Fresno County Fire Protection District

MOBILE EQUIPMENT REPLACEMENT PLAN 2020-2025

OCTOBER 2020

Fresno County Fire Protection District

Mobile Equipment Replacement Plan

Table of Contents

Table of Charts, Graphs, and Examples

I. INTRODUCTION

2001 Mobile Equipment Plan History:

In 2001, a basic informal Mobile Equipment Replacement Plan was developed by District staff to address the District's aging fleet. At that time, the average age of the District's fire engine fleet was over eighteen years old. The goal of the 2001 plan was to develop a strategy to replace all career staffed fire engines at fifteen years of service and water tenders after thirty years of service. The plan called for new engines to be purchased for the career staffed stations and the replaced engines to be rotated into reserve status. The reserve engines that were replaced would then be rotated to the stations that were staffed by paid call firefighters. The engines that were replaced at the volunteer stations would later be sold as excess equipment.

2007 Mobile Equipment Plan History:

In 2007, District staff developed a Mobile Equipment Replacement Plan that built on the improvements of the 2001 plan by continuing to address the need to maintain a modern mobile equipment fleet, it examined the need to purchase specialized equipment, and developed rotational strategies and operational priorities to improve the efficiency of the mobile equipment fleet. This plan was intended to be a ten-year roadmap for the District to follow as it worked to achieve industry standards and goals. The District pursued the objectives of the 2007 plan aggressively by utilizing lease purchasing and cash purchasing concurrently when advantageous; and as a result, was able to stabilize the average age of the career staffed fleet and reduced the ages of the reserve and volunteer staffed fleet as much as possible over the plan period. In addition, the District was able to replace or add specialized equipment and implemented a robust vehicle rotational practice that maximized the efficiency and effectiveness of the fleet. By developing a strong comprehensive plan and responding wisely to a poor economy, the District was able to make great strides toward achieving a comprehensive mobile equipment fleet that met industry and local standards.

2013 Mobile Equipment Replacement Plan:

The 2013 mobile equipment replacement plan served as an extension of the previous plans. This plan was shortened from the previous ten-year plan to a more refined five-year plan as a result of the poor state of the global economy. This updated plan sought to gain focus on the immediate needs of the fleet and how to best achieve goals most effectively in an ever-changing economy and industry. The District worked hard over many years to modernize its fleet and to develop sound business practices that squeezed the most efficiency and return from investments. However, while the District made great strides in its mobile fleet during this plan, there were still deficiencies that needed to be addressed in order to achieve reasonable industry standards, performance, and fleet vitality. Due to the geographic size of the District and the overall size of the fleet, the District maintains a fleet of reserve apparatus that are utilized daily to meet our

service needs and demands when front line apparatus are out of service or need preventative maintenance. Maintaining a reserve fleet is a common fleet practice, especially in public safety and transit fleet operations where daily service demands are constant regardless of whether, or not, a front-line apparatus is available. So, much like a chain that is only as good as its weakest link, the District's fleet is only as good as its reserve apparatus since they are relied upon so heavily to meet our daily service demands. Therefore, this plan focused on maintaining the age of the career staffed apparatus and administrative vehicles while at the same time reduced the age of the reserve apparatus and volunteer fleets while working within the same historical financial limits and practices.

2020 Mobile Equipment Replacement Plan:

The 2020 plan will continue the fleet strategies and implementation tactics of the previous successful plans. In addition, this plan will explore new options and considerations to further gain fleet efficiency and vitality as the District navigates the current and future economic uncertainties associated with the Coronavirus pandemic. Moreover, this plan will consider the effects of fire apparatus industry manufacturer consolidations as they relate to expected vehicle pricing and purchasing options. This plan will explore options to reduce future fleet size needs by improving the operational capabilities of new apparatus with the utilization of modern technology from other extreme duty industries. This plan will expand on the importance of reserve apparatus within our fleet and consider options to extend the useful life of our fleet by expanding the District's current refurbishment strategy to further reduce and stabilize lifetime vehicle costs.

Once again, this plan as with other plans, is intended to be an appendix to the Fresno County Fire Protection District Master Plan. This document should guide the Fire District Board of Directors

and department staff while instituting the goals and objectives of the Master Plan. This plan was developed with information obtained from the CAL FIRE Mobile Equipment Management Handbook, sections 6710 thru 6719, the National Fire Protection Association (NFPA) Handbook, sections 1901-1906, the Insurance Services Office (ISO), and various industry periodicals.

II. FIRE APPARATUS STANDARDS

The National Fire Protection Association (NFPA) is charged with developing standards for use by fire departments. NFPA 1901 is the Standard for Automotive Fire Apparatus. The latest edition was written in 2016 and broadly focuses on the safety and operational performance of apparatus. This standard is scheduled to be updated this year, 2020, and will be predominately relevant during the life of this plan. While NFPA standards are generally not law, they can affect a department's liability.

In 2013, the Environmental Protection Agency (EPA) introduced broad new emission standards for over the road diesel powered trucks including fire apparatus. In 2017, these standards were further refined to improve diesel engine emissions. It is anticipated that, next year (2021), a more stringent emission standard will most likely be developed and take effect.

The Insurance Services Office (ISO), as it pertains to fire apparatus, specifically focuses on the fire suppression capabilities of an apparatus as well as the equipment it carries. Although ISO ratings do not directly affect the design and operation of specific vehicles, they do affect fire insurance premiums for property owners in each department's response area based on the capabilities of that fire department which includes its apparatus fleet. The District has realized great improvement in its ISO review rating for fleet capabilities by implementing the strategies and recommendations from the previous Mobile Equipment Replacement Plans. The District recently completed its ISO review and successfully earned nearly all of the fleet points possible, for the first time ever. This contributed greatly to the District's overall performance improvement in becoming a 3/3Y ISO department.

While these agencies have differing focuses, which result in specific recommendations for apparatus design and configuration, collectively they provide the basis for the fire apparatus industry standards as a whole. Therefore, it is important that the Fire District research the standards of these agencies when purchasing new equipment. This will ensure that the District purchases vehicles that have the greatest suppression capabilities, the most operational effectiveness, and the highest safety standards possible in order to provide the best service to the district stakeholders. However, it is important to consider that when a single regulatory agency, or multiple agencies, update their standards simultaneously, it has historically resulted in sharp cost increases per apparatus to implement the respective changes. This inflationary cost needs to be considered and measured when multiple apparatus are scheduled for replacement over the long term to ensure that the financial burden can be absorbed within budgetary constraints. This plan was developed taking these factors into consideration.

III. FLEET SERVICES: SUPPORT vs OPERATIONAL FUNCTION

Most fire departments consider fleet services to be an essential support function within their organizations. Historically, the District also structured its organizational structure with fleet services aligned with other support functions. Within the last few years, the District has begun to analyze and challenge this traditional philosophy and approach. In a continuous effort to improve service delivery over a vast response area with limited resources, the District began to consider the viability of elevating fleet services into an operational function. This paradigm shift was based on the premise that fleet services interact almost exclusively with operations and that measurable improvements within fleet practices could translate into real quantifiable operational improvements. Typically, when fire departments seek to improve services, they add another station and/or field personnel which usually result(s) in improved service in a specific area or region. However, in larger fire departments the global performance improvement is significantly diluted by the vast coverage area demands. Moreover, when you factor cost vs global return, the investment is eroded further as the costs are significant, but the global improvement is usually difficult to quantify beyond the specific target area or adjacent response area(s). In the District's

case, most of its stations are still located in relevant strategic locations. Therefore, service improvement opportunities are more difficult to achieve with traditional enhancement strategies as the solution is more obscure since the District has to consider global improvements to gain desired results as compared to smaller regional strategies. As such, District staff analyzed all departmental functions to identify potential adjustments that could have positive global return. It was determined that fleet services intersected with every operational function within the department and that it was possible and probable that strategic changes within fleet could have a far reaching, positive impact on the overall operational performance of the department.

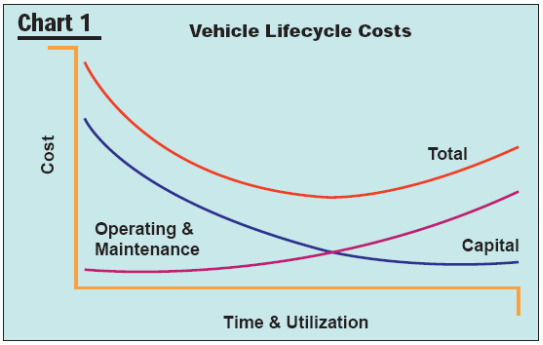
Staff determined that strategic adjustment in fleet service practices could translate into an equal improvement in response performance and could be achieved for a fraction of the cost of adding another station or fire engine into the network. The first operational strategy to be deployed was mobile service and repair to reduce coverage gaps caused from apparatus traveling to the fleet shop for these needs. For the second strategy, a parts/warehouse position was added to improve mechanic work performance by reducing part sourcing and delivery times which equated to improved fleet in-service times. Thus, further reducing incident response times and coverage gaps. Third, as performance improvements materialized, staff implemented a reserve apparatus delivery strategy to further compound gained returns. This approach calls for fleet staff to deliver reserve apparatus to the fire stations or incidents, when possible, to further reduce service gaps. Fourth, an office manager position was added to the fleet shop to ensure service/repair scheduling was efficiently coordinated when apparatus are assigned to training classes at our neighboring Training Center to further reduce service gaps by reducing unnecessary trips to the fleet shop/training center. This position also reduced the administrative duties of fleet staff, allowing the District to gain more performance output while reducing front-line apparatus out of service intervals. Finally, the District invested in a robust fleet management software program to streamline all fleet services into one manageable platform that allows for real time data analysis thus improving fleet services further.

The overall cultural change of shifting fleet services from a reactive support function to a proactive and streamlined operational arm has been both challenging and rewarding. The District is extremely fortunate to have very talented and determined personnel assigned to fleet services. Their willingness to embrace change and their unwavering commitment to strive for optimal fleet performance has returned results beyond what was considered possible. In fact, in its recent ISO review, the District narrowly reached its long-term goal of becoming a Class 3 ISO Department. District staff is confident that we would not have been able to reach this rating level without the sacrifice and strong contributions from fleet service staff. With a few additional adjustments and strategic positions, District fleet services has the potential to help stretch our global performance even further and serve as a strong enterprising service option for cooperating agencies. This will improve the District's overall return on investment while improving its global performance.

IV. VEHICLE REPLACEMENT CRITERIA

The economic theory of vehicle replacement is a concept that remains a standard for vehicle replacement within fleet management. The theory maintains that as a vehicle ages, the value of the capital asset diminishes and its operating cost increases. The combination of these two factors produces a total cost curve and suggests the optimal time to replace any vehicle is when the operating cost begins to exceed the capital cost. This optimal time is usually not a specific

fixed point, but a range of time. Chart 1 illustrates a flat spot at the bottom of the total cost curve that represents the most feasible replacement opportunity period.



In order to translate the theory of vehicle replacement into an average life expectancy for fire apparatus, an age-based replacement criterion is typically established.

However, while it is a generally accepted belief that all mechanical equipment has a finite life span, there are many factors within the fire service that must be considered to develop such a timeline for each vehicle use category within a department. Within the District, some of those factors are mileage, pump hours, quality and craftsmanship of the original builder, aggressiveness of the preventative maintenance program, driver or user training, extreme duty assignments, fleet rotational practices, availability of parts, and outdated safety standards. Also, rotational fleet practices and refurbishment strategies can and do work well to extend the useful life of vehicles beyond age-based criteria and should be factored when applicable to gain optimal fleet replacement results.

Fresno County Fire Protection District

Mobile Equipment Replacement Plan

The following general age-based criteria was established by the District in previous plans to provide an average age of replacement for fleet planning and budgeting purposes:

1. Career Staffed Fire Engines a. Purchase new	15 years of front-line service
2. Relief Engines a. Rotate from career staff	20 years of total service
3. PCF Staffed Fire Engines a. Rotate from relief status b. Purchase new to meet operational needs	20 years of total service without refurbishment, 25 years with refurbishment
4. Water Tenders a. Purchase new cab/chassis b. Refurbish pump/build-up	25 years total service or refurbishment
5. Support Vehicles a. Stakeside b. Trailers c. Tractors	Low use, replace as needed
6. Specialty Vehicles a. Brush Engines b. Rescue c. Breathing Support d. Hooklift	Low use, replace as needed
7. Command Vehicles a. Battalion Chief b. Division Chief	7 – 8 years service or 130,000 miles
8. Staff Vehicles	9 – 10 years service or 150,000 miles
9. Utility Vehicles a. Rotated from Command or Staff Vehicle Pool	12 years service or 180,000 miles

V. PLAN OBJECTIVES

This five-year plan focuses on replacing fire engines, purchasing specialized equipment, and command vehicles based on the District's current and future needs. This plan also continues a rotational practice that maximizes the efficiency of the District's fleet while maintaining operational effectiveness. The following items were taken into consideration during the development of this plan and represent a shift from the need to reduce fleet age in previous plans, to a strategy of maintaining the fleet improvement gains that have been realized:

a) The need to maintain the average age of the front-line fleet over the life of the plan.
b) The need to maintain the average age of the reserve and volunteer fleets within industry standards.
c) The need to stabilize fleet costs within a consolidating manufacturing field which translates to increased costs and fewer purchasing options.
d) Consider the implementation of technology from other vocations to improve operational gain while reducing fleet size and costs over vehicle lifetime.
e) The need to continue the refresh/refurbishment practice on light use apparatus and consider expanding this strategy to higher use apparatus sooner to gain fleet longevity and cost stabilization.
f) The need to purchase specialized equipment to meet the operational needs.
g) The need to purchase equipment that meets NFPA, EPA, and ISO standards.
h) The need to purchase equipment to meet the objectives of the strategic planning.
i) The need to deploy updated technology within the mobile fleet.
j) The need to continue the efficient and effective vehicle rotation strategy.
k) The Fire District's budgetary limitations.
l) The District's historical vehicle replacement success and limitations.
m) The overall state of the economy.

VI. REFURBISHMENT/REFRESH PRACTICE

Generally, most fire apparatus are typically worn out by the time that they reach the average age replacement criteria and are not worthy of the investment to continue as a serviceable vehicle. However, there are exceptions to this rule that should be explored and considered when applicable. If the District continues to take the time and dedicate its efforts to build innovative apparatus when purchasing new and employs manufacturers with the best technology, materials, and highest craftsmanship standards of the time, coupled with low use apparatus demands, it is not only possible but probable that a refresh/refurbishment practice can be deployed successfully and maintained. In 2010, the District recognized the need to begin upgrading its fleet of seven heavy water tenders. It was quickly determined that the custom quality and craftsmanship of the water tender bodies was outstanding and that the only component that needed to be replaced on

each were the commercial cab/chassis. For this reason, the District purchased a new cab/chassis and refurbished one of its water tender's bodies to meet new NFPA standards. This apparatus refresh was achieved at a 60% savings as compared to a new water tender purchase. The District has completed three water tender refresh projects since 2010 with grant dollars and is currently finalizing a fourth project during the summer/fall of 2020. It is expected that the District will continue this practice and should be able to upgrade all seven water tenders for the same price that it could have only purchased three new apparatus.

The success of the refurbishment practice for water tender apparatus caused staff to consider this strategy as a viable solution to combat high cost versus low use operational needs. The District needed to purchase its own wildland-urban interface apparatus to compliment the CAL FIRE apparatus fleet during local and statewide fire sieges compounded by severe drought and tree mortality within the County. Since CAL FIRE deploys a new wildland fleet as the county's primary fleet within the foothill communities, in and adjacent to the District, it seemed reasonable that the District would be best served by purchasing used apparatus to meet this low frequency, short duration operational coverage gap. By purchasing used apparatus and containing costs, the District could then afford to completely refurbish these vehicles and have a viable and affordable secondary fleet to CAL FIRE's primary fleet. This converts a high cost, low use scenario into a much lower cost, greater return scenario that meets operational demands without being a financial burden that disrupts the primary fleet needs of the District. In 2016, the District purchased five used wildland engines and have completely refurbished and deployed three of the apparatus to date. Moreover, the District has used this strategy to update one of its Paid Call Firefighter (PCF) staffed engines and repurposed a surplus Air/Light vehicle into a Tactical Water Tender under the same premise. This strategy and process has been very successful and it is anticipated that it will continue to be cultivated and refined as need and opportunity align.

VII. ROTATIONAL FLEET PRACTICE

The premise of this plan continues the practice of replacing vehicles that are assigned to heavy use positions and rotating vehicles to those positions that demand less use. By continuing to make rotational purchases when possible, the District will be able to ensure that its most critical heavy use vehicles are always in the best operational condition. The rotational purchasing will allow the District to realize a reduction in maintenance costs since the vehicles under warranty will also be the vehicles that are being used the most. The anticipated reduction in maintenance costs would offset some of the capital requirements to implement this plan. Moreover, the District has realized that this rotational practice reduces the need to rely on relief equipment since the vehicle(s) getting the most use are newer and the vehicles getting the least amount of use are the older vehicle(s) in the fleet. There will be times when operational needs and/or grant purchases will outweigh the economic efficiency gained from rotational purchasing and the

District should deviate from this practice to address the anomalies and/or opportunities. However, the rotational priorities should be re-implemented for the following purchase(s) as often as possible if operational needs allow in order to capitalize on the overall fleet efficiency gained from the rotational application.

VIII. ECONOMIC REALITY OF FIRE APPARATUS INDUSTRY

The annual inflationary cost of fire apparatus has far outpaced the revenue streams of government agencies since the economic expansion began following the Great Recession of 2008. Therefore, it has become increasingly difficult to maintain the purchasing power, over the last decade as it pertains to the number of apparatus that can be purchased for the same relative unit price based on revenue improvement over that same period. One contributing factor to this climate is the nearly constant pace of manufacturer consolidations that lead to reduced supply options for the consumer. As the smaller, more agile, and responsive, family manufacturers have been purchased by the larger intermediate sized corporate manufacturers, the vehicle costs to the consumer have continued to rise. The corporate manufacturers need to recover their investment(s) on the purchase as quickly as possible to satisfy their shareholders and return to suitable profit margins. However, corporate consolidations and factory contractions have occurred so rapidly based on the desire to gain economies of scale and further improve margins, that it has negatively disrupted production timelines thus compounding costs. These production costs ultimately get passed on again to the consumer as the cycle repeats itself, when an even larger corporation purchases the entire fire apparatus group from the intermediate entity.

In most manufacturing sectors, the premise that a larger corporation can produce goods more efficiently and economically than a smaller company is widely accepted as a standard industrial production reality. However, with the highly customized and demanding consumer needs of the fire apparatus industry, the production strategy that economies of scale theory is based on has significant limitations that do not translate well in an industry where each widget is essentially a custom, one-off design. Moreover, the centralized decision-making culture, that most large corporations create and subscribe to, is not agile enough to meet the custom production demands of the consumer. These additional layers of design and/or engineering approval further stymie the production process and erode profitability for the manufacturer which ultimately gets passed on to the consumer once again.

As the industry continues to consolidate and the number of de-centralized, effective, efficient, and agile manufacturing options dwindle, fire departments will continue to struggle to maintain pace with their vehicle replacement needs as costs continue to increase exponentially. Fleet managers will need to develop creative solutions, or the industry will need to be disrupted economically to return equilibrium to the revenue vs. cost escalation equation. As of this writing, the economic fallout from the Coronavirus pandemic could prove to be the industry disruption

that might drive down inflationary costs, at least in the near term, if the demand for vehicles decreases significantly as governments are forced to slash capital purchasing to balance budgets due to lost commerce and tax revenue. This will force manufactures and suppliers to reduce pricing to maintain operations and relevancy with the hopes of surviving another deep recession. This supply and demand disruption occurred during the Great Recession and the fire departments that were positioned well financially were able to gain momentum in their fleet replacement plans. The District was one of these agencies and was able to capitalize during the poor economic conditions and was able to exponentially decrease the average age of its fleet within a five-year period. However, if history is any indication, the manufacturers that manage to survive will almost certainly implement the same exuberant inflationary pricing as quickly as the overall economy shows signs of sustained recovery. Therefore, it is imperative that fire departments find realistic and tangible solutions to squeeze maximum return from their fleet dollars to insulate themselves from economic factors that they cannot control. These solutions need to stabilize the upward and downward swings of an ever-changing industry while maintaining gains that have been realized during good and/or bad economic times.

IX. FLEET COST STABILIZATION STRATEGIES

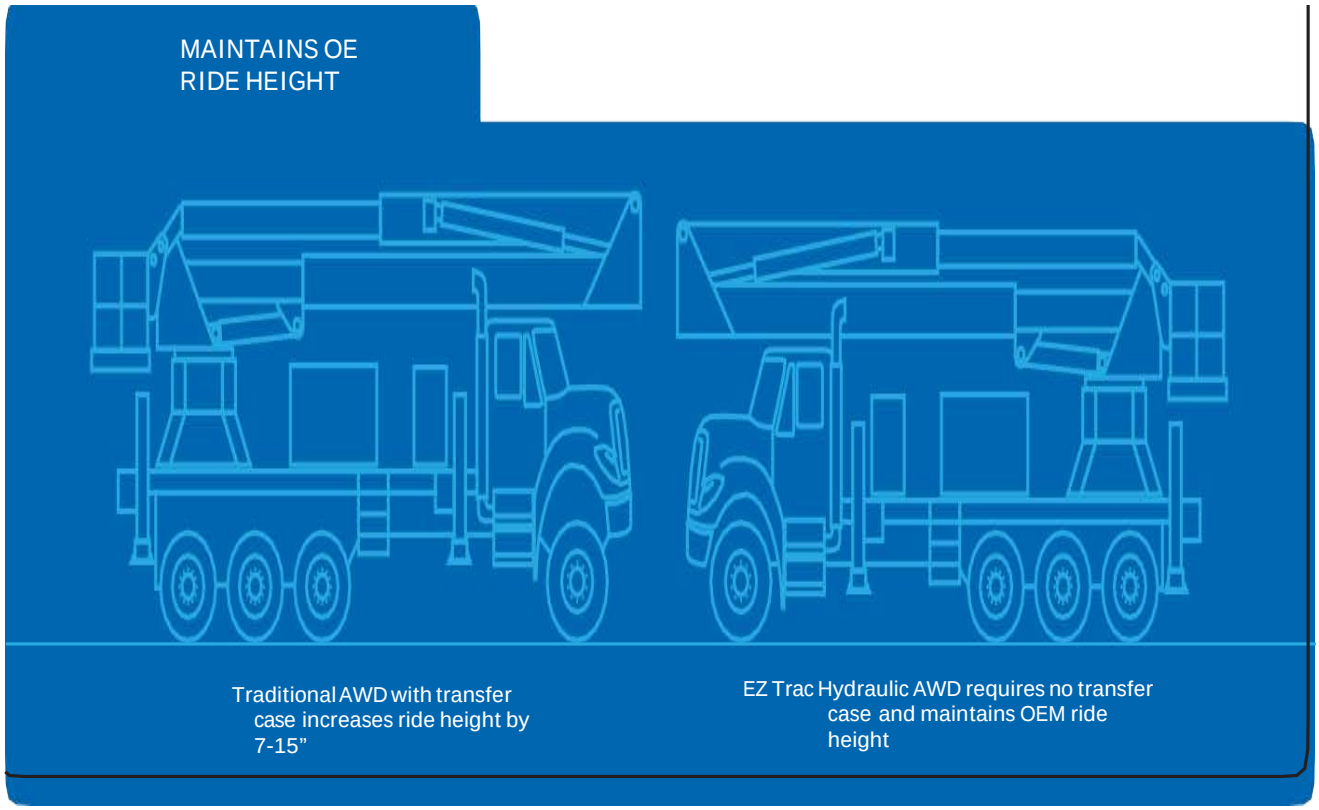
Fleet Size Reduction

Last year the District developed a plan to repurpose a surplus water-tender chassis to serve as the platform to mount a hook-lift hydraulic unit on to serve as a multi-purpose support vehicle. This strategy allowed the District to have only one medium duty support vehicle with interchangeable bodies as compared to several vehicles for each specific need. The District now has several hook-lift bodies that do not require ongoing maintenance and has been able to reduce its overall fleet size by eliminating the vehicles that it previously used for support functions. This single vehicle with multiple application approach has been effective, efficient, and fiscally prudent. The District should consider this strategy for each and every vehicle category within its fleet, when possible, to further reduce fleet size without compromising operational capabilities.

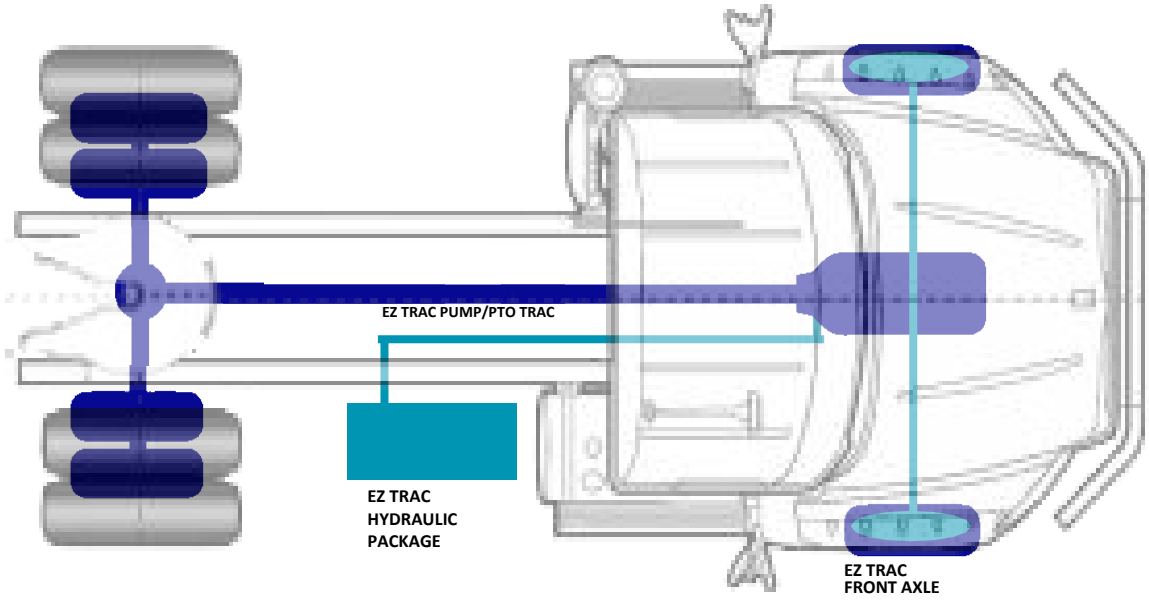
Extreme-Duty Technology

Fire departments continue to design and request vehicles that get larger and larger without much consideration for the negative effects that the increased size has on off-road operational capabilities. These same departments then recognize a need to purchase additional vehicles to meet those specific off-road needs. Therefore, these departments end up with multiple vehicles for specific tasks instead of fewer vehicles that can perform well in multiple environments. The District cannot afford to make this mistake with its fleet.

The District's current fire engine design specification was developed over many years under the belief that the apparatus needed to be able to function well on and off road in order to meet the diverse operational demands of a large fire department while containing costs. This design strategy has served the District well and has contributed to the overall fleet improvements that it enjoys today. However, as technology improves across all extreme duty manufacturing sectors, opportunity presents to further expand our fleet improvements in this area. For instance, if the District continues to convert fire equipment that is carried on its apparatus from large and heavy gas-powered hydraulics to smaller rechargeable battery powered equipment, it can continue to reduce the overall size of each apparatus as needed compartment space is also reduced thus improving overall performance. Moreover, as LED lighting technology continues to improve in performance and cost, the apparatus space needs will further be reduced as the power source is converted from a gas powered 110-volt generator to 12-volt power supplied by the apparatus' onboard alternator. Generally, as technology improves the size and space needed to perform the same function is reduced as well. Therefore, as the District designs its next generation of fire apparatus it should strive to improve functionality in multiple environments further by reducing the overall relative size of the vehicle simultaneously.



If the District can continue to reduce the overall size of its new apparatus designs, it will be able to further enhance fleet operational effectiveness by adding four-wheel drive technology to ensure supreme functionality in all on and off-road settings regardless of weather or terrain. In time, this enhancement would further allow the District to reduce its fleet size as every fire engine could perform in any assignment under any circumstance thus eliminating the need or pressure to have specialized apparatus for specific terrain or condition concerns. District fleet staff have researched/identified all-wheel drive technology options that could meet our future needs and have found proven technology from the agricultural industry that will meet our performance goals without raising the overall height of the vehicle. This technology was developed by EZ Trac, an Indiana corporation, to meet the extreme duty needs of specialized agricultural and forestry applications. This system has been installed successfully on fire apparatus for extreme weather applications. While this technology is expensive, at roughly $40K per installed vehicle, the opportunity to reduce fleet size long term and reach ultimate fleet assignment flexibility will realize savings over the vehicle lifetime to make this a worthy investment. This technology, if applied correctly to our multi-function extreme duty apparatus design has the potential to revolutionize the size and effectiveness of our fleet for years to come.



Expansion of Refurbishment Strategy

As stated previously, most fire apparatus are typically worn out by the time that they reach the average age replacement criteria and are not worthy of the investment to continue as a serviceable vehicle. The District has already identified anomalies where the merit of this statement can be challenged by refurbishment intervention in lower use vehicles to extend useful vehicle life by swapping chassis (Water Tender Refresh Strategy) or in very low frequency use (Brush Engine Refurbishment Strategy) that have proven to be extremely successful. So, if the manufacturing costs are outpacing the District's available revenue, perhaps a solution is to consider expanding the refurbishment strategy into our front-line fleet. Again, without intervention, fire apparatus are typically worn out by the time their replacement age is reached. Perhaps in such cases, intervention or refurbishment should occur before useful life of a vehicle is reached. The investment could then extend the life of the vehicle. And, most importantly, the investment could help lower overall fleet costs if the refurbishment was performed at the right time. To consider these possibilities, the District has analyzed the fleet cost of a new fire engine purchased today against refurbishing 2005/2009 purchased fire engines to gauge return on the investment.

Brush Engine 77 Before Refurbishments

Brush Engine 77 After Refurbishments

Currently, the District can safely assume that its new fire engine specification will cost the roughly $550K in today's dollars. Based on the District's current replacement criteria, this vehicle will be assigned to front-line service for 15 years and reserve status for 5 years.

Therefore, the vehicle's total life expectancy will be 20 years or 240 months. The vehicle cost for this example will be $550K/240 or $27,500 per year or $2,292 per month just to buy and own it without maintenance or operating costs.

If the District runs the same analysis for a 2009 model year, for which we paid $365K at purchase, the annual cost is $18,250 per year or $1,521 per month. If a refurbishment strategy was implemented between years 12 to 15 of the vehicle life, and the costs for refurbishment added $40K to the lifetime vehicle costs but added 5 more years or 60 months of extend vehicle life, the cost vs return analysis then becomes $16,200 per year or $1,350 per month. This represents a savings of roughly 12.5% as compared to not pursuing refurbishment for this generation of vehicle.

The same analysis on a 2005 model year, currently assigned to reserve status, that had a $285K purchase price, reveals that the annual cost is $14,250 per year or $1,188 per month. If a refurbishment strategy was implemented on year 15 of the vehicle life, and the costs for refurbishment again added $40K to the lifetime vehicle costs but also added 5 more years or 60 months of extend vehicle life, the cost vs return analysis then would become $13,000 per year or $1,083 per month. This represents an 8.7% savings as compared to no intervention.

Based on this analysis, if a refurbishment strategy is deployed on the right genre of apparatus at the right time during the vehicle lifespan, useful vehicle life could be extended while overall long-term fleet costs are reduced. However, from a practical application sense, beyond the estimated financial savings, considering reflex time to implement and overall operational gain, the most likely generation of fire engine to target would be the 2009 or newer apparatus as a long-range strategy. As a short-range strategy, to jump start the cycle, it would be prudent to refresh one or two of the 2005 era fire engines now, to a lesser degree, in anticipation of using them more as the front-line 2009 or newer model year move into the refurbishment process.

This calculation works equally as well on a new apparatus purchased today and could prove more beneficial if the refurbishment process could be initiated sooner in the vehicle life cycle. As the process is refined, newer apparatus could be refurbished at the 8-10 year or mid lifetime mark. It stands to reason, based on relative cost inflation for refurbishment, that the sooner the process is initiated the more cost effective the refurbishment process could be, and the greater overall fleet vitality return would be.

This concept can work well for heavier fire apparatus chassis that are designed to perform for many more miles and years than they are typically used for within the fire service. Refurbishment of drivetrain, pump, paint, interior, and the application of current NFPA updates is not only possible but probable to serve the District's financial and fleet needs well. This strategy would not work well on lighter vehicles, such as command vehicles, as they are not

constructed on platforms that can withstand the use and demand that emergency response dictates over the added years, regardless of intervention or refurbishment. Additionally, the lower relative costs of these lighter vehicles make purchasing new more advantageous as compared to the time and costs associated with refurbishment. Moreover, this strategy is also less attractive and likely much less feasible for Ladder Trucks as the refurbishment costs to upgrade the aerial device that has stringent tolerances and construction/maintenance requirements will certainly erode the benefits of this approach. In addition, the current and expected unit numbers for this category of apparatus will remain low as compared to the number of fire engines within our fleet thus diluting overall return further than the effort is worth.

While this strategy would serve to lengthen useful vehicle lifespan and curb fleet purchasing costs by extending the interval between new fire engine purchases, it would not eliminate the need to purchase new apparatus all together. In fact, if the District pursues some of the recommendations within this plan to increase the technology and capabilities of its new fire engine designs, it will initially increase the purchase price of each unit. But, as the capabilities improve, fleet redundancy (size of fleet for specific needs) will decrease, combined with a more robust and targeted refurbishment strategy, the District should be able to stabilize its current and future fleet costs within a limit that it can afford regardless of the industry volatility at any given time.

Water Tender 90 After Refurbishments

Diesel vs Gas Powered Command Vehicles

Many of the District's cooperating fire agencies have begun purchasing diesel powered command vehicles to replace the gas-powered vehicles in their fleets. The rationale for this shift is their desire for increased fuel economy and extended vehicle life (total miles over lifetime). On the surface, this rationale has merit. Diesel engines are more efficient (MPG) and are capable of more lifetime mileage. However, there are many factors that are not considered that, at best, neutralize these advantages and depending on specific circumstances, at worst, invert the desired outcome into a cost prohibitive endeavor. The District is currently paying $.38 more, on average, per gallon for Diesel as compared to gasoline. The District has one diesel powered command vehicle that averages 4 miles per gallon better fuel economy then the same make/model/year gas-powered command vehicle. The diesel-powered command vehicle is assigned to our highest annual mileage battalion and averages 20,000 miles more per year than the District's gas-powered command vehicle. In this assignment, the diesel-powered vehicle saves the District $822.06 per year on fuel costs due to more favorable MPG capabilities. However, on average for the District's make/model command vehicle specification, it costs roughly $10K or 20% more to purchase a diesel-powered vehicle. Therefore, at the current average gas vs diesel cost differential per gallon and consistent 20K additional mileage rate per year, it will take just over 12 years for the fuel cost savings to return the original investment for the diesel-powered drivetrain. Moreover, with these rates and factors, this vehicle would have at least 360K miles at the end of its lifespan which is double the District's current expected mileage rate for a command vehicle that rotates to a staff assignment and then to a utility assignment over the same 12-year period. While this total mileage is feasible for a diesel-powered drivetrain, it is unlikely that the rest of the vehicle will remain serviceable to the standard that we would expect even for a utility vehicle, much less a front-line command vehicle. Admittingly, this analysis is a basic overview

that does not account for maintenance cost variables or environmental concerns that could improve or diminish the advantageous benefits for either vehicle platform. This analysis is; however, intended to demonstrate that improved mileage per gallon benefits must be applied to exponentially more total miles over vehicle lifetime to outperform initial capital outlay costs. In this case, regional industry trends may be driven more by inter-departmental desire than sound operational and economic analysis. Therefore, the District should continue its current practice of analyzing and scrutinizing each command vehicle purchase to ensure that the desired efficiency translates into quantifiable outcomes that benefit the department and taxpayer alike.

X. FINANCING OPTIONS

Cash Purchase vs. Lease Purchase

Many fire departments pay for vehicles with cash because they believe it to be the lowest cost approach to financing fleet purchases. There are no interest charges involved in using this financing method and the department owns the vehicle out-right at the time it is acquired and placed in service in contrast to lease purchase financing. In order to purchase with cash, an organization must have the capital to pay for the vehicle(s) before they can use them. This becomes difficult when a department has the need to replace several vehicles at the same time or within a relatively short period of time. While cash purchasing is an economically and fiscally prudent way to acquire vehicles in most cases, there are times when debt financing is a more cost-effective option.
A municipal tax-exempt lease purchase is a financing agreement with a state or local government entity in which the lessor finances the lessee's intent to purchase equipment or real estate. Rather than accumulating reserves in advance to pay for the purchase of equipment, this approach involves borrowing money from the capital markets and repaying it at a low interest rate after vehicles have been placed in service. This option is very similar to an ordinary vehicle loan with annual payments rather than monthly payments. This product defers replacement costs over the useful life of a vehicle rather than before a vehicle is placed in service as is the case with cash purchases.

1. As the differential between anticipated annual equipment price inflation and current low tax-exempt interest rates increases, the advantage of purchasing now and financing at today's equipment prices also increases, as opposed to waiting to accumulate reserves to be used for the purchases.
2. When known, or planned regulatory changes are anticipated to increase the cost of vehicles or equipment during the life of a replacement plan even further beyond the normal industry inflation rate, the purchase now with financing option becomes even more favorable than the cash carry approach.

3. The closer interest rates and the rate of inflation are to each other, the advantage of buying now with financing is diminished, and it may in fact disappear with the right fiscal conditions. This of course, assumes budget cash flows are available to generate the needed cash purchase funds in a relatively short time frame.

In general, when an equipment purchase or replacement program of perhaps 5-10 years is considered, and the anticipated inflation rate exceeds comparable term borrowing rates, buying now and financing is considerably less expensive than delaying the purchase of equipment over that long period of time. Moreover, as the time period for delayed purchases is extended, the greater the "buy now" and finance option becomes.

The "buy now" decision is also impacted by costs of maintaining old undependable equipment as opposed to new equipment. While these points fail to examine the potential maintenance expense differential, it is fair to assume that the older a vehicle, the higher the annual maintenance costs will be thus amplifying the advantage of the "buy now" and finance option.

XI. FLEET REPLACEMENT FINANCING SUMMARY

Both fleet finance options have advantages and disadvantages from a fiscal, economic, administrative, and political point of view. The importance of such factors varies from department to department depending on the purchasing circumstances and fiscal climate faced at any one time. In many cases, the most effective mobile equipment plan is the one that has the flexibility to capitalize on both types of financing options depending on the operational needs and fiscal environment. Therefore, it is imperative that the District maintain its practice of thoroughly analyzing its financing options as compared to its fleet needs over the life of its mobile equipment plans.

The District should also consider implementing fiscal policies that earmark revenue from enterprising opportunities such as its Assistance by Hire (ABH) program, specifically for cash purchase fleet needs. This revenue could serve as a stabilizing factor for cash purchases if treated as a sinking fund. This revenue could be set aside each fiscal year, as it is generated, to help pay for future capital fleet purchases. Thus, reducing or eliminating budgetary strain when cash purchasing is most cost effective. The District has financial strategies that are worth considering for further gains in fleet financing efficiency. By remaining flexible and financing when the fiscal conditions and needs are advantageous as well as making cash purchases when the needs and fiscal conditions are not conducive to financing, the District should continue to have success in managing its fleet needs into the distant future just as it has in the recent past.

The following charts depict a current summary of the District fleet and a projected rotational replacement plan based on the established age-based criterion:

Chart 2:

Water Tenders and Specialty Vehicles

Water Tenders (7)

Vehicle (Asset #)	Year	Make	Replacement/Refurbishment Date
WT93 (319)	1995	International	2020
WT96 (328)	1993	International	2021
WT83 (318)	1993	International	2022
WT82 (314)	2001	International	2026
WT86 (320)	2010	Kenworth	2035
WT72 (321)	2011	Kenworth	2036
WT90 (322)	2019	International	2044

Specialty Equipment (11)

Vehicle (Asset #)	Year	Make	Replacement/Refurbishment Date
T43 (545)	2002	Peterbilt	2022
P71 (529)	1995	Ford	TBD
Rescue 87 (517)	2006	Spartan/SVI	2026
BS82 (520)	2009	Ford/SVI	2021
WT77 (519)	1999	International	2030
Hooklift (317)	1993	International	2027
Brush 77 (550)	1996	HME/M18	Refurbished 2019
Brush 75 (553)	1996	HME/M18	Refurbished 2020
Brush 94 (237)	2002	International	Refurbished 2020
Brush 73 (542)	1995	Mack	Replace with Model 18/14
Brush 74 (543)	1995	Mack	Replace with Model 14

Chart 3:
Command, Staff, and Utility Vehicles

Vehicle (Asset #)	Year	Make	Mileage
U17 (085)	2007	Chevy	208,984
P4323 (285)	2009	Chevy	234,666
U1 (535)	2008	Ford	146,415
A09 (005)	2005	Chevy	182,920
P22D (006)	2005	Chevy	181,946
S4311 (096)	2011	Ford	148,806
Honda (070)	2002	Honda	200,245
U18 (080)	2007	Chevy	157,470
U30 (064)	2005	Ford	161,844
R287 (061)	2008	Chevy	156,025
T4328 (088)	2007	Chevy	159,149
A06 (062)	2006	Ford	125,514
D4301 (004)	2012	Chevy	114,193
T4327 (001)	2013	Chevy	119,878
B4318 (002)	2015	Chevy	77,00
A4305 (008)	2017	Chevy	29,965
C4300 (009)	2018	Chevy	27,134
P22C (060)	2019	Chevy	12,232
P22A (065)	2017	Chevy	55,320
P22B (066)	2018	Chevy	35,021
B4317 (081)	2018	Chevy	12,262
B4315 (083)	2019	Chevy	11,082
B4316 (089)	2017	Chevy	60,115
DT43 (514)	2018	Dodge	9,138
R4331 (515)	2018	Dodge	8,879
Facilities (516)	2018	Dodge	11,138
R4333 (528)	2017	Dodge	28,032
R4332 (530)	2016	Dodge	50,902

Suggested Replacement Criteria

Command Vehicles	Every 7 – 8 years or 130,000 miles
Staff Vehicles	Every 9 – 10 years or 150,000 miles
Utility Vehicles	Every 12 years or 180,000 miles, should be rotated from Battalion Chief and/or Staff vehicles

Chart 4:

Vehicle Replacement and Rotation Plan (Command, Staff, and Utility Vehicles)

Fiscal Year	Purchase/Replace	Estimated Cost	Activity/Action	Sell
2019/20	N/A	$0	Old B4316 becomes T4328 Old T4328 becomes T4326	N/A
2020/21	B4318	$60K	Old B4318 becomes T4327 Old T4327 becomes Pool Vehicle	N/A
2020/21	P22D	$30K	Expansion Purchase	N/A
2020/21	B4317	$63K	Old B4317 becomes T4326 Old T4326 becomes U17	Old U17
2020/21	D4301	$50K	Old D4301 becomes Pool Vehicle	Honda Sedan
2020/21	B4316	$63K	Expansion Purchase	N/A
2021/22	BS82	Grant Fund	Old BS82 becomes U11	Old U11
2021/22	S4311A	$35K	Old S4311 becomes S4311B	N/A
2021/22	A09	$31K	Surplus Old A09	Old A09
2022/23	P22A	$32K	Old P22A becomes P22E	Old P22D
2022/23	B4318	$66K	Old B4318 becomes T4327 Old T4327 becomes P4327	Old P4323
2023/24	DT43	$85K	Old DT43 becomes R287	Old R287
2023/24	P22B	$33K	Old P22B becomes P22D	Old P22D
2024/25	A06	$30K	Surplus A06	Old A06
2024/25	U30	$30K	Surplus Old U30	Old U30

***Estimated vehicle cost represents 3% annual price inflation, rounded to nearest thousand.**

Chart 5:

Vehicle Purchase and Replacement Plan (Fire Engines, Water Tenders, and Specialty Vehicles)

Fiscal Year	Purchase/ Replace	Estimated Cost	Activity/Action	Sell
2019/20	BR94	$25K	Newer BR94, Old BR94 assigned to Training Division	N/A
2020/21	E73	$0	E73 become E74	N/A
2020/21	E90	$650K	New E90, Old E90 becomes Reserve E294	Old E294
2020/21	WT93	$20K	Grant Funded, New Chassis/Refurbishment	Old WT93
2021/22	T43	$180K	New Transport 43 Truck Chassis Old T43 becomes Fleet Service/Reserve Transport	N/A
2021/22	E89	$670K	New E89, Old E89 becomes E93 Old E93 becomes E295	Old E295
2021/22	WT96	$20K	Grant Funded, New Chassis/Refurbishment	Old WT96
2022/23	E95	$690K	New E95, Old E95 becomes E72 Old E72 becomes E296 (#208)	Old E296
2022/23	WT83	$250K	New Chassis Purchase	Old WT83
2023/24	E 82/E 96/ E 94/E 74	$500K / Year Payment	Lease Purchase 4 Engines Old E82 becomes E288, Old E288 Surplus Old E96 becomes E87, Old E87 Surplus Old E94 becomes E296, Old E296 Surplus Old E74 becomes E71, Old E71 Surplus	Old E288 Old E87 Old E296 Old E71
2020/21 /22/23/ 24	N/A	$25K / Each $75K Total Payment	District Purchases up to three used CAL FIRE Type 3 Model 14's. As this occurs it is expected that one will become BR73, BR74, and one Reserve Brush Engine.	Old BR73 Old BR74

***Estimated vehicle cost represents 3% annual price inflation, rounded to nearest thousand.**

Chart 6:

Combined Total Estimated Cost Per Fiscal Year, All Fleet

Fiscal Year	Estimated Cost
2019/20	$384K
2020/21	$1.3M
2021/22	$1.15M
2022/23	$1.422M
2023/24	$643K
2024/25	$585K

Average cost per year: $914K

***Total estimated annual costs include expected cash purchases combined with current or expected fleet financing payments.**

Chart 7:

Average Age of Fire Engine Fleet (Year 2020 thru 2025)

			Fiscal Year				
Engine	Make	Model Year	2020/21	2021/22	2022/23	2023/24	2024/25
E 75	Ftliner	2002	18	19	20	21	22
E 82	Spartan	2013	7	8	9	R	1
E 73	HME SFO	2006	14	15	16	R	1
E 72	Spartan	2009	11	12	13	14	15
E 84	Spartan	2019	1	2	3	4	5
E 86	Spartan	2009	11	12	13	14	15
E 87	HME P2	2005	15	16	17	14	15
E 71	Ftliner	1999	21	22	23	17	18
E 89	Spartan	2013	7	R	1	2	3
E 77*	Spartan	2000	20	21	22	23	24
L 287	Spartan	2006	14	15	16	17	18
E 83	Spartan	2013	7	8	9	10	R
E 294	HME P2	2005	15	16	17	18	19
S 287	Ford	2008	12	13	14	15	16
E 93	HME P2	2005	20	8	9	10	11
E 96	Spartan	2009	11	12	13	R	1
E 295	Spartan	2005	15	16	17	18	19
E 85	Spartan	2013	7	8	9	10	11
E 94	Spartan	2009	11	12	13	R	1
E 288	HME P2	2005	15	16	17	10	11
S 87	Dodge	2016	4	5	6	7	8
E 296*	HME P2	2005	15	16	17	14	15
L 87	Spartan	2019	1	2	3	4	5
E 95	Spartan	2013	7	8	9	10	11
E 90	HME P2	2007	R	1	2	3	4
	Avg.	**Age**	**11.08**	**11.24**	**12.24**	**10.12**	**10.68**

*** Indicates apparatus has been fully refurbished thus extending useful life of vehicle.**

Chart 8:

Fire Engine Fleet Summary for Year 2020

Apparatus	Year	2020	
E 73	2005	15	
E 72	2009	11	
E 94	2009	11	
E 85	2013	7	
E 93	2005	15	
L 87	2019	1	
E 83	2013	7	
E 96	2009	11	
E 86	2009	11	
E 89	2013	7	
E 84	2019	1	
E 90	2006	13	
S 87	2016	4	
E 82	2013	7	Career Staffed Engines
E 95	2013	7	8.53 years average age
E 288	2005	15	
L 287	2006	14	
S 287	2008	12	
E 296*	2005	15	
E 295	2005	15	
E 87	2005	15	Relief Fire Engines
E 294	2005	15	14.42 years average age
E 71	1999	21	
E 75	2002	18	PCF Staffed Fire Engine
E 77*	2000	20	19.66 years average age

*** Indicates apparatus has been fully refurbished thus extending useful life of vehicle.**

Chart 9:

Fire Engine Fleet Summary Projections for Year 2025

Apparatus	Year	2025	
E 72	2009	15	
E 94	2008	1	
E 85	2013	11	
E 93	2013	11	
L 87	2019	5	
E 83	2025	0	
E 96	2024	1	
E 86	2009	15	
E 89	2022	3	
E 84	2019	5	
S 87	2016	8	
E 90	2021	4	
E 82	2024	1	
E 73	2024	1	Career Staffed Fleet
E 95	2013	7	6.13 years average age
E 295*	2005	20	
E 288	2013	12	
E 87	2009	15	
E 296*	2009	15	
S 287	2008	17	
E 294*	2005	20	Relief Fleet
L 287	2007	18	16.71 years average age
E 75*	2002	22	
E 71*	2005	19	PCF Staffed Fleet
E 77*	2000	24	21.66 years average age

*** Indicates apparatus has been fully refurbished thus extending useful life of vehicle.**

XII. SUMMARY

Fire apparatus are the lifeblood of the service provided by the District. Almost every 911 call requires a fire apparatus to respond with efficiency and purpose. In 2001, the District's entire fleet was in dire need of replacement and an informal plan was developed to begin the long task toward fleet improvement. That plan began with the daunting task of attempting to update a total apparatus fleet that had an average age of 18-years with several front-line engines over 25-years-old. The plan began with the premise of buying one engine and one command/staff vehicle per year in an attempt to just stabilize the front-line fleet age and condition. In 2005, the District realized that its replacement needs were outpacing its purchase plans and the decision was made to lease purchase five new engines in order to gain momentum in its efforts to stabilize the age and condition of the front line fleet.

By 2007, the District had been able to purchase a few more engines which helped reduce the average age of the total fleet to just under 11-years-old. District staff was directed to develop a mobile equipment replacement plan that established replacement goals and standards for our various fleet vehicles in an effort to maintain the gains made in the prior years while beginning

to address the age and condition of the reserve and volunteer fleets. In addition, this plan addressed adding and replacing specialized equipment to meet the District's growing operational demands. This plan focused heavily on implementing a rotational practice and analyzing the best strategic practices to further gain efficiency within the fleet while maintaining the same historical financial outlay. The District refined its practice of making multiple apparatus lease purchases when it made financial sense and making singular cash purchases when fiscal conditions warranted in order to reach the goals of the 2007 plan.

Shortly after the 2007 plan was adopted, the fiscal climate began to decline sharply as the country slipped into the "Great Recession." While most government agencies were forced to cancel most if not all of their capital improvement spending, the District was able to continue to replace its vehicles, albeit at a more conservative pace than what the 2007 plan had called for, due to its strategic purchasing practices. By financing only when the fiscal climate made sense, and by limiting its financing to one obligation at a time rather than lease purchasing every apparatus, the District kept its annual financial obligations low while still improving the fleet conditions during very difficult fiscal times. By 2011, District leadership realized as a result of the state of the economy, that having a 10-year mobile equipment replacement plan was difficult to maintain in its latter years as it couldn't accurately predict and adjust to severe fluctuations in the economy. Therefore, the decision was made to update and streamline the plan into a more refined and accurate 5-year plan to further enhance the District's strategic decision-making advantage.

The 2013 Mobile Equipment Replacement Plan provided for a realistic and obtainable apparatus fleet to meet the service demands as outlined in the Fresno County Fire Protection District 2007 Master Plan. Specifically, the plan addressed the need to have modern equipment, to purchase specialized apparatus, and maintains a rotational practice that improved the operational effectiveness of the fleet while improving overall efficiency. The plan built on the improvements realized from the 2001 and the 2007 mobile equipment plans and went further to stabilize the age of the front-line career staffed fleet and reduce the age of the reserve and volunteer staffed engines by nearly 1/3 combined. Moreover, by 2018, after nearly 20 years of effort and dedication, the District finally realized a total fleet age that was within industry and local standards as established by the previous plans and continues today.

This 2020 plan also continues the conservative strategic practice of financing apparatus purchases only when it is fiscally prudent and making cash purchases when it is most advantageous based on the overall state of the economy. It maintains the robust rotational practice and extends the refurbishment strategy into front-line apparatus. This plan identifies turbulence within the fire truck manufacturing industry and provides original strategies to stabilize economic factors that would otherwise erode historic fleet gains. In addition, this plan

charts a future path to improve operational gains within financial limits that are realistic and sustainable.

XIII. CONCLUSION

This plan is intended to be a "living" document that will need to be reviewed and amended with regularity to best meet the ever-changing operational needs of the Fire District. The District has worked hard and invested greatly to realize the goals that will be achieved by the end of the 2020-2025 Mobile Equipment Replacement Plan. The next generation mobile equipment replacement plan will need to provide for a modern fleet, to maintain the total age and vitality of the fleet within the standards achieved by this plan and the previous plans. This plan as presented in October 2020, should serve to memorialize our previous actions and to quantify our current decisions while continuing to be the road map for the future apparatus needs of the Fresno County Fire Protection District.

Special thanks to the following team members for their contribution in researching, developing, and preparing the District's 2020-2025 Mobile Equipment Replacement Plan:

1. *Office Technician Jessica McAvoy*
2. *Staff Services Analyst Jessica Madrigal*
3. *Battalion Chief Jeremiah Wittwer*
4. *Fleet Manager Billy Greenwood*