

# **AMORTIZATION OF FIRE EQUIPMENT – A PLANNING TOOL**

Executive Planning

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## ABSTRACT

The problem addressed by this research project was that the Palm Beach Gardens Fire Rescue Department did not have a program in place to fund the replacement of fire and emergency medical equipment as it reached the end of its useful life. The department found itself seeking large budget increases to fund the replacement of fire apparatus or major pieces of fire equipment in some years and not in others.

The purpose of this research project was to develop a program for the amortization of specific types of fire equipment and to establish a fund to help in purchasing their replacements. This research project utilized action research methodologies by conducting a literature review of published materials and by conducting a survey of other local fire departments in an attempt to answer the following questions:

1. What is amortization?
2. What types of equipment should be amortized?
3. What is the useful life of specific types of fire equipment?

The research consisted of a review of material obtained from the National Fire Academy Library Learning Resource Center that included books, journal articles, and applied research projects. Further information was obtained through Internet search engines that located web sites containing pertinent information.

This information along with the information gained by the survey of other local fire departments was used to formulate answers to the research questions and used to establish an amortization schedule and equipment replacement plan for the Palm Beach Gardens Fire Rescue Department.

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## INTRODUCTION

Fire Rescue Departments today find themselves competing for funding with other public services and facing the rising costs of vehicles and equipment. Also, rapidly advancing technologies is increasing the cost of these items as well as making equipment become obsolete in a few short years.

These challenges require the leaders of these organizations to properly plan for future equipment and the replacement needs of their departments to help ensure the safety of their personnel and the reliability of their equipment. Proper planning can enable these organizations to determine their future equipment and replacement needs and establish a means of funding the purchases of the equipment when it is needed.

The problem addressed by this research project is that the Palm Beach Gardens Fire Rescue Department does not have a program in place to fund the replacement of fire and emergency medical equipment as it reaches the end of its useful life. The department finds itself seeking large budget increases to fund the replacement of fire apparatus or major pieces of fire equipment in some years and not in others.

The purpose of this research project is to develop a program for the amortization of specific types of fire equipment and to establish a fund to help in purchasing their replacements. This project will use action research by conducting a literature review of published materials and by conducting a survey of other local fire departments to answer the following questions:

1. What is amortization?
2. What types of equipment should be amortized?
3. What is the useful life of specific types of fire equipment?

## **BACKGROUND AND SIGNIFICANCE**

The Palm Beach Gardens Fire Rescue Department is currently a 75-member full service fire rescue department providing fire suppression, emergency medical including transport, fire prevention, and public education services. The department currently operates with three stations and plans to open two additional stations within three years. The department serves the city of Palm Beach Gardens, which is a rapidly developing city of 54 square miles, has a population of approximately 25,000 residents, and is projected to reach a population of 38,000 within 5 years.

The city has one of the lowest property tax millage rates in the area and the city council has insured the residents that the city will continue to have one of the lowest rates. Historically over the years the city budget has increased slowly while the property tax rate remained constant. However, the past two years have required a significant property tax increase to maintain the current level of services the City provides to its residents.

The city needs to build and staff two additional fire stations within the next three years to meet the emergency services response criteria contained in the City's Comprehensive Plan. Funding for these new stations and personnel will require significant tax increases or some other means of funding in order to keep the current level of service that the fire rescue department provides to the residents of Palm Beach Gardens. The city is also facing other financial challenges such as increasing personnel costs because of increasing health insurance premiums, demands for higher wages by bargaining units, and increasing workers compensation premiums.

To help aid in the financial challenges ahead for the Palm Beach Gardens Fire Rescue Department, the department needs to plan now for the future replacement of equipment. It needs to establish a policy and develop an amortization program that will fund the replacement of fire

and emergency medical equipment over a period of time and help keep the department's budget at a relatively constant level.

## **LITERATURE REVIEW**

A review of current literature reveals the following information in reference to the research questions:

### **What is amortization?**

The word amortize is defined by the Third College Edition of Webster's New World Dictionary as "to put money aside at intervals, as in a sinking fund, for the gradual payment of (a debt. etc.) either at or before maturity". (Webster's, 1988, p. 46) For the purpose of this project, in simpler terms, it is the gradual payment into some type of fund to cover the cost of the item over its expected lifetime. When the item reaches the end of its useful life, money will have been set aside to replace it. A common formula used to determine the amount amortized per year for an item is as follows:

### **FORMULA**

$$\text{Initial Cost} / \text{Useful Life} = \text{Amortization per Year}$$

$$\$10,000 / 10 = \$1,000 \text{ per Year}$$

You divide the initial cost of the asset by its estimated useful life, which would equal the amount to be amortized per year. For example if an item costs \$10,000 and its useful estimated life is 10 years, the amount that would be amortized per year is \$1,000. (Businessstow.com, 2001)

Another factor to consider in the amortization of equipment is that if you will be able to replace the equipment at the same price you initially paid for it. Most departments will find that this is not the case. In a book by Howard and Margaret Chatterton they reference two sources that will help to determine what the replacement costs of fire apparatus might be. They first

reference the *Handbook of Labor Statistics* by the Bureau of Labor that “provides information that can help you compute inflation for tools as well as apparatus. It presents inflation statistics for various industries and skills.” (Chatterton, 1994, p. 42-43) The other source referenced by the Chattertons is the apparatus manufacturers themselves. They found that most apparatus manufacturers recommended an inflation rate of 3.5% – 4% per year for the replacement of an identical unit. (Chatterton, 1994, p. 44)

### **What types of equipment should be amortized?**

The second edition of the book *Managing Fire Services* by the ICMA states that “major equipment such as fire apparatus cannot be purchased without careful planning. All fire service organizations should develop a needs assessment and amortization or replacement schedule for their major equipment in anticipation of growth or cutbacks, service life, obsolescence, maintenance costs, and so on.” (ICMA, 1988, p. 178)

Fire apparatus is probably the most expensive item purchased by fire departments today. Most departments find that they must plan ahead for the purchase of fire apparatus in order to keep their budgets within limits. The systematic replacement of fire apparatus will provide a department with reliable fire apparatus at all times. Further, improvements in apparatus design and technology can be introduced and maintenance costs can be reduced by systematically replacing apparatus. (Pollock, 1999, p. 13)

The purchase of other types of equipment can also affect a department’s budget. Based on the size of a department and their financial resources, “some kinds of expenditures raise special difficulties, notably those that are large and irregularly timed.” (Aronson & Hilley, 1986, p. 203) Other types of equipment such as cardiac monitors and SCBA equipment, which can cost thousands of dollars, may significantly affect a department’s budget.

### **What is the useful life of specific types of fire equipment?**

“Although guidelines for the replacement of major equipment exist in broad terms, individual municipalities differ sufficiently to require their own needs assessment and replacement schedule.” (ICMA, 1988, p. 178) In other words, the useful life span of equipment is not solely dependent on age. Joseph Anderson, in his Applied Research Project entitled *Justifying the Purchase of New Fire Apparatus*, identifies several factors to be considered as to whether or not equipment should be replaced. Some of the factors he identified are personnel safety, obsolescence, the condition of major components, the availability of parts, changes in national standards, federal mandates, and maintenance costs. (Anderson, 1998, p. 4-5)

In terms of age or fire apparatus, Howard and Margaret Chatterton recommend that fire engines be in front line service for a period of 15 years followed by 5 years of reserve status. They recommend the same time periods for aerial apparatus and 7 years of service for ambulance vehicles. (Chatterton, 1994, p. 28) Steve Pollock, in his Applied Research Project entitled *Fire Apparatus / Capital Equipment Replacement and Alternative Funding Methods*, determined that:

The fire service should plan for a service life of 10 to 15 years for first line apparatus, followed by 5 years of reserve status. This means that engines or ladders should be replaced after 20 years. A 10 to 15 year life expectancy is normal for first-line pumping engines. In some types of service, including areas of high fire frequency, a limit of only 10 years may be reasonable for first-line service. (Pollock, 1999, p. 25)

Fire apparatus and other types of equipment should be on a systematic replacement schedule. “A rational replacement schedule is essential to sound resource management.” (ICMA, 1988, p. 178)

## **PROCEDURES**

### **Research Methodology**

This research project used action research methodologies by conducting a literature review of published materials and by conducting a survey of other area fire departments to gather information and answer the research questions. This information was then used to develop an equipment replacement program for the Palm Beach Gardens Fire Rescue Department.

The literature review began with a review of the material obtained through the National Fire Academy Library Learning Resource Center. This information consisted of books, journal articles, and applied research projects. Further information was obtained through Internet search engines to identify web sites containing information relevant to the research questions. The information was then noted and separated by relevancy to the research questions. This information was then used to formulate answers to the research questions.

A survey was also conducted of 15 fire departments that are local to the Palm Beach Gardens Fire Rescue Department. The survey consisted of three questions relating to equipment replacement programs. Of the 15 surveys mailed out, only 6 were returned producing a 40% participation rate.

The information obtained through the literature review and the returned surveys was then used to formulate an equipment replacement program for the Palm Beach Gardens Fire Rescue Department.

### **Limitations**

The limitations of this project include the fact that while information was available in reference to the replacement of fire apparatus, very little information was found dealing with

other types of fire equipment. Additionally, the information obtained by the survey was limited by a 40% participation rate.

## **RESULTS**

### **What is amortization?**

Amortization is the gradual payment or setting aside of money over the useful life of a piece of equipment into some type of fund to fund its replacement when it reaches the end of its useful life. Typically this is done by dividing the cost or replacement cost of the piece of equipment by its useful life in years. The result is the amount of money that needs to be set aside or paid into a fund to fund its replacement.

Generally, it is best to use the replacement cost of equipment in order to fully fund its replacement. This can be accomplished by identifying an inflation rate for the type of equipment and adding it to the original cost of the equipment.

### **What types of equipment should be amortized?**

Fire apparatus, being the most expensive item purchased by fire departments, is one of the main pieces of equipment that needs to be amortized. The systematic replacement of fire apparatus provides departments with reliable fire apparatus and aids in keeping units with current technologies and equipment. The replacement also helps to reduce maintenance costs and down time for fire apparatus and aids in personnel safety.

Other types of fire equipment can be amortized depending on a departments needs and financial resources. Small departments with limited financial resources may find it beneficial to amortize equipment such as SCBA's and cardiac monitors. Other larger departments may not benefit from the amortization of these items because they may be replacing a portion of their equipment on a continual basis.

The results of the survey conducted of fire departments local to the Palm Beach Gardens Fire Rescue Department indicated that 50% of those departments that responded amortized fire apparatus and only one department that amortized any other type of equipment other than fire apparatus. One department noted that in addition to fire apparatus, they also amortized office equipment such as computers and copiers.

**What is the useful life of specific types of fire equipment?**

The research first identified that several other factors should be considered in addition to age in years to determine the useful life of fire equipment. These factors are personnel safety, obsolescence, the condition of major components, the availability of parts, changes in national standards, federal mandates, and maintenance costs.

In reference to fire apparatus, the literature review provided a 10 to 15 year service life for front-line fire engines and aerial apparatus followed by a 5 year reserve status. In some cases however, where the equipment is subject to a high frequency of responses and fires, it may be reasonable to limit front-line service to 10 years. Rescue and ambulance type vehicles should be replaced every 7 years. The literature review did not reveal any information as to the useful life of other types of fire equipment.

The survey of other area departments revealed the same useful life for fire apparatus as the literature review. On average the fire departments local to the Palm Beach Gardens Fire Rescue Department replace fire engines and aerial apparatus every 15 years. The survey also indicated that rescue and ambulance type vehicles are replaced every 7 years.

## DISCUSSION

In order to develop an amortization program for the Palm Beach Gardens Fire Rescue Department, several factors must be considered. The first factor to consider is that the program must include inflationary or replacement costs of equipment. Without fully funding the replacement cost of the equipment, the amortization fund that is established will fall short of funds when the time comes to replace equipment. As noted in the literature review, the inflationary rate for fire apparatus is typically 3.5% to 4% per year. (Chatterton, 1994, p. 42-43)

Another factor to consider is what types of equipment should be amortized by the Palm Beach Gardens Fire Rescue Department. Fire apparatus and rescue vehicles are the costliest pieces of equipment purchased by the department. Having to replace an aerial or a fire engine and a rescue vehicle in the same budget year significantly impacts the department's budget. (Aronson & Hilley, 1986, p. 203) Amortizing apparatus over their life span will help keep the department's budget at a more constant level and avoid large percentage increases from year to year.

Other costly items purchased by the department are cardiac monitors, SCBA equipment, and vehicle extrication equipment. The department currently utilizes the Lifepak 12 which can cost upwards of \$20,000 to replace and SCBA equipment can cost several thousand dollars. Any large dollar item may be considered and amortized over its useful lifespan.

The last factor to consider in establishing an amortization program for the Palm Beach Gardens Fire Rescue Department is the useful lifespan of fire equipment. The department has a vehicle replacement plan which calls for the replacement of aerial apparatus after 15 years of front line service, fire engines after 10 years of frontline service, and rescue vehicles after 7 years of frontline service. These established replacement periods for fire apparatus appear to be

consistent with the standards indicated by the literature review and the survey conducted of other fire rescue departments local to Palm Beach Gardens. (Chatterton, 1994, p. 28) & (Pollock, 1999, p. 25)

In considering other types of fire equipment, the Palm Beach Gardens Fire Rescue Department does not have any established standard for the replacement of cardiac monitors, SCBA equipment, or extrication equipment. Cardiac monitors are typically used for 3 to 4 years on frontline vehicles and then transferred to reserve vehicles for another couple of years until they are replaced. SCBA equipment is typically replaced a few pieces at a time every year as is extrication equipment.

In order to create a successful amortization program, the Palm Beach Gardens Fire Rescue Department must consider all of these factors to establish an amortization fund for fire equipment.

### **RECOMMENDATIONS**

To establish a successful amortization and equipment replacement plan for the Palm Beach Gardens Fire Rescue Department the following recommendations are made:

1. Establish an amortization schedule for the departments fire apparatus and rescue vehicle using the departments existing replacement schedule. This will provide the funding for the equipment when replacements are needed and keep the existing equipment on an established schedule.
2. Establish an amortization and replacement schedule for cardiac monitors. The schedule should plan on 3 years of frontline rescue vehicle service and 2 additional years of service on reserve equipment.

3. A fund should be established in which the amortized funds are placed each budget year and not utilized for any other purpose other than the replacement of the amortized equipment.
4. In establishing an amortization schedule for the equipment, the department should include an inflationary rate of 4% for the equipment. This will help to ensure that the established amortization fund will adequately fund the replacement of the equipment.

By following these recommendations the Palm Beach Gardens Fire Rescue Department should be able to establish a successful amortization and equipment replacement program. The establishment of a successful program will aid in the future planning for the growth of the department and help to stabilize the department's budget.

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**APPENDIX A**

### Equipment Replacement Schedule Survey

Conducted by: Scott A Fetterman, Deputy Chief  
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(561) 799-4300 Fax (561) 799-4399

**1. Does your department have a scheduled replacement plan for fire apparatus, rescue/ambulance vehicles, and/or staff vehicles?**

Yes \_\_\_\_\_  
No \_\_\_\_\_

**If so, what criteria do you use for replacement?**

Age/years \_\_\_\_\_  
Hours \_\_\_\_\_  
Gallons of fuel used \_\_\_\_\_  
Other \_\_\_\_\_

**Please indicate at what age, number of hours, or gallons used that your department uses to replace the following equipment?**

Engines \_\_\_\_\_  
Ladders \_\_\_\_\_  
Rescues \_\_\_\_\_  
Staff \_\_\_\_\_

**2. Does your department have a replacement schedule for any other types of equipment? If so please indicate below the type of equipment and the criteria used for its replacement.** \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**3. What funding sources does your department use to fund the replacement of equipment?**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Thank you for taking the time to complete this survey. The information you have provided will be most helpful in helping the Palm Beach Gardens Fire Rescue Department develop a scheduled equipment replacement program.**

**Completed By:** \_\_\_\_\_ **Department:** \_\_\_\_\_  
**Contact Number:** \_\_\_\_\_

## SURVEY RESULTS

Department	Criteria Used	<u>REPLACEMENTS</u>			
		Engines	Ladders	Rescues	Staff
Boca Raton	Age	15 years	15 years	6 years	8 years
Boynton Beach	Age	15 years	15 years	8 years	7 years
Greenacres	Age	18-20 years	18-20 years	10-12 years	
Palm Beach County	Age	10 years	10 years	7 years	7 years
Palm Beach Gardens	Age	15 years	15 years	7 years	5 years
Town of Palm Beach	Age	15 years	15 years	5 years	5 years
<b>Average</b>		<b>15 years</b>	<b>15 years</b>	<b>7 years</b>	<b>7 years</b>

**APPENDIX B**

### AMORTIZATION SCHEDULE

Equipment	Year	Cost	Repl. Cost	Payments to Fund				
				2002	2003	2004	2005	2006
Engine 61	1997	\$245,000	\$345,597	\$57,600	\$57,600	\$57,600	\$57,600	\$57,600
Engine 62	2000	\$260,000	\$366,756	\$40,751	\$40,751	\$40,751	\$40,751	\$40,751
Engine 63	2000	\$260,000	\$366,756	\$40,751	\$40,751	\$40,751	\$40,751	\$40,751
Engine 64	2000	\$260,000	\$366,756	\$40,751	\$40,751	\$40,751	\$40,751	\$40,751
Engine 65	1999	\$260,000	\$366,756	\$45,845	\$45,845	\$45,845	\$45,845	\$45,845
Truck 61	1993	\$275,000	\$460,721	\$65,817	\$65,817	\$65,817	\$65,817	\$65,817
Rescue 61	2001	\$135,000	\$171,758	\$24,537	\$24,537	\$24,537	\$24,537	\$24,537
Rescue 62	2001	\$135,000	\$171,758	\$24,537	\$24,537	\$24,537	\$24,537	\$24,537
Rescue 63	2002	\$140,000	\$178,119	\$25,446	\$25,446	\$25,446	\$25,446	\$25,446
Rescue 64	2001	\$135,000	\$171,758	\$24,537	\$24,537	\$24,537	\$24,537	\$24,537
Rescue 65	2002	\$140,000	\$178,119	\$25,446	\$25,446	\$25,446	\$25,446	\$25,446
Cardiac Monitors (5)	1999	\$75,000	\$89,076	\$12,725	\$12,725	\$12,725		
<b>Total Payments</b>				<b>\$428,740</b>	<b>\$428,740</b>	<b>\$428,740</b>	<b>\$416,015</b>	<b>\$416,015</b>

Equipment	Year	Cost	Repl. Cost	Payments to Fund				
				2007	2008	2009	2010	2111
Engine 61	1997	\$245,000	\$345,597	\$57,600				
Engine 62	2000	\$260,000	\$366,756	\$40,751	\$40,751	\$40,751	\$40,751	
Engine 63	2000	\$260,000	\$366,756	\$40,751	\$40,751	\$40,751	\$40,751	
Engine 64	2000	\$260,000	\$366,756	\$40,751	\$40,751	\$40,751	\$40,751	
Engine 65	1999	\$260,000	\$366,756	\$45,845	\$45,845	\$45,845		
Truck 61	1993	\$275,000	\$460,721	\$65,817	\$65,817			
Rescue 61	2001	\$135,000	\$171,758	\$24,537	\$24,537			
Rescue 62	2001	\$135,000	\$171,758	\$24,537	\$24,537			
Rescue 63	2002	\$140,000	\$178,119	\$25,446	\$25,446	\$25,446		
Rescue 64	2001	\$135,000	\$171,758	\$24,537	\$24,537	\$24,537		
Rescue 65	2002	\$140,000	\$178,119	\$25,446	\$25,446	\$25,446		
<b>Total Payments</b>				<b>\$416,015</b>	<b>\$358,416</b>	<b>\$243,525</b>	<b>\$122,252</b>	<b>\$0</b>