provision is also the one public safety service area in which some communities have switched from public to private service provision.

7.2 Capital Costs

The private enterprise is at a definite competitive disadvantage in acquisition of capital. A government unit can borrow money for a longer term at a considerably lower interest rate. L. Witzeman, President of Rural/Metro Fire Dept., Inc. indicated that to purchase apparatus in today's money market, a private department would be fortunate to borrow money at 15% for a 5 year period.* On the other hand, a municipality should be able to borrow the same amount at 9% interest for a 15 year period. On an $80,000 fire department pumper, the municipality's monthly repayment would be about $750 compared to about $1830 for the private department.

Private enterprise is at the greatest capitalization disadvantage in starting up a fire department and in serving small to medium size communities. Capital requirements can be quite large in starting a new department. In small to medium sized communities, which is where the major business opportunities exist for private

* This value has been higher in recent months.
fire departments, the capital equipment cost will be a greater proportion of the total cost than in a large fire department.

The initial start up costs can be very significant between the above rates and terms. For example, consider setting up a department to provide fire suppression and emergency medical services to a population of about 50,000. Typical equipment requirements and costs are tabulated below.

<table>
<thead>
<tr>
<th>Type Apparatus</th>
<th>Number</th>
<th>Approximate Cost (1979)</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pumper</td>
<td>4</td>
<td>$80,000</td>
<td>$320,000</td>
</tr>
<tr>
<td>Aerial Ladder*</td>
<td>2</td>
<td>$120,000</td>
<td>$240,000</td>
</tr>
<tr>
<td>Squad Truck</td>
<td>1</td>
<td>$50,000</td>
<td>$50,000</td>
</tr>
<tr>
<td>Advanced Life</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support Ambulance</td>
<td>2</td>
<td>$40,000</td>
<td>$80,000</td>
</tr>
<tr>
<td>Backup Ambulance</td>
<td>1</td>
<td>$20,000</td>
<td>$20,000</td>
</tr>
<tr>
<td>Autos</td>
<td>4</td>
<td>$7,500</td>
<td>$30,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>$740,000</strong></td>
<td></td>
</tr>
</tbody>
</table>

The annual payments on borrowed capital (using the above interest rate and load periods) would be approximately $83,250 for a municipality and $203,130 for a private enterprise. The private department disadvantage would be reduced after the first 5 years because, except for the autos and ambulances, the apparatus has a useful life of 15-25 years.

Two ways in which this capitalization cost imbalance could be reduced are discussed below.

1. The governmental unit can provide the apparatus.

   Comments:

   The private enterprise essentially provides operation under contract using the government units, facilities and equipment. Since the private business has no capital investment, the amount of profit that can be justified is low. The incentive to improve profit by improved utilization of capital equipment is removed.

   The governmental unit would not be sure that the apparatus is being properly maintained.

   One method of reducing fire department costs is partially building, modifying and rebuilding apparatus. The private operator does not have the same incentive to do this if the governmental unit owns the apparatus.

* Recent quotations go as high as $240,000.
2. Low interest government loans or lease-purchase arrangement.

Comments:

Either of these could correct the capital imbalance and have some analogies to industrial development bond/loans often used. Such loans from either the state or federal government would assist both the small business contractor and the municipality. A loan would probably be the best approach if new equipment were being purchased while a lease-purchase arrangement would be advantageous if the community already owned fire apparatus.

7.3 Public Fire Service Concerns

The subject of private fire department producers has been very controversial, particularly among public fire department personnel. In order to objectively cover this topic, a discussion was held with the President of the International Association of Fire Fighters and the General Manager of the International Association of Fire Chiefs.

The International Association of Fire Fighters, IAFF, has publicly indicated opposition to the concept of private for profit fire departments. This was confirmed in an interview with IAFF President, Howard McClennan. They recognize that the Union would likely have more strength in private fire departments which could be easier to organize. A private union would be legally free to strike while many public unions are not. The principal concerns of IAFF include the risks of compromising the level of service to increase profits and corruption in the contract process.

These concerns are legitimate and apply not only to fire department services but also to many other public functions, including emergency medical services for which private providers are less controversial. There are many examples in our society in which public safety has been compromised for corporate or individual gain.29 A risk exists in many functions commonly provided by private industry, including construction of bridges, roads, public buildings, and water and sewer lines. The risk of corruption and service compromise to increase profits must be recognized by responsible officials. If they elect to proceed with a private contract, they must take steps to minimize the risk just as they would with any other contract.
The fact that many public fire departments are not legally free to strike, had, until recent years, been an important advantage of public over private fire departments. However, in the last few years there have been a number of long and costly fire department strikes even though the action was not legal. Kansas City, MO; Chicago, IL; Memphis, TN; Gary, IN; and Milwaukee, WI, are a few of the large cities in which strikes have occurred. Although the strikes may have been illegal, the courts were either unwilling or unable to enforce the law.

The General Manager of the International Association of Fire Chiefs, Mr. Donald Flinn, did not express formal opposition to private fire departments per se, but did raise a number of concerns. He indicated that historically, all contract fire protection has generally been lacking in code enforcement inspections and public education; these are essential elements of the service that fire departments should provide. Some additional potential problems that he indicated might be encountered by private fire departments include:

"Relationship of the contract fire chief with other municipal department heads; will the desirable formal and informal relationships exist between departments?" How well this problem is handled depends on the mayor or manager, and on the fire chief. A similar problem exists in a community served by a fire protection district.

"Legal status of a private fire chief; some states give a public chief very strong emergency and inspection powers." However, recent court decisions have eroded many of the inspection powers. The need for availability of special emergency powers must be analyzed by the governmental officials and their attorneys.

"Non-fire responses - emergency and public service; fire department policies vary widely with respect to such requests." This policy must be clearly understood and contractually defined.

"Disasters and major emergencies - costs associated with such incidents can be extremely high." A major disaster might bankrupt a small fire department, although a larger fire department should be able to absorb an occasional major incident. Private fire departments have had major emergencies and been able to handle the cost; a recent tanker leak in Arizona and a DC-10 crash in Illinois both occurred in areas served by a private fire department.
"OSHA - Public firefighters are exempt from OSHA in some states while private contractors would not be." However, public firefighters must comply with OSHA in all states where the U.S. Dept of Labor approves the states occupational safety program and delegates enforcement authority to the state. A reasonable enforcement of OSHA should not cause any serious problems.

"Training Grants - federal and state training grants are generally not available for private contractors." However, the grants may be available to the contracting agency for disbursement.

7.4 Risk of Extraordinary Costs

A major emergency or disaster can require a maximum level of fire department services for several days which can result in extraordinary costs resulting from:

- Overtime payments to personnel.
- Consumption of fuel, foam, other chemicals, etc.
- Hiring outside support such as cranes, bulldozers, front end loaders, etc.
- Heavy wear on apparatus and equipment resulting from extended continuous use.

These emergencies may be the result of a severe storm, transportation accident, brush or forest fires, local fire or explosion, or unusual failures such as loss of elements in a communities water distribution system. A serious transportation accident may require fire department services for several days. There have been cases of municipal water system failure in which the fire department was called upon to pump for 2 weeks until repairs could be made.

In any contract for fire department services, provisions should be made for extraordinary costs to protect both parties. Such costs might bankrupt a private fire department which could leave the community without any fire department services. To avoid financial disaster a private fire department might be unable to commit the resources and manpower and to hire outside equipment which might be important in any emergency.
7.5 Other Barriers

Training/Grants

Federal and state grants for training are generally not available to private fire departments. Some states, Illinois for example, do not permit private fire department personnel to attend state training schools even if they pay tuition. Some of these discriminations may be circumvented by having the contracting municipality assume responsibility for some training costs and then apply for the grant.

OSHA

OSHA requirements apply to all private fire and EMS services and, in some states, also to public fire departments. Any state in which the responsibility for OSHA enforcement is delegated to the state, must mandate application of OSHA to public employees. OSHA requirements are very appropriate for most fire suppression operations and both public and private fire departments should provide the required protective equipment and training. However, many OSHA requirements do not contemplate what must be done under some emergencies. If OSHA inspectors follow the letter of the regulations, as some State inspectors have, private fire departments would occasionally be faced with the alternative of letting person(s) die or receiving OSHA citations. An example of such a situation is the recent State-OSHA citations issued to the Moraga Valley (CA) Fire Department. A construction worker was buried up to his shoulders when a slab of clay collapsed in a 12 ft. sewer excavation. The fire department used hydraulic ram jacks and timbers from the construction site to stabilize the trench during the 3 hr. rescue operation. However, California OSHA regulations require walls of such excavations be shored with metal to metal screw jack shorings. The fire department was cited for permitting its men to enter the excavation with their improvised shoring and for failing to provide the men with excavation training (for which no courses exist).

Vehicle Licenses

Private fire or EMS firms must pay state license fees while charges for public vehicles is normally nominal. This is very significant for fire trucks as the license is normally based on gross weight; fees may run $1,000 to $1,500 per truck. Of course, if the local government owns the apparatus it would not have to pay the higher fees. If the vehicle is leased to a local
government so they are responsible for the license, the nominal rates may apply in some states. This should be investigated by the local government's attorney to see if the contracts can be written to reduce these costs.

Personal Property Tax

A private company must pay such a tax on all its equipment in many jurisdictions. This can be significant on new firefighting apparatus and MICUs. If the local governmental unit owns or, under some laws, leases this equipment, the tax may be avoided.
8. CONCLUSIONS & GUIDELINES

8.1 Business Opportunities & Advantages

Private provision of fire suppression and emergency medical services by small business firms is a technically and economically viable alternative to government provision of such services in many communities. Although the subjective is controversial, particularly with respect to fire department services, many of the objections come from outside instead of within the communities serviced. Private businesses both can and have a strong incentive to provide a quality and cost-effective service. Although there are some laws, regulations, and policies which hinder private operation of these services, there are also others which benefit the private businesses. Private provision of these services is not a practical alternative to replace existing public services in large communities, although one city of several hundred thousand recently changed from a police-operated ambulance system to a private contractor-operated paramedic EMS system. The major opportunities for private provision of fire department and/or emergency medical services are in:

- Developing communities which must change from a volunteer or paid-on-call fire department to a part or full-paid fire department.
- Communities wishing to expand into advanced (paramedic) emergency medical services.
- Governmental units who are not satisfied with the cost or level of service being provided by a separate governmental unit such as a fire district.
- A group of communities without a full-paid department wishing to obtain the cost benefits of a larger scale operation by consolidation. These communities need not be contiguous to obtain many cost benefits.
- Facilities operated by local, special authority, county, state or federal government agencies which, because of their size, risk, or location, require on-site fire suppression and/or EMS services. Examples include airports, harbor terminals, institutional complexes, military bases, governmental laboratories, etc.
Generally, there will be a minimum of political problems generated in the above applications. However, private provision of these public services is most commonly controversial with respect to fire suppression services; historically, most ambulance service was originally provided privately, so private provision of emergency medical services is generally acceptable. Most of the opposition to private service has come from outside, not inside the community being served, except in cases where public employees were displaced by a private firm.

The advantages that can accrue to a governmental unit from contracting for fire departments and medical services include:

**Lower Cost and/or Better Service**

Competition and profit motive act the same way in a purchase of service agreement, as in private subcontracting. As long as there is a threat of competition, the private company must provide satisfactory service at a lower cost than can be obtained from a competing source. Even when there are few, or no competitors, the private fire department or emergency medical service competes with public provision of the service.

**Acquisition of Skills**

The private fire department can acquire specialized skills which the public fire department cannot because of restrictive hiring regulations encountered in most locations.

**Start-Up Time**

A private service provider can get an operational program started much faster than most public service providers. One private fire department began service less than 30 days after contract authorization. A private contractor put 15 paramedic units in service in a large city within two years of contract award. Both achievements would have been almost impossible if the governmental unit had set up its own delivery system.

**Avoids Large Initial Costs**

The community does not have to invest extensive capital for facilities, equipment, and training of personnel.
Provides an Objective Scale of the Level and Cost of Service

Specifications and contract should clearly define the level and cost of service. The community is forced to define its objectives and register its service demand. This will increase the objectivity at which the government assesses its operations, particularly when considering expansions and reductions.

Flexibility

Increasing and particularly reducing the level of service provided can be accomplished without lengthy negotiations with the municipal employees. If the government is not satisfied with the service or cost, it can go more easily to another supplier or elect to provide the service itself.

8.2 Problem Areas

Contracting for these services may present some problems which the community should be aware of in order to make an intelligent decision on contracting and to properly implement any contract. Examples of some problems that may be encountered include:

Citizen or Union Opposition

The concept of private contract fire department services is not common and may generate negative public reaction. Employees or Union members whose jobs or job opportunities are threatened can also be expected to oppose contracting for fire department services.

Potential Corruption

Historically, contracting has been a significant source of corruption in governmental operations. Graft, kickbacks, excessive costs, and poor service may result. No such recent experience has been reported with private fire department and EMS providers, but it is not impossible. However, fire department and EMS providers deliver service directly to the public at local sites. Therefore, as far as level of service, these contractors are under greater scrutiny than other governmental contractors. While public fire department and EMS systems have considerable inherent immunity from criticism, this is not likely to be found with...
a private provider. Public providers are not exempt from corruption. Fire department fire prevention bureau scandals occasionally occur in some cities. However, both public and private suppression and contract emergency medical services have been relatively free of reported corruption.

Possibility of Poorer Service

Since a private firm is in the business to make a profit, there is the risk that it may skimp on its service to increase profits. However, as previously noted, the level of service is clearly subject to public scrutiny; audits of books and records can help minimize this possibility. A recent metropolitan Chicago investigation alleged some private ambulance companies were skimping on service to improve profits; however, none of the contract operations previously discussed were involved.

Specifications are Difficult to Write

Since private contracting in this area is not common, public officials will not be experimental in preparing and enforcing specifications. Some outline guide specifications are included in the appendices; consultants are available who can assist governmental units.

8.3 Contracting Techniques and Guidelines

An excellent example of the technique for a government to use in setting up a fire department or EMS system was the approach used by San Diego for establishing paramedic EMS, section 6-5. The basic steps include:

1. Identification of Needs and Demand
2. Establishing Goals and Objectives
3. Selecting Public/Private Options
4. Proposal Request, evaluation

8.1 Identification of Needs or Demand

The need for fire and/or EMS in a community should be identified before attempting to establish any goals and objectives. This can be accomplished by considering experience in similar communities, historical experience, projected growth, and basic community
Some factors that will influence the demand for both fire and EMS services include:

1. Socio-economic population characteristics
2. Geometric configuration of the service area
3. Population density and distribution
4. Street system and travel obstacles
5. Temporal variations in population (day-night, seasonal, special event, etc.)
6. Special demand sources such as busy highways, airports, etc.

Factors which can effect the demand for fire department services include:

- Size, age, separation and quantity of one and two-family dwellings.
- Construction, age, size and separation of multiple family dwellings and commercial buildings.
- Number, type and use of industrial buildings.
- Target hazards such as nursing homes, hospitals, large assembly places, special industrial facilities, etc.
- Installation of automatic fire protection systems in buildings; may decrease risk of severe fire; some may significantly increase fire alarm response.
- Present and past building and fire codes and their enforcement; number of existing pre-code buildings.

The Insurance Service Offices "Required" Fire Flow is one method for measuring the magnitude of discrete fire department service demands; there are pitfalls in its use. It is discussed in more detail later in Appendix B.

EMS demands vary widely with communities but because there are more EMS calls than fire calls, a better historical statistical demand projection is usually possible. However, experience has shown that whenever the level of EMS is increased in a community, the demand also increases. Additional factors which influence the demand for EMS include:

- Population age distribution.
Stability of the population; largely homeowners or renters, high transient population, etc.

Availability of alternate medical aid such as local clinics, doctors, hospital emergency rooms.

8.4 Goals & Objectives

The purpose of fire department services is to protect life and property from loss due to fire. It is recognized that the effectiveness in accomplishing these purposes must depend on the level of fire suppression services provided. However, studies in both the U.S. and United Kingdom have not quantified this relationship. Life and property loss could not be correlated with the number or deployment of fire department services over the range of services considered. Since direct input-output relationships cannot be used to establish goals indirect parameters must be selected such as:

1. Meeting Insurance Service Office standards to achieve a particular insurance grade (Appendix B).
2. Average and maximum travel times of apparatus to fires.
3. Size of individual and/or number of simultaneous incidents to be handled without outside aid.

ISO municipal grading criteria are intended for use in determining insurance rates and do not necessarily coincide with the best fire protection for the community. However, if properly used they can provide a community very good guidelines for the number and deployment of firefighting apparatus.

Deploying apparatus to achieve travel time objectives can be based on equal coverage to the entire community or coverage adjusted based on alarm incidence and target hazards. Travel time is the element of response time which can be controlled by the initial location of apparatus. Goals using travel time normally consider the response of 2 engine companies and one ladder company unless the buildings served do not require ladder company service. The typical range of goals commonly used are:

1. 1st due engine
   - 3 min. - industrial, commercial, apartments
   - 4 min. - lower density areas
   - 5 min. - separated residential areas, 90% or higher of all fires
2. 2nd due engine 4-10 min. depending on community and risks

3. Ladder truck (if needed to service protected area) 4-10 min.

Travel times for paramedic EMS units used vary from 4-7 minutes for 90-95% coverage.

The size of incident and number of simultaneous incidents to be handled will dictate on-duty and available manning. A minimum of 2 men per first due unit is necessary for any fire suppression or EMS capability. If rescue problems are to be handled in conjunction with suppression, more immediately available manpower is necessary. Additional manpower discussion is included in Appendix A and Section 4.

8.5 Principal Public/Private Options

The principal options available to the community for implementing these goals are itemized below:

1. Fire Stations:
   a. Provided by Local Government:
      . most practical
      . may be poorly located
      . bond issue may require referendum
   or b. Provided by Contractor:
      . necessitates long term government commitment
      . or extremely high risk
      . interest costs will be higher
      . property taxes will have to be paid
      . strong incentive to control cost of facility
   or c. Provided by Contractor on Leased-Purchase to Local Government:
      . higher costs due to interest
      . reduces risk for contractor
      . strong incentive to control costs

2. Ambulance Location/Quarters:
   a. Fire stations provided as per options in (1):
      . frequently ideal location geographically
      . simplifies operation and start-up
      . develops good relationship if system dictates joint or cooperative fire/EMS operations
or b. Quarters provided by local government:

or c. Quarters provided by contractor:
  . Can be leased so risk is low.

3. Apparatus:
   a. Owned by local government:
      . Reduces contractors incentive for cost control, refurbishment and maintenance to extend life.
      . Procurement is more complex and may be hard to obtain exactly what is desired through competitive bidding.
      . Local government is in strong position to start own fire/EMS system if are not satisfied with contractor services.
   or b. Owned by Contractor:
      . Strong incentive for cost control and even assembly/fabrication of own apparatus.
      . Incentive present to maintain apparatus to maximize life.
      . License fees and personal property taxes may be significant.
   or c. Owned by Contractor but Leased to Local Government:
      . Contractor may achieve economies of scale if he operates in several jurisdictions.
      . May reduce license fees and eliminate personal property taxes depending on state law.
      . Some incentives for cost control and maintenance as in "b".
   or d. Combination of Above.

4. Personnel:
   a. Full paid staff provided by contractor:
      . Almost mandatory for advanced EMS.
      . Can be higher cost than other options for fire department services.
   or b. Full paid staff provided by contractor with auxiliary staff or other government employees:
      . Not possible in many fire district operations.
      . Manpower may not be available on nights and weekends if government employees do not live within jurisdiction.
      . Provides additional manpower at low cost that is available during day.
Employee selection must insure that their work is deferrable; persons who may be engaged in tasks such as repairing water mains or plowing snow are not desirable. Can provide specialized skills such as electricians, mechanics, building inspectors, etc. which is often useful at a fire or other emergency.

or c. Full time and part time auxiliaries provided by contractor:
- Auxiliaries may not be practical in some communities.
- Local government has less "clout" to encourage participation than in "b".

or d. Mixture of "b" and "c"

5. Communication and Dispatch

a. 911 Public Safety Answering Point:
- May be mandated by law.
- Usually results in long fire and EMS dispatch delays.
- High disruption risk from telephone system failures.

or b. Local police communication and dispatch:
- Often only practical arrangement in a small community.
- Not always possible in fire district.
- Some disadvantages as 911 PSAP.
- Better community control than 911 PSAP serving several jurisdictions.

or c. Provided by Local Fire Department (when contract service is for EMS only):
- Excellent with 2 tier response.
- Likely to provide prompt dispatch.

or d. Provided by Contractor:
- Practical for EMS only in larger cities.
- Practical for fire and EMS when serve about 75-100,000 population.
- Complicates emergency service call handling and dispatching when used for EMS only.

or e. Provided by Central Fire/EMS Communication and Dispatch Center serving several jurisdictions:
- Practical cost-effective approach for smaller communities.
- Usually provides prompt dispatch.
- More susceptible to disruption from failures in telephone system.
or f. Dispatch provided by "a", "b", "c" or "d" and communications by contractor:
. Important only during major fires or simultaneous alarms.
. Not cost effective for routine incidents.

6. Apparatus Maintenance:
   a. Provided by Community:
      . Split responsibility for apparatus owned by contractor.
      . Eliminates opportunity for increasing productivity of on-duty personnel.
      . May be cost effective if community operates maintenance shop for all vehicles although priorities can be a matter of dispute.
   
or b. Provided by Contractor:
      . Responsibility at a single point.
      . Incentive to maximize life with good maintenance of all contractor owned equipment.
   
or c. Combination of above.

7. Radio Maintenance
   a. Provided by community:
      . Practical if they operate a shop for all government radios.
   
or b. Provided by contractor:
      . Probably will be subcontracted to an outside shop in small communities.
      . Opportunity to obtain scale effects and personnel productivity in larger operations.

8. Gasoline/Diesel Fuel
   a. Provided by community:
      . Possible cost savings due to volume and tax savings.
   
or b. Provided by contractor.

The advantages and disadvantages of these various options are summarized in Table XII & XIII for the major cost elements of fire department and EMS systems.
<table>
<thead>
<tr>
<th>System Element</th>
<th>Provided By Local Government</th>
<th>Provided By Contractor</th>
<th>Provided By Contractor On Lease-Purchase to Local Government</th>
</tr>
</thead>
</table>
| FIRE STATION & AMBULANCE LOCATION & QUARTERS | - Most practical.  
- May be poorly located.  
- Bond issue may require referendum. | - Necessitates long term government commitment or extremely high risk.  
- Interest cost may be higher.  
- Property taxes will have to be paid.  
- Strong incentive to control cost of facility. | - Higher cost due to interest.  
- Reduces risk to contractor.  
- Strong incentive to control cost. |
| APPARATUS | - Reduces contractors incentive for cost control, refurbishing & maintenance to extend life.  
- Procurement is more complex and may be harder to obtain exactly what is required thru competitive bidding.  
- Local government is in strong position to start own fire/EMS if not satisfied with contractor services. | - Strong incentive for cost control, includes assembly/fabrication of own apparatus.  
- Incentive existing to maintain apparatus to maximize life.  
- License fees and personal property taxes may be significant. |  |
| PERSONNEL | - Full Paid Staff  
- Almost mandatory for advanced EMS.  
- Can be higher cost than other options for fire department services. | - Full Paid Staff With Auxiliary Staff of Other Government Employees  
- Not possible in many fire district operations.  
- Manpower may not be available on nights & weekends if government employees do not live within jurisdiction.  
- Provides additional manpower & low cost which is available during the day.  
- Employee selection must insure that their work is deferrable.  
- Persons engaged in water main repair or snowplowing should not be selected.  
- Can provide special skills, e.g. electricians, building inspectors & mechanics which are used at fire or other emergencies. | - Full and Part Time  
- Auxiliaries may not be practical in some communities.  
- May be less enthusiasm to participate on a part-time basis when private contractor operates fire department.  
- Can be combined with local government auxiliaries. |
<table>
<thead>
<tr>
<th>System Element</th>
<th>911 Public Safety Answering Point</th>
<th>Local Police Communication &amp; Dispatch</th>
<th>Provided by Local Fire Dept. (when contract is for EMS only)</th>
<th>Provided by Contractor</th>
<th>Provided by Central Fire/EMS Communication &amp; Dispatch Center Serving Several Jurisdictions</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMUNICATIONS AND DISPATCH</td>
<td>May be mandated by law.</td>
<td>Often only practical arrangement in a small community.</td>
<td>Excellent for two tier response</td>
<td>Practical for EMS only in large cities.</td>
<td>Practical cost effective approach for smaller communities.</td>
</tr>
<tr>
<td></td>
<td>Usually results in long fire and EMS dispatch delays.</td>
<td>Not always possible in fire district.</td>
<td>Likely to provide prompt dispatch</td>
<td>Practical for fire &amp; EMS when serve about 75-100,000 population.</td>
<td>Usually provides prompt dispatch.</td>
</tr>
<tr>
<td></td>
<td>High disruption risk from telephone system failures.</td>
<td>Some disadvantages as 911 PSAF.</td>
<td></td>
<td>Complicates emergency service, call handling &amp; dispatch when used for EMS only</td>
<td>More susceptible to disruption from failures in telephone system.</td>
</tr>
<tr>
<td>EQUIPMENT &amp; APPARATUS MAINTENANCE</td>
<td>Provided by Local Government</td>
<td>Split responsibility for apparatus owned by contractor.</td>
<td>Responsibility at a single point.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eliminates opportunity for increasing productivity of on-duty personnel.</td>
<td>Incentive to maximize life with good maintenance of all contractor owned equipment.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>May be cost effective if community operates maintenance shop for all vehicles although priorities can be a matter of dispute.</td>
<td>Provided by Local Government</td>
<td>Provided by Contractor</td>
<td></td>
</tr>
<tr>
<td>FUEL</td>
<td></td>
<td>Provided by Local Government</td>
<td>Provided by Contractor</td>
<td></td>
<td>Possible cost savings due to volume and tax savings</td>
</tr>
</tbody>
</table>
8.6 Proposal Request and Evaluation

Once the goals and implementation options have been selected, the community may solicit proposals from private and/or public providers. The request should include the defined parameters; additional specifications suggestions are included in Appendices C and D. Each respondent should be required to be fully responsive but encouraged to submit alternatives for consideration.

A detailed and weighted selection matrix should be prepared and used to evaluate as objectively as possible all proposals. Once all are compared on a uniform basis, alternatives may be considered. The final selection should be made on both technical and cost evaluations.
References


23. Anon: "Sprinkler Ordinance, City of Scottsdale." Scottsdale Fire Department, AZ.


27. Report to the Honorable Mayor and City Council from City Manager: Public Services and Safety Committee Agenda of April 26, 1978, San Diego, CA.


APPENDIX A  Fire Department Manning Options for Increased Cost-Effectiveness
APPENDIX B  Insurance Standards for Fire Departments
APPENDIX C  Example of Fire Department Specifications
APPENDIX D  Example of Emergency Medical Service Specifications
A fire department must serve a population of about 100,000 people before it can approach a reasonable cost effective and relatively independent operation. In order to handle a serious fire in target hazards such as a shopping center, manufacturing plant, church, etc. a minimum of four engines and two trucks with about 25 men are required. This necessitates a total fire-fighting force of about 100-120 men depending on their working hours and whether or not outside aid is available to cover the rest of the community. The economies of scale appear to optimize for a fire department service population of about 500,000.

Most communities serving this large a population use full-paid fire departments with some notable exceptions, such as Rural-Metro of Arizona. However, to provide adequate response to cover major hazards without leaving a city unprotected requires apparatus and manpower available from one of several options:

1) In town and on duty.
2) In town partly on duty and partly recall of off-duty personnel.
3) In town with on-duty personnel supplemented by on-call part time personnel.
4) In town with on-call, part-time personnel.

5) Partly in town and partly from adjacent fire departments with any of the above manning options.

Generally as a community develops, it starts with a fire department manned by on-call personnel. As it grows, some full-time personnel are hired to supplement the on-call personnel. A fire department manned by both full-paid and on-call (POC) personnel can be a very cost-effective way to provide a reasonable level of fire protection and EMS in smaller municipalities. This type of department is more difficult to manage than either a full-paid or all on-call department. However, many such departments are successfully operating and providing an adequate to very good level of service. However, usually the part-paid fire department gradually goes to a full-paid department, often for reasons other than improved effectiveness.

However, the part-paid department normally evolves from a paid-on-call department, not from a full-paid department. Any changes in working hours or conditions for full-paid personnel can be very difficult, if not impossible.

There are numerous manning options available to part-paid fire departments in suburban communities. Three examples are presented below.

OPTION 1
An on-duty force of paid men provides first due response. On-call personnel response provides supplementary manning on the scene and/or second due unit response and station coverage.

Advantages
Requires a minimum on-duty force of full-paid personnel.
A larger pool of manpower is available in case of a major emergency. Often on-call personnel are not available during normal working hours. However, a reliable source of on-call personnel during these periods are other on-duty public employees. This can create interdepartmental conflicts but also has often worked quite well.

A disadvantage is that on-call personnel are largely involved in second-line work and station coverage. It is difficult to maintain interest among personnel.

OPTION 2
Nominal 44-48 hour week; paid men work staggered 11 or 12 hour shifts during the day on weekdays only; four days per week.

On-call sleepers provide station coverage at night and weekends; they receive pay for this service, typically $3 - $3.50 per hour. They have only emergency response duties, not routine apparatus or station maintenance.

Advantages
6 men on duty require a total force of only 8-9 paid men plus about $125,000 - $150,000 overtime costs for on-call sleepers. The on-call personnel are actively involved in first alarm responses which helps to maintain their interest.

Paid men have weekends, evenings, and one day per week off.

Disadvantages
Schedule is generally disliked by some full-paid personnel.

A large on-call force is required which is difficult to keep
at an adequate skill level.

Available manpower pool for recall is usually very low during the day.

OPTION 3
Nominal 56 hour week except that the full-paid men work normally only two 24 hour shifts each week on weekdays only. The one day owed every three weeks is scheduled for a weekend. On-call personnel provide station coverage on weekends and get paid, typically $3-$3.50 per hour. They have only emergency response duties, no routine station or apparatus maintenance. Overtime to maintain minimum manning due to illness or injury can use paid men during the day but either paid or on-call men at night.

Advantages
Six men on duty requires only 16-17 full-paid men plus about $75-100,000 overtime and on-call payments.

Full-paid men have five days off per week including two out of three weekends.

On-call men are actively involved in first alarm responses which helps to maintain their interest. With a 30 man on-call department, each man would be obligated to two days in a five-week period plus training sessions.

A large pool of paid and on-call personnel is available for large or simultaneous alarms. (All would receive pay for call-up.)
Disadvantages
Requires on-call men to commit full days on a weekend to the fire department.
APPENDIX B

Insurance Standards
For Fire Departments

The Insurance Services Office (ISO) standards for grading municipal fire protection have been used both as a guide to select the level of equipment, manning, and stations a fire department provides and also as a lever to increase fire department size without regard to the benefits received. However, the ISO has recently replaced the 1974 Grading Schedule for Municipal Fire Protection with a new Fire Suppression Rating Schedule as part of its revision program on the methods of determining individual property fire insurance rates. The Fire Suppressions Rating Schedule (FSRS) will be used to develop ISO Public Protection Classification numbers based on the potential ability of the fire defenses to suppress a fire, once a fire has started. ISO's contention is that the pre-fire aspects, such as fire prevention, and building fire code enforcement, will be reflected in actual conditions found when individual properties are specifically surveyed for fire insurance rating purposes and these conditions will directly influence the first insurance rates for that property.

Several basic conceptual changes were made, such as: establishment of a minimal protection level and assigning credits to fire defense aspects exceeding minimal levels; elimination of the need for subjective judgment by the Surveyor; and increased flexibility by evaluating potential performance regardless of the
conditions and technology. The 1980 FSRS considers only Fire Department (50%), water supply (40%), and Fire Alarm/Communications (10%) features. Included in the FSRS is the fire flow calculation method with refinements for determining the effects of the occupancy, exposure and fire communication characteristics of a building, greatly reducing the need for subjective judgement that was previously required.

The schedule consists of two major sections. The first contains the method for calculating the community Public Protection Classification and it measures the fire suppression forces' potential ability to fight fires in all properties with fire flow requirements of 3500 gpm or less. The second schedule section is used to determine a building Public Protection Classification based on fire suppression potential in respect to the property being evaluated.

The second section is applied only to properties that exceed a fire flow of 3500 gpm, results in a classification for each property evaluated and will not affect insurance rates of other properties. The building classification is only important if it is not as good as the community classification.

Other deviations from the 1974 Grading Schedule include: fire company distribution evaluation based on first due companies, not mileage for back-up companies; water supply evaluation can include water carried on fire apparatus; and the detailed engineering evaluation of the water supply pumping and distribution system reliability has been eliminated. For individual properties, the deviations include: fire company manning is not considered; fire company response distances are not considered; and the water supply duration requirement has been reduced to four hours.
The new Fire Suppression Rating Schedule has streamlined the process for determining a community's Public Protection Classification. This will enable ISO to conduct a city grading evaluation in less time with reduced field survey time and will greatly reduce the calculation work required. The Surveyor will not have to obtain the detailed information, nor comprehensive understanding of the fire department operations and procedures. The schedule is a fire-insurance rating tool and is not intended to evaluate all fire defense aspects associated with a good, comprehensive public fire protection program. ISO reiterates that the schedule should not be used for purposes other than insurance rating. As the emphasis for fire insurance rate determination is shifting to emphasize fire loss experience, schedule streamlining appears consistent.

Of major significance to communities is that this new schedule eliminated the consideration of a municipality's fire prevention efforts and also has de-emphasized the provision of fire suppression capability for the very large, complex properties (those requiring a fire flow of greater than 3500 gpm as determined by the schedule) in a community. The fire protection classification of a community, which is used as a basis for fire insurance rates, will be based on the capability of the fire department, in conjunction with the available water supply, to combat fires in the small or average sized buildings (needed fire flows greater than 3500 gpm) will be obtained on an individual basis, and will not affect the rating of the remainder of the community. Although the fire potential has not changed, the need for protection at the larger properties is being shifted to the individual property owner. The residents of a community are not being penalized in their basic insurance rate classification because of the large, sometimes unusual
commercial/industrial/recreational properties in the community. As a result, many communities which have large commercial or industrial properties which were considered in the 1974 grading schedule may be able to retain the same overall rating classification with fewer pieces of apparatus and less manpower.

However, any communities considering fire department service cuts as a result, should first consider the effect of such cutbacks on life safety of its citizens, which is not a factor in the grading schedule. Additionally, the loss of a larger commercial/industrial risk in a community may have a disastrous economic effect on a community, and the citizens of the community may indeed have an interest in providing protection to these properties.
Appendix C

Example of Fire Department Specifications

GENERAL

The contractor shall provide the fire department services described herein to ___________ as follows:

Services shall be provided continuously and without interruption 24 hours a day, 365 days a year.

Fire department services shall be fully operational on a City-wide basis no later than ___________.

The fire department services shall provide for response of the first structural fire fighting unit to any structural fire within ___ minutes. Additional required structural units and a ladder truck shall be available at the scene within ___ minutes for all first alarm responses. The response time referred to herein shall be the elapsed time from the first alarm signal to the active attack at the fire scene.

The contractor shall agree to collect, record, and report any statistical data required by City, County, State or Federal Governments relative to the operation of the fire department services.

APPARATUS

The contractor shall provide, as a minimum, a sufficient number of vehicles of the following types to provide the fire department services required:
a. Fire department engines (pumpers) - sufficient number to provide first alarm response to all structures in the City consistent with the established response time criteria. In addition, the contractor shall have fire department engines sufficient in number and capacity to be able to cope with any structural fire potential and still have units available for response to a second incident. The pump capacity of available engines shall be capable of providing the fire flow at a location established using Item 300, "Needed Fire Flow," in the Fire Suppression Rating Schedule of the Insurance Services Office.

b. Fire department ladder trucks - sufficient number to provide first alarm response to all structures in the City requiring ladder service in excess of those carried on pumpers; such response shall be consistent with the response time criteria established above.

c. Fire department aerial ladder (or elevated stream) truck - as deemed necessary by the City.

e. Adequate reserve apparatus (minimum of 1 for each type of apparatus provided) to allow for first line apparatus to be out-of-service for general maintenance and for repairs.

NFPA 1901-1979, Standard for Automotive Fire Apparatus, shall be used as a minimum standard for fire department apparatus, including the recommendations for equipment to be carried on the apparatus. Any fire department apparatus provided shall also comply with any other applicable State or Federal requirements.
Adequate facilities shall be provided by the contractor to protect the apparatus and equipment from the adverse effects of the weather. Such facilities shall provide adequate space to park fire department vehicles inside and to provide for such storage space and work space as may be necessary.

A fleet maintenance system shall be developed to assure a program of regular preventive maintenance for all fire department apparatus. The fleet maintenance system shall include a detailed written record of all services, repairs and costs for each vehicle. The maintenance schedule shall include periodic test of all pumps and aerial ladder/elevating platform equipment.

**EQUIPMENT**

The contractor shall provide adequate equipment to carry out all required fire department functions.

As a minimum, all automotive fire apparatus shall be provided with equipment as recommended in NFPA 1901, Standard for Automotive Fire Apparatus.

Fire service ground ladders shall comply with NFPA 1931-1979, Standard for Fire Department Ground Ladders.


Fire service portable pumps shall comply with NFPA 1921-1975, Specifications for Fire Department Portable Pumping Units.

Fire hose will comply with NFPA 1961-1979, Standard for Fire Hose.

Fire service portable fire extinguishers shall comply with appropriate sections of NFPA 10-1798, Standard for Portable Fire Extinguishers, including appendix sections.
PERSONNEL

The contractor shall provide sufficient manpower to provide a minimum first alarm response of at least ___ firefighters to any structural fire in the City in accordance with the response parameters set forth above. As a minimum, 3 firefighters shall respond for every piece of apparatus required to respond to meet the response parameters under "GENERAL."

All full-time fire department personnel shall meet the minimum requirements for their respective positions as set forth in the following publications:

- NFPA 1002-1976, Standard for Fire Apparatus Driver/Operator Professional Qualifications
- NFPA 1003-1978, Standard for Airport Fire Fighter Professional Qualifications
- NFPA 1021-1976, Standard for Fire Officer Professional Qualifications
- NFPA 1041-1976, Standard for Fire Service Instructor Professional Qualifications

The contractor shall provide minimum qualifications for other than full-time fire department personnel consistent with the demands of the performance of their duties. Such qualifications shall be approved by the City.
Fire department employees shall not be permitted to hold other jobs which may conflict with the performance of their fire department duties.

COMMUNICATIONS

The contractor shall establish a communications network. The communications network shall provide for a means by which citizens can report fire emergencies, a means to alert and dispatch appropriate fire apparatus and personnel, and a means by which personnel at the fire scene may communicate to each other and to the dispatcher. NFPA 1221-1978, "Standard for the Installation, Maintenance and Use of Public Fire Service Communications" should be used as a guide in developing the communications network.

The communications system shall provide for communication with the police department and any paramedic service organization to coordinate responses and assistance as the need arises.

TRAINING

The contractor shall organize a training program for all fire department personnel to assure that they are proficient in the performance of their duties.

The training programs shall be under the direction of a Training Officer. The Training Officer shall meet the minimum qualifications as set forth in NFPA 1041-1976 indicated above.

FIRE PREVENTION

The contractor shall provide adequate personnel to enforce applicable local and state fire prevention codes and ordinances. The
person(s) so designated shall be herein referred to as Fire Prevention Inspectors. Such persons shall have a thorough knowledge of such codes as are applicable.

The Fire Prevention Inspectors will be authorized by the City and shall be permitted to enter upon or into any premises within the City, at any reasonable time, for the purpose of making inspection thereof to determine whether or not any such rules or regulations for the protection of the public from the effects of fires are being violated.

Records shall be kept of each such inspection. The records shall indicate all violations of any applicable rules or regulations for the prevention of fires or for the protection of the public from the effects of fires. The City shall cooperate with the contractor in the enforcement of such rules and regulations.

INSURANCE

The contractor shall be insured by an insurance carrier acceptable to __________ against loss from any personal liability or property damage arising from any operation or activity of the contractor, its agents or employees as provided for in this Agreement. Minimum coverage shall be $2,000,000 Combined Single Limit Liability, including, but not limited to, malpractice insurance.

A copy of the policy of insurance shall be filed with _____ and shall name __________ as an additional insured. Said policy shall specify that the policy may not be terminated, altered or cancelled without thirty (30) days prior written notice to _____ by the insurance company.
The contractor shall immediately notify in writing of any and all claims, accidents, and/or incidents which might give rise to litigation arising out of the contractor's performance as specified herein.

The contractor shall have Worker's Compensation and Employer's Liability Insurance providing full statutory coverage.

HOLD HARMLESS

The contractor shall indemnify and hold harmless and its agents and employees from and against all claims, damages, losses and expenses, including attorneys' fees, arising out of or resulting from the performance by the contractor of the services specified herein, caused by any negligent act or omission of the contractor, any subcontractor of the contractor, or anyone directly or indirectly employed by the contractor or his subcontractors.

ASSOCIATED RESPONSIBILITIES

The contractor shall also provide for community education in fire prevention. The extent of such education shall be as agreed upon between the contractor and the City.
Appendix D
Example of Contract EMS Specifications

The contractor shall provide paramedic services to _________ as follows:

Paramedic service shall be provided continuously and without interruption, 24 hours a day, 365 days a year.

Emergency call response time of Paramedic Units shall be a 5 minute City-wide average, in addition to which the provider must guarantee a maximum response time of 15 minutes in rural areas and 10 minutes in urban areas, as delineated by ________________ . Certain areas may be designated as "uncovered," in which case longer response times will be acceptable.

Paramedic units shall only be dispatched to emergency calls for service.

Paramedic service shall be fully operational on a City-wide basis no later than ____________ .

Provider shall agree to collect, record, and report any medical and statistical data required by City, County, State, or Federal Governments.

EQUIPMENT

A minimum of _____ paramedic vehicle(s) shall be provided as first line units.
The Paramedic vehicles and the equipment and supplies carried thereon shall meet __________ specifications, and essentially conform to Federal specification KKK 1822 for ambulances.

Each paramedic vehicle shall have adequate equipment and supplies to perform the services herein described. Such equipment shall include the following as a minimum:

<table>
<thead>
<tr>
<th>Minimum Qty</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1. Portable suction apparatus, with wide-bore tubing and rigid pharyngeal suction tip. May be battery or electrically powered. Laerdal or equivalent.</td>
</tr>
<tr>
<td>1</td>
<td>2. Bag-mask ventilation unit, hand-operated, with adult-, child- and infant size masks. Clear masks are preferable. Valves must operate in cold weather, and unit must be capable of use with oxygen supply</td>
</tr>
<tr>
<td>2 each</td>
<td>3. Oropharyngeal airways, adult, child, and infant sizes.</td>
</tr>
<tr>
<td>2 each</td>
<td>4. Mouth-to-mouth artificial ventilation airways, for adults, and children. Commonly referred to as &quot;S&quot; tubes, Resusci-Tubes, etc. (May be combined with Item 3 above.)</td>
</tr>
<tr>
<td>1</td>
<td>5. Portable oxygen equipment (Marion Valve or Equal) with adequate tubing and semi-open, valveless transparent masks in adult, child, and infant sizes. (Plus 1 extra D or E cylinder.)</td>
</tr>
<tr>
<td>3</td>
<td>6. Mouth gags, either commercial or made of three tongue blades taped together and padded.</td>
</tr>
<tr>
<td>6</td>
<td>7. Sterile solutions, preferably in plastic bags, for wetting dressing, flushing chemicals, etc. 500 CC's NOT FOR INTRAVENOUS USE.</td>
</tr>
<tr>
<td>12</td>
<td>8. Universal dressings, approximately 10 inches by 36 inches, compactly folded and packaged in convenient size.</td>
</tr>
<tr>
<td>200</td>
<td>9. Sterile gauze pads, 4&quot; by 4&quot;.</td>
</tr>
<tr>
<td>24</td>
<td>10. Bandages, soft roller, self-adhering-type, 6&quot; by 5 yards</td>
</tr>
</tbody>
</table>
11. Aluminum foil, roll, 18" x 25', sterilized and wrapped.

12. Adhesive tape, 3" wide.

13. Burn sheets, sterile.

14. Traction splint, lower extremity, hinged half-ring with commercial limb-support slings, padded ankle hitch, and traction strap. (Hare Traction Splint or Pulsion Traction Splint.)

15. Padded boards, 4 1/2 feet long by 3 inches wide. Padded boards, 3 feet long, of material comparable to 4-plywood for coaptation splinting of leg or thigh.

16. Padded wooden splints, 15" x 3", for fractures of the forearm. (By local option, similar splints of cardboard, plastic, wire-ladder, or canvas slotted lace-on may be carried in place of the above 36" and 15" boards.)

17. Inflatable splints, uncomplicated, in addition to Item 16, or as substitute for the short boards. Arm and leg.

18. Spine boards, short and long, with accessories

19. Triangular bandages.

20. Safety pins, large size.

21. Shears, for bandages. Double-action or 7 1/2" scissors.

22. Obstetrical kit, sterile. Pre-Packaged with instruments.

23. Poison Kit.

24. Blood Pressure cuff, and stethoscope pocket type.

25. Cot, ambulance, multi-level, with pad.

26. Stretcher chair with straps (Ferno-Washington Model 107c or equivalent).
All vehicles, equipment and supplies will be maintained in a sanitary manner. Linen shall be changed after each use. Blankets shall be changed frequently and kept clean and sanitary. After use involving communicable diseases the stretcher and/or the interior of the ambulance shall be stripped and disinfected as is necessary to prevent the spread of the communicable disease.

A fleet maintenance system shall be developed to assure a program of regular preventive maintenance for all paramedic units. The fleet maintenance system shall include a detailed written record of all services, repairs and costs for each vehicle.

The provider shall have plans, equipment, and personnel for back-up and/or emergency replacement of operating units.

The provider shall present a plan for mutual aid agreements with contiguous non-City service areas in accordance with existing City policy and County standards.

PERSONNEL

Paramedic units shall be staffed with a team consisting of a minimum of two certified EMT/Paramedics. Paramedic personnel shall not be routinely scheduled to work more than an average _____ hour week or _____ hours in any 4 week period, except:

1. In such unusual or extraordinary circumstances as may be approved by the City Manager; or

2. For emergency overtime, in case of disaster in any geographic area served by the provider and sickness coverage; or

3. To provide backup coverage while other Paramedics are engaged in training activities required for compliance with this Agreement.
Paramedic employees shall be high school graduates or must have a GED certificate.

Paramedic employees shall be certified by __________, and meet ______________ standards for continuing education, and re-certification.

Paramedic employees shall not be permitted to hold other jobs which may conflict with the performance of their paramedic duties.

COMMUNICATIONS

The providing agency shall be required to establish a communications network which meets minimum communications standards as established by the ______________

The system shall provide for communication with both the fire department and police department to coordinate responses and assistance as the need arises.

INSURANCE

The provider shall be insured by an insurance carrier acceptable to __________ against loss from any personal liability or property damage arising from any operation or activity of the provider, its agents or employees as provided for in this Agreement. Minimum coverage shall be $2,000,000 Combined Single Limit Liability, including, but not limited to, medical malpractice insurance.
A copy of the policy of insurance shall be filed with ______ and shall name ___________ as an additional insured. Said policy shall specify that the policy may not be terminated, altered or cancelled without thirty (30) days prior written notice to ______ by the insurance company.

The provider shall immediately notify ___________ in writing of any and all claims, accidents, and/or incidents which might give rise to litigation arising out of the provider's performance as specified herein.

The provider shall have Worker's Compensation and Employer's Liability Insurance providing full statutory coverage.

HOLD HARMLESS

The provider shall indemnify and hold harmless _______ and its agents and employees from and against all claims, damages, losses and expenses, including attorneys' fees, arising out of or resulting from the performance by the provider of the services specified herein, caused by any negligent act or omission of the provider, any subcontractor of the provider, or anyone directly or indirectly employed by the provider or its subcontractors.

ASSOCIATED RESPONSIBILITIES

The Paramedic service provider shall also provide for community education in basic life support as recommended by the American Heart Association in the supplement to JAMA (The Journal of American Medical Association), February 18, 1974. The community education must be on a continuing basis, designed to reach the maximum number of citizens possible.
The providing agency shall assume primary responsibility for training police and fire department personnel in working in coordination with the paramedic units.

The contractor shall provide the fire department services described herein to __________ as follows:

Services shall be provided continuously and without interruption 24 hours a day, 365 days a year.

Fire department services shall be fully operational on a City-wide basis no later than __________.

The contractor shall agree to collect, record, and report any statistical data required by City, County, State or Federal Governments relative to the operation of the fire department services.

EQUIPMENT

The contractor shall provide, as a minimum, a sufficient number of vehicles of the following types to provide the fire department services required:

a. Fire department engines (pumpers) - sufficient number to provide first alarm response to all structures in the City with an average running time (dispatch to arrival at scene) of not more than _____ minutes. Additional engines with sufficient pump capacity to provide adequate fire suppression water flow at any location to meet the fire flow requirements for buildings as determined by Item 300, "Needed Fire Flow," in the Fire Suppression Rating Schedule of the Insurance Services Office.
b. Fire department ladder trucks - sufficient number to provide first alarm response to all structures in the City requiring ladder service in excess of those carried on pumpers; the average running time for first alarm response to such structures shall be not more than __ minutes.

c. Fire department aerial ladder (or elevated stream) truck - as deemed necessary by the City.

d. Such other vehicles as may be required to carry out the duties prescribed herein (i.e. fire prevention, etc.)

e. Adequate reserve apparatus (minimum of 1 for each type of apparatus provided) to allow for apparatus to be out-of-service for normal maintenance and for repairs in the event of breakdown.

NFPA 1901-1979, Standard for Automotive Fire Apparatus, shall be used as a minimum standard for fire department apparatus, including the recommendations for equipment to be carried on the apparatus. Any fire department apparatus provided shall also comply with any other applicable State or Federal requirements.

Adequate facilities shall be provided by the contractor to protect the apparatus and equipment from the adverse effects of the weather. Such facilities shall provide adequate space to park fire department vehicles inside and to provide for such storage space and work space as may be necessary.
A fleet maintenance system shall be developed to assure a program of regular preventive maintenance for all fire department apparatus. The fleet maintenance system shall include a detailed written record of all services, repairs and costs for each vehicle. The maintenance schedule shall include periodic test of all pumps and aerial ladder/elevating platform equipment.